

CMMCP AERIAL LARVAL MOSQUITO CONTROL PROGRAM



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Central Mass. Mosquito Control Project

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ABSTRACT

Most mosquito species spend much of their life cycle in the larval stage when they are concentrated and highly susceptible to control efforts. The larvae are defined within water boundaries and relatively immobile with little ability to significantly disperse. Larviciding is a broad term for killing immature mosquitoes by applying agents called larvicides, while taking advantage of their confinement in their larval habitat. Effective larviciding can reduce the number of adult mosquitoes available to disperse, potentially spread disease, create a nuisance, and lay eggs which leads to more mosquitoes. In 2018, the Central Massachusetts Mosquito Control Project conducted an aerial larvicide in Billerica, Boxborough, and Chelmsford, using *Bacillus thuringiensis israelensis* (Bti), which resulted in 83.67% reduction in mosquito larvae at monitored areas.

OBJECTIVE

The melting of the heavy snows coupled with the early spring rains that were seen in Central Massachusetts have created wetlands and woodland pools with high water levels. These areas of water create ideal areas for mosquitoes to lay eggs and also supplies the eggs which were laid in previous years the water they need to hatch. In an effort to eliminate some of the mammal-biting adult mosquitoes, the Central Massachusetts Mosquito Control Project performs aerial applications of the larvicide *Bacillus thuringiensis israelensis* in the towns of Billerica, Boxborough and Chelmsford. This year the aerial treatment was conducted on April 18th, 19th and 20th. The larvicide

was applied to wetland areas that amounted to approximately 2,040 acres. *Ochlerotatus abserratus*, *Ochlerotatus canadensis* and *Ochlerotatus excrucians* emerge late in the spring and early summer. By reducing the population size of these three mammal-biting mosquitoes, the necessity for adulticide spraying later in the season is lessened to remove the potential disease vectors from our environment.

MATERIALS AND METHODS

As a means to determine if the aerial larvicide program was effective, the Commonwealth of Massachusetts employs the Generic Environmental Impact Report (GEIR). Recoverable Dip Stations (RDS) are established with

one RDS set for every 250 acres to be treated. One untreated RDS is set for each town to be used as a control site. Each RDS has ten flagged dip sites. Each of the dip sites are sampled for larvae, the juvenile form of the mosquito, prior to the treatment. Post-treatment surveys were done to make comparisons. Larval density changes among these observations form the basis for determining the level of control for the aerial larvicide program. Sampled larvae are always returned to ensure that the treatment and control observations are not artificially impacted. CMMCP personnel identified the areas where the aerial drops would have the greatest impact. In addition, per 333CMR 13.04 (7)(a) a legal notification of the aerial larvicide was placed in The Boston Globe on February 7, 2018, and was posted on the CMMCP website (http://www.cmmcp.org/2018_aerial_legal_ad.pdf).

CMMCP uses the organic larvicide AquaBac 200G® (EPA Reg. No. 62637-3). AquaBac 200G®, containing the bacterium *Bacillus thuringiensis israelensis* (Bti). Bti is a biological or a naturally occurring bacterium found in soils. It contains spores that produce toxins that specifically target and only affect the larvae of the mosquito. The mosquitoes ingest the toxins which breakdown the cells of the digestive system. This leads to the demise of the mosquito. Bti has no toxicity to people, so it can be applied safely

to mosquito habitat without a detrimental impact on food crops or water supplies. (<https://www.epa.gov/mosquitocontrol/bti-mosquito-control>).

The dates of the aerial treatment were April 18th for the member towns of Billerica and Chelmsford, with Warren Farm in Chelmsford, MA. being used as the loading area. Because of weather conditions the treatment of Boxborough was started on April 19th and completed on April 20th. Minute Man Airfield in Stow, MA. was used as the staging area. The dates were chosen to coincide when the larvae are most vulnerable and thus make the greatest impact on this population of mosquitoes. It is also done now to deliver the biopesticide to the targets before the tree canopy has developed which could impact efficacy.

North Fork Helicopter (Cutchogue, New York) was contracted to apply the larvicide to 840 acres in Boxborough, 600 acres in Billerica and 600 acres in Chelmsford for a total of 2,040 acres. The rate at which the larvicide was applied was five pounds per acre per label instructions. For this application, organically certified AquaBac G® was used.

Following the application of AquaBac 200G®, the CMMCP crews return to the flagged sites after 24 and 48 hours. The density of larvae are recorded and compared to the pre-treatment

collection numbers and used to determine the effectiveness of the aerial larvicide program. During the post-treatment larvicide surveys, the presence or absence of AquaBac G® is noted by the CMMCP field crews.

RESULTS

The average reduction in mosquito larvae amongst the towns of Boxborough, Billerica and

Chelmsford following the 2018 spring larvicide application was 83.67%. Individually, the Billerica RDS exhibited an average reduction of 75.96% while an average reduction of 84.79% in Chelmsford and 90.25% in Boxborough. This is in comparison to the untreated (control) in the three communities which saw only a decrease of 33.33% from the beginning of the program (Table 1; Figures 1-3).

Table 1: Larval Surveillance of Treatment and Control RDS

Treatment Sites	Pre-application	Post-application	Observed Change
BIL116	84	13	-84.52%
BIL112	81	8	-90.12%
BIL408	77	36	-53.25%
BOX44	27	0	-100.00%
BOX116	33	8	-75.76%
BOX77	37	2	-94.59%
BOX55	30	1	-96.67%
CHM82	25	4	-84.00%
CHM279	27	2	-92.59%
CHM236	36	8	-77.78%
Overall:	457	82	-82.06%
Control Sites	Pre-application	Post-application	Observed Change
BIL227	62	16	-74.19%
BOX103	30	26	-13.33%
CHM146	55	56	1.82%
Overall:	147	98	-33.33%

Figure 1: Billerica Treatment RDS Pre and Post Application

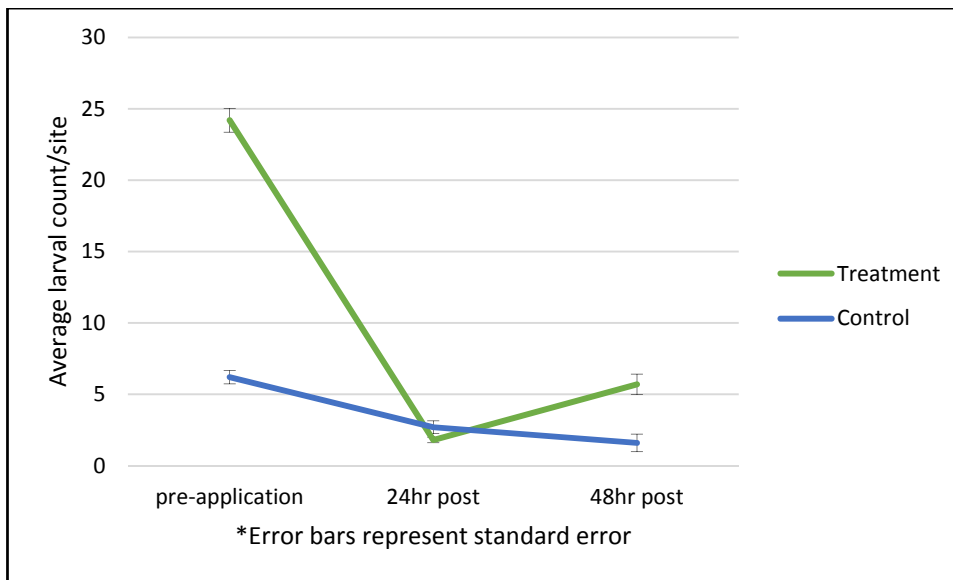


Figure 2: Chelmsford treatment RDS Pre and Post Application

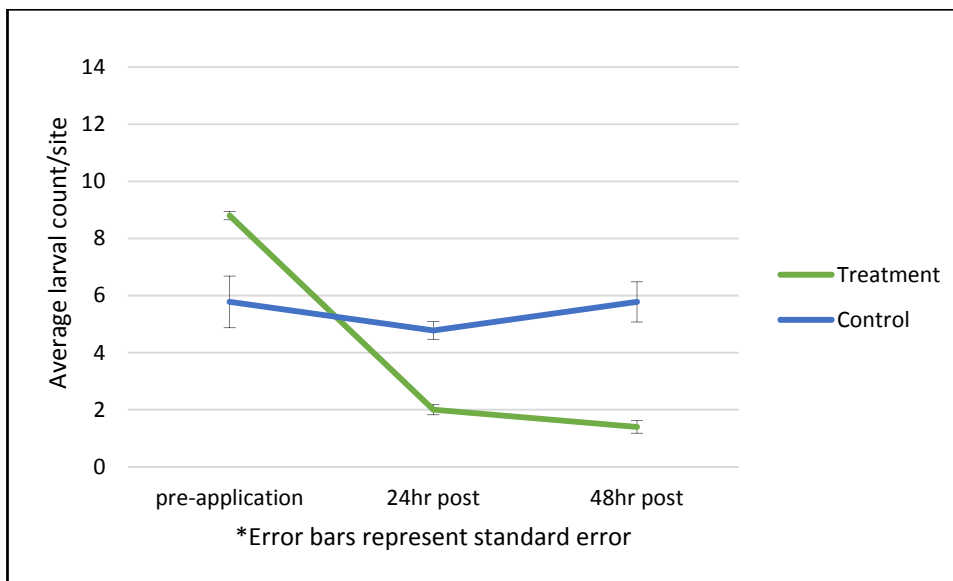
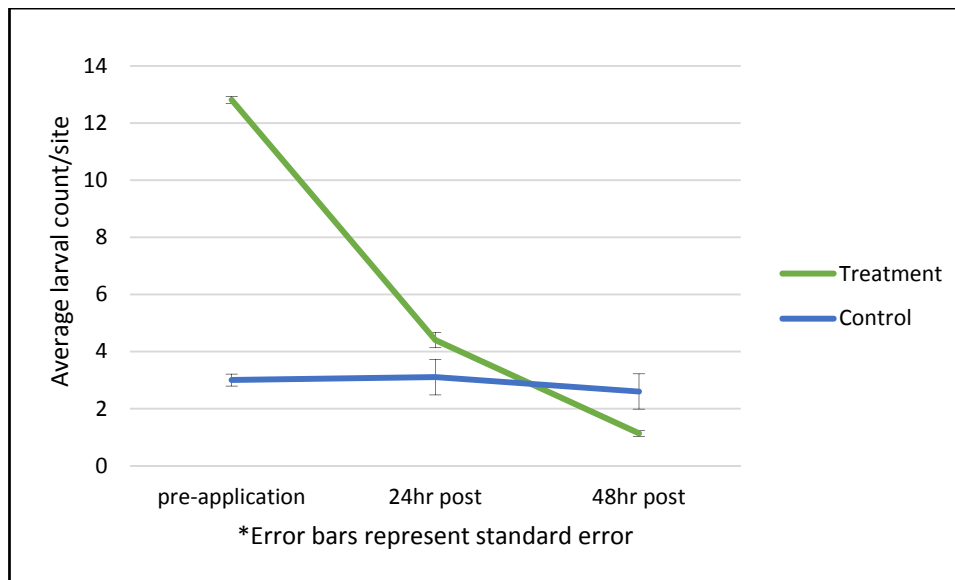


Figure 3: Boxborough Treatment RDS Pre and Post Application



DISCUSSION

Control of mosquito larvae is a key component in the reduction of the adult population. Targeting the developmental stages of the vector by aerial release of AquaBac 200G® allows CMMCP to reach sizeable wetland areas in Boxborough, Billerica and Chelmsford that would otherwise be too large to treat by ground crews. In 2018, the larvicide application took place April 18th, 19th and 20th. Larval surveys conducted prior to the treatment and twice following the treatment showed an overall average reduction of 83.67%. CMMCP considers this treatment a success. Although we are pleased with the results, one site in Billerica had a large number of larvae on the 48 hour recheck. We feel this may have skewed the statistical outcome of our result. The larvae on that recheck were early stage and could have been a

new emergence as a result of precipitation on April 19th.

The removal of the early brood *Ochlerotatus excrucians*, *Ochlerotatus abseratus* and *Ochlerotatus canadensis* mosquitoes from the environment, the residents of Billerica, Boxborough and Chelmsford will find less of these biting pests. Because of this success the need for adulticide spraying should be reduced early in the season. CMMCP will incorporate this years' experience into future aerial programs. This includes the potential expansion of the program into additional CMMCP member communities.

ACKNOWLEDGMENTS

The authors would like to acknowledge the participation of Billerica, Boxborough and Chelmsford in this supplemental program; North Fork Helicopters for providing the helicopter service; Warren

Farm, Chelmsford and MinuteMan Airfield, Stow for providing loading zones; the CMMCP Commission, and the CMMCP staff for larval monitoring, site selection, map development and assisting the helicopter application.

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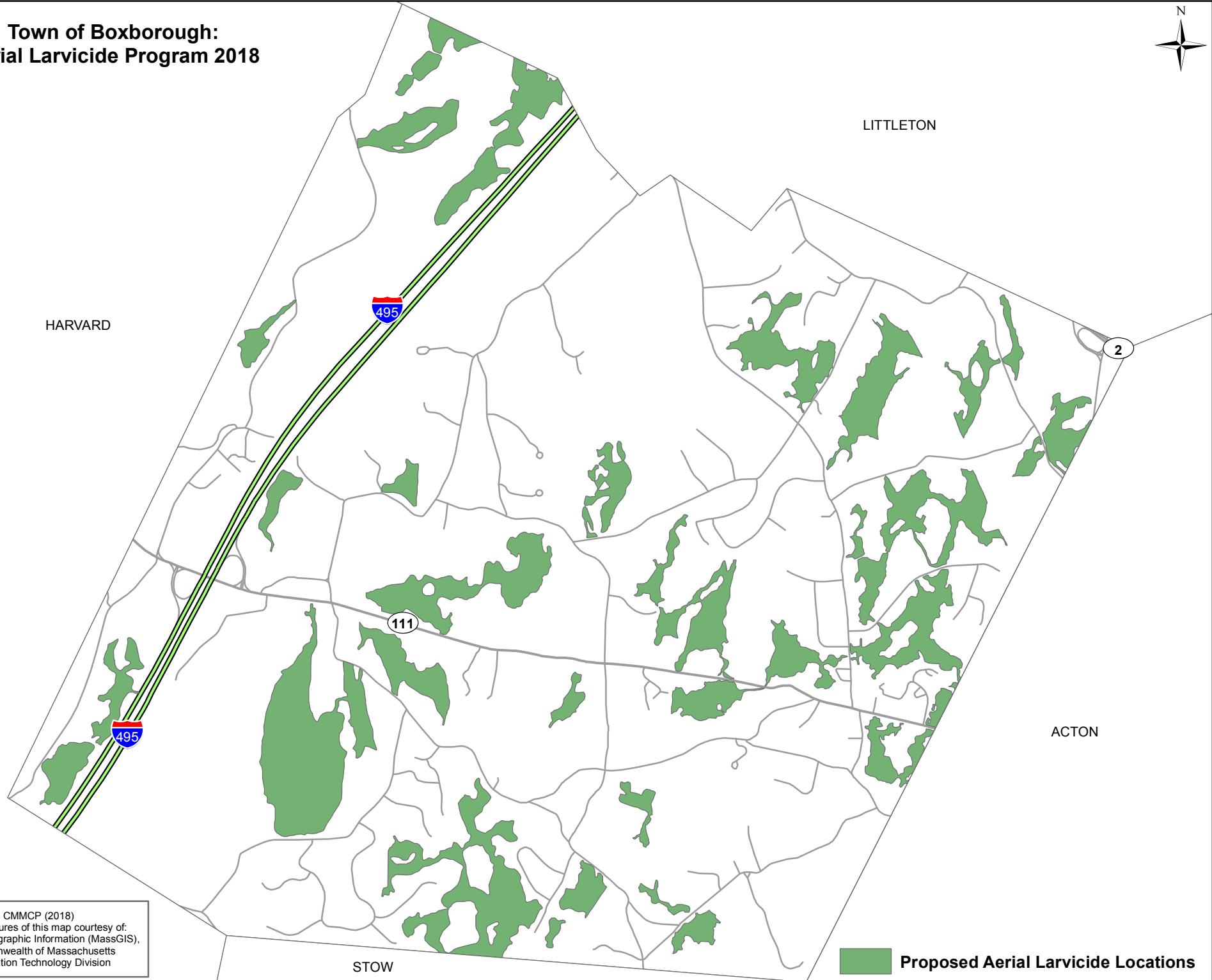
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LEGAL NOTICES

Legal Notice - Aerial Application to Control Mosquito Larvae

Per 333CMR 13.04(7)(a), the Central Mass. Mosquito Control Project (CMMCP) and North Fork Helicopters will be conducting helicopter applications of the biological larvicide Bti to control mosquito larvae over selected large wetlands in the CMMCP service area. The applications will be conducted during the daylight hours from March 1 to October 31, 2018 as conditions warrant. The trade name of the product to be used is Aquabac 200G EPA Reg. #62637-3. For additional information please contact Tim Deschamps at (508) 393-3055.

Town of Boxborough: Aerial Larvicide Program 2018

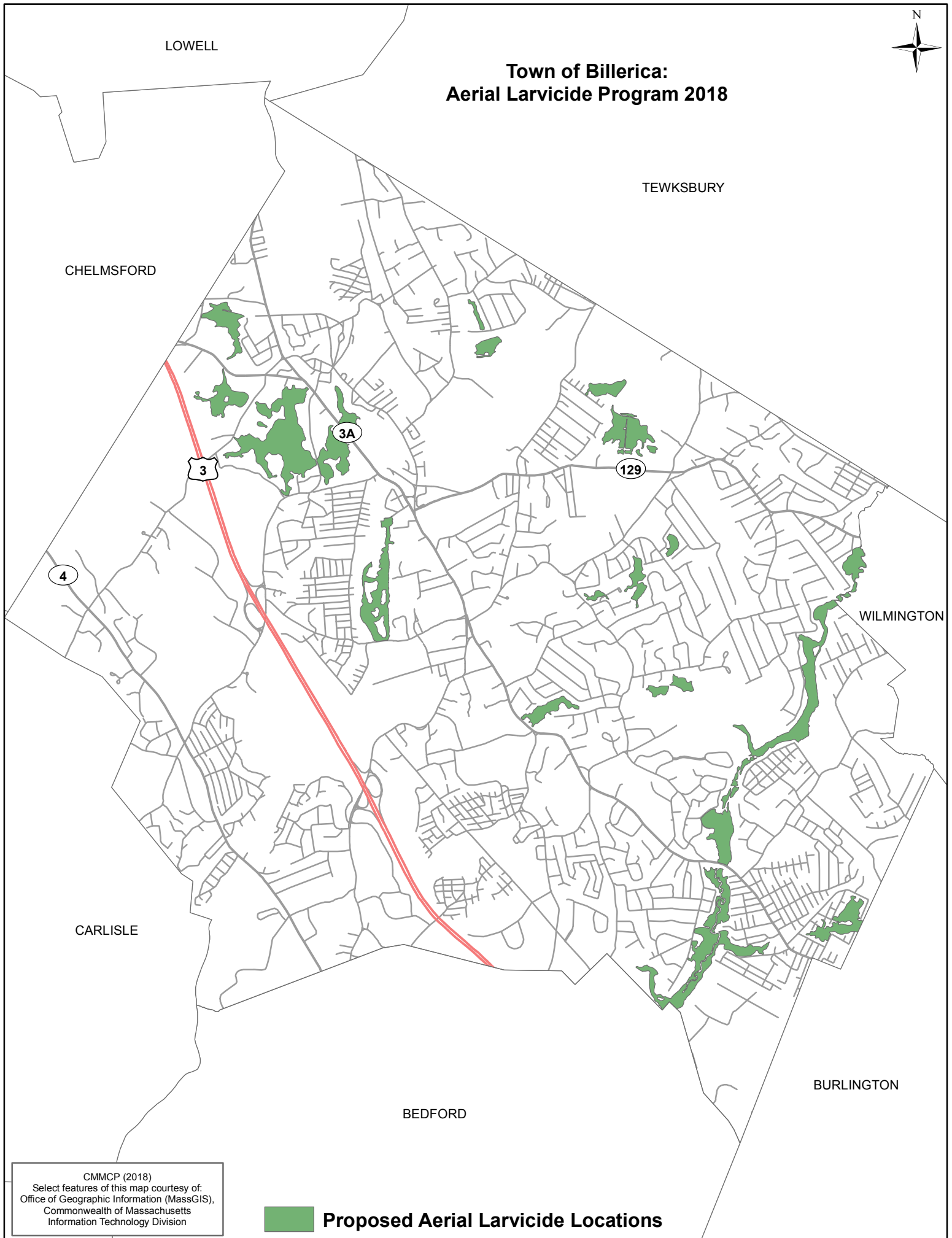


CMMCP (2018)
Select features of this map courtesy of:
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Commonwealth of Massachusetts
Information Technology Division

 **Proposed Aerial Larvicide Locations**



Town of Billerica: Aerial Larvicide Program 2018



CMMCP (2018)
Select features of this map courtesy of:
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Commonwealth of Massachusetts
Information Technology Division

 **Proposed Aerial Larvicide Locations**



TYNGSBOROUGH

DRACUT

Town of Chelmsford: Aerial Larvicide Program 2018

LOWELL

WESTFORD

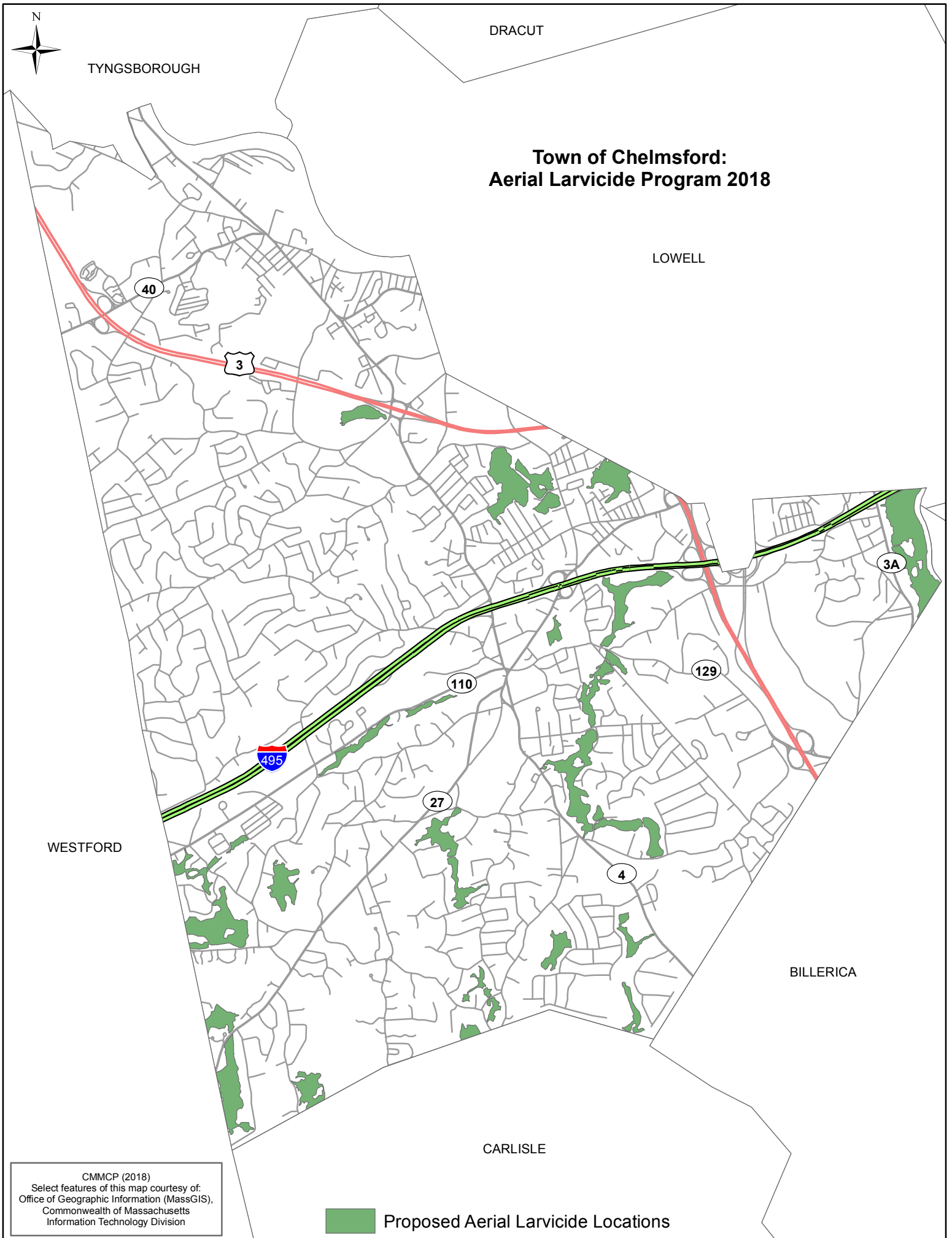
BILLERICA

CARLISLE

CMMCP (2018)
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Commonwealth of Massachusetts
Information Technology Division



Proposed Aerial Larvicide Locations





OMRI Listed®

The following product is OMRI Listed. It may be used in certified organic production or food processing and handling according to the USDA National Organic Program Rule.

Product

Aquabac (200G) Mosquito Biolarvicide Granule

Company

Becker Microbial Products Inc.

Terry L. Couch

11146 NW 69th Place

Parkland FL 33076-3846 USA

Status

Allowed with Restrictions

Category

NOP: Microbial Products

Issue date

06-Jan-2016

Product number

bmb-6012

Class

Crop Pest, Weed, and Disease Control

Expiration date

01-Mar-2019

Restrictions

May be used as a pest lure, repellent, or as part of a trap, or as a disease control. May only be used for other pesticidal purposes if the requirements of 205.206 [e] are met, which requires the use of preventative, mechanical, physical, and other pest, weed, and disease management practices.

Executive Director

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