CMMCP AERIAL MOSQUITO LARVAL CONTROL PROGRAM

SPRING 2021

DAVID MULLINS & TIMOTHY D. DESCHAMPS

Central Mass. Mosquito Control Project

111 Otis Street Northborough, MA 01532

(508) 393-3055 • www.cmmcp.org

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ABSTRACT

Central Massachusetts Mosquito Control Project carried out an aerial larvicide application of *Bacillus thuringiensis israelensis* in the towns of Billerica, Boxborough and Chelmsford. The larvicide was dispersed over an area of one thousand, nine hundred and forty (1,940) acres of wetland. The selected areas are either too large or inaccessible to treat by ground methods. Post-treatment inspections showed a 76.43% overall reduction of spring mosquito larvae.

OBJECTIVE

Most mosquito species spend much of their life cycle in the larval stage when they are highly susceptible to lethal control efforts. The larvae are often concentrated within defined water boundaries and immobile with little ability to disperse. Whereas adult mosquitoes fly in search of mates, blood meals, or water sources for egg laying and are often inaccessible, not concentrated, and widely distributed. Larviciding is a broad term for killing immature mosquitoes by applying agents called larvicides, while taking advantage of their confined larval habitat. An effective larvicide program can reduce the number of adult mosquitoes available to disperse, potentially spread disease, create a nuisance, and lay eggs which leads to more mosquitoes. The primary objective for the CMMCP aerial mosquito larval control program is to reduce the emergence of bothersome, biting mosquitoes. The species of mosquitoes which are the focus of attention for this aerial spraying are *Ochlerotatus excrucians* and *Ochlerotatus abserratus*, both mammal-biting mosquitoes. We also focus on early season *Ochlerotatus canadensis* which is known to be a vector for West Nile virus and Eastern Equine Encephalitis (Andreadis 2005). By reducing the population size of these mosquito species, the necessity for adulticide spraying later in the season is lessened to remove the potential disease vectors from our environment.

MATERIALS AND METHODS

In order to assess the effectiveness of the aerial larvicide spraying, 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[1] of the aerial larvicide was placed in The Boston Globe on February 22, 2021, and was posted on the CMMCP website (https://www.cmmcp.org/sites/g/files/vyhlif2966/f/uploads/2021_aerial_legal_ad.pdf).

CMMCP uses the organically-certified[2] larvicide Aquabac 200G® (EPA Reg. No. 62637-3). Aquabac 200G® contains 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 (Environmental Protection Agency 2016).

The Boxborough portion of the aerial application took two days to complete, starting on April 23rd from the Minute Man Airfield in Stow, MA. The Billerica treatments also took two days to complete, beginning on April 24th. The Billerica and Chelmsford portions of the aerial larvicide was staged at Warren Farm (Chelmsford, MA). The entirety of the Chelmsford application took place on April 25th. The dates were chosen to coincide when the larvae are in the 2nd and 3rd instar of development. It is also done now to deliver the chemical to the targets before the leaves and canopy has fully developed.

North Fork Helicopter (Cutchogue, New York) was contracted to apply the larvicide to 775 acres in Boxborough, 665 acres in Billerica and 500 acres in Chelmsford for a total of 1,940 acres[3]. The rate at which the larvicide was applied is the lowest label rate of five pounds per acre. CMMCP has found this rate has provided excellent control.

Following the application CMMCP crews return to the flagged sites after 24 and 48 hours. The density of larvae is 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 Bti is noted by the field crews.

RESULTS

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

[1] See legal ad in Appendix A

[1] See OMRI certification in Appendix B

[3] Application maps are at the end of this document

following the 2021 spring larvicide application was 76.43%. Individually, the Billerica RDS exhibited an average reduction of 74.77% while an average reduction of 76.85% and 81.38% in Chelmsford and Boxborough respectively. This is in comparison to the untreated (control) in the three communities which saw an average increase of 27.03% 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	37	6	-83.78%
BIL112	49	16	-67.35%
BIL408	41	11	-73.17%
BOX128	33	0	-100.00%
BOX74	40	0	-100.00%
BOX77	43	21	-51.16%
BOX55	51	13	-74.51%
CHM82	32	4	-87.50%
CHM279	32	4	-87.50%
CHM236	45	20	-55.56%
Overall:	403	95	**-76.43%**
Control Sites	**Pre-application**	**Post-application**	**Observed Change**
BIL70	26	37	42.31%
BOX32	45	58	28.89%
CHM146	40	46	15.00%
Overall:	111	141	**27.03%**

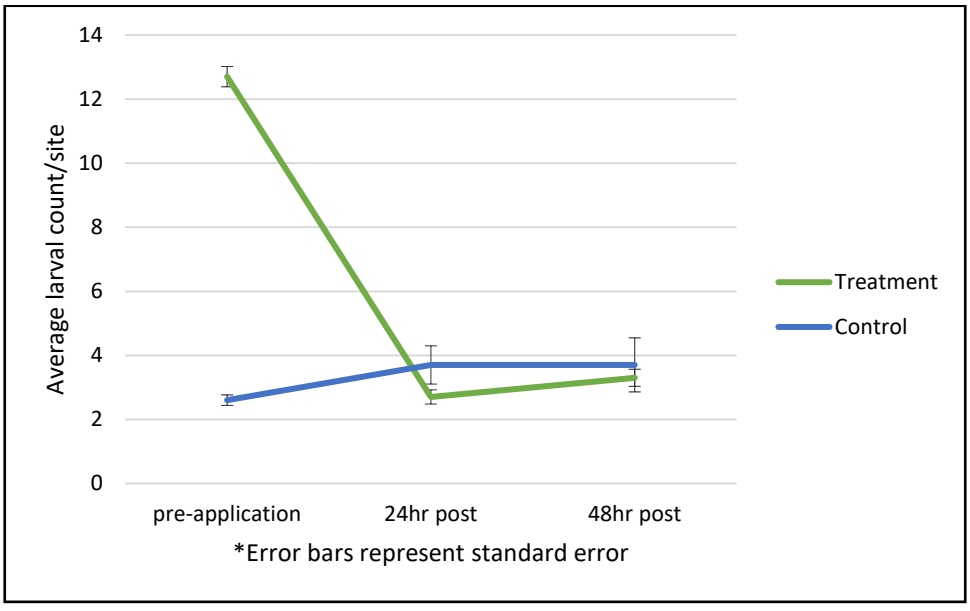


Figure 2: Chelmsford treatment RDS Pre and Post Application

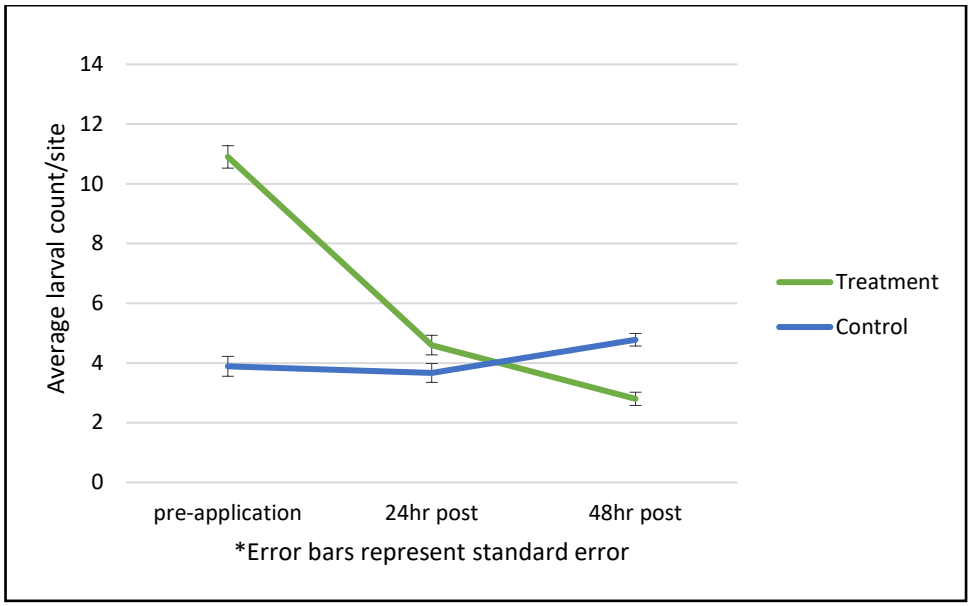
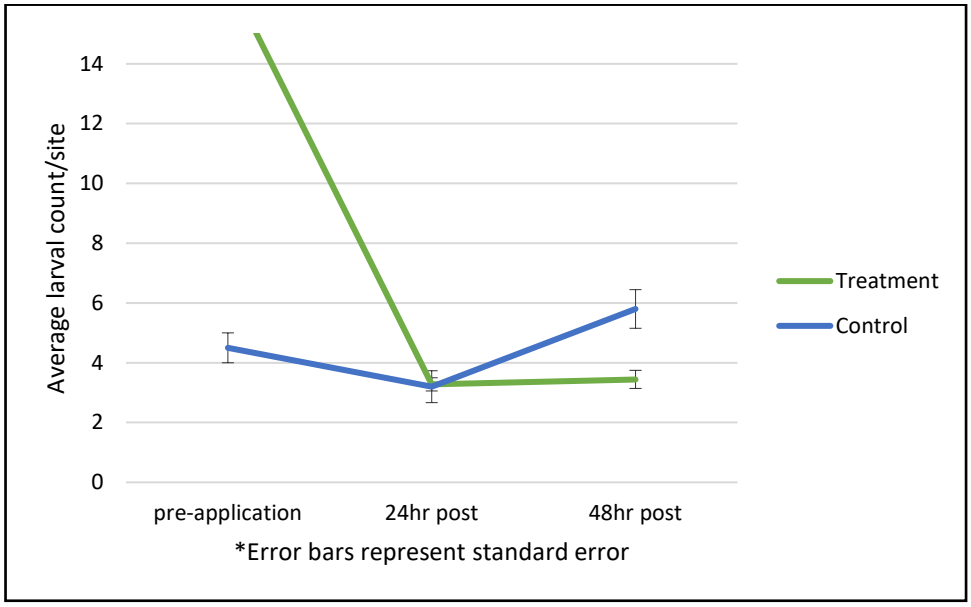


Figure 3: Boxborough Treatment RDS Pre and Post Application



DISCUSSION

As part of the plan to control adult mosquitoes, the juvenile larval form of the pest is targeted to reduce the size of the populations. Aerial release of the larvicide Aquabac 200G® allows CMMCP to reach sizeable wetland areas in Boxborough, Billerica and Chelmsford that would otherwise be too large or inaccessible, and therefore left inundated by mosquitoes. In 2021, the larvicide application took place April 23rd, 24th and 25th. Larval surveys conducted prior to the treatment and twice following the treatment showed an average reduction of 76.43%. CMMCP considers this treatment a success.

The removal of the early brood *Ochlerotatus excrucians*, *Ochlerotatus abserratus* and *Ochlerotatus canadensis* mosquitoes from the environment, the residents of Billerica, Boxborough and Chelmsford will find less of the bothersome, biting pests. Because of this success the need for adulticide spraying will 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 Minute Man 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.

REFERENCES

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APPENDIX A

The Boston Globe

Classified Legal Notice

Central Mass Mosquito Control
111 OTIS ST
NORTHBOROUGH, MA 01532

Thank you for placing your Legal Notice in The Boston Globe.

Your order information and a preview of your notice are displayed below for your review. If there are any changes or questions, please contact the Classified Department at 617-929-1314 or email legals@globe.com.

Thank you,
Boston Globe Classified Sales

ORDER INFORMATION: **Order Number:** **479913**

Title:	Boston Globe	First date:	2/22/2021
Classification	1505 Legal - Public Notice	Last date:	2/22/2021
		Number of Days:	1

NOTICE PREVIEW:

Legal Notice - Aerial Application to Control Mosquito Larvae

Per 333CMR 13.04(7)(a), the Central Mass. Mosquito Control Project (CMMCP), North Fork Helicopters and/or other contractors will be conducting aerial applications to control mosquito larvae over selected large wetlands in Worcester and Middlesex counties. The applications will be conducted during the daylight hours from March 1 to October 31, 2021 as conditions warrant. The trade name(s) of the product(s) to be used are Aquabac 200G EPA Reg. #62637-3; Vectobac G EPA Reg. #73049-10; FourStar Bti CRG, EPA Reg. #85685-4; Natular G EPA Reg. #8329-80; Natular G30 EPA Reg. #8329-83. For additional information please contact Tim Deschamps at (508) 393-3055.

APPENDIX B

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 regulations.

Product

Aquabac (200G) Mosquito Biolarvicide Granule

Company

Becker Microbial Products Inc.
Dr. Terry L. Couch
11146 NW 69th Place
Parkland FL 33076-3846 USA

Status	Category	Issue date
Allowed with Restrictions	NOP: Microbial Products	6-Jan-2016

Product number	Class	Expiration date
bmb-6012	Crop Pest, Weed, and Disease Control	1-Mar-2022

Restrictions

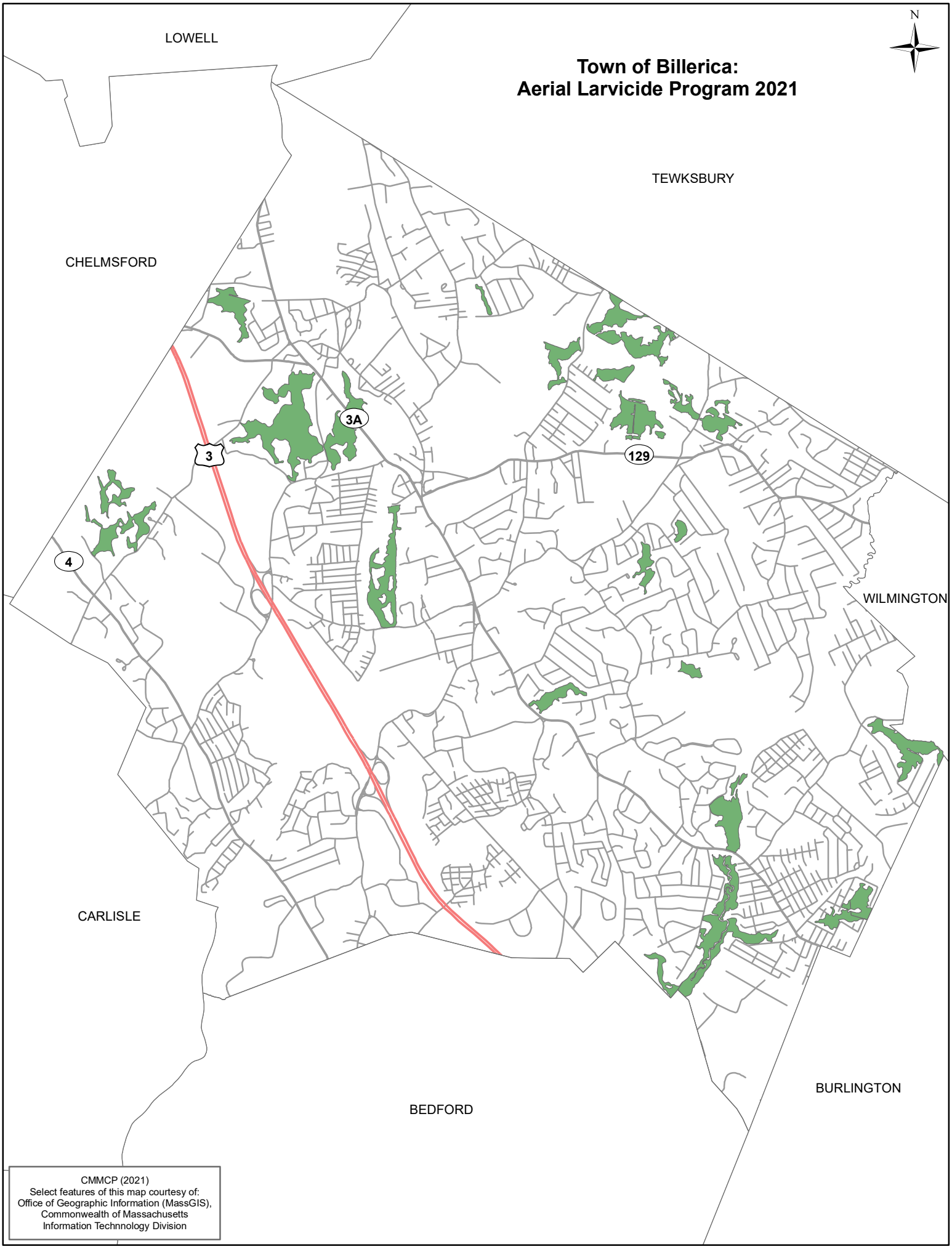
For use as a pest lure, repellent, or as part of a trap, or as a disease control.
May be used for other pesticidal purposes if the requirements of 205.206(e) are met, which requires the use of preventive, mechanical, physical, and other pest, weed, and disease management practices.

Peggy Miars
Executive Director/CEO

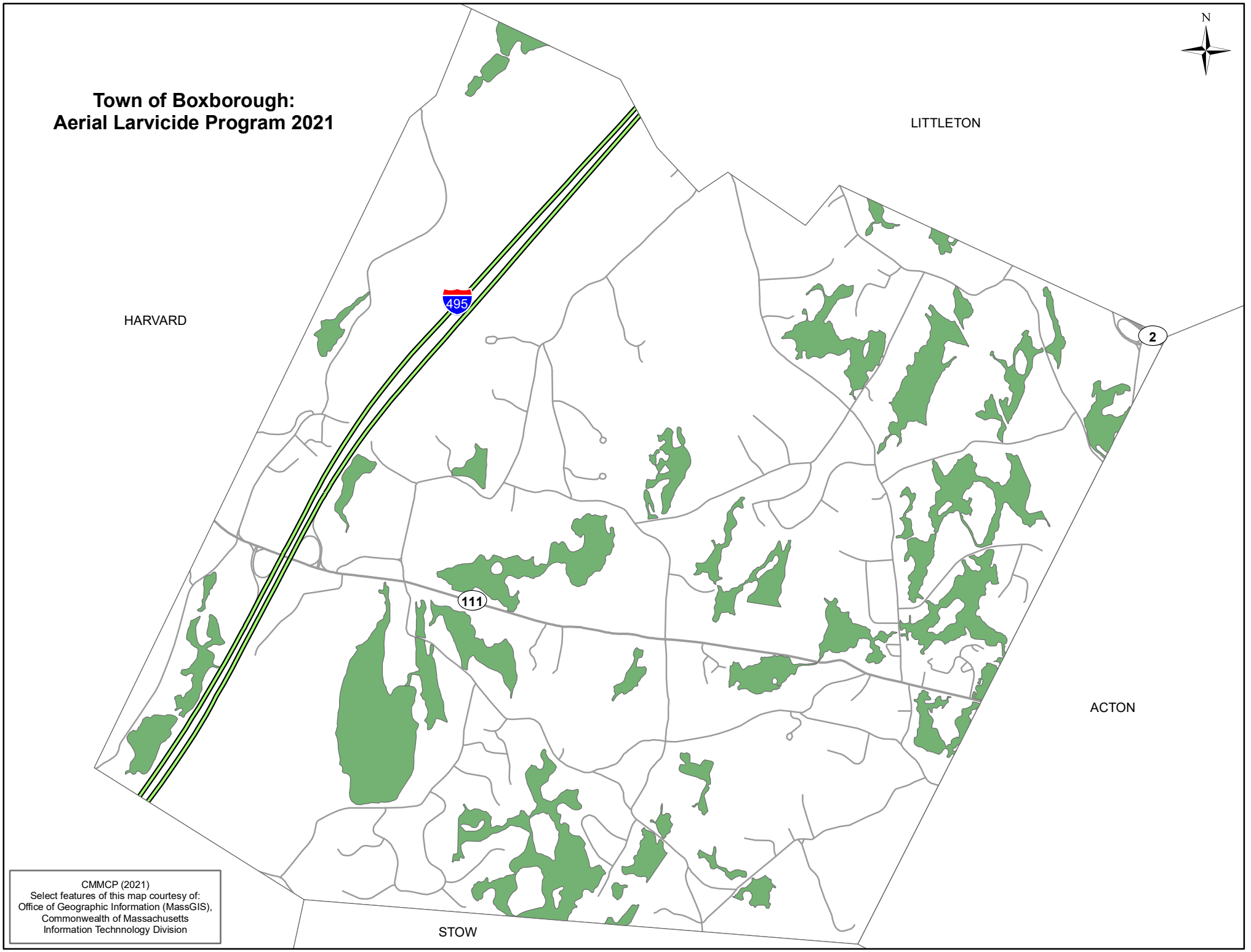
Product review is conducted according to the policies in the current *OMRI Policy Manual*© and based on the standards in the current *OMRI Standards Manual*©. To verify the current status of this or any OMRI Listed product, view the most current version of the *OMRI Products List*© at OMRI.org. OMRI listing is not equivalent to organic certification and is not a product endorsement. It cannot be construed as such. Final decisions on the acceptability of a product for use in a certified organic system are the responsibility of a USDA accredited certification agent. It is the operator's responsibility to properly use the product, including following any restrictions.

OMRI LISTED

Organic Materials Review Institute
P.O. Box 11558, Eugene, OR 97440-3758, USA
541.343.7600 · info@omri.org · OMRI.org


Town of Billerica:
Aerial Larvicide Program 2021
N
LOWELL
TEWKSBURY
CHELMSFORD
3A
3
129
4
WILMINGTON
CARLISLE
BEDFORD
BURLINGTON
CMMCP (2021)
Select features of this map courtesy of:
Office of Geographic Information (MassGIS),
Commonwealth of Massachusetts
Information Technnology Division

Town of Boxborough:
Aerial Larvicide Program 2021



CMMCP (2021)
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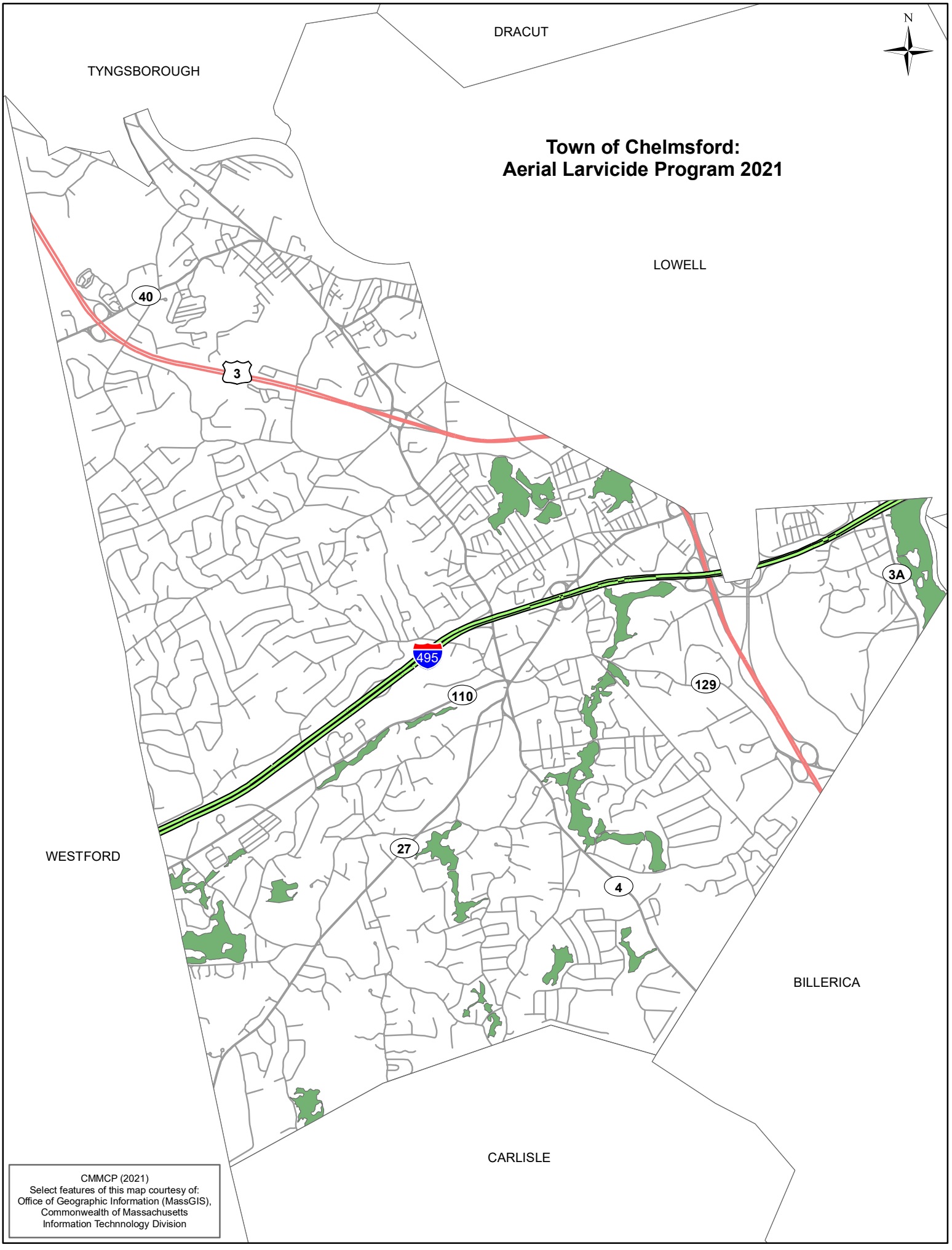
DRACUT
TYNGSBOROUGH
N
Town of Chelmsford:
Aerial Larvicide Program 2021
LOWELL
40
3
3A
495
110
129
27
4
WESTFORD
BILLERICA
CARLISLE
CMMCP (2021)
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