THE COMMONWEALTH OF MASSACHUSETTS
STATE RECLAMATION & MOSQUITO CONTROL BOARD

CENTRAL MASSACHUSETTS
MOSQUITO CONTROL PROJECT

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ANNUAL REPORT 2005

PREFACE

The 2005 Annual Report of the Central Massachusetts Mosquito Control Project (the Project) has been prepared to provide the citizens and officials of the member cities and towns with information pertaining to the Project's control procedures and related activities.

As you read through this report you will notice that the Project is committed to an Integrated Mosquito Management (IMM) program. IMM utilizes a variety of control techniques and evaluation procedures. All control efforts are undertaken only after surveillance data has been collected and analyzed. This allows control decisions to be made based on the exact need that exists at each specific site. Environmental considerations are paramount when prescribing various control techniques.

The CMMCP Board of Commission is appointed by the State Reclamation and Mosquito Control Board to represent your community's interest. The Commissioners meet with the Executive Director and Director of Operations 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 schedule an appointment to visit our Project headquarters.

Copies of this report are distributed to key officials and departments in our member communities, as well as to the public libraries. We would encourage officials to take time from their busy schedule to read this report. Project personnel are available to answer questions you may have, and to meet with you to discuss out procedures and techniques. The Project's website at **www.cmmcp.org** has extensive information on mosquito control in Central Massachusetts.

The Project's 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 competent, well-trained employees are known throughout the member communities as individuals who take great pride in their work.

Thank you,

Richard J. Day, Chair
Board of Commissioners
Central Massachusetts Mosquito Control Project

THE COMMONWEALTH OF MASSACHUSETTS

State Reclamation & Mosquito Control Board
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Boston, Massachusetts 02114

http://www.mass.gov/agr/mosquito/

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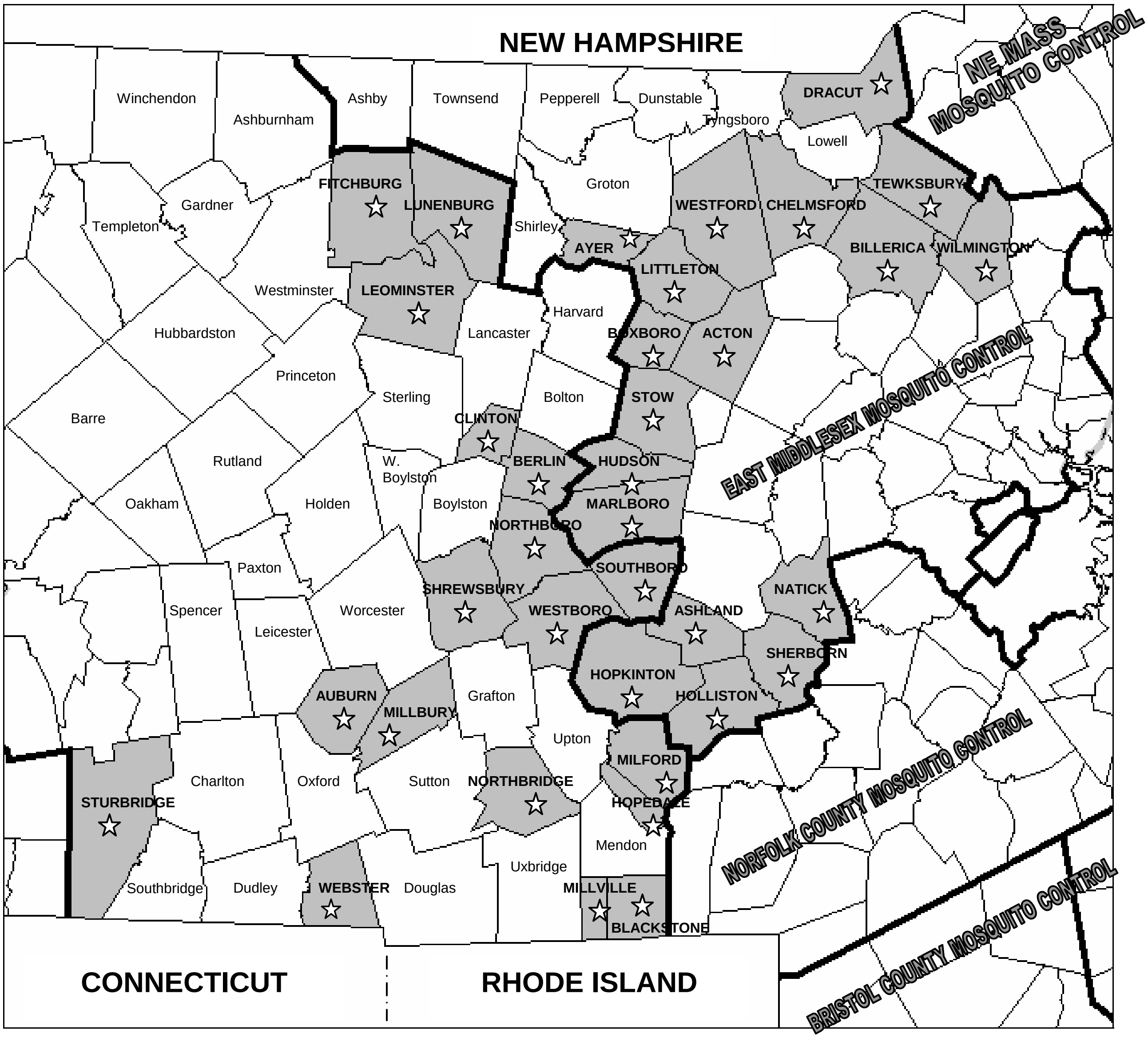
LIST OF MEMBER COMMUNITIES

TOWN	SQUARE MILES
DISTRICT ONE	
BILLERICA	25.96
CHELMSFORD	22.70
DRACUT	20.90
LITTLETON	16.60
TEWKSBURY	20.70
WESTFORD	30.60
WILMINGTON	17.12
DISTRICT TWO	
ACTON	20.00
AYER	9.00
BOXBOROUGH	10.40
FITCHBURG	27.80
LEOMINSTER	28.90
LUNENBURG	26.40
STOW	17.60
DISTRICT THREE	
BERLIN	12.90
CLINTON	5.70
HUDSON	11.50
MARLBOROUGH	21.10
NORTHBOROUGH	18.50
SHREWSBURY	20.70
SOUTHBOROUGH	14.10
DISTRICT FOUR	
ASHLAND	12.40
HOLLISTON	18.70
HOPEDALE	5.27
HOPKINTON	26.60
MILFORD	14.60
NATICK	15.10
SHERBORN	16.00
WESTBOROUGH	20.50
DISTRICT FIVE	
AUBURN	15.40
BLACKSTONE	10.90
MILLBURY	15.70
MILLVILLE	4.92
NORTHBRIDGE	17.20
STURBRIDGE	37.40
WEBSTER	12.50
Total Square Miles	642.37

CMMCP SERVICE AREA



~ 2005 ~

☆ = member towns

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MOSQUITO CONTROL ACTIVITIES

One basic fact of the mosquito's biology is the dependence on still, stagnant water to complete its life cycle from egg to adult. Currently, there are two basic control methods practiced by the Project to disrupt this process. The first and most permanent method is called "*water management, source reduction or wetlands restoration*". This method reduces or eliminates the source of a potential mosquito problem, and consists of cleaning road-side ditches and culverts, removal of brush and accumulated debris from streams, and removal of containers which contain water. All of the above mentioned methods serve to accomplish the same goal - they permit water to flow freely, and reduce the likelihood for stagnant areas, areas in which the mosquito needs to reproduce. Source reduction is practiced year-round, and is done only after extensive examinations, and permission is received by the property owner(s).

There are places where water management is neither practical nor feasible for one reason or another. In these situations, we practice a method called *larviciding*. After a field technician has determined that larval mosquitoes are present, a small amount of environmentally sensitive product is applied to the area according to label directions. This is often a very effective control method, reducing the emergence of the adult mosquito from that area. Larviciding is practiced from late-March to September. Bti is the product of choice for larviciding in wetlands.

A third method is to attempt to control the adult mosquito. The control of adult mosquitoes is done on a *request-only* basis, and the presence of adult mosquitoes is confirmed before any application is done. Adulticiding can be an effective method of *temporary* control, which can be beneficial prior to public gatherings, outdoor events and festivals, or when mosquito populations have been determined to be intolerable. Since this part of the program is done **only upon request**, this allows the individual resident to have the ultimate discretion on mosquito spraying in their area - how much or how little. Exemptions for spraying are handled through the City/Town Clerk and the Project office, and are updated each year. Adulticiding is done from approximately Memorial Day to Labor Day, depending on prevalent mosquito populations and the mosquito-borne disease situation.

All products used by the Project have been extensively tested by manufacturers, the US government and mosquito control agencies for many years. They are registered by the EPA and the Mass. Pesticide Bureau. Labels and fact sheets are available upon request to the public from the Project's office, or from our website.

We operate a full surveillance program in our service area. The landing rates performed by our field staff are brought back to the Project lab to be keyed out to species, allowing us to tailor our larviciding program and reduce future dependence on adulticides. We have a mobile team of specialized mosquito traps, called *gravid traps*, designed to capture virus-bearing mosquitoes. These mosquito collections, called *pools*, are sent into the Mass. Dept. of Public Health (MDPH) laboratory in Jamaica Plain for testing of West Nile Virus, Eastern Equine Encephalitis, and other arboviruses of concern by MDPH. These traps are used in a rotation throughout our service area, and are then concentrated in areas showing arboviral activity to supplement MDPH's collection protocols. Additional trap types are utilized in suspect areas to monitor and evaluate the risk of viral transmission to the local populace.

A comprehensive educational program is offered to area schools and civic groups. The program is aimed towards mosquito biology, mosquito habitat, and efforts citizens can undertake to reduce the potential for mosquito populations in their own neighborhood. This program is tailored to suit the requirements of the individual group, from elementary school children, to high school, to adult groups.

PROGRAM EVALUATION

This is a part of the program which many people involved directly never see. It must begin with a carefully planned program, one designed so that the data obtained during surveys before treatment and the surveys taken after treatment can be analyzed by statistically sound methods. Only by doing this can the value of a mosquito control program be determined. We will then know what type (species) of mosquito we are dealing with; what the population density is; what method(s) of control provide the most economical and efficient results.

Then and only then can we say that we have or have not affected mosquito control on a level that is acceptable to the community.

SEASONAL OUTLINE OF MOSQUITO CONTROL PROGRAM

1. Vehicle and equipment repair and storage - November through March
2. Wetlands Restoration - throughout the year
3. Program Preparation – December through March
4. Map compilation and training - throughout the year
5. Larviciding - May through September
6. Adulticiding - June through September
7. Catch Basin Treatment - May through September

Any mosquito control being done by individual member communities must, by law, be coordinated through the Central Massachusetts Mosquito Control Project.

SERVICES AND ACTIVITIES

The following services and activities are available to those communities participating in the Central Massachusetts Mosquito Control Project:

ADMINISTRATIVE

1. Assess the need for mosquito control within each of the member communities.

2. Plan and organize a mosquito control program for each member community based on the specific needs of that community.

3. Assist member communities to implement mosquito control programs so as to enable the residents of that community to receive maximum benefits from organized mosquito control.

4. Administer new and coordinate existing mosquito control programs.

5. Collect and maintain accurate records of mosquito populations, ascertain prevalent species, and collate pertinent data for each member community.

6. Cooperate with federal, state and local agencies concerned with vector control programs which may be implemented in the community.

7. Prepare annual reports of Project activities, mosquito population density profiles, recommendations, and any other data requested by the member communities.

8. Provide supervision to staff members and encourage policies which lend themselves to effective and efficient mosquito control.

PUBLIC EDUCATION

1. Inform the general public, as well as professional groups, of the mosquito control activities intended for each member community through news releases, speakers for community and professional organizations, special educational and training programs (including seminars for environmental interest groups), integration of proposed vector control programs with other organizations, agencies and institutions with similar goals.

2. Offer educational programs to the public school system within the member cities and towns. Programs will be aimed toward mosquito biology, mosquito habitat, and efforts which citizens can undertake to reduce mosquito populations in their neighborhoods.

3. Keep the member communities informed of changes and advancements in mosquito control technology and legislation.

MEDICAL ENTOMOLOGY LABORATORY REPORT 2005

The mission of the Medical Entomology Laboratory is to refine and maximize the CMMCP's ongoing effort to control mosquitoes. During 2005 CMMCP personnel carried forward this mission in the following ways:

- Medical Entomology Laboratory personnel made educational presentations about mosquito biology and mosquito control practices before elementary school students;
- CMMCP's larviciding and adulticiding practices were evaluated for efficacy;
- Mosquito species native to the CMMCP district were tested for resistance to an insecticide used to control adult mosquitoes;
- An evaluation comparing ground based traps to elevated traps in the tree canopy to maximize adult mosquito collections.

Our physical capabilities were improved during 2005 by the acquisition of seventeen (17) New Standard Miniature Light Traps with Photocell-controlled CO2 Release and two (2) Collection Bottle Rotators. These miniature light traps use a small incandescent light bulb to attract mosquitoes. Cleaner collections may be made by not using the light bulb, and instead use CO2 gas released from a cylinder as the attractant. The addition of CO2 gas also results in larger collections of mosquitoes. This trap has a small precision pneumatic valve which is controlled by an internal photoswitch that times the release of the CO2 with the ambient light level. Therefore the release of gas is only taking place when mosquitoes are most likely to be active in the area being monitored.

The Collection Bottle Rotator is a device which allows segregating the catch of a light trap into 8 bottles over periods of time determined by a programmable timer. These will provide information about the periodicity of mosquito activity which in turn will help target more precisely our mosquito control activities.

During 2005 four (4) interns were employed for part of the season to operate the mosquito surveillance traps and perform efficacy or resistance studies. Using their knowledge of mosquito behavior and the local terrain, these skilled and experienced personnel monitored the adult mosquito populations in our service area. Crews were rotated through the member cities and towns on a (minimum) bi-weekly basis, and were dispatched to area "hot zones" when avian and/or mosquito data showed the presence of mosquito-bore diseases. The New Standard Miniature Light traps with the timed release of CO2 were used to monitor the adult mosquito population for Eastern Equine Encephalitis (EEE). The CO2 used as the attractant sample for mammal-biting species. Modified Reiter Gravid Traps were used to monitor the adult populations for West Nile Virus (WNV). These traps are attractive to the mosquito species data has shown to be most likely to have a role in the maintenance cycle and transmission of WNV in our area and across the US.

Laboratory personnel made more than 1,254 collections this season. These collections contained more than 90,000 adult mosquitoes. These collections were identified to species and sorted to identify the species known to play a role in arbovirus transmission in our area. Collections were sent to the Mass. Department of Public Health (MDPH) State Laboratory in Jamaica Plain each week to be tested for EEE, WNV and other diseases. CMMCP staff logged in these collections through a new system implemented by MDPH this year. This system is a web-based, bar code system which allows for faster tracking and testing. The web-based system allowed CMMCP administrative staff to log in for results and not wait for phone or internet notifications. Eight (8) CMMCP collections were confirmed positive for mosquito-borne diseases (see table 1). Our surveillance confirms that these pathogens were circulating in the local environment in

2005. Intervention measures were performed in collaboration with the local Boards of Health.

TABLE 1

Pool ID	Town	Tested Date	Species	Result
CM05-00672	Westborough	8/23/2005	*Culex species*	WNV Positive
CM05-00737	Westborough	8/29/2005	*Culex salinarius*	WNV Positive
CM05-00769	Westborough	8/29/2005	*Culiseta melanura*	EEE Positive
CM05-01096	Westborough	9/28/2005	*Culiseta melanura*	WNV Positive
CM05-01097	Westborough	9/28/2005	*Culex species*	WNV Positive
CM05-01144	Holliston	10/4/2005	*Culex species*	WNV Positive
CM05-01157	Wilmington	10/4/2005	*Culex species*	WNV Positive
CM05-01170	Westborough	10/4/2005	*Culiseta melanura*	EEE Positive

The Medical Entomology Laboratory at CMMCP is committed to the advancement of mosquito control practices by the application of the scientific method. Such a commitment will further enable us to provide our member communities with quality mosquito control for comfort and health.

WNV Surveillance Summary – **Statewide**	
Dead Birds Reported	2,493
Birds Submitted for Testing	322
Birds Tested	303
Birds Positive	83
Mosquito Pools Positive	99
Horses Positive	0
Humans Positive	6
EEE Surveillance Summary – **Statewide**	
Mosquito Pools Positive	45
Horses Positive	4
Humans Positive	4
** An emu from Athol in Worcester County tested positive for EEE in 2005.	
CMMCP Surveillance Summary	
Mosquito Pools Submitted for testing	1,192
Mosquito Pools (total)	3,607
Mosquito Pools Positive WNV	6
Horses Positive	0
Humans Positive	0
Pools Positive EEE	2
Horses Positive	0
Humans Positive	0

CMMCP RESEARCH AND EFFICACY

In 2005 we dedicated a limited amount of resources for efficacy and research. One summer intern was hired to perform efficacy and resistance studies, one intern collected data for his senior thesis at college, and other full time employees performed limited research according to their busy schedules and on their own time. The results of this research are outlined in the next few pages, and are summarized below.

- Pesticide Resistance in Adult Mosquitoes – a Bottle Assay
- Satisfaction Survey of Service Requests in 2005
- 2005 Larval Control program – Product Efficacy Evaluation
- A Preliminary Study of Ovitraps in Central Mass.
- Tree Canopy Preference of *Culex* and *Culiseta* Mosquitoes

CMMCP is committed to be on the forefront of mosquito control and strives to offer the latest advances in our industry. If you have any questions please call (508) 393-3055 or e-mail us at cmmcp@cmmcp.org. Additional information on these studies is available on our website at http://www.cmmcp.org/research.htm

Thank you

Timothy D. Deschamps

Executive Director

RESISTANCE TO SCOURGE® INSECTICIDE IN THE MOSQUITO POPULATIONS OF FOUR TOWNS IN THE CENTRAL MASS. MOSQUITO CONTROL PROJECT SERVICE AREA: WESTBOROUGH, BILLERICA, TEWKSBURY, AND WILMINGTON

ANN G. PARSLEY, Research Technician & TIMOTHY D. DESCHAMPS, Executive Director
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111 Otis Street Northborough, Massachusetts 01532

ABSTRACT

The Central Massachusetts Mosquito Control Project (CMMCP) has been using a synthetic pyrethroid called resmethrin, trade name Scourge®, since the early 1990's to control adult mosquito populations in its service area. The current CMMCP policy is to accept service requests from residents and town officials for adult mosquito control and to perform limited, targeted applications, and not perform random, area-wide spraying as was the standard procedure for adult mosquito control in Massachusetts decades ago. As part of our Standard Operating Procedures manual and as a function of an Integrated Mosquito Management (IMM) plan, surveillance is analyzed before any product is applied to justify the application. This can be in the form of landing rate counts or data collected from mosquito traps. Resistance to a class of chemicals has been noted in other areas of the world, and we will attempt to determine if any mosquito species or any collections of mosquitoes from a given area will show resistance to the synthetic pyrethroid class of chemicals. If resistance is noted, this may affect the product choice for vector-borne disease control, as well as the reduction of nuisance levels of mosquitoes. Initial results from 2005 show a minor potential for resistance, but no change in product usage is recommended at this time. There is no indication that resistance levels will increase due to the limited, sporadic nature of the CMMCP adulticide program, but further study would be prudent.

INTRODUCTION

The purpose of this study was to determine whether or not resistance to resmethrin was developing in the mosquito populations at the most frequently sprayed properties. If significant resistance were present, it could necessitate changing from resmethrin to a different product registered in Massachusetts and accepted by the Centers for Disease Control (CDC) for mosquito control. This would be particularly important in the case of an outbreak of mosquito-borne diseases such as West Nile Virus (WNV) or Eastern Equine Encephalitis (EEE). If a particular species of mosquito or a mosquito collection from a given area has been shown to be resistant to the pyrethroid class of chemicals, then vector suppression may need to be done using different products and procedures. The towns of Westborough, Billerica, Tewksbury and Wilmington were chosen for the study because these are the only towns in the CMMCP service area where WNV or EEE have been found either in mosquitoes, horses or humans. WNV was found in a collection of mosquitoes in Westborough in 2003, and that same year a woman in the area of the virus positive mosquito also contracted WNV. Horses in Billerica and Wilmington were identified to have been infected with EEE in 2004, and mosquitoes positive for EEE were found in Tewksbury in 2002.

METHODS AND MATERIALS

Five study sites were chosen in each town, from among the most frequently sprayed properties in the town according to the CMMCP database of service requests. The frequency of spraying was determined from a database of spray requests from 1998 to the present. Because the towns vary in their overall mosquito population and the number of requests is determined by the property owners, no two sites had exactly the same number of requests in each season. The number of spray requests varied considerably. The most frequently sprayed property had been sprayed 38 times over the eight year period, while the least frequently sprayed property had only been sprayed four times, all in 2004. Most of the properties had been sprayed between 12 and 25 times since 1998. All but two of the properties were at private homes; one was a public recreational area, and another was a wetland area at the end of a cul-de-sac.

The cul-de-sac site was chosen because at that site mosquitoes had been found to be positive for West Nile in 2003 and this was in the neighborhood of the human WNV case in 2003.

A control site was chosen in the town of Westborough in a swamp bordering an organic farm. This site has never been sprayed for mosquitoes by CMMCP, and to the best of our knowledge the town and the property owners did not apply any insecticides in that area. It was presumed that mosquitoes from this site would have no resistance to resmethrin having never been exposed to any insecticides.

At each site, live adult mosquitoes were collected using two CDC-style traps (John W. Hock Company) baited with carbon dioxide at 20 psi. The traps were set early in the morning and collected the following morning. Traps were set for one or two nights, depending on how many mosquitoes were collected. The number of mosquitoes tested for each site varied from 30 to 152; for most sites it was approximately 50.

The resistance testing was conducted according to the bottle bioassay procedure described by Brogdon and McAllister[1]. Scourge® insecticide (18% Resmethrin + 54% piperonyl butoxide synergist, lot no. 465-0815) manufactured by Bayer Environmental Science Company was diluted in acetone to make a 0.005% solution, and was evenly applied to coat the insides of 250ml Wheaton bottles (Fisher Scientific Company). Each bottle was coated with 1ml of acetone and 1ml of Scourge solution, containing 9.05 μg of resmethrin and 27.02 μg of piperonyl butoxide. This dosage was determined by testing seven batches of mosquitoes from the control site with Scourge/acetone solutions of different strengths. Controls consisted of bottles coated only with acetone.

After the mosquitoes were aspirated from the trap cage and introduced into the coated bottles, each bottle was checked at five-minute intervals, and the number of mosquitoes knocked down was recorded. A mosquito was considered knocked down if it could not regain a standing position when knocked off its feet by gently tapping or shaking the bottle. Knock-down was chosen as the standard rather than overall mortality because resmethrin may cause the mosquitoes to twitch even after they are dead, making the time of death difficult to determine exactly.

RESULTS

No mosquitoes were knocked down in the acetone-only control bottles. The mosquitoes from the unsprayed control site were all knocked down within ten minutes, with 96% knocked down after only five minutes.

The mosquitoes from the recreational area site survived the longest, reaching 100% knocked down only at 35 minutes. At one other site, 100% were knocked down at 25 minutes. At twelve sites, 100% were knocked down at 20 minutes, and at six sites, 100% were knocked down at 15 minutes. Sample graphs are included in this presentation, and all data is available on the CMMCP website at http://www.cmmcp.org/2005resistance.htm.

DISCUSSION AND CONCLUSIONS

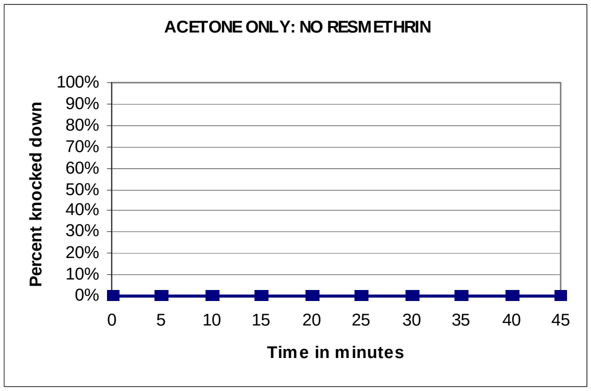
At all of the study sites, the mosquitoes survived longer than those from the control site. The majority of the samples contained some individual mosquitoes that survived at least twice as long as the control mosquitoes. This would seem to indicate that some resistance to resmethrin may be developing in the populations surveyed.

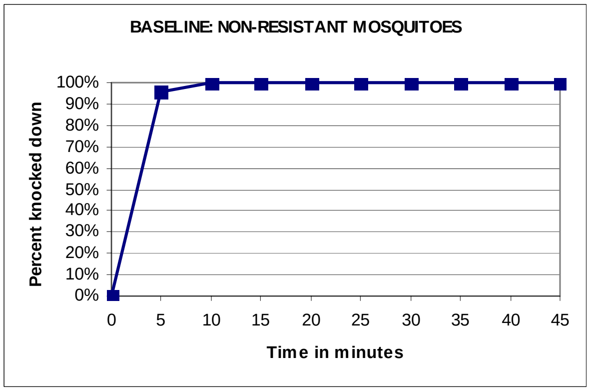
However, another bottle bioassay study of resistance to various insecticides, including resmethrin, found resistant mosquitoes surviving for up to three hours.[2] In comparison, mosquitoes that survive for 20 to 35 minutes do not seem to be very resistant to resmethrin. If resistance is developing in the CMMCP service area, it appears to be at an early stage. A change of insecticide is not recommended at this time, although continued monitoring of resistance would be a wise course of action. Greater resistance could develop at a later date.

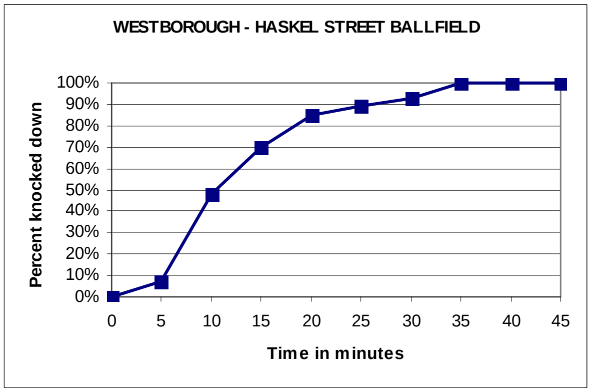
REFERENCES

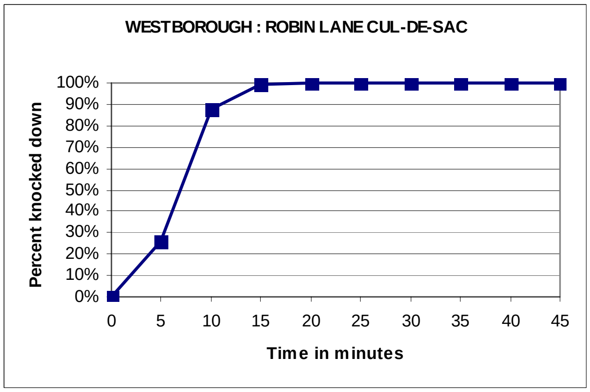
1. Brogdon WG and McAllister JC. Simplification of adult mosquito bioassays through use of time-mortality determinations in glass bottles. J Am Mosq Control Assoc 14:159-164 (1998).

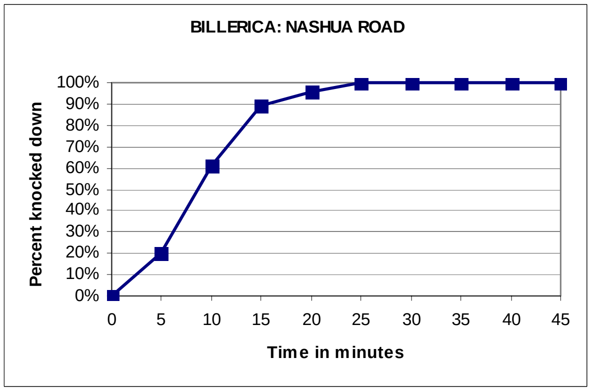
2. McAbee RD, Kang KD, Stanich MA, et al. Pyrethroid tolerance in *Culex pipiens pipiens* var *molestus* from Marin County, California. Pest Manag Sci 60:359-368 (2003).

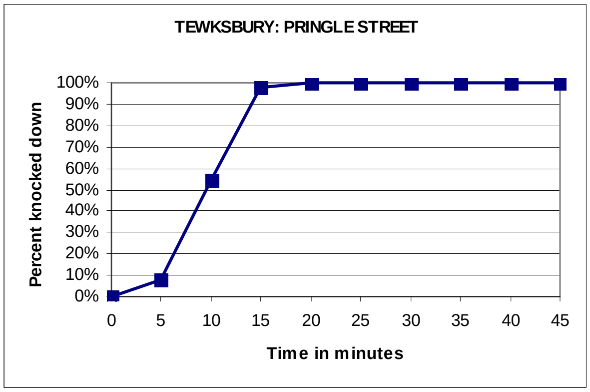












SATISFACTION SURVEY OF SERVICE REQUESTS IN THE CENTRAL MASSACHUSETTS MOSQUITO CONTROL PROJECT SERVICE AREA – 2005

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ABSTRACT

Residents of our service area request service from the menu of services offered to them by CMMCP. Requests for adulticiding (spraying) and larval control are the most common forms of service requests we receive. We accepts request for service through a variety of means, primarily by telephone, but increasing more by the online service request form from the CMMCP website. Additional methods include personal visits to our office, phone calls on behalf of residents from town and/or state officials, and direct requests to our field staff. The CMMCP Commission authorized a survey of resident who requested service in 2005 to determine if our staff was meeting acceptable levels of customer satisfaction. After compiling these results, we find that a majority of residents in our service area were satisfied with our control efforts and methods.

SURVEY METHODOLOGY

In 2005 we received 7,086 requests for service, ranging from adulticiding to larval control. 5,712 adulticiding calls were filtered and placed into a separate database. Service calls were sorted according to town, and each town was tabulated for total requests received in 2005. These towns were then graphed to show which towns had the most calls down to the towns with the fewest. Each town was assigned a percentage according to this data. This percentage would determine the number of postcards sent to each town from the overall total. The CMMCP Commission decided that 1,000 postcards would be a representative sample of the 5,712 service calls. The survey was designed to be as easy as possible for residents to access and complete. An online survey was created, and the postcards would include unique identifiers that the residents would use. The postcards contained a blind weblink to the survey so that unauthorized users would not be able to participate in the survey. Information such as how they contacted us, were the office and field staff helpful and informative, how long did they wait for service, was the service provided effective, and their overall satisfaction was measured.

SURVEY FINDINGS

From 1,000 postcards mailed, 244 responses were received (24.4%). The results are as follows:

1). In your most recent experience, how did you contact the Central Mass. Mosquito Control Project?

*4 through town offices, 1 through a neighbor

	Number	Percent
Telephone	191	81%
Website	38	16%
In person	3	1%
Other*	5	2%
Total	237	100%

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2). If by telephone or in person at the CMMCP office, were your questions or concerns answered to your satisfaction?

	Number	Percent
Yes	192	99.5%
No	1	0.5%
Total	193	100%

3). If by telephone, did you experience difficulty reaching our staff?

	Number	Percent
Yes	19	9.9%
No	172	90.1%
Total	191	100%

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4). If through the website or e-mail, did you find the information you needed in a satisfactory manner?

	Number	Percent
Yes	51	98.1%
No	1	1.9%
Total	52	100%

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5). Please give the approximate time you waited for service from your initial request:

NOTE: 87.3% within a week or less

	Number	Percent
1-3 days	74	31.4%
3-5 days	60	25.4%
1 week	72	30.5%
2 weeks+	30	12.7%
Total	236	100%

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6). Did you find our response from your initial request to when you received service within a reasonable amount of time?

	Number	Percent
Yes	223	95.5%
No	13	5.5%
Total	236	100%

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7). Were your questions and concerns answered by the Technician to your satisfaction?

	Number	Percent
Yes	204	95.8%
No	9	4.2%
Total	213	100%

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8). Did you receive any written information (pamphlets, etc.) from our representative?

	Number	Percent
Yes	138	40%
No	192	60%
Total	330	100%

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9). Did you find this information useful?

	Number	Percent
Yes	80	95%
No	4	5%
Total	84	100%

10). Did you request service more than once in 2005?

	Number	Percent
Yes	91	38.2%
No	147	61.8%
Total	238	100%

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11). If you requested additional service in 2005, was it because the original application was insufficient to meet your needs, or for a later re-treatment or follow up?

	Number	Percent
Re-treatment	87	79.8%
Insufficient	22	20.2%
Total	109	100%

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12). Would you/did you recommend our service to others in the future?

	Number	Percent
Yes	230	98.3%
No	4	1.7%
Total	234	100%

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13). In your opinion, did our application made your area better, worse, or had no effect?

	Number	Percent
Better	205	87.6%
Worse	0	0%
No Effect	29	12.4%
Total	234	100%

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14). If you think your area improved, can you give an approximate length of time you experienced relief from mosquito annoyance?

	Number	Percent
1-2 days	30	15.3%
3-5 days	34	17.4%
1 week	40	20.4%
2 weeks+	92	46.9%
Total	196	100%

NOTE: 2/3 of residents polled reported relief of 1 week or greater, nearly 1/2 report more than 2 weeks of relief

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15). On average, our services cost $2.00 – $4.00 per person each year (withheld from local aid rec'd from the State). In your opinion, is this amount too high, too low, or sufficient?

	Number	Percent
Sufficient	189	80.4%
Too Low	41	17.5%
Too High	5	2.1%
Total	235	100%

---

16). In which month or months do you recall receiving service?

	Number	Percent
1+	55	24.3%
August	24	10.6%
July	67	29.7%
June	80	35.4%
Total	226	100%

17). Overall, are you happy with the service provided this year by CMMCP?

	Number	Percent
Yes	211	90.9%
No	21	9.1%
Total	232	100%

---

18). Do you plan on using our service again in the future?

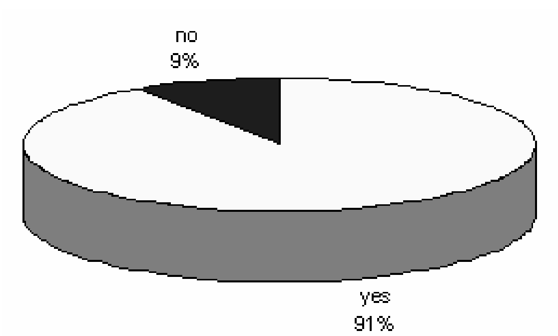
	Number	Percent
Yes	228	98.3%
No	4	1.7%
Total	232	100%

Please rate our performance for 2005 from 0 to 5, where 5 is the best rating, 0 is the worst rating:

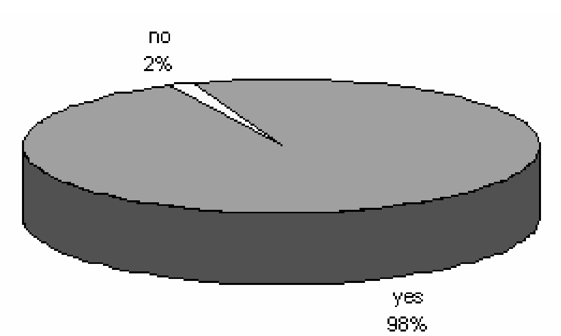
QUESTION	POINTS	AVERAGE
The information you received over the phone was informative & helpful	851 points from 1,010	4.2 average from 5
The information on our website is easily available and helpful	604 points from 745	4.0 average from 5
The response time for service is reasonable	992 points out of 1,145	4.3 average from 5
Our field staff that responded is knowledgeable and competent	939 points out of 1,070	4.3 average from 5
The service provided was effective	888 points out of 1,135	3.9 average from 5
This service is reasonable compared to the cost	995 points out of 1,120	4.4 average from 5
Please rate your overall satisfaction with the service received in 2005	975 points out of 1,140	4.2 average from 5
Total satisfaction rating: 6,244 points out of 7,365 possible – 4.23 average		

CONCLUSION

Overall satisfaction was 90.9% to 9.1%, and 98% would use our services again in the future. One weakness identified in this study is that only 40% of the residents polled recalled receiving our written information. The importance of public education and outreach will be stressed to all CMMCP personnel in 2006.



OVERALL SATISFACTION



WOULD USE OUR SERVICES AGAIN

2005 CMMCP LARVAL CONTROL PROGRAM
PRODUCT EFFICACY EVALUATION

TIMOTHY D DESCHAMPS, Executive Director & TIMOTHY E. McGLINCHY, Director of Operations
Central Mass. Mosquito Control Project
111 Otis Street Northborough, Massachusetts 01532

ABSTRACT

The Central Massachusetts Mosquito Control Project (CMMCP) has used the bio-pesticide *Bacillus thuringiensis* var. *israelensis* (Bti) since the late 1980's as the product of choice for mosquito larval control in area wetlands. The product efficacy evaluations performed each year are designed not only to check for Bti efficacy, but to monitor our application methods and amounts. Most areas showed nearly 100% control; some areas done by helicopter required follow up applications by ground equipment around the perimeter of the targeted wetlands. Our website at www.cmmcp.org has detailed information on this program. Bti will continue to be the foundation of our larval control program.

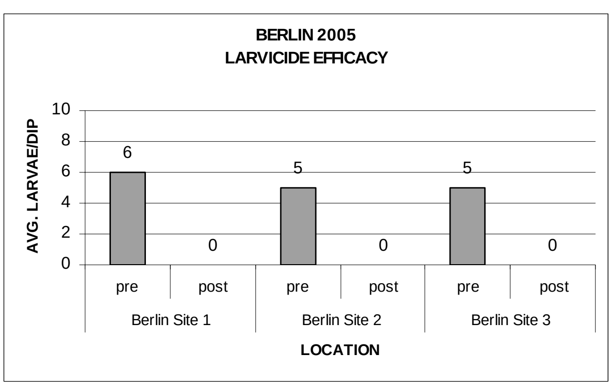
INTRODUCTION

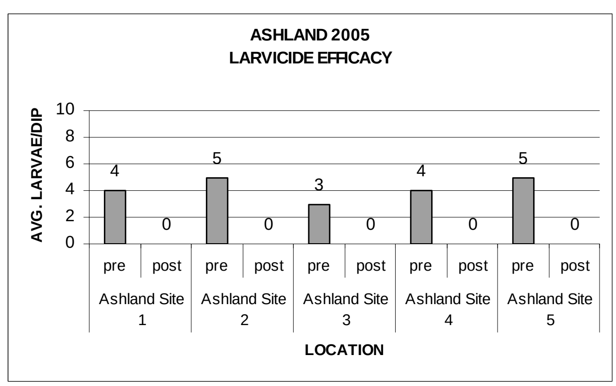
Larval control is the basis of an Integrated Mosquito Management (IMM) plan. Control of mosquitoes in the larval stage can show higher efficacy and lower non-target effects than other control methods, especially adulticiding. Broad-spectrum, chemical products available for larval control such as organophosphates have been used in the past by CMMCP, but we recognize the benefits of biocontrols such as Bti and have chosen this product over other products available for use, such as Abate®. Significant research has been done on Bti by researchers, university staff and mosquito control programs for many years, and the benefit-to-risk ratio is well documented.

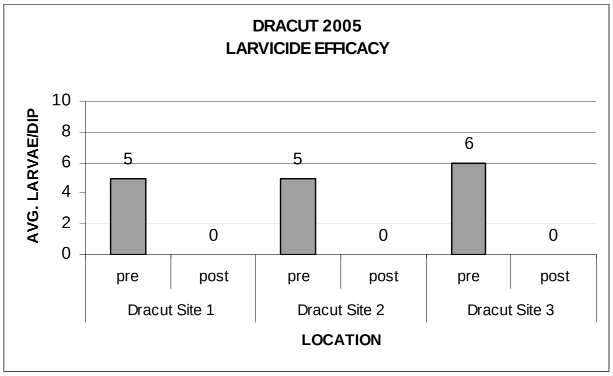
MATERIALS AND METHODS

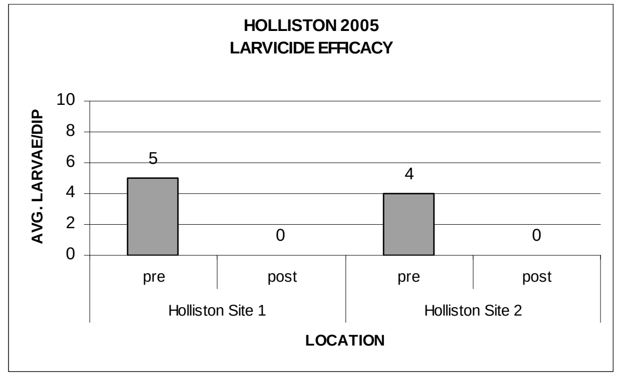
Granular Bti can be applied in a variety ways. It can be broadcast by hand, where the applicator can access areas not available to truck mounted equipment or aerial applications due to a heavy tree cover (canopy). Aircraft, either fixed wing or helicopter, can be used to deliver it to large, widespread areas inaccessible to any truck or hand applications because of size or location.
Label rates for applications are followed closely, and can range from 5 to 20 lbs per acre. Higher rates are recommended when late 3rd and early 4th instar larvae predominate, mosquito populations are high, water is heavily polluted, and/or algae are abundant.

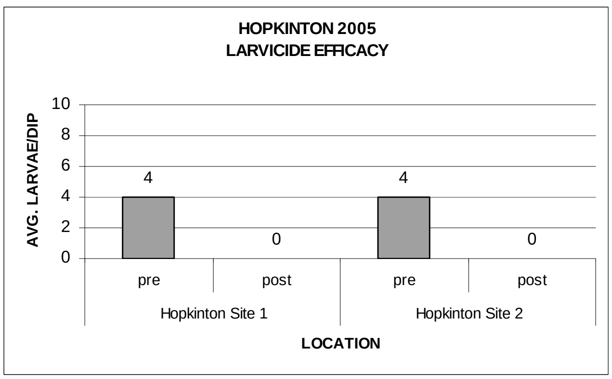
The following graphs show pre- and post treatment data for 29 sites in 8 member towns from 2005. 2 sites are from the aerial program, and the other 6 are from ground applications. Post monitoring data is done from 24 to 48 hours after the original treatment. The website has detailed information on the collection data, with types of area, product amounts, larval instars, etc.

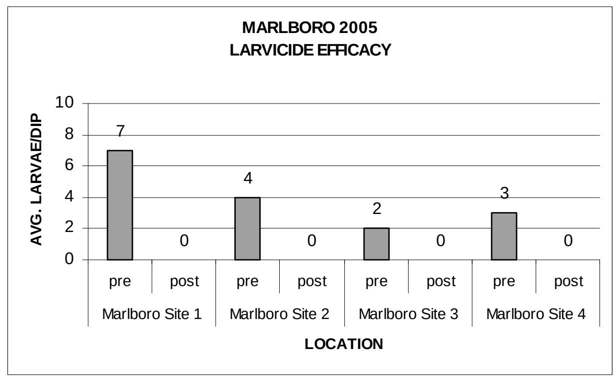


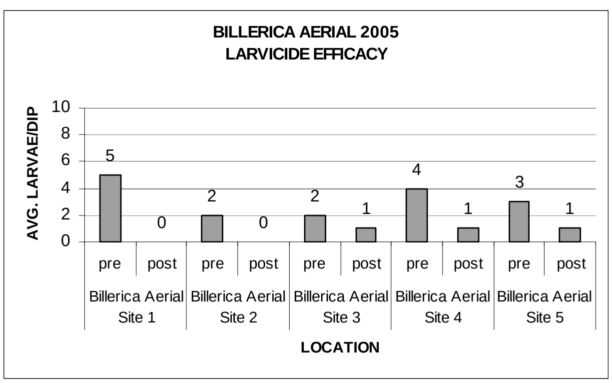


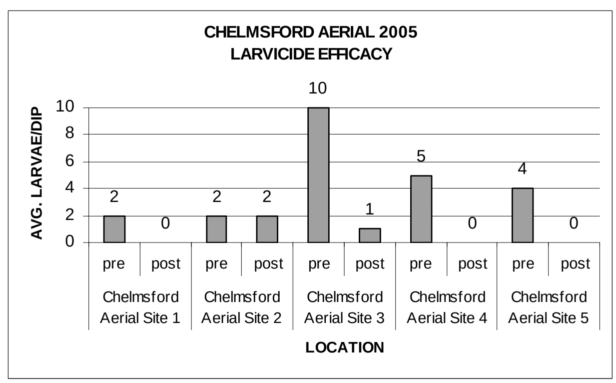












RESULTS & DISCUSSION

All sites done by hand showed 100% control. A wider study of hand applications would certainly show lower efficacy, but 90% on average is not unexpected based on previous results. The aerial application showed a range of 0% to 100% control. The wide range of results is not surprising; our aerial efficacy program is more intensive, with 20 dips per every 250 acres set up as recoverable dip stations. Dip stations near the perimeter of the wetlands, roads or residential areas will not show good control due to the buffer zone employed by the helicopter pilots. Hand applications around the perimeters are often used to increase total efficacy from an area. Surveys conducted by the ground crews during post-monitoring noted that where Bti granular product was <u>observed</u>, very effective larval control was achieved.

NOTE: REFERENCES FOR CLAIMS STATED HEREIN ARE AVAILABLE UPON REQUEST

A PRELIMINARY STUDY OF THE ATTRACTIVENESS OF OVITRAP CUPS IN COLLECTING CONTAINER SPECIES IN MASSACHUSETTS

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ABSTRACT

Using ovitraps to collect species data and to test for efficacy is a technique that has been well documented in many areas of mosquito control and research. A quick search on the Google website (www.google.com) using "Mosquito+Ovitrap" as the keywords turns up a wealth of information. In 2005 we employed ovitrap cups following the US Public Health Service & the Air Force Institute for Operational Health guidelines. Results were not entirely surprising, with *Oc. j. japonicus* as the predominant species, although *Oc. triseriatus* did not appear as anticipated, nor were any *Culex* identified. Ovitraps may be employed in the future by CMMCP to monitor population trends among the container species and for adulticide efficacy studies.

INTRODUCTION

The goal at CMMCP this year was simple and straightforward – will mosquitoes use ovitraps if presented, and what species will we expect to sample? Can ovitraps be used as a device to monitor container species and check for adulticide efficacy?

MATERIALS & METHODS

Ovitraps have been used at CMMCP in the past using coffee cans and seed germination paper. Dark colors are preferred by many container species of mosquitoes for oviposition (AFIOH website, Surveillance Methods/Ovitrap Collections). The coffee cans were painted black, but a source of seed germination paper can be hard to find once available stock is used up. To save on labor and to use materials readily available, the ovitraps will be designed according to the standards written by the US Public Health Service (figure 1). Black plastic cups with the CMMCP logo and "Mosquito Ovitrap" printed on the front were secured. Standard 6" hardwood tongue depressors and 8" natural (unbleached) paper towels were used to make the ovipaddle. A section of paper towel 8" square was cut and folded in half, then wrapped around the tongue depressor and secured at the top and bottom with office staples. A quarter-inch hole should be drilled in the cup 3.5 inches up from the bottom to prevent rainwater from overfilling the ovitrap. The cups may need to be secured in the area using a variety of methods such as a stone on the bottom, wired to a tree, etc.

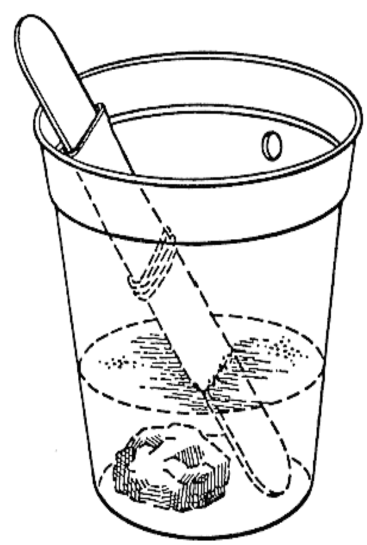

Figure 1

10 ovitraps were placed in a wooded area with other container-breeding sources such as tarps, cans, etc. Each cup was filled with approximately 10 ounces of water from a nearby pond, and the cups were allowed to season for 1 week without the ovipaddle. After 1 week, the ovipaddles were placed in the cups and allowed to remain for 2 additional weeks. After 2 weeks the ovipaddles were collected, and the larvae present in the cups was placed in a single breeding chamber and reared to adult to determine species (table 1). The ovipaddles were allowed to desiccate and then the egg clusters on each ovipaddle were counted (table 2).

Several ovipaddles were submerged in water at a later date to encourage the eggs to hatch with the intent of identifying these to species. However most of the eggs did not successfully hatch, possibly due to extreme desiccation or exposure to high temperatures. The Air Force Institute for Operational Health recommendations are to place each ovipaddle in a sealed plastic bag, which should slow desiccation if the intent is to hatch at a later date (AFIOH website, Sorting, Packaging and Shipping Specimens).

Table 1:

ADULT IDENTIFICATION OF ALL HATCHED LARVAE IN OVITRAPS
Oc. j. japonicus (11 male, 13 female)

Table 2:

OVIPADDLE EGG COLLECTION COUNT			
PADDLE 1:	350+	PADDLE 6:	350+
PADDLE 2:	275+	PADDLE 7:	175+
PADDLE 3:	200+	PADDLE 8:	350+
PADDLE 4:	250+	PADDLE 9:	250+
PADDLE 5:	200+	PADDLE 10:	350+
AVERAGE PER CONTAINER – 275			

CONCLUSION

As expected, *Oc. j. japonicus* dominated the collections. This species prefers cleaner water with less tannins than their counterparts *Oc. triseriatus* and *Culex* (Rutgers University, New Jersey Mosquito/Biology & Control website), and the pond water used would favor this species. If collections of *Oc. triseriatus* and *Culex* are the intended targets as well as *Oc. j. japonicus*, then water containing bacteria and tannins such as a hay infusion used in gravid traps should be used in the ovitraps.
Gravid females seemed to prefer to oviposit the eggs on the folded margins and on the dimples present on the oviposition substrate. The ovitraps collected an average of 275 eggs each over a 2 week period, and may be a useful device to monitor efficacy and to check for population trends among the container species especially if hay infusion water is used. The ovipaddles could also be collected and stored to be hatched at a later time for species composition, educational demonstrations, to check for larvicidal product efficacy, etc.

REFERENCES

Air Force Institute for Operational Health (AFIOH) website:
http://www.brooks.af.mil/afioh/Health%20Programs/rsrh_ent_methods.htm

Rutgers University, New Jersey Mosquito/Biology & Control website:
http://www-rci.rutgers.edu/~insects/njspp.htm

ENVIRONMENTAL INFLUENCES FOR THE TREE CANOPY PREFERENCE OF *CULEX PIPIENS* AND *CULISETA MELANURA*

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Central Mass. Mosquito Control Project
111 Otis Street Northborough, Massachusetts 01532

Senior Thesis for Unity College, ME

ABSTRACT

In our study we found that when mosquito collections were made on the same night and location, with one trap placed in the tree canopy and the other trap at ground level, there were a significantly higher number of *Culex pipiens* and *Culiseta melanura* in the tree canopy traps. These two trap levels also exhibited no significant difference in temperature, although it was determined that there was a significantly higher relative humidity at the ground level than in the canopy. This difference in relative humidity was also found to not be significantly correlated with the collections. By learning more about the biology of *Culex pipiens*, as well as other mosquitoes, we will be able to devise more effective methods to hamper their negative effects on humans without impacting other parts of the ecosystem.

INTRODUCTION

Since the discovery of West Nile virus (WNV) in the United States in 1999, much emphasis has been placed on learning more about its transmission and characteristics of the specific mosquito species involved (Kulasekera, 2001; Nasci, 2001; Kilpatrick, 2005). The first known human case of WNV was reported in New York City, in August of 1999. After this first case there were an additional 61 humans positive for WNV in New York, from August to October of 1999, consisting mostly of elderly people (Enserink, 2000; Rappole, 2000). As of March 2005, WNV has infected over 17,000 and killed over 670 people in North America (Kilpatrick, 2005). From its initial discovery, WNV quickly spread across the U.S. and has made its way down into Mexico and Central America (Knight, 2003).

An important vector of WNV in the United States is the mosquito species *Culex pipiens* (Goddard, 2002; Anderson, 2004; Kilpatrick, 2005). It has been suggested that these mosquitoes act as hosts for overwintering flaviviruses such as WNV, until they reemerge in the spring (Goddard, 2002). Some studies suggest that *Culex pipiens*, along with *Culex restuans*, may in fact be responsible for up to 80% of human WNV infections in the northeast United States (Kilpatrick, 2005). Previously believed to feed mainly on birds, and therefore reducing their likelihood of infecting humans, *Culex pipiens* are now thought to more commonly feed on humans than previously thought (Kilpatrick, 2005). By learning more about the biology of *Culex pipiens*, as well as other mosquitoes, we will be able to devise more effective methods to hamper their negative effects on humans without impacting other parts of the ecosystem.

The vast majority of female adult mosquitoes require a blood meal to begin development of each clutch of eggs, and obtain this from a variety of sources (Bates, 1949; Knight, 2003). Most mosquito species will feed on warm-blooded animals after receiving cues to induce biting. These signals include carbon dioxide and ammonia, especially when coupled with a temperature and moisture level similar to breath (Bates, 1949). Respiration of animals, along with color, motion, and smell to a lesser degree attract the mosquitoes to feed upon various hosts (Bates, 1949). Some mosquitoes exhibit host preference while others do not. For example, past studies have the *Culex pipiens* species preferentially feeding on birds, but also feeding on assorted mammals (Nasci, 2001).

Once they have acquired their blood meal necessary for egg development, mosquitoes may use many different types of areas for breeding, including irrigated agricultural lands, shallow isolated pools, dumping areas, and wetlands (Knight, 2003). After obtaining a blood meal, the female mosquitoes will usually have a resting period before oviposition. It has been shown that mosquitoes don't lay eggs randomly but instead may lay eggs where there are fewer predators present (Kiflawi, 2003).

In many aspects of mosquito life history, temperature seems to play a very influential role. Low air temperatures in the winter lead many mosquito adults to enter a hibernation state and high temperatures in the summer can also lead to decreased adult mosquito activity (Knight, 2003). As noted before, temperature also plays an important role in the feeding habits of mosquitoes. *Culex pipiens* have been shown to prefer host temperatures between 32° C and 43°C, with temperatures above 49°C and below 30°C showing less attraction. Temperature also seems to have an effect on oviposition, with mosquitoes avoiding water temperatures outside the range of 20°C to 30°C (Bates, 1949).

There are several common trapping methods for adult mosquitoes. These include gravid traps that simulate oviposition habitat, light traps, and carbon dioxide traps with the latter two possibly being combined. With carbon dioxide being a major attractant for mosquitoes, yields from these traps are especially clean, containing almost no unwanted insects. The traps with light alone can produce many kinds of non-targeted insect species, which can slow research.

Culex pipiens, as well as other mosquito species, has been discovered to prefer inhabiting tree canopies, or at least seem to frequent tree canopy height. The specific reasons for this behavior are not clear although it has been speculated that they may be influenced by temperature, humidity, light, as well as the potential feeding of nesting birds (Anderson, 2004). This project was geared toward gathering data on two of these possibilities, temperature and humidity. My hypothesis is that *Culex pipiens* and *Culiseta melanura* will both show a significant preference for the canopy level, but that this will not have a significant relationship with either temperature or humidity.

METHODS

Data collection for the project was started in late May 2005 and ended September 2, 2005. There were three different sites, two in Westborough, MA, and the other in neighboring Hopkinton. The two sites in Westborough were located off of Rogers St. (42°16.427'N, 071°36.033'W) and Hopkinton Rd. (42°15.709'N, 071°35.812'W), while the Hopkinton site was located off of Woods St. (42°15.354'N, 071°35.149'W).

Trapping involved using two CDC light/CO_2 mosquito traps (John W. Hock Co., model 512) with net collection bags, one placed approximately 6.5 meters into the air and the other about 1.5 meters high at the same site. Carbon dioxide was used as the only means of attractant, with the light feature of the traps being disabled to avoid non-target insects. The CO_2 tanks were adjusted with regulators to 15psi. On each trap there was a temperature/relative humidity data logger (Onset 64K HOBO Pro RH/Temp Logger) that logged each every 40 seconds while the trap was collecting.

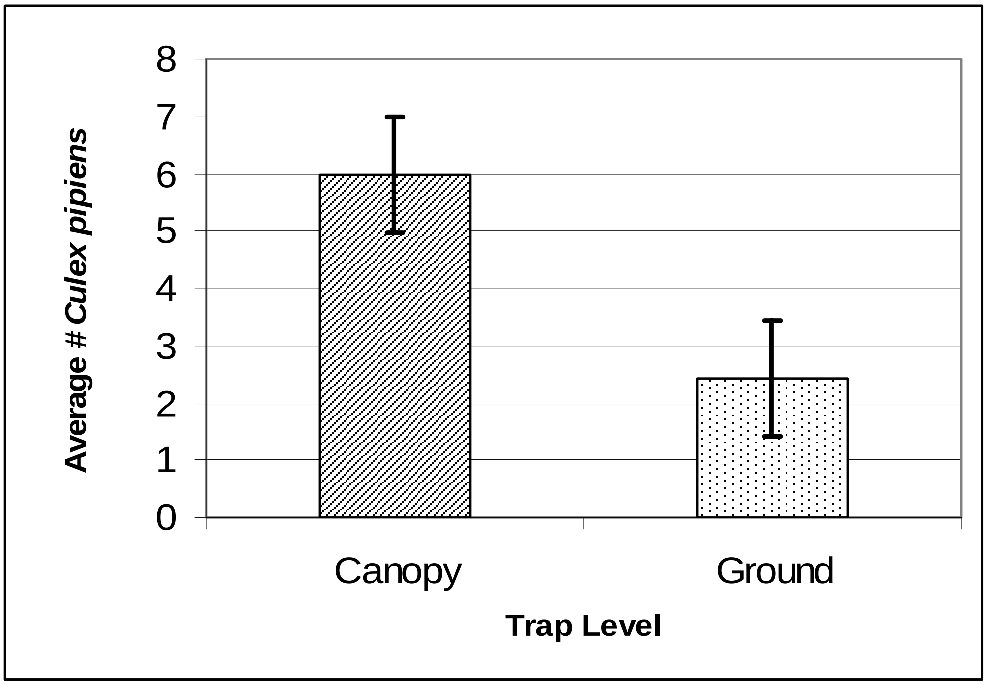
The traps were set and collected overnight and retrieved approximately 24 hours later and set again usually at one of the other sites, with new collection bags, new batteries and new CO_2 tanks. The data logger information was downloaded and reset at each retrieval. The specimen collections were knocked down and stored in a refrigerator until identification. The specimens were identified as *Culex pipiens*, *Culiseta melanura*, or "other," by using the Darsie mosquito index (1981) and a dissecting microscope.

The data collected from the data loggers and mosquito identification was then used in several ANOVAs to determine whether there were significantly different findings for the two trap levels, three trap sites, any interaction between those factors, and also for the temperature and relative humidity of the two trap levels. Significantly different mosquito numbers were then put through a test for normality and then a Spearman correlation test to determine if they were associated with any of the two possible environmental influences that were tested.

RESULTS

There were 42 viable collections made, which included both canopy and ground traps along with complete temperature and relative humidity data sets. An ANOVA for the number of *Culex pipiens* caught was performed against the two trap levels and the three sites. It was then determined that there was a significantly higher number of these mosquitoes caught in the canopy traps than in the ground traps (figure 1), but no significant difference between any of the sites and any interactions within the trap levels and sites.

Figure 1: Average # Culex pipiens at Canopy and Ground Trap Levels

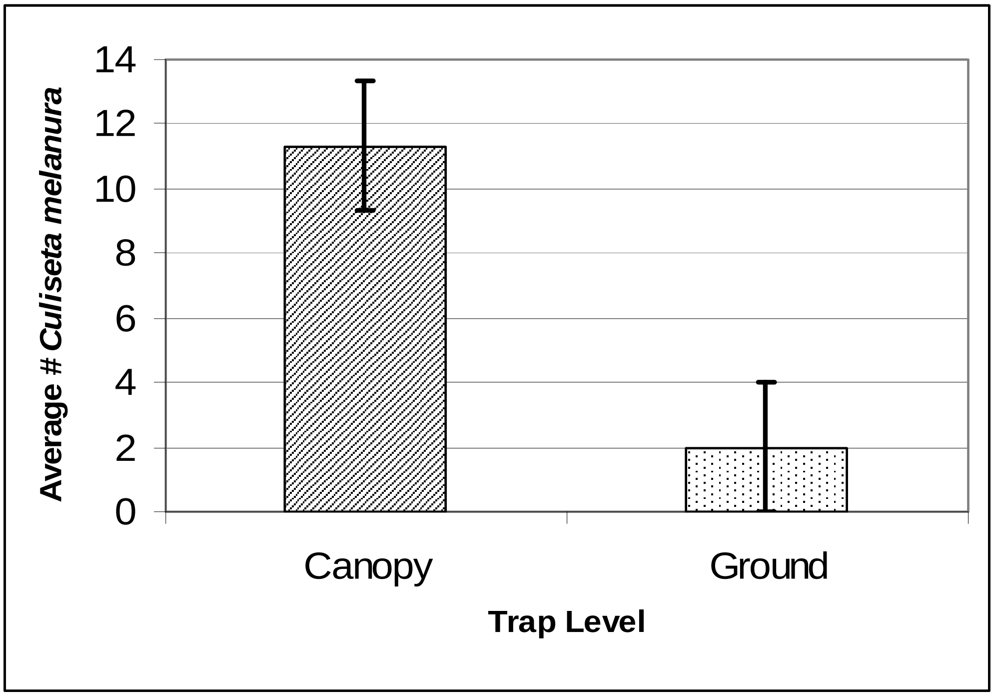


Similar results were found when an ANOVA was performed for the number of *Culiseta melanura* caught against the two trap levels and the three sites. There was a significantly higher amount of *Culiseta melanura* mosquitoes found in the canopy traps as opposed to the ground traps (Figure 2). Again, there was no significant difference between the number caught from the three sites or any interactions between the levels and sites.

When two-way ANOVAs were used with average temperature and average relative humidity against the trap levels and different sites, it was determined that there was a significant difference in the relative humidity readings of the canopy and ground level traps, but not in those of the average temperature of the two levels. There was no significant difference in the environmental factors between each site and also no significant difference in any interaction between trap level and site.

A test for normality showed that the mosquito collection data was not normal, and so the resulting Spearman correlation test showed that there was not a significant positive correlation between the *Culex pipiens* and *Culiseta melanura* canopy preference and the significantly different relative humidity of the two levels.

Figure 2: Average # Culiseta melanura at Canopy and Ground Trap Levels



DISCUSSION

Our collections exhibited the canopy preference shown by *Culex pipiens* and other mosquitoes in previous studies (Anderson, 2004). Our study also showed that there was not a significant difference in the average temperatures of the two traps level. However, the relative humidity of the two levels did prove to be significantly difference, leading us to perform a correlation, which showed that there was not a significant relationship between relative humidity and collections.

Through the lack of a correlation, I believe our results seem to support the idea that the canopy preference is due more to the feeding habitat of these mosquitoes on roosting birds than abiotic environmental influences. The preference for obtaining blood meals through birds by *Culex pipiens* seems to be more behavioral than being influenced by certain environmental factors, temperature and relative humidity in this case. Our results support the possibility that these target mosquitoes are present in the canopy not because of the proposed abiotic factors but more likely because the dominant feeding patterns and the location of these organisms.

Because of the susceptibility of *Culex pipiens* and *Culiseta melanura* to acquire and transmit West Nile virus and also other diseases including Eastern Equine Encephalitis, it is important to know where they are predominantly located and also the reasons why. Previous studies along with this one seem to indicate that these mosquito species do prefer canopy level, which could be very influential in the control aspect of mosquito (Anderson, 2004). With the right thermal currents, a mosquito control application could be administered so that it would rise through the canopy, eliminating those targets before any virus is allowed to transfer and build in bird hosts. Lessening the amount of virus that bird host populations are exposed to could significantly decrease the chances of a mosquito with bird and mammal feeding preference to obtain virus and transmit it to humans.

Similar research of canopy preference of *Culex pipiens*, *Culiseta melanura* and other mosquito species, may lead mosquito surveillance projects to change their trapping protocol. By shifting the focus of surveillance techniques to the canopies as opposed to the standard ground level, there could be an increased chance of finding infected mosquitoes before they have a chance to infect birds, which would begin to build up the virus in themselves. Finding these infected mosquitoes before they have a chance to infect birds would give mosquito control projects a head start on signaling potentially high risk areas, and taking any proper actions.

These ideas were relevant during this project as one of the collections from a canopy trap was found to have West Nile virus. Signs were posted and a press release was announced, allowing local residents to take their own precautions to avoid contracting WNV. In response to these findings more traps were established in the local area, which later in the season resulted in a positive Eastern Equine Encephalitis pool of mosquitoes. These traps were located in an area that was frequented by children and senior citizens, emphasizing the importance of identifying it for infectious mosquitoes early.

In conclusion this study reinforces the canopy preference for *Culex pipiens* and *Culiseta melanura*. It was also found that there was no correlation between the canopy preference and canopy temperature and relative humidity. This finding leads one to believe that the canopy preference exhibited by these mosquitoes is influenced by something else, host availability being among the possibilities.

ACKNOWLEDGMENTS

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I would like to give a special thanks to the following people and groups, for their help and guidance throughout this project:

Dr. Amy Arnett
Professor Barry Woods
Dr. Emma Creaser

Curtis Best
Timothy Deschamps
Timothy McGlinchy
Central Massachusetts Mosquito Control Project

PLEASE NOTE: THIS THESIS IN ITS ORIGINAL FORMAT INCLUDING TABLES AND REFERENCES IS AVAILABLE ON THE CMMCP WEBSITE AT www.cmmcp.org/cornine.pdf

TOWN OF NORTHBRIDGE

DATE	WORK DONE	LOCATION
01-11-05	Stream Cleaning 10’	Sutton Street
	Stream Cleaning 20’	Sutton Street
	Stream Cleaning 20’	Eisenhower Drive
	Stream Cleaning 40’	Highland Street
	Culvert Cleaning (27)	Sutton Street, Jefferson Avenue, Lincoln Circle, Eisenhower Drive, Gendron Street, Fowler Road, Hill Street, Kelly Street, Jessica Way, Kristin Court, Highland Street
04-14-05	Public Relations	Mendon Street
	Larval Survey	Mendon Street, Quaker Street, Shining Rock Drive, Macarthur Drive
	Larviciding	Mendon Street, Quaker Street, West Hill Road, School Street
04-20-05	Public Relations	Brian Circle, Kelly Road, South Tessier Lane
	Larval Survey	Sutton Street, Violette Circle, Pollard Road, Sprague Street, Eisenhower Drive, Kristin Court, Jessica Way, Goldwaithe Road, Kelly Road, Cooper Road, South Main Street, South Tessier Street
	Larviciding	Mahoney Lane, Sutton Street, Smith Street, Brian Circle, Pollard Road, Lincoln Circle, Eisenhower Drive, Adams Circle, Jessica Way, Goldwaithe Road, Kelly Road, South Tessier Street
04-28-05	Administrative Contact	Town Clerk
04-29-05	Public Relations	Highland Street, Mendon Street
	Stream Cleaning 150’	Fowler Road
	Larval Survey	North Tessier Street, Lovelace Lane, Elston Avenue, Riverdale Street, Sheryl Drive, Susanne Drive, Jon Circle, Highland Street, Fowler Road, Rumonoski Drive, Wing Road
	Larviciding	Mendon Road, Hudson Avenue, Highland Street, Fowler Road, Rumonoski Drive
05-02-05	Public Relations	Church Street, Lea Avenue
05-06-05	Public Relations	Hill Street, Lea Avenue
	Larval Survey	Providence Road, Fletcher Street, Carpenter Road, Marston Road, Hill Street, Benson Road, Sean Drive, Church Street, Colonial Drive
	Larviciding	Carpenter Road, Providence Road, Hill Street, Providence Street
05-09-05	Public Relations	Driscoll’s Lane, Center Street, Louisa Drive, Castle Hill Road, Cliffe Road, Hill Street
	Administrative Contact	Board Of Health
	Larval Survey	Route 122, Driscoll’s Lane, Union Street, Cedar Street, Union Street, Linwood Avenue, Castle Hill Road, Hastings Drive, Cliffe Road
	Larviciding	Union Street, Center Street, Devon Drive, Louisa Drive, Linwood Avenue, Castle Hill Road
05-11-05	Public Relations	Brookway Road, Conservation Drive, Prentice Road, Main Street
	Larval Survey	Fletcher Street, Conservation Drive, Carole Lane, Purgatory Road, Main Street,
	Larviciding	Brookway Road, East Street, Lake Street, Prentice Road, Main Street
05-17-05	Public Relations	Northbridge Water Treatment Plant
	Trap Site Survey	Northbridge Water Treatment Plant – Providence Road
05-19-05	Administrative Contact	Town Garage, Board Of Health
	Catch Basin Larviciding	Northbridge Housing Authority, Colonial Drive, Northbridge Housing Authority, Lake Street, Terrace Apartments, Northbridge Elementary School, Lake Street, Cotton Mill Apartments, Northbridge Middle School, Northbridge High School, Whitinsville Christian School, Northbridge After School Program, Aldrich Early Childhood Care, Whitinsville Community Center Child Care, Whitinsville Center School Age Program, Northbridge Primary School, St. Camillus Health Care Center, Cross Street, Beaumort Nursing Home, Conservation Drive, Carole Lane, Hickory Lane, Rachel Lane, Swift Road, Acorn Road, Michael Lane, Kerry Lane, Dover Drive, Tracey Drive,

DATE	WORK DONE	LOCATION
05-19-05	Catch Basin Larviciding (Continued)	Walker Street, D Street, C Street, B Street, A Street, Border Street, Maple Street, Chestnut Street, Whitinsville Retirement Home, Whitinsville Elderly Housing, Forest Street, Grove Street, High Street, Linden Street
05-24-05	Public Relations	Susanne Drive
	Catch Basin Larviciding [344]	Kelly Road, Alana Drive, Jessica Way, Danielle Lane, Nicole Avenue, Rose Avenue, June Street, Kristin Court, Lea Avenue, Brenda Drive, Jefferson Avenue, Lincoln Circle, Kennedy Circle, Washington Street, Eisenhower Drive, Adams Circle, Smith Street, Gendron Street, Brian Circle, South Main Street, Lovelace Lane, Wallen Way, South Tessier Street, North Tessier Street, Tessier Lane, Hudson Street, Spring Hill Avenue, Elston Avenue, Marion Drive, Robin Road, Jon Circle, Erica Drive, Heather Hill, Delmar Drive, Paul Place, Sheryl Drive, Susanne Drive
05-24-05	Set Trap	Northbridge Water Treatment Plant – Providence Road
05-25-05	Pick Up Trap	Northbridge Water Treatment Plant – Providence Road
05-31-05	Catch Basin Larviciding [309]	Gelinas Avenue, Thomas Street, McQuade Lane, Wards Lane, Raymond Avenue, Upton Street, Edmond Street, School Street, Church Avenue, Beane's Way, Taft Street, Legion Way, Plantation Street, McBride Street, Arrowhead Avenue, Duggan Way, Brookway Drive, Beech Street, Allyn Road, Macarthur Road, Puddon Street, Quaker Street, Providence Road, Fowler Road, Ash Street, Bartlett Street, Fowler Avenue, Hill Street, Green Meadow Court, Joan Court, Hillside Drive, Highland Street, Rumonoski Drive, Benson Street, Freedoms Way, Woodside Drive, Sean Drive, Kevin Court, Sherry Street
	Set Trap	Northbridge Water Treatment Plant – Providence Road
06-01-05	Pick Up Light Trap	Northbridge Water Treatment Plant – Providence Road
06-02-05	Administrative Contact	Police Department
	Public Relations	Railroad Street, Quaker Street, Arthur Street
	Landing Count	Quaker Street
	Adulticiding	Quaker Street, Arthur Street, Railroad Street
06-07-05	Set Trap	Northbridge Water Treatment Plant – Providence Road
06-08-05	Administrative Contact	Board Of Health
	Public Relations	A Street, Church Street, Mendon Street, Nicole Avenue, Thomas Street, Church Street,
	Landing Count	Church Street, Mendon Street, Nicole Avenue, Thomas Street, Providence Road, Church Street
	Catch Basin Larviciding [86]	Sutton Street, Cooper Road, Pollard Road
	Adulticiding	Nicole Avenue, Mendon Road, Church Street
	Pick Up Trap	Northbridge Water Treatment Plant – Providence Road
06-14-05	Set Trap	Northbridge Water Treatment Plant – Providence Road
06-15-05	Administrative Contact	Police Department
	Public Relations	Union Street, Nolet Street, Woodside Drive, Fowler Road, Jessica Way, Thomas Street
	Stream Survey	Nolet Street, Union Street
	Larviciding	Union Street
	Landing Count	Union Street, Woodside Drive, Jessica Way, Nolet Street
	Pick Up Trap	Northbridge Water Treatment Plant – Providence Road
06-21-05	Set Trap	Northbridge Water Treatment Plant – Providence Road
06-22-05	Administrative Contact	Police Department
	Public Relations	Thomas Street, Union Street, Nolet Street, Providence Street, Dudley Avenue, Woodside Drive, Jessica Way, Dudley Avenue, Fowler Road
	Landing Count	Providence Street, Woodside Road, Thomas Street
	Laval Survey	Marston Road
	Adulticiding	Union Street, Nolet Street, Providence Street, Dudley Avenue, Woodside Drive, Fowler Road, Jessica Way, Thomas Street
	Pick Up Trap	Northbridge Water Treatment Plant – Providence Road
06-28-05	Set Trap	Northbridge Water Treatment Plant – Providence Road

TOWN OF NORTHBRIDGE

DATE	WORK DONE	LOCATION
06-29-05	Public Relations	Church Street, Goldwaithe Road
	Adulticiding	Church Street, Goldwaithe Road
	Larval Survey	Mahoney Lane, Sutton Street, Pollard Road, Goldwaithe Road
	Stream Cleaning 10’	Goldwaithe Road
	Stream Cleaning 10’	Gendron Street
	Stream Cleaning 90’	Sutton Street
06-29-05	Culvert Cleaning (31)	Goldwaithe Road, Gendron Street, Sutton Street, Eisenhower Drive, Lincoln Circle Jefferson Avenue, Pollard Road, Kelly Road, Cooper Road
	Pick Up Trap	Northbridge Water Treatment Plant
07-07-05	Administrative Contact	Board Of Health
	Public Relations	Fletcher Street, Lea Avenue
	Landing Count	Church Street, School Street, Quaker Street
	Culvert Cleaning	School Street, Shining Rock Road
	Larval Survey	Shining Rock Road, School Street, Brookway Street, Quaker Street, Macarthur Drive, West Hill Road, Mendon Street
	Larviciding	Shining Rock Road, Quaker Street
	Catch Basin Larviciding [38]	Shining Rock Road, Clubhouse Lane, Fairway Drive
	Adulticiding	Fletcher Street, Lea Avenue
07-12-05	Set Trap	Northbridge Water Treatment Plant – Providence Road
07-13-05	Administrative Contact	Police Department
	Public Relations	Dudley Avenue, Lea Avenue
	Adulticiding	Dudley Avenue, Lea Avenue
	Larval Survey	Main Street, Purgatory Road, Conservation Drive, Lake Street, Cliffe Road, Hastings Drive, Castle Hill Road, Linwood Avenue, Union Street, Center Street, Louisa Drive, Carole Lane
	Larviciding	Carole Lane, Castle Hill Road, Linwood Avenue,
	Pick Up Trap	Northbridge Water Treatment Plant – Providence Road
07-19-05	Set Trap	Northbridge Water Treatment Plant – Providence Road
07-20-05	Administrative Contact	Police Department
	Public Relations	Arthur Drive, Union Street
	Landing Count	Union Street, Arthur Drive
	Adulticiding	Union Street, Arthur Drive
	Larval Survey	Arthur Drive
	Larviciding	Arthur Drive
	Pick Up Trap	Northbridge Water Treatment Plant – Providence Road
07-25-05	Public Relations	Union Lane
07-26-05	Set Trap	Northbridge Water Treatment Plant – Providence Road
07-27-05	Administrative Contact	Police Department
	Public Relations	Fletcher Road, Church Street
	Larval Survey	Castle Hill Road, Hastings Road, Cliffe Road, Shining Rock Road, Mendon Street, West Hill Road, Quaker Street
	Pick Up Trap	Northbridge Water Treatment Plant – Providence Road
08-02-05	Set Trap	Northbridge Water Treatment Plant – Providence Road
08-03-05	Administrative Contact	Police Department
	Public Relations	Church Street, Fletcher Road, Linwood Avenue, Union Street
	Larviciding	Union Street, Church Street, Fletcher Road, Linwood Avenue
	Larval Survey	Mahoney Lane, Sutton Street, Pollard Road, Sprague Street, Lincoln Circle, Eisenhower Drive, Adams Circle, Eisenhower Drive, Kristen Court, Jessica Way
	Pick Up Trap	Northbridge Water Treatment Plant – Providence Road
08-09-05	Set Trap	Northbridge Water Treatment Plant – Providence Road
08-10-05	Administrative Contact	Police Department
	Public Relations	Fletcher Street, Goldwaithe Road
	Adulticiding	Fletcher Street
	Larval Survey	Kelly Road, Cooper Road, Sutton Street, Violette Circle, Brian Circle, Smith Street, Sutton Street, South Main Street, South Tessier Street
	Pick Up Trap	Northbridge Water Treatment Plant – Providence Road
08-16-05	Set Trap	Northbridge Water Treatment Plant – Providence Road

DATE	WORK DONE	LOCATION
08-17-05	Administrative Contact	Police Department
	Public Relations	Goldthwaite Road, Railroad Street, Union Street, Nolet Street, Arthur Drive
	Pick Up Trap	Northbridge Water Treatment Plant – Providence Road
	Adulticiding	Goldthwaite Road
	Larval Survey	Union Street, Nolet Street, Arthur Drive, Riverdale Street, Sheryl Drive, Susanne Drive, Jon Circle, Highland Street, Fowler Road, Trajanowski Avenue, Rumonoski Drive, Goldthwaite Road
	Larviciding	Railroad Street, Nolet Street, Riverdale Street
08-18-05	Administrative Contact	Police Department, Board Of Health
	Public Relations	Eben Chamberlain Road
	Larval Survey	Macarthur Drive, Brookway Street, Center Street, Union Street, Lake Street, Carole Lane, Prentice Road
	Larviciding	School Street, Conservation Drive, Purgatory Road
08-23-05	Set Trap	Northbridge Water Treatment Plant - Providence Road
08-24-05	Administrative Contact	Police Department
	Public Relations	Thomas Street, Lea Avenue, Church Street
	Adulticiding	Thomas Street, Lea Avenue, Church Street
	Larval Survey	Kelly Road, Cooper Road, Sutton Street, Violette Circle, Brian Circle, Smith Street, Sutton Street, South Main Street, South Tessier Street
	Pick Up Trap	Northbridge Water Treatment Plant – Providence Road
08-30-05	Set Trap	Northbridge Water Treatment Plant – Providence Road
08-31-05	Pick Up Trap	Northbridge Water Treatment Plant – Providence Road
09-06-05	Set Trap	Northbridge Water Treatment Plant – Providence Road
09-07-05	Pick Up Trap	Northbridge Water Treatment Plant – Providence Road
09-08-05	Administrative Contact	Police Department, Board Of Health
	Public Relations	Moon Hill Road
	Adulticiding	Moon Hill Road
09-13-05	Set Trap	Northbridge Water Treatment Plant – Providence Road
09-14-05	Pick Up Trap	Northbridge Water Treatment Plant – Providence Road
09-20-05	Set Trap	Northbridge Water Treatment Plant – Providence Road
09-21-05	Pick Up Trap	Northbridge Water Treatment Plant – Providence Road
09-27-05	Set Trap	Northbridge Water Treatment Plant – Providence Road
09-29-05	Pick Up Trap	Northbridge Water Treatment Plant – Providence Road
10-21-05	Stream Cleaning 20’	Prentice Street
	Stream Cleaning 10’	Main Street
	Stream Cleaning 10’	Fletcher Street
	Stream Cleaning 10’	Marston Road
	Stream Cleaning 25’	Carpenter Road
	Stream Cleaning 15’	Lake Street
	Stream Cleaning 5’	Crescent Street
	Stream Cleaning 15’	Hill Street
	Stream Cleaning 10’	Hill Street
	Stream Cleaning 15’	Sutton Street
	Stream Cleaning 20’	Sutton Street
	Stream Cleaning 10’	Sutton Street
	Culvert Cleaning (27)	Carr Street, Prentice Street, Main Street, Cliffe Road, Douglas Road, Castle Hill Road, Fletcher Street, Marston Road, Samuel Road, Carpenter Road, Lake Street, Crescent Street, Hill Street, North Street, Sutton Street, Heights At Hill
11-07-05	Stream Cleaning 525’	Heritage Park
	Brush Cutting 525’	Heritage Park
11-08-05	Stream Cleaning 150’	Heritage Park
12-02-05	Stream Cleaning 135’	Benson Road
	Stream Cleaning 25’	Highland Street
	Stream Cleaning 70’	Highland Street
	Stream Cleaning 20’	Highland Street
	Stream Cleaning 210’	Highland Street
	Stream Cleaning 15’	Highland Street
	Stream Cleaning 5’	Benson Road
	Stream Cleaning 35’	Fowler Road
	Stream Cleaning 10’	Fowler Road
	Culvert Cleaning (26)	Benson Road, Highland Street, Benson Road, Woodside

DATE	WORK DONE	LOCATION
		Drive, Marion Drive, Sheryl Drive, Robin Road, Fowler Road, Kelly Road
12-06-05	Stream Cleaning 20’	Cooper Road
	Stream Cleaning 60’	Cooper Road
	Stream Cleaning 35’	Cooper Road
	Stream Cleaning 25’	Cooper Road
	Stream Cleaning 10’	Sutton Road
	Stream Cleaning 10’	Eisenhower Drive
	Stream Cleaning 40’	Eisenhower Drive
	Stream Cleaning 35’	Sutton Street
	Stream Cleaning 50’	Jessica Way
	Stream Cleaning 15’	Jessica Way
	Stream Cleaning 10’	School Street
	Stream Cleaning 20’	Shining Rock Drive
	Stream Cleaning 30’	Church Street
	Stream Cleaning 30’	School Street
	Stream Cleaning 10’	Quaker Street
	Stream Cleaning 15’	Quaker Street
	Stream Cleaning 25’	Quaker Street
	Stream Cleaning 5’	Quaker Street
	Stream Cleaning 35’	Church Street
	Stream Cleaning 10’	Church Street
	Stream Cleaning 15’	Quaker Street
	Stream Cleaning 20’	Quaker Street
	Stream Cleaning 10’	Quaker Street
	Stream Cleaning 10’	Quaker Street
	Stream Cleaning 15’	Quaker Street
	Stream Cleaning 20’	Mendon Road
	Stream Cleaning 5’	Moon Hill Road
	Stream Cleaning 5’	Mendon Road
	Stream Cleaning 15’	Mendon Road
	Stream Cleaning 20’	Mendon Road
	Culvert Cleaning (42)	Cooper Road, Gendron Street, Sutton Road, Eisenhower Drive, Sutton Road, Jessica Way, School Street, Shining Rock Drive, Church Street, School Street, McArthur Road, Quaker Street, Church Street
12-08-05	Stream Cleaning 30’	Sutton Street
	Stream Cleaning 35’	Sutton Street
	Stream Cleaning 10’	Sutton Street
	Stream Cleaning 10’	Sutton Street
	Stream Cleaning 10’	Hill Road
	Stream Cleaning 15’	Kings North Street
	Stream Cleaning 25’	Hill Road
	Stream Cleaning 35’	Carpenter Road
	Stream Cleaning 20’	Carpenter Road
	Stream Cleaning 20’	Prentice Road
	Stream Cleaning 20’	Prescott Road
	Stream Cleaning 5’	Hastings Drive
	Stream Cleaning 25’	Fletcher Street
	Stream Cleaning 35’	Keeler Road
	Culvert Cleaning (27)	Sutton Street, Hill Road, Kings North Street, Samuel Drive, Carpenter Road, Burdon Road, Carr Street, Prentice Road, Main Street, Gilmore Drive, Prescott Road, Castle Hill Road, Hastings Drive, Douglas Road, Fletcher Street, Keeler Road
12-28-05	Stream Cleaning 45’	Cedar Street
	Stream Cleaning 20’	Cedar Street
	Stream Cleaning 10’	Driscoll Lane
	Stream Cleaning 20’	Devon Drive
	Stream Cleaning 20’	Providence Road
	Stream Cleaning 10’	Providence Road
	Stream Cleaning 100’	Providence Road
	Stream Cleaning 20’	Providence Road
	Stream Cleaning 40’	Providence Road
	Stream Cleaning 10’	Providence Road
	Stream Cleaning 30’	Providence Road
	Stream Cleaning 75’	Providence Road

DATE	WORK DONE	LOCATION
	Stream Cleaning 15’	South Main Street
	Stream Cleaning 15’	Wing Road
12-28-05	Culvert Cleaning (30)	Cedar Street, Driscoll Lane, Union Street, Center Street, Devon Drive, Providence Road, Henry Street, Riverdale Street, Mahoney Lane, South Main Street, North Tessier Street, South Tessier Street, Wing Road

2005 Mosquito Surveillance Data

NORTHBRIDGE

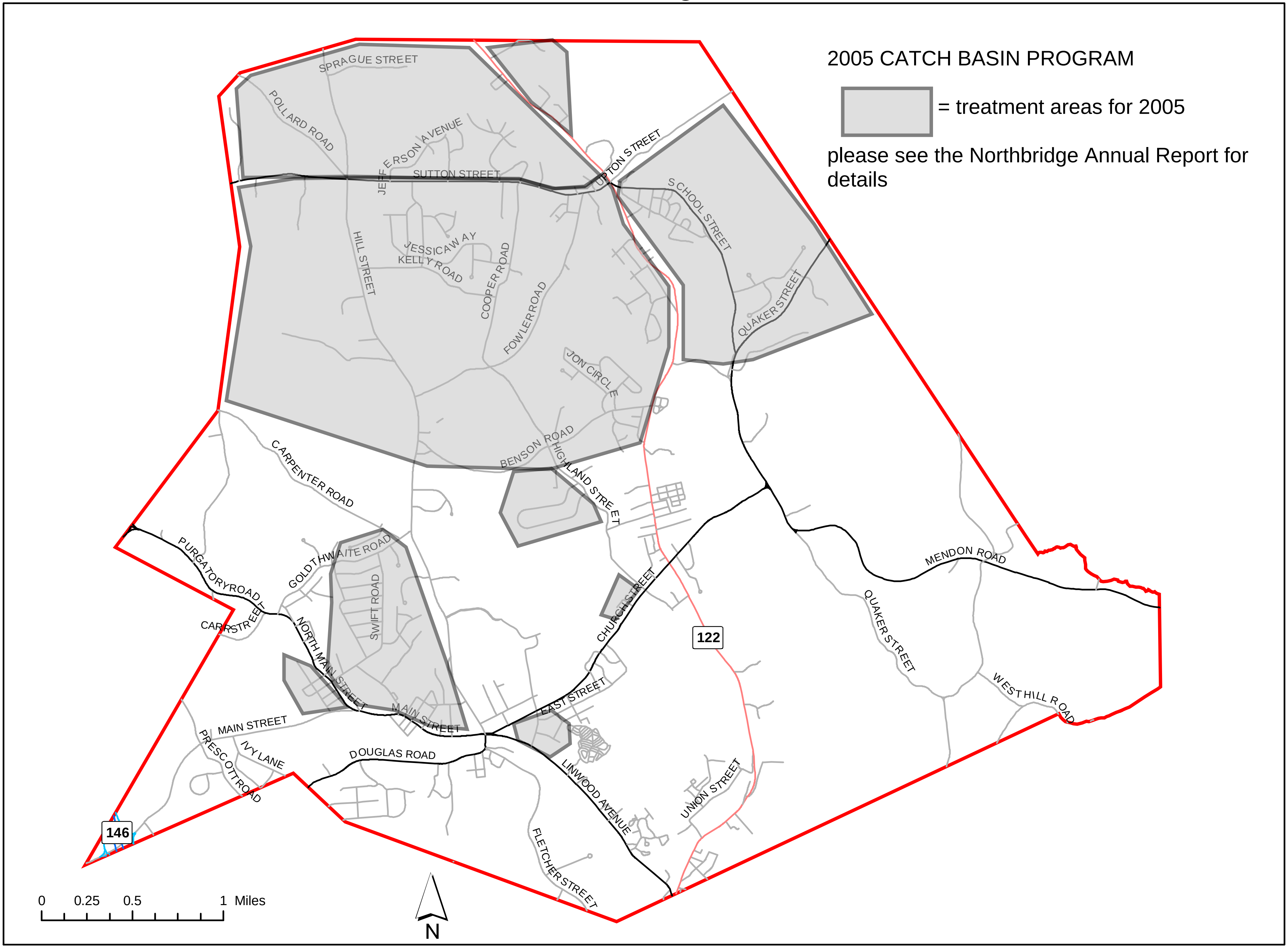
#	Town	Date	Pool ID	# Traps	Trap Site	Pool Size	Species	Result	Virus Type
1	Northbridge	6/14/2005	CM05-00038	1	Providence St. Treatment Plant	2	*Cs. melanura*	Negative	
2	Northbridge	6/14/2005	CM05-00039	1	Providence St. Treatment Plant	50	*Cx. species*	Negative	
3	Northbridge	6/14/2005	CM05-00040	1	Providence St. Treatment Plant	41	*Cx. species*	Negative	
4	Northbridge	6/21/2005	CM05-00071	1	Providence St. Treatment Plant	2	*Cs. melanura*	Negative	
5	Northbridge	6/21/2005	CM05-00072	1	Providence St. Treatment Plant	32	*Cx. species*	Negative	
6	Northbridge	6/21/2005	CM05NS-00209	1	Providence St. Treatment Plant	4	*Cq. perturbans*	N/S	
7	Northbridge	6/21/2005	CM05NS-00210	1	Providence St. Treatment Plant	1	*Ae. vexans*	N/S	
8	Northbridge	6/21/2005	CM05NS-00211	1	Providence St. Treatment Plant	5	*Oc. excrucians*	N/S	
9	Northbridge	6/28/2005	CM05-00140	1	Providence St. Treatment Plant	45	*Cx. species*	Negative	
10	Northbridge	6/28/2005	CM05NS-00356	1	Providence St. Treatment Plant	0	*Mixed Species*	N/S	
11	Northbridge	7/12/2005	CM05NS-00537	1	Providence St. Treatment Plant	2	*Ae. vexans*	N/S	
12	Northbridge	7/12/2005	CM05NS-00538	1	Providence St. Treatment Plant	1	*Oc. trivittatus*	N/S	
13	Northbridge	7/12/2005	CM05NS-00539	1	Providence St. Treatment Plant	1	*An. punctipennis*	N/S	
14	Northbridge	7/12/2005	CM05NS-00540	1	Providence St. Treatment Plant	1	*Oc. excrucians*	N/S	
15	Northbridge	7/12/2005	CM05NS-00541	1	Providence St. Treatment Plant	9	*Cq. perturbans*	N/S	
16	Northbridge	7/19/2005	CM05-00302	1	Providence St. Treatment Plant	2	*Cs. melanura*	Negative	
17	Northbridge	7/19/2005	CM05-00303	1	Providence St. Treatment Plant	35	*Cx. species*	Negative	
18	Northbridge	7/19/2005	CM05NS-00780	1	Providence St. Treatment Plant	1	*Oc. japonicus*	N/S	
19	Northbridge	7/26/2005	CM05-00361	1	Providence St. Treatment Plant	2	*Cx. species*	Negative	
20	Northbridge	7/26/2005	CM05-00362	1	Providence St. Treatment Plant	4	*Cx. species*	Negative	
21	Northbridge	7/26/2005	CM05NS-00948	1	Providence St. Treatment Plant	0	*Mixed Species*	N/S	
22	Northbridge	7/26/2005	CM05NS-01144	1	Providence St. Treatment Plant	1	*Ae. vexans*	N/S	
23	Northbridge	7/26/2005	CM05NS-01145	1	Providence St. Treatment Plant	3	*Cq. perturbans*	N/S	
24	Northbridge	8/2/2005	CM05NS-01259	1	Providence St. Treatment Plant	1	*Ae. vexans*	N/S	
25	Northbridge	8/2/2005	CM05NS-01260	1	Providence St. Treatment Plant	1	*Oc. triseriatus*	N/S	
26	Northbridge	8/2/2005	CM05NS-01261	1	Providence St. Treatment Plant	1	*An. punctipennis*	N/S	
27	Northbridge	8/2/2005	CM05NS-01281	1	Providence St. Treatment Plant	4	*Ae. vexans*	N/S	
28	Northbridge	8/2/2005	CM05NS-01282	1	Providence St. Treatment Plant	17	*Cq. perturbans*	N/S	
29	Northbridge	8/9/2005	CM05-00520	1	Providence St. Treatment Plant	50	*Cx. species*	Negative	
30	Northbridge	8/9/2005	CM05-00521	1	Providence St. Treatment Plant	41	*Cx. species*	Negative	
31	Northbridge	8/16/2005	CM05-00581	1	Providence St. Treatment Plant	1	*Cx. species*	Negative	
32	Northbridge	8/16/2005	CM05NS-01371	2	Providence St. Treatment Plant	2	*An. punctipennis*	N/S	
33	Northbridge	8/16/2005	CM05NS-01372	2	Providence St. Treatment Plant	1	*An. quadrimaculatus sl*	N/S	
34	Northbridge	8/16/2005	CM05NS-01373	2	Providence St. Treatment Plant	3	*Cq. perturbans*	N/S	
35	Northbridge	8/16/2005	CM05NS-01374	2	Providence St. Treatment Plant	1	*Oc. excrucians*	N/S	

2005 Mosquito Surveillance Data

NORTHBRIDGE

#	Town	Date	Pool ID	# Traps	Trap Site	Pool Size	Species	Result	Virus Type
36	Northbridge	8/16/2005	CM05NS-01375	2	Providence St. Treatment Plant	4	*Cs. morsitans*	N/S	
37	Northbridge	8/16/2005	CM05NS-01376	2	Providence St. Treatment Plant	2	*Oc. trivittatus*	N/S	
38	Northbridge	8/23/2005	CM05-00645	2	Providence St. Treatment Plant	50	*Cx. species*	Negative	
39	Northbridge	8/23/2005	CM05-00646	2	Providence St. Treatment Plant	50	*Cx. species*	Negative	
40	Northbridge	8/23/2005	CM05-00647	2	Providence St. Treatment Plant	2	*Cs. melanura*	Negative	
41	Northbridge	8/23/2005	CM05-00648	2	Providence St. Treatment Plant	50	*Cx. species*	Negative	
42	Northbridge	8/23/2005	CM05-00649	2	Providence St. Treatment Plant	50	*Cx. species*	Negative	
43	Northbridge	8/23/2005	CM05NS-01751	2	Providence St. Treatment Plant	2	*Cq. perturbans*	N/S	
44	Northbridge	8/23/2005	CM05NS-01752	2	Providence St. Treatment Plant	2	*An. quadrimaculatus sl*	N/S	
45	Northbridge	8/23/2005	CM05NS-01753	2	Providence St. Treatment Plant	1	*An. punctipennis*	N/S	
46	Northbridge	8/23/2005	CM05NS-01754	2	Providence St. Treatment Plant	1	*Oc. triseriatus*	N/S	
47	Northbridge	8/30/2005	CM05NS-01864	2	Providence St. Treatment Plant	1	*Oc. japonicus*	N/S	
48	Northbridge	9/6/2005	CM05-00808	2	Providence St. Treatment Plant	50	*Cx. species*	Negative	
49	Northbridge	9/6/2005	CM05-00809	2	Providence St. Treatment Plant	50	*Cx. species*	Negative	
50	Northbridge	9/6/2005	CM05-00810	2	Providence St. Treatment Plant	26	*Cx. species*	Negative	
51	Northbridge	9/6/2005	cm05ns-02006	2	Providence St. Treatment Plant	1	*Oc. triseriatus*	N/S	
52	Northbridge	9/13/2005	cm05-00939	2	Providence St. Treatment Plant	2	*Cx. species*	Negative	
53	Northbridge	9/13/2005	CM05-00940	2	Providence St. Treatment Plant	7	*Ae. vexans*	Negative	
54	Northbridge	9/20/2005	CM05NS-02186	2	Providence St. Treatment Plant	3	*Ae. vexans*	N/S	
55	Northbridge	9/20/2005	CM05NS-02187	2	Providence St. Treatment Plant	1	*An. punctipennis*	N/S	
56	Northbridge	9/20/2005	CM05NS-02188	2	Providence St. Treatment Plant	1	*Cs. morsitans*	N/S	
57	Northbridge	9/20/2005	CM05NS-02189	2	Providence St. Treatment Plant	3	*Oc. japonicus*	N/S	
58	Northbridge	9/27/2005	CM05-01117	2	Providence St. Treatment Plant	6	*Cx. species*	Negative	
		24 pools submitted				**732**	**mosquitoes collected**		
		NO VIRUS IDENTIFIED IN 2005				**N/S= Not Submitted for testing**			

Northbridge



2005 SUMMARY

The Central Massachusetts Mosquito Control Project (the Project) currently provides its services to 36 cities and towns throughout Middlesex and Worcester Counties. The Project's headquarters is located at 111 Otis Street, Northboro, MA. Tours of the headquarters or visits to field work sites may be arranged by calling the office in advance. Please call (508) 393-3055 during business hours for more information. The Project practices Integrated Mosquito Management (IMM), blending state of the art methods and techniques with expertise, experience, and scientific research to provide our member communities with environmentally sound and cost effective mosquito control.

During 2005 the Project received seven thousand and eighty five (7,085) requests for service from town residents and officials. A total of over six thousand (6,000) pounds of Bti (*Bacillus thuringiensis israelensis*) was applied by helicopter in 2 towns, Chelmsford & Billerica, and seven thousand, two hundred and ninety nine (7,299) pounds by hand throughout our service area were applied to area wetlands to reduce the emergence of adult mosquitoes. This represents over two thousand and sixty (2,060) acres of wetland that was treated with this mosquito-specific bacterium, significantly reducing adult mosquito populations in these areas. Thirty two thousand, for hundred and forty four (32,444) catch basins were treated with larvicidal product to control the mosquitoes that seek out these cool dark wet areas to breed, including the *Culex* mosquito, a major target for West Nile Virus transmission. Seven thousand, seven hundred and thirty seven (7,737) culverts were cleaned in an attempt to eliminate unnecessary standing water and reduce mosquito breeding. This work was done in conjunction with cleaning, clearing, and digging of one hundred and sixty eight thousand, three hundred and fifty two (168,352) feet of streams, brooks and ditches. This represents almost thirty two (32) miles of waterways which were cleaned and improved by Project personnel in 2005.

The Mosquito Awareness Program which we offer to elementary schools and other civic organizations in our district has become very popular. Project staff meets with students, teachers or concerned residents to discuss mosquito biology, mosquito habitat, and control procedures. Much of the presentation is directed towards what children and their families can do to prevent mosquitoes from breeding around their homes. Slides, videos, coloring books and other handouts make this an interesting program. This program is tailored to meet the needs of the specific audience. One thousand, six hundred and nineteen (1,619) students attended these programs.

As part of our effort to reduce the need for pesticides we continue to expand our wetlands restoration program. By cleaning clogged and overgrown waterways, mosquito breeding can be reduced and drainage areas are restored to historic conditions.

Bti mosquito larvicide is used to treat areas where mosquito larvae are found. We routinely check known breeding sites kept in out database, but also encourage the public to notify us of any areas they suspect could breed mosquitoes. Our field crews will investigate all such requests and treat the area only if surveillance gathered at the time shows an imminent threat of mosquito emergence.

Our goal is to manage all mosquito problems with education, wetlands restoration or larviciding, but we recognize that there are times when adult mosquito spraying is the only viable solution. In such cases specific areas are treated with either hand-held or pickup truck mounted sprayers if surveillance gathered at the time exceeds a pre-determined threshold to warrant an application. This program is offered on a **request-only** basis, and the exclusion process allows residents and/or town officials to exclude areas under their control from this or any part of our program.

The Project's surveillance program monitors adult mosquito and larval population density, and is the backbone for prescribing various control techniques. Specialized mosquito traps are deployed throughout the Project's service area to sample for mosquitoes that may be transmitting mosquito-borne diseases. In conjunction with the Mass. Dept. of Public Health we sample in areas suspected of harboring WNV and other viruses. One thousand, one hundred and fifty three (1,153) pools (collections) of mosquitoes totaling eleven thousand, nine hundred and twenty eight (11,928) specimens were tested for mosquito-borne viruses this year. Two (2) pools of *Cs. melanura* in Westborough were confirmed to be infected with the EEE virus. 6 pools of West Nile Virus were confirmed, 4 in Westborough (3 *Culex* and 1 *Cs. melanura*) and one each in Holliston and Wilmington, both *Culex* species. MDPH identified EEE in Holliston but subsequent surveillance did not confirm any additional virus isolates. No human or horse cases were identified with WNV or EEE in 2005 in our service area.

Educational pamphlets are available to anyone interested in learning about mosquito control and the services provided by the Project, and these items are routinely stocked in member Town/City Halls and libraries. Display boards with information on our program are rotated through area Town Halls throughout the year. We also have a website, **www.cmmcp.org** that has extensive information on mosquito biology, our control procedures, etc. This website has become a model for other Mosquito Projects and has been widely used throughout our service area and beyond.

We would like to thank you for your support during 2005 and we look forward to helping you and your community with its mosquito problems in 2006 and beyond.