

THE COMMONWEALTH OF MASSACHUSETTS
STATE RECLAMATION & MOSQUITO CONTROL BOARD

CENTRAL MASSACHUSETTS MOSQUITO CONTROL PROJECT

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www.cmmcp.org



ANNUAL REPORT 2009



PREFACE

The 2009 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 Pest Management (IPM) program. IPM 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



Member,
Northeastern
Mosquito Control
Association



Sustaining Member,
American
Mosquito Control
Association



Partner,
EPA Pesticide
Environmental
Stewardship Program



Member,
New Jersey
Mosquito Control
Association

THE COMMONWEALTH OF MASSACHUSETTS

State Reclamation & Mosquito Control Board
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LIST OF MEMBER COMMUNITIES - 2009

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
LANCASTER	27.70
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

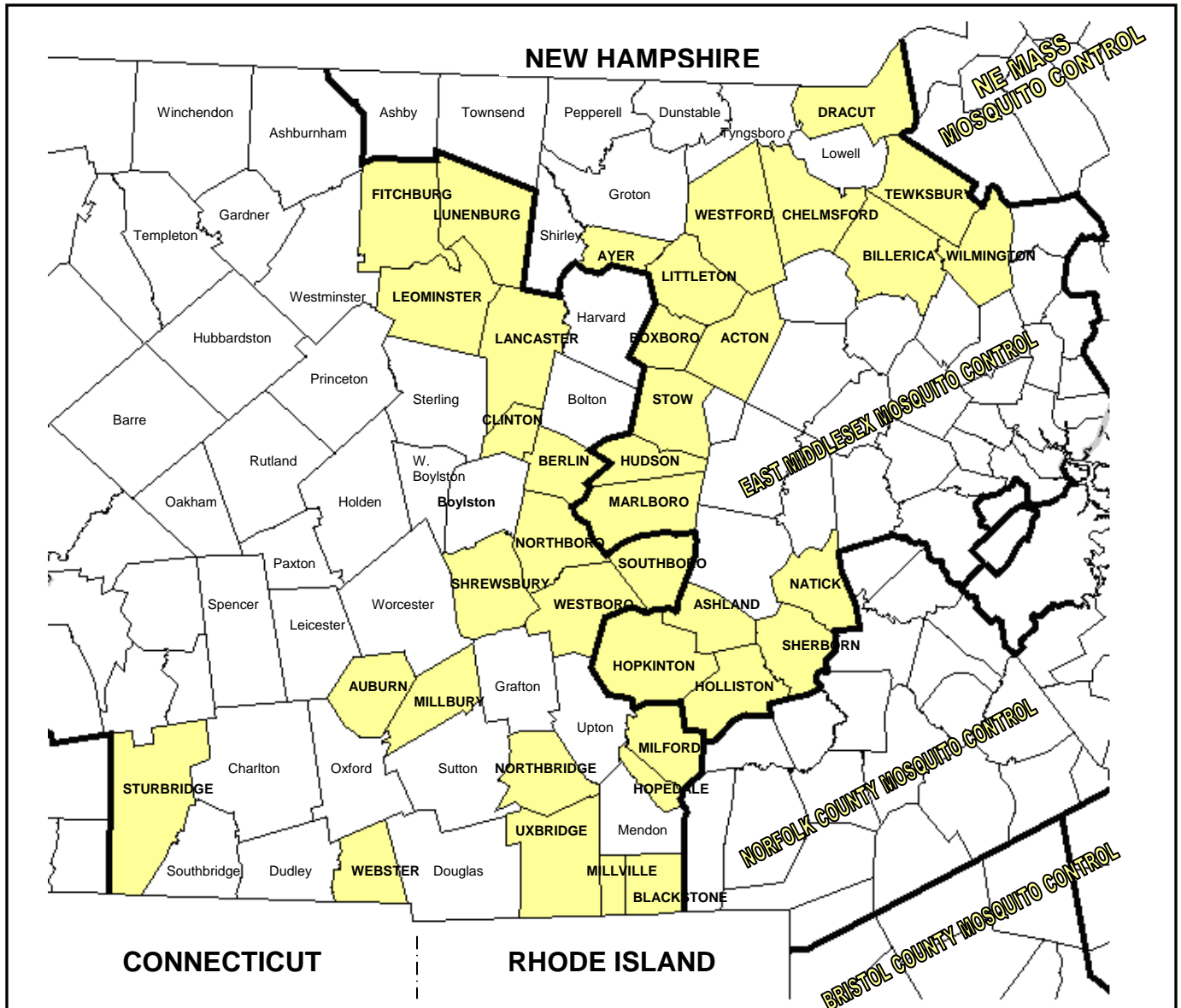
DISTRICT FIVE

AUBURN	15.40
BLACKSTONE	10.90
MILLBURY	15.70
MILLVILLE	4.92
NORTHBRIDGE	17.20
STURBRIDGE	37.40
UXBRIDGE	29.50
WEBSTER	12.50

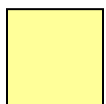
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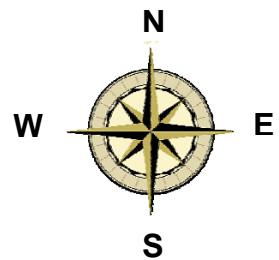
699.57

CMMCP SERVICE AREA



~ 2009 ~

 = member towns



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, 2009

The mission of the Medical Entomology Laboratory is to refine and maximize the CMMCP's ongoing effort to control mosquitoes. During 2009 Medical Entomology Laboratory personnel carried this mission forward in the following ways.

Medical Entomology Laboratory personnel made 63 educational presentations before 1,986 elementary school students in 15 Elementary schools. The students learned about the life cycle and biology of mosquitoes. They also learned what they could do to control the mosquito population around their own home and how to protect themselves from nuisance mosquitoes.

The laboratory also acquired five additional Modified Reiter Gravid Traps. Modified Reiter Gravid Traps are used to monitor the adult mosquito population for West Nile virus. Modified Reiter Gravid Traps are attractive to the mosquito species thought most likely to have a role in the maintenance and spread of West Nile virus in the United States of America.

CMMCP personnel constructed Resting Boxes to add to the Laboratory's array of mosquito traps. Resting boxes are attractive to *Culiseta melanura* the mosquito species known to play a part in the transmission cycle of Eastern Equine encephalitis. A Resting Box is made from plywood and measures one cubic foot in size. One side of the box is open. The box is painted black on the outside and red on the inside. The black color is attractive to mosquitoes that come to rest inside the box. The red colored interior of the box makes it easier for the collector to see the mosquitoes resting inside the box. One or more boxes are set out in a habitat favored by *Cs. melanura* mosquitoes. When the time comes to check the trap the collector first closes the open end of the box with a Plexiglas cover. Then the collector injects a chemical spray into the box which anesthetizes any adult mosquitoes which have come to rest in the box. The collector vacuums up the adult mosquitoes with a battery operated aspirator and places them in a cooler with cold packs. The mosquitoes are brought back to the laboratory for processing.

During 2009, four interns were employed for the season to operate the mosquito surveillance traps and assist in the identification of mosquitoes. CMMCP staff also participated in the operation of surveillance traps. Using their knowledge of mosquito behavior and the local terrain, these skilled and experienced personnel monitored the adult mosquito population.

CMMCP personnel made and processed 1,565 collections this season. The collections contained 37,230 adult mosquitoes which were identified to species. Twenty-six mosquito species were represented in the collections. Adult mosquitoes of species known to play a role in the transmission of disease were tested for the presence of West Nile virus and Eastern Equine Encephalitis virus.

Thirteen thousand, seven hundred and ninety-one mosquitoes (13,791) were determined to be suitable for virus testing. They were divided into 606 groups or pools. These pools of mosquitoes were tested for West Nile and Eastern Equine virus infection. Three of these pools tested positive for West Nile virus. Three of these pools tested positive for Eastern Equine Encephalitis. The findings are listed below.

The CMMCP increased surveillance of mosquitoes in these areas in response to the positive test results. Mosquito control measures were augmented as well. The data from these collections was shared with the Massachusetts Department of Public Health. The surveillance indicates that these pathogens were circulating in the local environment during 2009.

Modern, scientifically based mosquito control has many facets. These include public education, surveillance, water management and control of immature and adult mosquitoes. Medical Entomology Laboratory personnel are committed to advancing all facets of mosquito control. Such a commitment will further enable the Central Massachusetts Mosquito Control Project to provide its member communities with quality mosquito control.

Respectfully submitted,
 Curtis R. Best, Staff Entomologist

Collection Date	Species	Town	Test Type	Result
8/4/2009	<i>Culex species</i>	Westborough	WNV	Positive
8/6/2009	<i>Culex species</i>	Westford	WNV	Positive
9/2/2009	<i>Culex species</i>	Shrewsbury	WNV	Positive
9/22/2009	<i>Culiseta melanura</i>	Webster	EEE	Positive
9/22/2009	<i>Culiseta melanura</i>	Leominster	EEE	Positive
10/9/2009	<i>Culiseta melanura</i>	Webster	EEE	Positive

WNV Surveillance Summary - Statewide	2009
Mosquito Pools Positive	26
Animals Positive	1
Humans Positive	0
EEE Surveillance Summary - Statewide	2009
Mosquito Pools Positive	54
Animals Positive	3
Humans Positive	0
CMMCP Surveillance Summary	2009
Mosquitoes Collected and Identified	37,230
Mosquito Pools Submitted for testing	606 (13,791 specimens)
Mosquito Pools Positive WNV	3
Animals Positive	0
Humans Positive	0
Mosquito Pools Positive EEE	3
Animals Positive	0
Humans Positive	0

**Central Mass. Mosquito Control Project
2009 SEASON SUMMARY**

Cumulative Surveillance Summary

Target Species	Ae. vex	Cq. per	Cs. mel	Oc. can	Culex	All Species
No. Pools	136	269	355	180	888	3786
Total Specimens	836	10578	2114	852	13980	37274
No. Pools WNV +	0	0	0	0	3*	3*
No. Pools EEE +	0	0	3*	0	0	3*

- *Pool of WNV+ Culex Species collected in Westborough on 8/4/09
- *Pool of WNV+ Culex Species collected in Westford on 8/6/09
- *Pool of WNV+ Culex Species collected in Shrewsbury on 9/2/09
- *Pool of EEE+ Culiseta melanura collected in Webster on 9/22/09
- *Pool of EEE+ Culiseta melanura collected in Leominster on 9/22/09
- *Pool of EEE+ Culiseta melanura collected in Webster on 10/9/09

Weather Summary (Northborough, MA): This mosquito season was extremely wet. Statewide monthly rainfall averages were as follows: May-4.04" (CMMCP/Northborough 2.71"); June-5.84" (CMMCP/Northborough 4.2"); July-7.80" (CMMCP/Northborough 12.1"); August-4.15" (CMMCP/Northborough 3.75"); September-2.21" (CMMCP/Northborough 2.41").

CMMCP 2009 Mosquito Summary-

Target Species	Δ From Last Year's Final Totals	Predominant Trap Sites
Aedes vexans	-69.86%	Westborough, Dracut
Coquillettidia perturbans	-32.32%	Leominster, Tewksbury, Westborough
Culiseta melanura	+31.06%	Holliston, Boxborough
Ochlerotatus canadensis	-46.82%	Westborough, Hopkinton, Westford
Culex Species	+13.95%	Auburn, Northborough, Leominster
All Species	-7.240%	Leominster, Westford, Westborough

The predominant mosquito species for the 2009 surveillance season was Culex Species (~37.51% of total specimens collected) followed by Coquillettidia perturbans (~28.38% of total specimens collected). 606 pools of mosquitoes comprising 13,791 mosquitoes were sent into Jamaica Plain for testing.

Requests for service, especially adulticiding, showed a 28.5% increase over 2008 with a total of 12,800 calls. All requests for service this year totaled 13,614.

Frank Cornine, Field Biologist
Tim Deschamps, Executive Director

FIELD BIOLOGIST REPORT 2009

The Research and Efficacy Department continued many projects during 2009, including the observation for resistance in field collected mosquitoes to ANVIL® 10+10 using bottle assays, and the study of host-seeking activity for several mosquito species in the CMMCP service area. This year the Norfolk County Mosquito Control Project contributed data to the host-seeking activity study. Results from this study were presented during December at the 55th Annual Northeastern Mosquito Control Association Meeting, held in Sturbridge, MA. The presentation was well received by those in attendance.

This was the third full, consecutive season of conducting bottle assays for level of resistance in local mosquito populations to ANVIL® 10+10. By introducing mosquitoes into test bottles coated with a baseline concentration of diluted ANVIL® 10+10 we are able to observe to what degree if any, the collected CMMCP service area mosquitoes are developing resistance. Simultaneously conducting bottles without the presence of test product served as a control measure. Again, the observations from these bottle assays did not indicate a need for change in adulticide product at this time.

The host-seeking activity study was continued this season with the addition of collections from the Norfolk County Mosquito Control Project. Using programmable collection devices that segregate collections according to specific time periods, we are able to observe when targeted species are most active. Knowledge of when these species are most active has direct control implications because mosquitoes in flight have the highest probability to contact product, and so are most susceptible to adulticide control measures. Because species have different host-seeking activity behaviors, control methods may have to become more fluid depending on the local population dynamics and virus levels in order to maximize efficacy. Species of interest in this study included *Culex pipiens/restuans* complex, *Culiseta melanura*, *Ochlerotatus canadensis*, *Psorophora ferox*, *Coquillettidia perturbans*, *Aedes vexans*, *Anopheles quadrimaculatus* and *Anopheles punctipennis*.

As in past seasons, weekly mosquito surveillance reports were produced for the CMMCP service area, which included regional species population graphs, virus findings, yearly comparisons, and weather data. These reports were posted on the CMMCP website for residents, state and local officials. These weekly surveillance reports were also distributed to the State Reclamation Board, the Mass. Department of Public Health, and to the CMMCP Board of Commission. The mosquito surveillance program itself was assisted in several ways this past year. Seasonal staff were trained, while equipment and trap sites were maintained. Select mosquito surveillance traps were also set and collected. A seasonal intern assisted in many aspects of the department, including bottle assays and trap deployment, freeing up valuable time for mosquito identification.

Updates and advancements were made to the CMMCP geographic information system (GIS). A GIS layer updates included streets surveyed/treated in the catch basin larvicide program, wetlands treated in the aerial larvicide program, trap site locations from the mosquito surveillance program, and also statewide virus activity. Updates were also made for the NHESP Memorandum layers, with maps created and distributed to the CMMCP Wetlands Coordinator. Several maps were produced for the field technicians including standard town maps for use in the adulticide program, culvert cleaning and reference for catch basin larviciding. Maps were also created for select wetlands restoration jobs to examine the level of mosquito activity through service requests, historic larvicide sites, and virus activity.

Public education was conducted in several different ways. Assistance with the Elementary School presentations occurred in the spring with great success. "Mosquito Control in Central Massachusetts- an Overview," was also presented to a local Rotary club informing them of all aspects of CMMCP. As more public education opportunities arise, efforts will be made to accommodate.

Several training opportunities were taken during this past year, including two webinars presented by the American Mosquito Control Association entitled "What is an integrated mosquito management program," and "Dispelling myths about mosquito control utilizing the media." Training in the packaging and shipping of Division 6.2 materials and dry ice by the National Laboratory Training Network was successfully taken. GIS course "Understanding Map Projections and Coordinate Systems" by ESRI was also completed this year. Retaining current licenses and advancing through educational opportunities will be continued in 2010, with the Research and Efficacy Department also assisting other CMMCP departments.

Respectfully submitted,
Frank H. Cornine III, Field Biologist

WETLANDS RESTORATION PROGRAM REPORT 2009

INTENT AND PURPOSE OF PROGRAM:

Wetland restoration is an important part of the CMMCP's Integrated Pest Management (IPM) plan for mosquito control. The intent of the program is to improve the flow of water in degraded ditch systems through ditch maintenance and restoration projects. These projects will effectively reduce stagnant breeding sites, and can reduce or often eliminate the need for periodic applications of pesticides.

Wetland restoration/water management projects are conducted per the *Massachusetts Best Management Practices and Guidance for Mosquito Control* and the addendum entitled *Mechanical Wetlands Management Activity Post-Monitoring Guidelines*.

Projects are initiated with a phone call from a town resident or town official. Also, a member from the CMMCP staff may identify a site that could benefit from work. Once a site is brought to the attention of CMMCP, the Wetland Project Coordinator performs an assessment of the site. If the site is appropriate for work, a site survey, plan, and notifications are completed.

The site survey includes soil sampling, taking transects and cross sections of the ditch, and determining hydrological conditions. Wetlands are classified and sites are documented in the pre- and post-excavation states through a photographic record. Any historical information on the drainage system is obtained from local residents or town records. The data gathered in the field is used in combination with information acquired from maps and DEP wetland aerial photographs to develop a project site plan. The site plan includes the specifications that the field staff need in order to properly perform the project.

Once the site plan is completed, notification letters and permission slips are sent out to all property owners who would be affected by the project. In addition to the letters sent to property owners, notification letters are sent to DEP, the local conservation commission, and the US Army Corps of Engineers for all mechanized work using a low ground pressure excavator. The notification letter provides the agencies with a 30 day grace period prior to commencement of a project. During this time, the agencies have the opportunity to notify CMMCP of any concerns that they may have with a project. If there are legitimate concerns, a project may be modified, delayed or abandoned. If no issues are brought to the attention of CMMCP within the 30 day period, the project begins as planned.

SUMMARY OF WORK FOR 2009:

In 2009, 111 sites were assessed by the Wetland Project Coordinator. Of these sites, 34 were visited multiple times to best survey, implement, and monitor water management work at each site. Of the sites, 28 were brought to the attention of the Project through resident requests (25%). Eighteen sites were requested by town officials (16%), and forty-seven were identified by CMMCP staff (42%). Eighteen sites were requested from a combination of residents, officials, and/or CMMCP staff (16%).

Eighty-eight water management jobs were set up and completed, with ongoing maintenance. Twenty-four of these jobs involved the use of the low ground pressure excavator.

In addition to assessing and setting up sites for water management work, the wetland project coordinator's focus included beaver management. Several member communities requested assistance with breaching beaver dams. After the appropriate permits were issued by the local Board of Health and Conservation Commission, work to breach the dams was conducted.

Additional information on our procedures or on specific restoration projects can be acquired by calling the CMMCP office at (508) 393-3055 from 7:00am to 3:30pm.

Respectfully submitted,
Katrina Proctor, Wetland Project Coordinator

SATISFACTION SURVEY OF SERVICE REQUESTS IN THE CENTRAL MASSACHUSETTS MOSQUITO CONTROL PROJECT SERVICE AREA – 2009

TIMOTHY D. DESCHAMPS, Executive Director
Central Mass. Mosquito Control Project
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(508) 393-3055 • deschamps@cmmcp.org

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 accept requests 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 requested a survey of residents who requested service in 2009 to determine if our staff was meeting acceptable levels of customer satisfaction. This is the same survey that was done in 2005, 2007 and 2008. After compiling these results, we find that a majority of residents in our service area were satisfied with our control efforts and methods, which mirrors our results from previous years. We also compared 2009 with the 3 year average to determine if satisfaction levels were comparable.

SURVEY METHODOLOGY

In 2009 we received 13,614 requests for service, ranging from adulticiding to larval control, a 28% increase in service requests from 2008. 8,012 adulticiding calls were filtered (duplicates removed) and placed into a separate database. Service calls were sorted according to town, and each town was tabulated for total requests received in 2009. These towns were then graphed to show which towns had the most calls. 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 1,500 postcards would be a representative sample of the service calls received this year (this is an increase of 500 over the past 3 surveys). 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. This study uses the same methodology as the three previous resident surveys.

SURVEY FINDINGS

From 1,500 postcards mailed, 306 responses were received (21%). The results are as follows:

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

	Number	Percent
Telephone	146	48.5%
Website	148	49.2%
In person	1	0.3%
Other	6	1.9%
Total	301	

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

	Number	Percent
Yes	156	98.7%
No	2	1.2%
Total	158	

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

	Number	Percent
Yes	19	12.1%
No	137	87.8%
Total	156	

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

	Number	Percent
Yes	169	98.2%
No	3	1.7%
Total	172	

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

NOTE: 88.5% within a week or less

	Number	Percent
1-3 days	116	38.2%
3-5 days	76	25%
1 week	77	25.3%
2 weeks+	35	11.5%
Total	304	

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

	Number	Percent
Yes	283	94%
No	18	5.9%
Total	301	

7). When you received service, did our field representative appear knowledgeable and competent about his/her profession?

	Number	Percent
Yes	255	89.2%
No	31	10.8%
Total	286	

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

	Number	Percent
Yes	252	91.3%
No	24	8.6%
Total	276	

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

	Number	Percent
Yes	205	68.7%
No	93	31.2%
Total	298	

10). Did you find this information useful?

	Number	Percent
Yes	189	71.10%
No	14	5.20%
Did not receive	63	23.60%
Total	266	

11). Did you request service more than once in 2009?

	Number	Percent
Yes	138	45.5%
No	165	54.4%
Total	303	

12). If you requested additional service in 2009, was it because the original application was insufficient to meet your needs, or for a later re-treatment or follow up?

	Number	Percent
Retreatment	119	79.8%
Insufficient	30	20.1%
Total	149	

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

	Number	Percent
Yes	296	97.6%
No	7	2.4%
Total	303	

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

	Number	Percent
Better	245	81.6%
Worse	0	0%
No Effect	55	18.3%
Total	300	

15). 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	42	17.5%
3-5 days	41	17.1%
1 week	63	26.3%
2 weeks+	93	38.9%
Total	239	

NOTE: 2/3 experienced at least a week of relief, nearly 39% report more than 2 weeks of relief

16). 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	241	82.5%
Too Low	48	16.4%
Too High	3	1%
Total	292	

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

	Number	Percent
June	69	23.2%
July	92	30.9%
August	52	17.5%
More than 1	84	28.2%
Total	297	

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

	Number	Percent
Yes	276	92%
No	24	8%
Total	300	

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

	Number	Percent
Yes	293	98%
No	6	2%
Total	299	

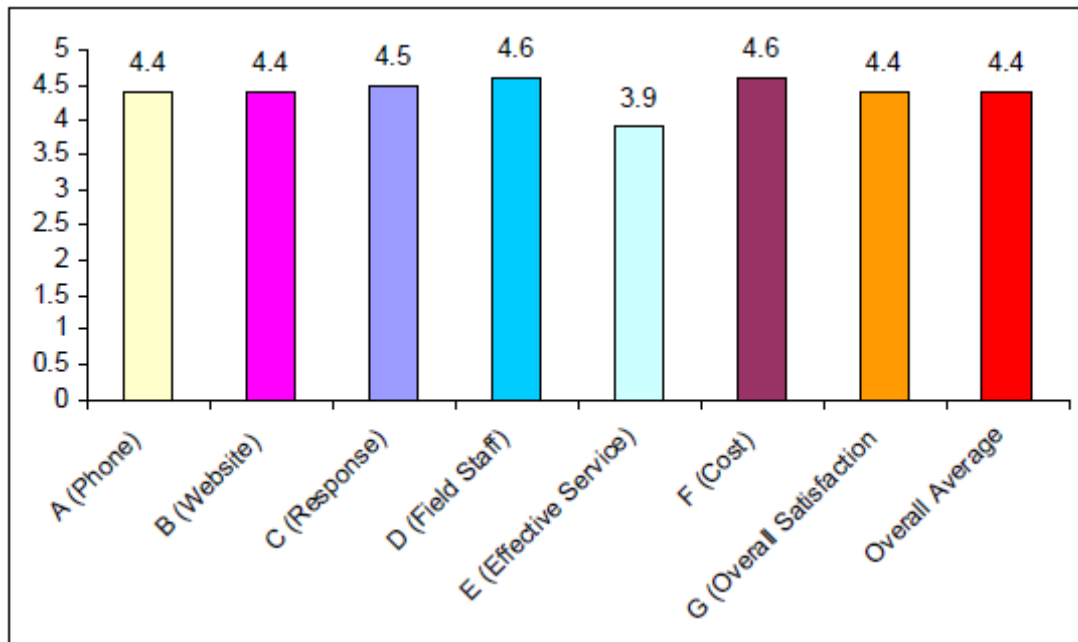
Please rate our performance for 2009 from 0 to 5, where 5 is the best rating, 0 is the worst rating:

QUESTION	POINTS	AVERAGE
The information you received over the phone was informative & helpful	935 points from 1,050 (210 respondents)	4.44 average from 5
The information on our website is easily available and helpful	1,137 points from 1,285 (257 respondents)	4.4 average from 5
The response time for service is reasonable	1,339 points out of 1,485 (297 respondents)	4.5 average from 5
Our field staff that responded is knowledgeable and competent	1,258 points out of 1,370 (274 respondents)	4.6 average from 5
The service provided was effective	1,175 points out of 1,475 (295 respondents)	3.98 average from 5
This service is reasonable compared to the cost	1,342 points out of 1,470 (294 respondents)	4.6 average from 5
Please rate your overall satisfaction with the service received in 2009	1,301 points out of 1,475 (295 respondents)	4.4 average from 5
Total satisfaction rating: 8,487 points out of 9,610 possible – 4.41 average		

CONCLUSION

Overall satisfaction was 92%, and 98% would use our services again in the future. Answers to question #9 shows a marked increase over past years in regards to residents receiving public relations materials. This survey also documents the increase in website usage to register requests.

Overall this survey shows high satisfaction amongst the respondents, but some ratings were lower slightly than in past surveys. This was due in part to a higher volume of service requests, cooler than average nighttime temperatures in the early part of the spray season, and most notably significant rain events throughout most of the summer that negatively impacted spray operations and contributed to a constant hatch of new mosquito broods.



Bottle Assays of Field Collected Mosquitoes for Level of Resistance to ANVIL® 10+10 in Central Massachusetts (Update 2009)

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ABSTRACT

In 2009, the Central Mass. Mosquito Control Project continued conducting bottle assays, which test the potency of a substance on live specimens, to determine if pesticide resistance has been developing in local mosquito populations. Using procedures recommended by the Center for Disease Control and Prevention, the results of unexposed mosquitoes were compared to those collected from areas serviced by the CMMCP adulticide program. It was determined that the level of resistance in local mosquito populations does not warrant any procedural or insecticide changes at this time. Despite these findings, CMMCP will continue bottle assays of local mosquito populations to monitor the levels of resistance so that if indications of resistance are observed, proper actions could be implemented to ensure control effectiveness.

INTRODUCTION

With environmental changes, mosquito species have the potential to change their current distribution and bring disease with them to new areas (Brogdon 1998; Simsek 2003). These possible diseases include malaria, dengue, yellow fever and Rift Valley Fever among others (McAbee 2003; Simsek 2003). Faced with these new threats, vector control personnel must be aware of the dynamics of local mosquito species in order to lessen the threat of human infections.

Resistance to pesticides can have a major impact on the abilities of public health officials against vector-borne disease (Brogdon 1998). It has been

shown that some past agricultural and pest control use of insecticides has led to the development of resistance of these chemicals in select populations of mosquitoes (Rodriguez 2005). This resistance is predicted to be the basis for future reemergence of vector-borne diseases, and also impair the control efforts in these situations (Brogdon 1998).

There are several factors that may have contributed to this development, including the narrowing scope of insecticides available for public health use, along with increasing restrictions from regulatory agencies (Brogdon 1998). Resistance to pyrethroids in

particular could be due in part to past use of DDT in some areas, with the resistance mechanism being similar for both (Brogdon 1998; McAbee 2003). This cross-resistance, as observed between pyrethroids and DDT, is becoming more prevalent as the existing resistance mechanisms are being enhanced in the target insects (Brogdon 1998).

Despite research that has shown resistance in specific mosquito species, the actual impact of this on vector control is not known due to several issues. One is the lack of information about the current resistance levels, due in part to the wide variety of surveillance programs and data collection efforts. Another factor, and potentially more important, is that resistance seems to be localized. In one study, certain mosquito populations that were only a few kilometers apart varied greatly on the presence and levels of resistance, including the actual mechanism for the resistance (Brogdon 1998).

These unknowns about the level of resistance in vector species have reinforced the need to study pesticide resistance by CMMCP. The goals of this research will be to create baseline data for control efforts, detect early resistance, and to observe the current effects of control strategies (Brogdon 1998). If resistance is observed, then a change in application rates or a change to a different class of insecticides may need to be considered.

To control adult mosquitoes, CMMCP uses ANVIL® 10+10 (Clarke Mosquito Control Products, Inc., Roselle, IL) (EPA Reg. No. 1021-1688-8329), a synthetic pyrethroid composed of 10% SUMITHRIN® (Sumitomo Chemical Company, Ltd., Osaka, Japan)(d-phenothrin) and 10% piperonyl butoxide (PBO)(Center for Disease Control and Prevention 2002; PHEREC 2001), which is used as a synergist¹. In this ongoing study to monitor resistance levels in its service area, CMMCP continued conducting bottle assays in the summer of 2009 for ANVIL® 10+10.

METHODS

The bottle assay procedure used by CMMCP was modeled after the CDC method (Center for Disease Control and Prevention 2002), where a baseline for resistance was established using specimens collected from an area without any historical adulticide exposure. This data could then be plotted against data from mosquito populations in areas where CMMCP records show past insecticide usage has occurred. This will determine if any degree of resistance has developed to the current CMMCP adulticide product.

To start, clean 250ml Wheaton bottles (Wheaton Science Products, Millville, NJ) were lined with 1ml of various concentrations of ANVIL® 10+10 (8.868µg/ml, 22.17µg/ml, 44.34µg/ml, and 88.68µg/ml), which

¹Synergist- Additional substance that will assist in the elimination of certain resistance mechanisms; PBO synergist eliminates oxidase activity (Center for Disease Control and Prevention 2002).

were diluted with pesticide grade acetone (Thermo Fisher Scientific, Inc., Fair Lawn, NJ). Approximately 10-15 field collected mosquitoes were introduced into each bottle by mechanical aspiration and % knockdown was recorded at 5 minute intervals, up to 100% knockdown. For control bottles lined with only acetone (zero ANVIL® 10+10), % knockdown was observed at 5 minute intervals up to an hour. Each pesticide concentration assay had several trials until a concentration was found that created a timely mortality curve that reached total knockdown around 30 minutes. Once the ANVIL® 10+10 baseline concentration was determined, it could be used against the exposed mosquito populations, with control bottles running simultaneously.

The collection of mosquitoes for the bottle assays were facilitated by the use of several CDC light traps (John W. Hock Co., Gainesville, FL), baited with CO₂ at a flow rate of 500ml/min. ABC standard collection nets (Clarke Mosquito Control Products, Inc., Roselle, IL) were used to contain the mosquitoes, along with a simple food source, until resistance testing took place, which was usually within a couple of hours. The mechanical aspiration from the collection cages to the assay bottles was enabled by the use of a flashlight aspirator (BioQuip Products, Inc., Rancho Dominguez, CA).

The baseline mosquitoes were collected from an area located near an organic farm. This site has been an official exclusion property since 2006, but even prior to that CMMCP

has no record of using adulticide products there. Once the baseline concentration had been determined using these unexposed mosquitoes, collections were made at several other sites that had varying number of adulticide events (~2-15) over the previous couple of years. In 2007 six different locations were used, with two sites having multiple collections and trial sets. An additional site was added in 2008, while bottle assays were concentrated on four different sites in 2009, sites which had been monitored previously. These potentially resistant mosquitoes were then run against the baseline concentration from the unexposed population, as well as control bottles coated with only acetone.

After conducting bottle assays on the collected mosquitoes against the baseline concentration, the knockdown percentage was plotted against the time interval to determine if any degree of resistance was forming in these populations compared to those unexposed. If any specimens survived longer than those of the baseline group, this could represent some degree of resistance has developed.

RESULTS

The baseline component of the bottle assays that resulted in the optimal concentration of the ANVIL® 10+10 was 22.17µg/ml, which corresponded with data from previous studies (PHEREC 2001). Using this concentration, it was found that in 2007 only one assay of eight trial sets had specimens that did not reach 100% knockdown

before the 25 minute mark. This particular site, Haskell Street, had an average of 98.9% knockdown at the 25 minute mark, and by the next time interval did reach 100% knockdown. Both Otis Street locations had a slower curve than the rest of the

sites, although they still reached 100% knockdown at 25 minutes like the baseline population. As one would expect, the control bottles coated with only acetone had zero knockdown effect (Figures 1, 2).

Figure 1: 2007 Time-% Knockdown Curves of Bottle Assays for ANVIL® 10+10 (22.17µg/ml)



Figure 2: 2007 Time-% Knockdown Curves of Bottle Assays (2) for ANVIL® 10+10 (22.17µg/ml)



The bottle assays performed in 2008 resulted in similar findings to 2007. Of the 13 trial sets, 6 had specimens that did not reach 100% knockdown by the 25

minute mark. However, these findings were not significant and all had knockdown rates at the 25 minute mark of over 97.22%. Again, the acetone only coated bottles had zero knockdown effect (Figure 3).

Figure 3: 2008 Time-% Knockdown Curves of Bottle Assays for ANVIL® 10+10 (22.17µg/ml)



Figure 4: 2008 Time-% Knockdown Curves of Bottle Assays (2) for ANVIL® 10+10 (22.17µg/ml)



Bottle assays performed in 2009 had trials where the specimens did not reach complete knockdown until the 35 minute mark (Figures 5, 6). Of all specimens tested in the 2009 trials, 99.72% of specimens were knocked down at the 30 minute mark or earlier. As with previous seasons, the acetone only coated bottles had zero knockdown effect (Figure 5).

Figure 5: 2009 Time-% Knockdown Curves of Bottle Assays for ANVIL® 10+10 (22.17µg/ml)

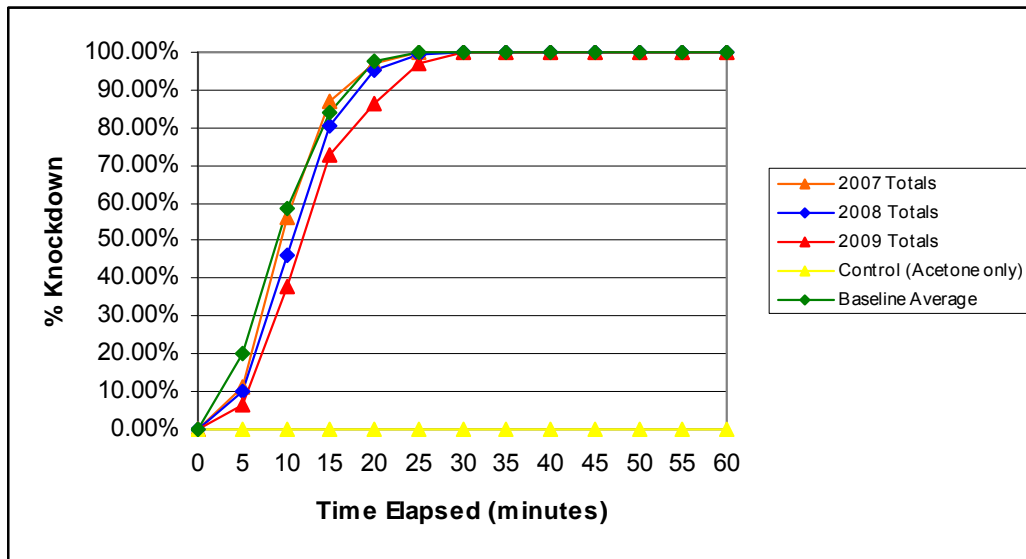


Figure 6: 2009 Time-% Knockdown Curves of Bottle Assays (2) for ANVIL® 10+10 (22.17µg/ml)



Looking at the yearly totals from the three seasons of bottle assays one can observe that the knockdown rate has slowed slightly (Figure 7). The yearly comparisons of bottle assay results show that the 2009 trials have been slower to reach 100% knockdown as opposed to earlier years.

Figure 7: Yearly Comparison of Time-% Knockdown Curves of Bottle Assays for ANVIL® 10+10 (22.17µg/ml)



DISCUSSION

The results of the bottle assays indicate that the level of resistance in the populations of the local mosquitoes tested in the CMMCP service area is not significant enough where a change of pesticide or application protocol is needed at this time. This is not necessarily surprising considering the nature of the CMMCP adulticide program, which is primarily request-only in localized, targeted areas. Another reason would be the vast size of the CMMCP service area, encompassing 38 municipalities, with non-member cities and towns with no mosquito control program scattered in and around them. These factors contribute to local mosquito populations not being consistently exposed to a single class of insecticides, lessening the potential development of resistance. The rapid degradation and low residual nature of the insecticide also could

contribute to low resistance development.

CMMCP had used resmethrin (Scourge® Bayer Environmental Science, Montvale, NJ) (EPA Reg. No. 432-667), for their ULV applications since 1988 before switching to ANVIL® 10+10 in 2007. Both products are synthetic pyrethroids. Both insecticides also use piperonyl butoxide (PBO) as a synergist, in different concentrations, with ANVIL® 10+10 using 10% PBO compared to 18% for Scourge® (Center for Disease Control and Prevention 2002; PHEREC 2001). Before using either of those synthetic pyrethroids, CMMCP had been using Malathion, an organophosphate, which is of a different chemical class (Nauen 2006).

Drought conditions in the latter part of 2007 impacted collection numbers, which hindered collections for additional bottle assay trials that

season. The 2008 season collections were not impacted by lack of rain, allowing more trials to be conducted. During 2009, heavy rains dominated the season, and in many instances hampered collection of specimens at previously monitored locations. Additional bottle assays in subsequent seasons will provide more baseline data for resistance management in the CMMCP service area.

Looking at the yearly trends from bottle assays it can be seen that the knockdown rate has become progressively slower, although blood meal stage on the field collected mosquitoes may have influence on this, as well as slight discrepancies between seasonal lab technicians. Despite this, the results of this bottle assays research conducted since 2007 show that the level of resistance in the local mosquito populations tested does not warrant a change in protocol or product, but monitoring for resistance should continue because it is a vital tool in resistance management.

ACKNOWLEDGEMENTS

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HOST-SEEKING ACTIVITY OF MOSQUITOES IN CENTRAL MASSACHUSETTS - 2009

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ABSTRACT

For a second year, the Central Massachusetts Mosquito Control Project evaluated various time periods for ultra-low volume adulticiding potential by conducting mosquito surveillance using programmable collection devices to observe the host-seeking activity periods for local mosquito species. Collections were made in several habitats for three hour intervals around sunset, with two collections being made before sunset, with another four afterwards. The specimens collected were later identified into several target groups including *Aedes vexans*, *Coquillettidia perturbans*, *Culex pipiens/restuans* complex, *Culiseta melanura*, *Ochlerotatus canadensis*, *Psorophora ferox*, and an *Anopheles* group which included *Anopheles punctipennis* and *Anopheles quadrimaculatus*. Besides *Oc. canadensis* and *Ps. ferox*, all species showed relatively little activity until the period right before sunset. Sunset was then followed by the largest activity period for all targeted mosquito groups except *Oc. canadensis* and *Ps. ferox*. Most species began to taper off for the rest of the collection period, except for *Oc. canadensis*, *Ps. ferox* and the *Anopheles* group which had a slight resurgence in the early morning hours. This season the Norfolk County Mosquito Control Project also collected data for this project. These findings reinforce the adulticiding protocol for CMMCP, which is to commence applications following sunset. Collections may be continued in the upcoming season with or without NCMCP, and will possibly include canopy traps, to further investigate this topic of host-seeking activity.

NOTE: Full publication pending

TOWN OF CHELMSFORD

<u>DATE</u>	<u>WORK DONE</u>	<u>LOCATION</u>
01-27-09	Administrative	GPS Coordinates - No Spray
02-04-09	Administrative	GPS Coordinates - No Spray
02-13-09	Stream Survey	Aberdeen Street, Billerica Road
02-24-09	Stream Cleaning 950'	Dayton Street
02-25-09	Brush Cutting 450'	Chelmsford Street
02-27-09	Brush Cutting 500'	Chelmsford Street
03-10-09	Brush Cutting 495'	Chelmsford Street
03-12-09	Brush Cutting 465'	Chelmsford Street
03-13-09	Brush Cutting 120'	Chelmsford Street
	Stream Cleaning 505'	Chelmsford Street
3-16-09	Stream Cleaning 390'	Chelmsford Street
03-17-09	Stream Cleaning 420'	Chelmsford Street
03-18-09	Stream Cleaning 485'	Chelmsford Street
	Larval Survey	Westford Road Corner Dalton Road
03-19-09	Stream Cleaning 640'	Chelmsford Street
03-24-09	Public Relations	Harold Street, Smoke Rise Drive
	Larviciding	Littleton Road
	Larval Survey	Harold Street, Smoke Rise Drive, Littleton Road, Oak Street
03-27-09	Larval Survey	Billerica Road
03-31-09	Public Relations	Tadmuck Road, Littleton Road, Meadow Crest Lane, Wedge Wood Drive, Garrison Road, Hunt Road, Mansfield Drive
	Larviciding	Warwick Drive, Shandel Drive, Wedgewood Drive, Garrison Road, Pine Wood Road, Alcorn Road, Mansfield Drive, Equestrian Lane, Robin Hill Road
	Larval Survey	Littleton Road, Kidder Road, Tadmuck Road, McCormick Lane, Meadow Crest Lane, Warwick Drive, Shandel Drive, Wedgewood Drive, Garrison Road, Pine Wood Road, Alcorn Road, Reid Road, Hunt Road, Mansfield Drive
04-06-09	Public Relations	Robin Hill Road, First Lane
	Larviciding	Robin Hill Road, First Lane, Parkerville Road, Pond Street, Acton Road, Westview Avenue, Evan's Way, Carriage Drive, Elm Street
	Larval Survey	Robin Hill Road, Pond Street, Acton Road, Westview Avenue, Evan's Way, Morning Glory Circle, Carriage Drive, Wedgewood Drive, Shandel Drive
04-10-09	Public Relations	Robin Hill Road, Heart Road, Cady Lane, Thornton Lane
	Larviciding	Elm Street, Cady Lane, Purcell Drive, Thornton Lane, Buttercup Lane, Lambda Road, Crescent Drive
	Larval Survey	Parkerville Road, Robin Hill Road, Cady Lane, Heart Road, Purcell Drive, Buttercup Lane, Southwood Drive, Park Road
04-15-09	Trap Site Set Up	Arlington Street
04-16-09	Larval Survey	Smith Street, North Road, Parkerville Road, Bridge Street
	Trap Site Set-Up	Bentas Place, Comanche Circle, Sierra Drive, Linwood Street, Diane Lane, Miland Drive
04-17-09	Larviciding	Drop off BTI For Aerial Drop
04-21-09	Culvert Cleaning (27)	Warren Avenue, Mill Road, Boston Road, Moore Street, Pleasant Avenue, Shedd Lane, Marshall Street, Billerica Road, Hall Road, Parker Road, Justin Road, Eugene Terrace, Rosemary Lane, Concord Road, Old Stage Road, Pecos Circle, Sierra Drive, Proctor Road
	Stream Cleaning 20'	Hall Road
	Stream Cleaning 30'	Eugene Terrace
04-22-09	Larviciding	Aerial Larviciding
04-23-09	Public Relations	Oak Hill Road, Virginia Lane, Proctor Road, Smoke Rise Drive
	Larviciding	Oak Hill Road, Virginia Lane, Proctor Road, Smoke Rise Drive
	Larval Survey	Oak Hill Road, Sarah Lane
04-24-09	Public Relations	Robert Bigelow Street, Chatham Road
	Larviciding	Bridge Street, Robert Bigelow Street, Chatham Road
	Larval Survey	Robert Bigelow Street
05-01-09	Public Relations	Tadmuck Road, Harold Street, Lauderdale Road, Temi Road, Old Stage Road, Zeus Drive, McIntosh Road, Cathy Road, Sandra Drive, Concord Road
	Larviciding	Tadmuck Road, Harold Street, Lauderdale Road, Sandra Drive, Temi Road, Concord Road, Old Stage Road, Zeus Drive, Proctor Road, Omega Circle, Higate Road

TOWN OF CHELMSFORD

<u>DATE</u>	<u>WORK DONE</u>	<u>LOCATION</u>
05-01-09	Larval Survey	Tadmuck Road, Sandra Drive, Temi Road, Minuteman Drive, Concord Road, Braeburn Road, Elm Street, Crabapple Road, Cathy Road
05-07-09	Administrative Contact Public Relations Larviciding Larval Survey	Board of Health New Fletcher Street, Westford Street Clara Way, Chelmsford Street, Glen Avenue, Katrina Avenue, New Fletcher Street New Fletcher Street, Westford Street, Clara Way, Westford Street, Chelmsford Street, Katrina Avenue, Emerson Road, Alpine Lane, Meeting House Road
05-11-09	Administrative Contact Public Relations Larviciding Larval Survey	Chelmsford Public Library Proctor Road, Harold Street, Empire Street, Stone Hill Road Proctor Road, Dunshire Drive, Stone Hill Road, Ledge Road, Swain Road, Scotty Hollow Drive, Ward Way, Doris Drive, Harold Street, Empire Street Proctor Road, Higate Road, Harold Street, Empire Street, Dunshire Drive, Tremont Road, Ledge Road, Oak Hill Road, Scotty Hollow Drive, Ward Way, Doris Drive
05-15-09	Public Relations Larviciding Larval Survey	Brian Road, Marose Avenue, Richardson Road, Meadow Brook Road, Aberdeen Road, Main Street Meadow Brook Road, Willis Drive, Groton Road, North Road, Western Avenue, Richardson Road, Aberdeen Road, Main Street, Groton Road, Princeton Street Amelia Drive, Willis Drive, Campers Trail, Groton Road, Spring Street, Princeton Street, Technology Drive, Brian Road, Marose Avenue, Lamplighter Lane, Roaen Drive, Meadow Brook Road, Aberdeen Road, Doral Drive, Burton Lane
05-23-09	Public Relations Larviciding Larval Survey	McCormick Lane, Park Road, Littleton Road, Tadmuck Road Oak Street, Littleton Road, Park Road, Cushing Place, Fox Hunt Condominiums Littleton Road, Oak Street, Tadmuck Road, McCormick Lane, Park Road, Cushing Place
05-27-09	Administrative Contact Public Relations	Police Department, Board of Health Patriot's Way, Littleton Road, Chamberlain Road, Tadmuck Road, McCormick Lane, Hunt Road, 4 th Lane, 5 th Lane, Thornton Lane, Southwood Drive, Proctor Road, Zeus Drive, Bentas Place, Concord Road, Farley Brook Road, Regina Drive, Topeka Road, Bruning Tree Lane, Acton Road, Green Valley Drive, Boston Road, Arthur Avenue
05-28-09	Trap Site Survey	Arlington Street, Diane Lane, Bentas Place
06-02-09	Administrative Contact Public Relations Adulticiding	Police Department Old Westford Road, Wellman Avenue, Bridge Street, Patriots Way, Littleton Road, Chamberlain Road, Tadmuck Road, McCormick Lane, Hunt Road, Thornton Lane, Proctor Road, Buttercup Lane, Southwood Drive, Zeus Drive, Bentas Place, Concord Road, Sonora Drive, Regina Drive, Topeka Road, Farley Brook Road, Burning Tree Lane, Acton Road, Green Valley Drive Adams Farm Condominium, Williamsburg Condominium, Old Westford Road, Wellman Avenue, Bridge Street, Patriots Way, Littleton Road, Chamberlain Road, Tadmuck Road, McCormick Lane, Hunt Road, Thornton Lane, Proctor Road, Buttercup Lane, Southwood Drive, Zeus Drive, Bentas Place, Concord Road, Sonora Drive, Regina Drive, Topeka Road, Farley Brook Road, Burning Tree Lane, Green Valley Drive
06-03-09	Set Up Trap Pick Up Trap	Arlington Street Arlington Street
06-08-09	Administrative Contact Public Relations	Police Department Arthur Avenue, Kristin Drive, Nadine Road, Boston Road, Cambridge Street, Freeman Road, Lord Road, State Street, Empire Street, Julio Street, Vincent Street, Ansie Road, Woodhead Road, Kensington Drive, Chatham Road, Third Street, York Avenue, Brian Road, Sears Lane, Shedd Lane, Pleasant Avenue, Jensen Avenue, Biltmore Avenue, Gorham Street, Fuller Road, Larsen Circle, Buckman Drive, Carter Drive, Golden Cove Road

TOWN OF CHELMSFORD

<u>DATE</u>	<u>WORK DONE</u>	<u>LOCATION</u>
06-08-09	Adulticiding	Arthur Avenue, Kristin Drive, Nadine Road, Boston Road, Cambridge Street, Freeman Road, Lord Road, State Street, Empire Street, Julio Street, Vincent Street, Ansie Road, Woodhead Road, Kensington Drive, Chatham Road, Third Street, York Avenue, Brian Road, Sears Lane, Shedd Lane, Pleasant Avenue, Jensen Avenue, Biltmore Avenue, Gorham Street, Fuller Road, Larsen Circle, Buckman Drive, Carter Drive, Golden Cove Road
06-10-09	Set Up Trap	Bentas Place
06-11-09	Administrative Contact Public Relations	Police Department North Road, East Shepard Lane, Woodlawn Avenue, Miland Avenue, Linwood Street, Dalton Road, Pine Hill Road, Westford Street, Longmeadow Road, Lantern Lane, Church Hill Road, Hillcrest Drive, Brentwood Road, Locke Road, Old Westford Road, Edgelawn Avenue, Marose Avenue, Stony Brook Road, Aberdeen Road, Ridgewood Road
	Adulticiding	North Road, East Shepard Lane, Woodlawn Avenue, Miland Avenue, Linwood Street, Dalton Road, Pine Hill Road, Westford Street, Long Meadow Road, Lantern Lane, Churchill Road, Hillcrest Drive
06-16-09	Pick Up Trap Administrative Contact Adulticiding	Bentas Place Board Of Health West Chelmsford United Methodist Church - Main Street
06-17-09	Set Up Trap Pick Up Trap Administrative Contact Public Relations	Arlington Street Arlington Street Board Of Health, Police Department Pine Hill Road, Sheehan Lane, Thomas Drive, Old Westford Road, Virginia Lane, Overlook Drive, Church Hill Road, Brentwood Road, Locke Road, Castlewood Drive, Ridgewood Road, Aberdeen Road, Edgelawn Avenue, Marose Avenue
	Adulticiding	Pine Hill Road, Sheehan Lane, Thomas Drive, Old Westford Road, Virginia Lane, Overlook Drive, Church Hill Road, Brentwood Road, Locke Road, Castlewood Drive, Aberdeen Road, Edgelawn Avenue, Marose Avenue
06-23-09	Administrative Contact Public Relations	Police Department Washington Street, Ripley Road, Holt Street, Mansur Street, Sheila Avenue, Rogers Road, Marguerite Drive, Cross Street, Mission Road, Ledge Road, Oak Hill Road, Kelshill Road, Drexel Drive, Old Westford Road, Brentwood Road, Westford Street, Buckman Drive, Larssen Circle, Priscilla Avenue, Hunt Road, Alcorn Road
06-24-09	Set Up Trap	Bentas Place
06-25-09	Pick Up Trap	Bentas Place
06-30-09	Administrative Contact Public Relations	Police Department Rack Road, Whipple Tree Road, Galloway Road, Littleton Road, Chamberlain Road, Tadmuck Road, Garrison Road, Mansfield Drive, Kenwood Street, Mill Road, Sleigh Road, Carriage Drive, Natalie Road, Higate Road, Proctor Road, Armand Drive, Farley Brook Road, Smoke Rise Drive, Janet Road, Cambridge Road
	Adulticiding	Rack Road, Whipple Tree Road, Galloway Road, Littleton Road, Chamberlain Road, Tadmuck Road, Garrison Road, Mansfield Drive, Kenwood Street, Mill Road, Sleigh Road, Carriage Drive, Natalie Road, Higate Road, Proctor Road, Armand Drive, Farley Brook Road, Smoke Rise Drive, Janet Road, Cambridge Road, Mill Road Pool & Tennis Club, Scotty Hollow Drive
07-01-09	Set Up Trap Pick Up Trap	Arlington Street Arlington Street
07-02-09	Larviciding	Brothers Lane (Swimming Pool)
07-07-09	Administrative Contact Public Relations	Police Department Alexandria Way, Acton Road, Bartlett Street, Empire Street, Ansie Road, University Lane, Harold Street, Chatham Road, Warren Avenue, Second Street, Plum Street, McFarlin Road, Riverneck Road, Sears Lane, Pleasant Avenue, Edgewood Street, Evergreen Street, Dulgarian Terrace, Woodbine Street, Larssen Circle, Buckman Drive, Brentwood Road, Churchill Road

TOWN OF CHELMSFORD

<u>DATE</u>	<u>WORK DONE</u>	<u>LOCATION</u>
07-07-09	Adulticiding	Alexandria Way, Acton Road, Bartlett Street, Empire Street, Ansie Road, University Lane, Harold Street, Chatham Road, Warren Avenue, Second Street, Plum Street, McFarlin Road, Riverneck Road, Sears Lane, Pleasant Avenue, Edgewood Street, Evergreen Street, Dulgarian Terrace, Woodbine Street, Larssen Circle, Buckman Drive, Brentwood Road
07-08-09	Set Up Trap	Bentas Place
07-09-09	Pick Up Trap	Bentas Place
	Administrative Contact	Police Department
	Public Relations	East Sheppard Lane, Linwood Street, Washington Street, Ripley Street, Holt Street, Coral Avenue, Dunstable Road, Michaels Drive, Stone Hill Road, Seventh Avenue, Lovett Lane, Main Street, Susan Avenue
	Adulticiding	East Sheppard Lane, Linwood Street, Washington Street, Ripley Street, Holt Street, Coral Avenue, Dunstable Road, Michaels Drive, Stone Hill Road, Seventh Avenue, Lovett Lane, Main Street, Susan Avenue, Joy Drive
07-14-09	Set Up Trap	Arlington Street
07-15-09	Pick Up Trap	Arlington Street
	Administrative Contact	Police Department
	Public Relations	Princeton Street, Whipple Tree Road, Carter Road, Pine Hill Road, Bridge Street, High Street, Hunt Road, Autumn Lane, Alcorn Road, Warwick Drive, McCormick Lane, Hart Road, Carriage Road, Brush Hill Road, Acton Road, Buttercup Lane, Higate Road, Proctor Road, Eldorado Road, Burning Tree, Regina Drive, Hazen Street, Kristin Drive, Belmont Drive, Cambridge Street
	Adulticiding	Princeton Street, Whipple Tree Road, Carter Road, Pine Hill Road, Bridge Street, High Street, Hunt Road, Autumn Lane, Alcorn Road, Warwick Drive, McCormick Lane, Hart Road, Carriage Road, Brush Hill Road, Acton Road, Buttercup Lane, Higate Road, Proctor Road, Eldorado Road, Burning Tree, Regina Drive, Hazen Street, Kristin Drive, Belmont Drive, Cambridge Street, Hitchin Post Condominiums
07-17-09	Larval Survey	Princeton Street
	Administrative Contact	Police Department
	Public Relations	Gorham Street, Vincent Street, Empire Street, Housatonic Avenue, Smith Street, Pleasant Street, Bellevue Street, Starlight Avenue, Wiggins Street, Eclipse Street, Pennsylvania Avenue, Dalton Road, Buckman Drive, Larssen Circle, Horn Beam Hill Road, Brentwood Road, Gorham Street
07-21-09	Adulticiding	Gorham Street
	Administrative Contact	Police Department, Board of Health
	Public Relations	Concord Road, Vincent Street, Empire Street, Gorham Street, Manning Road, Housatonic Avenue, Smith Street, Pleasant Street, Lancaster Avenue, Old Middlesex Turnpike, Eclipse Street, Starlight Avenue, Wiggins Street, Peach Tree Lane, Dalton Road, Buckman Drive, Larssen Circle, Pennsylvania Avenue, Horn Beam Hill Road, Brentwood Road
07-22-09	Administrative Contact	Police Department
	Public Relations	Concord Road, Vincent Street, Empire Street, Gorham Street, Manning Road, Jensen Avenue, Housatonic Avenue, Lancaster Avenue, Smith Street, Pleasant Street, Old Middlesex Turnpike, Eclipse Street, Starlight Avenue, Wiggins Street, Pennsylvania Avenue, Peach Tree Lane, Dalton Road, Buckman Drive, Larssen Circle, Brentwood Road, Walnut Road, Sycamore Street, Longspur Road, Spaulding Road, Archambault Way, Hornbeam Hill Road
	Landing Count	North Road, Mill Street
	Adulticiding	Concord Road, Vincent Street, Empire Street, Gorham Street, Manning Road, Jensen Avenue, Housatonic Avenue, Lancaster Avenue, Smith Street, Pleasant Street, Old Middlesex Turnpike, Eclipse Street, Starlight Avenue, Wiggins Street, Pennsylvania Avenue, Peach Tree Lane, Dalton Road, Buckman Drive, Larssen Circle, Brentwood Road, Walnut Road, Sycamore Street, Longspur Road,

TOWN OF CHELMSFORD

<u>DATE</u>	<u>WORK DONE</u>	<u>LOCATION</u>
07-22-09	Adulticiding (cont)	Spaulding Road, Archambault Way, Hornbeam Hill Road
07-22-09	Set Up Trap	Bentas Place
07-23-09	Pick Up Trap	Bentas Place
07-27-09	Administrative Contact	Police Department
	Public Relations	North Road, Arbor Road, Holt Street, Rogers Road, Dunstable Road, Ledge Road, Kelshill Road, Willis Drive, Waterford Place, Meadow Brook Road, Lamplighter Lane, Chamberlain Road, Meadow Crest Lane, Wedgewood Drive, Adirondack Road, Elm Street, Natalie Drive, Thornton Lane, Brian Road
	Adulticiding	North Road, Arbor Road, Holt Street, Rogers Road, Dunstable Road, Ledge Road, Kelshill Road, Willis Drive, Waterford Place, Meadow Brook Road, Lamplighter Lane, Chamberlain Road, Meadow Crest Lane, Wedgewood Drive, Adirondack Road, Elm Street, Natalie Drive, Thornton Lane, Brian Road
07-28-09	Set Up Trap	Arlington Street
07-29-09	Pick Up Trap	Arlington Street
07-30-09	Administrative Contact	Police Department
	Public Relations	Whipple Tree Road, Trotting Road, Amble Road, Sheehan Lane, Douglas Road, High Street, Robin Hill Road, Acton Road, Armand Drive, Zeus Drive, Smoke Rise Drive, Bonanza Road, Marina Road, Kristin Drive, Belmont Drive, State Street, Third Street, York Avenue, Forrest Street
	Adulticiding	Whipple Tree Road, Trotting Road, Amble Road, Sheehan Lane, Douglas Road, High Street, Robin Hill Road, Acton Road, Armand Drive, Zeus Drive, Smoke Rise Drive, Bonanza Road, Marina Road, Kristin Drive, Belmont Drive, State Street, Third Street, York Avenue, Forrest Street
	Catch Basin Larviciding [350]	State Street, Warren Avenue, First Street, Third Street, East Putnam Avenue, River Meadow Drive, Brook Street, Winter Street, Montcastle Drive, Marion Street, Manhattan Drive, Fleetwood Drive, Montclair Circle, Chatham Road, Luan Circle, Lauderdale Road, Hickory Lane, Kensington Drive, Jessie Road, Derringer Road, Lord Road, Hugo Lane, Freeman Road, Noble Drive, Bishop Street, Empire Street, Vincent Street, Julio Street, Domenic Drive, Samuel Road, Muriel Road, Raymond Road, Ruth Ellen Road, Porter Road, Gail Street, Pearson Street, Pine Street, Birch Street, Harold Street, University Lane, Pendleton Road, Biscayne Drive, Ansie Road, Queen Street
08-03-09	Catch Basin Larviciding [300]	Hidden Way, Priscilla Avenue, Diane Lane, Larssen Circle, Buckman Drive, Scott Drive, Linwood Street, Erlin Road, Decca Drive, East Sheppard Lane, Indian Drive, Sheppard Lane, Ideal Avenue, Woodlawn Avenue, Miland Avenue, Jensen Avenue, Clear Street, Field Street, Flint Street, Allen Street, Wiggin Street, Rainbow Avenue, Old Middlesex Turnpike, Gregory Road, Claude Road, Manwell Road, Stevens Street, Pleasant Street, Joyce Street, Starlight Avenue, Eclipse Avenue, Moonbeam Avenue, Sunrise Avenue, Orchard Lane, Montview Road, Boardwalk, Pennsylvania Avenue, Charles Way, Hornbeam Hill Road, Fairbanks Road, Skyview Drive, Brentwood Road, Sanford Road, Talbot Road, Hillcrest Drive, Churchill Road, Lantern Lane
08-05-09	Administrative Contact	Police Department
	Public Relations	Hildreth Street, Plum Street, Samuel Street, Moore Street, Sprague Avenue, Biltmore Avenue, Carlisle Road, Gorham Street, Glen Avenue, Sylvan Avenue, Bay Berry Drive, Jensen Avenue, Woodlawn Avenue, Clear Street, Starlight Avenue, Churchill Road, Brentwood Road, Locke Road, Chestnut Avenue, Pennock Road, Amble Road, School Street, Kelshill Road, Dunstable Road, Oak Hill Road
	Adulticiding	Hildreth Street, Plum Street, Samuel Street, Moore Street, Sprague Avenue, Biltmore Avenue, Carlisle Road, Gorham Street, Glen Avenue, Sylvan Avenue, Bay Berry Drive, Jensen Avenue, Woodlawn Avenue, Clear Street, Starlight Avenue, Churchill Road, Brentwood Road, Locke Rd, Chestnut Ave, Pennock Rd, Amble Rd, School St

TOWN OF CHELMSFORD

<u>DATE</u>	<u>WORK DONE</u>	<u>LOCATION</u>
08-05-09	Adulticiding (cont)	Kelshill Road, Dunstable Road, Oak Hill Road Ledge Road
08-05-09	Catch Basin Larviciding [450]	Mchugh Farm Lane, Clover Hill Drive, Abbott Lane, Gifford Lane, Wagontrail Road, Hostler Road, Pennock Road, Bentley Lane, Long Meadow Road, Woodlot Lane, Piccadilly Circle, Courtland Drive, Cathy Road, Jonathan Lane, McIntosh Road, Crabapple Lane, Thomas Drive, Livery Road, Bridle Road, Canter Road, Amble Road, Trotting Road, Mountain Laurel Drive, Blacksmith Road, Winslow Road, Rack Road, Prancing Road, Cliff Road, Hitchinpost Road, Gelding Road, Single Foot Road, Galloway Road, Whipple Tree Road, Conestoga Road, Chestnut Hill Road, Sarah Lane, Virginia Lane, Monument Hill Road, Horseshoe Road
08-06-09	Set Up Trap	Bentas Place
08-10-09	Pick Up Trap	Bentas Place
08-10-09	Administrative Contact	Police Department
	Public Relations	Dunstable Road, Acton Road, Hunt Road, Tadmuck Road, Sleigh Road, Natalie Road, Bentas Place, Boston Road, Belmont Drive, Hall Road, Queen Street, Riverneck Road, Gorham Street, Manning Road, Bayberry Drive, Churchill Road, Brentwood Road, Berkeley Drive, Longspur Road, Old Westford Road
	Adulticiding	Acton Road, Hunt Road, Tadmuck Road, Sleigh Road, Natalie Road, Bentas Place, Boston Road, Belmont Drive, Hall Road, Queen Street, Riverneck Road, Gorham Street, Old Westford Road, Pinedale Road, Manning Road, Bayberry Drive, Churchill Road, Brentwood Road, Berkeley Drive, Longspur Road
08-11-09	Larval Survey	Cottage Row, Dunstable Road
	Administrative Contact	Police Department
	Public Relations	Meadowbrook Road, Marguerite Road, Edward Place, Ripley Street, Holt Street, Spaulding Road, Cathy Road, Amble Road, Clover Hill Drive
08-12-09	Set Up Trap	Arlington Street
08-13-09	Pick Up Trap	Arlington Street
08-13-09	Administrative Contact	Police Department
	Public Relations	Meadow Brook Road, Holt Street, Ripley Street, Marguerite Road, Edwards Place, Old Westford Road, Spaulding Road, Amble Road, Cathy Road, Brentwood Road, Clover Hill Drive, Golden Cove Road
	Adulticiding	Meadow Brook Road, Holt Street, Ripley Street, Marguerite Road, Edwards Place, Old Westford Road, Spaulding Road, Amble Road, Cathy Road, Brentwood Road, Clover Hill Drive, Golden Cove Road
08-17-09	Administrative Contact	Police Department
	Public Relations	Chamberlain Road, Coach Road, Brian Road, Brentwood Road, Westford Street, Hildreth Street, Brick Kiln Road, Moore Road
	Adulticiding	Chamberlain Road, Coach Road, Brian Road, Brentwood Road, Westford Street, Hildreth Street, Brick Kiln Road, Moore Road, Williamsburg Condominium I
	Catch Basin Larviciding [180]	Wildes Road, Janet Road, Nadine Road, Algonquin Road, Judith Road, Clarissa Road, Gary Road, Kristen Drive, Howard Road, Herbert Road, Sandra Drive, Donna Road, Temi Road, Craig Road, Parlee Road, Fisher Road, Sonora Drive, Marina Road, Regina Road, Santa Fe Road, Old Stage Road, Stillwater Drive, Gallup Drive, Ranch Road, Prairie Road, Laredo Drive, Pecos Circle
08-19-09	Set Up Trap	Bentas Place
08-20-09	Administrative Contact	Police Department, Board of Health
	Public Relations	Wedgewood Drive, Alcorn Road, Proctor Road, Trailside Drive, Ranch Road, Mill Road, Gorham Street, Wildwood Street, Delwood Road, Harding Street, Alexandria Way
	Adulticiding	Wedgewood Drive, Alcorn Road, Proctor Road, Trailside Drive, Ranch Road, Mill Road, Gorham Street, Wildwood Street, Delwood Road, Harding Street, Alexandria Way
	Larviciding	Mill Road
	Larval Survey	Wedgewood Drive, Alcorn Road, Proctor Road
	Pick Up Trap	Bentas Place

TOWN OF CHELMSFORD

<u>DATE</u>	<u>WORK DONE</u>	<u>LOCATION</u>
08-25-09	Set Up Trap	Arlington Street
08-26-09	Pick Up Trap	Arlington Street
	Public Relations	North Road, Edwards Place, Maynard Circle, Baldwin Road, Old Westford Road, Clover Hill Drive, Pine Hill Road, Tadmuck Road, Bentas Place, Moore Street, Manning Road
	Adulticiding	Edwards Place, Maynard Circle, Baldwin Road, Old Westford Road, Clover Hill Drive, Pine Hill Road, Tadmuck Road, Bentas Place, Moore Street, Manning Road
09-01-09	Administrative Contact	Police Department, Board of Health
	Public Relations	North Road, Holt Street, Overlook Drive, Tadmuck Road, McCormick Lane, Old Stage Road, Farley Brook Road, Boston Road, Warren Avenue, Gorham Street
	Adulticiding	North Road, Holt Street, Overlook Drive, Tadmuck Road, McCormick Lane, Old Stage Road, Farley Brook Road, Boston Road, Warren Avenue, Gorham Street
	Larviciding	Littleton Road, Oak Street
	Larval Survey	Littleton Road, Oak Street, Tadmuck Road
09-02-09	Set Up Trap	Bentas Place
09-03-09	Pick Up Trap	Bentas Place
09-08-09	Set Up Trap	Arlington Street
09-09-09	Pick Up Trap	Arlington Street
09-16-09	Set Up Trap	Bentas Place
09-17-09	Pick Up Trap	Bentas Place
09-22-09	Set Up Trap	Arlington Street
09-23-09	Pick Up Trap	Arlington Street
09-30-09	Set Up Trap	Bentas Place
10-01-09	Pick Up Trap	Bentas Place
10-06-09	Set Up Trap	Arlington Street
10-07-09	Pick Up Trap	Arlington Street
10-08-09	Stream Survey	Old Westford Road
10-16-09	Stream Cleaning 35'	Parker Road
	Stream Cleaning 20'	Hall Road
	Stream Cleaning 25'	Hall Road
	Stream Cleaning 25'	Eugenie Terrace
	Stream Cleaning 45'	Brian Road
	Stream Cleaning 15'	Justin Road
	Stream Cleaning 35'	Wells Fargo Road
	Stream Cleaning 15'	Rose Mary Lane
	Stream Cleaning 30'	Concord Road
	Stream Cleaning 25'	Concord Road
	Stream Cleaning 15'	Peders Place
	Stream Cleaning 15'	Concord Road
	Stream Cleaning 25'	Trailside Drive
	Stream Cleaning 35'	Old Stage Road
	Stream Cleaning 40'	Old Stage Road
	Stream Cleaning 35'	Old Stage Road
	Stream Cleaning 20'	Pecos Circle
	Stream Cleaning 40'	Pecos Circle
	Stream Cleaning 25'	Dakota Drive
	Stream Cleaning 60'	Eldorado Road
	Culvert Cleaning (27)	Fay Street, Parker Road, Hall Road, Boston Road, Eugenie Terrace, Brian Road, Justin Road, Wells Fargo Road, Rose Mary Lane, Concord Road, Arthur Avenue, Peders Place, Trailside Drive, Old Stage Road, Pecos Circle, Dakota Drive, Eldorado Road
10-23-09	Pick Up Trap Site	Arlington Street
10-27-09	Stream Cleaning 45'	Cross Street
	Stream Cleaning 55'	Stone Hill Road
	Stream Cleaning 45'	Tremont Road
	Stream Cleaning 35'	Ledge Road
	Stream Cleaning 35'	Oak Hill Road
	Stream Cleaning 45'	Ledge Road
	Stream Cleaning 20'	Swain Road
	Stream Cleaning 15'	Swain Road
	Stream Cleaning 25'	Scotty Hollow Drive
	Stream Cleaning 35'	Scotty Hollow Drive
	Stream Cleaning 65'	Main Street
	Stream Cleaning 10'	Burton Lane

TOWN OF CHELMSFORD

<u>DATE</u>	<u>WORK DONE</u>	<u>LOCATION</u>
10-27-09	Stream Cleaning 30'	Aberdeen Road
	Stream Cleaning 20'	Dayton Street
	Stream Cleaning 65'	Dayton Street
	Stream Cleaning 70'	Doral Drive
	Culvert Cleaning (26)	Butterfield Street, Sleeper Street, Cross Street, Marguerite Road, Dunshire Drive, Stone Hill Road, Tremont Road, Ledge Road, Oak Hill Road, Ledge Road, Swain Road, Scotty Hollow Drive, Main Street, Burton Lane, Aberdeen Road, Dayton Street, Doral Drive
10-28-09	Administrative Contact	Assessor's Office, Engineering Department
	Stream Survey	Old Westford Road, Vincent Road
10-29-09	Stream Cleaning 495'	Vincent Road
	Brush Cutting 50'	Vincent Road
	Ditch Digging 25'	Vincent Road
11-06-09	Stream Survey	Drum Hill Rotary
11-16-09	Culvert Cleaning (1)	Old Westford Road
11-17-09	Stream Survey	Old Westford Road

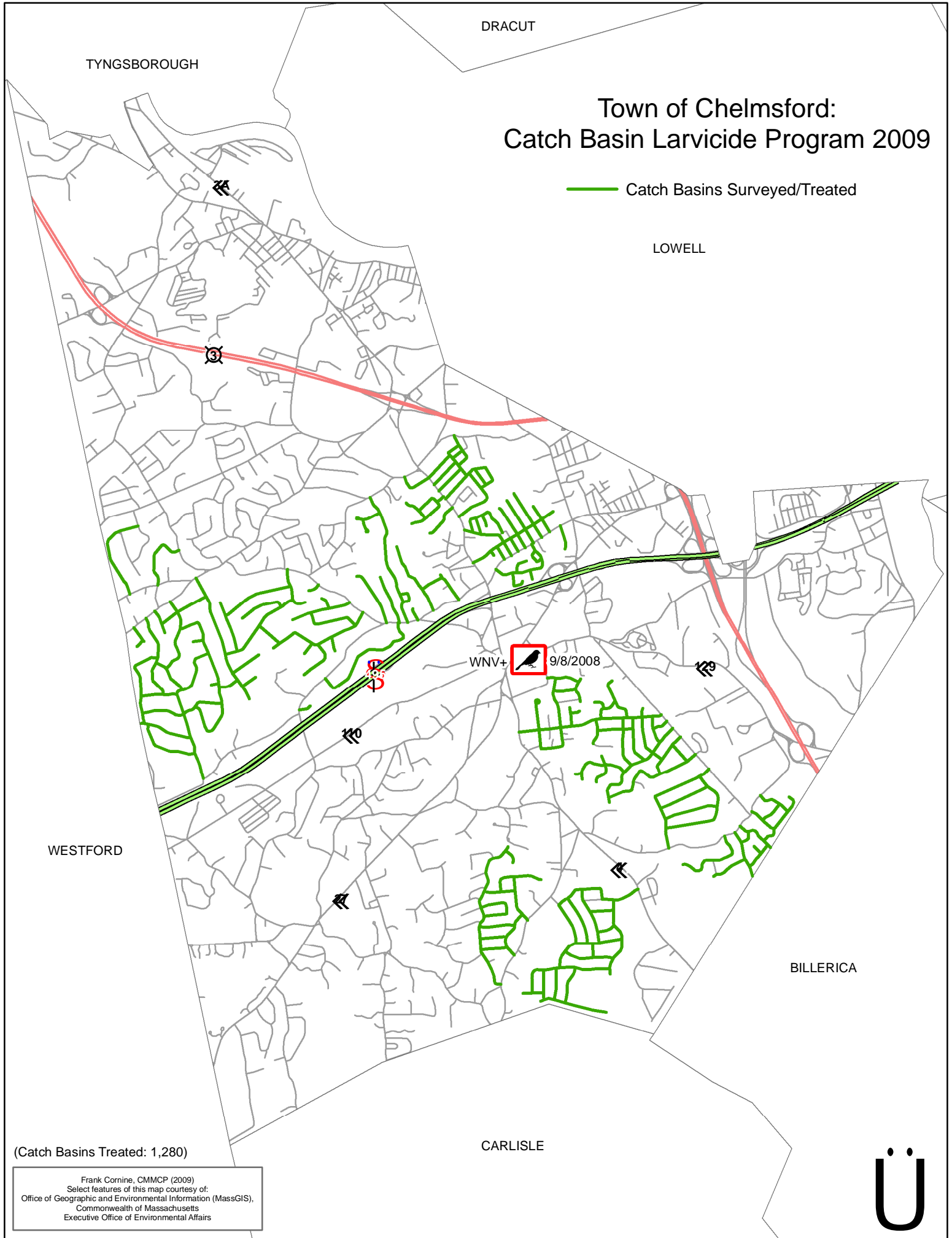
DRACUT

TYNGSBOROUGH

Town of Chelmsford: Catch Basin Larvicide Program 2009

— Catch Basins Surveyed/Treated

LOWELL



WNV+  9/8/2008

WESTFORD

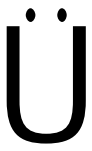
BILLERICA

(Catch Basins Treated: 1,280)

CARLISLE

Frank Cornine, CMMCP (2009)
 Select features of this map courtesy of:
 Office of Geographic and Environmental Information (MassGIS),
 Commonwealth of Massachusetts
 Executive Office of Environmental Affairs





TYNGSBOROUGH

DRACUT

Town of Chelmsford: Aerial Larvicide Program 2009

 Aerial Larvicide Locations

LOWELL

WESTFORD

 9/8/2008
WNV+

BILLERICA

CARLISLE





Frank Cornine, CMMCP (2009)
Select features of this map courtesy of:
Office of Geographic and Environmental Information (MassGIS),
Commonwealth of Massachusetts
Executive Office of Environmental Affairs

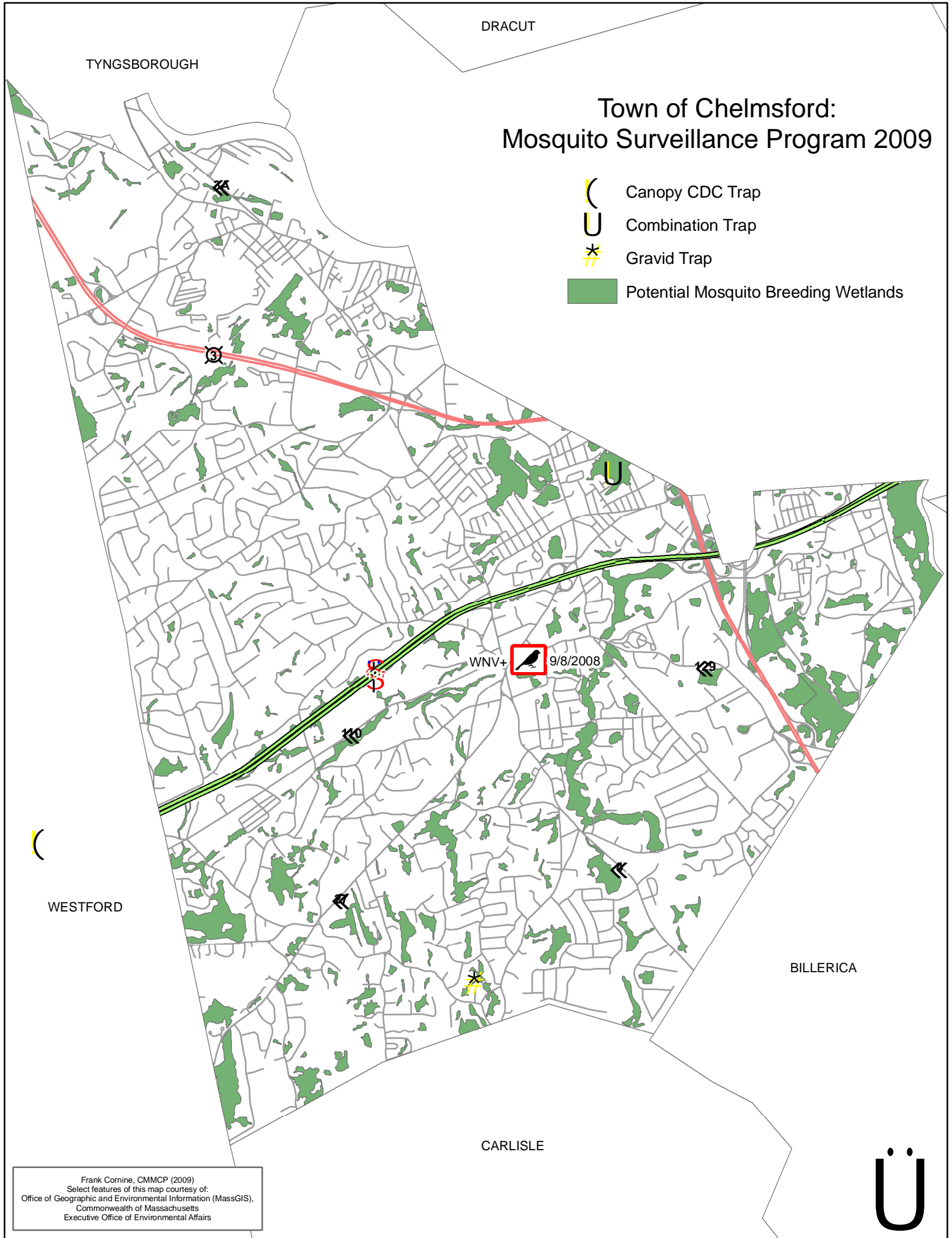
(Total Acreage Designated: ~713)

DRACUT

TYNGSBOROUGH

Town of Chelmsford: Mosquito Surveillance Program 2009

-  Canopy CDC Trap
-  Combination Trap
-  Gravid Trap
-  Potential Mosquito Breeding Wetlands



Frank Cornine, CMMCP (2009)
 Select features of this map courtesy of:
 Office of Geographic and Environmental Information (MassGIS),
 Commonwealth of Massachusetts
 Executive Office of Environmental Affairs



CHELMSFORD SURVEILLANCE DATA
2009

#	Town	Pool ID	Trap Set Date	Number of Traps	Trap Site	Pool Size	Species	Test Type	Result
1	Chelmsford	CM09NS-0227	6/10/2009	1	Bentas Place	18	<i>Culex species</i>	N/S	
2	Chelmsford	CM09NS-0228	6/10/2009	1	Bentas Place	4	<i>Ochlerotatus japonicus</i>	N/S	
3	Chelmsford	CM09-0010	6/16/2009	1	Arlington St.	11	<i>Culex species</i>	WNV & EEE	Negative
4	Chelmsford	CM09NS-0329	6/16/2009	1	Arlington St.	5	<i>Culiseta melanura</i>	N/S	
5	Chelmsford	CM09NS-0330	6/16/2009	1	Arlington St.	1	<i>Culex species</i>	N/S	
6	Chelmsford	CM09NS-0331	6/16/2009	1	Arlington St.	14	<i>Coquillettidia perturbans</i>	N/S	
7	Chelmsford	CM09NS-0332	6/16/2009	1	Arlington St.	1	<i>Aedes cinereus</i>	N/S	
8	Chelmsford	CM09-0031	6/24/2009	1	Bentas Place	13	<i>Culex species</i>	WNV & EEE	Negative
9	Chelmsford	CM09NS-0485	6/24/2009	1	Bentas Place	1	<i>Ochlerotatus japonicus</i>	N/S	
10	Chelmsford	CM09NS-0486	6/24/2009	1	Bentas Place	1	<i>Ochlerotatus triseriatus</i>	N/S	
11	Chelmsford	CM09-0044	6/30/2009	1	Arlington St.	20	<i>Culex species</i>	WNV & EEE	Negative
12	Chelmsford	CM09-0055	6/30/2009	1	Arlington St.	50	<i>Culex species</i>	WNV & EEE	Negative
13	Chelmsford	CM09-0056	6/30/2009	1	Arlington St.	22	<i>Culex species</i>	WNV & EEE	Negative
14	Chelmsford	CM09NS-0533	6/30/2009	1	Arlington St.	1	<i>Ochlerotatus japonicus</i>	N/S	
15	Chelmsford	CM09NS-0610	6/30/2009	1	Arlington St.	70	<i>Coquillettidia perturbans</i>	N/S	
16	Chelmsford	CM09NS-0611	6/30/2009	1	Arlington St.	1	<i>Anopheles punctipennis</i>	N/S	
17	Chelmsford	CM09NS-0612	6/30/2009	1	Arlington St.	1	<i>Ochlerotatus taeniorhynchus</i>	N/S	
18	Chelmsford	CM09NS-0746	7/8/2009	1	Bentas Place	5	<i>Culex species</i>	N/S	
19	Chelmsford	CM09NS-0747	7/8/2009	1	Bentas Place	1	<i>Ochlerotatus japonicus</i>	N/S	
20	Chelmsford	CM09-0107	7/14/2009	1	Arlington St.	21	<i>Culex species</i>	WNV & EEE	Negative
21	Chelmsford	CM09-0119	7/14/2009	1	Arlington St.	10	<i>Culex species</i>	WNV & EEE	Negative
22	Chelmsford	CM09NS-0855	7/14/2009	1	Arlington St.	1	<i>Ochlerotatus japonicus</i>	N/S	
23	Chelmsford	CM09NS-0906	7/14/2009	1	Arlington St.	2	<i>Aedes cinereus</i>	N/S	
24	Chelmsford	CM09NS-0907	7/14/2009	1	Arlington St.	1	<i>Aedes vexans</i>	N/S	
25	Chelmsford	CM09NS-0908	7/14/2009	1	Arlington St.	3	<i>Psorophora ferox</i>	N/S	
26	Chelmsford	CM09NS-0909	7/14/2009	1	Arlington St.	2	<i>Anopheles punctipennis</i>	N/S	
27	Chelmsford	CM09NS-0910	7/14/2009	1	Arlington St.	10	<i>Coquillettidia perturbans</i>	N/S	
28	Chelmsford	CM09NS-1084	7/22/2009	1	Bentas Place	1	<i>Culex species</i>	N/S	
29	Chelmsford	CM09NS-1085	7/22/2009	1	Bentas Place	3	<i>Ochlerotatus triseriatus</i>	N/S	
30	Chelmsford	CM09-0183	7/28/2009	2	Arlington St.	24	<i>Culex species</i>	WNV & EEE	Negative
31	Chelmsford	CM09-0189	7/28/2009	1	Arlington St.	35	<i>Culex species</i>	WNV & EEE	Negative
32	Chelmsford	CM09NS-1222	7/28/2009	2	Arlington St.	1	<i>Ochlerotatus japonicus</i>	N/S	
33	Chelmsford	CM09NS-1223	7/28/2009	2	Arlington St.	2	<i>Ochlerotatus triseriatus</i>	N/S	
34	Chelmsford	CM09NS-1253	7/28/2009	1	Arlington St.	1	<i>Ochlerotatus canadensis</i>	N/S	
35	Chelmsford	CM09NS-1254	7/28/2009	1	Arlington St.	1	<i>Aedes cinereus</i>	N/S	
36	Chelmsford	CM09NS-1255	7/28/2009	1	Arlington St.	12	<i>Coquillettidia perturbans</i>	N/S	

CHELMSFORD SURVEILLANCE DATA
2009

#	Town	Pool ID	Trap Set Date	Number of Traps	Trap Site	Pool Size	Species	Test Type	Result
37	Chelmsford	CM09NS-1256	7/28/2009	1	Arlington St.	1	<i>Aedes vexans</i>	N/S	
38	Chelmsford	CM09NS-1257	7/28/2009	1	Arlington St.	1	<i>Ochlerotatus triseriatus</i>	N/S	
39	Chelmsford	CM09-0237	8/5/2009	2	Bentas Place	33	<i>Culex species</i>	WNV & EEE	Negative
40	Chelmsford	CM09NS-1461	8/5/2009	2	Bentas Place	7	<i>Ochlerotatus japonicus</i>	N/S	
41	Chelmsford	CM09NS-1462	8/5/2009	2	Bentas Place	1	<i>Ochlerotatus triseriatus</i>	N/S	
42	Chelmsford	CM09NS-1463	8/5/2009	2	Bentas Place	1	<i>Aedes cinereus</i>	N/S	
43	Chelmsford	CM09NS-1464	8/5/2009	2	Bentas Place	1	<i>Ochlerotatus cantator</i>	N/S	
44	Chelmsford	CM09-0295	8/11/2009	1	Arlington St.	16	<i>Culex species</i>	WNV & EEE	Negative
45	Chelmsford	CM09NS-1723	8/11/2009	2	Arlington St.	6	<i>Culex species</i>	N/S	
46	Chelmsford	CM09NS-1724	8/11/2009	2	Arlington St.	1	<i>Culiseta morsitans</i>	N/S	
47	Chelmsford	CM09NS-1725	8/11/2009	2	Arlington St.	1	<i>Ochlerotatus triseriatus</i>	N/S	
48	Chelmsford	CM09NS-1752	8/11/2009	1	Arlington St.	2	<i>Psorophora ferox</i>	N/S	
49	Chelmsford	CM09NS-1753	8/11/2009	1	Arlington St.	2	<i>Aedes cinereus</i>	N/S	
50	Chelmsford	CM09NS-1754	8/11/2009	1	Arlington St.	3	<i>Anopheles punctipennis</i>	N/S	
51	Chelmsford	CM09NS-1755	8/11/2009	1	Arlington St.	1	<i>Ochlerotatus hendersoni</i>	N/S	
52	Chelmsford	CM09NS-1756	8/11/2009	1	Arlington St.	34	<i>Coquillettidia perturbans</i>	N/S	
53	Chelmsford	CM09-0354	8/19/2009	2	Bentas Place	8	<i>Culex species</i>	WNV & EEE	Negative
54	Chelmsford	CM09NS-1976	8/19/2009	2	Bentas Place	1	<i>Ochlerotatus japonicus</i>	N/S	
55	Chelmsford	CM09NS-1977	8/19/2009	2	Bentas Place	4	<i>Ochlerotatus triseriatus</i>	N/S	
56	Chelmsford	CM09-0393	8/25/2009	2	Arlington St.	7	<i>Ochlerotatus triseriatus</i>	WNV & EEE	Negative
57	Chelmsford	CM09NS-2140	8/25/2009	2	Arlington St.	5	<i>Culex species</i>	N/S	
58	Chelmsford	CM09NS-2141	8/25/2009	2	Arlington St.	6	<i>Ochlerotatus japonicus</i>	N/S	
59	Chelmsford	CM09NS-2142	8/25/2009	2	Arlington St.	2	<i>Culiseta melanura</i>	N/S	
60	Chelmsford	CM09NS-2143	8/25/2009	2	Arlington St.	1	<i>Uranotaenia sapphirina</i>	N/S	
61	Chelmsford	CM09NS-2144	8/25/2009	2	Arlington St.	3	<i>Anopheles quadrimaculatus</i>	N/S	
62	Chelmsford	CM09NS-2229	8/25/2009	1	Arlington St.	2	<i>Culex species</i>	N/S	
63	Chelmsford	CM09NS-2230	8/25/2009	1	Arlington St.	1	<i>Anopheles punctipennis</i>	N/S	
64	Chelmsford	CM09NS-2231	8/25/2009	1	Arlington St.	4	<i>Ochlerotatus hendersoni</i>	N/S	
65	Chelmsford	CM09-0455	9/2/2009	2	Bentas Place	8	<i>Culex species</i>	WNV & EEE	Negative
66	Chelmsford	CM09NS-2461	9/2/2009	2	Bentas Place	3	<i>Ochlerotatus triseriatus</i>	N/S	
67	Chelmsford	CM09NS-2462	9/2/2009	2	Bentas Place	1	<i>Ochlerotatus japonicus</i>	N/S	
68	Chelmsford	CM09NS-2516	9/8/2009	2	Arlington St.	1	<i>Culex species</i>	N/S	
69	Chelmsford	CM09NS-2517	9/8/2009	2	Arlington St.	2	<i>Ochlerotatus japonicus</i>	N/S	
70	Chelmsford	CM09NS-2518	9/8/2009	2	Arlington St.	3	<i>Ochlerotatus triseriatus</i>	N/S	
71	Chelmsford	CM09NS-2519	9/8/2009	2	Arlington St.	3	<i>Culiseta melanura</i>	N/S	
72	Chelmsford	CM09NS-2564	9/8/2009	1	Arlington St.	1	<i>Ochlerotatus cantator</i>	N/S	

CHELMSFORD SURVEILLANCE DATA
2009

#	Town	Pool ID	Trap Set Date	Number of Traps	Trap Site	Pool Size	Species	Test Type	Result
73	Chelmsford	CM09NS-2565	9/8/2009	1	Arlington St.	1	<i>Aedes vexans</i>	N/S	
74	Chelmsford	CM09NS-2566	9/8/2009	1	Arlington St.	1	<i>Anopheles punctipennis</i>	N/S	
75	Chelmsford	CM09NS-2833	9/16/2009	1	Bentas Place	1	<i>Ochlerotatus japonicus</i>	N/S	
76	Chelmsford	CM09-0556	9/22/2009	2	Arlington St.	5	<i>Culex species</i>	WNV & EEE	Negative
77	Chelmsford	CM09NS-2952	9/22/2009	2	Arlington St.	8	<i>Ochlerotatus japonicus</i>	N/S	
78	Chelmsford	CM09NS-2953	9/22/2009	2	Arlington St.	1	<i>Ochlerotatus triseriatus</i>	N/S	
79	Chelmsford	CM09NS-2954	9/22/2009	2	Arlington St.	2	<i>Culiseta melanura</i>	N/S	
80	Chelmsford	CM09NS-2955	9/22/2009	2	Arlington St.	1	<i>Uranotaenia sapphirina</i>	N/S	
81	Chelmsford	CM09NS-2989	9/22/2009	1	Arlington St.	3	<i>Culiseta melanura</i>	N/S	
82	Chelmsford	CM09NS-2990	9/22/2009	1	Arlington St.	1	<i>Aedes vexans</i>	N/S	
83	Chelmsford	CM09NS-3123	9/30/2009	2	Bentas Place	1	<i>Ochlerotatus japonicus</i>	N/S	
84	Chelmsford	CM09NS-3198	10/6/2009	2	Arlington St.	1	<i>Culex species</i>	N/S	
85	Chelmsford	CM09NS-3199	10/6/2009	2	Arlington St.	6	<i>Ochlerotatus triseriatus</i>	N/S	
		85 collections				579	mosquitoes collected		
		15 collections submitted for testing				283	submitted for testing		
		NO VIRUS IDENTIFIED IN 2009					N/S=not submitted for testing		

2009 SUMMARY

The Central Massachusetts Mosquito Control Project (the Project) currently provides its services to 38 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 Pest Management (IPM), 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 2009 the Project received thirteen thousand, six hundred and fourteen (13,614) requests for service from town residents and officials. Ten thousand, nine hundred and ninety (10,990) pounds of Bti (*Bacillus thuringiensis israelensis*) was applied by helicopter over two thousand, one hundred and ninety eight (2,198) acres in 3 towns, Chelmsford, Billerica & Boxborough, and six thousand, three hundred and forty seven (6,347) pounds by hand over one thousand, two hundred and sixty nine (1,269) acres throughout our service area were applied to area wetlands to reduce the emergence of adult mosquitoes. This represents over three thousand, four hundred and sixty seven (3,467) acres of wetland that was treated with this mosquito-specific bacterium, significantly reducing adult mosquito populations in these areas. Twenty nine thousand, eight hundred and forty six (29,846) 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. Three thousand, two hundred and twenty six (3,226) 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 thirty six thousand, eighteen (136,018) feet of streams, brooks and ditches. This represents over twenty five and a half (25.7) miles of waterways which were cleaned and improved by Project personnel in 2009.

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. In 2009, CMMCP laboratory personnel and other administrative staff made sixty three (63) educational presentations before one thousand, nine hundred and eighty six (1,986) students in fifteen (15) Elementary schools and ten (10) members of a rotary club. CMMCP gave a presentation on our program to 12 Clarke University students in the Clarke Vector Ecology program and exhibited at two (2) health fairs.

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 our 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. Six hundred and six (606) pools (collections) of mosquitoes totaling thirteen thousand seven hundred and ninety one (13,791) specimens were tested for mosquito-borne viruses this year. Six (6) collections were identified positive with mosquito-borne viruses, three (3) with West Nile Virus (WNV) and three (3) with Eastern Equine Encephalitis (EEE) - details are available in the Medical Entomology report in this document. No human cases of EEE or WNV were identified in our

service area. CMMCP lab personnel made one thousand, five hundred and sixty five (1,565) total collections of mosquitoes containing thirty seven thousand, two hundred and thirty (37,230) individual specimens, representing twenty six (26) mosquito species.

Some additional highlights from 2009:

- Resistance management study; no significant resistance to pyrethroids noted, no change recommended in adulticide material choice (see full report).
- Resident satisfaction survey: conclusion; overall satisfaction with the adulticide program was 92%, 98% plan to use our services again (see full report).
- Host seeking study to determine the prevalent time frame mammal-biting species are seeking bloodmeals; this information will determine the best time for adulticide applications (see abstract).
- Working with Tufts Veterinary Hospital to measure effects of adulticide program on non-target effects; no conclusion as of yet, multi year study begun in late 2007.
- Working with CT Agr. Experiment Station to determine host preference of *Culiseta melanura* by collecting and analyzing DNA of blood meals; results expected soon.
- We have been awarded PESP status by the US EPA again this year. The Pesticide Environmental Stewardship Program (PESP) is a voluntary program that forms partnerships between the EPA and pesticide users to reduce the potential health and environmental risks that may be associated with pesticide use.

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 2009 and we look forward to helping you and your community with its mosquito problems in 2010 and beyond.

Respectfully submitted,
Timothy D. Deschamps, Executive Director

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