

## Site Visit Report (Wednesday, July 8, 2010)

By Executive Director, Mark S. Buffone

On behalf of the State Reclamation and Mosquito Control Board (Board), the Executive Director report begins in Waltham, Massachusetts, the headquarters of the East Middlesex Mosquito Control Project. This mosquito control program provides mosquito control services to 26 member cities and towns including Arlington, Bedford, Belmont, Brookline, Burlington, Cambridge, Concord, Everett, Framingham, Lexington, Lincoln, Malden, Maynard, Medford, Melrose, Newton, North Reading, Reading, Sudbury, Wakefield, Waltham, Watertown, Wayland, Wellesley, Weston, and Winchester. The Superintendent, Mr. David Henley, an experienced and knowledgeable manager, oversees the day-to-day operations.

During this visit, Mr. Henley reported that the warmer than normal temperatures during March and early April created conditions that accelerated larval development (up to two weeks earlier than normal). He noted that in the 23 years that the Project has conducted helicopter applications to control *spring brood mosquitoes*, 2010 appears to be the earliest emergence of *spring brood* mosquitoes on record.

He noted that the hot and dry weather conditions have continued and as a result his program is now focused on other important mosquito species that have emerged such as *Coquillettidia perturbans*, *Culex pipiens / restuans*, and *Culiseta melanura*. These species play an important role in the transmission of serious arboviruses such as Eastern Equine Encephalitis (EEEV) and West Nile virus (WNV). In order to keep track of population trends of these important species, the East Middlesex Mosquito Control program, like the other regional mosquito control programs, are busy conducting surveillance. Surveillance is done by placing traps in various locations within the mosquito control district such as CDC traps with dry ice and gravid traps. Thereafter, mosquitoes are collected and sent to the state labs for testing.

The *CDC Trap* was first designed in the late 1950's by the Centers for Disease Control (CDC). The trap is compact and portable, is powered by a battery, and can maintain sampled mosquitoes alive for the purpose of species identification and viral assay. A small incandescent lamp disorients flying insects, and a fan draws these into a collection chamber. The light may be augmented or replaced by a carbon dioxide (CO<sub>2</sub>) source such as dry ice.

The *gravid trap* is used almost exclusively to collect female *Culex pipiens* and *Culex restuans* that have already taken a blood meal and are seeking a site to deposit eggs (gravid condition). These portable battery-operated traps are particularly useful for surveillance of virus-infected mosquitoes because they tend to collect the older (and thus infected) portion of the vector populations, and maintain the captured mosquitoes alive and in good condition for laboratory assay. Gravid traps, therefore, are valuable for WNV monitoring efforts.

Mosquitoes caught in the traps are retrieved and brought back to the office to be chilled, sorted, counted, and then sent to the state laboratory for testing of arbovirus.

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Currently, the East Middlesex mosquito control operations utilize trucks mounted with precision equipment that disperses an aerosol to kill adult mosquitoes. The technology, known as Ultra-Low-Volume (ULV), disperses micron size droplets of a specially formulated pesticide that impinge on flying mosquitoes. The pesticide used is called Anvil 10+10 ULV containing the active ingredient Sumithrin. The operation is usually conducted at dusk and into the evening when most species of mosquitoes especially *Coquillettidia perturbans* is at its peak activity. *Coquillettidia perturbans*, an aggressive mammal biting species, develops in permanent water marshes that frequently contain cattails, and currently is the predominant species that the East Middlesex Mosquito Control Projects light traps are collecting. Due to the above normal warm weather that has occurred since March, *Coquillettidia perturbans* has emerged earlier than normal.

During this site visit, the Executive Director viewed a number of cattail marshes, and in some cases, these marshes were quite large. In one area that was visited, the Superintendent noted that the cattail marsh was one of the largest in the State totaling up to 300 acres. Usually, these areas have been created where the drainage has been disturbed and/or water has been restricted creating conditions for this type of vegetation to grow. Interestingly, the immature stage of *Coquillettidia perturbans* is unlike other Massachusetts mosquito species in that it attaches underwater to the roots of the aquatic vegetation to obtain oxygen. As a result, controlling the larvae, which would be an ideal tactic, is not realistic for this species presently. Traps placed around some of these large cattail marshes catch thousands of these mosquitoes on any given night as they migrate into residential areas seeking blood. As a result of this surveillance, the Project can and does schedule adult mosquito control spraying in residential areas where traps reveal high populations of *Coquillettidia perturbans*. East Middlesex Mosquito Control deploys up to 3 trucks per night, weather permitting. All spraying is done between dusk and 11:30 PM.

Due to the lack of significant rains during June and July, populations of other mosquito species normally active at this time of year have declined and/or relatively few have emerged. For example, one of the most prevalent mosquitoes in the Commonwealth *Aedes vexans* (a flood water species), is relatively non-existent presently due to lack of flooding events. Therefore, the project has continued to focus its efforts on *Coquillettidia perturbans*.

Another focus of the Project is the monitoring and treating of catch basins with larvicides to control larval *Culex pipiens/restuans*. *Culex pipiens* considered both an enzootic and possible human vector of West Nile virus develops in more organic or polluted water sources, while *Culex restuans*, an enzootic vector of West Nile virus is more likely to develop in cleaner water. Artificial and manmade containers such as catchbasins are the preferred larval habitat of both *Culex pipiens* and *Culex restuans*. Adults of this species mainly feed on birds and occasionally on mammals. It will bite humans, typically from dusk into the evening. This species is regularly collected from May to October but can be found year round as it readily overwinters in man-made structures such as sheds and basements.

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Municipal catch basins are particularly important because they are installed throughout most communities, are designed to hold water, and often become fouled with leaf litter and other organic wastes such as animal wastes. Because water evaporates slowly from catch basins, they become a significant source of *Culex* mosquitoes during dry periods such as the conditions that currently exist. The stagnant water provides ideal conditions for the immature stages of these mosquitoes, and the space between the water surface and catch basin grate provides shelter for resting adults. Other sites, such as in clogged roof gutters and downspouts, stagnant puddles and pools, and water-containing buckets and toys will also support development of these mosquitoes. Just an inch of water within a trash barrel may allow many hundreds of mosquitoes to develop each week. Although many different kinds of habitats may support and produce numerous *Culex* mosquitoes, municipal catch basins have been identified as a major source.

The current weather of warm and dry conditions is usually more conducive to West Nile Virus than EEE virus. As a result, the project has prioritized its effort to making treatments to catch basins in their service area. In fact, the program treats up to 64,000 catch basins. The program will place gravid traps in many areas but concentrates on areas where there have been past human cases. Since 2002 there have been 17 human WNV cases in the district. The Superintendent reported that all of the cases occurred in communities with a population density of at least 4,000 people per square mile.

The East Middlesex program has a crew of workers that navigate through the urban areas of the service area to treat catch basins, in a cost effective manner, while posing little environmental impact. The purpose of the control strategy to reduce *Culex (species)* mosquitoes is to reduce the enzootic vector population and decrease buildup of virus. The crew members use products such as Altosid pellets (*methoprene*) and Vectolex WSP (water soluble packets) with the active ingredient *Bacillus sphaericus*. Both Altosid and Vectolex are larvicides; that is, they kill mosquitoes during the larval stage. Altosid's active ingredient contains an insect growth regulator (IGR) that is slowly released for many weeks making it an ideal product that will work in a basin that is chronically or periodically holding water. Vectolex's active ingredient contains a naturally occurring bacterium (*Bacillus sphaericus*) that is common in soils. Vectolex Water Soluble Packet (WSP) product continues to provide control of any new breeding as long as the catch basin remains wet.

With budget limitations and tough economic times, the project in many communities has had to limit its costs by applying pellets at \$.38 per catchbasin instead of using pre-measured water soluble packets at costs ranging from \$.71 - \$.94 per catchbasin. The Project director is concerned because meteorological or weather conditions in 2010 are similar, so far, to conditions observed in 2002, when there were 22 human cases of WNV statewide. As a result, the project has been proactive focusing on larval control of *Culex* mosquitoes.

The hot temperatures, even without significant precipitation, may actually increase the risk of arbovirus transmission as mosquitoes and birds might then concentrate in areas where remaining water sources allow conditions for the virus to amplify. Hot weather will speed up the entire dynamics of mosquitoes, pathogen, and virus cycling in bird populations. Mosquito host seeking, egg deposition, development and virus replication may thereby accelerate.

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Although during this site visit, the weather was hot and areas conspicuously dry, there were still plenty of mosquitoes, especially *Culex*. Gravid traps collections from Malden and Medford revealed abundant *Culex* mosquitoes. During the site visit a few lingering *spring brood* mosquitoes attempted to bite people walking in shady portion of wooded areas.

These important mosquito surveillance and collection activities of mosquito control projects such as East Middlesex Mosquito Control Project provide an early detection system to the member communities of their program. Once the virus is detected, the project works closely with both state and local health professionals to make sure that public is alerted in order to take appropriate action to protect themselves from the risk of arbovirus diseases such as West Nile Virus and Eastern Equine Encephalitis. Although arbovirus risk can be throughout the state once the virus is detected, the mosquito surveillance and collection efforts help to delineate areas most in need of treatments to further suppress mosquitoes, whether they burden the quality of life or pose risk of pathogen transmission.

If you need to contact your mosquito control project or find out if your town is covered by a regional control program please see the links below.

<http://www.mass.gov/agr/mosquito/docs/2010-Member-Communities-List-with-mosquito-project.pdf>

For more information specifically about East Middlesex Mosquito Control Project, click below or call David Henley, Superintendent at 781-899-5730

[http://www.mass.gov/agr/mosquito/east\\_middlesex.htm](http://www.mass.gov/agr/mosquito/east_middlesex.htm)

The Board also invites the public to visit the state arbovirus website during the mosquito season for important updates and fact sheets regarding West Nile Virus (WNV) and Eastern Equine Encephalitis (EEE).

<http://westnile.ashtonweb.com/>

<http://www.mass.gov/dph/wnv>

Finally, a picture is worth a thousand words; please click below to see photographs of the site visit. **Note:** The pictures of the during this site visit were taken by Executive Director, Mark Buffone, including the mosquito specimens of *Coquillettidia perturbans*, which were collected by from the Town of Reading, MA by the East Middlesex Mosquito Control Project entomologist, Doug Bidlack, on June 29, 2010