Mosquito Biology

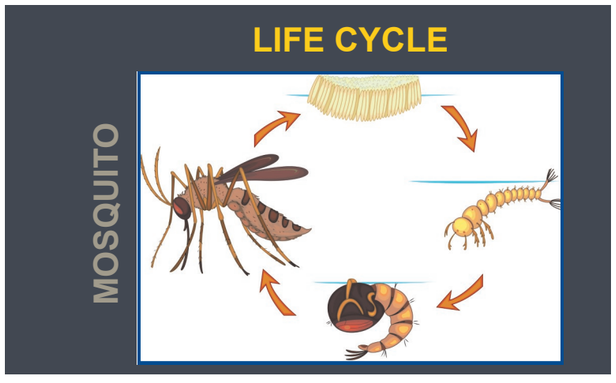
The foundation of a quality mosquito control program is to have an understanding of the biology and disease-vector potential of the local mosquito species.

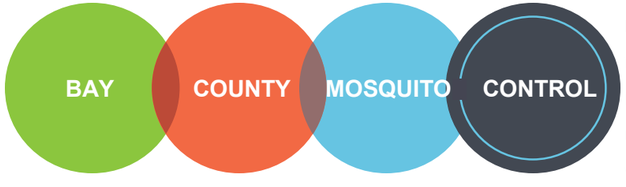
Mosquito Biology and Disease

Surveillance for immature and adult mosquitoes and the diseases they may transmit are part of the Biology Department's daily operations. Larvae are sampled in woodlots, fields, ditches, pools, sewage lagoons, and retention ponds while adults are collected from mechanical traps. These traps include New Jersey Light Traps, CDC Traps, and Gravid Traps. Data are collected and analyzed in order to control mosquitoes in the most effective way and reduce disease transmission while minimizing environmental impacts. A series of rain gauges will also be monitored to determine where likely larval production is occurring and to decide where to dispatch crews.

Monitoring of mosquito-transmitted diseases will continue for 2016 through processing/testing of adult mosquitoes and dead birds for the presence of West Nile, St. Louis, and Eastern Equine encephalitis viruses. *Culex* species are important for the amplification and transmission of WNV and SLE virus in our area and *Coquillettidia perturbans*, the cattail marsh mosquito, is an important vector of EEE. Staff will keep abreast, through the CDC, of Chikungunya and Zika virus activity.

Larval sampling/surveillance is important in determining the abundance of mosquito larvae in various habitats. The information can be used to determine optimal times for using larval control materials and to determine the need and timing for adult mosquito control. Crews collect larval samples daily that are identified by lab staff. Larvae are identified to the species level by using a dichotomous key and dissecting scope.





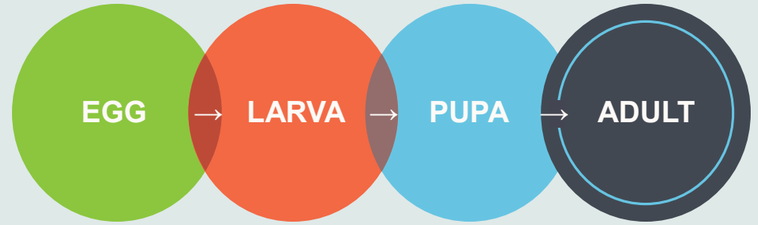
Education & Outreach

Mosquito control programs need the support of an informed public, so community outreach will continue to be an important part of the 2016 program.

Educational presentations are designed to raise awareness of mosquito habitats and life cycles. Each season homeowners are reminded of ways to reduce backyard larval breeding. Presentations are given to community service groups and township/county officials, while flyers, brochures, door hangers, bookmarks, and rack cards are hand-distributed or mailed to county residents. Media will be utilized for press releases on important activities, events, and disease updates. K-5 educational programs will continue as well.

Highlights

- 2016 Millage
- Purchase one new pickup truck
- Purchase one new ULV machine
- Apply for MDEQ scrap tire grant
- VectoLex WSP evaluation
- Aquabac aerial trial
- Refurbish Biology storage shed
- Wheel alignment system
- GPS vehicle tracking



BAY COUNTY MOSQUITO CONTROL 2016 PROGRAM PLAN

Aircraft Calibration

With aerial applications, Bay County can reach woodlots that are otherwise very difficult or too large to treat. Having the ability to utilize aircraft is an effective complement to ground-based activities. To calibrate, aircraft fly over a row of 15 heavy-duty plastic tubs, dropping *Bti* granules. The granules are gathered and weighed to determine the application dosage rate. Aircraft calibration also allows a swath width determination.

Spring Campaign

Control mosquitoes early to make a big impact!

Spring larviciding controls *Aedes* mosquito larvae in woodlots using *Bacillus thuringiensis israelensis (Bti)* to prevent them from emerging as biting adults. *Bti* kills 1st-3rd instar larvae, but does not adversely affect other wildlife or beneficial insects, people, or pets.

Aerial and ground applications will be timed to best impact larvae. Earl's Spray Service of Breckenridge, MI will be contracted to provide aerial application via fixed-wing aircraft. There will be 43,000-45,000 woodland acres scheduled for treatment with a dosage rate of three pounds of *Bti* per acre.

Treatment will occur after extensive surveillance has taken place and larvae are at the appropriate developmental stage.

The following is a list of aerial program components: 40 woodlots monitored, 200 acres of woodlots treated by ground crews, 3 aircraft, 1 loading zone at Barstow Airport in Midland, aircraft calibration, 43,000-45,000 acres treated by air, and quality control to monitor aerial application.

Woodlots are monitored both before and after application to determine treatment efficacy through pre- and post-larval counts. Dip counts are taken in both treated and untreated (control) woodlots.

Source Reduction

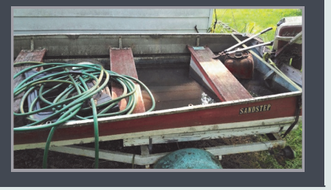
Source reduction is the physical or permanent removal of mosquito breeding sources from the environment. It can be as simple as dumping water from containers or as complex as installing a catch basin drain in a field to prevent standing water from developing. Much of our time is spent walking through neighborhoods and backyards looking for and eliminating these, small, but nevertheless effective breeding habitats.

Source reduction also includes collecting scrap tires. In 2016 BCMC will hold two scrap tire drives for homeowners to recycle up to 10 rimless car or pickup tires per residence. This eliminates tires as a breeding source and reduces the need for insecticides to be used.

SUMMER LARVICIDING

Larviciding involves the introduction of control materials into aquatic habitats to control larvae or pupae and prevent adult emergence. Habitats with a previous history of breeding will be investigated, with additional emphasis on mapping new sites. We expect to survey nearly 20,000 sites, treating about 15% of them. Emphasis will be given to source reduction in the form of dumping water from containers to eliminate larvae. Technicians will respond to residential service requests as well as survey known breeding sites or new sites found during daily monitoring.

Larviciding is a main program component, comprising about 70% of control efforts. Control materials utilized include the microbial products *Bti*, *Bacillus sphaericus*, and Natular (spinosad), as well as temephos and larvicide oils. Habitats monitored include catch basins, roadside ditches, abandoned pools, flooded fields and woodlots, retention ponds, scrap tires, and containers.



STAFFING

Seven full-time and 30 seasonal employees will be working during the 2016 season. Seasonal employees fill the following positions: 1 data entry clerk, 2 biology assistants, 18 larval control technicians, and 9 adult control technicians.

Shifts run from 8:00am-4:30pm (days) and 8:00pm-2:00am (nights), but may vary slightly throughout the year.

SERVICE REQUESTS & SPECIAL PROGRAMS

SERVICE REQUESTS

Bay County citizens call when adult mosquito populations rise, when rain creates standing water on properties, or when planning outdoor activities such as picnics, weddings, and graduations. These calls are logged into a database and used as a means to monitor mosquito annoyance. Crews are dispatched to help in each situation.

LONG DRIVEWAY PROGRAM

Homes that sit a distance off the main road that do not receive adequate adult mosquito control may opt into the long driveway program. Drives are mapped and sprayed during regular township sweeps.

MEDICAL NEEDS PROGRAM

This program offers extra service to residents who have a verifiable, doctor-supported medical need that warrants additional mosquito surveillance/control. Often, these are residents who suffer from severe mosquito allergies.

NO SPRAY PROGRAM

Some residents prefer their property not be treated for mosquitoes. Yellow reflective signs mark property lines as a visual reminder to "skip" the property. Frequently, residents who opt out of adult mosquito control are still in favor of larval control.

ADULT MOSQUITO CONTROL

Protecting public health by managing mosquito populations is BCMC's primary goal. Through control, the number of adult mosquitoes is lessened, thereby reducing their annoyance and disease risk.

In order to meet that goal, nine ultra low volume (ULV) truck-mounted spray units will be used with treatment occurring from sunset to 2:00 a.m., provided mosquito populations warrant treatment and that weather conditions are conducive. The ULV machines dispense a small amount of control material that must come in contact with adult mosquitoes in order to effectively control them. Machines are calibrated to ensure the proper dosage is applied according to label recommendations. Droplet size is also measured and adjusted on a regular basis ensuring the spray is as effective as possible.

Focus will continue where there is potential disease risk, as well as in areas where high mosquito numbers, as indicated by traps, are affecting Bay County residents. Park and recreation areas utilized for public functions will also be serviced. An electric ULV machine will be utilized full-time for the second year during the 2016 season.

Filling a ULV tank

Testing a ULV machine

TRAINING

Technicians are required to attend a day-long training session that takes place in May where all aspects of the program are discussed. Hands-on training takes place with a certified trainer.

Seasonal employees must pass two written tests administered by the Michigan Department of Agriculture and Rural Development (MDARD) to receive a certified pesticide applicator card. This certification lasts three years. Additional safety training will take place in 2016 regarding chemical spills and driver safety.

MILLAGE

County residents have had a mosquito abatement millage in place since 1976, when voters first approved the Saginaw-Bay Mosquito Control Commission's request for a .25-mill tax. Bay County Mosquito Control's current 0.45 millage rate has been in place for the last 28 years and was last approved by voters in 2008 for a period of eight years. In November 2016 Bay County residents will be asked to vote again to support mosquito control services.

VELOCITY SYSTEMS

GPS Tracking

Velocity Systems, LLC of Big Rapids, MI has been contracted to implement a fleet tracking system in 2016. With the 10 MqTrack™ units installed in vehicles, Velocity will run simulations throughout the winter months in order to test the units' performance. The MqTrack™ system provides guidance throughout the application process, handles automatic no-spray control, monitors and maps application positioning, collects detailed rate and volume measurements, and produces informative, statistical reports of coverage areas. The system uses an on-board computer and GPS to track position and rate information.