LARVICIDING OPERATIONS

Descriptions of mosquito breeding sites for larva/pupa control

Prepared by the

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Breeding Habitats

Common breeding habitats are described along with representative pictures. This is not an exhaustive list of all possible breeding sites, as ***anything*** with the potential to hold water can breed mosquitoes. Also, mosquito control materials may change as new materials become available. Please be advised the suggestions of where, when and with what material varies and always consult the labels to be sure to apply the appropriate material to standing water.

Mosquito Control Materials Used Standing Water to Control Larva or Pupa		
Abbrev.	Larval/Pupal Control	Active Ingredient
Bti	Larva	Bacillus thuringiensis isralensis
Bs	Larva	Bacillus sphaericus
Alto	Larva	Methoprene
Nat	Larva	Spinosad
Mosq	Larva	Novaluron
MLO	Larva & Pupa	Mineral Larviciding Oil

Spring Flooded Woodlot

Treatment Timeline: April 1-May 31

The larviciding season begins as a result of snowmelt and rain, which flood woodlots causing spring *Aedes* mosquito eggs to hatch. There are three major groups of spring *Aedes* mosquitoes: *Communis* group, *Stimulans* group and *Ae. canadensis*. These mosquitoes have a single generation each year as the eggs require a freezing period before they will hatch. Control applications to woodland pools should begin as soon as hatching of most of these groups has occurred, on average mid-late April, depending on larval development. *Bti*, either in granular or liquid form, is used for larval stages, with a switch to *MLO* approximately May 1st after surveillance has determined pupation. These long-lived (on average 6 - 8+ weeks) species are aggressive biters and emerge as adults approximately May 10-15. Larviciding will begin to shift away from spring woodlots and focus on summer habitats as the weather warms up in mid-late May.

Roadside Ditches

Treatment Timeline: May 1– September 30

Controlling mosquitoes in roadside ditches is a significant undertaking following major summer rains. Roadside ditches are checked after rain events to determine the density and stages of larvae. Ditches are commonly treated with *Bti* or *MLO* depending on larval/pupal development. *Spinosad* can also be used in sensitive areas. When mass-treatment of ditches are needed throughout a large area, specially adapted 2-person ditch trucks can be employed. Ditches with flowing water are not treated, as the treatment material would be carried away. Small ditches created by residences to drain rain water on their property can be treated by hand and may be treated with a pre -flood product to provide residual control to last through several floodings.

Flooded Fields

Treatment Timeline: May 1– September 30

Flooded fields are low, grassy areas with temporary water, usually 2-3 inches deep, that develop after rain events. These sites can be difficult to locate because the grass hides the water from view. Flooded fields produce *Ae. vexans* known for their vicious biting habits and long flight range. *Bti* or *MLO* is used to treat flooded fields depending upon the sensitivity of the site and the stages of mosquitoes present.

Catch Basins

Treatment Timeline: June 1– September 30

Catch basins are installed in a number of urban areas to facilitate drainage along roads, parking lots and fields. They provide a habitat that is wet, well protected, stable, and high in organic matter. With thousands of catch basins in municipalities, a high potential for production of large numbers of mosquitoes exists. To control mosquito breeding in catch basins, *Methoprene*, *Bs*, *Spinosad*, or *Novaluron* products are typically applied. For longer control, many products can be purchased in different formulations, for up to 150 days control. Mapping catch basins often makes for more accurate and efficient treatments.

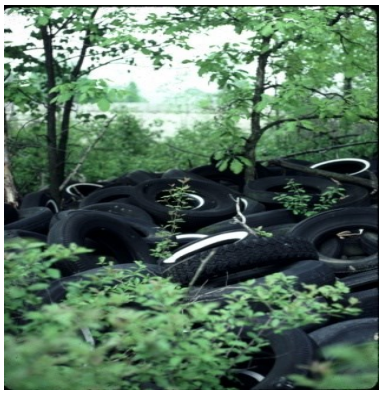
Artificial Containers

Treatment Timeline: May 1– September 30

Objects that hold water and cannot be easily emptied include horse troughs, rain barrels, old cars, etc. Artificial containers are a major producer of *Ae. japonicus,* a new invasive mosquito species as well as numerous other species. Dumping containers is the preferred method to reduce breeding sources, however, *Methoprene*, *Bti*, or *Bs* can be applied depending upon the stages of mosquitoes present. The sensitivity of the site must be considered before using *MLO*.

Tires

Treatment Timeline: May 1– September 30



Scrap tires have become a major concern to mosquito control personnel throughout the country. In southern states, tires are major breeding sites for *Ae. albopictus*, the Asian tiger mosquito, an imported mosquito with potential to vector many diseases including Zika virus. In Michigan, tires are also important as they breed a number of species including those in the genus *Culex*, a West Nile virus vector, *Ae. japonicus*, and *Ae. triseriatus*, a tree hole mosquito which has moved into these man-made sites. Tires make excellent breeding sites because their dark color absorbs sunlight allowing the water to warm quickly. In addition, the sidewalls often collapse preventing evaporation of the contained water. Larvae are controlled with *Bs*, *Bti*, or *Methoprene* pellets. *MLO* is used if pupation has occurred.

Idle/Neglected Pools

Treatment Timeline: June 1 – September 30

Unmaintained swimming pools should be routinely checked as they are capable of continuously breeding very large populations of *Culex*. Treat these sites with *Bti* (sustained 150 day release), *Bs*, or *Spinosad*. Using a longer residual formulation would be recommended as these pools are unlikely to dry. Ultimately, the best control is achieved through maintaining, draining, covering, removing, or filling.

Retention/Detention Ponds

Treatment Timeline: May 1– September 30

Retention and detention ponds are used to manage storm water runoff and prevent flooding. These ponds are sensitive, as they can contain fish, and are only treated with *Bti* even if pupae are detected.

Swamps

Treatment Timeline: June 1– September 30

Swamps are low-lying areas that remain wet throughout the summer. These permanent sites may produce *Cq. perturbans* that attach to the roots of aquatic plants. Conventional larviciding techniques are ineffective against them as they are well protected from pesticides. Control measures using ULV machines or thermal foggers, therefore, are directed against the adults. Marshes and swamps also breed other types of mosquitoes that normally do not present a major problem but if treatment is warranted, *Bti* is mainly used in these sensitive sites.

Cattail Marshes

Treatment Timeline: June 1– September 30

Many areas have low spots where the primary emergent vegetation is sedges, grasses and cattails. Usually, these sites will become wet sooner and retain water longer than flooded grasslands. Cattail marshes can produce a variety of *Ae. species*, *Anopheles*, and *Cq. perturbans*. *Bti* or *MLO* can be used to treat cattail marshes depending upon the sensitivity of the site and the stages of mosquitoes present.

Sewage Lagoons

Treatment Timeline: June 1– September 30

Lagoons are often used for the treatment of wastewater especially in highly populated areas that are not connected to city sewage treatment plants, such as trailer parks. Highly organic, these sites produce primarily *Culex pipens* and *Culex restuans*, which are WNV vectors. Sewage lagoons are treated with *Bs* or *MLO*, depending on mosquito development.

Ponds

Treatment Timeline: June 1– September 30

Ponds are permanent pools with open water that often have sufficient wave action to limit the site's ability to produce mosquitoes. Ponds are extremely sensitive, as they may contain fish and other wildlife, and are only treated with *Bti* even if pupae are detected.

If you have any questions or concerns regarding specific material please refer to the material label and safety data sheet.

For additional information regarding regulations for community level larvicide applications please contact:

Department of Environmental Quality or

Michigan Department of Agriculture & Rural Development