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Office of Water
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Stormwater Structures & Mosquitoes

What's the Issue?

Stormwater structures that temporarily or permanently retain runoff are receiving increasing attention as potential mosquito breeding areas. Mosquito-borne diseases such as West Nile virus, St. Louis encephalitis, and eastern and western equine encephalitis are human health concerns. Measures that lower mosquito production in stormwater structures are needed to protect public health.

If designed properly, stormwater structures should not promote mosquito breeding. Ensuring that these structures are properly designed and maintained is the key to limiting mosquito production.

What is Stormwater?

Stormwater is the rain or snowmelt that does not initially infiltrate into the ground and runs off of surfaces and is transported into nearby waterways.

Facts About Mosquitoes

- There are over 2500 mosquito species worldwide, about 200 of which are found in the United States.
- Only female mosquitoes transmit diseases since they need the protein from blood to breed.
- The primary breeding habitat for mosquitoes is stagnant or shallow pools of water (generally less than 3 feet in depth) that exist for at least 7 days and/or aquatic sites with dense floating vegetation regardless of the water depth.
- Depending upon species, the adult mosquitoes may live from 1 week up to 3 months maximum.
- Mosquito predators include birds, fish, dragonflies, spiders, and a wide variety of aquatic insects.

How is Stormwater Managed?

Historically, stormwater controls were designed to quickly collect, store, and transport runoff away from developed areas into nearby streams to prevent flooding. However, it is now recognized that these systems alone are often not the ideal solution because they impact streams by increasing the volume and velocity of water and amount of pollutants.

Today stormwater management promotes a variety of practices and controls that help to infiltrate runoff and minimize contact of runoff with pollutants. For example, infiltration practices (which can be cheaper and easier to maintain than traditional stormwater practices) involve using vegetated areas like swales and rain gardens (a.k.a. bioretention cells) to slow the velocity of water and allow for percolation into the ground. When properly designed and maintained, stormwater management practices are not conducive as habitat for mosquito breeding.

What Should Local Authorities Do?

Stormwater managers should incorporate design, construction, management, and maintenance features into stormwater structures to minimize mosquito production (and therefore decrease or eliminate the need for insecticides) without compromising water quality functions.

Local authorities should properly inspect and maintain stormwater structures to ensure their continued effectiveness, reduce the need for costly pesticide applications, and prevent large outbreaks of mosquitoes.

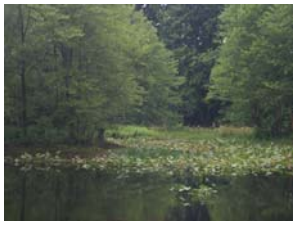
However, it might still be necessary for state, county, or local governments to apply a limited amount of insecticides to control mosquitoes. Mosquito control officials use EPA-registered products that do not pose unreasonable risks to human health, wildlife, or the environment. Monitoring efforts that involve field inspections by mosquito control personnel determine when and where insecticide applications are needed. However, as with all pesticide use, the use of insecticides in stormwater structures should be minimized. Stormwater managers should work closely with mosquito control officials to help achieve this goal.

Basins

There are two main types of basins used to manage stormwater – dry detention and wet retention basins. Dry detention basins are designed to hold water during storm events and then release the water within 3 days. Because these systems are designed to hold water for only short periods of time, they are not suitable habitat for mosquitoes. The aquatic stages of many mosquito species require 7-10 days in calm, standing water.

Wet retention basins are designed to hold permanent pools of water. These systems are usually between 3 and 8 feet in depth. Most mosquitoes only breed in shallow standing water (i.e. less than 3 feet) or deeply vegetated waters so mosquito breeding should not occur.

There are several maintenance considerations associated with basins to make these sites unsuitable as mosquito habitats. Debris and sediment must be removed from inlets, outlets and the bottom of the pond; eroded areas must be repaired; bare ground must be seeded to prevent soil loss; and plants must be harvested as needed.



Created Wetlands

Wetlands are vegetated areas designed to contain shallow, slow moving water. While these two characteristics are typically preferred by mosquitoes, healthy wetlands can actually prevent mosquito outbreaks. Mosquito breeding can be minimized through site design and management considerations that include mosquito predators such as fish and several types of aquatic insects.

Wetlands must be inspected for invasive plants, which must be removed; signs of erosion should be recognized and repaired; and inlets and outlets should be checked and accumulated debris or sediment should be removed.

Fountains

Fountains typically found near large buildings retain and slowly release stormwater. These structures range in depth. Aerators can be added to these fountains to agitate the water thereby deterring mosquitoes since they prefer standing water. Aerators should be checked regularly to ensure that they are working properly.

CONTACTS/RESOURCES

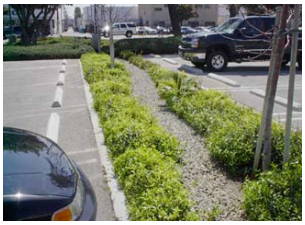
Stormwater
EPA's NPDES Stormwater Program http://www.epa.gov/npdes/stormwater
Stormwater Manager's Resource Center http://www.stormwatercenter.net

Mosquitoes/Pesticides/Mosquito-borne Diseases
EPA's Website on Pesticides http://www.epa.gov/pesticides/
The American Mosquito Control Association http://www.mosquito.org
Centers for Disease Control and Prevention http://www.cdc.gov

Storm Sewer Systems

Storm sewer systems include structures like catch basins. By design, catch basins, which are sumps located directly under storm drains, hold standing water. These structures require maintenance to ensure that debris does not accumulate in the storm drain grate or the storage area allowing mosquito breeding. Sometimes the only practical means of mosquito control involves the use of insecticides to kill the larvae.

Catch basins must be cleaned throughout the year to remove accumulated sediment. Screens and other devices used to remove debris must be checked regularly to ensure that they are working properly.



Rain Gardens

Rain gardens, also known as bioretention cells, are vegetated areas designed to retain and infiltrate stormwater. These areas are designed to not have standing water for more than a day or so except during very large storm events. Therefore when properly designed and maintained, rain gardens should not sustain mosquito populations.

These areas have some maintenance requirements to ensure their continued effectiveness. Accumulated litter and debris must be removed regularly; areas must be remulched as necessary; grassed areas must be mowed; areas showing signs of soil erosion must be repaired; and dead and diseased vegetation must be removed and replaced with healthy vegetation.

Rain Barrels/Cisterns

Rain barrels and cisterns allow homeowners to disconnect downspouts and divert runoff into a storage tank. These barrels decrease the volume of runoff and allow the owner to reuse the water for irrigation. Several precautions should be followed to prevent mosquito breeding, such as keeping barrels tightly closed, using debris screens to filter the water entering the barrel, and using the collected water within several days.

COMMONLY OVERLOOKED BREEDING AREAS: RESIDENTIAL BACKYARDS

Homeowners should check their property to eliminate mosquito breeding. Water can collect in unused flower pots, buckets, cups, old tires, etc. and may provide the perfect habitat for mosquitoes. What can homeowners do to deter mosquito breeding?

- Pick up trash, such as paper cups, which may have collected in the yard.
- Clear clogged rain gutters.
- Cover containers, tires, wading pools, and all other items which can hold standing water for extended periods of time.
- Change the water in bird baths and pet dishes regularly.