ENY627

UNIVERSITY OF FLORIDA
IFAS EXTENSION

Mosquitoes Associated with Stormwater Detention/ Retention Areas [1]

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Water Quality and Supply

Florida's extensive drainage and flood control systems have eliminated many wetland areas that provided suitable aquatic habitats for a variety of mosquito species. However, the diversion of storm water to coastal marine systems via canals has dumped pollutants into our estuarine systems, and it has also greatly diminished the amount of storm water that enters recharge areas for replenishing the aquifer. To alleviate these water quality and supply problems, various types of storm water detention/retention area are being incorporated into all new commercial and residential developments. Some established developments have also been retrofitted with storm water retention or detention systems. The widespread use of these storm water systems may lead to increased mosquito production, unless adequate precautions are taken.

Storm Water Detention and Retention Systems

Most storm water detention ponds are semi-permanent aquatic systems that dry out only under drought conditions. Often, during the rainy season the water levels in these ponds remain at or near the outflow structures. Under these conditions, storm water entering a detention area displaces an equivalent amount of water that usually overflows to an adjacent man-made or natural drainage system. The detention pond acts as a sink or trap where pollutants picked up by the initial surge of storm water settle out before leaving the detention pond. These ponds are usually referred to as "wet-detention systems."

By contrast, retention areas are designed to hold storm water until the effects of percolation and evapotranspiration return the area to its normal dry state. Regulations concerning the design and construction of retention areas stipulate that storm water inflow must be dissipated within 72 hours so that a new volume can be accommodated. Since these storm water areas are designed to dry out rapidly, they are usually called "dry-retention systems."

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Mosquito Production

Detention ponds for holding storm water runoffs usually do not produce mosquitoes in sufficient numbers to cause a problem. Exceptions may occur when ponds become nearly dry due to a lack of rainfall. Under these conditions wastewater *Culex* may invade the system. A similar type of invasion can occur in detention ponds that receive both storm and wastewater. Wide fluctuations in water levels, especially when they are frequent events, may make the detention system a suitable habitat for floodwater mosquitoes, such as *Aedes vexans* and *Psorophora columbiae* . Floating and rooted aquatic plants may foster the growth of populations of *Mansonia dyari* , *M. titillans* and *Coquillettidia perturbans* .

Although storm water entering retention systems is supposed to percolate into the ground within 72 hours, retention areas often remain wet for longer periods. Floodwater mosquitoes are normally the first to appear in retention areas. Later in the rainy season, it is not uncommon to find *Culex* , especially if grass cuttings have been accumulating in these areas. Overall, abundant populations of pest and disease-vectoring mosquitoes are much more frequently associated with retention systems than they are with detention systems. Moreover, it is much easier to achieve long-term mosquito abatement in detention ponds than it is in retention areas. Retention systems tend to be more effective for recharging the aquifer and for improving water quality than are detention systems. Therefore, water management experts often recommend the installation of retention systems for new developments. The use of detention with filtration is generally not recommended because it is often difficult to properly design, construct and maintain such a system.

Mosquito Control Considerations

Local mosquito control programs should be actively involved in the planning and approval stages for all new storm water management schemes. Try to avoid the placement of retention systems in areas where they are likely to remain wet for a period long enough for mosquito development. If retention areas must be placed at these sites, then a dual retention/ detention system might be the best approach for both storm water management and mosquito abatement. With proper design and construction, excess water in the retention part of the system can be sent to the detention pond, thus lessening the chances for mosquito production.

Detention ponds should receive only storm water. Treated wastewater from package plants should be placed in separate holding ponds. Banks on detention ponds should be steep, but not too steep to hinder mowing and other maintenance activities. Deeper ponds are preferable to shallow ones. Inlets and outlets should be constructed so that there are erosion protectors. Adequate vegetation should be maintained on the banks to prevent erosion.

Growth of aquatic vegetation should be restricted to the periphery of detention ponds. Property owners should be responsible for weed control in their ponds. City or county governments should have ordinances that require owners of detention ponds to follow proper maintenance procedures. The presence of a mechanical aerator, such as a fountain in the middle of the pond, often makes the site more attractive, deters the growth of unwanted vegetation, and makes the habitat more suitable for fish.

The bottoms of retention areas should be free of depressions where water might accumulate and remain for periods sufficient to allow mosquito production. Mowing and other maintenance operations should be done without producing ruts. Grass cutting and other types of debris should be removed from retention areas. Long-term responsibilities for proper maintenance of retention areas should be clearly stipulated in city or county ordinances.

Once a retention system has been installed at an inappropriate location (e.g. on a site where the water table is too close to the surface), not much can be done to change the situation without eliminating the system. Under these conditions, mosquitoes must be controlled with larvicides. For a larvicide operation to be effective, it must be supported with a quality inspection program. The widespread occurrence of potential mosquito breeding sites in retention areas greatly increases the costs and man-power needs of inspection programs. Perhaps, through educational

programs directed at the general public, we could generate more service request for the control of mosquito larvae and fewer for adult mosquito control.