Friends of Herring River

Mosquitoes and Herring River Restoration

Biting mosquitoes have and will always be a nuisance[1] on outer Cape Cod to a lesser or greater degree depending upon rainfall. This is because the four or five species that most commonly annoy people are "floodwater breeders", depositing their eggs in depressions, usually in wetlands, which subsequently fill with rainwater providing habitat for mosquito larvae. There are thousands of acres of coastal wetlands, and floodwater mosquito habitat, in Wellfleet alone.

Nevertheless, under natural conditions mosquito breeding is severely limited in Wellfleet's tidal marshes: twice-daily ebb tides flush mosquito larvae from marshes into predator-filled surface waters; and every high tide brings predatory killifish (*Fundulus* spp.) onto marsh surfaces and into marsh pools to voraciously consume mosquito larvae and pupae.

One hundred years of diking and drainage in Herring River have eliminated most tidal flushing; **without low tides** mosquito larvae are no longer flushed from the wetland surface; **without high tides** predatory killifish have no access to mosquito breeding sites. Further, the drainage of salt marsh peat has caused profound changes to soil and water quality: sulfur that is stored innocuously in the soils of all salt marshes converts to sulfuric acid once it is exposed to atmospheric oxygen by peat drainage. In the absence of buffering seawater, the acid persists in Herring River's creeks and drainage ditches, making the water toxic to fish and other aquatic animals…but not mosquito larvae, which can tolerate extremely acidic water. Fish kills have been common, and fish are absent from low-flow drainage ditches. It is no wonder that Wellfleet spent thousands more dollars on mosquito-control drainage and pesticides in the lands "affected by the Herring River Dyke" immediately after the river was diked in 1909 (Wellfleet Annual Reports). This phenomenon, i.e. salt marsh diking and drainage leading to both acidified surface water and high mosquito production, is not unique to Herring River, but has occurred throughout the world whenever salt marshes are managed in this way.

Despite the damage, peer-reviewed scientific research has shown that restoration of tides and daily flooding with seawater will reverse the chemistry and restore water quality and fish habitat in Herring River's extensive marshlands. This together with effective low-tide drainage will greatly reduce the habitat of floodwater mosquitoes.

Note 1: Medical entomologists and public health officials believe that the potential for mosquitoes to transmit serious viral diseases on outer Cape Cod is very low. This is because there is little habitat for the cedar swamp-breeding mosquito (*Culiseta melanura)* that feeds on birds, the normal hosts for viruses like Eastern Equine Encephalitis and West Nile. With little freshwater swamp habitat on outer Cape Cod, there are few *C. melanura* and apparently a low incidence in birds of the viruses that might otherwise be transmitted to humans by mosquito species that feed on both birds and mammals. As a probable consequence, these viruses have been very rarely detected on Cape Cod over many decades of state surveillance.