**Introduction**

In the 1950s and 1960s, dragline ditches were created throughout wetlands along Florida’s east coast as a way to control mosquitoes. Extensive networks of wide, deep ditches were cut through historic coastal wetlands habitat known as saltmarsh. The most extensive ditching occurred in the Mosquito Lagoon area at the northern end of the Indian River Lagoon ecosystem and covered nearly 1,200 acres. The purpose of the ditches was interrupting the life cycle of saltmarsh mosquitoes by decreasing their egg-laying areas. Large excavators, called draglines, were used to construct ditch networks. Draglines typically were mounted on small barges, with the excavated material piled on either side of ditches, thus creating spoil piles. While the practice reduced mosquito populations, it also decreased wetlands vegetation acreage by as much as 80 percent. These changes decreased the productivity of plants, fish, shrimp and crabs. Common wetland plants such as saltgrasses and mangroves were replaced by upland trees and shrubs that grew on the spoil islands, including invasive exotic species such as Brazilian pepper. The deep channels of the ditches also gave adult fish more opportunities to prey upon smaller juvenile fish in the saltmarsh.

**Objectives**

- **Restore coastal saltmarsh wetlands**
- **Increase productivity of coastal wetlands for plants, fish and wildlife**
- **Continue to provide effective mosquito control**

**Approach**

Restoration of coastal saltmarsh wetlands in Volusia County began with an unusual machine - an amphibious excavator mounted on a pair of tracked pontoons. The low weight-bearing machine (less than 2 pounds per square inch) can float in water or move across wetland grasses without killing them. First, undesirable vegetation is cleared from a spoil area and placed in the adjacent ditch. This avoids the need to burn the plants and permanently sequesters the carbon they contain in the marsh sediment. Second, spoil material is moved to side “fingers” of the ditch. If additional material remains, the main ditch also is narrowed. After decades of soil compaction, the entire dragline ditched area cannot be filled. But the areas containing spoil piles and newly filled portions of ditches can be graded to the elevation of adjacent wetlands. The result? The area of vegetated coastal wetlands is roughly doubled. The amphibious machine is owned and operated by Volusia County. Grant funds for the project were provided through the U.S. Fish and Wildlife Service’s National Coastal Wetland Conservation Grant Program. Matching funds came from the Florida Fish and Wildlife Conservation Commission (FWC) and St. John’s Water Management District. From 2009 to 2012, 283 acres of coastal saltmarsh wetlands, including 140 acres returned to appropriate elevation, were restored in Volusia County at a cost of nearly $1.2 million.

**Benefits**

Wetland plants quickly recruit to the restored wetland surface. Early colonizers include black mangroves, sea purslane and glasswort. Plants on site and from neighboring wetlands naturally stock these recruits in the restored areas within months or years. The resulting value of storm protection to homes and properties of heavily-vegetated coastal wetlands is estimated at $13,400 per acre per year. Restored coastal wetlands also provide more space for wading and shore birds and greater production of fish, crabs and shrimp and the plants upon which they depend. The restored wetland area and relic shallow ditches are a perfect combination for fish productivity. Restored saltmarsh can produce 50 pounds of resident fish per acre per year. With the small relic ditches that remain after restoration, mosquito breeding does not increase because the remnant ditches harbor mosquito-eating fish.