

MOSQUITO IMPOUNDMENTS

ST. LUCIE COUNTY MOSQUITO CONTROL DISTRICT

Problem Assessment

St. Lucie County, Florida is located along the Atlantic Ocean with a 21-mile-long barrier island, known as Hutchinson Island. Between the island and the mainland lies the Indian River Lagoon, a national estuary of more than 5,000 acres of coastal wetlands.

The 1865 survey maps officially showed St. Lucie County as part of "Mosquito County." Historical reports described people burying themselves in the sand if on land, and wrapping themselves in a sail, if in a boat, to avoid mosquitoes produced in the coastal marshes. Many long-time residents still recall the smudge pots that made it possible for them to sit outdoors on the porch during the evening. Cattle and horses sometimes were suffocated by enormous broods of salt marsh and fresh-floodwater mosquitoes, in combination. More than an inconvenience and nuisance, several mosquito species carry deadly viruses like West Nile virus and St. Louis encephalitis, all of which have occurred in St. Lucie County.

The 5000 acres of wetlands in the Indian River Lagoon provide a dangerous breeding ground for salt marsh mosquitoes which lay their eggs in depressions in the muddy coastal wetland sediments and produce up to 200 eggs per batch . Original mosquito control efforts were directed at eliminating the impact caused by standing water in these wetlands. From 1927 to 1935, 285 miles of ditches were built on public and private property for mosquito control in St. Lucie County. This program was short-lived. Salt marsh sandflies continued to flourish in the 285 miles of marsh ditches, potentially producing 70 million sandflies per day, and as many as 25 billion sandflies per year. By the 1940s, pesticides, primarily DDT, were the mosquito control method of choice for the St. Lucie County Mosquito Control District. Although economical and effective, mosquito resistance and harmful environmental effects resulted in the

end of DDT (and other similar chemical use). As a result, in the mid-1950s, the State fostered a new effort, the conversion of the dike system to impoundments along the Indian River Lagoon. The impoundments were constructed by converting the dikes into edges of large created lakes which flooded the marshes. About 6,000 acres of salt marsh were impounded in St. Lucie County during 1958-1966, and more than 41,000 acres were impounded along the east-central coast of Florida. The impoundment program was partially successful at reducing nuisance insects by providing a water barrier which prevented egg-laying. However, it had environmentally-costly after-effects. Long-term flooding with stagnant water destroyed the original vegetation by and red mangroves became dominant. Invasion by red mangroves was followed by a two- to four-fold increase in the build up of soil and sediment in the marshes. Most of the estuarine habitat functions of the salt marshes declined, as the nursery areas for fish were lost and species diversity declined.

Program Implementation and Costs

In 1983, the St. Lucie County Mosquito Control District adopted a Rotational Impoundment Management (RIM) strategy which reconnected the isolated, stagnant impoundments to the Indian River Lagoon using a rustic system of culverts with valves that open and close. During the mosquito breeding season (primarily May to August) the impoundments are flooded, preventing the adult mosquitoes from laying their eggs. The rest of the year, the valves are opened to allow the free flow of water between the lagoon and marshes, restoring the fish nursery access during their spawning seasons. Three-horsepower electric aerators have been installed at pump stations to provide constant aeration and solar-powered data transmission allows the constant monitoring to aid in maintenance of optimum water levels in the impoundment. The annual operating cost for the impoundment program is \$2.0 million.

Results

Seasonal management significantly reduces and often completely eliminates the need for mosquito control pesticides. When an impoundment has been managed during the year, salt marsh mosquitoes generally will not produce large broods in the fall, winter or spring. Under present management, there have been no human occurrences of the deadly viruses carried by mosquitoes in St. Lucie County.

Lessons Learned

Above and beyond the health and safety needs to control the mosquito population in St. Lucie County, the benefits of the mosquito impoundment program are exponential:

- Since 1994, more than 4,300 acres of marshes and wetlands have been reconnected to the Indian River Lagoon.
- Improved water quality has been documented.
- A broad range of estuarine biodiversity has returned. Snook and tarpon access the open culverts and are utilizing the marshes again as a fish nursery.
- Natural vegetation is flourishing and an unexpected benefit of the seasonal flooding has been prevention of the invasion of exotic species like Brazilian pepper and Australian pine
- Foraging and nesting areas for wading birds have been enhanced. Young birds benefit greatly because their feeding skills have not fully developed.
- Grant opportunities have been expanded, with over \$81.5 million in funding received for land acquisition and restoration since 1983.
- Fishing/observation piers and docks, crabbing docks, bird-watching platforms, and educational covered/elevated observation areas have been installed on the dikes and around the impoundments. More than 31,000 children and adults have participated in educational boat and walking led by an Audubon Warden. Most had never before been on the estuary in a

boat, and were unaware of the natural areas available for recreation. This outreach effort has been very successful in raising awareness of coastal wetland ecology in St. Lucie County.

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**IMAGES FROM MOSQUITO IMPOUNDMENTS MANAGED BY
ST. LUCIE COUNTY MOSQUITO CONTROL DISTRICT**

