Florida Department of Transportation Research

Seagrass Mitigation Site Modeling and Assessment
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As a result of awareness of wetlands' importance, community master plans define areas to develop and others to preserve; however, sensitive coastal ecosystems can still suffer impacts, directly, through physical disturbance, or indirectly, by excessive shade or impaired water quality. Restoring these areas and mitigating further damage are challenging because not enough is known about these complex environments to assure effective mitigation/restoration designs and because monitoring practices often take a broad view that does not help designers understand what worked and what didn't.

In this project, University of Florida researchers used more precise monitoring practices to evaluate the restoration design, to understand the coastal ecosystems' interactions and effect on plantings, and to determine the likely equilibrium state of the areas studied: a spoil island (SL-15) in St. Lucie County and Lake Surprise on Key Largo. The key to their approach was spatial and temporal mapping, rather than basing judgments of the design's success on a composite view. Spatial monitoring was coupled with geostatistical modeling.

Young mangroves colonize a restored wetland in St. Lucie County.

In St. Lucie County, spoil island SL-15 had been partially removed to create a seagrass and mangrove habitat to mitigate impacts resulting from a nearby road project. The restoration was monitored for five years and based on cumulative percentages of mangrove survival and seagrass growth. By these measures, the site was found to be in compliance, but without a more detailed approach, the monitoring provided little feedback on the original design.

The researchers monitored SL-15 semiannually from 2008 to 2011, finding that mangrove met compliance standards, but partly at the expense of marshgrass plantings. Spatial monitoring showed less success for seagrass than the composite method had, due in part to direct assessment of cover, compared to the composite method's scoring system. This suggested that the future of the planting is uncertain. The spatial method focused attention on specific areas for explanation of success and failure, as intended.

On Key Largo, the new Jewfish Bridge required removing the 100+-year-old causeway that bisected Lake Surprise. This disturbance exposed peat soils that can cause nutrient loading, that could contribute to algal blooms and potential seagrass decline. In fact, the appearance of algal blooms had increased concern over the lake's health. But after three years of semiannual spatial monitoring, no seagrass decline was observed, and some areas showed growth. Reconnecting the lake appeared to improve overall water quality.

Tests of transplants in a variety of subaqueous soil compositions showed that soil significantly affects transplant success; however, experiments with the same soils were more successful in Lake Surprise than at SL-15, showing that soil composition was only one factor in a more complex picture. Nevertheless, soil analyses should be a part of planting design to assure the greatest chance of success.

Better monitoring methods can assist Florida planners in designing more effective restorations for coastal ecosystems and in more effectively mitigating the impact of development. In addition, these methods also increase knowledge about coastal ecosystems and improve stewardship and protection of Florida's environment.

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