Development of a Seagrass Nursery for Restoration of Seagrass in the Indian River Lagoon

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Outline

• IRL Background
• Seagrass Decline
• Feasibility Experiment
  – Design
  – Results
• Nursery Development
  – Design
  – Progress to Date
• Summary & Next Steps
Why Study Seagrasses in the IRL?

- Seagrass is the basis for a major regional economy by providing productivity and nursery habitat for fisheries.
- Maintaining a seagrass-based ecosystem is a high priority for the management of IRL.
- Healthy seagrass = more fish.
- Value of seagrass = $10,000/acre/yr.
Status of Seagrass in IRL

2011 Seagrass - % Change of 2010 Length
Recent IRL Issues
The “Superbloom” (2011)

An unprecedented bloom (up to 800 million cells per liter!!) of a green alga (?Resultor sp.) began in the northern lagoon in April 2011.

Since then, serious seagrass declines have occurred lagoon-wide.

Photos: SJRWMD
In 2012, another unprecedented bloom (up to 3 billion cells per liter!!) of another alga, *Aureoumbra lagunensis*, began in the northern IRL and Mosquito Lagoon. This species is the brown tide species that plagued coastal lagoons in Texas for almost eight years in the 1990’s, with serious impacts on seagrasses and other resources.
Feasibility Questions

Have environmental conditions in the Lagoon improved to allow seagrass growth?

Is seagrass recovery in the Lagoon recruitment limited?

*Halodule wrightii* ("Shoal grass")
Photo: Littler, Littler, and Hanisak 2008
Transplant plugs of *Halodule wrightii* to sites showing no seagrass recovery

Monitor for survival and spread

Plugs (12 cm diameter = post hole size) were planted at 3 sites in July 2013

Half the plugs were protected from grazers, primarily manatees, by steel mesh cage
3 replicates of each treatment (randomized block)

4 treatments, each 2 m apart:
- 5 unprotected plugs
- 5 protected plugs
- 5 wood stakes to catch seagrass fragments
- Bare plot (Control)

Design
Test Plantings in IRL
Survival of Planting Units (PUs)

- All protected plugs survived
- Unprotected plugs survived only at Wabasso site
- No seagrass fragments on stakes
- No natural recruitment
Expansion (growth) was best at Wabasso (unprotected) and Pineda (protected).

Grazing an issue at Melbourne site.

Cages detrimental at Wabasso after 3 months – all seagrass lost by month 7.
An Experimental Seagrass Nursery

• Next step in considering seagrass restoration: pilot-scale test, drawing on what we learned in the experimental plots

• To provide a supply of sustainable donor material, we are developing the initial infrastructure and technical capabilities to cultivate and transplant seagrass in land-based, closed-system tanks at FAU Harbor Branch.
An Experimental Seagrass Nursery
An Experimental Seagrass Nursery

• Initial tank plantings began in March 2016.
• 60 plugs per tank, 6 11.1-m² tanks
• Except for first tank, 100% survival of plugs
• Survived high summer temperatures in tanks (used 50% shade cloth to moderate temperature)
• Judicious use of slow-release fertilizer (Osmocote 15-9-12)
• Snails to control epiphytes
• Goal: have all tanks at density equivalent to IRL natural populations by summer 2017
An Experimental Seagrass Nursery
Experimental protocol provides a good assessment tool of potential transplant success

We can successfully transplant *Halodule* in test plantings

In absence of grazing pressure, environmental conditions at most sites are favorable for seagrass recovery

Initial attempt at developing an experimental land-based, closed-system seagrass nursery is underway

Next step: pilot-scale test in the field, drawing on what we learned in the experimental plots and using nursery-grown material

This innovative nursery approach to seagrass restoration and creation could play a significant role in re-establishment of seagrass habitat, one of the most valuable communities in the marine environment, and improve the management of this vital IRL resource
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