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

M. Dennis Hanisak

Harbor Branch Oceanographic Institute at Florida Atlantic University

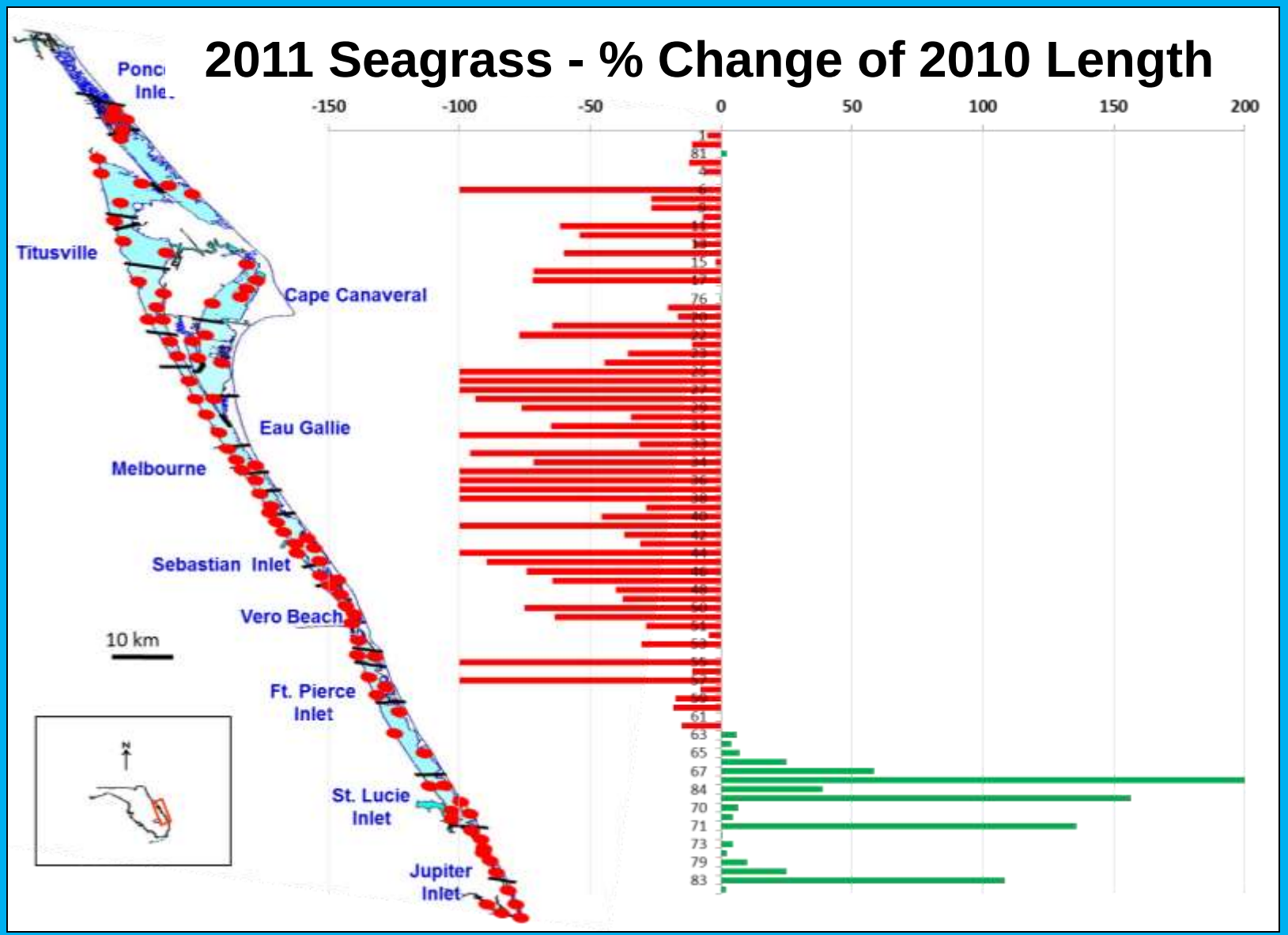
Outline

- 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



SJRWMD

Recent IRL Issues
The “Superbloom” (2011)

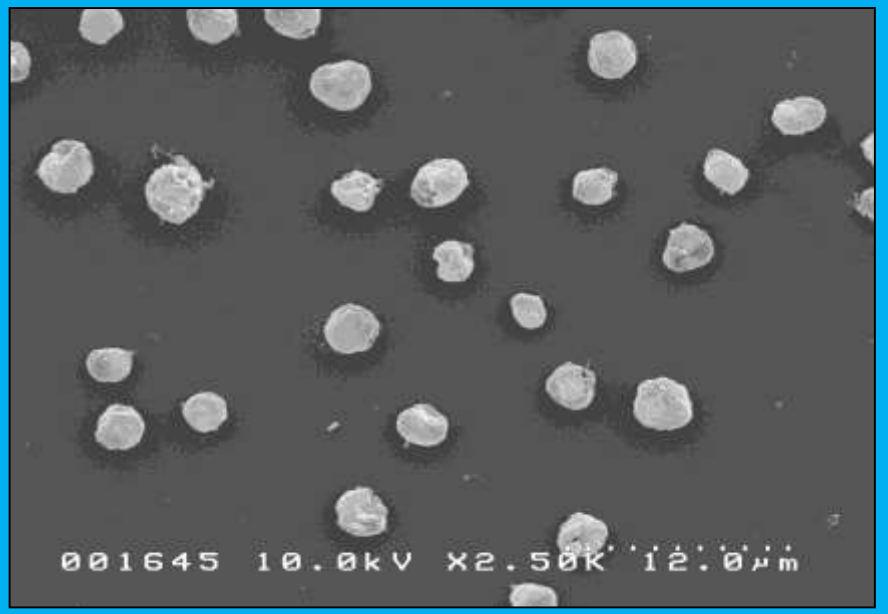
An unprecedented bloom (up to 800 million cells per liter!!) of a green alga (?*Resultor* sp.) began in the northern lagoon in April 2011

Since then, serious seagrass declines have occurred lagoon-wide

Photos: SJRWMD

Recent IRL Issues
The “Brown Tide” (2012)


Bloom - Haulover Canal, July 10, 2012



In 2012, another unprecedented bloom (up to 3 billion cells per liter!!) of a 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

Photos: SJRWMD

Feasibility Questions

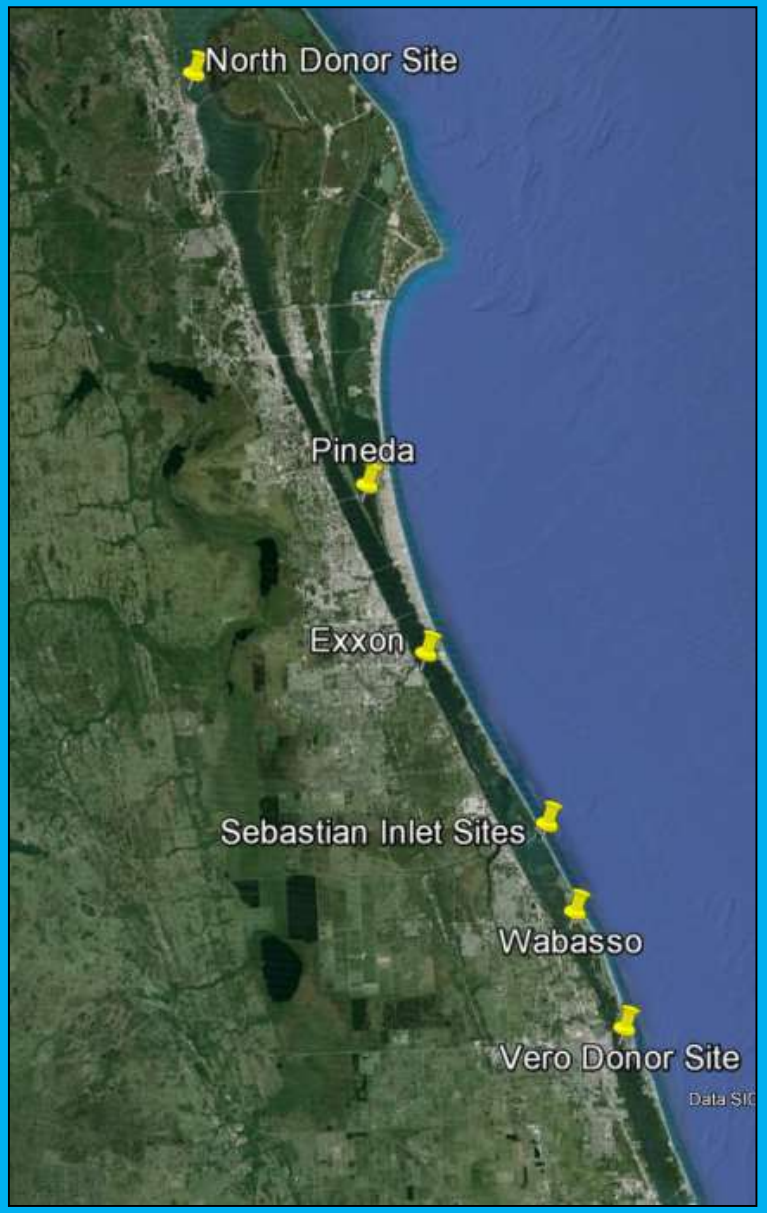
***Halodule wrightii* ("Shoal grass")**

Photo: Littler, Littler, and Hanisak 2008

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

Is seagrass recovery in the Lagoon recruitment limited?

Approach



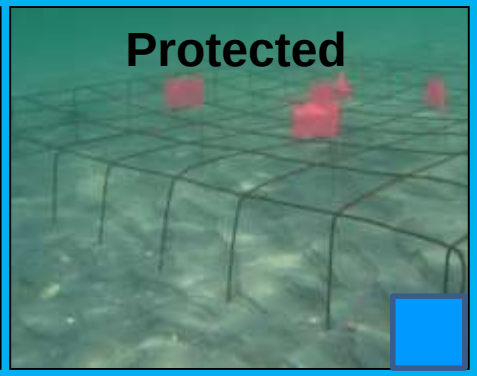
Transplant plugs of *Halodule wrightii* to sites showing no seagrass recovery

Monitor for survival and spread

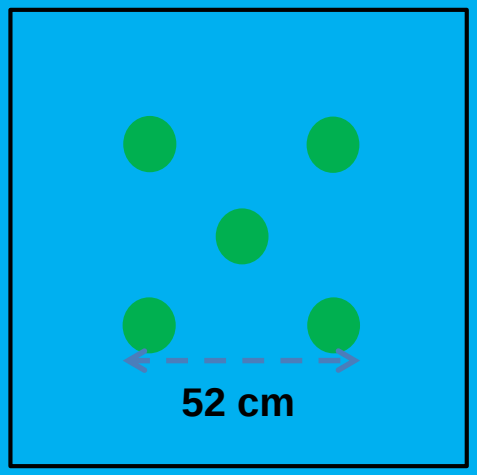
Plugs (12 cm diameter = post hole size) were planted at 3 sites in July 2013

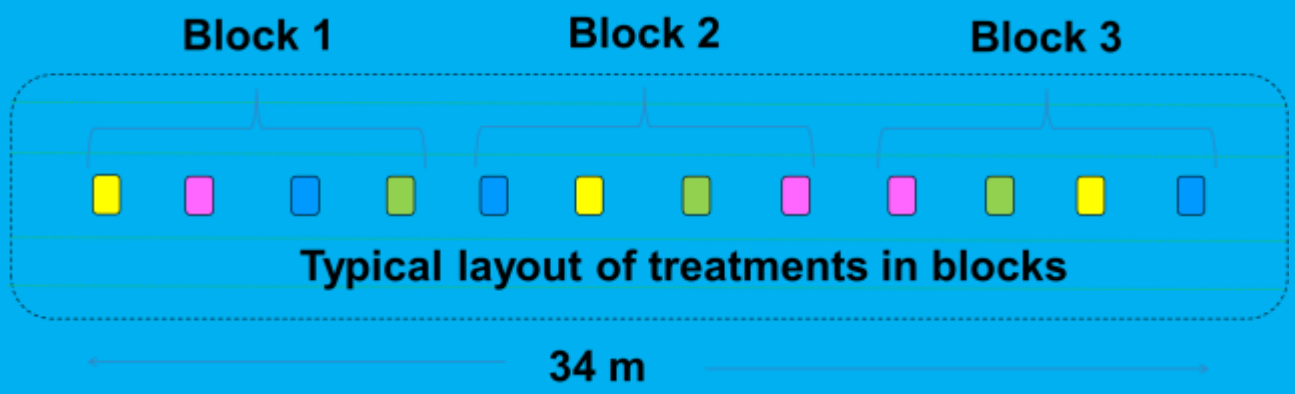
Half the plugs were protected from grazers, primarily manatees, by steel mesh cage

Design



3 replicates of each treatment (randomized block)



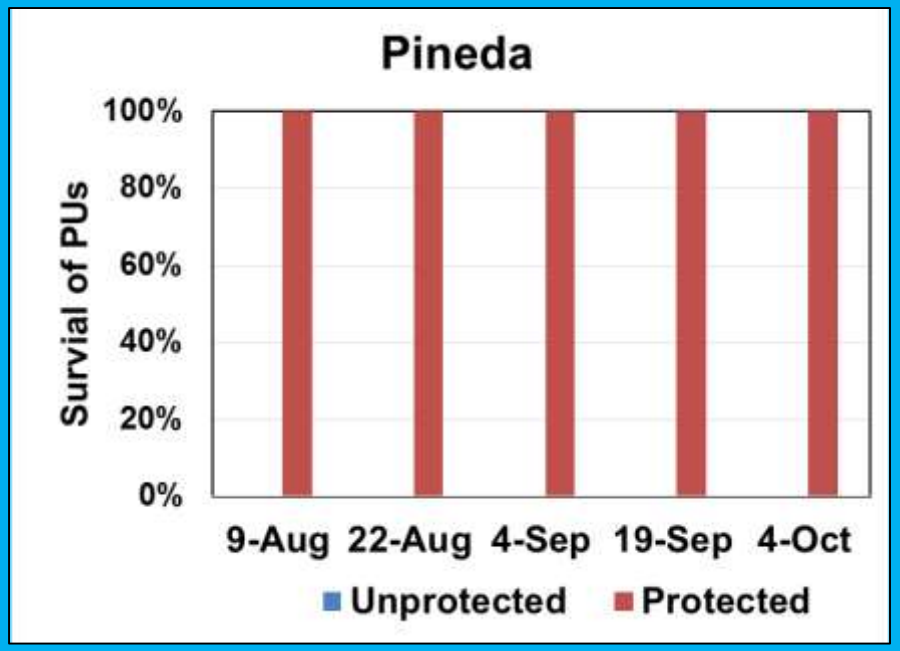


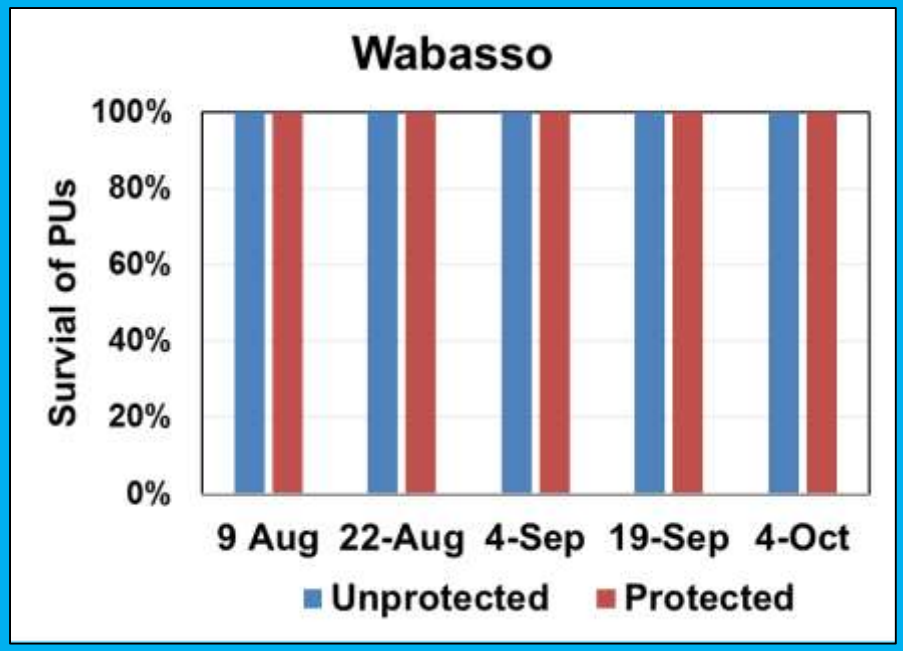
4 treatments, each 2 m apart:

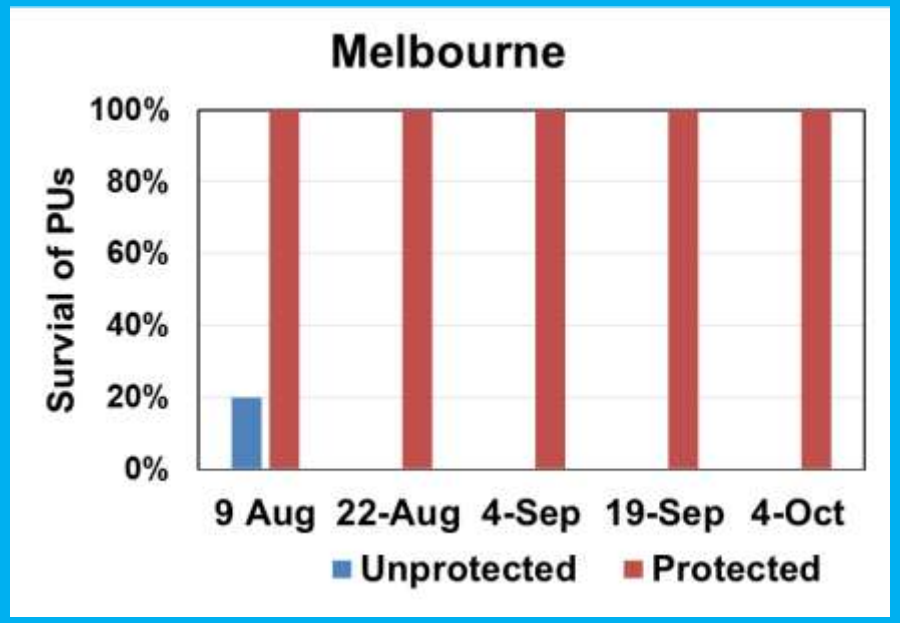
- 5 unprotected plugs
- 5 protected plugs
- 5 wood stakes to catch seagrass fragments
- Bare plot (Control)

Test Plantings in IRL

Survival of Planting Units (PUs)

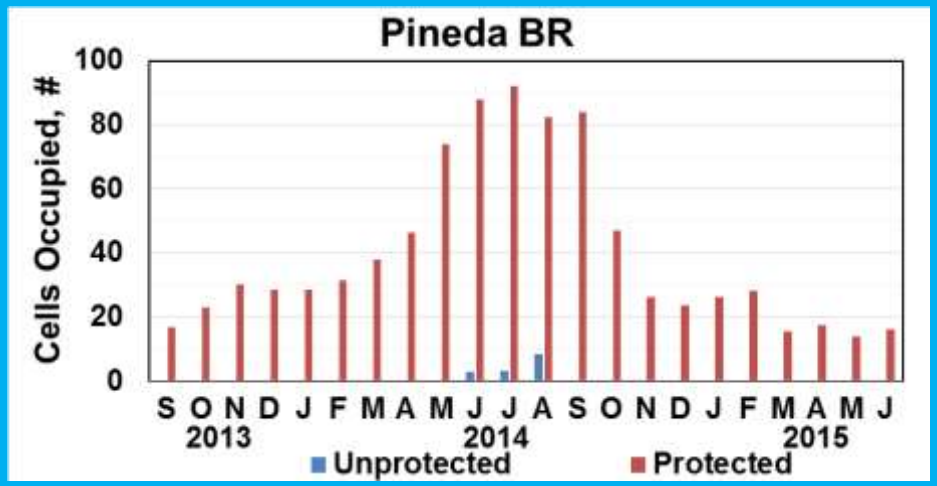


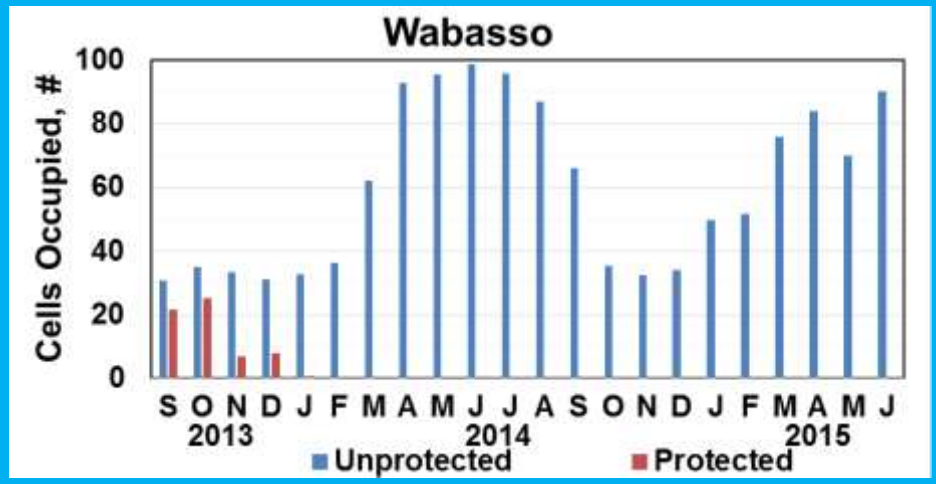


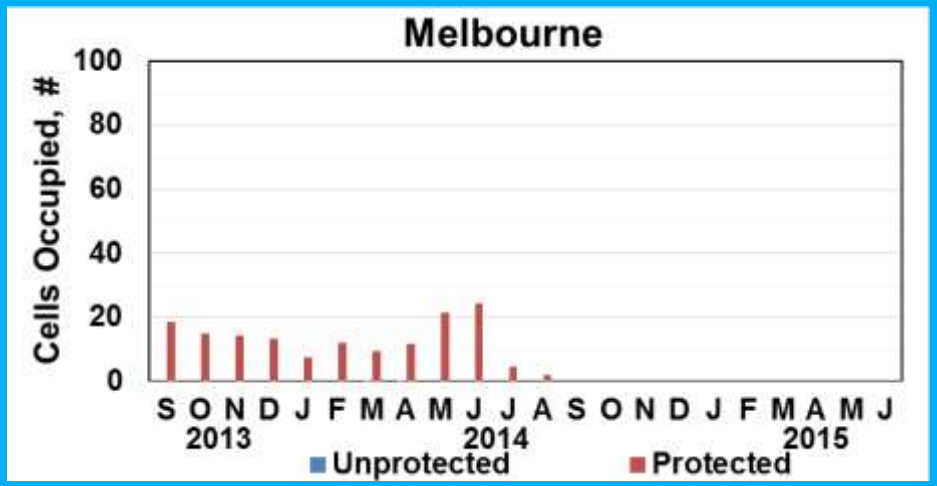


- All protected plugs survived
- Unprotected plugs survived only at Wabasso site
- No seagrass fragments on stakes
- No natural recruitment

Cover of Transplants







- **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-m^2 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

Summary

- 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

Acknowledgements

Collaborators:

Field project – Bob Virnstein (HBOI), Bob Chamberlain, Lori Morris (St. Johns River Water Management District)

Nursery – Paul Wills (HBOI)

Technical Support: John Hart, Patrick Monaghan, Richard Mulroy, Christopher Robinson

Funding:

Donor plants for the nursery were collected under Permit Number 48008874 issued by the Florida Department of Agriculture and Consumer Services, Division of Plant Industry.