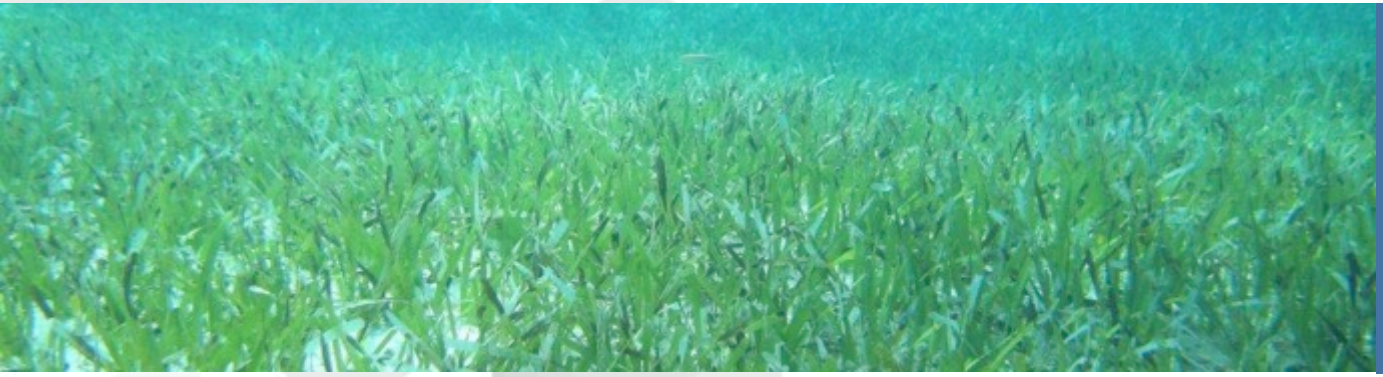

How the Ecology and Biology of Florida's Seagrasses Drive the Reality of Regulatory Options

Mark S. Fonseca, Ph.D.
Vice President, Science
CSA Ocean Sciences Inc.

Outline

Mark Fonseca: *How the Ecology and Biology of Florida's Seagrasses Drive the Reality of Regulatory Options*

- What are seagrasses?
- Challenges to restoration / what have we learned?
- Success evaluation criteria
- Summary

Ray Dennis: *Port Manatee Seagrass Mitigation Project: Case Study Relative to Lessons Learned*

What are Seagrasses?

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Putative "*H. beaudettii*"

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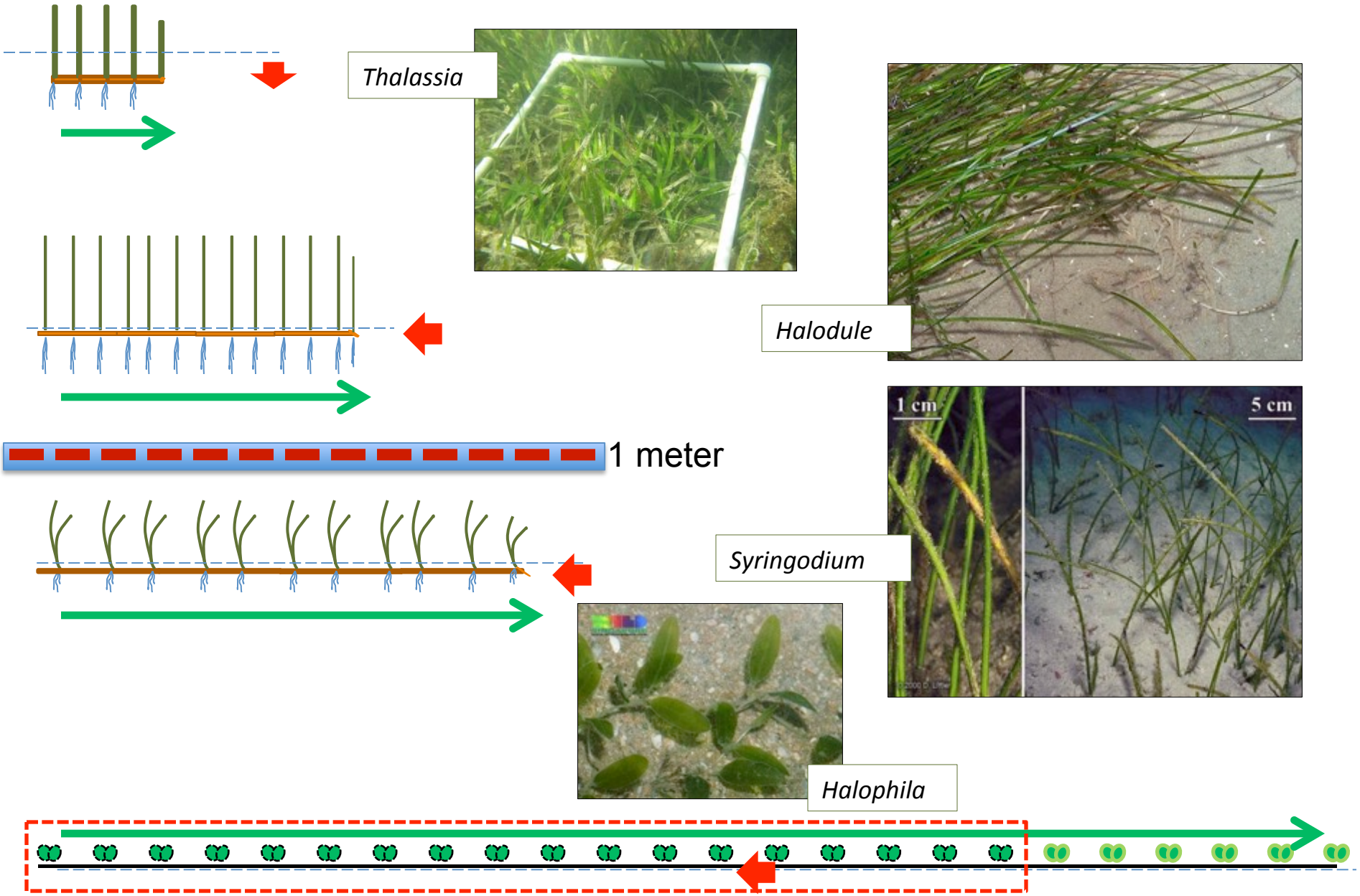

Thalassia
Halodule
1 meter
Syringodium
1 cm
5 cm
Halophila

Challenges

67. Seagrass beds in general, and Halophila johnsonni in particular, move around. They may be in one spot one year and in another (close-by) location the next.. Therefore, although seagrass may not be presently growing in a particular area, that area may be a potential site for such growth.

Flynn vs. FDEP
State of Florida
Division of Administrative Hearings
96-4737

Larger Issues

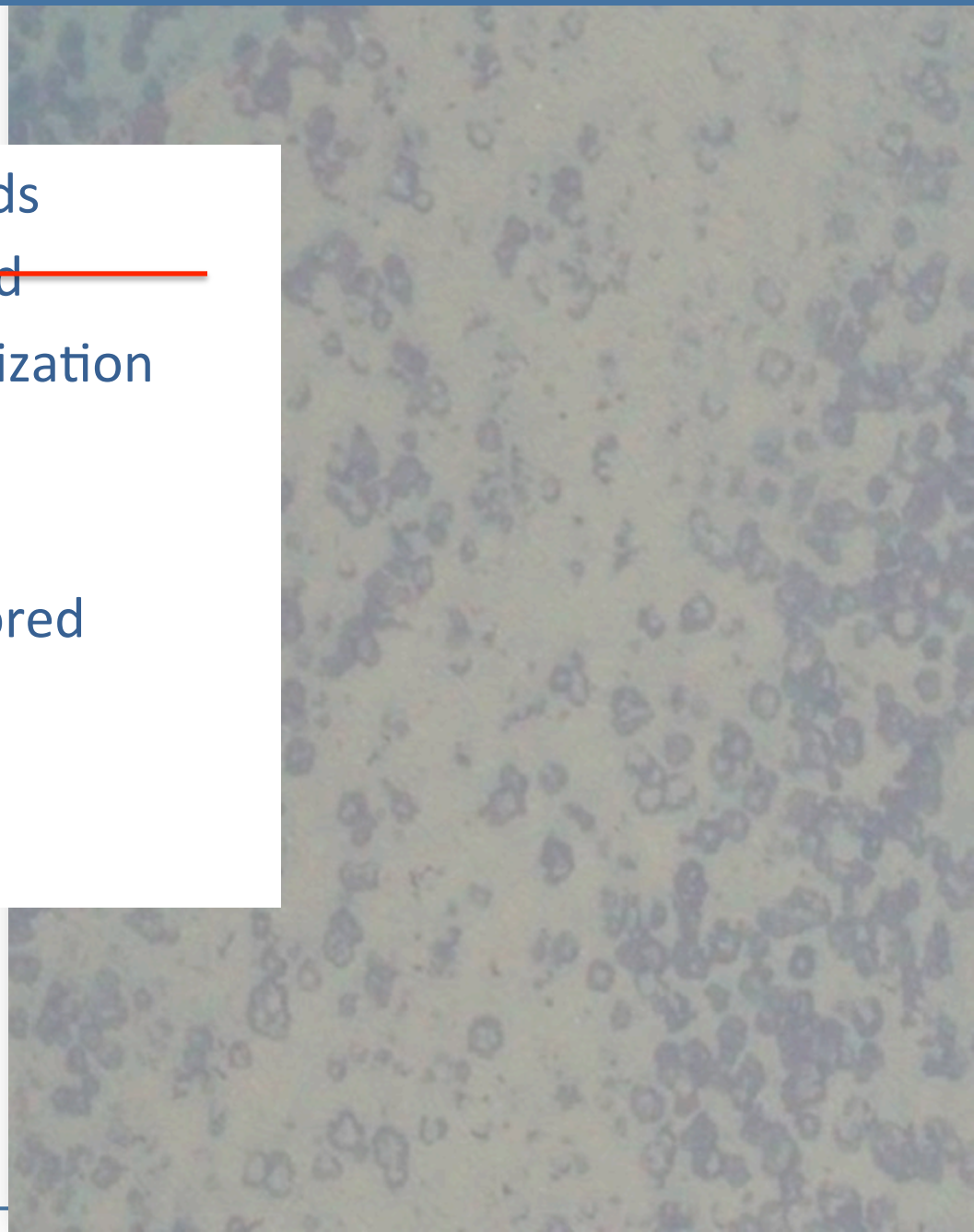
- Habitat restoration rarely a net gain
- Avoidance > minimization > mitigation
- Seagrass niche is full
- Biggest gains –past, large-scale modifications
    - watersheds, borrow pits, roadways, scarring

Regulatory Issues

- Consistency
- Trade-offs of seagrass loss for conservation off-site = net long term loss
- Prop scars – not always much 'lift'
- UMAM process not designed for seagrass
    - Complicates performance and compliance levels
    - Cross-agency issues
- Bird stakes & carbonate sediments (ONLY south Fl and *Halodule*)
- Spatially & temporally dynamic cover – defining habitat

Site Selection Problems with a Full 'Niche'

- Depth similar as natural beds
- ~~Anthropogenically disturbed~~
- No rapid or natural recolonization
- Track record
- Sufficient area
- Similar quality habitat restored
- Uncontrolled disturbance
  (storms, bioturbation)



What Have We Learned?

- Site selection
  - Stalled at simple observations of depth, and human causality
  - Not including dynamics confounds interpreting status
- Methods – most of them work
- Extreme expectations…too much like crops

  (80% vs. 50%)
- Defining success: persistence and acreage
- Impediments to success
  - Disturbance (water clarity, storms and bioturbation)
  - Grazing
- Applying seagrass biology and ecology
  - Spreading rates, vegetative vs. seeding
  - Compressed succession
  - Landscape responses
- Economics

Success Evaluation Criteria

Success = Coverage and persistence

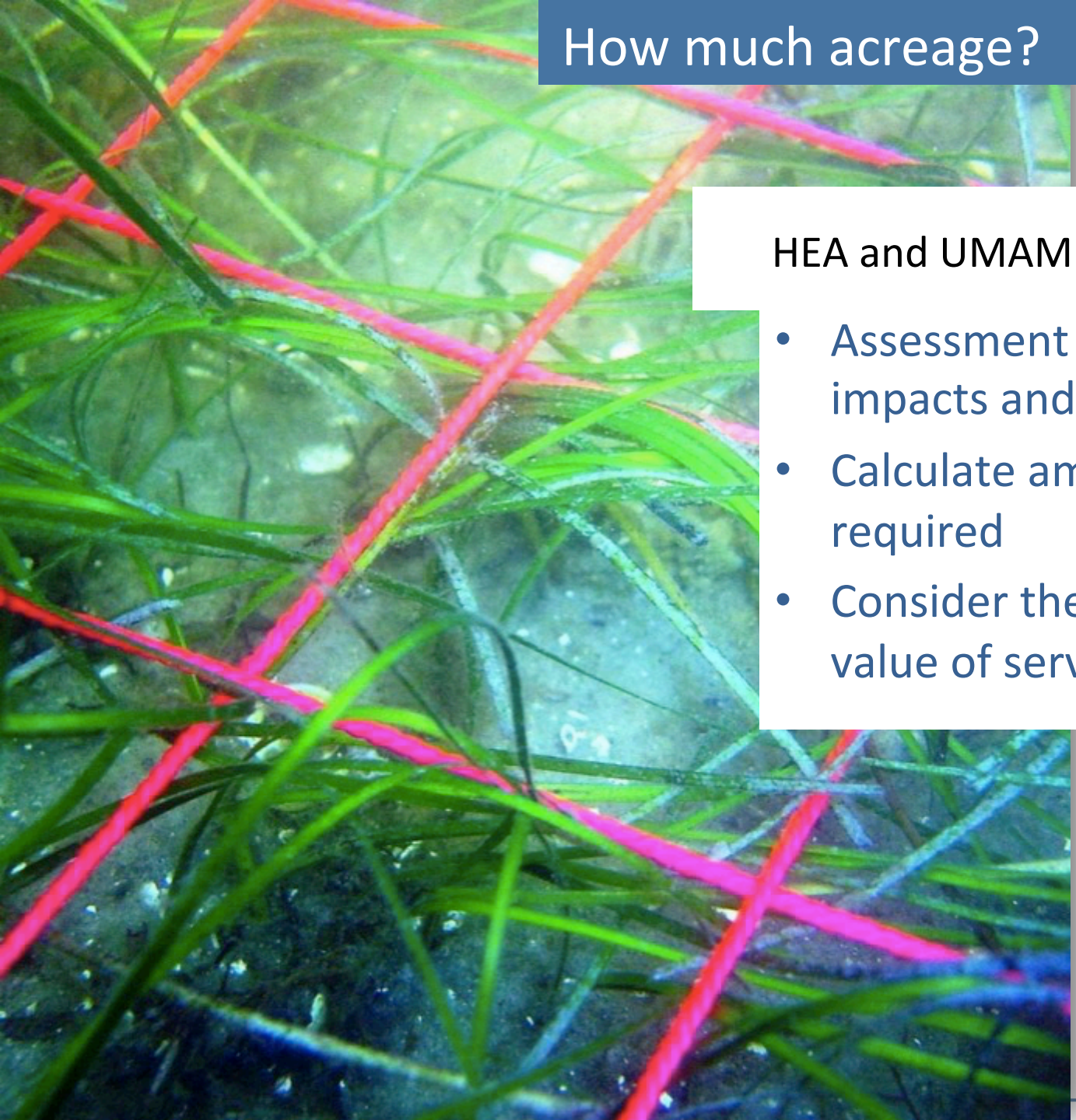
Other measures…..

- Interesting research
- Do not guide interim action
- Unreliable indicators

  f (small scale gradients)

  - Blade width
  - Leaf length
  - Epiphytes
  - Rhizome length
  - Biomass

How much acreage?



HEA and UMAM Similarities

- Assessment tools for habitat impacts and mitigation
- Calculate amount of mitigation required
- Consider the change in the value of services over time

Habitat Equivalency Analysis

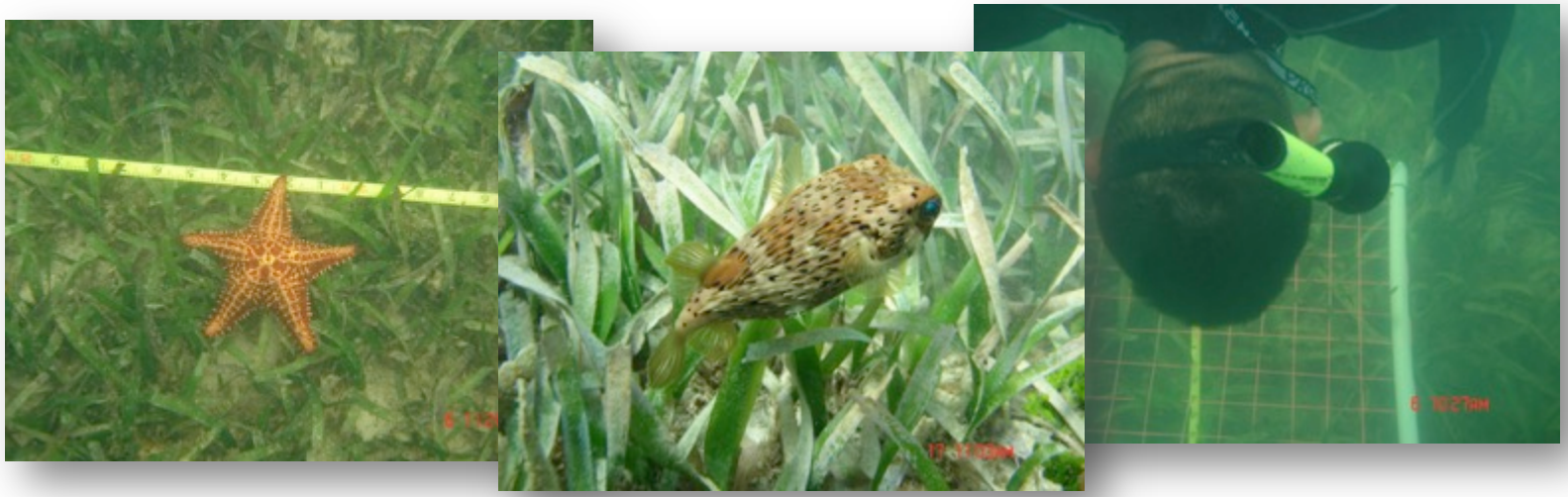
- Quantitative assessment based on a recovery function
- Two primary components
  - Amount of injury (area and severity)
  - Lost services vs natural recovery + restoration (all discounted over time)
- Units = acre-years of service
- No formal risk assessment or preservation factor
- Often yields a 1:1 replacement ratio

Uniform Mitigation Assessment Method

- Qualitative assessment
- Relative to fish and wildlife utilization
- Problematic terminology – currently under review for seagrass/ benthic habitats
  - Time scales – salinity, water clarity/quality, wave energy
  - Reference communities – actual or but for stressors
  - Species (e.g., "All species observed within the assessment area are appropriate for the reference community type and location.")
  - Demographic structure
  - Stress

Assessment Uncertainties

- Spatially and temporally dynamic habitat vs 30 min assessment
- Natural growth variations f (habitat conditions)
- Functional roles
- Open system for wildlife/fish utilization
- Separating anthropogenic degradation vs natural variation

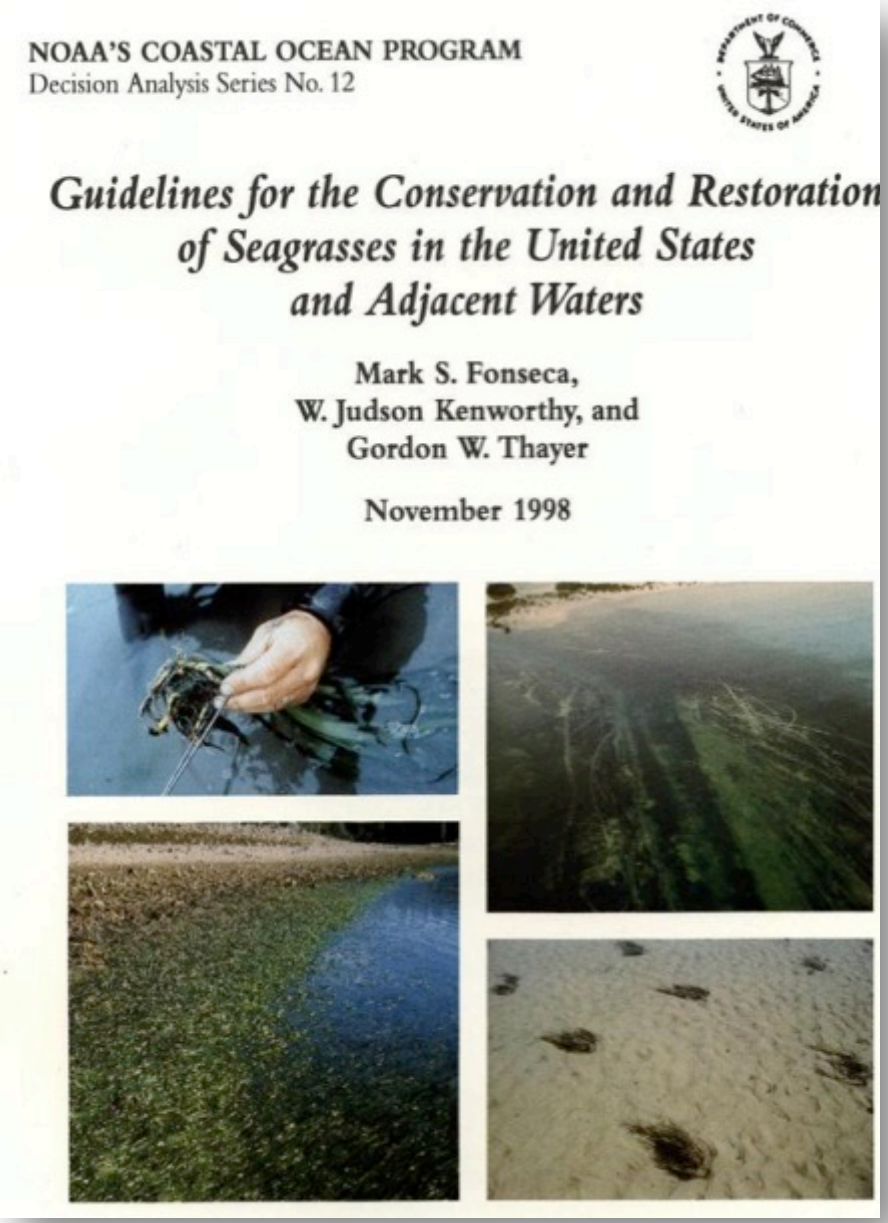


Summary - Challenges

What are the challenges for Florida seagrass restoration?

1. Understanding disturbances, defining extremes,
2. Managing spatially and temporally dynamic communities
   (often non-charismatic species)
3. Forecasting site suitability
4. Applying economics
5. Using genetic information at the scale of action
6. Effective use of information – examples of redundant or dimensionally nonsensical criteria
7. Reconciling UMAM

General Resource



NOAA'S COASTAL OCEAN PROGRAM
Decision Analysis Series No. 12

Guidelines for the Conservation and Restoration of Seagrasses in the United States and Adjacent Waters

Mark S. Fonseca,
W. Judson Kenworthy, and
Gordon W. Thayer

November 1998

Google:

"Seagrass guidelines"

Port Manatee Seagrass Mitigation Project:

Case Study Relative to Lessons Learned

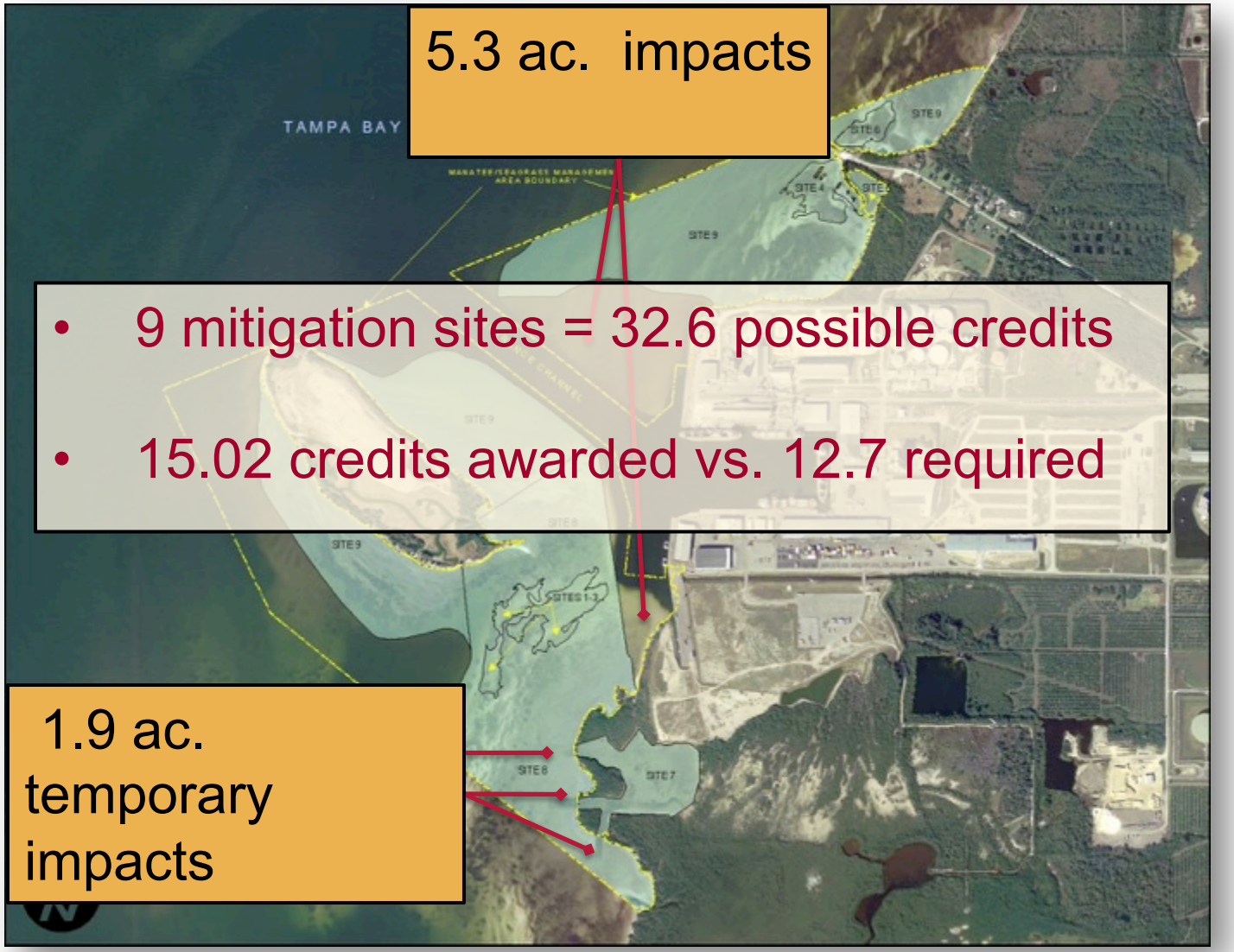
Raymond F. Dennis III
Senior Project Manager, Environmental Services
Stantec

Seagrass Restoration Perception

- "…the track record for successful mitigation projects remains variable."
- "Spectacular failures have created a lasting impression that seagrass restoration is still an experimental management tool."

Fonseca, M.S., et al. 1998. Guidelines for the Conservation and Restoration of Seagrasses in the United States and Adjacent Waters. NOAA Coastal Ocean Program Decision Analysis Series No. 12. NOAA Coastal Ocean Office, Sliver Spring, MD. 222 pp.

Over-Design Mitigation – Plan for Failure



- 9 mitigation sites = 32.6 possible credits
- 15.02 credits awarded vs. 12.7 required

Site Selection/Suitability – CRITICAL

8,000 rhizome PU

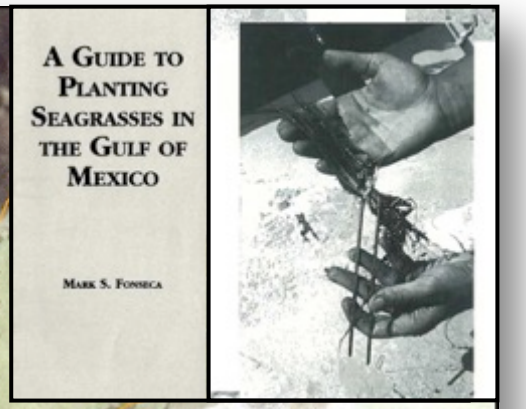
2,000 bare root bundle PU

4,582 peat pot PU

2,000 peat pot PU *

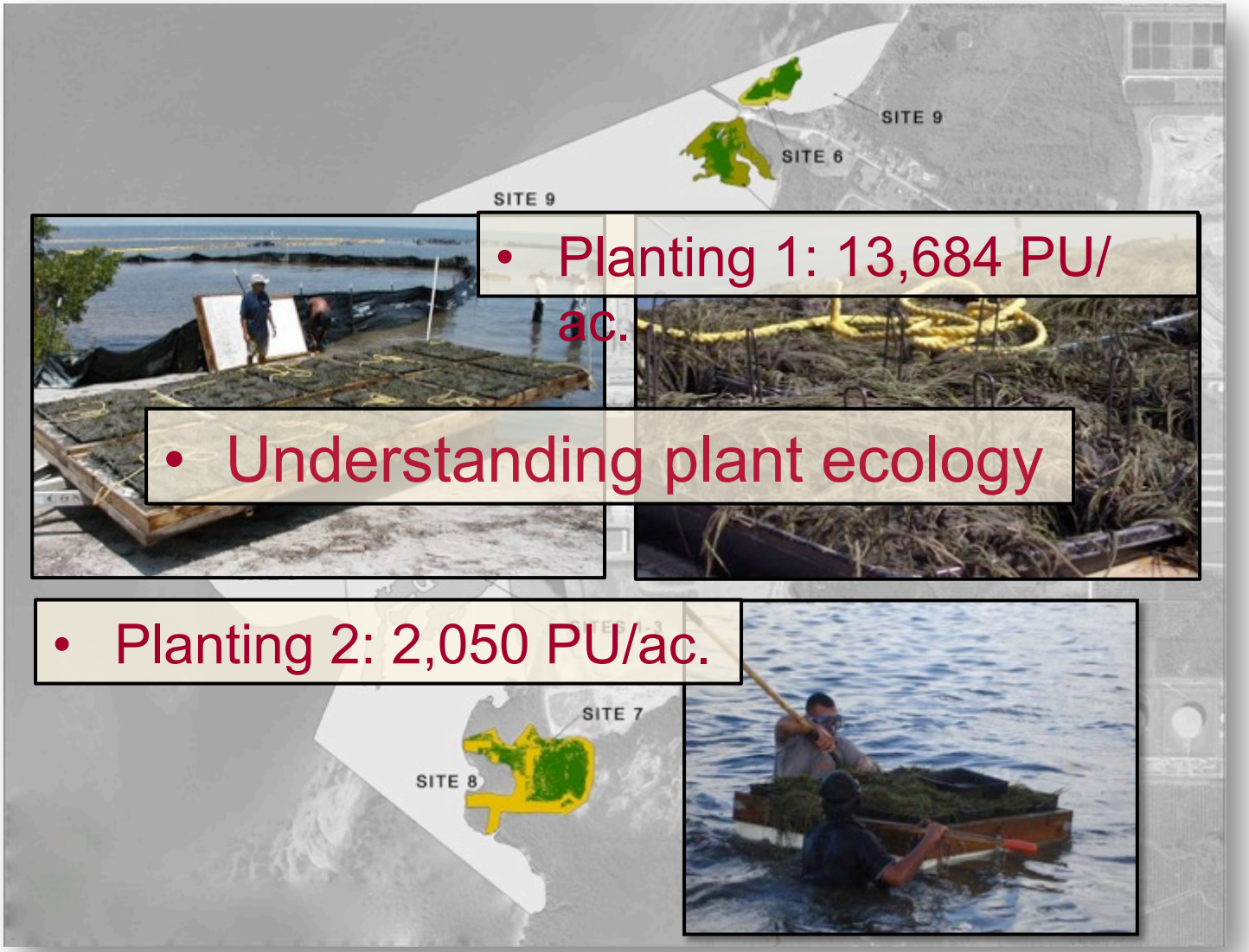
44,321 mechanized (JEB)

11,609 mechanized (GUTS)



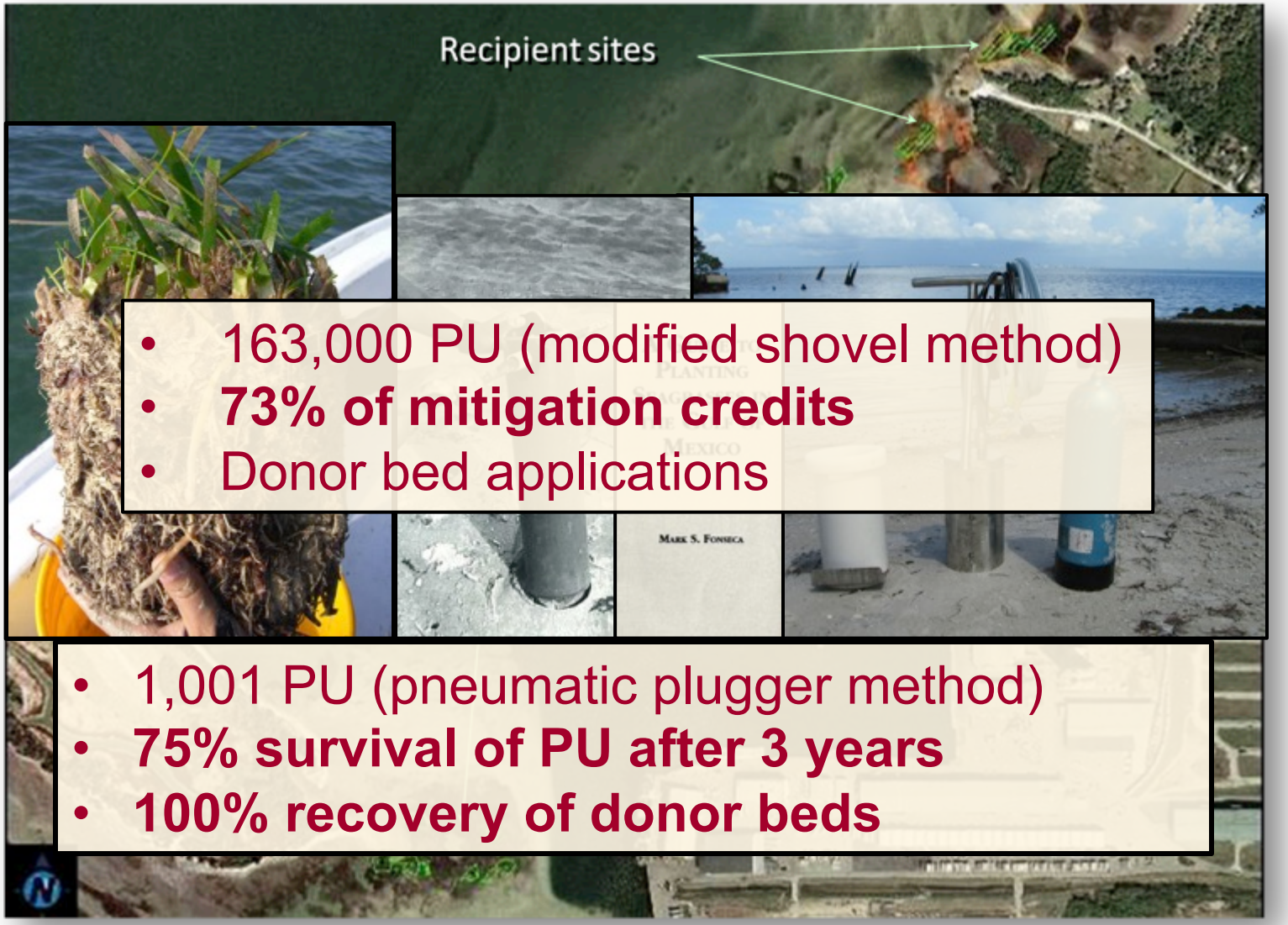
- Low survival
- No mitigation credits awarded
- **Currents, bioturbation, methods**

100% Impact Salvage – Is it necessary?



- Planting 1: 13,684 PU/ac.
- Understanding plant ecology
- Planting 2: 2,050 PU/ac.

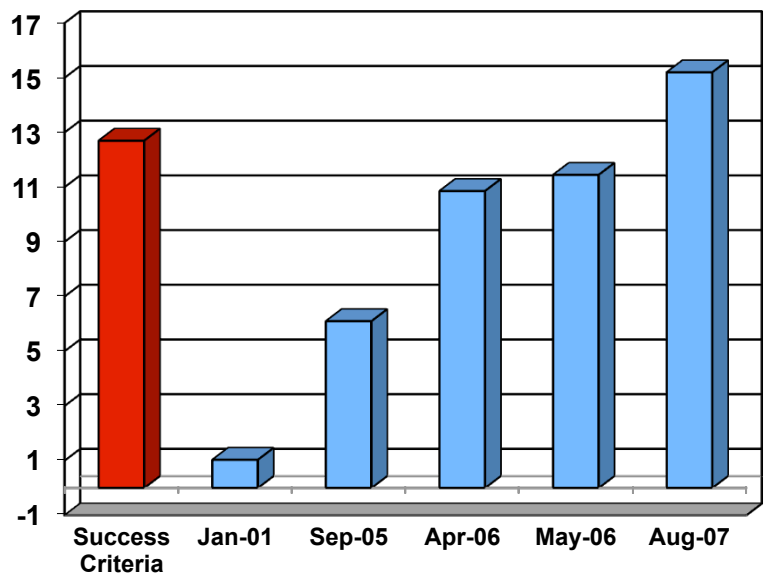
Utilize Proven Restoration Methods



- 163,000 PU (modified shovel method)
- **73% of mitigation credits**
- Donor bed applications

- 1,001 PU (pneumatic plugger method)
- **75% survival of PU after 3 years**
- **100% recovery of donor beds**

Lessons Learned



$6.3 Million (USD) or **$255,337** per ac.

- Over-Design Plan
- Suitable Site Selection
- Seagrass Ecology
- Utilize Proven Methods
- Less Risk
- Reduction of ratio
- Restoration Cost Savings
- Feasible Project

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1.5 acre (0.607 HA) project

- Map & Ground truth = 6
- Planting = 19
- Monitoring = 59
- Contractor = 8
- Gov't. oversight = 9
- TOTAL COST = $504 to 826K *In 2013 dollars*

$336 to 550K per acre

Source: United States vs. Salvors Inc.

Planting Unit Size Affects Survival