



Florida Department of Environmental Protection
Division of Water Resource Management

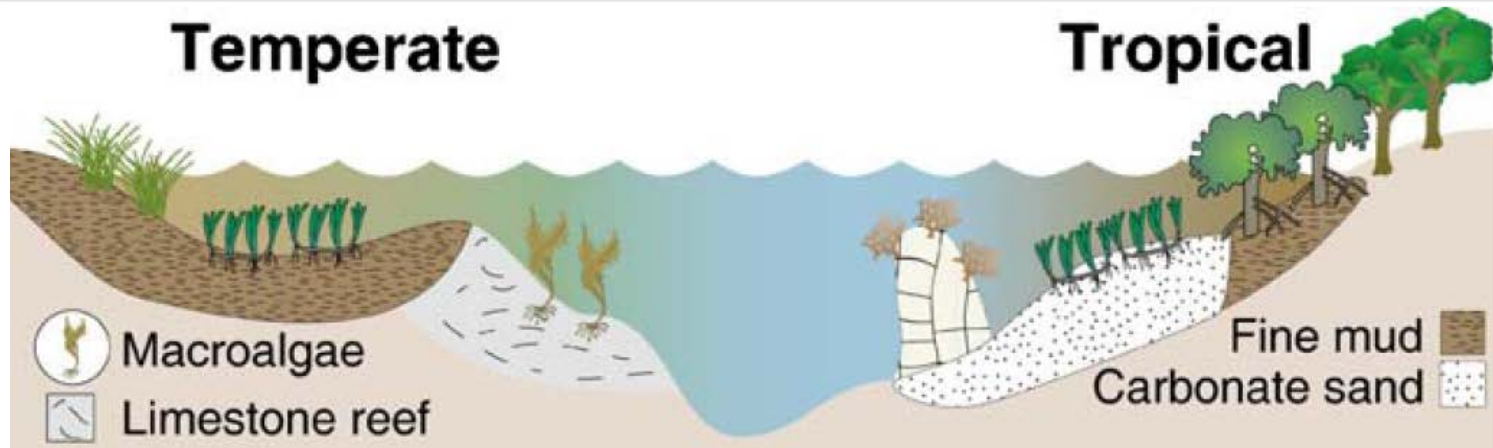
Regulatory Perspective on Seagrass Monitoring

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Value of Seagrasses



Ecosystem	Area (10 ⁶ ha)	Loss (% year ⁻¹)	Value (US\$ ha ⁻¹ year ⁻¹)
Seagrass 	18	2–5	19 004

~ 2.2 million acres of seagrass in Florida
Value ~ \$17 billion

Duarte *et al*
2008
Estuaries
and Coasts



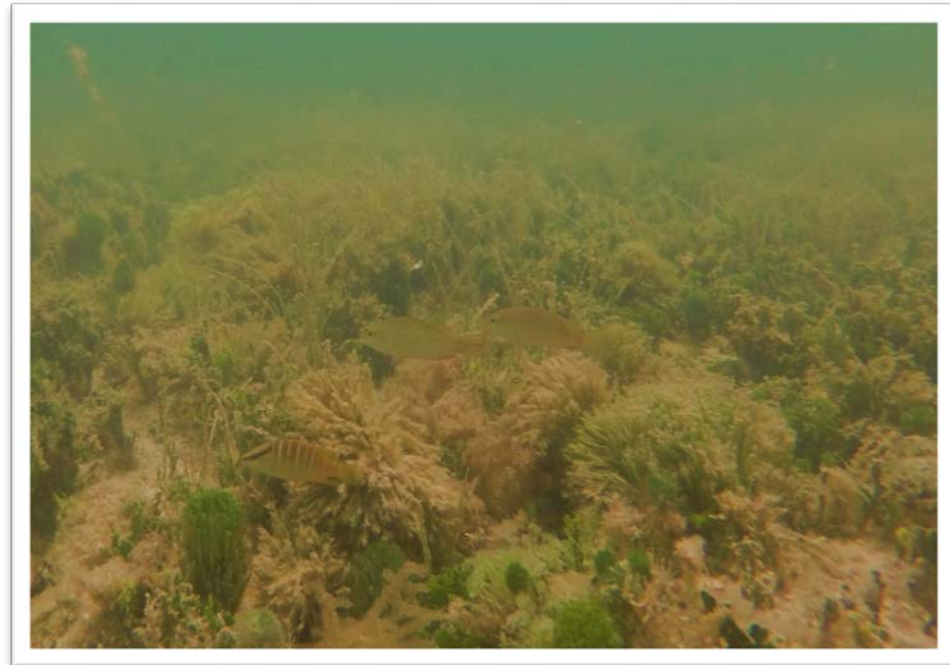
Beaches Inlets and Ports Program

Types of permits issued:

- **Joint Coastal Permits:** Beaches and Inlets
- **Environmental Resources Permits:** Deepwater Ports

Types of project-related impacts to seagrass:

- Turbidity (62-4.244 F.A.C.)
- Burial by dredged materials
- Removal by dredge
- Sloughing of channel slopes
- Damage due to anchor / line
- Damage due to pipeline
- Shading by equipment



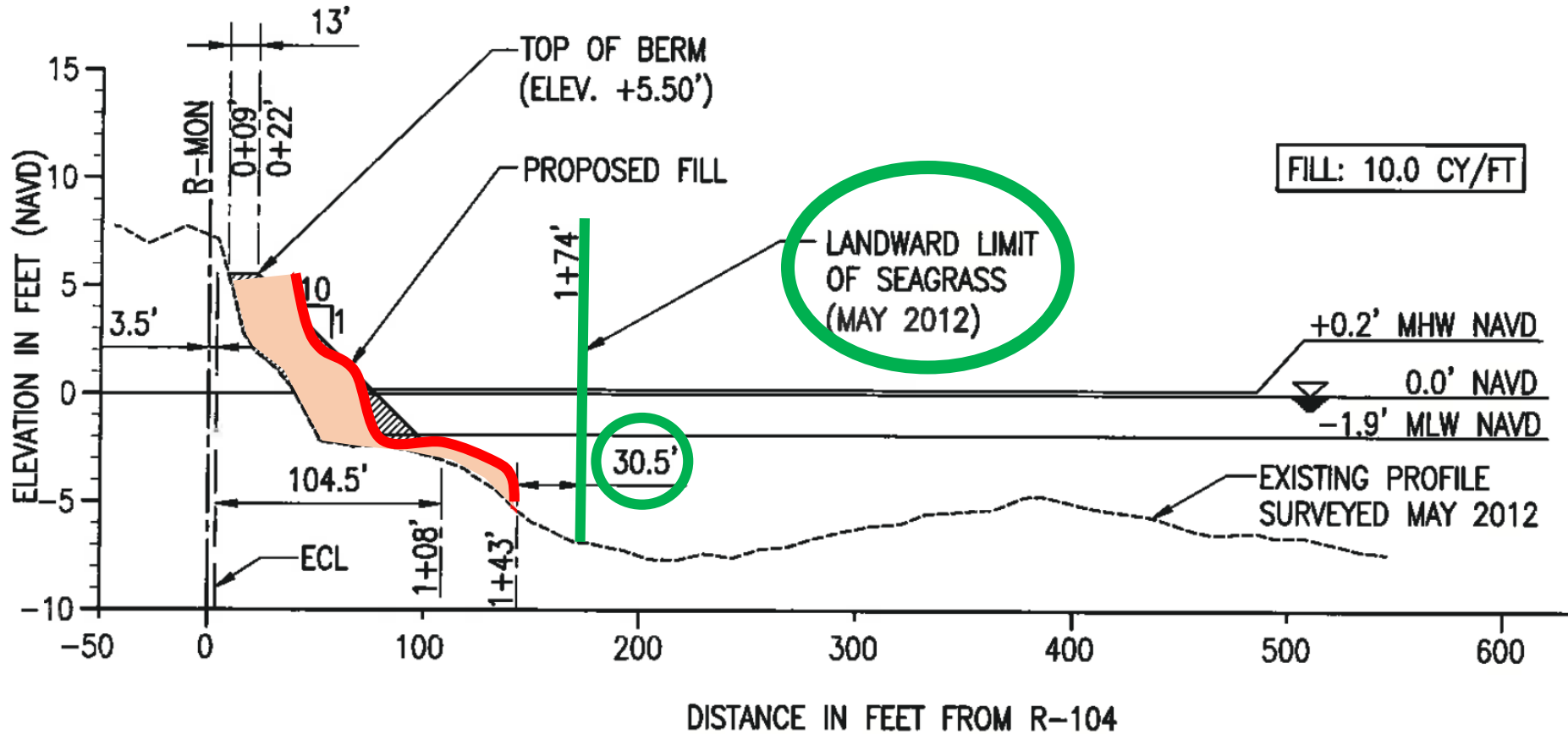


Beach Nourishment





Beach Nourishment



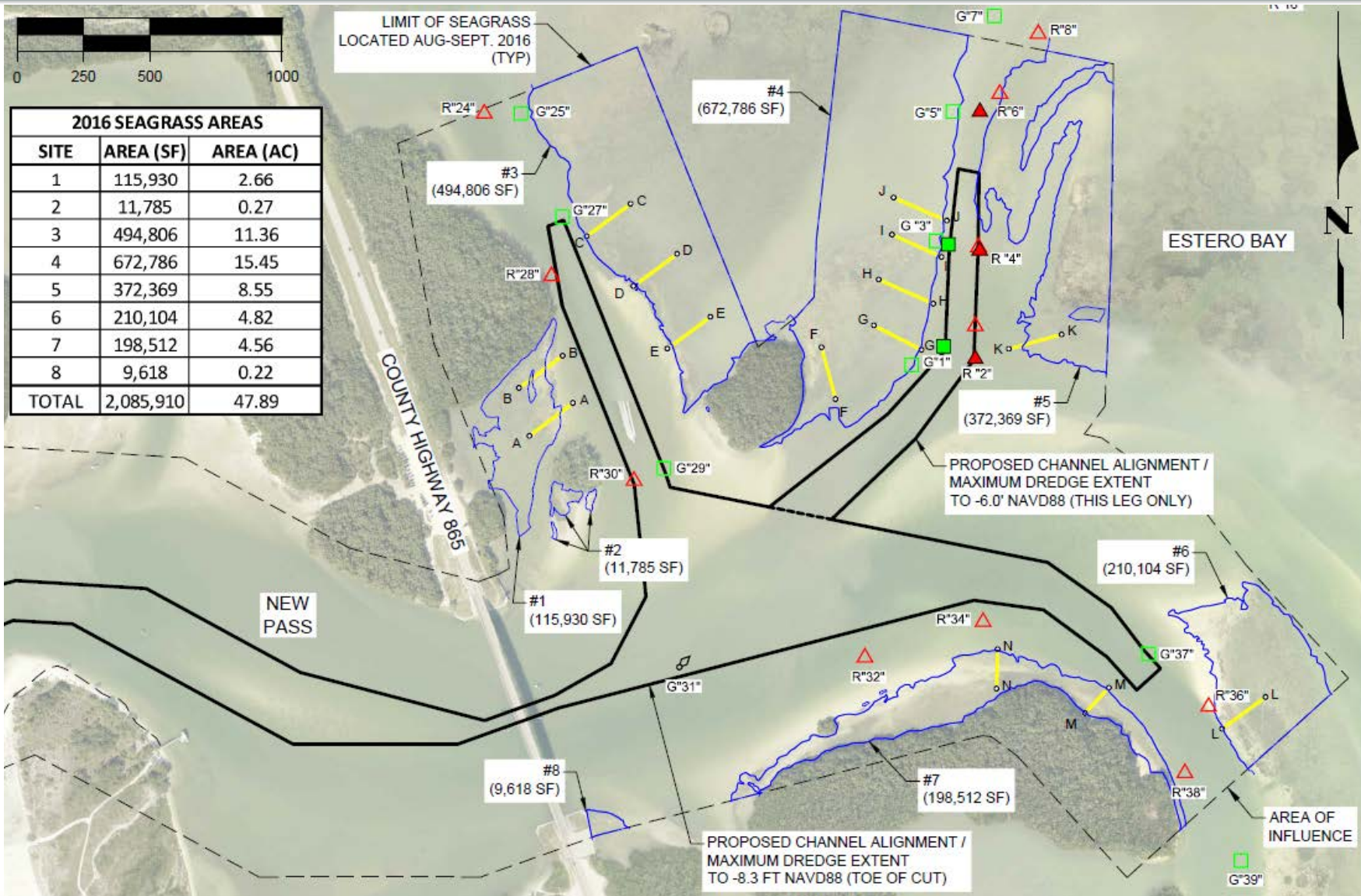


Dredging of Channel





Dredging of Channel





Regulatory Requirements

Identify and characterize resources in project area

Mitigate for permitted / predicted impacts

Monitor for reasonable assurance

- Confirm that impacts do not exceed predictions
- Determine success of mitigation activities





Goals of Monitoring

Document impacts

- Verify predictions
- Identify unpermitted impacts

Determine success of mitigation

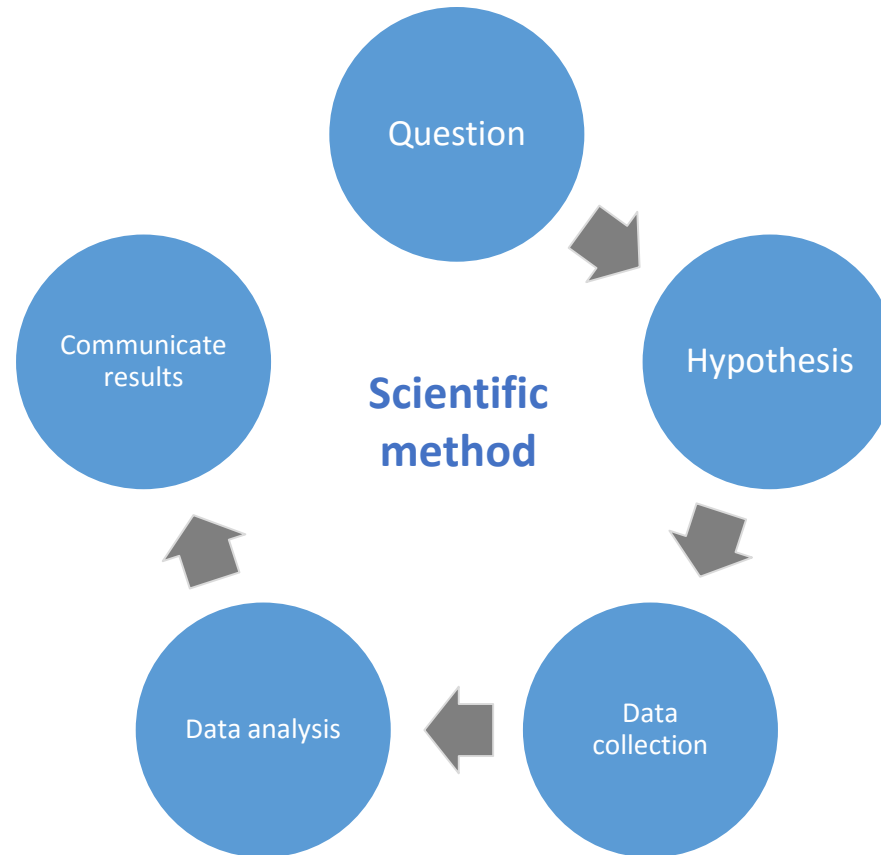
- Success criteria achieved
- Donor site recovery (if applicable)





Principles and Process

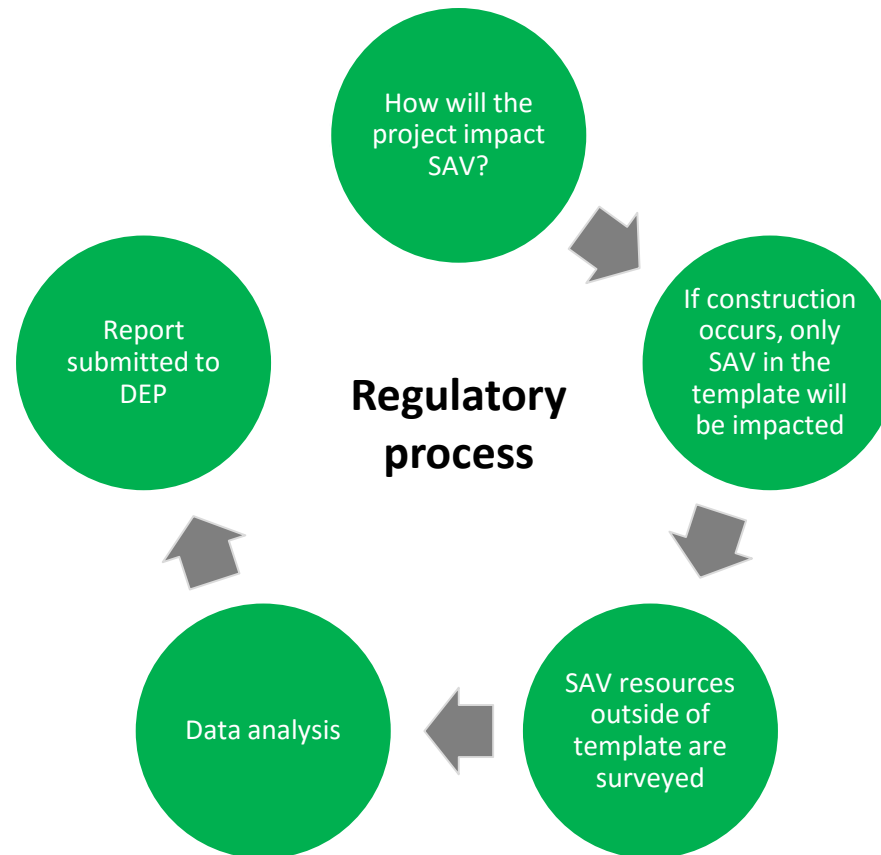
Chapter 161.041(4) F.S. “Biological and environmental monitoring conditions included in the permit must be based upon *clearly defined scientific principles*”





Principles and Process

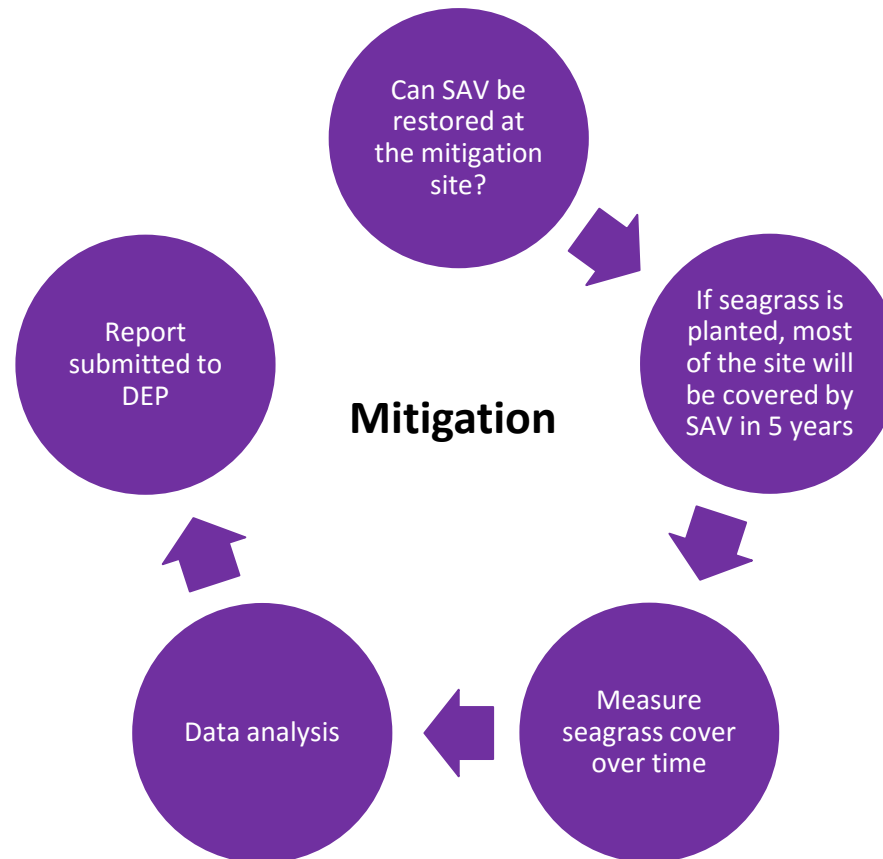
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Principles and Process

Chapter 161.041(4) F.S. "Biological and environmental monitoring conditions included in the permit must be based upon *clearly defined scientific principles*"





Means and Methods

Monitoring plans are project-specific

Scope and scale of project

Type of assessment area

Type of construction activities

Type of mitigation technique

**But means and methods
are typically similar**





Timing of Surveys

Survey during peak growing season

- Aboveground biomass may senesce in winter
- Survey between April 1st – Oct. 31st
 - Sites with *H. johnsonii*: April - August
 - South FL (Virginia Key in Dade - Monroe): year round





Impact Assessment Surveys

Reconnaissance

- Prior to complete application / UMAM
- Characterize site
- Identify/ map resources

Baseline

- Immediately prior to construction
- Document condition of resources

Post-construction

- Immediately after construction
- Document condition relative to baseline
- Identify potential unpermitted impacts

Is a reference (control) site needed?

Is the area reasonably expected to be adversely affected by factors that are not project-related, e.g., storm water run-off?



Mitigation Surveys

Mitigation Site

- Reconnaissance
- Baseline / Pre-construction
- Immediate Post-construction / post-planting
- Annually until success criteria achieved

Reference Site

- Reconnaissance
- Concurrent with mitigation site surveys

Donor Site

- Reconnaissance
- Baseline / Prior to harvesting
- Annually until site has recovered



Survey Tasks

Map SAV boundaries

- Delineate edges using DGPS
- Produce georeferenced maps

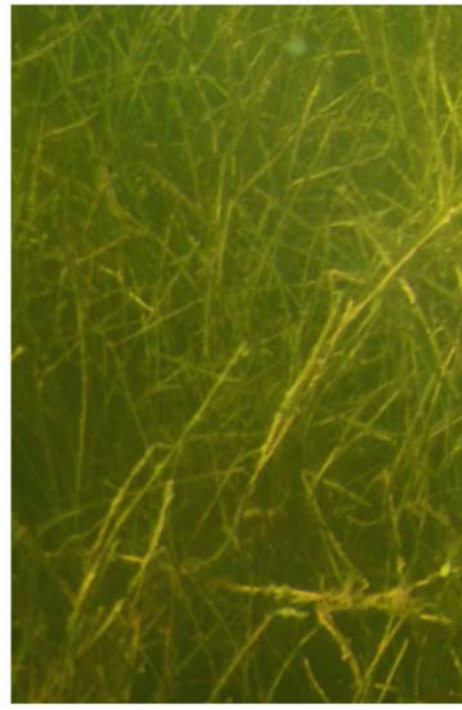
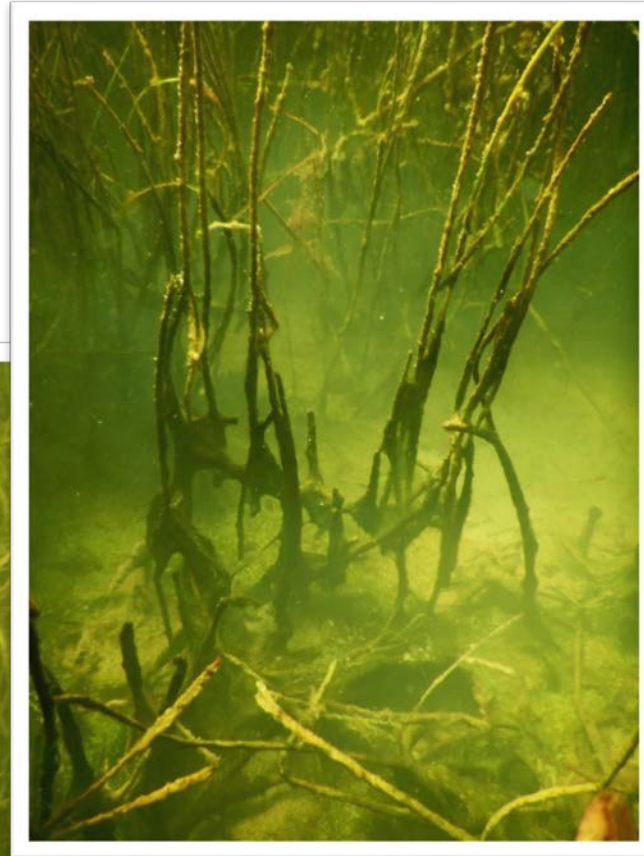
Qualitative observations

- Rapid visual assessment
- General condition

Quantitative surveys

- Species
- Abundance

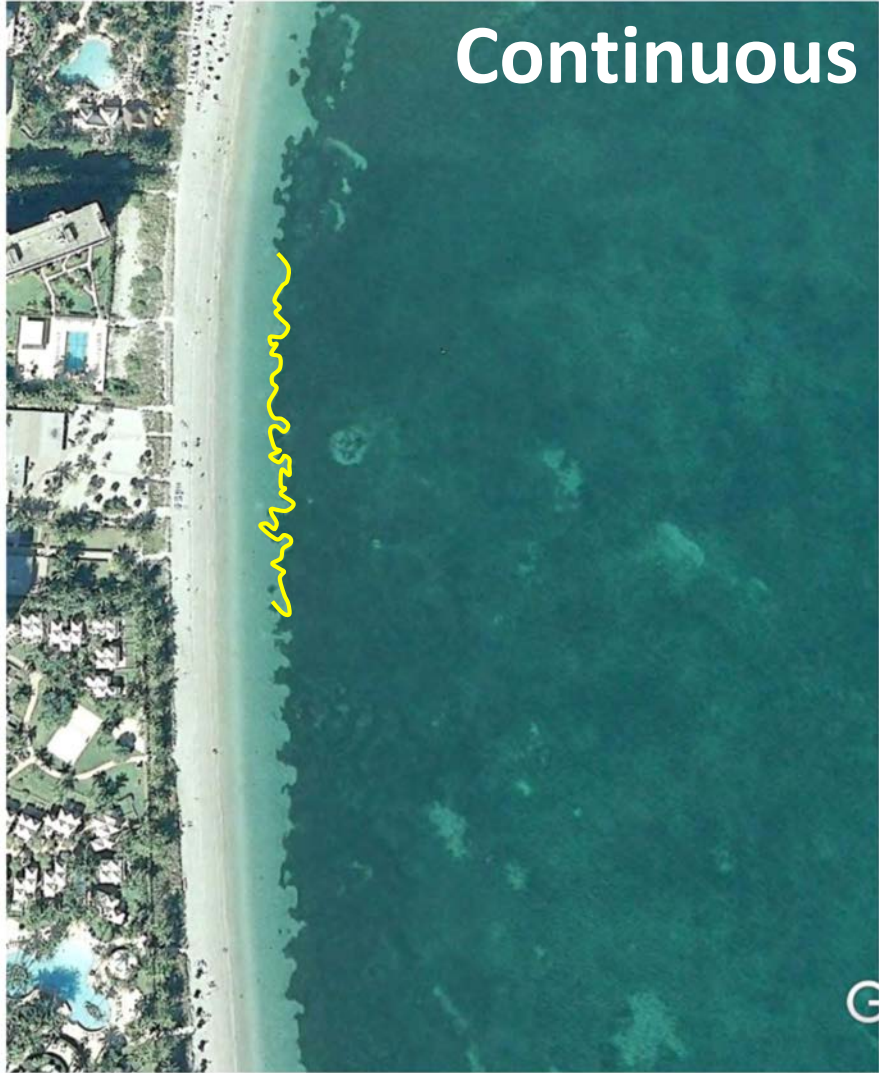
<input checked="" type="checkbox"/>	Excellent
<input type="checkbox"/>	Very good
<input type="checkbox"/>	Good
<input type="checkbox"/>	Average
<input type="checkbox"/>	Poor





Edge Mapping: Spatial Extent and Distribution

Continuous



Patchy



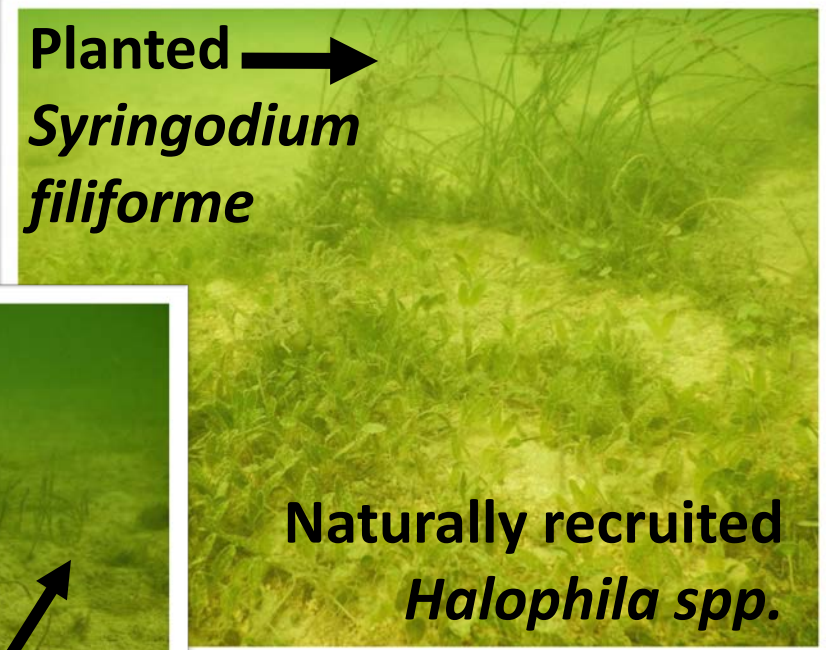


Transect-based Methods

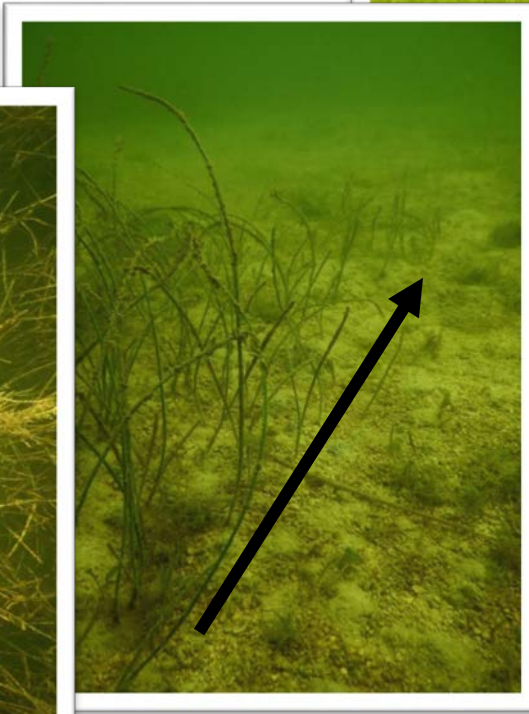
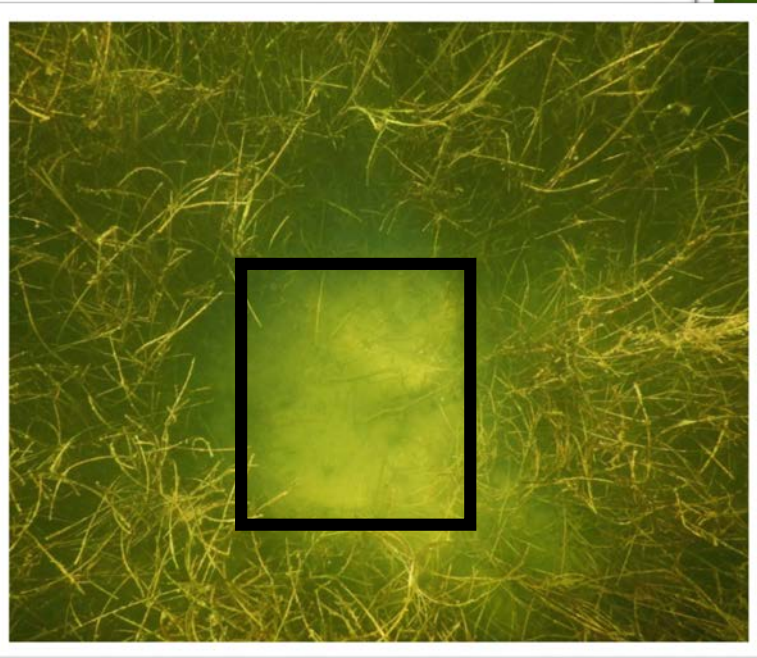
Line-intercept surveys to quantify net-acreage

- Donor site recovery
- Mitigation site succession
 - Expansion of planting units
 - Natural recruitment

Planted →
*Syringodium
filiforme*

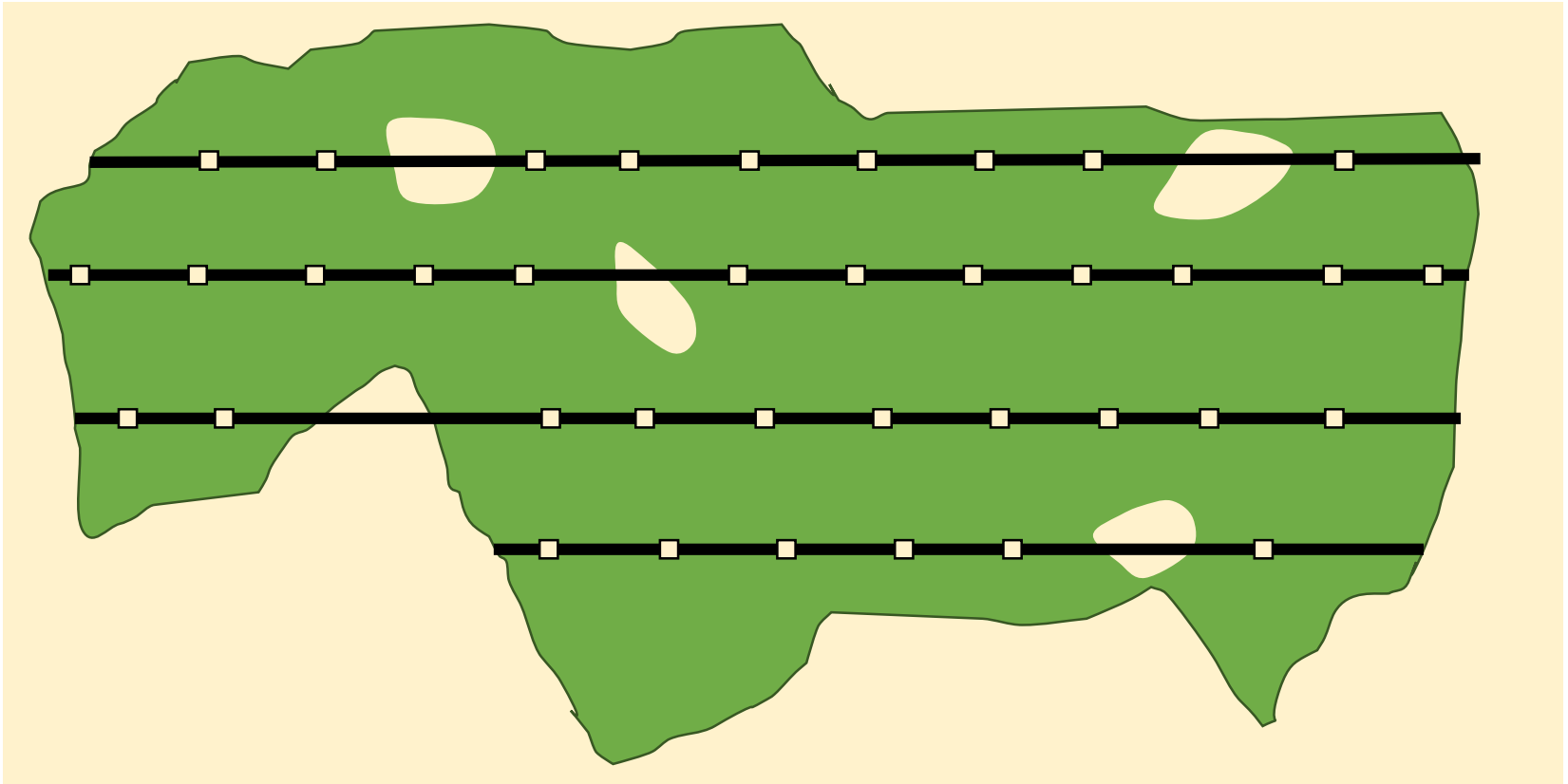


Naturally recruited
Halophila spp.





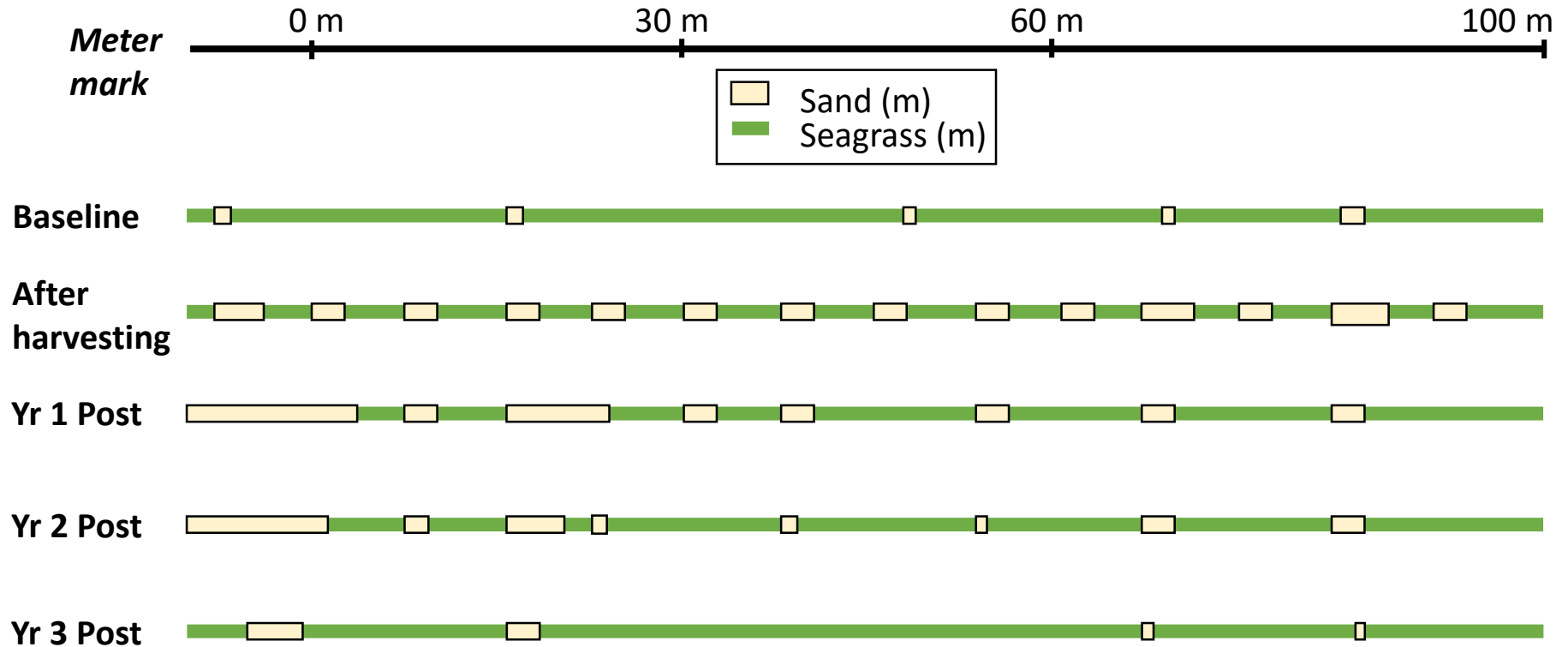
Line-intercept Example Donor Site Recovery



Harvest materials



Line-intercept Example Donor Site Recovery





Quadrat-based Methods

Quantify SAV Abundance

- Shoot counts
- Percentage of occupied cells
- Braun-Blanquet





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Reported Metrics

- Frequency of occurrence – number of quadrats with SAV
- Density – average cover in all quadrats
- Abundance – average cover in quadrats with SAV



Data Management and Reporting

Quality control / quality assurance

- Data collection by experienced biologists
- *In situ* calibration between observers
- Data checked for accuracy

Reporting requirements

- Map of SAV habitats (ArcGIS)
- Methods and transect locations
- Qualitative description of SAV
- Descriptive statistics (mean and stdev)
- Statistical analyses and results
- Physical (e.g., bathymetric) data

Deliverable deadlines

- Raw data - 45 days
- Report - 90 days





Documents Referenced

- Florida Fish and Wildlife Conservation Commission Recommended Survey Protocols for Estuarine and Marine Submerged Aquatic Vegetation related to Permitting Applications (14 December 2011)
- Seagrass Monitoring in the Florida Keys National Marine Sanctuary (2 October 2006)
- NOAA's Recommendations for Sampling *Halophila johnsonii* at a Project Site
- Seagrass-Watch: Manual for Mapping and Monitoring Seagrass Resources by Community (Citizen) Volunteers



Next Steps

- Draft guidance (in progress)
- Workshop (stay tuned)
- Review feedback
- Finalize documents
- Post on DEP website



Questions?

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