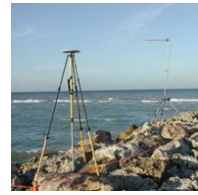
Biological Monitoring: An Underwater Perspective

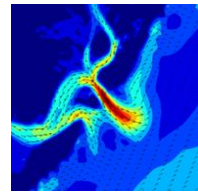
Lauren Floyd and Stacy Buck, CB&I

Overview

- Florida's Reefs
- The Path of a Florida Marine Biologist
- Biological Monitoring for Beach Nourishment
  - Background
  - Monitoring Protocol
  - Challenges
- Efforts to Improve the Protocol
  - Input from Biological Monitoring Firms
  - FDEP Initiatives
- Conclusion

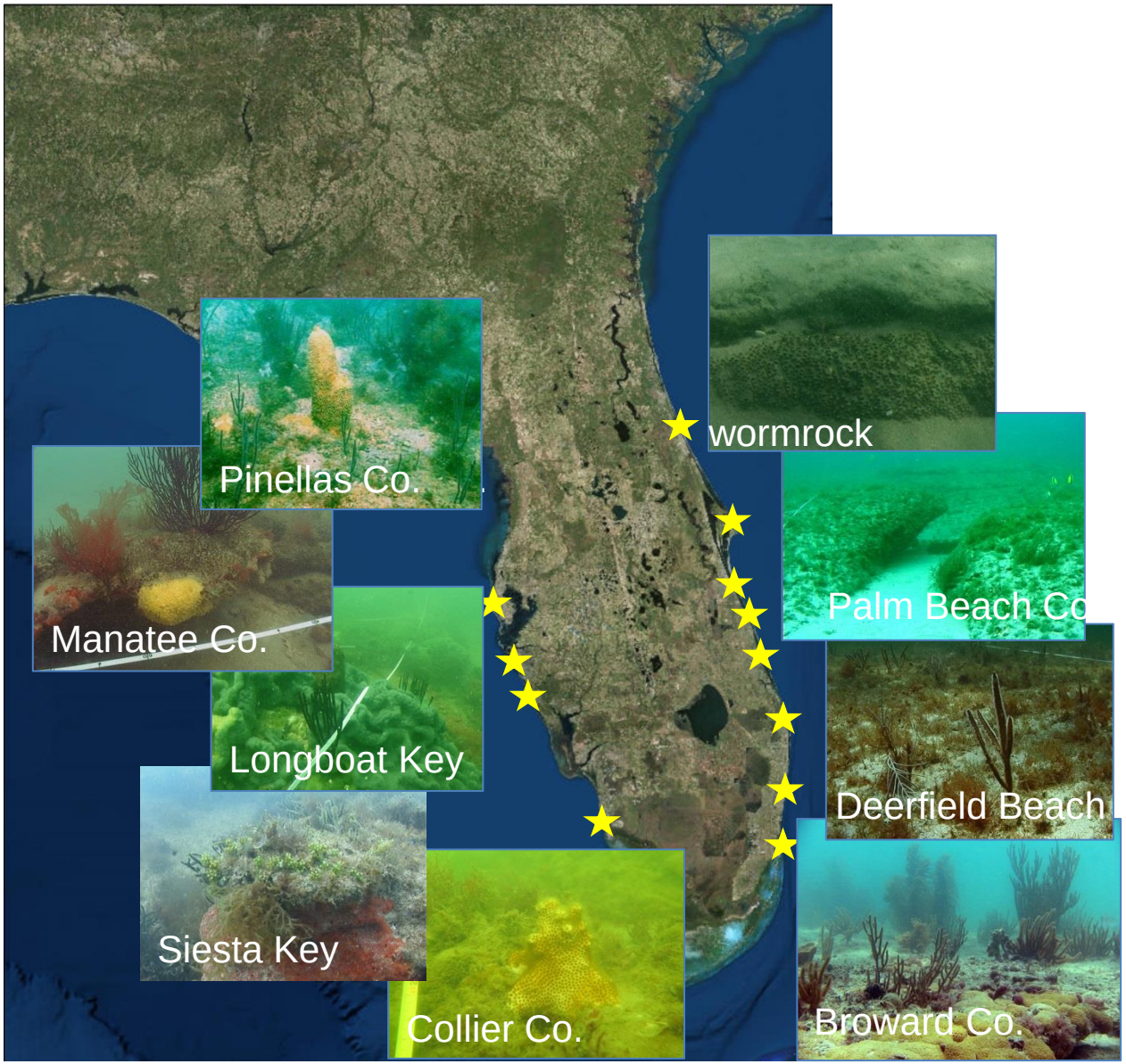




Florida Reefs

Duck Key

Florida Reefs

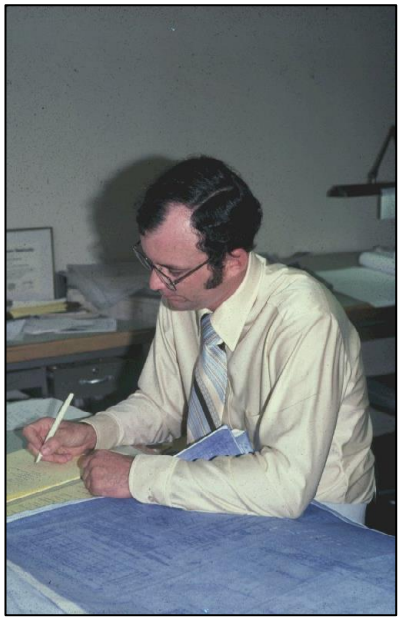


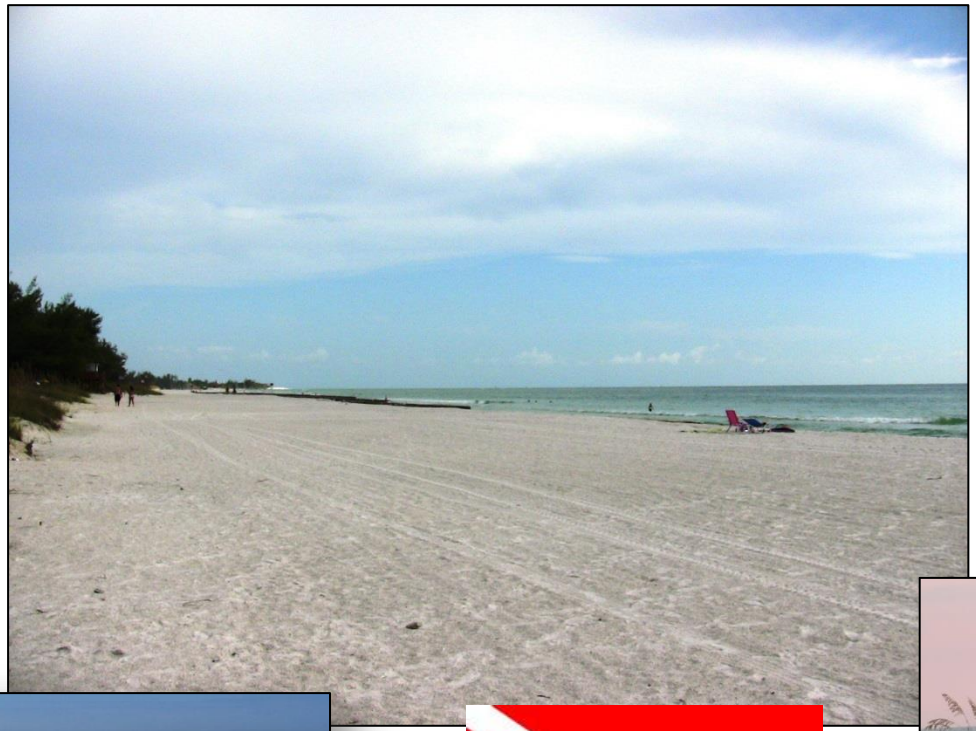
The Path of a Florida Marine Biologist

NSU NOVA SOUTHEASTERN UNIVERSITY

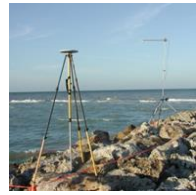
NCRI

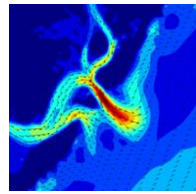
Beach Nourishment



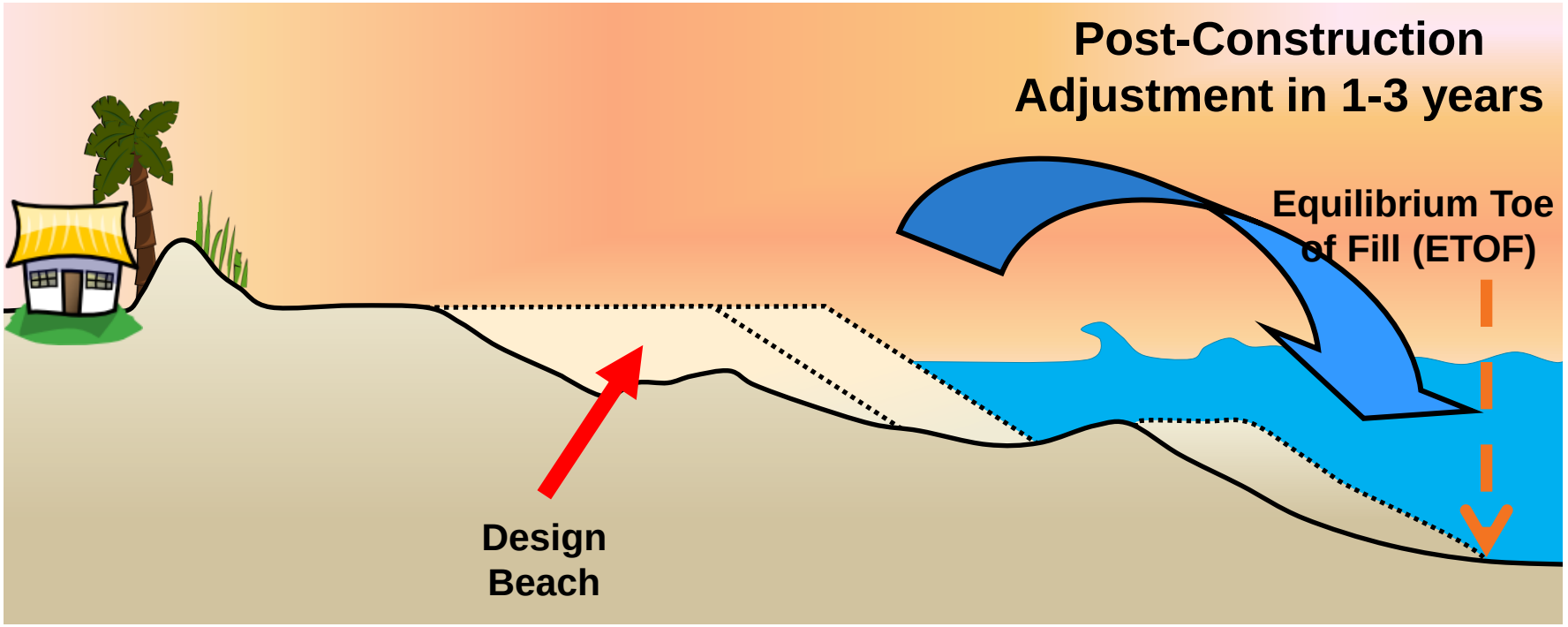


- Eroded Beach
- Design and Permitting of Beach Nourishment Project
- If Nearshore Hardbottom Present:
  - Mitigate for anticipated impacts (ETOF)





PROFILE EVOLUTION OF BEACH NOURISHMENT



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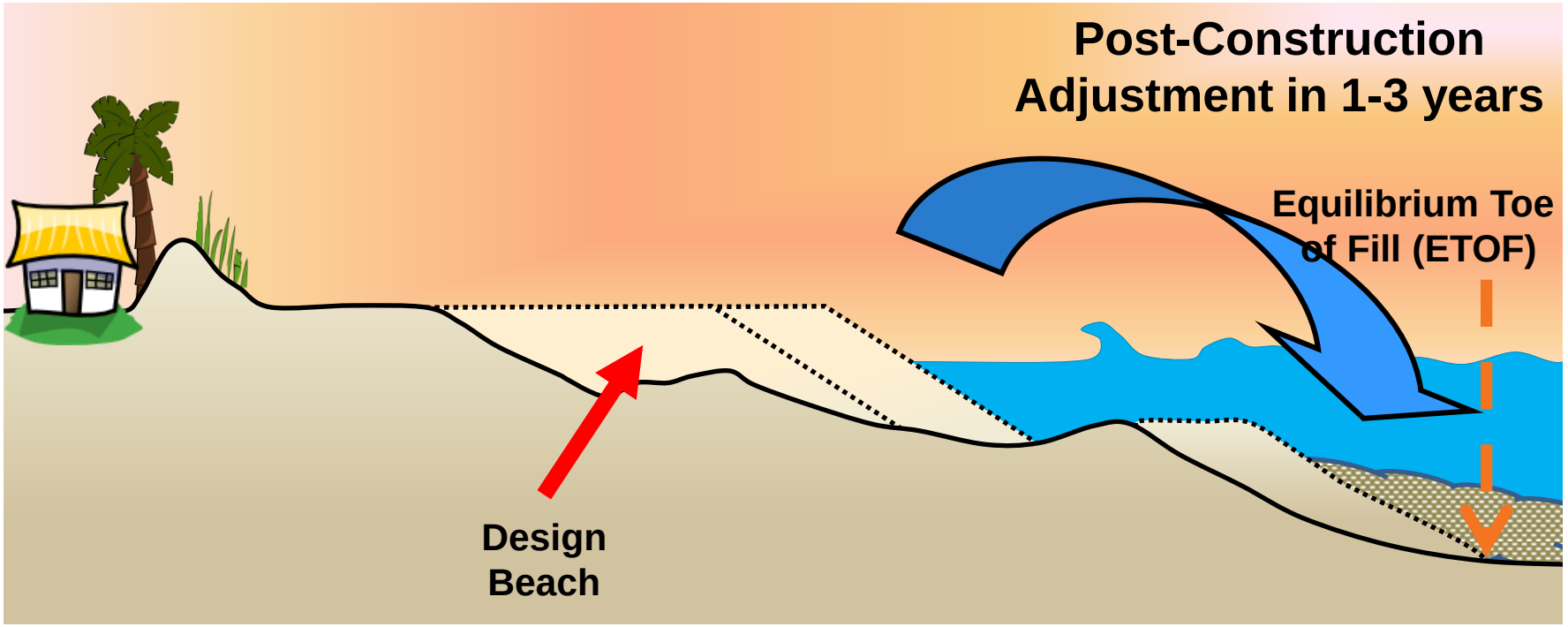
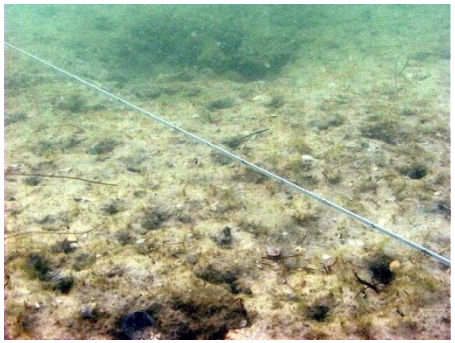
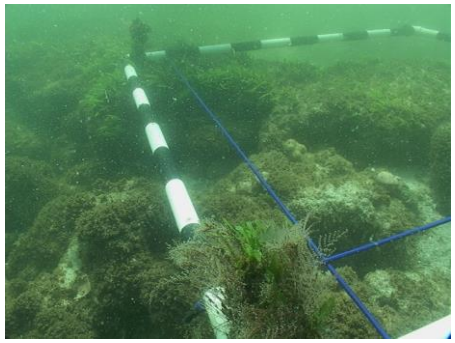
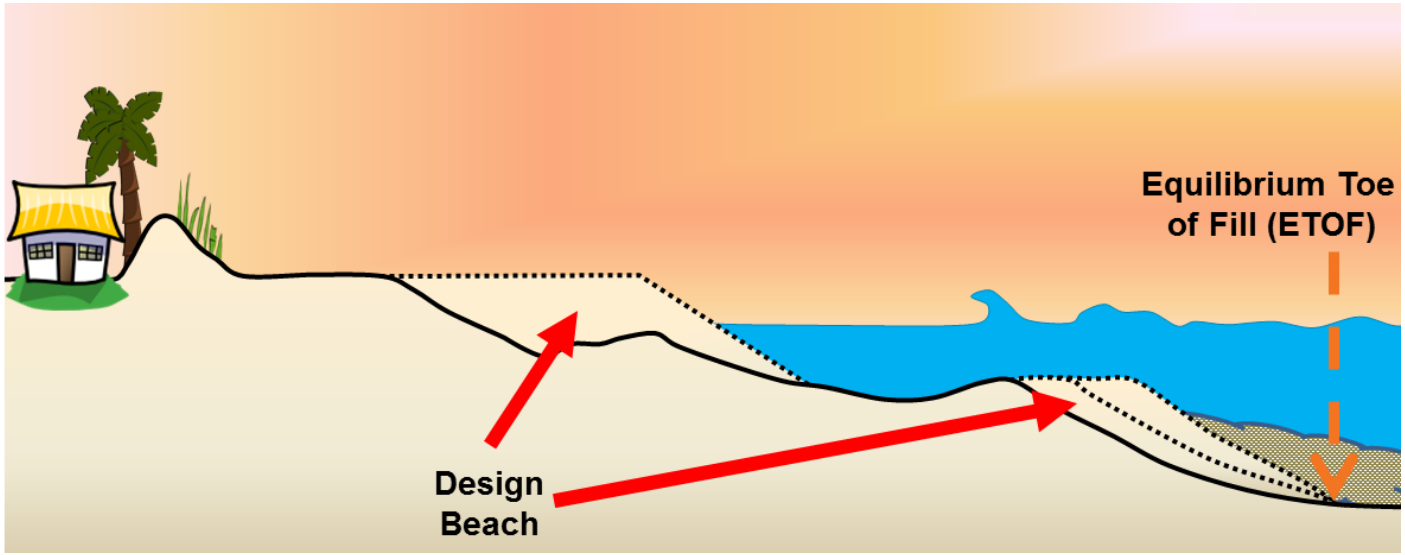


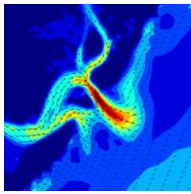



- Eroded Beach
- Design and Permitting of Beach Nourishment Project
- If Nearshore Hardbottom Present:
  - Mitigate for anticipated impacts (ETOF)
  - Biological monitoring conducted beyond ETOF for potential unanticipated impacts







Biological Monitoring for Beach Nourishment

- Why do we monitor?
  - FDEP has the responsibility and statutory authority to protect and manage the waters of the State (Part IV of Chapter 373, F.S.)
  - Monitoring programs required for "any coastal construction permitted…that is determined to have an adverse impact," and that "Monitoring programs shall include sufficient pre-project data to establish an adequate baseline for project construction and post construction comparison." (FAC Chapter 62B-41)
  - Regulatory monitoring plans will provide reasonable assurance under State regulatory requirements that approved projects will have no unpermitted impacts to nearshore hardbottom and their associated benthic communities. (Chapter 161 and Part IV of 373, F.S.)

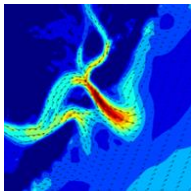
- Who pays for monitoring?
  - Typically cost-shared between the State and local municipalities
  - Annual surveys can cost between $150,000 and $500,000

Biological Monitoring Protocol

- Timing
  - Pre-Construction
  - Immediate and Annually Post-Con (3-5 yrs)
  - Summer Surveys
- Each survey documents
  - Location hardbottom edge
  - Sedimentation
  - Benthic community
- Submittals
  - Raw data - 45 days
  - Report - 90 days



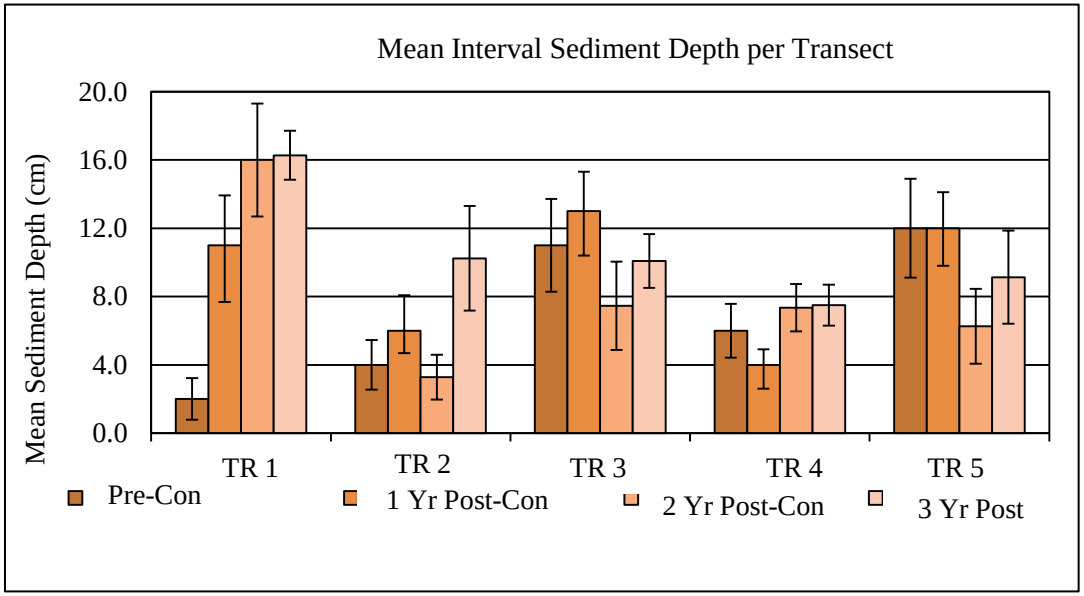


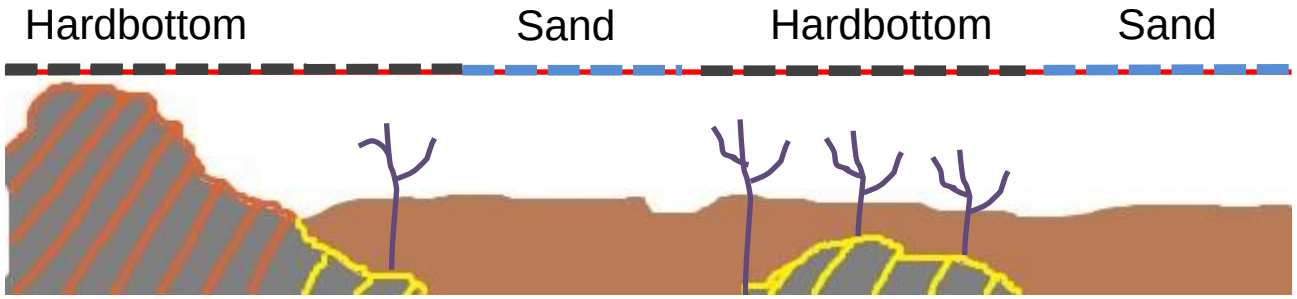
Hardbottom Edge Delineation

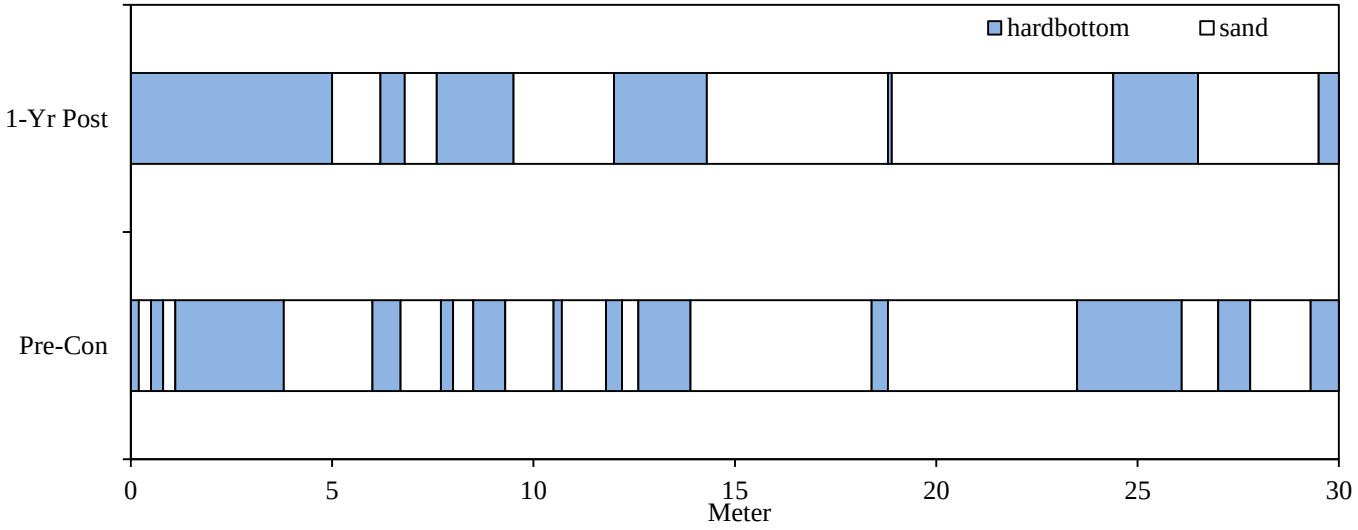
- Determines location of sand/hardbottom edge
- Divers swim hardbottom edge while towing DGPS buoy
- Edged either continuous hardbottom or “emergent epifauna”
- Seaward shifts of edge indicate burial

- Interval Sediment Depth Measurements



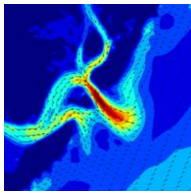
- Line-Intercept Method



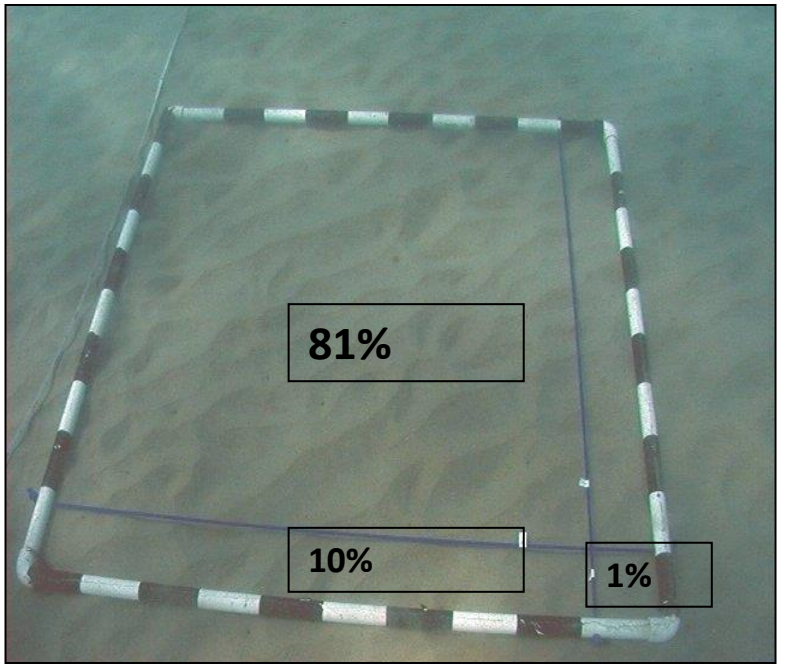






- Quadrat Assessment



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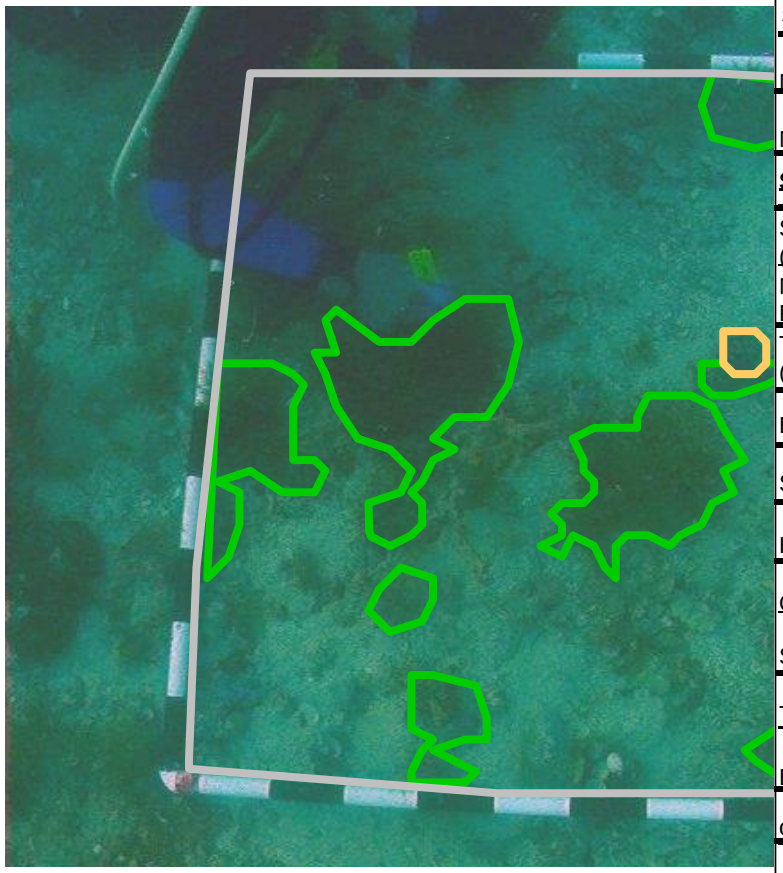

Sample Name or # 2.5		List macroalgae Genus List every coral colony ~and coral condition(s)	% cover max size (cm)
Max Relief (cm)	4	Hypnea	1
Max Sediment Depth (cm)	1	Gracilaria	1
Sessile Benthos…	**% Cover**		
Sediment- (circle all: (sand) shell mud)	20		
Macroalgae- Fleshy+Calcareous	3		
Turf- algae+cyanobacteria (circle all: (g) (r) b)	60		
Encrusting Red Algae	0	S. hyades	14
Sponge	2	S. siderea	5
Hydroid	0		
Octocoral	0		
Stony Coral	1		
Tunicate	0		
Bare Hard Substrate	14		
other-…	0		
Total Must = 100%			

- Video and Photos

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  - Document biota along the transect

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  - Document substrate types

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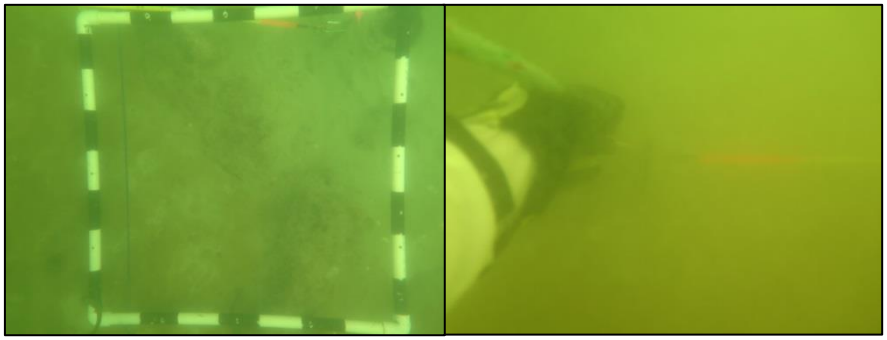

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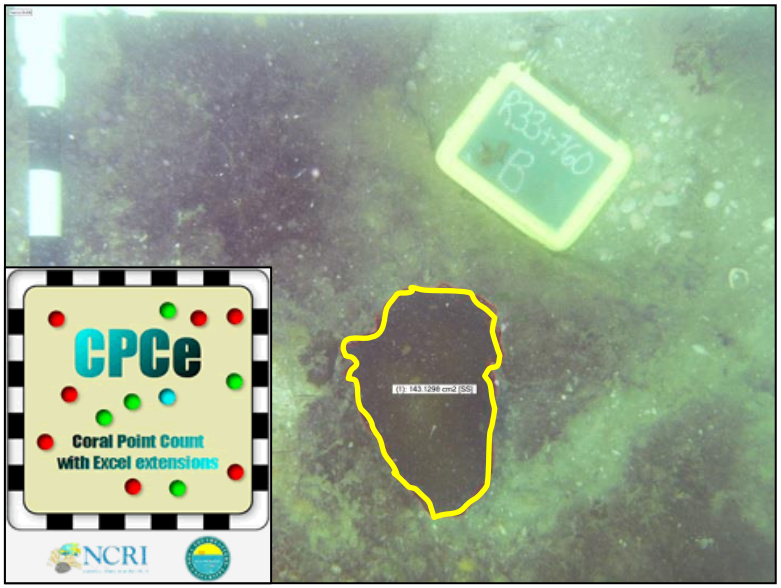
  - Document substrate types
  - Document site conditions
  - Analyzed in the lab for additional data (if high quality)



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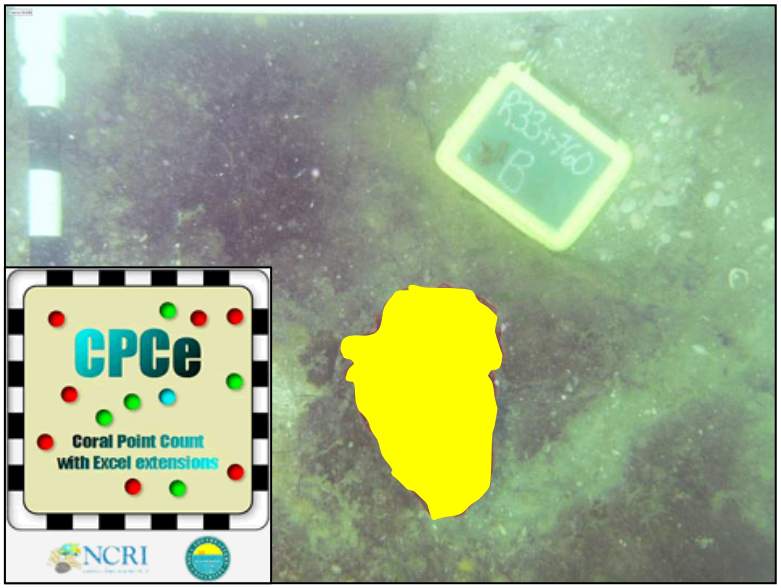
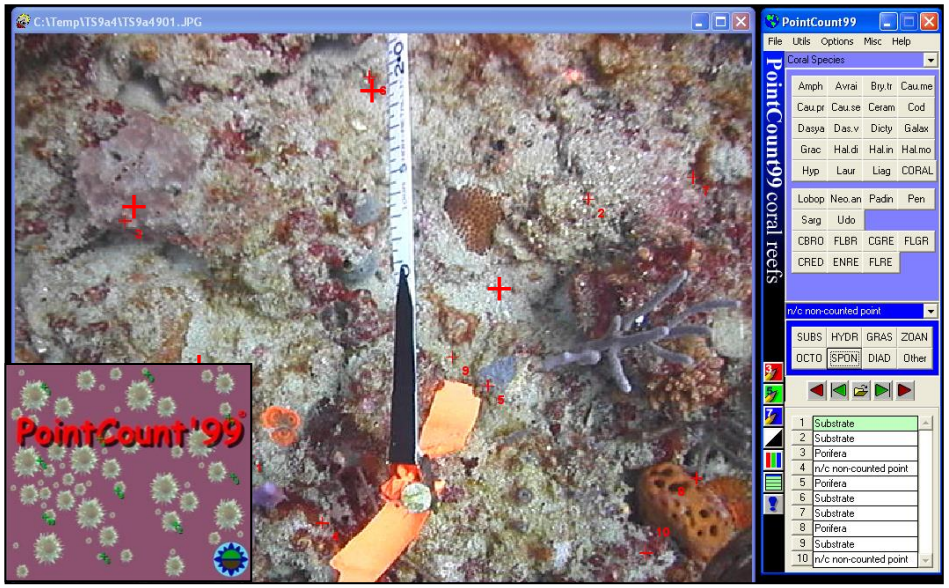
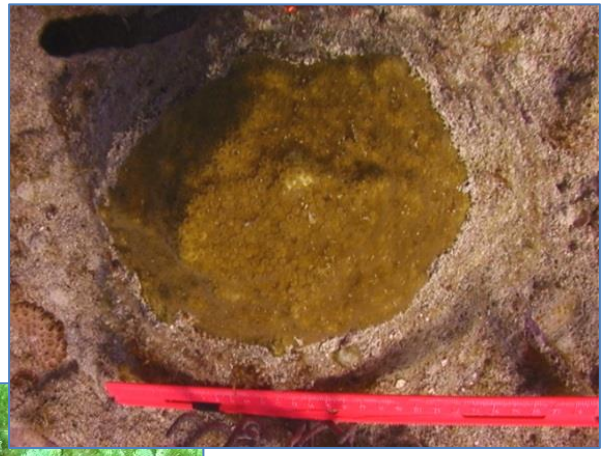
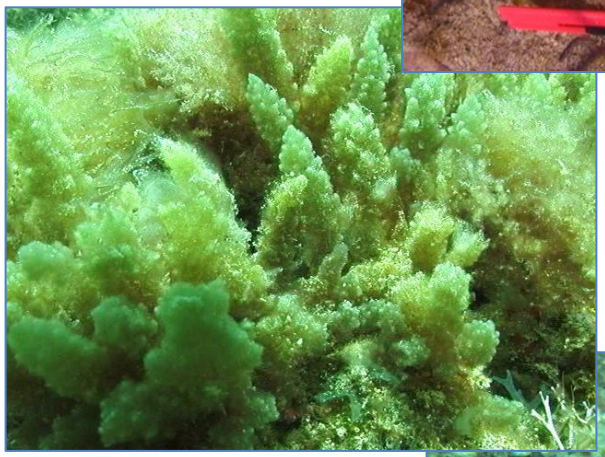


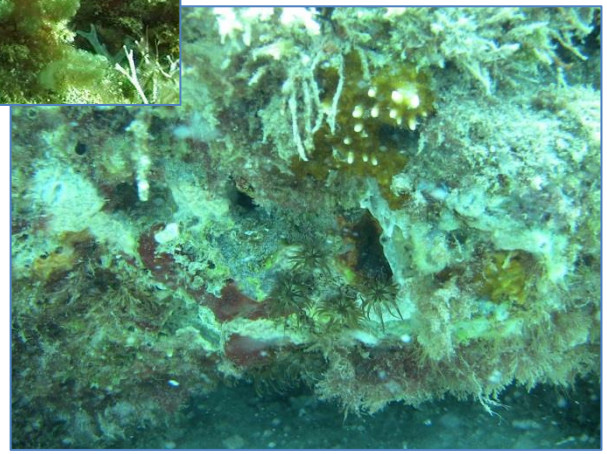


Additional Methods

- Coral Stress
- Rugosity
- Species Area Curves
- Motile Invertebrate Census
- Macroalgae height
- Coral Census
- Coral Fate Tracking



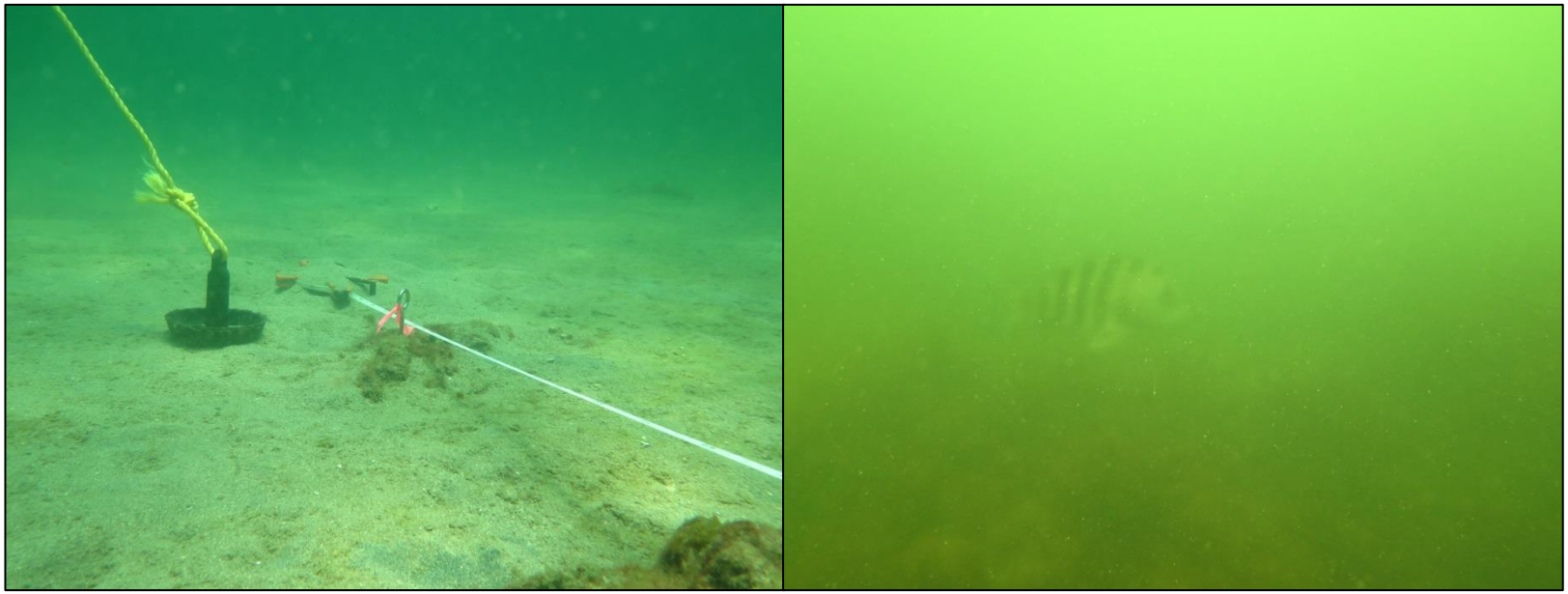




- Weather

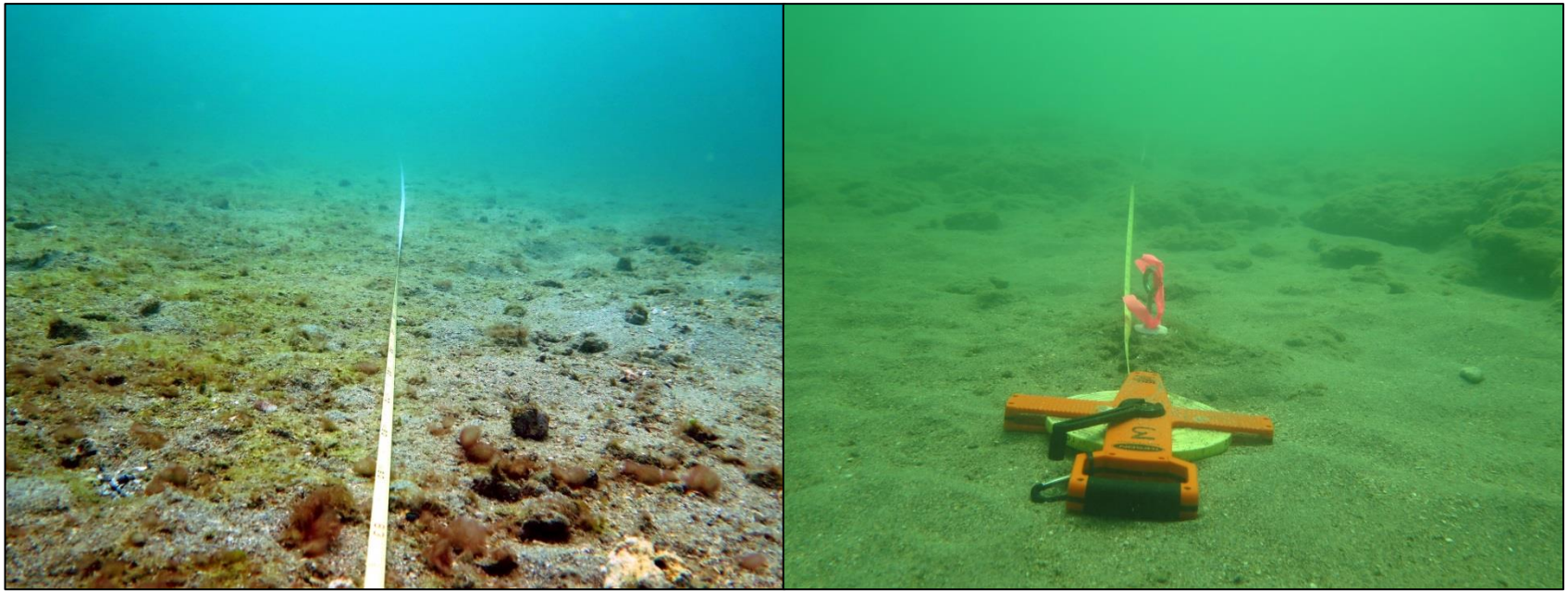
Challenges

- Locating Pins



- Mapping

- Long Transects

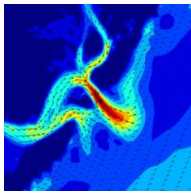


Biological Monitoring – Efforts to Improve the Protocol

- Input from other Firms
  - Many respondents say current protocol does not accurately determine project impact
  - Specific methods that received comments
    - Pre-construction surveys and/or more frequent aerials
    - Mapping – need to differentiate hardbottom from emergent epifauna and rubble, add relief measurements
    - Line-intercept – add emergent epifauna and rubble
    - Permanent vs. temporary transects/quadrats
    - Questionable usefulness of additional methods
  - Concerns that submittals are due too soon
  - Question as to what is done with the data/how is it used
  - Why is monitoring reinitiated for repeat projects
  - Most cited improved coordination, communication and assistance from FDEP biologists





Biological Monitoring – Efforts to Improve the Protocol

- FDEP SOP for Nearshore Hardbottom Monitoring of Beach Nourishment Projects
  - Reaching out to biological monitoring firms for input
  - Workshops to discuss methods/changes
  - Addressing comments in next draft of SOP
  - More workshops
  - Training

- FDEP Site visits
  - Opportunity for FDEP biologists to put data into context of project area conditions
  - Opportunity for biological monitoring firm and permittee to discuss questions and provide recommendations for improvement

Biological Monitoring – Efforts to Improve the Protocol

- Discussions with FDEP
  - Understand that each additional method and transect adds cost, trying to balance quality of data with cost efficiency
  - More pre-construction surveys add cost, as does the much greater number of temporary transects that would be required
  - Will be including additional habitat classifications and relief measurements for mapping
  - Have begun including “sediment only” transects to get greater detail on sedimentation but without over-burdening monitoring firms and permittee
  - Eliminated quantitative video surveys, but video archive can provide additional data if needed
  - Still addressing comments to SOP, will circulate next draft and hold a webinar to discuss

Conclusions

- General consensus is that hardbottom biological monitoring protocol still needs work but is improving
- FDEP is working to improve effectiveness and consistency of monitoring, keeping in mind associated cost/time required
- Suggest that permittees/biological monitoring firms continue to provide input to FDEP on concerns and recommendations
- Keep in mind that SOP is needed but that project-specific considerations must still be made
- Apply data to form greater understanding of project impacts

Thank You