Best Management Practices (BMPs) for Construction, Dredge and Fill and Other Activities Adjacent to Coral Reefs

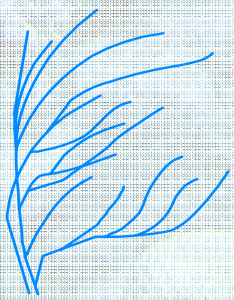
WORKSHOP PROCEEDINGS

Prepared by:

PBS&J

for

The Southeast Florida Coral Reef Initiative
Maritime Industry and Coastal Construction Impacts Focus Team



Southeast
Florida
Coral Reef
Initiative

DEVELOPMENT OF BEST MANAGEMENT PRACTICES (BMPs) FOR CONSTRUCTION, DREDGE AND FILL, AND OTHER ACTIVITIES ADJACENT TO CORAL REEFS

WORKSHOP PROCEEDINGS

DANIA BEACH, FLORIDA
JULY 16, 2007

Prepared by:

Completed in fulfillment of contract RM6011 for the:

Southeast Florida Coral Reef Initiative (SEFCRI)
Maritime Industry and Coastal Construction Impacts (MICCI) Focus Team
Local Action Strategy Project # 6

and

Florida Department of Environmental Protection
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1277 N.E. 79th Street Causeway
Miami, FL 33138

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1.0 INTRODUCTION

1.1 Background

The southeast Florida reef system is located next to an increasingly populated and urban area which subjects the system to ever-increasing impacts from a variety of sources, including recreational use (e.g. diving, fishing, boating), land based sources of pollution (e.g. sewer and treated wastewater outfall pipes, coastal run-off), and marine construction activities (e.g. beach nourishment, fiber optic cable and pipeline installation, port maintenance and expansion). Resource management agencies are regularly faced with the problem of assessing and managing response, damage, and restoration requirements resulting from impacts (either permitted or un-permitted) to the reefs.

As part of a Local Action Strategy of the Southeast Florida Coral Reef Initiative (SEFCRI) (FDEP 2004) a Maritime Industry and Coastal Construction Impacts (MICCI) project was developed to guide the coastal construction industry, environmental planners, managers and regulators in planning, permitting and implementing projects adjacent to coral reef and hardbottom habitats. The primary goal of this project is to develop a document of marine and coastal construction Best Management Practices (BMPs) that will serve as a guidance tool for the coastal construction industry, environmental planners, managers and regulators. The BMPs are meant to reduce, minimize and/or eliminate impacts to coastal habitats and reef ecosystems potentially impacted by coastal construction activities. This BMP document will be a living document subject to changes and additional recommendations evolving from lessons learned.

1.2 Purpose

The SEFCRI MICCI Focus Team is charged with the development of Best Management Practices (BMPs) for dredging and coastal construction activities adjacent to coral communities. The BMPs are meant to serve to reduce, minimize and/or eliminate impacts to coastal habitats and reef ecosystems potentially impacted by coastal construction activities. These BMPs will serve as a guidance tool for the coastal construction industry, environmental planners, managers and regulators.

1.3 Workshop Participants

A public workshop was conducted on July 16th, 2007 in Dania Beach, Florida at the International Game Fish Association (IGFA). The workshop was widely advertised in Miami-Dade, Broward, Palm Beach and Martin county newspapers, the Florida Administrative Weekly (FAW) and on the SEFCRI website in order to bring together a group of people from diverse backgrounds and differing points of view. The goal of the workshop was to receive public input and discussion on the draft document "*Development of Best Management Practices (BMPs) for Construction, Dredge and Fill and Other Activities Adjacent to Coral Reefs*". Participants at the workshop included representatives from the coastal construction industry, permitting and

environmental agencies, non-governmental organizations, academic institutions, and the general public. The workshop agenda is provided in the appendix.

1.4 Process

Speakers from SEFCRI and PBS&J began the workshop with a brief introduction of SEFCRI, the goals and objectives of the MICCI team, and the objective of the workshop and draft BMP document. The first session reviewed coastal construction practices in southeast Florida and the associated impacts to environmental resources. The second session highlighted the permitting process associated with coastal construction and mentioned necessary federal, state and local permits. After a brief break, the third and fourth sessions reviewed MICCI Project 3 and MICCI Project 6 respectively. MICCI Project 3 evaluated existing and emerging innovative technologies in coastal construction practices and procedures that minimize or eliminate impacts to reef resources in southeast Florida. MICCI Project 6 is the subject of the public workshop and draft BMP document. Speaker presentations can be found in Appendix 5.

1.5 Breakout Session Organization

At registration, workshop attendees were asked to choose a structural and managerial BMP breakout session to join. Structural BMPs deal with equipment, construction techniques, and other structural aspects of coastal construction. Managerial BMPs deal with ideas and concepts about management of coastal construction.

1.5.1 Structural BMPs

Following the four morning sessions, participants were divided into three groups in order to discuss the structural BMPs associated with the draft BMP document.

Group A
- Turbidity curtains
- Pipeline pedestals
- Floating pipelines
- Sand dikes

Group B
- Integrated GPS systems/dredge operational controls
- Cofferdams/sheet piling
- Horizontal directional drilling

Group C
- Manatee signage/observer
- Marine turtle deflectors
- Marine turtle trawling
- Floating tow lines

A summary of each of the groups are included in Section 2 of these Proceedings.

1.5.2 Managerial BMPs

After the structural BMPs discussion, groups reorganized to discuss the managerial BMPs.

Group A
- Design/siting/minimization and avoidance
- Surveying
- Sand quality and borrow area siting

Group B
- Mitigation
- Artificial reefs
- Buffer zones
- Pipeline corridors
- Vessel ingress/egress corridors

Group C
- Water quality monitoring
- Biological monitoring
- Personnel qualifications

Group D
- Construction windows
- Adaptive management
- Ecosystem management

A summary of each of the groups comments are included in Section 2.0 of these Proceedings.

After discussions regarding managerial BMPs were complete, participants summarized the comments and suggestions mentioned during the breakout sessions and shared their findings with other groups. Perhaps the strongest message resulting from the breakout sessions was concern regarding a lack of compliance and enforcement. BMP's and permit conditions are required during coastal construction and stakeholders expressed concern regarding the enforcement of permit conditions and BMPs.

2.0 WORKSHOP RESULTS AND CONCLUSIONS

2.1 Workshop Participant Recommendations/Suggestions

Throughout the morning sessions workshop participants offered several recommendations/ suggestions regarding beach restoration and nourishment, stormwater outfalls, water quality, and adaptive management. The following is a summary of their comments:

Beach Restoration/Nourishment: The quality of beach fill material was identified as an essential consideration in the design of beach restoration/nourishment projects. A high percentage of fine (very small grain material) material in the fill material can elevate turbidity and has the potential to cause adverse impacts to nearshore resources. Stakeholders expressed concerns regarding the definition of fines. However, several classification systems exist and the Wentworth Classification or Unified Soils Classification systems are most commonly used in coastal engineering to describe the grain size characteristics of beach fill material. In the Unified Soils Classification system, fine sand is defined as particles between 0.074 mm and 0.42 mm.

There was a recommendation regarding the development of a BMP for sand quality for beach projects. It was noted that the FDEP has developed a 'sand rule' for beach projects (62B-41.007 (2)(j) and (k) Florida Administrative Code) that defines the limit of fines contained within beach nourishment material. The rule also requires submittal of a Sediment QA/QC plan for review and approval by the Department. The QA/QC plan is meant to have the applicant provide procedures and contingencies to be followed to ensure that the material placed on the beach meets the criteria put forth in the rules.

Stormwater Outfalls: Concerns were voiced regarding stormwater outfall pipes as a direct source of pollution and a direct cause of beach erosion that accelerates the need for beach nourishment. Stormwater run-off was also identified as a factor in the degradation of water quality. There was a recommendation that a planning process be developed to address stormwater directly affecting discharge to the coastal zone. The main issues and concerns raised associated with these outfall pipes are related to the operation of the structures and not the construction of the outfall structures. Therefore, it was recommended that these issues could possibly be addressed through a future SEFCRI project that addresses operational issues.

Water Quality: Concern was expressed regarding the 29 NTU maximum allowable level of turbidity above background levels at the edge of a 150 meter mixing zone typically associated with beach restoration and nourishment projects. Some participants suggest the level of turbidity above background should be further limited within the SEFCRI region to provide a greater level of resource protection. However, such a change would require rule revision and other participants cautioned that the

process for rule change also allows those seeking greater flexibility in the rules to participate.

Adaptive Management: A question from the floor generated discussion on the viability of adaptive management criteria during the construction operation, specifically related to complications in interpreting real-time data. This issue raises the question of how to pre-determine adaptive management criteria to allow for appropriate field decisions to be made.

2.2 Breakout Session A– Structural BMPs

The following comments were provided by workshop participants during this breakout session.

Group A

Turbidity Curtains

- Effective in inland waters but not practical for offshore application due to wave and tidal influences.
- Need to add contingency for removal.
- Turbidity curtains should not be used as the primary means to control turbidity during coastal construction projects.
- Schedule daily inspections of turbidity curtain (regular operation and maintenance as well as wildlife entanglement).
- Maintain turbidity curtain one foot off of seafloor, if applicable.
- In addition to specifying vertical distance off seafloor (when applicable), add horizontal buffer of 25' from protected resource.
- May be used for flow diversion applications. Take caution not to cause adverse impacts to resources being protected.
- Sediment quality as it relates to curtain permeability Those turbidity curtains that are designed to allow water to flow through the curtains should be compared to the level of fine material in the construction sediment to ensure the curtains will hold back turbidity (i.e. very fine material) while allowing some level of water to flow through the curtain.

Pipeline Pedestals

- The application of pipeline pedestals is better than nothing; however, they need improved engineering and stability.
- Installment of buoy corridor for visual guidance to vessel operator during pipeline deployment.
- Making pipeline connections and deploying long segments is less destructive to resources than attempting to connect and deploy shorter segments.
- Pedestals are deployed and removed attached to the pipeline and are set at variable intervals along pipeline, no less than every 50 feet.
- Pedestal technology is a good candidate for innovation. Incentives should be established for contractors who want to design and implement novel alternatives to pipeline pedestals.

- The quantification and mitigation of pipeline impacts to reef resources needs further development and attention.

Floating Pipelines

- Restrictions on length of pipe.
- Rubber floating line is available at approximately $1000/foot.
- Boater and navigational safety need to be considered.
- Contingency plans cannot be effectively implemented because adjustment to the pipeline is time consuming.
- Installment of buoy corridor for visual guidance to vessel operator during pipeline deployment.
- Not feasible in offshore environments but useful for inland waterway work.

Sand Dikes

- Length of sand dike is controlled by water quality requirements.
- Sand dikes will likely be used regardless of whether or not they are required because they provide substantial benefits to the contractor by maximizing the amount of sand retained on the beach.
- If sand is not of optimal quality, a sand dike may not be utilized.
- Sand dikes are not only used to control water quality but also to maximize and control sand placement.
- Stakes are set every 100 ft for measurement/control of beach template geometry/volumes.
- In sensitive areas, daily surveys of the nearshore environment should be taken to determine adjustment of dike length.
- Employment of sand dike is contingent upon character of material and ability to control turbidity.
- In the case of beach placement of channel maintenance dredging material, the contractor is paid based on the volume of material removed from the channel, not the volume placed on the beach. In this case, the requirement of sand dikes should be specified.

Group B

Integrated GPS Systems/Dredge Operational Controls

- Resource protection is a reasonable assurance when using these systems.
- To monitor special data relative to dredge position, cutterhead location, etc.
- These systems can be used for tracking and release detection of materials.

Cofferdam/Sheet Piling

- Important to note that cofferdams/sheet piling are *temporary* structures used to exclude water and/or sediment from an area that is normally submerged.
- They have limited application.
- Pump outs require turbidity and environmental inspections.

Horizontal Directional Drilling (HDD)

- Limitations on distances over which HDD can be achieved.
- Should request clear information on total impacts such as intermediate receiving pits that may impact resources.
- The use of rhodamine dye to assist tracing "frac-outs" during monitoring.
- Monitoring is critical.
- Need a better indicator of a "frac-out" than pressure monitoring alone.
- Use of divers to look for "frac-outs".
- Tunneling may be a better alternative BMP than HDD due to potential reduction in turbidity.

Group C

Manatee Signage/Observer

- Training of personnel on awareness of regulated/sensitive resources (e.g. coral reef resources, turtles, manatees, etc).
- Certification is necessary for manatee observation associated with coastal construction projects.
- Need to impose limits on observer shift lengths.
- Observers should be required on all operating dredges.

Marine Turtle Deflector

- Decrease flow velocity within draghead when draghead comes off seafloor.
- Clearing of the draghead and pump should occur at or above keel depth.

Marine Turtle Trawling

- Add GPS to trawler.
- Marine turtle trawling should occur only within a beach nourishment borrow area.
- Currently, turtle trawling is not used in the SEFCRI region.
- Important to release turtles in a similar depth and habitat.
- No turtle trawling on hardbottom communities.
- During turtle nesting season, require trawling before hopper dredge activity to prevent turtle mortality.

Floating Tow Lines

- The purpose is to ensure excess line is off the seafloor but this may be achievable by other means, such as mid water buoy.

2.3 Breakout Session B – Managerial BMPs

The following comments were provided by workshop participants during this breakout session.

Group A

Design/Siting/Minimization and Avoidance

- Recreation impacts (fishing, propeller contact, anchoring, etc.) are often greater than construction impacts.
- How much avoidance is appropriate? How much is feasible?
- There needs to be formal negotiation and coordination between agencies early in the process. There are conflicts between agencies and protection of resources.
- A project designer with increased knowledge of construction equipment can better design to avoid resource impacts.
- Stakeholders should try to learn the "value" of the project from each perspective (environmental, social, economic, etc.) in an effort to understand the need for a project.
- Re-emphasis of technical aspects of construction.
- Resident engineer of project.
- Greater upfront cost in planning and engineering will offset backend environmental impacts.

Surveying

- The latest technology, such as acoustic mapping, should be utilized for design whenever possible.
- Monitoring requiring large budgets are more applicable for large scale rather than small-scale projects.
- LIDAR (Light Detection and Ranging) remote sensing technology.
- Understanding accuracy of data is important and the appropriate level of expertise should be used both in obtaining field data and using that data in the design process.
- Good global tools.
- Follow surveys with field (ground truthing) bathymetry.
- The more resources present in the proposed project area the greater the resolution and extent of the survey that should be done when assessing the resources.
- Allows for excellent decision-making.
- There is a significant difference in survey needs between planning and design.

Sand Quality and Borrow Area Siting

- Access and operational constraints.
- Turbidity due to crushing of material.
- Understand equipment and its use in the site selection and design components of a project.
- The longer that material is worked through the equipment processes, the more broken down it can become, resulting in higher turbidity and less durability.

- Durability should be a consideration in material selection.
- Local ordinances can be adopted at a local level to define requirements of sand quality. For example, Okaloosa County has a higher standard for the color of sand for beach nourishment within the county than that defined by the State.
- In addition to a mixing zone, a timeframe for elevated turbidity/siltation may also be required.

Group B

Mitigation

- On-site and in-kind definitions were added to the BMP plates by one of the members during the commenting period. These definitions were inconsistent with the understanding of the group. The group requested these definitions be revised prior to the next round of comments.
- Expand upon the definition of mitigation. There are different types of coral mitigation (e.g. habitat replication, transplant, etc).
- Mitigation does not look at connectivity of reefs.
- Acknowledge feasibility issues (in-kind) in replication of habitat.
- Structure/function of habitat impacted vs. habitat replaced. Project specific evaluation of functionality is necessary.
- Monitoring to determine success of mitigation.
- Mitigation determination methods/time lag/quantities (UMAM and HEA).

Artificial Reefs

- When defining mitigation, include multiple purposes (e.g. coral impacts, creation of habitat for recreation, etc).
- In addition to the importance of material selection, add the importance of geometry, relief, stability, and seafloor structure for placement of artificial reefs (e.g. sandy bottom vs. hardbottom covered by thin veneer of sand, etc).
- Monitoring for reef success.

Buffer Zones

- Minimum distance (500 ft was proposed) for borrow area buffer zone when adjacent to corals/hardbottom communities.
- Must factor in typical current conditions vs. turbidity generated.
- Mark limits of corridors with buoys to guide vessel operators. Buoys should be lighted if 24 hour operation.
- Mark reef edges for vessel operator guidance. Buoys should be lighted if 24 hour operation.

Pipeline Corridors

- Mark pipeline corridor with buoys (prior to placement) to guide vessel operators during pipeline deployment.
- Avoid corals/hardbottoms to the maximum extent possible.
- Add monitoring of pipeline: pre-deployment, during project, and post project.

- Pre-deployment monitoring: assess corridor for existing resources and relocate corals to the extent possible. Relocate corals greater than 10cm in diameter. Those corals too large to relocate should be marked for avoidance.
- During project monitoring: monitor for pipeline movement and leakage at a frequency to be determined on a project specific basis.
- Post project monitoring: as soon as the pipeline is removed, monitor the corridor, repair any damaged corals as soon as possible and document impacts, if any.
- Remove pipeline from corridor as soon as possible after completion of sand pumping.

Vessel Ingress/Egress Corridors

- Define areas of survey.
- Vessel specifications (fully loaded draft, LOA, beam, turning radius, etc) would be needed up front if tight tolerances on the corridor are likely.
- Consideration of tides.
- Recommend plenty of buffer/room for error built into corridor limits.

Group C

Water Quality Monitoring

- Include larger list of environmental contaminants that are introduced into nearshore environments as a result of coastal construction projects (Table 62-302 in Florida Statutes).
- Water quality monitoring also typically includes: QA/QC protocol, detailed description of activities occurring in the vicinity, light attenuation, availability of raw data.
- Use hydrological modeling and current flow data to assure water sampling for turbidity is occurring in the densest portion of the plume.
- Clearly state the two concepts associated with water quality monitoring plans: state water quality certificate and resource protection.
- Require comparison of background monitoring to average, pre-dredging water quality data for site.
- Recommend a new FDEP rule to protect hardbottom communities (i.e. 15 NTU turbidity standard in close proximity and down-current of dredge and fill projects).

Biological Monitoring

- The overall goal of biological monitoring is to document before and after project conditions.
- Biological monitoring typically includes: 1) availability of data from previous studies, 2) interpretation of results, 3) control/reference sites, 4) detailed description of projects occurring in the vicinity, 5) baseline survey (should be conducted under similar methodologies as during/post project monitoring), and 6) QA/QC protocol.
- Level of detail for biological monitoring plan should be equivalent to the anticipated environmental impact.

- Possibility of separate BMP for physical monitoring. It should include statements that waves, currents, sedimentation, erosion, etc. be monitored. This data could be used for environmental monitoring as well as engineering purposes. Sedimentation on hardbottom communities should be measured with sub-millimeter resolution (preferably in real time) and geostatistically interpolated to give acceptable confidence levels between measurement stations.
- Biological monitoring plan should consist of: 1) identify purpose/threats/areas of concern, 2) document the background condition, 3) detailed data collection and analysis procedures, 4) state anticipated outcomes with "success", "acceptance" criteria, 5) peer and independent review, and 6) provide references of typical methods for different habitats.

Personnel Qualifications

- The BMP needs to be more general.
- All personnel involved in the monitoring plan must be trained and skilled with the tasks to be conducted, specifically the people involved in the data collection.
- Ask for past activities of personnel as indicators of level of experience.
- If resources are present in the project area, use a 3rd party independent for monitoring.
- Conflict of interest issues should be minimized.
- Person approved should train those actually doing the data collection/field work.
- Requirement of marine sensitivity training for SEFCRI project area.

Group D

Construction Windows

- Create a table with relevant corals and spawning times.
- Coral bleaching needs to be included in construction windows table.
- Within SEFCRI region, different localities have "concerns" with different coastal organisms (i.e. Broward – manatees; Martin – plovers).
- Animals that are less of a concern in a particular area could be dealt with by monitoring, rather than by construction window requirements. Not all areas (counties, towns etc…) will require the same construction windows, but they are something everyone should be aware of and restrictions due to these activities should be considered on a case-by-case basis.

Adaptive Management

- This management technique when applied to coastal projects must have flexibility and communication as two key components.
- Monitoring plan must be designed with flexibility built in.
- Adaptive management allows us to apply lessons learned from previous projects.
- Adaptive management gives us the ability to change or alter a project.
- If adaptive management is modification to permit conditions "on the fly" it may do more harm than good. Permit condition changes are most likely for the benefit of the contractor, not the resource. Care must be taken so that resources come first.

Ecosystem Management

- This concept should be incorporated into the document itself and not necessarily be a BMP.
- The goal of Ecosystem Management is sustainability and it understands that biological communities are not static, but always dynamic.
- Biological, social, economic and human elements all taken together make up an ecosystem and should be elements of management.
- In the SEFCRI region for example we would include the uplands (largely modified), mangrove, estuarine, and coral reef communities to be part of the ecosystem.
- This is a broad management approach.
- It must take into consideration the land use – resource; management – partnering.
- The way to get people to understand they are part of an ecosystem and affect an ecosystem is through education and awareness.

APPENDIX 1 –WORKSHOP AGENDA

Development of Best Management Practices (BMPs) for Construction, Dredge and Fill and Other Activities Adjacent to Coral Reefs

A Maritime Industry and Coastal Construction Impacts (MICCI) Project of the Southeast Florida Coral Reef Initiative (SEFCRI)

8:30am – 5:30pm, July 16, 2007

International Game Fish Association (IGFA)
300 Gulf Stream Way, Dania, Florida 33004

THIS MEETING IS OPEN TO THE PUBLIC

AGENDA

8:00-8:30am Registration

8:30-8:50am Welcome, Introductions, Goals and Objectives

- Meeting Facilitator, PBS&J,
  - Welcome
  - Housekeeping: guidelines for participation and comment
- Chantal Collier, Florida Department of Environmental Protection,
  - Brief introduction of the SEFCRI
  - Issues, goals and objectives of the MICCI Team
- Ken Jones, PBS&J
  - Objective and goal of the workshop and draft BMP document
  - Overview layout of document

8:50-9:50am Session 1 - Review of:

- Historical overview of coastal construction practices in southeast Florida.
- Coastal construction impacts to resources (turbidity, sedimentation, direct contact, pollution, etc.)
- Descriptions of types of coastal construction activities occurring in southeast Florida (i.e. dredging, coastal and nearshore construction, infrastructure installation, beach restoration/nourishment, shoreline stabilization, blasting).
- Objectives of these coastal construction activities (i.e. accommodate population migration to the coasts, shoreline stabilization, infrastructure development).
- Pros and cons of selected coastal construction projects.

9:50-10:20am Session 2 – Review of permitting process

- Authority for construction, management and maintenance of various types of coastal projects (governmental organizations or private entities).
- Coastal Zone Management regulations/issues
- Permits for coastal construction activities
  - Federal (NEPA EIS or EA, Dredge & Fill permit)
  - State (JCP, NTP (prematurely complete), ERP, CCCL)
  - County/Local
- Permitting of Experimental Projects

10:20-10:40 Break

10:40-11:10am Session 3 - Review of MICCI Project 3

- Review of MICCI Project 3 Innovative Workshop Results/Recommendations
- Highlight innovative/emerging technologies identified during MICCI 3 Project
- Highlight additional innovative/emerging technologies geared toward resource protection/coastal construction/shoreline protection.
- Identification of cost incorporation of emerging technologies into regional beach nourishment, erosion control, inlet management and infrastructure placement programs.

11:10-12:10am Session 4 - Review of MICCI Project 6 draft document:

- Definition of what a BMP is and is not.
- Other BMP manuals/guidelines
- Overview of Managerial and Structural BMPs
  - Managerial BMPs
  - Structural BMPs

12:15-1:15 Lunch (on your own)

Breakout Sessions

1:15-2:30 Breakout Session A – Structural BMPs

Gather/Verify completeness of information

- Turbidity Curtains
- Pipeline Collars/Floating Pipelines
- Sand Dike (Beach Placement)
- Integrated GPS Systems/ Dredge Operational Controls
- Cofferdam/Sheet Piling
- Horizontal Directional Drilling
- Manatee Signage/Observer
- Marine Turtle Deflectors/ Marine Turtle Trawling
- Floating Tow Lines

2:30-2:45 pm Break

2:45-4:00 Breakout Session B – Managerial BMPs

Gather/Verify completeness of information

- Design/Siting/Minimization and Avoidance
- Surveying (traditional, LIDAR, resource mapping, etc.)
- Borrow Area Siting
- Sand quality/Sand sources (upland mine, alternative sources, recycled glass, alternative resources)
- Mitigation
- Artificial Reef (materials)
- Buffer Zones
- Pipeline Corridors
- Vessel Ingress/Egress Corridors
- Water Quality Monitoring Plan
- Biological Monitoring Plan (pre, during and post construction)
- Personnel Qualifications
- Construction Windows (coral reproduction seasons, marine turtle nesting season, shorebird nesting seasons, etc.)
- Adaptive Management
- Ecosystem Management

4:00-5:00 pm Session 5 - Summary of components of breakout session and compilation of identified needs or shortcomings.

- Review of comments, suggestions and identified shortcomings from breakout sessions
- Review of BMPs identified in breakout sessions not included in the Draft.
- Recommendations for development of new BMPs to address issues not covered by existing BMPs.

5:00-5:30 pm Final Comments and Adjourn

Note: Please send any additional comments to Martha Robbart by email mrobbart@pbsj.com; or fax: (305) 594-9574 by July 31, 2007.

APPENDIX 2 – WORKSHOP PARTICIPANTS

List of Workshop Participants

Name	Affiliation
Sam Purkis	NCRI
Nick Gadbois	FDEP
Meredith Gibboney	FDEP
Kelly Voloshin	USACE
Bud Howard	Taylor Engineering
Wendy Wood	NCRI
Chris Creed	Olsen Associates
Bill Hanson	Great Lakes Dredge and Dock
Bryan Lanois	FDEP/BBAP
Jessica Craft	CPE
Kim Colstad	Coastal Tech
Alison Moulding	NCRI/NSU
Lou Fisher	Broward EPD
Lakhdar Boukerrou	FAU
Sharon Niemczyk	Tetra Tech
Kelly Egan	NOVA
Pamela Sweeney	FDEP/BBAP
Jules Craynock	NOAA/AOML
Leslye Waugh	DEP/ERP
Julie Krawczyk	EPD/BRD
Sara Thanner	DERM
Jocelyn Karazsia	NOAA Fisheries
Sam Morrison	Great Lakes Dredge and Dock
Dick Dodge	NCRI/NSU
Ulf Erlingsson	Lindorm Inc.
Audra Livergood	NOAA/NMFS
Dona Kendall	FDEP
Marsha Colbert	BBAP/FDEP
Brie Cokos	Coastal Systems International
Rob Ruzicka	FDEP/CRCP
Stephanie Clark	Cry of the Water
Dan Clark	Cry of the Water
TJ Marshall	SurfRider
Kathy Fitzpatrick	Martin County
Steve Blair	Miami-Dade DERM
Cindy Lewis	FWC
Phill Bates	USACE
Virginia Barker	Brevard County
David Cox	RSMAS
Adam Nardelli	NCRI
Leanne Welch	Palm Beach Co. ERM
Erin McDevitt	FWC
Mary Truglio	FWC
George Cauns	
Lesley Bertolotti	Tetra Tech
Michael Laas	SurfRider

APPENDIX 3 - ANONYMOUS COMMENT

DEVELOPMENT OF BEST MANAGEMENT PRACTICES (BMPs) FOR CONSTRUCTION, DREDGE AND FILL AND OTHER ACTIVITIES ADJACENT TO CORAL REEFS

Anonymous Comments

- Marine resource sensitivity training for contractors
- **Turbidity barriers** – their use on coastal zones exposed to natural ocean conditions is not practical due to wave and tidal influences. Have turbidity curtains been used in conjunction with sand dikes, which create a more protected and stable water body?
- **Floating pipeline and pedestals** – the quantification and mitigation of pipeline impacts to reefs needs further development and attention. Incentives should be established for contractors who want to design, constrict, and implement novel alternatives to pedestals.
- **Sand dikes** – the type and quality of sand used for a dike should have a stronger influence in the design and decision to use a sand dike.
- Include limits to T/E observer shift lengths.
- Require T/E observers on ALL dredges.
- In turtle nesting season, require trawl netting before hopper dredge to minimize turtle mortality.
- **Surveying**: The BMP might mention not just LIDAR for resource mapping, but also the traditional and time-proven acoustic methods of echo-sounding (including multi-beam, sub-bottom, and the newer technology of 3D that is used by the oil industry), and side scan sonar. Each of these has unique advantages. Acoustic methods can also make use of different frequencies in order to vary the resolution, and for sediment classification purposes.
- **Sand Quality and Borrow Area Siting**: An application for permit ought to indicate in an EIA what the impacts at or near the borrow area might be in terms of sediment dynamics and biota, after removing the sand. Questions to answer are: 1) how much time until the sand area has returned to a normal biotope? 2) will that biotope differ from the preexisting one? and 3) will there be any changes to sediment transport, to bottom chemistry, to wave climate, to currents? It should be remembered that soft-bottom biotopes are part of the overall coastal ecosystem.
- **Sand Quality and Borrow Area Siting**:
  When the borrow site is more than 10 miles from the beach placement area a hopper dredge will most likely be the most economical way to perform the shore protection project.
  1) The borrow site should be in 40 to 60 feet of water. If the borrow site is too shallow, the dredge will run aground before it is full of sand. The dredge then has to light the load, which reduces the dredge's productivity.
  2) The borrow site should be 2 square miles with flat sides to minimize the number of turns the dredge has to make to get a load of sand.
  A) Large and wide borrow sites allow the dredge to move in any direction (which minimizes the creation of trenches). Trenches

cause the draghead to tack away or under the dredge causing the drag tender to have to raise the draghead off the bottom and reset it next to the dredge. The more times the draghead is raised and lowered, the greater the odds of taking a turtle and the less productive the dredging operation.

B) Large and wide borrow sites reduce crabbing by allowing the dredge to move into variable currents/winds. Crabbing occurs when the dredge has to steer across a current or the wind, causing the dredge to move sideways. Crabbing requires the drag tender to raise the draghead off the bottom more often.

C) Dredging becomes less efficient when the dredge has to turn or raise the draghead off the bottom. The less efficient the dredging, the longer the project takes and the more stress on the coral, sea turtles and other natural resources in the area. The maximum production is obtained when a hopper dredge shortens its cycle time (time the dredge takes to dig a full load, sail to the beach and pump the sand out and return to the dredge site).

3) The borrow site should have more sand than needed to complete the project. A hopper dredge does not dig corners well so sand in the corners of the borrow site can not be dug efficiently with a hopper dredge. Hopper dredges like to dredge flat, thin, long layers of sand.

A) Stepping the bottom of a borrow site may cause the hopper dredge to have to raise and lower the draghead. This reduces productivity and sand in the corners and sides of each step can not be dug efficiently with a hopper dredge.

4) Dredging is expensive so spending more money in the location and design of a borrow site is paid back in reduced dredging cost. Costly dredging delays due to sea turtle takes or coral impacts can be reduced by proper borrow site location and design.

5) There are many limitations to borrow site location and design but the above criteria should be part of the Best Management Practice to protect coral and sea turtles by maximizing dredging production and reducing project cost.

- **Mitigation**: The goal of mitigation should be to make sure that the overall function of the ecosystem remains unchanged. I seem to recall that the meeting replaced "hardbottom and corals" with something like 'sensitive bottoms'. What I propose is to go all the way and replace it with **'ecosytem'**, to cover not just what we know now to be important, but also what we may learn in the future.
- **Water Quality**
  - Use hydrological modeling and current detection to determine densest part of the plume for water quality monitoring.
  - Require comparison of background monitoring to average water quality data (pre-dredging) for site.
  - Make raw data available.
  - Specify how x,y coordinates are represented.
- **Water Quality**: The turbidity monitoring, if I'm not mistaken, exists in order to

document that the maximum NTU value at a defined distance from the spill source does not exceed a certain value. It is my experience that much spill is created near the bottom by the dredger, and if the dredger lifts the material up through the water surface, another cloud is created near the surface. Furthermore, the flow of water in the sea is turbulent, not laminar. The sediment concentration in the cross-section at the defined distance thus varies depending on depth, cross-current coordinate, and time, in a stochastic manner. The turbidity shall, obviously, be measured in a scientifically sound way. This means that the result shall be impossible to influence subjectively by the one doing the measurements. The technology is there. A basic premise is of course randomness, as opposed to cherry-picking the results. Independent auditing is one way of assuring that it has been made scientifically. The auditor must of course have access to all data and field logs. The following statement could improve the BMP: "The plan should show how the applicant plans to demonstrate that the measured values are representative, and how he will determine the uncertainty of the reported result."

- A physical monitoring plan should be included as a BMP. It should include statements that waves, currents be monitored along with sedimentation, erosion, light attenuation, etc. This data shall be used for environmental monitoring as well as engineering purposes. Sedimentation on hardbottoms should be measured with sub-millimeter resolution preferably in real time, and geostatistically interpolated to give acceptable confidence levels between measurement stations.
- There is no BMP that takes an overall view on sediments and sediment transport. At the meeting, I proposed to add a BMP called Physical Monitoring (mentioned above). A better title might, however, be Sedimentological Monitoring, since that is the core of the matter.
- Recommend a new FDEP rule to protect coral/hardbottom (i.e., 15 NTU turbidity standard in close proximity and downcurrent from dredge and fill projects).
- **Biological Monitoring**: It says under 'issues addressed': "Direct Impacts such as burial and indirect impacts such as sedimentation." The word sedimentation can be used to mean 'the accumulation of sediments on the bottom', or 'the settling of sediments in suspension towards the bottom'. None of the 'issues' thus refers to biological effects, which seems at odds with the title of the BMP. I propose a change of wording to make it consistent. As regards the title I propose dropping the word "Plan", since 'best management practice' reasonably ought to address the monitoring activity, and not just the plan for the activity.
- **Personnel Qualifications**: Scientific sampling requires that the result be the same regardless of who does it. If the permit requirements are formulated appropriately, the methods are objective and scientifically sound, and the auditing is working, then it is in the interest of the project owner to make sure that he assigns competent persons for the job. Formal qualification levels should be offered as advice only in my opinion, since one otherwise might discriminate against a person who might be better able to do the job, but for whatever reason lacks formal qualifications.
- **Adaptive management** – if adaptive management is a modification to permit conditions "on the fly", I say no. Permit condition changes are most likely for the

benefit of the dredger not the resource. We must be careful that this does not turn into more changes without comment. Resources must come first.

- Often contractors and applicants will agree to special permit conditions to get a permit, but will then ask for and receive variances and modifications that will void those special permit conditions. We saw this happen with the borrow pits in Broward County Segment III.
- **Ecosystem Management**
    - There are two aquatic preserves contained in the Biscayne Bay Aquatic Preserve: 1) Biscayne Bay (~63K acres) and 2) Biscayne Bay/Cape Florida to Monroe County Line (~4K acres).
    - Biscayne Bay (~63K acres) does not overlap with SEFCRI and contains *H. johnsonii* seagrass.
    - Biscayne Bay/Cape Florida to Monroe County Line (~4K acres) does overlap with SEFCRI (at the tip of Key Biscayne and extends 3 miles offshore) and lacks *H. johnsonii* seagrass.
    - Suggestion: "Two of forty-one aquatic preserves that occur within the SEFCRI region are": 1 and 2 mentioned above. Both aquatic preserves consist of 67,000 acres of submerged land (not all state owned).
- If possible, have a summary email (or post on website) of notes from breakout sessions.
- The morning session was not very useful – i.e, in that the presentation was not developed for the target audience. It seemed that the presentation was developed for high school level audience. Also there was too much emphasis on state FDEP process and not enough on county or federal process.

APPENDIX 4 - FOLLOW UP WORKSHOP CORRESPONDENCE

Ulf Erlingsson
Lindorm, Inc.
601 Plover Avenue
Miami Spring, FL 33166

Date: 2007-07-17
Ref: MICCI 070717

Martha Robbart
PBS&J

Cc: Joanna Walczak, Stephen M. Blair

Comments on "Development of Best Management Practices (BMPs) for Construction, Dredge and Fill and Other Activities Adjacent to Coral Reefs"

The following comments are offered as a complement to the views expressed at yesterday's meeting.

Sedimentological Monitoring: There is no BMP that takes an overall view on sediments and sediment transport. At the meeting I proposed to add a BMP called Physical Monitoring. A better title might, however, be **Sedimentological Monitoring**, since that is the core of the matter. I enclose such a draft BMP, but first some comments about existing BMP proposals.

Surveying: The BMP might mention not just LIDAR for resource mapping, but also the traditional and time-proven acoustic methods of echo-sounding (including multi-beam, sub-bottom, and the newer technology of 3D that is used by the oil industry), and side scan sonar. Each of these has unique advantages. Acoustic methods can also make use of different frequencies in order to vary the resolution, and for sediment classification purposes.

Sand Quality and Borrow Area Siting: An application for permit ought to indicate in an EIA what the impacts at or near the borrow area might be in terms of sediment dynamics and biota, after removing the sand. Questions to answer are, –how long time until the sand area has returned to a normal biotope?, –will that biotope differ from the preexisting one?, and –will there be any changes to sediment transport, to (bottom) chemistry, to wave climate, to currents? It should be remembered that soft-bottom biotopes are part of the overall coastal ecosystem.

Mitigation: The goal of mitigation should be to make sure that *the overall function of the ecosystem remains unchanged.* I seem to recall that the meeting replaced "hardbottom and corals" with something like 'sensitive bottoms'. What I propose is to go all the way and replace it with **'ecosytem'**, to cover not just what we know now to be important, but also what we may learn in the future.

Water Quality: The turbidity monitoring, if I'm not mistaken, exists in order to document that the maximum NTU value at a defined distance from the spill source does not exceed a certain value. It is my experience that much spill is created near the bottom

by the dredger, and if the dredger lifts the material up through the water surface, another cloud is created near the surface. Furthermore, the flow of water in the sea is turbulent, not laminar. The sediment concentration in the cross-section at the defined distance thus varies depending on depth, cross-current coordinate, and time, in a stochastic manner. The turbidity shall, obviously, be measured in a *scientifically* sound way. This means that the result shall be impossible to influence subjectively by the one doing the measurements. The technology is there. A basic premise is of course *randomness*, as opposed to cherry-picking the results. Independent auditing is one way of assuring that it has been made scientifically. The auditor must of course have access to all data and field logs. The following statement could improve the BMP: "The plan should show how the applicant plans to demonstrate that the measured values are representative, and how he will determine the uncertainty of the reported result."

Qualifications: Scientific sampling requires that the result be the same regardless of who does it. If the permit requirements are formulated appropriately, the methods are objective and scientifically sound, and the auditing is working, then it is in the interest of the project owner to make sure that he assigns competent persons for the job. Formal qualification levels should be offered as advice only in my opinion, since one otherwise might discriminate against a person who might be better able to do the job, but who for whatever reason lacks formal qualifications.

Biological Monitoring: It says under 'issues addressed': "Direct Impacts such as burial and indirect impacts such as sedimentation." The word sedimentation can be used to mean 'the accumulation of sediments on the bottom', or 'the settling of sediments in suspension towards the bottom'. None of the 'issues' thus refers to *biological* effects, which seems at odds with the title of the BMP. I propose a change of wording to make it consistent, as indicated in **blue** in the attached revised BMP. Also some other minor changes are proposed. As regards the title I propose dropping the word "Plan", since 'best management *practice'* reasonably ought to address the monitoring *activity*, and not just the *plan* for the activity.

Please find attached my proposal for a revised Biological Monitoring BMP, and a separate Sedimentological Monitoring BMP. If the latter is not adopted, then the Biological Monitoring BMP ought to be edited to clearly distinguish between monitoring the physical *agents* on the one hand, and their biological *effects* on the other.

Feel free to call me for any questions you might have.

Best regards,

Dr. Ulf Erlingsson
Lindorm, Inc.
305 888 0762

* After further conversations with Dr. Erlingsson, the proposed BMP title Sedimentological Monitoring was changed to Siltation Monitoring.

Proposed revised **Biological Monitoring**

Best Management Practices

SUMMARY :

PURPOSE: To **quantify the degree** of biological impacts associated with a coastal construction project.

ENVIRONMENTAL ISSUES ADDRESSED: Direct and indirect biological impacts to the ecosystem caused by physical and or chemical changes to the environment as a result of the project.

DESCRIPTION: Biological monitoring will likely be necessary for any coastal construction project that is conducted in the vicinity of **sensitive ecosystems** or when the constructed project may continue to impact the **ecosystem** after the construction is completed. A biological monitoring plan should be a concise document that can be used as a guideline on how to properly conduct the biological monitoring scheme appropriate for the particular project. Depending on the type of project, certain topics may be included or excluded. All biological monitoring plans should provide a scientifically valid method for monitoring the ecosystem that may be impacted by a particular project. The following subjects may be required in a biological monitoring plan for a beach nourishment project.

- Permanent Biological Monitoring Transects
- Video Transects
- *In situ* Quadrats, Macrobenthic, and Quadrat Photography
- Sediment **Dynamics** [redundant if a Sedimentological Monitoring BMP is added]
- Hardbottom Edge Mapping and Monitoring
- Monitoring Schedule
- Aerial Photography
- Adverse Weather Conditions and Contingency Monitoring Plan
- Deliverables\Reports

APPLICATIONS: Any project with a **potential** impact to **sensitive ecosystems**.

Proposed new **Siltation Monitoring**

Best Management Practices

SUMMARY :

PURPOSE: To monitor the sedimentological effects of a coastal construction project.

ENVIRONMENTAL ISSUES ADDRESSED: Changes in sediment dynamics that negatively impact the ecosystem.

DESCRIPTION: The ecosystem is composed of living organisms, plus the abiotic environment in which they live. Apart from the living organisms, water contains dissolved matter and suspended matter. The suspended matter tends to sink to the bottom and become sediment. Coarse sediment such as sand can be transported along the bottom as bedload, whereas the finer fractions such as mud can be resuspended and transported in suspension by currents. While in suspension they impact the water quality, and attenuate the light. These processes affect dredging spill at borrow sites. Resuspension, as well as bedload transport, can also affect fill material placed on or near a beach, even long after the end of the project. Especially the finer fractions, and the non-clastic material that may be present (known as "loss on ignition"), have a strong potential for causing adverse impacts to offshore communities within a certain reach from the beach. The monitoring should quantify the effects and determine the impact distance.

Sediment monitoring may be designed to detect adverse conditions for the biota already before any serious harm has been done. On-line sediment meters near the work zone can provide real-time feedback about the potential for impact, so that work procedures may be adjusted to minimize negative impacts on the environment (Erlingsson, In prep). Recording sediment meters in a wider zone around the project may be used to document the sediment dynamics before, during, and after the project. Such data may be used for quantifying the environmental impact of the project, and to discriminate between natural and project-induced effects. Geostatistical methods such as kriging can be used to interpolate between measurement stations, and to demonstrate that the station network has sufficient density to monitor the entire area with the desired confidence level.

Changes in sediment transport patterns caused by engineering projects may also result in channel siltation, beach erosion, and other geomorphological effects that can be monitored using real-time or recording sediment meters. The sediment monitoring plan may be integrated with the monitoring of bathymetrical changes in beach replenishment projects, channel dredging projects, and similar.
A sediment monitoring plan should be a concise document that describes the objective of the monitoring, the parameters to monitor, the type of sensors and their resolution, the area to monitor, the spatial resolution of estimates, the target confidence level of estimates, and the statistical and geostatistics methods to be used. If the system will be used for real-time operational control, the criteria for action should be defined. Also incident light, sediment concentration, currents, and waves may be monitored. The following subjects may be included in a sediment monitoring plan for a beach nourishment project.

- Sediment Level
- Near-Bed Sediment Concentration
- Monitoring Schedule
- Analysis, Statistics, Geostatistics
- Organization\Responsibilities
- Quality Control and Verification
- Alert Levels and Contingency Plans
- Deliverables\Reports

APPLICATIONS: Any project where sediments are being moved or otherwise physically disturbed near a sensitive ecosystem, or where projects have the potential of changing the sediment dynamics in the nearshore.

Literature: Thomas, S., and Ridd, P.V., 2004. Review of methods to measure short time scale sediment accumulation. *Marine Geology*, Vol. 207, pp. 95–114.

APPENDIX 5 – SPEAKER PRESENTATIONS

Workshop Presentations

Welcome Presentation

WELCOME!

- Ken Jones, PBS&J Project Manager, Facilitator
- Stacey Roberts, PBS&J Facilitator
- Martha Robbart, PBS&J Facilitator
- Leslie Duncan, PBS&J Facilitator

Housekeeping

Turn off all beepers/cell phones and make/take all calls out of the room.

Be concise.

State problem/no "personalizing".

Don't repeat what has been said.

If you state a problem/give a potential solution

Housekeeping continued

Explain reasons behind a statement.

Agree on meaning of important words.

Disagree respectfully but openly, not in private.

No side conversations, they are distracting to others and disrespectful to the speaker.

Keep tone positive.

Objectives and Goals

- Present BMP draft document
- Review BMPs – Managerial and Structural
- Gather input and incorporate comments and thoughts for final document and recommendations

Agenda

8:50-9:50am Session 1 - Review of:

- Historical overview of coastal construction practices in southeast Florida.
- Coastal construction impacts to resources (turbidity, sedimentation, direct contact, pollution, etc.)
- Descriptions of types of coastal construction activities occurring in southeast Florida (i.e. dredging, coastal and nearshore construction, infrastructure installation, beach restoration/nourishment, shoreline stabilization, blasting).
- Objectives of these coastal construction activities (i.e. accommodate population migration to the coasts, shoreline stabilization, infrastructure development).

Agenda Continued

- **9:50-10:20am Session 2 – Review of permitting**
- Authority for construction, management and maintenance of various types of coastal projects (governmental organizations or private entities).
- Coastal Zone Management regulations/issues
- Permits for coastal construction activities
  - Federal (NEPA EIS or EA, Dredge & Fill permit)
  - State (JCP, NTP (prematurely complete), ERP, CCCL)
  - County/Local (ask reps for local requirements)
- Permitting of Experimental Projects

Agenda Continued

- **10:40-11:10am Session 3 - Review of MICCI Project 3**
- Review of MICCI Project 3 Innovative Workshop Results/Recommendations
- Highlight innovative/emerging technologies identified during MICCI 3 Project
- Highlight additional innovative/emerging technologies geared toward resource protection/coastal construction/shoreline protection.
- Identification of cost incorporation of emerging technologies into regional beach nourishment, erosion control, inlet management and infrastructure placement programs.

Agenda Continued

- **11:10-12:10amSession 4 - Review of MICCI Project 6 draft document:**
- Definition of what a BMP is and is not.
- Other BMP manuals/guidelines
- Overview of Managerial and Structural BMPs
  - Managerial BMPs
  - Structural BMPs
- **12:15-1:15 Lunch (on your own)**

Agenda Breakout A

1:15-2:30 Breakout Session A – Structural BMPs
Gather/Verify completeness of information

Turbidity Curtains

- Pipeline Collars/Floating Pipelines
- Sand Dike (Beach Placement)
- Integrated GPS Systems/ Dredge Operational Controls
- Cofferdam/Sheet Piling/Portadam®
- Horizontal Directional Drilling
- Manatee Signage/Observer
- Marine Turtle Deflectors/ Marine Turtle Trawling
- Floating Tow Lines

Agenda Breakout B

2:30-2:45 pm Break

2:45-4:00 Breakout Session B – Managerial BMPs

- **Gather/Verify completeness of information**
- Design/Siting/Minimization and Avoidance
- Surveying (traditional, LIDAR, resource mapping, etc.)
- Borrow Area Siting
- Sand quality/Sand sources (upland mine, alternative sources, recycled glass, alternative resources)
- Mitigation
- Artificial Reef (materials)
- Buffer Zones
- Pipeline Corridors

Agenda Breakout B

- Vessel Ingress/Egress Corridors
- Water Quality Monitoring Plan
- Biological Monitoring Plan (pre, during and post construction)
- Personnel Qualifications
- Construction Windows (coral reproduction seasons, marine turtle nesting season, shorebird nesting seasons, etc.)
- Adaptive Management
- Ecosystem Management

Agenda – Final Summary

4:00-5:00 pm Session 5 – Summary of components of breakout session and:

- **compilation of identified needs or shortcomings.**
- Review of comments, suggestions and identified shortcomings from breakout sessions
- Review of BMPs identified in breakout sessions not included in the Draft.
- Recommendations for development of new BMPs to address issues not covered by existing BMPs.

5:00-5:30 pm Final Comments and Adjourn


BMP document outline
1.0 Introduction
2.0 Coastal Construction
3.0 Summary of MICCI Project 3 Innovative Technologies Workshop
4.0 Permits for Coastal Construction Activities
5.0 Implementation of Innovative Technologies for Coastal Construction


6.0 Managerial BMPs for Coastal Construction
7.0 Structural BMPs for Coastal Construction
8.0 BMP Summary Plates
9.0 Additional Readings and Other Sources of Information
10.0 References

SEFCRI Introduction

Southeast Florida Coral Reef Initiative

Development of Best Management Practices (BMPs)
for Coastal Construction, Dredge and Fill,
and Other Activities Adjacent to Coral Reefs
July 16, 2007

Chantal Collier
Coral Reef Program Manager
Office of Coastal and Aquatic Managed Areas

Southeast Florida Coral Reef Initiative (SEFCRI)

Facts

- Florida's coral reefs formed over 5000 years ago.
- Coral reefs provide shelter, food and breeding sites for a diverse assortment of marine life, including many Florida game fish species.
- Reefs protect our shorelines from tropical storms and erosion.
- Southeast Florida's reefs contribute $6 billion in sales and income and 61,000 jobs to our local economy each year.
- Coral cover on many of Florida's reefs has declined.
- Impacts from human activities, diminished water quality, increased coral disease and bleaching threaten the long-term survival of our reefs.

Southeast Florida Coral Reef Initiative (SEFCRI)

- identifies *key threats* to the coral reef resources of southeast Florida and *priority actions* needed to reduce those threats
- a locally developed and driven roadmap for collaborative and cooperative action among federal, state, local and non-governmental partners
- developed with guidance from the U.S. Coral Reef Task Force and in tandem with local action strategies in Hawaii, Guam, American Samoa, CNMI, USVI and Puerto Rico, through a facilitated process including public review and input
- linked to the goals and objectives of the U.S. Coral Reef Task Force's National Action Plan

Southeast Florida Coral Reef Initiative (SEFCRI)

Southeast Florida (including Miami-Dade, Broward, Palm Beach and Martin Counties) was chosen because it contains reef ecosystems that:

- are extensive
- are close to shore
- co-exist with an intensely-developed coastline
- lacked a coordinated public education and management plan

Southeast Florida Coral Reef Initiative (SEFCRI)

140 LAS projects targeting 4 focus areas of concern:

- Awareness and appreciation
- Land-based sources of pollution
- Fishing, diving, and other uses
- Maritime industry and coastal construction impacts




Maritime Industry & Coastal Construction Impacts (MICCI)

Issue 1: Coral systems in southeast Florida are threatened by projects and activities such as anchoring, vessel groundings infrastructure installation, beach nourishment and dredge and fill operations.

Goal: Protect coral systems from impacts associated with projects and activities in and around the reef tracts of southeast Florida.

Objective 2: Avoid and minimize impacts on coral reef ecosystems.

Project 6: Develop BMP's for coastal construction, dredge and fill and other activities around coral reefs.

Southeast Florida Coral Reef Initiative (SEFCRI)

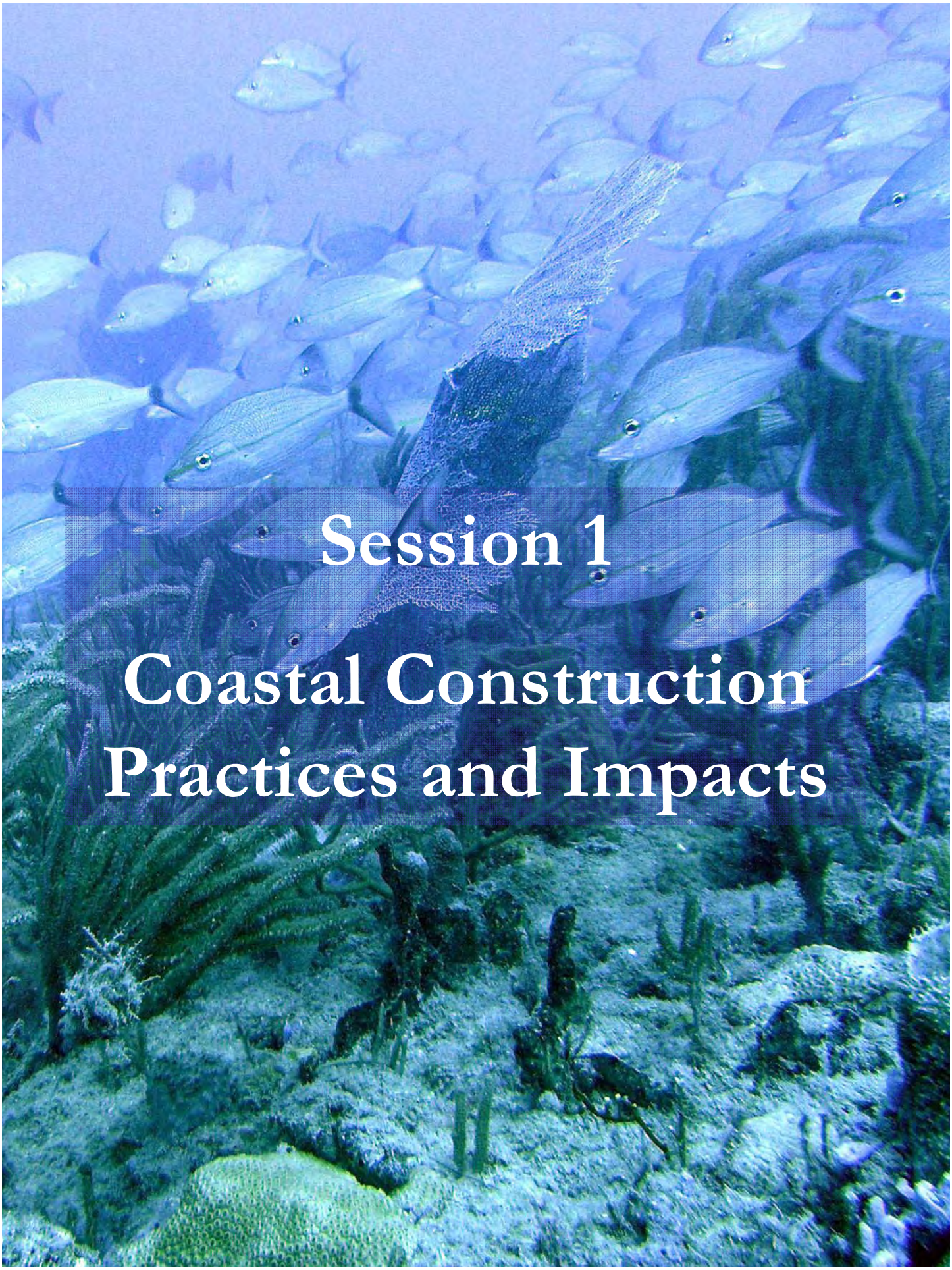
The FDEP Coral Reef Conservation Program recognizes and thanks the growing group of stakeholders and partners who have contributed their time, expertise support and in-kind resources to the development and implementation of the Southeast Florida Coral Reef Initiative.

Biscayne National Park
Broward County
Broward Audubon Society
Coastal Eco Group
Coastal Planning & Engineering
Coastal Systems International
College of Charleston
Cry of the Water
Dive Equipment Manufacturers Association
Environmental Defense
Florida Fish and Wildlife Conservation Commission
Florida Department of Environmental Protection
Florida International University
Florida Outdoor Writers Association
Florida Sea Grant
Florida Sportsman Magazine
Florida Keys National Marine Sanctuary
Greater Fort Lauderdale Diving Association
Harbor Branch Oceanographic Institute
International Game Fish Association
Lighthouse Point Saltwater Sportsman Association
Lithophyte Research
Marine Industries Association of Florida
Martin County
McMaster University
Miami-Dade County
National Coral Reef Institute/Nova Southeastern University
National Oceanic & Atmospheric Administration
Ocean Engineering
Ocean Watch Foundation
PADI Project Aware
Palm Beach County
Port Everglades
Port of Miami
Port of Palm Beach
Reef Environmental Education Foundation
Smithsonian Institute Marine Station
South Florida Diving Headquarters
South Florida Water Management District
Surfrider Foundation
Tetra Tech
The Nature Conservancy
The Ocean Conservancy
Tropical Audubon Society
University of Florida
University of Georgia
University of Miami
University of North Carolina, Wilmington
University of South Florida
U.S. Army Corps of Engineers
U.S. Coast Guard
U.S. Department of Agriculture
U.S. Environmental Protection Agency
U.S. Geological Survey
Vone Research

Thank You

For more information on SEFCRI, including the complete Local Action Strategy visit:
www.dep.state.fl.us/coastal/programs/coral/
or:
www.southeastfloridareefs.net

Or contact:
Chantal Collier
FDEP/Office of Coastal & Aquatic Managed Areas
Coral Reef Conservation Program
Biscayne Bay Environmental Center
1277 NE 79th Street Causeway
Miami, FL 33138
Phone: 305-795-1208
Email: Chantal.Collier@dep.state.fl.us



Session 1

Coastal Construction Practices and Impacts

Development of Best Management Practices (BMPs) for Construction, Dredge and Fill and Other Activities Adjacent to Coral Reefs

Session 1

- Historical overview of coastal construction practices in southeast Florida.
- Coastal construction impacts to resources (turbidity, sedimentation, direct contact, pollution, etc.)
- Descriptions of types of coastal construction activities occurring in southeast Florida (i.e. dredging, coastal and nearshore construction, infrastructure installation, beach restoration/nourishment, shoreline stabilization, blasting).
- Objectives of these coastal construction activities (i.e. accommodate population migration to the coasts, shoreline stabilization, infrastructure development).

Historical Overview of Coastal Construction Practices in Southeast Florida

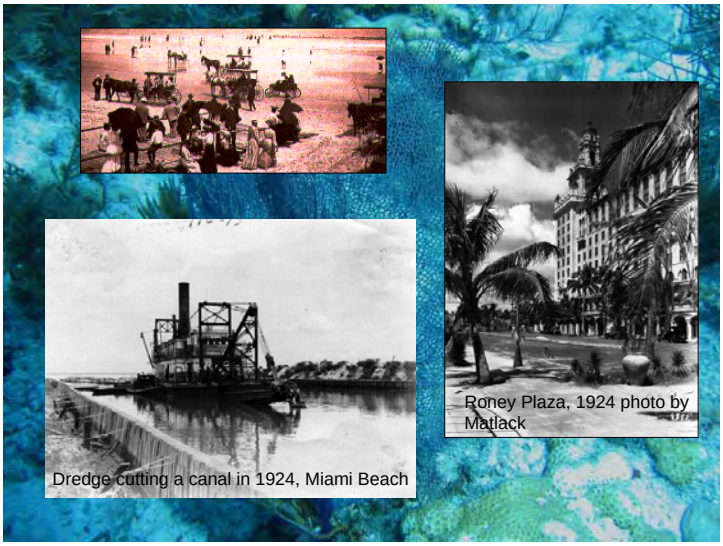
Early Florida

- Pleasant climate attracted initial settlement
- Long winding wild rivers, Hillsboro, New River
- beautiful shallow lake where wealthy could escape cold winters (Lake Worth)
- plentiful fish including tarpon, bluefish, pompano, sea trout, barracuda and more (Florida Handbook 1890, Charles Norton)

New River, 1890 photo by Ralph Munroe

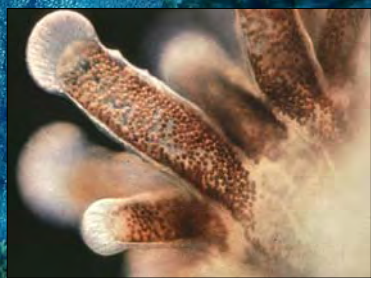
Early Development

- 1894 Florida East Coast Railway (FECR) reaches West Palm Beach
- 1896 FECR reaches Miami
- Resulted in economical and efficient means of transportation of goods and people
- FECR contributed substantially to subsequent boom in construction and development
- Early part of 20th century saw the hardening of east coast ports



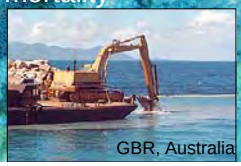
Coastal Construction Impacts to Coral reefs and hardbottom communities

- Turbidity
- Sedimentation
- Direct contact
- Pollution



Turbidity

- Measure of water clarity and particle reflectance in the water column (NTU - nephelometric turbidity units)
- Light needed for photosynthesis which is necessary for normal function of corals, soft corals, sponges, other invertebrates
- If prolonged may result in:decreased growth rates, decreased reproduction, mortality

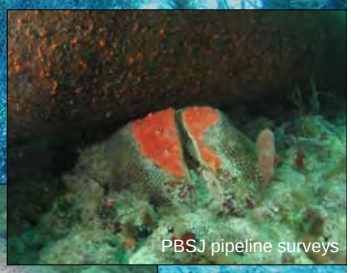


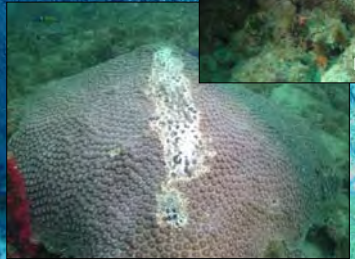
Sedimentation

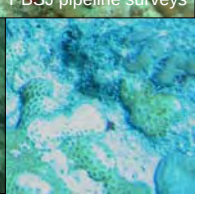
- The settling of sediments on corals or other organisms on the hardbottom
- Corals have some ability to remove sediments with mucus
- If short lived: decreases coral growth, reproductive capacity
- If prolonged: mortality

Direct Contact

- Abrade
- Fracture
- Break
- Fragment
- Smash
- Flip







Pollution

- a chemical or physical agent in an inappropriate location or concentration
- Sediments
- Nutrients
- Heavy metals

Coastal Construction

- Blasting
- Inlets and Inlet Maintenance
- Beach Restoration and Nourishment
- Dredged Material Disposal
- Coastal Structures

Blasting

- Rock removal/loosen hard substrate for dredging
- Typically associated with expansion/ deepening of navigation channels/ port facilities

Port of Miami – photo by Jacksonville District Corps

Inlets

- Provide substantial economic benefits
- Passageways between the ocean, ports, inland waterways
- Tidal flushing of lagoons and estuaries

Inlets and Inlet Maintenance

- Largest single contributing factors to coastal erosion are inlet stabilization structures (jetties)
- Shoreline offset
- Contributes significantly to need for beach projects

Inlet Maintenance Dredging

- Maintenance dredging - maintain navigable waterways
- Placement of beach quality material on downdrift shoreline

Stump Pass Channel, Charlotte County

Inlet Maintenance/ Sand Bypassing

- Fixed sand bypassing plants – small quantities, O&M costs, operation conditions
- Locally owned small dredge for 'continuous' bypassing

Sand Bypassing

- Dredging accreted shoreline areas north of inlet (updrift)
- Placement on eroded shoreline areas south of inlet (downdrift)

Dredged Material Nearshore Placement

- When dredged material contains a high percent of fines (10% to 20%) 62B-41.007(2)k.
- If maintenance dredging and subsequent sand placement must take place during marine turtle nesting season.
- If the beach template lacks capacity to absorb sand into the system.

Dredged Material Disposal

- Material is undesirable for beach placement
- Upland disposal
- "Spoil Islands"
- Offshore disposal aka Ocean Dredged Material Disposal Sites (ODMDS)

Beach Restoration and Nourishment

- Beach restoration – first time sand placement
- Beach nourishment – repeated sand placement to maintain the restoration project

Coastal Erosion

- Approximately 50% of Florida beaches are experiencing some level of erosion
- Some due to natural forces and imprudent coastal development
- *"A significant amount is directly attributable to the construction and maintenance of navigation inlets" (FDEP)*

Beach Restoration & Nourishment

According to the FDEP Bureau of Beaches and Coastal Systems

- Preferred method of adding sand to coastal system
- Provides significant level of storm protection
- Least impacting to the coastal system

Beach Restoration & Nourishment

According to SEFCRI

- Numerous coastal projects along urbanized shorelines and often highly developed barrier islands in Florida inevitably lead to shore protection projects, including beach nourishment.
- Lindeman (1997) estimated that, during 1957 to 1997 over 50 large-scale coastal dredging projects were completed between Dade and Martin Counties.
- SEFCRI projects 7&11 will quantify the number of projects within the SEFCRI area.

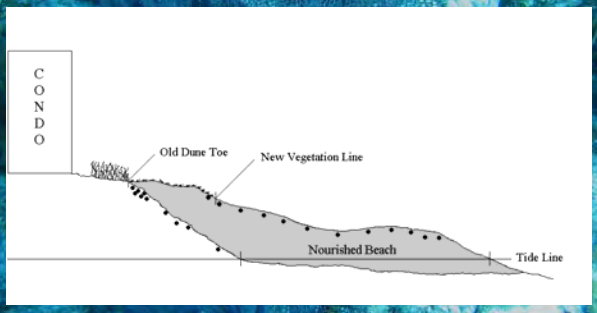
Typical Beach Project

- Sand is dredged, mixed with seawater to form a slurry and transported (pumped) to shore by pipeline
- Sand slurry is discharged along the shore
- Bulldozers move and shape the newly placed sand

Beach Placement Area

- Beach restoration/ nourishment design
- Design profile vs. equilibrated profile
- Design planform vs. equilibrated planform

Nourished Beach Profile



Dune Restoration

- Often included in beach restoration and nourishment projects
- Should include planting with native, salt tolerant vegetation for stabilization and continued growth

Borrow Areas (sand source)

- Most often an offshore source of sand
- Sometimes an upland sand mine is used
- Sand quality is reviewed by the BBCS to determine consistency with 62B-41.007
- On occasion, accreted shoreline areas may be authorized as sand source (backpassing, sand sharing).

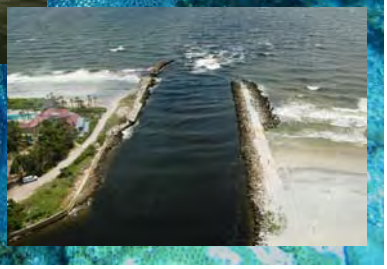
Coastal Structures

- Seawall/Bulkhead
- Revetment
- Jetty
- Groin
- Breakwater
- Pier
- Dock

Seawalls

Bulkheads

Jetties

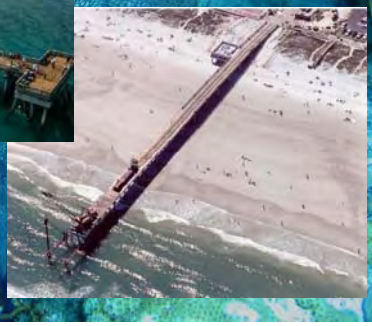


Groins

Revetments

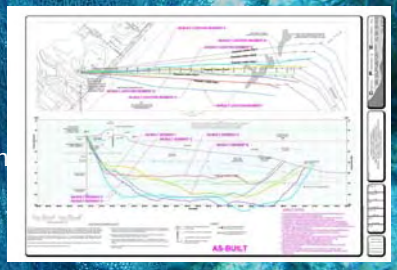
Breakwaters

Fishing Piers

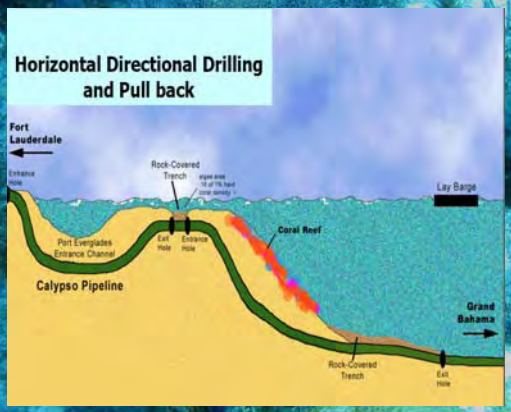


Permanent Cables & Pipelines

- Utility pipelines
  - Water & sewer
  - Oil & gas
- Utility cables
  - Telecommunication
  - Fiber optics



Directional Drilling



Outfalls

- Ocean outfalls
  - May be Directionally Drilled or trenched.
  - Extends offshore for discharge of secondary treated water
- Stormwater outfalls
  - Typically do not extend into nearshore
  - Discharge of upland stormwater onto beach

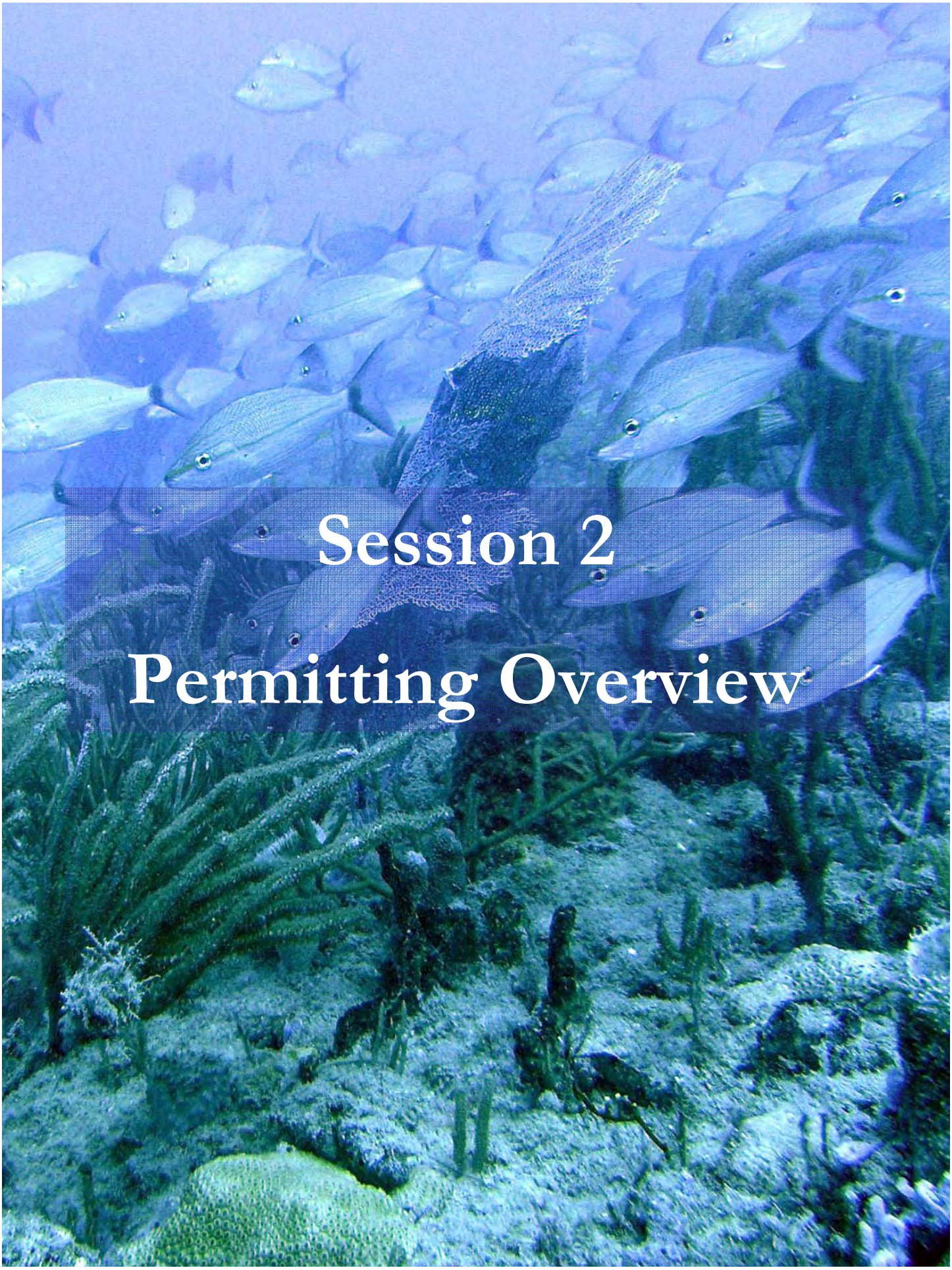
Navigation Aids, Anchorages & Moorings

- Navigation aids
  - Minor construction required
  - Channel markers
  - Buoys
- Anchorages
  - Defined anchoring area for ships waiting port entry
- Mooring Fields
  - Pre-established anchorage to seafloor with floating buoys for ship anchorage
  - Minor impact upon construction and thereafter reduces anchoring impacts

Artificial Reefs

- Purpose
  - Disposal of material
  - Mitigation
  - Habitat creation
- Typically deployed by barge over sandy substrate
- Minor (if any) construction and/or impacts

Questions?



Session 2
Permitting Overview

Coastal Construction Permitting

- Authority for Construction, Management and Maintenance of Coastal Projects
- Coastal Zone Management Regulations
- Permits for Coastal Construction Activities
  - Federal (NEPA EIS or EA, Dredge & Fill)
  - State (JCP, ERP, CCCL)
  - County/Local
- Permitting of Experimental Projects

Authority for Construction, Management & Maintenance

Federal Authority - U.S. Army Corps of Engineers

- Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) Corps regulatory jurisdiction over activities in navigable waterways
- Section 404 of the Clean Water Act (33 USC 1344) Corps regulatory jurisdiction over deposition of dredged material in all waters of the U.S.

Authority for Construction, Management & Maintenance

- Federally maintained navigation projects
- Beach Restoration projects typically associated with maintenance of neighboring inlets and navigation channels
- U.S. Coast Guard
  - Aids to Navigation

Authority for Construction, Management & Maintenance

Federal National Environmental Policy Act (NEPA)

- Evaluation of environmental impacts of federal projects
- Three levels of analysis
  - Categorical exclusion determination
  - Preparation of an Environmental Assessment (EA)/ Finding of No Significant Impact (FONSI)
  - Environmental Impact Statement (EIS)

Authority for Construction, Management & Maintenance

FDEP

- Chapter 161 Florida Statutes (F.S.) – Beach & Shore Preservation
- Chapter 373 F.S. - Water Resources - regulatory authority over activities in the waters of the State of Florida
- Chapter 18-21 Florida Administrative Code (F.A.C.) – Sovereign Submerged Lands (SSL) Authorization

Authority for Construction, Management & Maintenance Beaches

Beaches

Chapter	Title	Description	Effective Date
62B-26	Metes and Bounds Descriptions of Coastal Construction Control Lines	The legal description of the location of the Coastal Construction Control Lines in the coastal counties of Florida.	12/31/01
62B-33	Bureau of Beaches and Coastal Systems - Rules and Procedures for Coastal Construction and Excavation (Permits for Construction Seaward of the Coastal Construction Control Line and Fifty-Foot Setback)	Rules and procedures to obtain Permits for construction seaward of the Coastal Construction Control Line	07/03/05
62B-34	General Permits for Activities Seaward of the Coastal Construction Control Line	Implement the provisions of Section 161.053(19), F.S., providing General Permit for activities performed seaward of the Coastal Construction Control Line.	11/21/05
62B-36	Beach Management Funding Assistance Program	Governs policy on the ranking and cost sharing of state-funded restoration and inlet management projects. Provides procedures for executing a comprehensive, long-range, statewide beach management plan for the protection of Florida's critically eroded shoreline.	12/25/03
62B-41	Rules and Procedures for Application for Coastal Construction Permits	Contains criteria and procedure for obtaining a Coastal Construction permit.	10/23/01
62B-49	Joint Coastal Permits and Concurrent Processing of Proprietary Authorizations	Contains the rules and procedures for obtaining a Joint Coastal Permit pursuant to section 161.055, Florida Statues.	02/18/98
62B-54	Administrative Fines and Damage Liability	Provides a method for determining the amount of fines or damages to be assessed for violations pursuant to 161.054 FS, and the procedure for imposing and collecting such fines or damages.	03/20/00

Authority for Construction, Management & Maintenance ERP

Environmental Resource Permitting

General ERP Rules

Chapter	Title	Description	Effective Date
62-4	Permits		04/03/03
62-113	Delegations		07/16/01
62-301	Surface Waters of the State		01/08/96
62-302	Surface Water Quality Standards - (Table 62-302.530 - Surface Water Quality Standards)		04/04/02
62-330	Environmental Resource Permitting		12/05/05
62-340	Delineation of the Landward Extent of Wetlands and Surface Waters		05/09/00
62-341	Noticed General Environmental Resource Permits		08/04/05
62-342	Mitigation Banks		05/21/01
62-343	Environmental Resource Permit Procedures		02/19/03
62-343.900(1)	ERP Joint Application Booklet		10/03/95
62-344	Delegation of the Environmental Resource Program to Local Governments		05/09/00
62-345	Uniform Wetland Mitigation Assessment Method		04/27/05
62B-49	Joint Coastal Permits and Concurrent Processing of Proprietary Authorizations		02/19/98

Authority for Construction, Management & Maintenance SSL

Sovereign Submerged Lands

Chapter	Title	Description	Effective Date
18-14	Administrative Fines for Damaging State Lands or Products Thereof		07/07/85
18-18	Biscayne Bay Aquatic Preserve		06/05/96
18-20	Florida Aquatic Preserves		08/01/01
18-21	Sovereign Submerged Lands Management (Forms)		01/01/06

Authority for Construction, Management & Maintenance

Florida Department of Environmental Protection (FDEP) Bureau of Beaches & Coastal Systems (BBCS)

- Protection and management of coastal system along sandy coast of Florida
- Strategic Beach Management Plan
- State Funding/ Long Range Budget Plan
- Partner with Local Government Sponsor

Authority for Construction, Management & Maintenance

Local Authority – SEFCRI Counties

- Martin County
- Palm Beach County
- Broward County
- Miami-Dade County

Coastal Zone Management Act (CZMA)

- 1972 Coastal Zone Management Act
  - Assist coastal states in developing coastal management programs
  - Manage and balance competing uses and impacts to coastal resources
  - Federal CZMA consistency required for federal coastal projects

Permits for Coastal Construction

- U.S. Army Corps of Engineers Federal Dredge & Fill Permit
- FDEP Joint Coastal Permit (JCP)
- FDEP Environmental Resource Permit (ERP)
- FDEP Coastal Construction Control Line (CCCL) Permit
- County Permits

Permits for Coastal Construction

Federal

- Dredge & Fill Permit
  - Single permit application to State of Florida which is forwarded to the U.S. Army Corps of Engineers (Corps) for separate processing of Federal Dredge & Fill Permit\
- Nationwide Permit

Permits for Coastal Construction

State of Florida Department of Environmental Protection (FDEP)

- Coastal Construction Control Line (CCCL) Permit
- Environmental Resource Permit (ERP)
- Joint Coastal Permit (JCP)

Permits for Coastal Construction FDEP

CCCL

- 62B-33 Florida Administrative Code
- Protect coastal system from improperly sited and designed structures
- Structures seaward of the CCCL and landward of Mean High Water (MHW)

Permits for Coastal Construction

Environmental Resource Permit (ERP) State Programmatic General Permit (SPGP IV)

- Corps delegated authority to FDEP
- Avoid duplication of permitting between agencies (Corps & FDEP)
- Excludes NWFWMD jurisdiction, Monroe and Miami-Dade Counties.

Permits for Coastal Construction

ERP SPGP IV (inland waterway works) is for the following activities:

1. Shoreline stabilization
2. Boat ramps, boat launch areas and associated structures
3. Docks, piers, associated facilities and other minor piling supported structures
4. Maintenance dredging of canals and channels

Permits for Coastal Construction

Environmental Resource Permit (ERP)

- Ensures activities in uplands, wetlands and other surface waters does not degrade water quality or wildlife habitat
- Addresses dredging, filling and construction as well as stormwater and surface water management systems
- **Permits activities in open water including docks and marinas**

Permits for Coastal Construction

ERP is required for activities such as:

- Port dredging
- Inland waterway maintenance dredging
- Docks
- Marinas
- Submerged utility cables/conduits
- Anchorages

Permits for Coastal Construction

JCP

- Combination of coastal construction permit, environmental resource permit and sovereign submerged lands authorization

Permits for Coastal Construction

JCP required for activities that are:

- Located on sandy coast of Florida
- Activities that extend seaward of MHW
- Activities that extend on sovereign submerged lands
- Activities that are likely to affect the distribution of sand

Permits for Coastal Construction

JCP is required for activities such as:

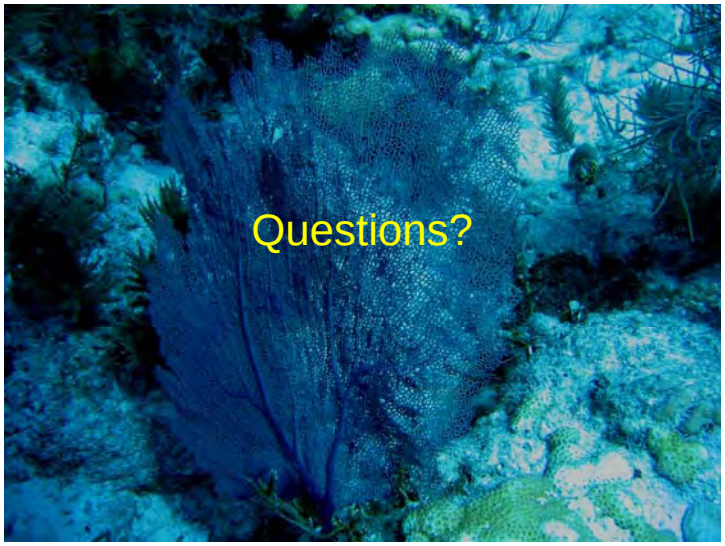
- Beach Restoration and Nourishment
- Inlet Maintenance
- Erosion Control Structures (groins, breakwaters, jetties)
- Public Fishing Piers
- Navigation Channel dredging with Beach or Nearshore Placement

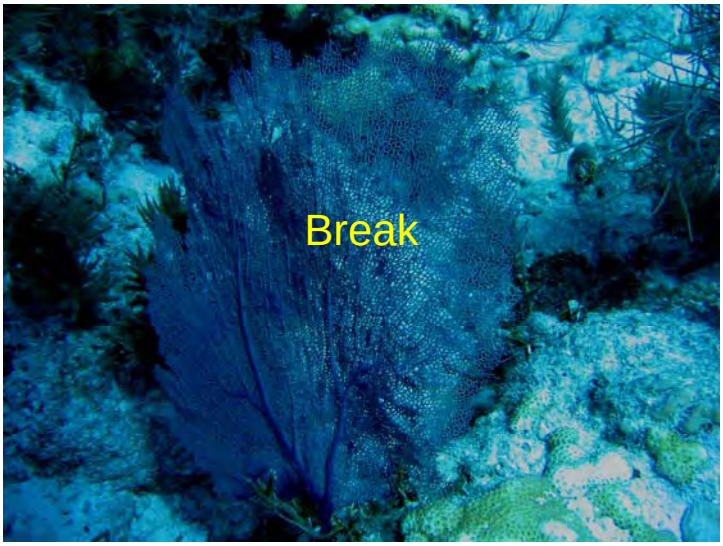
Permitting Innovative Technology

62B-41.0075 F.A.C.

- Located in an erosion area suited for experiment
- Supported by scientific, engineering and design theory or experimental data
- Request presented by riparian owner or government
- Independent Third Party Evaluation
- Experimental Test Plan
  - Present hypothesis, methods and criteria for success determination
  - Rigorous monitoring
  - Analysis and reporting of results


Permitting Innovative Technology
– Financial assurances for mitigation or removal
– Experimental test period of up to 3 years
– If experiment is determined ineffective or causes adverse impacts, structures shall be removed
– Permittee responsible for restoring any adversely affected areas to pre-project conditions


Questions?


Break

Session 3

Review of MICCI Project 3 and Other Innovative Projects

Review of MICCI Project 3 and other Innovative Technologies

Workshop on Innovative & Emerging Coastal Construction Technologies

Review of MICCI Project 3 and other Innovative Technologies

- Review of MICCI Project 3 Innovative Workshop Results/Recommendations
- Highlight innovative/emerging technologies identified during MICCI 3 Project
- Highlight additional innovative/emerging technologies geared toward resource protection/coastal construction/shoreline protection.
- Identification of cost incorporation of emerging technologies into regional beach nourishment, erosion control, inlet management and infrastructure placement programs.

MICCI 3 Innovative Workshop Goals

- Identify existing coastal construction practices known to affect coral reefs and their associated impact on coral reefs;
- Identify innovative technologies that have recently been implemented and shown to minimize or eliminate impacts to resources;
- Review emerging technologies for shoreline stabilization, erosion/beach stabilization, and beach nourishment; and
- Review permit conditions and study designs for mitigation in innovative or advanced coastal construction activities.

Review of MICCI Project 3 Recommendations

- Dredging and blasting
- Water Quality
- Beach nourishment
- Resource management and permitting
- Monitoring and mitigation
- Vessel Groundings and other direct vessel related impacts
- Placement of pipelines or cables

Dredging and blasting

- Minimize dredging and blasting
- ADCP/acoustic backscatter and fluoremetry to monitor for increased turbidity
- Technological advances: increasing slurry density, pushing sand, change in borrow area design to improve efficiency, recycling of skim water,
- Management: designated pipeline corridors in reef gaps
- All members suggested applying multiple advanced technologies in a single project to maximize project performance and resource protection.

Water Quality

- Counties should develop Master Plans to address and resolve cumulative impacts resulting from sewer, septic, deep well injection, stormwater runoff, landfills and ocean outfalls.
- Retrofitting stormwater and discharge outfalls along developed coast lines.
- Develop alternatives to wastewater outfalls and deep well injection.

Beach nourishment

- Reduce need for beach nourishment
  - Submerged shore parallel structures such as wave breaks and multi-purpose reefs
- Sand bypassing/backpassing technology
- Stringent criteria for evaluating borrow areas
  - Sand compatibilty – size, color, and quality
- Enforce state regulations on discharge prohibitions across beach
- County level prohibitons developed

Resource management and permitting

- Requirements included as specific permit conditions
- Adaptive management (coral spawning)
- Advanced technologies (GPS, i.e. Silent Inspector)
- Hypothesis driven pre-during and post-project monitoring
- Use of floating lines and/or cables

Monitoring and mitigation

- Monitoring should be hypothesis driven and peer reviewed to ensure appropriate design, statistical power, precision, accuracy and completeness.
- Monitoring results used in adaptive management to protect coral reefs (i.e. sublethal stress indicators used to alter project progress)
- Mitigation must be compensatory for resource impacts.
- Mitigation monitoring, data analysis and archiving for long-term comparative use.

Vessel Groundings and other direct vessel related impacts

- Boater education and training
- Establishment of beacons or marker buoys around large vessel anchorages
- Removal or modification of existing ship anchorages

Placement of pipelines or cables

- Use technology to avoid laying pipelines/cables over reef
  - Horizontal directional drilling
  - Tunneling
- LADS/LIDAR can be used to identify corridors and avoid/minimize impact

BBCS Innovative Workshop

Innovative Technologies

Section 27 of Laws of Florida 89-175

- **Legislation to encourage the development of new and innovative technologies for addressing shoreline erosion**
- **62B-41.0075 F.A.C. addresses experimental coastal construction with criteria for performance evaluation**

Past Innovative Technologies

- Early 1980's artificial seaweed
- Early 1990's Prefabricated Erosion Prevention Reefs or PEP Reefs
- Beach 'Dewatering' – lower water table
- Geotextile tube structures (Longuard Tubes, Protect Tubes, Undercurrent Stabilizers)
- Net Groin Technology

Net Groins

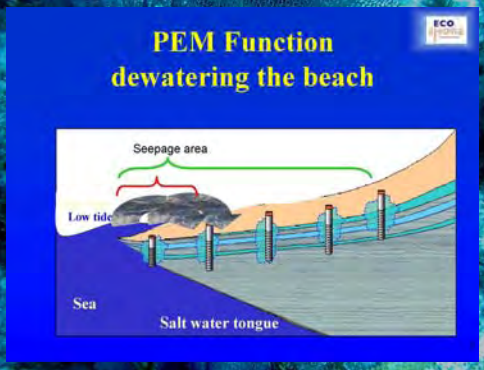
Total Beach Management System

Coastal Erosion Mitigation Solution

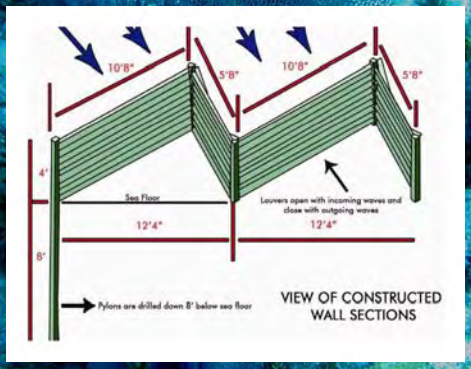
Artificial Reef Breakwater

Mitigation Gardens

Pressure Equalized Modules

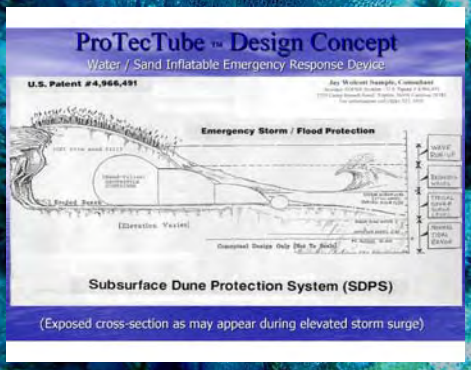


Sandi Technologies Erosion Control System



Seament Shoreline System Solutions

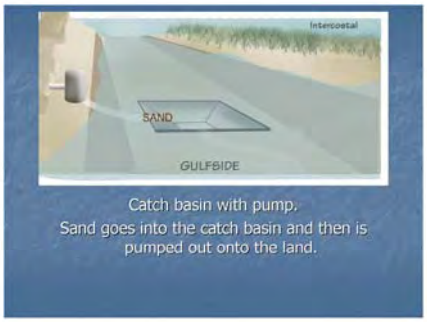
Subsurface Dune Protection System



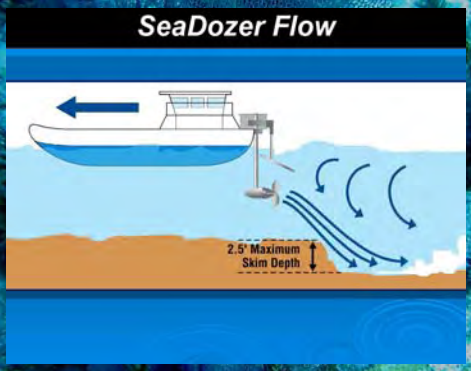
Jetspray

Quick Levee Builder and Pro-bagger

Catch Basin



Seadozer



Funding Opportunities

- Chapter 62B-36 Beach Management Assistance Program
  - Program works with eligible governments towards the protection, preservation and restoration of sandy beaches fronting the Atlantic Ocean, the Gulf of Mexico and the Straits of Florida.
  - State may cost share with eligible governments to implement beach projects.
  - 62B-36 establishes funding request procedures, project ranking, cost sharing procedures and project agreement requirements
- Separate legislative line item funding for innovative/ experimental technologies for erosion control

Questions?

Session 4

Review of BMP's

Development of Best Management Practices for Construction, Dredge and Fill and Other Activities Adjacent to Coral Reefs

Review of BMP's

Definition of BPM

- BMPs <u>are</u>: physical, structural and/or managerial practices that when used singly or in combination, prevent or minimize adverse impacts to environmental resources resulting from coastal construction activities.

Other BMP Manuals/Guidelines

Section 9 of document

- BMPs for South Florida Urban Stormwater Management Systems https://my.sfwmd.gov/pls/portal/docs/PAGE/PG_GRP_SFWMD_ENVIROREG/PORTLET_REGUIDANCE/TAB383509/BMP_MANUAL.PDF
- The Florida Stormwater, Erosion, and Sedimentation Control Inspector's Manual http://www.dep.state.fl.us/Water/nonpoint/ero_man.htm
- Office of Agricultural Water Policy BMP forms, documents and manuals http://www.floridaagwaterpolicy.com/BestManagementPractices.html
- Guideline for Marine Artificial Reef Material, Second Edition http://www.gsmfc.org/pubs/SFRP/Guidelines_for_Marine_Artificial_Reef_Materials_January_2004.pdf
- Preparation of Vessels for Artificial Reefs http://www.epa.gov/owow/oceans/habitat/artificialreefs/documents/0605finalreefguidance.pdf
- Environmental and Aesthetic Impacts of Small Docks and Piers http://www.nccos.noaa.gov/documents/dockpier.pdf

Overview of Structural (Physical) and Managerial BMPs

Structural BMPs

- Turbidity Curtains
- Pipeline Collars/Floating Pipelines
- Sand Dike (Beach Placement)
- Integrated GPS Systems/ Dredge Operational Controls
- Cofferdam/Sheet Piling
- Horizontal Directional Drilling
- Manatee Signage/Observer
- Marine Turtle Deflectors/ Marine Turtle Trawling
- Floating Tow Lines

Managerial BMPs

- Design/Siting/Minimization and Avoidance
- Surveying (traditional, LIDAR, resource mapping, etc.)
- Borrow Area Siting
- Sand quality/Sand sources (upland mine, alternative sources, recycled glass, alternative resources)
- Mitigation
- Artificial Reef (materials)
- Buffer Zones
- Pipeline Corridors
- Vessel Ingress/Egress Corridors

Managerial BMPs

- Water Quality Monitoring Plan
- Biological Monitoring Plan (pre, during and post construction)
- Personnel Qualifications
- Construction Windows (coral reproduction seasons, marine turtle nesting season, shorebird nesting seasons, etc.)
- Adaptive Management
- Ecosystem Management

Structural BMPs

Turbidity Curtains

- Allow for suspended sediment to settle out of the water column in a controlled area
- Turbidity Curtains
  - floating impermeable barriers
- Turbidity Screens
  - Made with permeable geosynthetic fabric, allowing water flow-through

Pipeline Collars

- Supporting structures that elevate pipelines over hardbottom communities
- Used in beach nourishment and outfall installation projects
- Inert materials are to be chosen as supports

Floating Pipelines

Damage to coral *Montastraea cavernosa* from direct contact with pipeline.

- Placement of pipelines above hardbottom communities
- Used in beach nourishment and outfall installation projects
- Many designs and materials are feasible
- Ideal pipeline location allows for vessels to pass safely overhead

Sand Dike

- Provides settling time for fine particles to be released from the water column prior to entering the open waters
- Parallel-shore dikes must
  - Withstand incoming waves
  - maintain structural integrity during the discharging of sand onto the beach
- Ultimately, dike becomes the seaward edge of construction and is integrated into the final beach
- No removal of a sand dike is necessary

Integrated GPS/ Silent Inspector

Monitors dredge position, cutterhead location, and dredge production status

- Enhances environmental monitoring
  - provides real-time alarms
  - archival recording of dredge head position/depth outside of prescribed boundaries/depths

Dredge Operational Controls

- Hopper Dredges and Barges Operational Controls
  - Eliminate or reduce hopper overflow
  - Lower hopper fill level
  - Recirculation system
- Hydraulic Dredge Operational Controls
  - Reduce cutterhead rotation speed
  - Reduce swing speed
  - Eliminate bank undercutting
- Mechanical Dredge Operational Controls
  - Increase cycle time
  - Eliminate multiple bites
  - Eliminate bottom stockpiling

Cofferdam

- Temporary Barrier
- Commonly made of wood, steel, or concrete sheet pile
- Internally braced cofferdam is
  - Used in shallow water bridge/pier construction
  - Dewatered for ease in excavation

Sheet Piling

- Reusable, water-tight barrier
  - Made of steel, vinyl, plastic, wood, recast concrete, or fiberglass.
- Interlocking sheets and various types
  - Used in shallow, intermediate, and deep wall construction

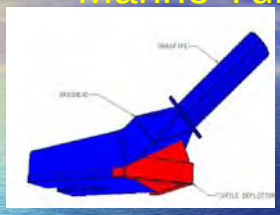
Horizontal Directional Drilling

- Allows a pipeline to go underground, minimizing impact to existing benthic reef organisms
- Eliminates physical contact by the pipeline or cable
- Eliminates the need for excavation and backfilling of a submarine trench
- Drilling commences upland from the environmentally sensitive area and passes below the reef

Manatee Signage/Observer

- West Indian manatee is a federally endangered species
- Construction personnel must be educated regarding manatee protection upon
- Prevention of injury, harassment, and mortality during coastal construction operations
  - i.e. dredging, rock cutting/blasting, coastal structure construction
- Manatee observers/spotters are to monitor waterways for manatee presence

Marine Turtle Deflectors



- Prevent sea turtle mortality
- Deflect sea turtles in or near the path of the draghead during dredging activities
- Required during all hopper dredge activities
- Only successful when draghead is completely engaged with the seafloor

Marine Turtle Trawling

- Trawling for turtles before and during dredging projects
- Relocates present sea turtles away from a dredge operation
- Lessens the likelihood of turtle take by the hopper dredge

Floating Tow Lines

- Tow lines are a necessary component for ships and dredges
- When heavy lines break they are often dragged along the sea floor, causing irreversible damage
- Floating lines eliminate impact to the hardbottom upon breakage

Managerial BMPs

Design, Siting, Minimization and Avoidance

- Consider resources within and neighboring project area
- Design project to avoid resource impacts
- Minimize unavoidable impacts
- Enter permitting phase with maximum resource information possible

Surveying

- Traditional surveying techniques
- Resource surveys
- Advancements in surveying
  - Laser Airborne Depth Sounding (LIDAR)
  - High Definition Surveying Technology
  - 3-D Laser Scanning Technology

Borrow Area Siting/ Sand Quality

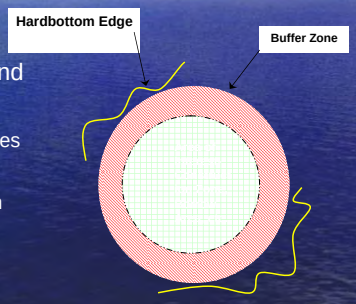
- Ensures material applied to beach is similar to native/existing material
- 62B-41.007(2)(j) F.A.C. 'Sand Rule'
  - Defines criteria for evaluation
  - Requires sufficient sampling (core samples)
  - QA/QC Plan Required

Mitigation

- Offset primary and secondary impacts to hardbottom & corals
- Applicable after impacts have been avoided/minimized to the maximum extent practicable
- Agencies generally prefer mitigation be conducted in-kind (like for like) and at the project site

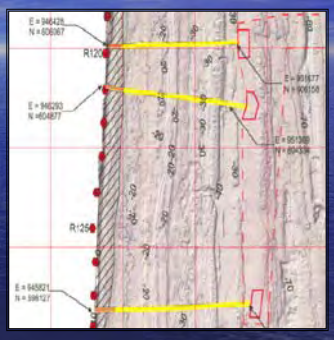
Buffer Zones

- A defined area surrounding a site to ensure a minimum distance between construction activities and hardbottom/corals.
  - should be established during the planning phases of a project
  - provides a cushion between the construction activities and the hardbottom or corals
  - may also be used as exclusion areas around hardbottoms or corals

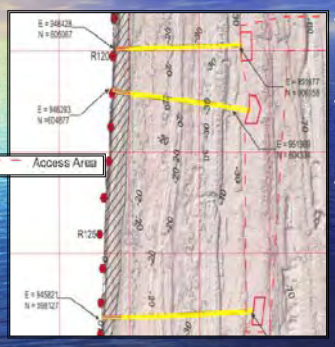


Pipeline Corridors

- Initially, the extent of hardbottom and corals located in the vicinity of a project shall be identified
- When pipelines are to be used during construction, corridors for pipelines are established
  - If hardbottom or corals are located within the footprint of the pipeline corridors, structural BMP's should be considered
    - (pipeline collars, floating pipelines)
- Location of pipeline corridors should be adequately identified via GIS maps, GPS locations, or buoys



Vessel Ingress/Egress Corridors



- Movement of vessels to and from a site during coastal construction may impact present hardbottom/corals
- Corridors for vessels to access the coastal construction site should be identified to protect the benthic community
- Considerations Include
  - mean tidal range
  - difference in draft between a fully loaded and empty vessel.
  - width of vessels and appropriate width of the corridor
  - turning radius for vessels

Water Quality Monitoring Plan

- Addresses direct and indirect impacts to hardbottom and corals
- Monitoring is necessary for coastal construction when activities may result in introducing environmental contaminants to the surrounding waters
- Plan typically includes
  - Establishing Background Values
  - Selection of Monitoring Stations
  - Monitoring Schedule
  - Monitoring Protocol
  - Adverse Weather Conditions
  - Contingency Monitoring Plan
  - Deliverables\Reports

Biological Monitoring Plan

- Monitoring to confirm anticipated unavoidable impacts
- Monitoring to confirm no secondary impacts
- Monitoring of mitigation artificial reefs or transplants for success

Construction Windows

- Construction limited due to seasonal biological windows such as:
  - Coral spawning
  - Manatee congregation
  - Manatee movement to warm waters
  - Sea turtle nesting, incubation, hatching, and emergence
  - Shorebird nesting
  - Migratory bird movement

Breakout!

Break-Out Session A

Group A1
- Turbidity Curtains
- Pipeline Collars/Floating Pipelines
- Sand Dike (Beach Placement)

Group A2
- Integrated GPS Systems/Dredge Operational Controls
- Cofferdam/Sheet Piling
- Horizontal Directional Drilling

Group A3
- Manatee Signage/Observer
- Marine Turtle Deflectors/Marine Turtle Trawling
- Floating Tow Lines

Break-Out Session B

Group B1 (design/permitting phase of projects – up front)
- Design/Siting/Minimization and Avoidance
- Surveying (traditional, LIDAR, resource mapping, etc)
- Borrow Area Siting
- Sand quality/Sand sources (upland mine, alternative sources, recycled glass, alternative resources)

Group B2 (hardbottom avoidance and/or mitigation for hardbottom impacts)
- Mitigation
- Artificial Reefs (materials)
- Buffer Zones
- Pipeline Corridors
- Vessel Ingress/Egress Corridors

Group B3 (Monitoring, monitoring, monitoring)
- Water Quality Monitoring Plan
- Biological Monitoring Plan (pre, during, and post construction)
- Personnel Qualifications

Group B4 (How to balance competing environmental interests)
- Construction windows (coral reproduction seasons, marine turtle nesting season, shorebird nesting seasons, etc).
- Adaptive Management
- Ecosystem Management