Nearshore Berm Discussion
Environmental Impacts

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Definitions

- **Fines** – very fine sand passing 200 sieve, silts and clays
- **Nephelometric Turbidity Units (NTU)** – Measures the Light that is Scattered at 90° from the Light Source
- **Total Suspended Solids (TSS)** - Measure of the Total Mass of Particles in a Sample
- **Turbidity** – Optical property that causes light to be scattered and absorbed rather than transmitted in straight lines through the sample*

*Standard Methods for Examination of Water and Wastewater
Definitions

• **Traditional Placement** – placement of material to “build a beach”

• **Submerged Aquatic Vegetation** - any combination of seagrasses, oligohaline grasses, attached macroalgae and drift algae that covers 10 to 100 percent of a substrate*

* [http://myfwc.com](http://myfwc.com)
Definition of Placement Operations

Hopper or Split Barge Placement

Hydraulic Placement

- Methodologies have very different dynamics
Topics to Discuss - Outline

• Resources of concern
• Potential environmental impacts
• Modeling & field measurements
• Reduced impacts vs. traditional placement
• Drawbacks vs. traditional placement
• Research to further “Engineering with Nature”
Regional Resources

Northeast
- Hardbottom
- Manatees
- Right Whales
- Sea Turtles
- Shorebirds

East central
- Hardbottom
- Manatees
- Sea Turtles
- Shorebirds

Southeast
- Corals
- Hardbottom
- Manatees
- Sea Turtles
- Shorebirds

Southwest
- Hardbottom
- Manatees
- Sea Turtles
- Shorebirds

West central
- Hardbottom
- Manatees
- Sea Turtles
- Shorebirds

Northwest
- Hardbottom
- Manatees
- Sea Turtles
- Shorebirds
Potential Environmental Impacts

Corals

- Concern about sedimentation impacting corals.
- Mitigated by NMFS requirement to that placement occur 400 ft from Acropora spp. (Boynton Beach and south).

Shorebirds

- Nearshore placement may be preferable to beach placement:
  - May create emergent or ephemeral shoals utilized as foraging habitat; and
  - No direct impacts to beaches (nesting, foraging, roosting).

Photo Credit: National Audubon Society, Inc.
Potential Environmental Impacts

Nearshore Hardbottom

- Support diverse assemblages of algae, invertebrates, fishes, and sea turtles.
- Impacts can occur from direct burial during placement, or from movement of sand onto hardbottom habitats.
- Resource surveys required for SPPs.

Sea Turtles

- Nesting turtles may be precluded from reaching nesting beaches, resulting in false crawls.
- Hatchling turtles may be prevented from reaching the open ocean.
- More of an impact on the Gulf Coast due to shallow nearshore waters.
- USFWS typically requires that no sand be placed higher than MLLW.

Photo Credit: Nova Southeastern University
Potential Environmental Impacts

Cultural Resources

- Cultural resources in the nearshore area must be buffered to prevent impacts from equipment or dredged materials.
  - Ponce Inlet
  - Egmont Key

Photo Credit: Kat McConnell, USACE
Potential Environmental Impacts

Turbidity

• Light attenuation – reduced photic depth
• Gill abrasion
• Settlement of suspended solids resulting in habitat coverage
Potential Environmental Impacts

Secondary Impacts

• Turbidity
  • Reduced biological productivity

• Settlement of suspended solids
  • Reduced biological productivity
  • Larger re-suspendable bed loads
Modeling

- **Sediment transport models**
  - Based on our understanding of physical processes
  - Nearshore processes are extremely complex
  - Site-Specific sediment data
  - Mixed sediments pushing the envelope of transport model capabilities
  - Based on process research/data collection
  - Must be aware of model limitations
Field Measurements

- Process Measurements
  - Hydrodynamic conditions (tides, currents, waves, salinity, …)
  - Sediment settling (disposition/sedimentation)
  - Water column concentrations
  - Sediment bed composition
  - Morphologic evolution
  - Monitor dredging process
Reduced Impacts vs. Traditional Placement

- **Lower cost**
  - Construction – no beach grading equipment
  - Maintenance – less escarpment, tilling

- **Reduced beach traditional use impacts**
  - Sunbathing
  - Water sports

- **Reduced environmental Impacts**
  - Turtle nest relocations avoided
  - Cemotation potential eliminated
  - Beach Munsell Color change reduced as sediment is spread out and bleaches more naturally
    - Shorebird impacts eliminated
Drawbacks vs. Traditional Placement

- Material is not immediately visible to public
- Remediation for unacceptable material far more difficult
- If parameters imposed on nearshore placement are overly restrictive this placement method could become more expensive than traditional beach placement
Research to Further “Engineering with Nature”

- **Modeling development efforts**
  - Improve mixed sediment transport algorithms
  - Improve site-specific parameterization methods
  - Improve far field modeling of fines

- **Field data collection efforts**
  - Long term background turbidity/sedimentation data collection
  - Site specific correlation for NTU to SSC
  - Near and far field dispersion and settlement of fines
  - Threshold of turbidity, SSC, and sedimentation required for resource impacts
Thank You!

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