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Sediment Sorting During Coastal Restoration Projects: Implications for Resource Management, Environmental Impacts, and Multiple Use Conflicts

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FE = Fates & Effects HE = Habitat & Ecology IM = Information Management

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Sediment Sorting During Coastal Restoration Projects: Implications for Resource Management, Environmental Impacts, and Multiple Use Conflicts

BOEM Information Needs:

- Determine the extent of sediment sorting during dredging, handling, and placement processes
- Quantify the losses and percent changes of fine-grained material through the full hopper dredging life-cycle
- Evaluate environmental trade-offs and inform impact assessments

Date Information is Required:

- Ongoing need for current and future projects

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Background:

- **State Sediment Compatibility Requirements:**
  - **Grain Size Distribution**
    - *FL:* ≤ 5% fines
    - *NC:* < 5% fines over the native
- **Borrow Area Screening:**
  - **"Compatibility" exclusion criteria:**
    - Borrow source vs. native beach
- **Current Assumptions:**
  - Overly precautionary relative to limited sand sources
  - No consideration of project life cycle losses and associated resource consequences and tradeoffs
  - Screening borrow sources towards more environmentally sensitive areas (i.e., sand ridges, shoals, etc.)

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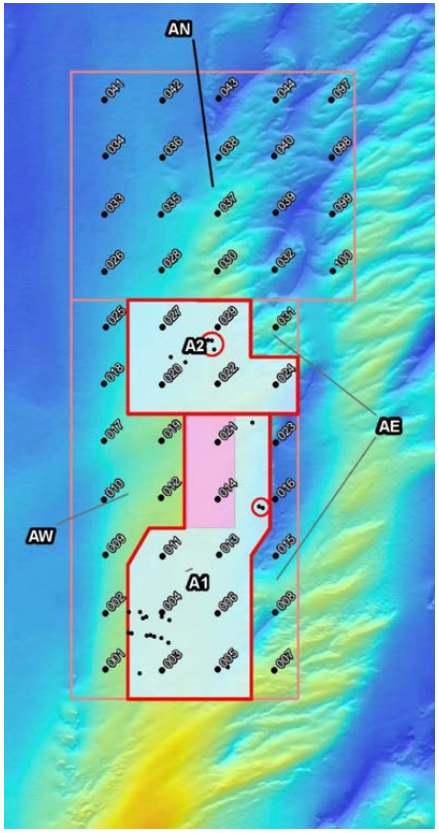
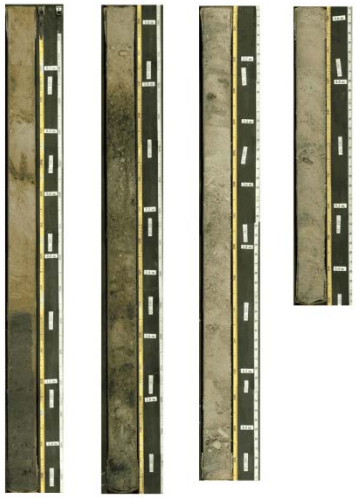
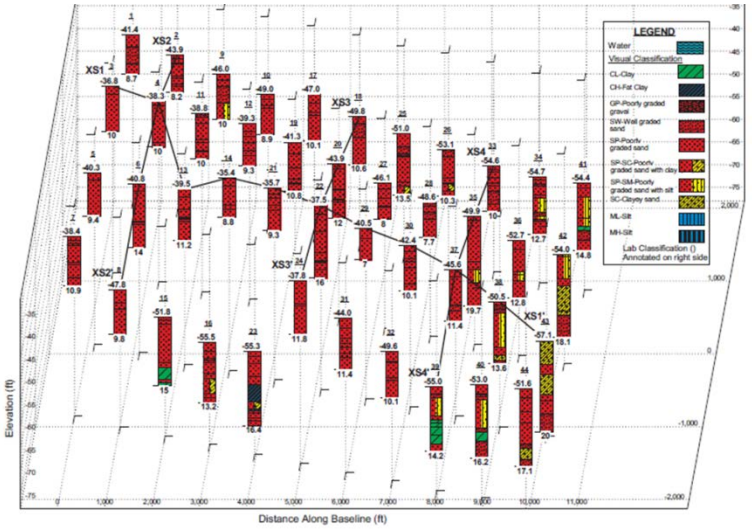
Current Borrow Area "Compatibility" Screening Process







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Mechanical Losses Associated with Dredging and Placement Operations

(1) **Draghead**

(2) Inflow

(3) **Overflow**

(4) Productive Load

(5) Re-Slurry/Pumpout

(6) **Placement**

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Background:

A) Relationship with Previous Efforts

- **USACE Engineer Research and Development Center (ERDC):**
  - Hopper overflow and plume dynamics associated with dredging fine-grained sediment
- **International Literature:**
  - Niche topics with respect to overflow sedimentation and plume dynamics
- **USACE Jacksonville District –Sediment Assessment and Needs Determination (SAND) Study:**
  - In-situ vs. post construction sediment data

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Background:

B) Relationship with Concurrent/Future Efforts

- **USACE - Jacksonville District**
  - •Evaluating sediment behavior throughout the dredging and placement process
  - •No existing studies quantifying losses through the full project life cycle relative to resource implications

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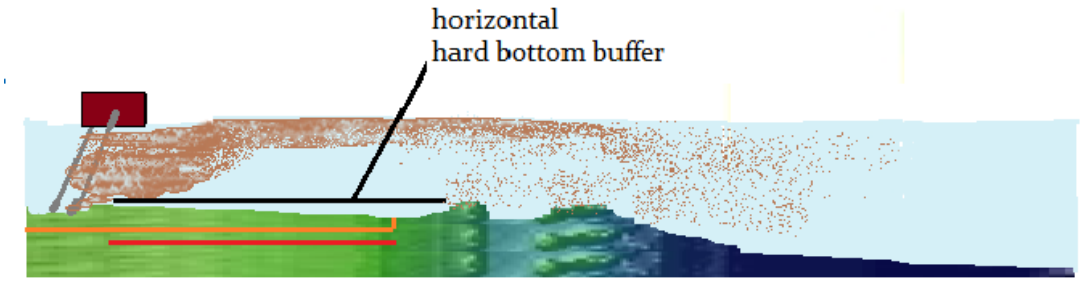
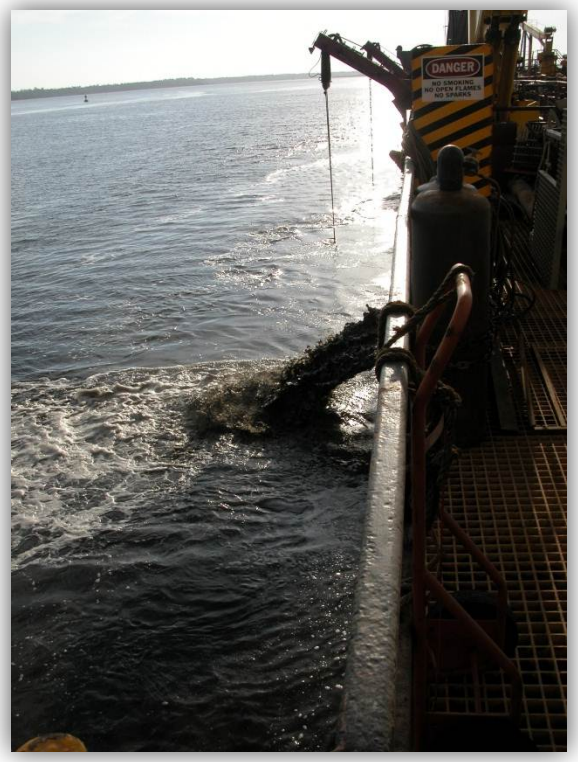
Study's Objectives:

- Quantify changes in sediment characteristics (i.e., grain size, sorting) and the degree, timing, and variability of sediment sorting during dredging, pump-out, and placement operations





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Study's Methods:

- **Repeat sediment sampling** – Four operational phases:
  1. Borrow area,
  2. Within the hopper
  3. Pipeline discharge
  4. Constructed beach

- **Turbidity/suspended sediment measurements**

- **ADCP backscatter/particle imaging videography:** Document sediment transport and settling dynamics and quantify overflow losses

- **Sediment tracers**

- **Laboratory analyses** - sediment grain size, color, sorting, flocculation behavior, and settling velocity

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Additional *Pertinent* Information

- **Partnership and Collaboration:**
  - USACE Districts, USACE ERDC, state agencies, dredging contractors, engineering firms, and other vested stakeholders
- **Leveraging Opportunities:**
  - Existing pre-construction and post-construction monitoring efforts
  - Existing research efforts
- **Technical and Cost Ramifications:**
  - Close coordination and partnership with dredging contractors to minimize non-productive time