SE Florida Sediment Assessment and Needs Determination (SAND) Study

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US Army Corps of Engineers
Jacksonville District
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Regional Sediment Management

- SAND effort consists of intense coordination/collaboration
  - Regional Stakeholders
  - Florida Department of Environmental Protection
  - US Army Corps of Engineers
  - Other parties including BOEM

- Kicked off in February 2012
  - Three team meetings
  - Several additional tele/web conferences

- Dr. Checks peer review of SAND Needs completed by the Counties.

- FDEP funded an independent technical review by CP&E of SAND Assessment reports.
Timeline

- Dec. 2007 memo from Assistant Secretary of the Army (Civil Works).
- Recommends a regional approach to address east Florida’s sand needs.
- Objective: determine if domestic sand sources can meet the need of beach nourishment projects in southeast Florida over the next 50 years.
- 2008 GEC, Halcrow, and Corps complete Southeast FL Sediment Source Study.
- 2009 Taylor and Corps expand 2008 work to cover all 5 southeast counties and includes non-domestic (Bahamas) and upland sources.
- Needs based on planning documents, verified by counties. Available volume based on available data (no new investigation).
- Results showed that Southeast FL has just enough sand to meet its need for the next 50 years.
- February 2012 FSBPA, southeast counties, and the Corps begin the SAND study to refine 2009 results.
Itinerary

- Needs Determination
- Geotechnical Investigation
- Sediment Assessment
- Current Momentum
## 2009 Results

<table>
<thead>
<tr>
<th>County</th>
<th>50-Year Volume Need (cy)</th>
<th>Borrow Area Beach Quality Sand Volumes (cy)</th>
<th>Volume Balance (cy)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Category 1 (Proven)</td>
<td>Category 2 (Potential)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Category 1 (Proven)</td>
<td>Category 2 (Potential)</td>
</tr>
<tr>
<td>St. Lucie</td>
<td>24,440,000</td>
<td>17,218,750</td>
<td>41,600,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Martin</td>
<td>29,900,000</td>
<td>24,781,000</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palm Beach</td>
<td>48,216,000</td>
<td>12,039,000</td>
<td>42,307,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broward</td>
<td>24,225,000</td>
<td>988,400</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miami-Dade</td>
<td>14,174,000</td>
<td>900,000</td>
<td>2,009,713</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>140,995,000</td>
<td>141,843,863</td>
<td></td>
</tr>
</tbody>
</table>

SE Atlantic Regional Sediment Management Plan, Taylor Engineering 2009

Is there enough sand available to meet everyone’s 50-year project needs (FY62)??
SAND Needs – 2012 Estimates

- Estimated by group with best institutional knowledge.
- Federal and nonfederal projects included.
- Based on project performance, and up-to-date planning reports over an adequate time period to estimate future need.
- Need should be based on existing projects. Need based on unconstructed projects/features should be limited and well-founded.
- Peer-review and revision resulted in final needed volumes.
Contingency added to final needs included:

- 30% contingency for borrow area waste (sand left in the borrow area)
- 15% contingency for "dig to place" losses
- 10% contingency for future project performance including potential sea level rise acceleration

**Total Contingency = 55%**

Needs were finalized in August 2012 after group peer review.
**SAND Needs Determination**

- Planning Level estimates are from 2009 RSM Plan (Martin and Miami-Dade estimates were updated post-2009).

- Survey Level estimates are from 2012 SAND Needs Evaluations

<table>
<thead>
<tr>
<th>County</th>
<th>Estimate Type</th>
<th>Need</th>
<th>Survey Level Volume + 55%</th>
</tr>
</thead>
<tbody>
<tr>
<td>St. Lucie</td>
<td>Planning Level 2009</td>
<td>24,440,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Survey Level 2012</td>
<td>18,017,487</td>
<td>27,927,105</td>
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<tr>
<td>Martin</td>
<td>Planning Level 2009</td>
<td>22,651,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Survey Level 2012</td>
<td>22,111,000</td>
<td>34,272,050</td>
</tr>
<tr>
<td>Palm Beach</td>
<td>Planning Level 2009</td>
<td>49,166,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Survey Level 2012</td>
<td>45,577,000</td>
<td>70,644,350</td>
</tr>
<tr>
<td>Broward</td>
<td>Planning Level 2009</td>
<td>24,225,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Survey Level 2012</td>
<td>11,650,000</td>
<td>18,057,500</td>
</tr>
<tr>
<td>Miami-Dade</td>
<td>Planning Level 2009</td>
<td>17,588,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Survey Level 2012</td>
<td>14,968,300</td>
<td>23,200,865</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td>Planning Level (2009)</td>
<td>138,070,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Survey Level (2012)</td>
<td>112,323,787</td>
<td>174,101,870</td>
</tr>
</tbody>
</table>
Sediment Assessment

- Desktop Evaluation
  - RSM 2009 and ROSS
  - NOAA Maps
  - ICONS Reports

- Site Investigation
  - Drilling
  - Logging and Lab Testing
  - Reporting

- Volume Estimates
2009 RSM Sand Sources/ROSS

Borrow Areas St. Lucie County: Area AB, C; SL-2, 5; MMS-6

Legend:
- FDEP Monuments
- Core Borings
- Dredge Locations (inset)
- Obstruction/Restricted Area
- Continental Shelf Boundary

Borrow Areas:
- 0 - Depleted or otherwise unusable
- 1 - Proven
- 2 - Potential
- 3 - Unverified
- Original Borrow Area Boundaries

Reef Areas:
- Artificial Reef Permit Area
- Artificial Reef (incl. 400ft buffer)
- Hard bottom (incl. 400ft buffer)
NOAA NOS Maps

- Bathymetry
- Fish Havens
- Cables
- ODMDS
- Cultural Resources
ICSNS Blue Horizon

- Meisburger and Duane, CERC TM-29, 1969 and CERC TM-34, 1971
- Seismic reflector
- Persistent over large area
- Calcarenite: consolidated carbonate sand
Vibracore Plan

- SE Atlantic RSM Study
- NOAA NOS Maps
- ICONS Study
- FDEP ROSS Database
- FGS/ MMS studies
- Miscellaneous Project Reports
Site Investigation Phase

- USACE Wilmington M/V Snell
- 20’ hydraulic vibracore
Site Investigation Phase

- Drilling complete: 12 Jun 2012
- 199 borings collected
- Water Depth (NAVD88):
  - -26.0’ minimum
  - -86.2’ maximum
- Average penetration: 18.9’
- Average recovery: 91%
- Cut and Logged Cores at the USACE warehouse
Laboratory and Reporting

- **Laboratory Analysis**
  - Visual Shell Content
  - Munsell Color
  - Sample Grain Size Distribution
  - Carbonate Content
  - Carbonate Grain Size Distribution
  - gINT Data Files

- **Site Investigation Report**
  - Vibracore logs
  - Grain Size Distribution Curves
  - Granularmetric Reports
  - Penetration Reports
  - Photos
Site Investigation Phase

- Site Investigation Phase completed: 5-Oct-2012
Sediment Assessment Phase

• Volume Calculations:
  • Collected existing cores and jet probes, including SAND cores
  • Evaluated 2009 RSM and new borrow areas
  • Created a systematic and uniform nomenclature
  • Calculated volumes using average thickness of borings x area
  • Evaluated potential impacts to volume
## RSM Borrow Area Criteria

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1: Proven</strong></td>
<td>Sufficient vibracore data to prove quality and quantity of sand. Laboratory testing throughout full three-dimensional geometry of the borrow area. Not exclusively Plans and Specifications level.</td>
</tr>
<tr>
<td><strong>2: Potential</strong></td>
<td>Strong evidence to suggest a beach-quality sand source, including laboratory testing of samples from vibracores. Might include additional information, such as geomorphic evidence, remote sensing, seismic etc.</td>
</tr>
<tr>
<td><strong>3: Unverified</strong></td>
<td>Some evidence to suggest a beach-quality sand source, such as a single vibracore (with or without laboratory testing), geomorphic evidence, or remote sensing. Anecdotal evidence, such as grab samples, usually sufficient.</td>
</tr>
<tr>
<td><strong>0: Depleted, Unusable or Currently Economically Unfeasible</strong></td>
<td>Cannot extract any beach-quality sand from the area because the material occurs in small quantities (less than 4’ thickness), is of poor beach-quality per Table 3, or is in close proximity (less than 200’) to hardbottom, historical artifacts, or submerged utility. Fish havens and Offshore Dredge Material Disposal Areas also fit this category. This Category is shown on Plate B-2, but is not included in detailed discussions.</td>
</tr>
</tbody>
</table>
Delineation

LEGEND
- Potential Borrow Areas
- Unverified Borrow Areas
- Proven Borrow Areas
- Depleted Borrow Areas
- R-Monuments
- Borrow Area Centroid

GRAPHIC SCALE
6,000' 0' 6,000' 12,000'

MATCHLINE SHEET B-5
### Results

<table>
<thead>
<tr>
<th>County</th>
<th>Jurisdiction</th>
<th>Proven(^a)</th>
<th>Potential(^b)</th>
<th>Unverified(^c)</th>
<th>2012 Total Volume per County</th>
<th>Volume + Contingency/Confidence</th>
<th>Volume after Needs met</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>with 2' buffer</td>
<td>2' buffer w/ 90% confidence</td>
<td>with 2' buffer</td>
<td>2' buffer w/ 60% confidence</td>
<td>with 2' buffer</td>
<td>2' buffer w/ 30% confidence</td>
</tr>
<tr>
<td>St. Lucie</td>
<td>State</td>
<td>6,288,550</td>
<td>5,659,695</td>
<td>15,228,003</td>
<td>9,136,802</td>
<td>5,769,065</td>
<td>1,730,719</td>
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<tr>
<td></td>
<td>Federal</td>
<td>14,802,828</td>
<td>13,322,545</td>
<td>153,143,618</td>
<td>91,886,171</td>
<td>63,332,986</td>
<td>18,999,896</td>
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<tr>
<td>Martin</td>
<td>State</td>
<td>17,775,499</td>
<td>15,997,949</td>
<td>48,897,121</td>
<td>29,338,273</td>
<td>20,209,579</td>
<td>6,062,874</td>
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<tr>
<td></td>
<td>Federal</td>
<td>21,747,917</td>
<td>19,573,125</td>
<td>44,342,127</td>
<td>26,605,276</td>
<td>13,456,928</td>
<td>4,037,079</td>
</tr>
<tr>
<td>Palm Beach(^2)</td>
<td>State</td>
<td>100%</td>
<td>134,277,355</td>
<td>120,849,620</td>
<td>103,518,035</td>
<td>62,110,821</td>
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<tr>
<td></td>
<td>Federal</td>
<td>0%</td>
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<td>0</td>
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<td>Broward(^3)</td>
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<td>0%</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td></td>
<td>Federal</td>
<td>0%</td>
<td>-</td>
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<tr>
<td>Miami-Dade(^4)</td>
<td>State</td>
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<td></td>
<td>Federal</td>
<td>0%</td>
<td>-</td>
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<td>-</td>
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<td>-</td>
</tr>
</tbody>
</table>

\(^a\) Contingency/ Confidence applied to Sand Availability for 2012:
- Volumes where calculated with a 2' vertical buffer
- 25% loss in PBC for talus
- 90-60-30% confidences to category volumes

\(^b\) Increased delta from 888,863 $\rightarrow$ 210,000,000 cy
Conclusion

- Southeast Florida has sufficient domestic sand resources to support placement of scheduled full-sized projects beyond the 50-year need (FY62)

- FDEP funded CP&E technical review was delivered earlier this week and comments are currently being incorporated

- **Momentum:**
  - Address technical review comments
  - Finalizing the SAND Study documents
  - Decisions regarding sand sharing sources