St. Lucie Inlet Sediment Management: Sustaining the Beaches of Martin County

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In the beginning...
Management of St. Lucie Inlet

• **1892** – Inlet was first opened by local interests
• **1927** – Locals construct 3300 ft North Jetty
• **1948** – Federal construction of channel through offshore reef
• **1982** – Expanded federal project initiated
  – North jetty extended to 4000 ft
  – South jetty constructed to a length of 1320 ft
  – Offshore 400 ft breakwater constructed
  – Impoundment basin construction initiated
• **1994** – St. Lucie Inlet Management Plan
• **2002** – Impoundment basin completed
• **2009** – North jetty improvements completed
LAKE O KEE CHO-BEE, OR WEE-THLOKO, OR BIG WATER.

1838
St. Lucie Inlet – 1930
(“natural” channel depths)
Major Inlet Features
Updated Inlet Sediment Budget Analysis

- Historical shoreline change
- Wave-induced sediment transport
- Inlet hydrodynamics and sediment transport
- Annual shoreline and bathymetry monitoring
Historical Shoreline Change
Wave-Induced Sediment Transport
August 2007 Bathymetry
August 2008 to 2009 Change
What is the influence of inlet hydrodynamics?

Modeling Results
Predicted shoaling and scour versus measured bathymetric change
Bathymetric Change Areas
St. Lucie Inlet Shoaling Rates
## Observed Bathymetric Change (2003-2006 and 2007 to 2010)

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<tr>
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<tbody>
<tr>
<td><strong>Area I</strong></td>
<td>163,791</td>
<td>156,157</td>
<td>160,127</td>
</tr>
<tr>
<td><strong>Area II</strong></td>
<td>25,144</td>
<td>46,304</td>
<td>35,301</td>
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<tr>
<td><strong>Area III</strong></td>
<td>-25,321</td>
<td>-32,698</td>
<td>-28,862</td>
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<tr>
<td><strong>Total</strong></td>
<td>163,614</td>
<td>169,763</td>
<td>166,566</td>
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Updated Inlet Sediment Budget 2011
Beach Monitoring Sectors

HOBE SOUND NATIONAL WILDLIFE REFUGE
BEACH PLACEMENT AREA
VOLUME TEMPLATES BY SECTOR

DATE OF AERIAL PHOTOGRAPHY: JUNE 2010
Profile Fill Remaining

The graph shows the profile fill volume remaining from July 2007, August 2008, August 2009, and August 2010, plotted against DEP R Transect. The fill limits are indicated by the arrows, showing the range between the highest and lowest fill volumes.
Beach Volume Change

Hobe Sound National Wildlife Refuge
Beach Disposal Area Volumetric Change

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Volumetric Change (cu yd)</th>
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<tbody>
<tr>
<td>July 2007 - August 2008</td>
<td>(100,000)</td>
</tr>
<tr>
<td>August 2008 - August 2009</td>
<td>(80,000)</td>
</tr>
<tr>
<td>August 2009 - August 2010</td>
<td>(60,000)</td>
</tr>
<tr>
<td>July 2007 - August 2010</td>
<td>(40,000)</td>
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Legend:
- Sector I
- Sector II
- Sector III
- Total
Other Ongoing Local Efforts

- Bathtub Beach
- Town of Jupiter Island
- Sailfish Point
ATLANTIC OCEAN

PROJECT
YEAR  | FILL VOLUME CUBIC YARDS | DREDGING COST  | COST/CY ($)  | FILL LENGTH (FT.) | SECTION CY/FT
--- | --- | --- | --- | --- | ---
1973-1974 | 3,488,759 | $3,200,000 | $0.92 | 26,000 | 134.2
1977-1978 | 1,327,289 | $1,750,000 | $1.32 | 13,000 | 102.1
1983 | 1,000,000 | $2,430,000 | $2.43 | 9,000 | 111.1
1987 | 2,234,869 | $3,000,000 | $1.34 | 16,200 | 138.0
1990 | 585,308 | $2,719,000 | $4.65 | 9,600 | 61.0
1991 | 414,812 | $2,545,000 | $6.14 | 8,800 | 47.1
1993 | 203,736 | $1,239,000 | $6.08 | 4,200 | 48.5
1995/1996 | 1,741,134 | $9,596,000 | $5.51 | 26,000 | 67.0
2002/2003 | 1,519,561 | $8,281,000 | $4.94 | 30,500 | 49.8
2006/2007 | 1,706,711 | $11,300,000 | $6.62 | 27,000 | 63.2
2012 | 1,200,000 | $11,520,000 | $9.60 | 24,000 | 50.0
1973-2012 | 15,422,179 | $57,580,000 | | |
Sailfish Point and Bathtub Beach

- Recent changes to beach/dune stability
- Dune restoration
- Beneficial reuse
Sailfish Point and Bathtub Beach

Evaluation of beach nourishment scenarios
Questions

Sustaining the Beaches of Martin County

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- Gahagan & Bryant Associates
- Atkins
- Taylor Engineering
- Isiminger & Stubbs Engineering
- Olsen Associates
Indian River Inlet – 1861 (natural channel depths)