Deer Island Evolution and Morphology

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Introduction

- Recently acquired by the State of Mississippi
- Incorporated into the Mississippi Coastal Preserves Program
- Located just offshore of the entrance to Biloxi Bay
- Remnant portion of the mainland
- Shoreline erosion dominant on eastern end, slight accretion on western end, overall loss of about 2.4 acres per year
Methods

- Field survey of shoreline morphology
- Shoreline change monitored by GPS surveys
- Buffers used to determine advance and retreat of the shoreline
- Long and short term erosion rates used to extrapolate possible future shoreline changes
Morphology Determining Factors

- Shoreline and adjacent morphology divided into 6 types based on 8 existing morphological components
- 1. Beach: sub-classified as wide or narrow
- 2. Remnant geology
- 3. Relict features: trees, stumps, etc.
- 4. Wooded: sub-classified as mixed or pine
- 5. Grass: dune and marsh types
- 6. Scarps: sub-classified as large or small
- 7. Marsh platform: sub-classified as large or small and further distinguished as angled, terraced, or steep
- 8. Spit
Type 1: Spit

- Narrow land formation that is tied to the coast at one end. It is formed by the longshore movement of sediments.
Type 2: Marsh, Marsh Platform

- Feature characterized by fine grained organic-rich soils and dominated by marsh grass. It is subdivided into angled, terraced, and steep.
Type 3: Marsh or Marsh Platform with Beach

- Same as previous, but is fronted by a small or narrow sandy beach.
Type 4: Beach

- Sandy sediments that accumulate along the shore, typically associated with dune grasses. Sub-classified as wide or narrow.
Type 5: Wooded Beach

- Sandy beach that is backed by a maritime forest composed of either mixed trees or pine trees.
Type 6: Relict Beach

- Sandy beach that contains relict stumps, trees, or other vegetation that have remained after the original shoreline receded.
Deer Island Morphology
Area
1950: 563 acres
1993: 456 acres  Land loss of 107 acres
Areas of Erosion & Accretion: 1993-2002

Area
1993: 456 acres
2002: 433 acres  Land loss of 23 acres
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<th>&gt;2m</th>
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**Indicator**
- High
- Stable
- N\A

**Map**
- Scale: 1 Kilometer
- Orientation: North (N)
Extrapolated Shorelines

- Shoreline data collected in the past can be used to predict future shoreline changes.
- Cross-shore profiles are used to determine erosion rates over two different time frames, one long and one short.
- In this case the periods used extended from 1950-1993 (43 yrs.) and 1993-2002 (9 yrs.).
- Both long and short-term erosion rates are averaged and used to extrapolate a predicted shoreline for a specified year in the future.
2050 Extrapolated Shoreline

2002 Shoreline
2050 Shoreline
Conclusions

• Average land loss due to erosion is 2.4 acres per year
• Marsh platform areas with beach and spit morphologies are associated with medium to high erosion
• Beach and wooded beach morphologies are associated with stable shorelines
• The average acreage loss of the 2050 shoreline is very close to the average over the last 52 yrs.
• Future investigations might include determining specific factors that cause certain morphology types to erode faster and correlating sand bar morphologies to island morphology types