

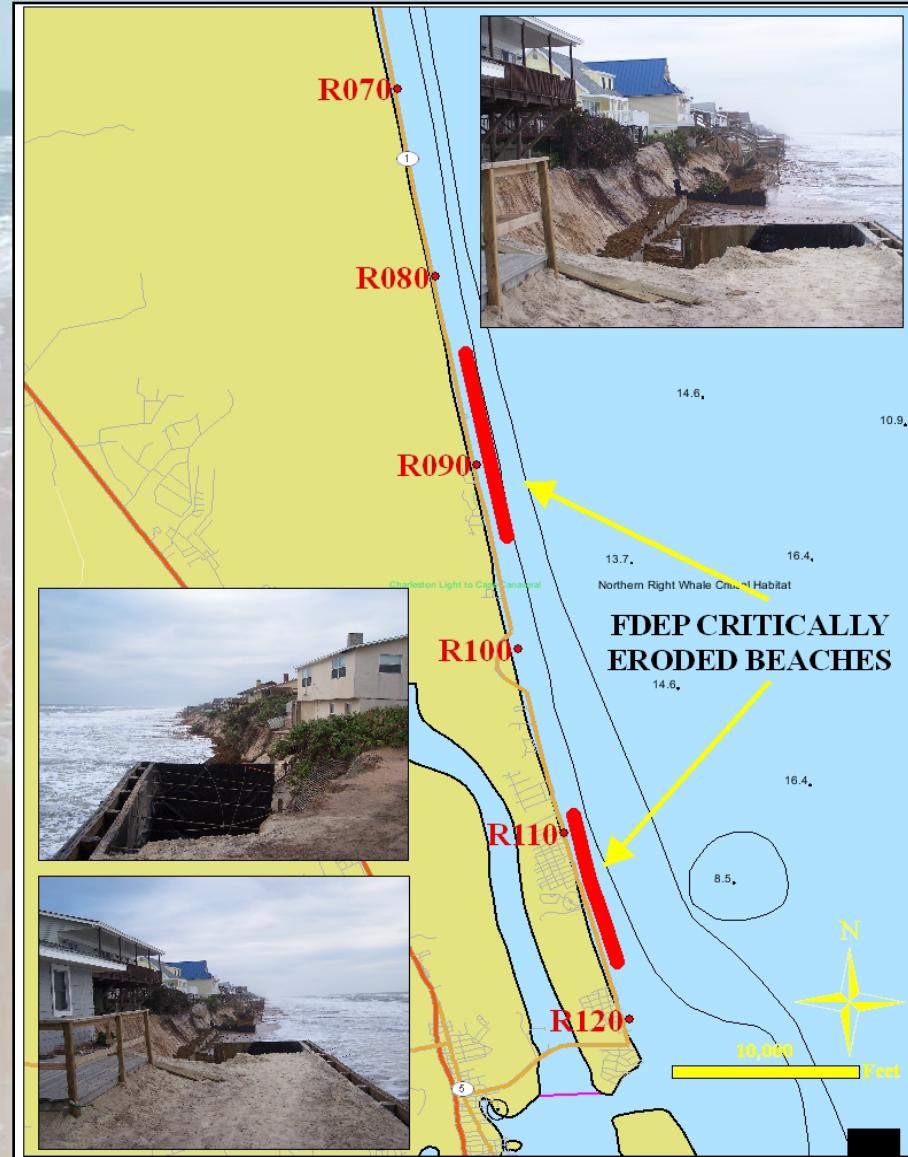
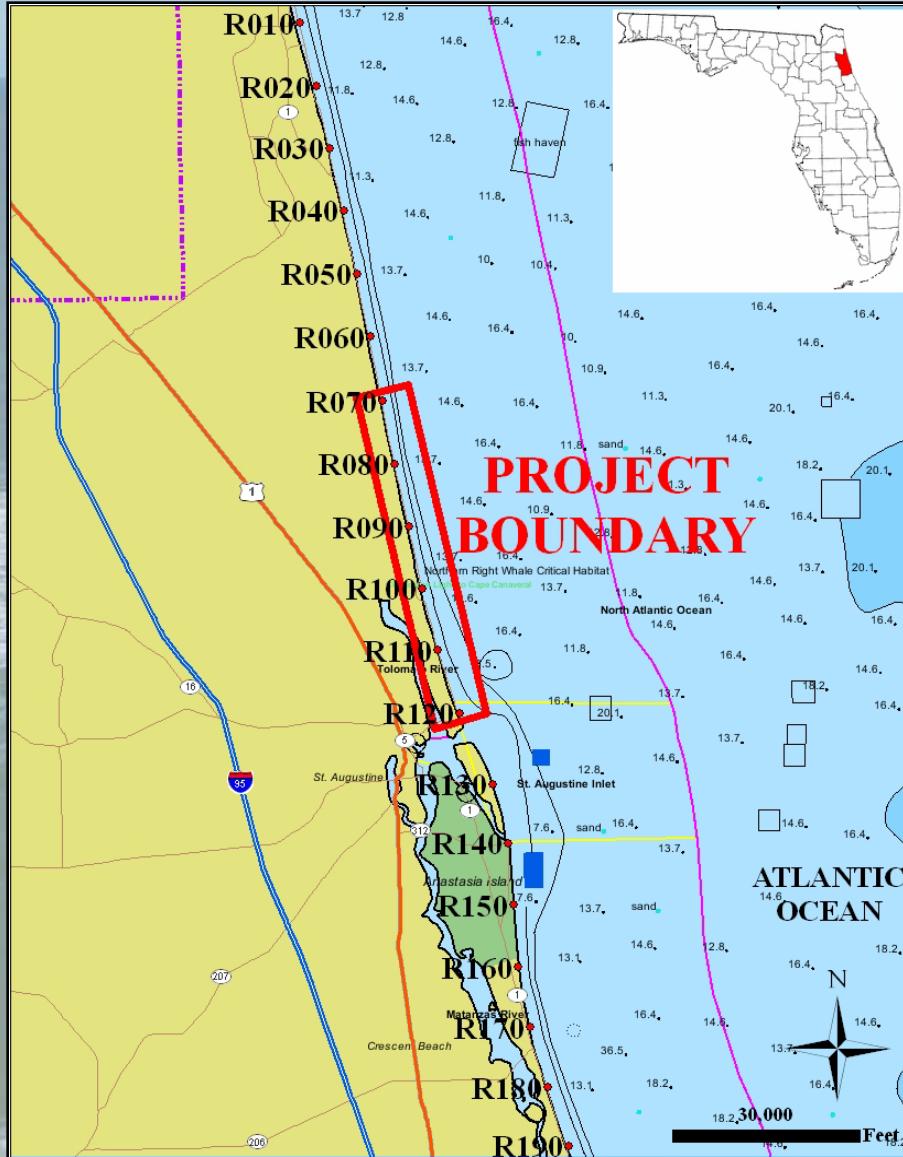
Planning a Beach Nourishment Project Using GIS in Ponte Vedra Beach, FL



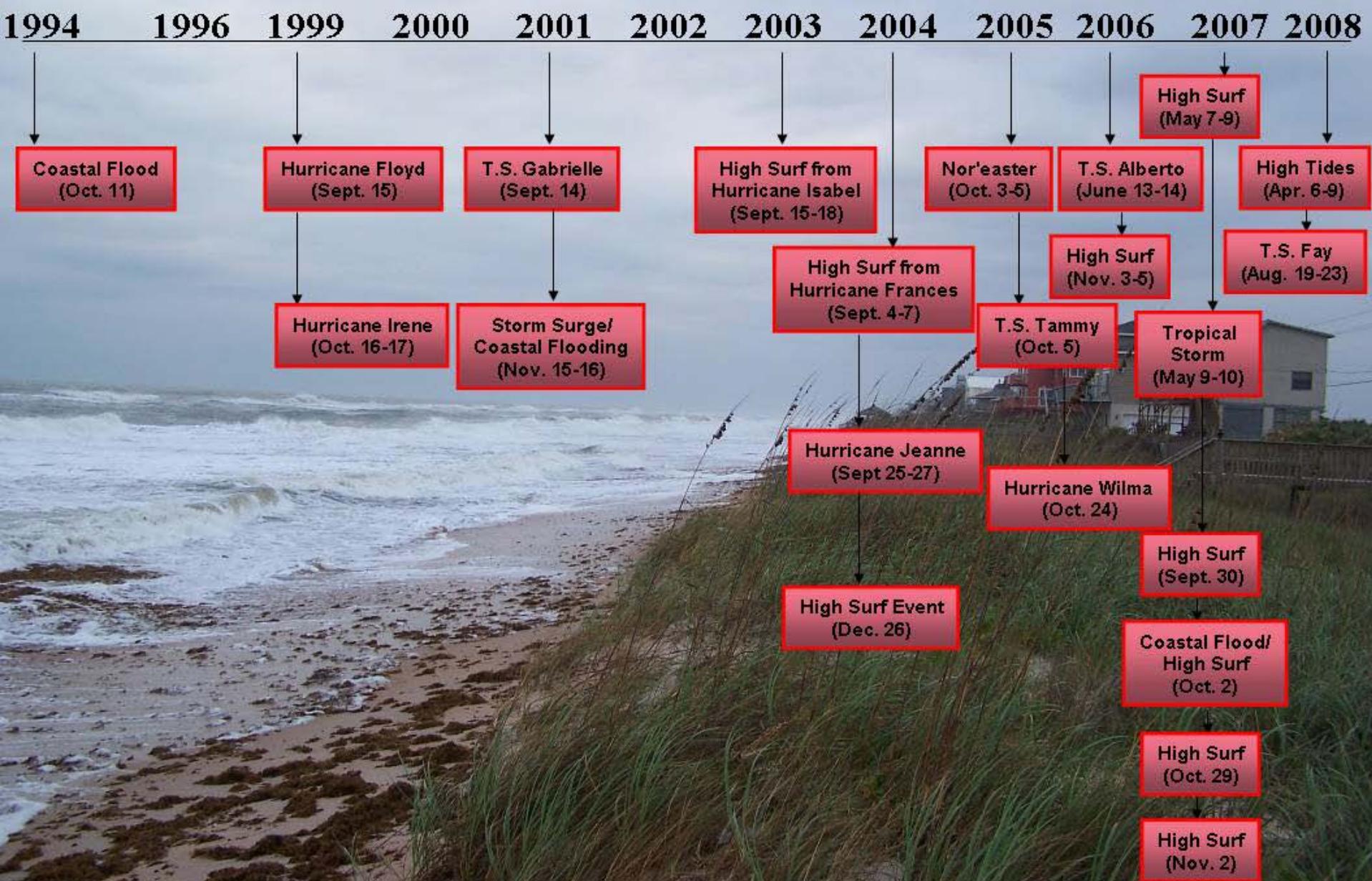
Presented by:
Bryan Flynn, EI
Matt Starr
Todd DeMunda, EIT
Jeffrey Tabar, PE



Study Location



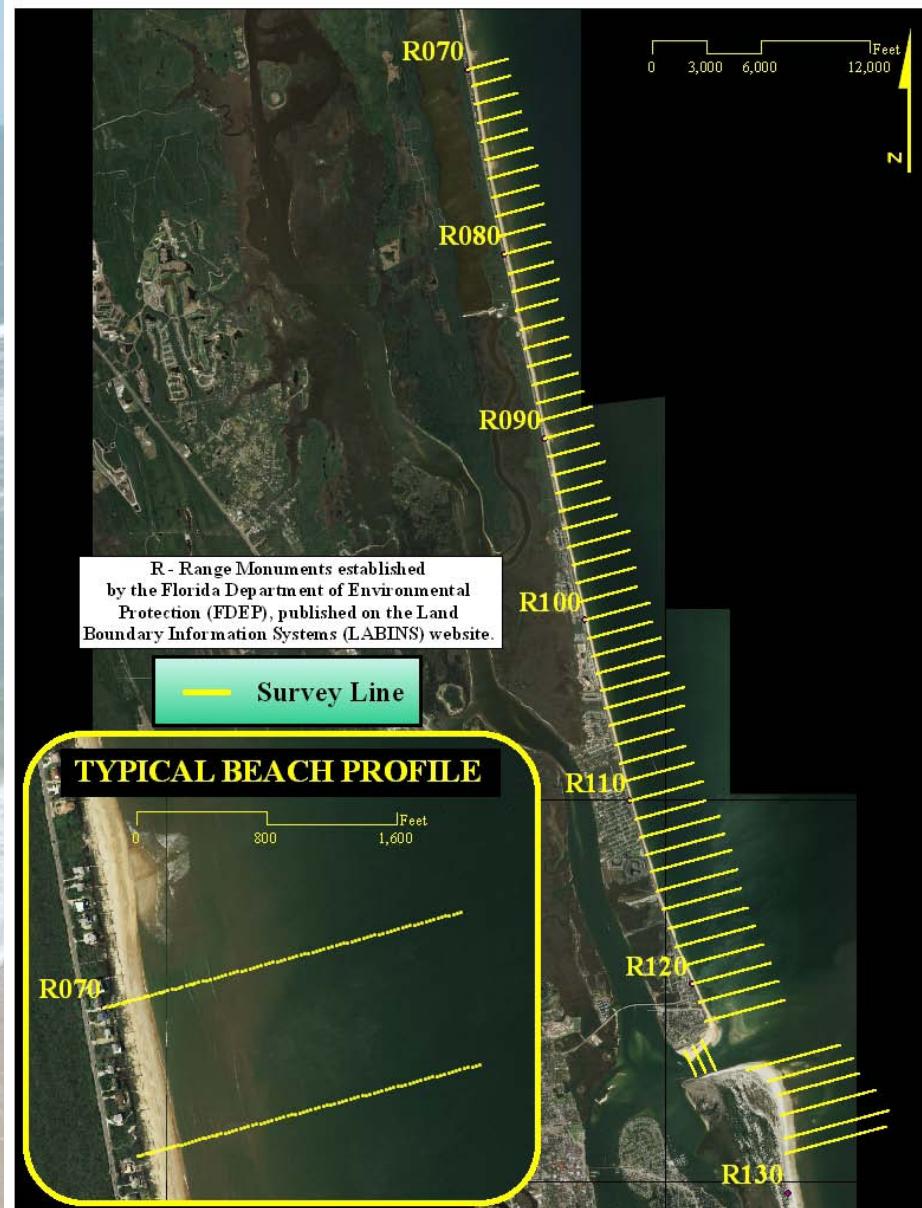
ST. JOHNS COUNTY STORM EVENTS



Residences

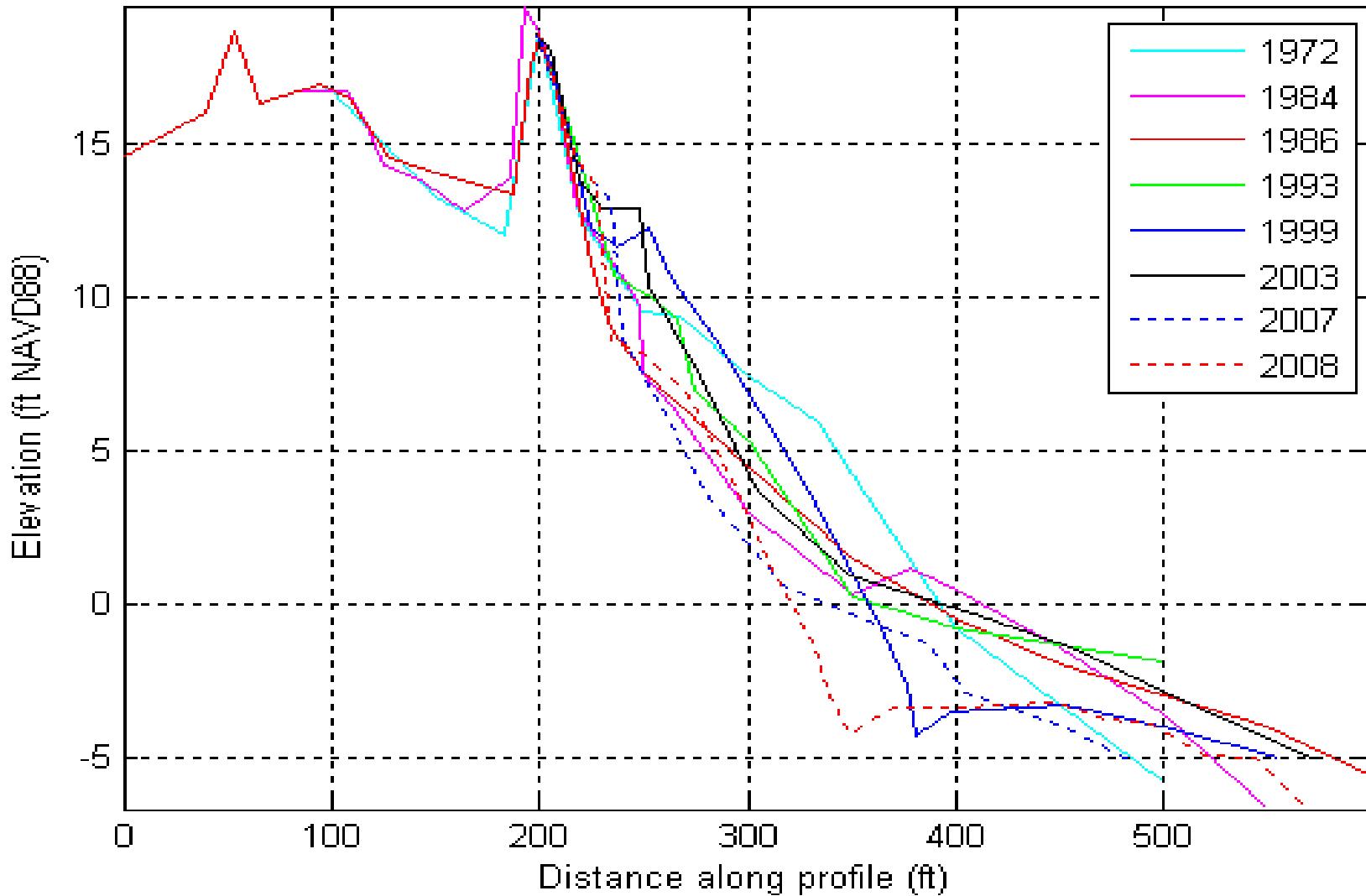


Beach Survey Transects



Beach Profile Data

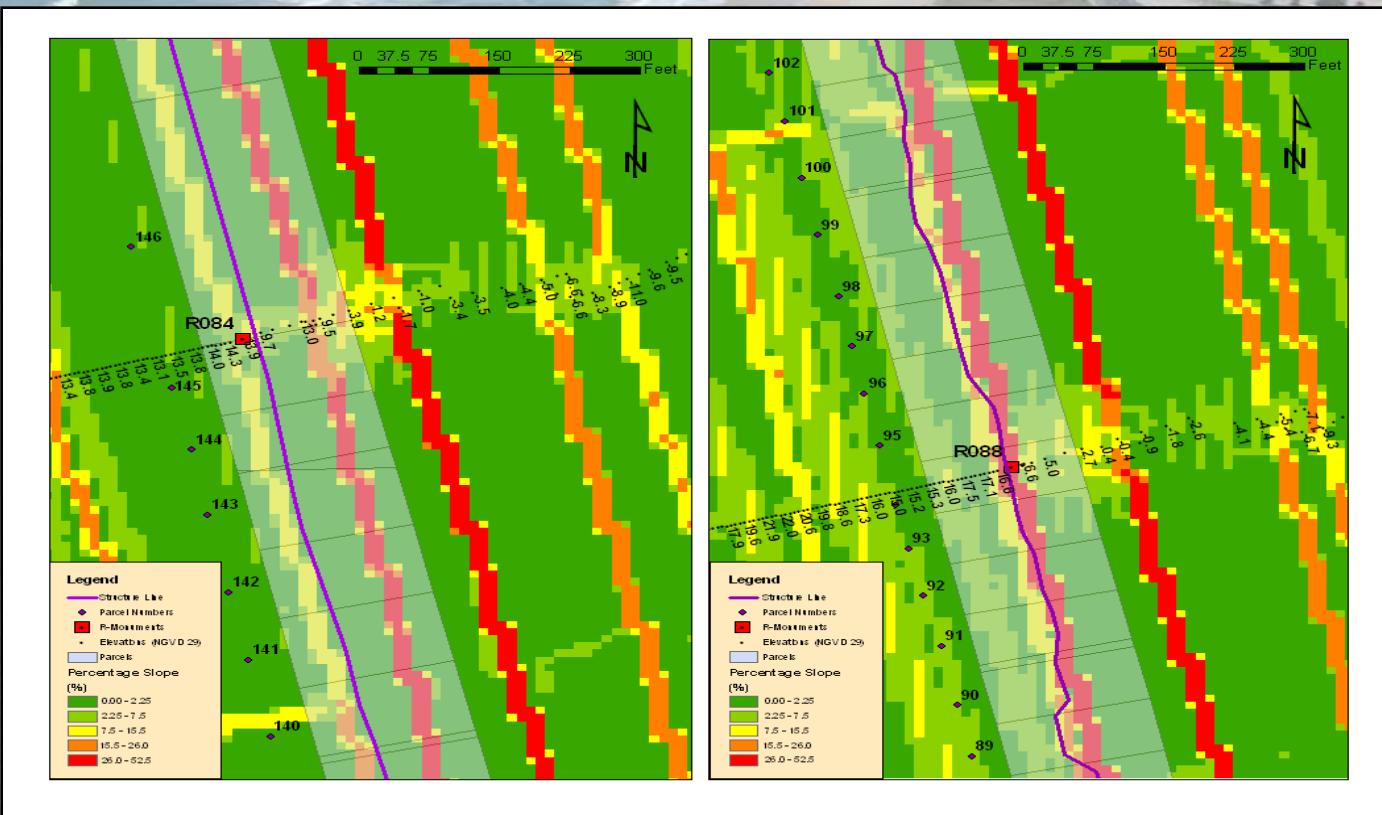
St. John's County
Profile R-87



FDEP Emergency Permit Criteria

- Protect residences that are unstable
- Slope stability analysis modeled in geotechnical report
- Utilized GIS to graphically depict the results of the geotechnical report for presentation to county and residents

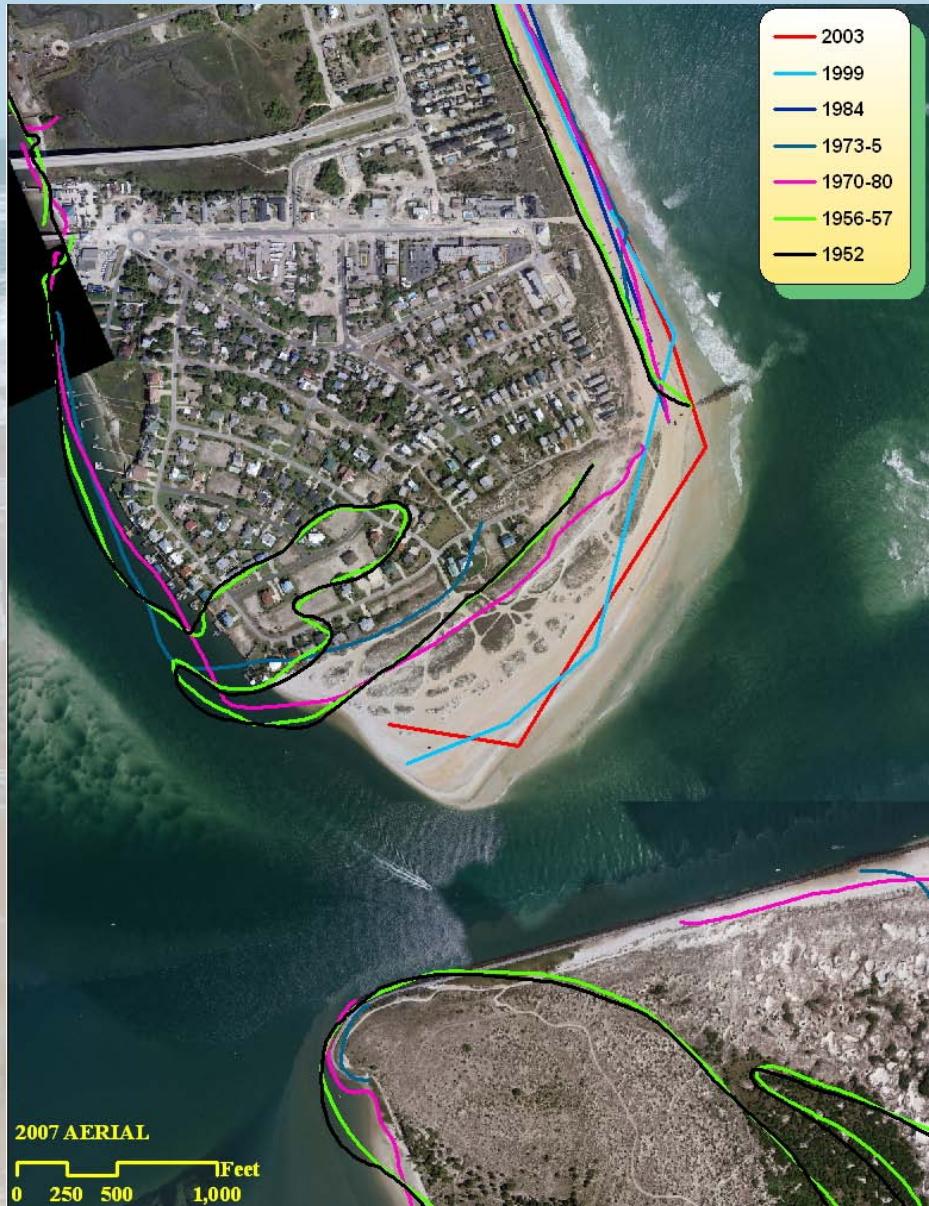
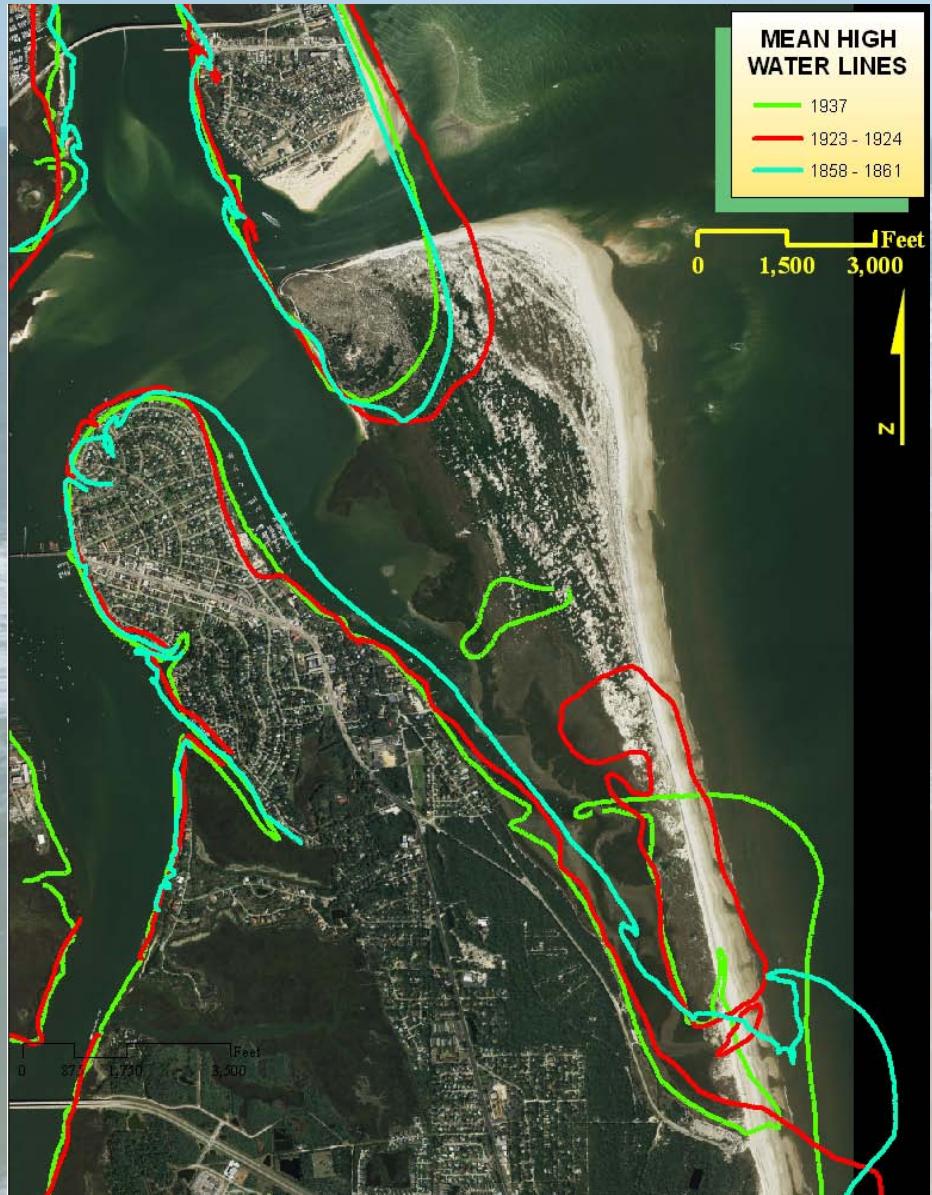
GIS Slope Analysis



Beach Restoration Feasibility Study

- Plan, design and permit a beach nourishment project
- Historical shoreline change
- Sediment transport modeling
- Sand Search – offshore and upland sources

Historical MHW Lines



Historical Profile Analysis

Shoreline and Volume Changes from Profile Data				
R-70 to R-120				
Years	ΔV_{avg} (yd ³ /ft/yr)	ΔV_{max} (yd ³ /ft/yr)	ΔS_{avg} (ft/yr)	ΔS_{max} (ft/yr)
1972 - 2003	-0.2	-1.6 (R-117)	-1.2	-3.3 (R-118)
1972 - 2008	-0.5	-1.5 (R-116)	-1.2	-3.1 (R-116)
2003 - 2007	-3.0	-9.9 (R-88)	-3.9	-13.0 (R-88)
2003 - 2008	-3.1	-8.3 (R-88)	-1.4	-8.8 (R-88)
2007 - 2008	-1.2	-11.7 (R-116)	+9.9	-16.0 (R-119)

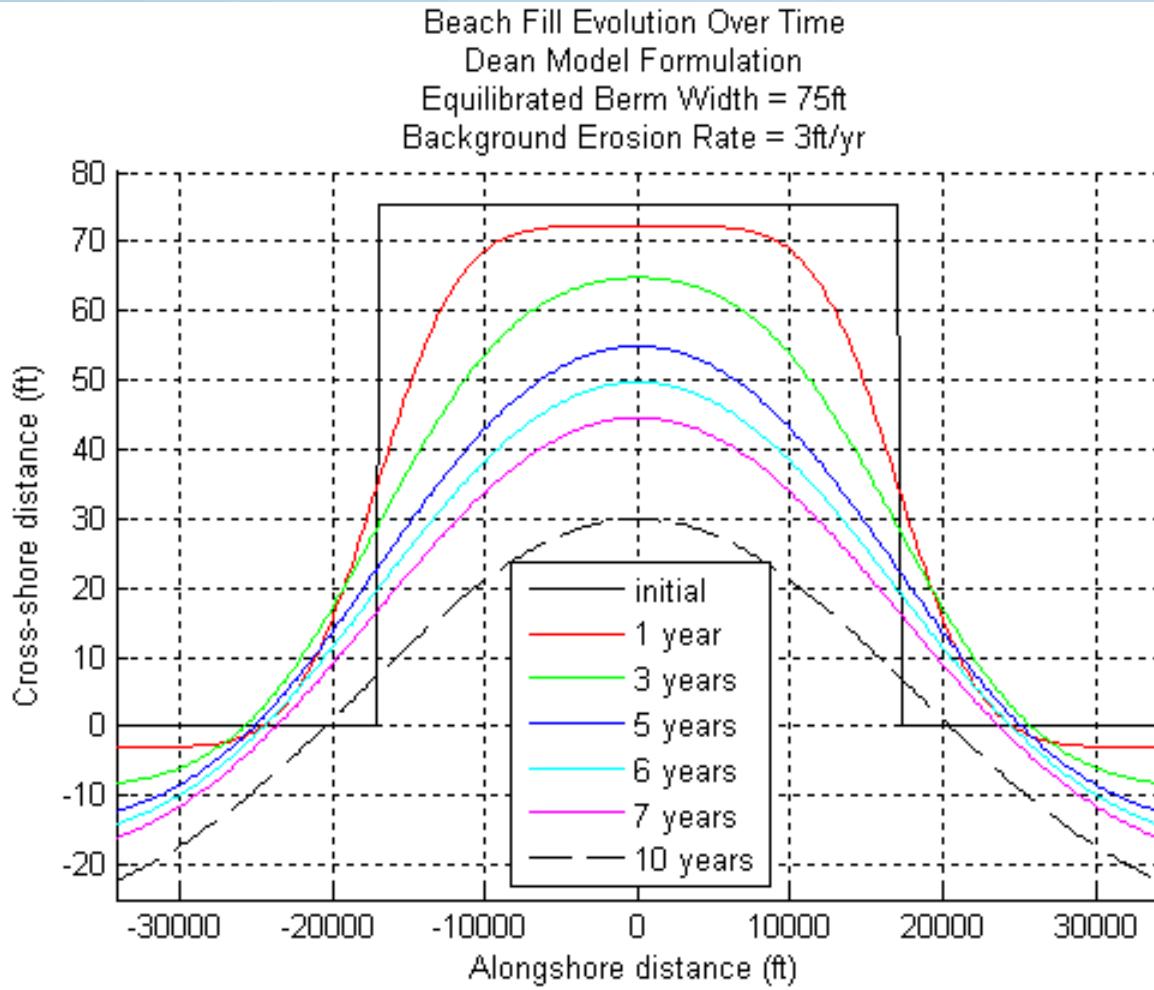
Recent Erosion Trend

- 1972-2003: mild erosion (-0.2 yd³/ft/yr)
 - 2003-2007: increase erosion (-3.0 yd³/ft/yr)
 - 2007-2008: moderate erosion (-1.2 yd³/ft/yr)
-
- 1994-2003: less than 1 storm per year
 - 2003-2007: 3 storms per year
 - 2007 : 6 storms
 - 2008 : 2 storms

Design Width Determination

- SBEACH: determine minimum berm for storm protection
 - 30 ft wide at +10 ft NAVD88
- Historical profiles: estimate average rate of shoreline recession
 - Recession rate of 3 ft/yr
 - Double to account for lateral diffusion
 - Assume 5 yr project life → additional 30 ft
- First-time project losses based on performance of similar projects: add 25%
- **Design berm = $(30 \text{ ft} + 30 \text{ ft}) * 1.25 = 75 \text{ ft}$**

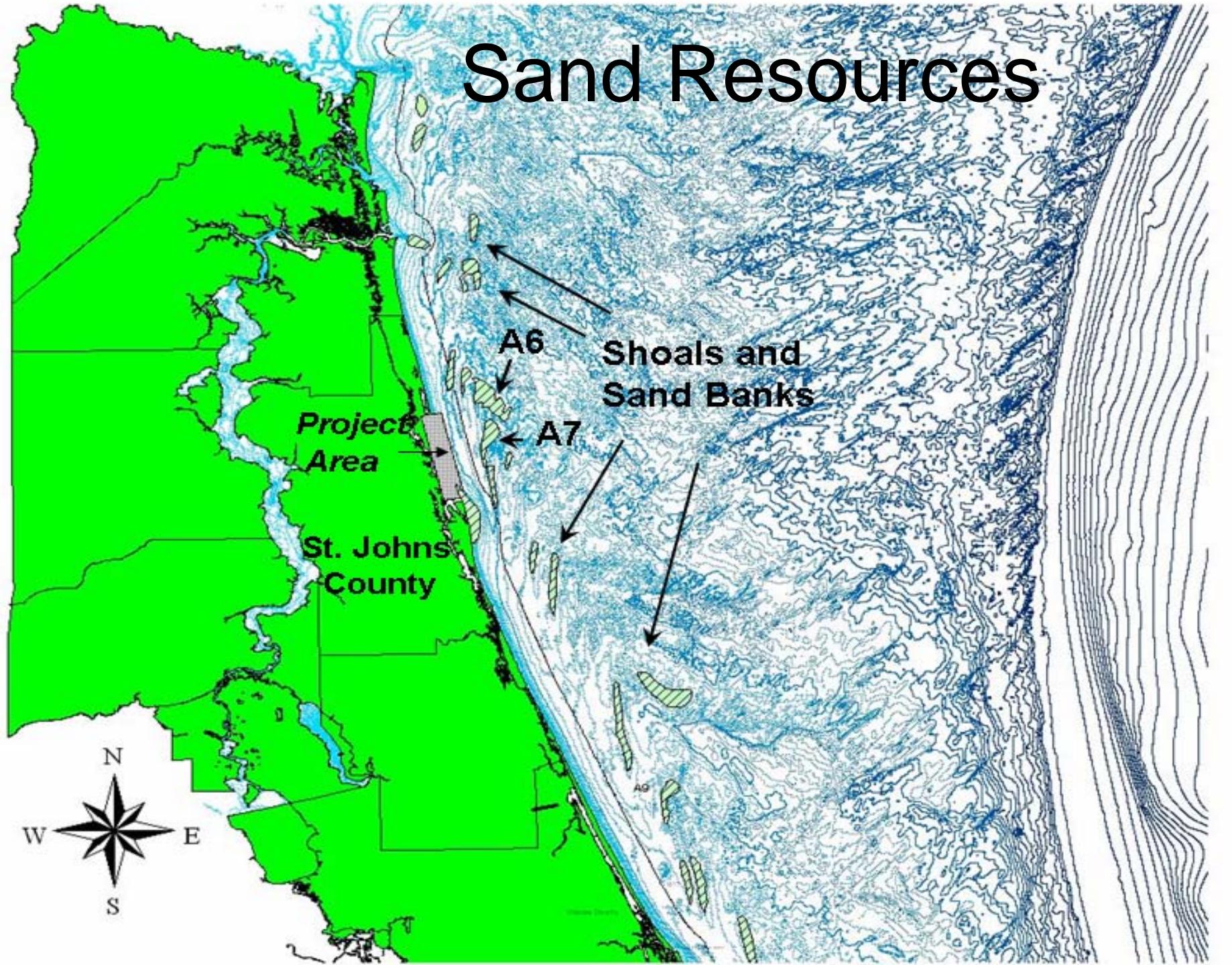
Beach Planform Evolution



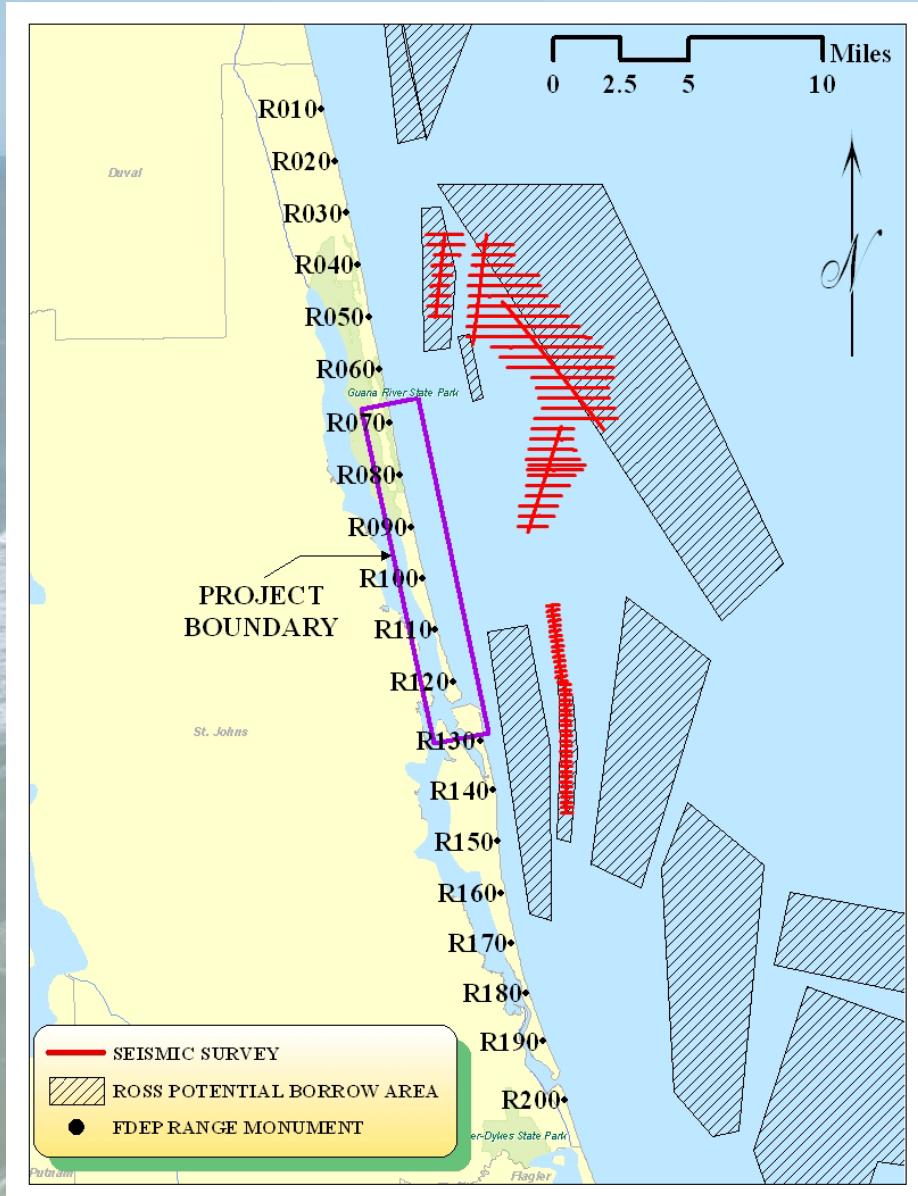
Beach Performance



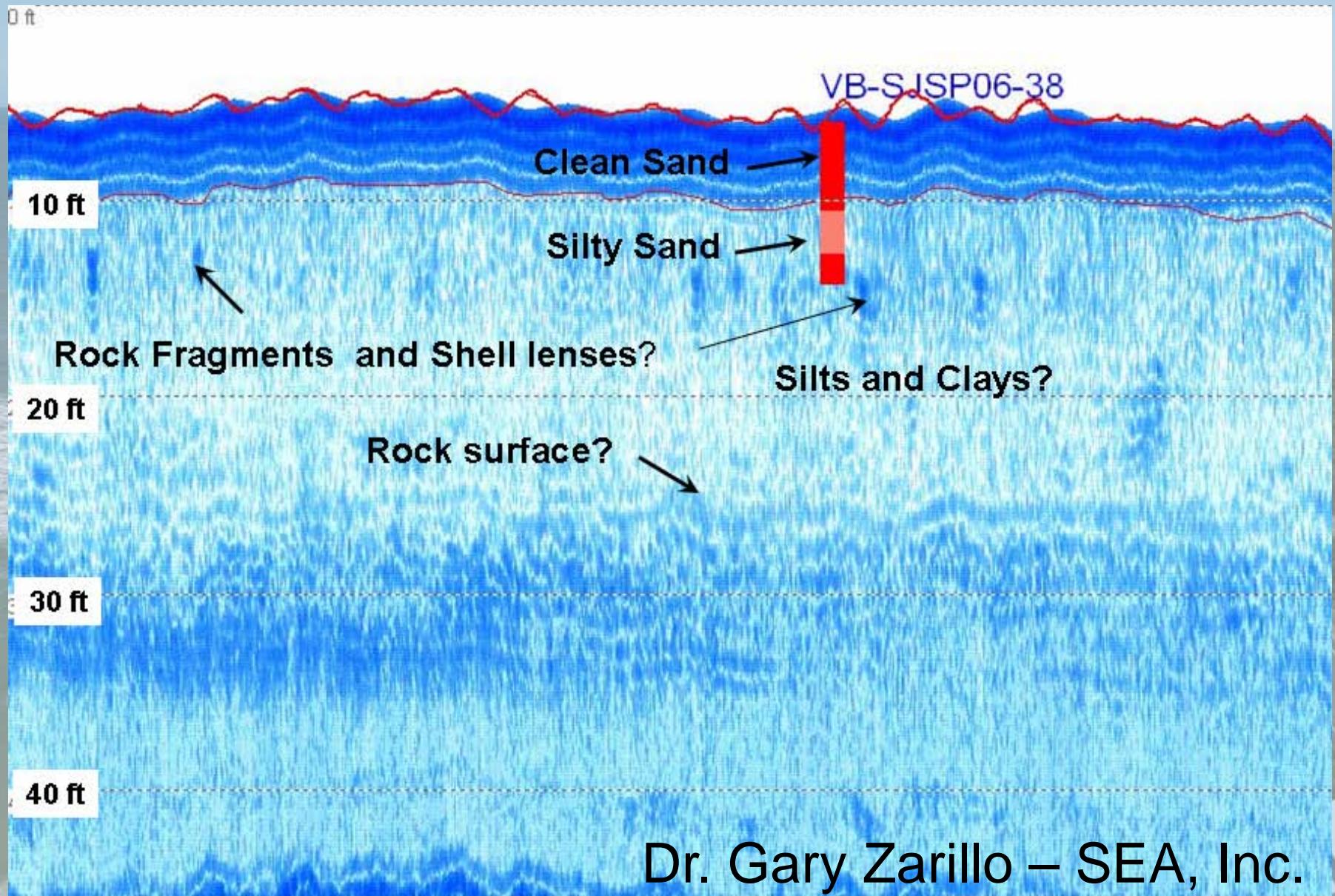
Sand Resources



Sand Resources



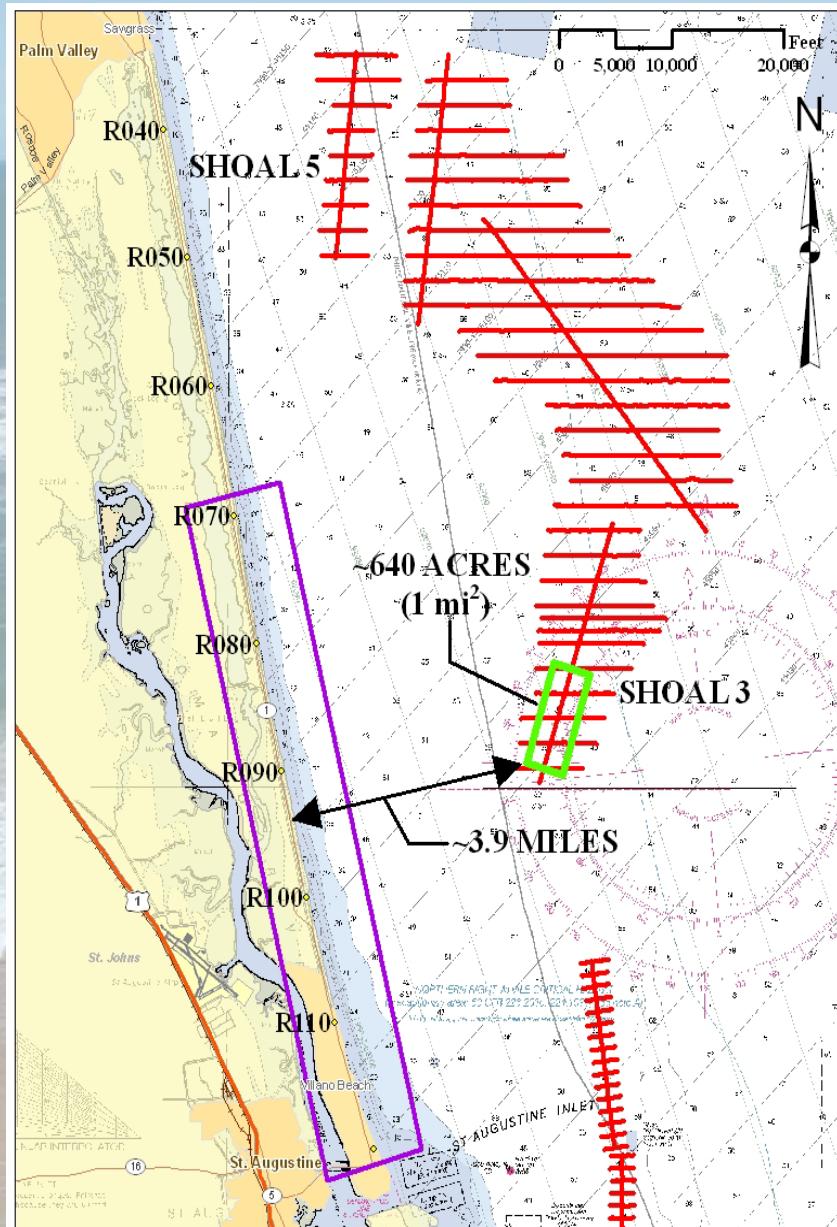
Subbottom Survey



Sand Resources

- Five sand shoals identified
- Beach compatibility
 - Native 0.23mm
 - Shoals: 0.17mm to 0.27mm
- Total volume: approx: 80 million cubic yards

Preferred Borrow Area



BEFORE RESTORATION



AFTER RESTORATION (CONCEPTUAL)



An aerial photograph of a coastal landscape. A long, sandy beach stretches from the foreground towards the horizon. The ocean to the left has white-capped waves crashing onto the shore. To the right, a paved road runs parallel to the beach, with some low-lying buildings and green vegetation further inland.

Thank You Questions?

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