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Analyzing Shoreline Change in the New River Estuary (NRE)

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Objectives

Provide information to support Shoreline Management Plan for Marine Corps Base Camp Lejeune

- Calculate shoreline change rates in NRE
- Characterize shoreline type in the NRE
- Calculate wave exposure within the NRE
- Analyze the influence of wave exposure and shoreline composition on shoreline change rates.

Shoreline Change Rate (SCR)

- Imagery from 1956, 1989, and 2004 used to calculate SCR (Fig 1).
- SCR computed from points every 50 m along the shoreline.
- Mean SCR ~ Equal over time
- Mean SCR over 44 yr (1956-2004) = 12.3 m loss

Figure 1. Map of Hospital Point displaying the digitized 1956, 1989, and 2004 shorelines.

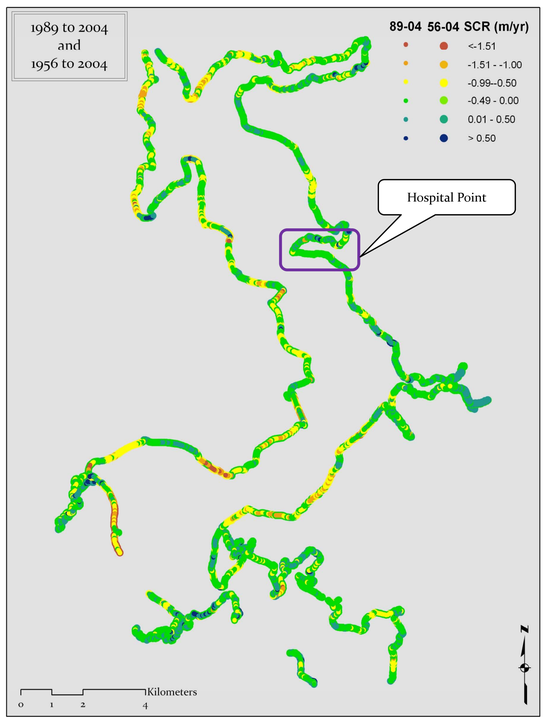

Figure 2.1956-2004 and 1989-2004 shoreline change rate.

Red pts = high erosion
Blue pts = accretion
Mixed colors = different SCR for each time series.
Constant color = constant SCR for each time series.

Shoreline Characterization

- Used 2004 imagery to characterize shoreline types (Fig 3.)
- Ground-truthing (Fig. 4) revealed significant problems accurately identifying shoreline type
- Comparison of imagery vs. field-collected data (Table 1)
  - ~ 50% of marsh and modified shoreline improperly classified using imagery
  - No swamp forest detected using imagery
- Shoreline type map prepared using field-collected data (Fig 5)
  - 19% of the NRE Shoreline is modified (Table 1)
  - Majority (53%) of shoreline is sediment bank (Table 1)

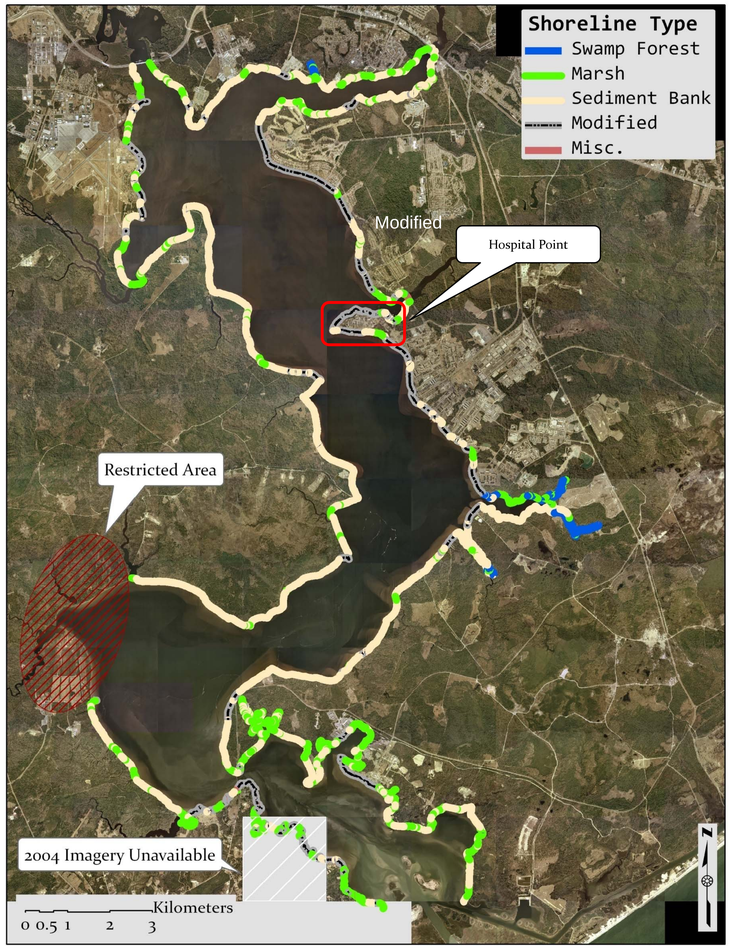

Figure 5. Map of NRE shoreline characterization performed with field techniques.

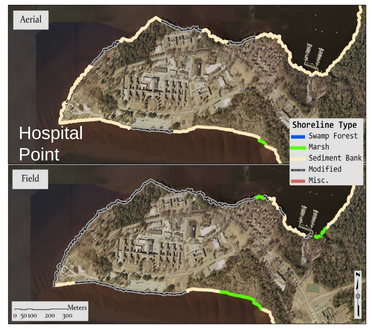

Figure 3:. Hospital Point shoreline characterization mapped via aerial photography and field technique.

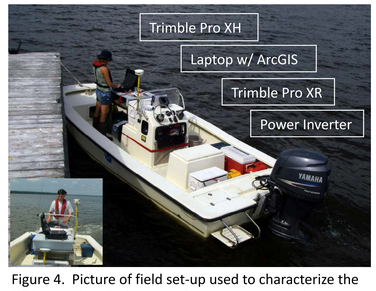

Figure 4. Picture of field set-up used to characterize the NRE shoreline. Entire shoreline was mapped this way.

Table 1. Summary table of shoreline type lengths for aerial and field mapping techniques.

Description	Length (km)	
	Aerial	Field
Unclassified	3.6	0.0
Swamp Forest	0.0	7.3
Marsh	15.9	26.5
Sediment Bank	91.6	66.3
Modified	13.1	24.3
Miscellaneous	0.8	0.7
Total	125.0	125.1

Summary

- Between 1956 and 2004, the New River Estuary shoreline position receded an average of 12.3 meters, or -0.28 m/yr
- The majority of NRE shoreline is composed of sediment banks, which exhibit the highest erosion rate (Fig. 6)
- Shorelines classified as modified, or hardened, in 2009 field-based study exhibited the second highest erosion rate between 1956 and 2004. Many of these modified shorelines are in areas receiving the highest wind wave energy. Installation dates of modifications and more recent aerial imagery are required to evaluate the effectiveness of shoreline modifications.
- Field-based ground-truthing is required to accurately characterize the shoreline

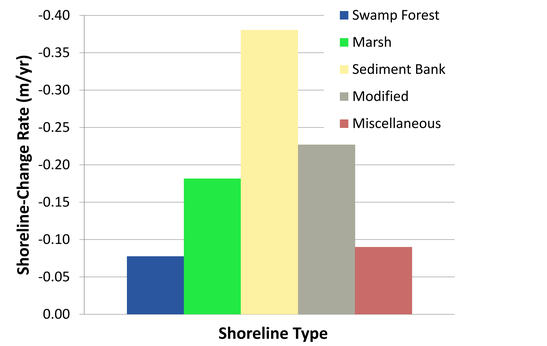

Figure 6. Mean shoreline-change rates from 1956 to 2004 for the five shoreline types characterized.

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