

Report on The Effects of Hard Structures on Sandy, Open-ocean Coastlines

To be prepared by the CRC Science Panel - Proposed Draft Outline

1. Introduction

- a. General high-level overview of shoreline change and barrier island dynamics across the range of relevant scales
 - Overview of alongshore vs. cross-shore dynamics;
 - Long-term evolution and change; large volumes of sand moving
 - Storm impacts and change
- b. The NC ocean coastline
 - Alongshore-extended high-energy coastline facing long-term erosion; lots of sand moving alongshore, inlets and barrier islands
 - Rates of shoreline change, how they are monitored, why they vary
 - Erosion hot spots (what they are, why they exist, provide examples);
- c. Categories of erosion management approaches for sandy, ocean coastlines
 - Avoid the problem (setbacks, relocation)
 - Plant or use fences (trap wind-blown sand)
 - Add sand (nourishment and dune construction)
 - Trap sand with structures (*focus of this report, see section 2*)
 - Harden the shoreline (*focus of this report, see section 2*)
- d. What is allowed currently in NC and already being used?
- e. The challenge of reducing erosion in one place leading to erosion elsewhere resulting in tradeoffs;
 - Brief overview of the types of physical effects that arise from trapping sand with structures and hardening the shoreline; sometimes used in combination
 - Differences between high-energy open ocean coastlines vs. lower energy estuarine shorelines where living shorelines are often employed
 - Brief overview of ecological impacts, and their importance (including recreationally and commercially important species and other managed species).

2. The effects of Structures that Trap Sand and Shoreline Hardening

For each approach listed provide intended purpose, physical effects, brief statement of potential ecological impacts, and tradeoffs)

a. Structures that Trap Sand

- Jetties (intended effects to provide safe navigation, but affects erosion)
- Groins (traditional designs vs. leaky, which can reduce consequences)
- Terminal groins (located at the end of islands)

- Offshore breakwaters and wave attenuators (visible, submerged, floating)
- b. Shoreline Hardening
 - Seawalls - concrete
 - Seawalls - revetments and riprap
 - Seawalls - Sand bags and geotextile tubes (size limits more important than time limits– scale is important; same effect as seawalls)
- 3. Key Lessons learned - a few examples