

# **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