



Concerns & Considerations Regarding a Hardened Structure at Cape Fear Bald Head Island Conservancy June 27, 2024

On June 19, 2024, language was added to [NC House Bill 385](#) which, if passed by the General Assembly, would give the Village of Bald Head Island (hereafter ‘Village’) the legal authority to pursue the option of using a hardened structure to mitigate shoreline erosion on the east side of South Beach near the shoals of Cape Fear (hereafter ‘Shoals’). Bald Head Island Conservancy recognizes the important and complex environmental and economic issues related to the accelerating beach erosion in this region. However, we encourage a cautionary approach when considering a hardened structure in this location as we are not aware of existing engineering solutions that have been successful at stabilizing such a dynamic and complex littoral system as the shoals at Cape Fear. Further, as outlined below, there are significant potential environmental impacts that could arise if a hardened structure is installed in this location. Passing legislation to permit a hardened erosion-control structure at a non-inlet cape is, at a minimum, premature because it sets a risky precedent for the State of North Carolina allowing for the hardening of natural shorelines without adequate research or understanding of these systems.

The Village will have the opportunity to examine how the Shoals responds to the voter-approved 2025 renourishment project that could fundamentally change the physical dynamics of the area. Thus, we recommend the Village and State of North Carolina halt current legislative action regarding Part XVII of House Bill 385 specific to new legislation allowing the installation of a hardened structure at the Shoals based on the following concerns:

#1 = Effectiveness

- NC’s Seawall Ban was recommended by the Coastal Resources Commission (CRC) in 1985, except when protecting historic buildings that cannot be moved or to maintain waterways needed for navigation (e.g., Oregon Inlet). The latter category includes the Bald Head Island (BHI) terminal groin at the inlet of the Cape Fear River. The CRC conducted a study in 2009 on the environmental impacts of terminal groins, but all examples focused on inlet groins.
- All large rock groins in NC are located at inlets and are intended to keep sand from moving into inlets in a downdrift direction. This includes the BHI terminal groin which captures sand moving westward towards the Cape Fear River. Cape Hatteras has a small groin field upstream of the old lighthouse location but officials chose to move the Cape Hatteras Lighthouse rather than install a more significant groin structure just south (downdrift) of the Lighthouse.
- BHI’s Shoals are located at the intersection of two littoral systems, South Beach and East Beach, with bidirectional sand movement. No one has been able to quantitatively predict or model the movement of the nearshore shoal feature because of the complicated nearshore geophysical environment and the unpredictability of storms that can bring strong prevailing wind and wave energy from multiple directions.
- The sources of sand to the Shoals are highly dynamic and influenced not only by sand supply from East Beach and South Beach, but also nearshore channels formed/changed during storms (Olsen and Associates 2023). Altering the dynamics of this system may exacerbate long-term erosion.

- A hardened structure at or near the Shoals would still require consistent renourishment projects to maintain the fillet. BHI's terminal groin rock structure and geotubes are often exposed even though this area receives regular renourishment.
- Without extensive geophysical modeling, it isn't clear if a hardened structure would create down-drift erosion issues on the southern side of East Beach or within the state of North Carolina property located at the intersection of East and South Beaches (aka 'The Point').
- A Bureau of Ocean Energy Management (BOEM) funded study evaluating many aspects of the larger Frying Pan Shoals system including its sand geophysics is currently underway (US Department of Interior 2023; research being led by UNC Wilmington coastal engineers and scientists). It seems wise to see its results/data before proceeding.

#2 = Policy

- The US Army Corps of Engineers occasionally makes environmental concessions about hardened structures because of their mandate to protect navigation: this is why terminal groins are approved at inlets but have never been approved at other locations.
- Placing barricades on the beach has impacts on public trust resources, including beach sand, wildlife, and fisheries - for the benefit of private entities. According to DEQ, "*the erosion-control structure must not adversely affect adjacent private properties, coastal resources or public use of the beach.*"
- Precedent: if this groin is allowed, how many more non-inlet groins will be approved in NC?

#3 = Sea Turtles

- The Endangered Species Act states that BHI's beaches are federally designated as 'Critical Habitat for Loggerhead Turtles' so this issue extends beyond local and state purview (see Figure 1).
- BHI's Shoals are a hotspot for sea turtle activity and nesting, with 36% of all BHI sea turtle nesting occurring within 13% of BHI's total shoreline area centered around the shoals point to the west and north (see Figure 2).
- Most of the nests in this area over the past few years have been relocated due to tidal overwash, but if there are false crawls, there are no nests to relocate. False crawls can result in eggs being deposited at sea and lost.
- Since the installation of the wall and sandbag revetment at the Shoals Club in 2022, there have been 29 direct observations of sea turtles interacting with these structures = 28 false crawls (sea turtle crawls onto the beach but does not lay a nest) and 1 nest among the sandbags where a small amount of sand had accumulated (it was relocated as the nest chamber was exposed).
- The southwestern corner of BHI near the terminal groin area has never been a sea turtle nesting hotspot, with only 243 of 1850 nests (13%) being laid in this area since 2002 (see Figure 2). Thus, it is not a good comparison for evaluating how a hardened structure at the Shoals would impact nesting sea turtles, although one nest was disturbed and three adult turtles were caught in the BHI's terminal groin during its construction (Sarah Finn, pers. comm.).
- Several studies in Florida have proven that the armoring of coastlines results in significant decreases in nesting success among green and loggerhead sea turtles (Mosier 1998, Mosier and Witherington 2002, Hirsh et al. 2022, NC Terminal Groin Study Final Report 2010).

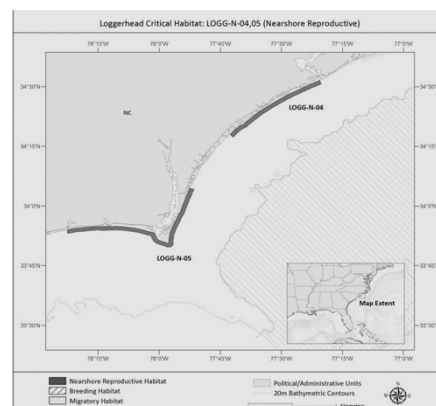


Figure 1. Map from 1973 Endangered Species Act showing Critical Loggerhead Habitat areas in SE NC

- NOAA and US Fish and Wildlife have identified the following specific threats of hardened structures to sea turtles (NMSF & USFWS 2008):
 - Prevention of access to suitable nesting sites
 - Abandonment of nesting attempts due to interaction with structure
 - Interference with proper nest construction and covering
 - Impeding/trapping nesting females and hatchlings (T-head design)
 - Enhanced predation due to increased predator concentrations
 - Alteration of current regimes and longshore sediment transport
 - Loss of nesting habitat due to escarpment formation
 - Increase in clutch mortality due to frequent inundation/erosion
 - Increase in hatchling and/or adult energy expenditures to overcome structures
 - Change in sand temperatures in nourished areas

Concluding Statement

The Village of BHI just approved a major renourishment project for 2025 that will provide a substantial volume of sand on the east side of South Beach. Additionally, the ongoing BOEM study is likely to provide considerably more background data and insight on the geophysics of the Shoals' complicated littoral system. Given that we are not aware of current examples of engineering projects that have successfully stabilized the shoreline of a shoals/cape littoral system, we strongly recommend 1) determining the success or failure of the 2025 sand placement in slowing erosion in this area of South Beach and 2) allowing the BOEM study to provide a better understanding of Frying Pan Shoals dynamics before passing legislation regarding shoreline erosion control structures near The Point. Further, any type of hardened structure is likely to have deleterious consequences for federally-listed species including sea turtles. Therefore, we also recommend that the state of North Carolina carefully consider public vs. private interests and environmental impacts to one of North Carolina's most special coastal characteristics = its 3 Capes. Thank you for allowing the Bald Head Island Conservancy to participate in this discussion.

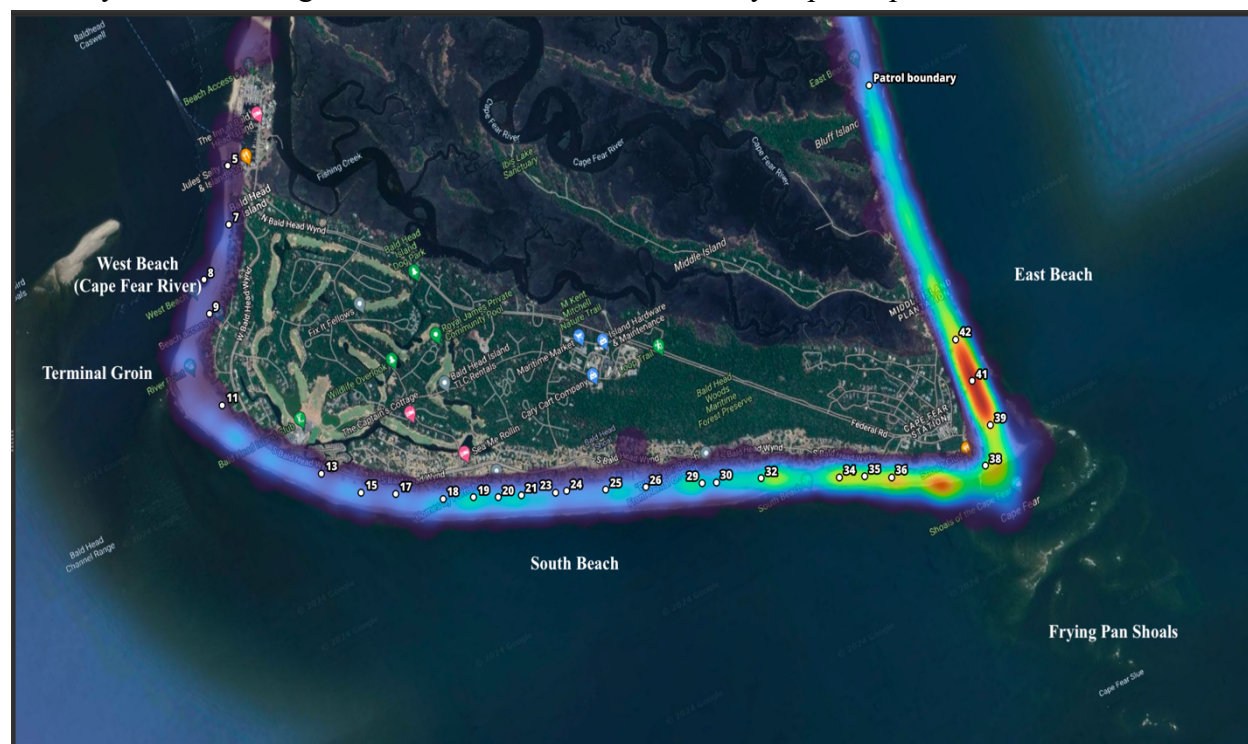


Figure 2. Heat Map showing sea turtle nesting density on Bald Head Island from 2000 - 2023. **Red = High Density, Blue = Low Density.** Beach accesses denoted by white dots. Please note the very high concentration of sea turtle activity centered around the Shoals area.

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