

Preliminary observations on the effects of dredging of the shipping channel on “The Point” of southwest Bald Head Island (BHI), NC

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By Dr. Paul J. Hearty

Professional employment:

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Education:

Bachelor of Arts (B.A.) and M.Sc Degree, Department of Geography. University of Nebraska Omaha, Nebraska 1978. M.Sc. Thesis topic: *“The biogeography and geomorphology of the Niobrara River Valley, Nebraska” (the effects of landsliding and mass wasting on the evolution of the river valley).*

Ph.D Degree: 1987 Institute of Arctic and Alpine Research (INSTAAR) and Department of Geology, University of Colorado, Boulder, Colorado 80309

PhD Thesis: *“Age and Aminostratigraphy of Quaternary coastal deposits in the Mediterranean basin”.* (The sedimentary end-products of climate and sea level cycles during the Quaternary (past 2 million years)).

Qualifications (CV attached Document A):

Sedimentary geologist and stratigrapher specializing in the transport of sediments in response to storms and/or sea level changes. 25 years of experience in research, education, and environmental consultancy at widespread global locations. Published over 85 peer-reviewed articles on the topics of coastal stratigraphy, sedimentology, and paleobiology.

Setting and littoral sand drift on Bald Head Island:

As a barrier island, sand and sediments at the margins of BHI are constantly in motion. Although vectors of littoral drift may change seasonally, the net direction of movement is southward along East Beach, both eastward and westward along South Beach, and northward along West Beach. The westward movement along South Beach historically is critical to the supply of West Beach. Previous to the establishment of shipping channels in the mouth of the Cape Fear River, sand moved freely across the river mouth to supply both BHI and Oak Island. The building and enlargement of the shipping channel and its proximity to Bald Head Island has interfered with the supply of sand to BHI shorelines,

and resulted in a strongly negative sand budget leading to severe erosion at several locations.

Erosion at The Point:

The single principal cause of erosion at the southwest “Point” of BHI is the proximity and position of the shipping channel within a stone’s throw from land. Rather than migrating around The Point, the vast majority of sand moving westward in the littoral zone on South Beach falls directly into the >40 foot deep shipping channel. Over the course of several years, a very large volume of sand (hundreds of thousands of cubic yards) is dumped into the channel. Periodically, the sand must be dredged to maintain adequate depth for ships to move freely in and out of the river basin to sea. In 2007, the impact of dredging of the channel was compensated by renourishment of a large reach of South Beach, which temporarily maintained a positive sand budget for that coast and The Point. The current dredging of the channel in March/April 2009 has had a dramatic and severe immediate impact on the land and shore of The Point, as the sand was pumped away from the coast to Caswell Beach and Oak Island. This has created a significant negative sand budget for The Point, causing rapid and significant erosion of The Point. This erosion and loss of sand from The Point has continued since the dredging began, and is expected to continue for several months to come. The initial impact of the dredging is reported in the attached Document B. Recent measurements indicate erosion of land area has exceeded 100 feet in less than 4 weeks. Updates on erosion rates and areas at The Point and adjacent beaches will be available on a timely basis.

Erosion from adjacent shorelines:

The erosional effects of the dredging are not isolated to The Point. The large negative sand budget centered on The Point is already having and will continue to have a carry-on effect on the adjacent beaches. In other words, sand will be lost at increasing rates at greater distance from The Point as beaches are seeking to equilibrate with the loss of sand from the western location. These effects will continue until a new supply of sand is provided for South and West Beaches, or until the channel is filled with sand or shifted westward.

Threats created by dredging of the shipping channel:

The major threat caused by the loss of sand in the area due to dredging and proximity of the shipping channel is the loss of the “buffering effect” of the former sandy spit forming The Point against major storms and hurricanes. As it is expected that any category hurricane will erode a significant width of beach and dunes, the much narrower barrier of the former Point will increase the likelihood of loss of land area and property.

The secondary result is the more extensive erosion of coastline and probably infrastructure due to the broadening effects of erosion due to the large negative sand budget. Indeed, the threat to property and wildlife will be increased to greater areas of BHI due to the loss of sediment at The Point.

The deleterious effects to wildlife habitat by land loss at the Point are described in another report by Dr. Dorsey and Ms. Dewire.

Recommendations:

1). Restoration of a stable sandy spit at The Point providing buffering strength against storms and protection of wildlife habitat can be largely accomplished by moving the channel several hundred feet westward. Moving the channel several hundred feet westward would allow the submerged sand slopes bordering to the relocated channel to establish stable profiles of a few degrees. These flatter profiles would allow for littoral sand drift along the natural resupply routes of sand from South Beach to West Beach; this sedimentary process is currently disrupted and virtually severed by the presence of the shipping channel *at* The Point. Buffering against storms and enhancement of wildlife habitat would be a direct result of relocating the channel. A relocated channel with relatively stable adjacent sand slopes will decrease the need for maintenance dredging and thus decrease the costs in private and Federal tax dollars.

2). Sand nourishment of the South and West Beaches is a necessary but not a long term or practical solution as the sand will ultimately be redeposited back into the shipping channel, requiring removal by maintenance dredging and associated costs. Ultimately, the more sand placed on South Beach by whatever source will result in a greater flow of sediment into the channel and thus an increase in maintenance costs. If the shipping channel is not moved, the labors and associated costs will continue indefinitely.

With regards,

A handwritten signature in black ink, appearing to be 'P. Hearty', written in a cursive style.

Dr. Paul J. Hearty
Director of Conservation, BHI Conservancy