

## COMMENTS ON THE ISSUE OF SAND ACCUMULATION AT THE MOUTH OF BALD HEAD CREEK

**Paul J. Hearty, Ph.D.**

**25 Sept 2008**

*The problem:* northward migration of large amounts of sand along West and Harbour Beaches on BHI have greatly reduced access to “the Creek”.

*Premise:* Gaping wound and ultimate cause: the Cape Fear ship channel is too close to BHI.

- 1) *Natural pre-human setting:* depending on weather and currents, sand moved back and forth across the ancient ebb tidal delta that was situated between Caswell beach and Bald Head Island. Remnants of that ebb tidal delta are Jaybird shoals, the Point, and perhaps even Frying Pan shoals. Regular movement of the sand across the delta supplied all of the beaches in the area, which probably maintained a state of “dynamic equilibrium” (constantly changing but with a similar profile). Beach, bar, and spit sand migration is a natural process that has been constantly changing the shape of Cape Fear and BHI for the past several thousand years.
- 2) Dredging and realignment of the ship channel in Cape Fear River and estuary drastically changed the natural situation. Naturally migrating sand moving across the delta front now falls into the 40-45’ deep shipping channel and cannot be removed except mechanically by humans.
- 3) The effects of the ship channel are felt widely across the across the area. Delta sand exchange that normally supplied South Beach decreased. Westward sand movement along South Beach also is decreased, and upon reaching the Point, is swept downward into the channel. The size and configuration of the spit on the Point has fluctuated wildly over the past few decades (DNR), but the majority of sand ultimately was deposited in the channel.

- 4) As a consequence, West Beach is starved of sand and with the increased wave energy from the adjacent shipping aids in the removal of sand. The little sand that is on West Beach migrates northward and is slowed or stopped by the southern entrance jetty to the BHI marina.
- 5) Currently, sand accumulating at the channel is dredged and barged to just north of the northern marina jetty where it is dumped on the beach face.
- 6) As this sand is uncompacted and in the intertidal zone, it is easily transported by flood tides and currents, ultimately moving northward where it is deposited in a spit that is growing rapidly across the mouth of BH Creek, and further to near the mouth of Cape Creek. The abundance of sand has created an access problem the Creek for even small boats at low tide.

**Recommendations:**

- 1) *Caveats:* As the shipping channel is ultimately the source of the problem, however complex, and it shall remain indefinitely in the same location, all recommendations offered here are tentative and temporary. Further, Dr. Hearty has only been in this position for about 6 weeks, and his observations are just that -- observations. There is a clear need for a detailed scientific investigation seeking to understand the causes and effects related to this situation.
- 2) It appears that the sand blocking BH Creek is the direct result of dredging of "bypass sand" on West Beach. Because the loose sand is placed in the intertidal zone, it is easily and quickly entrained and transported northward by tides and currents. Much of the sand is being deposited in subtidal bars, and a spit that is growing northward from the Marina area and across the creek mouth.
- 3) Much of the access problem to the Creek would be resolved if the bypass sand could be placed above the mean high tide level (supratidal zone) and planted with sea oats and dune vegetation. This would greatly slow the transport of dredged sand, and at least give the beach a better chance (but no guarantee) of recovery. The same process could be implemented on Harbour Beach north of the marina entrance.

- 4) If more sand can be stored in the supratidal zone on West and Harbour Beaches, less would ultimately find its way to the Creek mouth, and that problem/issue would be significantly alleviated.
- 5) Dredging of the existing sand at BH Creek mouth?
  - Minimal proposal A. Seek a permit to dredge what is needed to maintain open access to the Creek for small boats.
  - Alternate proposal B. Seek a larger permit to maintain access into the creek, as well as to move suitable sand material to be used directly on Harbour and West Beaches for renourishment.

**Also consider the following potential effects of these actions:**

Positive effects

Increased access to Creek  
Fishing/shellfishing  
Improvement of water quality  
Sand resource

Negative short-term effects?

Suspended sediment or continued sediment transport  
Channel redirection during major storms?  
Erosion of salt marsh  
Ecological impact  
Refraction/reflection of waves by hard structure

Negative long-term effects?

Exposing the interior salt marsh of BHI to much higher energy currents and waves

Paul J. Hearty, Ph.D.  
Sedimentary Geologist and  
Director of Conservation  
Bald Head Island Conservancy  
700 Federal Road  
BHI, NC 28461  
910.457.0089; FAX: -9824  
Cell: 843.422.8499