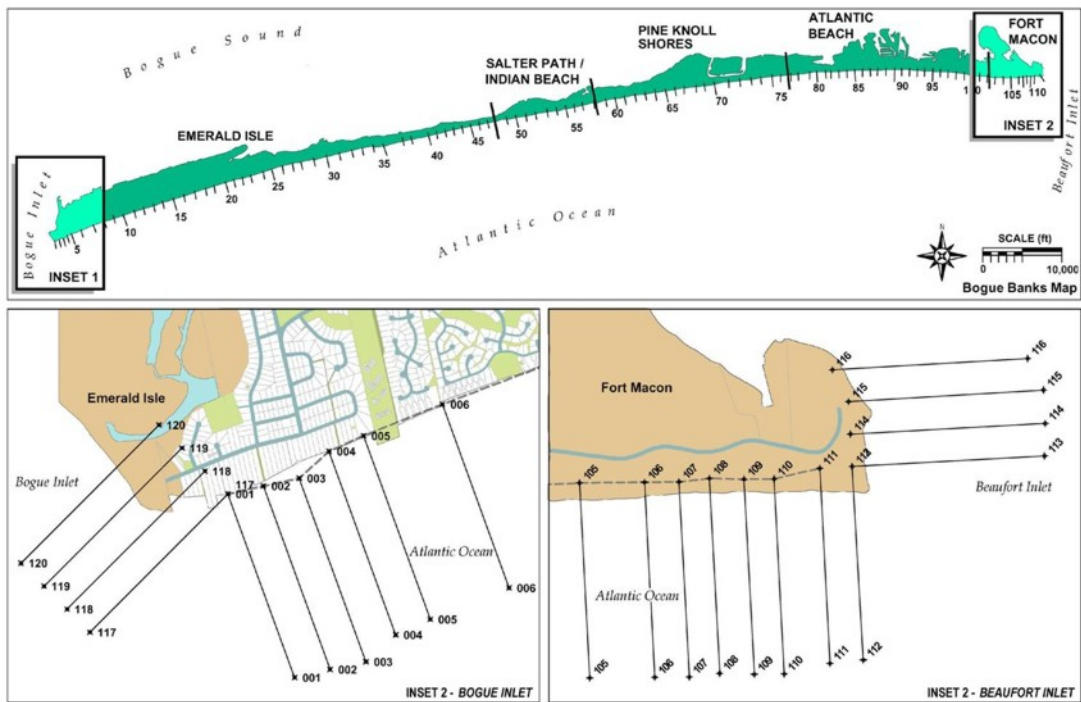


**State of the Beach - 2006**

Last month (November 2006), Dr. Tim Kana with Coastal Science & Engineering (CSE) presented the key results and main conclusions regarding our local Beach and Nearshore Surveying Program to the Carteret County Beach Commission. In 1999, CSE first established 111 shore-perpendicular transects along Bogue Banks to gain baseline information and begin assessing the overall health of the beach in the wake of the hurricanes that impacted the region in the 1990s. Elevations of the dry and underwater (nearshore) portion of the beach have been obtained along these same transects on a routine basis since 1999 and with these data in hand; the annual report provided to the Beach Commission is often considered as our “State of the Beach” address. Actually the monitoring program has grown since the formative years and now includes 120 transects along Bogue Banks (see accompanying figure), in addition to 24 transects along Shackleford Banks, and 18 along Bear Island, located east and west of Bogue Banks, respectively. The beaches are surveyed in May or June every year.



**Fig. 1 – Site map depicting the location and identification scheme of the 120 transects positioned along Bogue Banks utilized for beach/nearshore monitoring purposes.**

**Beach Volume**

One of the means to quantify beach health is to compare the volume of sand lost or gained over time along Bogue Banks and the adjacent islands. Engineers and scientists most often use the measuring unit of a cubic yard to describe volume change, which can simply be envisioned as a 3 ft. by 3 ft. by 3 ft. block of sand – that’s 27 ft<sup>3</sup>, or again a single cubic yard. A standard dump truck holds roughly 15 cubic yards.

Since 1999 Bogue Banks has gained ~6 million cubic yards of sand, which is mostly attributed to the many beach nourishment projects that have been constructed along the island beginning in 2001. Actually a total of ~8.5 million cubic yards have been placed on Bogue Banks as a result of beach nourishment, meaning that ~2.5 million cubic yards have since eroded off the beach (8.5 million minus 6 million cubic yards). Interestingly, a

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whopping 2.25 million cubic yards were lost in 2005-06 alone, which appears to be directly correlated to the notorious slow moving Hurricane *Ophelia* that impacted Bogue Banks for several days in September 2005.

If we average the volume loss across the entire 128,393 feet of Bogue Banks oceanfront, the island has lost 3 cubic yards per linear foot per year (-3 cy/ft/yr) since 1999. This number is essentially our “background erosion rate”. The erosion rate reported for 1999 to 2005 (pre-*Ophelia*) was only -0.4 cy/ft/year, which again emphasizes the rather dramatic impact of *Ophelia*.

Another noteworthy statistic to mention is the entire island, with the exception of Pine Knoll Shores, substantially meets the target minimum volumetric threshold established for Bogue Banks. That’s a mouthful to say and may sound confusing, but when Hurricane *Floyd* impacted Bogue Banks in 1999, we noticed Atlantic Beach was relatively unscathed while the remaining island communities sustained significant dune erosion and property damage. Atlantic Beach was a traditional recipient of beach nourishment projects associated with the dredging of the Morehead City Harbor prior to 1999, and if we averaged the volume of sand residing in Atlantic Beach from the toe of the dune to -11 feet, we generated an average number of over 225 cubic yards per linear foot (225 cy/ft). We soon noticed the remaining Bogue Banks municipalities that never received substantial beach nourishment prior to 1999 all averaged below this 225 cy/ft figure. Accordingly we have since utilized 225 cy/ft as the benchmark for beach health or as our “minimum volumetric threshold”.

Although Pine Knoll Shores is the only municipality that presently does not substantially meet the volumetric threshold on Bogue Banks, two separate beach nourishment projects planned for 2007 should add ~1 million cubic yards to this corridor of shoreline. This should remedy the volume deficiency mentioned above for Pine Knoll Shores.

### Shoreline Change

Another measurement of beach health is shoreline change. This barometer for beach health is less cerebral and more visual than the beach volume method as we can actually put our finger on the shoreline – the magical place where land meets the sea. To quantify and consistently compare shoreline positions over time, the “shoreline” is demarcated as the mean high water elevation established at +2 foot above sea level. If you want to impress your friends at the next Holiday party, the catchphrase for this measurement technique is “datum-derived shoreline change analysis”.

All kidding aside, the average net shoreline change for Bogue Banks is +71 feet seaward from June 1999 to May 2006, and is obviously an expression of nourishment projects, storms, and background erosion/accretion that have occurred along the island in the past 7 years. The Indian Beach/Salter Path and the eastern half of Pine Knoll Shores had the highest and lowest average shoreline change rates at +106 foot and +60 feet, respectively, with the exception of Ft. Macon (+18 feet). To no surprise, there appears to be a direct correlation regarding the rate of volume change and shoreline change reported along Bogue Banks, i.e., more nourishment (volume) equates to larger shoreline gains.

If you want to get into the nitty-gritty of the 2006 Monitoring Report, please visit <http://www.protectthebeach.com/Monitoring/monitoring.htm>. The entire report by sections is available on-line approximately half-way down the webpage. Have a great Holiday Season.