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SHORELINES – August 2010

As presented to the *Island Review* magazine

Inlet Hazard Areas (IHAs) – An Update

The State's Division of Coastal Management (DCM) has long recognized the differences in shoreline behavior along; **(1) oceanfront shorelines** whose configuration and evolution rely predominantly on factors such as sand supply, sea level, and storms, and **(2) inlet shorelines** that are more dependent upon factors including *tidal prism* (difference of water volume between low & high tide), *tidal amplitude* (difference of height between low & high tides), *tidal dominancy* (the differential in water flow through an inlet at low vs. high tide), and channel orientations. Accordingly ***Inlet Hazard Areas*** (IHAs) are one of the four ocean hazard Areas of Environmental Concern (AECs) designated and defined by the State. This makes a lot of intuitive sense to be quite honest as well – the beaches near inlets tend change more frequently than the beaches along the middle of the island.

Diving deeper into policy, the regulatory definition and development stipulations for IHAs can be found in Title 15A, Subchapter 07H, sections .0304 & .0310 of the State's Administrative Code. In reality however, development allowed in IHAs is very similar to that along the oceanfront – the setback requirements are the same although it is difficult to build a structure exceeding 5,000 square feet in an IHA according to current rules.

Transitioning back to the science side of the coin, the existing IHA boundaries were first developed in 1978 predominantly based upon historic shoreline movement ascertained from multiple aerial photosets. Over three decades later and with marked improvements in Geographical Information Systems (GIS), a richer dataset in hand, more development and public investments along the North Carolina coast, and a better scientific understanding of inlets in general; many have thought the time is ripe to re-examine IHA boundaries and policies.

This has culminated in a new report released by NCDCM in May providing the scientific basis for re-defining IHA boundaries. Besides utilizing geomorphic evidence (i.e., marked changes in topography or bathymetry), NCDCM hinged most of their boundary delineations along the ocean/inlet front by statistically analyzing two shoreline parameters – shoreline change rates and standard deviation. Without getting deep into mathematical theory, let's briefly summarize how these two parameters work.

Shoreline change rates were plotted along each inlet heading towards the middle of the island, and notice was made where there was a break in the trend of shoreline erosion. So for instance, if the erosion rate near an inlet was 4 feet per year (ft/yr) and 2,000 feet towards the middle of the island the erosion rate diminished to 2 ft/yr or less, then this inflection point might be good position to demarcate where the inlet influence ends, hence a possible IHA boundary.

The ***standard deviation*** of shoreline change helps quantify how wide the oscillation of shoreline change might be. I like to try to explain standard deviation like this – if the shoreline change rate is close to zero, one may think that the shoreline moves very little. However, we really don't know if that's a result of the shoreline moving back by -2 feet from

the measuring point one year, then up by +2 the following year, then -2 feet the next year, then +2 feet the next year, etc., etc. Or perhaps the shoreline moved +10 feet one year, -20 feet the next, -10 feet the next, and finally +20 feet. That would also be a shoreline rate of zero, but the shoreline has moved wildly compared to first example. Calculating standard deviation helps capture that range/variation of shoreline movement, and similar to our first example, the standard deviation is examined near the inlet and the break in that number as one heads toward the middle island is noted, and again might be a good location for an IHA boundary. The accompanying figure (1) provides a good example of how these statistical parameters were used. Figure 2 graphically depicts the proposed IHA area along the east side of Bogue Inlet in map view.

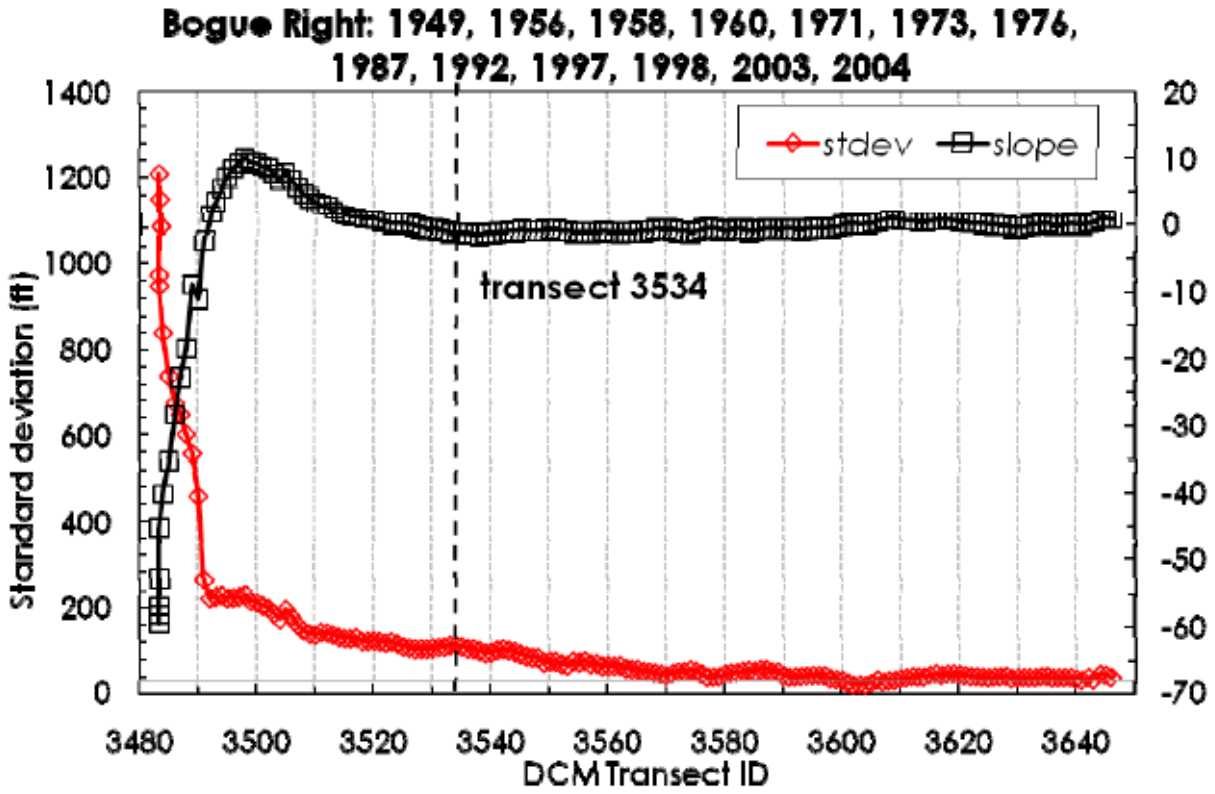

Figure 1 – IHA data plot for the east side of Bogue Inlet (Emerald Isle) going from the left to the right toward the middle of the island. The **black curve** is shoreline change (ft/yr) with the scale along the right axis. The **red curve** is standard deviation (ft) with the accompanying scale along the left axis. Notice the shoreline change rate and standard deviation equilibrates near "Transect 3534" (the IHA east boundary), which corresponds to the boundary of the Dolphin's Ridge/Spinnaker's Reach subdivisions (see Figure 2).

However the recently released technical report indeed is a just that (a technical report) – there are no policy recommendations in the document. So with the new IHA areas now scientifically justified, DCM can begin formulating the policy that goes into regulating the IHA boxes. There have been no formal proposals to date, but issues such as setbacks, sandbags, and building constraints could (or could not) be included in these new, yet to be developed rules for IHAs. Ultimately any new rules will undergo the public hearing process and be approved by the governor-appointed Coastal Resources Commission. Accordingly, if you have a passion for this issue or it impacts you directly (i.e., property owner, insurance and/or real estate agent), it would be a good idea to stay in touch with this important issue.

Figure 2 – Depiction of the IHA proposed along the east side of Bogue Inlet in map view.