



10 February 2020

Renee Cahoon, Chairman
North Carolina Coastal Resources Commission
PO Box 714
Nags Head, NC 27959

Subject: Proposed Inlet Hazard Areas

Dear Ms. Cahoon,

The Town of Holden Beach has provided comments previously in correspondence dated 31 January. Additionally; please find a technical memo from the Town's consulting coastal engineer regarding the matter.

Sincerely,

David W. Hewett
Town Manager
Holden Beach NC

Cc: Larry Baldwin, Vice-Chair
Neal Andrew
Craig Bromby
Trace Cooper
Bob Emory
Robert High
Doug Medlin
Phil Norris
Lauren Salter
Robin Smith
Alexander D. Tunnell
Angie Willis
Braxton Davis DCM, Director

2019 Inlet Hazard Area (IHA) Report Notes/Concerns

The entire report seems to be based on the assumption that extreme erosion occurs at all NC inlets. As this excerpt from the introduction states:

"Oceanfront shorelines near inlets have long-term erosion rates approximately 5 times greater than other oceanfront shorelines."

The example Figure 1 below shows a "typical" inlet where higher erosion rates occur at an inlet. However there are several inlet shorelines that are accreting over the long-term and the inlet delineation methodology does not take this into account.

Figure 6. The LRR and the standard deviation of shorelines plotted relative to the alongshore transect numbers. Transects are spaced 82 feet (25 meters) apart. The vertical dashed line at transect-291 separates Inlet Influence from the oceanfront.

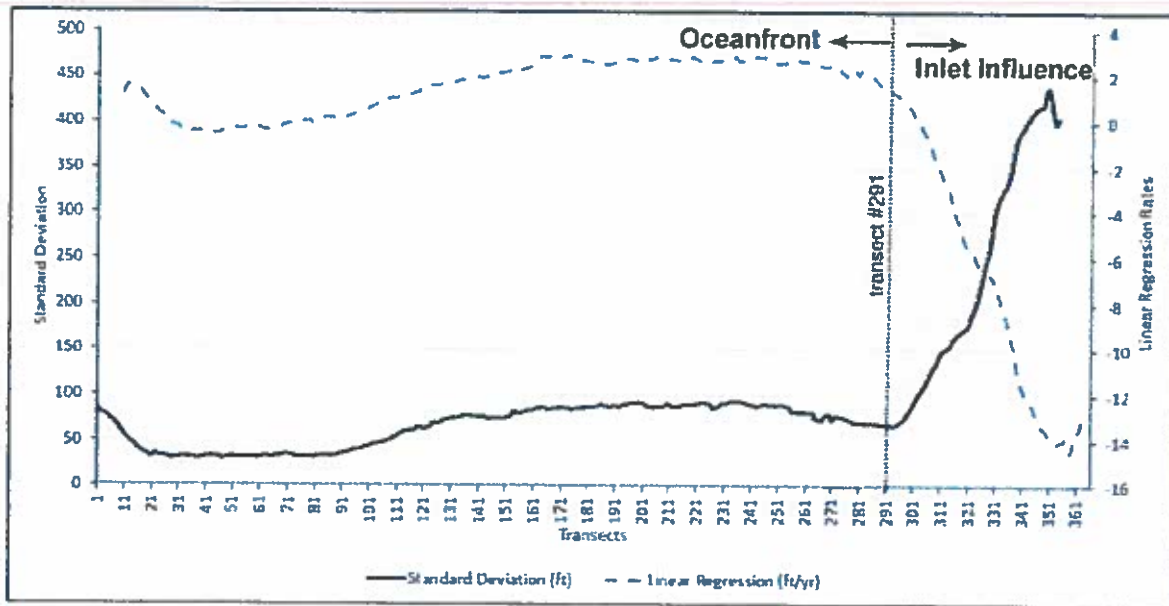


Figure 1: Example: Standard Deviation greater than ~100 and negative LRR. This makes sense and the inflection point is near where it should be (significant change in slope). But this is not very quantitative and appears to be "arbitrary and capricious" where this delineation occurs in figures 21, 25, 29, 65 (discussed later in this document). Issues include: 1) Areas where a positive LRR (ACCRETION) are treated the same as erosional shorelines. 2) StDEV value inflection points vary considerably.

Another excerpt from the report:

In these cases, the Panel used their professional knowledge of each inlet to aid in the delineation of the IHA boundaries. In some cases, they refined the shoreline dates used in the analysis or moved the IHA boundary to a more appropriate location based on the underlying geology. Specific details are provided in the descriptions for each of the inlets.

It appears the Panel relies heavily on their professional knowledge because there is a lack of quantitative analysis regarding inflection points (or derivatives) where the delineation between Inlet and Ocean Influence occurs.

There appears to be an over-reliance on previous reports that are based primarily on professional knowledge and qualitative analysis of sporadic aerial photography. Aerial photography does not take into account high/low tide, seasonal fluctuations, spring/neap conditions and time between aerials can span a couple years to a decade.

For example it is cited for Shallotte Inlet:

“Since the late 1960’s the ebb channel has generally been aligned in an SE-ESE direction, which has favored the accretion along the Holden Beach shoulder that has led to the bulbous shape of the western end of the island. By contrast, during the same interval, the Ocean Isle oceanfront shoreline has experienced chronic long-term erosion. ”

This general idea that if the channel is closer to the island, it accretes while the other side of the inlet erodes is much too simple however it appears to be applied to most of shallow-draft inlets along the NC coast. North Topsail Beach even performed an inlet channel realignment largely based on this notion and this project was not successful in changing the island’s erosion rate. Likewise, modeling of Lockwood Folly Inlet of different channel locations/alignments did not show a significant effect on erosion/accretion trends of nearby shorelines. Note that some small changes were noted when comparing different channel alignment alternatives, however these changes were insignificant in the overall scheme of things (for example, an erosion rate might change from -6 ft/yr to -5.5 ft/yr for a small section of shoreline).

Another example where the channel location is cited as the primary cause for erosion on one side of the inlet and accretion on the other:

“The accretional cycle caused by the ebb channel alignment close to the Holden Beach shoreline, which began in the 1970s, results in an underestimate of the difference between the 30- and 90-Year Risk Lines closer to the inlet. To compensate for this, beginning at transect-90, the Panel adjusted the landward boundary to follow the existing IHA boundary and to connect with the inlet end of the 90-Year Risk Line (Figure 22).”

This idea that one side of the inlet accretes while the other side erodes also appears to disagree with the overall assumption that inlet shorelines erode at much higher rates than oceanfront shorelines.

Figures 2-5 are excerpted from the report and the inlet/oceanfront inflection points do not appear to coincide with the change in LRR or StDev. Additionally, the LRR and StDev values where the oceanfront/inlet inflection points occur appear to vary significantly.

Figure 21. Based on the standard deviation of shoreline position at Shallotte Inlet-Holden Beach, transect-170 is recommended as the inlet-ocean transition boundary along the shoreline. Negative Linear Regression rates indicate erosion, while positive values represent accretion (right axis).

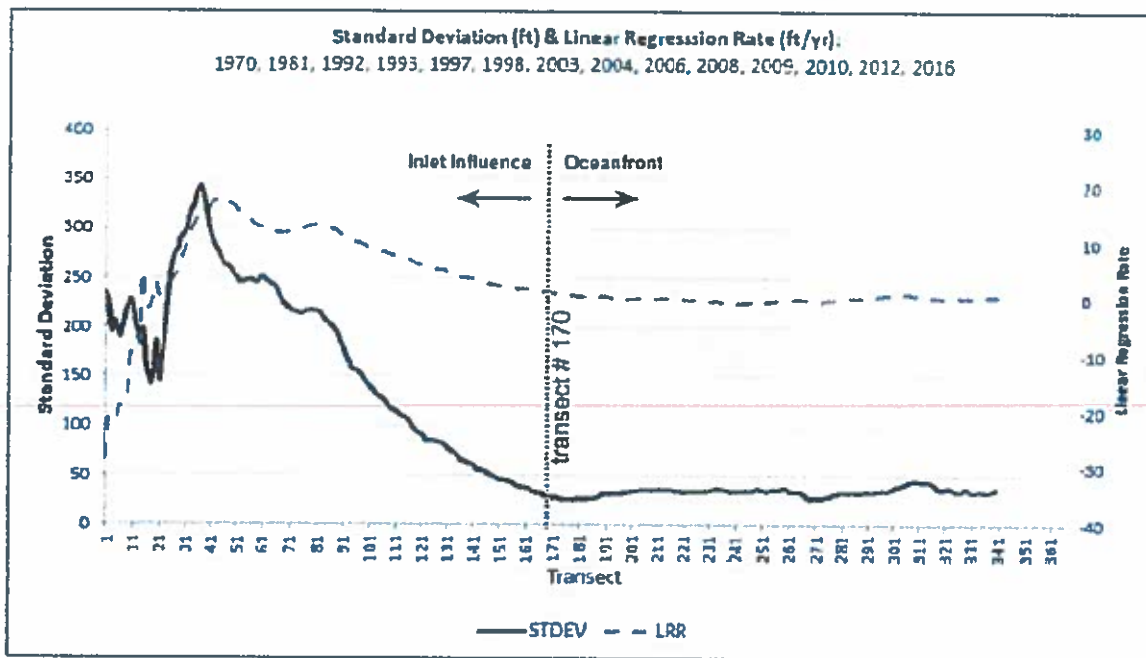
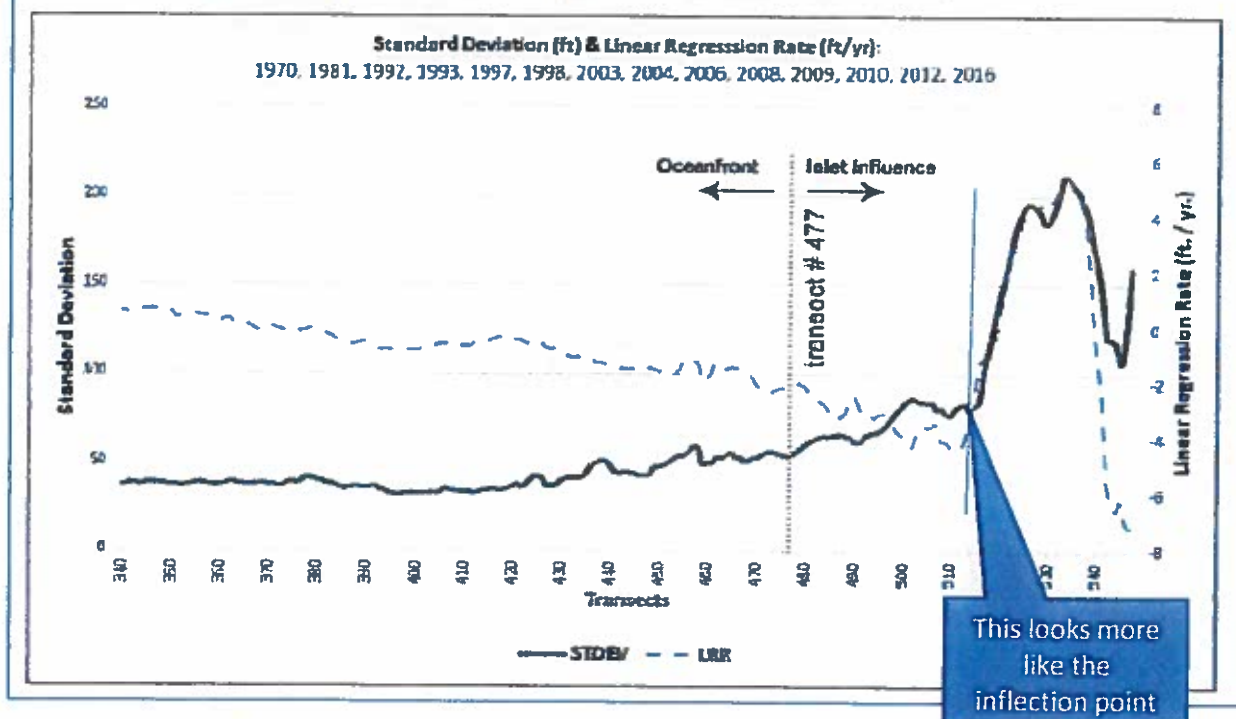


Figure 2: STDEV less than 50 (why not more like 100? Like example). LRR is positive (accretional). If this is inlet influenced, then this is a positive influence. No clear inflection point

Figure 25. Based on the standard deviation of shoreline position at Lockwood Folly Inlet-Holden Beach, transect-477 is recommended as the inlet-ocean transition boundary along the shoreline. Negative Linear Regression rates indicate erosion, while positive values represent accretion (right axis).



This looks more like the inflection point

Figure 3: StDEV around 50, LRR is negative except close to the inlet. Again kind of strange since this indicates long-term accretion.

Figure 29. At Lockwood Folly Inlet-Oak Island, inlet transect-70 is recommended as the inlet-ocean transition boundary along the shoreline. Negative Linear Regression rates indicate erosion, while positive values represent accretion (right axis).

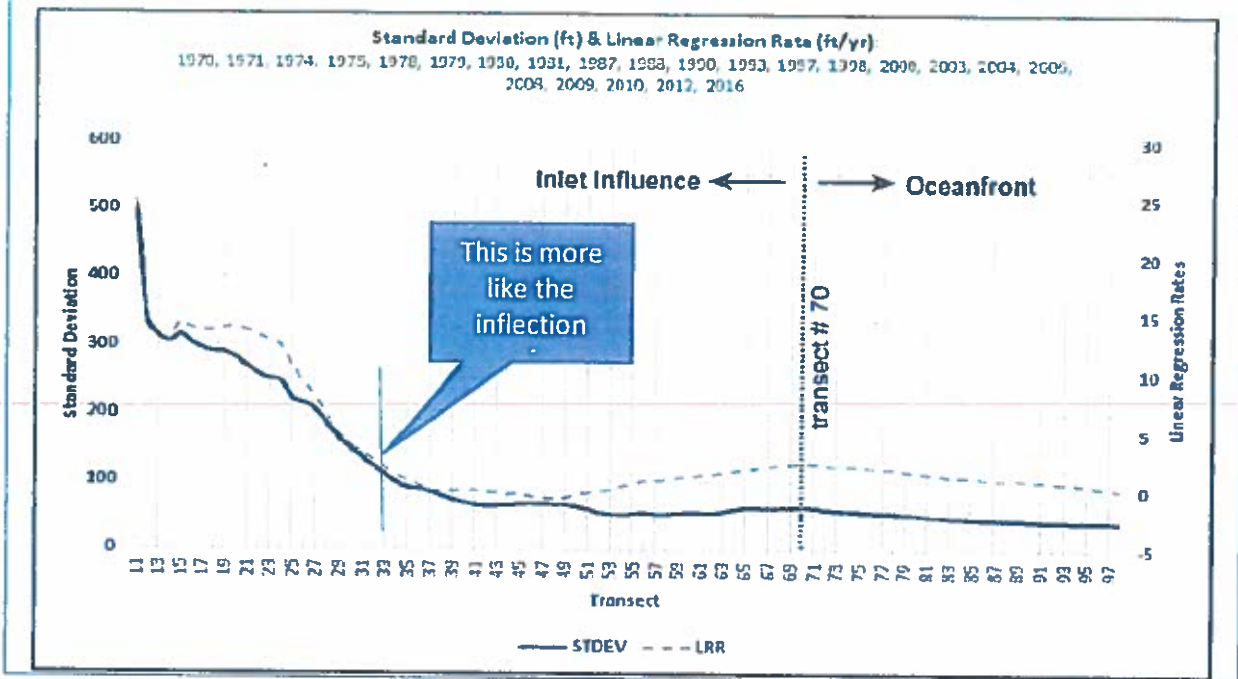


Figure 4: Oak has LRR ft/yr of generally greater than 0 (accretional). Besides a small section of shoreline.

Figure 65. Based on the standard deviation of shoreline position at New River Inlet at North Topsail Beach, transect-1345 is recommended as the inlet-ocean transition boundary along the shoreline. Negative Linear Regression rates indicate erosion, while positive values represent accretion (right axis).

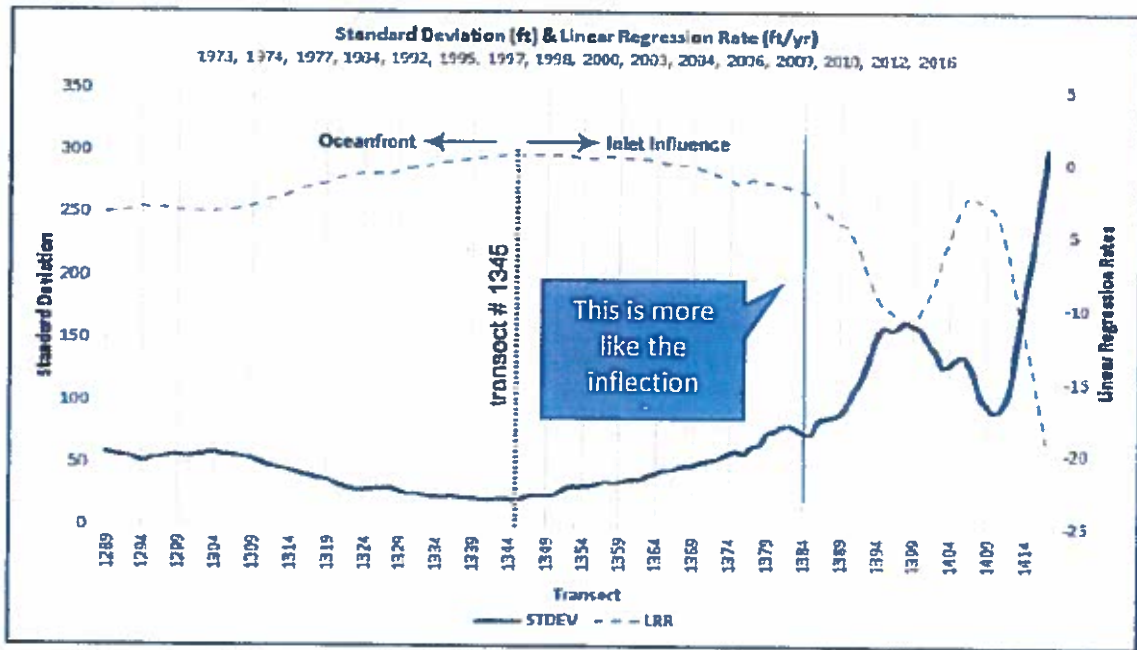


Figure 5

DSAS analysis and SBF

DCM's erosion and setback analysis clearly shows the west ends of Holden Beach and Oak Island as long-term accretional. See figures 6 and 7.

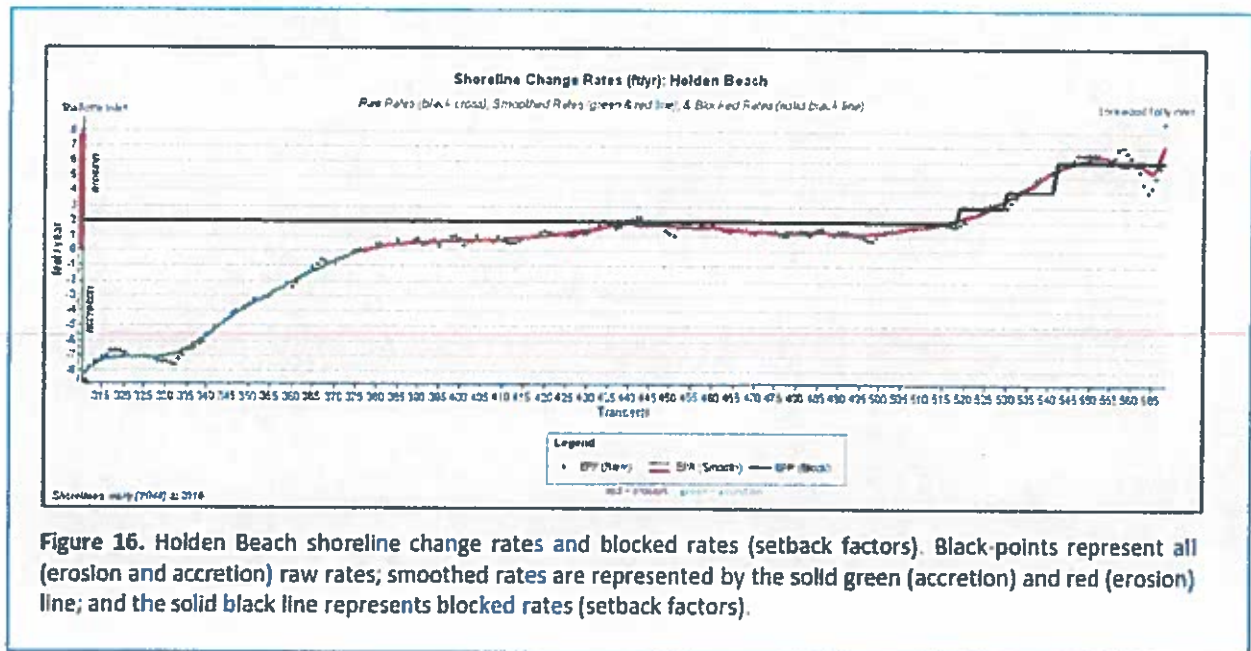


Figure 16. Holden Beach shoreline change rates and blocked rates (setback factors). Black-points represent all (erosion and accretion) raw rates; smoothed rates are represented by the solid green (accretion) and red (erosion) line; and the solid black line represents blocked rates (setback factors).

Figure 6: Significant accretion along Holden Beach's Shallotte Inlet.

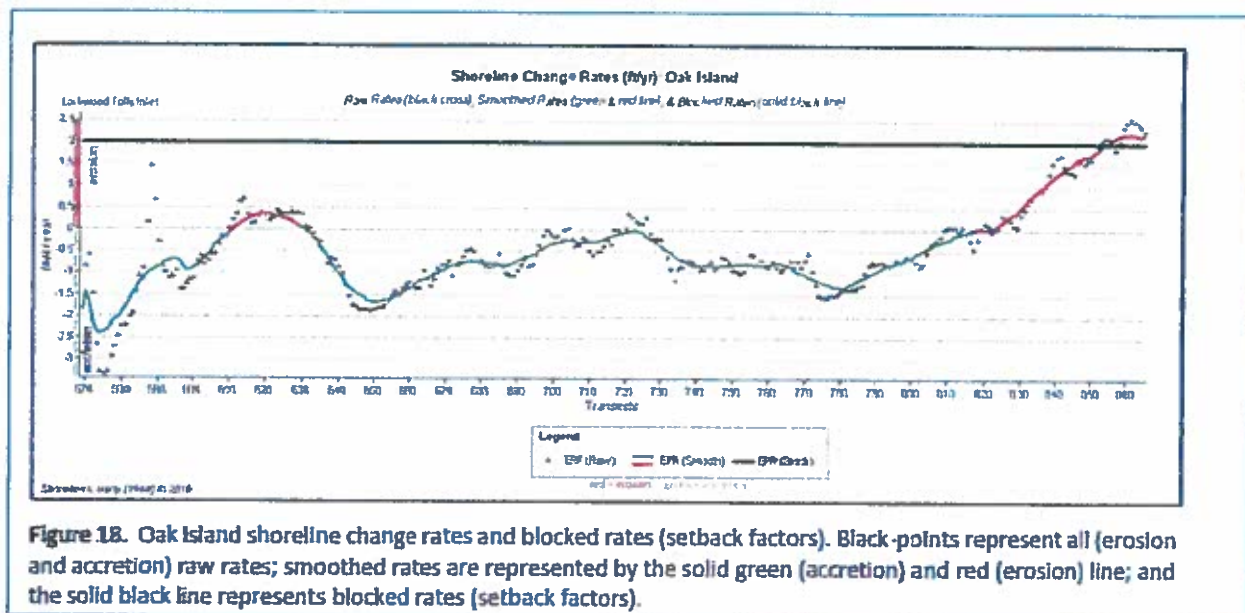


Figure 18. Oak Island shoreline change rates and blocked rates (setback factors). Black-points represent all (erosion and accretion) raw rates; smoothed rates are represented by the solid green (accretion) and red (erosion) line; and the solid black line represents blocked rates (setback factors).

Figure 7: Oak Island's west end is ACCRETIONAL except for one small hotspot.

Figure 8 presents a comparison with 2010 IHAs which were never instituted with the existing and proposed. The 2019 proposed IHA is even bigger than the 2010 IHA.



Figure 8: So the 2019 proposed IHA is even bigger than the 2010 IHA. The dune system is over 600 feet wide in some of these areas.

Other notes:

The financial analysis cites a potential to detrimentally impact the FEMA Community Rating System. This is slightly concerning in that DCM has maintained that the IHA would not affect NFIP or other federal flood mapping policies/guidelines, etc.

The significant accretion along Holden Beach's west end is a result of the inlet influence as well as the nourishments to the east (updrift).

While the LRR, StDev and hybrid vegetation line method appear to be sufficient, the method for delineating the inlet/ocean influence does not appear to be quantitative and instead relies solely on the Panel's discretion. Accretional LRRs are ignored in some cases as long as Standard Deviations increase. Of course delineations based on Standard Deviation also vary significantly related to its value (25, 50, 100, etc.) and even the inflection point chosen.