Shore Protection Manager

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IRENE UPDATE #2 (8/25/11 – 8:00 pm)

As reported by the National Hurricane Center and various media outlets, the track of *Irene* has shifted significantly to the west since yesterday (8/24) – Fig 1. The official track has the center (eye)

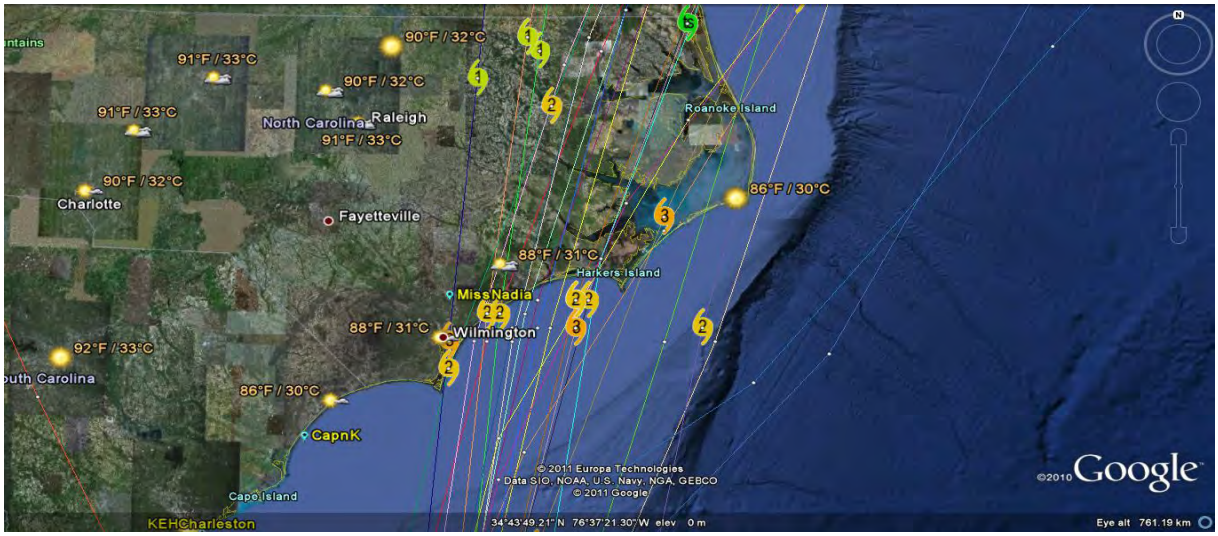

Fig. 1 – Projected tracks and intensities (8/25/11) for *Irene*.

making landfall near Pine Knoll Shores as a Category 2 hurricane (Fig. 2). This has obviously changed our mindset for *Irene*, and it appears that most of Carteret County will be situated along the east side of the hurricane, which as summarized in the last update, presents very dangerous conditions. While there is still some possibility *Irene* could shift more to the east or west in the next 36-48 hours, it is important to think about the worse-case scenario; and without trying to sound alarmist, *Irene* could very well be a storm of record for this area, resulting in ***CATASTROPHIC*** flooding and wind conditions along the oceanfront, soundfronts, creeks, and even upland areas. Again, most of the impacts may be worse than *Hazel* (1954), *Donna* (1960), *Bertha* and *Fran* (1996), *Floyd* (1999), *Isabel* (2003), and *Ophelia* (2005).

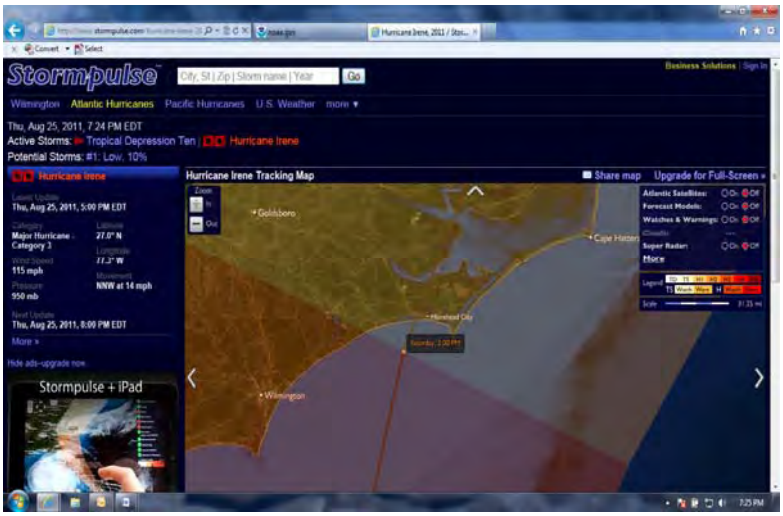

Fig. 2 – Projected modeled track for *Irene*.

There will be a very high volume of debris throughout the County and flooding along the Down East corridor could rival that of *Isabel* (2003). Below are some of the latest estimates by the National Weather Service, and the Shore Protection Office's thoughts on what type of shoreline impacts we might see. To that effect, our office has a specific focus and mission and all matters concerning health and safety should be first and foremost – please pay close attention to all notices released by the County's Emergency Services Department and local municipalities.

PARAMETERS

(A) Rainfall – Eight to twelve inches expected Friday through Sunday morning.

(B) Wind – *Irene* is a large hurricane and the wind field is expansive, and ***sustained*** hurricane force winds (<73 mph) and higher (Cat. 2) gusts are very likely.

(C) Storm Surge – Ocean storm surge (not including additive forces of the tides, i.e., storm tide) is currently predicted to be in the 7' to 9' feet range and could very well be realized by Bogue Banks as we are now located along the east side of the storm. An 8' to 10' surge is predicted for Down East Carteret County – as mentioned in the previous update; the additive effects of a new moon tide and other tidal factors will accentuate flooding. The tides for Saturday (Beaufort Inlet) are 7:04 am – HIGH, 1:18 pm – LOW, and 7:34 pm – HIGH.

(D) Waves – Storm surge is a result of the lift of water as the cyclonic low pressure acts like a straw, and mounds the water upwards, and to a greater extent the push of water like a plow by the cyclone. Before and during the surge, wave heights along the beach (breakers) are estimated to be as high as 15 feet. Open ocean waves could reach as high as 35 feet.

BEACH IMPACTS

(A) SIGNIFICANT DUNE EROSION – Most of Bogue Banks possess some of the highest, naturally-occurring oceanfront and interior dunes along the Mid-Atlantic, and overwash has historically occurred in very discrete locations along the 25-mile long island (Fig. 3). It is not uncommon to have primary

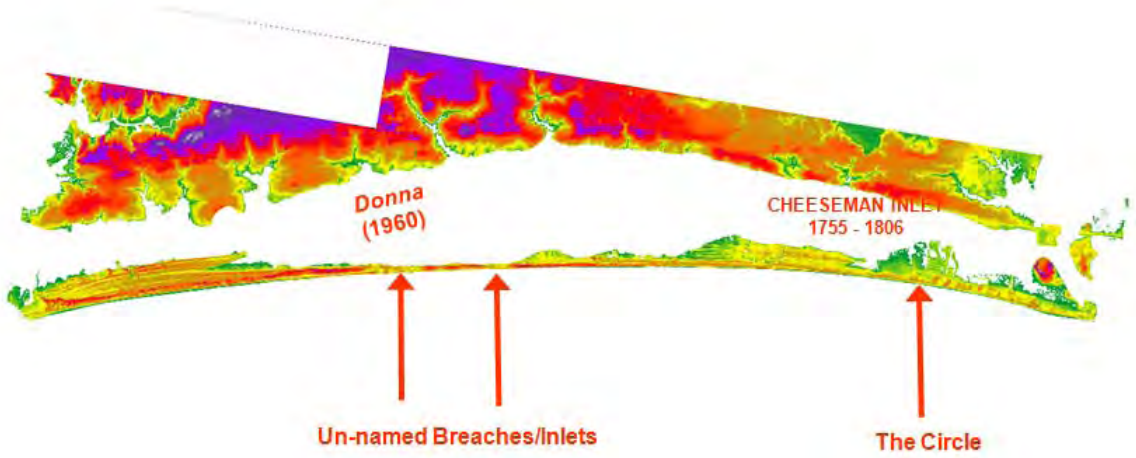

Fig. 3 – Map depicting topography of Bogue Banks (hot colors = higher elevations; cooler colors = lower elevations), and areas of the island that have experienced overwash in the past (1950s – present).

dunes exceeding 20 feet of elevation. Moreover, beach nourishment activities conducted over the past decades has repaired damages sustained to the dune system in the past (the 1990s) and has even advanced the dunes in many areas. Again, the angle of approach and intensity of *Irene* (predominantly) could translate in sea conditions that are unparalleled in the history of Bogue Banks resulting in massive dune erosion. Hopefully some of the sand that has been placed on the beach will be sacrificial, leaving a majority of the oceanfront dune system intact – this is the primary defense of the island's infrastructure. Otherwise a compromised dune system could result in flooding of the various oceanfront roads along the island, and property damage.

(B) OVERWASH – As mentioned above, complete overwash (ocean to sound) of the island has been a rare event along Bogue Banks and is limited to two general areas; (1) the Circle in Atlantic Beach, and (2) East Emerald Isle in the numbered Streets. It would not be surprising to see overwash in these areas for *Irene* – (1) up and over the Circle and down towards the Causeway, and (2) possibly a breach of sorts in East Emerald Isle, respectively. Hurricane *Donna* (1960) caused a breach that was mechanically filled-in near the 20th Street area – this area is presently one of the narrowest parts of the island and has a consistently low elevation along a shore perpendicular line (Fig.4). Again, these figures are not to alarm anyone, but highlights some of the areas of concern.

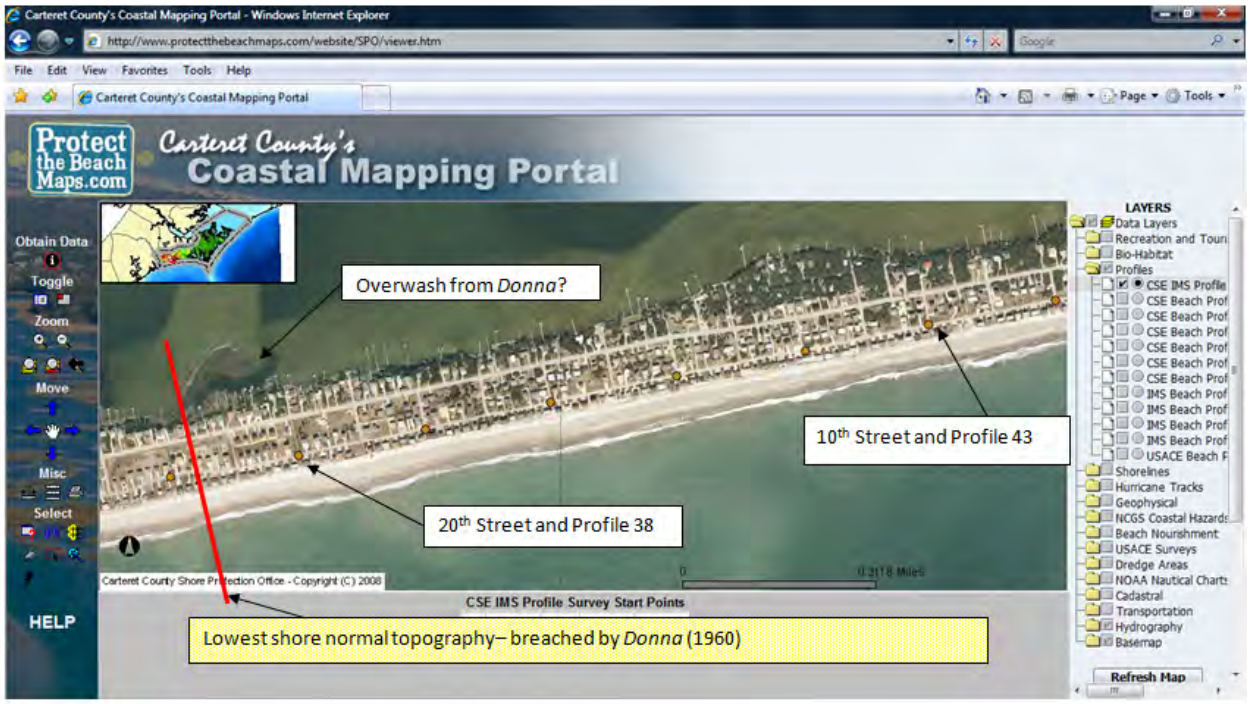

Fig. 4 – Map depicting the general location where overwash occurred from Hurricane *Donna* (1960)

(C) Bogue Inlet – This inlet floodway has been one of the more stable in North Carolina, appearing on every map of the State since the late 1500s. The ebb channel migrates east and west along the floodway and is currently in a near equidistant position between Bear Island and the Point in Emerald Isle. The hydraulics associated with the many channels that feed the inlet (flood and ebb) are complex and difficult to predict for *Irene*. We could see the main channel realign itself in a new position, the Coast Guard channel re-open, etc., or none of the above. A mentor has often said "inlets should be called outlets, because their main function is to drain the water out of the sounds." This saying could

be applicable here with the types of water levels we may see in Bogue Sound and drainage from the White Oak River.

PRE STORM ACTIONS (updated)

Beach Surveying – Our contractors (Geodynamics) have been activated for a post *Irene* survey. This survey will be compared to our annual monitoring event of Bogue Banks, Shackleford Banks, and Bear Island that is conducted in the May/June timeframe, thereby constituting our "pre-storm survey".

Photographic Cataloguing – We are conducting a pre-storm photography on land of certain locations along Bogue Banks, and will have a post-storm suite of photos as well in addition to aerial photos as well. The pictures will be made available on-line.

*The post storm summary and photos will be take time to conduct and generate, but we will do our best to make this available as soon as possible. The survey is a much more extensive process, but will also be made available in due time.