The back-barrier sounds of the Northern Province (figures 1-2 and 1-11) are medium to large estuaries that are parallel to the coast. They include:

1. Currituck Sound in the north
2. Roanoke and Croatan Sounds separated by Roanoke Island
3. Pamlico Sound (the largest estuary)
4. Core Sound in the south

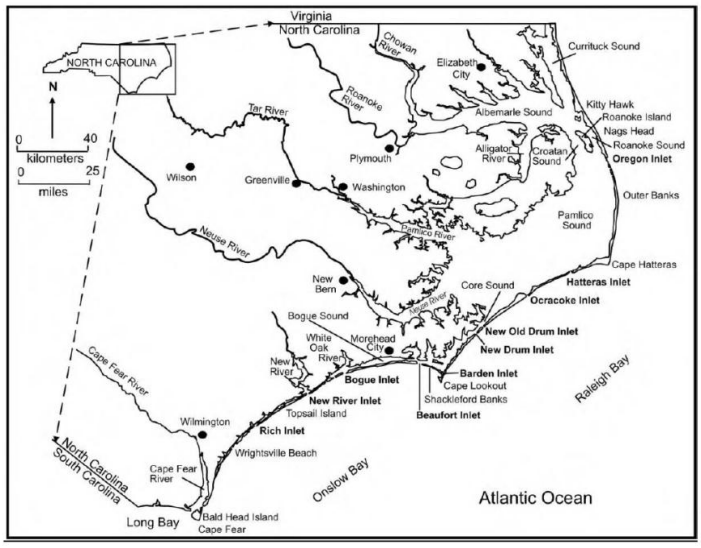

Figure 1-11. Location map shows major towns and coastal features for the North Carolina coastal system. Figure 2-1-2, p. 18 in Riggs and Ames (2003).

Figure 1-2. This satellite image shows the Sea-View site locations. The image is a joint product of the NASA Landsat Project Occupancy Office, Goddard Space Flight Center, and the U.S. Geological Survey EROS Data Center. Figure is modified from Figure 2-1-3, p. 19 in Riggs and Ames (2003).

As seen previously, only five inlets exist in more than 190 miles of barrier islands, limiting the influence of oceanic water and processes to this estuarine system. In addition, there is a major input of fresh water from both Piedmont and Coastal Plain draining rivers. These factors result in an estuarine system with minor or small astronomical tides and highly variable salinities that range from fresh water to high-brackish water within specific portions of these large water bodies.

However, because the sounds behind the Outer Banks have relatively large surface areas with moderately uniform depths and no interior salt marshes, there is maximum response to waves and wind tides. Normal wind tides generally are small (inches to one-two feet) with storm-tide heights (amplitudes) commonly up to three-five feet and occasionally up to ten feet or more in response to major hurricanes.

As illustrated by figure 1-9, the direction, intensity, and duration of wind determine the currents and tide levels. For example, a nor'easter that blows strongly for several days produces strong south-flowing currents. This will blow much of the water out of the Currituck, Roanoke, and Croatan Sounds (with three to five foot lower water levels) and produce flood conditions in southern Pamlico and Core Sounds (with three to five foot higher water levels). (Refer to figure 1-11.) This sloped water surface will hold as long as the wind continues to blow. As soon as the wind relaxes in intensity or shifts direction, the water flow responds immediately. Consequently, these back-barrier sounds tend to be dominated by irregular flooding and wind tides caused by storms.

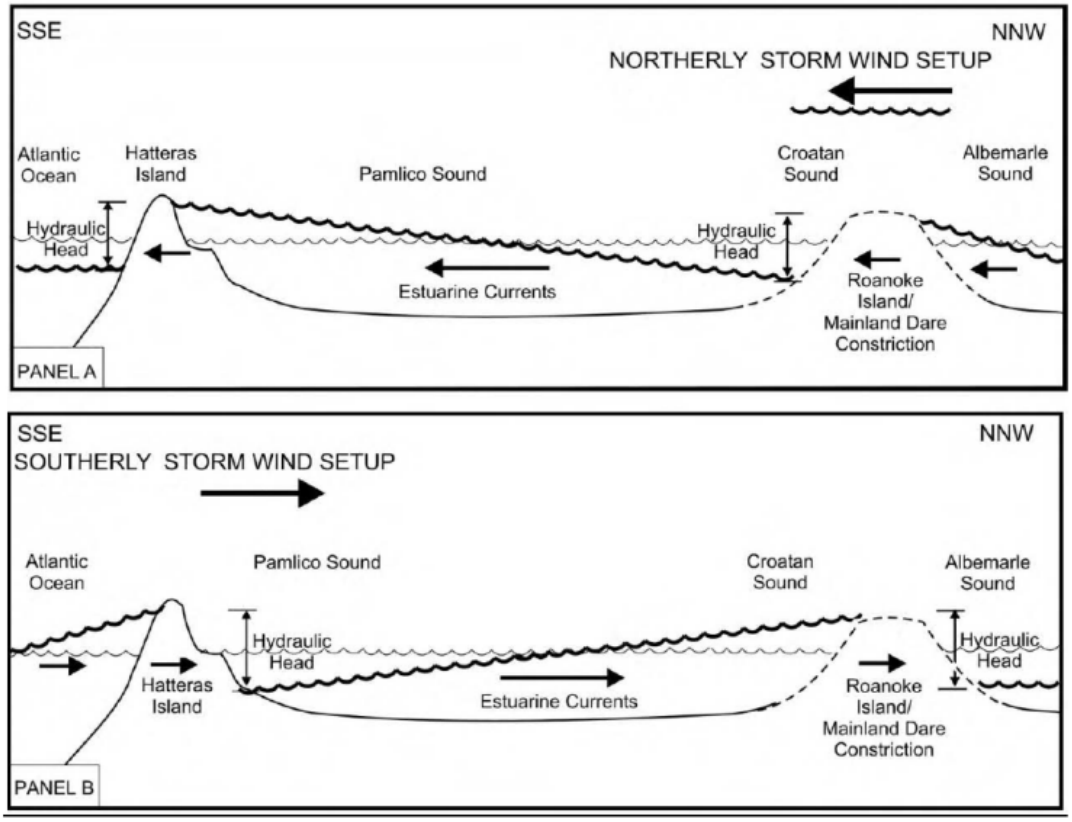

Figure 1-9. Model of estuarine storm tides in the North Carolina sounds that form in response to different storm events. Wave energy added to both high and low storm tides is the primary process driving estuarine shoreline recession. Panel A. High storm tides occur along southern shores in response to events dominated by northeast, north, or northwest wind directions, whereas low storm tides occur along the northern shores. Panel B. High storm tides occur along the northern shores resulting from events dominated by winds from the west, southwest, or south wind directions, whereas low storm tides occur along the southern shores. Figure 5-2-1, p. 57 in Riggs and Ames (2003).