Numerical Modeling Analysis of Proposed Jetty Design
Oregon Inlet, North Carolina

Project Characteristics:

- Numerical Modeling
- Tidal Hydrodynamics
- Tidal Flushing

Plans to construct stabilizing jetties on both the north and south sides of Oregon Inlet prompted a series of studies regarding the effects of structures on the present system. As part of this effort, Woods Hole Group used a one-dimensional (1-D) numerical model to quantify the tidal hydrodynamics of the entire Pamlico Sound system including the three major inlets: Ocracoke, Hatteras, and Oregon. The DYNLET1 numerical model was chosen for this application since it uses an implicit solution technique and is more stable than the standard 1-D linked-node tidal models. The model was driven by tidal forcing at each of the three inlets. Since tidal constituent data were not readily available for any of the inlets studied, the forcing was assumed to consist of a simple sinusoidal wave with the period of the M2 constituent. In addition, the forcing phase was assumed to be identical at each of the inlets.

Results from the numerical model were used to establish the general magnitude of possible changes in hydraulic conditions for three proposed jetty designs; no jetties (existing conditions), jetties 2500 ft apart, and jetties 3500 ft apart. Various hydrodynamic properties of the inlet were evaluated including tidal setup, water levels, current velocities, and tidal flushing.

The model results showed that the proposed jetties would influence the inlet hydrodynamics primarily due to the increased velocity over the longer channel segment. Frictional losses over the longer channel were found to reduce the tidal range within the Sound for distances up to four miles from Oregon Inlet. Tidal setup was also found to decrease as a result of jetty construction. The model results showed an 11% to 19% reduction in tidal prism with the proposed jetties.