

Section 22, Planning Assistance to States

Indian River Inlet Sediment Management Investigation

Background. Indian River Inlet is the only inlet on the 25-mile-long Atlantic Ocean coast of Delaware and is the location of two USACE Federal projects. The first is a navigation project (Indian River Inlet & Bay, Sussex County, DE) that is operated and maintained by the Philadelphia District with no recurring non-Federal sponsor requirements. Construction of the Indian River Inlet navigation project was completed in 1939. The second is a Federal shore protection project (Delaware Coast Protection, Sand Bypass Plant, Indian River Inlet, DE), which is a cost-shared Construction General (CG) project jointly funded by USACE and the non-federal sponsor, the Delaware Department of Natural Resources and Environmental Control (DE DNREC). The sand bypassing project was authorized and constructed to mitigate the impacts of the Federal navigation project on the north ocean shoreline adjacent to the inlet. Construction of this project was completed in 1989 and it began operation in 1990. USACE annually provides Federal funding to DNREC according to the terms of the project authorization and the 1988 Local Cooperation Agreement for the project. However, DNREC is responsible for and performs all operation and maintenance activities associated with the sand bypassing project.

Sediment management in and adjacent to Indian River Inlet has been a continuous and serious problem almost from the time that the navigation project was completed. The inlet interior west of the highway bridge experienced significant shoreline erosion beginning in the 1940s that has necessitated westward extension of the original rubble-mound jetty structures over a distance of 3,000 lineal feet on both north and south interior shorelines. The inlet channel between the jetties has scoured in three locations to depths that exceed -80 feet Mean Lower Low Water (MLLW) and this scour was in part responsible for the Delaware Department of Transportation decision to replace the DE Route 1 highway bridge between 2011 and 2013. Erosion of the downdrift (north) ocean beach adjacent to the inlet is an adverse impact of the navigation project, and several large beachfills between 1951 and 1990 were needed to prevent

a breach of the ocean shoreline north of the inlet. Since 1990 the sand bypassing plant has been the principal mechanism by which sand is transferred from the wider south ocean beach to the sediment-starved north ocean beach.

DNREC and UD Commitment. Given the significant and ongoing investment of State funds utilized to operate the sand bypassing plant at Indian River Inlet, DNREC has supported investigations in conjunction with coastal engineers at the University of Delaware (UD) Center for Applied Coastal Research in order to develop a better understanding of sediment transport pathways and transport rates within and adjacent to the inlet. DNREC is presently engaged with the UD team in an effort titled “Drifter Study of Circulation near Indian River Inlet, DE”. This project and earlier DNREC-funded research have attempted to understand and quantify flow patterns in and near the inlet that result in gradients in sediment transport patterns and morphological change. UD researchers have previously placed in situ wave and current sensors to quantify wave statistics and velocities near the inlet. Proposed drifter studies will reveal Lagrangian flow path lines that drive sediment transport pathways. Numerical model simulations provide a holistic view/prediction of the waves, currents and sediment transport patterns near the inlet. Hydrodynamics in the model will be validated with the in situ sensor and drifter data.

Accurately placing sensors on the sea bed requires knowledge of the bathymetry. Also, the modeling study depends on recent and accurate bathymetry as a boundary condition for realistic simulations. Modeling and instrument placement to date have relied on USACE bathymetry most recently obtained in 2011. Since that date, Hurricane Sandy in October 2012 has impacted the distribution of sediment in the vicinity of Indian River Inlet, and new bathymetry is required to complement the modeling and interpretation of observed drifter patterns. The FY14 Section 22 Planning Assistance to States funding will be applied by the Philadelphia District to obtain complete bathymetric mapping of the inlet and adjacent nearshore zones.