Success Story

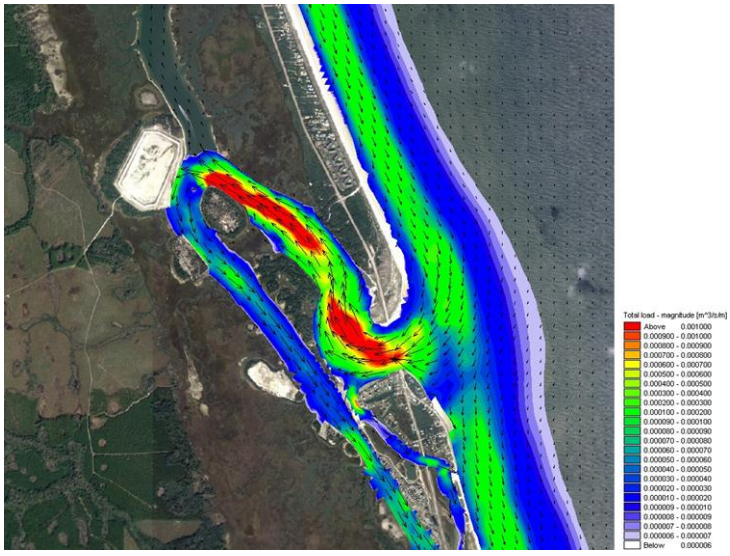
Matanzas Inlet Study Uses Coastal Modeling to Evaluate Reduction of Maintenance Dredging Requirements in Intracoastal Waterway

Matanzas Inlet lies 2.5 miles (4.0 kilometers) north of the St. Johns/Flagler county line in Florida. The Intracoastal Waterway (ICWW) near Matanzas Inlet exhibits an extremely high shoaling rate requiring maintenance dredging, on average, every 2.7 years. This high maintenance requirement exists primarily because the ICWW in this area lies relatively close to an exposed, active, natural sandy inlet, and because the littoral materials introduced through the inlet to the interior channels are not actively managed.

To evaluate the feasibility of reducing the amount of shoaling, the Florida Inland Navigation District funded a sedimentation study by Taylor Engineering to (1) identify, quantify, and analyze the existing features, wave climate, hydrodynamics, and sediment characteristics of the Matanzas Inlet area, and (2) evaluate alternatives to reduce sediment inflow into the ICWW channel and other adjacent waterways. These alternatives could reduce the frequency and costs of dredging the ICWW channel near Maintenance Spoil Area St. Johns 1 (MSA SJ-1).

In order to achieve this, Taylor Engineering used DHI's MIKE 21 software to model the integrated coastal hydrodynamics, waves, and sediment transport processes influencing the water levels, flow velocity, bed transport, erosion and deposition at the area of interest. The model was calibrated against historical water level and bed level data, and the sediment transport was adjusted until it achieved patterns consistent with the formation of the ebb shoal, erosion at Summer Haven beach, and shoaling in the ICWW. Once the model was calibrated against observed and measured data, it was used as a tool to:

(1) understand sediment transport forcing mechanisms,
(2) identify potential alternatives to reduce ICWW shoaling,
(3) evaluate the performance of alternatives to reduce ICWW shoaling,
(4) understand the potential impact of the alternatives to flow and sediment transport, and
(5) estimate potential morphological changes associated with modifications.



The study evaluated a no-action alternative and three proactive alternatives to reduce ICWW shoaling. The proactive alternatives included constructing a sediment trap or basin in the north arm of Matanzas River, constructing a spur dike off the northern tip of Rattlesnake Island, and extending the existing sediment trap in the ICWW.

Among these alternatives, a deep sediment basin in the Matanzas River north arm and north of Fort Matanzas seems the most feasible based on estimated construction and maintenance cost. Model results indicate the basin would reduce dredging frequency in the ICWW from the current frequency of one dredging operation every 2.7 years to one dredging operation every four years.

For more information about the MIKE by DHI suite of 2D and 3D coastal and marine modeling software products, please visit www.dhigroup.com, send an email to dhi-ca@dhigroup.com, or call our North American Toll Free Telephone number at 1-888-344-9233.

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