

Modeling Environmental Effects of Dredging in Mt. Hope Bay and the Taunton River

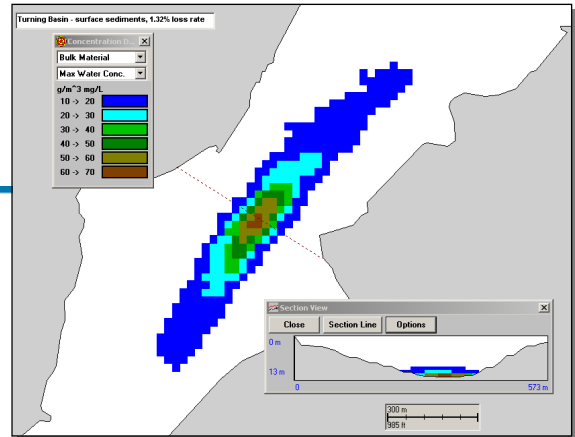


CLIENT:

Weaver's Cove Energy LLC through Epsilon Associates, Inc.

PROJECT ELEMENTS:

- Dredge disposal modeling
- Field monitoring program
- SSFATE sediment modeling
- SSDOSE sediment modeling



PROBLEM. PURPOSE.

ASA was retained to evaluate the environmental effects from both maintenance dredging and dredging operations to create a larger basin for permitting of a proposed Liquid Natural Gas (LNG) terminal at a site on the Lower Taunton River in Fall River, MA.

SCIENCE. SERVICES. SOLUTIONS.

ASA designed a field monitoring program and modeling study to assess the potential biological effects the sediment plumes generated from these operations. The field program was designed to provide information on present conditions in the turning basin at the head of the channel located at the proposed terminal site. An Acoustic Doppler Current Profiler (ADCP) was deployed for a month to measure the vertical structure of horizontal currents. Two YSI instruments were also deployed at the present terminal pier to measure near surface and near bottom temperature, salinity, dissolved oxygen and turbidity. A NOAA PORTS site located in the channel south of the mouth of the Taunton River provided additional temperature, salinity and ADCP velocity data as well as meteorological (wind velocity and atmospheric pressure) time series.

The modeling component of the study uses three of ASA's models. BFHYDRO in WQMAP estimates the three-dimensional time-varying currents in the bay and river under a variety of tidal, wind and river flow conditions. The model is applied to the lower Taunton River and Mt. Hope Bay with specific focus on the area encompassing the dredged channel.

The SSFATE (Suspended Sediment FATE) model was jointly developed with the Engineer Research and Development Center of the U.S. Army Corps of Engineers to predict the transport and fate of material suspended during dredging operations. Both water column concentrations and bottom deposition patterns are predicted for multiple sediment size classes. Bucket dredging at a series of locations along the dredged channel and turning basin will be simulated for different environmental conditions.

The companion SSDOSE (Suspended Sediment DOSE) model was also developed in part with USACE ERDC. This model estimates the exposure of multiple behavior categories (plankton; stationary benthic; stationary, non-directed and directed movement of demersal and pelagic fish) by calculating the dose from a range of exposure concentrations and exposure times. The dose is then compared to sublethal and lethal endpoints and the affected population or biomass is determined.

PRODUCTS. RESULTS.

This procedure was repeated for the different dredging locations and environmental conditions to help optimize the dredging schedule to minimize effects to the biota.