

# Modeling Dredge Disposal Operations on the Thames River near Groton, CT



## CLIENT:

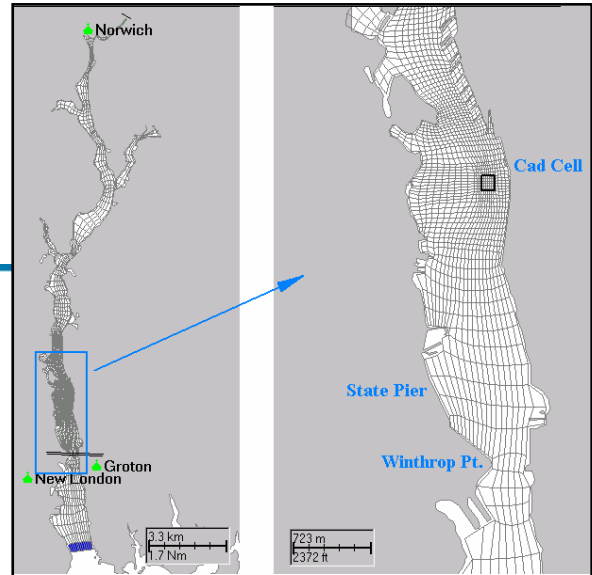
U.S. Navy (through Maguire Group, Inc.)

## PROJECT ELEMENTS:

- Dredge disposal modeling
- Hydrodynamic modeling using BFHYDRO
- SSFATE sediment modeling
- Temporal and spatial sediment concentration analysis using BFMASS

## PROBLEM. PURPOSE.

Seeking to rehabilitate a pier located at its submarine base on the Thames River at Groton, Connecticut, the U.S. Navy, needed plans for the disposal of sediment dredged during construction into a confined aquatic disposal (CAD) cell located just south of the pier complex. The potentially harmful effects of the disposal operation on water quality are a major concern to the reviewing regulatory agencies.



## SCIENCE. SERVICES. SOLUTIONS.

ASA performed a series of model simulations for dredged deposition analysis. ASA approached the problem using a series of computer models. BFHYDRO was used to generate hydrodynamic information (currents) for the system. SSFATE was then used to estimate the size strength of the sediment plume created during disposal operations at the CAD cell. Finally, BFMASS was used to estimate the characteristics of the pollutant plumes associated with individual contaminants in the dredged sediments.

The domain of the hydrodynamic model for this application was the estuarine portion of the Thames River, from its mouth at Long Island Sound upstream to the Greenville Dam at Second Street in Norwich, CT. The boundary fitted model grid cells ranged in size from ~380 m x 380 m to 12 m x 12 m in the vicinity of the CAD cell. The model was run in two-dimensional mode with forcing from both tidal flow and river flow. The model was calibrated to historical harmonic elevation and current data from NOAA.

SSFATE, developed jointly by ASA and the U.S. Army Corps of Engineers (USACE) Environmental Research and Development Center, was used to simulate dredge disposal operations. The center of the CAD cell was designated as the representative disposal operation location. The source was simulated as an instantaneous release of sediment. Simulations were conducted for spring, mean and neap tidal forcings and release during ebb and flood. Results were presented as excess TSS concentration as a function of both space and time.

BFMASS was used in this application to predict the temporally and spatially varying concentrations associated with transport of equilibrated sediment contaminants in the dissolved phase (i.e., a conservative constituent). Simulations were conducted for a representative conservative pollutant with a source concentration of 1 g/L under three different tidal forcings (neap, mean, and spring) and two different tidal phases (flood and ebb).

## PRODUCTS. RESULTS.

Results gave excess pollutant concentrations (i.e., concentrations above ambient) as a function of both space and time.