

# WATER QUALITY ASSESSMENT OF SCONTICUT NECK, FAIRHAVEN, MASSACHUSETTS AND OUTER NEW BEDFORD HARBOR

**Client: Habitat Conservation Division, National Marine Fisheries Service**

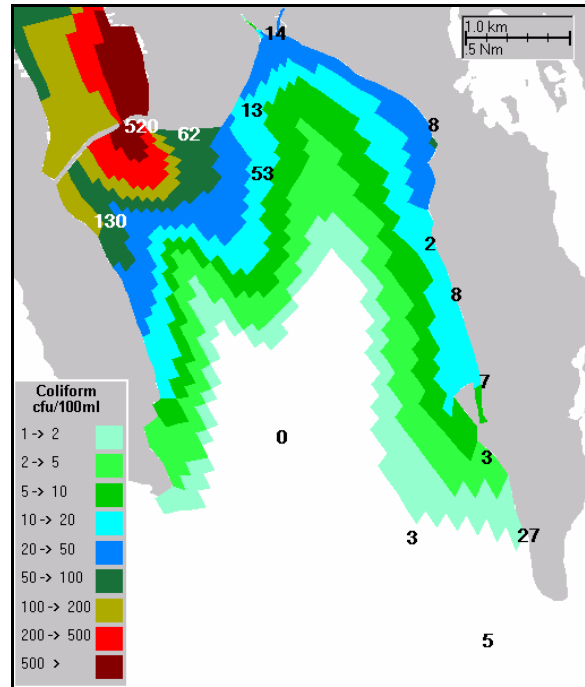
Shellfish have long been recognized as a valuable resource in Outer New Bedford Harbor. The quahog is the predominant species in the area, estimated at 100 to above 200 bushels/ac in the area along Sconticut Neck, located on the east side of the Harbor. Access to the resource has been restricted by the Massachusetts Division of Marine Fisheries due to elevated fecal coliform (FC) concentrations.

This study investigated the origin and distribution of FC within Outer New Bedford Harbor. A two-phase approach was adopted to accomplish this: first a field survey was undertaken to characterize the FC sources contributing to the harbor. A modeling study was then performed to evaluate the effect of each of the identified sources on the distribution of FC in the harbor.

For the field component, water samples were collected at 21 stations located in and around Outer New Bedford Harbor. Samples were analyzed for FC content in an attempt to identify the major sources of FC. Water samples from 13 dry periods and 2 storm events over the course of 15 months were subjected to analysis. FC concentrations were found to be relatively low throughout most of the harbor, with high concentrations limited to near-shore areas. Two sources of FC were identified as being consistently significant: Boy's and Girl's Creeks and Winsegansett Pond. In addition, Inner New Bedford Harbor was found to be a significant contributor of FC to the outer harbor during November and December.

Water samples from two dry periods and one storm event were subjected to bacterial source tracking analysis using a method that relied on DNA fingerprinting, DNA Ribotyping. This analysis was done to identify the biological origin of FC entering Outer New Bedford Harbor at each source. Results indicated birds to be the dominant source of FC in the harbor, with rodents and raccoons also significant contributors. Humans were found to account for only a small fraction (~10-20%) of the total FC entering the outer harbor.

The modeling study consisted of two components: hydrodynamic and pollutant transport. Hydrodynamic modeling of Outer New Bedford Harbor was performed to obtain detailed currents in the harbor. This was accomplished through an application of ASA's BFHYDRO (Boundary Fitted Hydrodynamic model) to the study area. Model circulation was driven by winds and tides and the model was calibrated by comparison to historical current data for the harbor.



A series of pollutant fate and transport simulations was conducted using the currents generated by the hydrodynamic model and ASA's BFMAS (Boundary Fitted Mass Transport model). Three scenarios were investigated based upon the findings of the field program: 1) typical dry conditions (excluding November-December period), 2) typical storm conditions and 3) dry conditions during the November-December period. Comparison of modeled FC concentrations to data from the field program indicates that FC contributions from Boy's and Girl's Creeks and Winsegansett Pond are adequate to account for the distribution of FC in the outer harbor during typical dry conditions and storm events. Furthermore a FC source in the inner harbor, reflecting the influence of unchlorinated effluent from the Fairhaven Water Pollution Control Facility, is adequate to explain anomalously elevated FC concentrations in the harbor during November and December.