Example 2: PCB and Heavy Metal Assessment and Coastal Water Remediation

New Bedford Harbor, a part of the Buzzard Bay in Massachusetts, was highly contaminated by polychlorinated biphenyls (PCBs) and heavy metals, including arsenic, cadmium, chromium, copper, lead, mercury, silver, and zinc. The site was designated as a Superfund Site by the U.S. Environmental Protection Agency (EPA) (See Fig. 1 showing sampling locations). As a part of a site remediation investigation/feasibility study, Dr. Onishi conducted the three-dimensional modeling. Dr. Onishi was also involved in development of a field sampling plan and participated to collect field data. With FLESCOT code he co-developed, he predicted a wind-wave-enhanced tidal flow (See Fig. 2); transport, deposition and re-suspension of sand, silt, and clay (See Fig. 3); transport of dissolved contaminant (PCBs and the heavy metals), and transport, deposition, and re-suspension of particulate contaminants sorbed by sand, silt, and clay (See Fig. 4). The model also predicted the distributions of bed sediment and particulate contaminants associated with bed sediment within the bed by simulating bed erosion and suspended sediment deposition, and their associated contaminants.

The predicted model results for ten simulation years were supplied to a food web model to assist EPA to evaluate the effectiveness of the various clean-up options, including dredging of contaminated sediment.

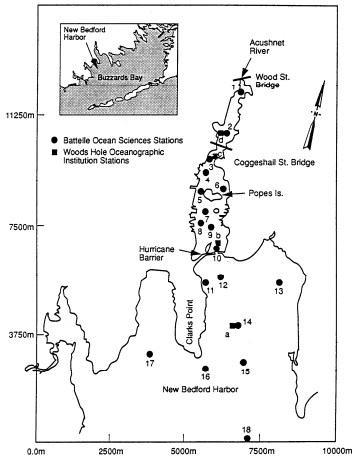

Fig. 1. New Bedford Harbor and Buzzards Bay, Massachusetts and Sampling Sites

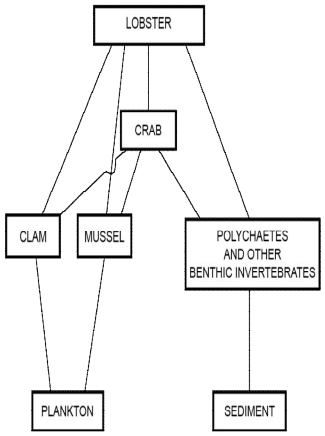

Fig. 2. Lobster Food Web

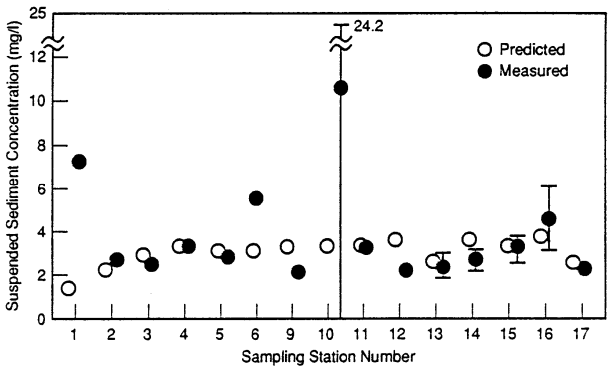

Fig. 3. Predicted total suspended sediment (sum of sand, silt and clay) Concentrations

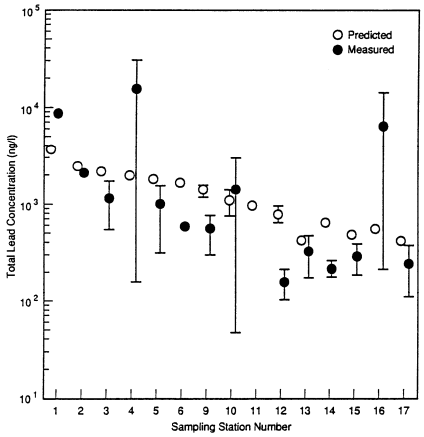

Fig. 4. Predicted total lead concentrations in water