EXECUTIVE SUMMARY

Natural weathering, runoff, aerial deposition, open water dredged spoil disposal as well as industrial and municipal discharges constitute the major input of trace metals in coastal waters. In Long Island Sound, according to Fitzgerald (1974), more than 80% of the Cu and Zn input appears to be of anthropogenic origin; he further states that "about 90% of the Cu and Zn entering the Sound annually is removed either biologically or geochemically to the sediment". The role of marine bivalve molluscs in extracting trace metals from their environment and concentrating the metals in their tissues is well known. It is one of the biological mechanisms by which trace metals are removed from the aquatic environment. *A* number of investigators have taken advantage of this unique characteristic of the molluscs, and successfully used them as sentinel organisms in monitoring environmental qualities (Pringle et al., 1968; Shuster and Pringle, 1968; Romeril, 1974; Leatherland and Burton, 1974; Goldberg et al., 1978). Feng and Ruddy (1975) reported that the concentrations of certain trace metals in oysters deployed along the Connecticut coast were associated with the degree of industrialization of the region, while Frazier (1976) observed a relative enrichment of metals in oysters, which reflected patterns of metal contamination in sediment. Comparative studies of trace metals in bivalve molluscs and other marine organisms from within and around disposal sites in the New York Bight have been reported by Greig and Jones (1976) and Greig et al. (1977). In recent years, Phelps and Galloway (1980) have used the blue mussel, Mytilus edulis, to assess the condition of Narragansett Bay in Rhode Island. These monitoring systems are important from a food chain point of view, since high concentrations of trace metals in edible bivalve molluscs constitute a health hazard to consumers. Furthermore, the presence of excess amounts of trace metals from anthropogenic activities may impose stresses on marine organisms (Bryan, 1971). For example, cadmium and copper in particular have been shown to be toxic to the growth and reproduction of bivalve molluscs (Shuster and Pringle, 1968; Calabrese et a1., 1977).

The uptake of trace metals by bivalve molluscs is dependent on the availability of metals in the environment as well as water temperature, physiological state and the size of the organism (Romeril, 1974). However, the uptake is by no means irreversible; as shown by Fang and Ruddy (1975), oysters from a highly polluted area, when transplanted to an environment of low metal concentrations, show depuration of metals. From July 1977 through July 1979 more than 1.6 million cubic yards of spoil were removed from the Thames River and disposed in a one square mile area known as the Eastern Long Island Sound Disposal Site which is located ca. two miles south of the river mouth. Because resuspension of fine sediment and concomitant release of interstitial water during maintenance dredging of channels and harbors, and subsequent open water disposal of dredge spoils could increase certain nutrients, trace metals and organics in the environment (Nisbet and Sarofin, 1972). We are, therefore, concerned with the transport and fate of these spoil-associated contaminants in the

environment as well as their potential effects on living marine resources, such as the blue mussel.

In this investigation we are seeking answers to the following questions:

1. Are there significant increases of trace metals in M. edulis, attributable to open water disposal of dredged spoils or other environmental factors?

2. Are there overt physiological changes in M. edulis, that can be ascribed to the increase in tissue trace metals?

This report analyzes the results of temporal and spatial variations of trace metal levels and the physiological condition expressed as changes in the ratio of wet and dry tissue weight of M. edulis deployed in the vicinity of Eastern Long Island Sound disposal site and reference site. Histological studies which attempt to discern differences, if any, in the development of female reproductive tissues between the reference and experimental populations, are presented in a separate report. Findings on PCB levels in mussels have been reported elsewhere (Arimoto and Feng, 1982).