

# INTRAAANNUAL VARIATION IN FISH POPULATION CHARACTERISTICS AND SEAFLOOR HABITAT RELATIONSHIPS IN A LARGE ESTUARINE EMBAYMENT: BUZZARDS BAY, MASSACHUSETTS

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## INTRODUCTION – FISHES, FISH HABITAT & DREDGED MATERIAL MANAGEMENT

The Massachusetts Office of Coastal Zone Management (CZM) and the Division of Marine Fisheries (DMF) studied fish population characteristics in eastern Buzzards Bay (BB) to assess the suitability of potential dredged material disposal sites (Figure 1). There are few studies or monitoring programs that assess seasonal population features of fishes in Massachusetts waters (e.g., Howe et al. 2000; Carey and Haley 2002; Hughes et al. 2002; Wyda et al. 2002), and no study describes the fish community of the deeper waters of BB. This lack of information hinders resource management decisions, and decisions are frequently made without adequate knowledge of the potentially effected resources. CZM required quantitative data on fish populations and the seafloor environment to facilitate the assessment of disposal site suitability.

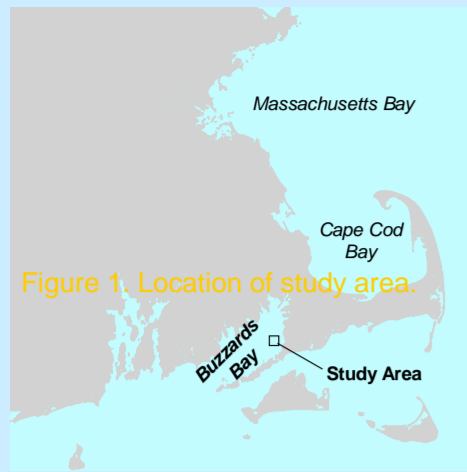


Figure 1. Location of study area.

The need for a regional disposal site led CZM to investigate the possibility of re-opening the Buzzards Bay Disposal Site (BBDS). The BBDS was historically used to dispose fine grain sediments (mud to sand) that were dredged from local harbors (BBDS was closed in 1989). The resource management question (is there a suitable site for dredged material disposal?) presented an opportunity to inform management and investigate the fish community of BB.

The objective of this study was to facilitate the determination of site suitability for dredged material disposal by characterizing the seasonal cycle of relative abundance, assemblage structure, life history characteristics and seafloor habitat associations of fishes in eastern BB. A commercial fisherman (Captain Andy Mannix, *F/V Lady Jane*; Figure 2 and 3) was hired, DMF and the captain designed the sampling gear, and the project team identified trawl stations to achieve this objective. The collaborative effort was a success, and each investigator played an important role in designing the study, analyzing data and applying results.



Figure 2. Captain Andy Mannix.



Figure 3. Fishing Vessel Lady Jane.



This poster presents a description of seafloor habitat, the relative abundance (by number and weight) of dominant fish species and life history characteristics of selected fish species.

## MATERIALS AND METHODS – BUZZARDS BAY SEAFLOOR ENVIRONMENT & TRAWL SURVEY

Buzzards Bay is a large estuarine embayment in southeastern Massachusetts. BB is a broad, semi-enclosed basin, open to the continental shelf to the south, vertically mixed, and is in the transition zone between the Acadian and Virginian zoogeographic zones (Howes and Goehring 1996). The seafloor environment is dominated by fine grain sediment (mud to sand) in the central, deeper portion of the bay and coarser grain material on shoals and nearshore areas (Moore 1963). This study assessed benthic habitat type and quality using sediment profile imagery, bathymetric, side scan sonar, benthic grab and scuba surveys.

The study area contained a broad depression, shoals and several submerged valleys with variable slopes, and surficial sediments were predominately fine grain (>4 to 2 phi; Figure 4 and 5). Seven trawl stations were established to include the variation in seafloor features found within the study area (Table 1; Figure 4 and 5). Stations were towed once per month in March 2001 and November 2001 through March 2002, and twice per month from April 2001 through October 2001 (20 sample periods). Each tow was 0.5 nautical miles. The otter trawl had a 6.4mm knotless liner to capture small fishes.

This poster presents total number per tow (no.) and weight (kg) per tow for all stations combined to illustrate seasonal population characteristics of BB fishes. This study investigated habitat associations. The seafloor environment is described in this section, and habitat relationships are mentioned in the summary.

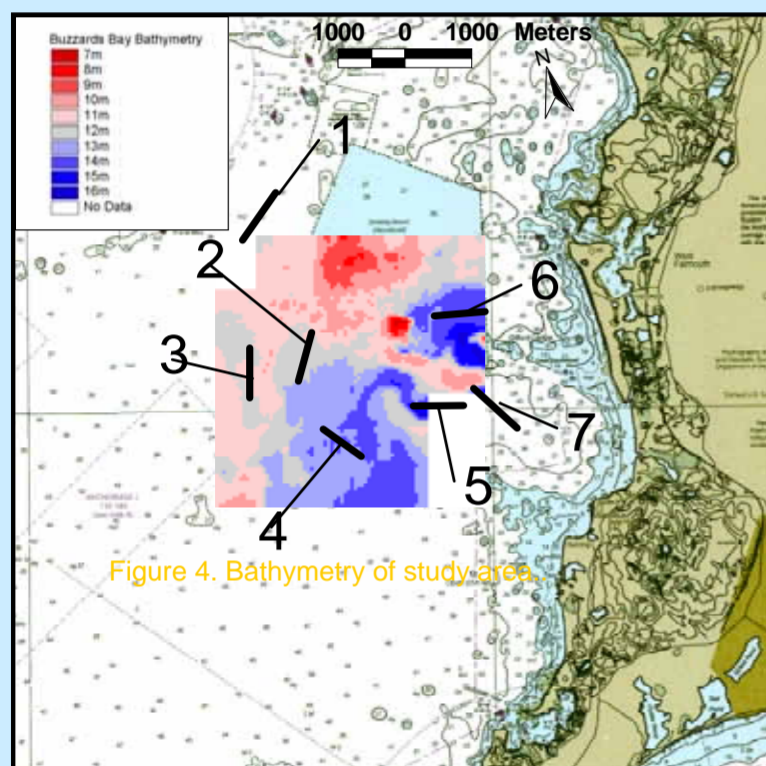


Figure 4. Bathymetry of study area.

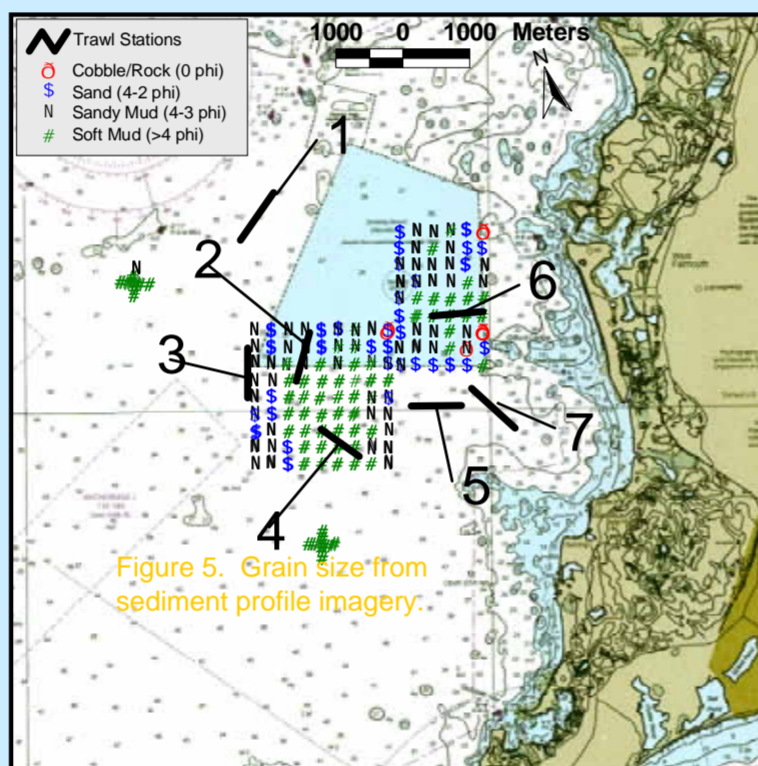


Figure 5. Grain size from sediment profile imagery.

Table 1. General characteristics of trawl stations.

	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7
WATER DEPTH (m)	~13	10-13	11-12	13-16	13-16	14-16	14-16
PREDOMINANT SUBSTRATE (phi)	soft mud (>4) sandy mud (4-3)	soft mud (>4) sandy mud (4-3) sand (2)	sandy mud (4-3)	soft mud (>4)	soft mud (>4)	soft mud (>4)	soft mud (>4)
SEAFLOOR LANDSCAPE	smooth plain	variable (erratics located on plain)	smooth plain	broad, sloping valley	submerged valley	submerged valley steep slope	submerged valley steep slope
OBSERVATION				broad topographic depression		frequent snags	seasonal occurrence of drift algae

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**Soft mud (> 4phi):** Seafloor environment was low energy and depositional, characterized by periodic accumulation of drift algae (especially at trawl station 7). **Trawl stations 4, 5, 6 and 7**



**Sandy mud (4-2phi):** Seafloor environment was comparably shallower and/or higher energy; several stations contained snags. **Trawl station 3** (sandy mud), **stations 1 and 2** (mix)

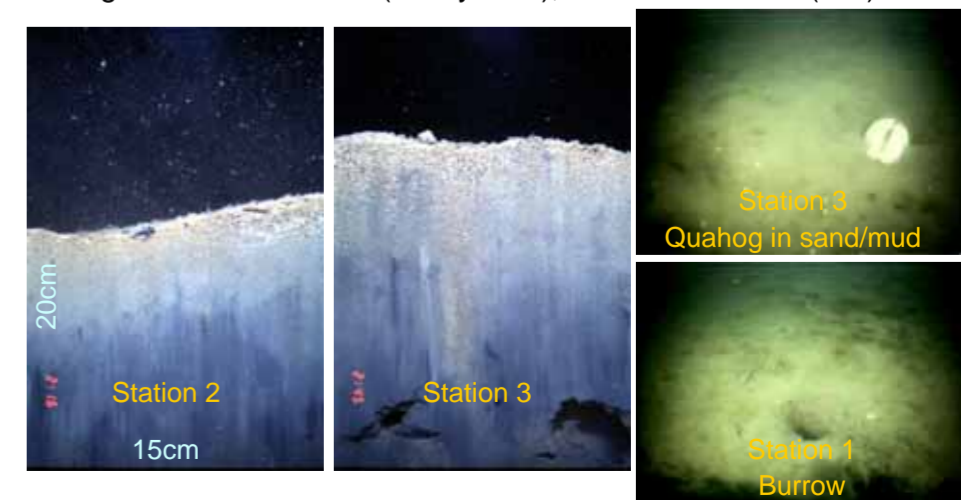


Figure 6. Representative images of seafloor environment.