EXECUTIVE SUMMARY

A monitoring survey was conducted at the Cape Cod Bay Disposal Site (CCBDS), as part of the Disposal Area Monitoring System (DAMOS), from 19 to 28 August 2003. The August 2003 field effort consisted of bathymetric and sediment-profile imaging surveys designed to document changes in seafloor topography, evaluate the physical distribution of dredged material, and assess the recovery of the benthic community within CCBDS relative to ambient sediment conditions.

The bathymetric survey was conducted over the eastern two-thirds of CCBDS, and revealed relatively flat topography, no natural features and three dredged material disposal mounds. Two distinct mounds were identified in CCBDS; Mound A in the southeast quadrant and Mound B in the northeast quadrant. A less distinct mound was identified near the center of the site, at the location of the historic Wellfleet Disposal Area.

Mound A was formed in late 1994 to early 1995 by the disposal of 112,000 m^3 of dredged material. In November 2002, an additional 2600 m^3 of dredged material was placed at Mound A. Three monitoring surveys have been performed in the eight years following the initial disposal: 1996, 2001 and 2003. The 2003 survey indicated that Mound A has a maximum height of approximately 1 m above the surrounding seafloor and an approximate footprint 450 m in diameter. There was little change in the mound height and lateral extent between the 2001 and 2003 surveys.

Eight years following cessation of disposal activities at Mound A, the recovery of the benthic community in 2003 was slower than expected. Relatively shallow RPD depths and presence of Stage I only assemblages in some 2003 replicates resulted in a median OSI of +4, lower than the Mound A OSI in 1996 (+11) and 2001 (+5), and lower than the 2003 reference area OSI (+6). However, Stage III infauna were present in at least one replicate at all stations, indicating patchy, but advancing recolonization over the mound. CCBDS lies within the *Molpadia oolitica* community of Cape Cod Bay; this relatively large Stage III species is found in low densities (2 to 6 individuals per m^2), and produces feeding voids at depths of 20 cm or more. This intermittent occurrence of *M. oolitica* makes the abundance of this species difficult to document with the relatively few SPI stations that were occupied over Mound A. A more intensive monitoring survey is recommended to monitor the apparent inhibited recovery and more fully characterize benthic recolonization status of Mound A.

Mound B was formed by the disposal of 324,000 m^3 of dredged material, placed between June 1996 and December 2000, and an additional 185,000 m^3 of dredged material placed between October 2001 and January 2002. The August 2003 survey

results indicated that Mound B was approximately 1.5 m higher than indicated in the August 2001 survey. A new mound apex was created to the southeast, forming an elongated mound with an approximate height of 5.5 m above the surrounding seafloor. The footprint of the mound had an approximate diameter of 600 m, comparable to that measured in the 2001 survey. Side slopes near the apex of Mound B were relatively steep, and it is recommended that no additional dredged material be placed in the vicinity of the peak of the mound.

The benthic community on Mound B showed recovery with Stage III assemblages present in 42% of the replicates, a mean RPD of 1.3 cm and a median OSI of +5. Benthic conditions appeared to be stressed relative to the reference conditions (Stage III assemblages in 60% of the replicates, mean RPD = 2.3 cm and median OSI=+6) eighteen months following the cessation of disposal events, however benthic recovery is consistent with expectations at this site. It is recommended that Mound B be resampled in the future to continue to monitor benthic habitat recovery.

In the August 2003 survey, Cape Cod Bay Reference Station (CCBRS) was the only reference area surveyed to provide characterization of ambient conditions. Based on the 1996, 2001 and 2003 SPI surveys at CCBRS, there was an apparent decline in ambient benthic conditions (1996 OSI = +10, 2001 OSI = +7, 2003 OSI = +6) due to shallowing RPD depths and decreasing appearance of Stage III infauna. However, sample numbers are not sufficient for a significance test of these results. A preliminary review of long-term MWRA benthic data at two stations (including one at the location of CCBRS) indicated stable benthic conditions in Cape Cod Bay over the 11-year period of record. The apparent decline in ambient benthic community could be due to analysis techniques, seasonal variations in benthic conditions, or natural variation or recovery patterns of Cape Cod Bay that differ from other disposal locations within the DAMOS program. Further study is recommended to better understand the trends observed in the SPI data at the reference area.