

EXECUTIVE SUMMARY

In support of the Disposal Area Monitoring System (DAMOS) Program, Science Applications International Corporation (SAIC) conducted an environmental monitoring survey at the Cape Cod Bay Disposal Site (CCBDS) from 17 to 21 August 2001. The August 2001 field effort consisted of collecting precision bathymetric and Remote Ecological Monitoring of the Seafloor (REMOTS[®]) data over two dredged material disposal mounds within CCBDS. These survey techniques were used to document changes in seafloor topography, evaluate the distribution of dredged material, and assess the recovery of the benthic community within the active areas of CCBDS relative to conditions within the surrounding ambient sediments.

Although several bathymetric surveys have been performed over small areas within CCBDS, the August 2001 monitoring effort was the first high-resolution, master bathymetric survey completed over the entire disposal site. The natural seafloor within CCBDS was found to be relatively flat and regular; the only features found at the site consisted of three dredged material deposits. Two clearly distinguishable disposal mounds were detected, Mound A located in the southeastern corner and Mound B in the northeastern quadrant of the disposal site. A subtle dredged material mound was also detected near the center of CCBDS within the historic Wellfleet Disposal Area.

Mound A is an older mound, formed in the fall of 1994 and winter of 1995 by the placement of 112,000 m³ of sediment dredged from Wellfleet Harbor. The August 2001 monitoring survey detected a water depth of 29.25 m at the base of the mound and a minimum depth of 28.65 m at its apex, yielding a mound height of 0.6 m. The comparison between the August 2001 and May 1996 bathymetric survey data indicated only small-scale changes in seafloor topography over Mound A. The REMOTS[®] results agreed relatively well with the depth difference comparison over Mound A and showed that the mound apron extended 100 to 200 m to the south of the mound center and beyond 200 m to the east.

At roughly six years following disposal activities, the benthic recolonization over the surface of Mound A appeared to be inhibited and slower than expected, with a dominance of Stage I surface dwelling taxa. Stage III deep-dwelling infauna were present in only 31% of the images obtained over Mound A, compared to 68% at the reference area stations. A shallower overall redox potential discontinuity (RPD) depth of 1.9 cm and the dominance of only Stage I organisms served to diminish the overall median Organism-Sediment Index (OSI) value to +4.5 at Mound A, indicative of moderately degraded or disturbed benthic habitat quality; this value was considerably lower than the observed value of +7.9 at the reference areas. Results of the May 1996 survey suggested that complete benthic recolonization of the mound had occurred, with the presence of deep RPD depths and Stage III infauna. The August 2001 REMOTS[®] survey over a similar sampling grid of Mound A showed a significant decline in OSI values from +9.1 (1996) to +4.5 (2001).

EXECUTIVE SUMMARY (continued)

The August 2001 REMOTS[®] stations over Mound A should be resampled to monitor the progress of benthic habitat recovery in the future.

The largest and most recent bottom feature detected at CCBDS was the active disposal Mound B. Mound B was formed over a four-year period (June 1996 to December 2000) by the placement of 324,000 m³ of sediment dredged from Wellfleet, Plymouth, Sesuit, and Duxbury Harbors and deposited in the northeast quadrant (NE) of CCBDS. Rising four meters above surrounding seafloor, the apex of the Mound B was 27.5 m below the water surface (the shallowest depth at CCBDS), with an estimated diameter based on the bathymetric survey alone of about 350 meters. Because of the continued dredged material disposal over Mound B, the possibility of directing disposal to a new position should be considered before the stability of the mound is affected.

The results of the summer 2001 REMOTS[®] survey agreed relatively well with the bathymetric results over Mound B and indicated that the dredged material (fine-grained silt and clay occasionally mottled with white clay) was contained within the confines of the northeast portion of the disposal site. Ambient sediment (i.e., no dredged material) was detected at stations located primarily to the outer 300 m of the REMOTS[®] survey grid. Based on bathymetry and REMOTS[®], the mound was estimated to be about 500 to 600 m in diameter.

The benthic community over Mound B appeared to be recovering as anticipated, with an overall median OSI value of +6.5, indicating undisturbed benthic habitat quality. A diverse benthic community consisting of both surface-dwelling and deeper-dwelling infauna had recolonized Mound B and was comparable to conditions on the ambient seafloor. The bioturbational activity of this advanced benthic infaunal community was responsible for the formation of moderate to deep RPD depths, ranging from 1.4 to 3.7 cm below the sediment-water interface at the time of the August 2001 survey. Because of its recent disposal history, variability in benthic habitat quality was expected (OSI values ranging from +3 to +9). This variability is expected to continue as new dredged material is deposited over Mound B during the 2001–02 disposal season.

The initial reference area around CCBDS (CCBRS) has been periodically monitored over the past seven years, while the newly designated NW REF and SW REF reference areas were first monitored in 1996. Results of the August 2001 monitoring survey indicated that the CCBDS reference areas have continued to show undisturbed benthic habitat quality, with an overall OSI value of +7.9, similar to previous 1996 results.