

EXECUTIVE SUMMARY

The Portland Disposal Site (PDS) was monitored in August 2001 as part of the Disposal Area Monitoring System (DAMOS). Field operations consisting of Remote Ecological Monitoring of the Seafloor (REMOTS[®]) surveys were concentrated over three dredged material disposal mounds within PDS and three nearby reference areas. The three disposal mounds were comprehensively sampled to evaluate benthic recolonization of the individual dredged material deposits relative to conditions on the ambient seafloor at the reference areas.

The PDA 98 Mound was formed in the fall of 1998 and winter of 1999 by the placement of 315,600 m³ of sediment dredged from the interior reaches of the federally maintained channel within Portland Harbor and the Fore River. Dredged material disposal operations during the first and second phases of the project targeted a natural containment cell located near the center of the disposal site. Monitoring surveys performed during the summer of 2000 indicated the majority of the dredged material deposit was retained within the natural containment cell, with some accumulation of sediment over a prominent bedrock ridge to the south of the disposal location. The initial benthic recolonization surveys indicated the sediment deposit was recovering as anticipated, with a well-developed Stage I benthic infaunal population over the entire mound, and progression to Stage III at greater than 50% of the stations sampled.

The August 2001 survey confirmed the continued benthic recolonization of the PDA 98 Mound, as an advanced Stage I on III population was present at each station displaying soft sediment in the REMOTS[®] images. The bioturbational activity of this advanced benthic infaunal community was responsible for the formation of mean redox potential discontinuity (RPD) depths ranging from 1.1 to 2.8 cm below the sediment-water interface. The moderate RPD depths and presence of an advanced benthic infaunal community resulted in Organism Sediment Index (OSI) values ranging from +3 to +9, with the overall average for the mound exceeding the composite value calculated for the reference areas. Based on the findings of the 2001 survey, the PDA 98 Mound is expected to fully recover as the foraging activity associated with Stage III deposit feeders continues to consume the organic matter entrained within the deposited sediments and increases the level of oxidation below the sediment-water interface.

The DG Mound is located approximately 500 m to the northeast of the PDA 98 Mound and corresponds to the location of the US Coast Guard Class A special purposes buoy "DG" within the confines of PDS. The DG Mound is composed of many layers of sediment placed at PDS in recent years from dredging operations in the Casco Bay region. Since the winter of 1999, a total estimated barge volume of 186,450 m³ of sediment dredged from Portland Harbor and the Fore River has been deposited in close proximity to the DG buoy. Disposal logs indicate that approximately 155,800 m³ of silt,

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clay, and sand removed from the outer reaches of Portland Harbor was deposited at the DG buoy as part of the third phase of dredging performed in winter 1999. This volume of material was followed by smaller quantities in 2000 (18,300 m³) and 2001 (12,350 m³) produced by small dredging projects at multiple marine terminals in the Fore River.

Depth difference comparisons between the September 1998 and July 2000 multibeam bathymetric surveys detected a sizable accumulation of material at the DG buoy location resulting from the 1999 and 2000 disposal. However, no sediment-profile images were collected in the summer of 2000 to confirm the findings of the bathymetry or evaluate benthic recolonization over the DG Mound. A 25-station REMOTS[®] survey performed over the DG Mound in August 2001 detected benthic conditions analogous to those of the PDA 98 Mound. Although there was minimal impact related to the recent 2001 disposal detected, the majority of the replicate images displayed biologically reworked dredged material supporting a stable benthic infaunal population. Stage I tube-dwelling polychaetes were observed in relative abundance at the sediment-water interface over Stage III deposit feeding invertebrates at depth. In conjunction with the presence of an advanced benthic community, RPD depths were moderate to deep, yielding an overall average OSI value of +7 for the DG Mound. This value is indicative of an undisturbed or non-degraded benthic environment and exceeded the composite OSI value calculated for the reference areas.

The Royal River Mound was formed in the southeast corner of PDS between 1995 and 1997 as part of a capping demonstration project at this relatively deep water disposal site. Sediments were sequentially dredged from the Royal River in Yarmouth, Maine and deposited at the PDA 95 buoy to successfully form a capped mound on the PDS seafloor. The mound was extensively surveyed during the demonstration project, but had not been evaluated for benthic recolonization since the January 1997 postcap survey.

In August 2001, benthic habitat conditions over the Royal River Mound were found to be comparable to that of the ambient, Gulf of Maine sediments at the reference areas. The sediment detected in the replicate images was characteristic of historic dredged material with a generally gray color indicating a reduction in organic load relative to January 1997 as a result of biological reworking. An advanced successional stage assemblage was present at the majority of the stations sampled, and RPD depths ranged from 1.7 to 3.7 cm. The average OSI value over the Royal River Mound (+6.3) was slightly higher than the composite value for the PDS reference areas, reflecting undisturbed benthic conditions.

Similar to the findings of previous survey efforts, the data obtained from the PDS reference areas were representative of the ambient conditions surrounding the disposal site. However, the composition of the seafloor at the reference areas may not be directly comparable to the thick layers of soft sediment composing the disposal mounds. Despite

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the presence of deep RPDs ranging from 1.4 to 4.7 cm, a low abundance of Stage III activity at the reference areas in August 2001 resulted in diminished OSI values. Stage III activity over reference areas SREF and EREF appeared to be limited by the presence of rocky substrate and small patches of soft sediment existing as thin layers over bedrock. In addition, the limited quality of the data obtained from SEREF prevented the analysis of key parameters. As a result, the dataset compiled for the PDS reference areas was relatively limited and may have produced a skewed composite OSI value of +5.7.