

EXECUTIVE SUMMARY

The Providence River and Harbor Maintenance Dredging Project (PRHMDP) was an extensive dredging project designed and implemented to address the increasing navigational constraints within the principal commercial waterway in Rhode Island. Project planning began in 1994, and the main project was completed in 2005. The project included removal of a large volume of dredged material, which necessitated identification of disposal options for sediments of varying quality.

An Environmental Impact Statement (EIS) was prepared to identify and evaluate dredging and disposal options to minimize environmental impact while achieving the goals of the project. The EIS included extensive predictive modeling to support assessment of potential impacts of dredging and disposal on marine resources.

Dredging commenced in April 2003 and continued through July 2005. A total of 3.8 million cubic yards (mcy) (2.9 million m³) of maintenance material was dredged. Material that was determined to be unsuitable for unconfined open water disposal (1.2 mcy [0.9 million m³]) was placed in confined aquatic disposal (CAD) cells constructed within the footprint of the Federal Navigation Channel at the head of Providence Harbor. An additional 2.0 mcy (1.5 million m³) was dredged to create these CAD cells. The majority of the material that was suitable for unconfined open water disposal was placed at the Rhode Island Sound Disposal Site (RISDS), with a lesser volume being used beneficially for upland fill purposes. The dredging was sequenced to allow uninterrupted operations while minimizing the potential for impacts to sensitive resources.

Extensive environmental monitoring was performed by a number of parties during and following PRHMDP dredging and disposal operations. Monitoring was conducted to fulfill the requirements of the Water Quality Certification and the environmental monitoring plan developed for the project. Monitoring included surveys to characterize the spatial extent and suspended sediment concentrations of plumes generated by maintenance dredging, CAD cell construction, disposal into the CAD cells, and disposal at RISDS. Other studies examined benthic conditions, and included bathymetric surveys, a benthic community survey, a study on flounder hatching success, and an assessment of lobster abundance.

All suspended solids plumes studied, including those generated by both dredging and disposal operations in both the Providence River and at RISDS, were found to be near-field and short-lived phenomena, with the highest suspended sediment concentrations found near the bottom of the water column. Lower concentrations of suspended solids were generally detected for up to several hours and up to 3000 feet (1000 m) down-current of the source, at which point suspended solids concentrations returned to ambient or near-ambient conditions. Modeling of dredging and disposal plumes performed for the EIS were within the envelope of observed conditions for concentration after model results were scaled to actual release rates derived from measured production rates and sediment flux; modeled plume footprints

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were larger than observed because actual plumes largely stayed within the channel or CAD cell.

The potential impacts on winter flounder eggs from sediment deposition by dredging operations within the harbor were studied in both the laboratory and field. The field study found no significant difference in egg survival between dredging and background conditions. The laboratory study demonstrated the potential for high levels of sediment deposition to smother winter flounder eggs and reduce hatching success. While the levels of deposition shown to inhibit hatching are not thought to have been realized in flounder habitat during PRHMDP, modeling or monitoring of such deposition may be useful for future projects with similar fisheries concerns.

Several monitoring studies were conducted at RISDS during and following the cessation of disposal. A series of six bathymetric surveys were conducted throughout disposal at RISDS. The survey results were used in part to direct disposal locations in order to (1) use the coarser grained sediments to construct a continuous berm of sediment along the rim of a natural seafloor depression and (2) to evenly distribute the finer grained maintenance sediments within the depression. The purpose of the berm was to enhance the capacity of the depression and to limit the lateral spread of finer grained maintenance sediment. The final bathymetric survey illustrated a well-defined berm with sufficient remaining capacity in the artificial containment cell.

A benthic survey at RISDS, which utilized sediment-profile imaging and sediment grab samples for benthic community analysis, was conducted six months following the last disposal at RISDS. The benthic community was comprised primarily of Stage II organisms, with some Stage III organisms, indicative of an intermediate to advanced phase of recolonization. Overall, the infauna at the disposal site was represented by fewer species, fewer individuals and lower species diversity compared to the reference areas, but benthic recolonization met or exceeded expectations six months following disposal.

A study of lobster abundance was conducted seven months after the last disposal at RISDS. The objective of this study was to compare lobster abundance at RISDS to two other sites in Rhode Island Sound and to results of a similar survey in 1999 to examine whether disposal impacted local lobster populations. There was an overall decrease in lobster abundance observed at all three sites in Rhode Island Sound between the 1999 and 2005 sampling events, consistent with a longer-term trend of decreasing lobster abundance throughout southern New England waters. Statistical comparisons indicated no significant changes in lobster abundance or size at RISDS between 1999 and 2005 that were unusually strong or anomalous compared to the changes observed at the other sites over the same time period. Thus, disposal activities did not appear to have caused significant adverse impacts to lobster populations at RISDS compared to nearby areas of Rhode Island Sound.