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New Jersey Department of Transportation
Bureau of Research

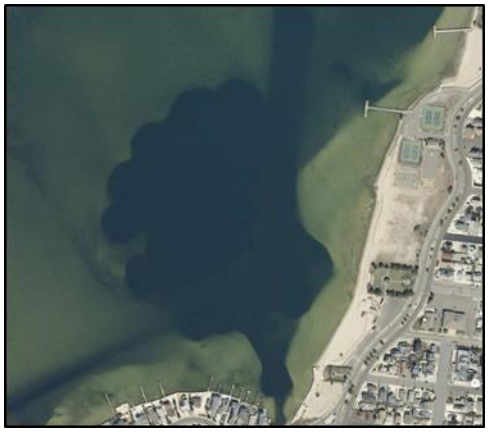
Technical Brief

State Channel Maintenance Capacity

The New Jersey Department of Transportation/Office of Maritime Resources (NJDOT-OMR), Richard Stockton College of New Jersey Coastal Research Center (CRC), and Ocean and Coastal Consultants (OCC) investigated the utilization of dredged holes in New Jersey's coastal bays for the dual benefit of restoring degraded habitat and alleviating shoaling of nearby navigation channels through the beneficial use of dredged material.

Background

Currently, conventional placement areas for sediments dredged from New Jersey's waterways are in upland placement sites known as Confined Disposal Facilities (CDF). There is a great need for dredged material placement sites as their designated CDFs are nearing capacity. One solution for addressing the need for dredged material placement is to utilize the former subaqueous borrow pits or "dredged holes" that are found throughout the New Jersey bay-wide system. Utilizing dredged holes for the placement of dredged material presents a dual benefit of improving degraded marine habitat while maintaining navigation channels to support commercial and recreational economies.



A cuspate boundary created by a dredge can be seen on the northern and eastern limits of Dredged Hole 25 in 2012 aerial photograph.

Research Objectives and Approach

Research objectives and approaches included:

- Identify dredged holes and develop a dredged hole database through interpretation of aerial photography and navigation charts in a geographic information system (GIS).
- Complete a literature review and collection of existing information related to location, history, current status, and any other required data and identify candidate sites for further evaluation in collaboration with the NJDEP and NJDOT-OMR.
- Survey candidate dredged holes utilizing a single-beam echosounder and real time kinematic (RTK) global positioning system (GPS).
- Complete candidate site analysis (maximum depth, capacity, and access).
- Perform biological and water quality surveys for five identified dredged hole sites:
  - Using a YSI 6600 multipart water quality sampler to determine dissolved oxygen content, temperature, pH, and salinity in each feature.
  - Take a benthic grab sample at each water quality sampling location and visually assess the sample for benthic community structure as well as sediment composition.

- Map occurrence of submerged aquatic vegetation within 100 meters of priority dredged holes using the submerged aquatic vegetation early warning system Jr. (SAVEWS Jr.) methodology if recent areal extents of SAV are not available.

Findings

This study created a geodatabase containing a total number of 122 dredged hole features that were identified and delineated from aerial photography, navigation charts, and previous investigations. Of the 46 features visited during field reconnaissance, three were previously investigated as part of a pilot study (Bass River and both Drag Island sites [Barone et al., 2013]), 28 received a basic site visit, 10 were surveyed as candidate sites and 5 were identified and surveyed as priority sites. Candidate sites were deep enough to warrant a bathymetric survey, benthic grab sample and bottom water quality reading at the deepest location within the dredged hole during the reconnaissance field survey. After consultation with the study partners, Priority dredged holes were identified from the candidate dataset as those that provide the greatest opportunities for the placement of dredged material to improve degraded marine habitat while continuing to maintain navigation channels to support commercial and recreational economies. Field visits of the priority sites consisted of more extensive water quality, sediment, submerged aquatic vegetation, and benthic analyses.

The project team recommends five priority dredged holes for potential habitat restoration (18 [USACE 18], 25, 78, 86, and 93). Water quality surveys and benthic grab samples confirm that hypoxia (dissolved oxygen content of less than 2mg/l) is occurring in these dredged holes and that the benthic habitat is azoic. Through the placement of dredged material the bottom elevation of these dredged holes can be increased to shallower depths that do not facilitate the stratification of the water column and subsequent stagnation and hypoxia of the waters in these features. An engineering feasibility analysis was completed by OCC for each priority site to identify appropriate dredged material placement methodologies and the need for any pre-placement dredging or engineering.

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A final report is available online at: http://www.state.nj.us/transportation/refdata/research/. If you would like a copy of the full report, send an e-mail to: Research.Bureau@dot.state.nj.us.

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