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Engineer Research and
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New York District: Regional Sediment Budget for Long Island, New York

ISSUE

The 125-mile-long Atlantic (south) shore of the Long Island, New York, region ([Figure 1](#)) includes six inlets, six barrier islands or spits (three with Federal Shore Protection Projects in place), 15 Federal navigation projects, nonbarrier island beaches, bluffs, and extensive back bays. Development ranges from completely urban (New York City) to relatively undeveloped National Seashore, with suburban development dominating. Sediment in the littoral system is predominantly beach-quality sand. Sediment-related issues impact many of the region's projects, including shore protection, storm damage reduction, efficient navigation, maintaining a viable environment, commerce, and recreation. Accurate quantification and visualization of sediment movement, both natural and human induced, will aid in optimizing the use of sediment resources.



RSM DEMONSTRATION PROJECT GOALS

The goal of this project will be to develop a regional sediment budget (RSB) for use as a management tool in the handling of sediment resources within the region. An RSB will serve as a visualization tool for forming connections between “nearest

neighbor” sediment needs; a base calculation of sediment sources, sinks, and transport volumes; as well as an archive of all known sediment movement data within the region for each year. Accumulating knowledge will continually improve accuracy.

SUMMARY

The following RSM demonstration initiatives were identified:

Sediment Budget by Products

A valuable by-product of the sediment budget work will be the compilation of historical shorelines for use in determining long-term erosion rates and placement of the most recent shoreline positions on historical shoreline mapping, where mapping is available. Existing historical shorelines will be updated to include two additional historical shoreline positions between 1979 and 2000, and the 2000 shoreline position, extracted from aerial photography. Available historical shorelines and mapping are not comprehensive west of Fire Island Inlet, so input data quality may vary. It is a goal of this project to define data deficiencies for future efforts at regional sediment management.

Existing Sediment Budgets

Previously compiled sediment budgets for the Long Island study area, or portions thereof, will be evaluated and incorporated into the comprehensive sediment budget developed in this task as appropriate. Likewise, products of any detailed inlet dynamics studies will be incorporated into

the comprehensive sediment budget for Long Island. It is noted that less detailed information is available on inlets from Jones Inlet westward than on inlets from Fire Island Inlet eastward.

Short-Term Budgets

Production of a series of short-term extremal sediment budgets for Jones, East Rockaway, and Rockaway Inlets will take place. These short-term extremal sediment budgets would serve as an aid in determining the bypassing capacity requirements at the inlets.

STATUS

A long-term existing conditions sediment budget is under development through processing and analysis of historical data sets. These data sets include bathymetric and topographic surveys, aerial photography, beach profile surveys, shoreline change maps, and engineering activities (beach fills, dredging, sand stockpiling, jetty rehabilitation, breach closures, etc.), together with estimates of sand transport rates using Wave Information Studies hindcast wave information and morphologic indicators of sand transport rates such as volumetric sand fillet growth rates and volumetric bluff erosion rates. The long-term existing conditions sediment budget will be compiled from an integration of multiple shorter term sediment budgets developed based on specific historical data sets cataloged in an Event Log. These shorter term sediment budgets will enable identification of temporal

changes in overall regional sediment sources, sinks, and transport pathways.

The spatial domain considered in the development of the sediment budget extends in the cross-shore from the backshore or primary dune to the seaward limit of significant sediment movement. Alongshore, the sediment budget encompasses the entire Long Island shoreline from Coney Island to Montauk Point and will include the tidal deltas at the inlets and portions of the back barrier island area that are subject to overwash events or periodic dune breaching. Specific quantities transported to or from the offshore zone, beach, dune, and bluffs are being detailed. Throughout the development of the sediment budget, quantitative historical survey data, maps, and aerial photographs will be given preference over theoretical considerations in determining both net and gross sand transport quantities.

Comparisons between transport rates derived from the available physical data and those computed from hindcast wave information will be provided. Assumptions used to make the necessary estimates will be stated and justified. Locations where sufficient historical data were available to develop sediment transport quantity estimates will be identified, as well as locations where theoretical considerations were used to develop estimates in lieu of historical data.

All historical data pertinent to the sediment budget will be compiled in an Event Log. The Event Log will include annotated, chronological listings of selected bibliographic records, historical charts and photographs, permit records, dredge and fill records, sediment data, and process data. The Event Log will be organized into shoreline reaches or compartments to provide the basis for the sediment budget.

LESSONS LEARNED

Other Corps RSM demonstration programs have proven that the RSB is an essential tool in measuring the impacts of engineering actions along a regional coastal area and the effects of natural processes such as long-term erosion and barrier island breaching seen on the Long Island coastal region.

KEY WORDS

Fillet, bluff, sediment sources, sinks

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Figure 1. Long Island, New York [back to text](#)