## EXECUTIVE SUMMARY

The Estuary Restoration Act of 2000 (ERA), Title I of the Estuaries and Clean Waters Act of 2000, was created to promote the restoration of habitats along the coast of the United States (including the US protectorates and the Great Lakes). The NOAA National Centers for Coastal Ocean Science was charged with the development of a guidance manual for monitoring plans under this Act.

This guidance manual, titled *Science-Based Restoration Monitoring of Coastal Habitats*, is written in two volumes. It provides technical assistance, outlines necessary steps, and provides useful tools for the development and implementation of sound scientific monitoring of coastal restoration efforts. In addition, this manual offers a means to detect early warnings that the restoration is on track or not, to gauge how well a restoration site is functioning, to coordinate projects and efforts for consistent and successful restoration, and to evaluate the ecological health of specific coastal habitats both before and after project completion (Galatowitsch et al. 1998).

The following habitats have been selected for discussion in this manual: water column, rock bottom, coral reefs, oyster reefs, soft bottom, kelp and other macroalgae, rocky shoreline, soft shoreline, submerged aquatic vegetation, marshes, mangrove swamps, deepwater swamps, and riverine forests. The classification of habitats used in this document is generally based on that of Cowardin et al. (1979) in their Classification *of Wetlands and Deepwater Habitats of the United States*, as called for in the ERA Estuary Habitat Restoration Strategy.

This manual is not intended to be a restoration monitoring "cookbook" that provides templates of monitoring plans for specific habitats. The interdependence of a large number of site-specific factors causes habitat types to vary in physical and biological structure within and between regions and geographic locations (Kusler and Kentula 1990). Monitoring approaches used should be tailored to these differences. However, even with the diversity of habitats that may need to be restored and the extreme geographic range across which these habitats occur, there are consistent principles and approaches that form a common basis for effective monitoring.

Volume One, titled *A Framework for Monitoring Plans under the Estuaries and Clean Waters Act of 2000*, begins with definitions and background information. Topics such as restoration, restoration monitoring, estuaries, and the role of socioeconomics in restoration are discussed. In addition, the habitats selected for discussion in this manual are briefly described.

Volume One continues with a framework for developing a monitoring plan. The first element in this framework is an explanation of the stages of restoration and monitoring: project conception and design; monitoring plan development; data collection before, during, and after construction; and export of data. Second in this framework, the manual presents the process of developing a monitoring plan through twelve clear steps. These steps are 1) identify the goals of the project, 2) collect information on similar restoration monitoring projects, 3) identify and describe the habitats within the project area, 4) define basic structural and functional characteristics for those habitat types, 5) consult experts, 6) determine the hypotheses, 7) collect historical data, 8) identify reference sites, 9) identify monitoring time span, 10) identify monitoring techniques, 11) design a monitoring review and revision process, and 12) develop a cost estimate for implementation

of the monitoring plan.  Third in this framework for developing a monitoring plan, the manual explains basic elements that should be considered when writing a restoration monitoring plan. These critical elements include background material, project goals and objectives, monitoring components (metrics, hypotheses, reference sites, pre-construction sampling plans, plans for sampling during and after construction, statistical analysis, data handling, report preparation, and review plans), projected budget, and participants' contact information. The manual also offers a series of three parameter matrices to help practitioners choose which habitat characteristics may be most appropriate to monitor for their project.

Volume Two, titled *Tools for Monitoring Coastal Habitats,* of the guidance manual *Science-Based Restoration Monitoring of Coastal Habitats* will follow the publication of Volume One in 2004. Volume Two will begin with detailed discussions of the habitats, including a description of the habitats, a review of restoration monitoring approaches applied within the habitats, common anthropogenic impacts on each habitat, and annotated bibliographies of monitoring projects, protocols, and techniques used in coastal habitat monitoring.  Volume Two continues with a discussion on selection of reference sites or conditions, an inventory of monitoring programs in the United States, a review of acts relevant to restoration monitoring, a sample list of costs involved in restoration monitoring, and a review of socioeconomic factors associated with restoration monitoring.

## *References*

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