Lyle M. Varnell

Design Criteria for Dune Fields of Fetch-Limited Shorelines Mother Nature's Metric

Biography

Lyle is Assistant Director for Advisory Services in the Office of Research and Advisory Services at the Virginia Institute of Marine Science (VIMS), College of William and Mary. VIMS is the mandated scientific advisor to Virginia government and Lyle coordinates and develops advisory responses for projects that affect the marine and estuarine environment including dredging, shoreline development, commercial and recreational fisheries, aquaculture, and surface water allocation. Lyle represents VIMS before local, state, and regional resource management meetings, and before Virginia regulatory agencies. Lyle has published basic and applied research in the areas of tidal and nontidal wetlands, beaches and dunes, environmental restoration, resource management and policy, and environmental law.

Abstract

Submerged materials removal decisions often are significantly influenced, and various alternatives limited, by spoil placement alternatives. Beneficial use of dredge material generally is the preferred management strategy. Dune field restoration, creation, or supplementation commonly is considered, but often is eliminated as a preferred alternative due to numerous physical variables inherent to marine and estuarine shorelines that affect the *a priori* confidence of the investment and the ultimate value and sustainability of the manipulated shoreline. The results of a comprehensive study of dunes in the lower (Virginia portion) Chesapeake Bay reveals consistency in dune-beach geomorphology that can be used as design criteria in fetch-limited marine and estuarine environments, which can provide added confidence to decisions that target sandy dredged materials for dune-beach destinations. An index termed "robustness", which is the ratio of the vertical height of the primary dune above mean low water to the width of the beach between mean low water and the lateral vertical axis of the primary dune, was discovered to be consistent around the value of 0.10. A classification system developed as a part of the comprehensive study also was used to compare this ratio between dune fields in separate geological categories. All estuarine geological dune settings were found to conform consistently to the 0.10.