12-2008

LIDAR-Derived Benthic Habitat Maps Enable the Quantification of Potential Dredging Impacts to Coral Reef Ecosystems

Brian K. Walker
Nova Southeastern University, walkerb@nova.edu

Richard E. Dodge
Nova Southeastern University, dodge@nova.edu

David S. Gilliam
Nova Southeastern University, gilliam@nova.edu

LIDAR-derived Benthic Habitat Maps Enable the Quantification of Potential Dredging Impacts to Coral Reef Ecosystems

Brian K. Walker*, Richard E. Dodge* and *David S. Gilliam*
Nova Southeastern University, National Coral Reef Institute, Dania Beach, FL, USA

An essential component to the analysis of ecosystem services is to characterize and define the major habitats within the area of interest. Aerial photography and/or satellite imagery coupled with geographic information systems (GIS) are frequently used to identify and quantify habitats in open terrestrial ecosystems. However, it is more difficult to successfully apply this methodology to deeper, <20 m, underwater environments. Light detection and ranging (LIDAR), a relatively new remote sensing technology that provides detailed bathymetry, can be used when adequate imagery is not available. This study uses LIDAR as the basis to characterize various benthic habitats in a coral reef ecosystem in order to quantify the habitats for a Habitat Equivalency Analysis (HEA) related to planned dredging activities to expand the Port Everglades entrance channel, Broward County, FL. As part of a regional mapping effort, marine benthic habitats were characterized for Broward County, FL. A mosaic of interpolated, sun-shaded, laser bathymetry data served as the foundation upon which acoustic ground discrimination, limited subbottom profiling and aerial photography, and groundtruthing data were added in a GIS to aid in interpretation of benthic habitats. Expert-driven visual interpretation outlined geomorphological features in the LIDAR data at a scale of 1:6000 with a minimum mapping unit of 1 acre. The map of Broward County yielded a high overall accuracy of 89.6%. To quantify the potential dredging impacts, the habitat layer was clipped in GIS to the boundaries of anticipated direct and indirect impacts of the proposed project. Then the area of each clipped polygon was totaled for each habitat by impact type. HEA and ***Florida***'s Uniform Mitigation Assessment Method (UMAM) were performed using these areas. This work would not have been possible using satellite imagery or aerial photography alone and illustrates the capability of relatively new remote sensing technologies to aid in the definition and quantification of habitats for ecosystem service analyses.

Contact Information: Brian K. Walker, Nova Southeastern University's Oceanographic Center, National Coral Reef Institute, 8000 N. Ocean Drive, Dania Beach, FL 33004 USA, Phone: 954-262-3675, Email: walkerb@nova.edu