Reference SON: *2015-ER-8 Detection of Benthic Habitats to Improve Understanding of Species-level Impacts*

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Wiki

Upcoming Activities

Reports/Interim Results

Images

Classifying Benthic Habitats in the Great Lakes and Coastal Environments[1]

Research Need

Understanding bottom type variation is critical to coastal management and to understanding how to create mutually supporting economic and environmentally sustainable solutions to coastal planning challenges, consistent with the Corps' Environmental Operating Principles.

Mapping bottom type variation at a high resolution and demonstrating how the resulting maps can be used to understand and forecast spatial variation in species guilds and key population processes of native and invasive species (e.g., spawning locations), will provide critical information to support environmentally sustainable coastal management.

Project Objectives & Plan

A streamlined approach for classifying bottom types, and their association with key biological parameters in shallow (nearshore) aquatic and marine habitats, will be developed using the Great Lakes as a case study. The proposed effort aims to utilize existing and new geospatial technologies to improve the resolution and accuracy of our understanding of bottom type variation, and associated critical habitat parameters that influences native and non-native biota important to ecosystems and their derived services (e.g., fisheries production). The work will be coordinated with other Great Lakes initiatives, including the Great Lakes Aquatic Habitat Framework (GLAHF), the Habitat and Species Annex (Annex 7) of the Great Lakes Water Quality Agreement (GLWQA), and the joint National Oceanic and Atmospheric (NOAA)/National Park Service (NPS) Benthic Mapping for Coastal Restoration projects.

Available geospatial data resources and technologies suitable for benthic habitat characterization in coastal environments will be synthesized, including high resolution imagery, lidar and sonar data. A bottom type classification scheme that characterizes geomorphic structure, substrate, and biological potential of bottom types will be developed to rate different macrohabitats according to their functional value to support

sensitive, recreational, and commercial species in coastal aquatic habitats. A pilot study will be conducted in one of the Great Lakes to apply the classification methodology for select native and invasive species, and summarize results in a technical report for wider application in other coastal environments.

Payoff

The product will provide a repeatable approach for mapping bottom types that could be applied in other shallow coastal environments, allowing state and federal agencies to:

- Use a consistent framework to identify characteristics in underwater features using remote sensing data (lidar, sonar, imagery, etc.),
- Support the goals of Annex 7, GLAHF, and the Great Lakes Fisheries Commission, and
- Support planning for economic and environmentally sustainable solutions to coastal management challenges. The product will provide a methodological template that can be transferred to other USACE projects with interest in the quality and aerial extent of substrates and benthic habitats.

Products

White Papers

(2017). Conference summary: NOAA integrated ocean and coastal mapping, Great Lakes Coastal Mapping Summit Summary. Office of Coastal Survey, Chicago, IL.

Conference Presentations/Webinars/Workshops

(2017). Classifying Coastal Benthic Habitats: A Great Lakes Example, Meeting Author/Presenter. Great Lakes Coastal Mapping Summit, Chicago, Illinois.

Menza, C. (presenter), Sautter, W., Kendall, K., Costa, B. and Reif, M.K. (2017). Using LIDAR surveys to map habitats and archaeological sites in western Lake Michigan, Presentation. International Association of Great Lakes Research Conference 2017, Detroit, Michigan.

Project Activities

Field data acquisition - Recent changes in Lake Michigan's water clarity have exposed large expanses of shallow lakebed areas to aerial imagery and other remote sensing technologies. The Joint Airborne LIDAR Bathymetry Technical Center of Expertise collected airborne laser scanning LIDAR (Light Detection and Ranging) along Lake Michigan's coasts in 2008 and in 2012 to identify and characterize nearshore lakebed habitats and submerged archaeological sites in the proposed Wisconsin-Lake Michigan National Marine Sanctuary. Our developed coastal benthic habitat maps will offer new substrate, hazard and archaeological information to coastal managers tasked with maintaining lake-derived ecosystem services and protecting the exceptional historic and recreational value of the area.

Coordination with the Illinois State Geological Survey and NOAA regarding airborne and boat-based survey activities (June 2018), to include collection of high resolution hyperspectral imagery and bathymetric LiDAR along the nearshore of Western Lake Michigan at Illinois Beach State Park, leveraging other multi-agency studies in the area with the USACE-Chicago District, NOAA, USGS, and others. Goals include developing sustainable nearshore management solutions to prevent critical habitat loss, field and modelling investigation to solve sand management challenges, USACE and USGS Effectiveness of Nearshore Placement of Dredged Material Study and USACE Waukegan Harbor Section 107 Feasibility Study.

Joined Steering Committee for the Great Lakes Bottom Mapping Workgroup inter-agency/academic partnership regarding nearshore mapping with the goal of harmonizing, collecting, processing, and sharing continuous high resolution maps of bathymetry, sonar reflectance, bottom type, and derived products.

Multi-agency (NOAA, USACE, NPS, and state agencies) coordination pertaining to future file/data sharing, and modifications to the Coastal and Marine Ecological Classification Standard (CMECS) as needed to adapt to the nearshore freshwater environments in the Great Lakes.

[1]Project Alias – Work Unit Documentation Title: *Classifying Benthic Habitats in the Great Lakes and Other Coastal Environments* ERDCpedia Title: *EMRRP: Classifying Coastal Benthic Habitats - A Great Lakes Example*