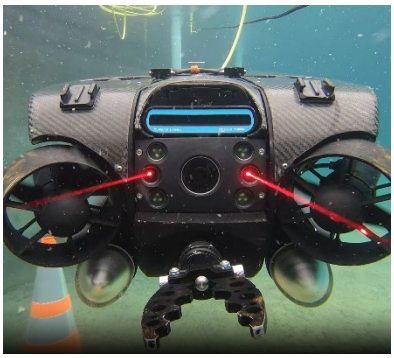
Advancing the Use of AUV and ROV Technologies for Benthic Habitat Assessment

Dredging Operations Environmental Research (DOER) Program

U.S. ARMY CORPS OF ENGINEERS BUILDING STRONG®

Focus Area

Environmental Resource Management



Problem

The US Army Corps of Engineers (USACE) conducts underwater ecological surveys to inform dredging, navigation, restoration, and storm risk management, often in areas in close proximity to sensitive habitats (e.g., Essential Fish Habitat). Current methods such as diver-based transects and vessel-mounted sensors are costly, labor-intensive, and offer limited spatial and temporal coverage. Additionally, outsourcing these efforts often leads to inconsistent deliverables and reduces institutional control and knowledge.

Study Description

This project will evaluate the use of Autonomous Underwater Vehicle (AUV) and Remotely Operated Vehicle (ROV) technologies to support benthic habitat assessments in USACE operations, with the goal of developing a scalable, efficient alternative to vessel-mounted and diver-based surveys. Leveraging previously collected AUV/ROV datasets the project will evaluate data quality, develop image processing workflows, and assess the potential for species or habitat identification using photogrammetry and AI-based tools. Survey information provided by partner Districts will inform the design of field demonstrations to test real-time data collection, processing, and analysis under operational conditions. Field efforts will focus on producing practical, decision-relevant deliverables, such as high-resolution benthic mosaics, 3D reconstructions, and automated identification of organisms or substrate types. The deliverables will include tested protocols and guidance that support USACE adoption of unmanned systems for ecological surveys, with improved speed, resolution, and safety over current methods.

Products

ERDC Technical Note (Q4 FY26) – Consolidation and Analysis of District Benthic Surveys to Inform and Identify Opportunities for Employing AUVs and ROVs in Support of Navigation and Dredging Missions

Video – (Q2 FY27) Video highlighting the use of ROVs and AUVs in support of navigation and dredging missions.

ERDC Technical Report (Q4 FY27) – AUV/ROV Integration for Ecological Surveys

Summary

Unmanned underwater systems offer potentially superior survey capabilities through high-resolution imaging and precision navigation. These platforms enable access to high-risk or logistically challenging environments and support repeatable, spatially comprehensive data collection over extensive benthic areas. By operating beneath the air-sea interface, these vehicles decouple sensor payload from surface wave action, capturing stabilized, high-resolution datasets that are often degraded by motion artifacts in traditional vessel-mounted surveys. Integration of automated image segmentation, multibeam bathymetry, and sonar mosaicking workflows facilitates rapid, high-throughput classification of habitat features. This research will result in an unmanned underwater systems-based ecological survey framework, optimized to support environmental compliance and dredging operations.

Balancing operational and environmental initiatives and meeting complex challenges of dredging and dredged material placement in support of the navigation mission.

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November 2025

Research Products

Product Type	Product Title

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