LIVING MARINE RESOURCES PROJECT 62

Raven-X: Enhancing the Efficiency of Large-scale Bioacoustic Analyses

NEED

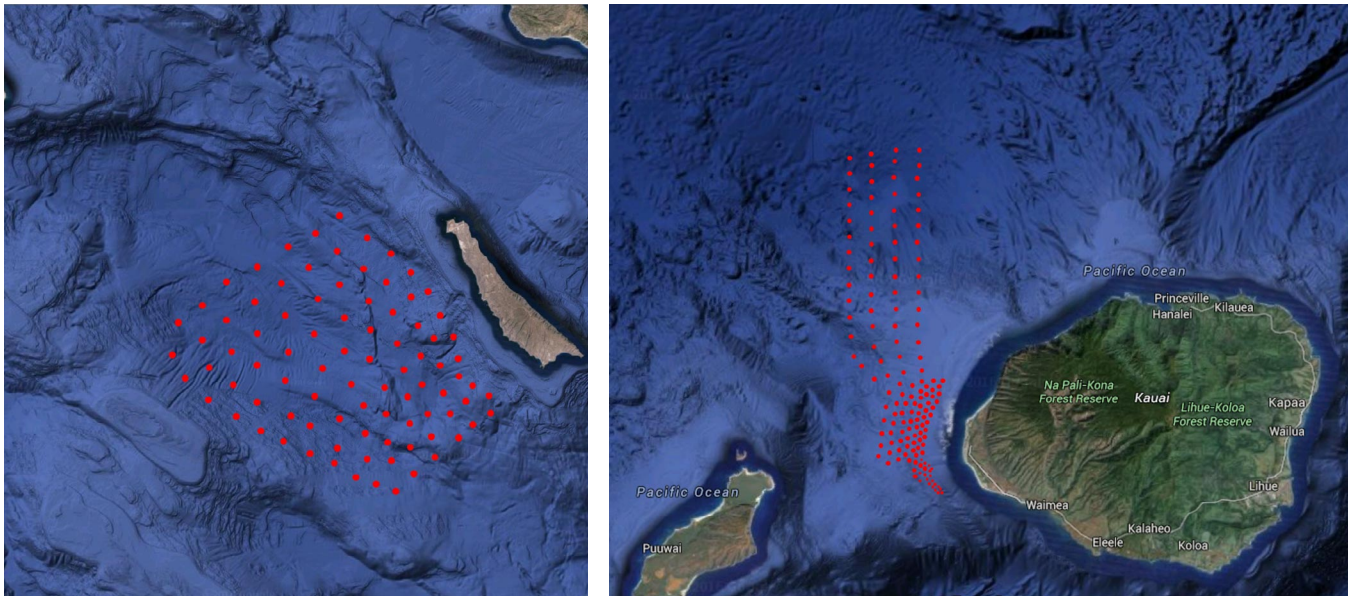
The Navy is interested in developing methods to improve the efficiency of processing and analyzing marine species data and providing cost effective solutions to enhance marine species monitoring capabilities (e.g., detection and classification algorithms, Passive Acoustic Monitoring automated processing tools, statistical methods).

SOLUTION

This project will enhance the shared software package, Raven-X, principally designed as a common acoustic processing software package to handle big data. Originally developed through funding from the Office of Naval Research, and through collaboration with Cornell University and Marine Acoustics Inc., Raven-X successfully demonstrated the ability to analyze large, complex, ocean-scale acoustic data sets. The Raven-X development team will work to integrate multiple custom algorithms currently used by the Naval Undersea Warfare Center (NUWC) and the Naval Information Warfare Center (NIWC) Pacific to increase speed and efficiency as well as enable analysis of bioacoustic data sets previously too large to tackle.

METHODOLOGY

The project will develop computer code to integrate existing acoustic detection, classification and location (DCL) algorithms into Raven-X. Both NUWC and NIWC have DCL algorithms that are customized for their needs and data formats. In addition, the LMR project, Standardizing Methods and Nomenclature for Automated Detection of Navy Sonar (project 34), has made significant progress on developing an improved sonar detector. As a case study, teams from that



Raven-X could help NIWC and NUWC programs more rapidly analyze historic and current data from Navy ranges, including the Southern California and Pacific Missile ranges.

project and this Raven-X project have worked together to complete detector classification testing that was being conducted with a cooperative Navy/NOAA project, SanctSound (see LMR 2021 Program Status Report, page 105, for background information). Additional case study applications of Raven-X will be investigated as they present themselves.

To promote use at both locations and to build on work to date, this project will bring the products together for broader use within the Navy's Marine Species Monitoring program. Work will include developing application programming interfaces (API) to support Raven-X processing capacity for Navy range sound and archive data sets. It will develop interfaces to enable existing algorithms that were written by NUWC and NIWC to be used together on the Raven-X platform. The common platform will provide new capabilities to each facility for processing and analyzing data from the Navy ranges. Key software applications will be tested and documented to facilitate use by Navy personnel.

SCHEDULE

The three-year project began in fiscal year 2023 and is slated for completion during 2026.

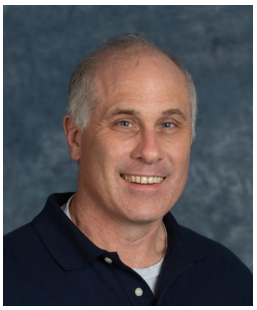
NAVY BENEFITS

After completing this work, NIWC and NUWC be able to apply detection, classification and localization algorithms and more rapidly analyze historic and current range data across multiple formats. Additionally, the teams will be able to holistically analyze the large quantities of U.S. Navy archival data, which NUWC has collected on a variety of ranges over several decades.

TRANSITION

The project will ultimately provide the Raven-X Toolbox for NUWC's M3R and NIWC's WARP programs. It will include documentation and training for Navy personnel. It will work to integrate multiple custom algorithms currently used by the Naval Undersea Warfare Center (NUWC) and the Naval Information Warfare Center (NIWC) Pacific to increase speed and efficiency of processing. From laptops to large distributed servers, Raven-X offers a scalable, low-cost, efficient distribute processing solution to handle Navy data previously too large to tackle.

ABOUT THE PRINCIPAL INVESTIGATOR



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About the LMR Program

The Living Marine Resources (LMR) program seeks to develop, demonstrate, and assess data and technology solutions to protect living marine resources by minimizing the environmental risks of Navy at-sea training and testing activities while preserving core Navy readiness capabilities. For more information, contact the LMR program manager at exwc_lmr_program@navy.mil or visit exwc.navfac.navy.mil/lmr.