

## **Environmental Topic**

Munitions and explosives of concern (MEC) at underwater munitions response sites (MRS)

## **Proposed Project Title**

Underwater Munitions Response Technology Guidance Document, Fact Sheets, and Training Materials

## **Project Deliverables**

Written Products: Technical Guidance and Fact Sheets on Underwater Munitions Detection, Classification, Characterization, Recovery, and Disposal Technologies

Listed below are the proposed topics to include in the ITRC technical guidance document materials and fact sheets:

- state of existing underwater munitions detection, classification, characterization, recovery, and disposal technologies,

- applications of each above underwater munitions response technology,

- limitations of each above underwater munitions response technology,

- quality control considerations of each above underwater munitions response technology,

- review of underwater geolocation and survey platforms such as boats and autonomous underwater vehicles,

- analysis of three to five Conceptual Site Models (CSMs) to inform underwater munitions response technology use at the site and those similar to it, and

- best practices for each underwater munitions response technology.

Training Products: Training Video Modules on Underwater Munitions Response Technologies

The Team anticipates creating the following training products:

- four modules for in-person training on each category of underwater munitions response technology, shorter modules on select topics (e.g., understanding CSM information to select appropriate technologies),

- recordings of the modules for stakeholders to review as needed, and

- transcripts and PDFs of the presentations for the stakeholders to review as needed.

Intended Audience for All Project Deliverables: federal and state regulators, federal land managers (FLMs), and underwater development industries (e.g., offshore renewable energy development, oil and gas exploration).

## **State Team Leader(s)**

Team Leaders will be sourced for interest by ITRC.

## **Proposal Contacts**

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## Problem Statement

The science and technology to address underwater munitions is constantly evolving and updated guidance on the detection, classification, characterization, recovery, and disposal of these munitions is needed. The team proposes reviewing existing and recently developed underwater technologies from organizations such as the Strategic Environmental Research and Development Program (SERDP) and the Environmental Security Technology Certification Program (ESTCP) to develop written and training materials for federal and state regulators, FLMs, and other stakeholders. The burial and mobility of underwater MEC present unique management challenges, not found on terrestrial sites, for federal and state regulatory agencies. Underwater MRS characteristics such as water clarity, seafloor inundations, MEC depth, and other conditions vary by site, change over time, and impact underwater munitions response technologies differently. This project will:

- facilitate better coordination between the Office of the Secretary of Defense, the Military Departments (MILDEPs), U.S. EPA, and state agencies addressing underwater munitions challenges;

- support more efficient and effective Military Munitions Response Program cleanup; and
- address the munitions risks associated with the placement of infrastructure (e.g., offshore renewable energy) in the underwater environment.

Underwater MEC can be found in ponds, rivers, lakes, canals, intercoastal waterways, harbors, and the ocean. The attached figure illustrates the over 450 underwater MRS identified by the Department, which cover more than 10 million acres. Underwater MEC not only impact MRS along the coastlines but also rivers and lakes across the country.

SERDP-ESTCP continues to support underwater munitions research areas, including:

- detection, localization, and classification systems,
- techniques to survey large areas and identify concentrations of munitions,
- munitions recovery and disposal methods, and
- munitions mobility and burial.

While underwater munitions response technology research is advancing, comprehensive guidance and training describing the applications, limitations, and quality control considerations of each technology is not available to the state agencies, U.S. EPA, and other stakeholders. Development of such materials would provide federal and state agencies information necessary to:

- meet investigation and cleanup goals under and comply with the Comprehensive Environmental Response, Compensation, and Liability Act and other environmental cleanup laws,
- better characterize MRS data gaps, and
- reduce hazards to the environment and human health.

An ITRC project to create training, guidance materials, and fact sheets developed by academia, regulators, industry partners, and other stakeholders would:

- educate federal and state agencies on the status, applications, limitations, and quality control considerations of each technology,
- describe the best practices for each underwater munitions response technology,
- examine the applications, limitations, and quality control considerations of each technology at example MRSs using available CSM information, and
- create a framework for federal and state regulators to assess available underwater munitions response technology(ies).

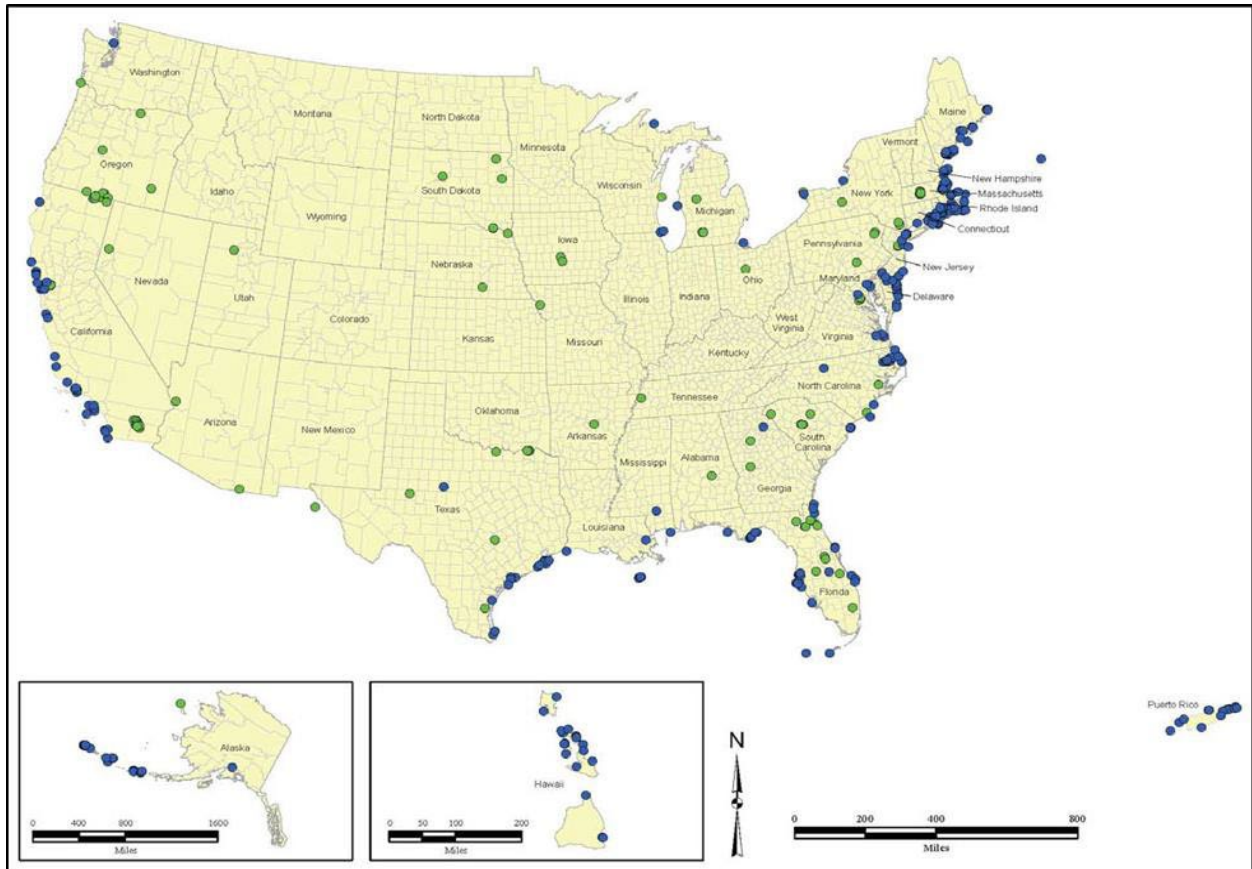
### **Additional Information**

ODASD(EMR) convened an underwater munitions response technology workgroup in March 2023, including members from the MILDEPs, SERDP-ESTCP, U.S. EPA, and state agencies. The workgroup has since transitioned to an ESTCP advisory group that meets regularly to discuss the status of underwater munitions detection technologies and plan technology demonstrations at active MRS with underwater MEC. The advisory group coordinates with the MILDEPs for specific MRS CSM information to assess the applications, limitations, and quality control considerations for each technology at the site. As the advisory group compiles this information, they will share it with federal and state stakeholders. The advisory group's technical findings could also be leveraged by the ITRC Underwater Munitions Response Technology Project Team to develop the written and training materials.

SERDP-ESTCP has supported numerous underwater munitions response technology studies to detect, classify, remove, and address burial and mobility of underwater munitions. A sample list of and links to these studies are included in the attachment.

In addition to the state team leaders identified above, the following states have expressed interest in participating in the Underwater Munitions Response Technology Project Team: Alabama, California, Florida, Hawaii, Massachusetts, Michigan, New Jersey, North Carolina, and South Carolina.

## Underwater MRS across the United States



This figure illustrates the over 450 underwater MRS identified by the Department. These MRS collectively cover more than 10 million acres.

## **SERDP-ESTCP Underwater Munitions Response Technology Studies**

General information on SERDP-ESTCP supported underwater munitions response technology studies to detect, classify, remove, and address burial and mobility of underwater munitions can be found [here](#). Example studies include:

- [Demonstration of UAS-Based Topobathymetric Lidar for Shallow-Water Munitions Response](#), Mr. Gerald Thompson
- [Demonstration of Highly Integrated Autonomous ROV-based 3DEM for Underwater Advanced Geophysical Classification](#), Dr. Gregory Schultz
- [Nearshore Dewatering for Cost-effective Underwater Munitions Removal](#), Mr. Claudio Fassardi
- [Multi-Sensor Towbody \(MuST\): Technology Readiness Level 7 Field Efforts and New Sensor Demonstrations](#), Dr. Kevin Williams
- [Enhanced Sensing for Detailed Surveys in Very Shallow Water](#), Dr. Daniel Brown
- [UltraTEM Marine Towed System for Detection and Characterization of Buried Ordnance](#), Dr. Stephen Billings
- [Classification of Underwater UXO from Dynamic EMI Survey Data](#), Mr. Keith Whitener
- [Demonstration of AUV-Based Structural Acoustic Look-Down and Side-Look Sonars for Underwater Buried UXO Detection and Classification](#), Dr. Zachary Waters
- [Optical Detection and Classification of Military Munitions Underwater](#), Mr. Jed Wilbur
- [Shallow Water Lidar for Target Morphology: Impacts of Surface Roughness and Turbidity](#), Dr. Jeffrey Thayer
- [Modeling Munitions Mobility and Burial in a Micro-tidal Estuary](#), Professor Maurizio Brocchini
- [PRISM: 3D PRedictive Imaging of Water Surface for Munitions Mobility and Burial](#), Dr. Shawn Harrison