Munition Response Program

The Best of the SAGEEP/MRM: Lessons Learned, Case Studies and Emerging Technologies in Support of MMRP

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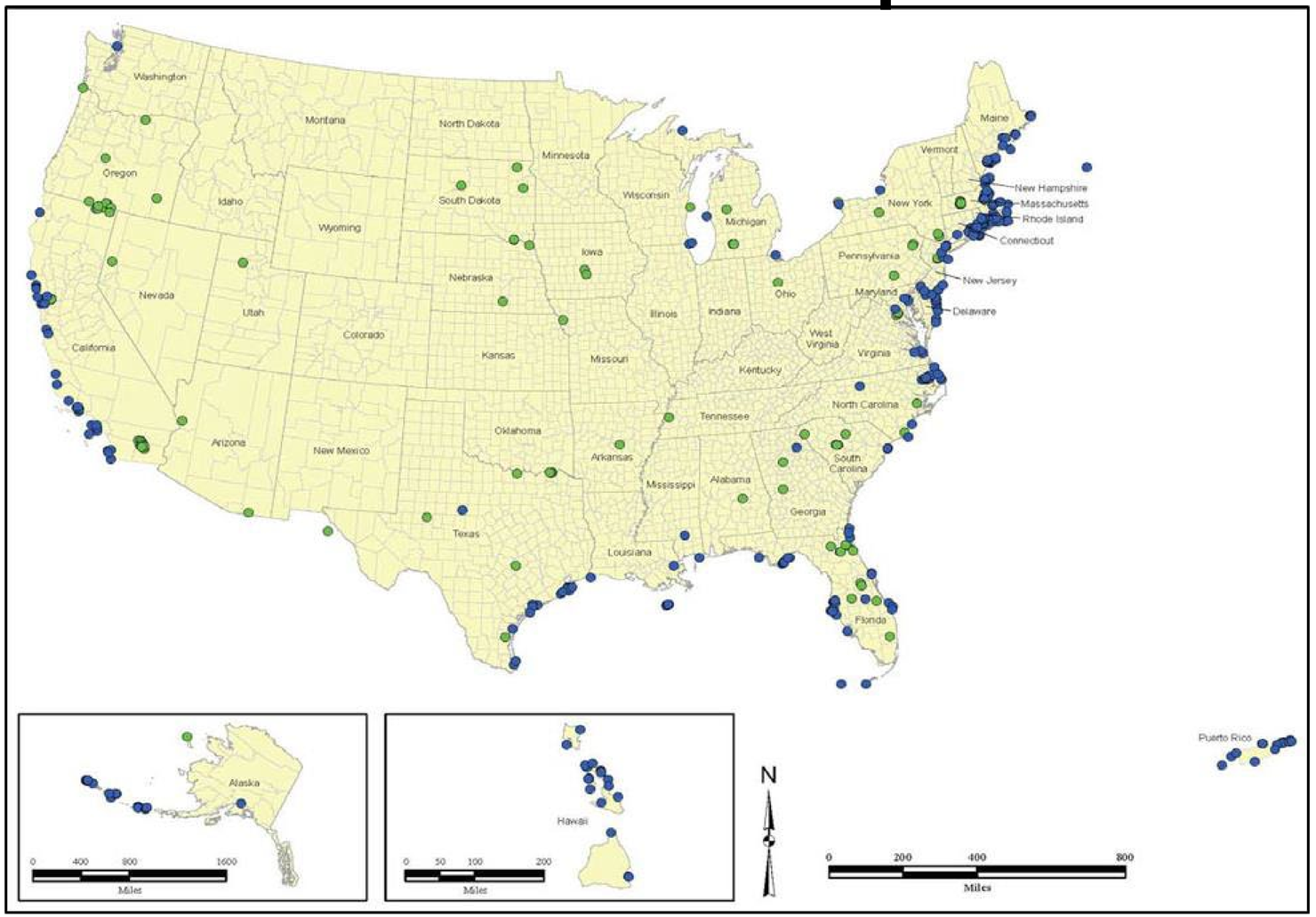
ABSTRACT

The Munition Response (MR) portion of the SERDP/ESTCP program is transitioning from detection, classification and localization system development to demonstration of the devices that have been successful in controlled tests, to live sites. The search continues for methods of removal once a particular munition has been found, identified and its position defined. The cost of removal is estimated to be high enough that the option of leaving the munitions in place and monitoring their movement is, for many sites, the most likely action. Program efforts to identify the combination of geophysical parameters and munition physical properties required to define the transition from stationary/burial condition to lateral movement are ongoing.

Underwater Munitions Response Sites



The US Army Corps of Engineers and the US Navy have identified over 450 formerly used and active underwater defense sites, totaling more than 10 million acres

SERDP ESTCP

DoD's Environmental Technology Programs

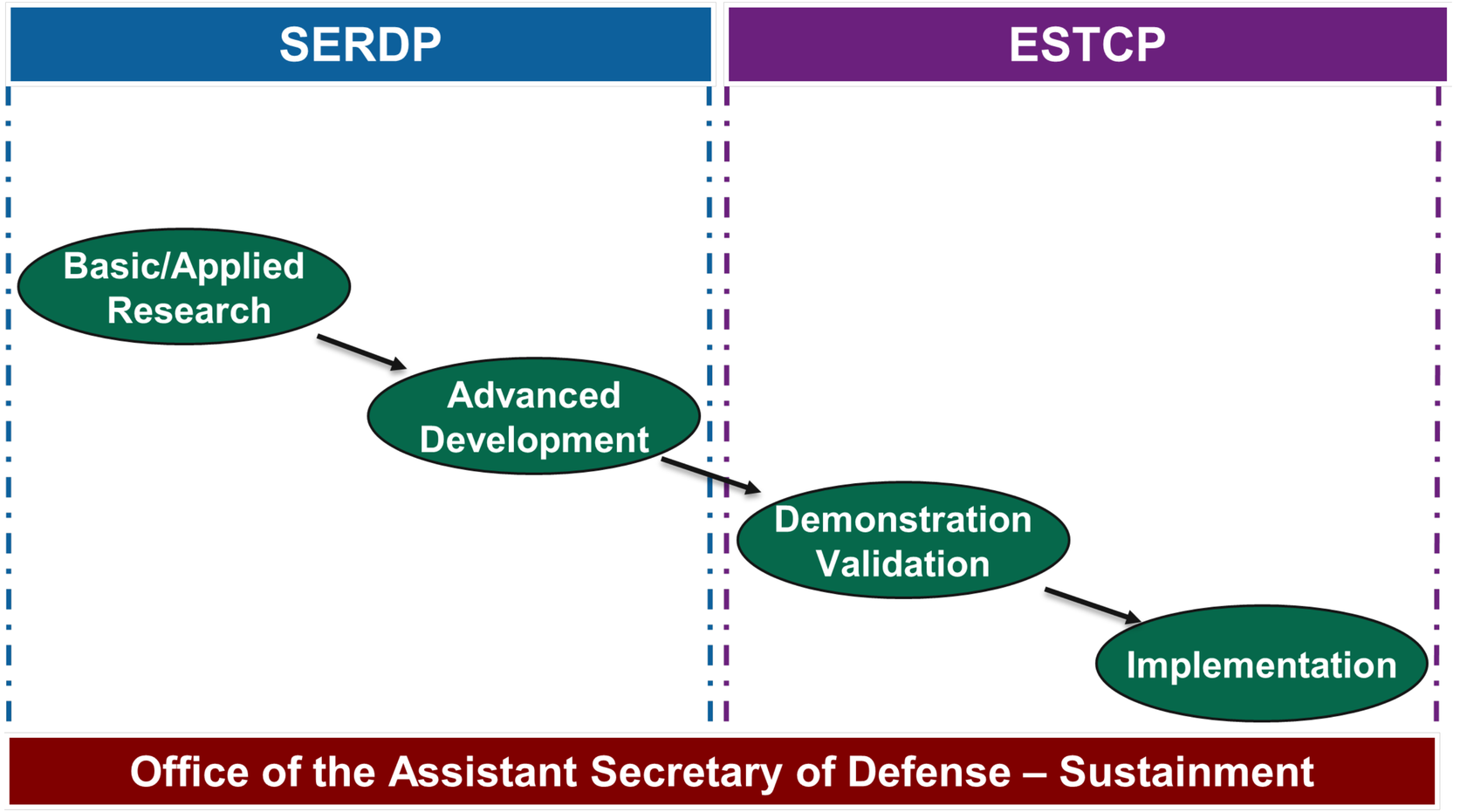
Science and Technology

- Statutory Program Established 1991
- DoD, DOE, EPA Partnership
  - Advanced technology development to address near-term needs
  - Fundamental research to impact real world environmental management

Demonstration and Validation

- Demonstrate Innovative Cost-Effective Environmental and Energy Technologies
  - Transition technology out of the lab
  - Establish Cost and Performance
  - Partner with End User and Regulator
  - Technology Transfer
    - Accelerate Commercialization or Broader Adoption
    - Direct Technology Insertion

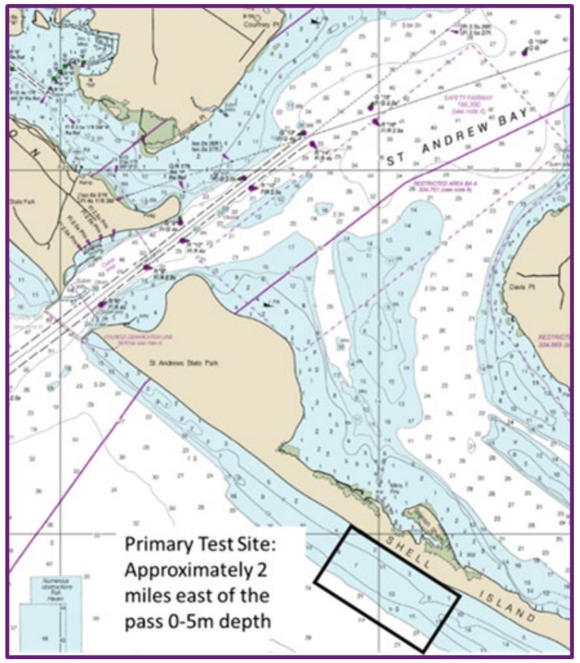
Environmental Technology Development Process

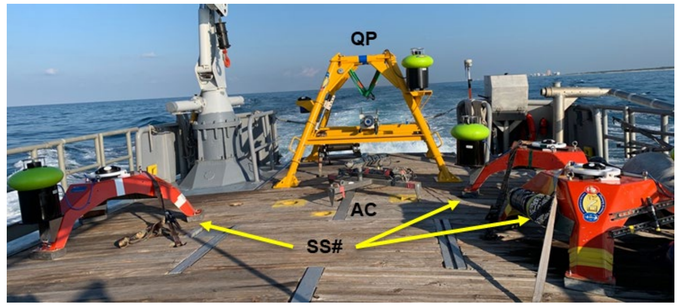


Demonstration and Test Sites

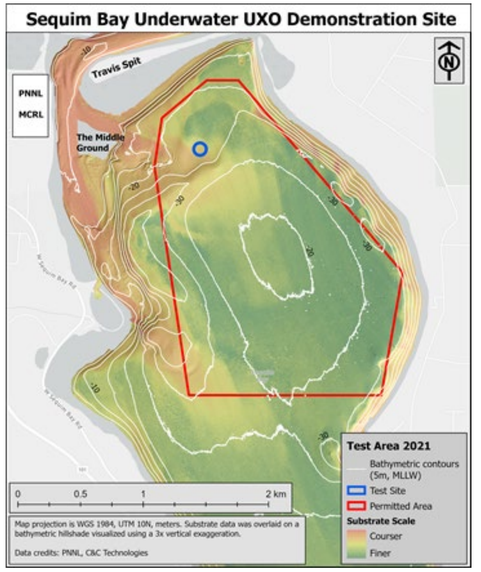
Underwater UXO Demonstration Sites for Technology Assessment CONUS

- **Florida Gulf Coast, USA**
- Naval Surface Warfare Center Panama City, NRL South
- MR20-5116
- Subtropical, Water Depths < 5m, Dynamic Sand/Mud Environment
- Minimization of Test-Range “Clues”





- **Sequim Bay, Pacific Northwest, USA**
- Pacific Northwest National Laboratory
- MR21-7564
- Temperate, Water Depths 5-30m, Mud/Sand/Gravel
- Environmental Characterization



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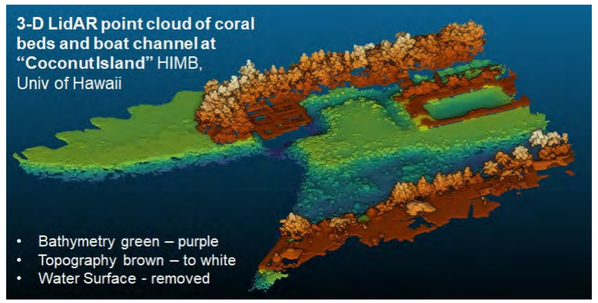
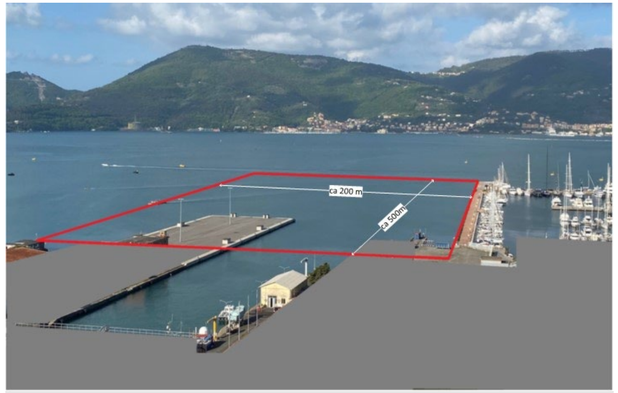
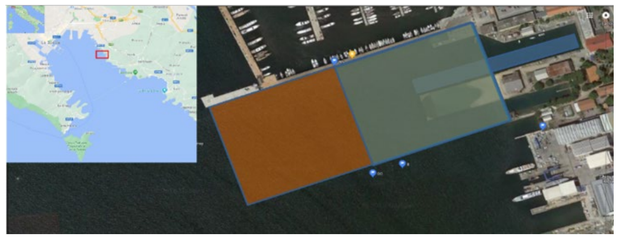
Underwater UXO Demonstration Sites for Technology Assessment OCONUS

- **Oahu, Hawaii, USA**
- Applied Research Laboratory, University of Hawaii, NRL South
- MR20-5292
- Tropical, Clear Visibility
- Multiple sites under investigation
- Mobile, scalable testbed with unmanned systems emphasis



- **Ligurian Sea, Italy**
- NATO Centre for Maritime Research and Experimentation
- MR21-5243
- Cross-Atlantic US/EU UXO Testbed
- Mediterranean – Borderline Subtropical, 4-10m water depth
- Controlled performance evaluation of UXO remediation systems





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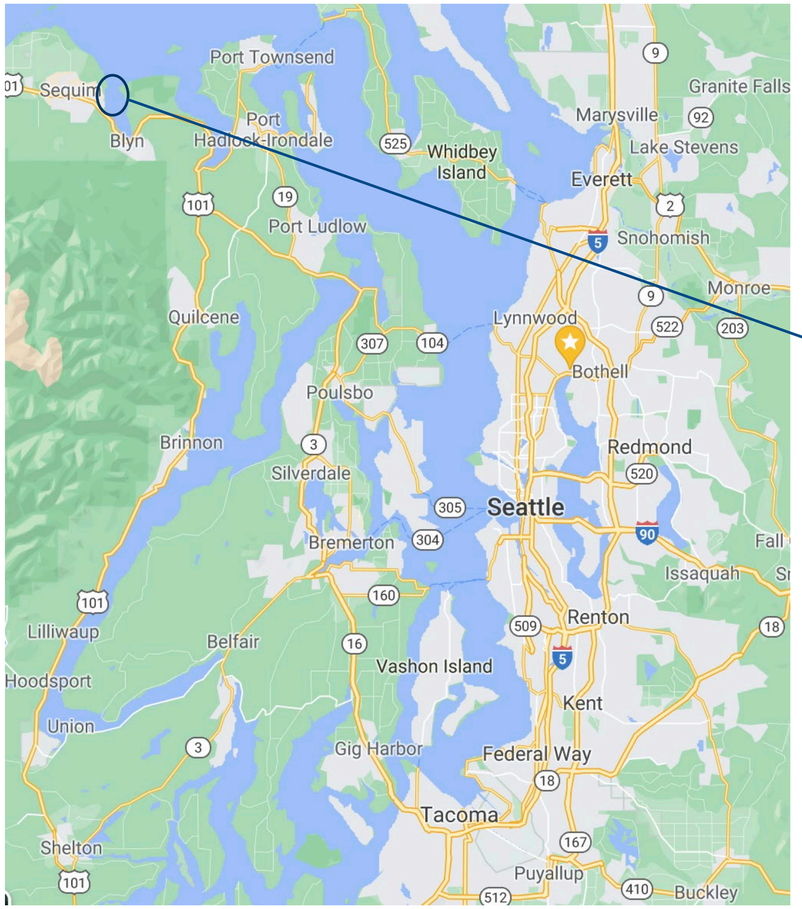
The Demonstrations – where and when

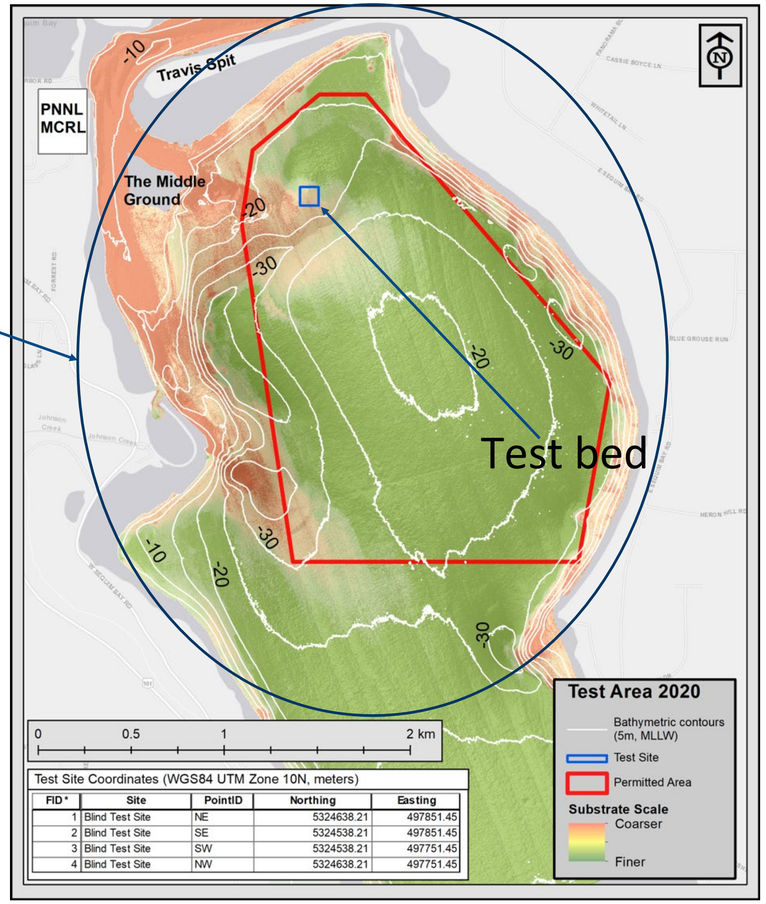
- September 2020

  - Collaboration of PNNL and APL-UW
  - Prototype test bed set up by PNNL
  - 4-day informal demonstration of MuST

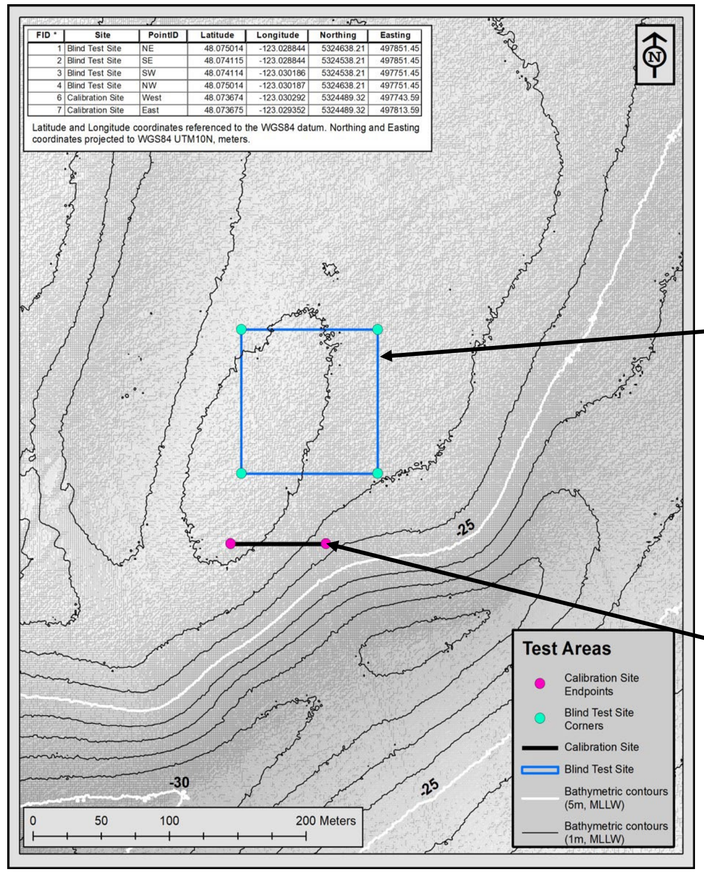
- September 2021

  - test bed set up by PNNL – more and different targets
  - 4-day formal demonstration of MuST





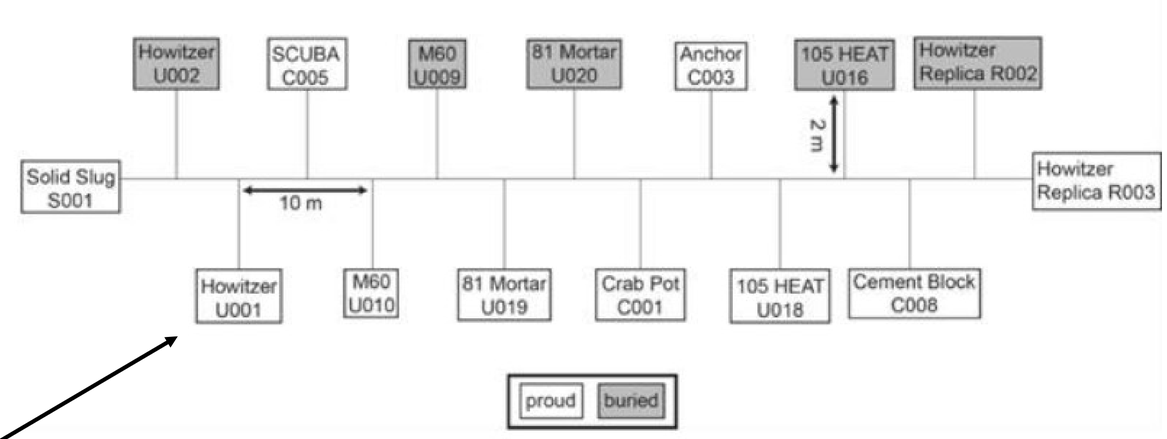
The Demonstrations – how

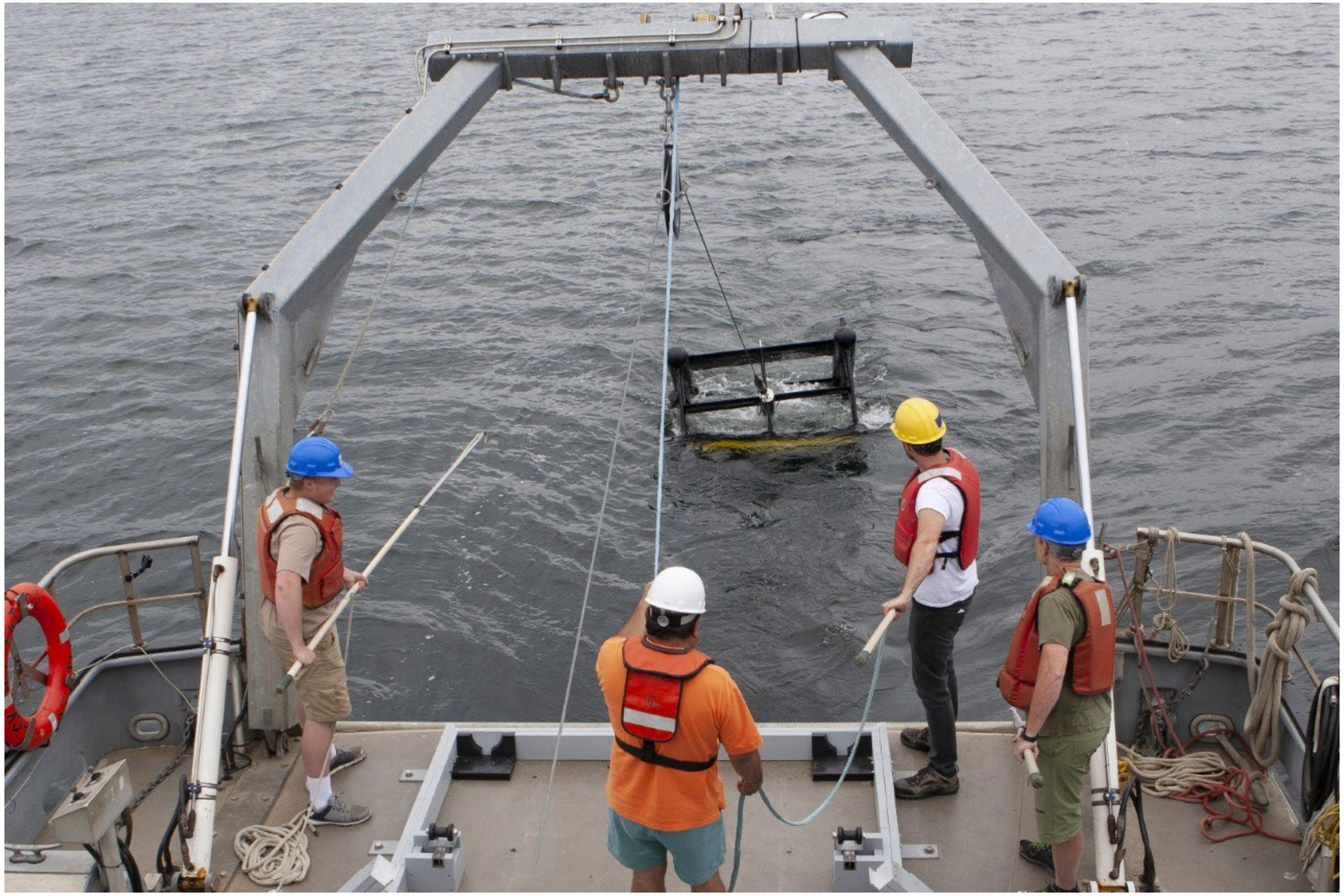


Blind Test Area

Calibration Line

PNNL responsible for target placement and overall test bed
Scheduling/Operations/Communications/Regulations

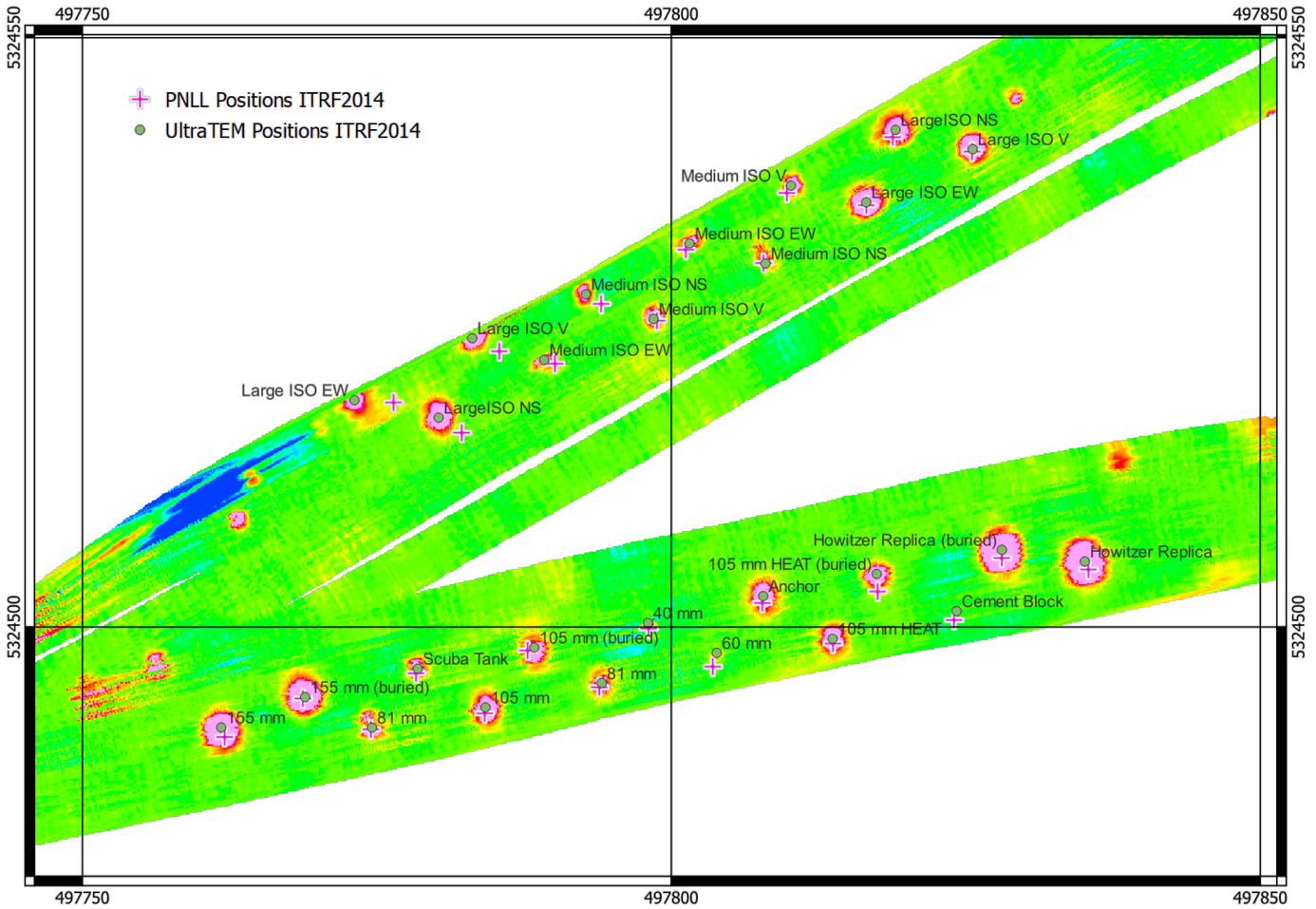




Sequim Bay 2022

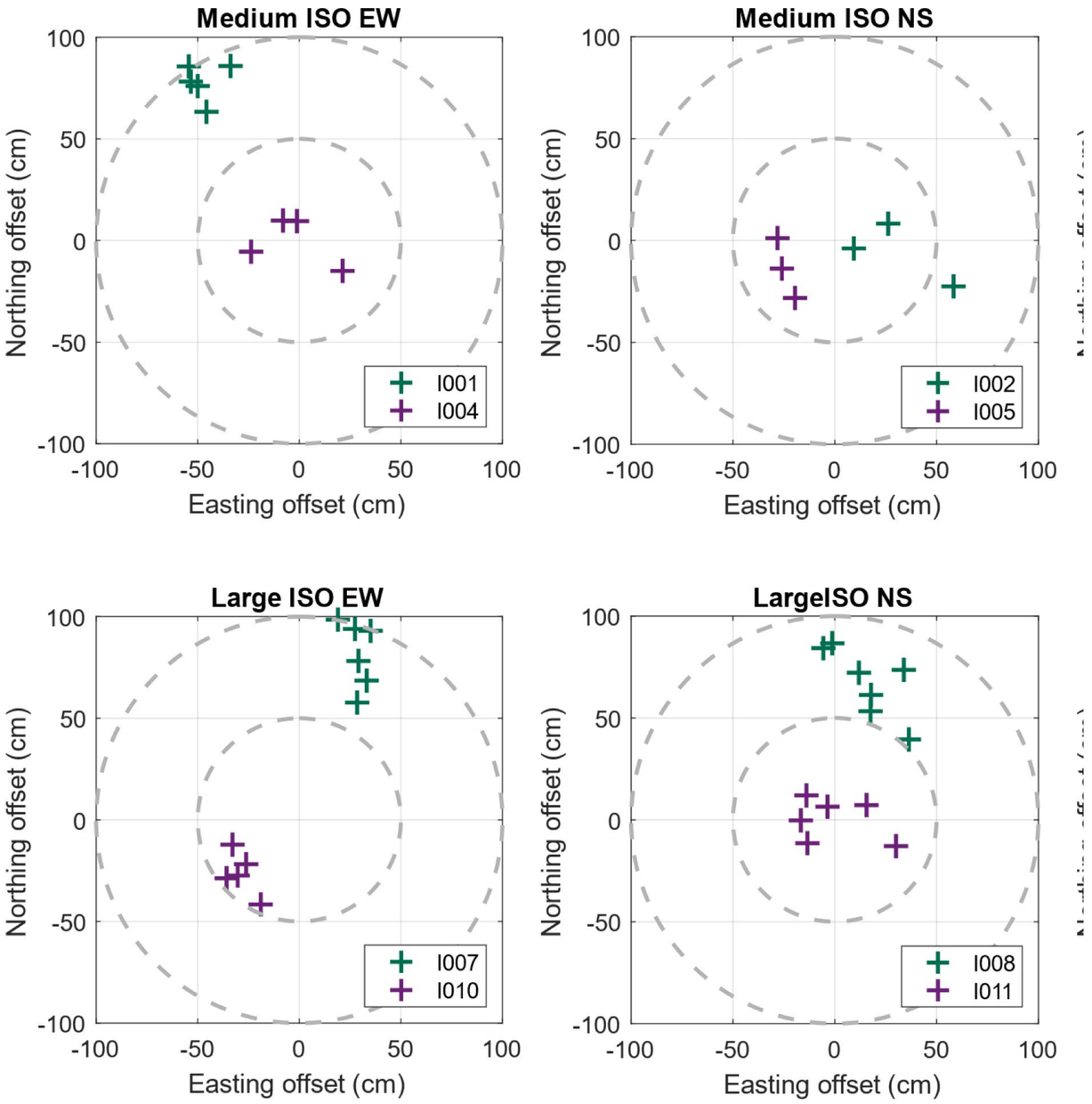
Sequim Bay Shakedown Test

- Three days of data collection
- Calibration lanes at multiple flying heights and different transmitter modes (fast and medium transmitter frequency)
- Blind-grid at one flying height and fast transmitter frequency



Black Tusk GEOPHYSICS | TETRA TECH | GapEOD Explosive Ordnance Detection

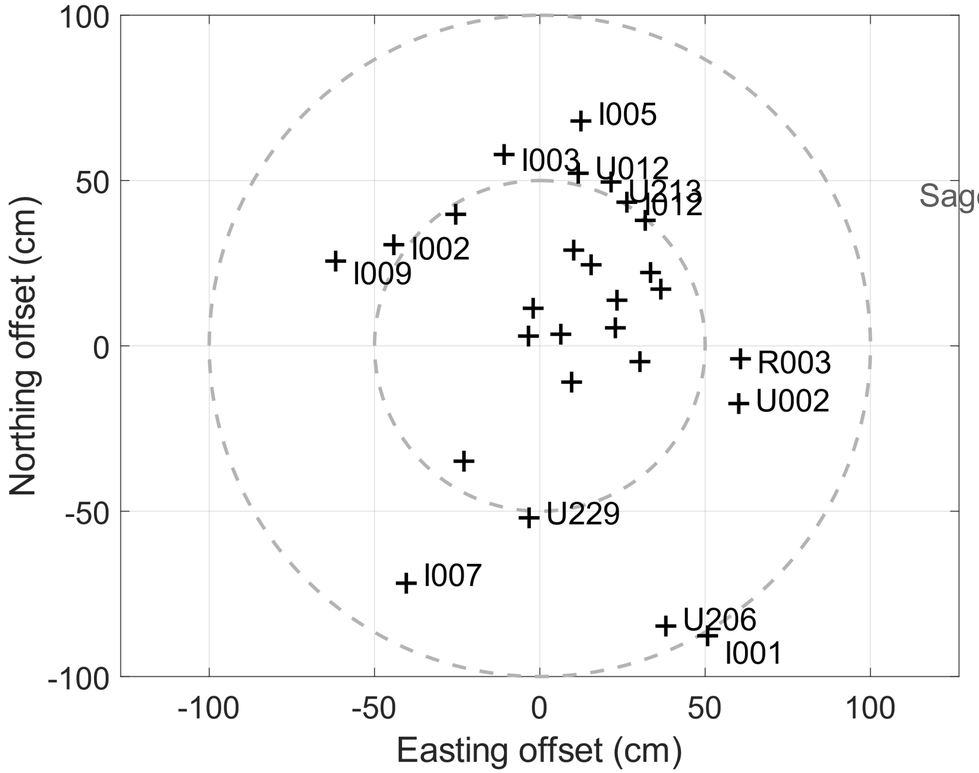
Relative error on 8 items

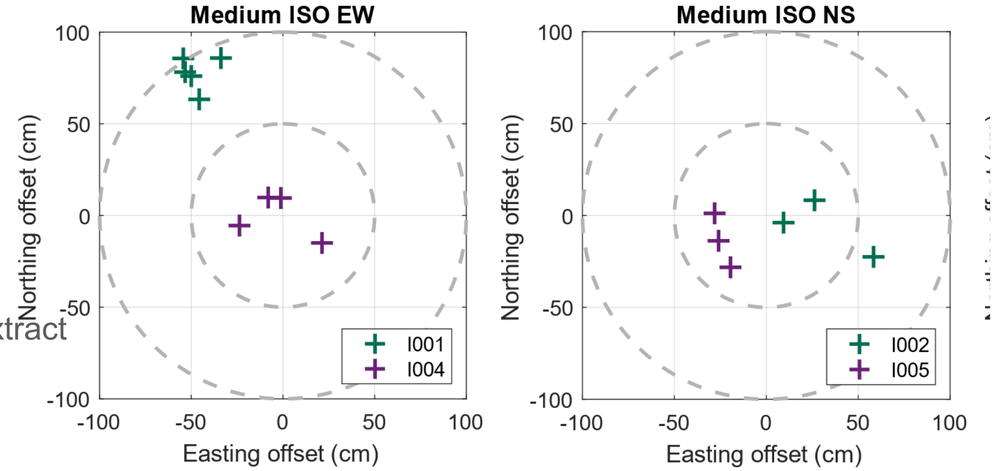
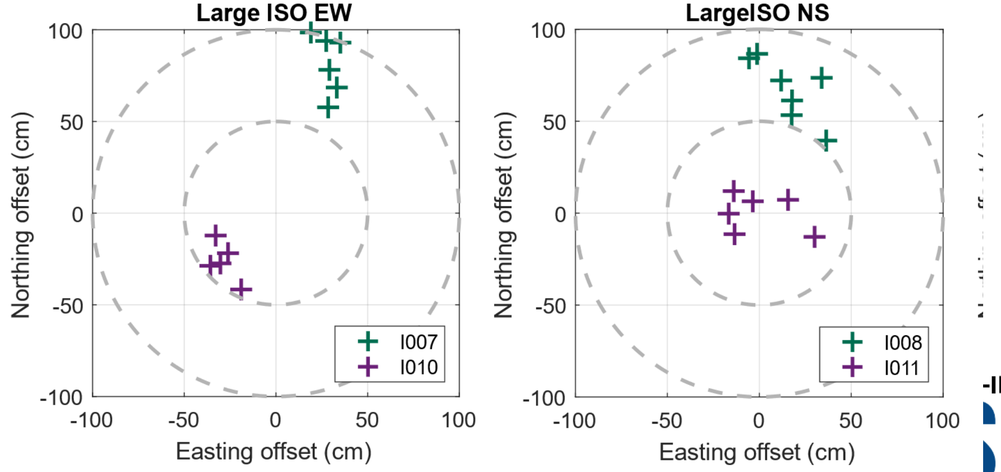


Positional accuracy
RMS Error ~ 20 cm (8”)

Compared to ground-truth

All items



Sageep Talk Extract

Relative error on 8 items