



# **JPAC's Underwater Search and Recovery Process**

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**13 June 2014**



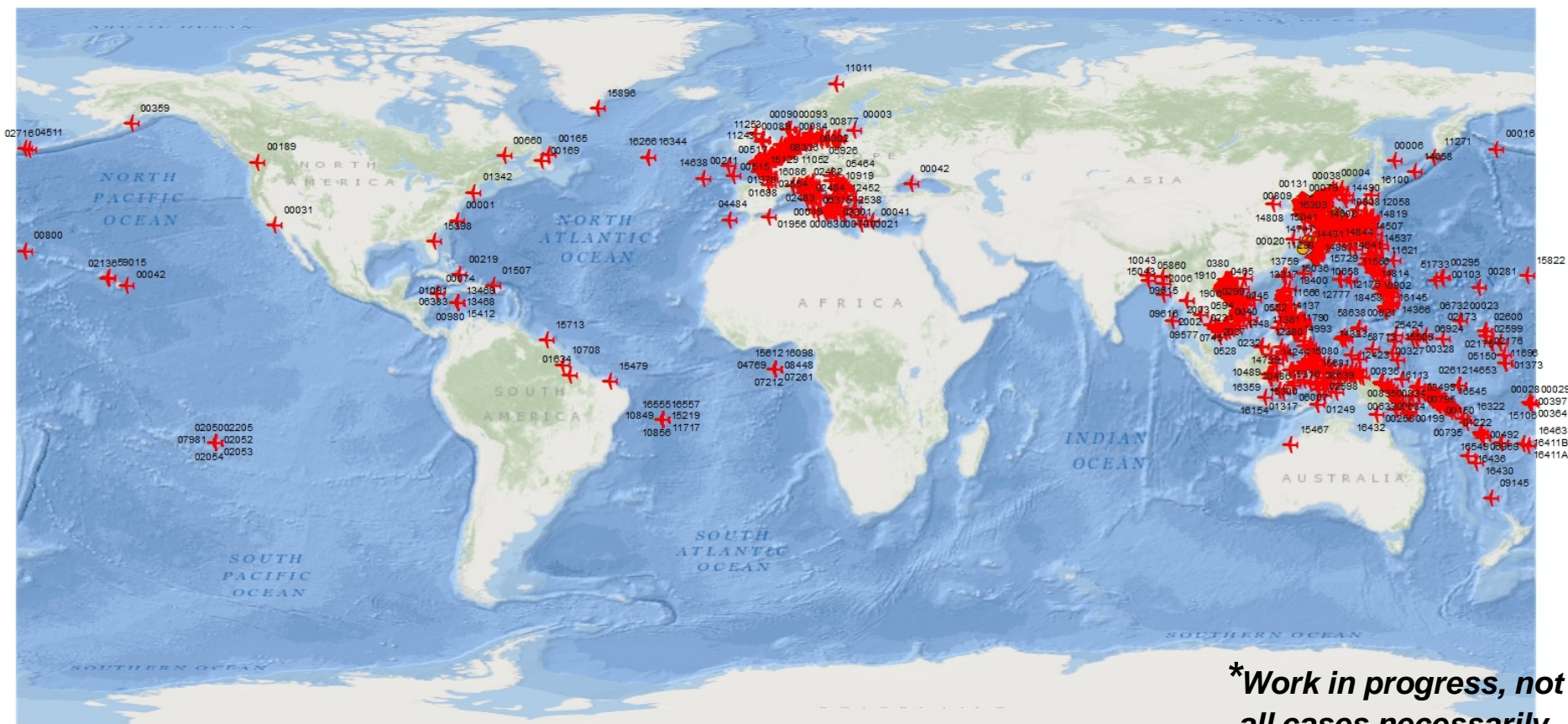
# ***Underwater Operations at JPAC***

- JPAC takes *overwater loss cases* and *underwater sites and leads* into consideration as part of the larger search and recovery planning process.
- At present, JPAC typically plans and executes at least two underwater investigation activities and two underwater recovery activities each year. Additional activities occur as situation and funding permit.
- CIL Forensic Anthropologists with training in Underwater Archaeology support the planning process and oversee scientific aspects of the field work.



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# ***Worldwide Distribution of Overwater Loss Cases JPAC is Currently Tracking\****



***\*Work in progress, not  
all cases necessarily  
represented***

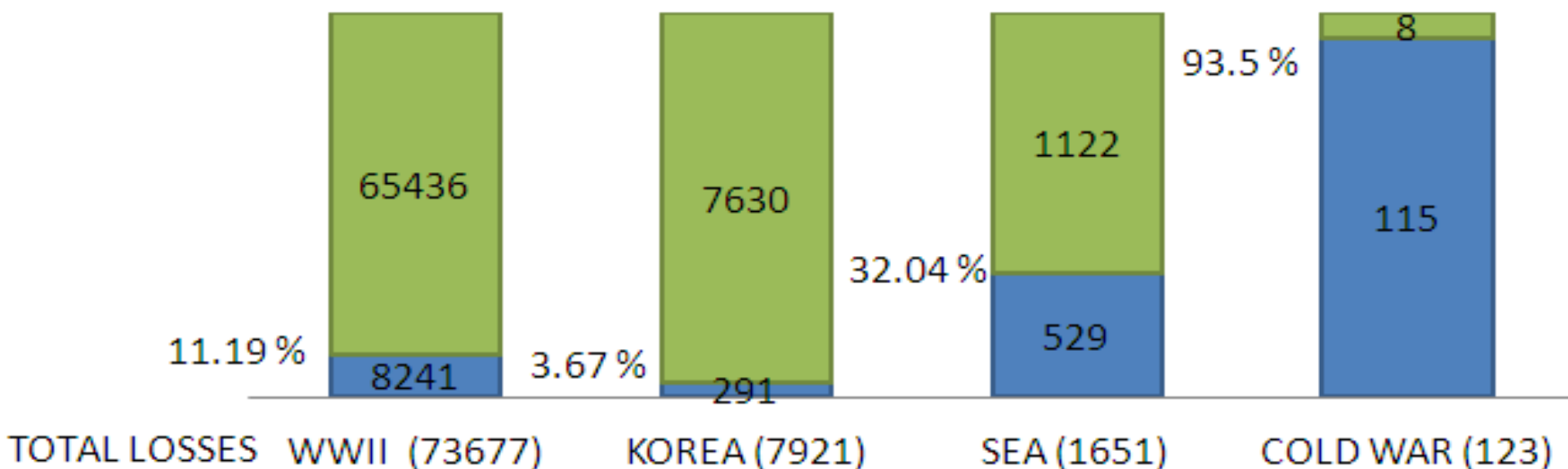
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# ***Unaccounted-For Individuals by Conflict: Land vs Water Losses\****

Individuals By Conflict

■ Underwater Losses ■ Land Losses



*\*Work in progress,  
some sites not yet  
definitively located*



# ***Setting Up an Underwater Program***

- Staff (Anthropologists, Underwater Missions Planner, Core Underwater Search & Recovery Team)
- Standard Operating Procedures
- Phased approach (search, survey, and recovery)
- Planning conducted on a mission-specific basis (research design, equipment, team, platform, timeframe)
- Basic in-house capabilities (remote sensing, diving)
- Relationships with other organizations (expeditionary Navy Mobile and Diving Salvage Units/ Army Engineering Diving Units, EODMUs, NCBs, Navy Underwater Combat Camera, NAVO, MSC)



# ***Setting Up an Underwater Program***

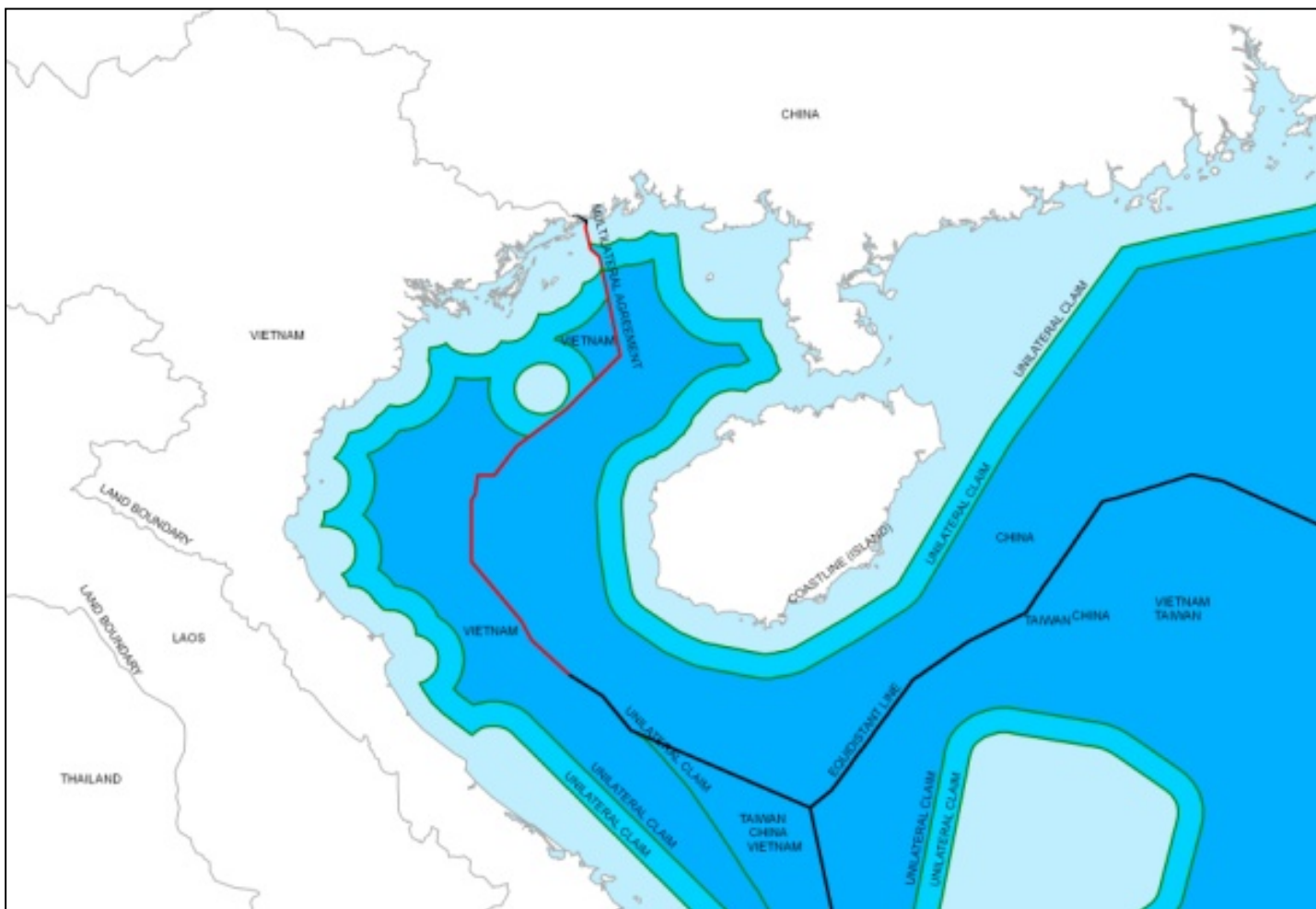
- Coordination with property custodians, land-owners, and/or host-nation governments
- Basic evidence stabilization procedures (desalination)
- Systematic historical research effort (*proactive* versus *reactive*)
- Data management scheme
- Underwater Geographic Information System (UGIS) to manage geospatial data and assist in planning
- Research and development of specific tools more suited to JPAC's unique needs





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# *Underwater GIS*



## Maritime Boundary / Political Jurisdiction Data

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# ***Ways of Sorting Information***

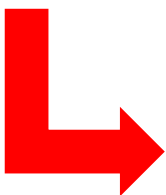
- Classification of Loss Incidents (Nature of Incident, Level of Information available, Level of interest to JPAC)
- Classification of Leads (Source of information)
- Classification of Sites (Relative Level of Intactness, Nature of the Environment, Complexity of Site)
- Identifying Types of Site Formation Processes (Processes at work in how site was formed, processes at work on site following its formation)





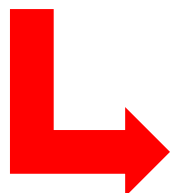
# ***Underwater Site Development Process***

Historical Loss Incident



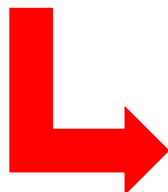
Lead on a Site is Generated

- Historical research
- Informant-provided



Search Process (Investigation)

- Search Areas are proposed
- Areas are searched
- Targets of Interest are investigated



Site is Encountered

- Survey (Investigation)
- Recovery, as warranted



# ***Diagnostic Evidence***

- Human remains
- Identification media
- Personally worn or carried items
- Aircrew apparel
- Aircraft egress systems
- Escape, evasion, and survival-related items
- In certain cases, selected items that otherwise serve to correlate a site to a specific case (aircraft wreckage with identifying manufacturer or military data, etc)





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# *Underwater Investigation: Obtaining Site Leads*



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## ***Underwater Investigation: Platforms***



Shore-based or Ship-based Small Boat Team: Lightweight, Short-Distance Range, Portable, Maneuverable, Working Depths 5-100 ft

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# Underwater Investigation: Platforms

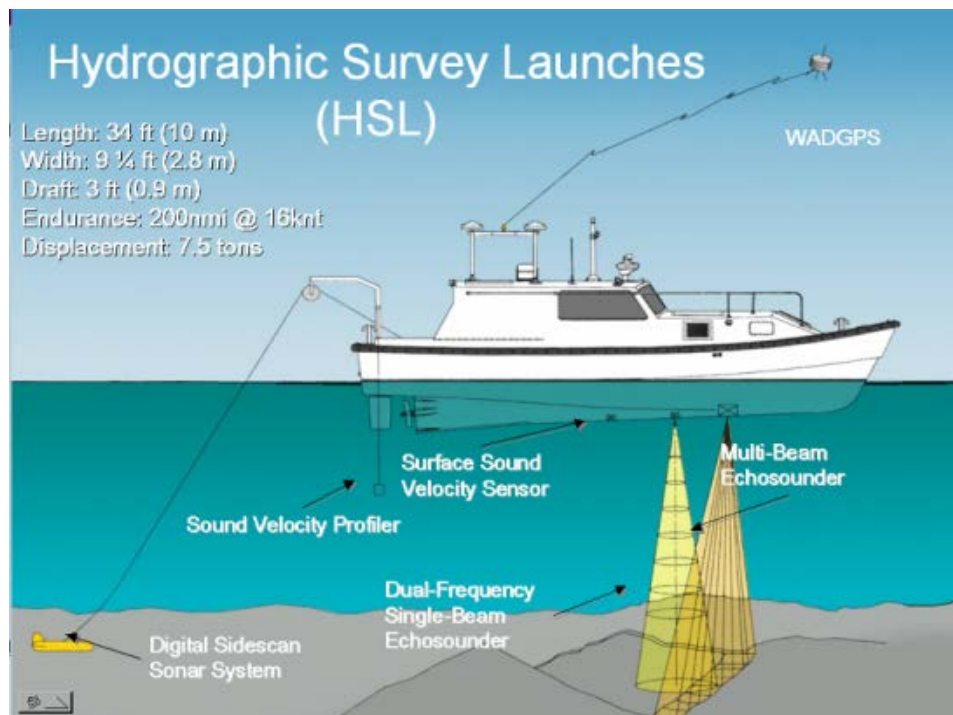


Image courtesy of NAVO

Hydrographic Survey Launches (HSLs) or local watercraft of opportunity: Heavy, Medium-distance, Maneuverable, Depths 20-130 ft





# Underwater Investigation: Platforms



T-AGS-60 Class Naval Hydrographic Survey Vessel: Heavy, Long-distance, Low Maneuverability, 130 ft+ depths

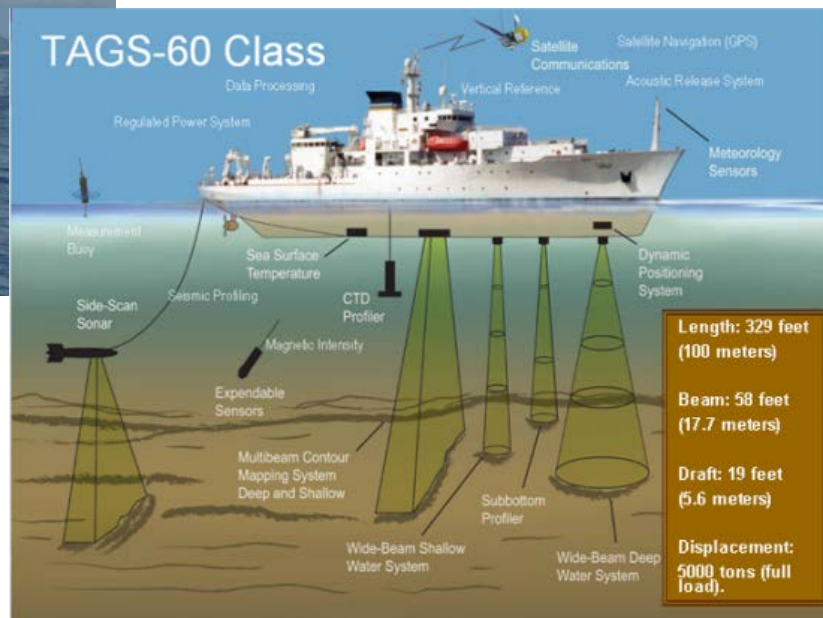


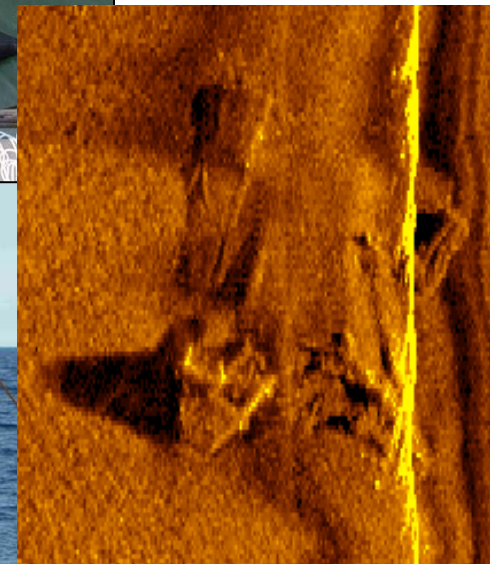
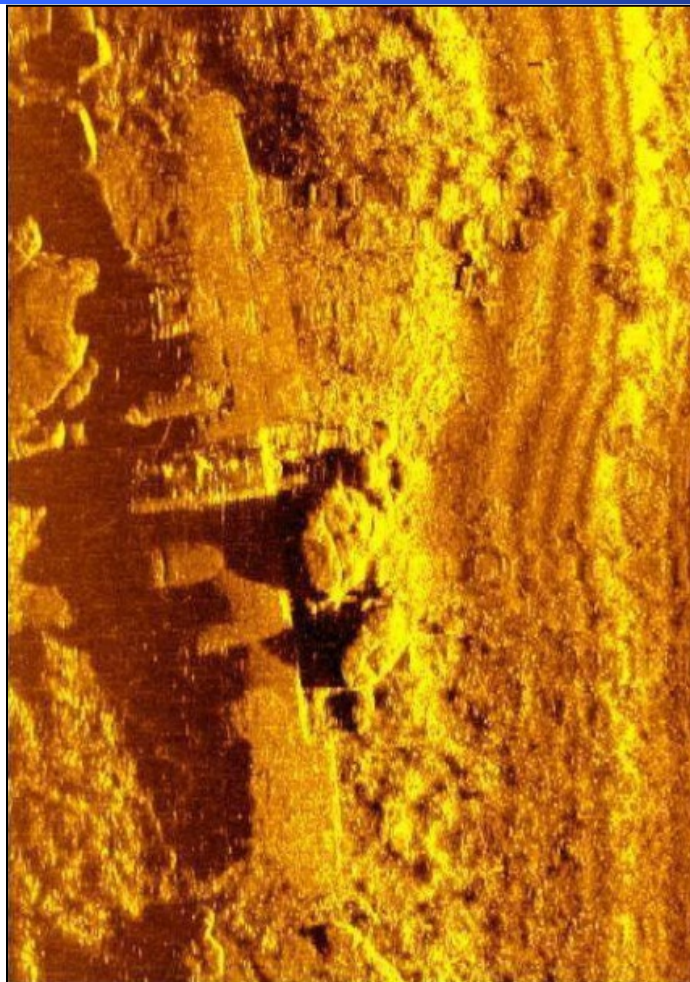
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# *Underwater Investigation: Methods and Tools*



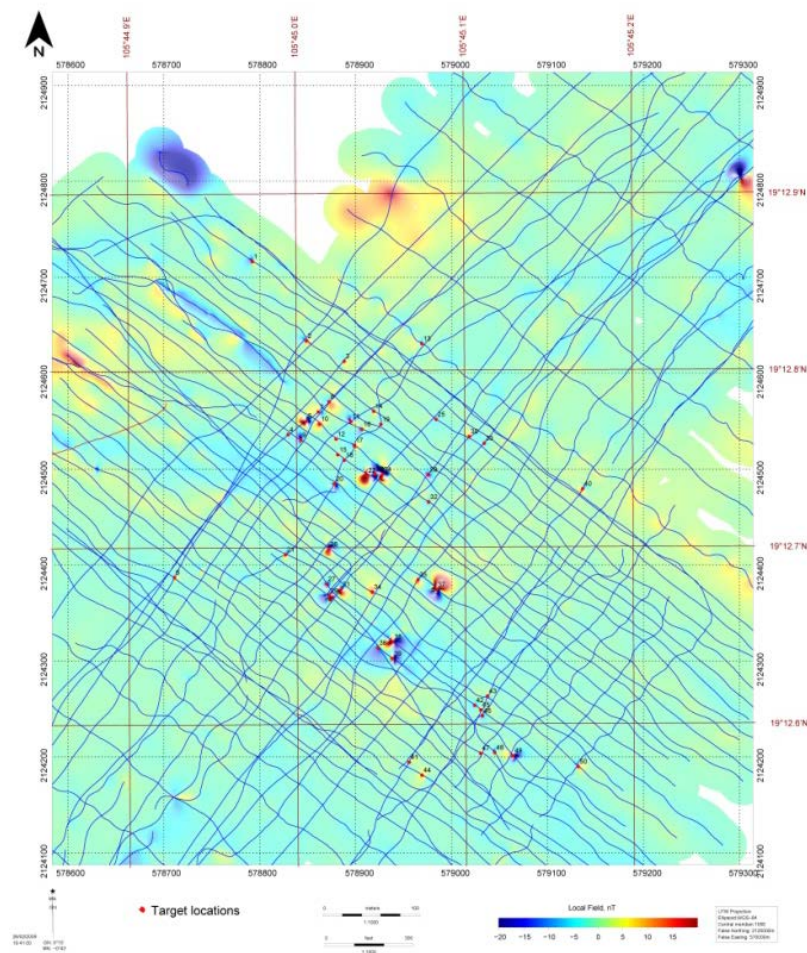
Side-Scan Sonar: Searching for acoustic anomalies

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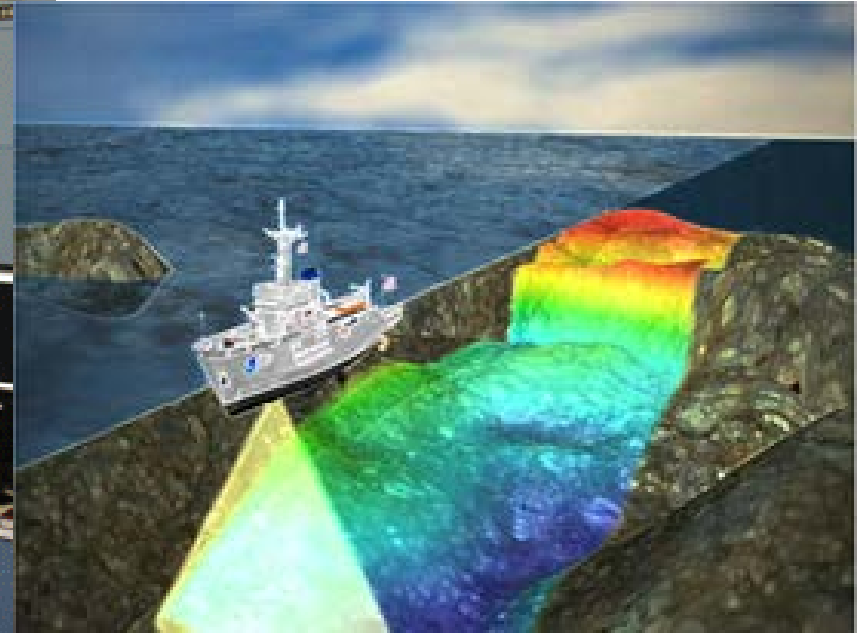
# *Underwater Investigation: Methods and Tools*



Marine Magnetometer: Searching for ferromagnetic anomalies



# *Underwater Investigation: Methods and Tools*

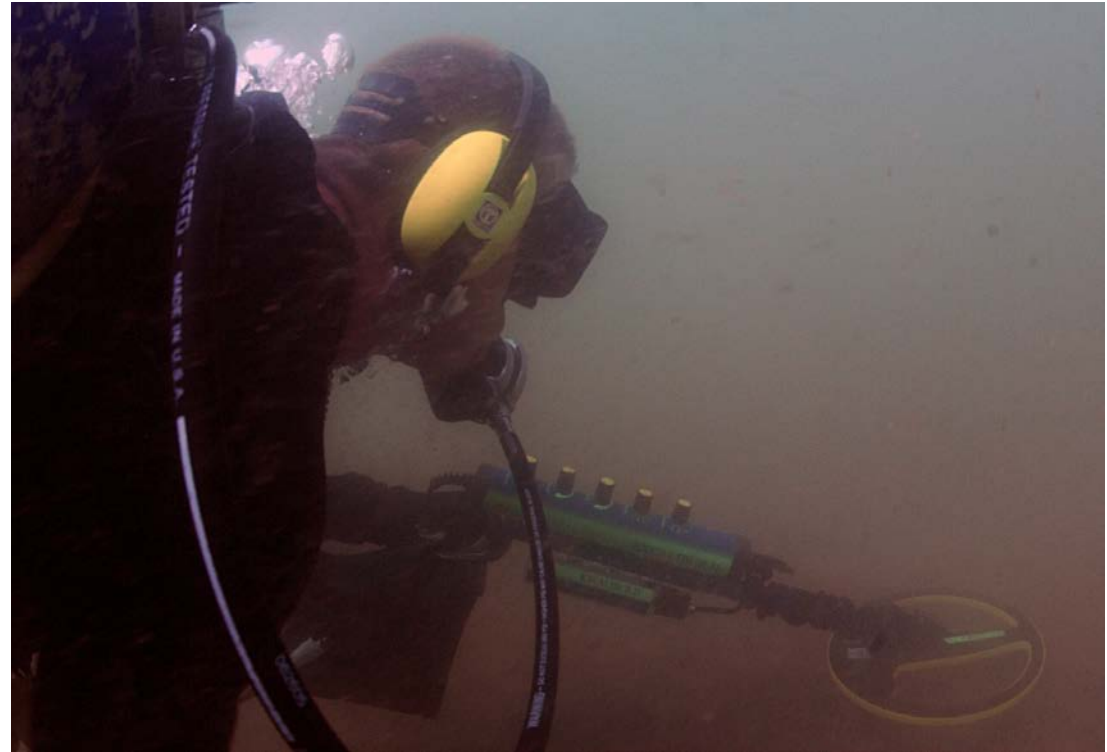


*Images courtesy of NAVO*

Multibeam Echosounder: Determining broader area bathymetry and detecting targets of interest



# *Underwater Investigation: Methods and Tools*

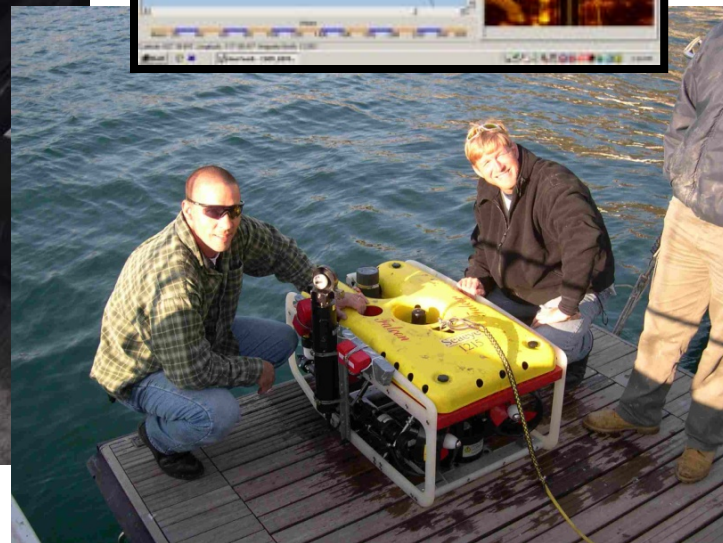
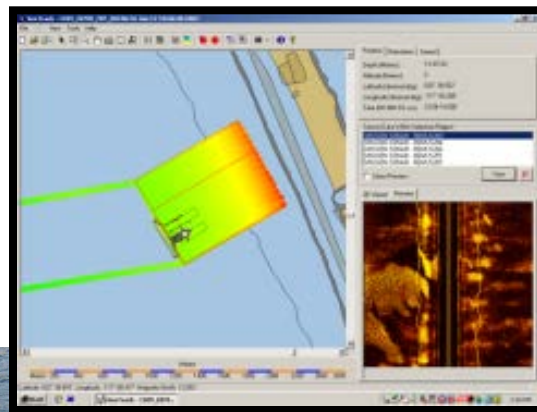


In-water Survey and Target Verification: divers, search patterns, metal detectors, photo/video





# *Underwater Investigation: Methods and Tools*



In-water Survey and Target Verification: Autonomous Underwater Vehicles (AUVs) / Unmanned Underwater Vehicles (UUVs); Remotely Operated Vehicles (ROVs)



# *Underwater Investigation: Methods and Tools*



Probing & Sampling: Characterizing and correlating anomalies and deposits





# ***Underwater Investigation: Methods and Tools***



Test Excavations: Target characterization,  
assessing approximate site size and depth



## *Underwater Recovery: Platforms*



**Staging Operations from Shore; Dynamic Shallow-water Environments  
(Very Shallow Water <30 ft in depth; >50 m from shore)**







## ***Underwater Recovery: Platforms***



**Light Surface Supply Air System from  
Small Craft or Shore  
(Small Inland or Riverine  
Environments >30 ft in depth; >50 m  
from shore)**



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## ***Underwater Recovery: Platforms***



**Flat-Bottom Barge w/Surface  
Supply Dive System and Crane  
(Shallow Water <100 ft in depth;  
<10 km from shore)**

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## ***Underwater Recovery: Platforms***

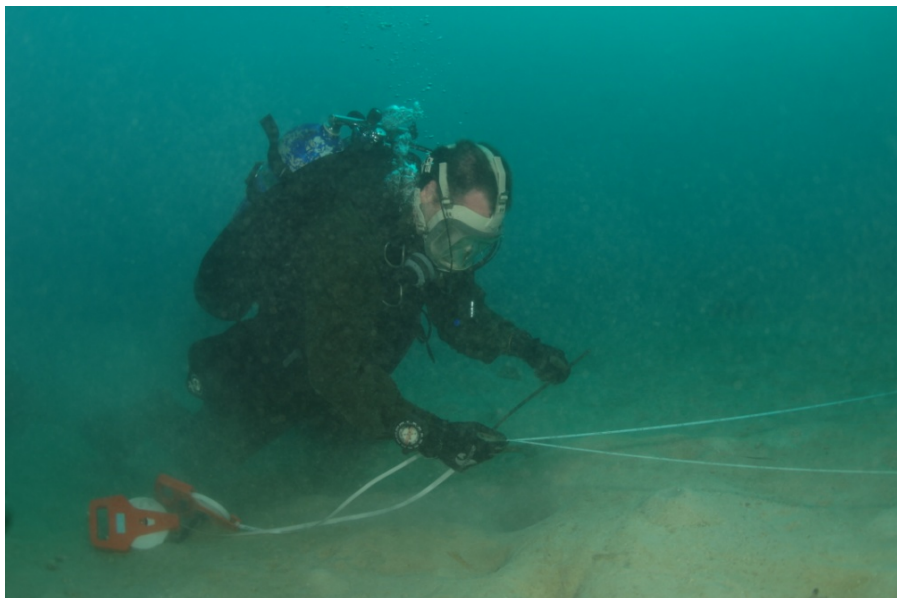


**T-ARS-50 Class Naval Salvage Vessel  
(Deeper Water >100 ft in depth; >10 km  
from shore)**

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# ***Underwater Recovery: Methods and Tools***



**Underwater Mapping  
Methods  
(Angle/Distance  
Measurement, Triangulation,  
Installed Grid Systems)**







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# ***Underwater Recovery: Methods and Tools***



## **Underwater Suction Dredge System**

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# ***Underwater Recovery: Methods and Tools***



**Lifting Baskets for  
bringing excavated  
sediment off bottom  
and up to screens**

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# ***Underwater Recovery: Methods and Tools***



**Wet-screening  
configurations**



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THANK YOU