

N|V|5

HYDROGRAPHIC SURVEY
Case Studies

Project Highlights

- Multibeam, sidescan, sub-bottom, and magnetometer surveys conducted in 2015
- ROV inspection survey conducted in 2017
- Surveys to support installation of underwater infrastructure in the Navy USWTR, located about 110km offshore
- Over 800nm of geophysical and hydrographic data collected
- Precise positioning of trunk cable and listening node locations
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Project Location

Undersea Warfare Training Range Corridor – Jacksonville, FL

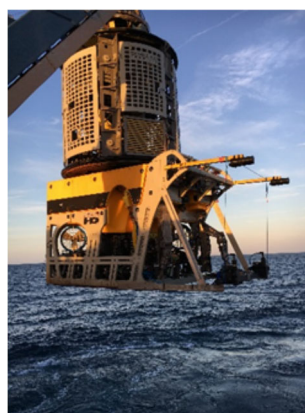
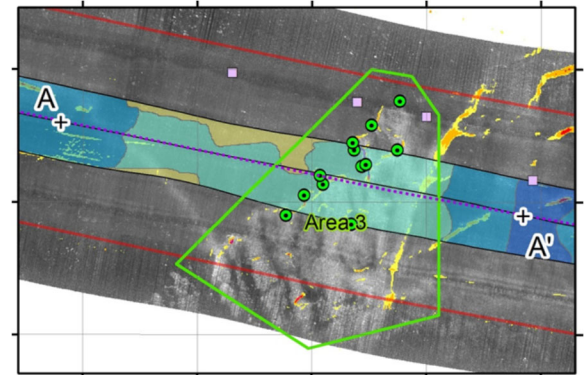
Client

L3 MariPro / Navy—NUWC

Project Description

Geodynamics was contracted by L-3 MariPro, Inc. to provide hydrographic and geophysical surveys and analysis as part of the design, fabrication and installation of the Undersea Warfare Training Range (USWTR) in the Atlantic Ocean. Located about 110km offshore of Jacksonville, FL, the USWTR tracking range will consist of several strings of listening nodes on the seabed. To mitigate the risk of interaction with fishing gear, range cabling will be buried as much as possible while avoiding hardbottom substrate, habitat, and areas of potential archaeological significance.

Geodynamics designed and implemented hydrographic and geophysical surveys of the proposed trunk cable route using a Kongsberg EM2040 multibeam, an Edgetech 2000 combined sidescan and sub-bottom sonar towfish, and a SeaSPY 2 marine magnetometer with precise positioning provided through iXBlue USBL transceiver and an Applanix POS-MV 320 inertial motion unit. Data was acquired aboard the UNOLS vessel R/V Savannah to describe general seabed morphology and bathymetry along the proposed route and identify any seabed features that may have an impact on the laying and plough burial of the trunk cable. Geodynamics also provided identification and precise positioning of all natural and manmade obstructions in the vicinity of the proposed cable route and node sites. Deliverables included daily “at sea” reports and preliminary data, and final data deliverables were provided in a directory-designed geodatabase for all processed data files and ancillary data acquired during the field operation.



In a follow-on effort, Geodynamics designed and led an ROV survey to assess and measure the extent of cable burial following construction. Aboard the M/V Shelia Bordelon, an inspection-class ROV collected high-definition video of selected portions of the trunk cable. In addition to standard survey deliverables reporting, Geodynamics also integrated this Full Motion Video (FMV) into a GIS database to support data-driven documentation and analysis of the acquired ROV inspection data.

Project Highlights

- Multi-sensor / Multi-vessel multibeam bathymetry and backscatter survey
- Survey area of 313nmi²
- Surveys support monitoring and expansion of underwater cable installation for the Navy
- Designed, supervised and processed video data from ROV inspection surveys
- Developed custom algorithm to reduce ellipsoidally-referenced survey data to MLLW chart datum

Project Location

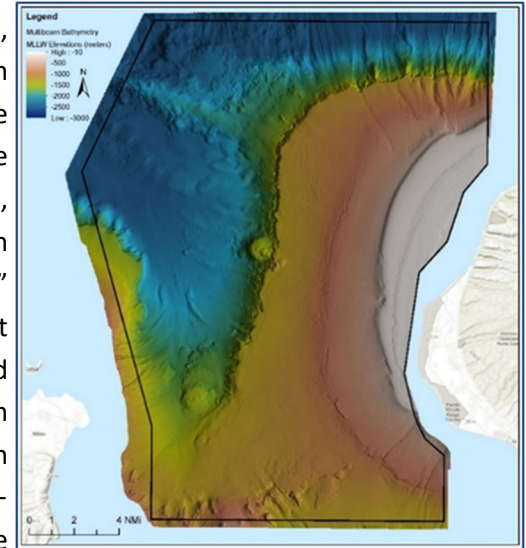
BARSTUR—Kauai, HI

Client

L3 MariPro / Navy—NUWC

Project Description

Geodynamics was contracted to acquire, process, analyze and report on multibeam hydrographic surveys in support of the Barking Sands Tactical Underwater Range (BARSTUR) expansion offshore of Kauai, Hawaii. Geodynamics worked closely with the client to provide “best-practice” insights and recommendations to meet and exceed a combination of IHO S-44 and NOAA HSSD guidelines for multibeam resolution, coverage, and feature detection over a considerable range in depth (10m—3,100m). In consideration of the remote survey area, Geodynamics designed a multi-phase survey and chartered two research vessels to most efficiently meet the survey objectives, ensured the use of the best sonar system for each depth range, maximized safety of operations, and offered the client a cost-efficient contingency plan against poor weather.



Phase I included shallow water multibeam (Kongsberg EM2040C-Dual / Applanix POS MV) and ROV (Falcon DR) data acquisition in the shallowest regions of the survey area (10m – 100m) aboard a 43’ vessel of opportunity. Phase II included acquisition and processing of multibeam data using a Kongsberg EM710 (100m – 700m) and a Kongsberg EM122 (700m – 3100m) aboard the UNOLS vessel R/V Kilo Moana. Geodynamics collected video and still imagery of underwater cables and planned cable routes within the asset expansion area using Inspection- and Working-class ROV’s. The multibeam survey data was integrated with USBL positioned underwater video in a comprehensive GIS deliverable using ESRI’s Full-Motion Video (FMV) tool. This cohesive database allows the client to precisely position, target and inspect underwater assets on the seafloor with great efficiency and will support multibeam backscatter ground-truthing for sediment classification in future phases of the project.



Top: Multibeam data in survey extent.

Left: R/V Huki Pono

Right: R/V Kilo Moana



Project Highlights

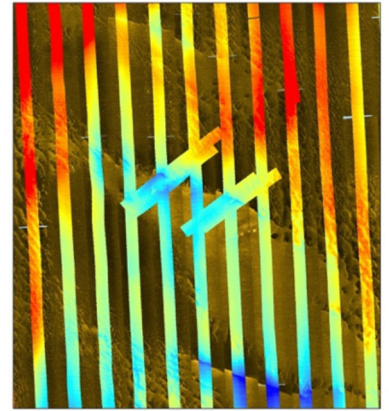
- Designed sidescan and multibeam sonar survey to cost effectively characterize the seafloor
- Supervised all hydrographic operations aboard NOAA research vessel Nancy Foster
- Provided target identification coordinates for potential shipwrecks & cultural resources
- Digitized all sidescan data and classified seabed types to create attributed GIS layers for analysis

Project Location

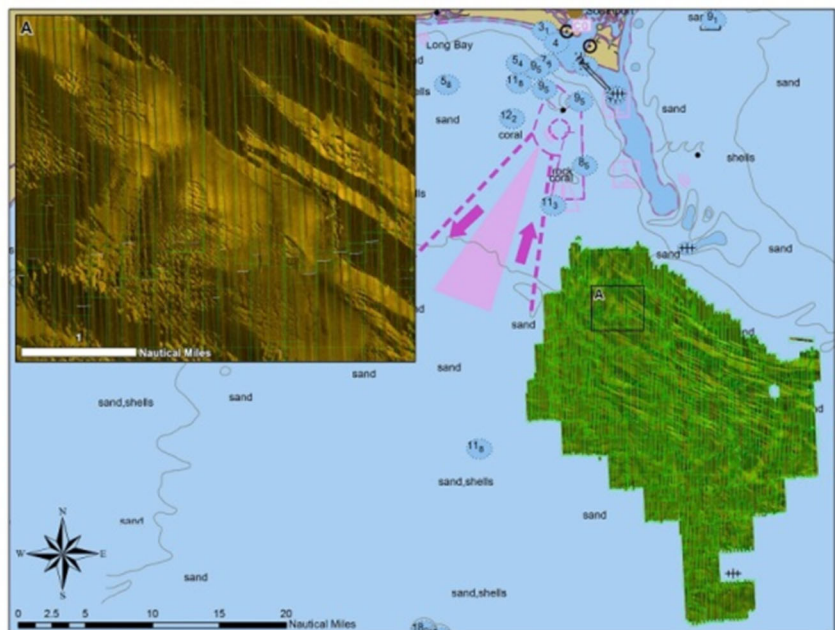
Call Area Wilmington-East—
Offshore Cape Fear, NC

Project Description

In support of researchers at UNC-CH’s Institute for Marine Science and NOAA’s Center for Coastal Fisheries Habitat Research, Geodynamics developed and conducted preliminary surveys using sidescan and multibeam sonar of a 437 mi² area. The survey design balanced the need for appropriate sediment characterization and target identification with constraints to available shiptime and a limited budget. Geodynamics oversaw all hydrographic operations, including 2700 line miles of full coverage (110%) sidescan sonar using an EdgeTech 4200 and ‘skunk stripe’ multibeam collection using a Reson 7125, both paired with an Applanix POS-MV inertial navigation system. Acquisition and processing were completed according to NOAA Hydrographic Specifications & Deliverables and the IHO Standards. Data derived from this study will not only provide real presence/absence information on hard-bottom and cultural resources in Call Area Wilmington-East, but will also establish baseline data for use in future monitoring efforts. Geodynamics digitized all sidescan data and classified seabed polygons based on ground truthing to create attributed GIS layers.



“Skunk Stripe” Multibeam



Project map showing survey area and sidescan inset