H13574

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Service

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13574

LOCALITY

State(s):	Guam
General Locality:	Western Pacific Ocean
Sub-locality:	Apra Harbor

2022

CHIEF OF PARTY
Hector L. Casanova, CAPT/NOAA

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Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H13574**

INSTRUCTIONS: The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

State(s):	**Guam**
General Locality:	**Western Pacific Ocean**
Sub-Locality:	**Apra Harbor**
Scale:	**5000**
Dates of Survey:	**04/08/2022 to 07/09/2022**
Instructions Dated:	**01/07/2022**
Project Number:	**OPR-T381-RA-22**
Field Unit:	**NOAA Ship *Rainier***
Chief of Party:	**Hector L. Casanova, CAPT/NOAA**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Multibeam Echo Sounder Backscatter**
Verification by:	**Pacific Hydrographic Branch**
Soundings Acquired in:	**meters at Mean Lower Low Water**

Remarks:

Any revisions to the Descriptive Report (DR) applied during office processing are shown in red italic text. The DR is maintained as a field unit product, therefore all information and recommendations within this report are considered preliminary unless otherwise noted. The final disposition of survey data is represented in the NOAA nautical chart products. All pertinent records for this survey are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via https://www.ncei.noaa.gov/. Products created during office processing were generated in NAD83(MA11) UTM 55N, MLLW. All references to other horizontal or vertical datums in this report are applicable to the processed hydrographic data provided by the field unit.

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Descriptive Report to Accompany Survey H13574

Project: OPR-T381-RA-22

Locality: Western Pacific Ocean

Sublocality: Apra Harbor

Scale: 1:5000

April 2022 - July 2022

NOAA Ship *Rainier*

Chief of Party: Hector L. Casanova, CAPT/NOAA

A. Area Surveyed

This survey is referred to as H13574, "Apra Harbor" (sheet 4) within the Project Instructions. The assigned survey area encompassed an estimated four square nautical miles in the main harbor of the U.S. island territory of Guam in the Western Pacific Ocean.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
13° 28' 5.02" N 144° 36' 54.95" E	13° 24' 58.45" N 144° 41' 21.02" E

Table 1: Survey Limits

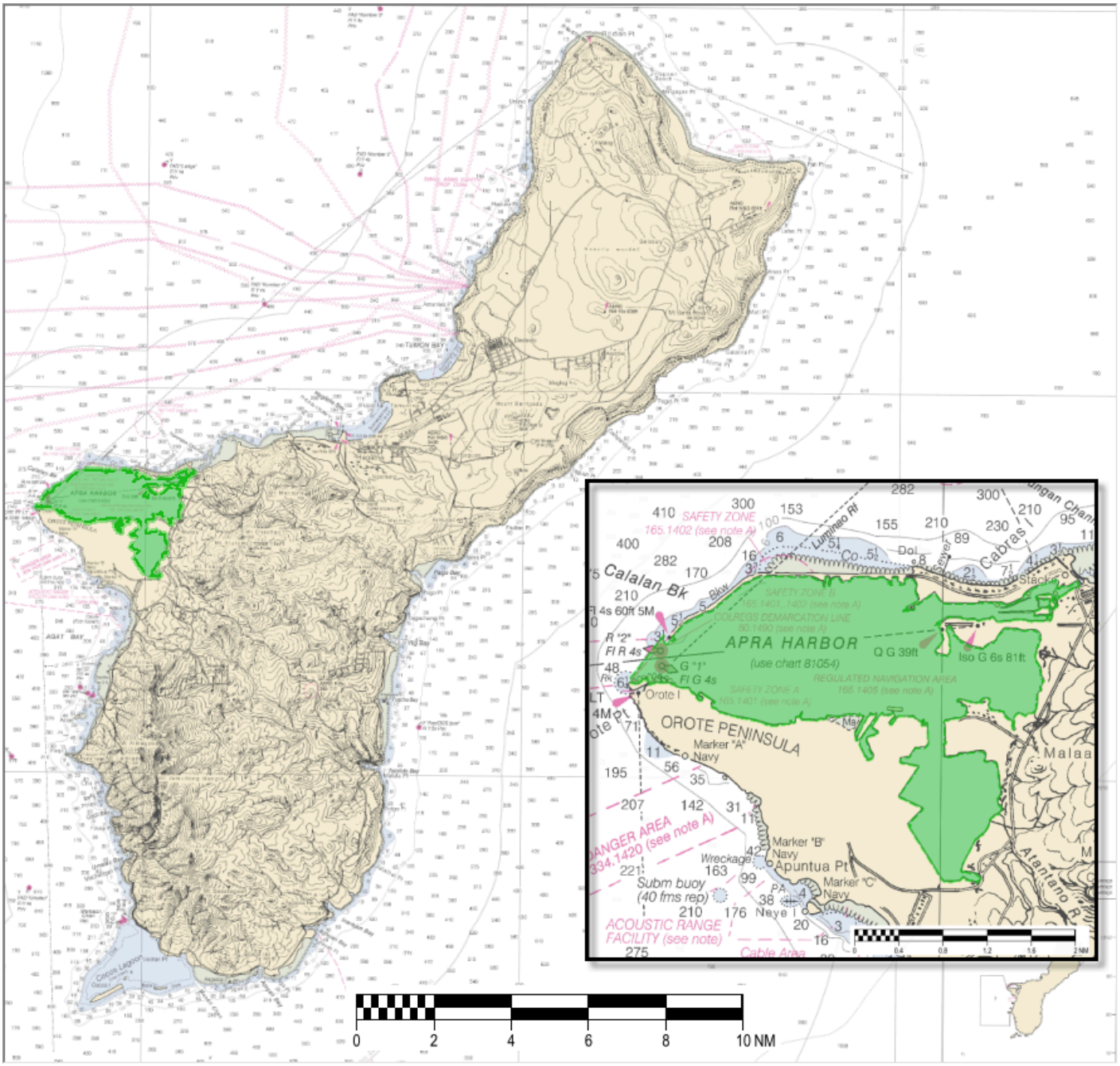


Figure 1: H13574 assigned survey area (Chart 81048).

Survey limits were acquired in accordance with the requirements in the Project Instructions and the HSSD.

A.2 Survey Purpose

The ecosystem surrounding the U.S. Territory of Guam is experiencing stress imposed by climate change and other environmental factors. This survey is part of extensive hydrographic project intended to map the bathymetry and habitat around Guam in support of nautical charting and habitat mapping.

With the collaboration and partnership of the National Centers for Coastal and Ocean Science (NCCOS), the NOAA Coral Reef Conservation Program (CRCP), and the National Marine Fisheries Service (NMFS), this survey will also study the health of coral reef systems, ocean chemistry, and fisheries habitat. This team has developed a strategy to map the waters from nearshore to depths greater than 1000 meters. Within these waters, the ship's crew and visiting scientists will map bathymetry and backscatter and characterize habitat, while concurrently performing coral reef assessment dives and collecting other oceanographic observations.

Data collected during this mission are pivotal to long-term biological and oceanographic monitoring of coral reef ecosystems around Guam. Data from this survey will add to information collected during prior monitoring and mapping projects. Oceanographic and ecological time series data will allow scientists to evaluate potential changes in environmental conditions and coral reef health in the Mariana Archipelago. This will enable federal and state resource managers to more effectively conserve the coral reef ecosystems of Guam, and to manage ecosystems services. Data collected during this survey also support monitoring components of the CRCP Coral Reef Ecosystem Integrated Observing System.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

We used Pydro QC Tools (v.3.7.0) Grid QA to analyze H13574 multibeam echosounder (MBES) data density. The submitted H3574 finalized variable-resolution surface met HSSD density and object detection requirements as shown in the histograms below.

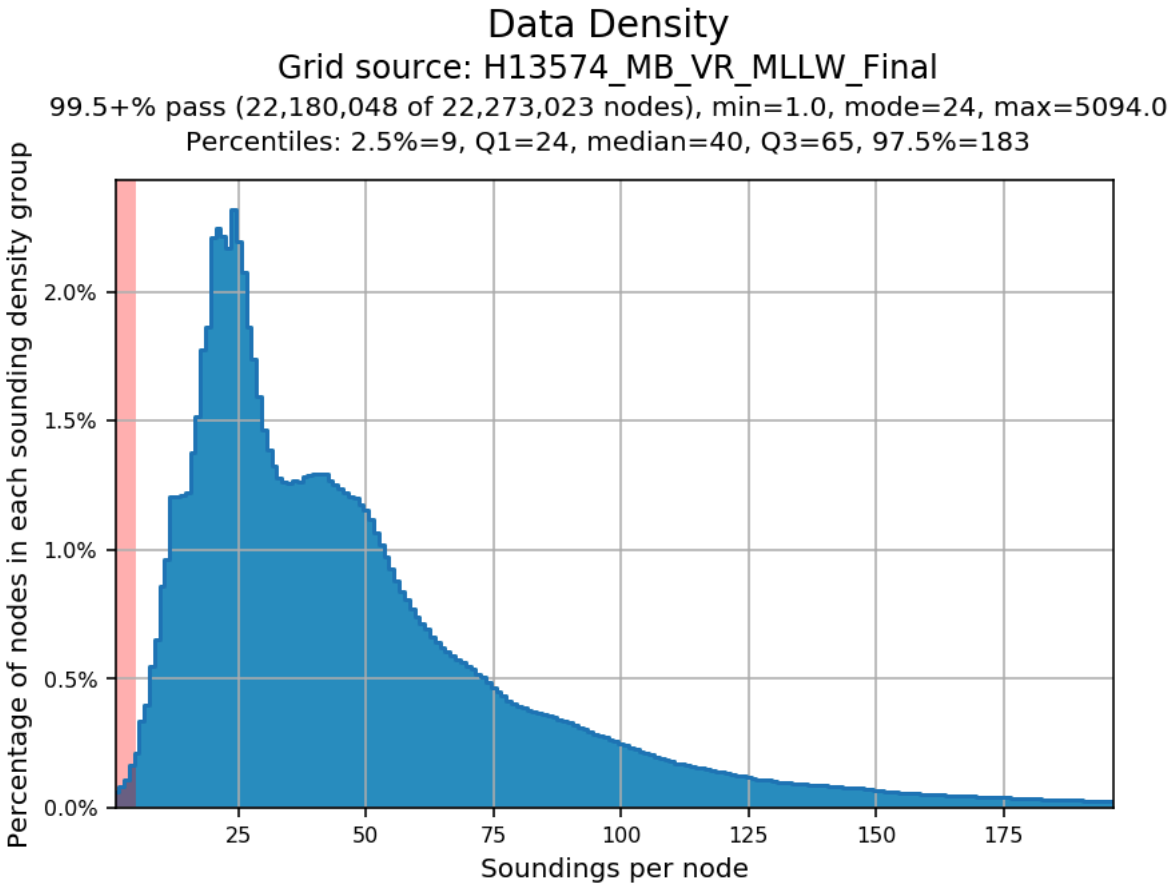


Figure 2: Pydro derived plot showing HSSD density compliance of H13574 finalized variable resolution MBES data.

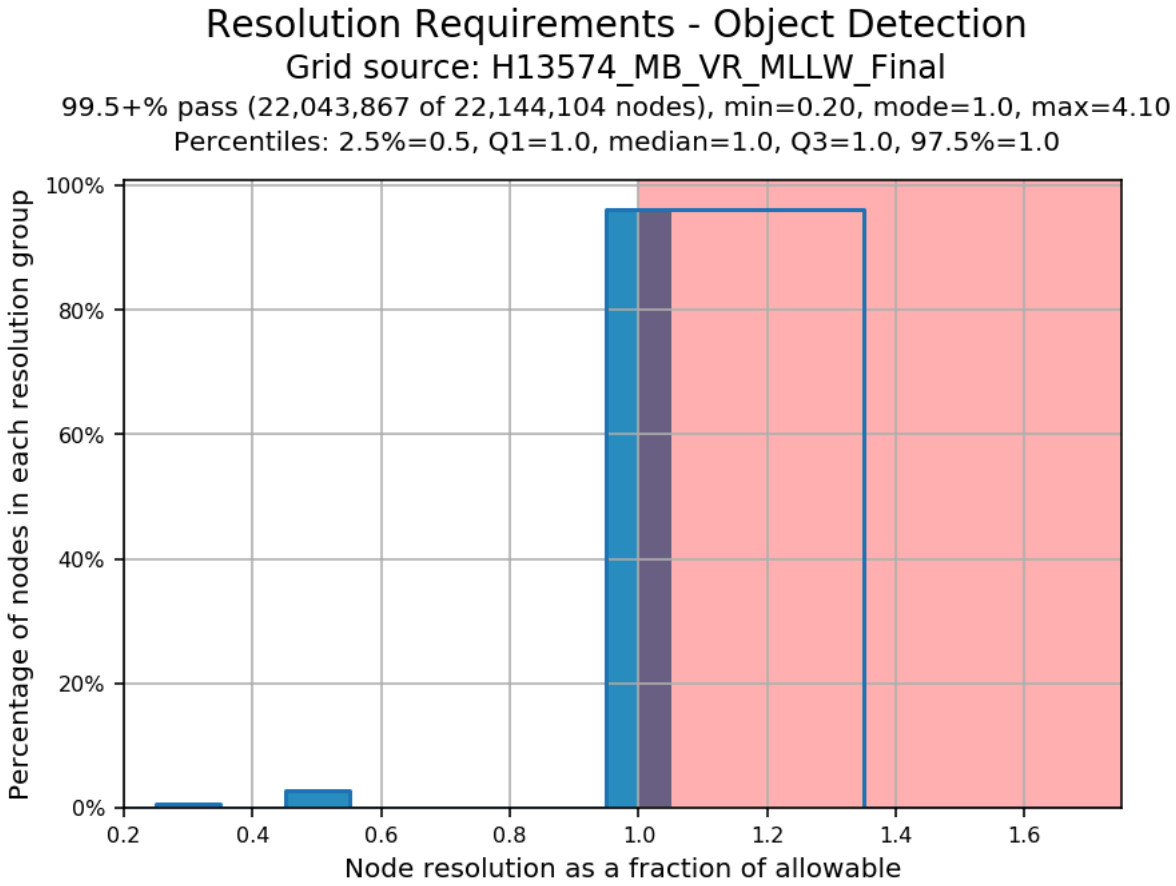


Figure 3: Pydro derived plot showing HSSD object detection compliance of H13574 finalized variable-resolution MBES data.

A.4 Survey Coverage

The following table lists the coverage requirements for this survey as assigned in the project instructions:

Water Depth	Coverage Required
All Waters	Object Detection Coverage (Refer to HSSD Section 5.2.2.2)

Table 2: Survey Coverage

Object detection multibeam echosounder (MBES) coverage was acquired to the inshore limit of hydrography, the Navigable Area Limit Line (NALL) except as noted below. The NALL is defined as the most seaward of the following: the surveyed 3.5-meter depth contour, the line defined by the distance seaward from the observed MHW line which is equivalent to 0.8 millimeters at chart scale, or the inshore limit of safe navigation. Some wharves within the survey area were occupied by moored U.S. Naval ships and other commercial vessels, limiting access for survey operations. Areas where H13574 survey data

reached neither 3.5-meters water depth nor the appropriate distance from the observed MHW line, were due to safety concerns.

Pydro QC Tools (v3.7.0) Find Holidays program identified a significant number of gaps in coverage, "holidays" in H13574 MBES data. Virtually all these holidays occurred at the most nearshore edge of coverage where the dynamic nature of the seafloor caused acoustic shadows in the data. Safety concerns prevented survey operations from being conducted further inshore. A small number of holidays occurred in the main survey area, again caused by acoustic shadows on the side of slopes or objects. Most of these gaps in coverage were very small, the largest measured 9 x 3 meters and is shown in the figure below. We examined the holidays in subset mode to ensure that the least depth of navigationally significant features were included in the delivered data set.

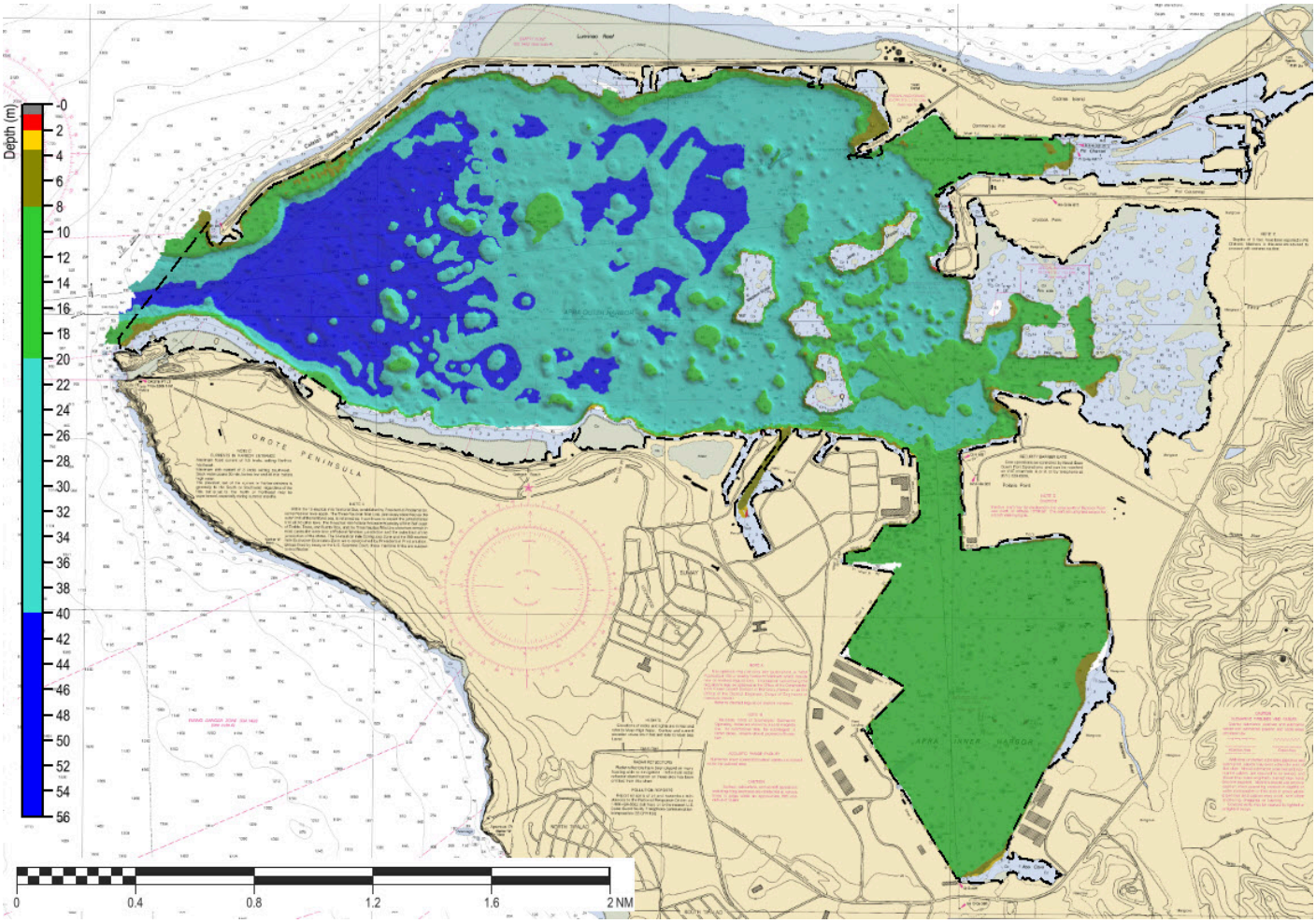


Figure 4: H13574 MBES coverage, assigned survey limits shown as dashed black line.

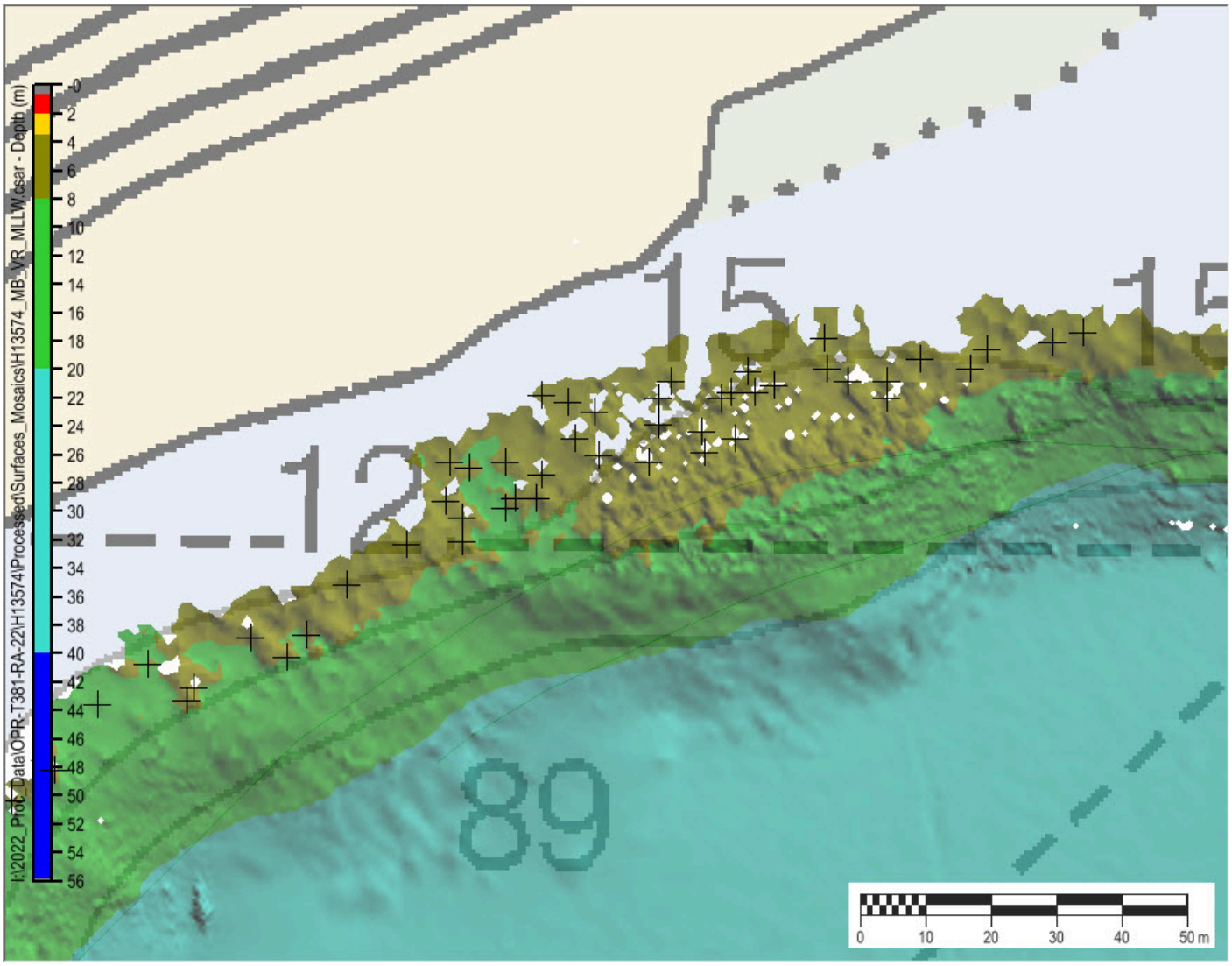


Figure 5: Example of H13574 nearshore acoustic shadow holidays, note charted depth units are feet.

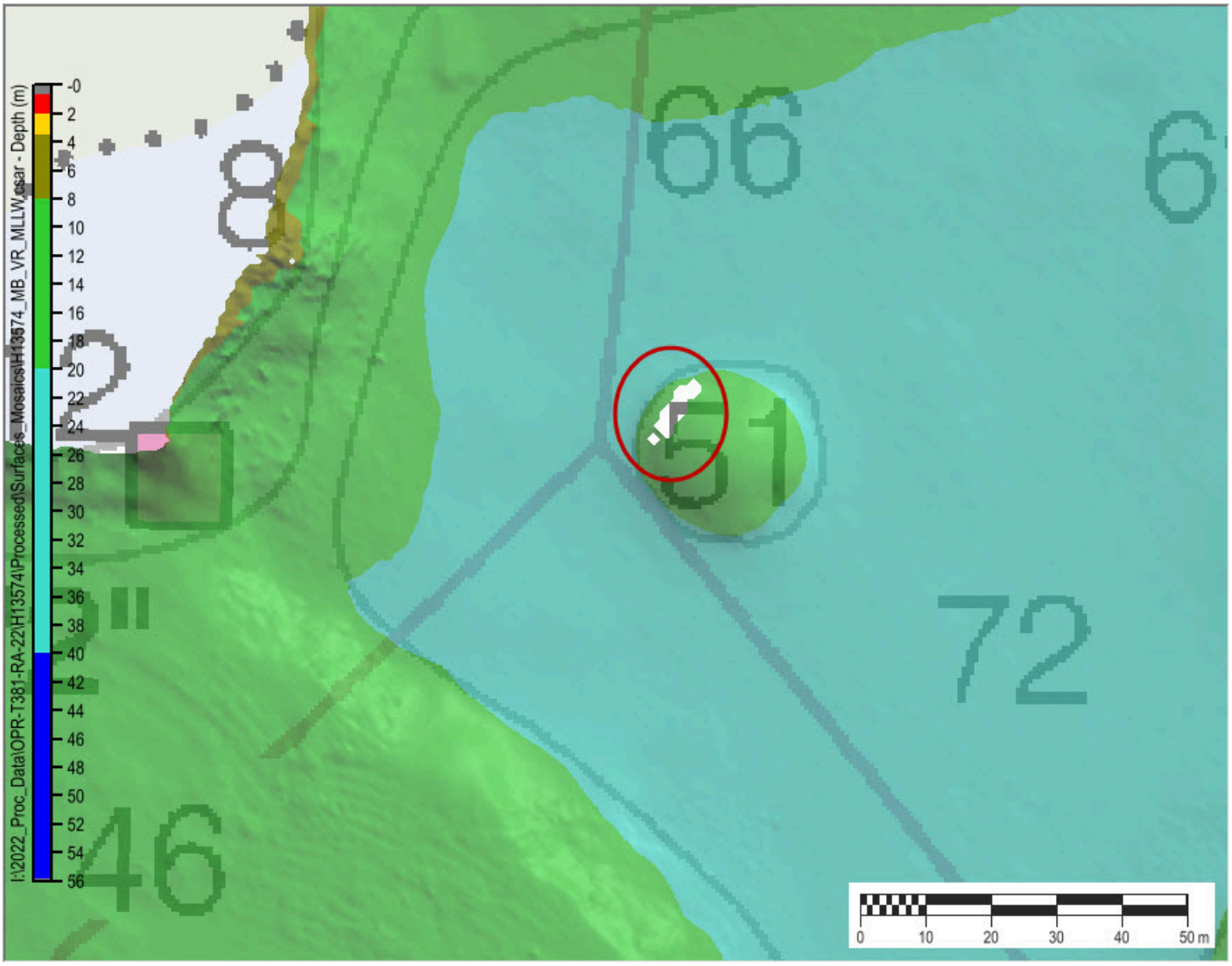


Figure 6: Example of the small number of holidays found in the main H13574 survey area. This is the largest gap in coverage; it measures approximately 9 x 3 meters.

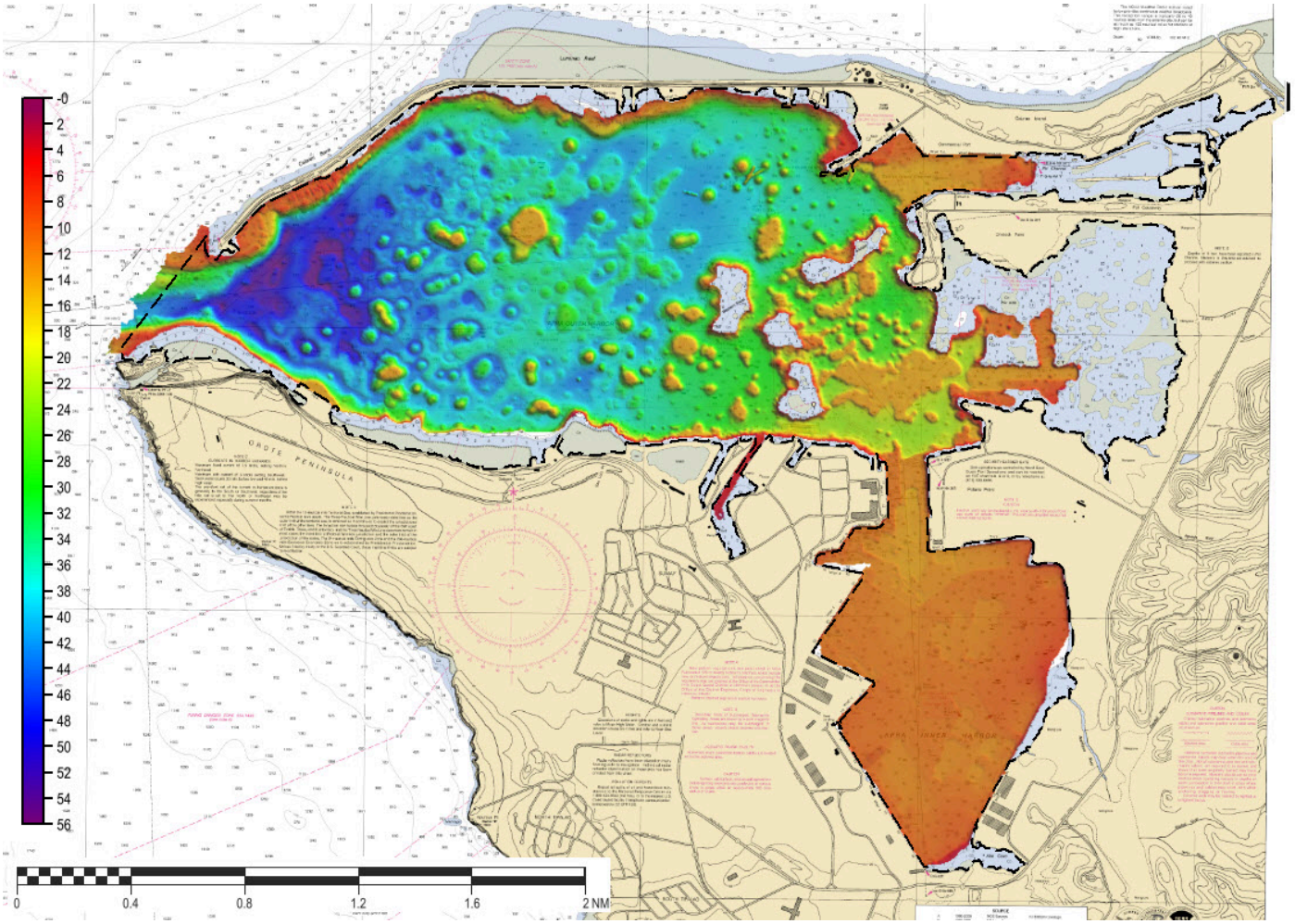


Figure 7: H13574 survey coverage overview (Chart 81054).

A.6 Survey Statistics

The following table lists the mainscheme and crossline acquisition mileage for this survey:

	HULL ID	*2803*	*2804*	*Total*
LNM	**SBES Mainscheme**	0.0	0.0	0.0
	MBES Mainscheme	27.0	113.3	140.3
	Lidar Mainscheme	0.0	0.0	0.0
	SSS Mainscheme	0.0	0.0	0.0
	SBES/SSS Mainscheme	0.0	0.0	0.0
	MBES/SSS Mainscheme	0.0	0.0	0.0
	SBES/MBES Crosslines	0.0	8.0	8.0
	Lidar Crosslines	0.0	0.0	0.0
Number of Bottom Samples				0
Number Maritime Boundary Points Investigated				0
Number of DPs				100
Number of Items Investigated by Dive Ops				0
Total SNM				3.54

Table 3: Hydrographic Survey Statistics

The following table lists the specific dates of data acquisition for this survey:

Survey Dates	Day of the Year
04/08/2022	98
04/11/2022	101

Survey Dates	Day of the Year
05/04/2022	124
05/09/2022	129
06/02/2022	153
06/10/2022	161
07/06/2022	187
07/07/2022	188
07/09/2022	190

Table 4: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Refer to the Data Acquisition and Processing Report (DAPR) for a complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods. Additional information to supplement sounding and survey data, and any deviations from the DAPR are discussed in the following sections.

B.1.1 Vessels

The following vessels were used for data acquisition during this survey:

Hull ID	*2803*	*2804*
LOA	8.8 meters	8.8 meters
Draft	1.1 meters	1.1 meters

Table 5: Vessels Used

Figure 8: NOAA Hydrographic survey launch 2803. (photo credit: RAINIER CST Jacobson)

All data for H13574 were acquired by NOAA Ship RAINIER survey launches 2803 and 2804. The vessels acquired depth soundings, backscatter imagery and sound speed profiles.

B.1.2 Equipment

The following major systems were used for data acquisition during this survey:

Manufacturer	Model	Type
Applanix	POS MV 320 v5	Positioning and Attitude System
Kongsberg Maritime	EM 2040	MBES
Sea-Bird Scientific	SBE 19plus	Conductivity, Temperature, and Depth Sensor
Teledyne RESON	SVP 70	Sound Speed System

Table 6: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

RAINIER launch 2804 acquired eight nautical miles (5.8% of mainscheme) of MBES crosslines across all depth ranges, water masses and boat days that were operationally practical in order to evaluate the internal consistency of H13574 sonar data. We performed crossline analysis using the Compare Grids function within Pydro Explorer on Caris variable-resolution surfaces of H13574 mainscheme only and crossline only data. 99.5+% of grid nodes met allowable uncertainties; see Pydro generated plots below.

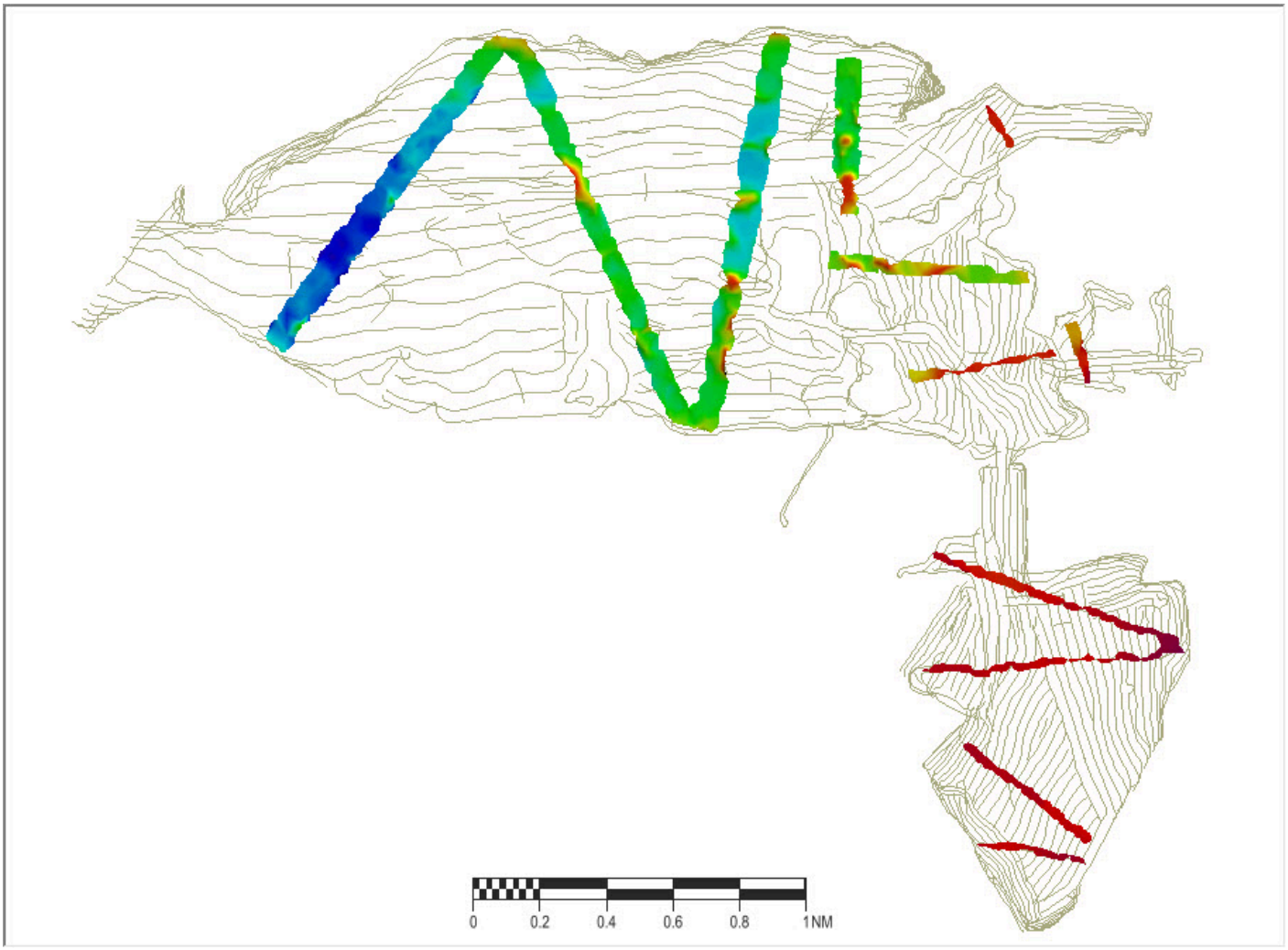


Figure 9: H13574 crosslines only surface overlaid on mainscheme tracklines.

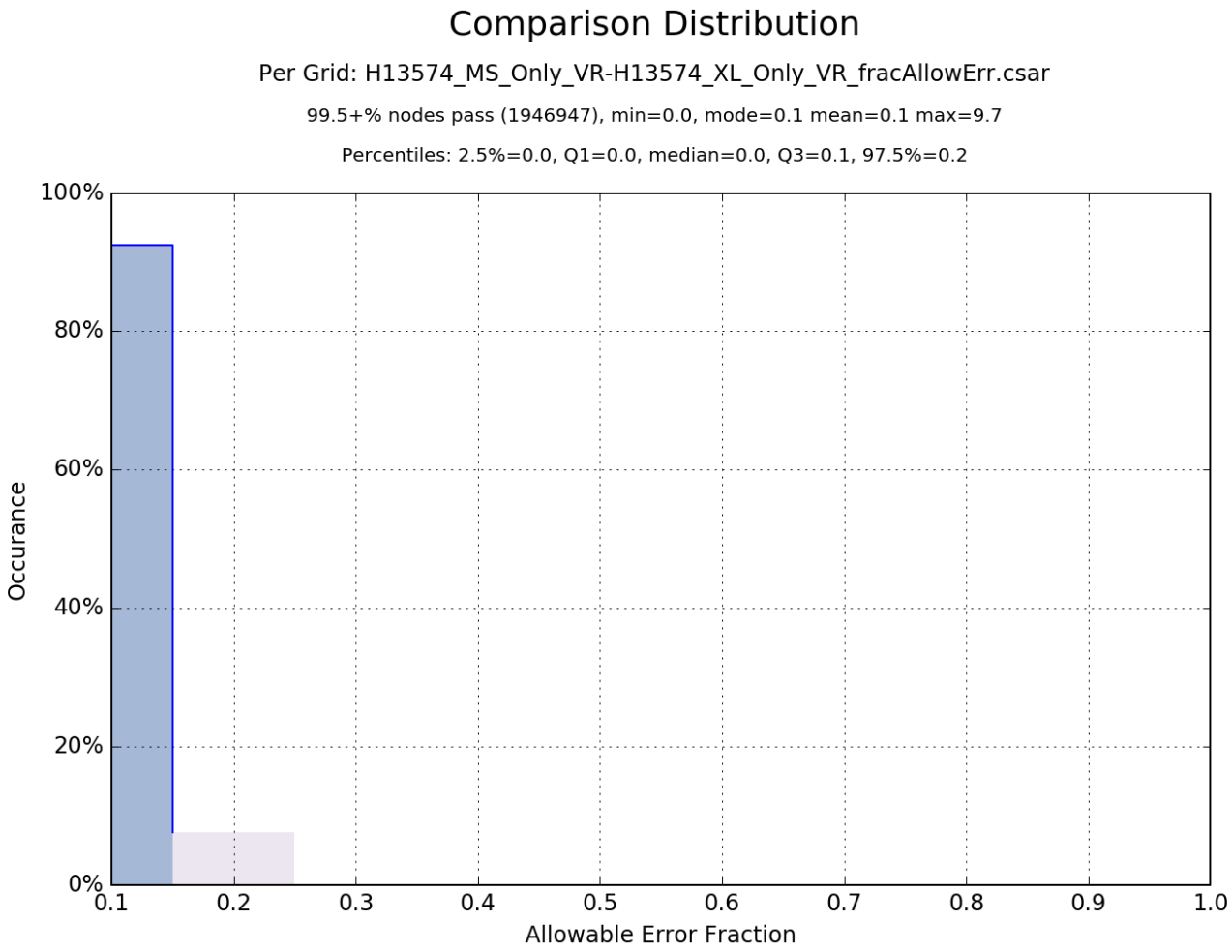
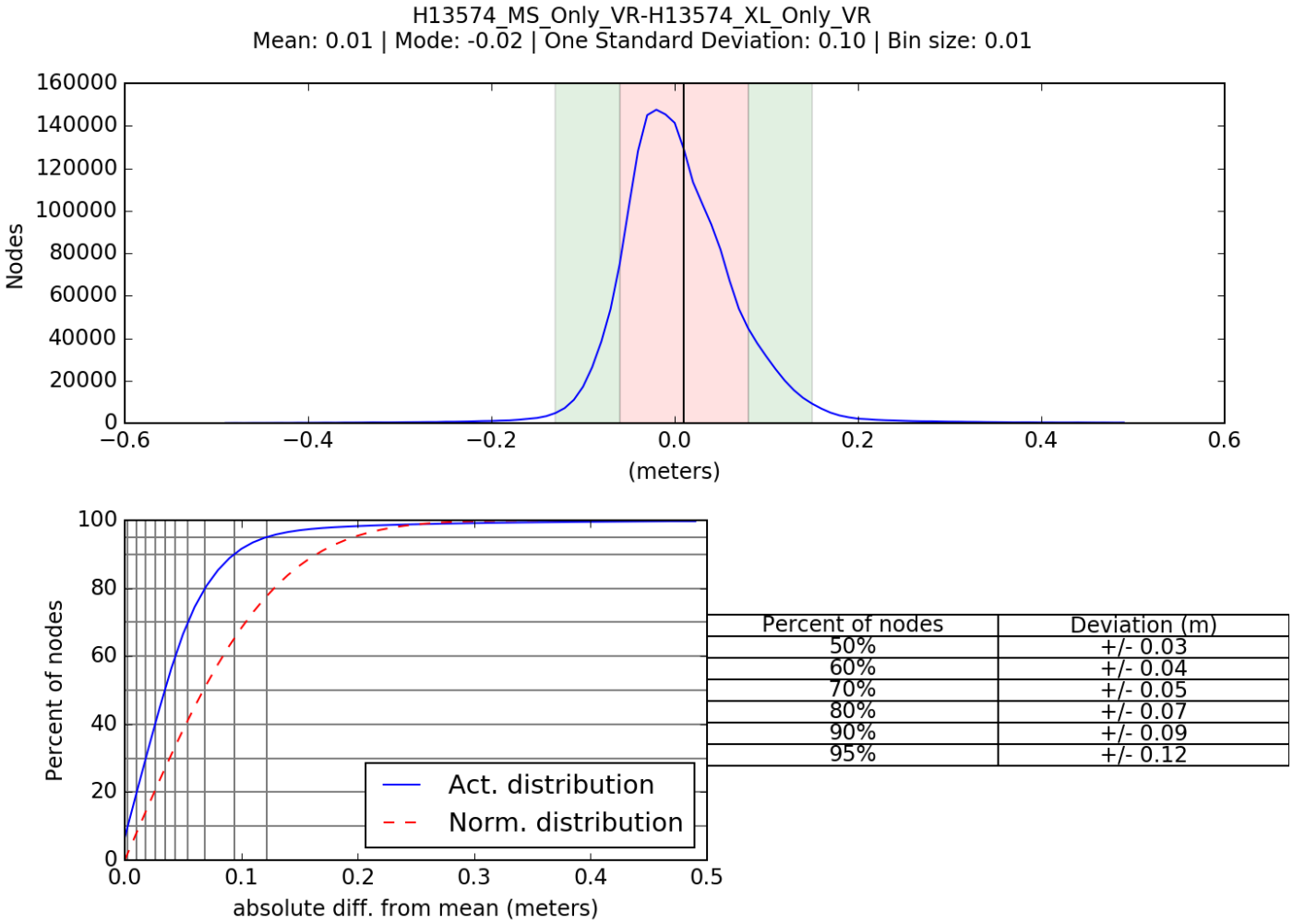


Figure 10: Pydro derived plot showing node percentage pass value of H13574 mainscheme to crossline data.



Percent of nodes	Deviation (m)
50%	+/- 0.03
60%	+/- 0.04
70%	+/- 0.05
80%	+/- 0.07
90%	+/- 0.09
95%	+/- 0.12

Figure 11: Pydro derived plot showing absolute difference statistics of H13574 mainscheme to crossline data.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via ERTDM	0.0 meters	0.11 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
2803, 2804	3 meters/second	N/A	N/A	0.05 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

Total Propagated Uncertainty (TPU) values for survey H13574 were derived from a combination of fixed values for equipment and vessel characteristics, as well as from field assigned values for sound speed uncertainties. Tidal uncertainty was provided in metadata for the NOAA vertical datum transformation model used for this survey.

In addition to the usual a priori estimates of uncertainty, real-time and post-processed uncertainty sources were also incorporated into the depth estimates of this survey. Real-time uncertainties for position, navigation and vessel motion data from Applanix POS MV were applied during acquisition and initially in post-processing. POSPac SBET and RMS files were subsequently applied in Caris HIPS to supersede POS MV uncertainties associated with GPS height and position.

Uncertainty values of the submitted finalized grids were calculated in Caris using "Greater of the Two" of uncertainty and standard deviation (scaled to 95%). Grid QA v6 within Pydro QC Tools was used to analyze H13574 TVU compliance. H13574 met HSSD requirements in 99.5+% percent of grid nodes as shown in the histogram plot below.

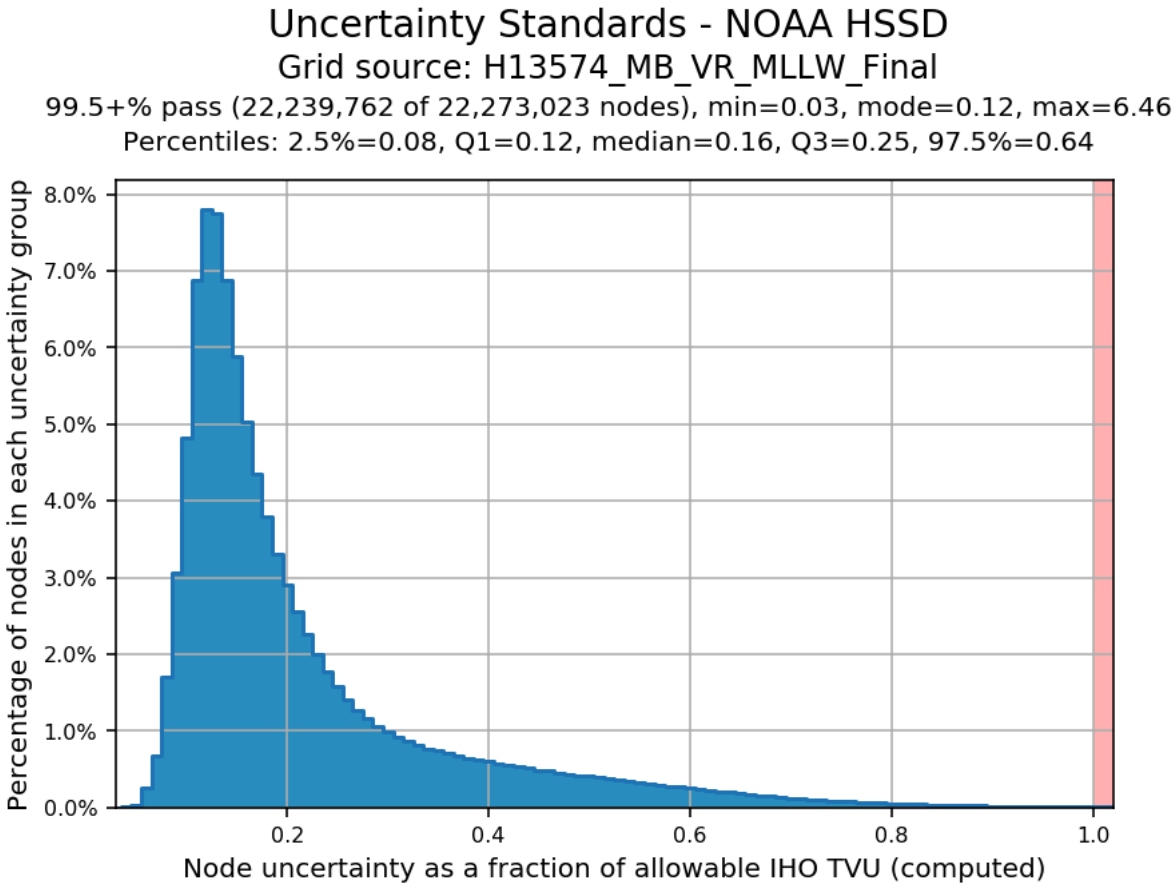


Figure 12: Pydro derived plot showing TVU compliance of H13574 finalized multi-resolution MBES data.

B.2.3 Junctions

H13574 (Apra Harbor) junctioned with contemporary survey H13571 (Guam Island) which was part of the same project, OPR-T381-RA-22.

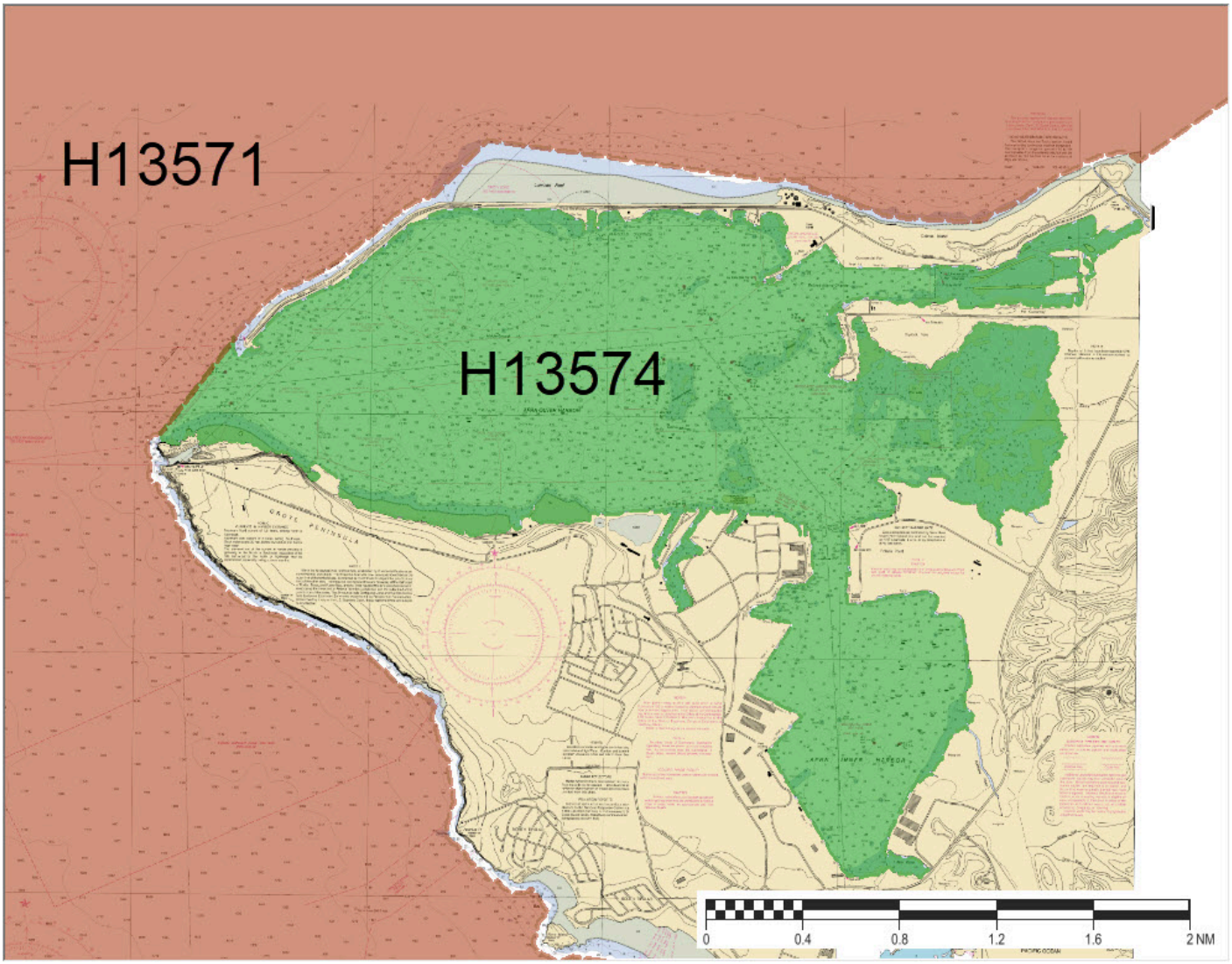


Figure 13: H13574 / H13571 Junction.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H13571	1:5000	2022	RAINIER	W

Table 9: Junctioning Surveys

H13571

We performed the comparison between H13574 and H13571 on finalized, variable-resolution surfaces from each survey using the Compare Grids program within Pydro Explorer. Results of the comparison showed that 99.5+% of nodes in the common area met NOAA allowable error standards, see figure below.

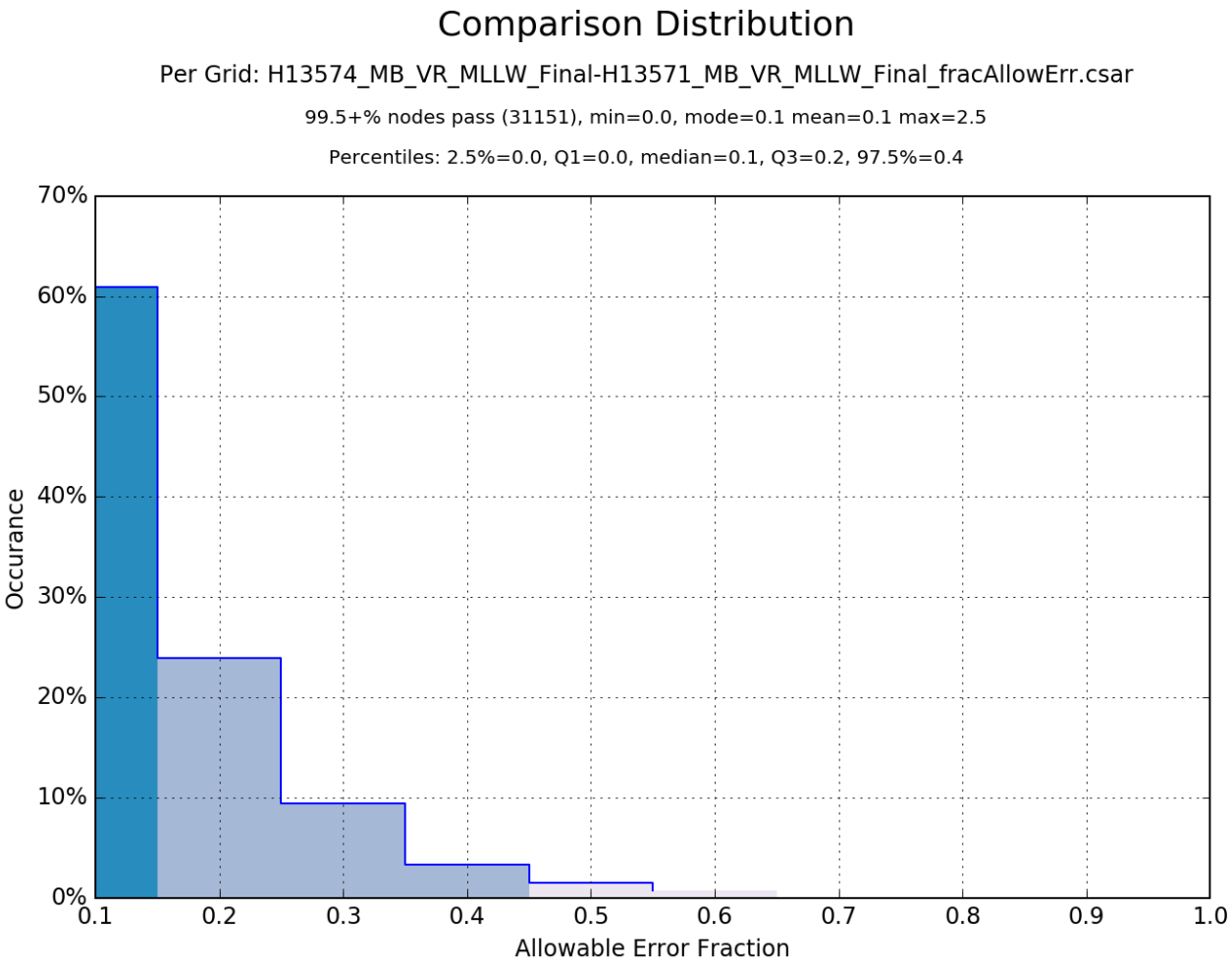


Figure 14: Pydro derived plot showing H13574 / H13571 VR surface comparison statistics.

B.2.4 Sonar QC Checks

Sonar system quality control checks were conducted as detailed in the quality control section of the DAPR.

B.2.5 Equipment Effectiveness

There were no conditions or deficiencies that affected equipment operational effectiveness.

B.2.6 Factors Affecting Soundings

Incorrect Time Source

The "Time to use" option within Kongsberg SIS installation parameters was incorrectly set to use computer system time rather than datagram time on launch 2804. The error was identified and corrected on DN160. Some lines acquired with the incorrect time setting, most notably on DN098 and DN101, displayed horizontal offsets of approximately two meters. In order to address this issue we compared the GPS and system times recorded in the raw data position datagram and determined an appropriate time offset value to incorporate when applying SBETs. We used this procedure for affected lines with a timing difference of greater than 0.3 seconds; time differences of less than that value had no apparent adverse effects on data quality. All 2804 MBES data submitted appears to meet HSSD specifications.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: 27 sound speed profiles ("casts") were acquired for this survey at discrete locations within the assigned area at least once every four hours, when significant changes to surface sound speed were observed, or when shifting operations to a new area. All sound speed profiles were concatenated into a master file and applied to H13574 MBES data using the "Nearest distance within Time (4 hours) profile selection method.

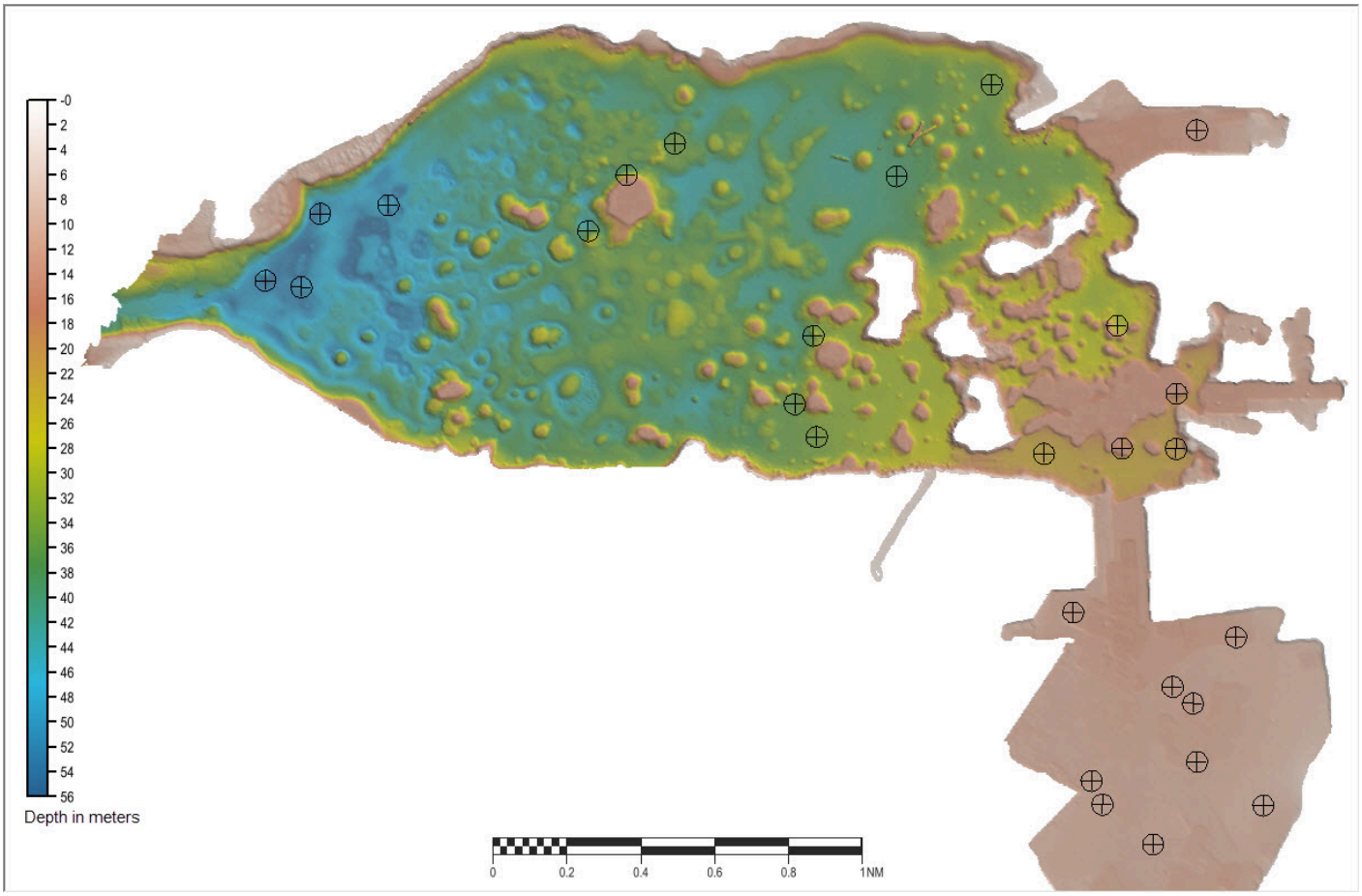


Figure 15: H13574 sound speed cast locations.

B.2.8 Coverage Equipment and Methods

All equipment and survey methods were used as detailed in the DAPR.

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

All data reduction procedures conform to those detailed in the DAPR.

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Raw backscatter data were acquired as .ALL files logged during MBES operations and subsequently processed by RAINIER personnel. The .GSF files created during processing, and backscatter mosaic data has been delivered with this report. Backscatter processing procedures are described in the DAPR.

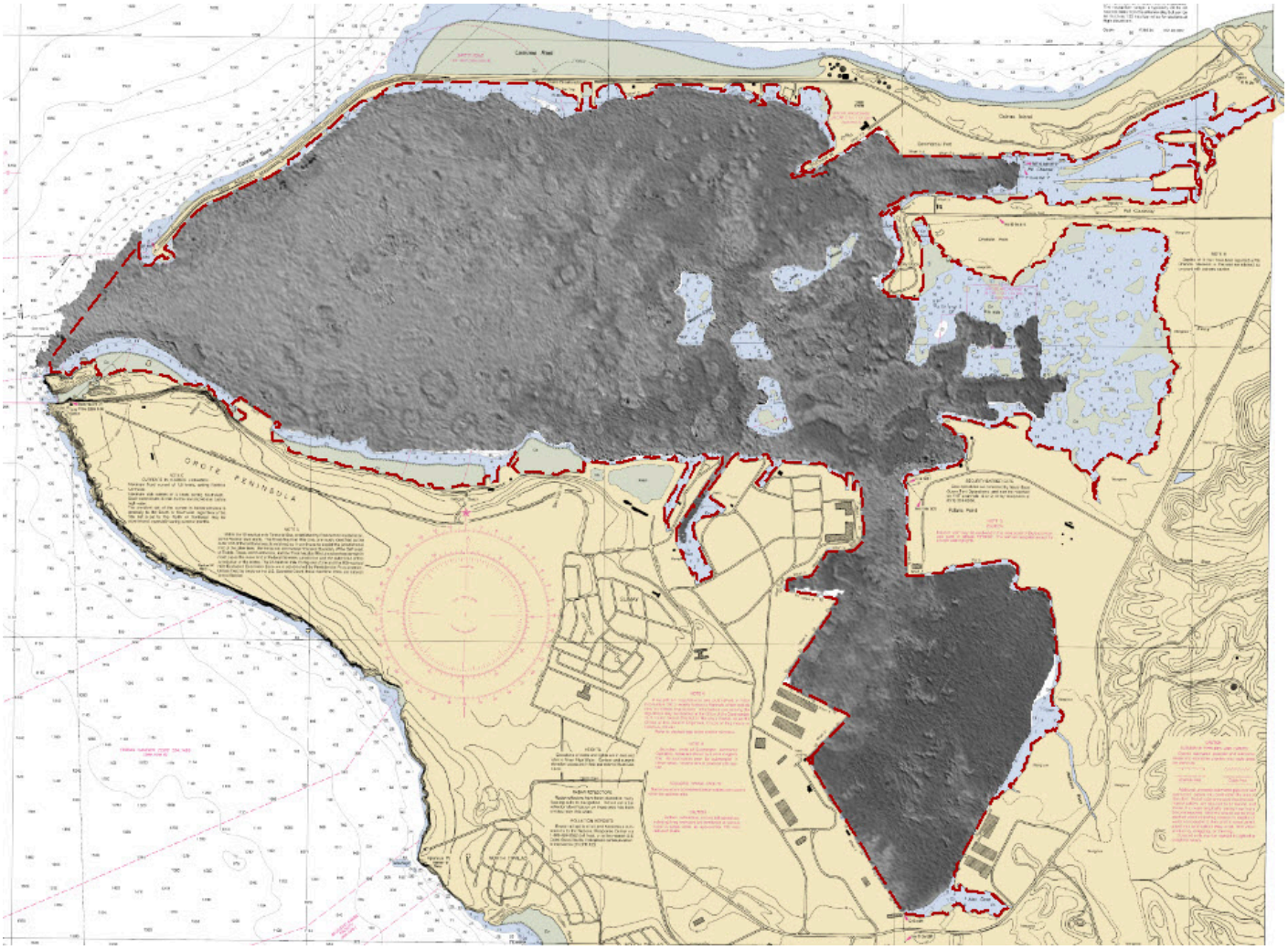


Figure 16: Overview of H13574 multibeam acoustic backscatter data.

B.5 Data Processing

B.5.1 Primary Data Processing Software

The following software program was the primary program used for bathymetric data processing:

Manufacturer	Name	Version
CARIS	HIPS and SIPS	11.4.6

Table 10: Primary bathymetric data processing software

The following software program was the primary program used for imagery data processing:

Manufacturer	Name	Version
QPS	FMGT	7.10.0

Table 11: Primary imagery data processing software

The following Feature Object Catalog was used: NOAA Profile 2022v2.

B.5.2 Surfaces

The following surfaces and/or BAGs were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H13574_MB_VR_MLLW	CARIS VR Surface (CUBE)	Variable Resolution	0.66 meters - 55.86 meters	NOAA_VR	Object Detection
H13574_MB_VR_MLLW_Final	CARIS VR Surface (CUBE)	Variable Resolution	0.56 meters - 55.86 meters	NOAA_VR	Object Detection

Table 12: Submitted Surfaces

The submitted H13574 surfaces were generated using NOAA recommended parameters for depth-based (Ranges) Caris variable-resolution bathymetric grids. We used Pydro Flier finder with default settings as a quality control check of the submitted MBES grid data. We examined each of the potential fliers identified by the program, rejected soundings as needed, then re-ran the process until we were satisfied that all remaining fliers identified were false-positives and represent actual natural features of the seafloor or wrecks and obstructions.

Ninety-six soundings were designated as part of shoreline feature management and to ensure that submitted H13574 surfaces honored least depths of navigationally significant rocks, wrecks and obstructions.

We ran Pydro QC Tools VALSOU Check (v8) to compare H13574 FFF features with submitted surfaces. Six depths were flagged by the program, however in each case, the survey's critical soundings, FFF Value of sounding and surface grid depth matched exactly. It is unclear why the program mistakenly flagged these soundings.

C. Vertical and Horizontal Control

Additional information discussing the vertical or horizontal control for this survey can be found in the accompanying HVCR.

C.1 Vertical Control

The vertical datum for this project is Mean Lower Low Water.

ERS Datum Transformation

The following ellipsoid-to-chart vertical datum transformation was used:

Method	Ellipsoid to Chart Datum Separation File
ERS via VDATUM	OPR_T381-RA-22_GuamCNMI_EC_ERTDM2021_NAD83(MA11)-MLLW.csar OPR_T381-RA-22_GuamCNMI_EC_ERTDM2021_NAD83(MA11)-MHW.csar

Table 13: ERS method and SEP file

All submitted H13574 MBES data were vertically referenced to the ellipsoid. VDATUM Models included with the Project Instructions were used for referencing H13574 data to MLLW and MHW.

C.2 Horizontal Control

The horizontal datum for this project is North American Datum of 1983 (NAD 83).

The projection used for this project is Universal Transverse Mercator (UTM) Zone 55.

RTK

Precise Positioning-Real time Extended (PP-RTX) processing methods were used in Applanix POSPac MMS (v8.5) software for post-processing horizontal correction of submitted H13574 MBES data.

WAAS

The Wide Area Augmentation System (WAAS) was used for real-time horizontal control during data acquisition.

D. Results and Recommendations

D.1 Chart Comparison

Shoreline Feature Verification

Limited shoreline verification was conducted in accordance with applicable sections of NOAA HSSD and FPM using the Composite Source File (CSF) provided with the Project Instructions. In the field, all assigned unverified charted features that were safe to approach, were addressed as required with S57 attribution and recorded in the H13574 Final Feature File (FFF) to best represent the features at chart scale. This file also includes new features found in the field as well as recommendations to update, retain or delete assigned features. Features that were unsafe to approach were attributed in the FFF as Not Addressed, and the reason stated.

D.1.1 Electronic Navigational Charts

The following are the largest scale ENCs, which cover the survey area:

ENC	Scale	Edition	Update Application Date	Issue Date
US5SP03M	1:100000	13	02/17/2021	02/17/2021

Table 14: Largest Scale ENCs

D.1.2 Shoal and Hazardous Features

One Danger to Navigation (DTON) was identified within the H13574 survey area; it was submitted to the Marine Chart Division and subsequently applied to NOAA charting products. Details regarding the DTON

are included in the H13574 Final Feature File (FFF) and in the supplemental records submitted with this report.

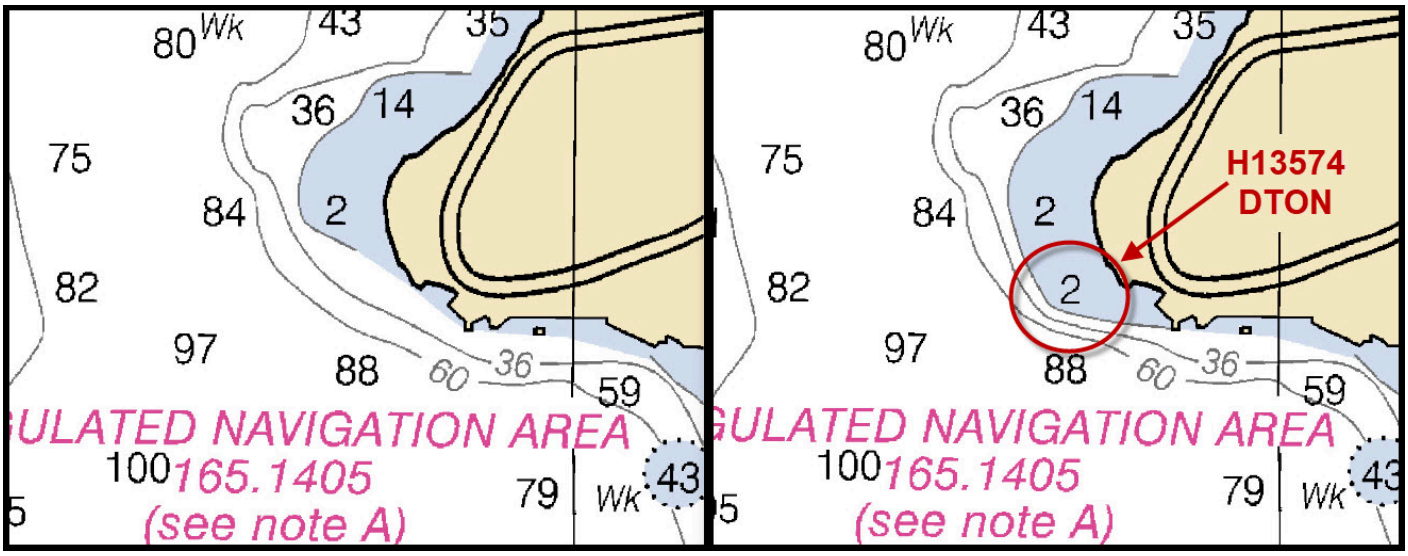


Figure 17: Chart 81054 Before (left) and after (right) H13574 DTON data was applied.

D.1.3 Charted Features

The dry dock charted off the southern shore of Outer Apra Harbor was permanently removed in 2016 according to a news story by U.S. Naval Base Guam, see supplemental correspondence for more information.

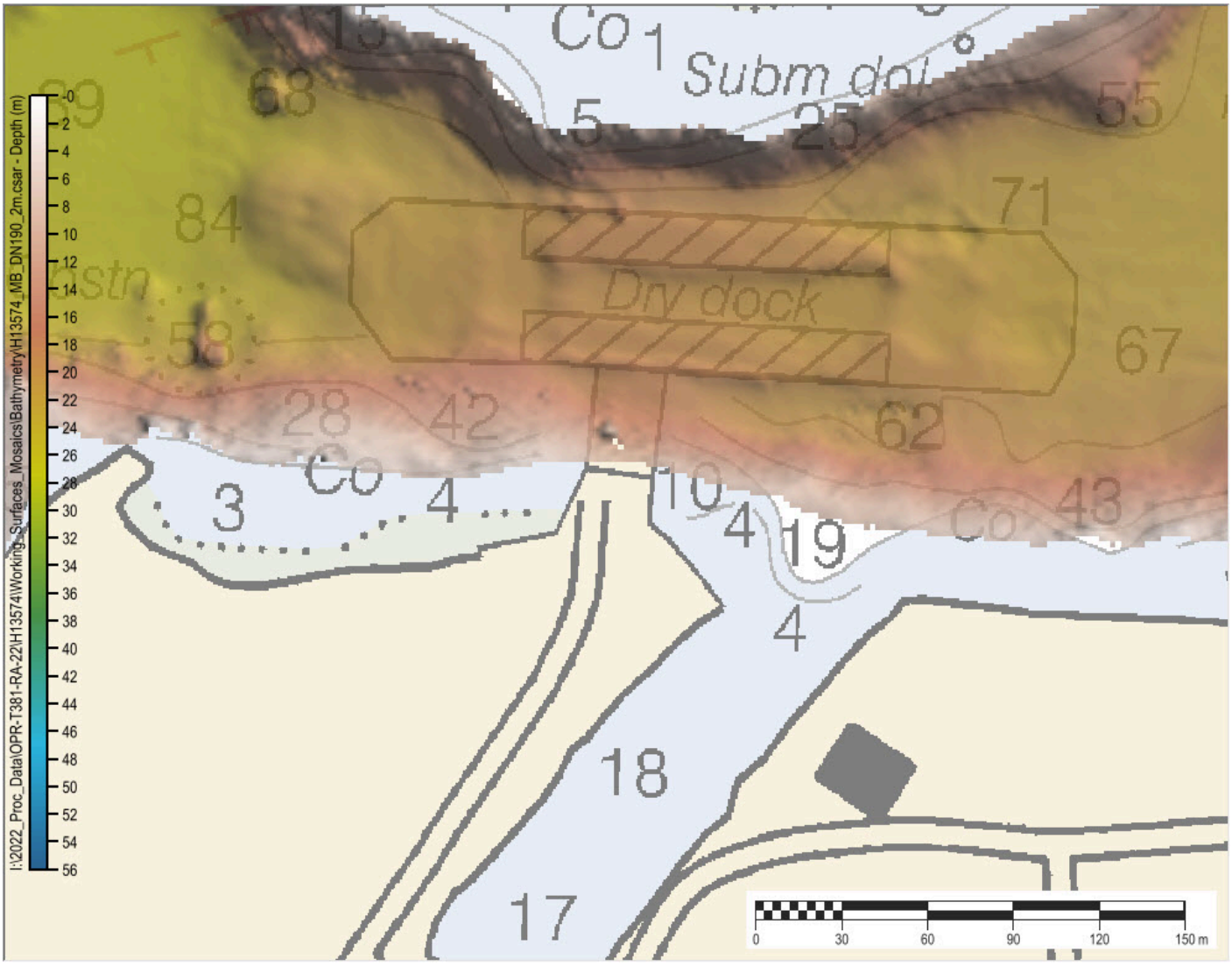


Figure 18: Charted location of Apra Harbor dry dock that was removed in 2016.

D.1.4 Uncharted Features

All navigationally significant features identified are included in the H13574 Final Feature File.

D.1.5 Channels

No maintained channels are charted within the H13574 survey area. Special Anchorages, Safety Zones, Regulated Navigation Areas, Restricted Areas and pilot requirements were all charted and acknowledged within the survey area but were not investigated further.

D.2 Additional Results

D.2.1 Aids to Navigation

Numerous Aids to Navigation (ATON) are located within the survey area. All observed aids appeared to be on station and serving their intended purpose.

D.2.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.2.3 Bottom Samples

No bottom samples were required for this survey.

D.2.4 Overhead Features

No overhead features were observed in the H13574 survey area.

D.2.5 Submarine Features

A sewer line is charted south of the security barrier gate near the entrance to Apra's inner harbor. Within Apra Outer Harbor, two submerged cables, one between mooring buoys in Naval Anchorage area B and a second between mooring buoys "5" and "6a" south of Commadores cut. No evidence of any of these features were detected in H13575 MBES data.

D.2.6 Platforms

No platforms exist for this survey.

D.2.7 Ferry Routes and Terminals

No ferry routes or terminals were located within the H13574 survey area.

D.2.8 Abnormal Seafloor or Environmental Conditions

This survey highlighted the dynamic nature of the Apra Harbor seafloor which contains a wealth of coral reef formations, however it also includes several striking historic features such as the pair of wrecks from two different eras shown in the figure below.

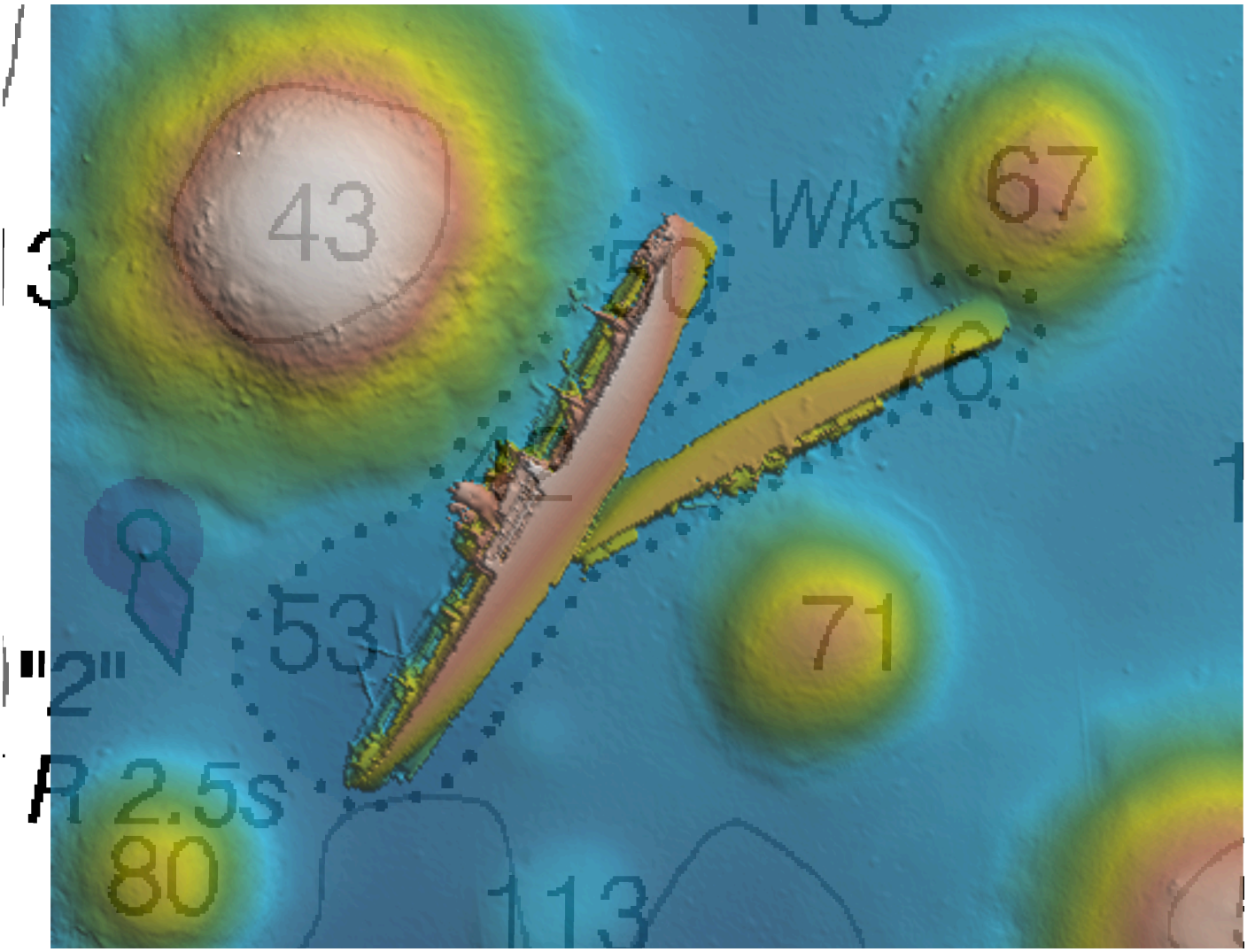


Figure 19: WWI German vessel SMS CORMORAN and WWII Japanese vessel TOKAI MARU rest on Apra Harbor seafloor.

D.2.9 Construction and Dredging

Periodic dredging is apparently conducted within the survey area as shown in the image below. We saw evidence of various construction projects at U.S. Naval and Commercial facilities along the shoreline of the survey area.

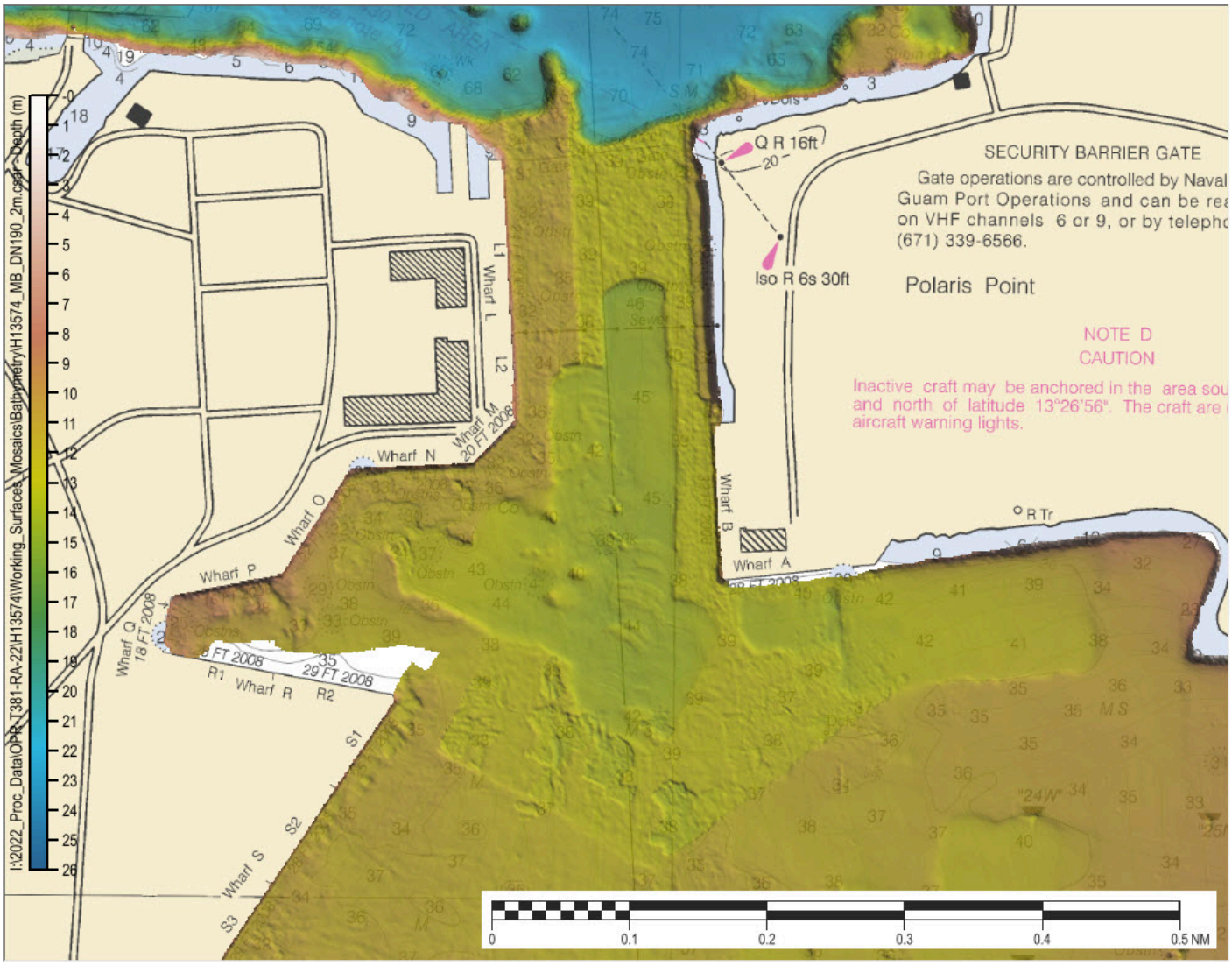


Figure 20: Evidence of dredging activities seen in H13574 MBES data of Apra Inner Harbor.

D.2.10 New Survey Recommendations

No new surveys or further investigations are recommended for this area.

D.2.11 ENC Scale Recommendations

No new ENC scales are recommended for this area.

E. Approval Sheet

As Chief of Party, field operations for this hydrographic survey were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports.

All field sheets, this Descriptive Report, and all accompanying records and data are approved. All records are forwarded for final review and processing to the Processing Branch.

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys Specifications and Deliverables, Field Procedures Manual, Letter Instructions, and all HSD Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies noted in the Descriptive Report.

Approver Name	Approver Title	Approval Date	Signature
Hector L. Casanova, CAPT/NOAA	Chief of Party	08/01/2022	Digitally signed by CASANOVA.HECTOR.LUIS.1253816461 Date: 2022.08.01 14:02:27 +10'00'
Collin H. Walker, LT/NOAA	Field Operations Officer	08/01/2022	WALKER.COLLIN.HARRISON.1523758540 2022.08.01 11:14:32 +10'00'
James B. Jacobson	Chief Survey Technician	08/01/2022	JACOBSON.JAMES.BRYAN.1269664017 I have reviewed this document 2022.08.01 10:31:34 +10'00'
B.D. Jackson	Sheet Manager	08/01/2022	B Jackson

F. Table of Acronyms

Acronym	Definition
AHB	Atlantic Hydrographic Branch
AST	Assistant Survey Technician
ATON	Aid to Navigation
AWOIS	Automated Wreck and Obstruction Information System
BAG	Bathymetric Attributed Grid
BASE	Bathymetry Associated with Statistical Error
CO	Commanding Officer
CO-OPS	Center for Operational Products and Services
CORS	Continuously Operating Reference Station
CTD	Conductivity Temperature Depth
CEF	Chart Evaluation File
CSF	Composite Source File
CST	Chief Survey Technician
CUBE	Combined Uncertainty and Bathymetry Estimator
DAPR	Data Acquisition and Processing Report
DGPS	Differential Global Positioning System
DP	Detached Position
DR	Descriptive Report
DTON	Danger to Navigation
ENC	Electronic Navigational Chart
ERS	Ellipsoidal Referenced Survey
ERTDM	Ellipsoidally Referenced Tidal Datum Model
ERZT	Ellipsoidally Referenced Zoned Tides
FFF	Final Feature File
FOO	Field Operations Officer
FPM	Field Procedures Manual
GAMS	GPS Azimuth Measurement Subsystem
GC	Geographic Cell
GPS	Global Positioning System
HIPS	Hydrographic Information Processing System
HSD	Hydrographic Surveys Division

Acronym	Definition
HSSD	Hydrographic Survey Specifications and Deliverables
HSTB	Hydrographic Systems Technology Branch
HSX	Hypack Hysweep File Format
HTD	Hydrographic Surveys Technical Directive
HVCR	Horizontal and Vertical Control Report
HVF	HIPS Vessel File
IHO	International Hydrographic Organization
IMU	Inertial Motion Unit
ITRF	International Terrestrial Reference Frame
LNM	Linear Nautical Miles
MBAB	Multibeam Echosounder Acoustic Backscatter
MCD	Marine Chart Division
MHW	Mean High Water
MLLW	Mean Lower Low Water
NAD 83	North American Datum of 1983
NALL	Navigable Area Limit Line
NTM	Notice to Mariners
NMEA	National Marine Electronics Association
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NRT	Navigation Response Team
NSD	Navigation Services Division
OCS	Office of Coast Survey
OMAO	Office of Marine and Aviation Operations (NOAA)
OPS	Operations Branch
MBES	Multibeam Echosounder
NWLON	National Water Level Observation Network
PDBS	Phase Differencing Bathymetric Sonar
PHB	Pacific Hydrographic Branch
POS/MV	Position and Orientation System for Marine Vessels
PPK	Post Processed Kinematic
PPP	Precise Point Positioning
PPS	Pulse per second

Acronym	Definition
PRF	Project Reference File
PS	Physical Scientist
RNC	Raster Navigational Chart
RTK	Real Time Kinematic
RTX	Real Time Extended
SBES	Singlebeam Echosounder
SBET	Smooth Best Estimate and Trajectory
SNM	Square Nautical Miles
SSS	Side Scan Sonar
SSSAB	Side Scan Sonar Acoustic Backscatter
ST	Survey Technician
SVP	Sound Velocity Profiler
TCARI	Tidal Constituent And Residual Interpolation
TPU	Total Propagated Uncertainty
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDF	Zone Definition File