H13734

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13734

LOCALITY

State(s):	American Samoa
General Locality:	American Samoa and PRIA
Sub-locality:	Pago Pago Harbor

2023

CHIEF OF PARTY
Héctor L. Casanova CAPT/NOAA

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

H13734

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):	**American Samoa**
General Locality:	**American Samoa and PRIA**
Sub-Locality:	**Pago Pago Harbor**
Scale:	**5000**
Dates of Survey:	**03/23/2023 to 08/17/2023**
Instructions Dated:	**01/27/2023**
Project Number:	**OPR-T382-RA-23**
Field Unit:	**NOAA Ship *Rainier***
Chief of Party:	**Héctor 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 UTM 02S, 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 H13734

Project: OPR-T382-RA-23

Locality: American Samoa and PRIA

Sublocality: Pago Pago Harbor

Scale: 1:5000

March 2023 - August 2023

NOAA Ship *Rainier*

Chief of Party: Héctor L. Casanova CAPT/NOAA

A. Area Surveyed

The survey is referred to as H13734, "Pago Pago Harbor" (Sheet 5), within the Project Instructions. The surveyed area encompasses approximately 5 square nautical miles within the main harbor of the U.S island territory of American Samoa in the South Pacific Ocean.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
14° 16' 9.67" S 170° 41' 56.47" W	14° 19' 16.1" S 170° 38' 28.93" W

Table 1: Survey Limits

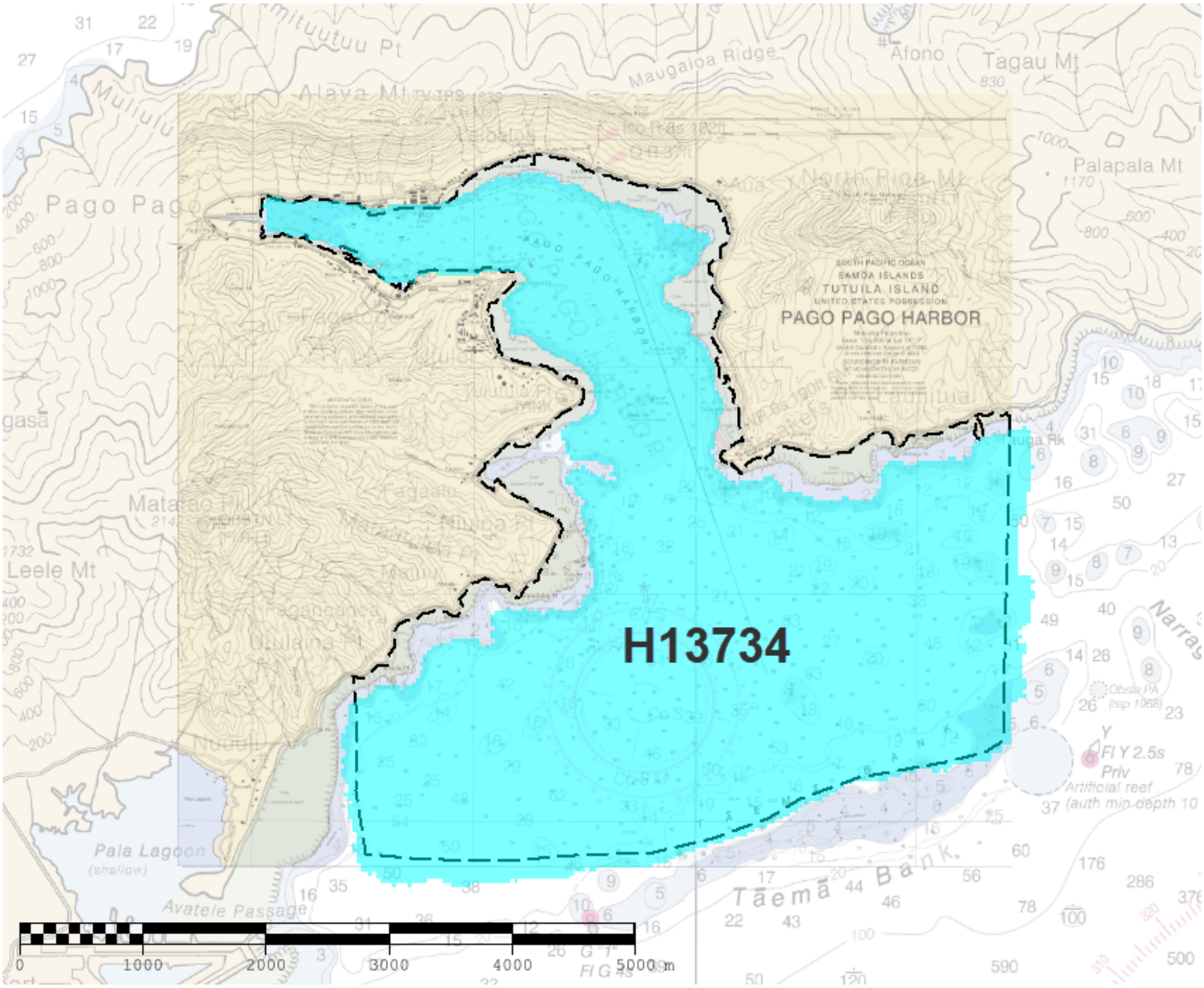


Figure 1: H13734 assigned survey area (Chart 83484).

Data were acquired within the assigned survey limits as required in the Project Instructions and HSSD unless otherwise denoted.

A.2 Survey Purpose

The ecosystem surrounding American Samoa and the U.S. Pacific Remote Island Area (PRIA) are experiencing stress imposed by climate change and other environmental factors. For this project, NOAA Ship RAINIER operated around American Samoa and PRIA to conduct an extensive hydrographic survey to map bathymetry and habitat around the islands, pinnacles, and reefs in support of nautical charting and habitat mapping.

With the collaboration and partnership of the National Centers for Coastal and Ocean Science (NCCOS), the National Coral Reef Monitoring Program (NCRMP), and the National Marine Fisheries Service (NMFS), this project studied 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 5000 meters. Within the project area, the ship's crew collected bathymetric data to update charts and acquire backscatter data to characterized habitat, while visiting scientists from NCRMP performed coral reef assessment dives and other oceanographic observations.

Data collected during this mission are pivotal to long-term biological and oceanographic monitoring of coral reef ecosystems in American Samoa and PRIA. This project will add to information collected during previous monitoring and mapping surveys. Oceanographic and ecological time series data will allow scientists to evaluate potential changes in environmental conditions and coral reef health. This will enable federal and state resource managers to more effectively conserve coral reef ecosystems of American Samoa and PRIA, and manage ecosystem services. Data collected during this project also supports monitoring components of the NCRMP Coral Reef Ecosystem Integrated Observing System.

A modern bathymetric survey in this area will identify hazards and changes to the seafloor, provide critical data for updating National Ocean Service (NOS) nautical charting products, and improve maritime safety. It will also address data gaps to support the Seabed 2030 global mapping initiative. Survey data from this project is intended to supersede all prior survey data in the common area.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Pydro QC Tools (v3.7.0) Grid QA was used to analyze H13734 multibeam echosounder (MBES) data density. The submitted H13734 finalized variable-resolution (VR) surface met HSSD density requirements as shown in the histogram below.

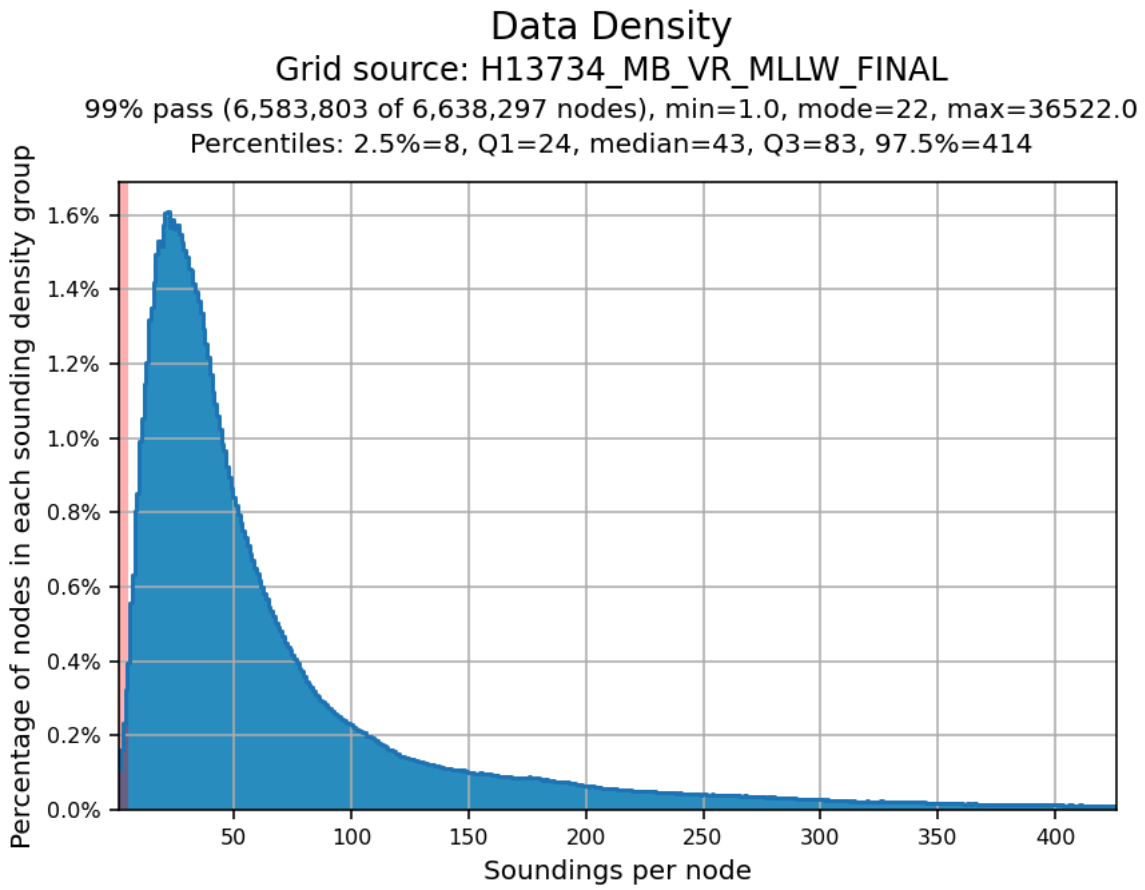


Figure 2: Pydro derived histogram plot showing HSSD density compliance of H13734 finalized variable-resolution MBES data.

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 in sheet H13734 survey area.	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 the 0.8 millimeters at chart scale (the assigned sheet limits closely reflect this), or the inshore limit of safe navigation. Areas where H13734 survey data did not reach 3.5 meter water depth was due to safety concerns.

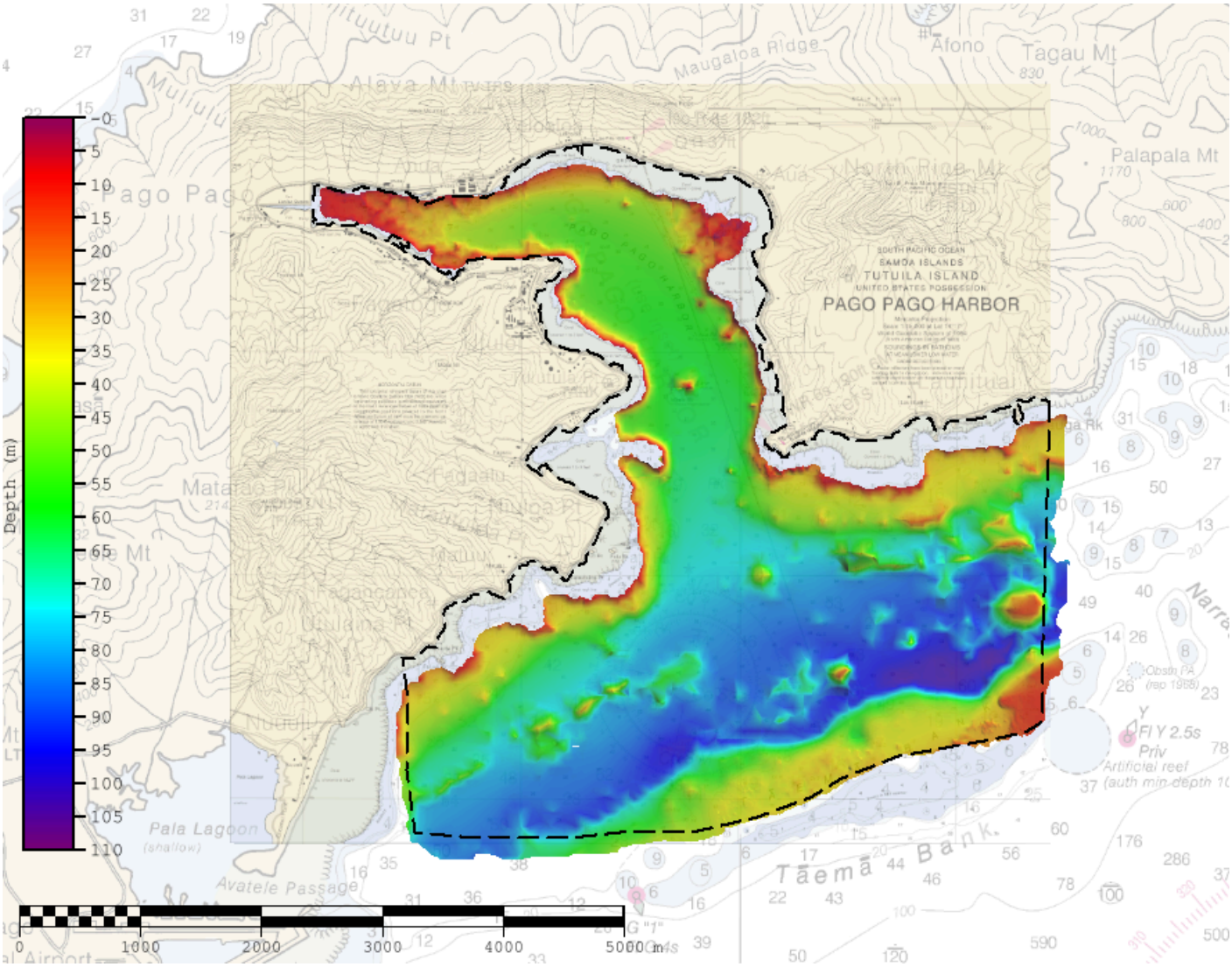


Figure 3: H13734 MBES coverage and assigned survey limits for Pago Pago Harbor.

A.6 Survey Statistics

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

	HULL ID	*S221*	*2801*	*2802*	*Total*
LNM	**SBES Mainscheme**	0.0	0.0	0.0	0.0
	MBES Mainscheme	22.4	57.55	36.75	116.7
	Lidar Mainscheme	0.0	0.0	0.0	0.0
	SSS Mainscheme	0.0	0.0	0.0	0.0
	SBES/SSS Mainscheme	0.0	0.0	0.0	0.0
	MBES/SSS Mainscheme	0.0	0.0	0.0	0.0
	SBES/MBES Crosslines	0.0	3.83	2.35	6.18
	Lidar Crosslines	0.0	0.0	0.0	0.0
Number of Bottom Samples					0
Number Maritime Boundary Points Investigated					0
Number of DPs					65
Number of Items Investigated by Dive Ops					0
Total SNM					5.05

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
03/23/2023	82
03/29/2023	88

Survey Dates	Day of the Year
04/13/2023	103
04/21/2023	111
07/07/2023	188
07/19/2023	200
07/20/2023	201
08/14/2023	226
08/15/2023	227
08/17/2023	229

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	*S221*	*2801*	*2802*
LOA	70.4 meters	8.8 meters	8.8 meters
Draft	4.7 meters	1.1 meters	1.1 meters

Table 5: Vessels Used

Figure 4: NOAA Ship RAINIER.

Figure 5: NOAA Ship RAINIER survey launch 2802.

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 304-MK2	MBES
Kongsberg Maritime	EM 2040-MK2	MBES
Kongsberg Maritime	EM 2040	MBES
AML Oceanographic	MVP200	Conductivity, Temperature, and Depth Sensor
Sea-Bird Scientific	SBE 19plus	Conductivity, Temperature, and Depth Sensor
Teledyne RESON	SVP 70	Sound Speed System
Lockheed Martin Sippican	Deep Blue XBT	Sound Speed System

Table 6: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

NOAA Ship Rainier and launches collected 6.18 nautical miles of crosslines, approximately 5 percent, across a range of depths in the mainscheme data. The Compare Grids function in Pydro Explorer was used to analyze the finalized VR surfaces of H13734 mainscheme only and crossline only data. Pydro determined that 99 percent of nodes met allowable uncertainties. For additional results, see plots below.

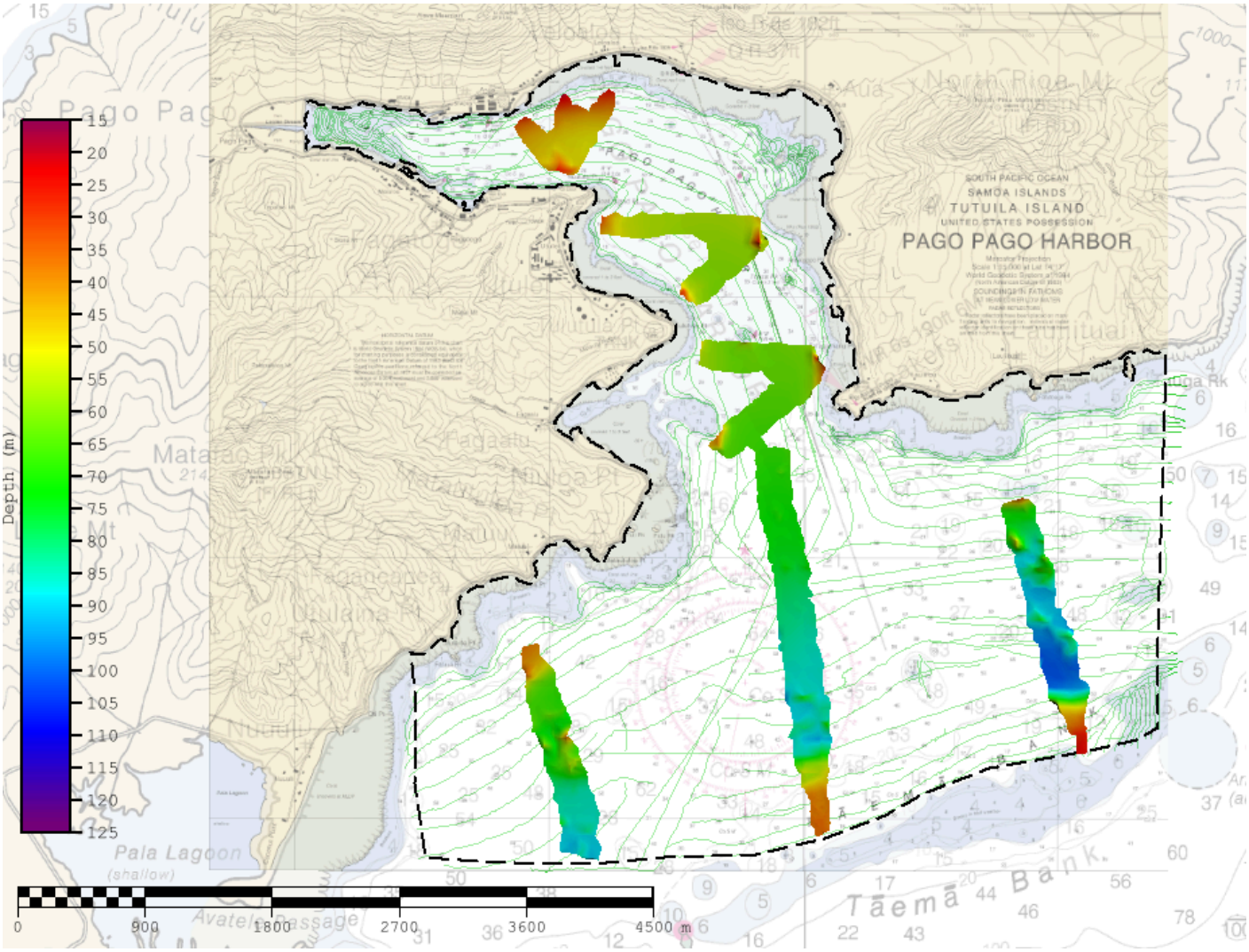
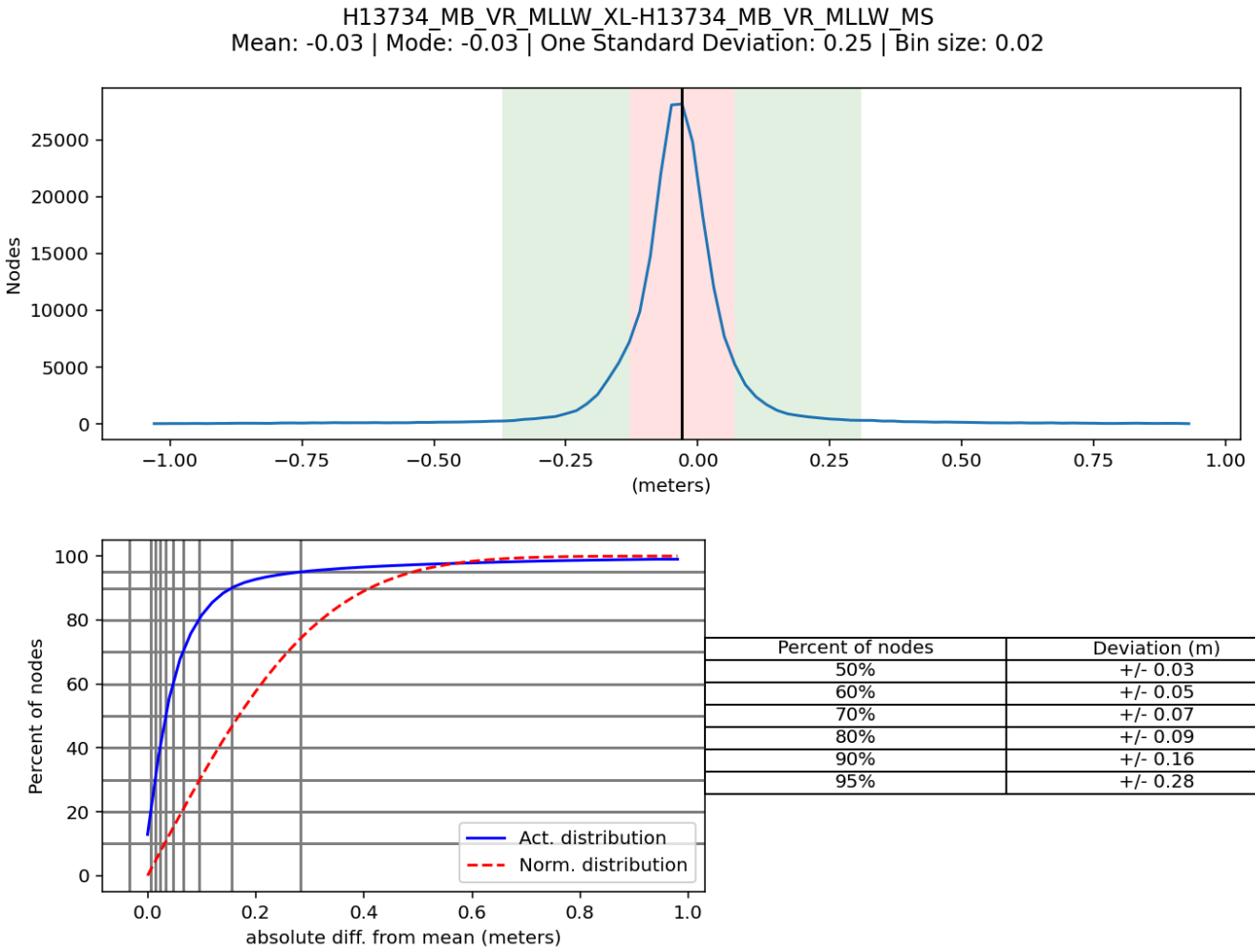


Figure 6: H13734 crossline surface overlaid on mainscheme tracklines.



Percent of nodes	Deviation (m)
50%	+/- 0.03
60%	+/- 0.05
70%	+/- 0.07
80%	+/- 0.09
90%	+/- 0.16
95%	+/- 0.28

Figure 7: Pydro derived plot showing absolute difference statistics of H13734 mainscheme to crossline data.

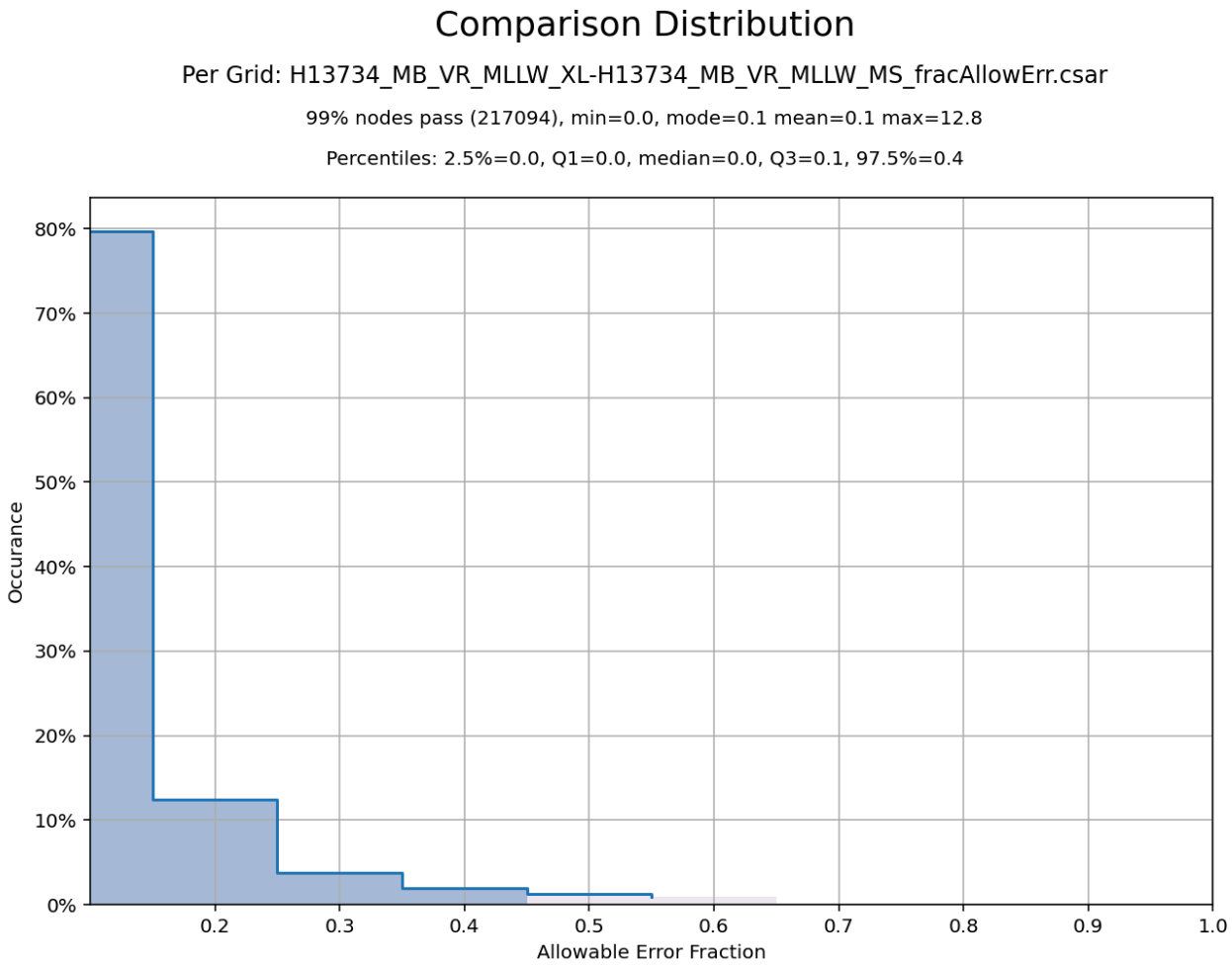


Figure 8: Pydro derived plot showing percentage-pass value of H13734 mainscheme to crossline data.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0.0 meters	0.11 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
S221	N/A meters/second	1 meters/second	4 meters/second	0.05 meters/second
2801, 2802	3 meters/second	N/A meters/second	N/A meters/second	0.05 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

Total Propagated Uncertainty (TPU) values for survey H13734 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 the project instructions 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, attitude, and vessel motion data from Applanix POS MV were applied during acquisition and initially in post-processing. POSPac SBET and RMS files were later 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 "Uncertainty" when creating the finalized surface. Grid QA v5 within Pydro QC Tools was used to analyze H13734 TVU compliance. H13734 met HSSD requirements in 99.5 percent of grid nodes, which is shown in the histogram plot below.

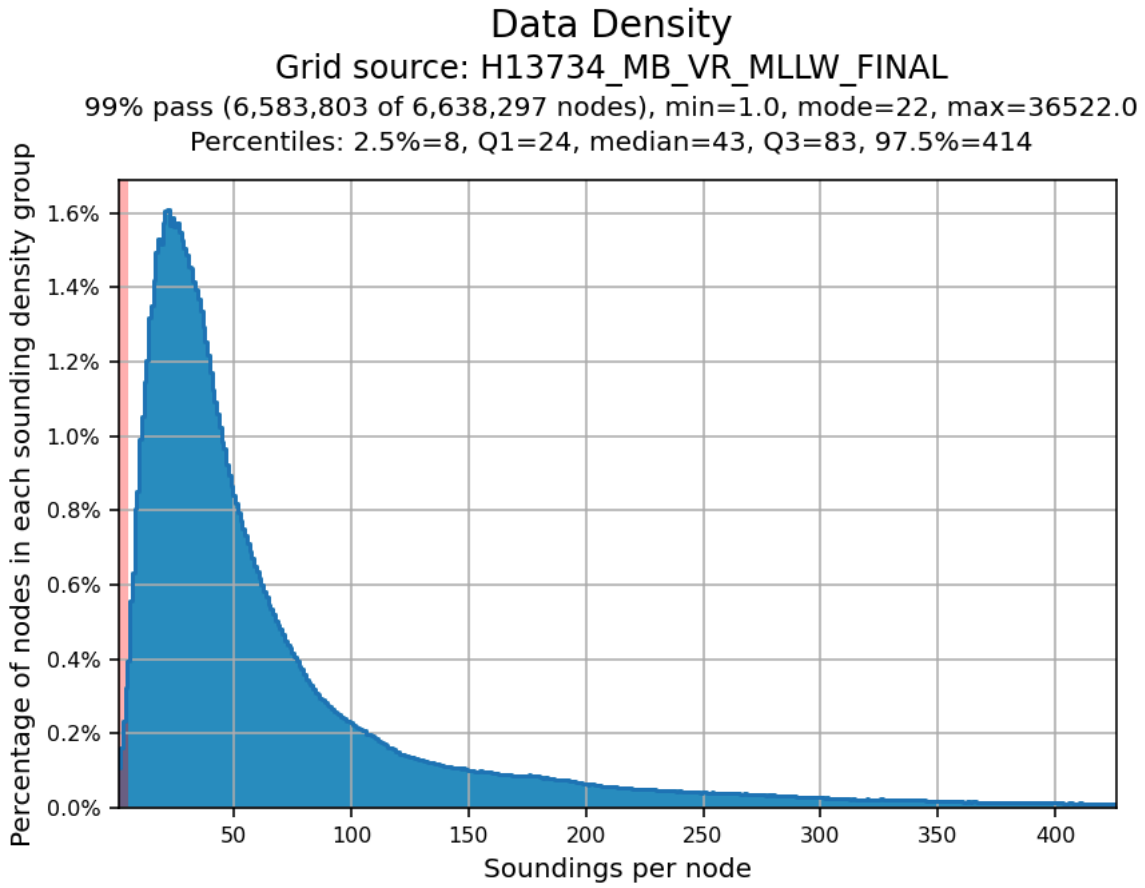


Figure 9: Pydro derived plot showing TVU compliance of H13734 finalized variable-resolution MBES data.

B.2.3 Junctions

There is one survey that junctions with H13734. Sheet H13735 junctions with H13734 along its southern edge and was surveyed concurrently with H13734 during project OPR-T382-RA-23. The figure below depicts the location of the junction survey relative to H13734. Information from junction analysis with H13735 can be found in the respective Descriptive Report (DR).

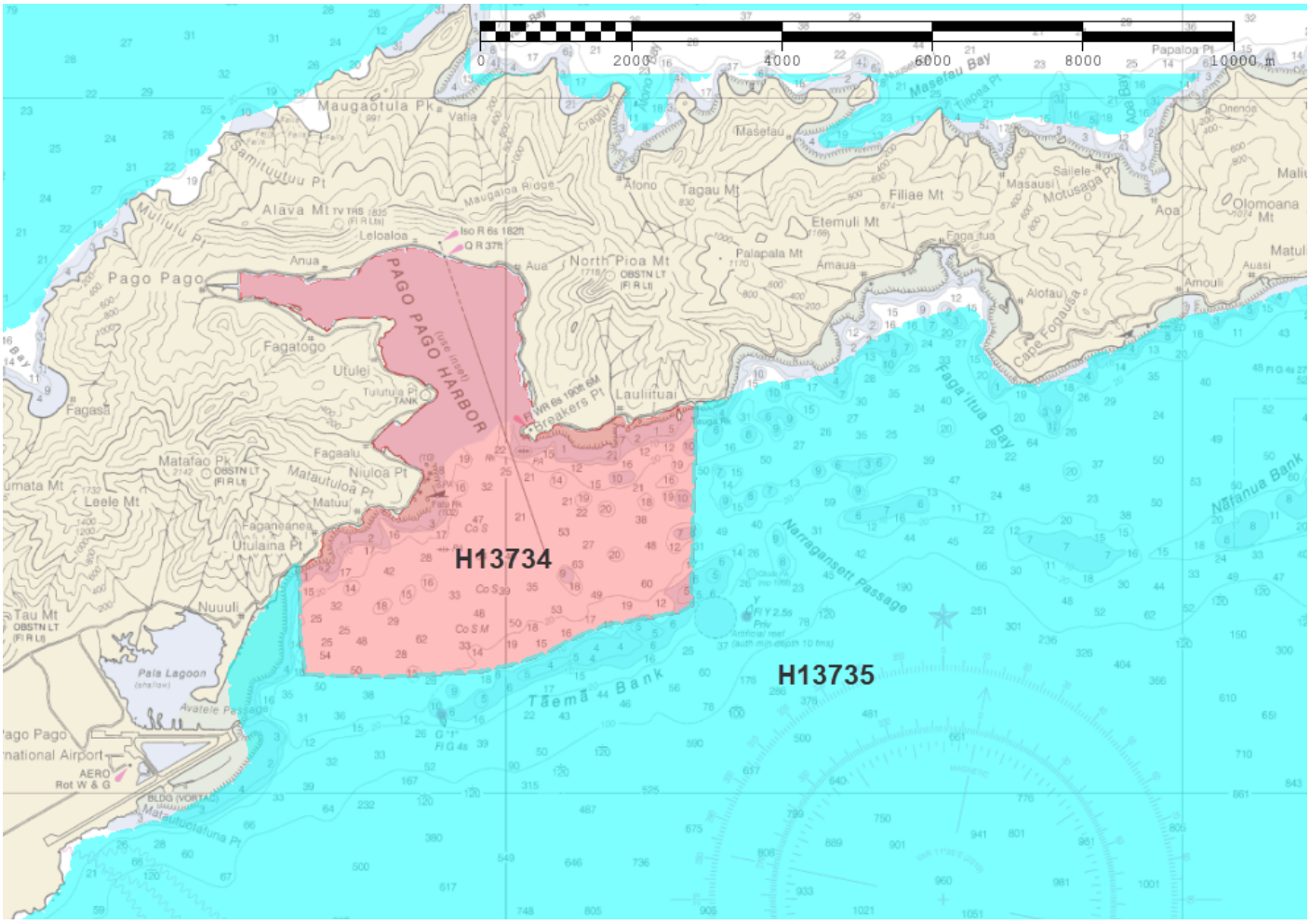


Figure 10: Overview of the junction between H13734 and H13735.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H13735	1:40000	2023	RA	S

Table 9: Junctioning Surveys

H13735

Please reference the respective Descriptive Report (DR) for the junction analysis of H13735.

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

There were no other factors that affected corrections to soundings.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: At least once every 4 hours or as needed.

A total of 17 sound speed profiles were acquired for this survey at discrete locations within the survey area at least once every four hours, when significant changes in surface sound speed were observed, or when operating in a new area. All casts were concatenated into a master file and applied to MBES data using the "Nearest distance within time" (4 hours) profile selection method. Several of the casts were taken outside of the survey area. This is due to the ship transiting into the harbor. Data was collected while entering the harbor, but due to safety concerns casts were taken prior to entering the harbor. Due to the limited variability of sound speed in the area, the cast distance from the data collected did not impact the reliability of the data and no sound speed offsets were identified.

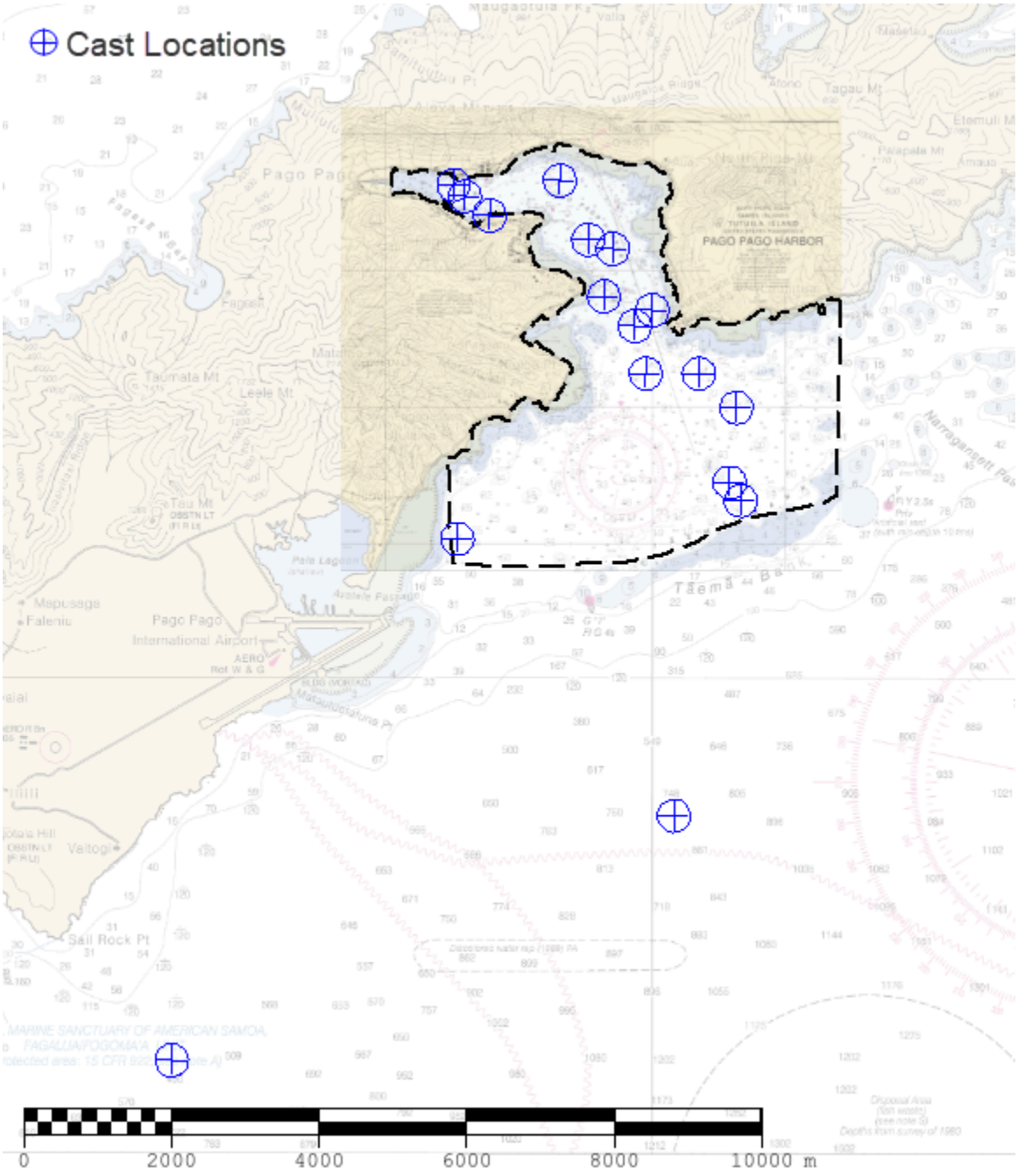


Figure 11: H13734 sound speed cast locations.

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 or .KMALL files logged during MBES operations and subsequently processed by RAINIER personnel. The .GSF files created during processing and backscatter mosaics per vessel and per frequency are delivered with this report. Backscatter processing procedures are described in the DAPR.

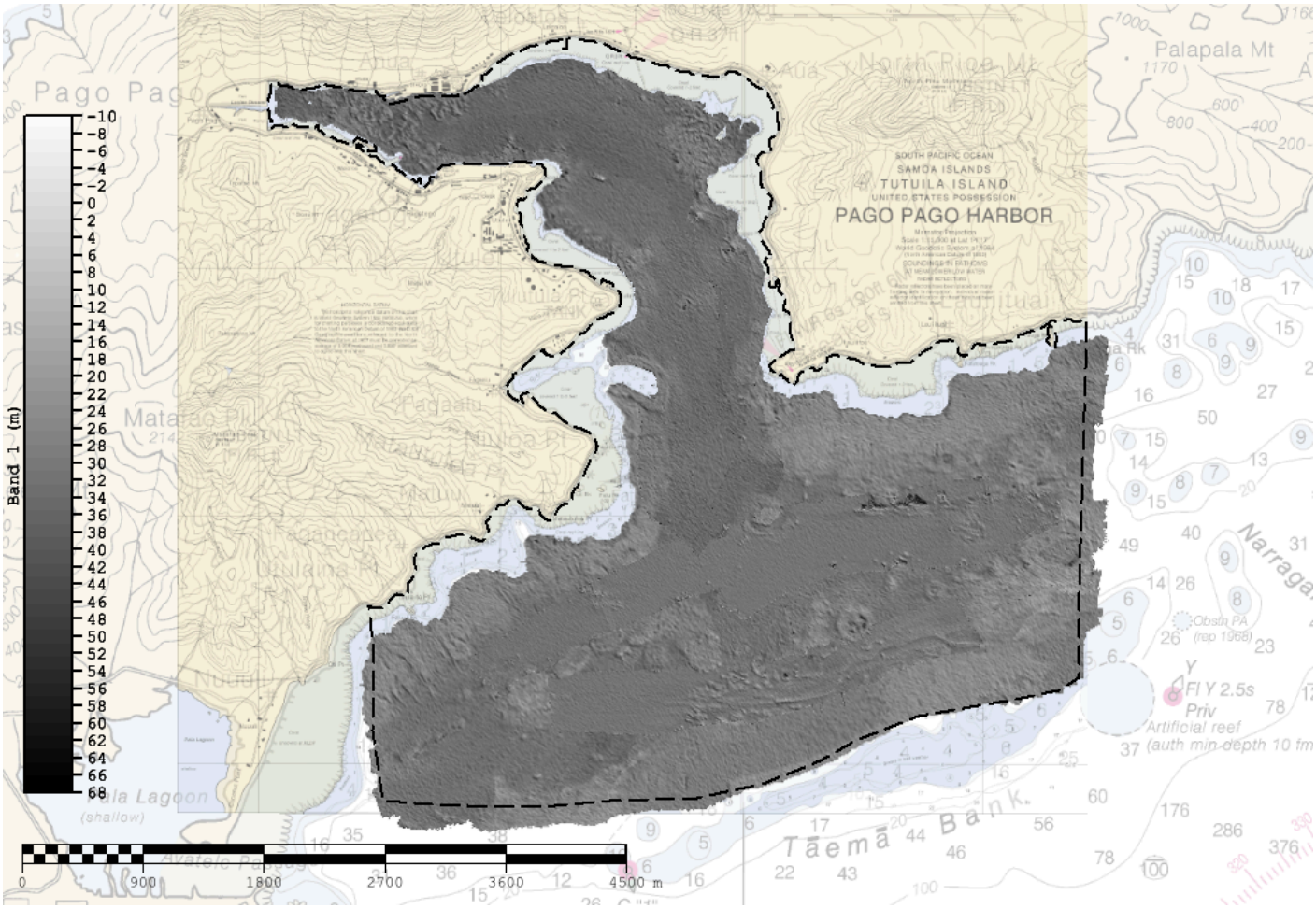


Figure 12: Overview mosaic of H13734 multibeam acoustic backscatter coverage.

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	7.10.2

Table 11: Primary imagery data processing software

The following Feature Object Catalog was used: NOAA Profile Version 2023.

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
H13734_MB_VR_MLLW	CARIS VR Surface (CUBE)	Variable Resolution	0.74 meters - 106.46 meters	NOAA_VR	Object Detection
H13734_MB_VR_MLLW_FINAL	CARIS VR Surface (CUBE)	Variable Resolution	0.74 meters - 106.46 meters	NOAA_VR	Object Detection

Table 12: Submitted Surfaces

Submitted H13734 surfaces were generated using NOAA recommended parameters for density-based (Ranges) Caris variable-resolution bathymetric grids. The submitted surfaces were generated with the NOAA_DepthRanges_ObjectDetection_2023 Range/Resolution file.

Pydro QC Tools v.3.10.0 Flier Finder, with default settings, was used to identify sounding "fliers" in the finalized H13734 VR surface. Obvious noise was rejected by the hydrographer in Caris Subset Editor. After data cleaning, the Flier Finder tool was run again and found 48 potential fliers in the Object Detection Coverage surface. These were investigated and determined to be a result of the steep slopes and a dynamic coral rich seafloor. Therefore, these fliers have been found to be false positives. The image below depicts an example of fliers that have been determined to be false.

Pydro QC Tools v3.10.0 Holiday Finder was used with default settings to find holidays in the finalized H13734 VR surface. Holiday Finder detected 56 certain holidays in the Object Detection Coverage Surface. Each holiday was examined in subset editor and are primarily the result of acoustic shadows on the inshore side of features. Additionally, several holidays were the result of moored vessels in the harbor. The holidays were reviewed and do not impact the quality or reliability of the data. See figures below for more information.

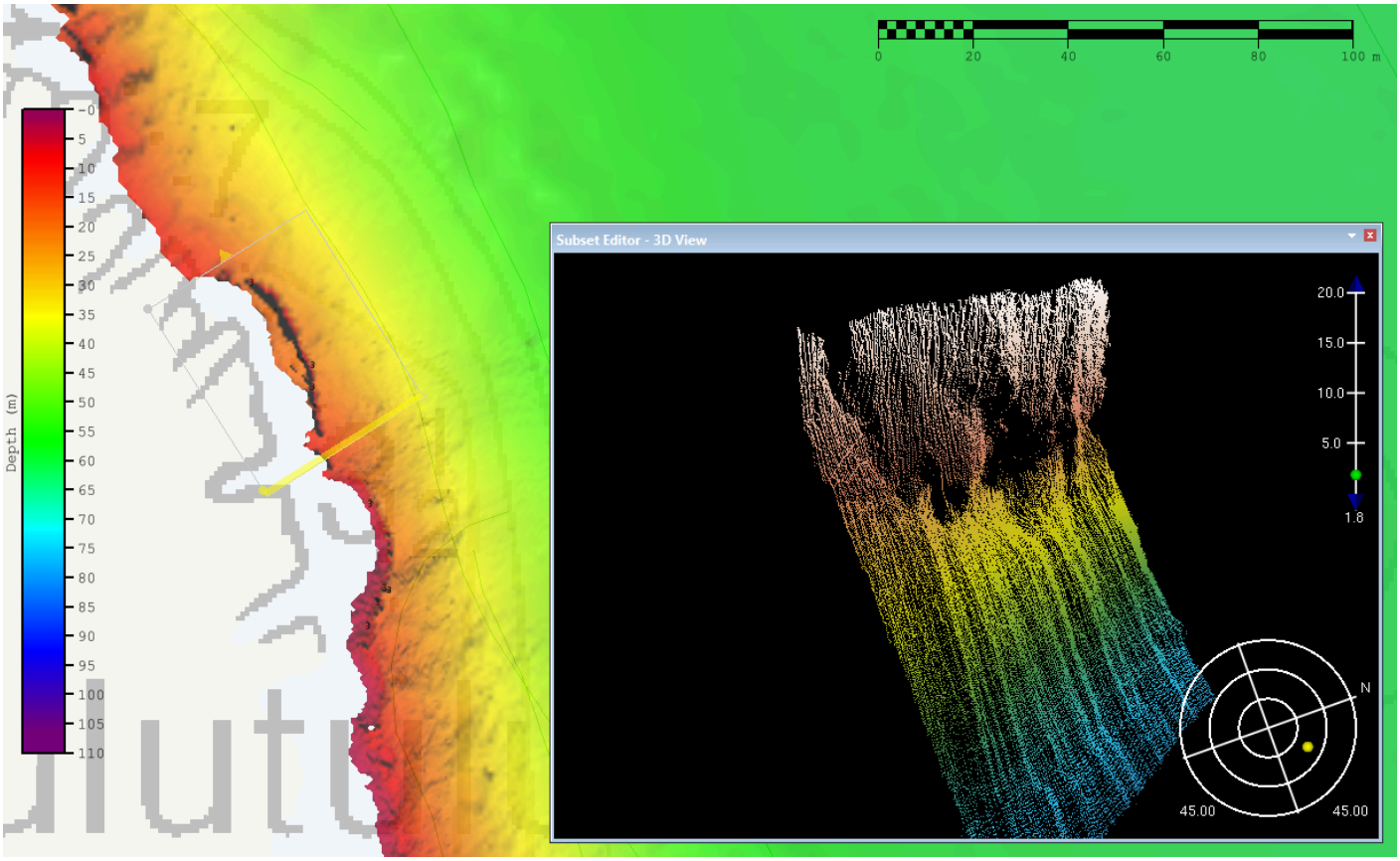


Figure 13: Example of fliers determined to be false.

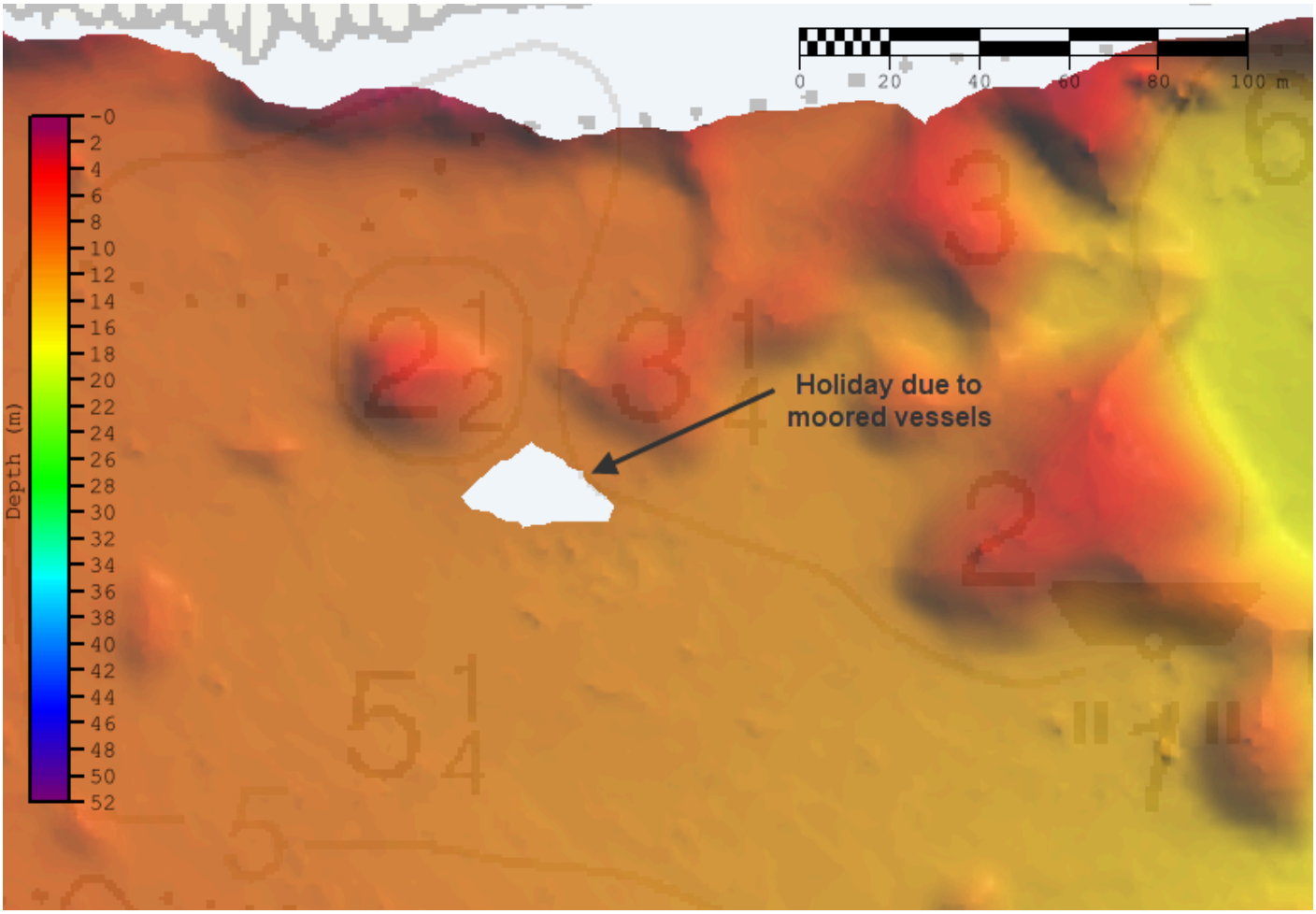


Figure 14: Example of holiday detected by QC Tools Holiday Finder.

Figure 15: Example of moored vessels that resulted in a holiday.

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-T382-RA-23_American_Samoa_ERTDM_NAD83(PA11)-MHW_11cm1sigma.csar OPR-T382-RA-23_American_Samoa_ERTDM_NAD83(PA11)-MLLW_11cm1sigma.csar

Table 13: ERS method and SEP file

C.2 Horizontal Control

The horizontal datum for this project is North American Datum 1983 (PA11).

The projection used for this project is Universal Transverse Mercator (UTM) Zone 2.

RTK

Precise Positioning-Real Time Extended (PP-RTX) processing methods were used in Applanix POSPac MMS (v8.9) software during post-processing horizontal correction of submitted H13734 MBES data.

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 H13734 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.

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
US1EEZ3M	1:3500000	2	10/21/2013	08/28/2020
US4SP30M	1:60000	10	05/19/2023	05/19/2023
US5SP30M	1:15000	10	04/05/2023	04/05/2023

Table 14: Largest Scale ENCs

D.1.2 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.3 Charted Features

Several charted features were disproved with the collected MBES data. See Final Feature File for more information.

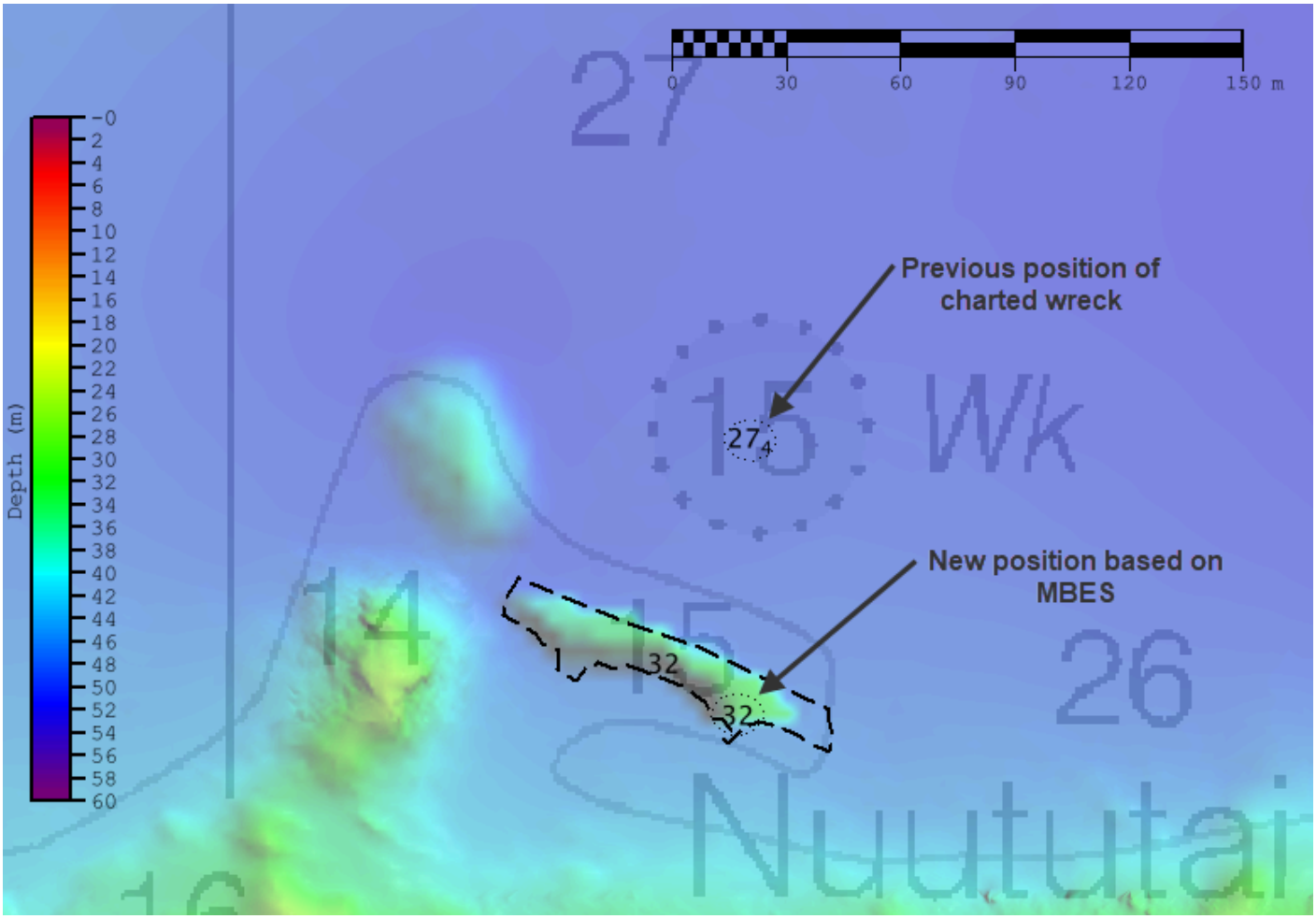


Figure 16: Example of feature location disproved with MBES data. A new feature was added to the FFF for the correct location of the feature shown.

D.1.4 Uncharted Features

Several uncharted wrecks and obstructions were identified in the MBES data collected. All navigationally significant features identified are included in the H13734 Final Feature File.

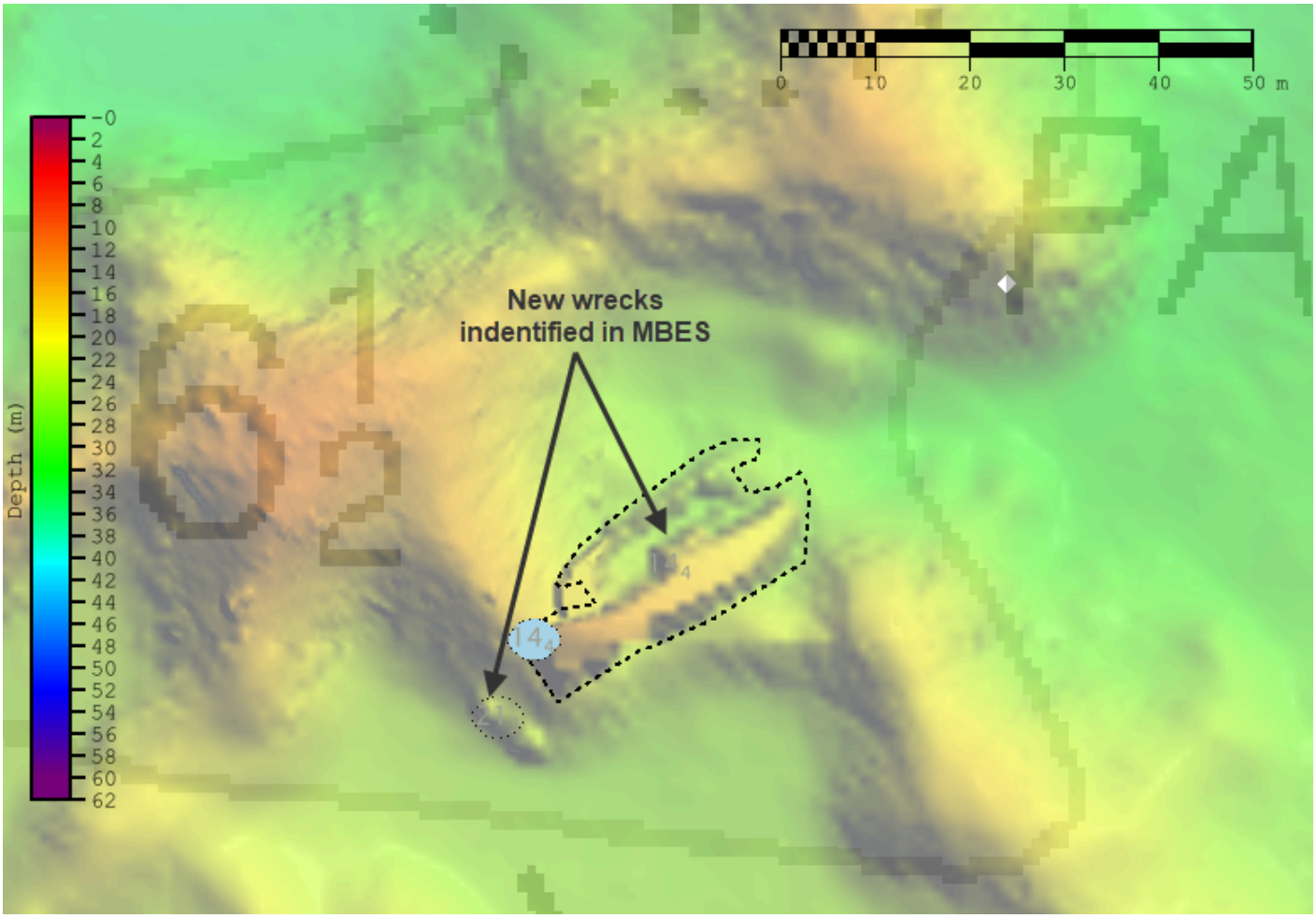


Figure 17: Example of a new wreck identified in the MBES data for Pago Pago Harbor.

D.1.5 Channels

No channels exist within the survey limits.

D.2 Additional Results

D.2.1 Aids to Navigation

Numerous Aids to Navigation (ATON) are located within the survey area. ATONS were not included in the CSF provided by the branch, and were instead imported from the ENC into the Final Feature File. All observed aids appeared to be on station and serving their intended purpose. See Final Feature File for more information.

Figure 18: Example of ATON located in Pago Pago Harbor.

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 exist for this survey.

D.2.5 Submarine Features

Numerous pipelines are charted in Pago Pago Harbor on the north side of the harbor, near the Starkist Cannery. Several of the pipelines could be clearly identified in the H13734 MBES data and have been updated based on their position in the data. An additional pipeline was identified on the south west side of the harbor and has been included in the Final Feature File. See Final Feature File for more information.

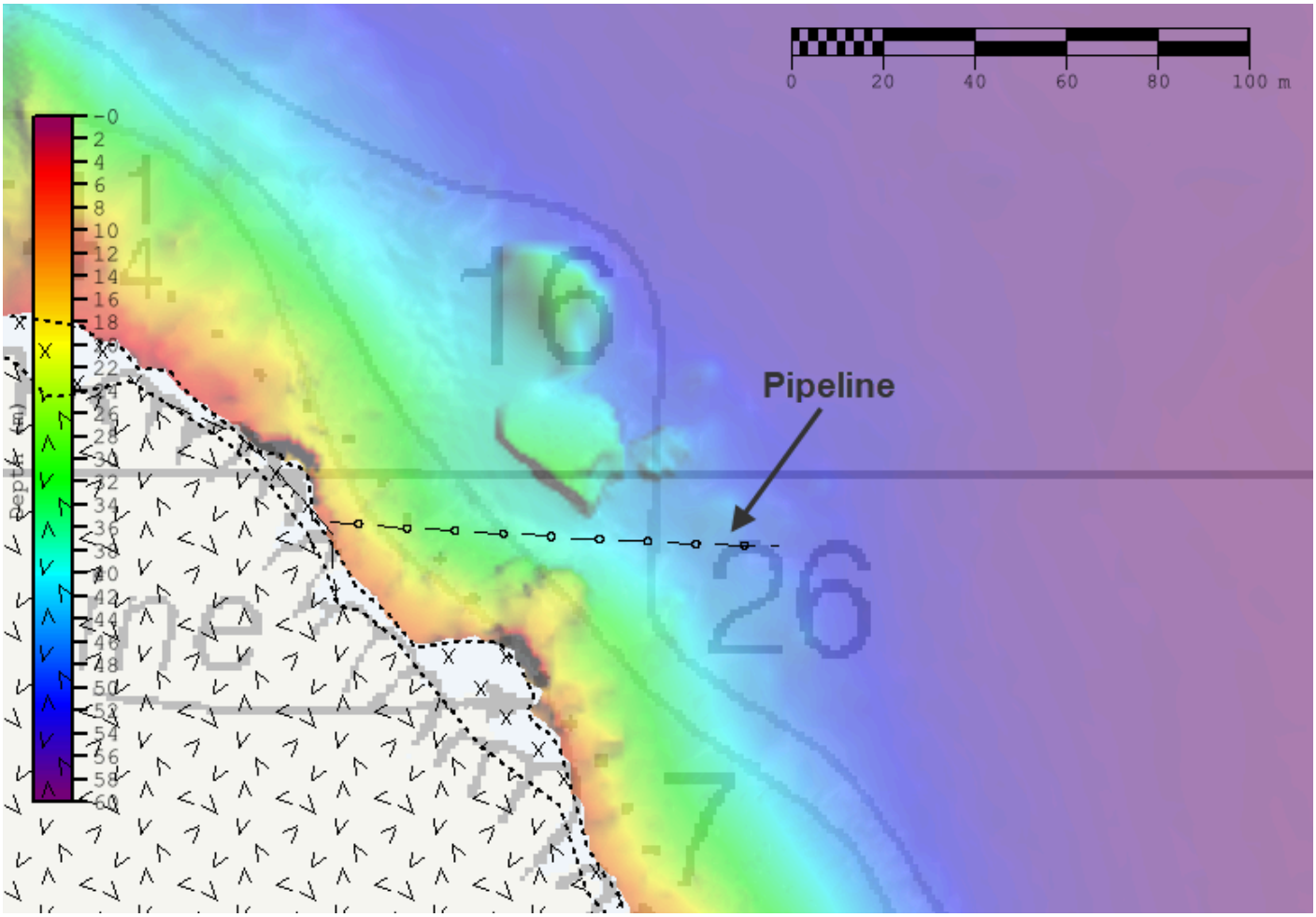


Figure 19: New pipeline identified in the MBES data on the south west side of Pago Pago Harbor.

D.2.6 Platforms

No platforms exist for this survey.

D.2.7 Ferry Routes and Terminals

Although no ferry routes or terminals are charted, a ferry operated by the Samoa Shipping Corporation was observed making irregular weekly runs between Pago Pago in American Samoa and Apia in Samoa.

D.2.8 Abnormal Seafloor or Environmental Conditions

No abnormal seafloor or environmental conditions exist for this survey.

D.2.9 Construction and Dredging

No present or planned construction or dredging exist within the survey limits.

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
Héctor L. Casanova CAPT/NOAA	Chief of Party	11/10/2023	Digitally signed by CASANOVA.HECTOR.LUIS.1253816461 Date: 2023.11.27 12:15:43 -10'00'
Garrison Grant LT/NOAA	Field Operations Officer	11/10/2023	GRANT.GARRISON.LAWRENCE.1523750115 Digitally signed by GRANT.GARRISON.LAWRENCE.1523750115 Date: 2023.11.27 10:07:17 -10'00'
James B. Jacobson	Chief Survey Technician	11/10/2023	JACOBSON.JAMES.BRYAN.1269664017 2023.11.27 10:39:10 -08'00'
Melissa A. Weber	Sheet Manager	11/10/2023	Digitally signed by Melissa A. Weber Date: 2023.11.09 18:14:00 -05'00'

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