H13695

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

DESCRIPTIVE REPORT

Type of Survey:	Basic Hydrographic Survey
Registry Number:	H13695

LOCALITY

State(s):	Alaska
General Locality:	Norton Sound, AK
Sub-locality:	Nome Harbor

2023

CHIEF OF PARTY
David Neff, C.H.

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Date:

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

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

H13695

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):	**Alaska**
General Locality:	**Norton Sound, AK**
Sub-Locality:	**Nome Harbor**
Scale:	**10000**
Dates of Survey:	**06/06/2023 to 08/30/2023**
Instructions Dated:	**03/01/2023**
Project Number:	**OPR-R390-KR-23**
Field Unit:	**eTrac**
Chief of Party:	**David Neff, C.H.**
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:

All times are UTC. The purpose of this survey is to update existing NOS nautical charts. H13695 covers approximately 20 square nautical miles in Norton Sound, Alaska.

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 03N, 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 H13695

Project: OPR-R390-KR-23

Locality: Norton Sound, AK

Sublocality: Nome Harbor

Scale: 1:10000

June 2023 - August 2023

eTrac

Chief of Party: David Neff, C.H.

A. Area Surveyed

eTrac conducted hydrographic survey operations in Nome, Alaska. H13695 covers approximately 20 square nautical miles of survey area. 1075.57 linear nautical miles were acquired during the survey.

Survey was conducted within these limits between June 6, 2023 (DN157) and August 30, 2023 (DN242).

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
64° 30' 43.92" N 165° 35' 8.46" W	64° 25' 47.68" N 165° 20' 50.71" W

Table 1: Survey Limits

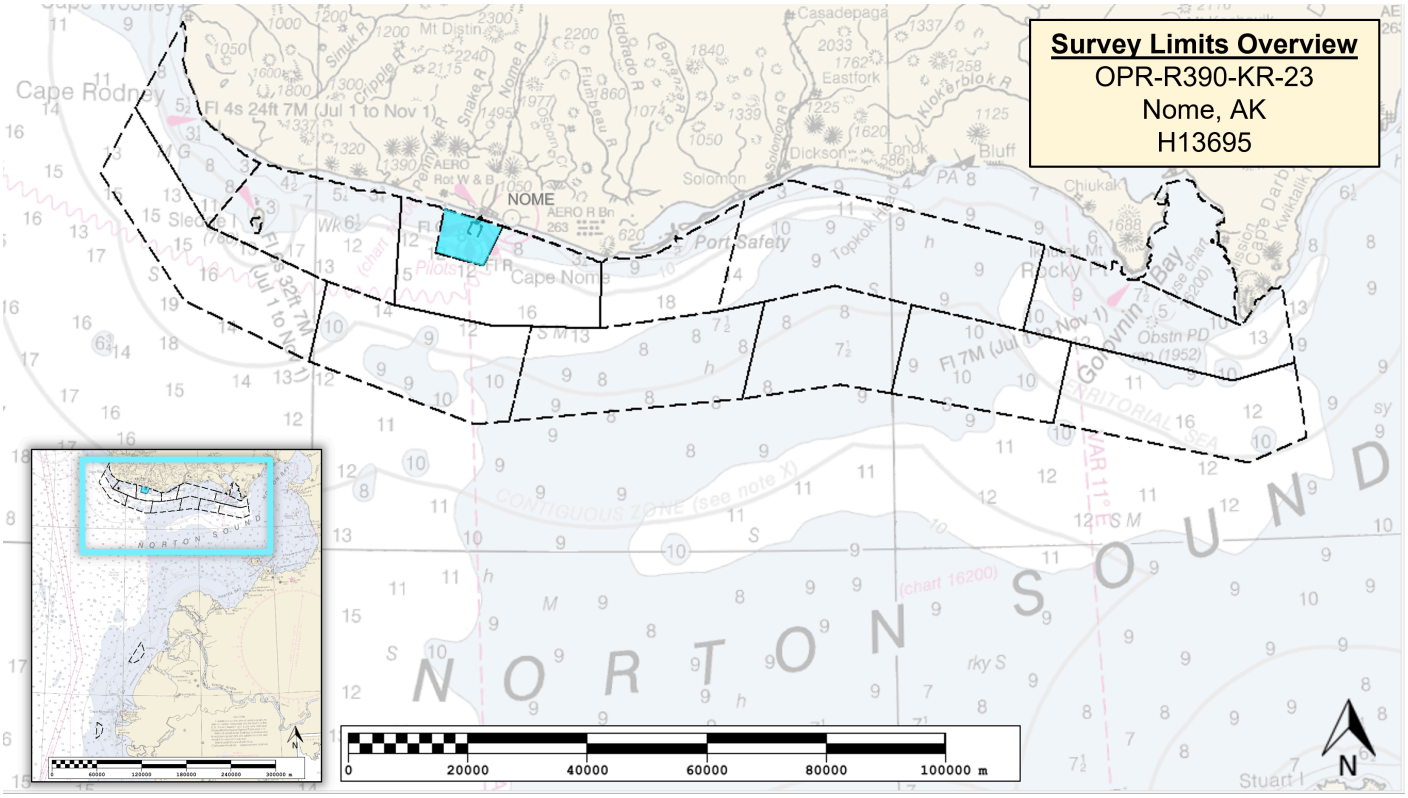


Figure 1: Survey Limits Overview (light blue area)

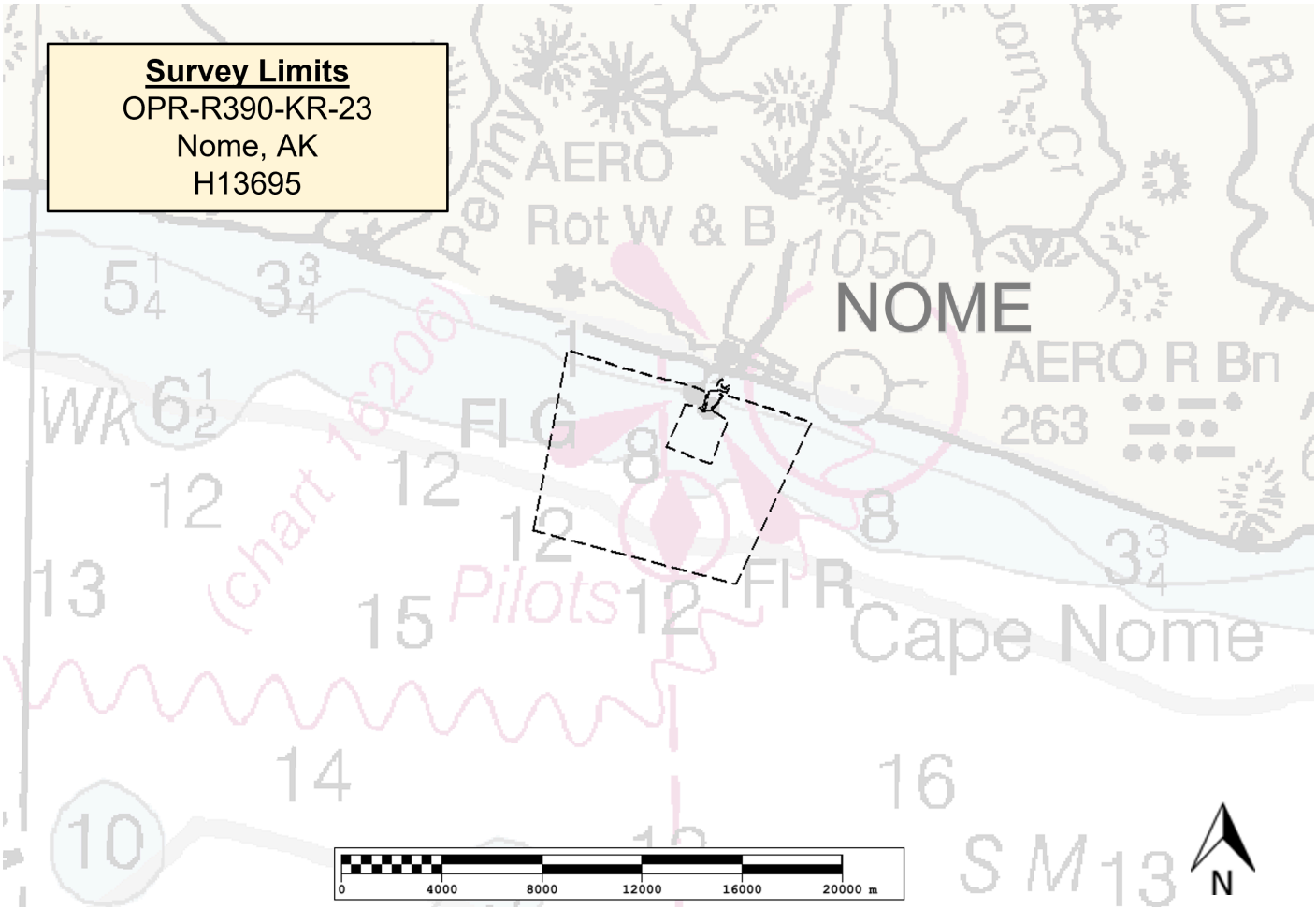


Figure 2: Survey Limits (black line)

All data were acquired in accordance with the requirements in the project instructions and specifications set forth in the Hydrographic Survey Specifications and Deliverables 2022 Edition (HSSD 2022).

A.2 Survey Purpose

The purpose of this survey is to update existing National Ocean Service (NOS) nautical charts.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Survey H13695 is accurate to International Hydrographic Organization (IHO) Order 1a as required per the HSSD 2022.

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 3	Complete Coverage in accordance with the requirements listed below and HSSD 2022.
All waters in survey area	Collect a minimum of 13,210 LNMs. Per request of COR, junction area with F00664 was upgraded to survey area that counts towards mileage cap.

Table 2: Survey Coverage

Survey coverage was in accordance with the requirements listed above and in the HSSD.

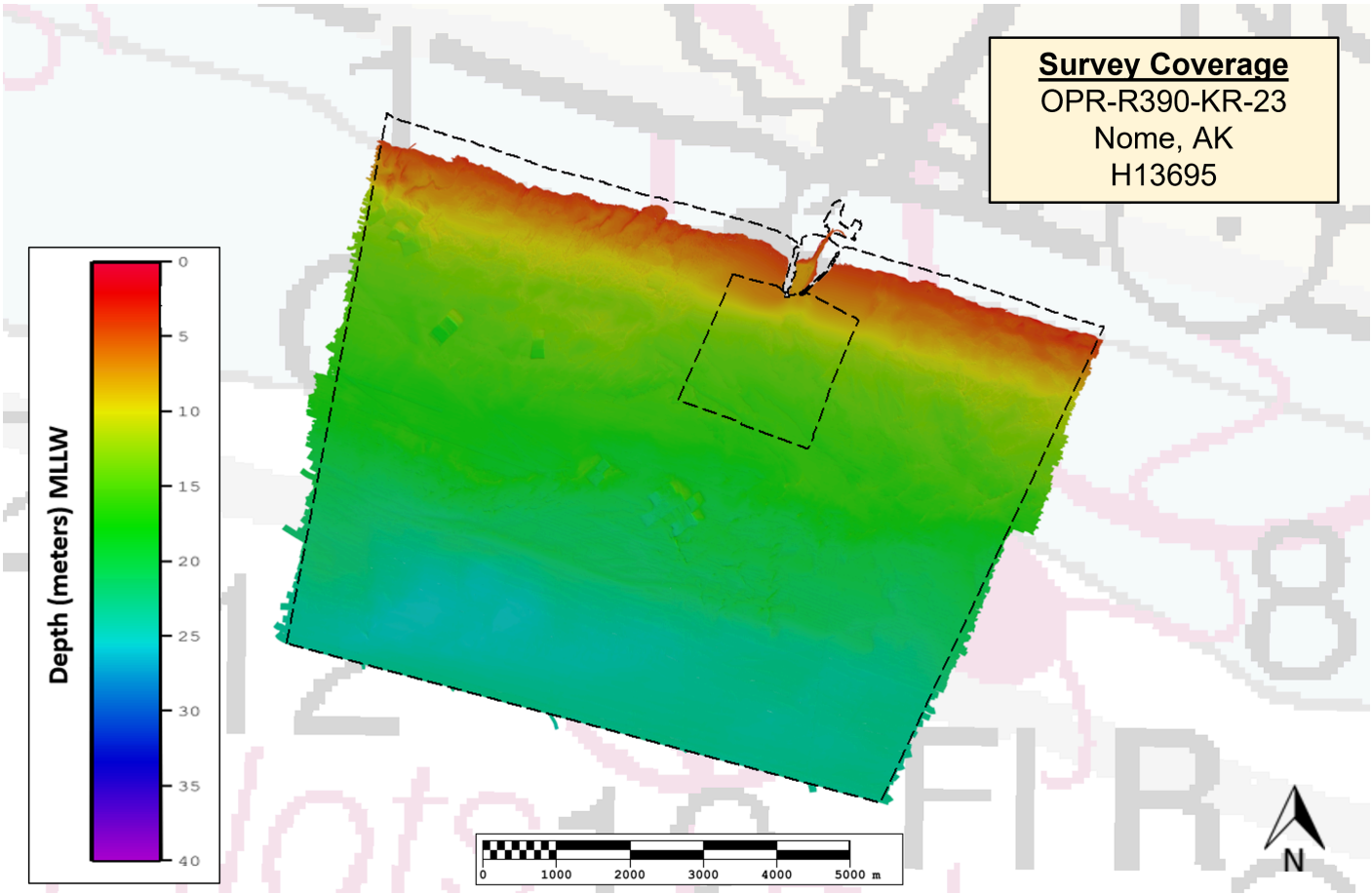


Figure 3: Survey Coverage

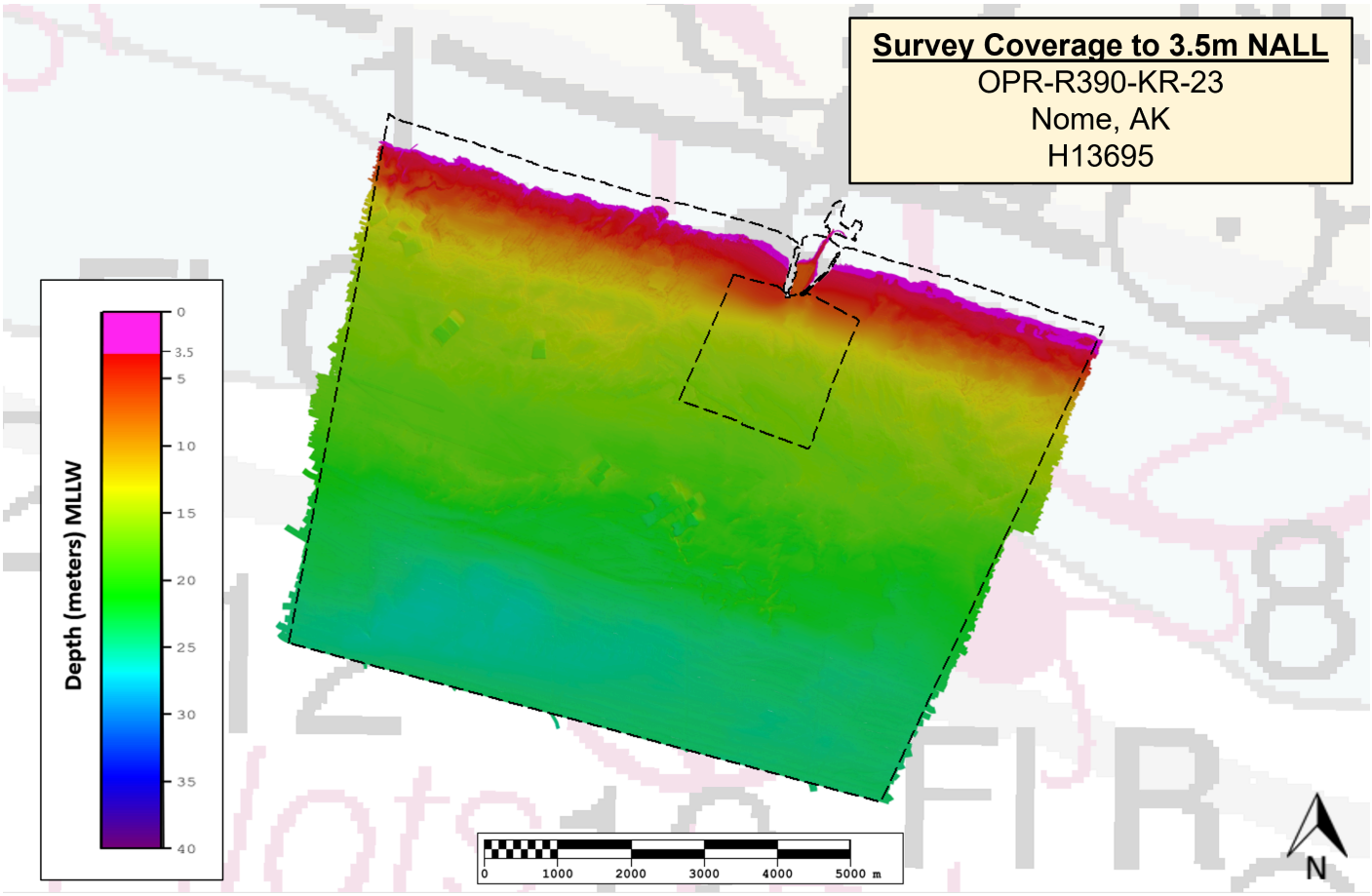


Figure 4: Survey Coverage with 3.5m NALL Displayed

A.6 Survey Statistics

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

	HULL ID	*R/V Thunder*	*ASV Quimby*	*Total*
LNM	**SBES Mainscheme**	0.0	0.0	0.0
	MBES Mainscheme	493.14	543.13	1036.27
	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	39.31	0.0	39.31
	Lidar Crosslines	0.0	0.0	0.0
Number of Bottom Samples				4
Number Maritime Boundary Points Investigated				0
Number of DPs				0
Number of Items Investigated by Dive Ops				0
Total SNM				20.0

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
06/06/2023	157

Survey Dates	Day of the Year
06/07/2023	158
06/08/2023	159
06/09/2023	160
06/21/2023	172
06/23/2023	174
06/24/2023	175
06/25/2023	176
06/27/2023	178
06/30/2023	181
07/01/2023	182
07/02/2023	183
07/03/2023	184
07/06/2023	187
07/07/2023	188
07/08/2023	189
07/09/2023	190
07/10/2023	191
07/11/2023	192
07/13/2023	194
07/16/2023	197
08/09/2023	221
08/10/2023	222
08/16/2023	228
08/17/2023	229
08/21/2023	233
08/22/2023	234
08/25/2023	237
08/30/2023	242

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	***R/V Thunder***	***ASV Quimby***
LOA	21.3 meters	7.0 meters
Draft	0.8 meters	0.56 meters

Table 5: Vessels Used

The R/V Thunder is a 21.3 meter aluminum catamaran equipped with an Universal Sonar Mount High-Tower over-the-side sonar pole.

ASV Quimby is a 7 meter Wave Adaptive Modular Vessel (WAM-V) which is an innovative class of watercraft using unique suspension technology to radically improve seagoing capabilities. ASV Quimby is equipped with a custom sonar mount.

B.1.2 Equipment

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

Manufacturer	Model	Type
R2Sonic	2022	MBES
R2Sonic	2024	MBES
AML Oceanographic	MicroX SV	Sound Speed System
AML Oceanographic	BaseX2	Sound Speed System
AML Oceanographic	MVP-X	Sound Speed System
R2Sonic	I2NS	Positioning and Attitude System
Applanix	POS MV OceanMaster	Positioning and Attitude System

Table 6: Major Systems Used

Note: R/V Thunder utilized a single head R2Sonic 2024 multibeam echosounder system, an AML Micro.X for the surface sound speed system, an AML/eTrac MVP-X and an AML Base.X2 for the sound speed systems, and an Applanix POS MV OceanMaster for the positioning and attitude system.

ASV Quimby utilized a single head R2Sonic 2022 MBES, an AML Micro.X for the surface sound speed system, an AML Base.X2 for the sound speed profiles, and a R2Sonic I2NS for the positioning and attitude system.

B.2 Quality Control

B.2.1 Crosslines

A beam-to-beam statistical analysis was performed using the Cross Check tool in Qimera. A 1 meter Combined Uncertainty and Bathymetric Estimator (CUBE) weighted dynamic surface was created incorporating only the mainscheme lines and excluded crosslines. The Cross Check tool was used to perform the beam-by-beam comparison of the crossline data to the mainscheme surface. Comparisons showed excellent agreement, well above 95% of the allowable TVU.

Note: This surface was created for QC only and is not submitted as a surface deliverable.

Below is a histogram of the crossline comparison statistics showing IHO Order 1a compliance per beam.

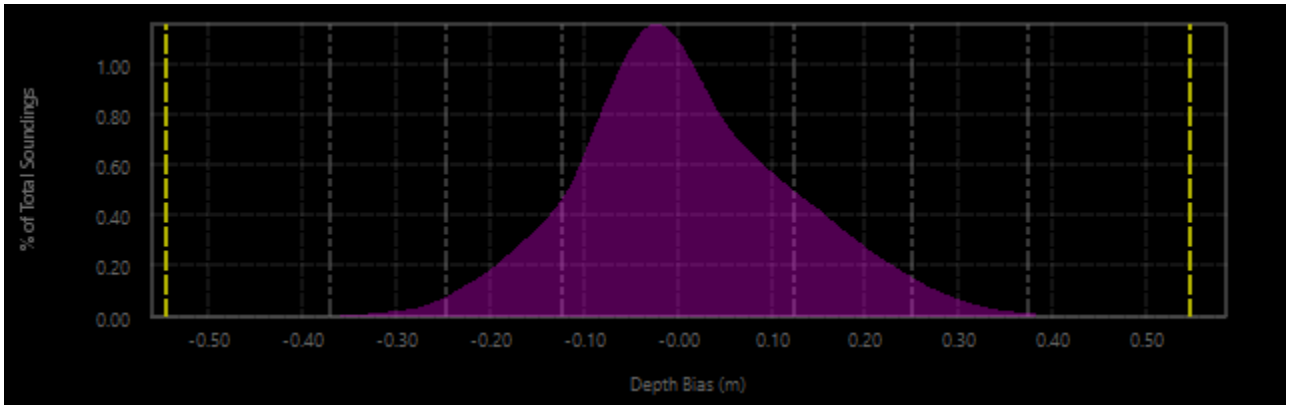


Figure 5: H13695 Crossline Comparison

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via ERTDM	0.13 meters	N/A

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
R/V Thunder	0.05 meters/second	N/A	N/A	0.2 meters/second
ASV Quimby	0.05 meters/second	N/A	N/A	0.2 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

The standard deviation uncertainty and the total vertical uncertainty (TVU) layers of the Dynamic Surface were utilized during data processing to search for features, water column noise, and systematic errors.

IHO Order 1a uncertainty specification was met by 100% of the nodes.

In Qimera versions beginning in 2.5.1 and beyond, the user has the ability to export the Dynamic Surface to a Bathymetric Attributed Grid (BAG)
with the TVU layer.

Using this BAG, the percentage of nodes that fell within the TVU specification for each Dynamic Surface was calculated using the NOAA QC tools program.These results are shown in an image below. The TVU was also reviewed using the Colormap Range in the Qimera TVU surface layer.

Complete Coverage MBES (Finalized 1m CUBE weighted Dynamic Surface in NOAA QC Tools) = 100% of nodes are within the allowable TVU.

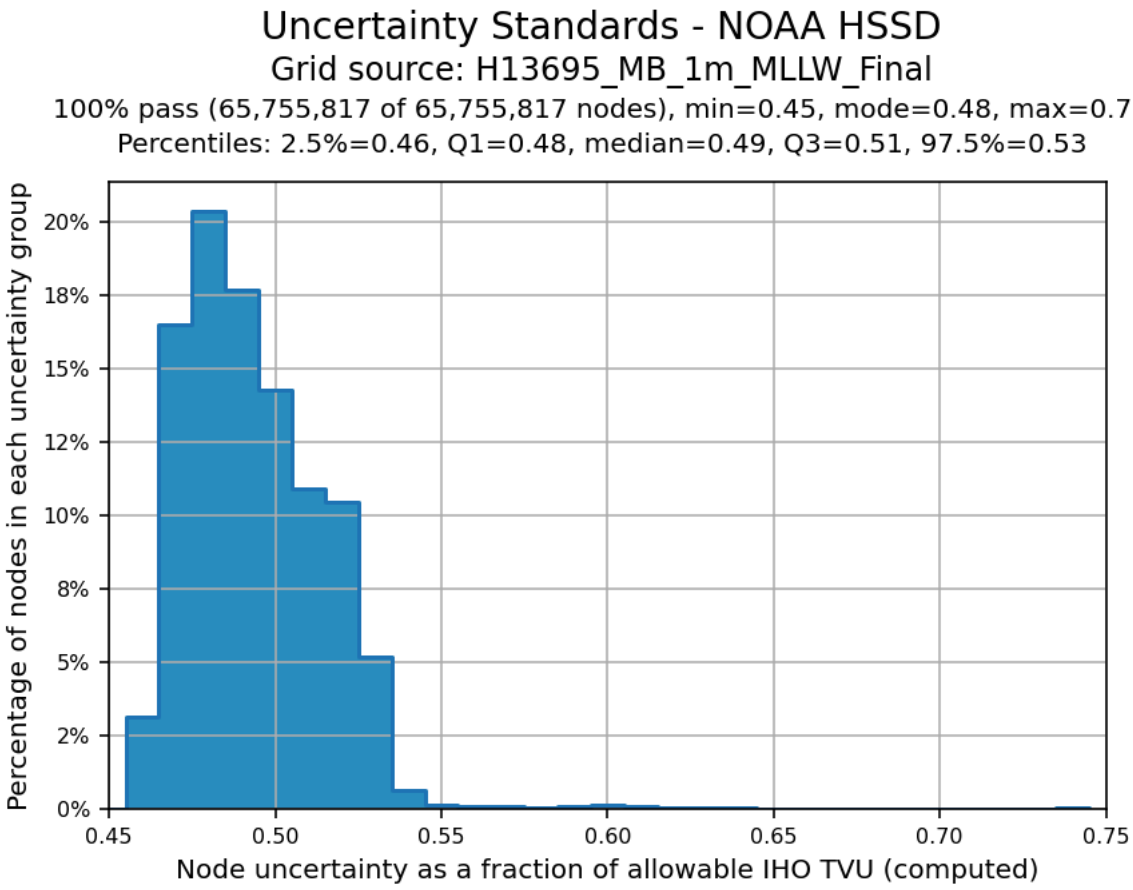


Figure 6: H13695 Finalized 4m MBES TVU Statistics

B.2.3 Junctions

Depth differences between junctioning surveys were evaluated using the JunctionTrac program, developed in-house by eTrac. For each junction, each CUBE weighted dynamic surface's nodes were exported to an ASCII CSV file where the fields were (Easting, Northing, Depth) for each node. A 4 meter difference surface between the junctioning datasets was also created and exported to an ASCII CSV file where the fields were (Easting, Northing, Diff) for each node. The three ASCII CSV files were then loaded into the JunctionTrac program and junction statistics were computed. A file was also created in this process to locate any nodes from the difference surface that exceed the allowable TVU, which was imported into Qimera

and any identified points from JunctionTrac were analyzed. Note: the difference surfaces were created for comparison efforts only and are not submitted as surface deliverables.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H13696	1:10000	2023	eTrac	S
F00664	1:20000	2015	Fairweater S220 Launches 2806 and 2808	N

Table 9: Junctioning Surveys

H13696

The junction comparison was performed using all overlapping data between H13695 and H13696. Below is a histogram of junction comparison statistics showing the difference between the junctioning surfaces and allowable TVU as well as difference statistics. 99.4% of nodes were within allowable TVU.

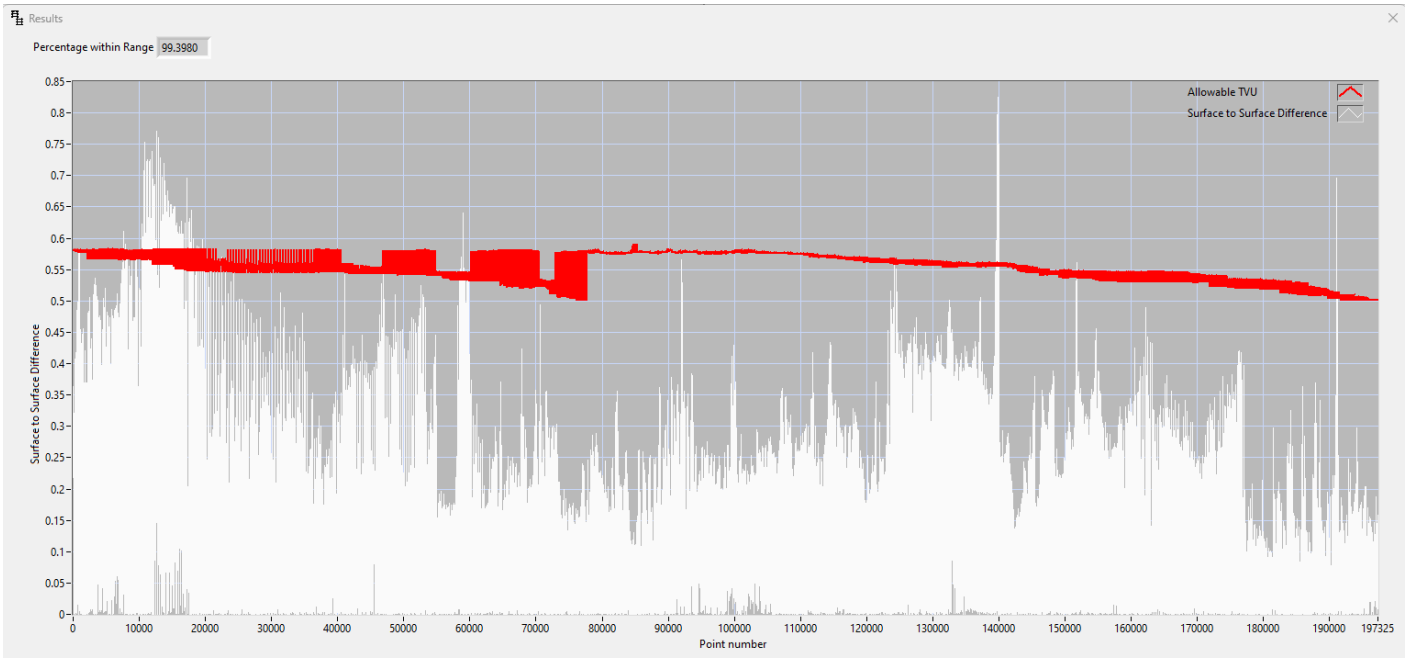
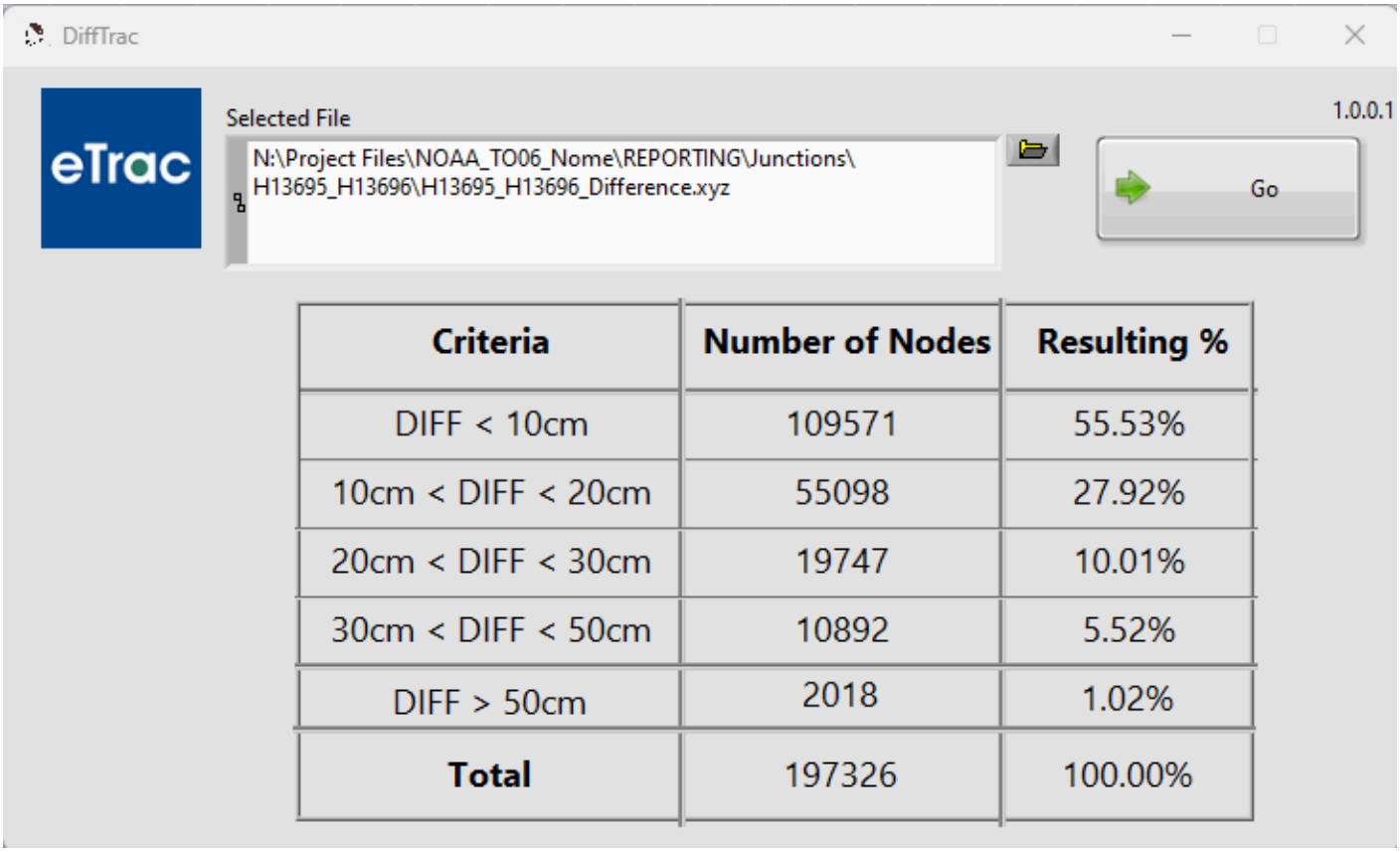


Figure 7: H13695 - H13696 Junction Comparison



Criteria	Number of Nodes	Resulting %
DIFF < 10cm	109571	55.53%
10cm < DIFF < 20cm	55098	27.92%
20cm < DIFF < 30cm	19747	10.01%
30cm < DIFF < 50cm	10892	5.52%
DIFF > 50cm	2018	1.02%
Total	197326	100.00%

Figure 8: H13695 - H13696 Difference Statistics

F00664

The junction comparison was performed using all overlapping data between H13695 and F00664. Below is a histogram of junction comparison statistics showing the difference between the junctioning surfaces and allowable TVU as well as difference statistics. 83.24% of nodes were within allowable TVU. H13695 completely covers and supersedes F00664.

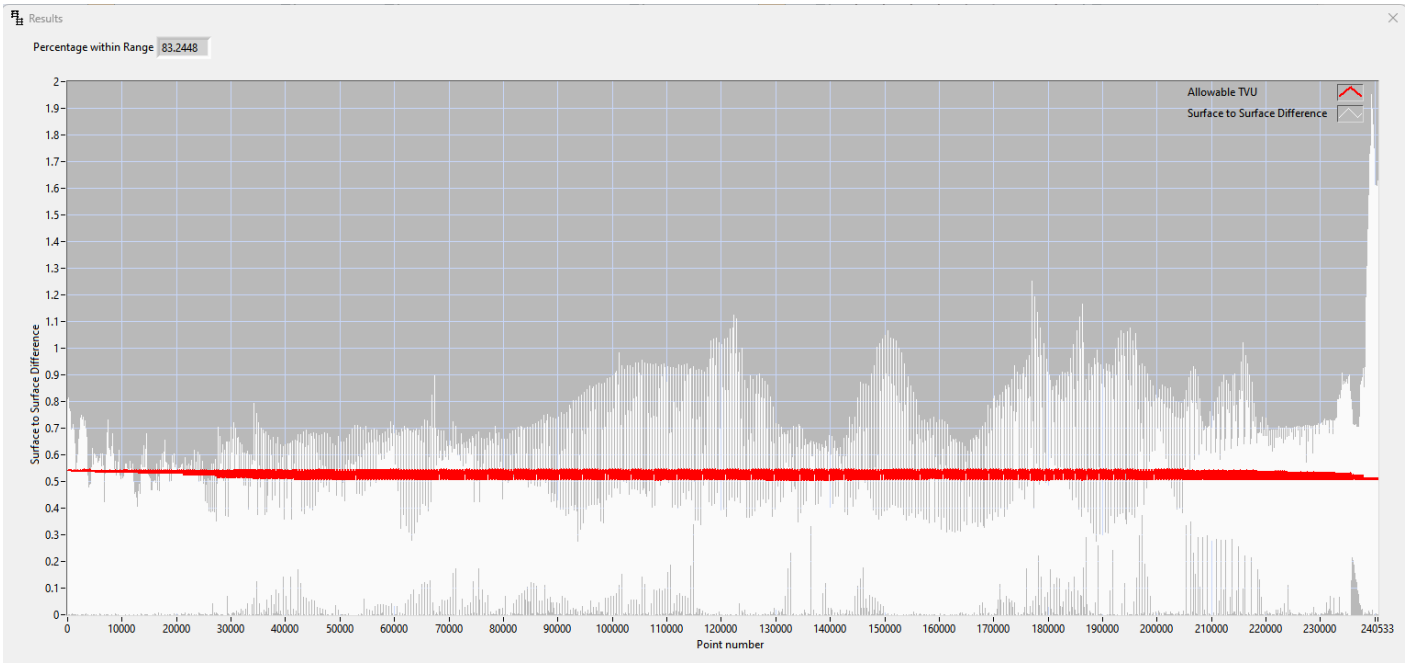


Figure 9: H13695 - F00664 Junction Comparison

DiffTrac

eTrac

Selected File

D:\NOME\Junctions\H13695_F00664\H13695_F00664_Difference_v2.xyz

1.0.0.1

Go

Criteria	Number of Nodes	Resulting %
DIFF < 10cm	50646	21.06%
10cm < DIFF < 20cm	52999	22.03%
20cm < DIFF < 30cm	41299	17.17%
30cm < DIFF < 50cm	50846	21.14%
DIFF > 50cm	44744	18.60%
Total	240534	100.00%

Figure 10: H13695 - F00664 Difference 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

There were no other factors that affected corrections to soundings.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: SVP casts were generally taken every 2 hours. Occasionally casts would exceed a 2 hour frequency, however would never exceed a 4 hour frequency.

On R/V Thunder and ASV Quimby casts were applied in QPS Qinsy acquisition software at the time of the cast. Surface sound velocity measured at 1Hz was compared to surface velocity from the sound velocity profile in real-time. If the surface velocity comparison was in excess of 2 m/s at any time during survey operations, a new cast was taken.

Surface sound speeds were compared in real-time and profile to profile for each cast on the vessel. Additionally, the processor reviewed profiles in Qimera to remove spurious readings within a cast, compare day-to-day casts, and to check distribution over the surveyed area, in order to better understand trends for efficient acquisition planning.

B.2.8 Coverage Equipment and Methods

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

B.2.9 Data Density Evaluation

In order to determine if the density of the data met the specified 5 soundings per node, data density was evaluated using DensityTrac in the AmiTrac program, developed in-house by eTrac. Each finalized CUBE weighted dynamic surface's nodes were exported to a BBH file. The BBH file was then loaded into the DensityTrac program and density statistics were computed.

For H13695 the following percentages represent the results of the density query:

Complete Coverage MBES (Finalized 1m CUBE weighted Dynamic Surface) = 99.77% of nodes are composed from at least 5 soundings.

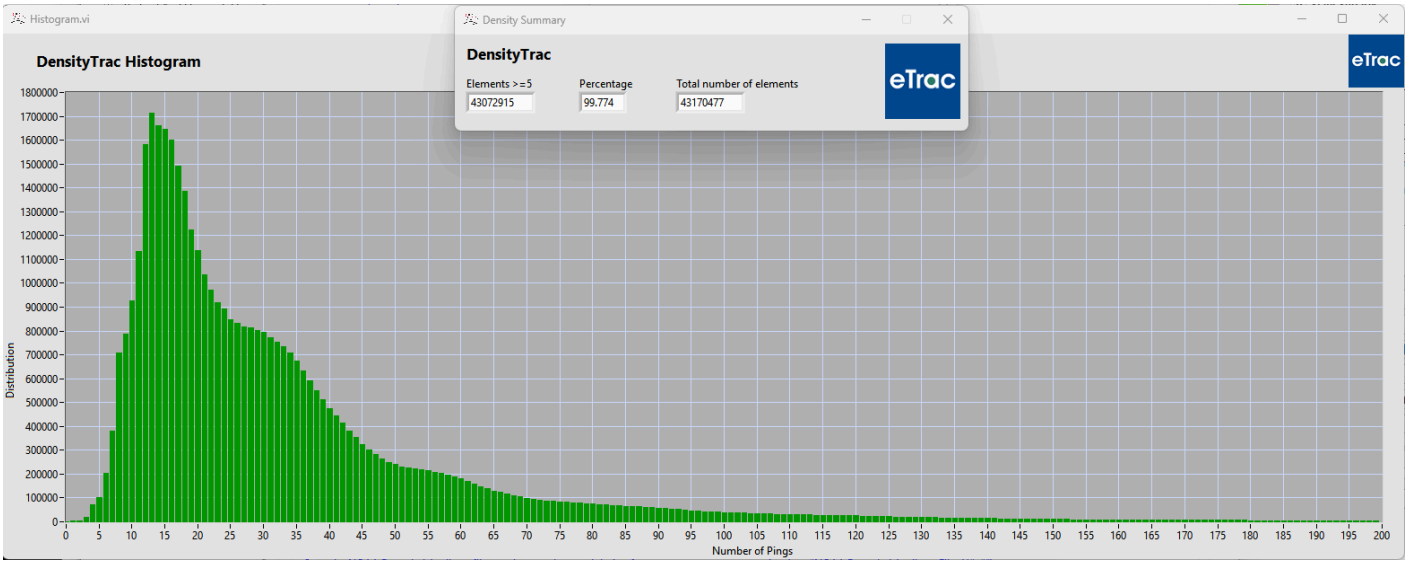


Figure 11: H13695 Finalized 1m Complete Coverage MBES Density Distribution

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

Backscatter data were collected throughout the survey and are retained in the raw DB files. Every effort was made in the field to collect quality backscatter data while maintaining the primary mandate of high quality bathymetric data. eTrac verified coverage and general quality of the backscatter data collected daily. A beam intensity window was monitored in Qinsy during acquisition to ensure backscatter data collection. Raw backscatter data were viewed in QPS FMGeocoder (FMGT) to further confirm collection criteria had been met. After MBES data was fully processed and cleaned in Qimera, GSF files were exported and brought into FMGT and processed into backscatter mosaics. Shown below is an example of the raw backscatter mosaic from H13695 DN175 (ASV Quimby).

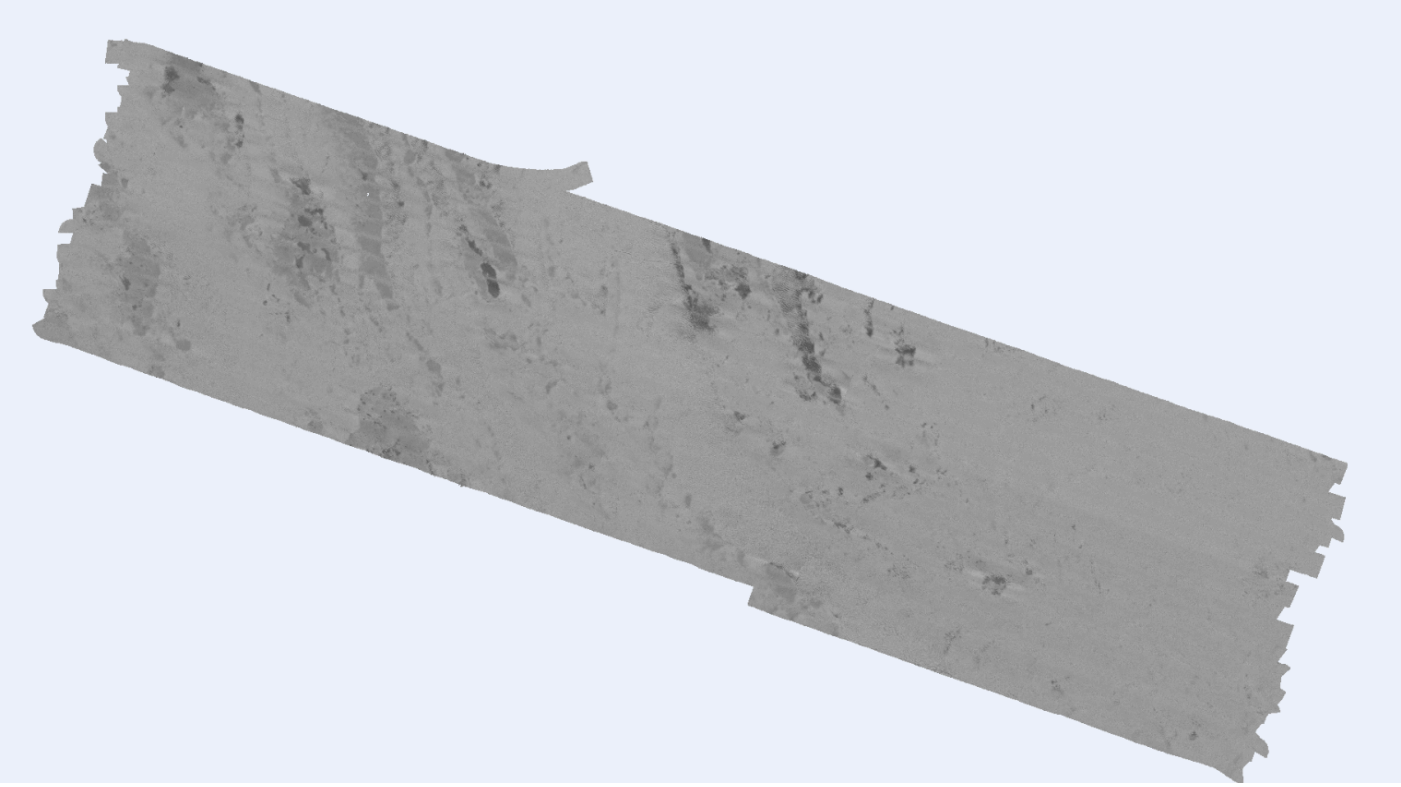


Figure 12: Raw Backscatter from ASV Quimby (DN175)

B.5 Data Processing

B.5.1 Primary Data Processing Software

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

Feature Object Catalog, NOAA Profile Version 2022 was used only in CARIS. Qimera was used as the primary processing software.

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
H13695_MB_1m_MLLW_Final	BAG	1 meters	0.89 meters - 25.33 meters	NOAA_1m	Complete MBES
H13695_MBAB_2m_TH_400kHz_1of2	MB Backscatter Mosaic	2 meters	-	N/A	Complete MBES
H13695_MBAB_2m_QU_400kHz_2of2	MB Backscatter Mosaic	2 meters	-	N/A	Complete MBES

Table 10: Submitted Surfaces

A 1m surface is provided meeting complete coverage MBES with backscatter specifications for H13695.

Note: The 1m MBES surface's depth range was extended past 20m to include the remaining deeper values beyond 20m to avoid creating superfluous surfaces at a lower resolution.

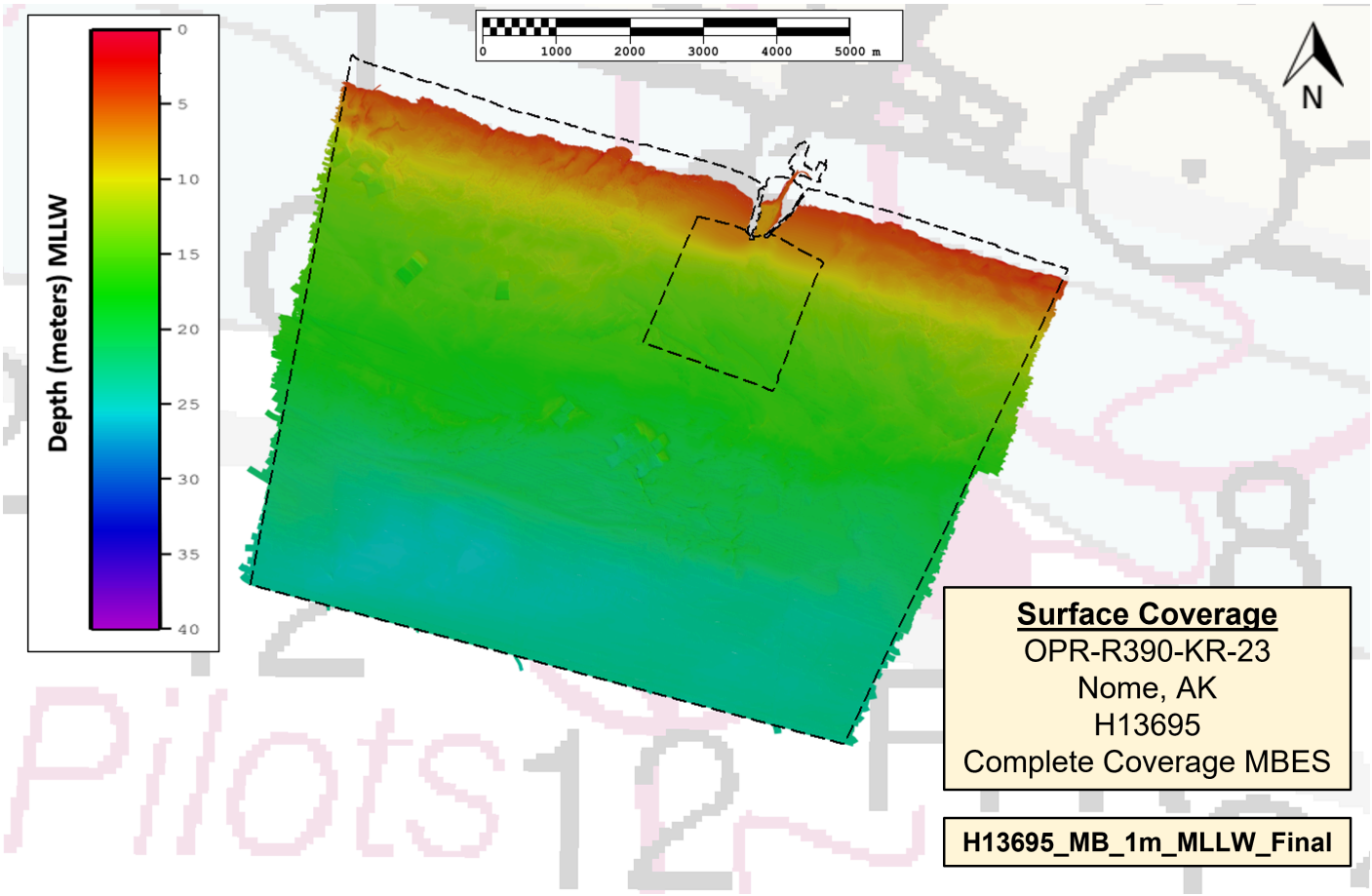


Figure 13: H13695 Finalized 1m CUBE weighted Dynamic Surface Coverage

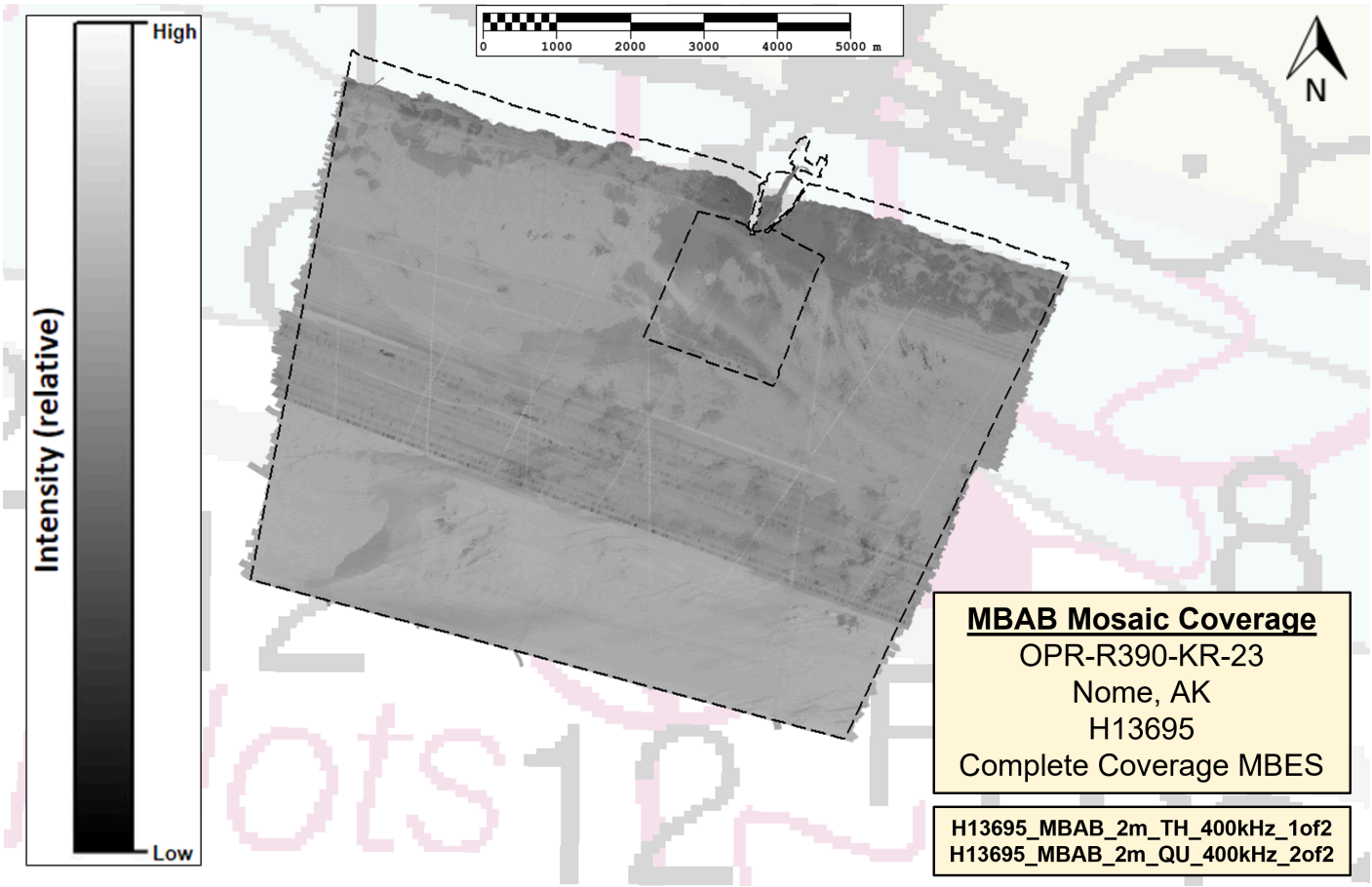


Figure 14: H13695 Finalized 2m MBAB Mosaic Coverage

C. Vertical and Horizontal Control

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

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 ERTDM	OPR-R390-KR-23_Nome_CapeWoolleyToGolovin_AK_ERTDM_2023_NAD83-MLLW.qgfvom

Table 11: ERS method and SEP file

In order to reference soundings to Mean Lower Low Water Datum, a separation model was provided by NOAA and was applied to the Qinsy DB files via a .qgfvom separation file in the acquisition software.

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 3.

The following PPK methods were used for horizontal control:

- RTX

Applanix PosPac MMS was utilized to post process real time positioning data utilizing Trimble's PP-RTX implementation of Trimble CenterPoint RTX to create a Smoothed Best Estimate of Trajectory (SBET).

RTK

GNSS satellite corrections were received on each vessel using the G4+ carrier signal from the Marinestar Global Correction System maintained by Fugro.

D. Results and Recommendations

D.1 Chart Comparison

A chart comparison was conducted for H13695 using Pydro CA tools, Qimera, and Caris HIPS and SIPS. Survey data were compared against the largest scale ENCs to accomplish the chart comparisons.

US5AK82M, scale: 20000, edition: 8.1, update application date: 3/17/2023, issue date: 3/17/2023
US4AK6RO, scale: 80000, edition: 1, update application date: 10/04/2022, issue date: 10/04/2022
US4AK6QO, scale: 80000, edition: 1.1, update application date: 3/17/2023, issue date: 3/17/2023

Throughout survey operations sounding comparisons between the charted depths and the surveyed depths were analyzed to identify depth discrepancies. Using 1 meter CUBE weighted Dynamic surfaces, soundings were generated in the "Sounding Selection" tab of Pydro CA tools. Soundings were displayed against the charted soundings and a visual comparison was made in Caris HIPS and SIPS. Additionally, potential DtoNs and discrepancies were generated using the "DTM vs Chart" tab of Pydro CA tools. The results were displayed through CA tools and investigated in CARIS HIPS and SIPS and Qimera.

An overview image of the generated soundings on each chart is included below.

Results of the chart comparison are included in the following sections.

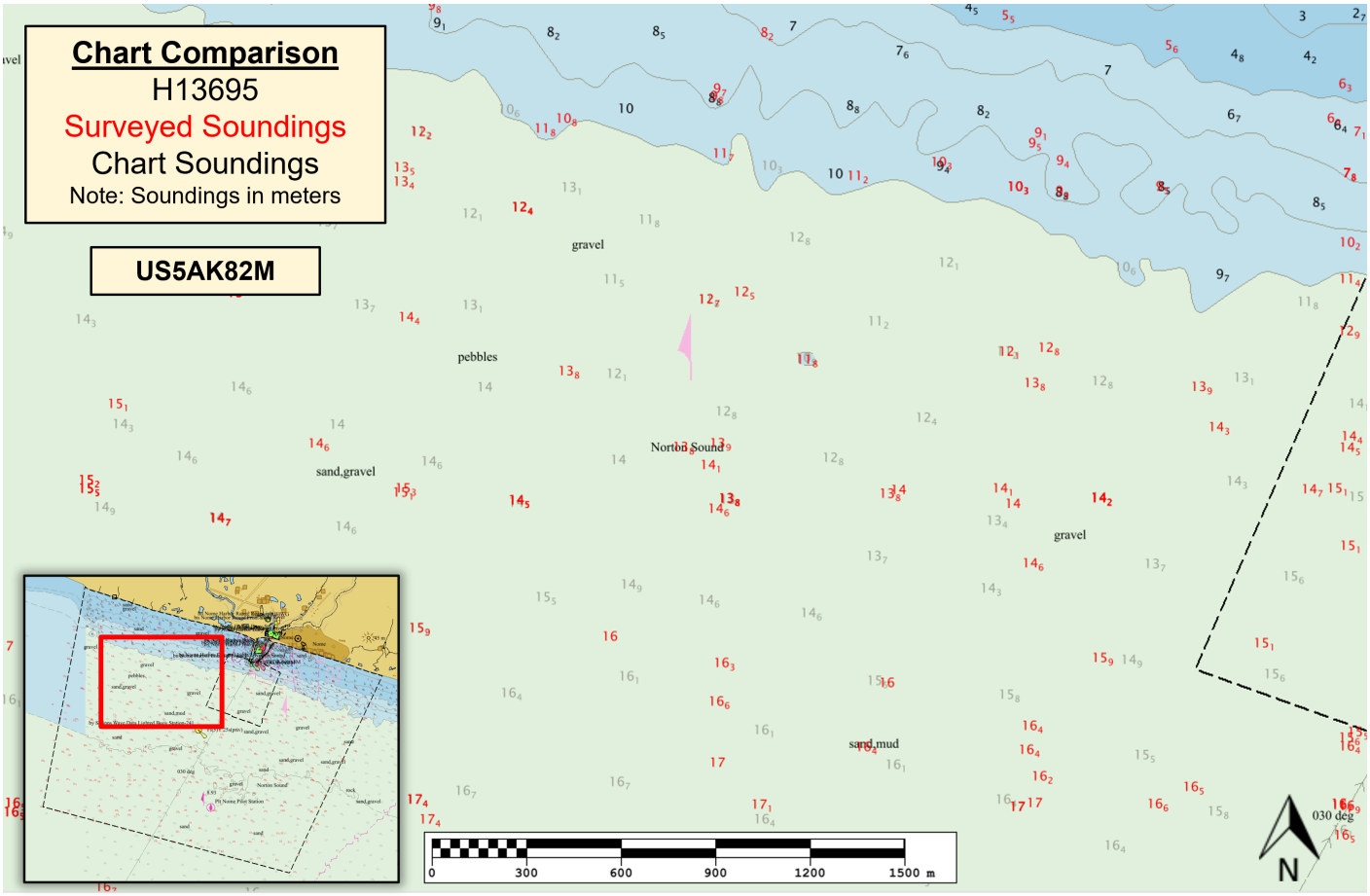


Figure 15: Generated Soundings used for Chart Comparison (US5AK82M)

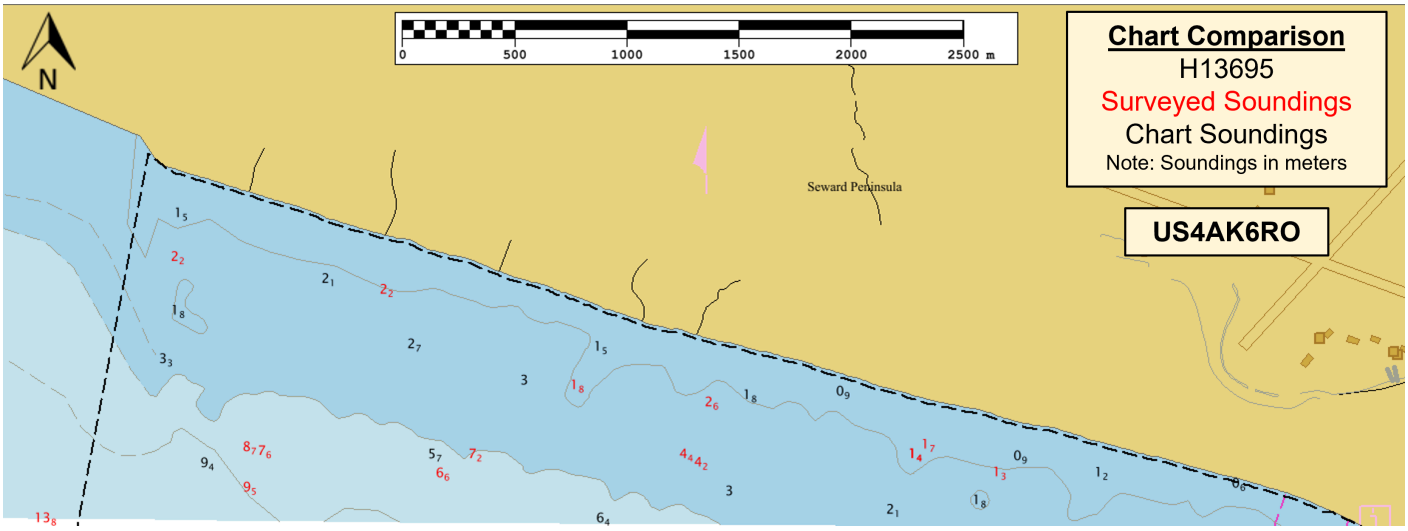


Figure 16: Generated Soundings used for Chart Comparison (US4AK6RO)

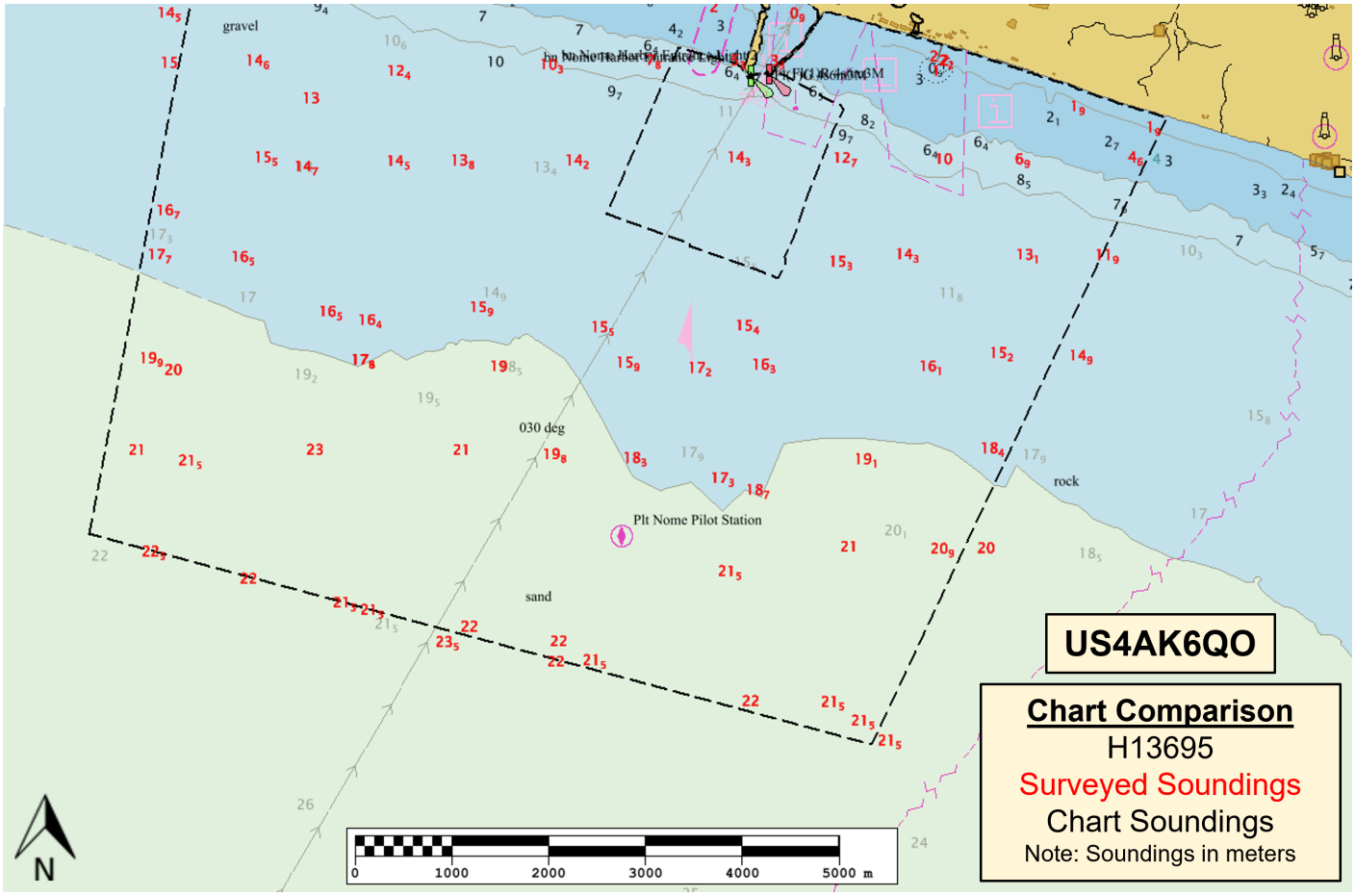


Figure 17: Generated Soundings used for Chart Comparison (US4AK6QO)

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
US5AK82M	1:20000	8	03/17/2023	03/17/2023
US4AK6RO	1:80000	1	10/04/2022	10/04/2022
US4AK6QO	1:80000	1	03/17/2023	03/17/2023

Table 12: Largest Scale ENCs

D.1.2 Shoal and Hazardous Features

No DTONs exist for this survey.

Although shoals were found to have deviated from the charts, it was determined that they were not hazardous to navigation, so a Danger to Navigation Report was not submitted.

D.1.3 Charted Features

There were 25 charted features assigned to H13695. 15 of these features were not included in the Final Feature File (FFF) per investigation requirements. Each feature in the FFF has been given a unique identifier in the "userid" field of the .000 S-57 file. Refer to the FFF for determinations and recommendations of each feature.

D.1.4 Uncharted Features

1 new feature was found in H13695. Each feature in the FFF has been given a unique identifier in the "userid" field of the .000 S-57 file (format 30XXX). Refer to the FFF for determinations and recommendations of each feature.

D.1.5 Channels

The Nome Harbor has an entrance channel that extends through the outer harbor and into the inner harbor. The USACE reports the channel as 3760 feet (1146 m) in length with variable width and having controlled depths of 10, 12, and 22 feet (3.0, 3.7, and 6.7 meters). Dredging in the Nome harbor was observed in June of 2023. Observed soundings in H13695 show evidence of recent dredging in the harbor and are consistent with the expected channel depths. The dredged channel extends inshore of the NALL and thus was not fully covered by the extents of H13695.

D.2 Additional Results

D.2.1 Aids to Navigation

No AtoNs were assigned for this survey. Charted AtoNs within the survey area were visually confirmed on station and without damage. No AtoNs were reported to the U.S. Coast Guard.

D.2.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.2.3 Bottom Samples

4 bottom samples were obtained in accordance with section 7.1 of the HSSD 2022 in areas designated by the field through discussions with our COR. Detailed information and images of the bottom samples are located in the Final Feature File (FFF). Each bottom sample has been given a unique identifier in the "userid" field of the .000 S-57 file (format CX).

D.2.4 Overhead Features

1 overhead cable was assigned for this survey. The cable was charted as crossing the Snake River north of the Inner Harbor and south of the Snake River Bridge. The cable was not found visually.

1 bridge was assigned for this survey. The bridge connects part of Nome Harbor and was visually confirmed.

These features were not included in FFF per investigation requirements.

D.2.5 Submarine Features

No submarine features exist for this survey.

D.2.6 Platforms

No platforms exist for this survey.

D.2.7 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.8 Abnormal Seafloor or Environmental Conditions

Evidence of seafloor ice scouring and biogenic gas-generated craters (seafloor "pockmarks") are evident in this sheet.

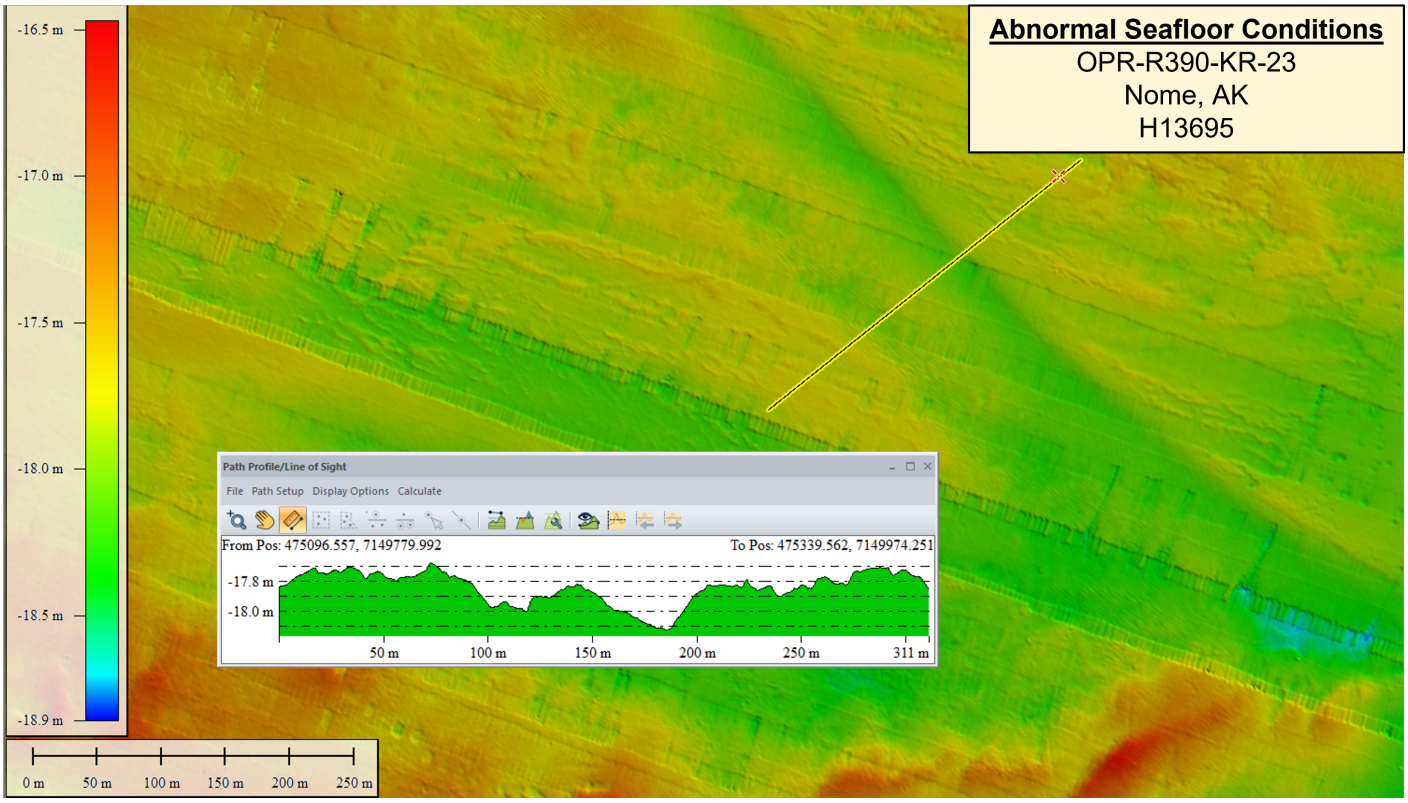


Figure 18: Abnormal Seafloor Condition (Ice Scour)

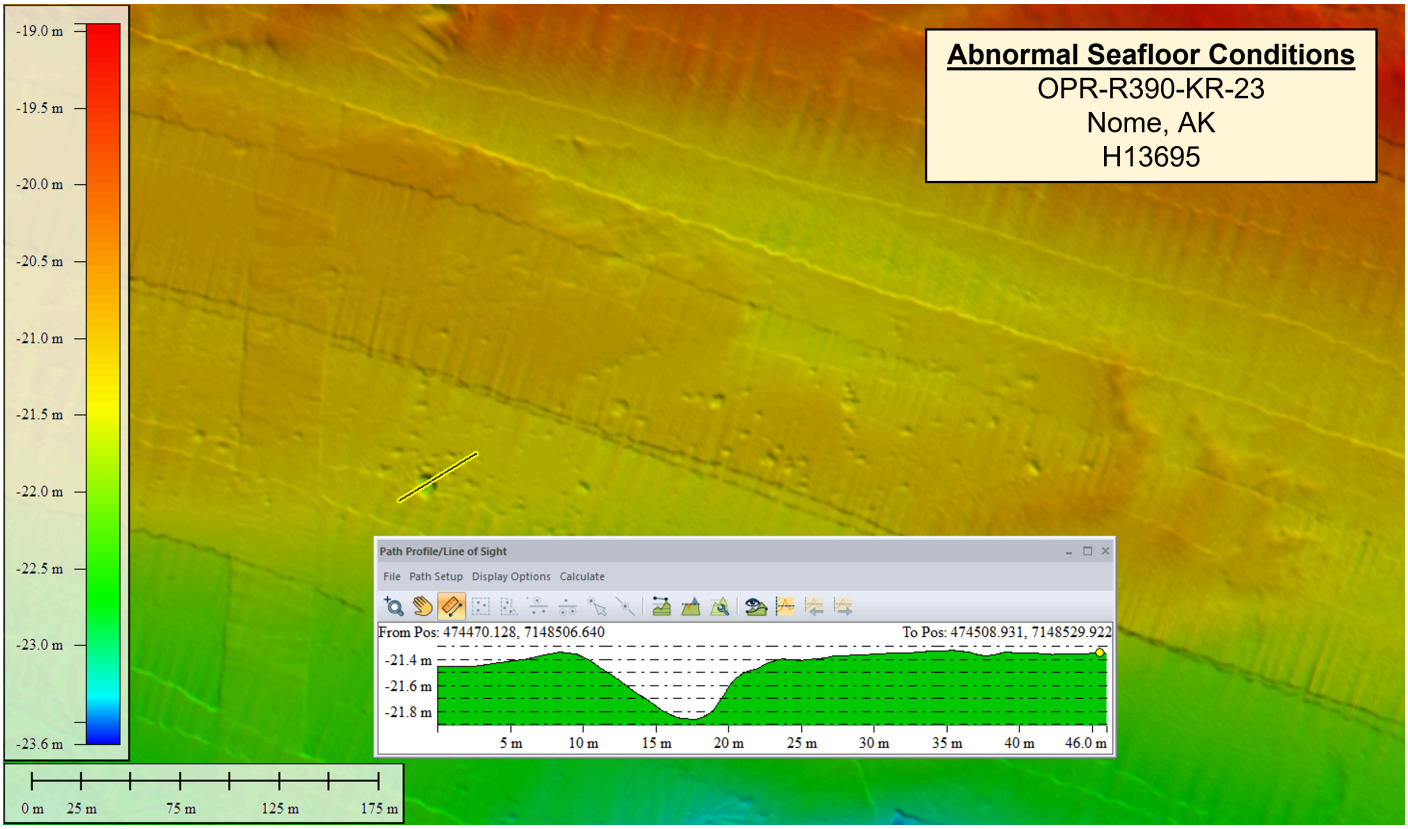


Figure 19: Abnormal Seafloor Condition (Pockmarks)

D.2.9 Construction and Dredging

Annual maintenance dredging occurs at the Port of Nome to maintain the Entrance Channel, Basin, and Sediment Trap. The Port of Nome is also undergoing construction to enlarge and deepen the outer harbor. Dredging for placer gold deposits in submerged beach ridges occurs within H13695. Rectangular dredge scars up to 2m deep with surface areas up to 0.2 square kilometers are present in the seafloor south and west of the harbor in water depths ranging from 7 to 21 meters.

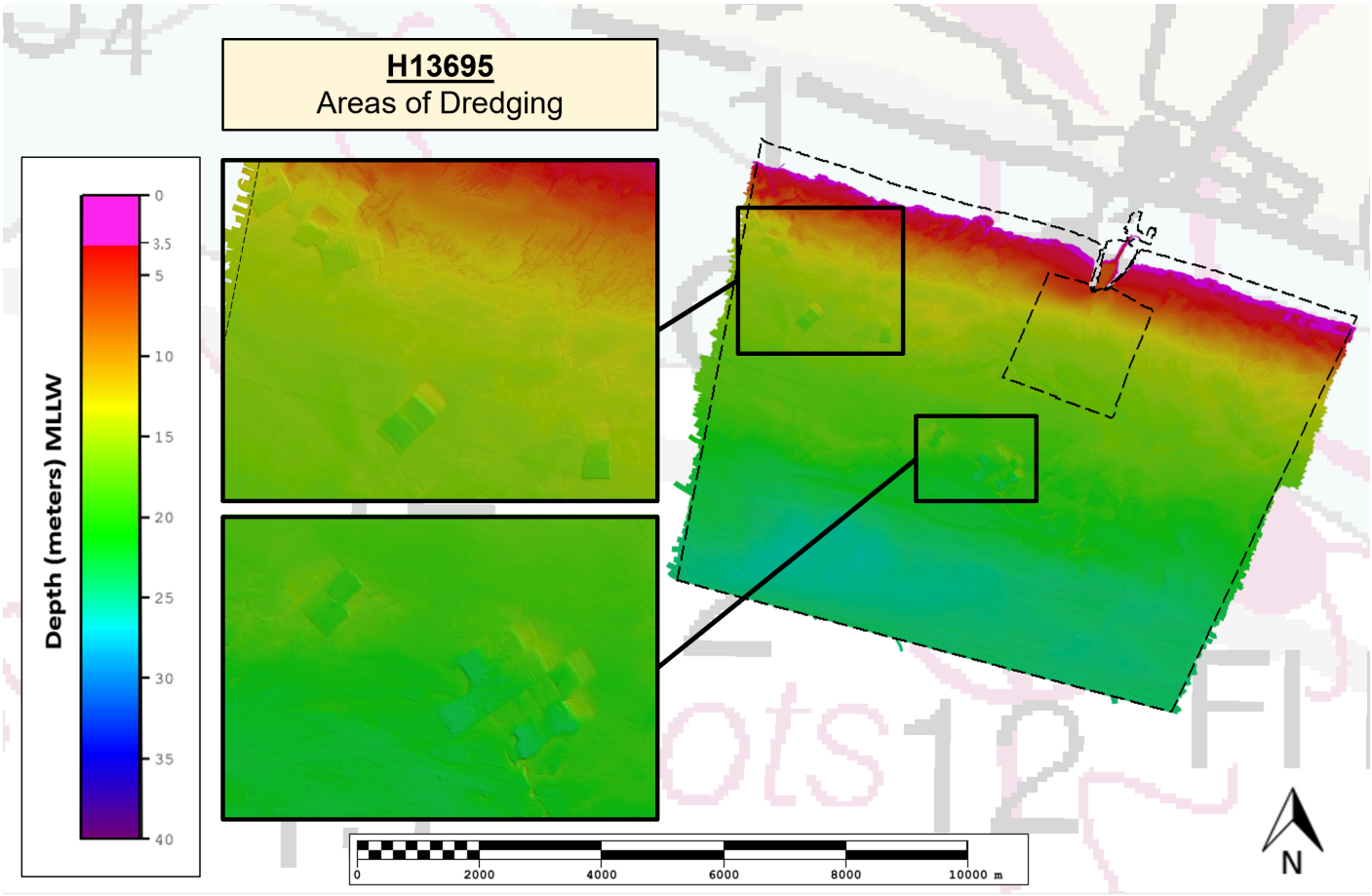


Figure 20: Mining related dredging scars in H13695

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 CUBE surfaces, 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 and Specifications Deliverables Manual, 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
David Neff, C.H.	Chief of Party	12/04/2023	David Neff, CH Digitally signed by David Neff, CH DN: C=US, E=dave.neff@woolpert.com, O="eTrac, A Woolpert Company", OU="eTrac, A Woolpert Company", CN="David Neff, CH" Date: 2023.12.04 21:14:03-08'00'

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