

H13451

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

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: H13451

LOCALITY

State(s): Alaska

General Locality: Unimak Island, AK

Sub-locality: 20NM North of Dublin Bay

2021

CHIEF OF PARTY
Allison Stone

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION		REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET		H13451
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:	Unimak Island, AK	
Sub-Locality:	20NM North of Dublin Bay	
Scale:	40000	
Dates of Survey:	07/21/2021 to 07/23/2021	
Instructions Dated:	04/02/2021	
Project Number:	OPR-Q350-KR-21	
Field Unit:	Fugro USA Marine, Inc.	
Chief of Party:	Allison Stone	
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: <i>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 3N, MLLW. All references to other horizontal or vertical datums in this report are applicable to the processed hydrographic data provided by the field unit.</i>		

Table of Contents

A. Area Surveyed	1
A.1 Survey Limits	1
A.2 Survey Purpose	2
A.3 Survey Quality	3
A.4 Survey Coverage	3
A.6 Survey Statistics	5
B. Data Acquisition and Processing	7
B.1 Equipment and Vessels	7
B.1.1 Vessels	7
B.1.2 Equipment	9
B.2 Quality Control	9
B.2.1 Crosslines	9
B.2.2 Uncertainty	11
B.2.3 Junctions	12
B.2.4 Sonar QC Checks	15
B.2.5 Equipment Effectiveness	15
B.2.6 Factors Affecting Soundings	15
B.2.7 Sound Speed Methods	16
B.2.8 Coverage Equipment and Methods	16
B.3 Echo Sounding Corrections	16
B.3.1 Corrections to Echo Soundings	16
B.3.2 Calibrations	16
B.4 Backscatter	16
B.5 Data Processing	16
B.5.1 Primary Data Processing Software	16
B.5.2 Surfaces	17
C. Vertical and Horizontal Control	17
C.1 Vertical Control	17
C.2 Horizontal Control	18
D. Results and Recommendations	18
D.1 Chart Comparison	18
D.1.1 Electronic Navigational Charts	18
D.1.2 Shoal and Hazardous Features	18
D.1.3 Charted Features	19
D.1.4 Uncharted Features	19
D.1.5 Channels	19
D.2 Additional Results	19
D.2.1 Aids to Navigation	19
D.2.2 Maritime Boundary Points	19
D.2.3 Bottom Samples	19
D.2.4 Overhead Features	19
D.2.5 Submarine Features	19
D.2.6 Platforms	20

D.2.7 Ferry Routes and Terminals.....	20
D.2.8 Abnormal Seafloor or Environmental Conditions.....	20
D.2.9 Construction and Dredging.....	20
D.2.10 New Survey Recommendations.....	20
D.2.11 ENC Scale Recommendations.....	20
E. Approval Sheet.....	21
F. Table of Acronyms.....	22

List of Tables

Table 1: Survey Limits.....	1
Table 2: Survey Coverage.....	3
Table 3: Hydrographic Survey Statistics.....	6
Table 4: Dates of Hydrography.....	7
Table 5: Vessels Used.....	7
Table 6: Major Systems Used.....	9
Table 7: Survey Specific Tide TPU Values.....	11
Table 8: Survey Specific Sound Speed TPU Values.....	11
Table 9: Junctioning Surveys.....	13
Table 10: Submitted Surfaces.....	17
Table 11: ERS method and SEP file.....	17
Table 12: Largest Scale ENCs.....	18

List of Figures

Figure 1: Survey H13451 relative to overall sheet limits of OPR-Q350-KR-21.....	2
Figure 2: Survey H13451 MBES coverage.....	4
Figure 3: Survey H13451 8m finalized set line MBES density QC.....	5
Figure 4: R/V Woldstad.....	8
Figure 5: H13451 MBES mainscheme and MBES crossline distribution.....	10
Figure 6: H13451 MBES mainscheme differenced from MBES crosslines statistical output.....	11
Figure 7: H13451 8m finalized grid TPU QC.....	12
Figure 8: Junction surveys to H13451.....	13
Figure 9: Survey H13451 junction with Survey H13448.....	14
Figure 10: Survey H13451 junction with Survey H13452.....	15

Descriptive Report to Accompany Survey H13451

Project: OPR-Q350-KR-21

Locality: Unimak Island, AK

Sublocality: 20NM North of Dublin Bay

Scale: 1:40000

July 2021 - July 2021

Fugro USA Marine, Inc.

Chief of Party: Allison Stone

A. Area Surveyed

Survey H13451 (Figure 1 and Table 1) is located 20 nautical miles North of Dublin Bay on Unimak Island, AK. This area is utilized extensively by vessels involved in diverse fisheries activities in the region, including cod and crab.

The R/V Woldstad acquired 500m set line spaced Multibeam Echosounder (MBES) and Multibeam Echosounder Acoustic Backscatter (MBAB) within the assigned survey limits 21-23 July 2021 (Tables 2-4).

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
55° 0' 13.49" N 165° 17' 26.98" W	54° 57' 58.76" N 164° 58' 56.99" W

Table 1: Survey Limits

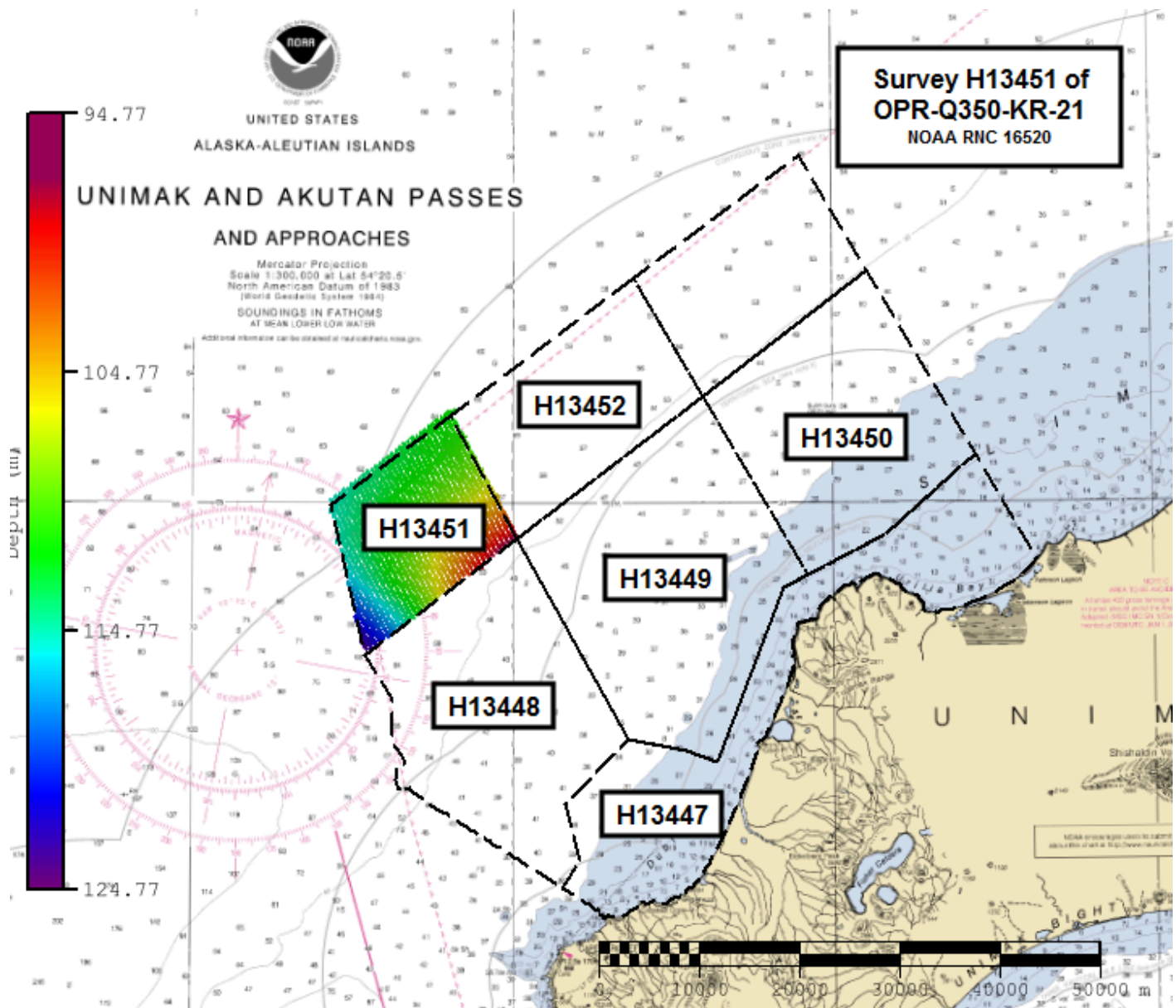


Figure 1: Survey H13451 relative to overall sheet limits of OPR-Q350-KR-21

Survey limits were acquired in accordance with the requirements set forth in the Project Instructions and the HSSD 2020.

A.2 Survey Purpose

This project will provide contemporary data to update NOS nautical charting products; increasing maritime safety and commerce in the region. The waters around the the North side of Unimak Island are an important

fishing ground for the Bering Sea Pacific Cod and other Bering Sea fisheries. This area is part of the main route transited by vessels between Bristol Bay and Dutch Harbor, AK.

The North shore of Unimak Island commonly serves as a refuge from weather and waves coming off of the open waters from the North Pacific.

The area has been identified by the Western Alaska Tanker Lightering Best Practices Committee as a primary location for lightering operations to occur.

The project area has also been identified as an area of inadequate coverage by a risk-based model with respect to the desired coverage needed to support modern navigational needs.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

500m set line MBES was achieved within the survey limits of H13451 (Figures 2 and 3).

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 8	500m Set Line Spacing (Reference HSSD Section 5.2.2.4 Option A). Note: Change was made in set line spacing requirement by COR after it was determined original requirement of 320m created more coverage than necessary for desired level of data acquisition.

Table 2: Survey Coverage

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

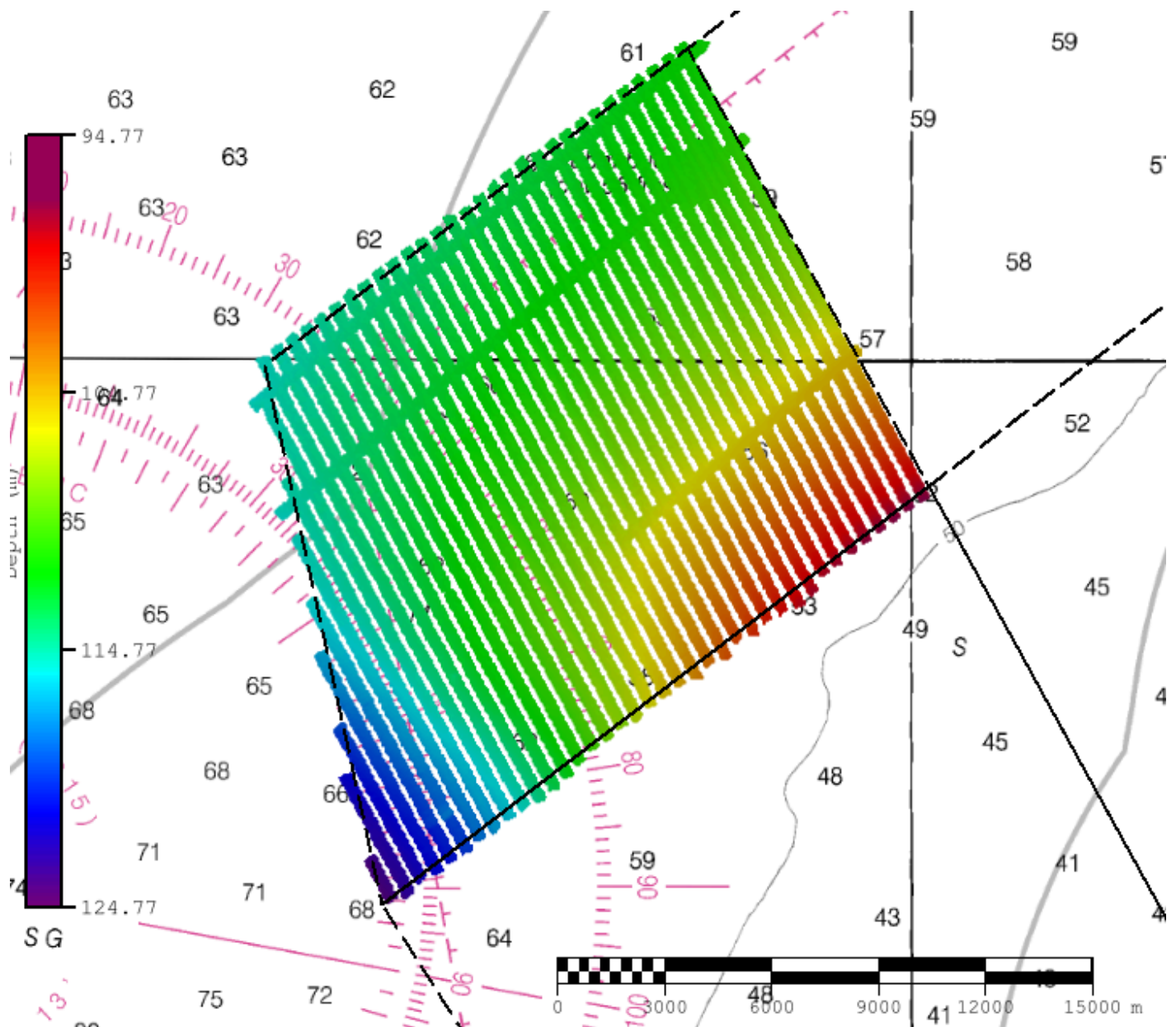


Figure 2: Survey H13451 MBES coverage

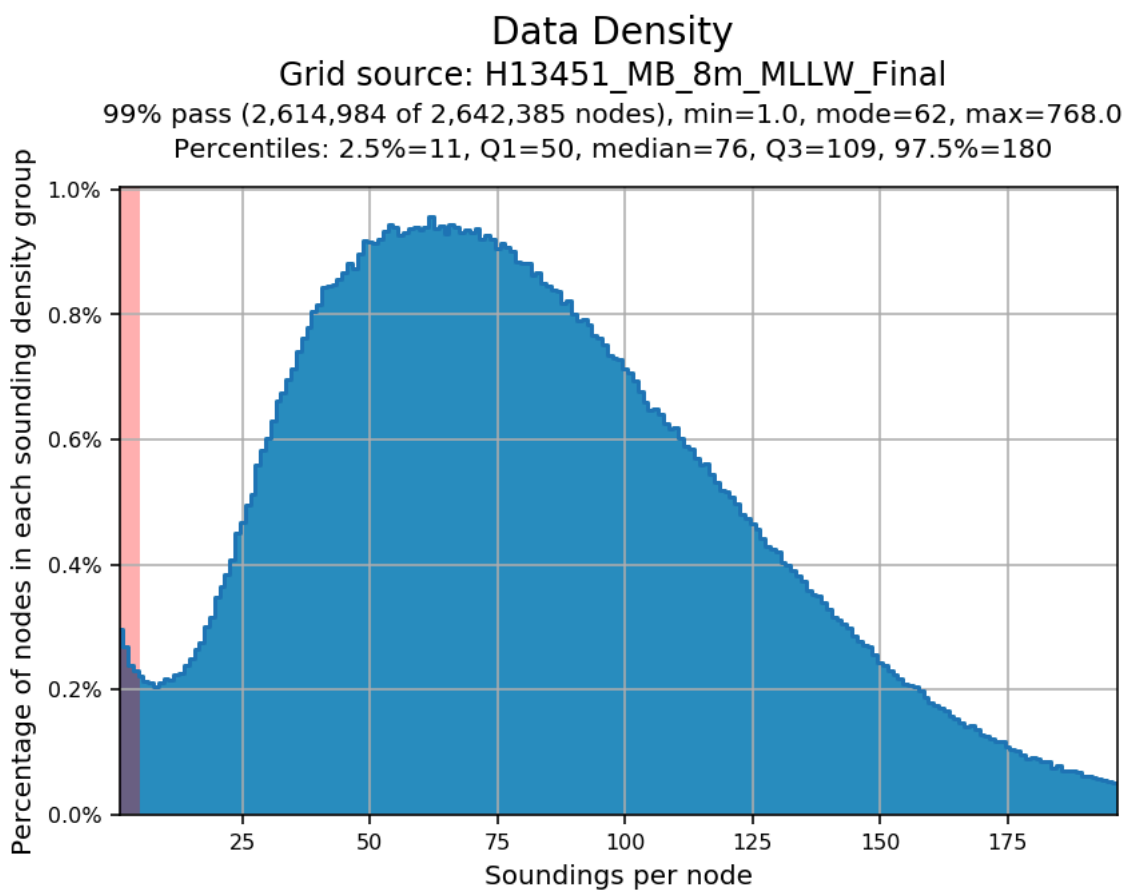


Figure 3: Survey H13451 8m finalized set line MBES density QC

A.6 Survey Statistics

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

	HULL ID	<i>R/V Woldstad</i>	<i>Total</i>
LNM	SBES Mainscheme	0	0
	MBES Mainscheme	275.23	275.23
	Lidar Mainscheme	0	0
	SSS Mainscheme	0	0
	SBES/SSS Mainscheme	0	0
	MBES/SSS Mainscheme	0	0
	SBES/MBES Crosslines	22.52	22.52
	Lidar Crosslines	0	0
Number of Bottom Samples			0
Number Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Investigated by Dive Ops			0
Total SNM			72.6

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
07/21/2021	202

Survey Dates	Day of the Year
07/22/2021	203
07/23/2021	204

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	<i>R/V Woldstad</i>
LOA	121 feet
Draft	12 feet

Table 5: Vessels Used



Figure 4: R/V Woldstad

R/V Woldstad (Table 5 and Figure 4) acquired MBES, MBAB, surface sound velocity, sound velocity profiles, and attitude and positioning data within the survey limits of H13451 (Table 6). For a detailed listing of equipment used to acquire survey data, refer to the DAPR submitted with this report under Project Reports.

B.1.2 Equipment

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

Manufacturer	Model	Type
Teledyne RESON	SeaBat 7125 SV2	MBES
Teledyne RESON	SVP 70	Sound Speed System
Applanix	POS MV 320 v5	Positioning and Attitude System
Teledyne Oceanscience	rapidCAST	Conductivity, Temperature, and Depth Sensor

Table 6: Major Systems Used

For a detailed listing of equipment, refer to the DAPR submitted with this report.

B.2 Quality Control

B.2.1 Crosslines

Crosslines for survey H13451 were acquired in accordance with section 5.2.4.2 of the HSSD 2020 (Figure 5). Mainscheme to crossline mileage percentage across H13451 is 8.18%. Of the 140,288 grid nodes compared between H13451 mainscheme MBES and MBES crosslines, 100% were within 1m difference. The mean difference is 0.0m, with a standard deviation of 0.13m (Figure 6).

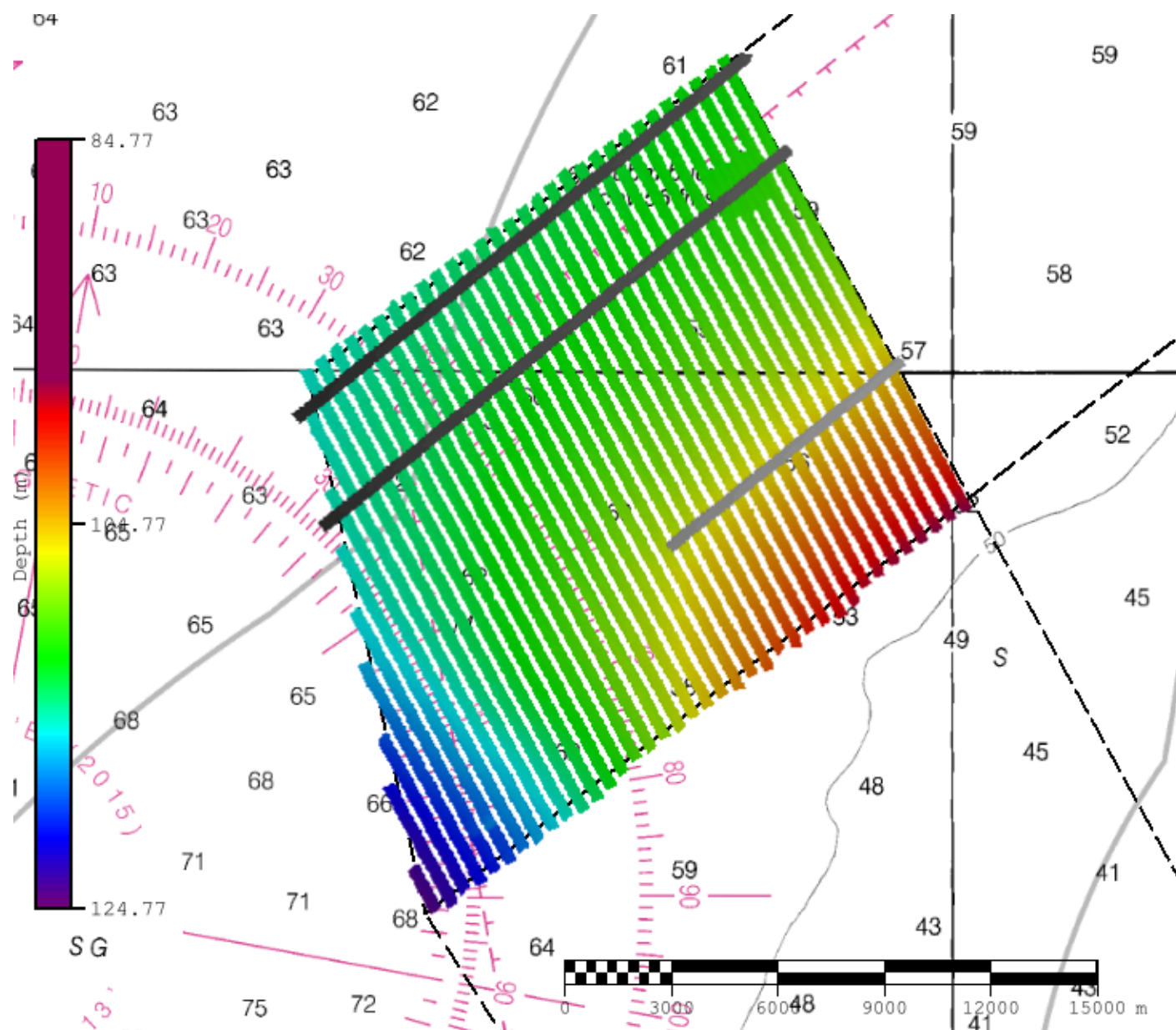


Figure 5: H13451 MBES mainscheme and MBES crossline distribution

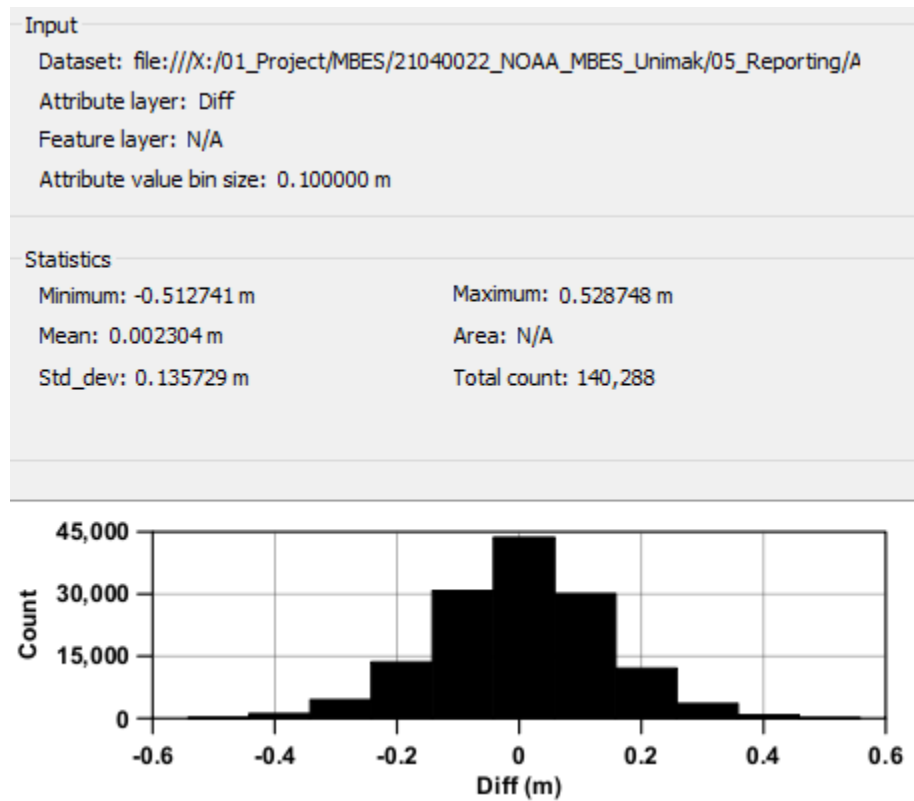


Figure 6: H13451 MBES mainscheme differenced from MBES crosslines statistical output

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0.13 meters	0.101 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
R/V Woldstad	0.42 meters/second	N/A meters/second	N/A meters/second	0.25 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

Survey H13451 uncertainty values (Tables 7 and 8) were evaluated in both CARIS HIPS 10.4 and via Pydro QC Tools v3.4.7. The finalized 8m (Figure 7) bathymetric grid meets uncertainty standards with 100% of nodes passing.

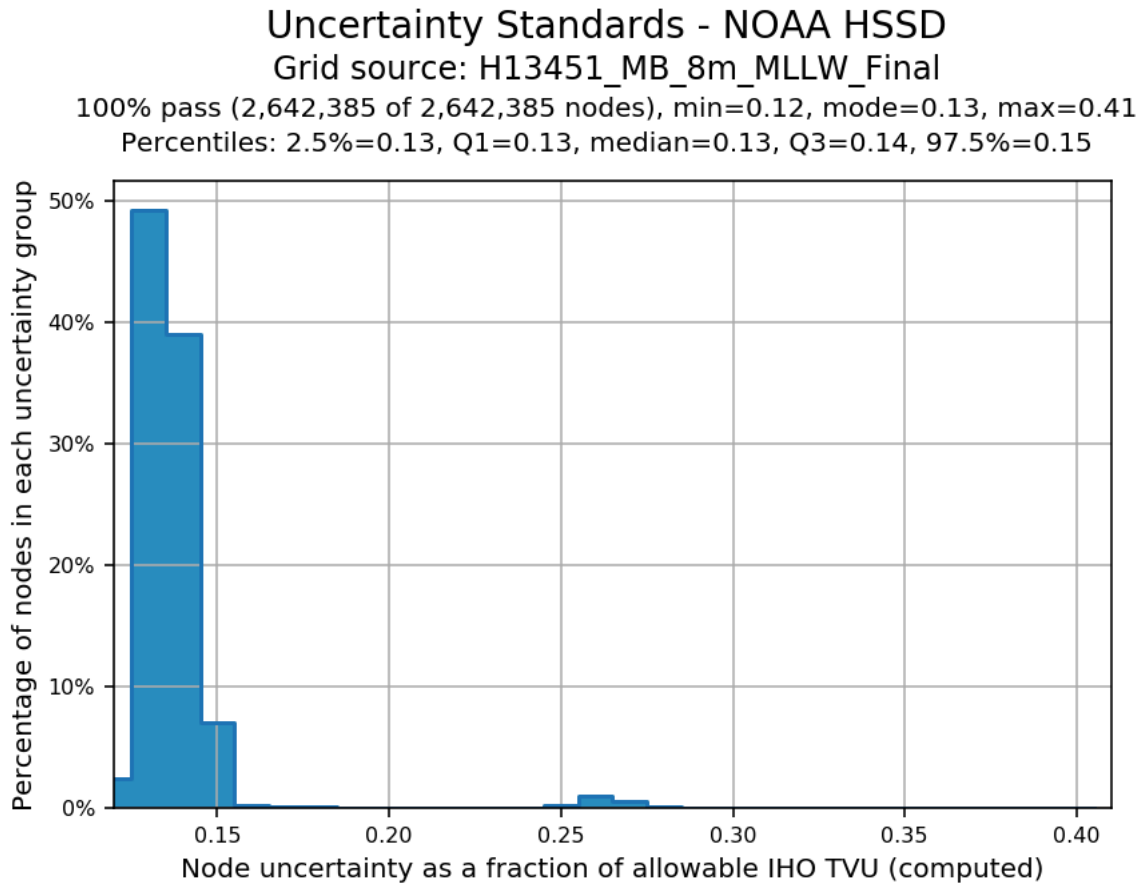


Figure 7: H13451 8m finalized grid TPU QC

Static draft uncertainty values differ slightly from what is reported in the DAPR, the value for the Static Draft Uncertainty for H13451 is -0.03m.

B.2.3 Junctions

Two contemporary surveys are available for comparison to H13451: H13448 and H13452 (Table 9 and Figure 8).

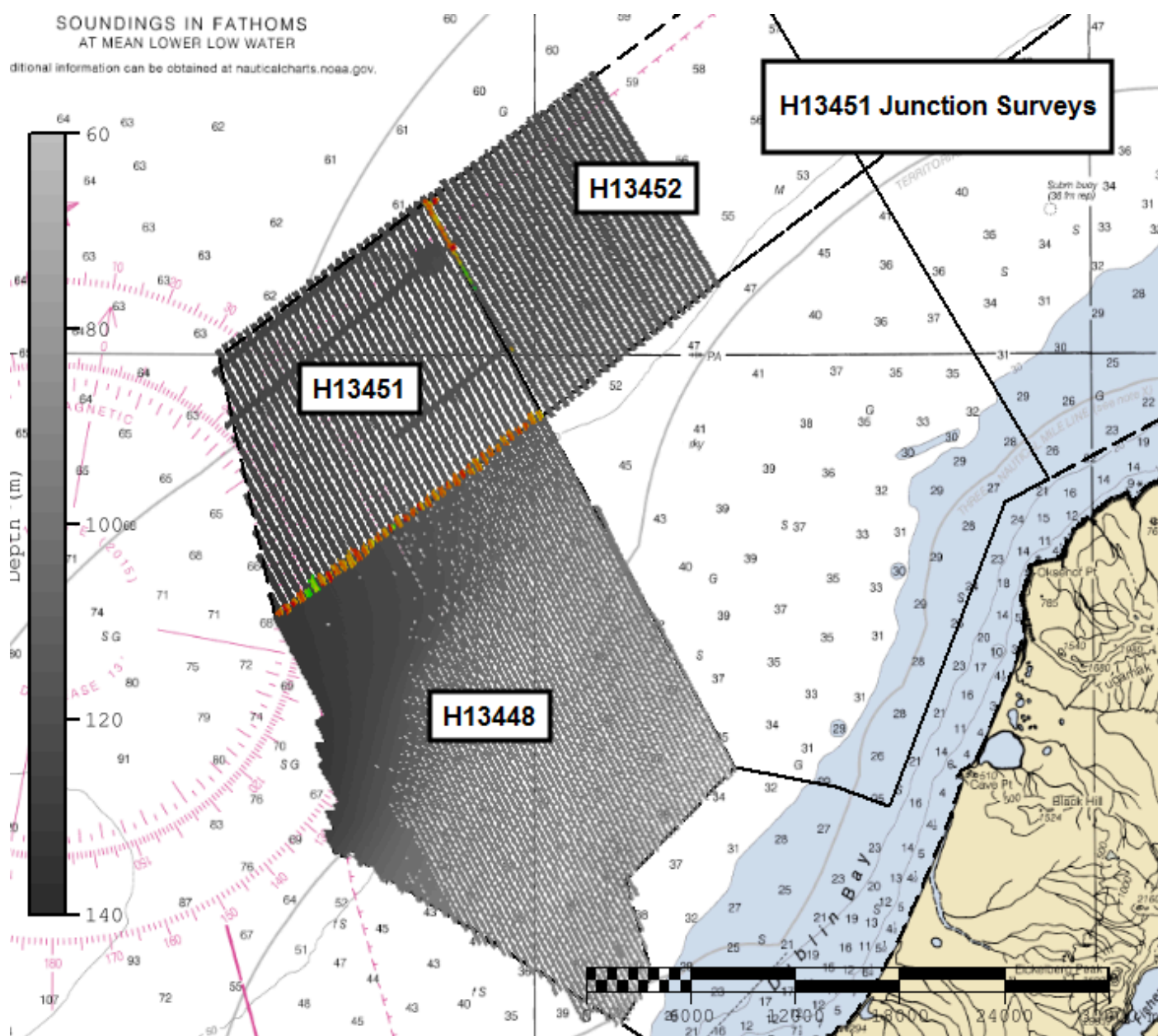


Figure 8: Junction surveys to H13451

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H13448	1:40000	2021	Fugro USA Marine, Inc.	S
H13452	1:40000	2021	Fugro USA Marine, Inc.	E

Table 9: Junctioning Surveys

H13448

Survey H13448 was acquired by Fugro USA Marine, Inc. in 2021 as a part of OPR-Q350-KR-21. Of the 91,845 grid nodes compared between H13451 and H13448 the mean difference is 0.08m; 99.9% agree within 1m (Figure 9).

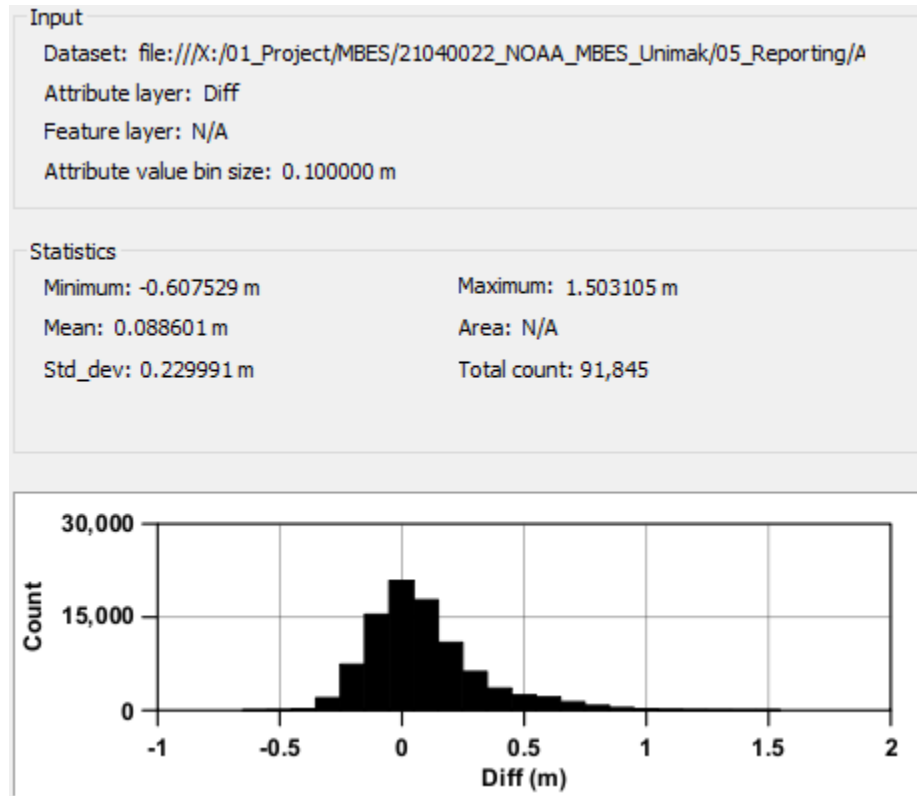


Figure 9: Survey H13451 junction with Survey H13448

H13452

Survey H13452 was acquired by Fugro USA Marine, Inc. in 2021 as a part of OPR-Q350-KR-21. Of the 18,256 grid nodes compared between H13451 and H13452 the mean difference is 0.12m; 100% agree within 1m (Figure 10).

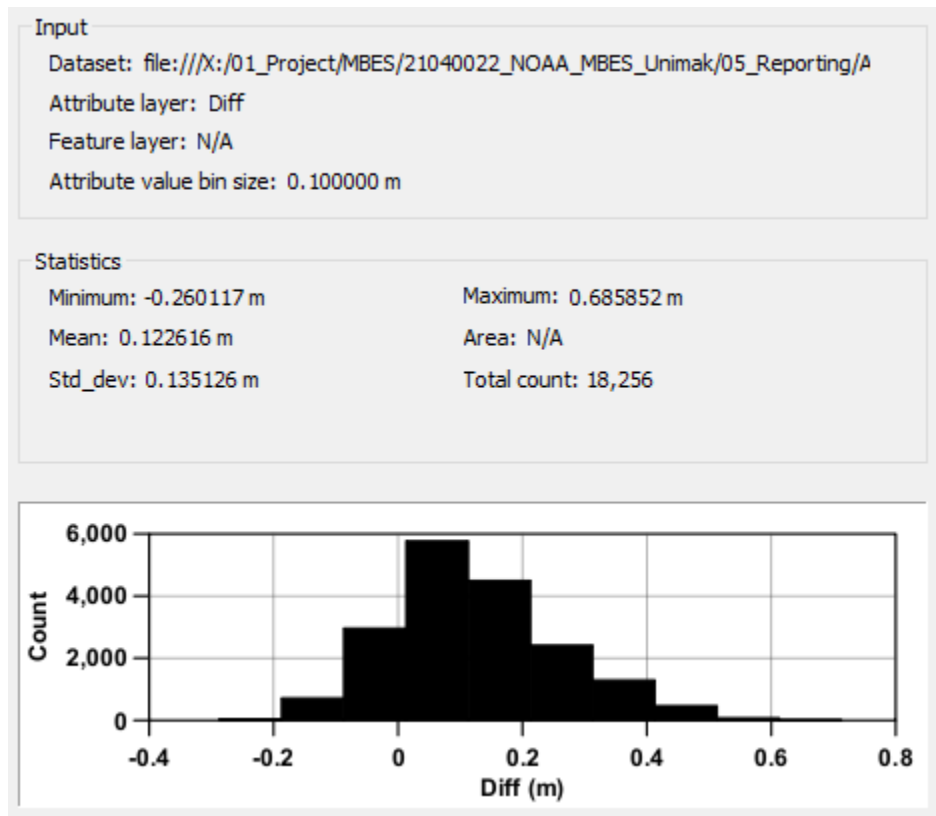


Figure 10: Survey H13451 junction with Survey H13452

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: Sound velocity profiles were acquired approximately every two hours from the R/V Woldstad using a Teledyne Ocean Science Rapid Cast.

Refer to the DAPR for additional information.

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

No backscatter deliverables are submitted with survey H13451. One line of data per vessel, per day was processed to ensure quality control. All equipment and survey methods utilized in the acquisition and processing of backscatter are detailed in the DAPR.

B.5 Data Processing

B.5.1 Primary Data Processing Software

The following Feature Object Catalog was used: NOAA Profile Version 2021.

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
H13451_MB_8m_MLLW	CARIS Raster Surface (CUBE)	8 meters	97.17 meters - 124.77 meters	NOAA_8m	MBES Set Line Spacing
H13451_MB_8m_MLLW_Final	CARIS Raster Surface (CUBE)	8 meters	97.17 meters - 124.77 meters	NOAA_8m	MBES Set Line Spacing

Table 10: Submitted Surfaces

C. Vertical and Horizontal Control

No vertical or horizontal control reports were generated for this survey. All data were reduced to MLLW via VDatum model.

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_Q350_KR_21_CapeSarichef_ERTDM21-1_NAD83-MLLW

Table 11: ERS method and SEP file

All positioning and attitude data associated with OPR-Q350-KR-21 was post-processed in POSPac MMS using PP-RTX methods. For further discussion, reference the DAPR submitted with this report.

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.

PPP

All positioning and attitude data associated with OPR-Q350-KR-21 was post-processed in POSPac MMS using PP-RTX methods.

D. Results and Recommendations

D.1 Chart Comparison

A chart comparison was conducted using the Triangle Rule script within the Chart Review Tool of Pydro QC Tools. A combined s57 file of charted soundings extracted from ENC's listed in the project instructions and an s57 file of surveyed soundings were compared with the following results.

Survey H13451 surveyed soundings exhibit 0 instances where surveyed soundings are shoal to charted soundings by greater than 1m.

D.1.1 Electronic Navigational Charts

The following are the largest scale ENC's, which cover the survey area:

ENC	Scale	Edition	Update Application Date	Issue Date
US3AK61M	1:300000	25	03/20/2019	09/29/2020

Table 12: Largest Scale ENC's

D.1.2 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.3 Charted Features

One submerged buoy charted 55-02-49.92N 165-05-40.08W was investigated to full coverage with a radius of 500m from the charted feature. No submerged buoy was located. Refer to the Final Feature File (FFF) for further detail.

D.1.4 Uncharted Features

No uncharted features exist for this survey.

D.1.5 Channels

No channels exist for this survey. There are no designated anchorages, precautionary areas, safety fairways, traffic separation schemes, pilot boarding areas, or channel and range lines within the survey limits.

D.2 Additional Results**D.2.1 Aids to Navigation**

No Aids to Navigation (ATONs) exist for this survey.

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

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

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.

Report Name	Report Date Sent
Data Acquisition and Processing Report	2021-10-24
Coast Pilot Report	2021-07-26

Approver Name	Approver Title	Approval Date	Signature
Allison C Stone	Chief of Party	10/25/2021	Allison C Stone Digitally signed by Allison C Stone Date: 2021.10.25 16:04:25 -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