

# H13450

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

## DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: H13450

### LOCALITY

State(s): Alaska

General Locality: Unimak Island, AK

Sub-locality: 3NM North of Cape Mordvinoff

**2021**

CHIEF OF PARTY  
Allison Stone

### LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION		REGISTRY NUMBER:
<b>HYDROGRAPHIC TITLE SHEET</b>		<b>H13450</b>
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):	<b>Alaska</b>	
General Locality:	<b>Unimak Island, AK</b>	
Sub-Locality:	<b>3NM North of Cape Mordvinoff</b>	
Scale:	<b>40000</b>	
Dates of Survey:	<b>07/16/2021 to 07/20/2021</b>	
Instructions Dated:	<b>04/02/2021</b>	
Project Number:	<b>OPR-Q350-KR-21</b>	
Field Unit:	<b>Fugro USA Marine, Inc.</b>	
Chief of Party:	<b>Allison Stone</b>	
Soundings by:	<b>Multibeam Echo Sounder</b>	
Imagery by:	<b>Multibeam Echo Sounder Backscatter</b>	
Verification by:	<b>Pacific Hydrographic Branch</b>	
Soundings Acquired in:	<b>meters at Mean Lower Low Water</b>	
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 <a href="https://www.ncei.noaa.gov/">https://www.ncei.noaa.gov/</a>. 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>		

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## Descriptive Report to Accompany Survey H13450

Project: OPR-Q350-KR-21

Locality: Unimak Island, AK

Sublocality: 3NM North of Cape Mordvinoff

Scale: 1:40000

July 2021 - July 2021

**Fugro USA Marine, Inc.**

Chief of Party: Allison Stone

### A. Area Surveyed

Survey H13450(Figure 1 and Table 1) is located 3 nautical miles North of Cape Mordvinoff on Unimak Island, AK. This area is utilized extensively by vessels involved in diverse fishery activities in the region, including cod and crab.

The R/V Woldstad and Skiff acquired 500m set line spaced Multibeam Echosounder (MBES) and Multibeam Echosounder Acoustic Backscatter (MBAB) within the assigned survey limits from 16 July to 20 July 2021 (Tables 2-4).

#### A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
55° 5' 57.09" N 164° 42' 29.26" W	55° 2' 27.96" N 164° 16' 34.28" W

*Table 1: Survey Limits*

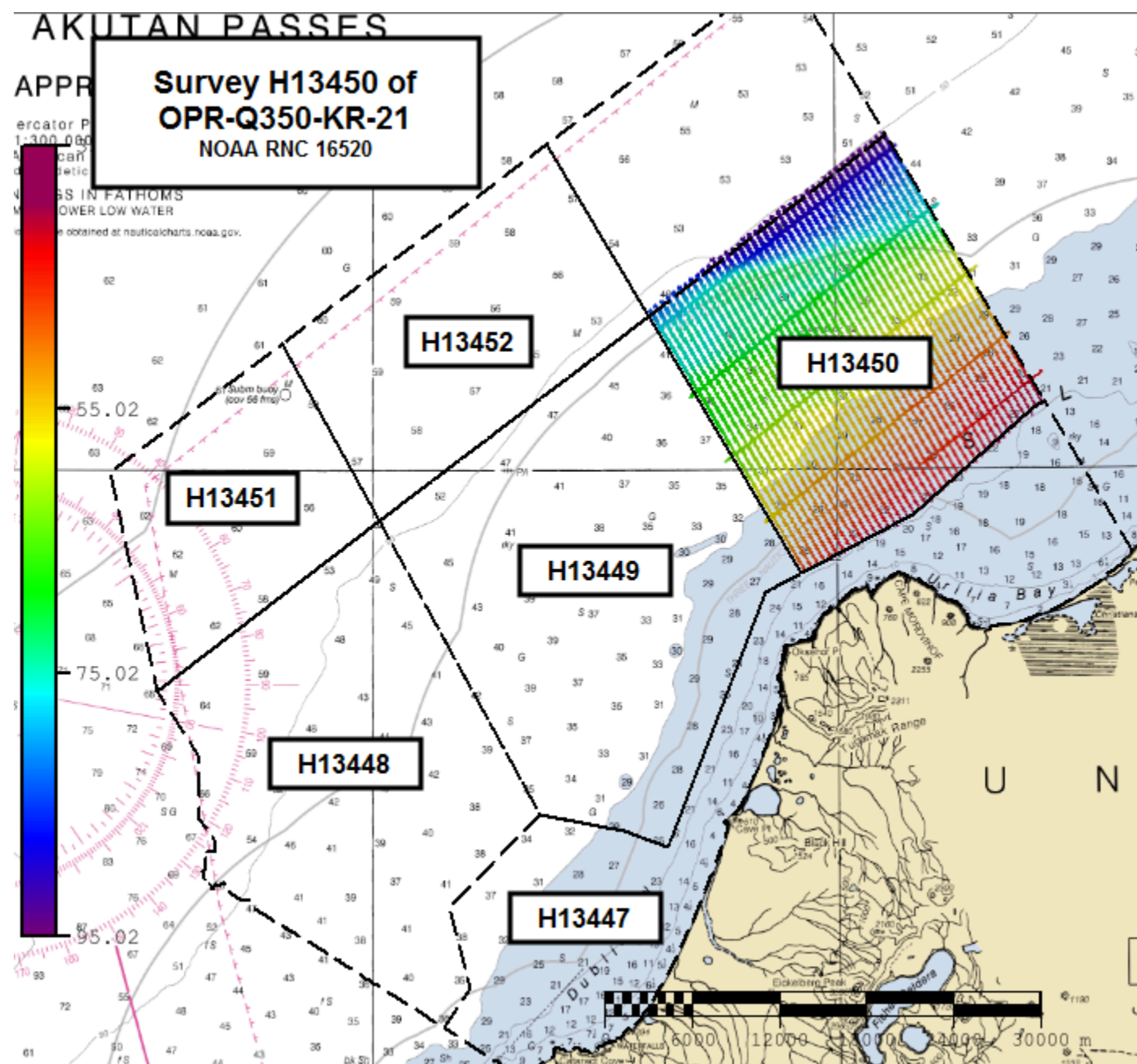


Figure 1: Survey H13450 relative to overall sheet limits of OPR-Q350-KR-21

Survey limits were acquired in accordance with the requirements set forth in the Project Instructions (PI) and the Hydrographic Surveys Specifications and Deliverables (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 North side of Unimak Island are an important fishing ground for the Bering Sea Pacific Cod and other 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 H13450 (Figures 2-4).

## 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 Sheet7	320m Set Line Spacing (Reference HSSD Section 5.2.2.4 Option A). Note: The requirement to verify or disprove all charted depths falling between sounding lines and shallower than adjacent surveyed soundings is waived. Note: after assessing set line spacing at 320m, both HSD PM and Fugro PM determined 500m set line spacing to be a more effective spacing for meeting data acquisition goals.

*Table 2: Survey Coverage*

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

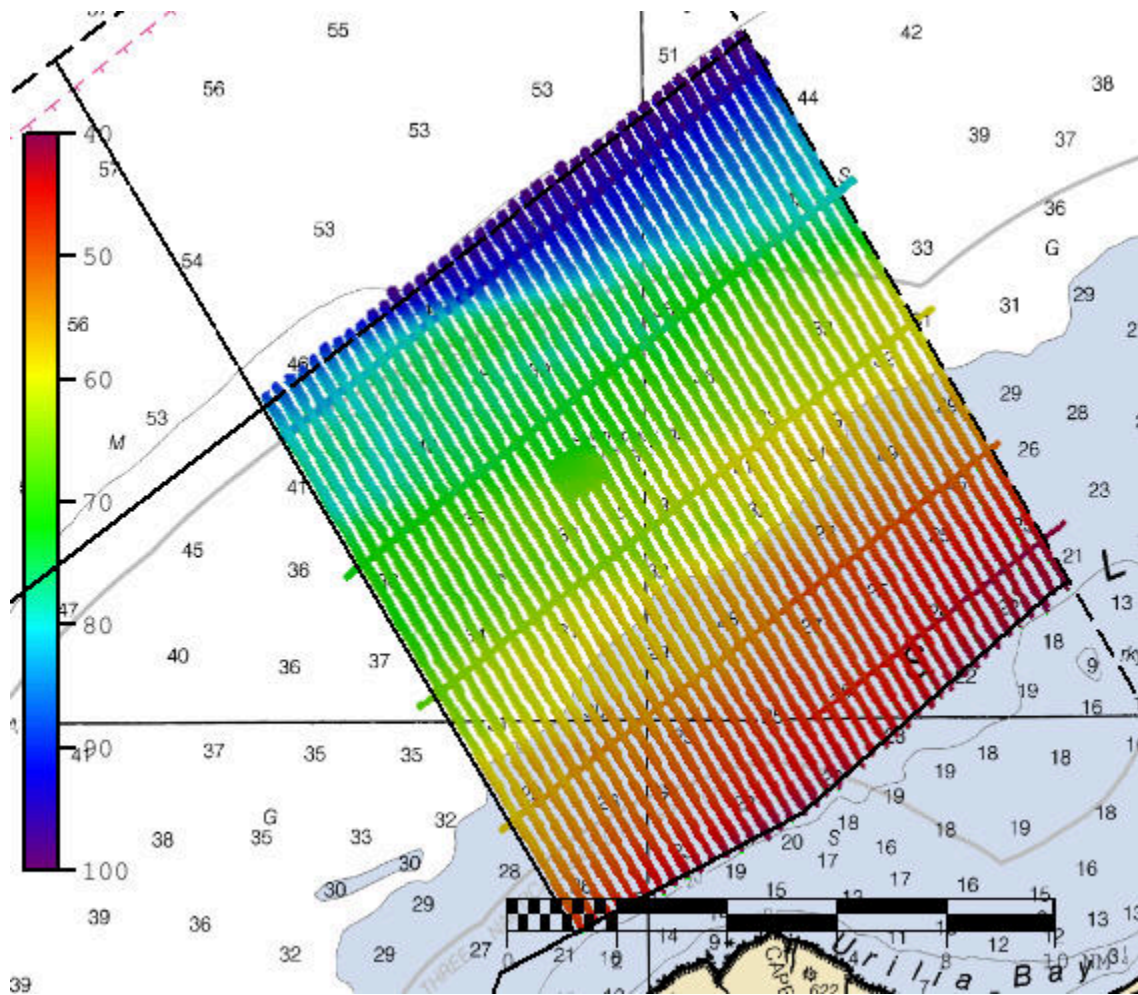
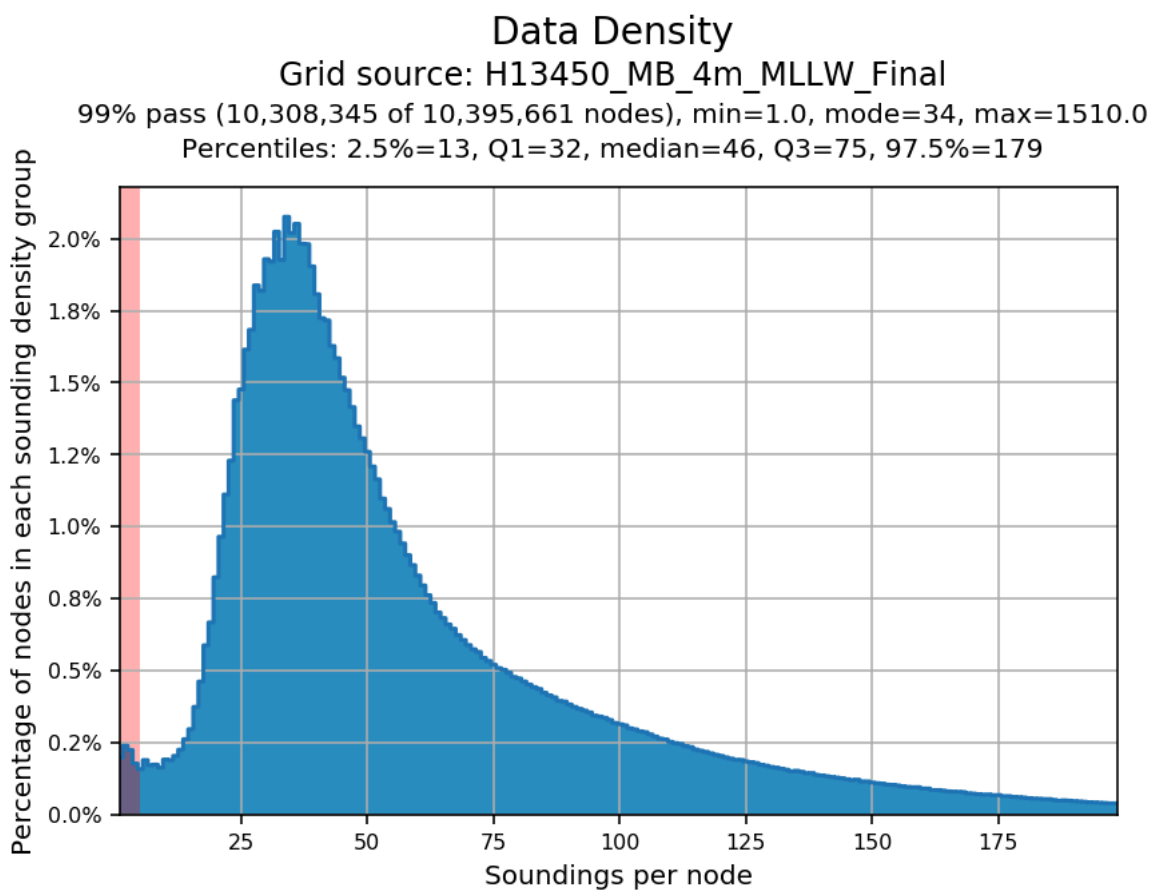
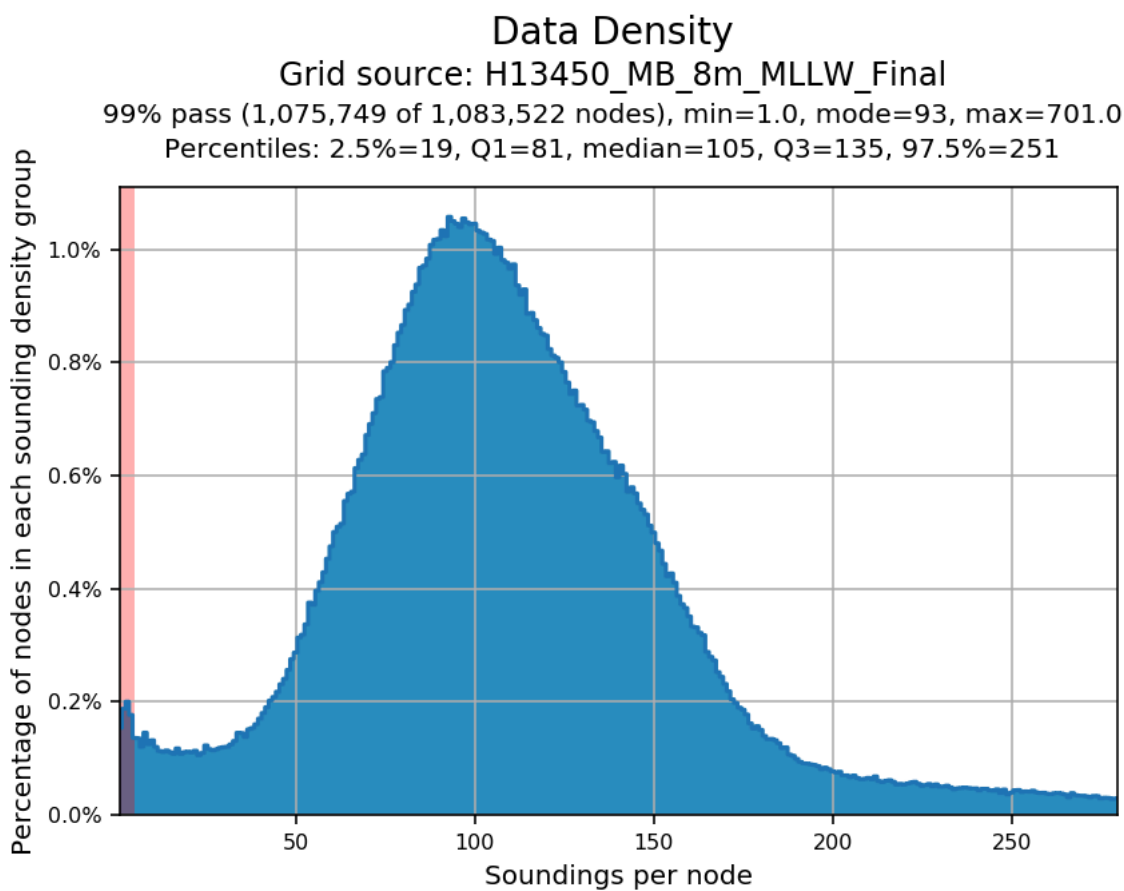


Figure 2: Survey H13450 MBES coverage





*Figure 3: Survey H13450 4m finalized set line MBES density QC*



*Figure 4: Survey H13450 8m finalized set line MBES density QC*

## A.6 Survey Statistics

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

	<b>HULL ID</b>	<i>R/V Woldstad</i>	<i>Skiff</i>	<i>Total</i>
<b>LNM</b>	<b>SBES Mainscheme</b>	0	0	0
	<b>MBES Mainscheme</b>	404.17	96.09	500.26
	<b>Lidar Mainscheme</b>	0	0	0
	<b>SSS Mainscheme</b>	0	0	0
	<b>SBES/SSS Mainscheme</b>	0	0	0
	<b>MBES/SSS Mainscheme</b>	0	0	0
	<b>SBES/MBES Crosslines</b>	53.99	0	53.99
	<b>Lidar Crosslines</b>	0	0	0
<b>Number of Bottom Samples</b>				6
<b>Number Maritime Boundary Points Investigated</b>				0
<b>Number of DPs</b>				0
<b>Number of Items Investigated by Dive Ops</b>				0
<b>Total SNM</b>				137.71

*Table 3: Hydrographic Survey Statistics*

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

<b>Survey Dates</b>	<b>Day of the Year</b>
07/16/2021	197

<b>Survey Dates</b>	<b>Day of the Year</b>
07/17/2021	198
07/18/2021	199
07/19/2021	200
07/20/2021	201

*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:

<b>Hull ID</b>	<b><i>R/V Woldstad</i></b>	<b><i>Skiff</i></b>
<b>LOA</b>	121 feet	23 feet
<b>Draft</b>	12 feet	1 feet

*Table 5: Vessels Used*



*Figure 5: R/V Woldstad*





*Figure 6: Skiff*

R/V Woldstad (Table 5 and Figure 5) and the Skiff (Table 5 and Figure 6) acquired MBES, MBAB, surface sound velocity, sound velocity profiles, attitude, and positioning data within the survey limits of H13450 (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:

<b>Manufacturer</b>	<b>Model</b>	<b>Type</b>
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
AML Oceanographic	3-RT Velocity Probe	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 H13450 were acquired in accordance with section 5.2.4.2 of the HSSD 2020 (Figure 7). Mainscheme to crossline mileage percentage across H13450 is 10.79%. Of the 515,345 grid nodes compared between H13450 mainscheme MBES and MBES crosslines, 100% were within 1m difference. The mean difference is 0.00m, with a standard deviation of 0.14m (Figure 8).

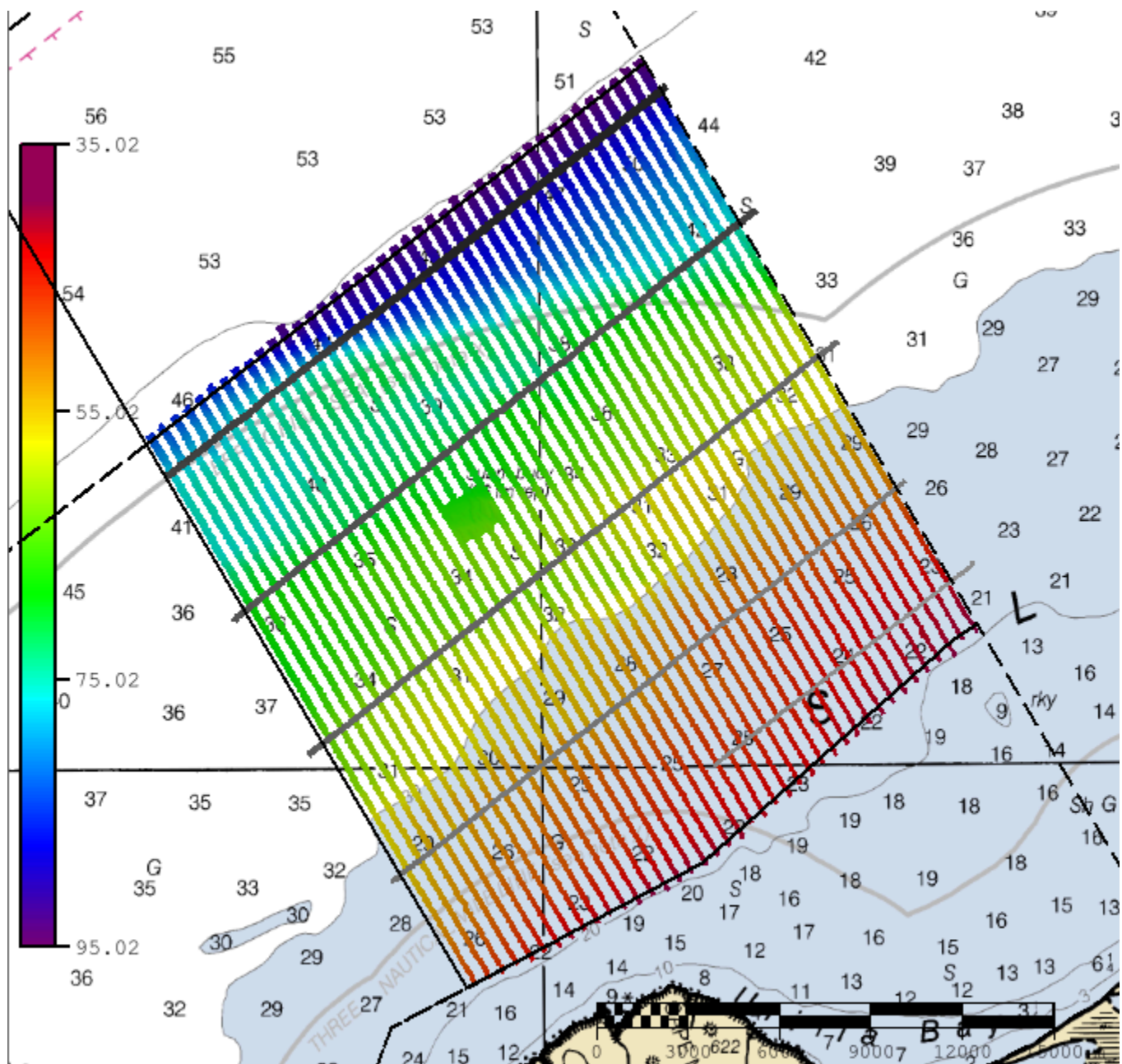


Figure 7: H13450 MBES mainscheme and MBES crossline distribution



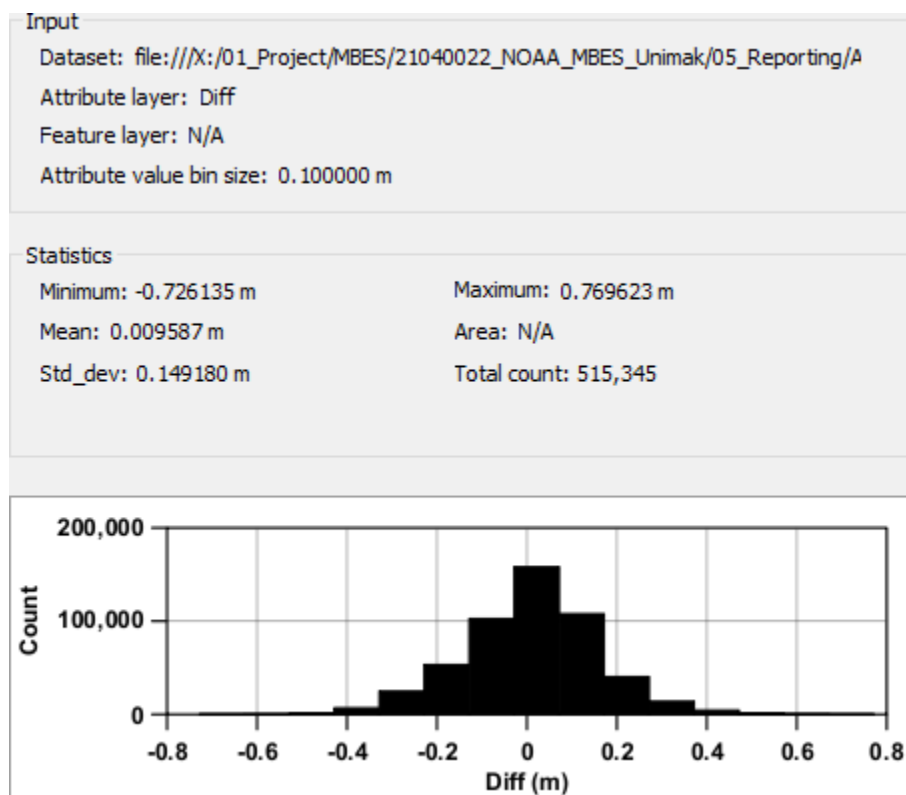


Figure 8: H13450 MBES mainscheme differenced from MBES crosslines statistical output

### B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

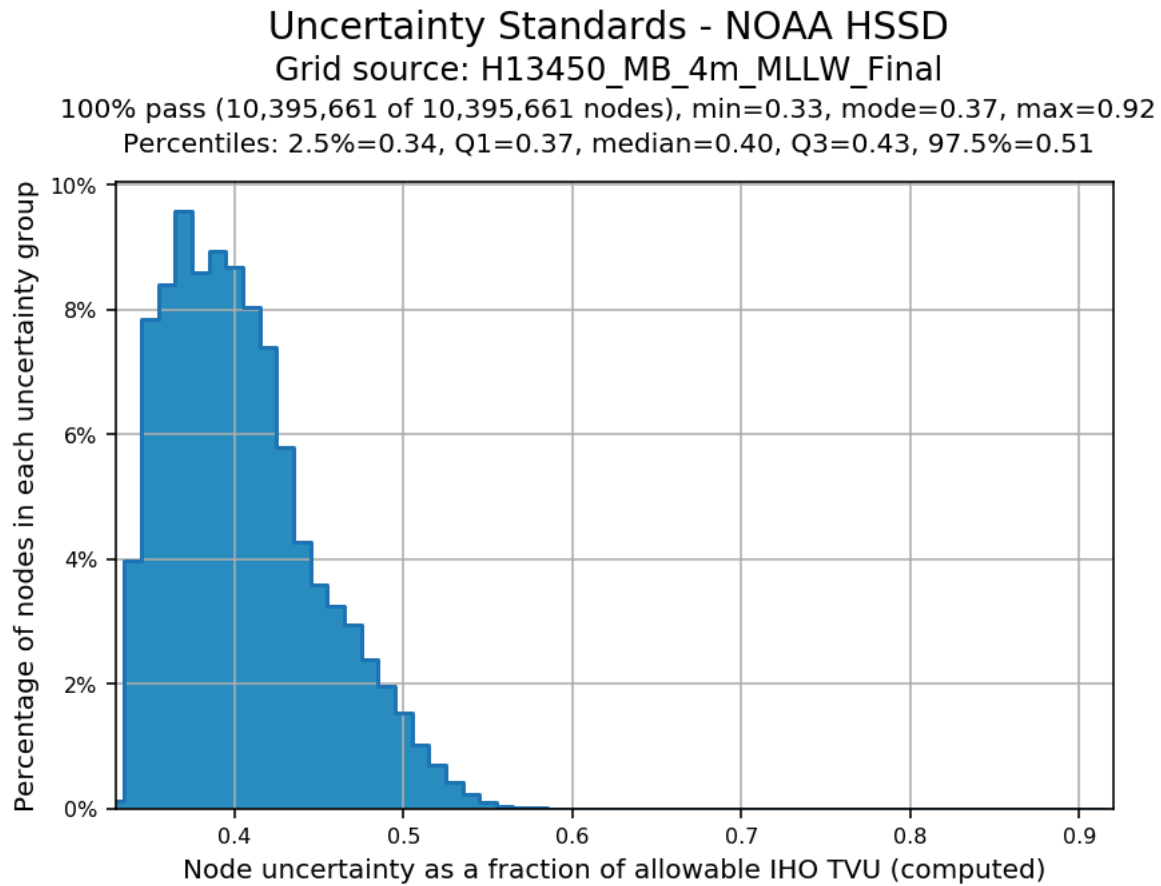
Method	Measured	Zoning
ERS via VDATUM	0.08 meters	0.101 meters

Table 7: Survey Specific Tide TPU Values.

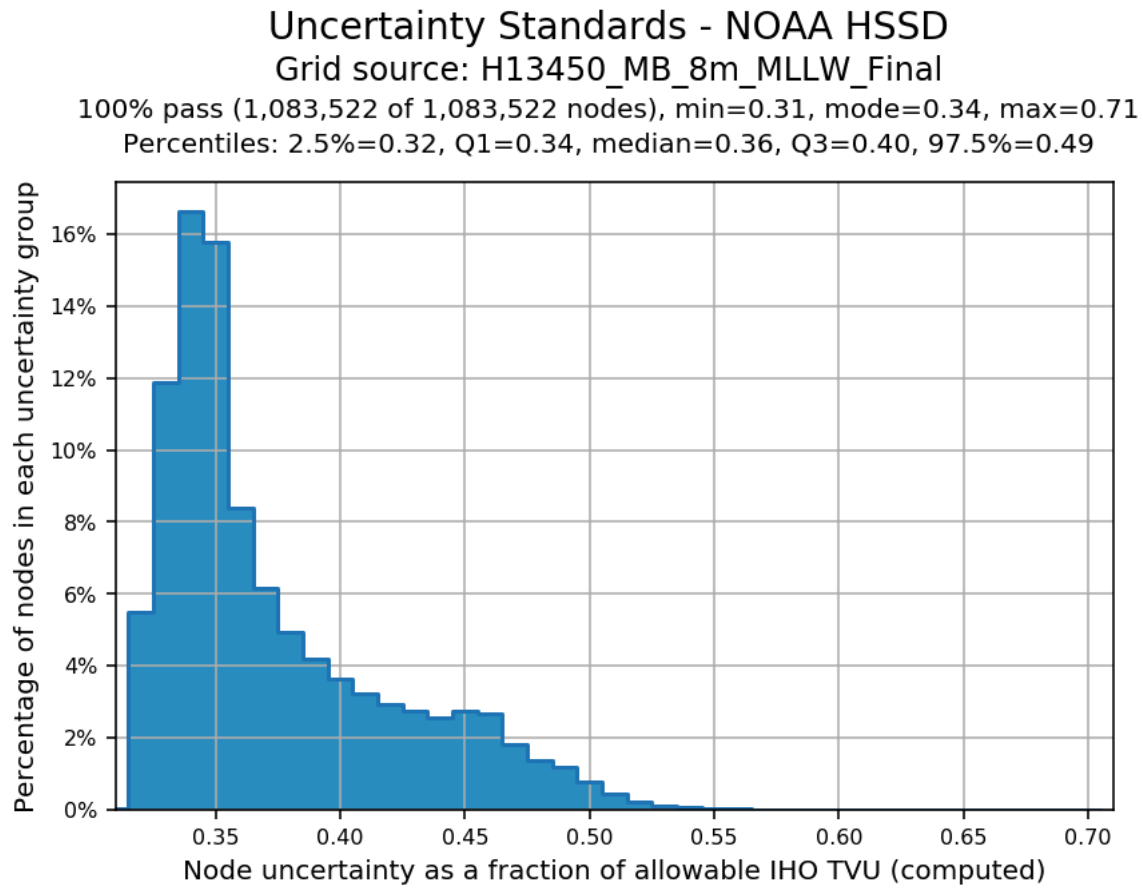
Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
R/V Woldstad	2.5826 meters/ second	N/A meters/second	N/A meters/second	0.25 meters/second
Skiff	2.6044 meters/ second	N/A meters/second	N/A meters/second	0.25 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

Survey H13450 uncertainty values (Tables 7 and 8) were evaluated in both CARIS HIPS 10.4 and via Pydro QC Tools v3.4.7. The finalized 4m (Figure 9) and 8m (Figure 10) bathymetric grids meet uncertainty standards with 100% of nodes passing.



*Figure 9: H13450 4m finalized grid TPU QC*



*Figure 10: H13450 8m finalized grid TPU QC*

### B.2.3 Junctions

Two junction surveys are available for comparison to H13450: H13447 and H13449 (Table 9 and Figure 11).

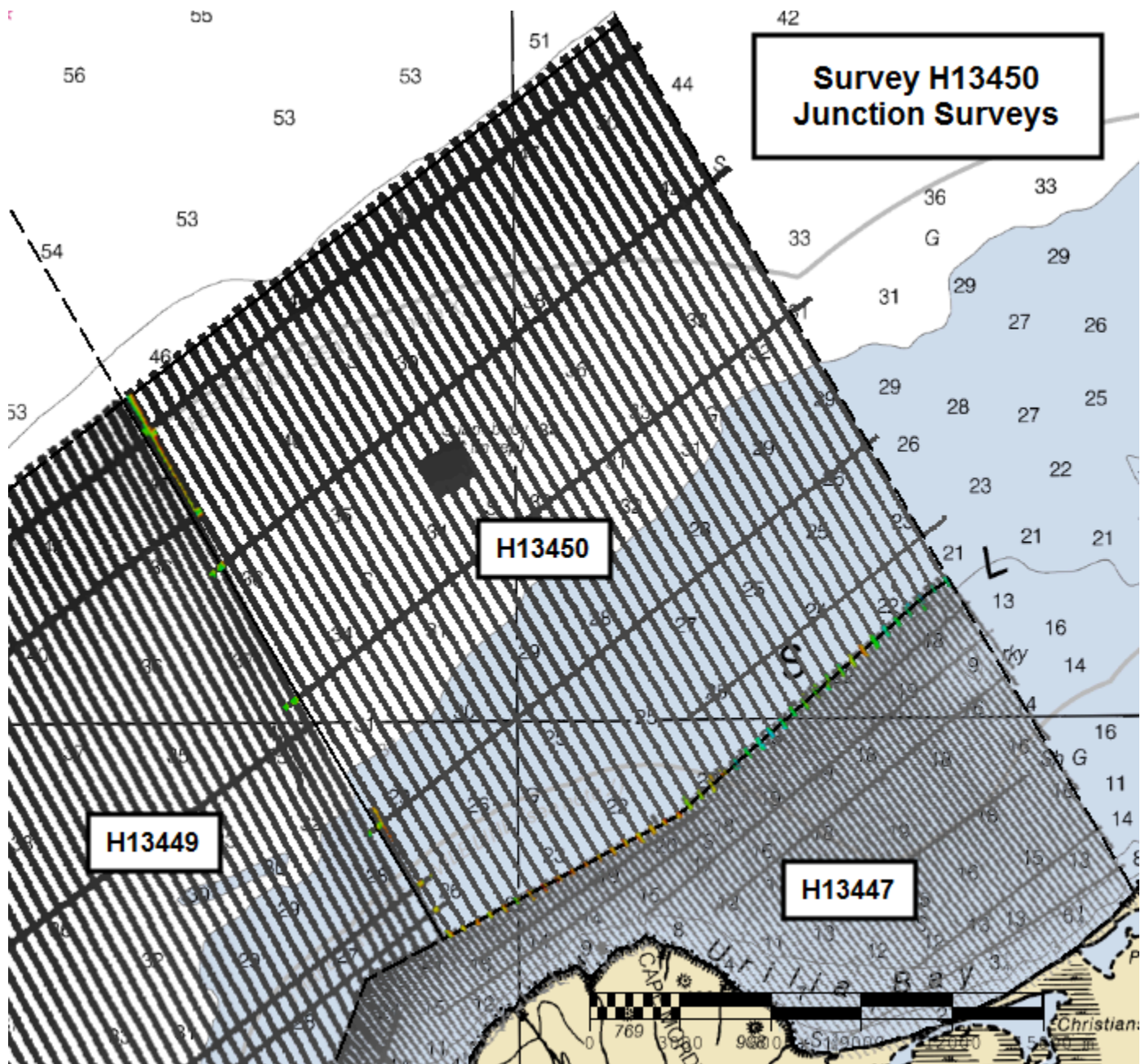


Figure 11: Junction surveys to H13450

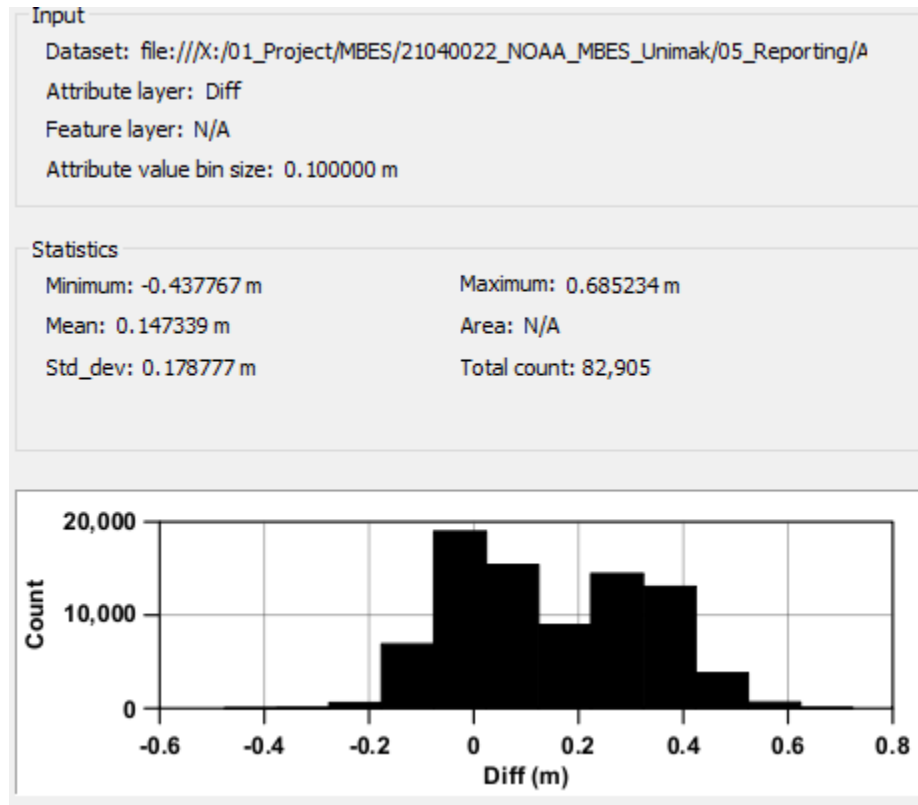
The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H13447	1:40000	2021	Fugro USA Marine, Inc.	S
H13449	1:40000	2021	Fugro USA Marine, Inc.	W

Table 9: Junctioning Surveys

H13447

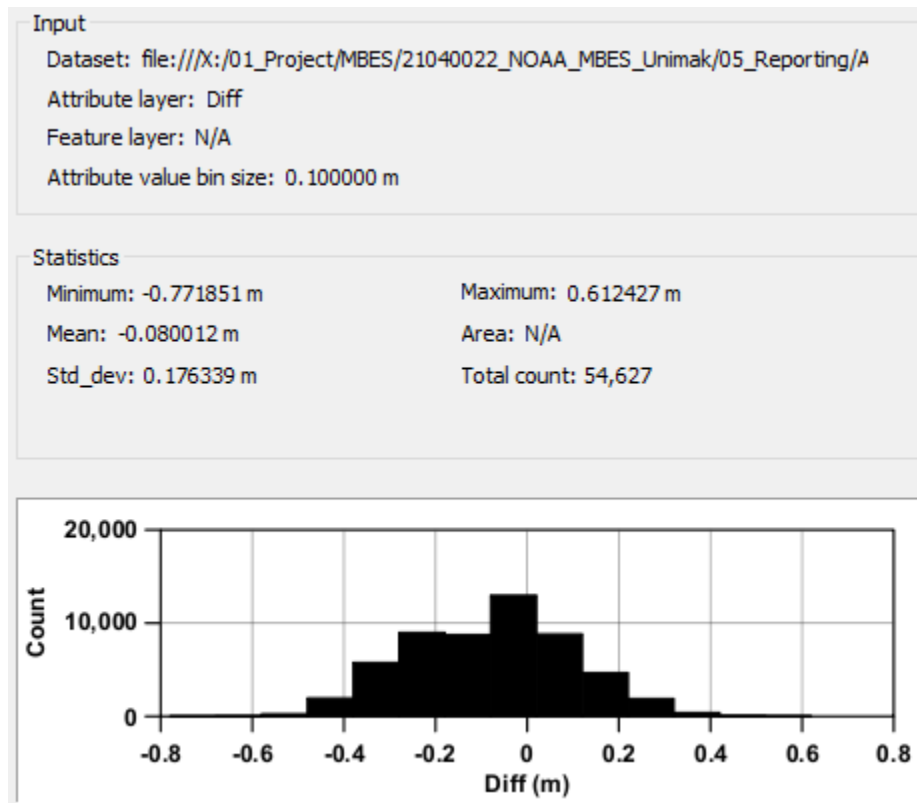
Survey H13447 was acquired by Fugro USA Marine, Inc. in 2021 as a part of OPR-Q350-KR-21. Of the 82,905 grid nodes compared between H13450 and H13447, the mean difference is 0.14m; 100% agree within 1m (Figure 12).



*Figure 12: Survey H13450 junction with Survey H13447*

H13449

Survey H13449 was acquired by Fugro USA Marine, Inc. in 2021 as a part of OPR-Q350-KR-21. Of the 54,627 grid nodes compared between H13450 and H13449 the mean difference is 0.08m; 100% agree within 1m (Figure 13).



*Figure 13: Survey H13450 junction with Survey H13449*

#### **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 and Skiff using a Teledyne Ocean Science Rapid Cast and AML RT-3 SVP, respectively.

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 H13450. 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
H13450_MB_4m_MLLW	CARIS Raster Surface (CUBE)	4 meters	39.16 meters - 95.01 meters	NOAA_4m	MBES Set Line Spacing
H13450_MB_4m_MLLW_Final	CARIS Raster Surface (CUBE)	4 meters	39.16 meters - 80 meters	NOAA_4m	MBES Set Line Spacing
H13450_MB_8m_MLLW	CARIS Raster Surface (CUBE)	8 meters	39.19 meters - 94.94 meters	NOAA_8m	MBES Set Line Spacing
H13450_MB_8m_MLLW_Final	CARIS Raster Surface (CUBE)	8 meters	72 meters - 94.94 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 were 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

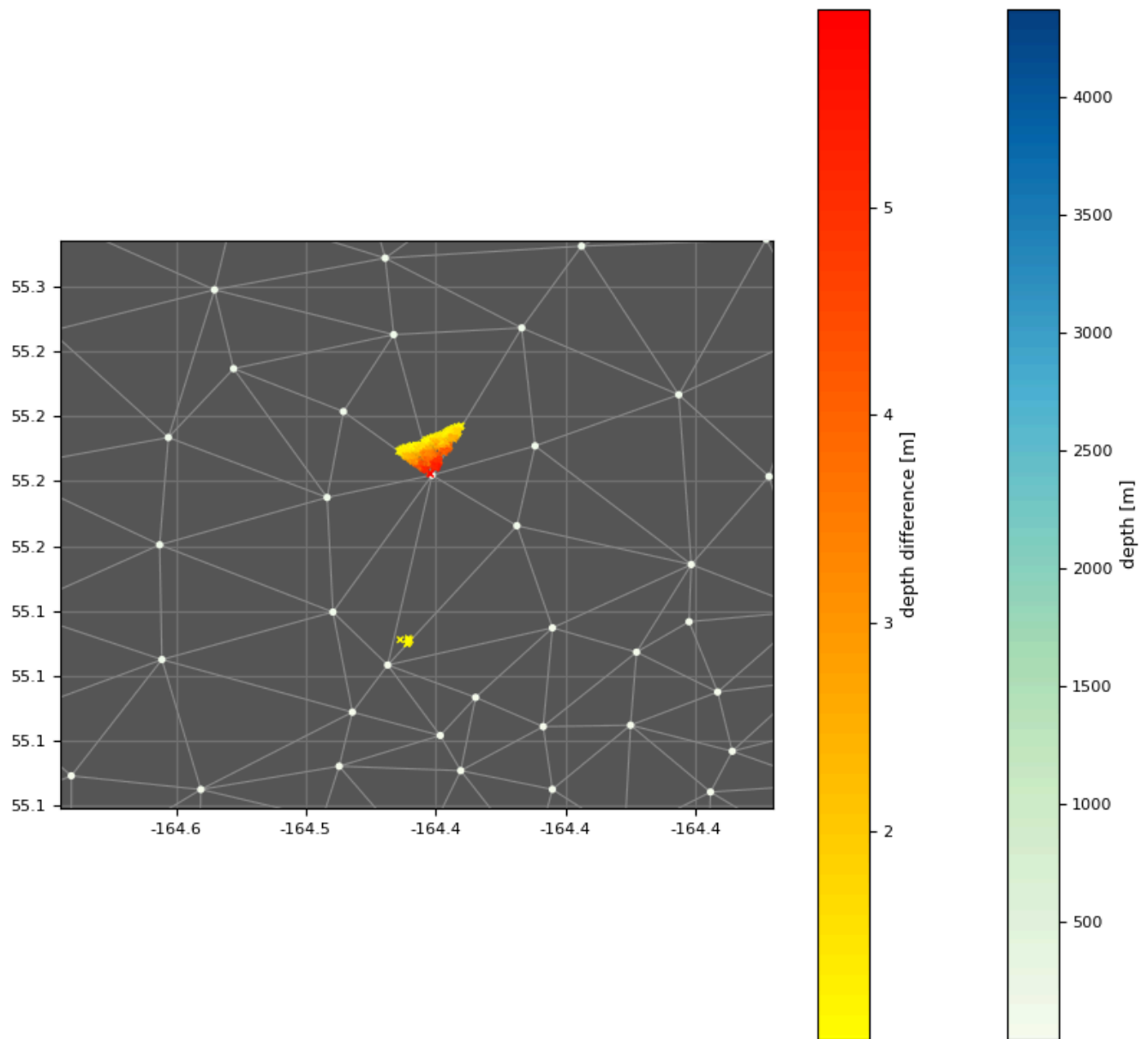
All positioning and attitude data associated with OPR-Q350-KR-21 were post-processed in POSPac MMS using PP-RTX methods.

## 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 the ENC listed in the project instructions and an s57 file of surveyed soundings were compared with the following results.

Survey H13450 surveyed soundings exhibit 278 instances where surveyed soundings are shoal to charted soundings by greater than 1m (Figure 14). The maximum instance of survey soundings being shoal to charted soundings is 5.952m in the vicinity of 55-10-39.8816N 164-27-07.1676W (Figure 15).



*Figure 14: Pydro QC Tools chart review output of surveyed soundings shoal to charted soundings*

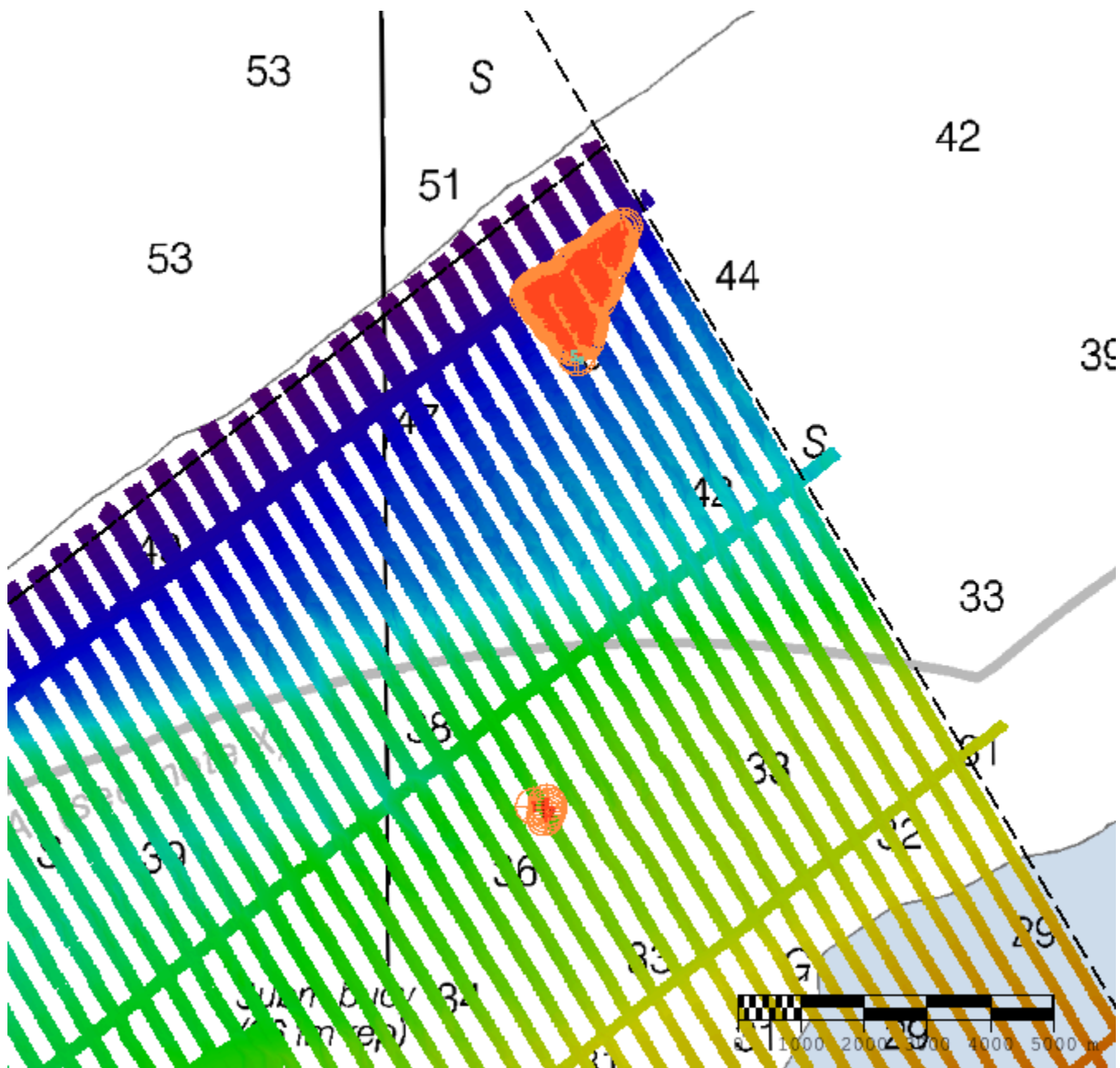


Figure 15: Pydro QC Tools chart review output of surveyed soundings shoal to charted soundings

### 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 charted submerged buoy exists within the survey limits of H13450. Refer to the 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**

Six bottom samples were required for Survey H13450. Refer to the FFF for further detail.

**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	11/01/2021	Allison C Stone Digitally signed by Allison C Stone Date: 2021.11.01 13:44:23 -05'00'

## F. Table of Acronyms

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

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



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