

H13873

50 NM Southeast of Kodiak Island

OPR-P337-FA-24
Seascape
Alaska

Responsible Party

DOC/NOAA/NOS/OCS --
Office of Coast Survey

Contact Information

hsd.chief@noaa.gov

Field Unit

NOAA Ship Fairweather (S220)

Survey Dates

April 01, 2024 - May 03, 2024

License Information

CC0-1.0

Approver

CAPT Meghan McGovern

Platform and Sonar Equipment

NOAA Ship Fairweather (S220)

Kongsberg Maritime EM 712

Bathymetry Grid

H13873_MB_VR_MLLW_1of1 (North American Datum 1983 (2011), Mean Lower Low Water, Projected UTM 5)

			Fixed	Variable
Sounding Technique:	Multibeam	Full Seafloor Coverage:	Yes	Feature Detection Size: 2.0m 10%
Features Detected:	Yes	Bathymetric Coverage:	Yes	Uncertainty Horizontal: 5m 5%
Least Depth Detected:	Yes	Interpolated:	No	Uncertainty Vertical: 0.5m 1%

Quality Control Procedure

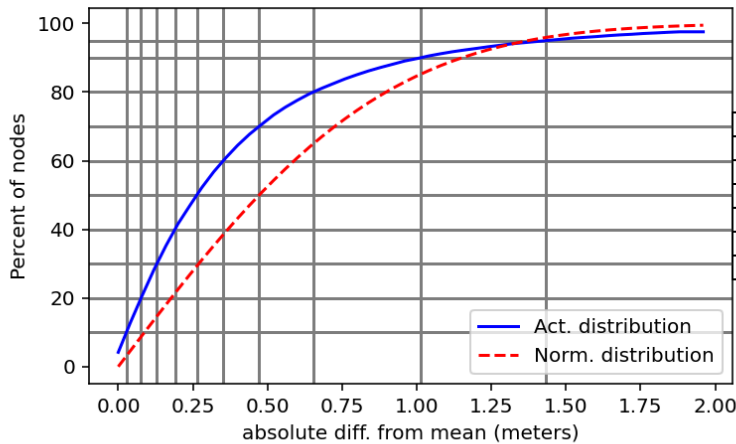
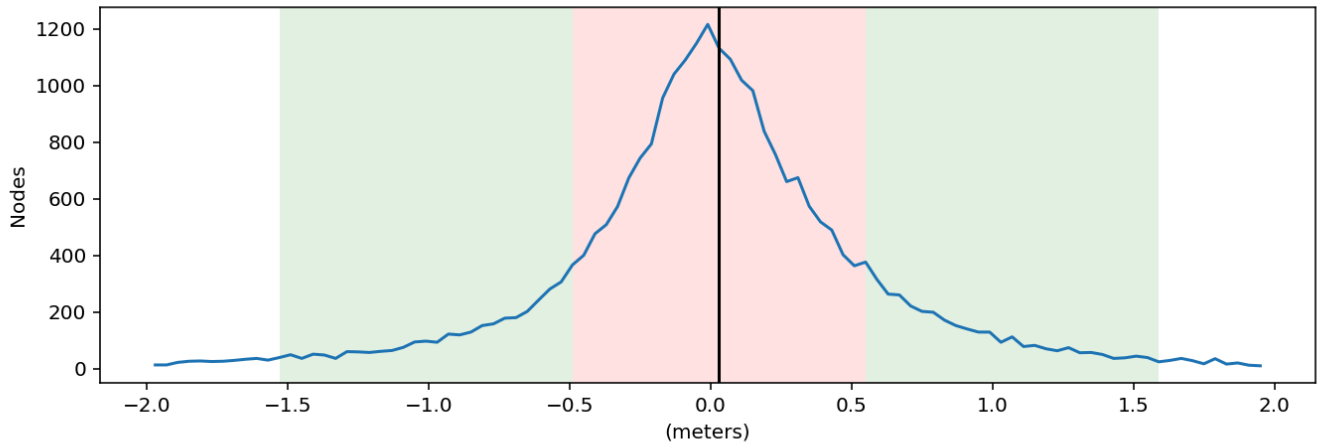
Crosslines

As a quality control measure, 3.17% of survey linear nautical miles were acquired as crosslines, not meeting the required 4% by the 2024 HSSD. Time and maintenance restraints resulted in ending acquisition before sufficient crosslines were acquired. A surface containing data strictly from mainscheme lines and a surface containing data strictly from crosslines were generated and compared with the tool Compare Grids in Pydro 24. The results of this comparison indicate that 100% of grid-node comparisons between the two grids are within the Allowable Error Fraction for depth, exceeding the specification of 95% stipulated by NOAA's 2024 Hydrographic Surveys Specifications and Deliverables (HSSD). The resulting mean of this comparison was a 0.03m difference, with a standard deviation of 0.70m.



A statistical summary of the comparison between H13873 crossline and mainscheme data, NOAA Exceptional.

H13873_MB_VR_MLLW_MS_Final-H13873_MB_VR_MLLW_XL_Final
 Mean: 0.03 | Mode: -0.01 | One Standard Deviation: 0.70 | Bin Size: 0.04

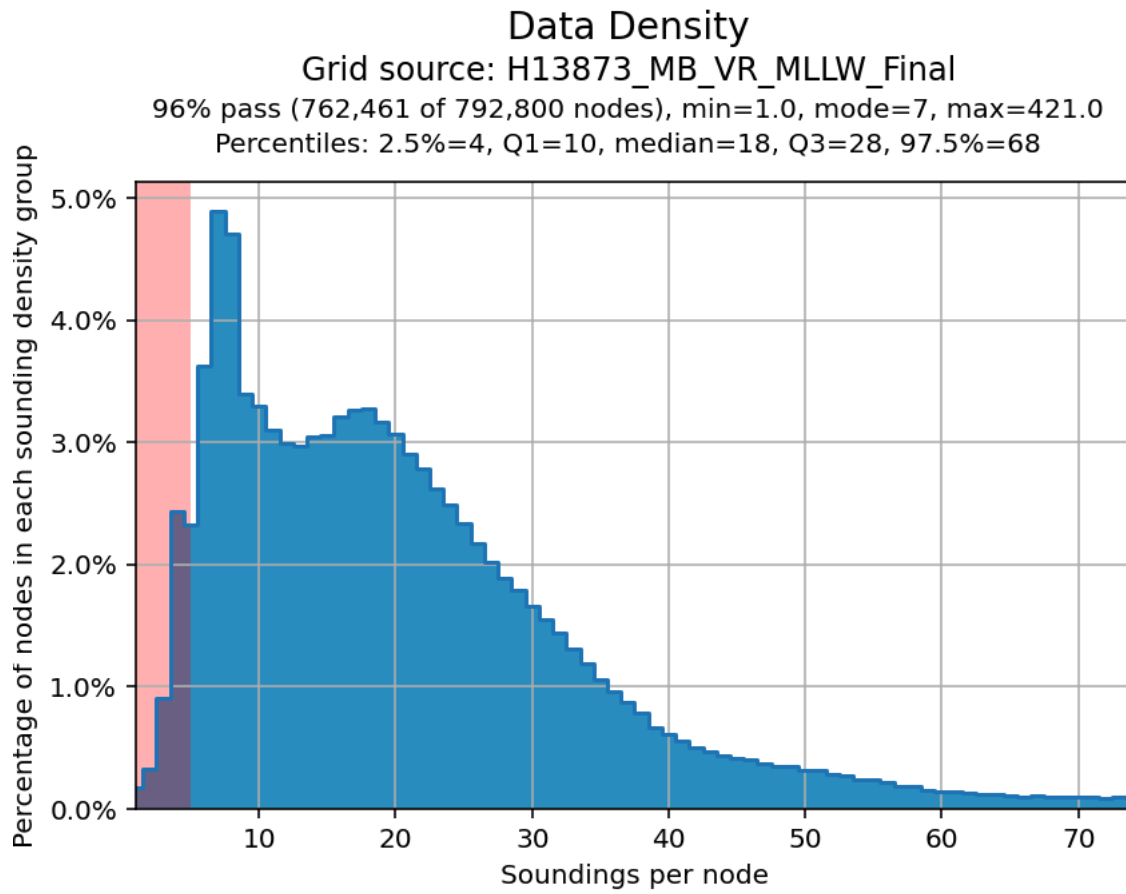


Percent of nodes	Deviation (m)
50%	+/- 0.26
60%	+/- 0.35
70%	+/- 0.47
80%	+/- 0.65
90%	+/- 1.01
95%	+/- 1.43

A statistical summary of the comparison between H13873 crossline and mainscheme data, NOAA Exceptional.

Statistical Analysis

Statistical analysis of grid layers was conducted to assess the quality of the bathymetry. The Grid QC program contained within NOAA's Pydro 24 QC Tools was used to assess grid density, resolution, and uncertainty against allowable standards specified in the most recent edition of the HSSD. This survey was assigned to the field unit to be acquired as quality metric General 1; the delivered grid exceeds this metric. The uncertainty metrics reported in the Metadata reflect the highest quality metric that was achieved for the grid.



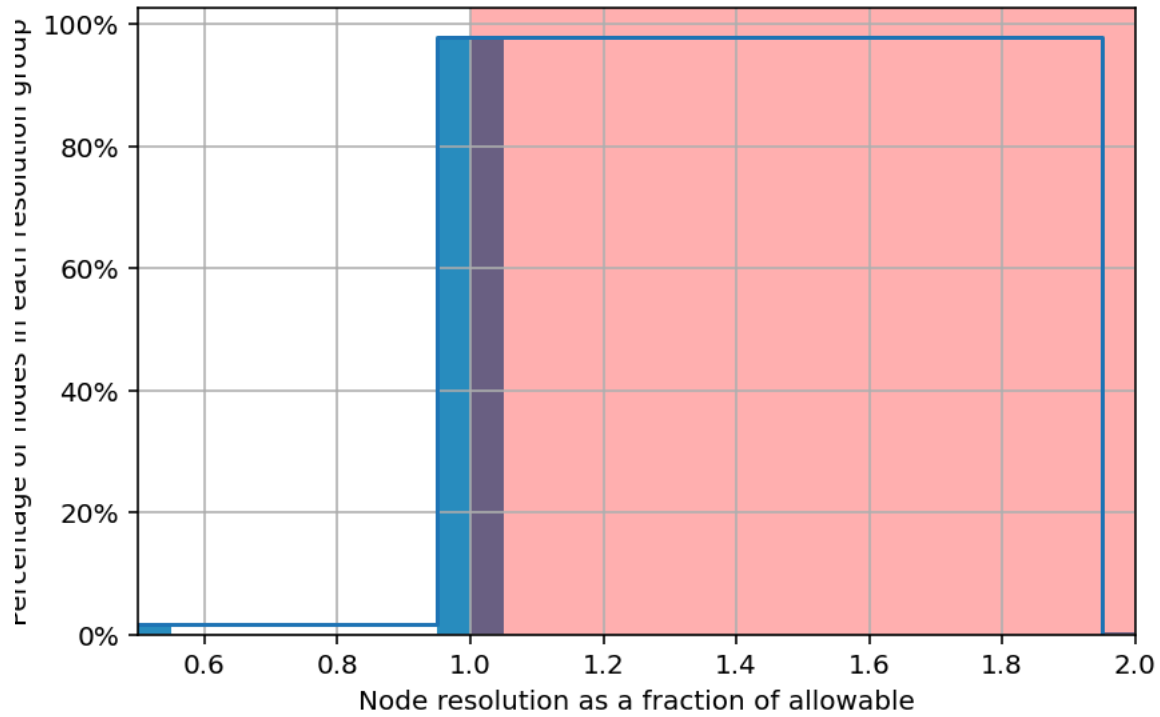
H13873 density statistics, NOAA Exceptional.

Resolution Requirements - NOAA General 1

Grid source: H13873_MB_VR_MLLW_Final

99.5+% pass (790,010 of 792,800 nodes), min=0.50, mode=1.0, max=2.00

Percentiles: 2.5%=1.0, Q1=1.0, median=1.0, Q3=1.0, 97.5%=1.0



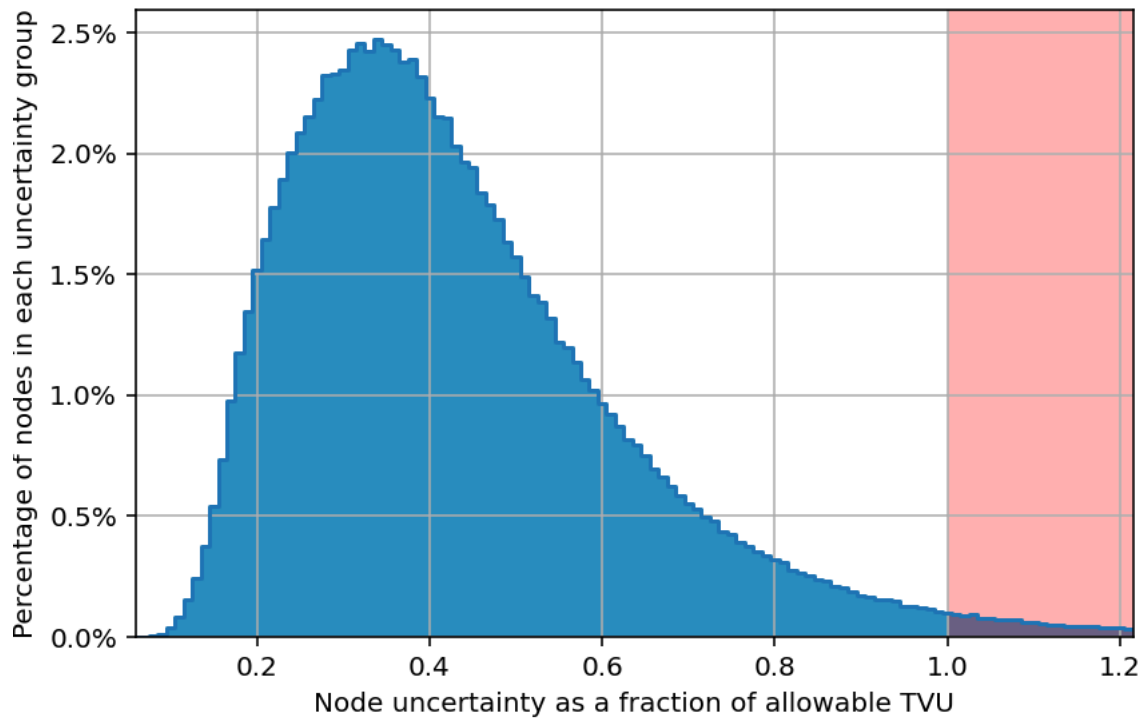
H13873 resolution statistics, NOAA General 1.

Uncertainty Standards - NOAA Exceptional

Grid source: H13873_MB_VR_MLLW_Final

98% pass (776,762 of 792,800 nodes), min=0.06, mode=0.34, max=5.59

Percentiles: 2.5%=0.17, Q1=0.29, median=0.40, Q3=0.53, 97.5%=0.96



H13873 uncertainty statistics, NOAA Exceptional.

Directed Editing

Multibeam echosounder (MBES) data was inspected and edited to ensure no systematic errors were present and to remove erroneous fliers. Teledyne's CARIS software was used to generate and examine a VR CUBE surface as well as its uncertainty and standard deviation layers, which guided visual inspection for fliers. Editing was done in Subset Editor, rejecting data deemed false aspects of the seafloor. Flier Finder, part of the QC Tools package in Pydro 24, was used to assist the search for spurious soundings. Flier Finder was run iteratively until all remaining flagged fliers were deemed to be valid aspects of the seafloor.

Holiday Identification

Pydro 24 Holiday Finder tool scanned the CUBE surfaces for any empty grid nodes that were surrounded by populated nodes, and flagged gaps in coverage that were larger than the 2024 HSSD specifications. All flags were then visually inspected in CARIS Subset Editor to determine the validity of each holiday. All confirmed holidays were addressed and all reasonable attempts were made to acquire missing coverage.

Survey Adequacy

This entire survey is adequate to supersede all previous data. The data in this survey were acquired in accordance with requirements set in the 2024 NOS Hydrographic Surveys Specifications and Deliverables (HSSD) unless otherwise noted in this report.

H13873

Imagery Coverage

Imagery coverage assessment was not performed for this survey

Data Interpolation

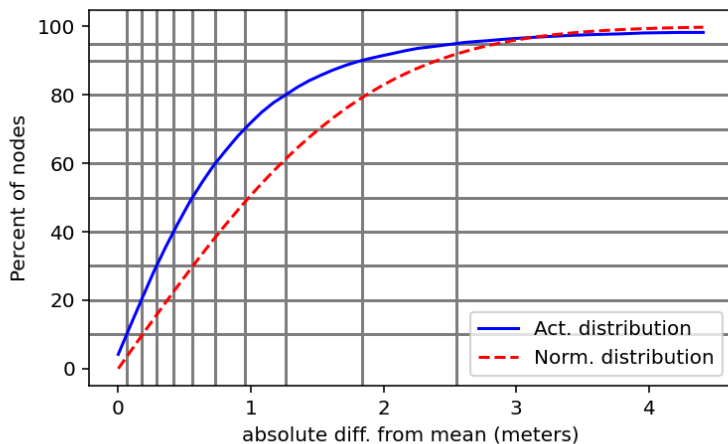
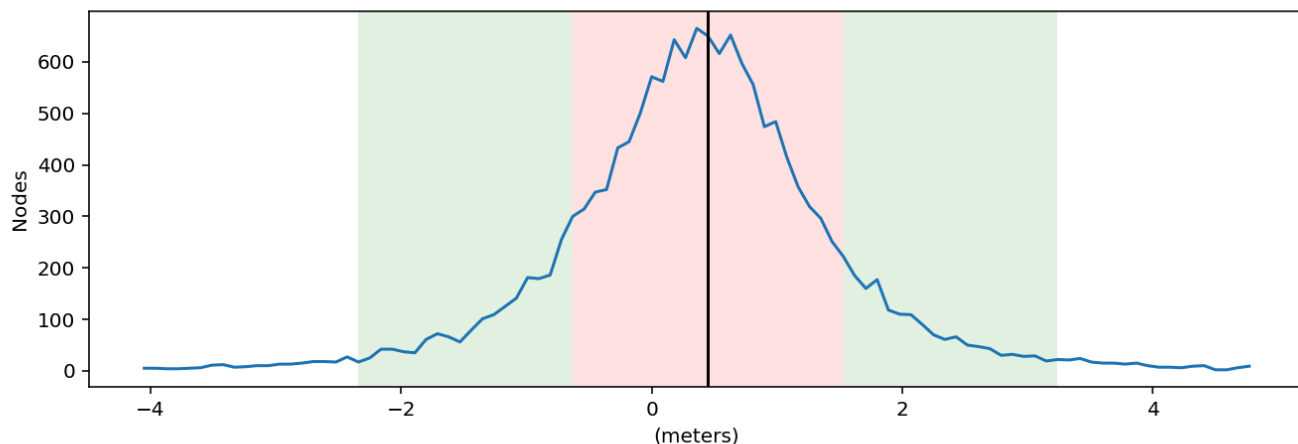
Data interpolation was not performed for this survey

Junction Overlap

Survey H13873 junctions with two surveys, D00260 and H13821. The Pydro 24 tool Compare Grids, discussed in Crosslines, was utilized to assess the overlap of these junctions. The results of these junctions are shown in the statistics below. At the time of this report the grid for H13821 had not yet been verified by the Pacific Hydrographic Branch.

The results between H13873 and H13821 indicate that 99.74% of grid-node comparisons are within Allowable Error Fraction Exceptional standards for depth, exceeding the specification of 95% stipulated by NOAA's 2024 HSSD. The resulting mean of this comparison was -0.13m, with a standard deviation of 1.26m which is within allowable total vertical uncertainty (TVU) for the area.

H13873_MB_VR_MLLW_Final-D00260_MB_VR_MLLW_Final
 Mean: 0.45 | Mode: 0.36 | One Standard Deviation: 1.46 | Bin size: 0.09



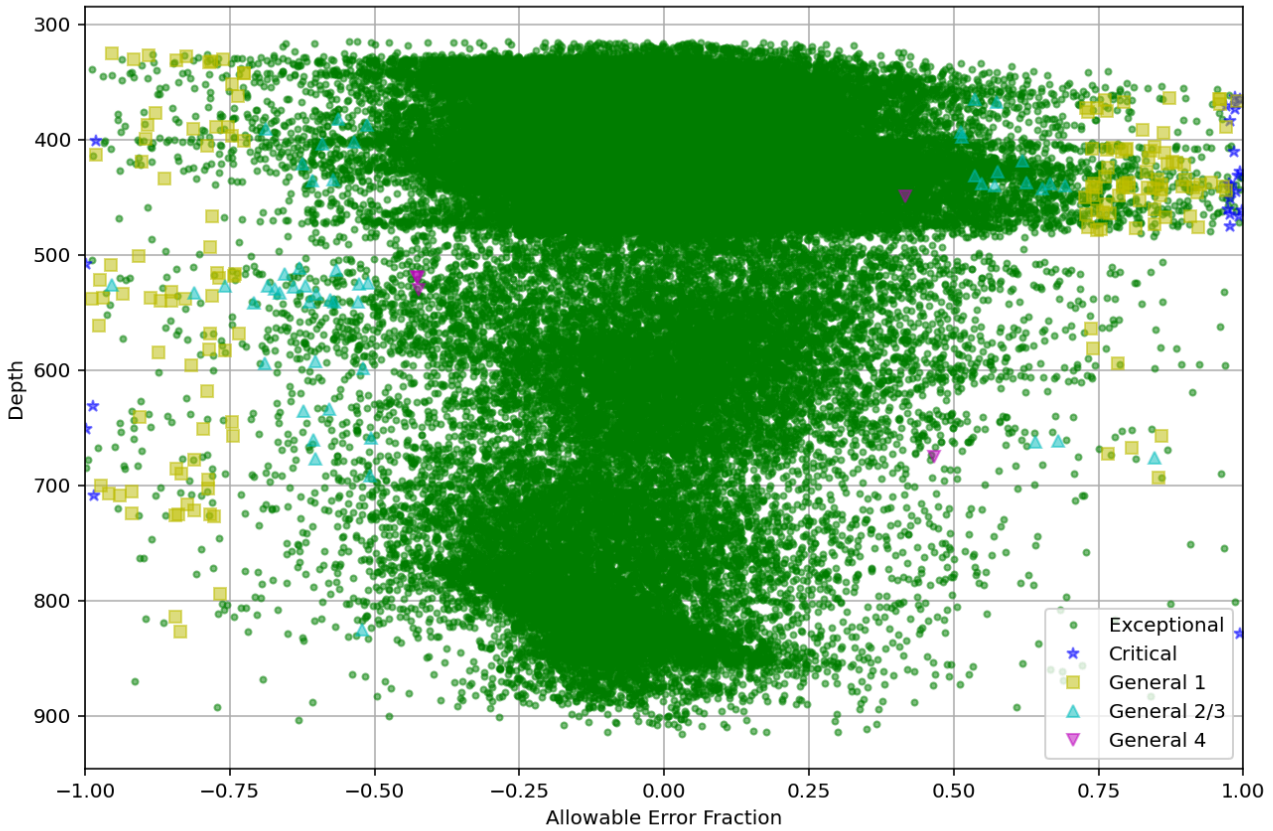
Percent of nodes	Deviation (m)
50%	+/- 0.56
60%	+/- 0.73
70%	+/- 0.95
80%	+/- 1.26
90%	+/- 1.83
95%	+/- 2.55

H13873 and H13821 junction statistics, NOAA Exceptional.

Node Depth vs. Allowable Error Fraction

Total comparisons 89315

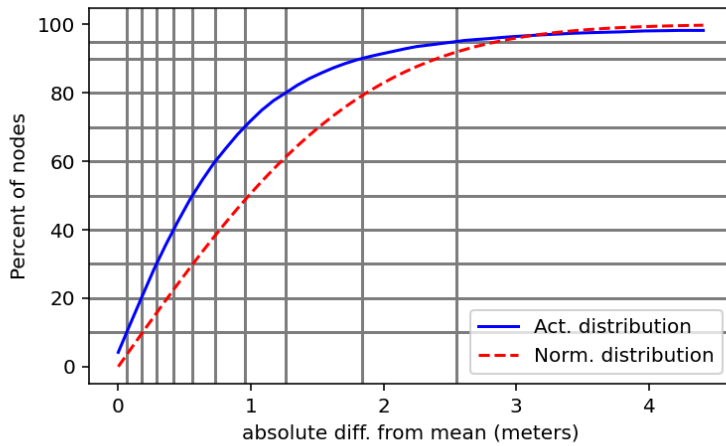
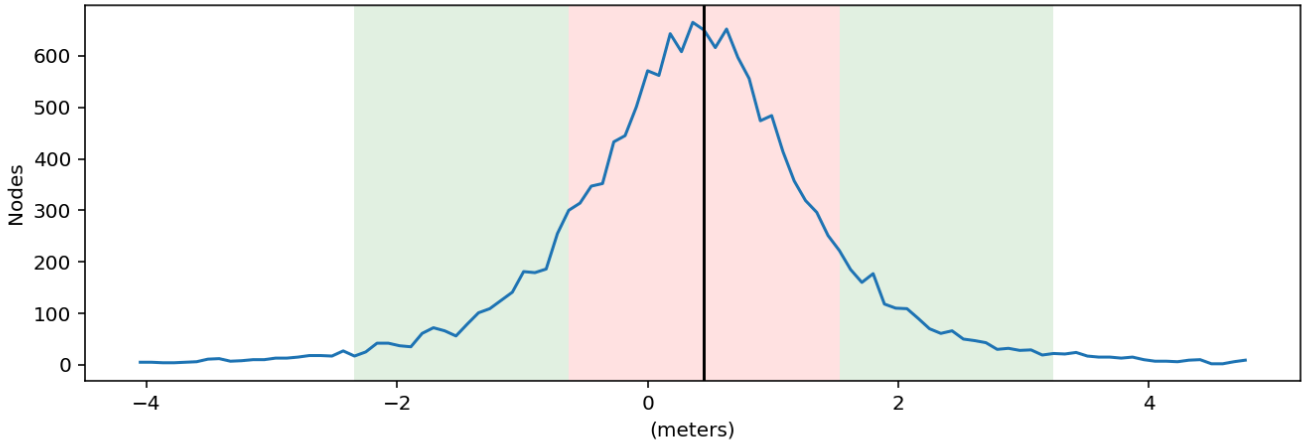
Passed States: Exceptional=99.74%, Critical=99.77%, General 1=99.94%, General 2/3=99.99%, General 4=100.00%,



H13873 and H13821 junction statistics, NOAA Exceptional.

The results between H13873 and D00260 indicate that 99.90% of grid-node comparisons are within Allowable Error Fraction Exceptional standards for depth/height, exceeding the specification of 95% stipulated by NOAA's 2024 HSSD. The resulting mean of this comparison was 0.45m, with a standard deviation of 1.46m which is within allowable TVU for the area.

H13873_MB_VR_MLLW_Final-D00260_MB_VR_MLLW_Final
 Mean: 0.45 | Mode: 0.36 | One Standard Deviation: 1.46 | Bin size: 0.09



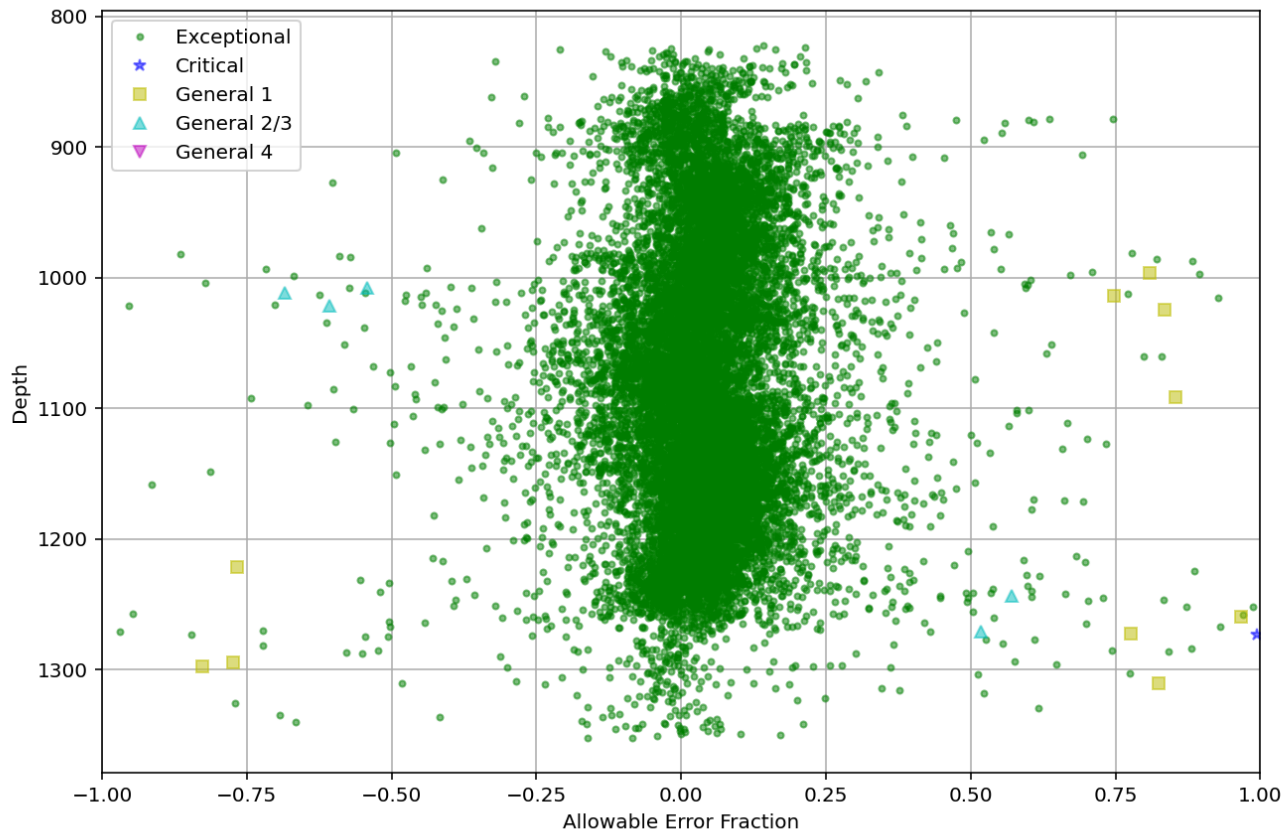
Percent of nodes	Deviation (m)
50%	+/- 0.56
60%	+/- 0.73
70%	+/- 0.95
80%	+/- 1.26
90%	+/- 1.83
95%	+/- 2.55

H13873 and D00260 junction statistics, NOAA Exceptional.

Node Depth vs. Allowable Error Fraction

Total comparisons 15532

Passed States: Exceptional=99.90%, Critical=99.90%, General 1=99.97%, General 2/3=100.00%, General 4=100.00%,

*H13873 and D00260 junction statistics, NOAA Exceptional.***Backscatter****Calibration Method**

N/A

Dynamic Range

The system echo sounders have the dynamic range to accommodate the relatively homogeneous survey area. The echo sounder was set to the 70-100 kHz range for the duration of the survey.

Acquisition Configuration

No special techniques were used outside of normal considerations for quality data acquisition for a bathymetric survey.

Environmental Variable

Sound speed profiles were collected at the start of acquisition each day and at a minimum of once every five hours in order to apply appropriate absorption coefficients during acquisition.

Acquisition Output

Please refer to Section 4.3.2.1.2 Acoustic Backscatter Imagery of the Field Procedures Manual 2020 for the backscatter post processing workflow.

Report of Survey

Uncertainty Source

Total propagated uncertainty (TPU) can be found within the CARIS HIPS project and associated HIPS vessel file (HVF). The TPU section of the HVF captures fixed approximations of uncertainty estimates for latency, sensor offset measurements, attitude and navigation measurements, and draft measurements. Post processed uncertainties with navigation and GPS height were applied in CARIS HIPS via Smooth Best Estimate of Trajectory (SBET) and Root Mean Squared (RMS) files generated with POSPac. Additional TPU values that can be found in the CARIS HIPS project include a georeferenced computation with values for the following uncertainties: tide values zoning, measured sound speed, and surface sound speed. Uncertainty results for H13873 can be found in this document under Quality Control Procedures section Statistical Analysis.

Error Source

When importing the raw MBES data into CARIS HIPS, some lines were imported with the incorrect coordinate reference system (CRS) of NAD 83(2011) / UTM Zone 6 and some were imported with correct CRS of NAD 83(2011) / UTM Zone 5. This was corrected in post-processing using an SBET in the correct UTM zone, which overrides the input CRS. The input CRS is noted in the HIPS file and could potentially affect the metadata. After post processing, all final products are in the correct CRS of NAD 83(2011) / UTM Zone 5.

Sound speed casts were taken less frequently than the standard of one every four hours, and were taken one every five hours. The survey is offshore with a consistent sound speed profile across the area; there are no apparent sound speed artifacts seen in the data.

Supplementals

- **NCEI Sound Speed Data** (*Sep 08, 2024*)
- **Final Survey Outline** (*Sep 08, 2024*)
- **Trained Marine Mammal Observers list** (*Oct 01, 2024*)

Approval Statement

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 and approved all data and metadata. The survey meets or exceeds requirements as set forth in the Project Instructions and NOS Hydrographic Surveys Specifications and Deliverables. The survey is complete and no additional work is required with the exception of any deficiencies noted in the Report of Survey.

Approver Name	Approver Title	Approver Certification
CAPT Meghan McGovern	Commanding Officer	

Personnel

Name	Title	Certification
HAST Philip Fahy	Sheet Manager	
LT Taylor Krabiel	Operations Officer	
CHST Sara Ober	Chief Survey Technician	

Full Equipment List						
Equipment Type	Manufacturer and System	Model Number	Serial Number	Calibration Date	Frequency	Accuracy Check Date
<i>NOAA Ship Fairweather (S220)</i>						
Positioning and Attitude System	Applanix POS MV 320 v5	POS MV 320 V5	8194	2024-05-10	NA	NA
Multibeam	Kongsberg Maritime EM 712	EM 712	10070	2024-05-01	70-100 kHz	2024-05-30
CTD	AML Oceanographic MVP200	MVP200	10330	2023-01-24	n/a	2024-05-01
CTD	AML Oceanographic Micro-CTD	MVP-X	9039	2023-01-24	n/a	2024-05-01
Sound Speed System	Teledyne RESON SVP 70	SVP 70	0614172	2023-01-24	n/a	2023-01-24