H13782

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13782

LOCALITY

State(s):	Alaska
General Locality:	Togiak Bay and Approaches
Sub-locality:	Vicinity of Anchor Point

2023

CHIEF OF PARTY
Meghan McGovern CDR/ NOAA

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H13782**

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:	**Togiak Bay and Approaches**
Sub-Locality:	**Vicinity of Anchor Point**
Scale:	**40000**
Dates of Survey:	**05/24/2023 to 06/02/2023**
Instructions Dated:	**04/05/2023**
Project Number:	**OPR-R331-FA-23**
Field Unit:	**NOAA Ship *Fairweather***
Chief of Party:	**Meghan McGovern CDR/ 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 04N, 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 H13782

Project: OPR-R331-FA-23

Locality: Togiak Bay and Approaches

Sublocality: Vicinity of Anchor Point

Scale: 1:40000

May 2023 - June 2023

NOAA Ship *Fairweather*

Chief of Party: Meghan McGovern CDR/ NOAA

A. Area Surveyed

Vicinity of Anchor Point

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
58° 56' 47.62" N 160° 23' 11.59" W	58° 55' 16.82" N 160° 15' 10.77" W

Table 1: Survey Limits

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

A.2 Survey Purpose

Togiak Bay is well known for its striking landscapes and unique variety of wildlife and fish. The Togiak National Wildlife Refuge’s rivers are home to all five species of Pacific Salmon, Rainbow Trout, Arctic Grayling, Dolly Varden, and Arctic Char. The rivers contribute a large part of Togiak’s fisheries production of nearly 3 million salmon annually and as the primary subsistence resource for local villages including Togiak and Twin Hills. Archaeological evidence indicates the occupation of this area by Alaska Native Peoples for over 4,000 years.

This hydrographic survey project will be a continuation of NOAA's mapping campaign in Bristol Bay, with sister projects surveying from the Nushagak Peninsula area to Kvichak Bay and Southern Cape Newenham. Portions of Togiak Bay were last surveyed in the early 1990s with offshore areas having never been surveyed. Higher priority areas for have been identified for updated bathymetry by the Alaska Marine Pilots and the West Alaska Lightering Group. This project will provide modern bathymetric data in an area of high hydrographic risk, improve maritime safety, and support the Seabed 2030 global mapping initiative.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

The survey H13782 is split between areas of complete coverage and set line spacing of 50 meters. Data acquired in H13782 meets multibeam echo sounder (MBES) complete coverage requirements in addition to set line spacing requirements as specified in the HSSD. This includes NOAA allowable uncertainty (see Section B.2.10) and density requirements (see Section B.2.11). This does not include crosslines; less than 4 percent were acquired for areas of complete coverage and less than 8 percent were acquired for areas with set line spacing (see section B.2.1).

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 survey area	Complete Coverage (MBES)
South-east waters in survey area	Set Line Spacing (MBES) at 50 m

Table 2: Survey Coverage

The southeast region of H13782 was changed from complete coverage to 50 meter set line spacing, as recommended by the Project Manager. The shoal area was large and shallow, and the time required to achieve complete coverage would have adversely affected data collection on other priority areas. Additionally, the area was very uniform and soundings were in agreement with existing charts. Since complete coverage had been achieved on the majority of the sheet, and changing to set line spacing only affected nearshore areas in depths less than 6 meters, the field unit continued with set line spacing in accordance to the Project Manager (see Project Correspondence).

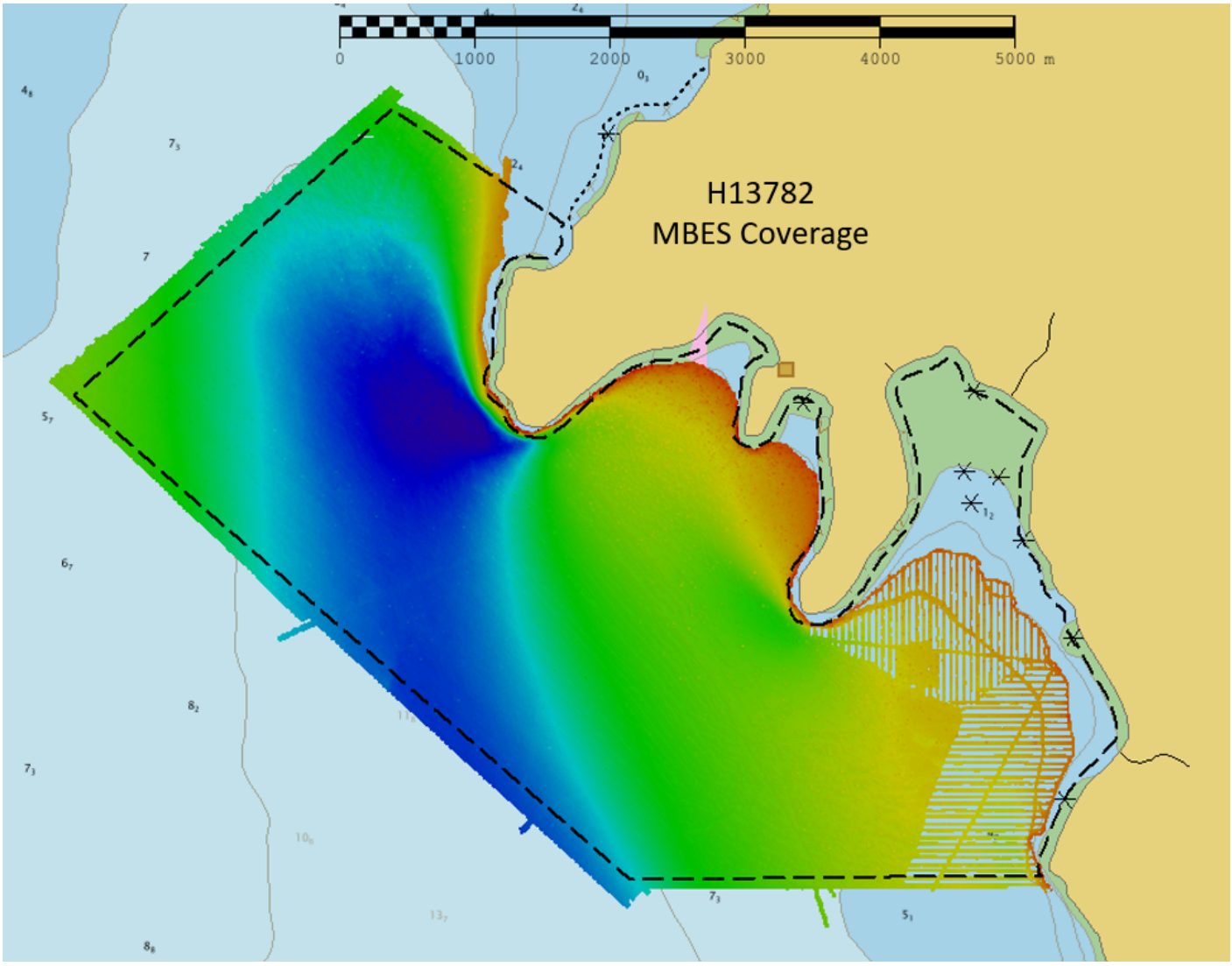


Figure 1: H13782 set line spacing, 50 meters with complete coverage over the charted shoal area (ENC US4AK87M).

Figure 2: H13782 MBES coverage and assigned survey limits (ENC US4AK87M).

A.6 Survey Statistics

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

	HULL ID	*2805*	*2806*	*2808*	*Total*
LNM	**SBES Mainscheme**	0.0	0.0	0.0	0.0
	MBES Mainscheme	246.9861	174.4133	0.0	429.8072
	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	5.0146	0.0	3.393	8.4076
	Lidar Crosslines	0.0	0.0	0.0	0.0
Number of Bottom Samples					2
Number Maritime Boundary Points Investigated					0
Number of DPs					0
Number of Items Investigated by Dive Ops					0
Total SNM					438.2148

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
05/24/2023	144
05/25/2023	145

Survey Dates	Day of the Year
05/26/2023	146
05/27/2023	147
05/28/2023	148
05/30/2023	150
05/31/2023	151
06/02/2023	153

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	*2805*	*2806*	*2808*
LOA	8.6 meters	8.6 meters	8.6 meters
Draft	1.1 meters	1.1 meters	1.1 meters

Table 5: Vessels Used

Figure 3: NOAA Ship FAIRWEATHER survey launches.

All data for survey H13782 was acquired by NOAA Ship FAIRWEATHER and launches 2805, 2806, and 2808. The vessels acquired MBES bathymetry, backscatter, and sound velocity profiles.

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 2040	MBES
Teledyne RESON	SVP 71	Sound Speed System
Sea-Bird Scientific	SBE 19plus V2	Conductivity, Temperature, and Depth Sensor

Table 6: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines were collected, processed and compared in accordance with Section 5.2.4.2 of the HSSD. For comparison, 1.38 percent of crossline to MBES data was acquired. The HSSD specifies 4 percent for complete coverage. We were not able to acquire 4 percent due to operational time constraints. The Compare Grids function in Pydro Explorer was used to analyze the finalized single resolution surfaces of H13782 mainscheme only and crossline only data. Pydro determined that 99.5+ percent of nodes met allowable uncertainties. For additional results, see plots below.

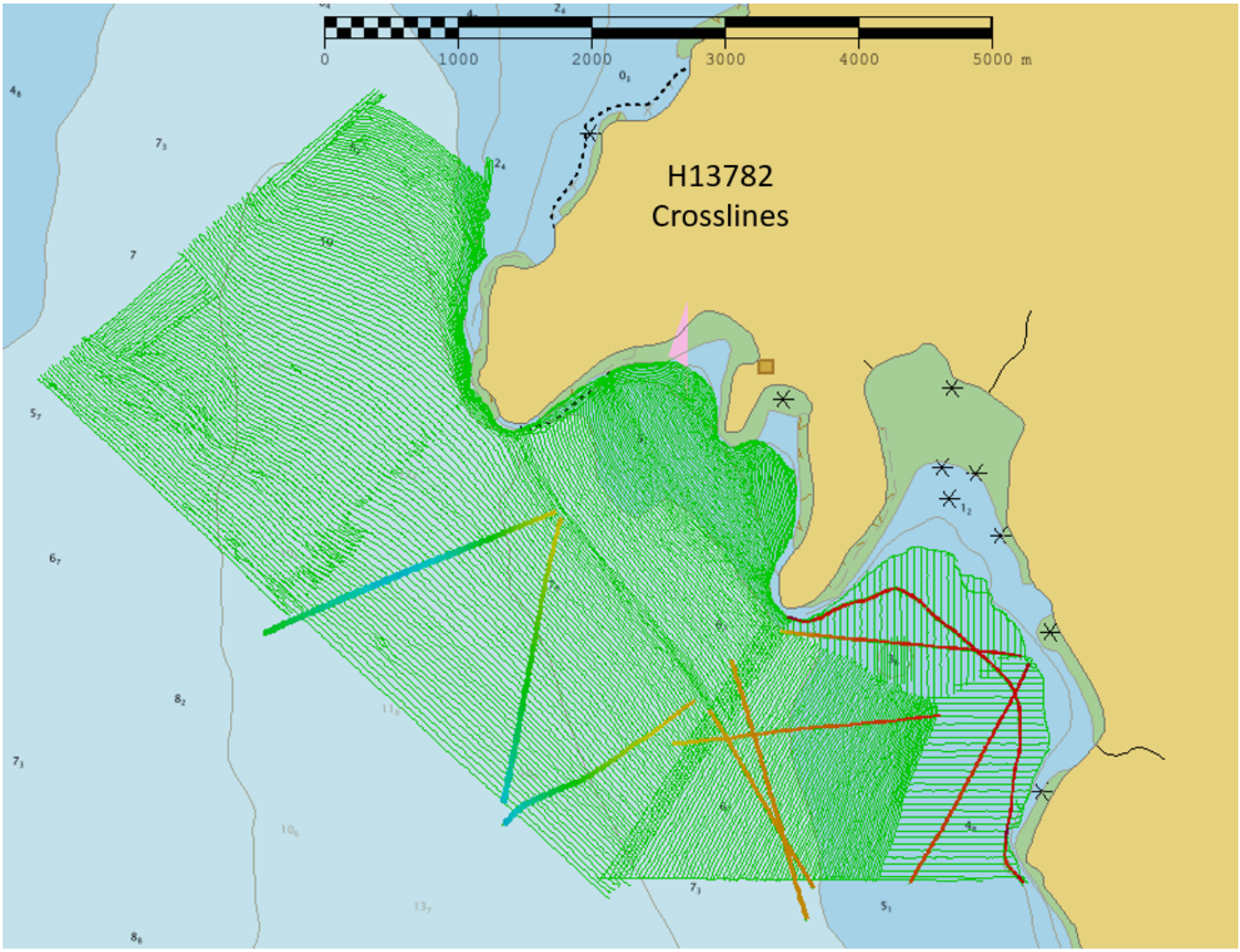
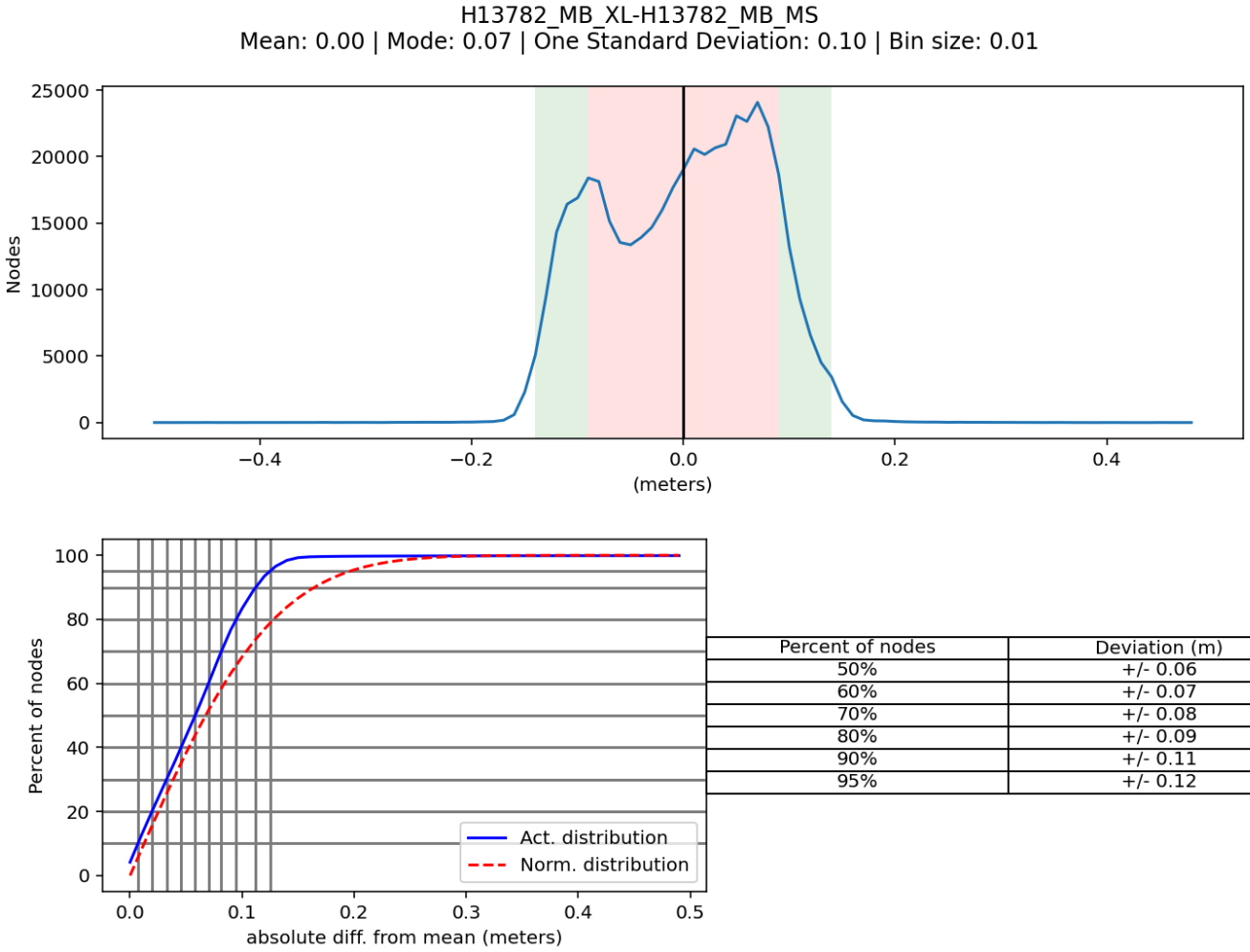


Figure 4: H13782 crossline surface overlaid on mainscheme tracklines (ENC US4AK87M).



Percent of nodes	Deviation (m)
50%	+/- 0.06
60%	+/- 0.07
70%	+/- 0.08
80%	+/- 0.09
90%	+/- 0.11
95%	+/- 0.12

Figure 5: Pydro derived plot showing absolute difference statistics of H13782 mainscheme to crossline data.

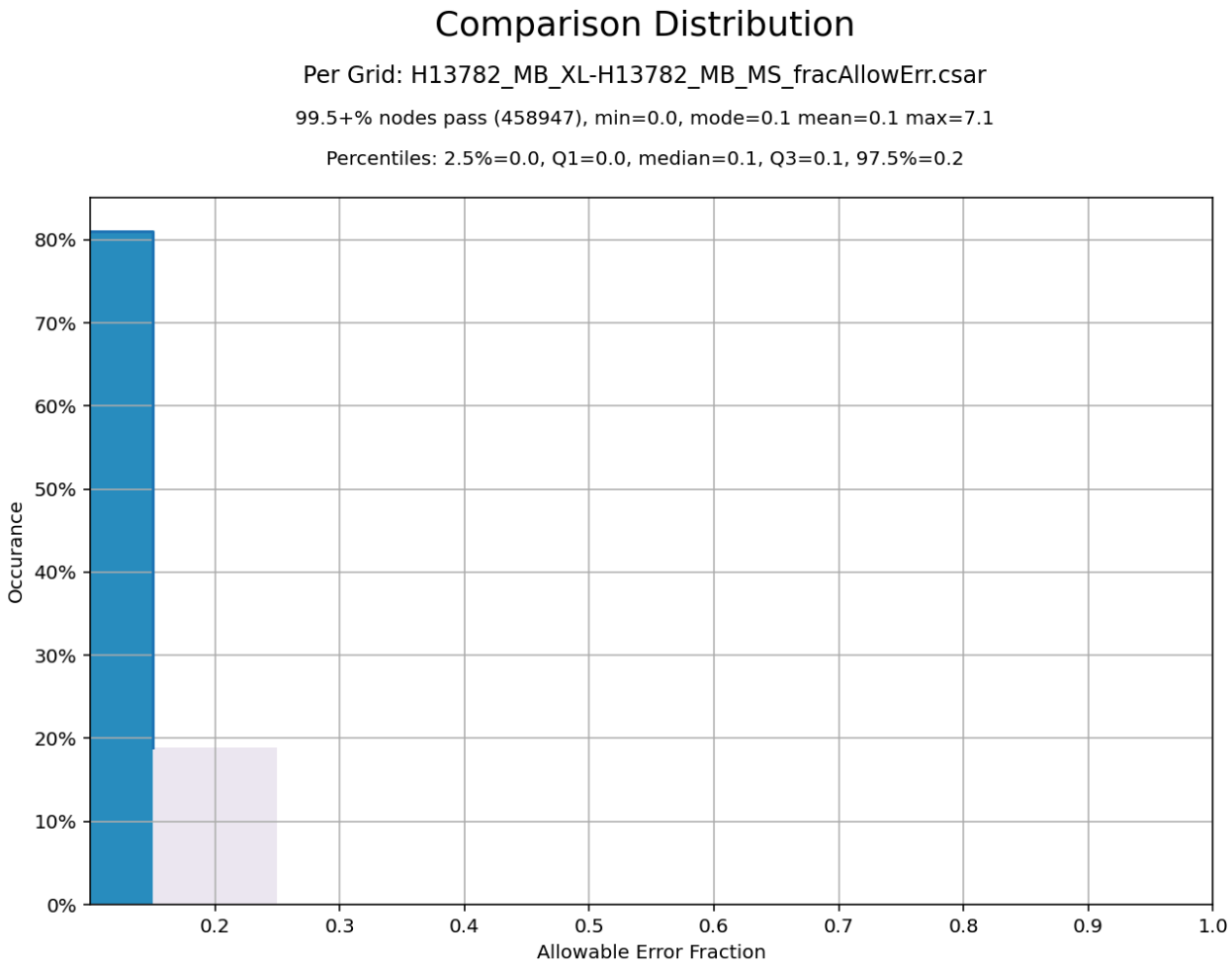


Figure 6: Pydro derived plot showing percentage-pass value of H13782 mainscheme to crossline data.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via ERTDM	0.0 meters	0.17 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
2805	2 meters/second	N/A meters/second	N/A meters/second	0.5 meters/second
2806	2 meters/second	N/A meters/second	N/A meters/second	0.5 meters/second
2808	2 meters/second	N/A meters/second	N/A meters/second	0.5 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

Uncertainty values of the submitted finalized grids were calculated in Caris using "Greater of the two values" when creating the finalized surface. Grid QA v6 within Pydro QC Tools was used to analyze H13782 TVU compliance. H13782 met HSSD requirements in 99.5+ percent of grid nodes, which is shown in thehistogram plot below.

Pydro QC Tools 3.10.10 Grid QA was used to analyze H13782 multibeam echosounder (MBES) data density. The submitted 1 meter single-resolution (SR) surface met HSSD density requirements shown in the histograms below.

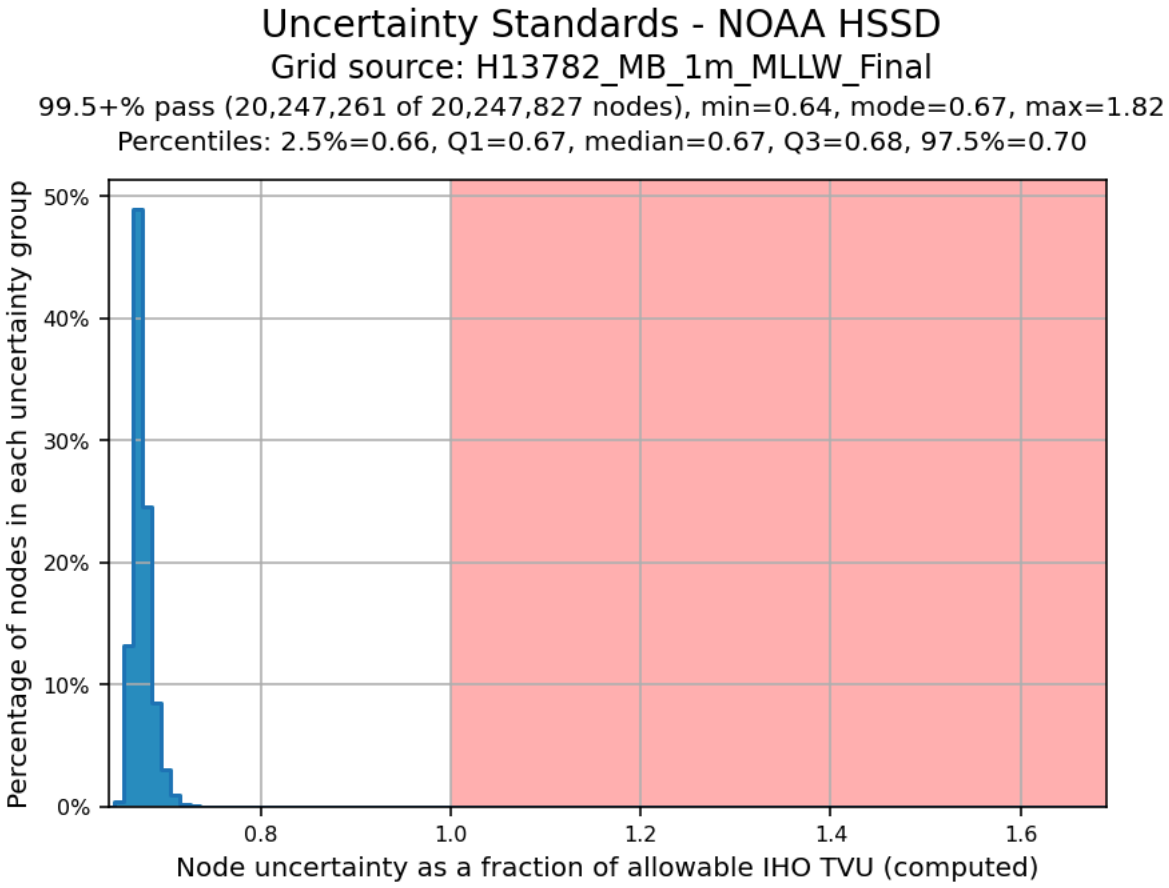


Figure 7: Pydro derived plot showing TVU compliance of H13782 finalized single resolution MBES data.

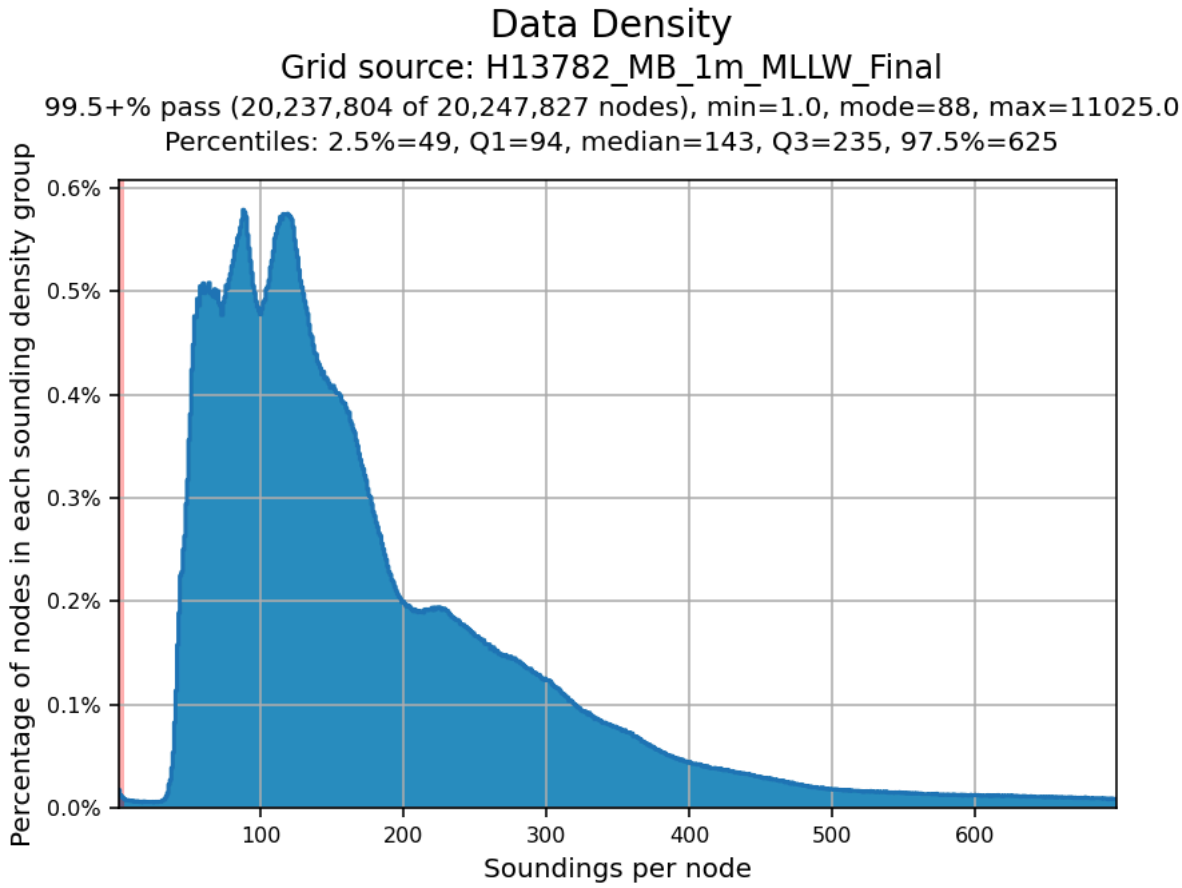


Figure 8: Pydro derived histogram plot showing HSSD density compliance of H13782 finalized single resolution MBES data.

The uncertainty values for Measured CTD applied to the data were not 2m/s as stated above. The value applied to the data was 4m/s which is a reasonable value and does not affect data quality.

B.2.3 Junctions

There are no contemporary surveys that junction with this survey.

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

Casts were conducted at a minimum of one every four hours during launch acquisition. Casts were conducted more frequently in areas where the influx of freshwater had an effect on the speed of sound in the water column and when there was a change in surface sound speed greater than two meters per second. All sound speed methods were used as detailed in the DAPR.

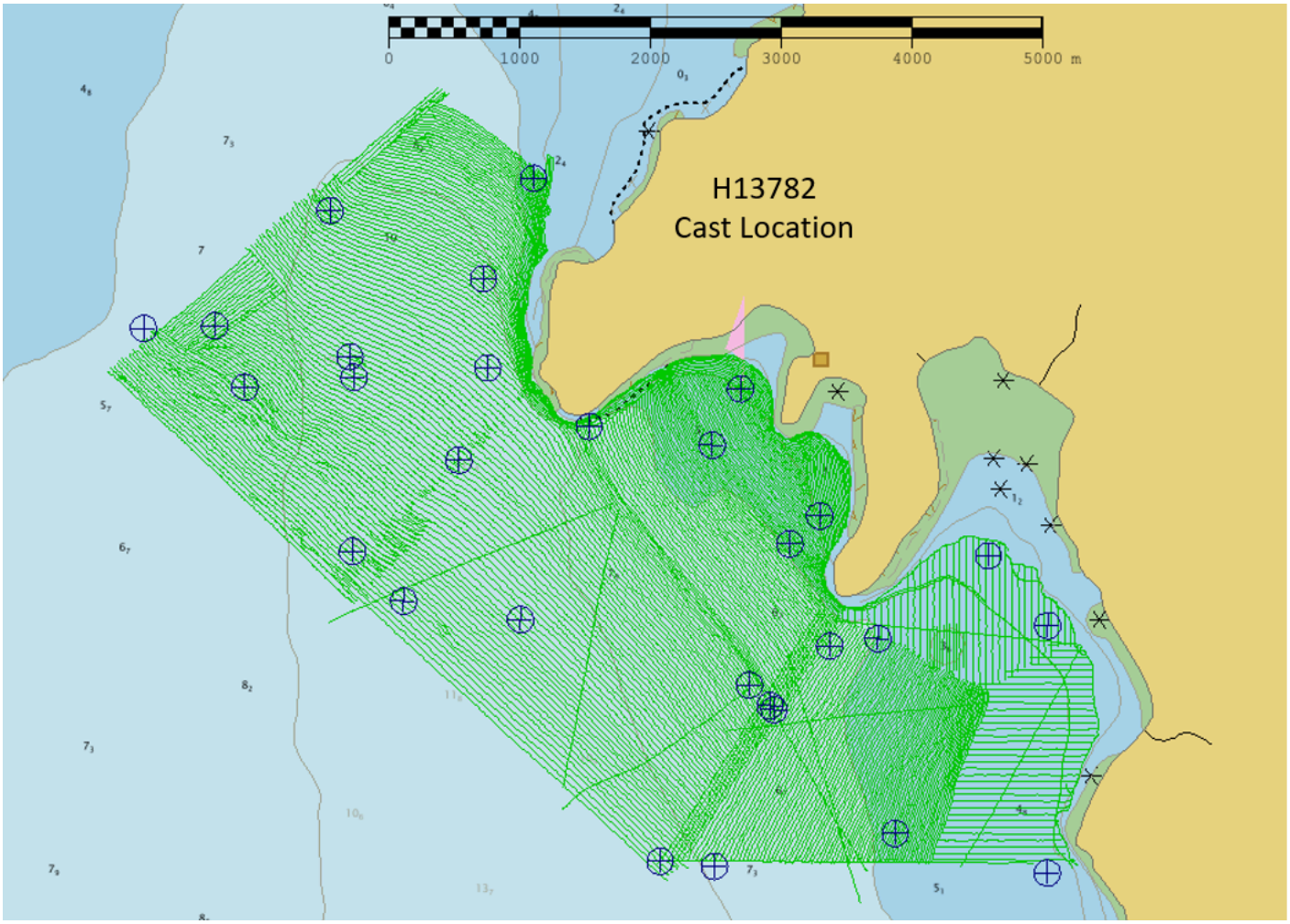


Figure 9: H13782 sound speed cast locations (ENC US4AK87M).

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 files logged during MBES operations and subsequently processed by FAIRWEATHER 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.

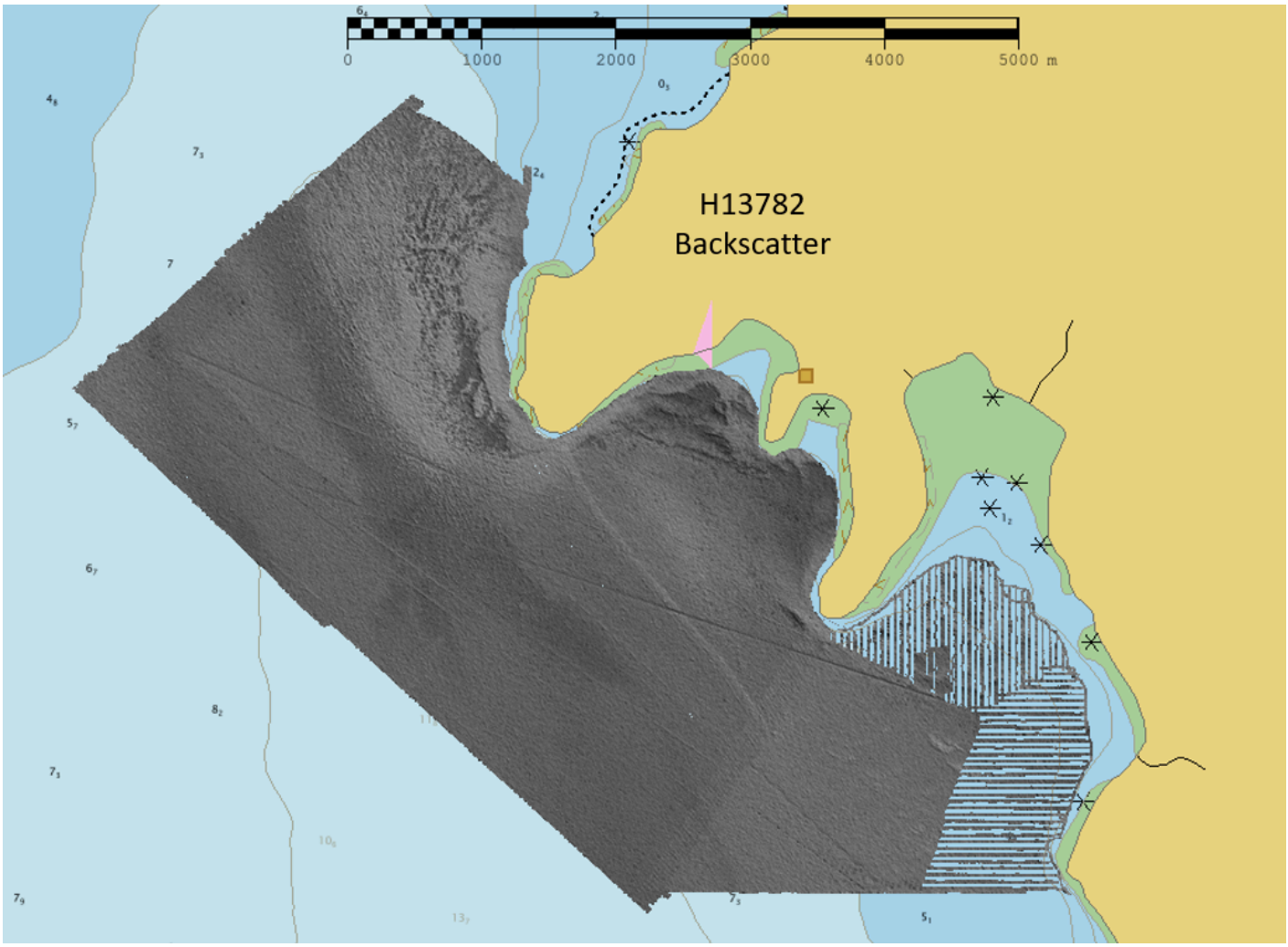


Figure 10: Overview mosaic of H13782 multibeam acoustic backscatter coverage.

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
QPS	Fledermaus	7.11.0

Table 9: Primary bathymetric 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
H13782_MB_1m_MLLW	CARIS Raster Surface (CUBE)	1 meters	-0.2 meters - 14.9 meters	NOAA_1m	Complete MBES
H13782_MB_1m_MLLW_Final	CARIS Raster Surface (CUBE)	1 meters	-0.2 meters - 14.9 meters	NOAA_1m	Complete MBES

Table 10: Submitted Surfaces

Pydro QC Tools v.3.10.0 Flier Finder, with default settings, was used to identify sounding "fliers" in the finalized H13782 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 25 potential fliers in the Complete coverage and set line spacing surface. These were investigated and determined to be a result of dynamic bathymetry in the outer beams. 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 H13731 VR surface. Holiday Finder detected 154 holidays in the complete coverage and set line spacing surface. Of these holidays 146 were flagged because of the set line spacing. One observed holday in DN 151 line 47 was caused by the incorrect input of patch test data in the POS MV. The hydrographer determined that in this one section there is no data, however there is data collected for the rest of the line.

The holidays were reviewed and do not impact the quality or reliability of the data. See figures below for more information.

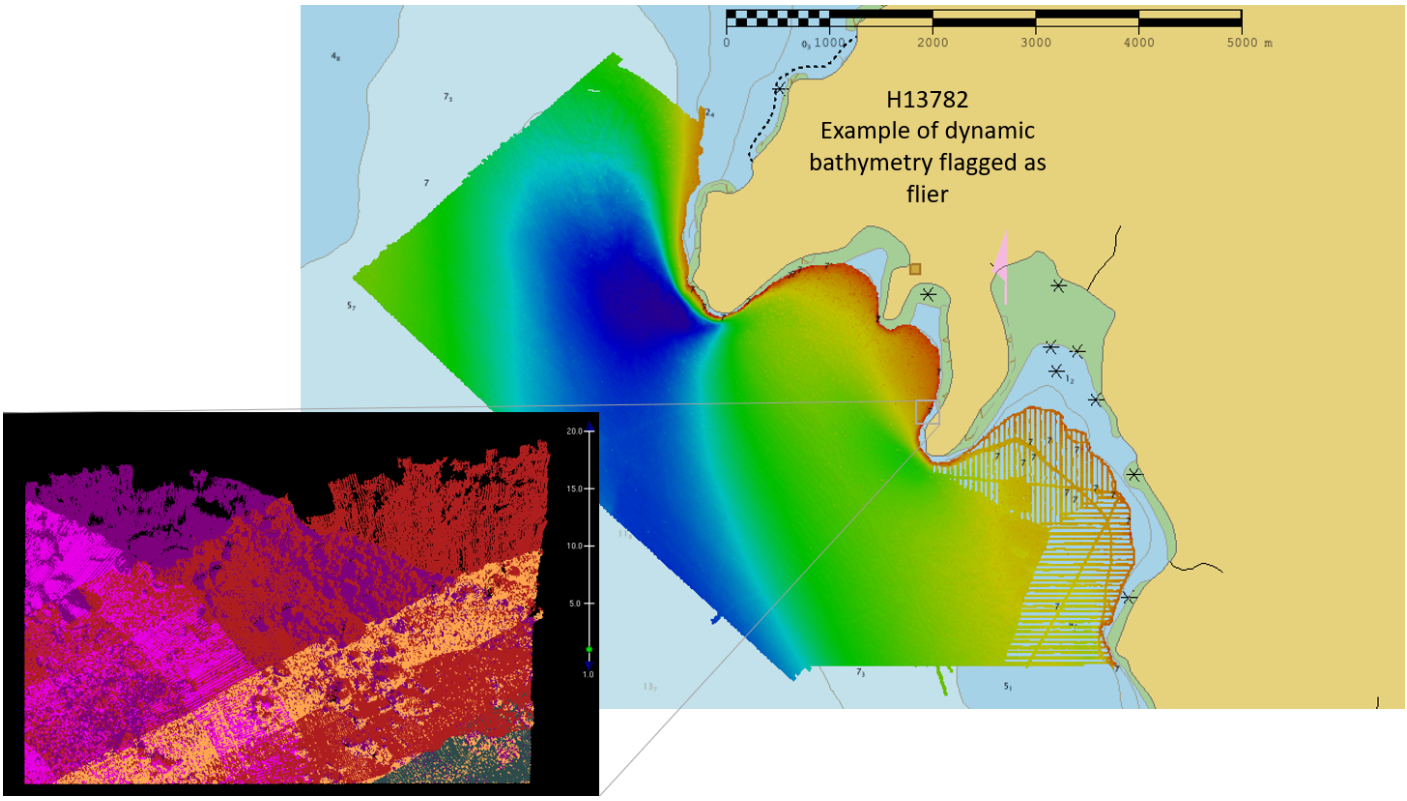


Figure 11: Example of fliers determined to be false.

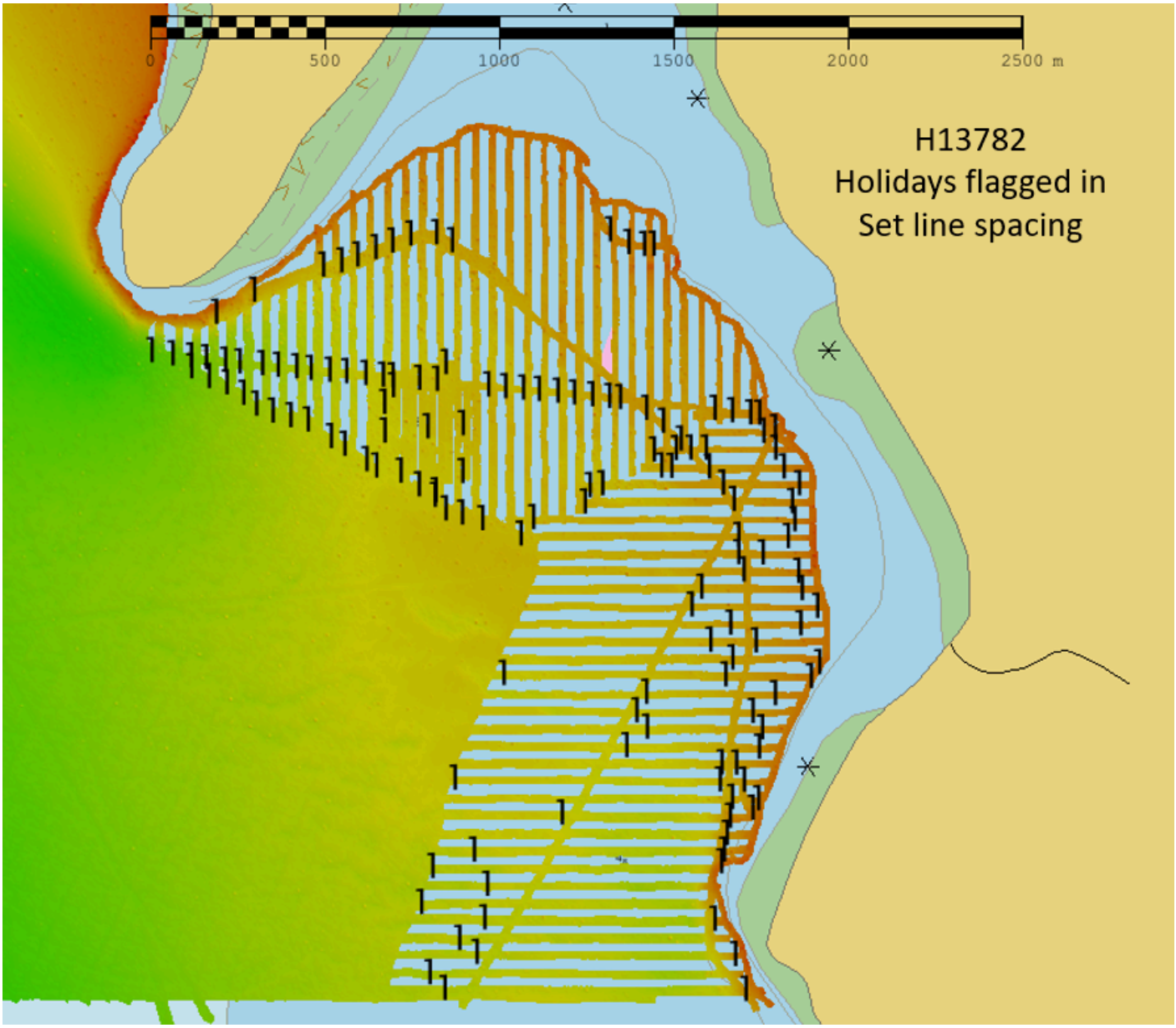


Figure 12: H13782 flagged holidays in set line spacing

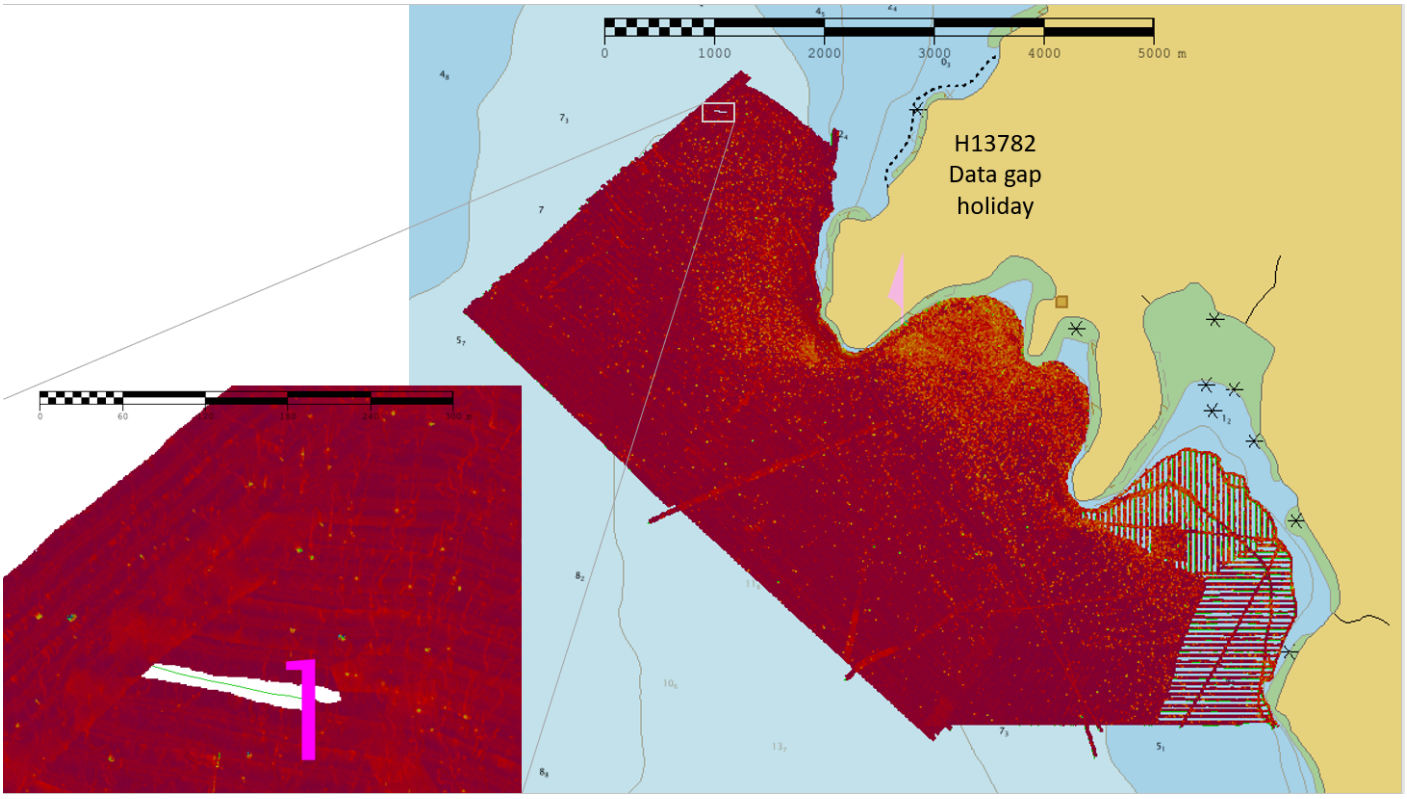


Figure 13: H13782 holiday data gap holiday (ENC US4AK87M).

During branch processing, it was necessary to capture the quality of survey differences between set line spacing and complete coverage MBES, which has impacts for the NBS, by splitting the single 1m surface into two separate 1m surfaces. The surfaces available to the public are named H13782_MB_1m_MLLW_1of2 and H13782_MB_1m_MLLW_2of2

C. Vertical and Horizontal Control

Additional information discussing the vertical or horizontal control for this survey can be found in the accompanying 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-R331-FA-23_AK_ERTDM_2023_NAD83-MLLW

Table 11: ERS method and SEP file

C.2 Horizontal Control

The horizontal datum for this project is North American Datum 1983 (2011).

The projection used for this project is Universal Transverse Mercator (UTM) Zone 4.

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 H13782 MBES data.

WAAS

The Wide Area Augmentation System (WAAS) was used for real-time horizontal control during data acquisition.

C.3 Additional Horizontal or Vertical Control Issues

C.3.1 Incorrectly applied patch test values

NOAA Ship FAIRWEATHER survey launch 2805 conducted patch testing prior to data collection on sheet H13782. The results of the patch test were input incorrectly into corresponding POS MV software, causing an IMU lever arm offset. The offset was not observed until DN150. To fix the vertical offset observed in previously acquired data by 2805, raw POS files were reprocessed using the correct IMU lever arm values. New SBETs were reapplied to the affected bathymetry files from DN 150 and prior to show no vertical offset.

D. Results and Recommendations

D.1 Chart Comparison

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
US4AK87M	1:100000	5	09/15/2022	01/24/2023

Table 12: Largest Scale ENCs

D.1.2 Shoal and Hazardous Features

Shoals or potentially hazardous features exist for this survey and were investigated.

D.1.3 Charted Features

Charted features exist for this survey, but were not investigated.

D.1.4 Uncharted Features

No uncharted features exist for this survey.

D.1.5 Channels

No channels exist for this survey.

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

Bottom samples were assigned and acquired 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 and/or terminals exist for this survey.

D.2.8 Abnormal Seafloor or Environmental Conditions

No abnormal seafloor or Environmental Conditions were observed in this survey.

D.2.9 Construction and Dredging

No present and/or planned construction or dredging exists 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
Meghan McGovern CDR/ NOAA	Chief of Party	03/29/2024	MCGOVERN.MEGHAN.ELIZABETH.1284020495 Digitally signed by MCGOVERN.MEGHAN.ELIZABETH.1284020495 Date: 2024.03.28 13:19:36 -07'00'
Taylor Krabiel LT/ NOAA	Operations Officer	03/29/2024	Digitally signed by KRABIEL.TAYLOR.ALAN.1539169935 Date: 2024.03.28 13:16:51 -07'00'
Chrisinta Brooks	Sheet Manager	03/29/2024	BROOKS.CHRISTINA.LORRAINE.1553513177 Digitally signed by BROOKS.CHRISTINA.LORRAINE.1553513177 Date: 2024.03.28 13:17:27 -07'00'

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