H12985

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H12985

LOCALITY

State(s):	Florida
General Locality:	Northeastern Florida
Sub-locality:	20 NM East of Jacksonville Beach

2019

CHIEF OF PARTY
LCDR Mark Blankenship

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H12985**

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):	**Florida**
General Locality:	**Northeastern Florida**
Sub-Locality:	**20 NM East of Jacksonville Beach**
Scale:	**40000**
Dates of Survey:	**08/13/2019 to 08/22/2019**
Instructions Dated:	**05/15/2019**
Project Number:	**OPR-G343-FH-19**
Field Unit:	**NOAA Ship Ferdinand Hassler (S250)**
Chief of Party:	**LCDR Mark Blankenship**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Multibeam Echo Sounder Backscatter**
Verification by:	**Atlantic 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 17N, 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 H12985

Project: OPR-G343-FH-19

Locality: Northeastern Florida

Sublocality: 20 NM East of Jacksonville Beach

Scale: 1:40000

August 2019 - August 2019

NOAA Ship Ferdinand Hassler (S250)

Chief of Party: LCDR Mark Blankenship

A. Area Surveyed

The survey area is located 20 nm East of Jacksonville Beach, FL.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
30° 20' 0.51" N 81° 6' 12.6" W	30° 11' 36.34" N 80° 58' 14.55" W

Table 1: Survey Limits

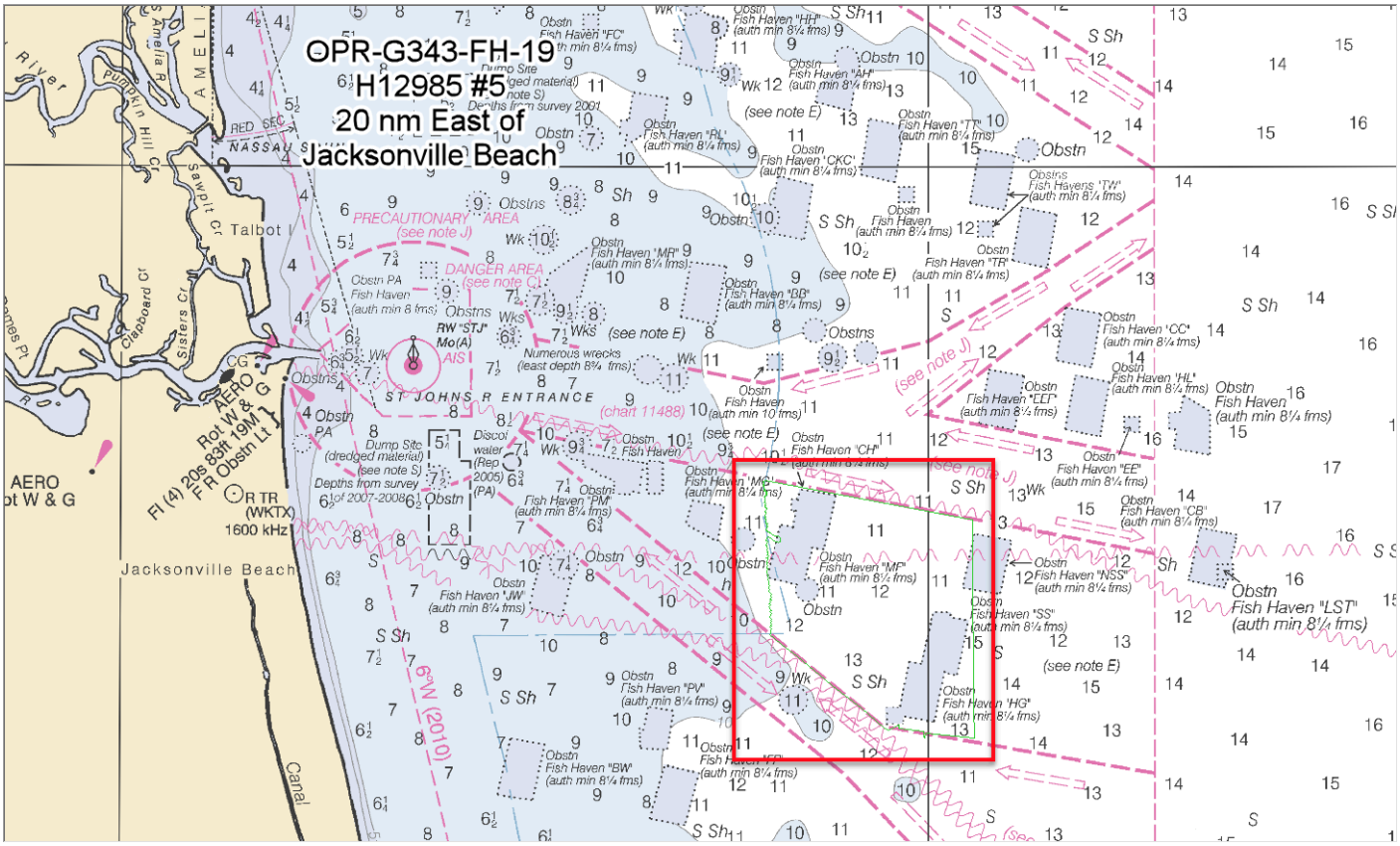


Figure 1: H12985 Survey limits (green inside red box) overlaid on Chart 11480.

Data were acquired to the survey limits in accordance with the requirements in the Project Instructions and the March 2019 NOS Hydrographic Surveys Specifications and Deliverables (HSSD) as shown in Figure 1. This complete coverage survey acquired data to the survey limits including depths ranging from 19.522 meters to 32.035 meters.

A.2 Survey Purpose

Maritime commerce to the Port of Jacksonille including increased shipping activity and military support are critical to the economic vitality and security of the region. To accommodate anticipated growth, the harbor is undergoing a greater than $700 million expansion project which will widen the river channel and turning basin. Thus deepening them from 40 to 47 feet to support the new fully-loaded Panamax class vessels. In order to assure adequate underkeel clearance for the deeper draft Panamax vessels, this survey will provide modern bathymetry to update 1970's vintage surveys in the approaches to the harbor.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data acquired in H12985 meet multibeam echo sounder (MBES) coverage requirements for complete coverage, as required by the HSSD. This includes crosslines (See Section B.2.1), NOAA allowable uncertainty (see Section B.2.10), and density requirements (see Section B.2.11). The data acquired will supersede Coast Survey charts and products, improving maritime safety and enhancing the regional economy and protecting the environment.

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 (Refer to HSSD Section 5.2.2.3)

Table 2: Survey Coverage

The entirety of H12985 was acquired with complete coverage MBES, meeting the requirements listed above and in the HSSD. See Figure 2 for an overview of coverage.

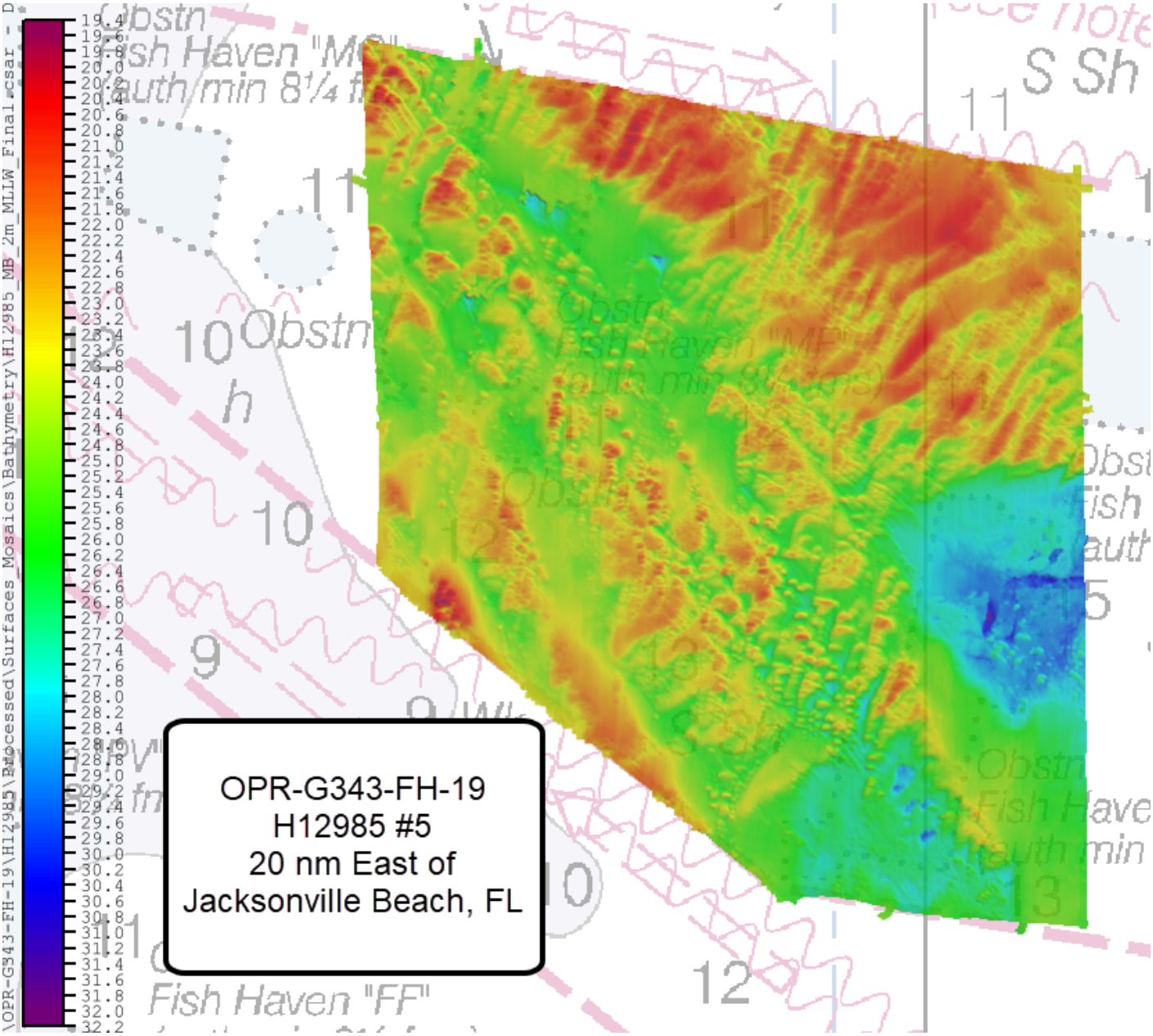


Figure 2: H12985 survey coverage overlaid onto Chart 11480.

A.6 Survey Statistics

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

	HULL ID	*S250*	*Total*
LNM	**SBES Mainscheme**	0	0
	MBES Mainscheme	880.391	880.391
	Lidar Mainscheme	0	0
	SSS Mainscheme	0	0
	SBES/SSS Mainscheme	0	0
	MBES/SSS Mainscheme	0	0
	SBES/MBES Crosslines	47.906	47.906
	Lidar Crosslines	0	0
Number of Bottom Samples			5
Number Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Investigated by Dive Ops			0
Total SNM			44.48

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
08/13/2019	225
08/14/2019	226

Survey Dates	Day of the Year
08/15/2019	227
08/16/2019	228
08/17/2019	229
08/18/2019	230
08/19/2019	231
08/20/2019	232
08/22/2019	234

Table 4: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Refer to the OPR-G343-FH-19 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	*S250*
LOA	37.7 meters
Draft	3.77 meters

Table 5: Vessels Used

B.1.2 Equipment

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

Manufacturer	Model	Type
Kongsberg Maritime	EM 2040	MBES
Sea-Bird Scientific	SBE 19plus V2	Conductivity, Temperature, and Depth Sensor
AML Oceanographic	MVP200	Conductivity, Temperature, and Depth Sensor
Teledyne RESON	SVP 70	Sound Speed System
Applanix	POS MV 320 v5	Positioning and Attitude System

Table 6: Major Systems Used

The equipment was installed on the survey platform as follows: S250 utilizes the Kongsberg EM 2040 MBES, a POS MV v5 system for position and attitude, SVP 70 surface sound speed sensors, and AML Oceanographic MVP 200 in conjunction with Sea-Bird Scientific SBE 19plus V2s for conductivity, temperature, and depth (CTD) casts.

B.2 Quality Control

B.2.1 Crosslines

Multibeam/single beam echo sounder/side scan sonar crosslines acquired for this survey totaled 5.44% of mainscheme acquisition.

Multibeam crosslines were collected, processed and compared in accordance with Section 5.2.4.2 of the HSSD. To evaluate crosslines, a surface generated via data strictly from mainscheme lines and a surface generated via data strictly from crosslines were created. From these two surfaces, a difference surface (mainscheme - crosslines = difference surface) was generated (Figure 3), and is submitted in the Separates II Digital Data folder. Statistics show the mean difference between depths derived from mainscheme data and crossline data was 0.02 meters (with mainscheme being deeper) and 99.5% of nodes falling within +/- 0.15 meters (Figure 4). For the respective depths, the difference surface was compared to the allowable NOAA uncertainty standards. In total, 100% of the depth differences between H12985 mainscheme and crossline data were within allowable NOAA uncertainties.

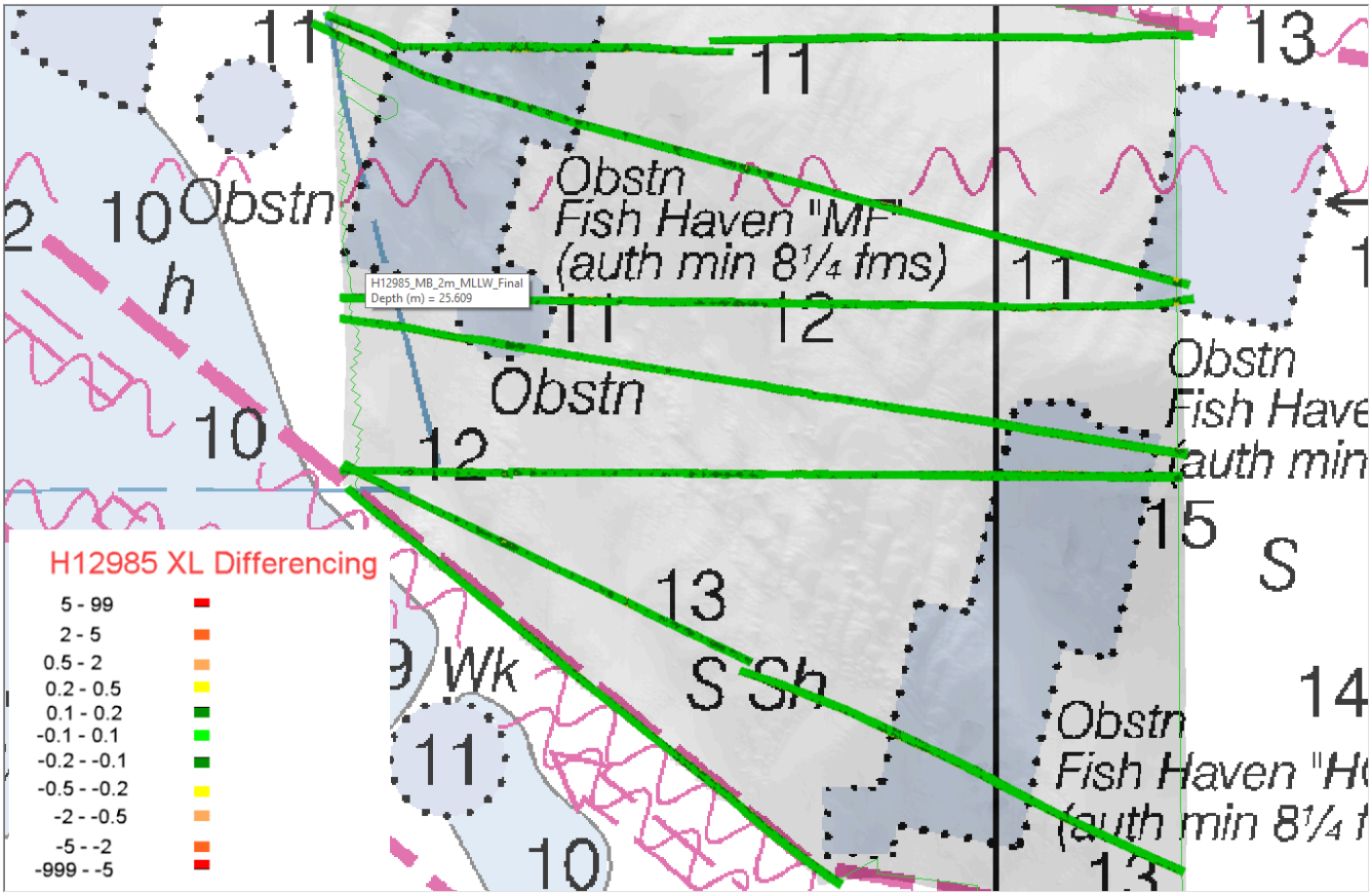
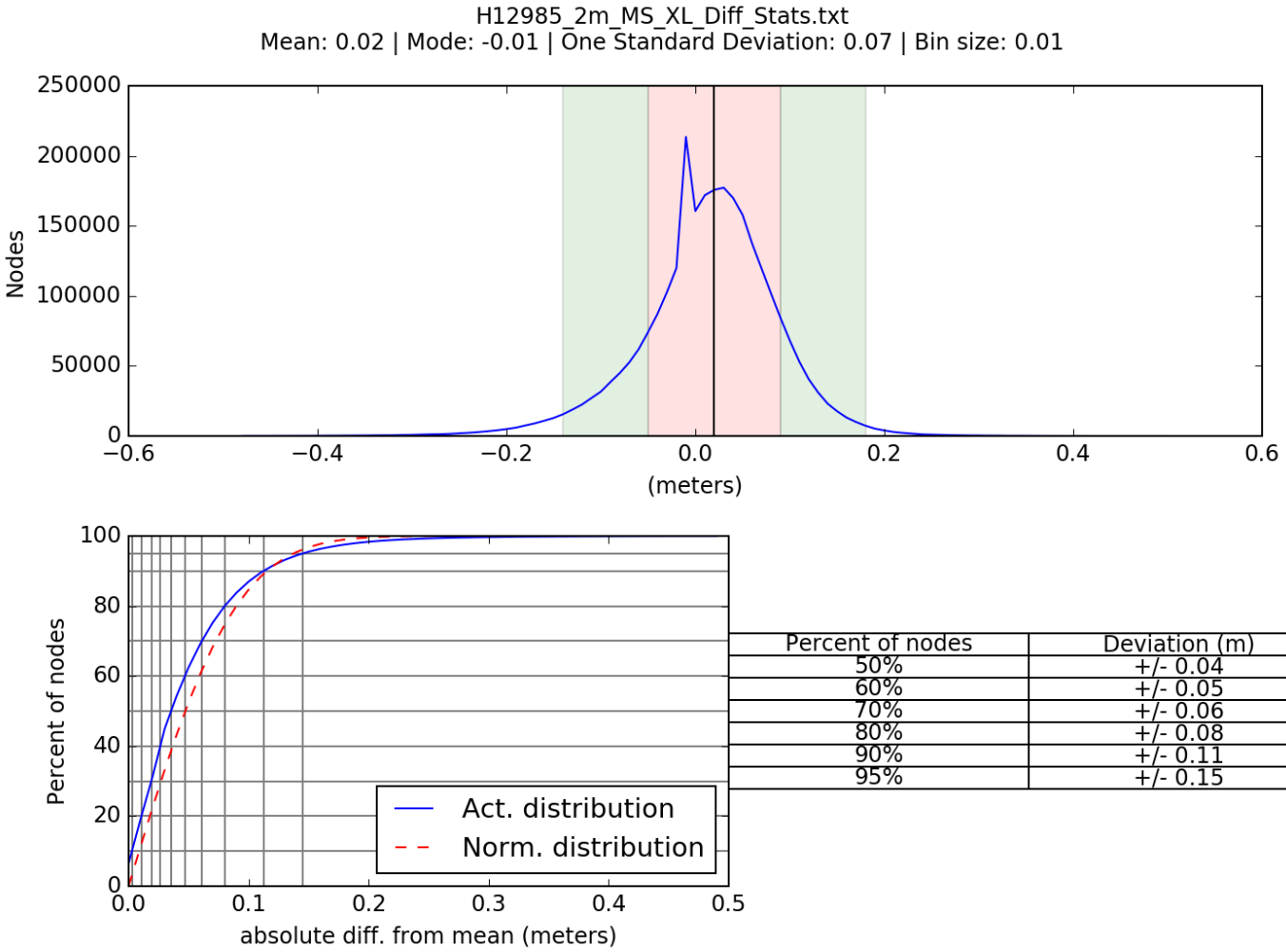


Figure 3: Depth differences between H12985 mainscheme and crossline data as compared to NOAA allowable uncertainty standards for the associated depths. Green is within allowable uncertainty, yellow exceeds allowable uncertainty by less than 0.1m, and red exceeds allowable uncertainty by more than 0.1m.



Percent of nodes	Deviation (m)
50%	+/- 0.04
60%	+/- 0.05
70%	+/- 0.06
80%	+/- 0.08
90%	+/- 0.11
95%	+/- 0.15

Figure 4: H12985 crossline and mainscheme difference statistics.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0 meters	0.1 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Surface
S250	4 meters/second	1 meters/second	0.5 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

In addition to the usual a priori estimates of uncertainty via device models for vessel motion and VDATUM, real-time and post-processed uncertainty sources were also incorporated into the depth estimates of survey H12985. Real-time uncertainties were provided via EM 2040 MBES data and Applanix Delayed Heave RMS. Following post-processing of the real-time vessel motion, recomputed uncertainties of vessel roll, pitch, gyro and navigation were applied in CARIS HIPS and SIPS via a Smoothed Best Estimate of Trajectory (SBET) RMS file generated in Applanix POSPac.

B.2.3 Junctions

H12985 junctions with zero acquired contemporary surveys, and three surveys from prior projects, H11821, H12977, and H12984 as shown in Figure 5. Data overlap between H12985 and each adjacent survey was achieved. These areas of overlap between surveys were reviewed in CARIS HIPS and SIPS by surface differencing (at equal resolutions) to assess surface agreement. The multibeam data were also examined in CARIS Subset Editor for consistency and agreement. The junctions with H12985 are generally within/ exceed the NOAA allowable uncertainty in their areas of overlap. For all junctions with H12985, a negative difference indicates H12985 was shoaler and a positive difference indicates H12985 was deeper.

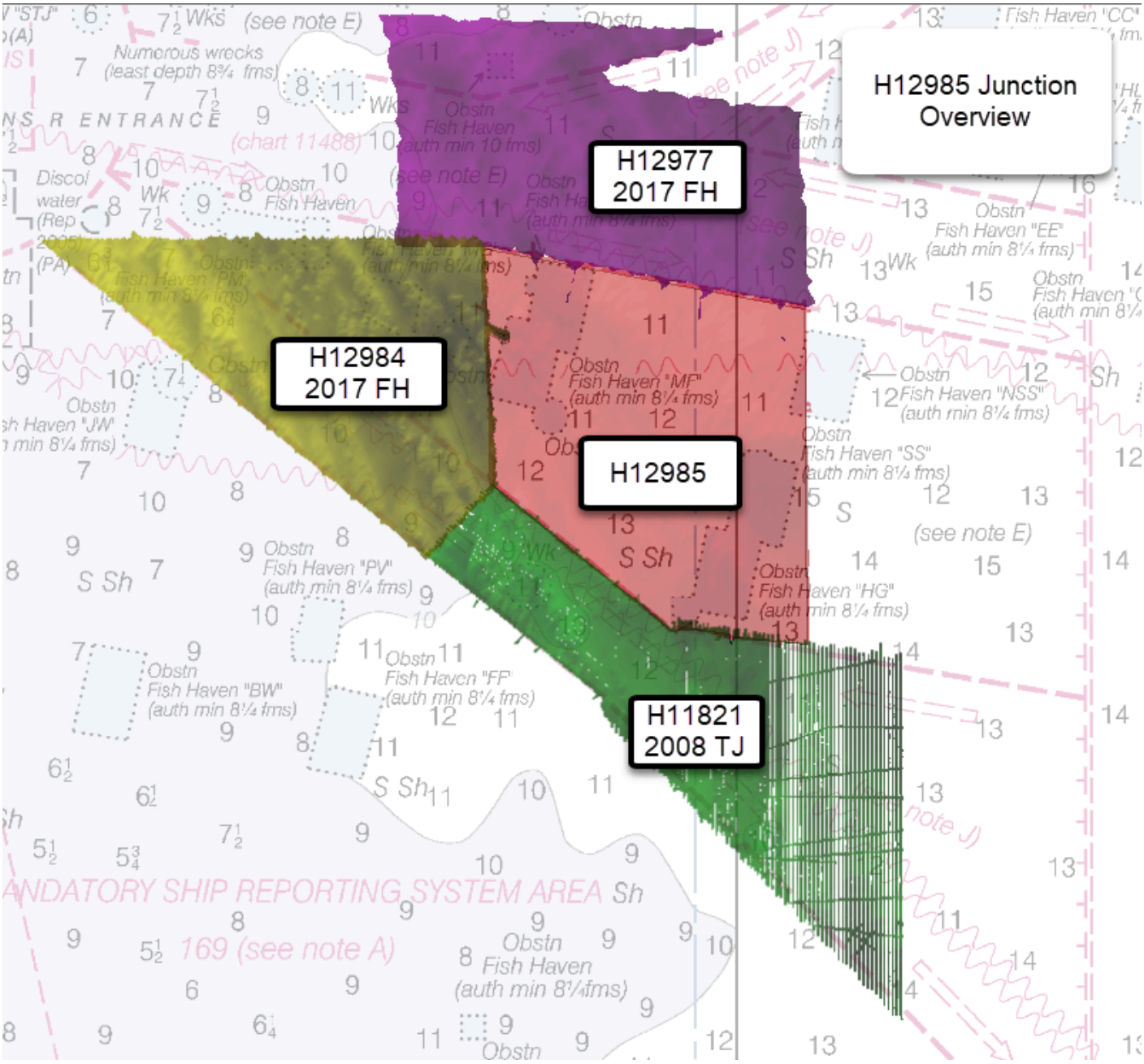


Figure 5: Overview of H12985 junction surveys.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H11821	1:20000	2008	NOAA Ship THOMAS JEFFERSON	S
H12977	1:40000	2017	NOAA Ship FERDINAND R. HASSLER	N
H12984	1:40000	2017	NOAA Ship FERDINAND R. HASSLER	W

Table 9: Junctioning Surveys

H11821

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between the surface from H12985 and H11821 (Figure 6). The statistical analysis of the difference surface shows a mean of 0.13 meters with 95% of the nodes having a maximum deviation of +/- 0.32 meters, as seen if Figure 7. It was found that 99.96% of nodes are within NOAA allowable uncertainty (Figure 8).

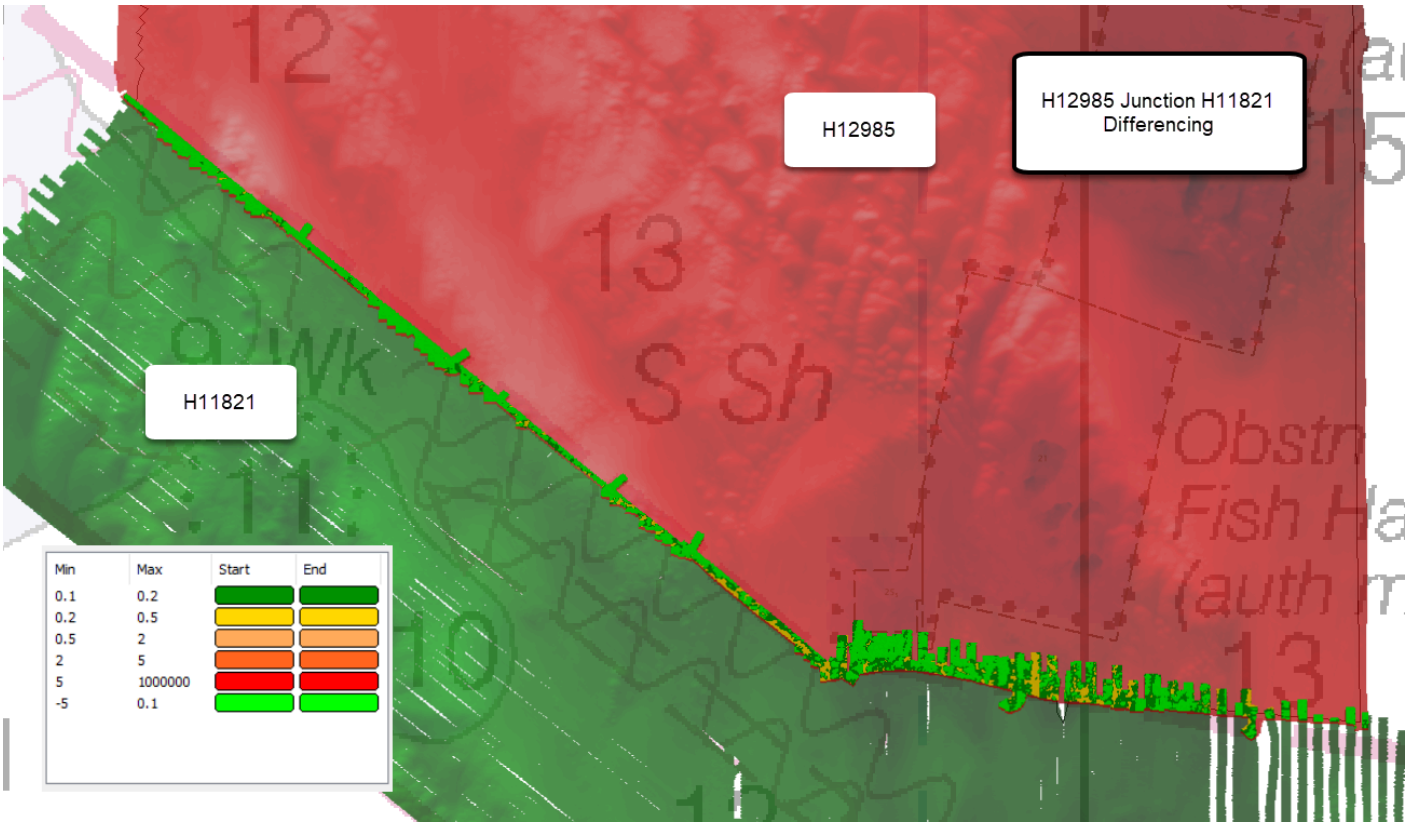
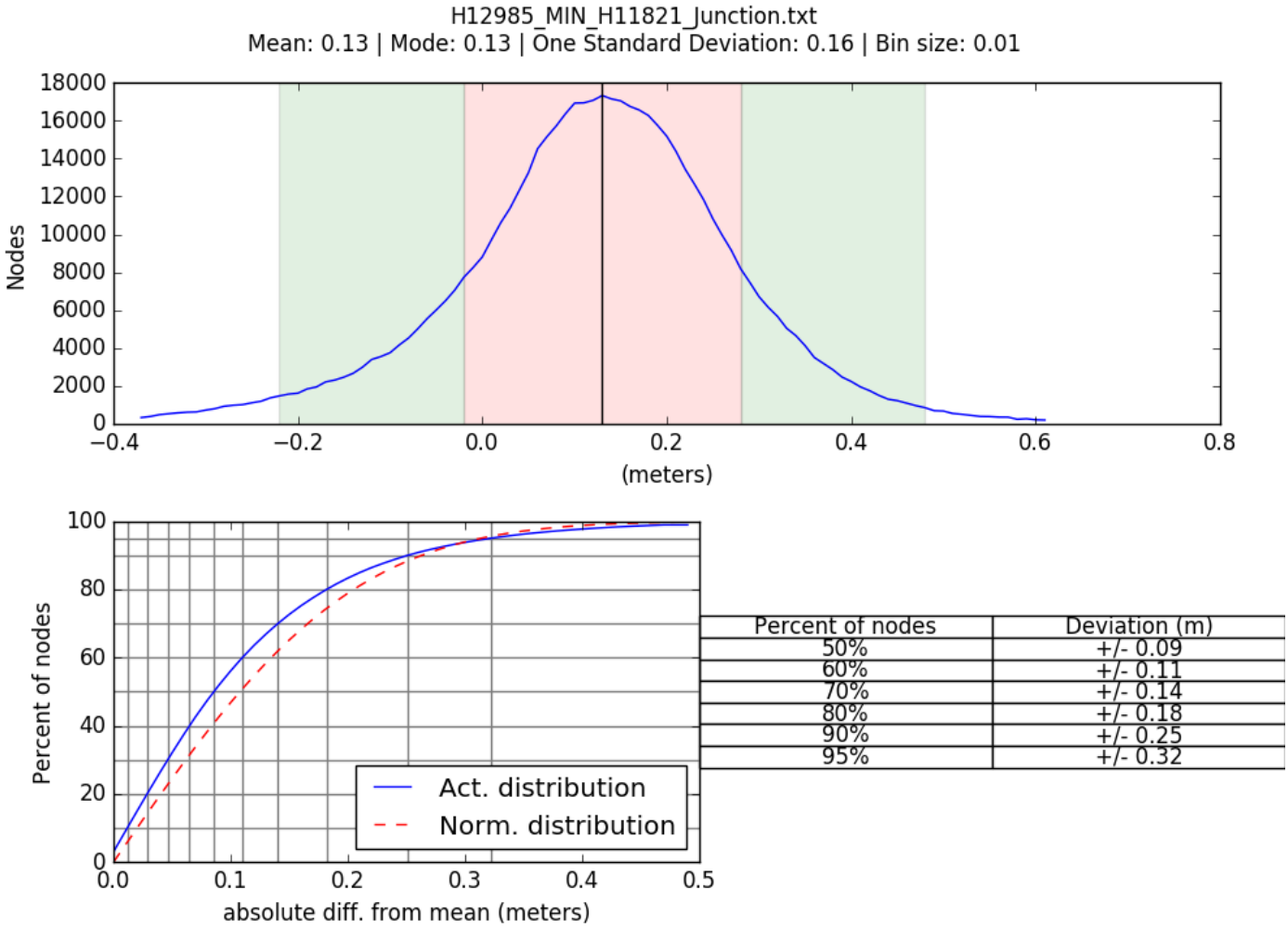


Figure 6: Difference surface between H12985 (red) and junctioning survey H11821 (green).



Percent of nodes	Deviation (m)
50%	+/- 0.09
60%	+/- 0.11
70%	+/- 0.14
80%	+/- 0.18
90%	+/- 0.25
95%	+/- 0.32

Figure 7: Difference surface statistics between H12985 and H11821 (2 meter surface).

H12985 Junction H11821

NOAA Allowable Uncertainty

Variable Resolution Surface	
Total Nodes	574,263
Total Nodes Pass	574,058
Total Percent Pass	99.96%

Figure 8: Difference surface statistics between H12985 and H11821 showing percentage of nodes meeting NOAA allowable uncertainty.

H12977

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between the surface from H12985 and H12977 (Figure 9). The statistical analysis of the difference surface shows a mean of -0.02 meters with 95% of the nodes having a maximum deviation of =/- 0.23 meters, as seen if Figure 10. It was found that 99.95% of nodes are within NOAA allowable uncertainty.

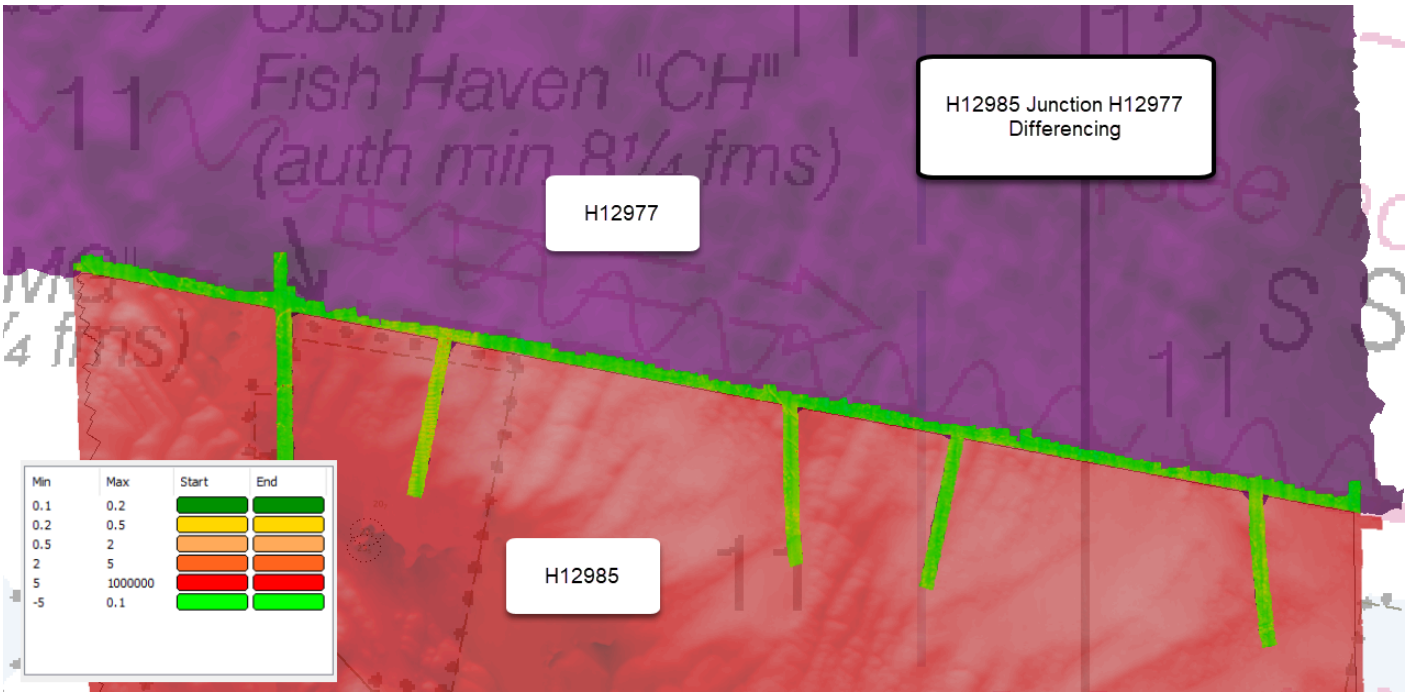
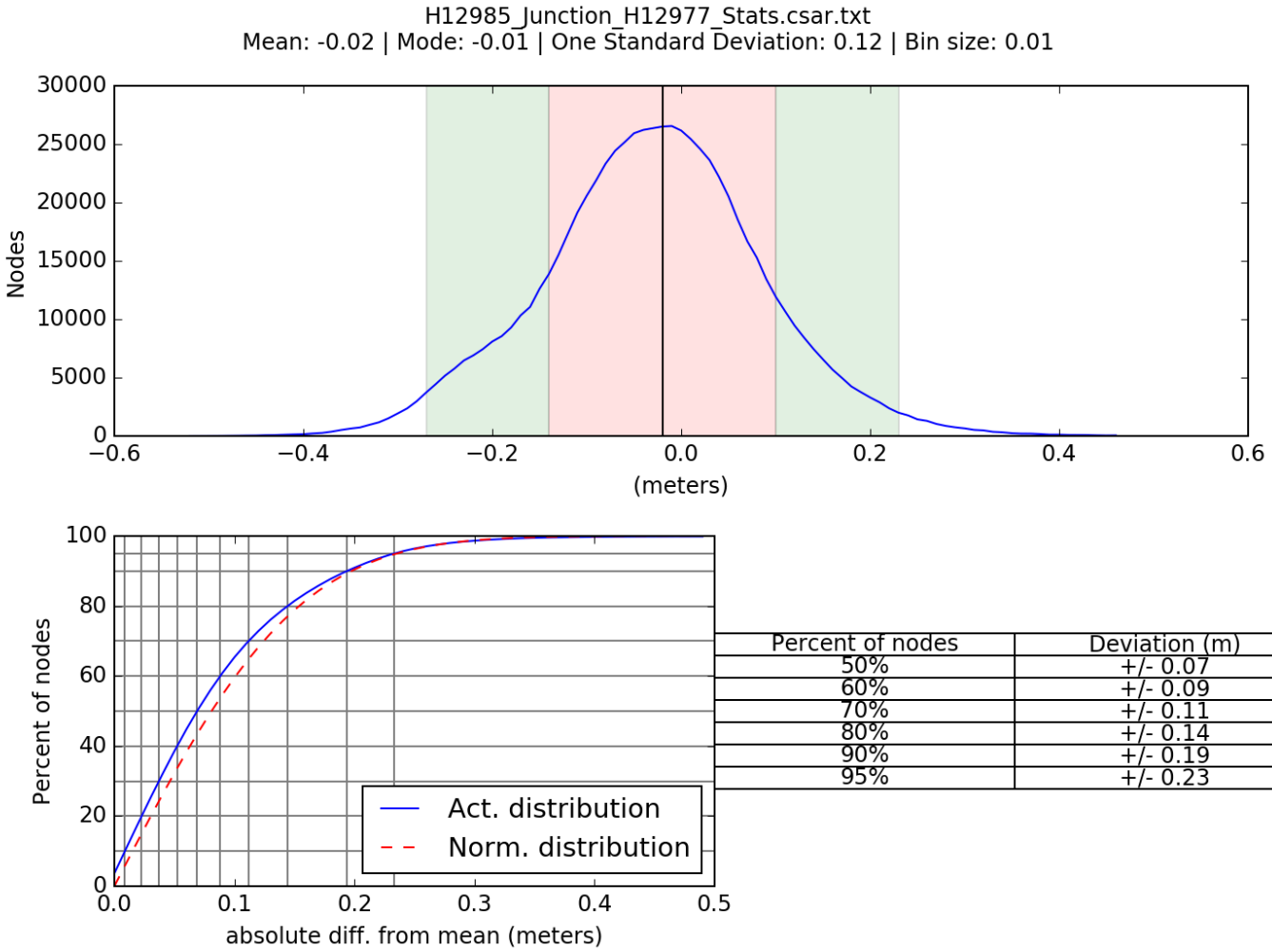


Figure 9: Difference surface between H12985 (red) and junctioning survey H12977 (purple).



Percent of nodes	Deviation (m)
50%	+/- 0.07
60%	+/- 0.09
70%	+/- 0.11
80%	+/- 0.14
90%	+/- 0.19
95%	+/- 0.23

Figure 10: Difference surface statistics between H12985 and H12977 (2 meter and 5 meter surfaces).

H12984

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between the surface from H12985 and H12984 (Figure 11). The statistical analysis of the difference surface shows a mean of 0.07 meters with 95% of the nodes having a maximum deviation of +/- 0.20 meters, as seen if Figure 12. It was found that 100% of nodes are within NOAA allowable uncertainty.

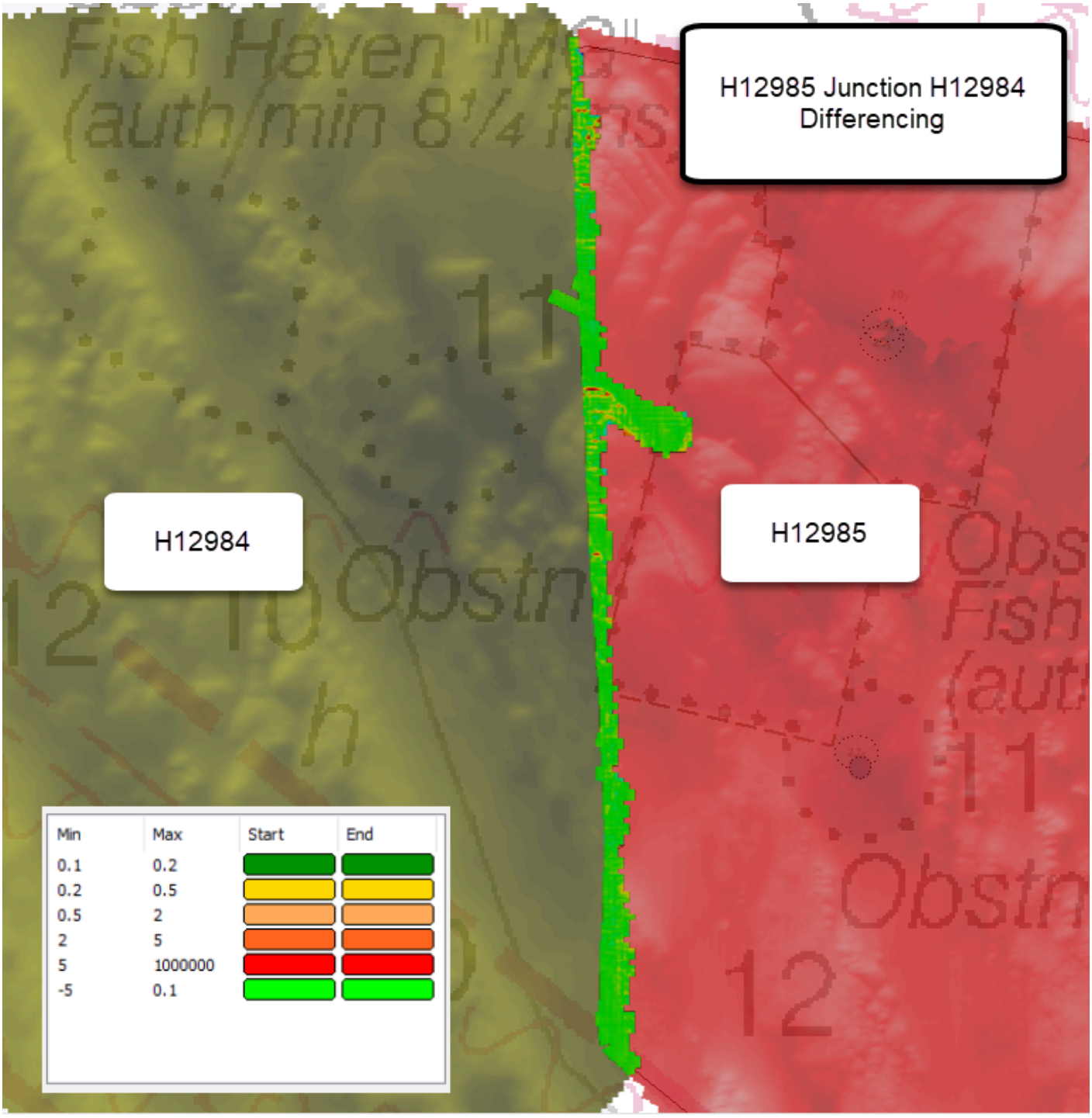
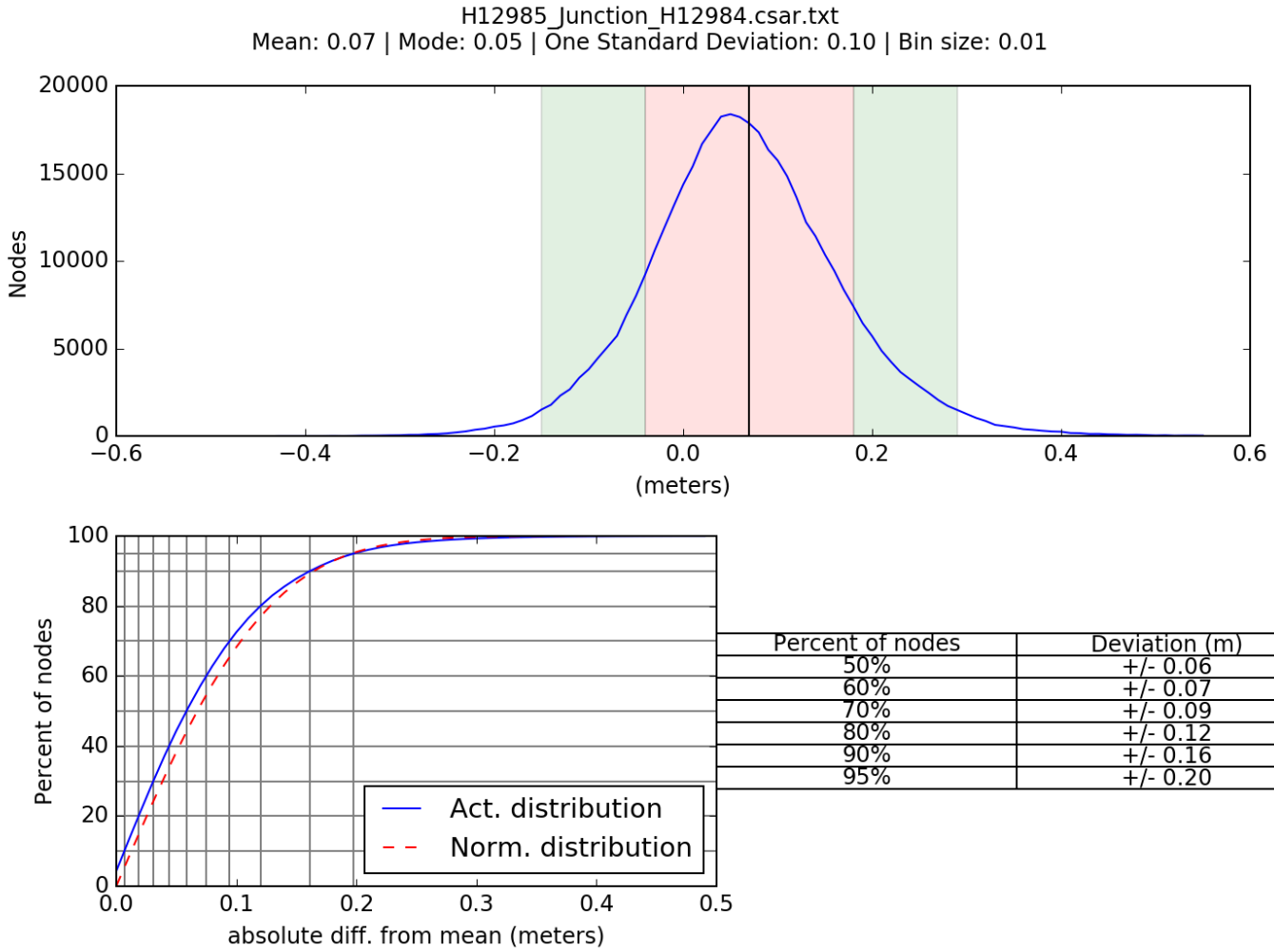


Figure 11: Difference surface between H12985 (red) and junctioning survey H12984 (mustard).



Percent of nodes	Deviation (m)
50%	+/- 0.06
60%	+/- 0.07
70%	+/- 0.09
80%	+/- 0.12
90%	+/- 0.16
95%	+/- 0.20

Figure 12: Difference surface statistics between H12985 and H12984 (2 meter and 5 meter surfaces).

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

Malfunctioning Moving Vessel Profiler (MVP)

Midmorning of Aug 13, 2019 DN225, the MVP malfunctioned where it ceased to reel back in. After many days of testing, it was determined there was an inner sheave and communication problem. MVP usage resumed for the last day of acquisition on August 22, 2019 DN234.

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: Due to sailing conditions where offshore storms would be prevalent in the evenings and the mvp was inoperable, CTD casts were not always taken within the 4 hour time frame; which deviates from the DAPR. This area is not a dynamic sound speed area, but one with consistent surface sound speed (less than two meters per second generally).

Certain days did not always have a CTD cast interval of 4 hours, therefore the application of sound speed in Caris had alterations. All day numbers and lines had NIDWT 4 hours applied during processing except the following which had NIT applied: DN225 lines 0 and 2; DN226 lines 3 to 18 and 27 to 34 ; DN227 lines 103 to 109; DN229 lines 208 to 213; DN230 lines 268 to 273; and DN231 lines 325 to 332. This applies to MVP casts as well.

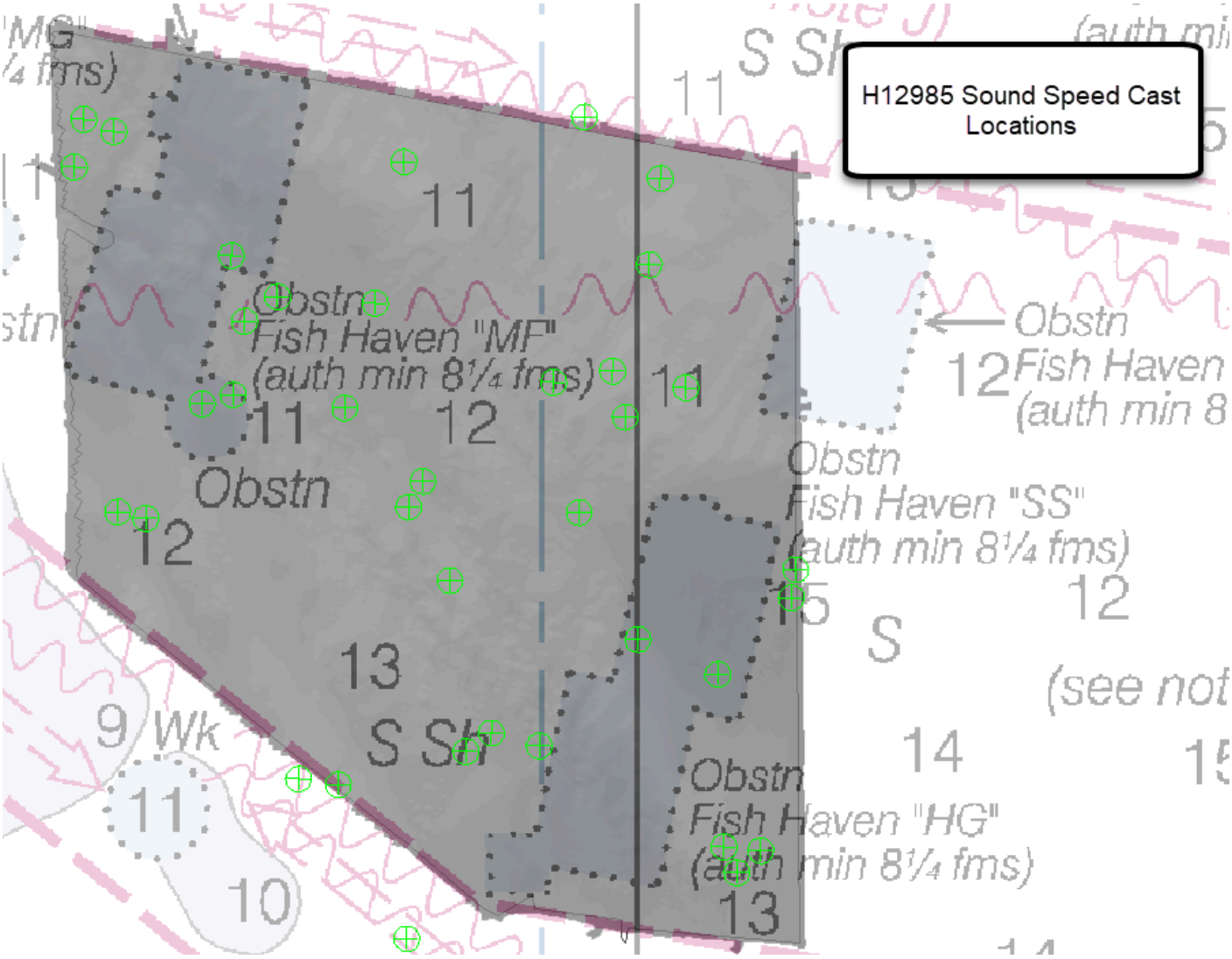


Figure 13: Sound speed cast locations in relation to the survey area.

B.2.8 Coverage Equipment and Methods

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

B.2.9 Holidays

H12985 data were reviewed in CARIS HIPS and SIPS for holidays in accordance with Section 5.2.2.3 of the HSSD. Zero (0) holidays which meet the definition described in the HSSD for complete coverage were identified via HydrOffice QC Tools Holiday Finder tool. This tool automatically scans the surface for holidays as defined in the HSSD and was run in conjunction with a visual inspection of the surface by the hydrographer.

B.2.10 NOAA Allowable Uncertainty

The surface was analyzed using the HydrOffice QC Tools Grid QA feature to determine compliance with specifications. Overall, 99.5% of nodes within the surface meet NOAA Allowable Uncertainty specifications for H12985 (Figure 14).

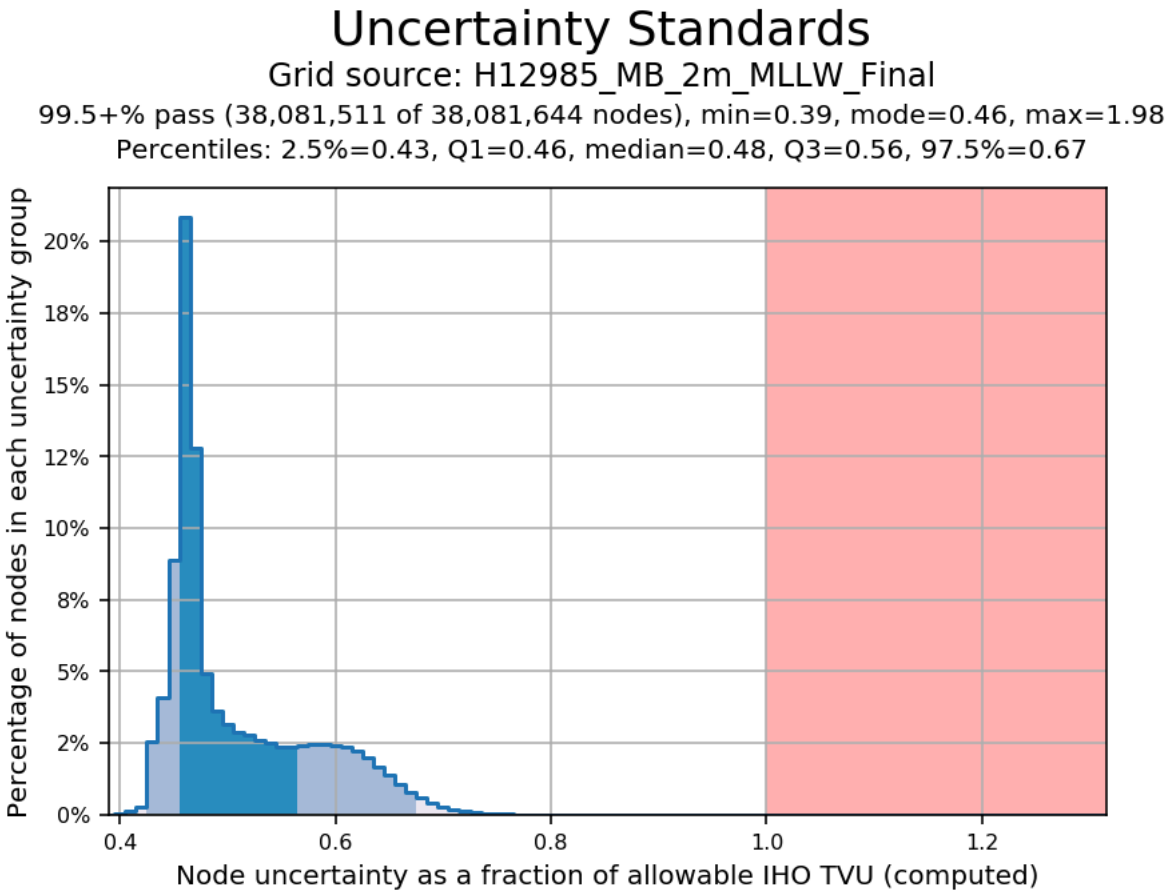


Figure 14: H12985 Allowable uncertainty statistics.

B.2.11 Density

The surface was analyzed using the HydrOffice QC Tools Grid QA feature to determine compliance with specifications. Figure 15 Portrayed an overview of density in relation to the surface. Density requirements for H12985 were achieved with at least 99.5% of surface nodes containing five or more soundings as required by HSSD Section 5.2.2.3 (Figure 16).

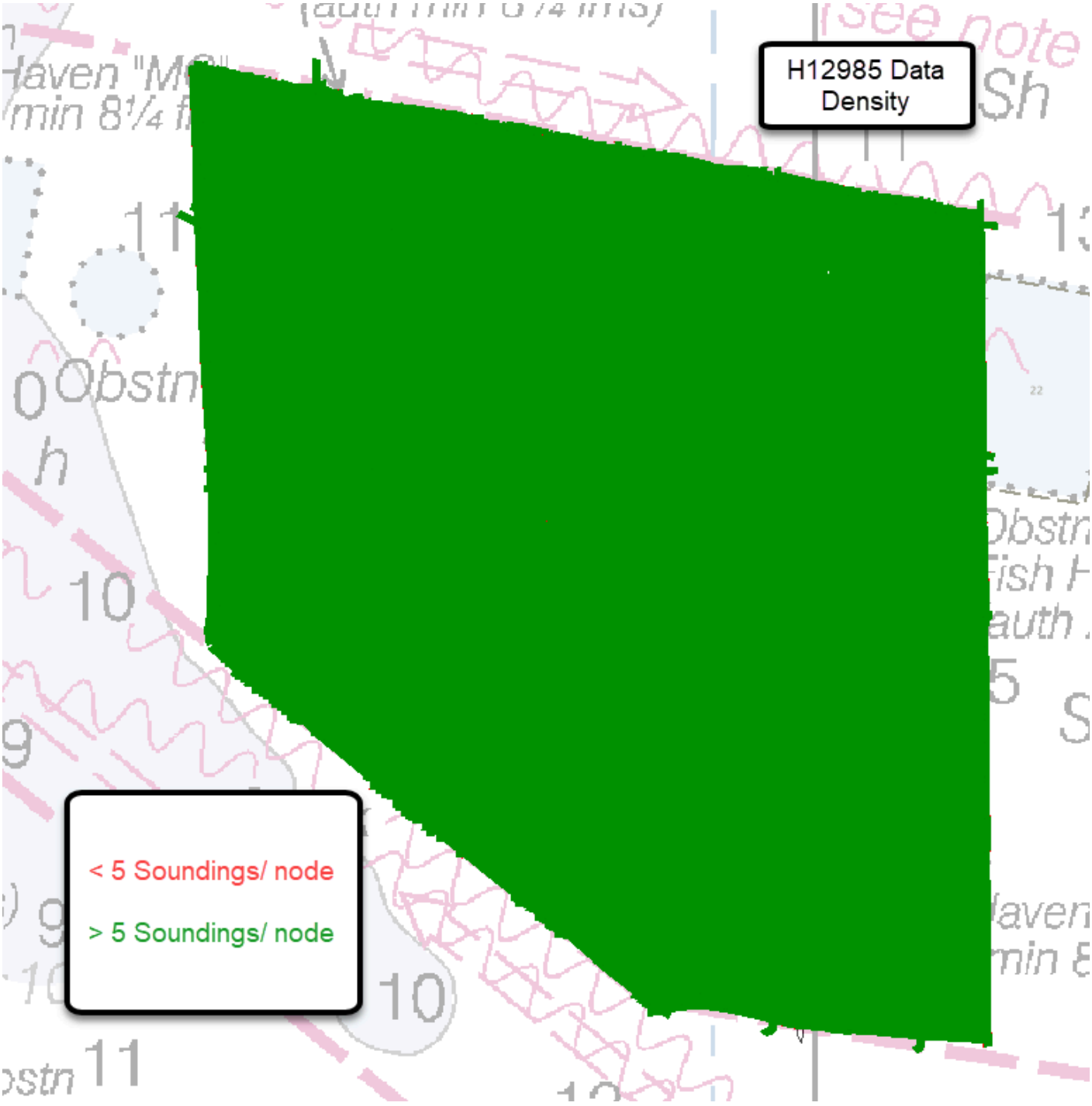


Figure 15: H12985 Density achieving greater than 5 soundings/ node (green).

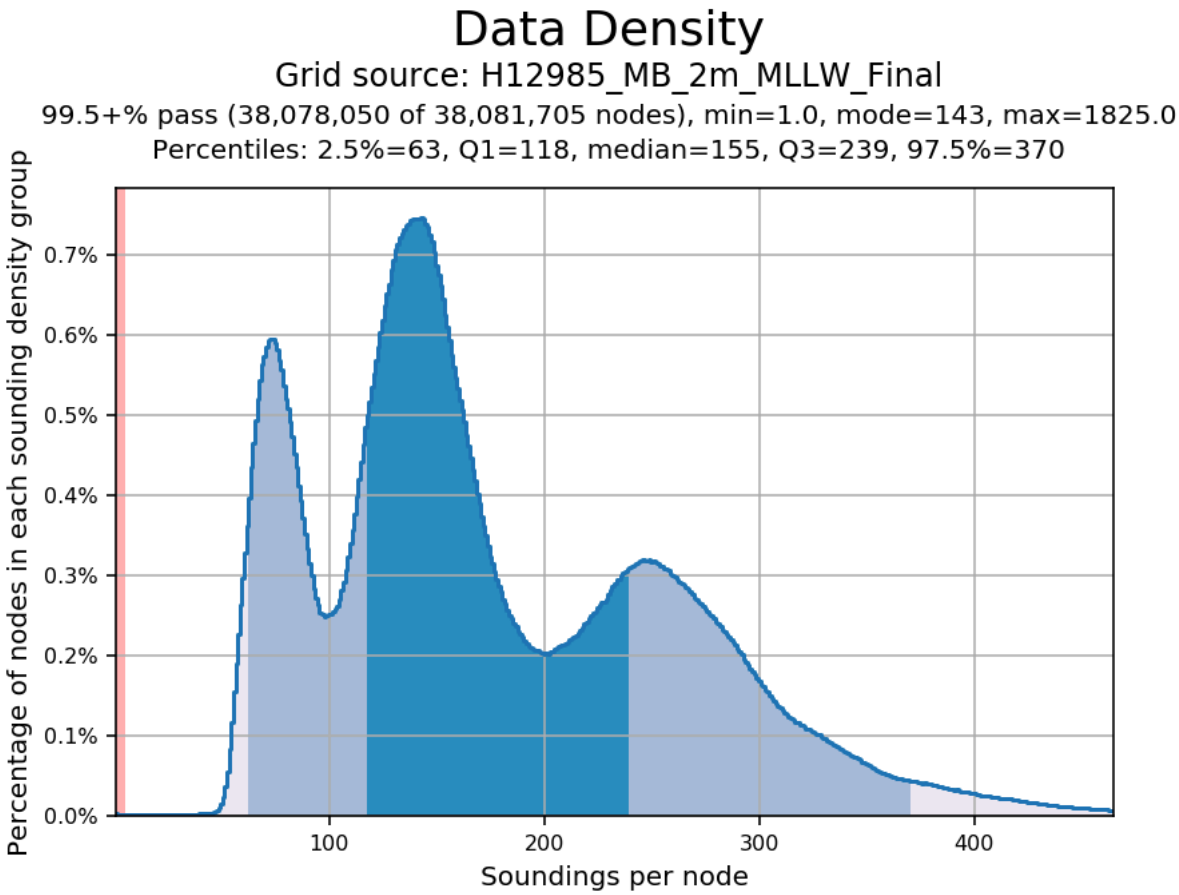


Figure 16: H12985 Density statistics.

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

All equipment and survey methods were used as detailed in the DAPR. Raw backscatter data were stored in the .all file for Kongsberg systems. All backscatter were processed to GSF files and a floating point mosaic was created by the field unit via Fledermaus FMGT 7.8.6. See Figure 17 for a greyscale representation of the complete mosaic.

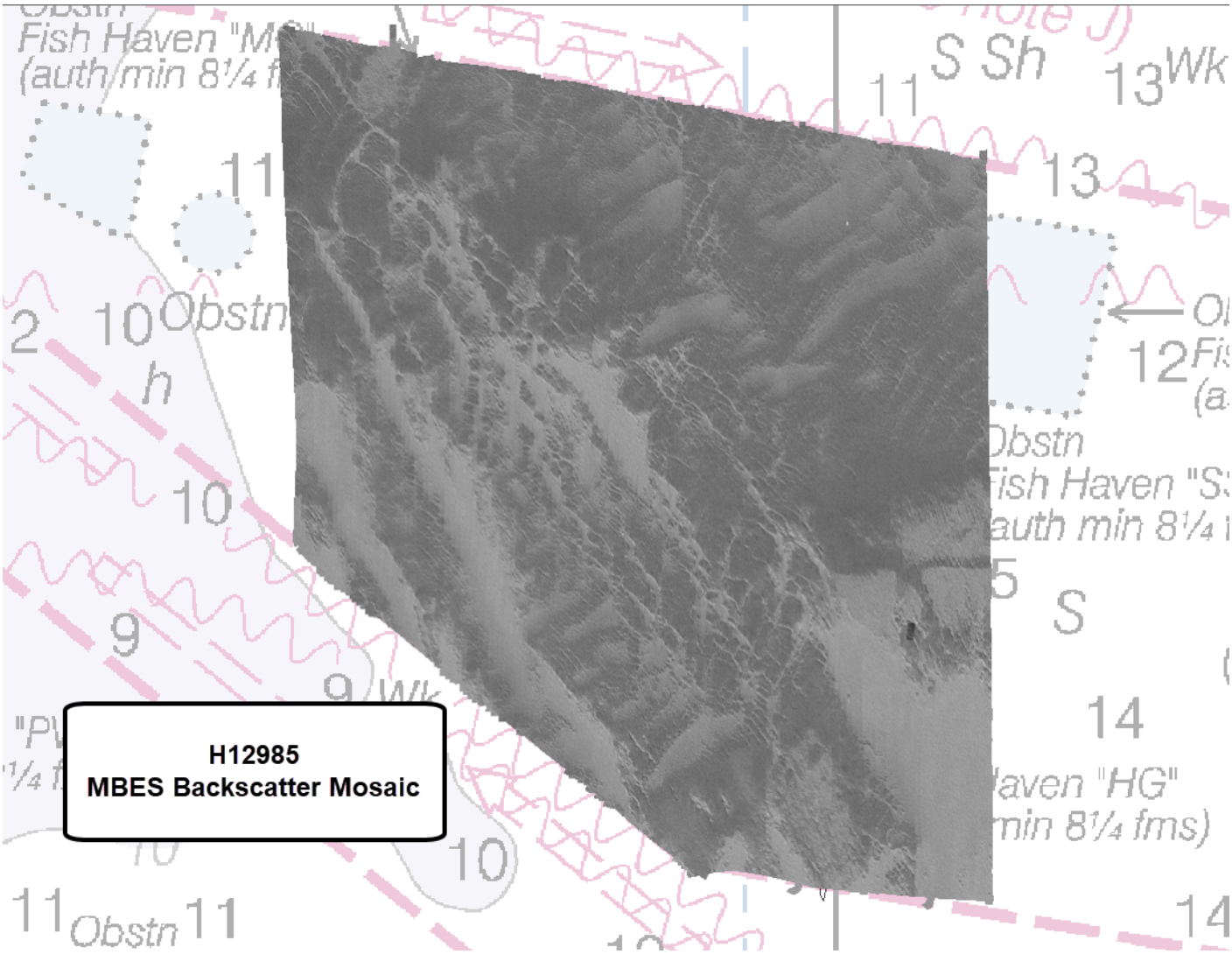


Figure 17: Multibeam backscatter mosaic for H12985.

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	10.4.12

Table 10: Primary bathymetric data processing software

The following software program was the primary program used for imagery data processing:

Manufacturer	Name	Version
QPS	Fledermaus	7.8.10

Table 11: Primary imagery data processing software

The following Feature Object Catalog was used: NOAA Profile Version 2019.

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
H12985_MB_sm_MLLW.csar	CARIS Raster Surface (CUBE)	2 meters	19.536 meters - 32.035 meters	NOAA_2m	Complete MBES
H12985_MB_2m_MLLW_Final.csar	CARIS Raster Surface (CUBE)	2 meters	19.536 meters - 32.035 meters	NOAA_2m	Complete MBES

Table 12: Submitted Surfaces

The NOAA CUBE parameters defined in the 2019 HSSD were used for the creation of all CUBE surfaces for H12985. The surfaces have been reviewed where noisy data, or "fliers" are incorporated into the gridded solutions causing the surface to be shoaler or deeper than the true sea floor. Where these spurious soundings cause the gridded surface to vary from the reliably measured seabed by greater than the maximum allowable Total Vertical Uncertainty at that depth, the noisy data have been rejected by the hydrographer and the surface recomputed.

Flier Finder, part of the QC Tools package within HydrOffice, was used to assist the search for spurious soundings following gross cleaning. Flier Finder was run iteratively until all remaining flagged fliers were deemed to be valid aspects of the surface.

B.5.3 Data Logs

Data acquisition and processing notes are included in the acquisition and processing logs, and additional processing such as final separation model reduction and sound speed application are noted in the H12985 Data Log spreadsheet. All data logs are submitted digitally in the Separates folder.

B.5.4 Designated Soundings

H12985 contained one designated sounding in accordance with HSSD Section 5.2.1.2.3 to accurately represent the seafloor. The designated sounding was in a rocky area in the charted obstruction where the CUBE surface did not accurately depict the true seafloor. The charted location of the obstruction was udated with the current location. For an overview of the survey area and the location of designated soundings refer to Figure 18.

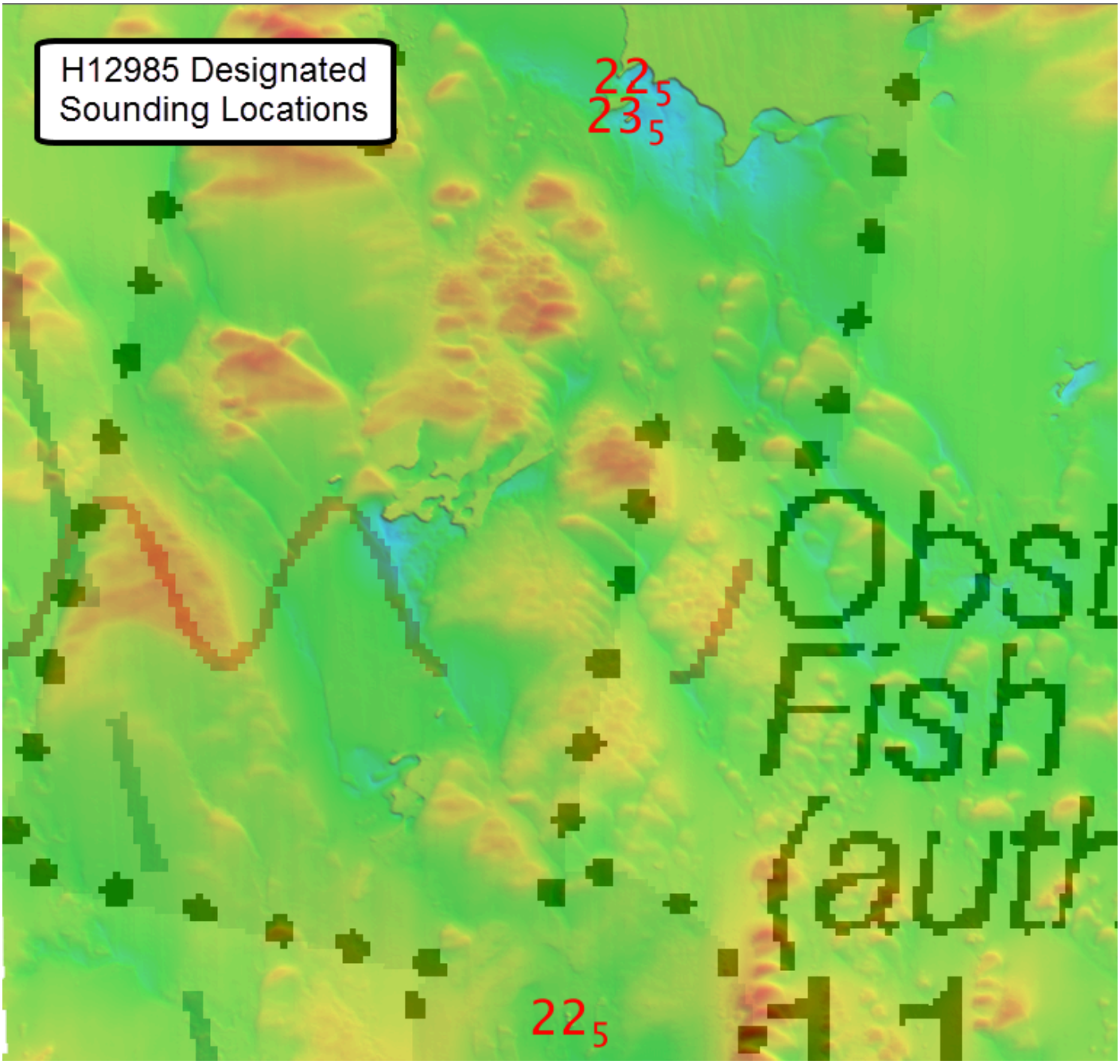


Figure 18: H12985 Overview of designated sounding location.

C. Vertical and Horizontal Control

Per Section 5.1.2.3 of the 2014 Field Procedures Manual, no Horizontal and Vertical Control Report has been generated for H12985.

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	2019Vdatum_ShapefileACHARE(A)_xyNAD83-MLLW_geoid12b.csar

Table 13: ERS method and SEP file

ERS methods were used as the final means of reducing H12985 to MLLW for submission.

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 17.

The following PPK methods were used for horizontal control:

- RTX

Vessel kinematic data were post-processed using Applanix POSPac processing software and RTX positioning methods described in the DAPR. Smoothed Best Estimate of Trajectory (SBET) and associated error (RMS) data were applied to all MBES data in CARIS HIPS and SIPS.

WAAS

During real-time acquisition, all platforms received correctors from the Wide Area Augmentation System (WAAS) for increased accuracies similar to USCG DGPS stations. WAAS and SBETs were the sole methods of positioning for H12985 as no DGPS stations were available for real-time horizontal control.

D. Results and Recommendations

D.1 Chart Comparison

A comparison was performed between survey H12985 and ENC US3GA10M and US4FL50M using CARIS HIPS and SIPS. Sounding and contour layers were overlaid on the ENC to assess differences between the surveyed soundings and charted depths. ENC's were visually compared to the surface by overlaying the ENC with a survey sounding set.

All data from H12985 should supersede charted data. In general, surveyed soundings agree with the majority charted depths. A full discussion follows below.

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	Preliminary?
US3GA10M	1:449659	37	01/03/2019	01/03/2019	NO
US4FL50M	1:80000	22	06/19/2019	06/19/2019	NO

Table 14: Largest Scale ENCs

US3GA10M

Soundings from H12985 were in general agreement with charted depths on ENC US3GA10M, with most depths agreeing within one meter as shown in Figure 19. The largest differences were seen in the charted obstruction (fish haven) areas where differences range up to 18.5 meters. The obstruction areas have an authorized minimum depth of 8.25 fathoms or 15.088 meters.

The area covered by H12985 did not contain contours. Although, one and five meter spacing contour files were developed for comparison purposes (light green- 5 meter spacing). While a user defined sounding spacing at 1:40000 mm at map scale and a single-defined radius of 20 was portrayed in the figure, red sounding values were derived from a spacing at 1:40000 mm at map scale and a single-defined radius of 1.

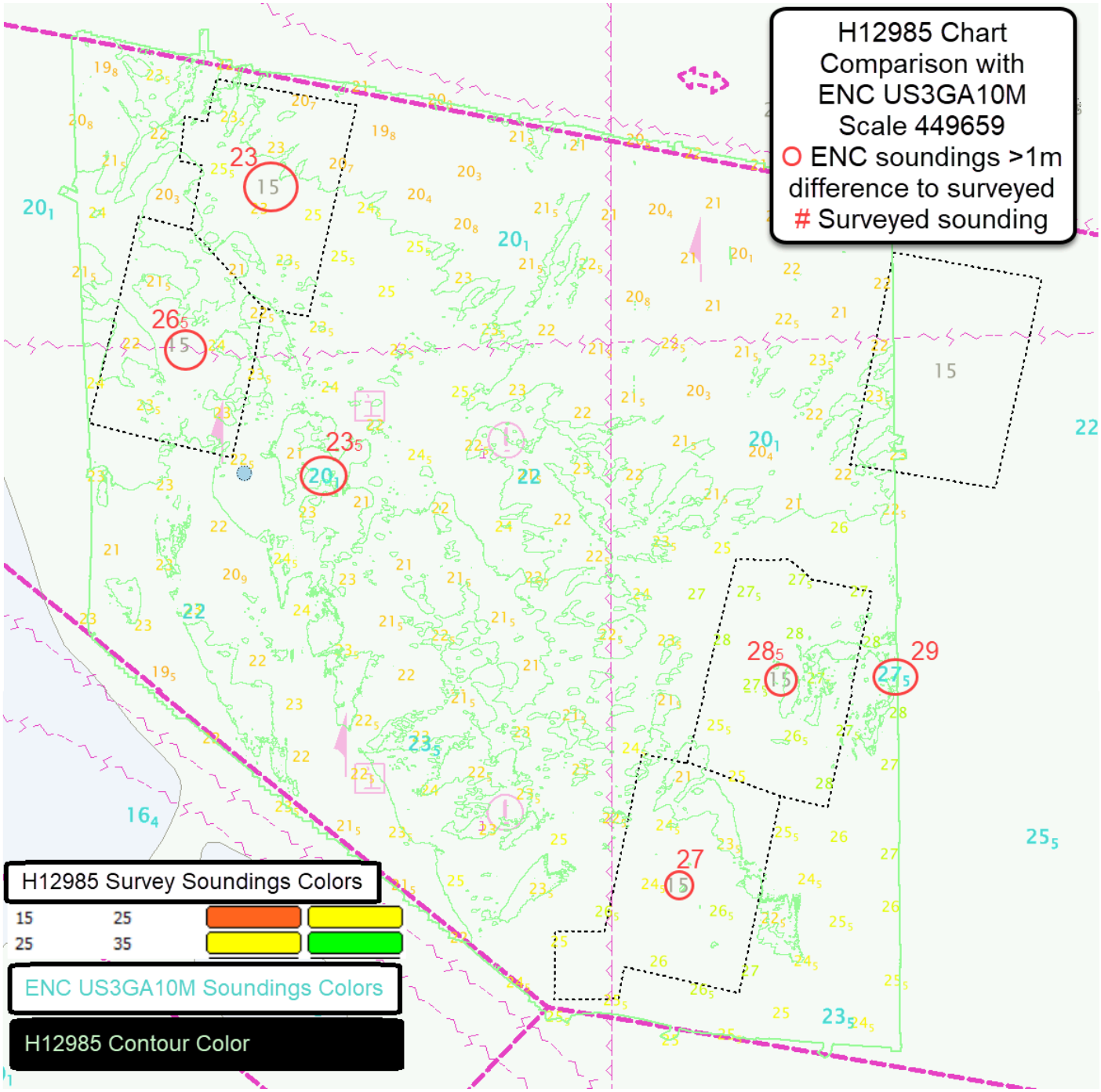


Figure 19: Overview of ENC US3GA10M soundings (turquoise) overlaid with H12985 soundings (orange, yellow, green) spaced at 1:40000 mm at map scale and a single-defined radius of 20. ENC soundings circled in red are generally greater than one meter disparate from the surveyed soundings. Contour interval is five meters. The number in red next to the circled ENC sounding is the H12985 surveyed sounding.

US4FL50M

Soundings from H12985 were in general agreement with charted depths on ENC US3GA10M, with most depths agreeing within one meter as shown in Figure 20. The largest differences were seen in the charted obstruction (fish haven) areas where differences range up to 18.5 meters. The obstruction areas had an authorized minimum depth of 8.25 fathoms or 15.088 meters.

The area covered by H12985 did not contain contours. Although, one and five meter spacing contour files were developed for comparison purposes. While a user defined sounding spacing at 1:40000 mm at map scale and a single-defined radius of 20 was portrayed in the figure, red sounding values were derived from a spacing at 1:40000 mm at map scale and a single-defined radius of 1.

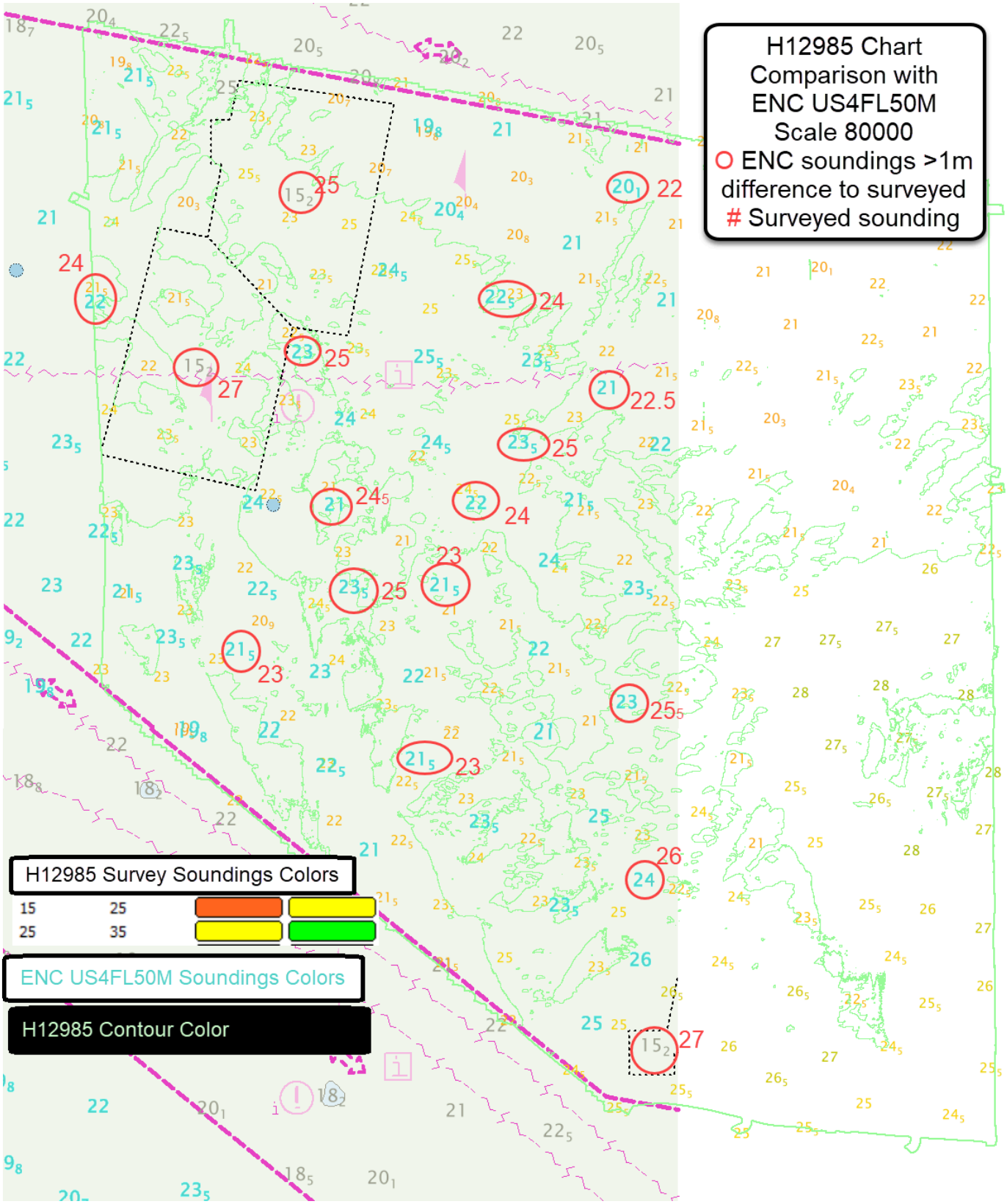


Figure 20: Overview of ENC US4FL50M soundings (turquoise) overlaid with H12985 soundings (orange, yellow, green) spaced at 1:40000 mm at map scale and a single-defined radius of 20. ENC soundings circled in red are generally greater than one meter disparate from the surveyed soundings. Contour interval is five meters. The number in red next to the circled ENC sounding is the H12985 surveyed sounding.

D.1.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.3 Charted Features

No charted features exist for this survey.

D.1.4 Uncharted Features

Survey H12985 had three new features that were address in the H12985 Final Feature File (FFF). Of these features, there was one (1) new obstruction and two (2) new wrecks, of which none are submitted as DTONs.

The Obstruction (FOID US 000007819200001) was a new surveyed location 134.631 meters from the charted Obstruction (FOID US 000007818800001) .

The two (2) new wrecks were included in the FFF even though they were located within the fish haven obstruction areas. Both wrecks (FOID US 000007819100001 and FOID US 000007818900001) were deeper than the authorized minimum depth of 8.25 fathoms or 15.088 meters. H12985 may have future charting implications regarding the movement of the fish havens located within the boundaries of this sheet.

D.1.5 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.6 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. H12985 was bordered to the north and south with two-way traffic areas.

D.1.7 Bottom Samples

Five bottom samples were acquired in accordance with the Project Instructions for H12985. All bottom samples were entered in the H12985 FFF. See Figure 21 for a graphical overview of sample locations.

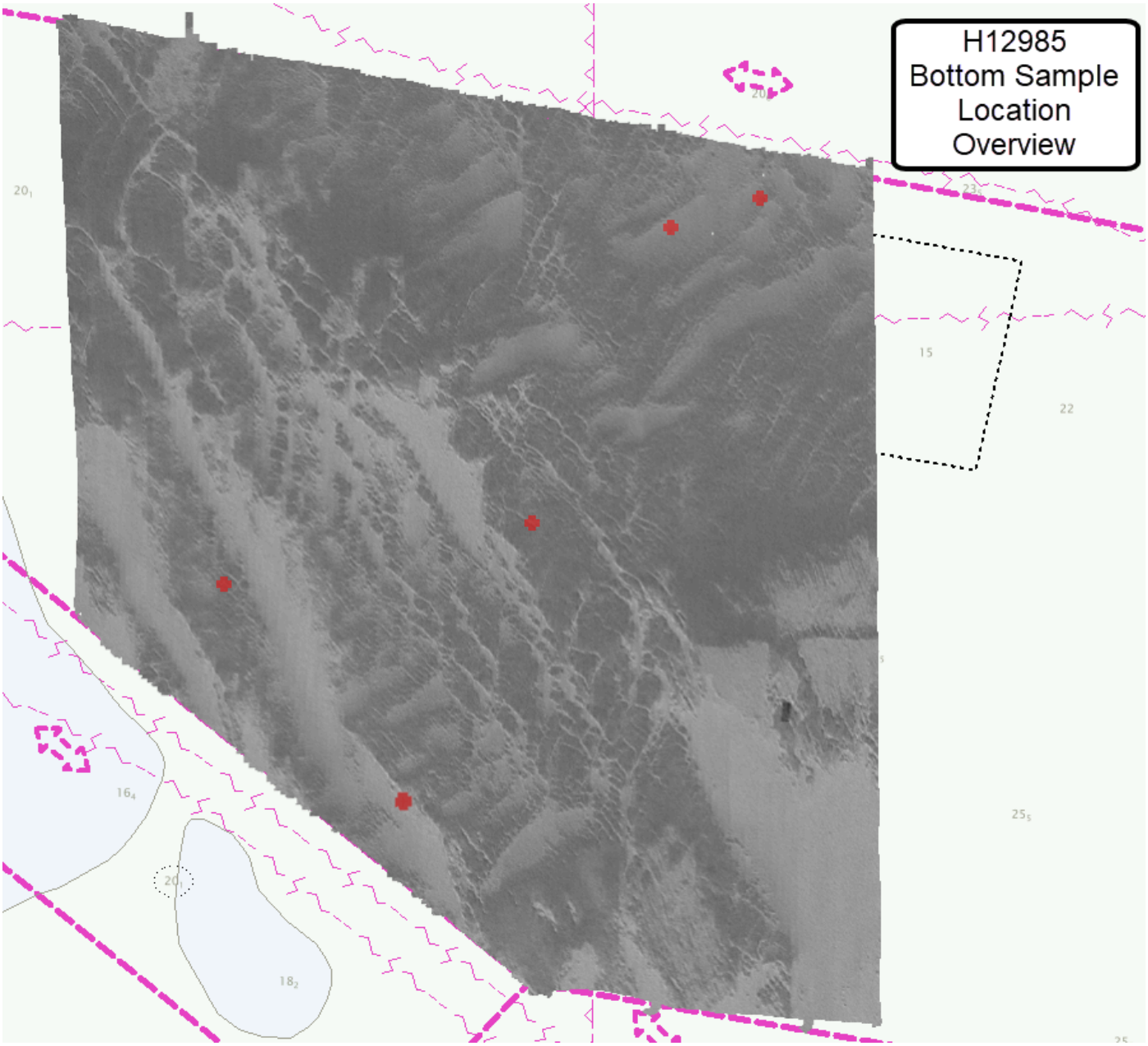


Figure 21: H12985 Bottom sample locations (red) overlaid upon multibeam backscatter mosaic.

D.2 Additional Results

D.2.1 Shoreline

Shoreline was not assigned in the Hydrographic Survey Project Instructions or Statement of Work.

D.2.2 Aids to Navigation

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

D.2.3 Overhead Features

No overhead features exist for this survey.

D.2.4 Submarine Features

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

D.2.5 Platforms

No platforms exist for this survey.

D.2.6 Ferry Routes and Terminals

Ferry routes and/or terminals exist for this survey, but were not investigated.

D.2.7 Abnormal Seafloor and/or Environmental Conditions

Abnormal seafloor and/or Environmental Conditions were observed in this survey, but were not investigated. There was a ledge area located 30-18-34.2374N and 81-04-12.8917W as noted in Figure 22, that was 3.260m proud off the seafloor generally in 25 meters of water. This was especially seen in the H12985_MB_2m_MLLW_Final.csar Hypothesis_Count layer (Figure 23). While it was not a hazardous feature, the hydrographer thought it prudent to note, as it affects the Hypothesis_Count layer in the surface and the current location was in the Obstruction (fish haven) areas.

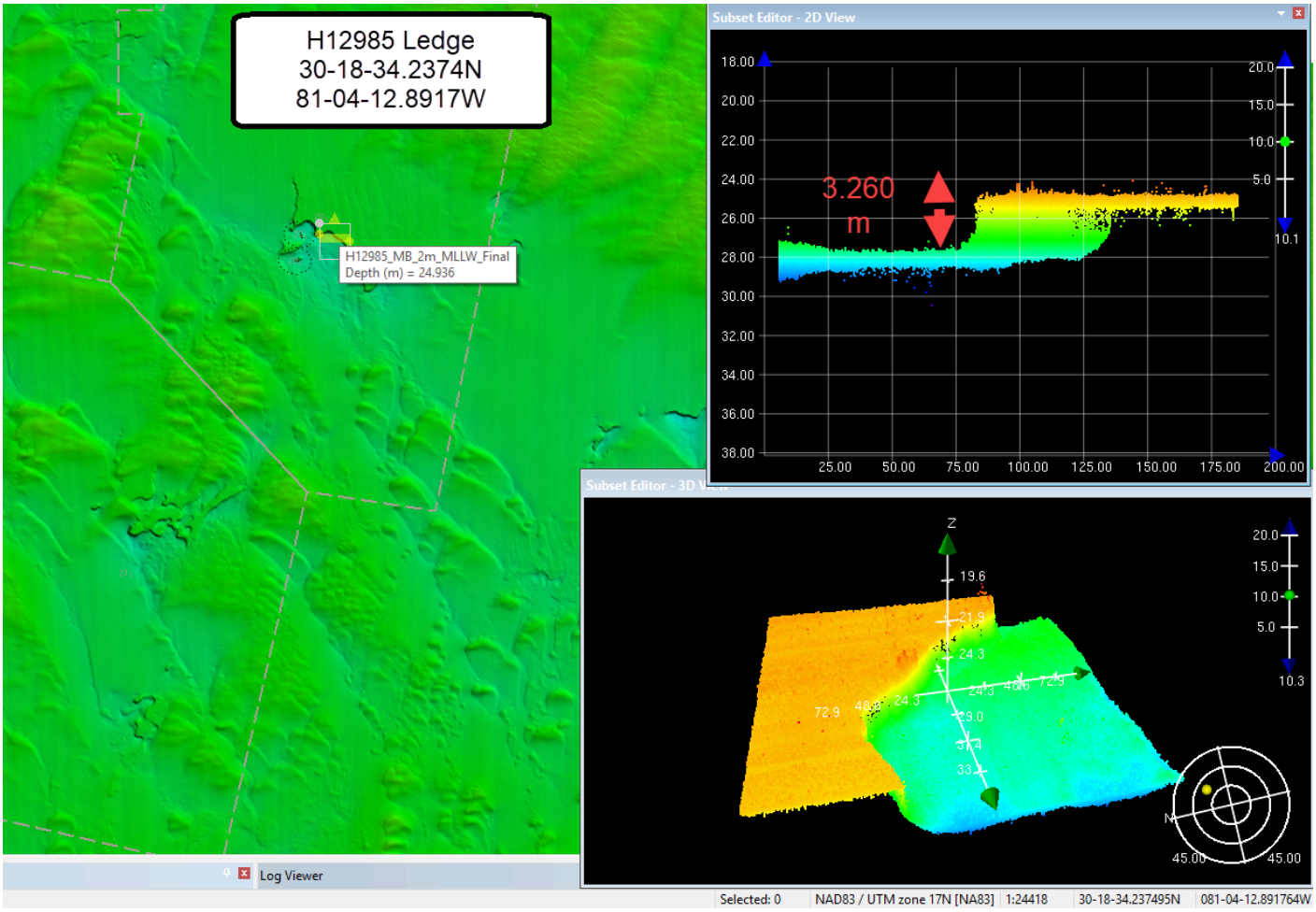


Figure 22: H12985 Ledge example located 30-18-34.2374N and 81-04-12.8917W . The H12985_MB_2m_MLLW_Final.csar surface is exaggerated by 8.

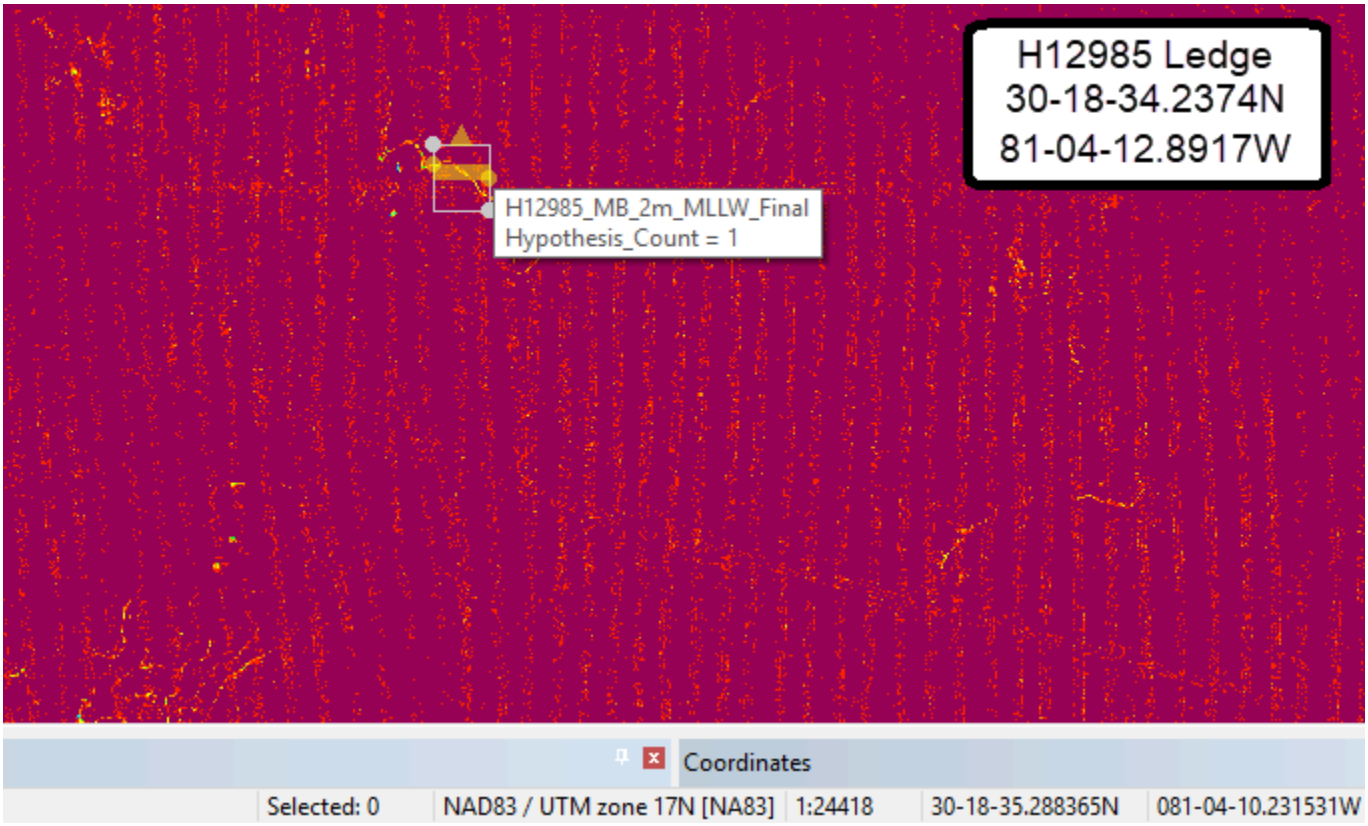


Figure 23: H12985 Ledge example located 30-18-34.2374N and 81-04-12.8917W is easily identified in the Hypothesis_Count layer of the H12985_MB_2m_MLLW_Final.csar surface.

D.2.8 Construction and Dredging

No present or planned construction or dredging exist within the survey limits.

D.2.9 New Survey Recommendation

No new surveys or further investigations are recommended for this area.

D.2.10 Inset Recommendation

No new insets 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
LCDR Mark Blankenship	Chief of Party	10/30/2019	Mark A Blankenship 2020.03.25 08:57:19 -04'00'
LT Steven Wall	Field Operations Officer	10/30/2019	WALL.STEVEN.JAMES.1459978298 Digitally signed by WALL.STEVEN.JAMES.1459978298 Date: 2020.03.27 09:22:39 -04'00'
PS Rita Bowker	Sheet Manager	10/30/2019	BOWKER.RITA.SARA.1400785461 Digitally signed by BOWKER.RITA.SARA.1400785461 Date: 2020.04.06 11:06:46 -04'00'

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