H13331

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13331

LOCALITY

State(s):	Florida
General Locality:	Gulf of Mexico
Sub-locality:	North of Ochlockonee Shoal Western Portion

2019

CHIEF OF PARTY
LT John Kidd

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H13331**

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:	**Gulf of Mexico**
Sub-Locality:	**North of Ochlockonee Shoal Western Portion**
Scale:	**10000**
Dates of Survey:	**10/14/2019 to 10/17/2019**
Instructions Dated:	**10/01/2019**
Project Number:	**OPR-J359-NRT1-19**
Field Unit:	**NOAA Navigation Response Team - Stennis**
Chief of Party:	**LT John Kidd**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Multibeam Echo Sounder Backscatter Side Scan Sonar**
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 16N, MLLW. All references to other horizontal or vertical datums in this report are applicable to the processed hydrographic data provided by the field unit.

Table of Contents

List of Tables

List of Figures

Descriptive Report to Accompany Survey H13331

Project: OPR-J359-NRT1-19

Locality: Gulf of Mexico

Sublocality: North of Ochlockonee Shoal Western Portion

Scale: 1:10000

October 2019 - October 2019

NOAA Navigation Response Team - Stennis

Chief of Party: LT John Kidd

A. Area Surveyed

The survey area is located in the Gulf of Mexico within the sub locality of North of Ochlockonee Shoal Western Portion.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
30° 1' 9.03" N 84° 13' 38.47" W	39° 55' 10.46" N 84° 8' 14.83" W

Table 1: Survey Limits

Data were not acquired to the survey limits in accordance with the requirements in the Project Instructions due to the lack of a weather window late in the field season. The inability to survey to the prescribed limits was communicated to the Project Manager and can be found in Supplemental Survey Correspondence.

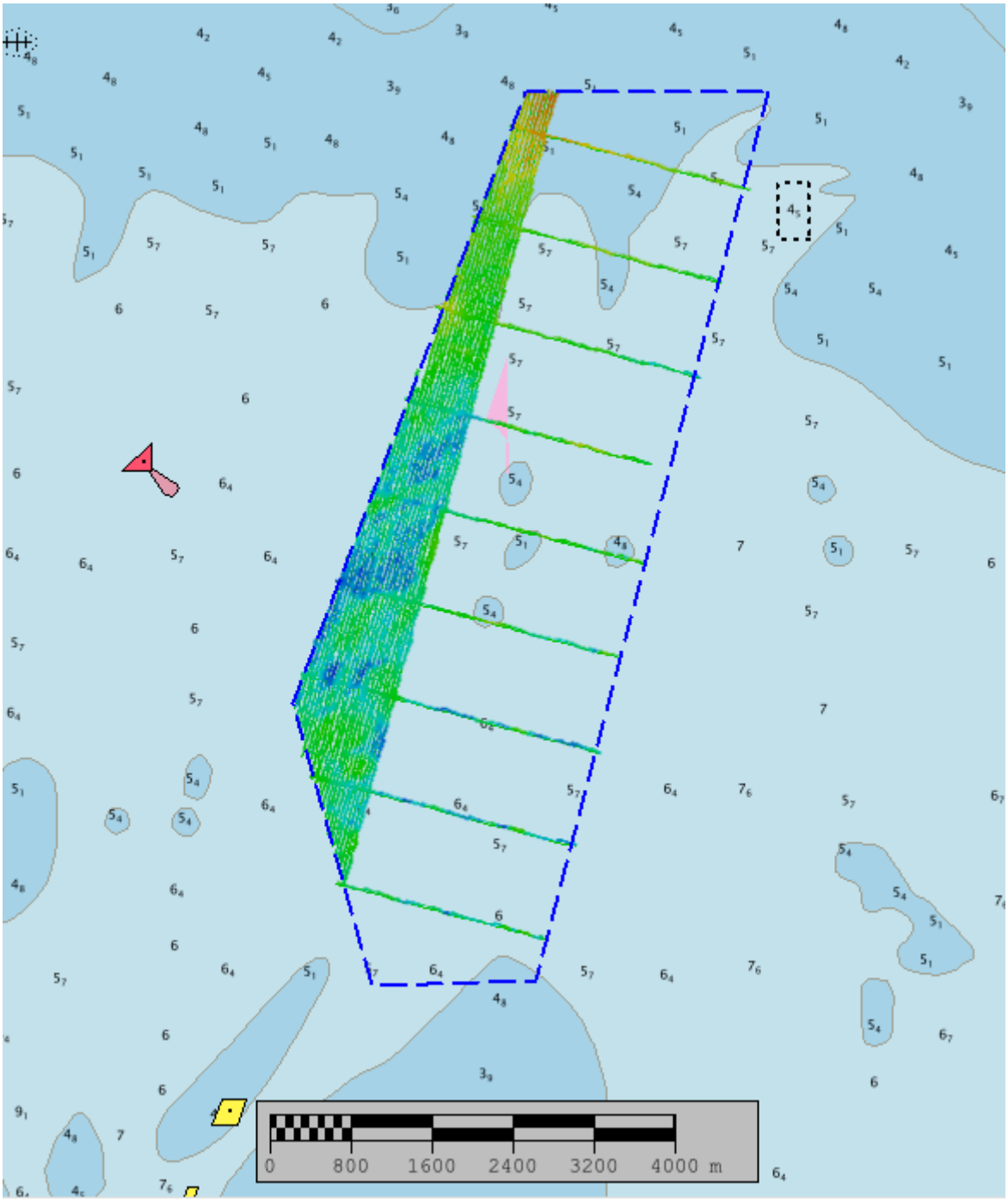


Figure 1: H13331 Survey Limits

A.2 Survey Purpose

The Apalachee Bay project will provide contemporary surveys to update National Ocean Service nautical charting products and services. The Apalachee Bay Survey is part of the Big Bend Mapping project, a Florida Coastal Mapping Program (FCMaP) priority. This is a multi-year, multiagency mapping project to

map the seafloor with modern hydrographic data. Survey data from this project is intended to supersede all prior survey data in the common area.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data acquired for H13331 met the coverage requirements for object detection, as required by the HSSD. This includes crosslines (see Section B.2), NOAA allowable uncertainty and density requirements (Section B.2). The surface was analyzed using the HydrOffice QC Tools Grid QA feature. Density requirements for H13331 were achieved with at least 99.5% of surface nodes containing five or more soundings as required by HSSD Section 5.2.2.3.

A.4 Survey Coverage

The following table lists the coverage requirements for this survey as assigned in the project instructions:

Water Depth	Coverage Required
All waters in survey area	Object Detection Coverage (Refer to HSSD Section 5.2.2.2)
All waters in survey area	Acquire backscatter data during all multibeam data acquisition (Refer to HSSD Section 6.2)

Table 2: Survey Coverage

The entirety of H13331 was acquired in accordance with the Object Detection MBES coverage standard, meeting the requirements listed above and in the HSSD.

The entirety of H13331 was acquired in accordance with the Object Detection 200% Side Scan Coverage with Concurrent Multibeam coverage standards.

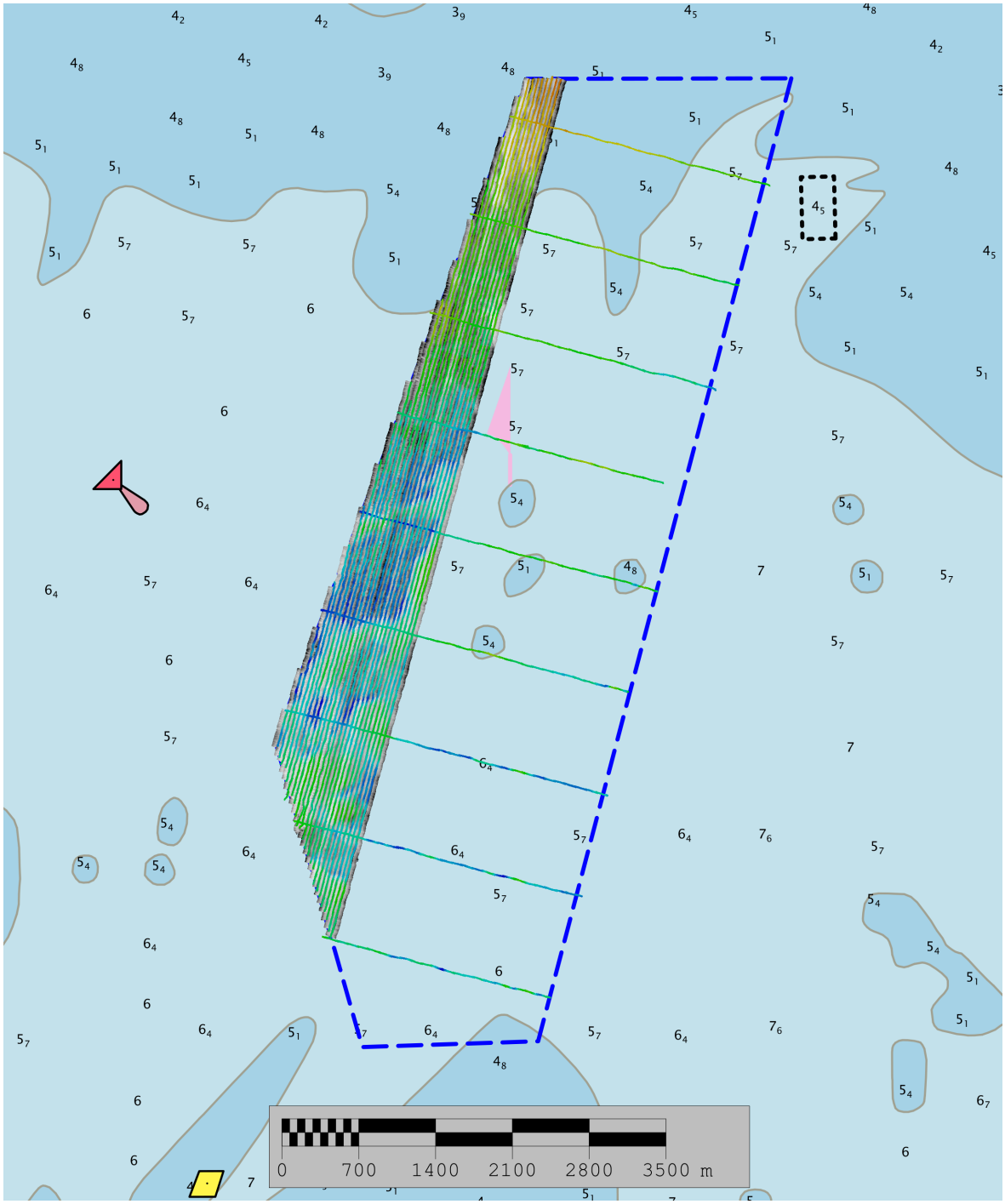


Figure 2: H13331 Survey Coverage - 200% side scan coverage with concurrent multibeam bathymetry.

A.6 Survey Statistics

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

	HULL ID	*NRT1*	*Total*
LNM	**SBES Mainscheme**	0	0
	MBES Mainscheme	0	0
	Lidar Mainscheme	0	0
	SSS Mainscheme	0	0
	SBES/SSS Mainscheme	0	0
	MBES/SSS Mainscheme	67.24	67.24
	SBES/MBES Crosslines	12.97	12.97
	Lidar Crosslines	0	0
Number of Bottom Samples			3
Number Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Investigated by Dive Ops			0
Total SNM			0.64

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
10/14/2019	287
10/15/2019	288

Survey Dates	Day of the Year
10/17/2019	290

Table 4: Dates of Hydrography

Mainscheme MBES/SSS Combo value updated to reflect Mainscheme only in Table 3.

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Refer to the OPR-J359-NRT1-19 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	*NRT1*
LOA	31 feet
Draft	1.7 feet

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 2040C	MBES
EdgeTech	4125	SSS
YSI	CastAway-CTD	Conductivity, Temperature, and Depth Sensor
AML Oceanographic	MicroX SV	Sound Speed System
Applanix	POS MV 320 v4	Positioning and Attitude System

Table 6: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines were collected by S3005 and are spatially distributed across the survey area. Crosslines were collected, processed and compared in accordance with Section 5.2.4.2 of the HSSD. A depth surface was created in Caris of only mainscheme lines, and a second depth surface was created of only crosslines. A difference surface was generated and compared with the Pydro Explorer's Compare Grids tool. The mainshceme only, crossline only, and difference surface are included in the submission of this survey as Digital Data.

In total, 99.5+% of the total number of nodes pass the TVUmax test between H13331 mainscheme and crossline data. For H13331 respective depths, the difference surface was compared to the allowable NOAA uncertainty standards. Statistics show the mean difference between the depths derived from mainscheme data and crossline data was -0.07 meters.

Crosslines extend over the entire width of the assigned sheet limits because they were acquired on the first day of survey. This data was retained in the finalized surface.

Crossline 006_20191014_162038_XL exhibited large depth differences of ~0.30-0.50m. All correctors were verified to be applied properly and no indication of a drifting SBET could be found.

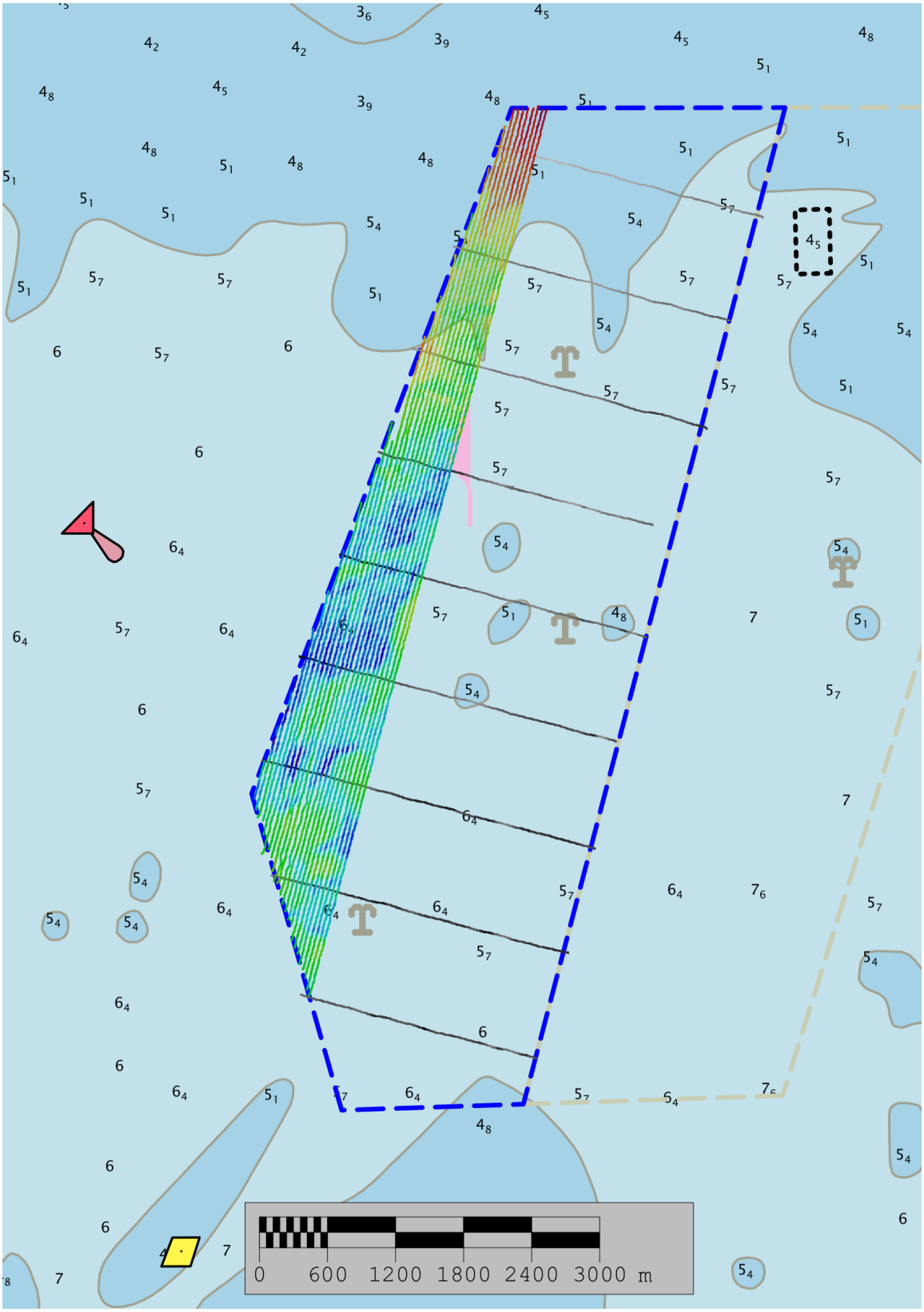


Figure 3: H13331 Crossline surface overlaid on mainscheme lines.

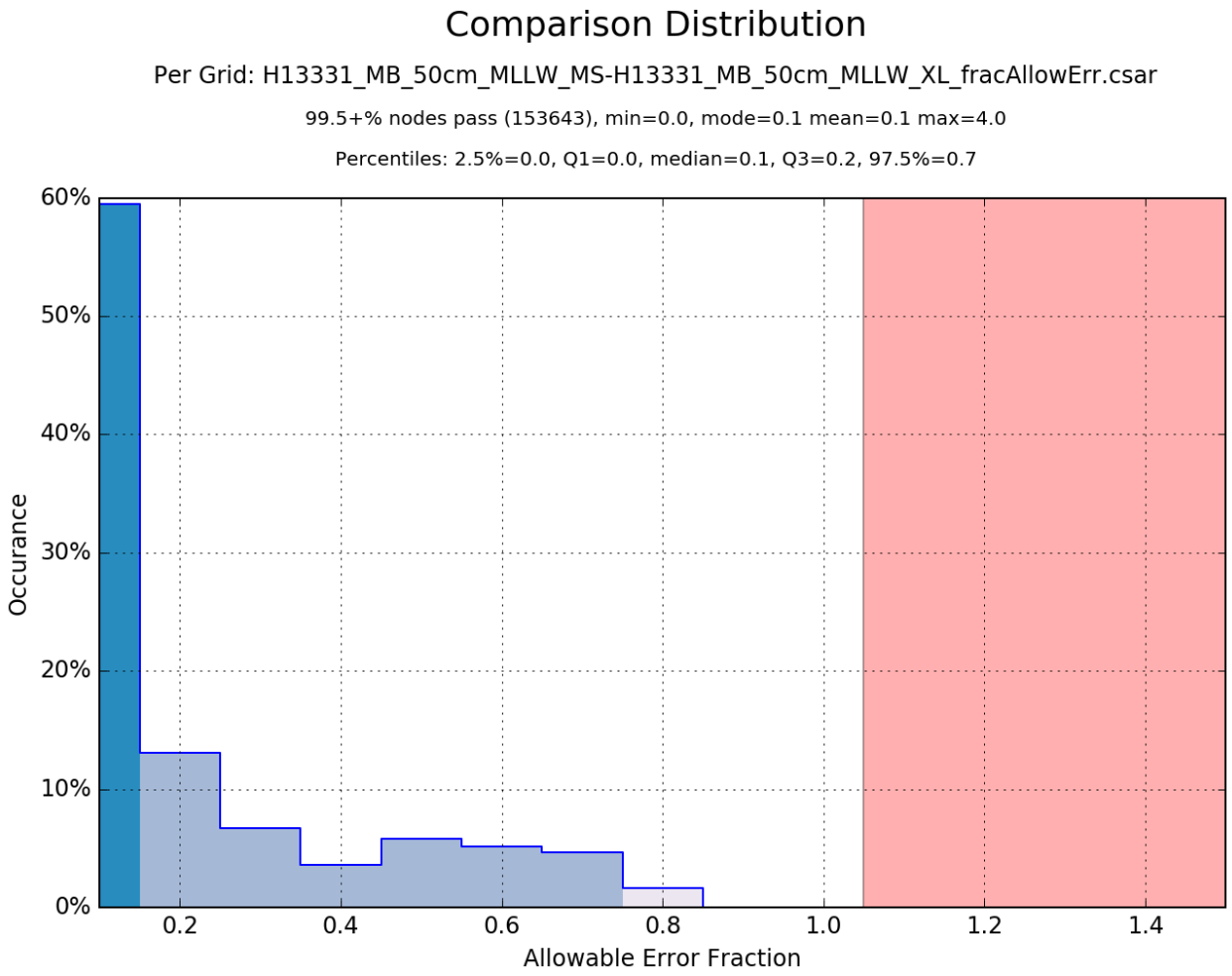
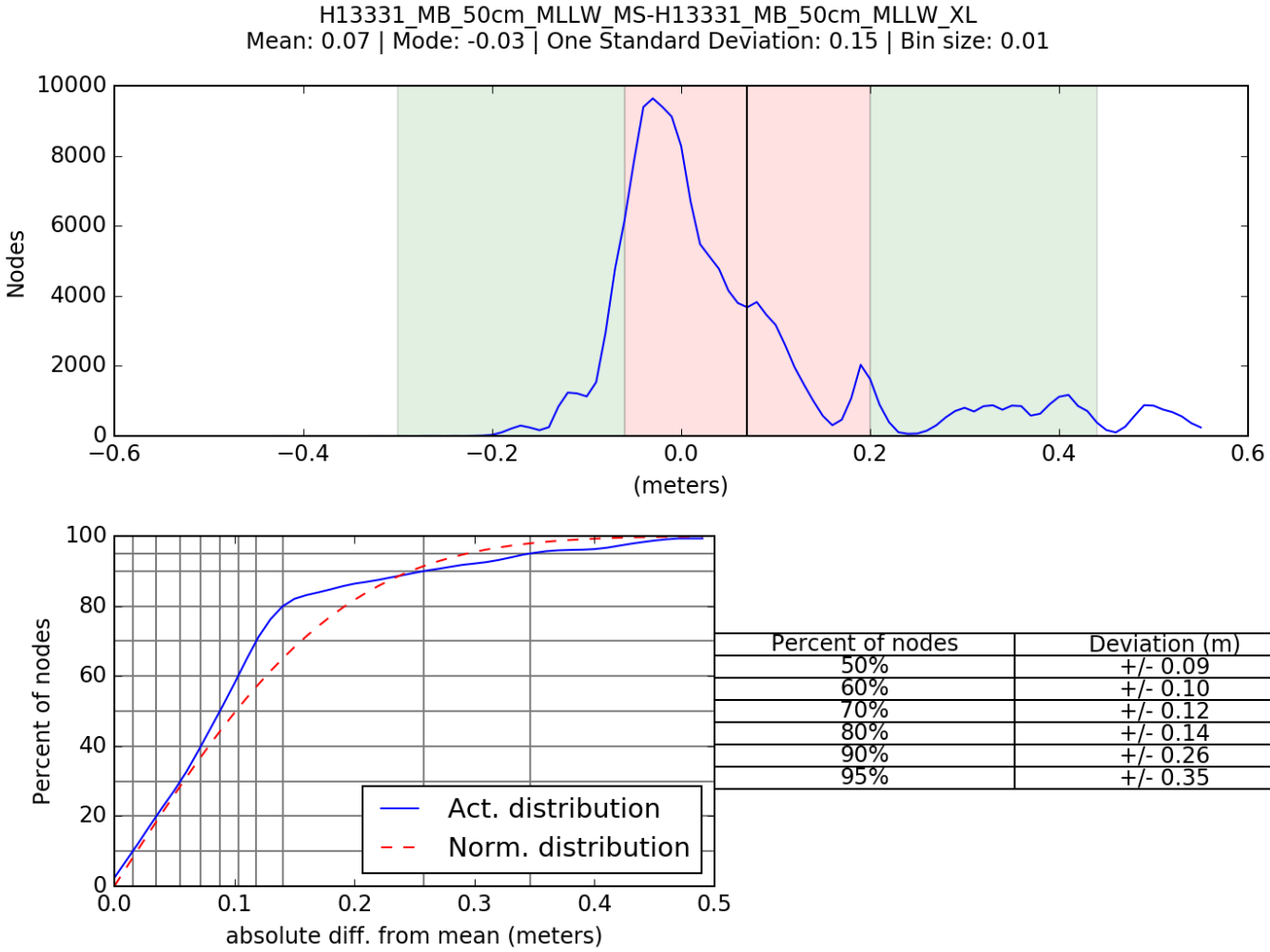


Figure 4: Pydro derived histogram showing percentage-pass value of H13331 mainsheme to crossline data.



Percent of nodes	Deviation (m)
50%	+/- 0.09
60%	+/- 0.10
70%	+/- 0.12
80%	+/- 0.14
90%	+/- 0.26
95%	+/- 0.35

Figure 5: Pydro derived plot showing absolute difference statistics of H13331 mainscheme to crossline data.

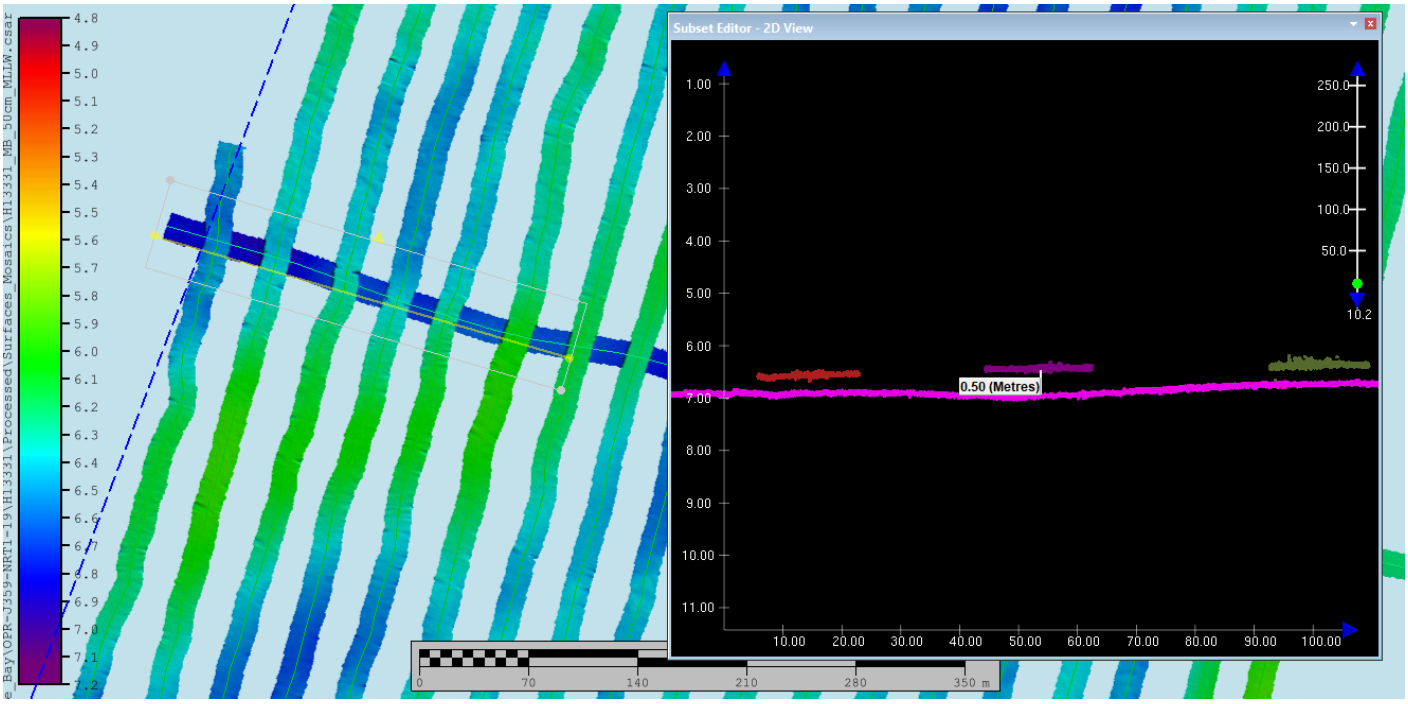


Figure 6: Area of large mainscheme to crossline difference. Line 006_20191014_162038_XL shown in magenta ~0.30-0.50m deeper than mainscheme lines.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0.10 meters	0 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
S3005	2 meters/second	0 meters/second	0 meters/second	0.2 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

In addition to the usual a priori estimates of uncertainty provided via device models for vessel motion, VDatum, Poor Mans VDatum (PMVD), and real-time and post-processed uncertainty sources were also incorporated into the depth estimates of survey H13331. Real-time uncertainties were provided via MBES data and Applanix Delayed Heave RMS. Following post-processing of the real-time vessel motion,

recomputed uncertainties of vessel GPS height and navigation were applied in CARIS HIPS and SIPS via a Smoothed Best Estimate of Trajectory (SBET) RMS file generated in Applanix POSPac.

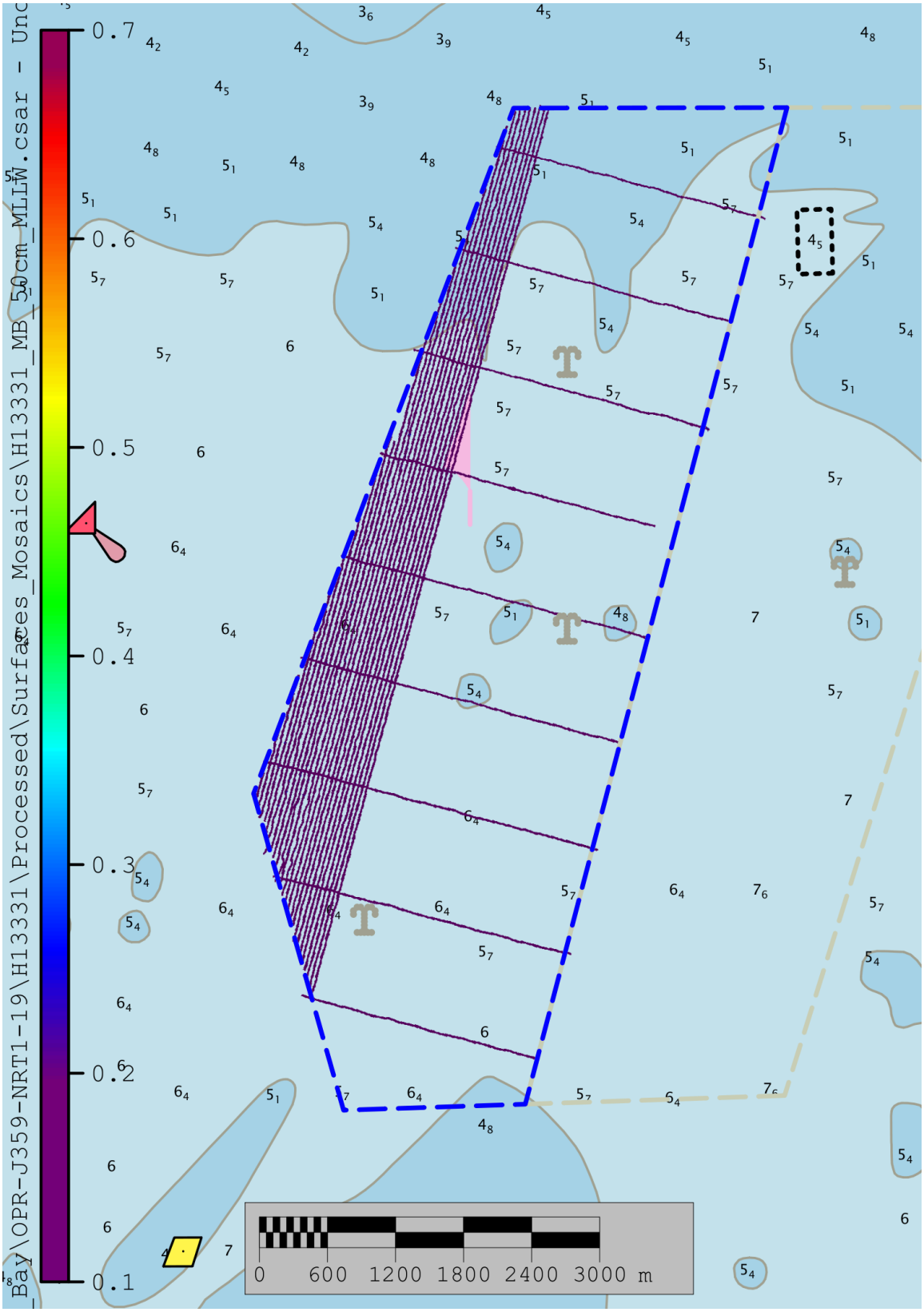


Figure 7: H13331 Survey Uncertainty Overview

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

Weather Induced Blowout

The weather on DN288 worsened in the afternoon creating winds of 10-15kts and short period waves of 2 feet. These worsening conditions caused intermittent blowout of the multibeam echosounder data. The most egregious blowouts were manually cleaned from the data to best depict the actual seafloor.

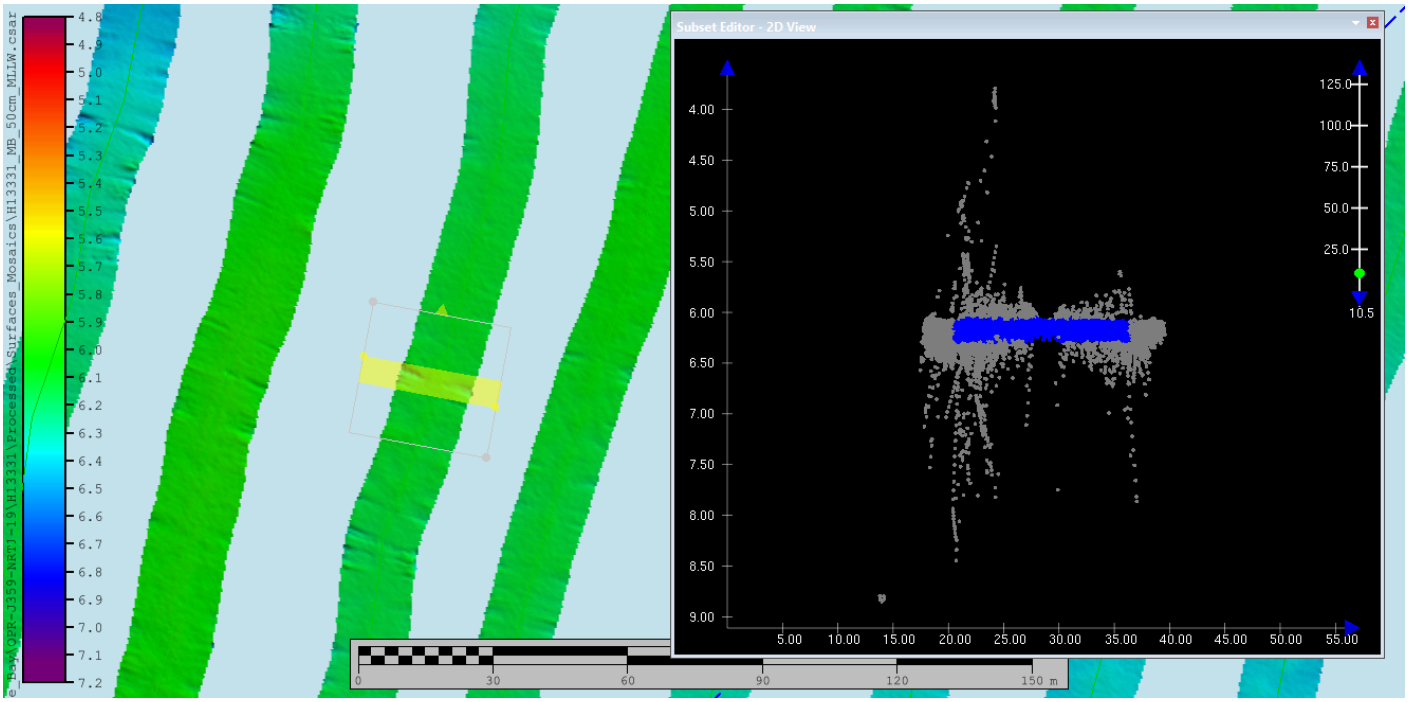


Figure 8: Example showing blowout and data cleaning needed due to wind waves on DN288

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: 4 hours

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.

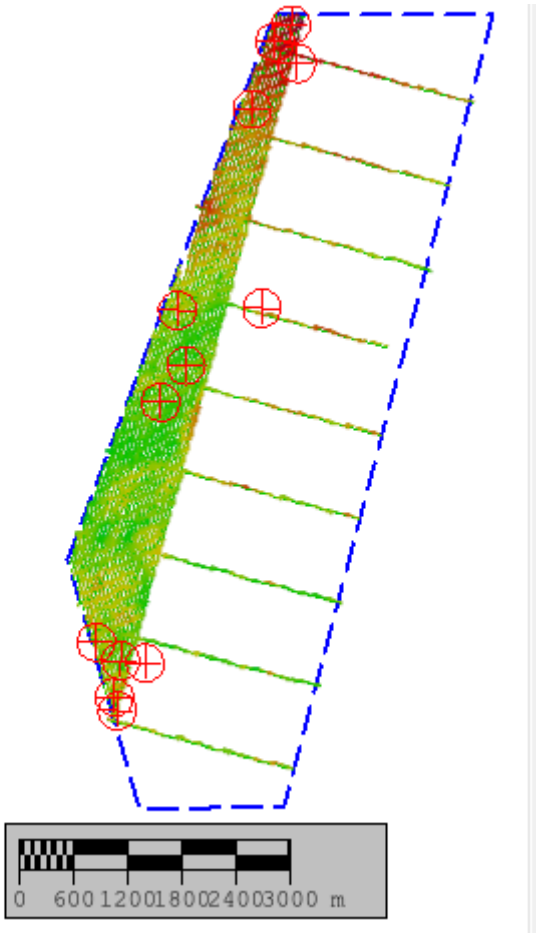


Figure 9: H13331 locations of all sound speed casts.

B.2.8 Coverage Equipment and Methods

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

B.2.9 Density

The surface was analyzed using the HydrOffice QC Tools Grid QA feature. Density requirements for H13331 were achieved with at least 99% of surface nodes containing five or more soundings as required by HSSD Section 5.2.2.3. The few nodes that did not meet density requirements are due to sparse data in the outer beams, especially near steep slopes and rocky areas where acoustic shadowing occurred, and at the edges of the survey limits.

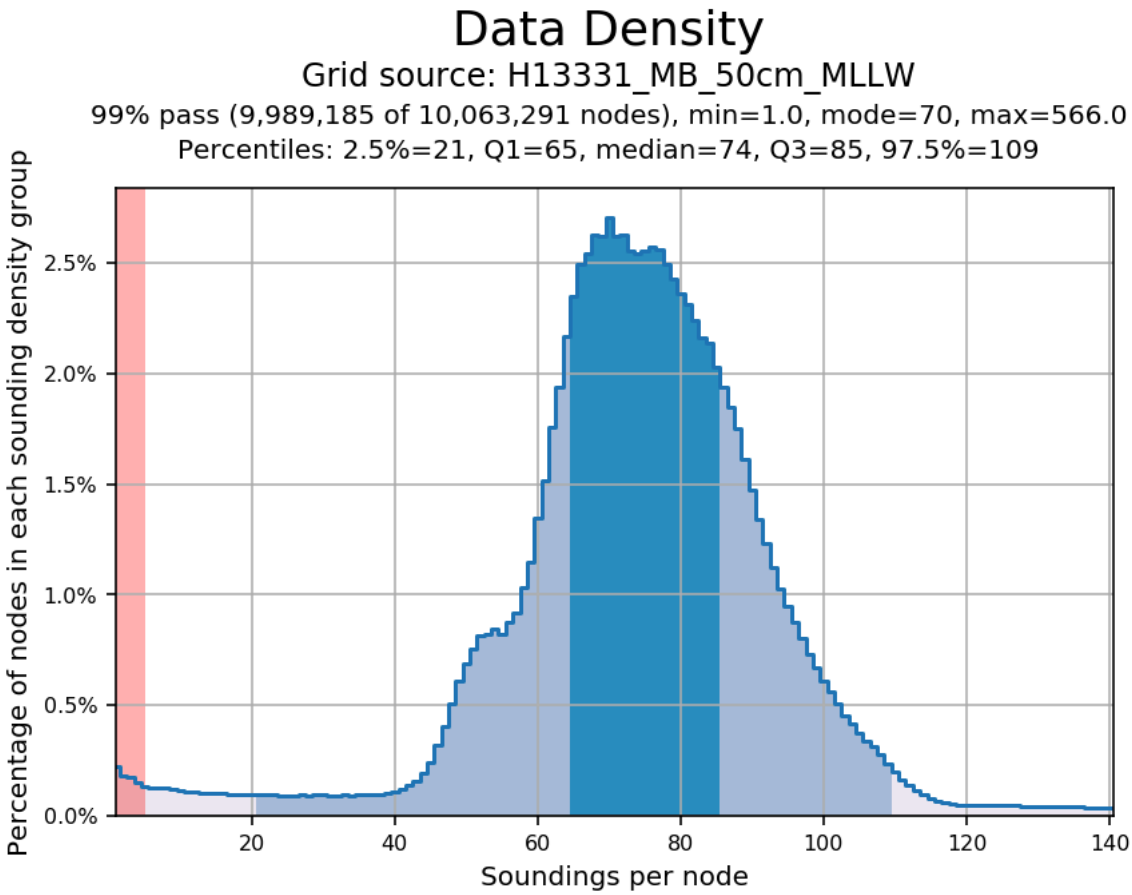


Figure 10: H13331 Survey Density Overview

B.2.10 Total Vertical Uncertainty

The surface was analyzed using the HydroOffice QC Tools Grid QA feature. Total Vertical Uncertainty is determined by a ratio of uncertainty to allowable error per NOAA and IHO specification:
TVU\, QC = Uncertainty / \sqrt{A^2 + (B * Depth)^2}. Where A = 0.5, B = 0.013 for Order 1 (depths less than 100 m), and A = 1.0, B = 0.023 for Order 2 (depths greater than 100 m). TVU requirements for survey H13331 were achieved with 99% of nodes passing.

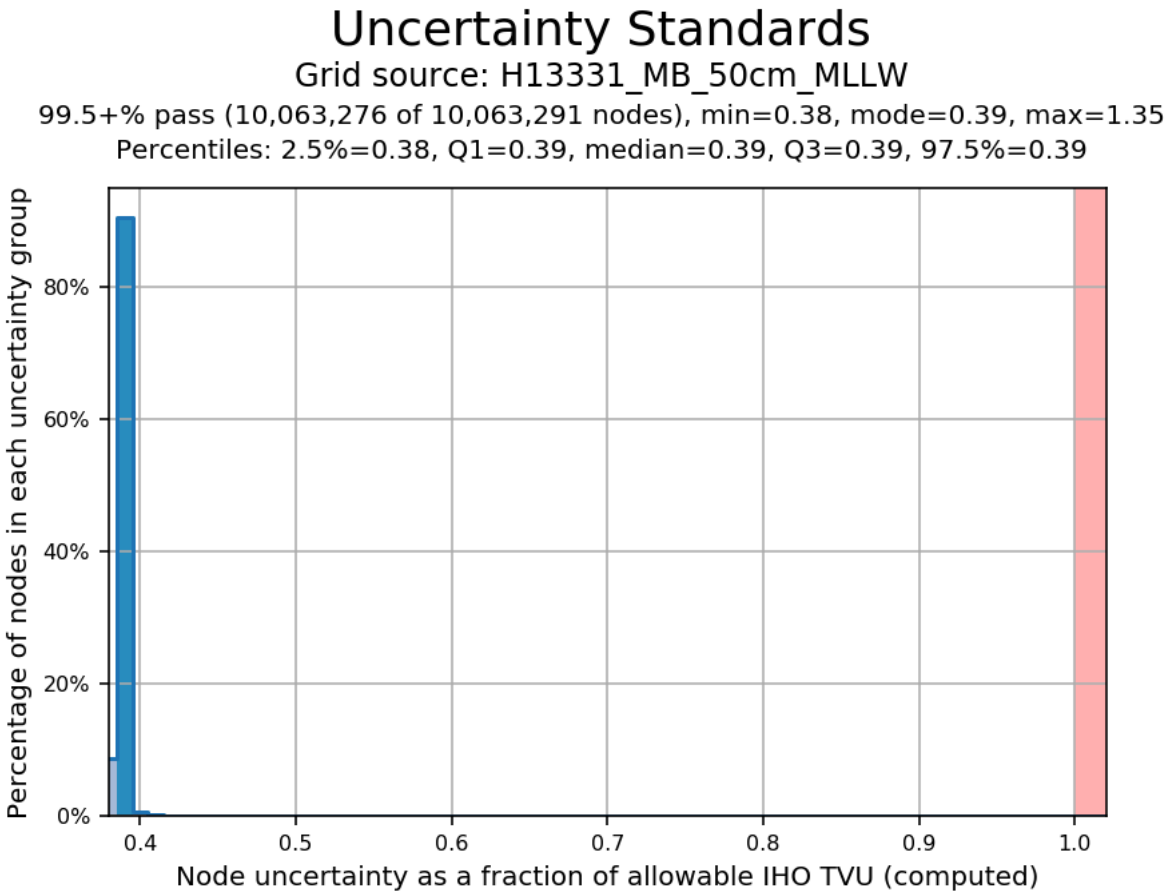


Figure 11: H13331 TVU histogram

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

Backscatter was not processed for this survey.

Backscatter was processed during office review.

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	Version: 11.1.6 (64-bit) Build: 2019-05-24_10-11-09

Table 9: Primary bathymetric data processing software

The following Feature Object Catalog was used: CARIS_Support_Files_5.8.

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
H13331_SSSAB_1m_400kHz_1of2	SSS Mosaic	1 meters	-	N/A	100% SSS
H13331_SSSAB_1m_400kHz_2of2	SSS Mosaic	1 meters	-	N/A	200% SSS
H13331_MB_50cm_MLLW	CARIS Raster Surface (CUBE)	0.5 meters	4.8 meters - 8.3 meters	NOAA_0.5m	Object Detection
H13331_MB_50cm_MLLW_Final	CARIS Raster Surface (CUBE)	0.5 meters	4.8 meters - 8.3 meters	NOAA_0.5m	Object Detection

Table 10: Submitted Surfaces

The NOAA CUBE parameters defined in the HSSD were used for the creation of all CUBE surfaces for H13331. 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 be shoaler or deeper than 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 steep slopes and dynamic nature of the seafloor.

C. Vertical and Horizontal Control

All vertical and horizontal control activities conducted during the course of this survey are fully addressed in the following sections. Therefore, no separate HVCR is submitted.

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-J359-NRT1-19_Vdatum_Limits_100m_NAD83-MLLW_geoid12b

Table 11: ERS method and SEP file

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 16.

The following PPK methods were used for horizontal control:

- RTX

WAAS

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

D. Results and Recommendations

D.1 Chart Comparison

A comparison was performed between survey H13331 and chart US4FL69M using CARIS HIPS and SIPS sounding and contour layers derived from the 0.50m surface. The contours and soundings were overlaid on the charts to assess differences between the surveyed soundings and charted depths. ENCs were compared to a 0.50m grid by extracting all soundings from the chart and creating an interpolated TIN surface which could be differenced with the combined surface from H13331. All data from H13331 should supersede charted data. In general, surveyed soundings agree with the majority of charted depths. A full discussion of the disagreements follows below.

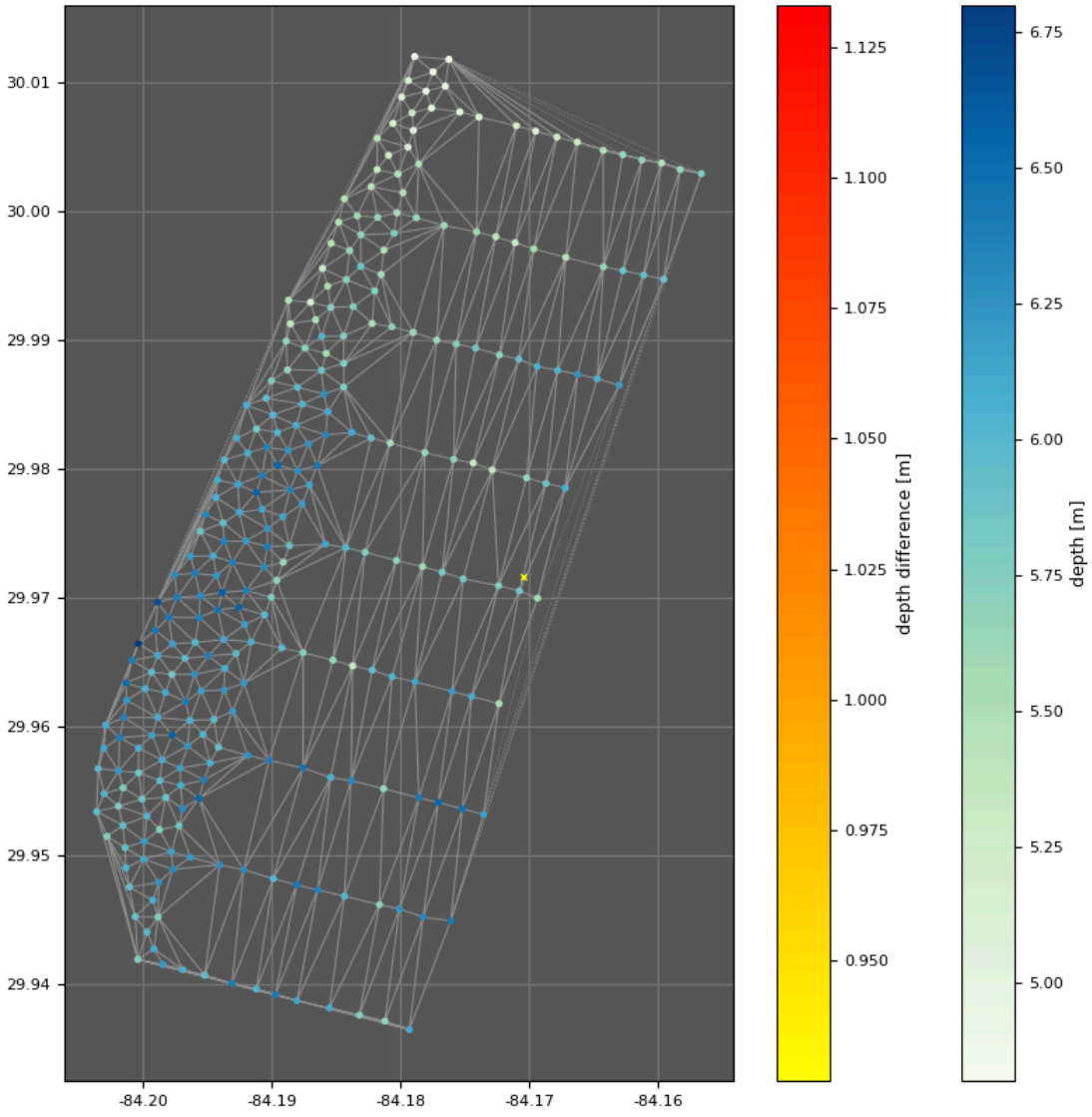


Figure 12: Results of QCTools Chart Comparison Triangle Rule tool

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
US4FL69M	1:80000	17	06/28/2019	09/06/2019

Table 12: Largest Scale ENCs

D.1.2 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.3 Charted Features

No charted features exist for this survey.

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

Three bottom samples were collected and are reported in the Final Feature File.

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 and/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 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.

Report Name	Report Date Sent
Data Acquisition and Processing Report	2020-03-03

Approver Name	Approver Title	Approval Date	Signature
John R. Kidd, LT/NOAA	Chief of Party	03/03/2020	

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