F00825

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	F00825

LOCALITY

State(s):	Maryland
General Locality:	Patapsco River
Sub-locality:	Hawkins Point

2020

CHIEF OF PARTY
LTJG Patrick Lawler

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

F00825

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):	**Maryland**
General Locality:	**Patapsco River**
Sub-Locality:	**Hawkins Point**
Scale:	**5000**
Dates of Survey:	**10/27/2020 to 10/27/2020**
Instructions Dated:	**10/26/2020**
Project Number:	**S-E935-BH2-20**
Field Unit:	**NOAA R/V *Bay Hydro II***
Chief of Party:	**LTJG Patrick Lawler**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**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 18N, 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 F00825

Project: S-E935-BH2-20

Locality: Patapsco River

Sublocality: Hawkins Point

Scale: 1:5000

October 2020 - October 2020

NOAA R/V *Bay Hydro II*

Chief of Party: LTJG Patrick Lawler

A. Area Surveyed

The survey area is located in the Patapsco River within the sublocality of the vicinity of Hawkins Point.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
39° 12' 38.61" N 76° 32' 6.03" W	39° 12' 25.84" N 76° 31' 35.86" W

Table 1: Survey Limits

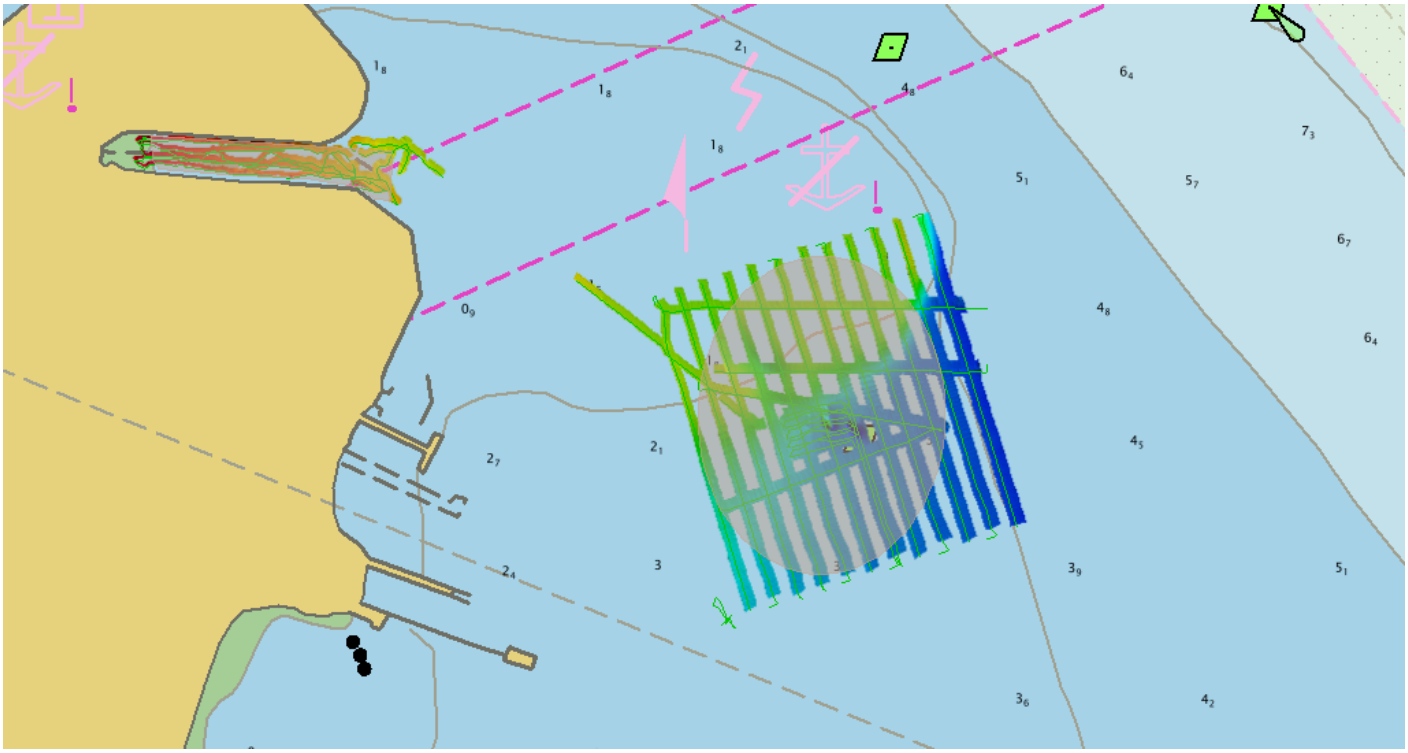


Figure 1: F00825 Survey Area with the assigned sheet limits shown with the pink shading

Data were acquired to the survey limits in accordance with the requirements in the Project Instructions and the May 2020 NOS Hydrographic Surveys Specifications and Deliverables (HSSD) as shown in Figure 1.

A.2 Survey Purpose

The USCG requested a survey to investigate if there are any remains of a submerged wreck near Hawkins Point Buoy WR1, to determine if they could potentially remove the buoy that has been marking the wreck. Also assigned is the visible wreck PA just northwest of the submerged wreck. 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 in F00825 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.2.2), and density requirements (see Section B.2.11). Additional compliance statistics can be found in the Standards and Compliance Review located in Appendix II of this report.

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

Table 2: Survey Coverage

The entirety of F00825 was acquired with 200% SSS and concurrent MBES coverage, meeting the requirements listed above and in the HSSD. See Figure 2 for an overview of coverage.

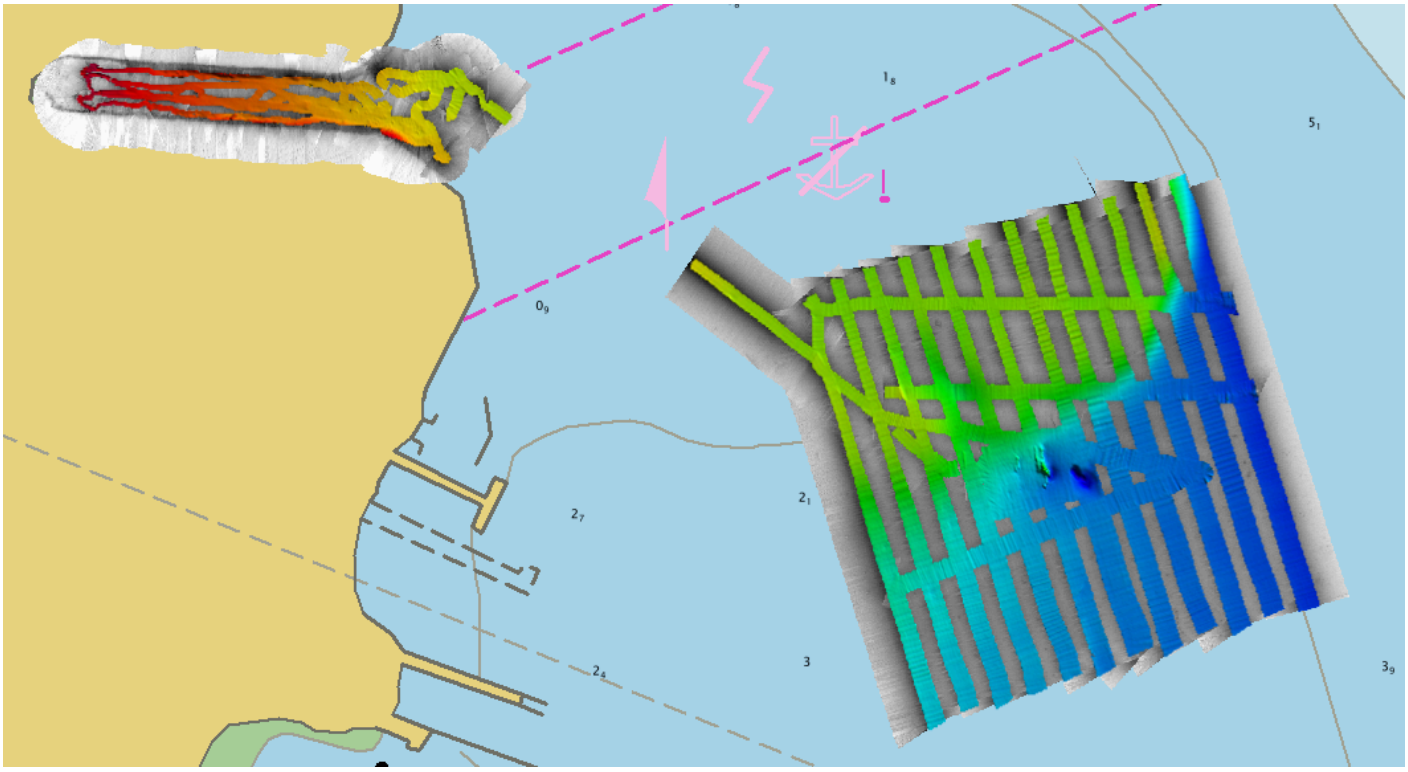


Figure 2: F00825 Coverage overlaid onto ENC US5BALBB

A.6 Survey Statistics

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

	HULL ID	*Echoboat ASV 008*	*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	2.97	2.97
	SBES/MBES Crosslines	0.47	0.47
	Lidar Crosslines	0	0
Number of Bottom Samples			0
Number Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Investigated by Dive Ops			0
Total SNM			0.02

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
10/27/2020	301

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	***Echoboat ASV 008***
LOA	1.68 meters
Draft	0.258 meters

Table 5: Vessels Used

B.1.2 Equipment

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

Manufacturer	**Model**	**Type**
Picotech	PicoMB-120SF	MBES
Tritech	Starfish 453	SSS
Valeport	MiniSVS	Sound Speed System
Applanix	POS MV Surfmaster	Positioning and Attitude System
Valeport	SWiFT SVP	Conductivity, Temperature, and Depth Sensor

Table 6: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Multibeam/side scan sonar crosslines acquired for this survey totaled 15.8% of mainscheme acquisition.

Crosslines were collected, processed, and compared in accordance with Section 5.2.4.2 of the HSSD. To evaluate crosslines, a 50 cm Single Resolution (SR) CUBE surface using strictly mainscheme lines, and a 50 cm Single Resolution (SR) CUBE surface using strictly crosslines were created. From these two surfaces, a difference surface (mainscheme - crosslines = difference surface) was generated at a Single Resolution (Figures 3), and is submitted in the Separates II Digital Data folder. Statistics show the mean difference between the depths derived from mainscheme and crosslines was 0.01 meters with mainscheme being deeper and 95% of nodes falling within 0.10 meters (Figure 4). For the respective depths, the difference surface was compared to the allowable NOAA uncertainty standards using Pydro's Compare Surfaces tool. In total, 100% of the depth differences between F00825 mainscheme and crossline data were within allowable NOAA uncertainties (Figure 5). The percentage of crosslines to mainscheme was more than required by the HSSD due to relative size of the survey area.

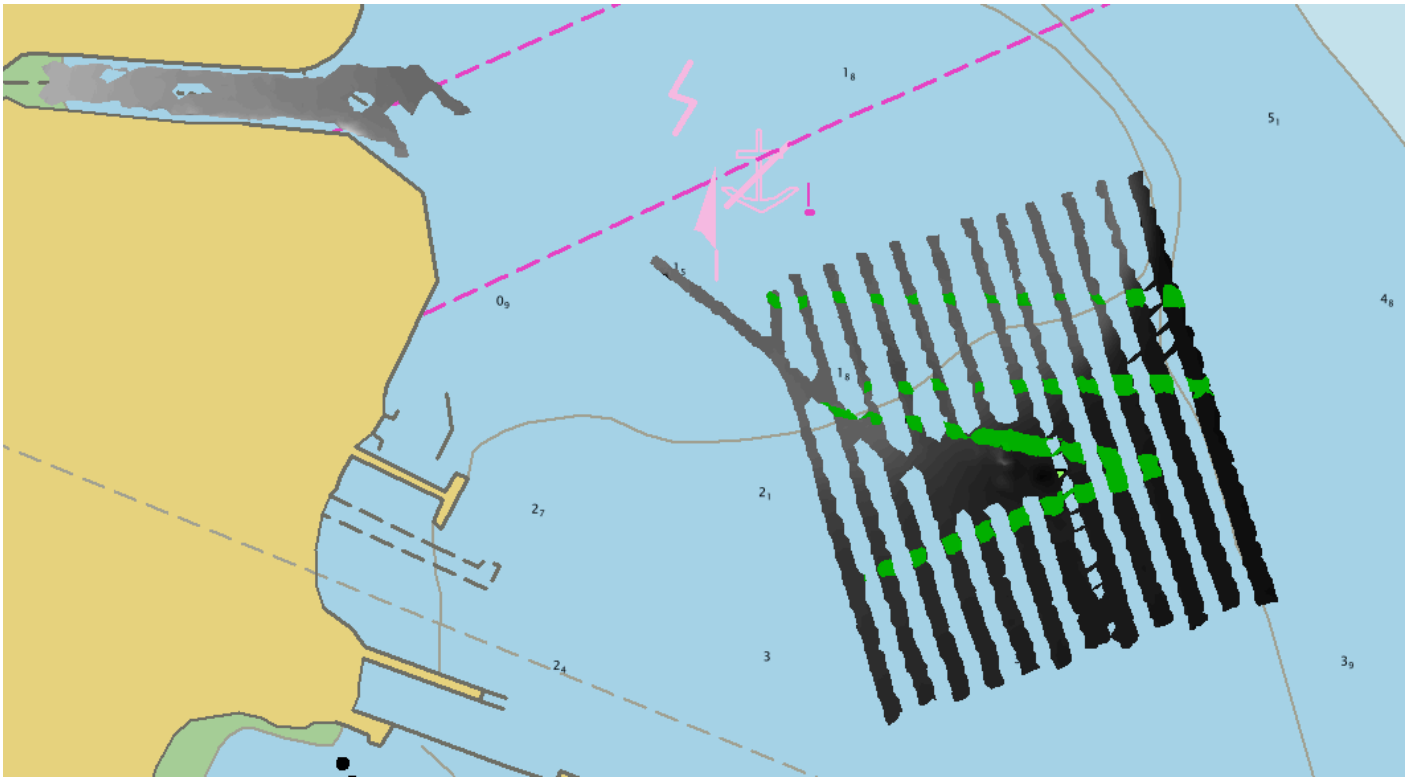
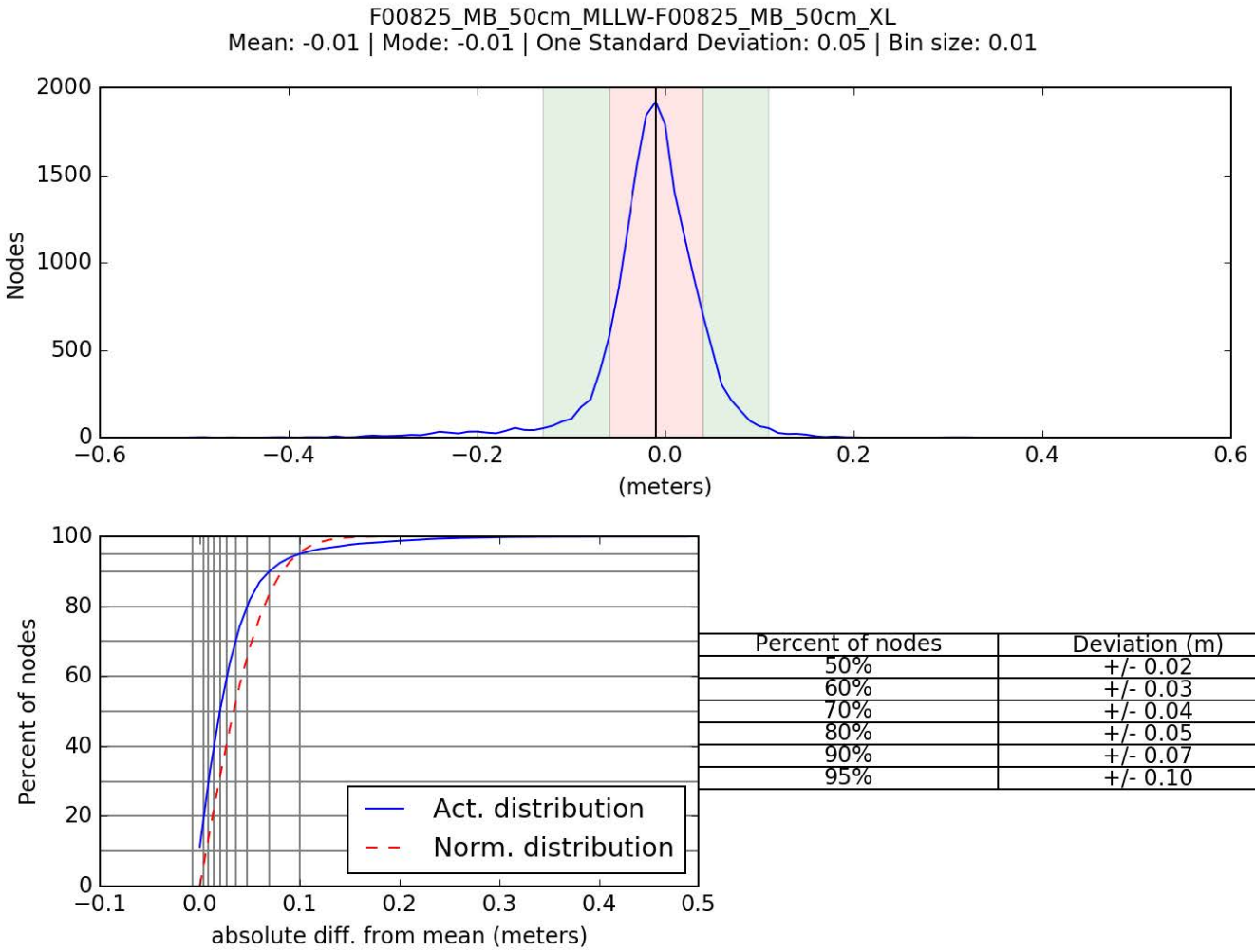


Figure 3: Depth differences between F00825 mainscheme (in grayscale) and F00825 crossline data.



Percent of nodes	Deviation (m)
50%	+/- 0.02
60%	+/- 0.03
70%	+/- 0.04
80%	+/- 0.05
90%	+/- 0.07
95%	+/- 0.10

Figure 4: F00825 mainscheme to crossline difference statistics.

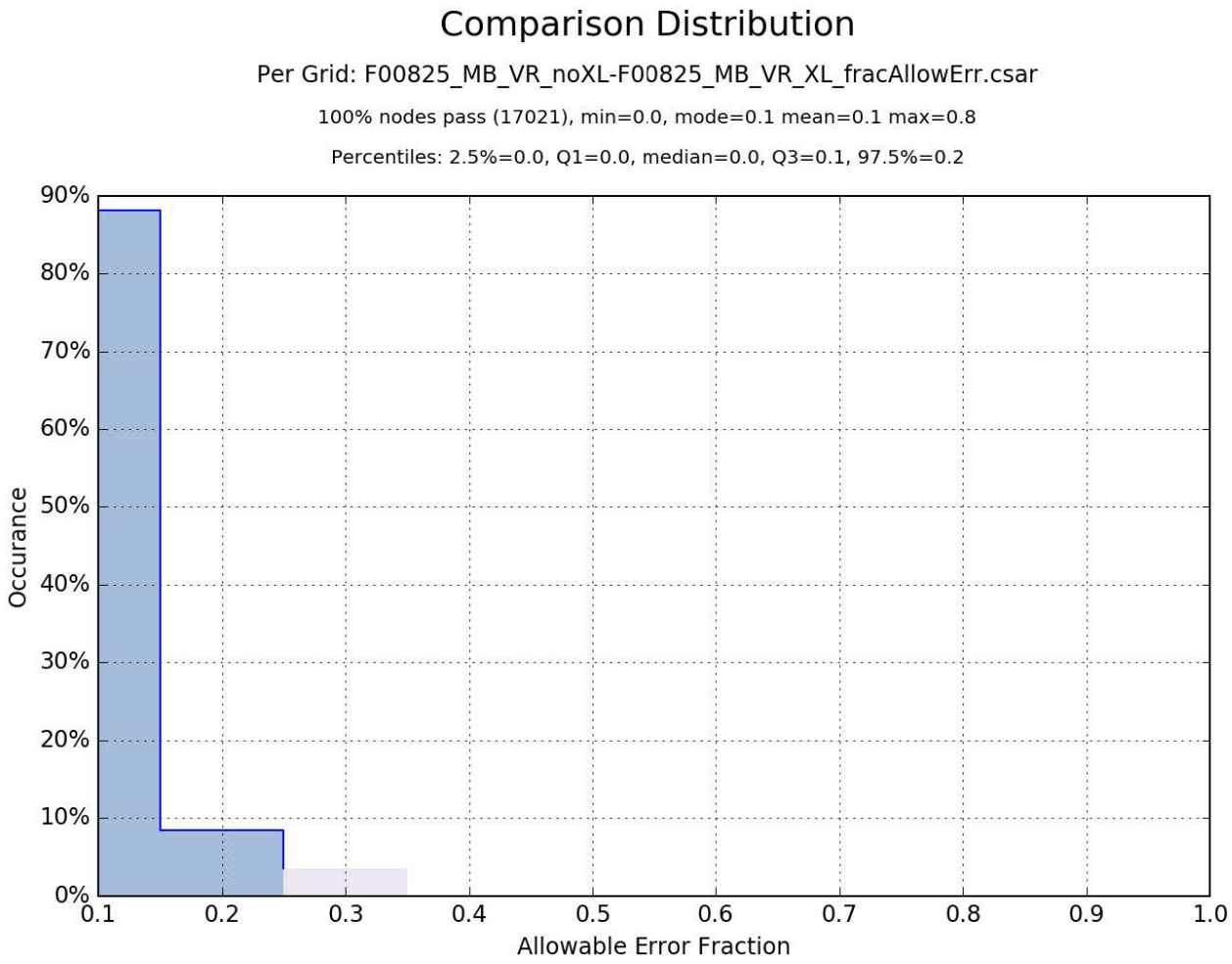


Figure 5: F00825 mainscheme and crossline NOAA allowable uncertainty statistics

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0 meters	0.090 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
ASV008	2.0 meters/second	0 meters/second	0 meters/second	0.5 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 and VDATUM, real-time and post-processed uncertainty sources were also incorporated into the depth estimates of survey F00825. 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 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

No survey junctions were assigned as part of this project.

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: Casts were conducted at a minimum of one every 4 hours during acquisition.

Casts were conducted more frequently in areas where tidal shift caused variations in the make up of the water column or 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.

B.2.8 Coverage Equipment and Methods

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

B.2.9 Holidays

F00825 data was reviewed in CARIS HIPS and SIPS for holidays in accordance with Section 5.2.2.2 of the HSSD. 91 holidays which meet the 3 by 3 node definition were identified via Pydro QC Tools Holiday Finder tool. This tool automatically scans finalized surfaces for holidays as defined in the HSSD and was run in conjunction with a visual inspection of all surfaces by the hydrographer. Although numerous holidays were flagged by the Holiday Finder tool, the nature of the concurrent SSS and MBES acquisition leads to erroneously flagged holidays in the MBES data.

B.2.10 NOAA Allowable Uncertainty

Finalized surfaces were analyzed using the Pydro QC Tools Grid QA feature and the results are shown in Figure 6 below. Allowable uncertainty requirements for F00825 were achieved in accordance with HSSD Section 5.1.3. Overall, 100% of nodes in surface meet or exceed NOAA Allowable Uncertainty specifications for F00825.

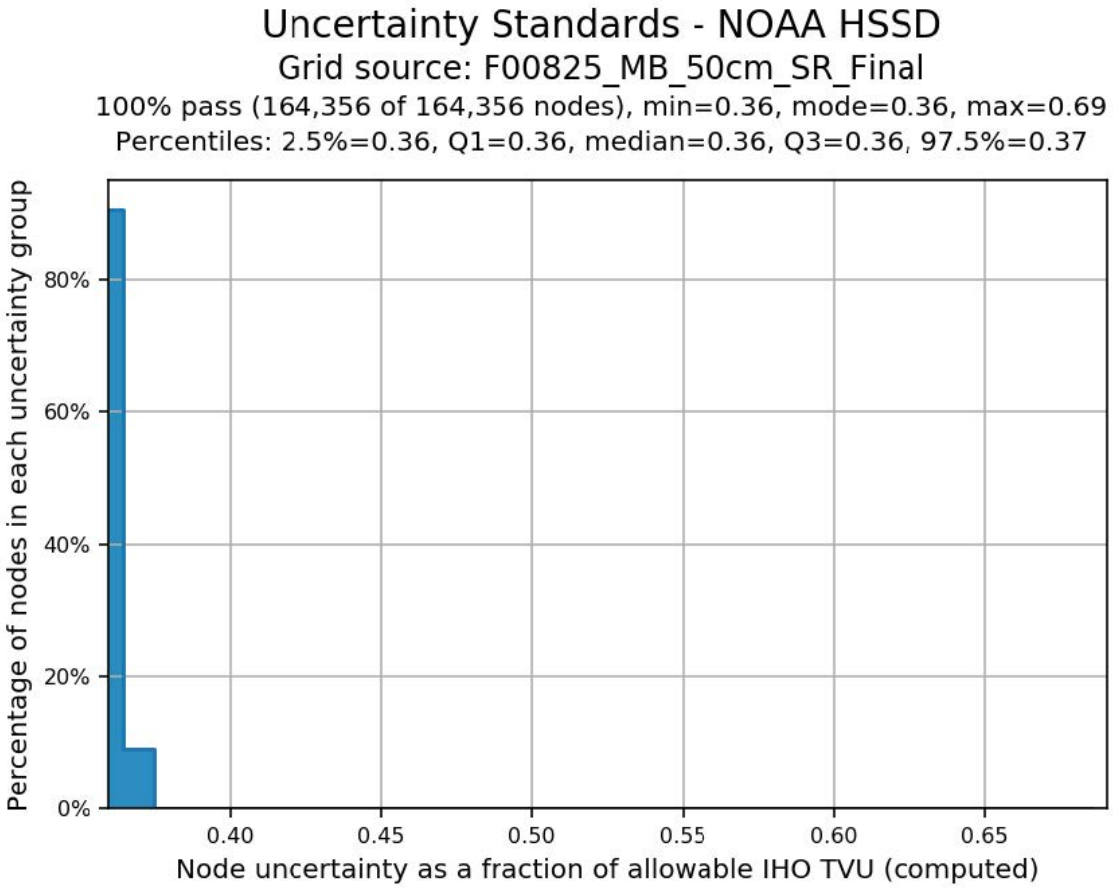


Figure 6: Figure 6: F00825 Allowable Uncertainty statistics

B.2.11 Density

Finalized surfaces were analyzed using the Pydro QC Tools Grid QA feature and the results are shown in Figure 7 below. Density requirements for F00825 were achieved with at least 98% of finalized surface nodes containing five or more soundings as required by HSSD Section 5.2.2.2.

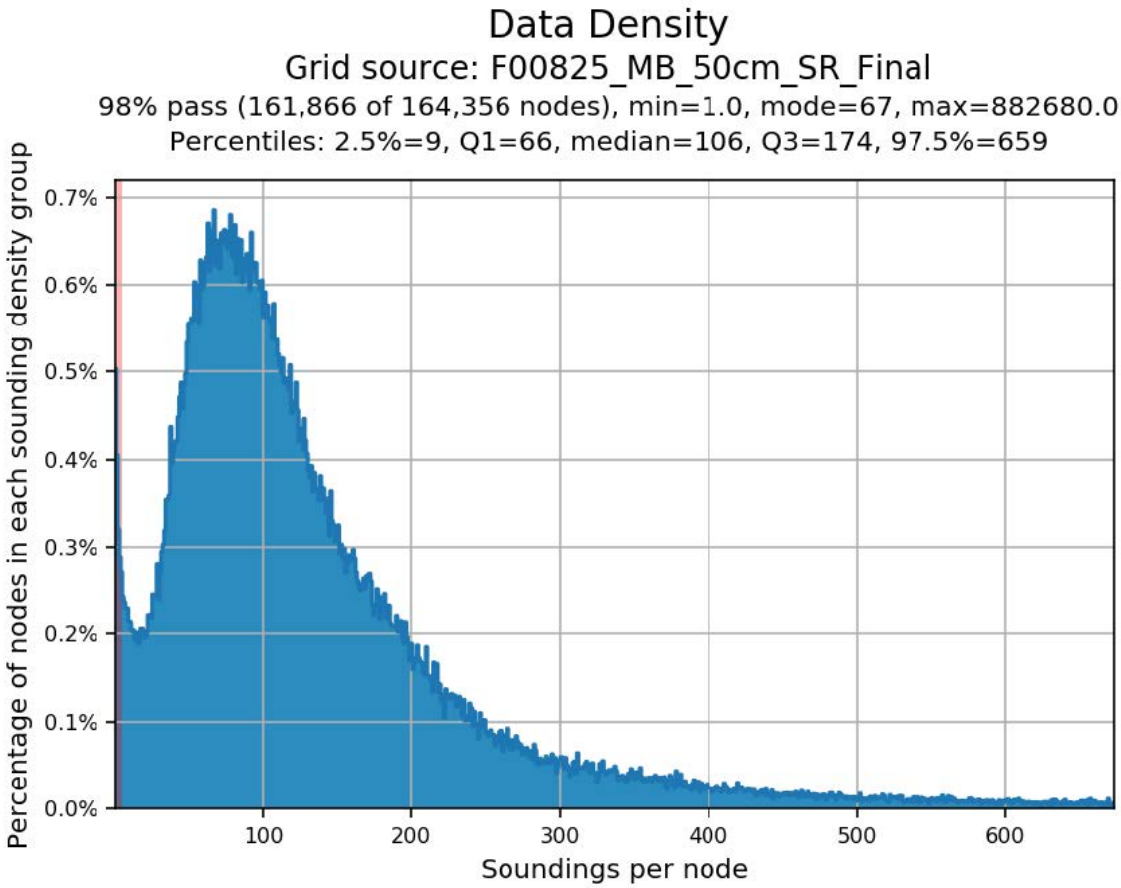


Figure 7: F00825 density statistics

B.2.12 Motion Artifact

A heave artifact was detected in the data (Figure 8) visible in the alongtrack direction of the deeper lines. This peak to trough amplitude of this artifact was determined to be within NOAA specification, so no further action was taken.

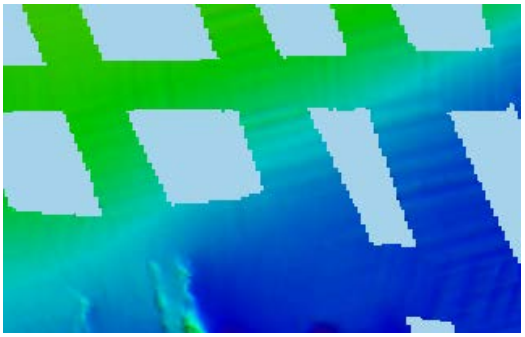


Figure 8: F00825 motion artifact

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

All data reduction procedures conform to those detailed in the DAPR.

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

No backscatter was collected as part of this project.

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	11.3.8

Table 9: Primary bathymetric data processing software

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

Manufacturer	Name	Version
CARIS	HIPS and SIPS	11.3.8

Table 10: Primary imagery data processing software

The following Feature Object Catalog was used: NOAA Profile Version 2020.

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
F00825_MB_50cm_MLLW	CARIS Raster Surface (CUBE)	0.5 meters	0 meters - 4.9 meters	NOAA_0.5m	MBES Trackline
F00825_SSS_100	SSS Mosaic	0.5 meters	0 meters - 4.9 meters	N/A	100% SSS
F00825_SSS_200	SSS Mosaic	0.5 meters	0 meters - 4.9 meters	N/A	200% SSS
F00825_MB_50cm_MLLW_Final	CARIS Raster Surface (CUBE)	0.5 meters	0 meters - 4.9 meters	NOAA_0.5m	MBES Trackline

Table 11: Submitted Surfaces

The NOAA CUBE parameters defined in the HSSD were used for the creation of all CUBE surfaces in Survey F00825. 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 v8, part of the QC Tools package within Pydro, was used to assist the search for spurious soundings following gross cleaning.

During review the SSS mosaics were exported in the correct naming convention and in the correct resolution.
F00825_SSSAB_50cm_450_kHz_1of2
F00825_SSSAB_50cm_450_kHz_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 VDATUM	S-E935_VDatum_100m_NAD83-MLLW_geoid12b.csar

Table 12: ERS method and SEP file

Following the successful application of SBETs, ERS methods using VDATUM were used for reducing data to MLLW. ERS methods were used as the final means of reducing F00825 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 18.

The following PPK methods were used for horizontal control:

- Smart Base

WAAS

The Wide Area Augmentation System (WAAS) was used for real-time horizontal control during data acquisition. WAAS and SBETS were the sole methods of positioning for F00825.

D. Results and Recommendations

D.1 Chart Comparison

Soundings from F00825 are in general agreement or deeper than the charted depths on ENC US5BALBB. A TIN was created from the ENC and the resulting surface was differenced with the MBES bathymetry surface from F00825 (Figure 9). The shoal existing off of Hawkins Pt appears to have shifted north, resulting in deeper depths in the assigned survey region.

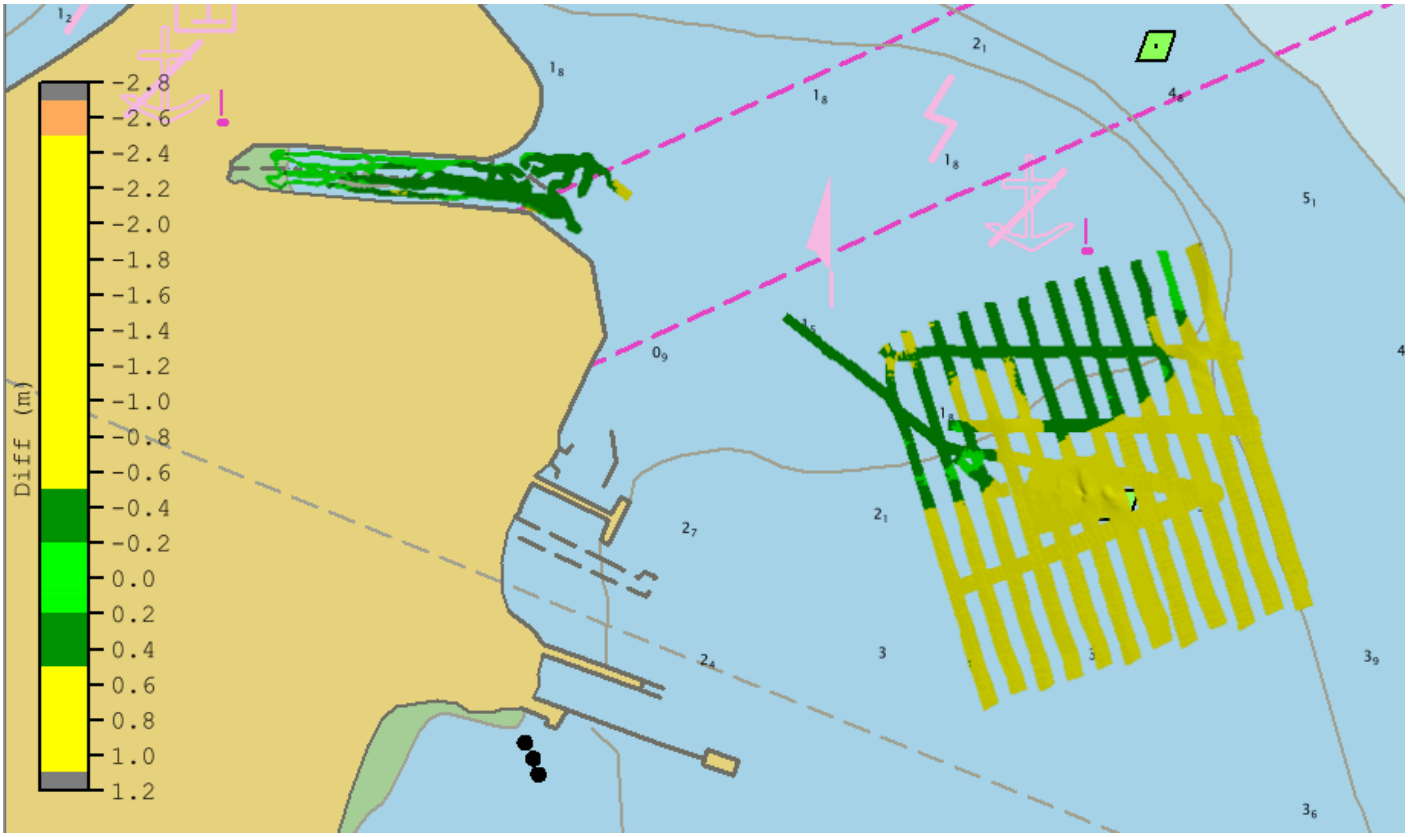


Figure 9: Surface showing the difference between a TIN of US5BALBB and the MBES surface from F00825

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
US5BALBB	1:10000	2	07/07/2020	07/07/2020

Table 13: Largest Scale ENCs

D.1.2 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey. Figure 10 shows a SSS contact (denoted by the UWTROC symbol) that was investigated and was determined not to be hazardous due to a lack of shadowing in SSS imagery, although no MBES coverage was acquired over the target.

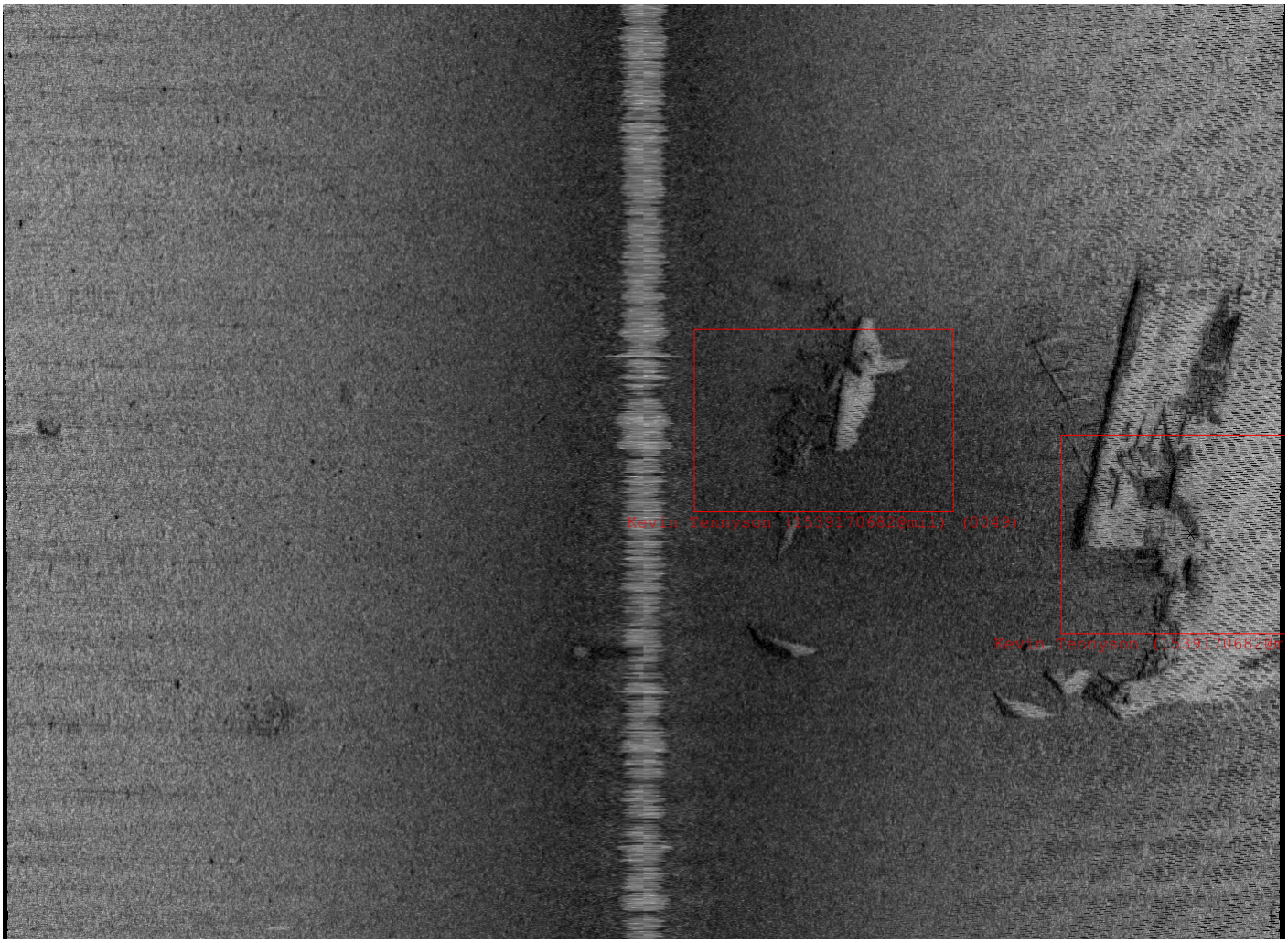


Figure 10: SSS contact determined not to be dangerous.

D.1.3 Charted Features

The assigned charted PA wreck in the North Western portion of the survey was not observed in the survey data or visually during acquisition. The field unit recommends removal of the charted wreck from the chart. The field unit further recommends designating the northern assigned survey area as a foul area due to its shallow depth, logs, and trash in the water (Figure 11). The field unit believes that no prudent mariner should attempt to navigate within this region and it therefore should be considered inside the NALL. The assigned ATON Hawkins PT WR1 and associated wreck were in their charted locations. A least depth was established on the submerged structure assigned within the northern survey area.

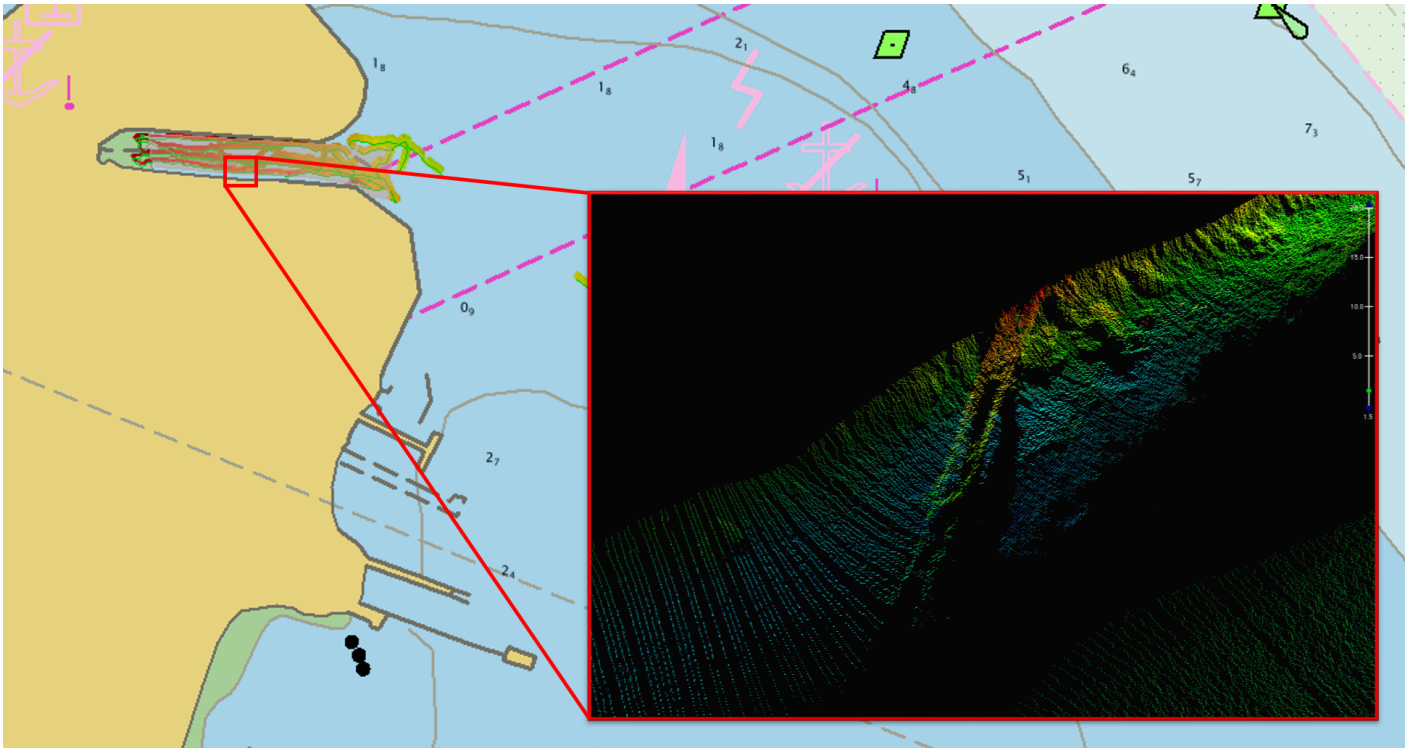


Figure 11: Log observed within proposed foul area

D.1.4 Uncharted Features

Uncharted features exist within the survey limits and are addressed in the Final Feature File.

Upon review it was determined at the processing branch to represent this feature as a foul ground.

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

An ATON exists in the center of the survey area, Hawkins PT WR1. It was determined to be on station and serving its intended purpose.

D.2.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.2.3 Bottom Samples

No bottom samples were required 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 or terminals exist for this survey.

D.2.8 Abnormal Seafloor or Environmental Conditions

No abnormal seafloor or environmental conditions exist for this survey.

D.2.9 Construction and Dredging

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

D.2.10 New Survey Recommendations

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

D.2.11 ENC Scale Recommendations

No new ENC scales are recommended for this area.

E. Approval Sheet

As Chief of Party, field operations for this hydrographic survey were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports.

All field sheets, this Descriptive Report, and all accompanying records and data are approved. All records are forwarded for final review and processing to the Processing Branch.

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys Specifications and Deliverables, Field Procedures Manual, Letter Instructions, and all HSD Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies noted in the Descriptive Report.

Approver Name	Approver Title	Approval Date	Signature
LTJG Patrick Lawler	Chief of Party	08/11/2021	Digitally signed by LAWLER.PATRICK.THOMAS.1523750239 Date: 2021.08.12 10:33:17 -04'00'
LTJG Kevin Tennyson	Sheet Manager	08/11/2021	TENNYSON.KEVIN.ALEXANDER.1539170682 Digitally signed by TENNYSON.KEVIN.ALEXANDER.1539170682

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