

F00737

NOAA Form 76-35A

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

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: F00737

LOCALITY

State: Maryland

General Locality: Baltimore

Sub-locality: Baltimore Harbor

2018

CHIEF OF PARTY
LTJG Sarah L. Chappel

LIBRARY & ARCHIVES

Date:

HYDROGRAPHIC TITLE SHEET

F00737

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: **Maryland**

General Locality: **Baltimore**

Sub-Locality: **Baltimore Harbor**

Scale: **1: 5,000**

Dates of Survey: **08/06/2018 to 08/08/2018**

Instructions Dated: **07/23/2018**

Project Number: **S-E937-BH2-18**

Field Unit: **NOAA R/V BAY HYDRO II**

Chief of Party: **LTJG Sarah L. Chappel**

Soundings by: **Multibeam Echo Sounder**

Imagery by: **Multibeam Echo Sounder**

Verification by: **Pacific Hydrographic Branch**

Soundings Acquired in: **meters at Mean Lower Low Water**

Remarks:

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Any revisions to the Descriptive Report (DR) generated during office processing are shown in bold red italic text. The processing branch maintains the DR as a field unit product, therefore, all information and recommendations within the body of the DR are considered preliminary unless otherwise noted. The final disposition of surveyed features is represented in the OCS nautical chart update products. All pertinent records for this survey, including the DR, are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via <http://www.ncei.noaa.gov/>.

Descriptive Report Summary F00737	
Project	S-E937-BH2-18
Survey	F00737
State	Maryland
Locality	Baltimore
Sub Locality	Baltimore Harbor
Scale of Survey	1:5000
Sonars Used	Kongsberg Maritime EM 2040 (MBES)
Horizontal Datum	North American Datum 1983
Vertical Datum	Mean Lower Low Water
Vertical Datum Correction	VDatum
Projection	Projected UTM 18N
Field Unit	NOAA R/V <i>Bay Hydro II</i>
Survey Dates	08/06/2018 - 08/08/2018
Chief of Party	LTJG Sarah L. Chappel

A. Area Surveyed

This hydrographic survey was acquired in accordance with the requirements defined in the Project Instruction and the April 2018 NOS Hydrographic Surveys Specifications and Deliverables (HSSD) as shown in Figure 1. See Appendix II for information regarding altered survey coverage.

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
39° 17' 7.72" N 76° 36' 42.49" W	39° 16' 32.68" N 76° 35' 18.86" W

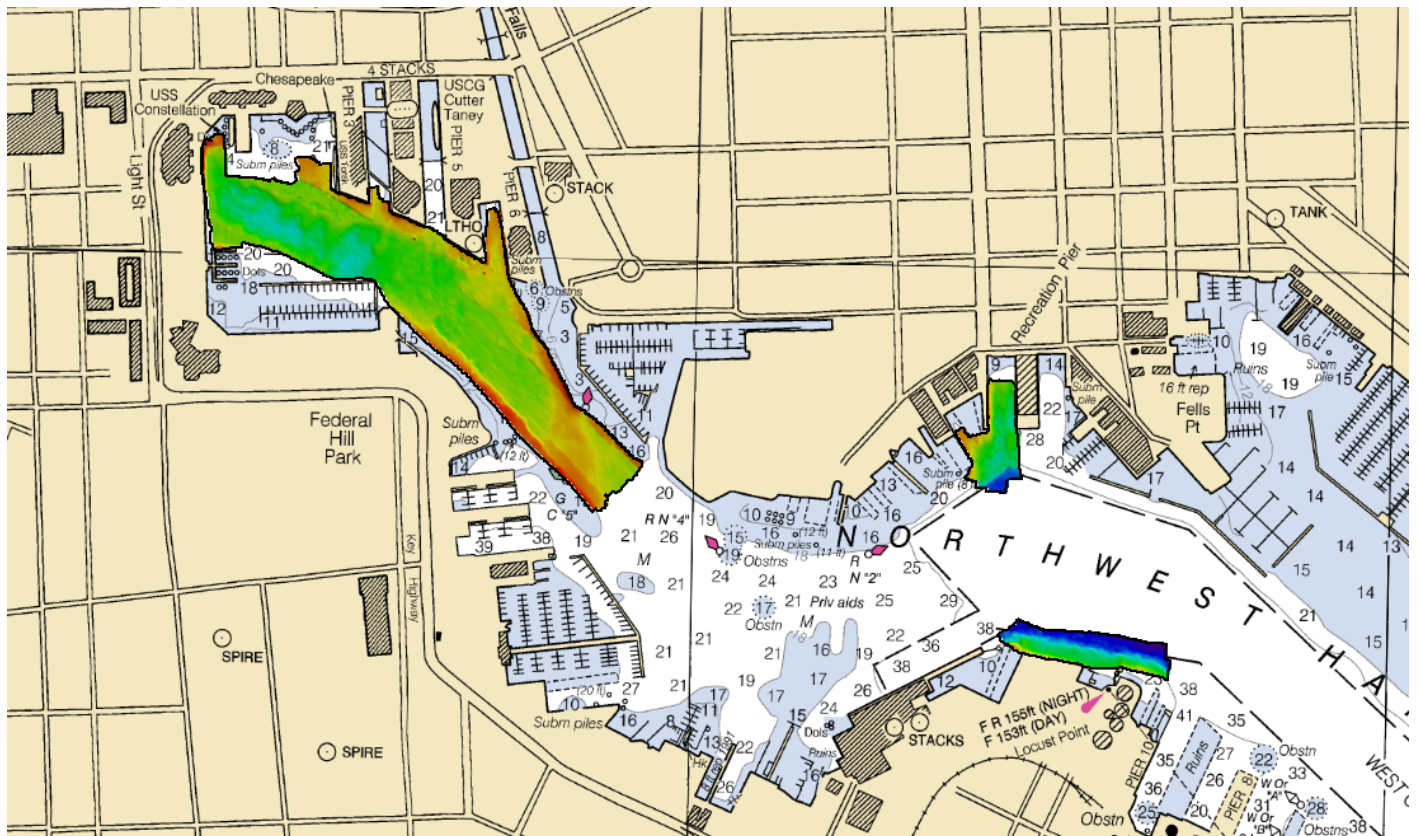


Figure 1: F00737 Sheet limits and coverage overlaid onto Chart 12281.

B. Survey Purpose

Sail Baltimore requested a hydrographic survey to determine safe berthing for vessels during the 2018 Fleet Week event in the Baltimore Harbor. There is also concern of an area of shoaling in the approach to the Inner Harbor. Survey data from this project is intended to supersede all prior survey data in the common area.

C. Intended Use of Survey

The entire survey is adequate to supersede previous data.

Data acquired in F00737 meet multibeam echo sounder (MBES) coverage requirements for object detection coverage, as required by the HSSD. This includes crosslines, NOAA allowable uncertainty, and density requirements. Additional compliance statistics can be found in Appendix II of this report.

D. Data Acquisition and Processing

Refer to the S-E937-BH2-18 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.

E. Uncertainty

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 F00737. 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.

To verify that all data meets the accuracy specifications as stated in HSSD Section 5.1.3, a child layer titled NOAA_Allowed_1 was created for the 50cm surface using the equations stated in Section 5.1.3 of the HSSD. These surfaces were then analyzed using the Pydro QC Tools QA feature to determine what percentage of each surface meets specifications. Figure 2 shows an overview of the NOAA Allowable Uncertainty layer for the surface. Figure 3 shows the corresponding statistics for the surface. Overall, 99.5+% of nodes with all surfaces meet or exceed NOAA Allowable Uncertainty specifications for F00737.

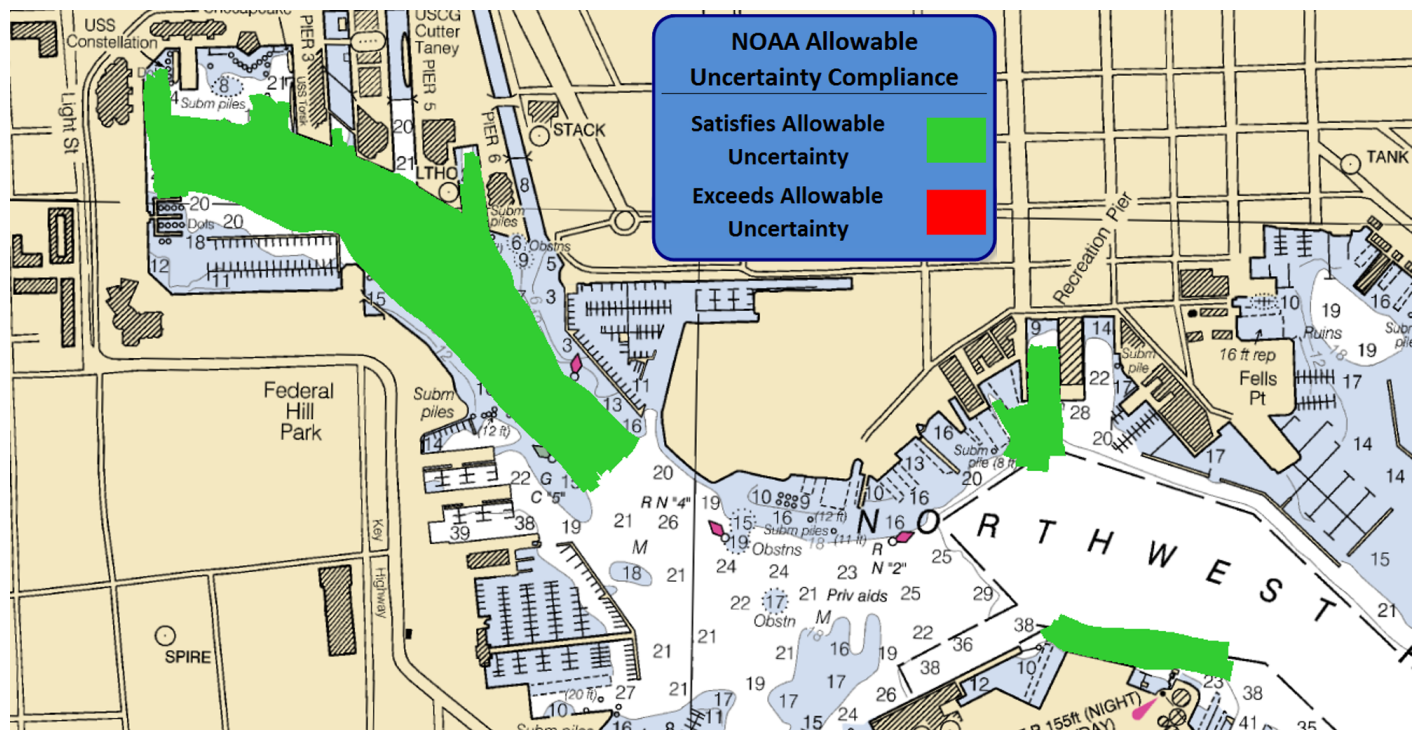


Figure 2: F00737 NOAA Allowable Uncertainty Overview

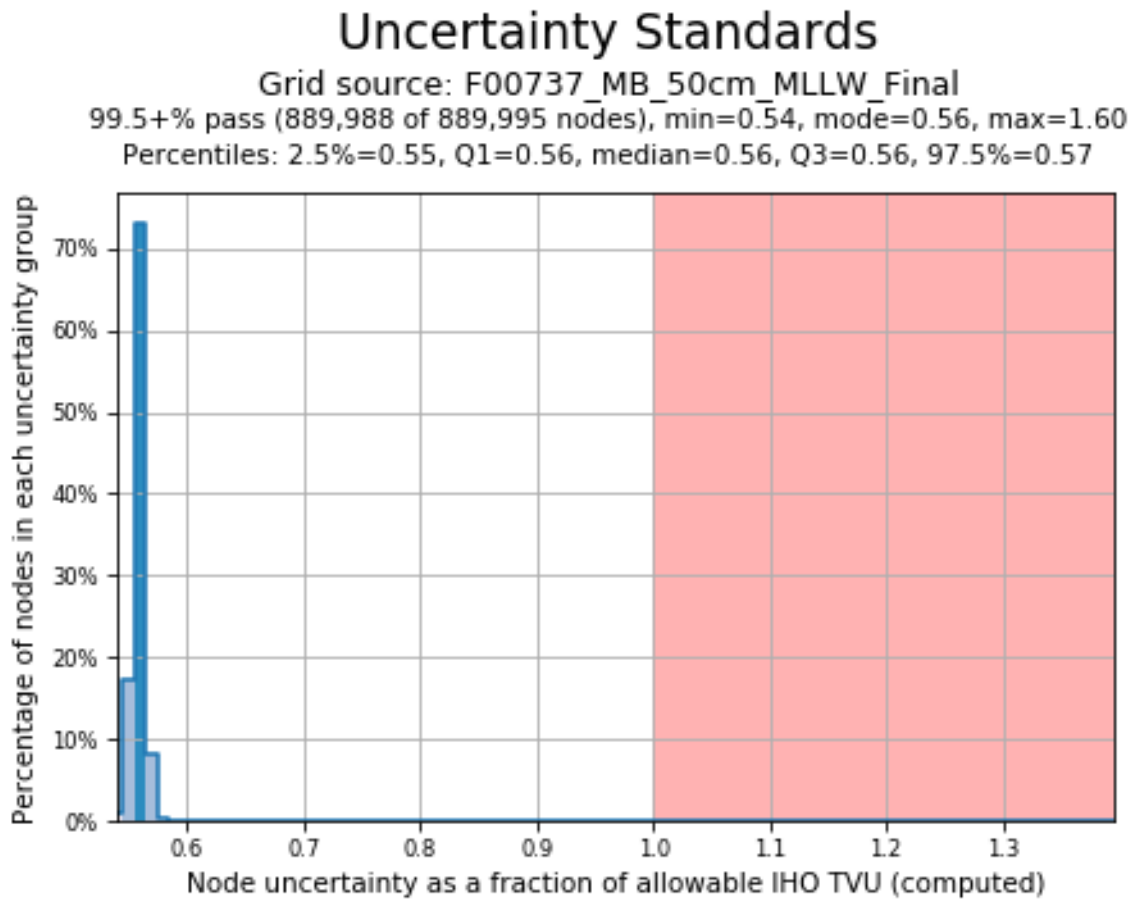


Figure 3: F00737 Total Propagated Uncertainty Statistics

F. Results and Recommendations

The following are the largest scale ENC that cover the survey area:

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US5MD11M	1:15000	54	07/11/2018	07/11/2018	NO

Soundings from F00737 are in a general agreement with charted depths on ENC US5MD11M, with most depths agreeing to 1 foot, the surveyed depths are deeper in most areas. The largest difference of note is seen in the far east part of the western survey area, where charted soundings are 2 feet deeper than surveyed depths, as seen in Figure 4.

To more accurately visualize trends within these differences, a 10 meter TIN surface was interpolated from the ENC sounding layer. This surface was then differenced with a corresponding 0.5 meter surface from F00737 and shown in Figure 5. There are no major discrepancies in charted versus survey soundings.

Contours from F00737 are in a general agreement with charted contours on ENC US5MD11M with surveyed contours being deeper than charted contours.

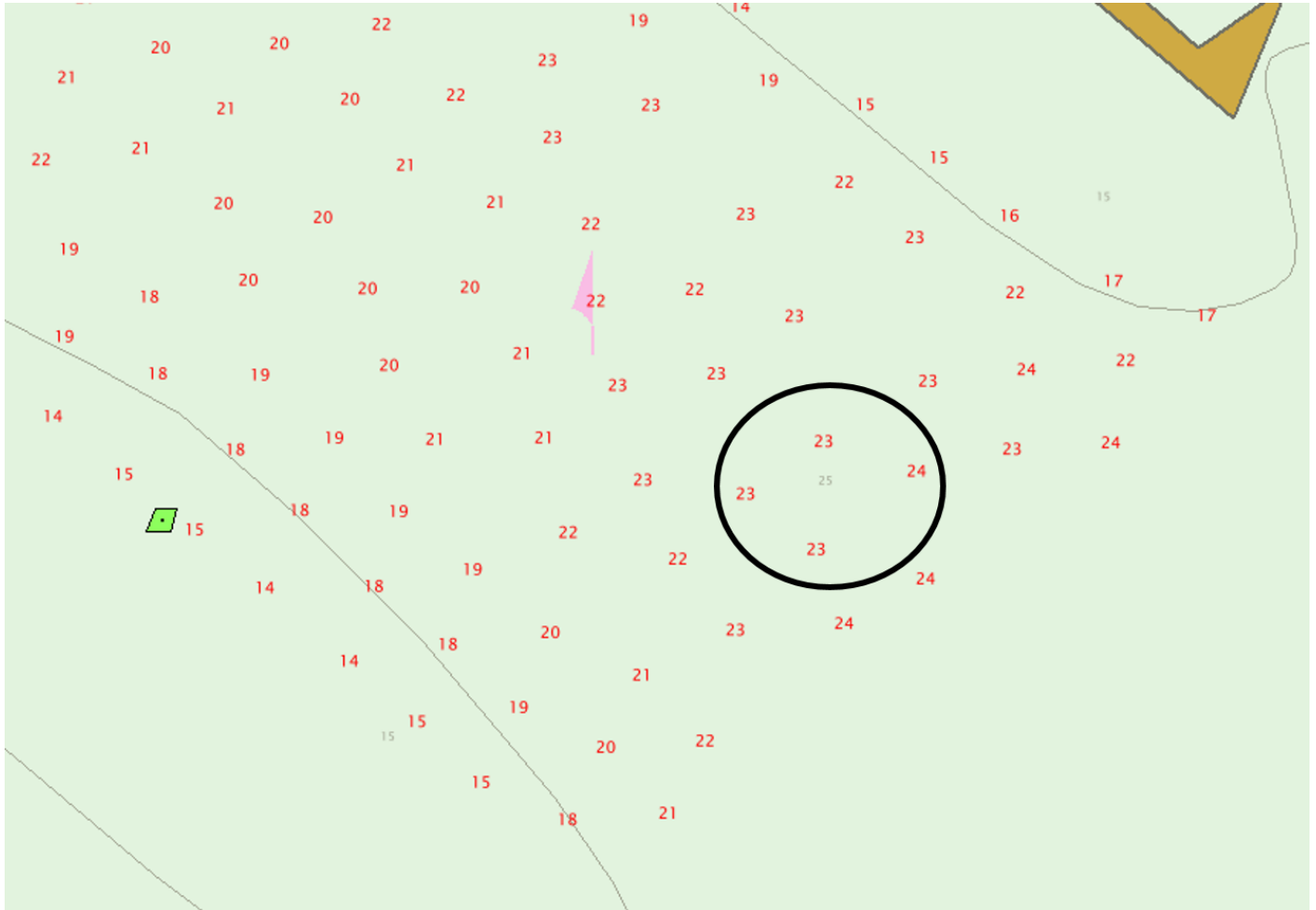


Figure 4: Largest sounding difference for F00737.



Figure 5: Difference surface between F00737 and interpolated TIN surface from ENC US5MD11M.

The following surfaces and/or BAGs were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
F00737_MB_50cm_MLLW	CUBE	0.5 m	3.4 m - 13.6 m	NOAA_0.5m	Base Surface
F00737_MB_50cm_MLLW_Final	Cube	0.5 m	0 m - 20 m	NOAA 0.5m	Finalized Surface

G. Vertical and Horizontal Control

The vertical datum for this project is Mean Lower Low Water.

The vertical control method used for this survey was VDatum.

ERS methods were used as the final means of reducing F00737 to MLLW for submission. Data were reduced using the VDATUM model S-E937-BH2-18-Limits_xyNAD83-MLLW_geoid12b.csar provided by the project manager.

The horizontal datum for this project is North American Datum 1983. The projection used for this survey is Projected UTM 18N.

Vessel kinematic data were post-processed using Applanix POSPac processing software and Single Base 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. For further details regarding the processing and quality control checks performed, see the F00737 POSPAC Processing Logs spreadsheet located in the Separates folder.

During real-time acquisition, correctors from the Wide Area Augmentation System (WAAS) were applied to the data for increased accuracies, similar to USCG DGPS stations. WAAS and SBETs were the sole methods of positioning for F00737.

H. Additional Results

Crosslines were collected, processed, and compared in accordance with Section 5.2.4.3 of the HSSD. To evaluate crosslines, a 0.5 meter CUBE surface using strictly mainscheme lines, and a 0.5 meter CUBE surface using strictly crosslines were created. From these two surfaces, a difference surface (mainscheme - crosslines = difference surface) was generated using Pydro's Compare Surfaces tool at a 0.5 meter resolution (Figure 6), and is submitted in the Separates II Digital Data folder. Statistics show the mean difference between the depths derived from mainscheme and crosslines was 0.05 meters with mainscheme being deeper and 95% of nodes falling within 0.10 meters (Figure 7). For the respective depths, the difference surface was compared to the allowable NOAA uncertainty standards using Compare Surfaces. In total, 99.5% of the depth differences between F00737 mainscheme and crossline data were within allowable NOAA uncertainties (Figure 8)

The finalized surface was analyzed using the Pydro QC Tools Grid QA feature and the results are show in Figure 9 below. Density requirements for F00737 were achieved with at least 99.5% of finalized surface nodes containing five or more soundings as required by HSSD Section 5.2.2.3.

Casts were conducted at a minimum of one every 4 hours during acquisition. Casts were conducted more frequently in areas where the influx of freshwater affected 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 used are detailed in the DAPR.

Data acquisition and processing notes are included in the acquisition and processing logs, and additional processing such as final tide and sound speed application are noted in the F00737 Data Log spreadsheet. All data logs are submitted digitally in the Separates I folder.

F00737 contains ten designated soundings in accordance with HSSD Section 5.2.1.2.3. All of the designated soundings are included in the FFF, as they are anthropogenic or associated with new or assigned features. Soundings from anthropogenic features, such as piers, seawalls, and bridge pilings were rejected to a point where the natural sea floor was not effected. In some cases, Flier Finder identified fliers in these areas, however, they were deemed to be on valid data surrounding the anthropogenic features.

No bottom samples were assigned to F00737.

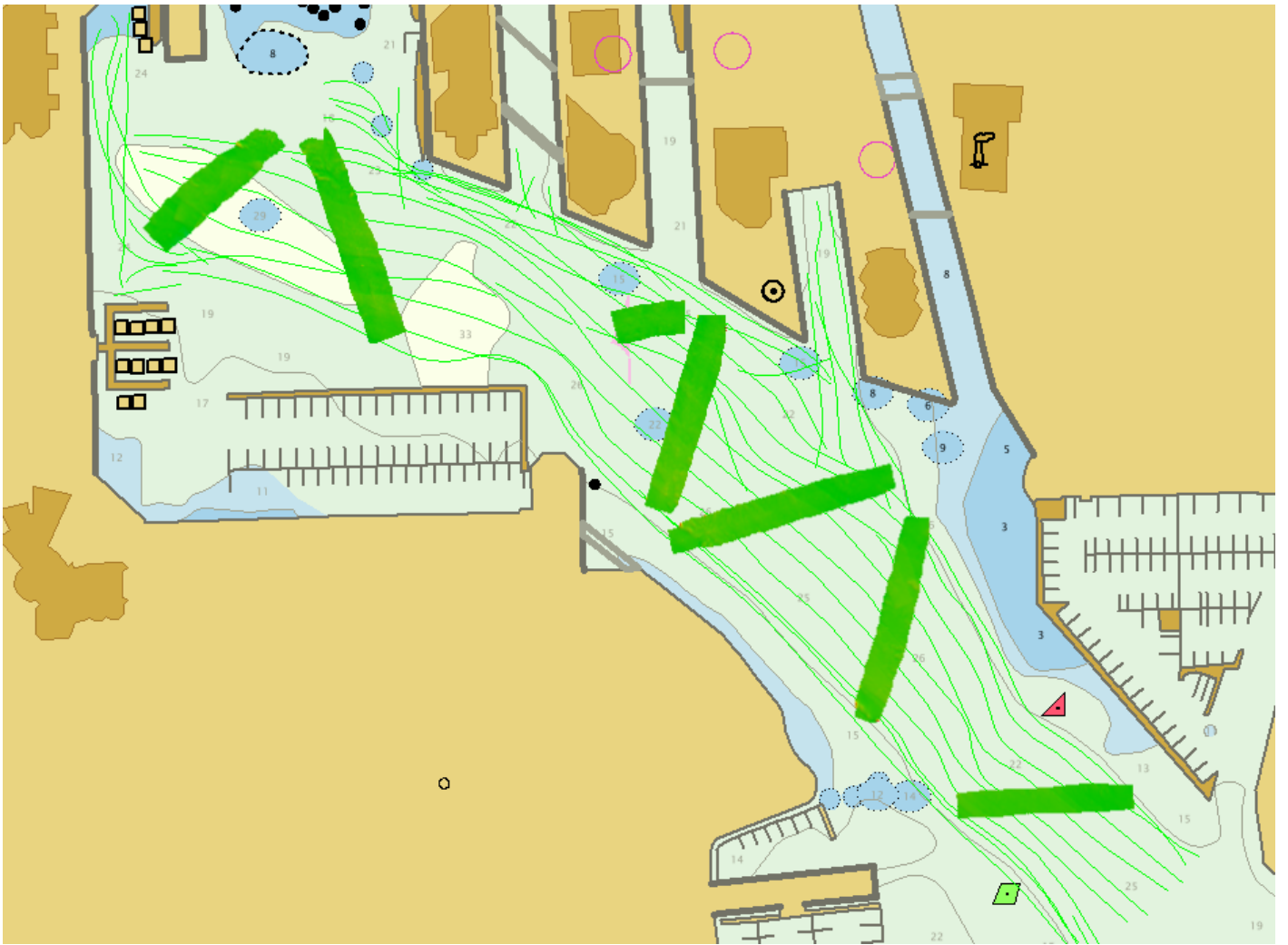


Figure 6: F00737 Crossline Difference Surface

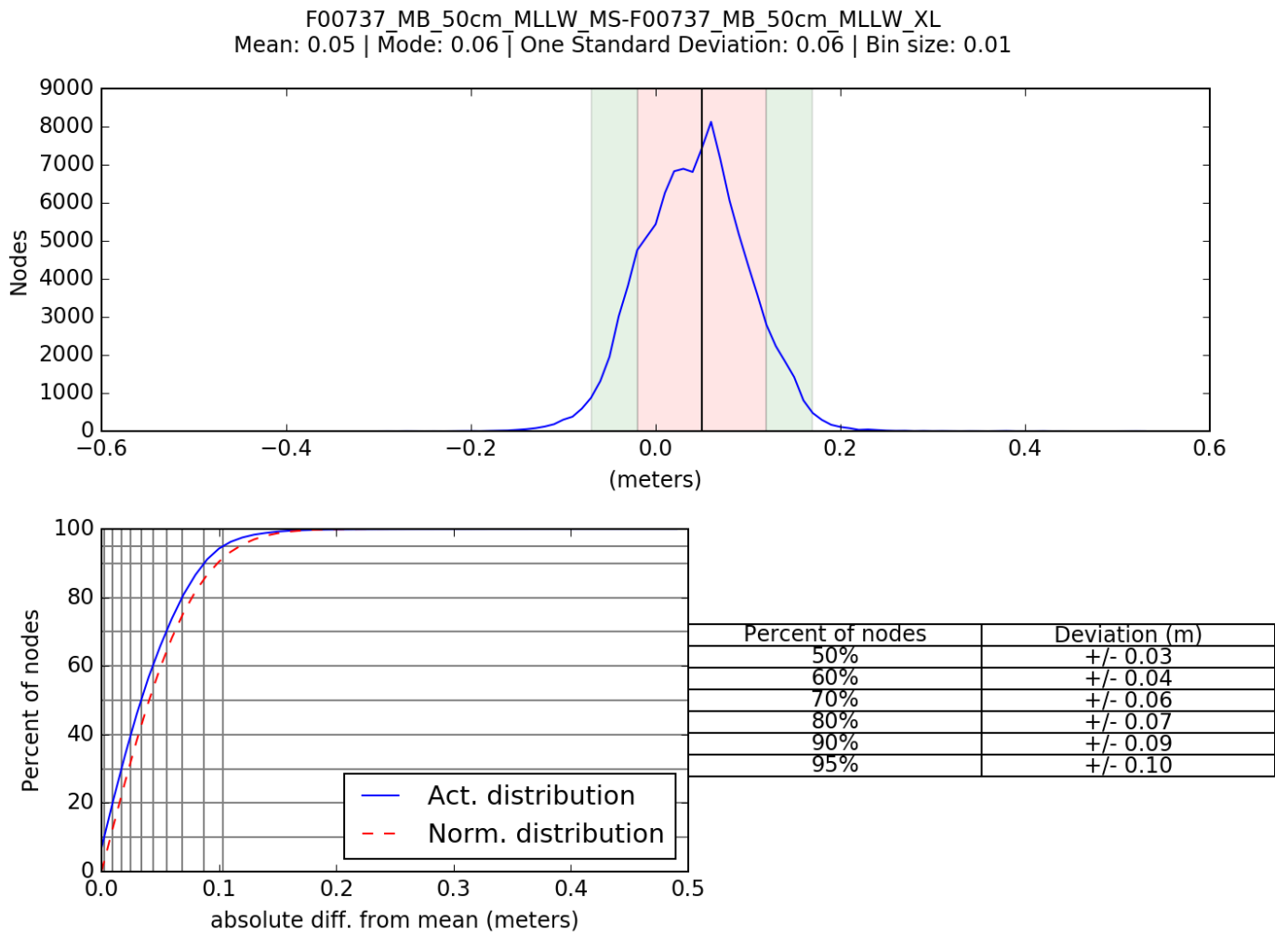


Figure 7: F00737 Crossline Statistics

Comparison Distribution

Per Grid: F00737_MB_50cm_MLLW_MS-F00737_MB_50cm_MLLW_XL_fracAllowErr.csar

99.5+% nodes pass (107167), min=0.0, mode=0.1 mean=0.1 max=1.7

Percentiles: 2.5%=0.0, Q1=0.0, median=0.1, Q3=0.1, 97.5%=0.2

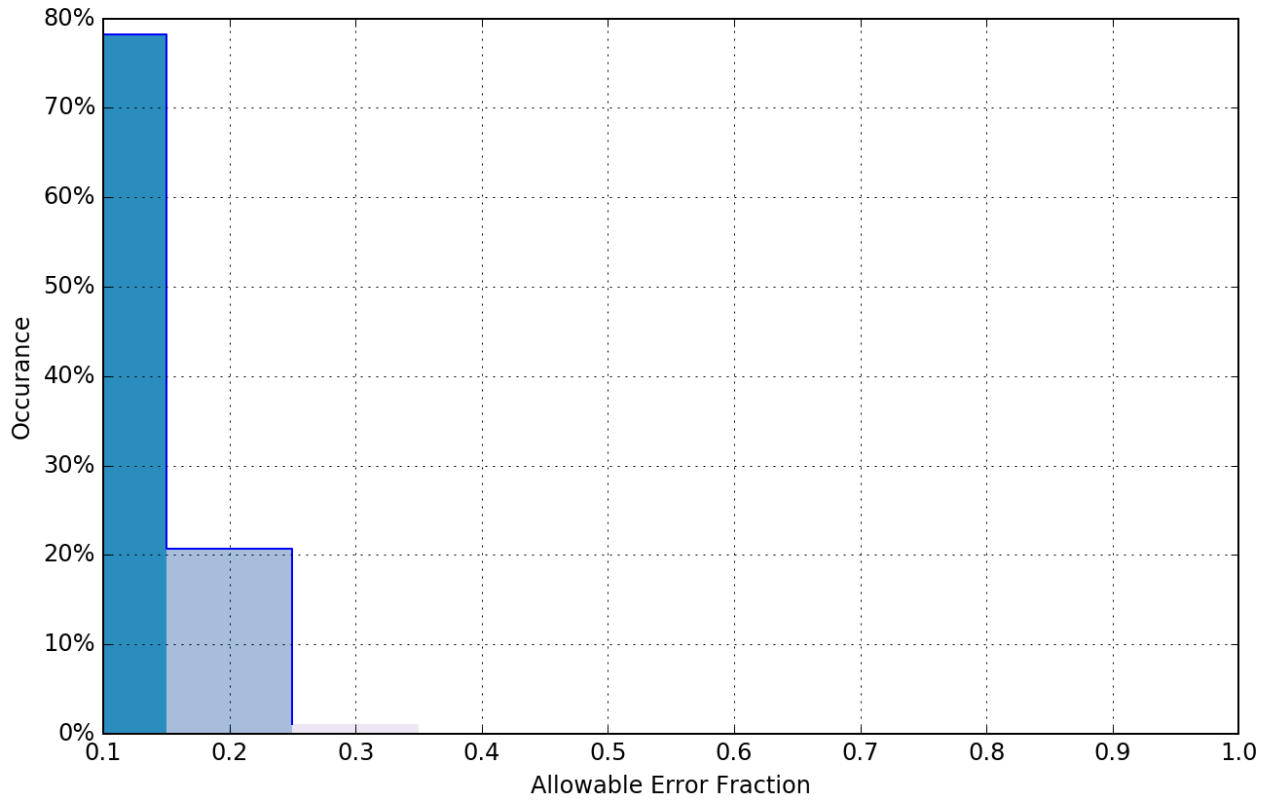


Figure 8: F00737 crossline and mainscheme NOAA allowable uncertainty statistics

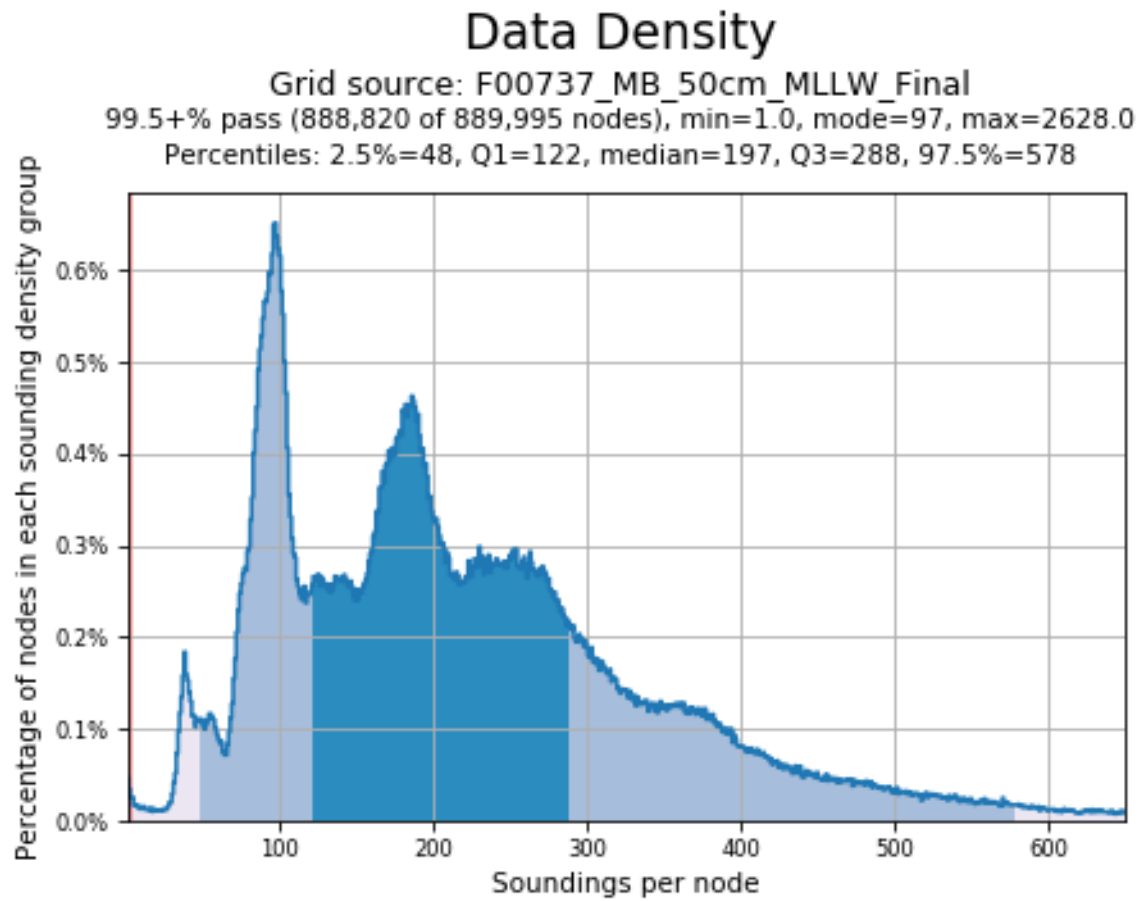


Figure 9: F00737 Density Statistics

I. Approval

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 Survey Summary 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 and Specifications Deliverables, Field Procedures Manual, Standing and 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 Survey Summary Report.

Approver Name	Title	Date	Signature
LTjg Sarah Chappel	Chief of Party	09/19/2018	 CHAPPEL.SARAH.LYNN. 1472631272 2018.09.19 11:22:57 -04'00'



OCS BHII - NOAA Service Account <ocs.bhii@noaa.gov>

S-E937-BH2-18 Baltimore Harbor, MD

1 message

Christopher Hare - NOAA Federal <christopher.hare@noaa.gov>
To: OCS BHII - NOAA Service Account <ocs.bhii@noaa.gov>

Tue, Aug 21, 2018 at 1:14 PM

LTJG Chappel,

NRB acknowledge and approves the additional survey areas in the Baltimore Harbor, after Bay Hydro II discussions with USACE and updated requests from Sail Baltimore, while surveying on the project. NRB also acknowledges the area on the west side of the USS Constellation Pier was removed as a requested area.

Chris

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Chris Hare
Project Manager
Navigation Response Branch
NOAA's Office of Coast Survey
240-533-0065

APPROVAL PAGE

F00737

Data meet or exceed current specifications as certified by the OCS survey acceptance review process. Descriptive Report and survey data except where noted are adequate to supersede prior surveys and nautical charts in the common area.

The following products will be sent to NCEI for archive

- Descriptive Report
- Collection of Bathymetric Attributed Grids (BAGs)
- Collection of backscatter mosaics
- Processed survey data and records
- GeoPDF of survey products

The survey evaluation and verification has been conducted according current OCS Specifications, and the survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.

Approved: _____

Commander Olivia Hauser, NOAA
Chief, Pacific Hydrographic Branch