

F00753

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

DESCRIPTIVE REPORT

Type of Survey: Natural Disaster Response

Registry Number: F00753

LOCALITY

State(s): South Carolina

General Locality: Charleston, SC

Sub-locality: Approaches to Charleston

2018

CHIEF OF PARTY
Mark Blankenship, CDR/NOAA

LIBRARY & ARCHIVES

Date:

HYDROGRAPHIC TITLE SHEET

F00753

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): **South Carolina**

General Locality: **Charleston, SC**

Sub-Locality: **Approaches to Charleston**

Scale: **10000**

Dates of Survey: **09/15/2018 to 10/23/2018**

Instructions Dated: **09/16/2018**

Project Number: **S-G944-FH-18**

Field Unit: **NOAA Ship Ferdinand Hassler (S250)**

Chief of Party: **Mark Blankenship, CDR/NOAA**

Soundings by: **Teledyne RESON SeaBat 7125 SV (MBES)
 R2Sonic 2022 (MBES)**

Imagery by: **Teledyne RESON SeaBat 7125 SV (MBES Backscatter)
 R2Sonic 2022 (MBES 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.

DESCRIPTIVE REPORT SUMMARY

A. Area Surveyed

This hydrographic survey was acquired in accordance with the requirements defined in the Project Instruction S-G944-FH-18. See figures 1 and 2 for survey overview and survey assignment as designated from the project instructions.

The Port of Charleston ranks as the 8th port in the United States by cargo value, with almost \$70 billion in imports and exports traded across the docks. In 2018 Hurricane Florence shut down the Port of Charleston, this survey is a direct result of the hurricane to assess damage and assist in reopening the port.

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
32° 51' 9.53" N 79° 56' 58.37" W	32° 41' 55.31" N 79° 45' 50.22" W

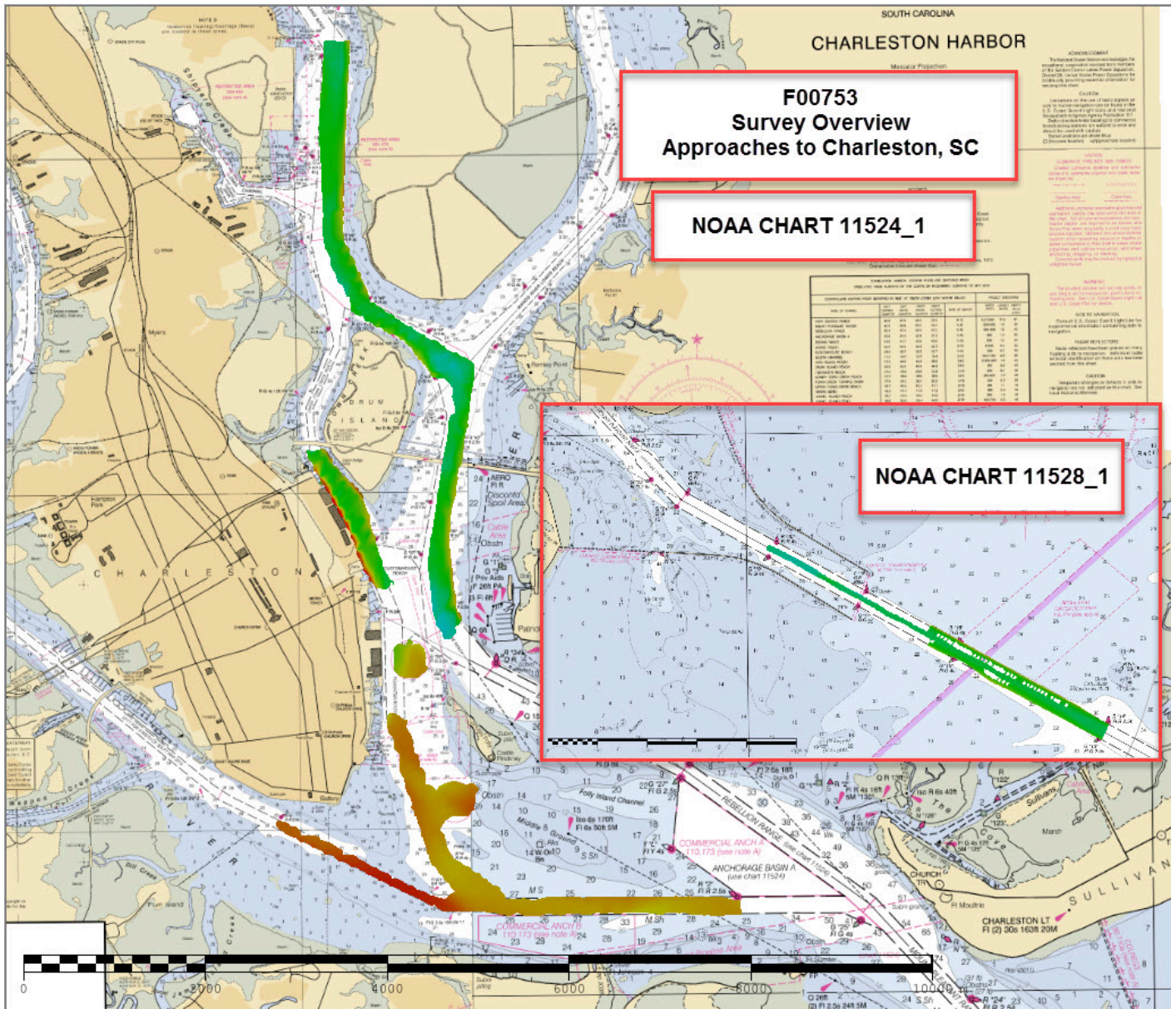
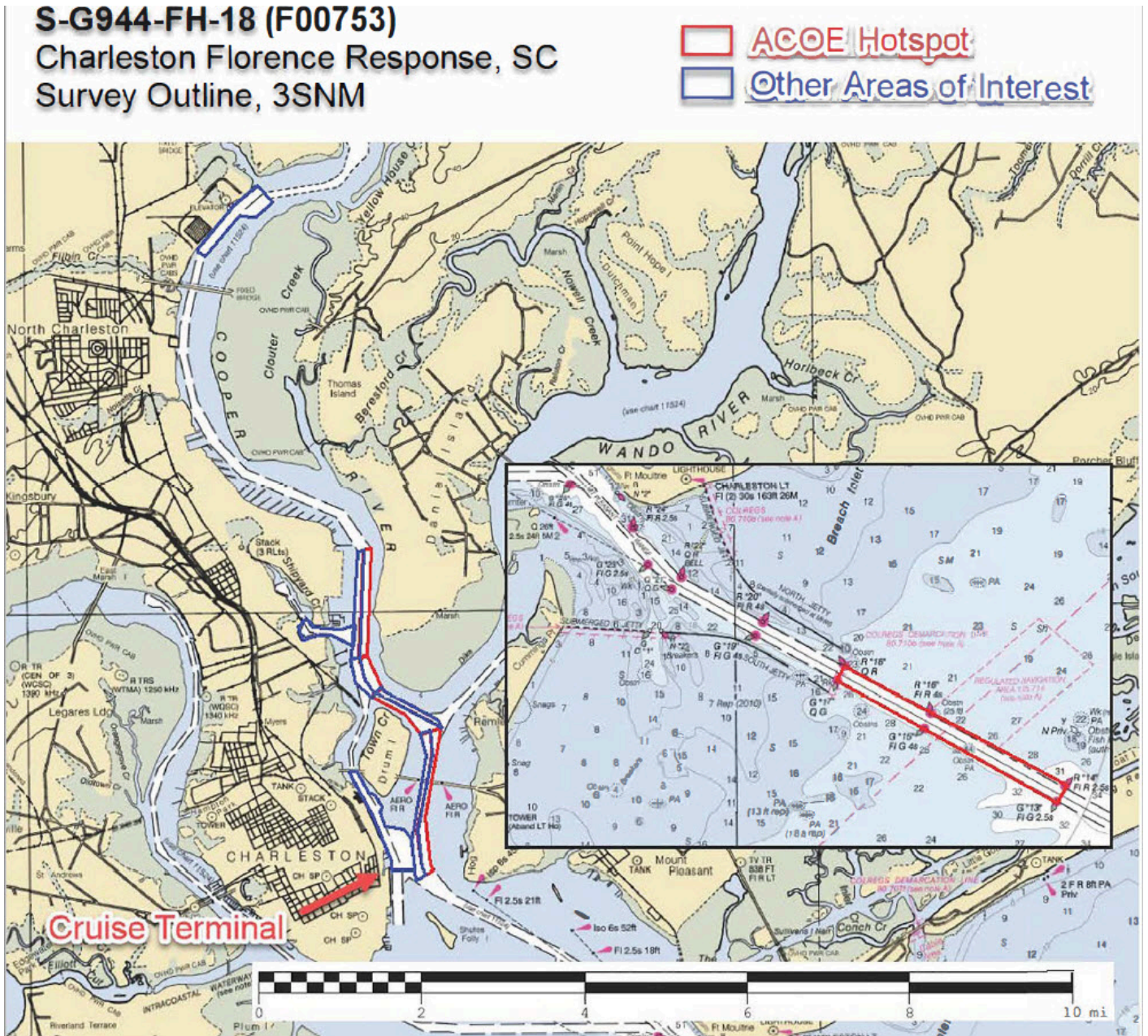


Figure 1: F00753 Survey Overview Approaches to Charleston, SC. Chart 11524_1 & 11528_1



B. Survey Purpose

The purpose of this survey is to support post storm recovery following Hurricane Florence by identifying shoaling and hazards per requested from our stakeholders.

C. Intended Use of Survey

The survey is NOT adequate to supersede previous data.

This survey is for informational purposes only and is not adequate to supersede prior data. The hydrographer recommends that these data and the accompanying documentation be archived without further action. Survey is in response to Hurricane Florence and is for hazard investigation for approaches to Charleston, SC.

D. Data Acquisition and Processing

Please reference Data Acquisition and Processing Report S-G944-FH_DAPR_1.2.co for a complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods.

E. Uncertainty

A horizontal uncertainty of 4.11 meters is noted periodically on hydro survey launch 2702 , the result of a motion artifact. See figure 3 for a detailed look at the uncertainty at commercial anchorage D on chart ENC US5SC14M.

A vertical uncertainty of ~0.60 meters is noted between hydro survey launch 2702 and the NOAA Ship Ferdinand R. Hassler, the uncertainty is 0.10 meters over the allowable uncertainty as defined by HSSR 2018 section 5.1.3 Uncertainty Standards. See figure 4 for an example of the ~0.60 meters uncertainty on chart ENC US5SC14M.

The previous mentioned vertical and horizontal uncertainty did not result in the overall survey failing to meet the IHO allowable error. The overall uncertainty is less than or equal to the allowable IHO error, the entire survey passed with 98% (5,034,195 nodes of 5,156,467 nodes) see figure 5. Overall uncertainty was generated using Pydro 19.4 QC tool Grid QA. This tool is an automated process that checks the data against allowable error per NOAA and IHO specification and compute particular statistics shown as a series of plots.

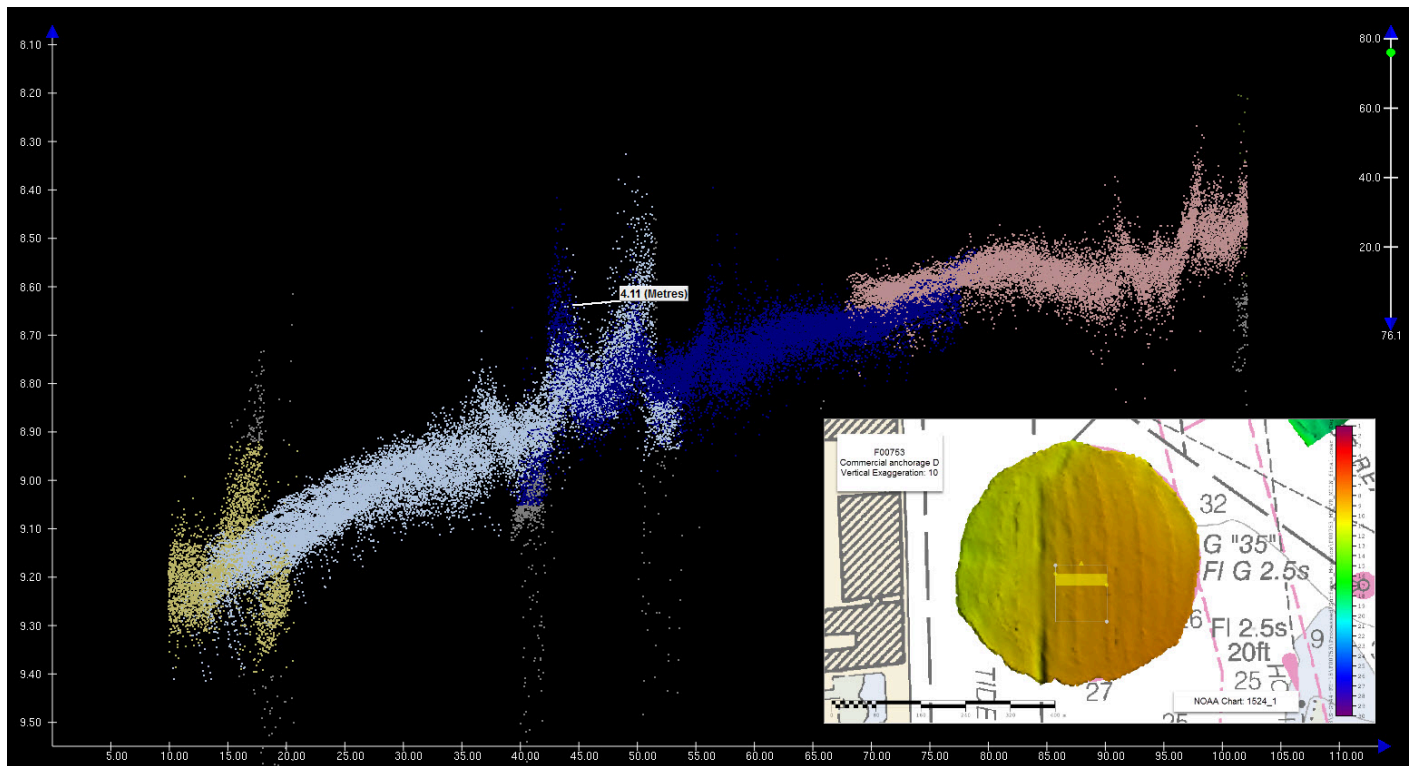


Figure 3: The image demonstrates a motion artifact resulting in a horizontal uncertainty 4.11 meters within commercial anchorage D.

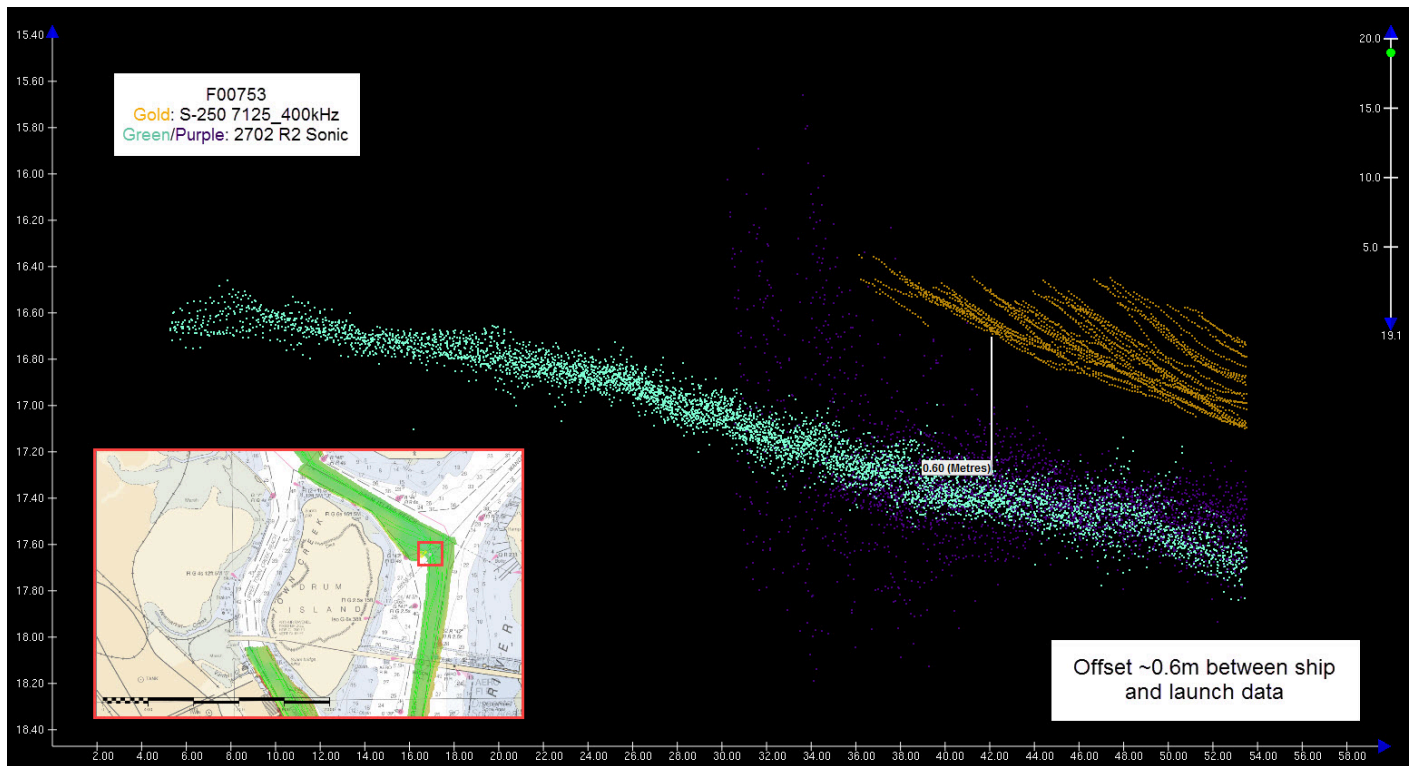


Figure 4: The image is an example of the ~0.60 meters vertical uncertainty between hydro survey launch 2702 and the NOAA Ship Ferdinand R. Hassler.

Uncertainty Standards

Grid source: F00753_MB_VR_MLLW_final

98% pass (5,034,195 of 5,156,467 nodes), min=0.05, mode=0.20, max=5.22

Percentiles: 2.5%=0.09, Q1=0.17, median=0.24, Q3=0.34, 97.5%=0.98

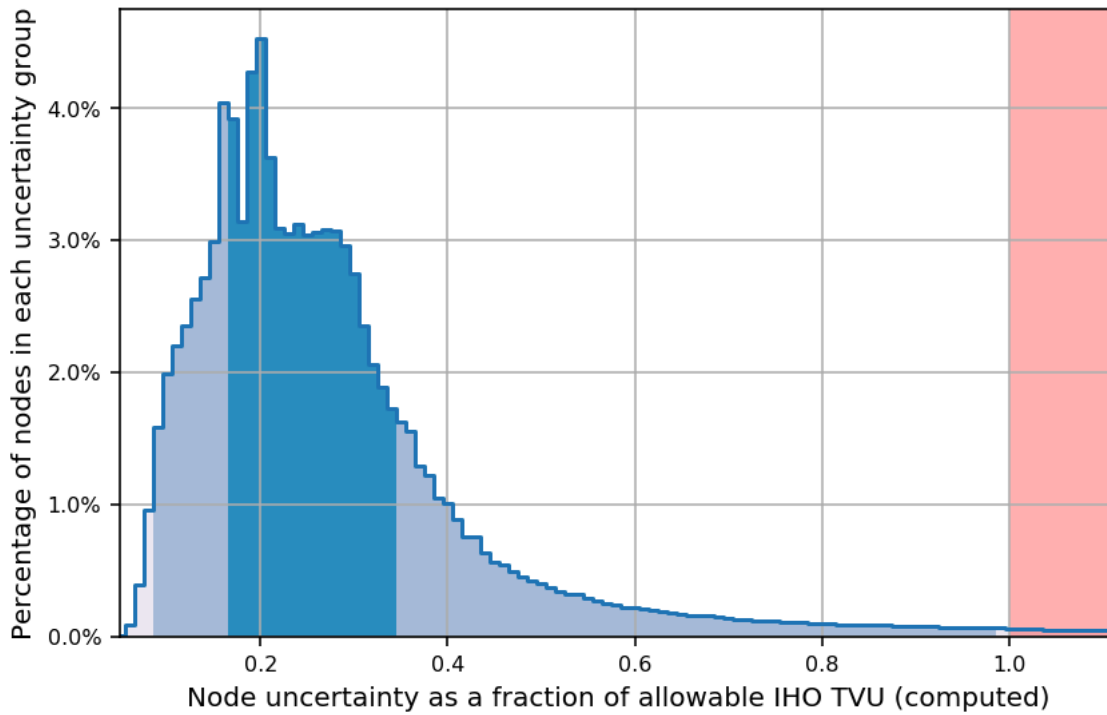


Figure 5: Nodes with Uncertainty less than or equal allowable IHO error pass with 98% (5,034,195 of 5,156,467)

F. Results and Recommendations

The following are the largest scale ENC's, which cover the survey area:

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US5SC14M	1:20000	57	01/31/2020	11/03/2018	NO
US5SC25M	1:40000	13	12/30/2019	09/25/2018	NO

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

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
F00753_MB_VR_MLLW_final	CARIS VR Surface (CUBE)	Variable Resolution m	1.396 m - 29.993 m	NOAA_VR	Object Detection
F00753_MB_VR_MLLW	CARIS VR Surface (CUBE)	Variable Resolution m	1.396 m - 29.993 m	NOAA_VR	Object Detection

This data is not intended for charting but most of the data agrees closely to what is charted on ENC US5SC25M and ENC US5SC14M. The survey data shows that the channel is deeper in specific areas than is currently charted on ENC US5SC14M see figures 8 and 9. A total of 433 holidays are in the finalized surface, located along the pier edges of chart ENC US5SC14M and the survey limits. The holidays are a result of pier pylons being removed from the surface. These holidays were located using Pydro 19.4 QC tools holiday finder. Holiday finder is a tool that scans the uploaded grid for any empty grid nodes (“holes”) surrounded by populated nodes and identifies them based upon 2018 NOAA NOS Hydrographic Survey Specifications and Deliverables. Due to time limitation and the inability for the vessels to return to the survey area the holidays are submitted with the finalized surface.

The finalized variable-resolution surface (F00753_MB_VR_MLLW_final) has been adjusted to meet grid resolution threshold for object detection survey as defined by HSSD 2018 5.2.2 Coverage Requirements. See attached standered compliance graphs below figures 6 and 7.

Backscatter was collected by all survey vessels but not processed on board the vessel per the project instructions coverage requirement.

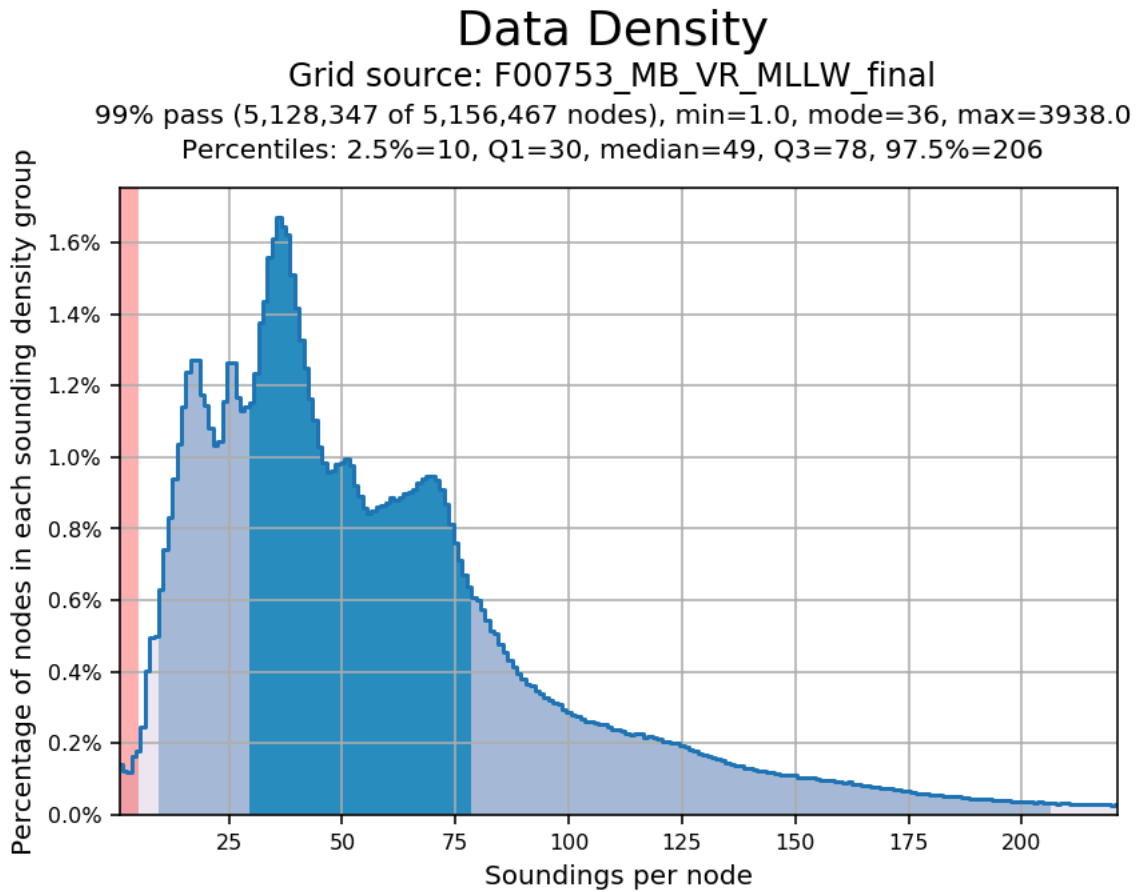


Figure 6: Data Density nodes passed with 99% (5,128,347 of 5,156,467).

Depth Distribution

Grid source: F00753_MB_VR_MLLW_final

Total nodes: 5,156,469, min=1.40, mode=15.3, max=29.99

Percentiles: 2.5%=5.2, Q1=8.6, median=13.6, Q3=15.2, 97.5%=17.0

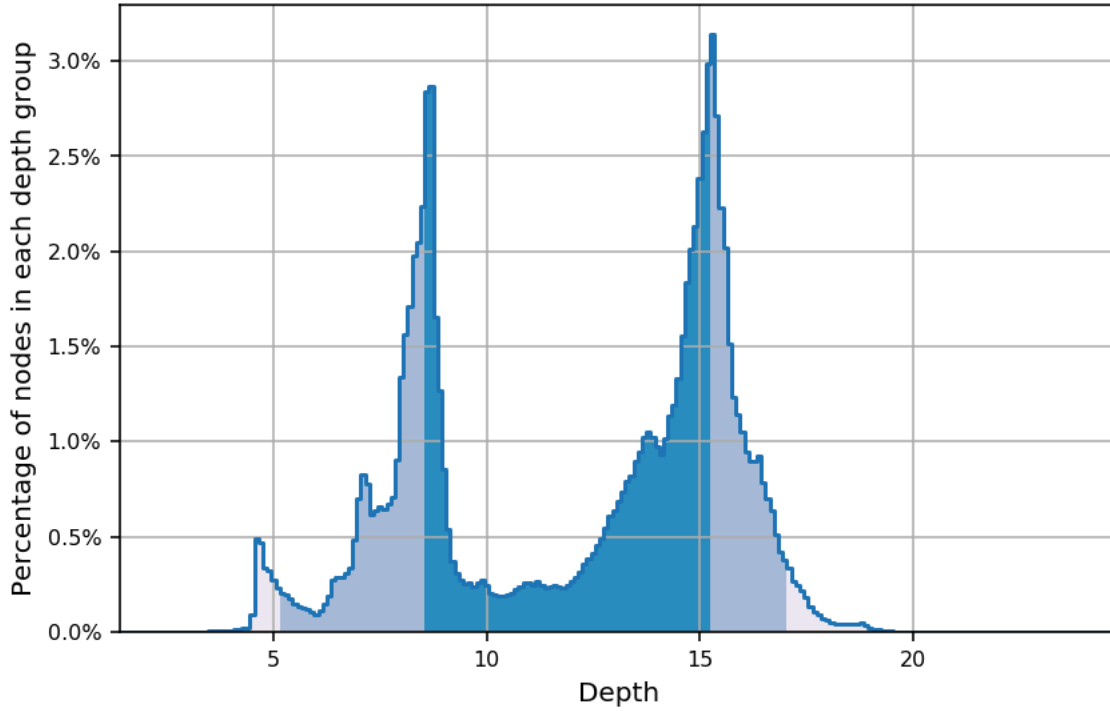


Figure 7: Depth Distribution shows total nodes of 5,156,469.

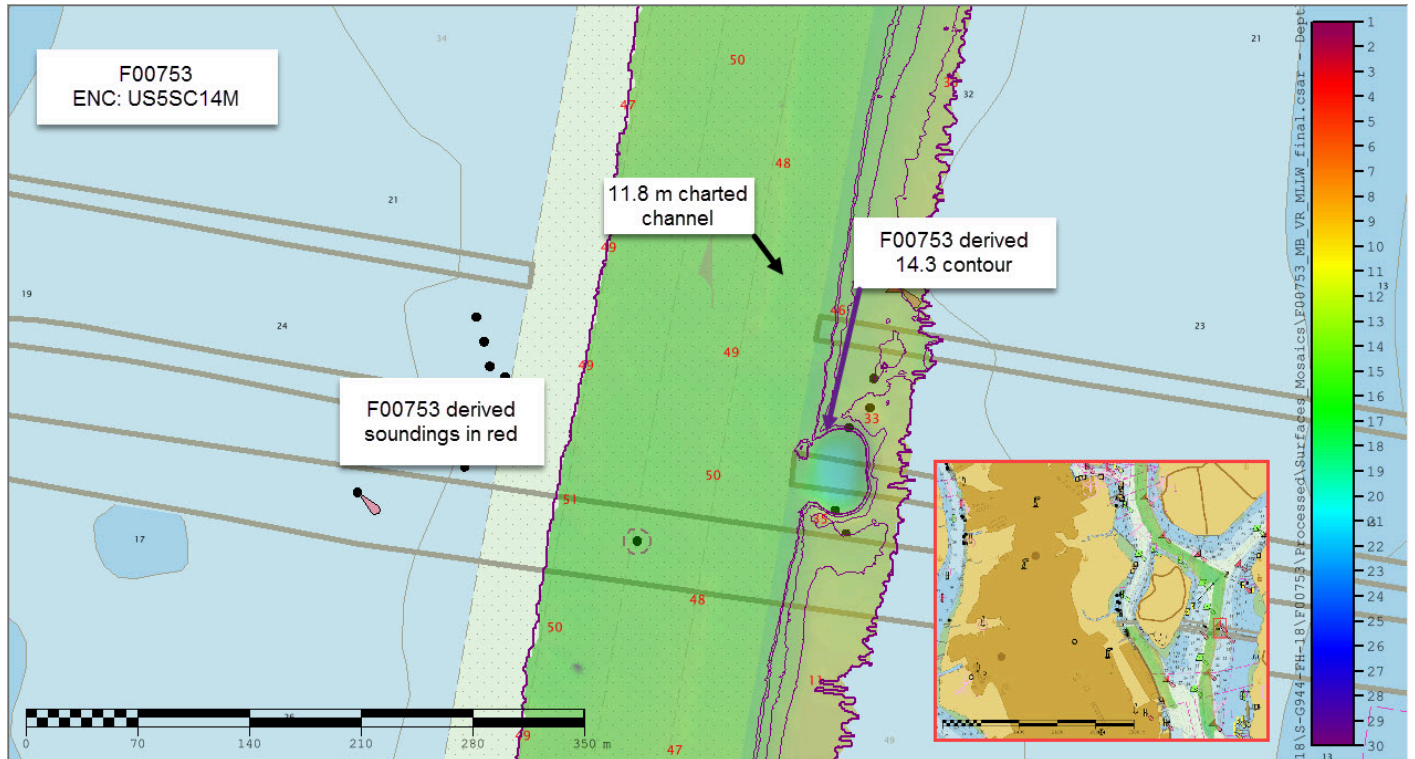


Figure 8: The image demonstrates the survey derived contour show the channel to be deeper than is charted. Channel charted at 11.8 meters with surveyed contour showing 14.3 meters.

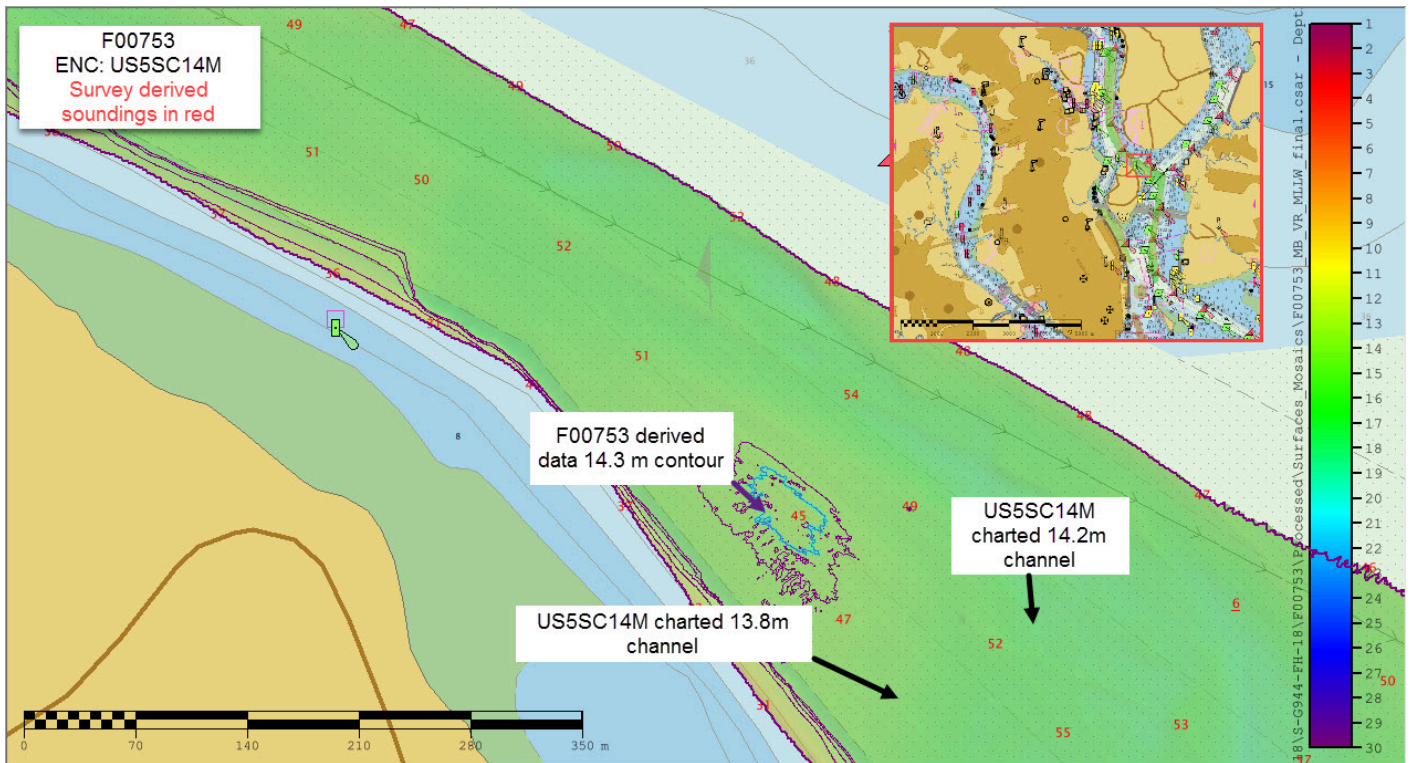


Figure 9: The image demonstrates the survey derived contour show the channel to be deeper than is charted. Channel charted at 14.2 meters and 13.8 meters with surveyed contour showing 14.3 meters.

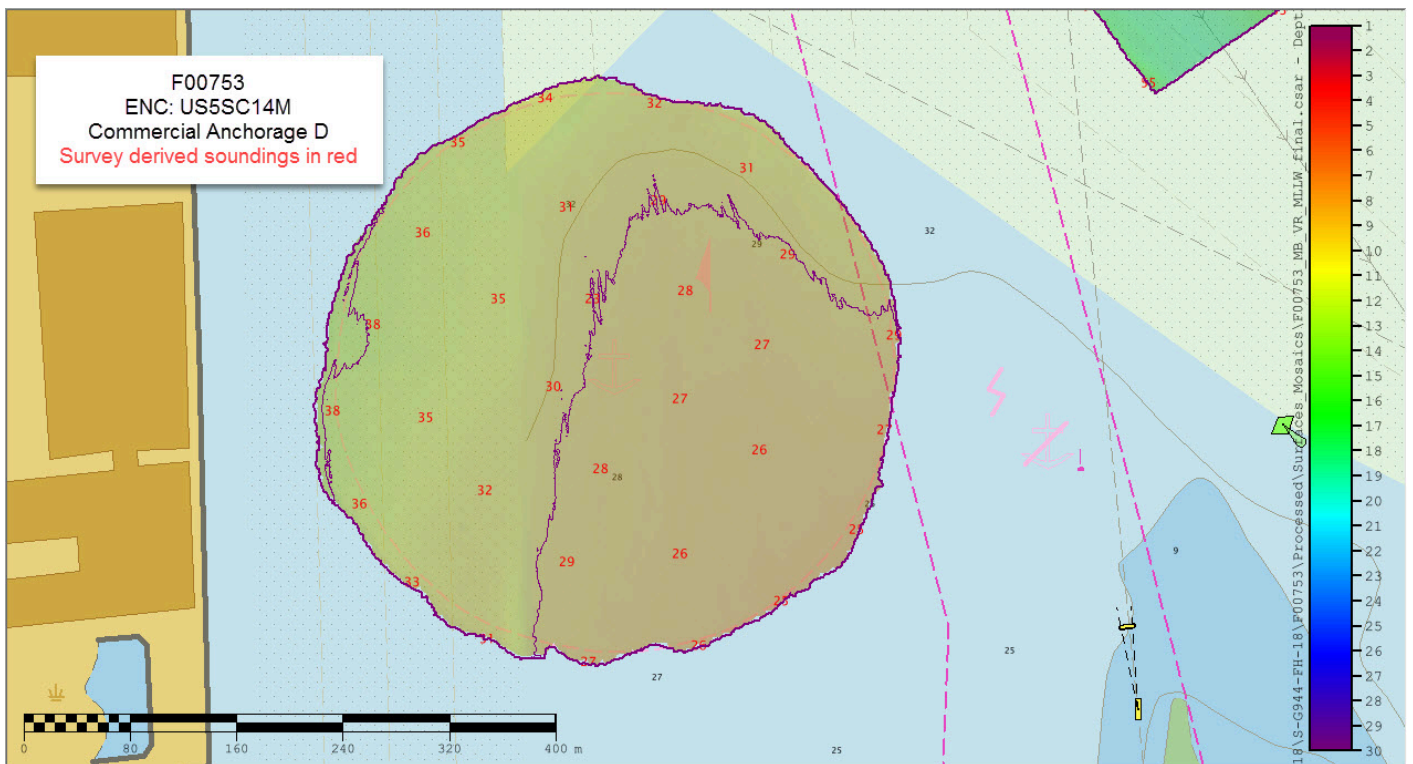


Figure 10: The image demonstrates that survey derived soundings agree with the charted soundings.

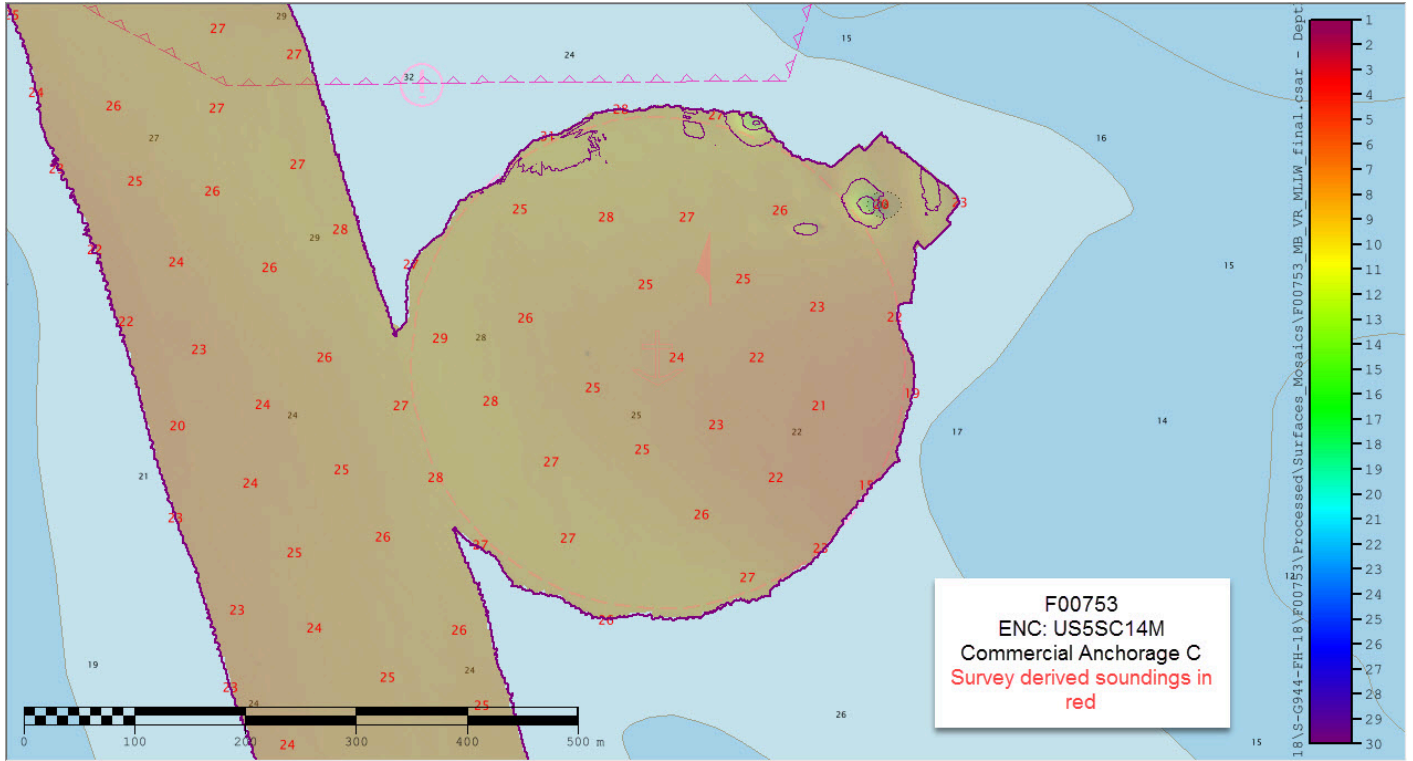


Figure 11: The image demonstrates that survey derived soundings agree with the charted soundings.

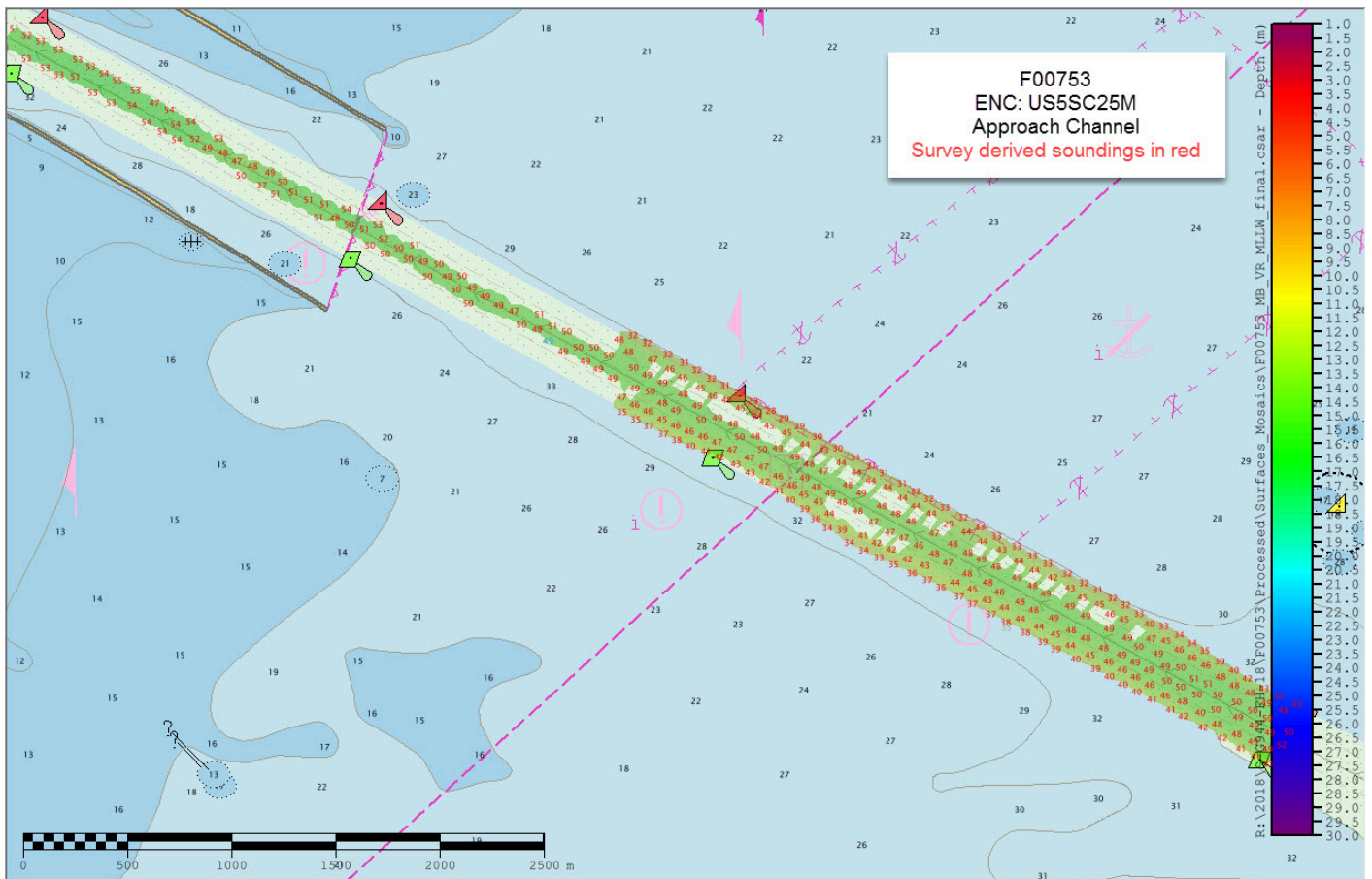


Figure 12: The image demonstrates that survey derived soundings agree with the charted soundings. Finalized surface is made to meet USACE specification for channel surveys.

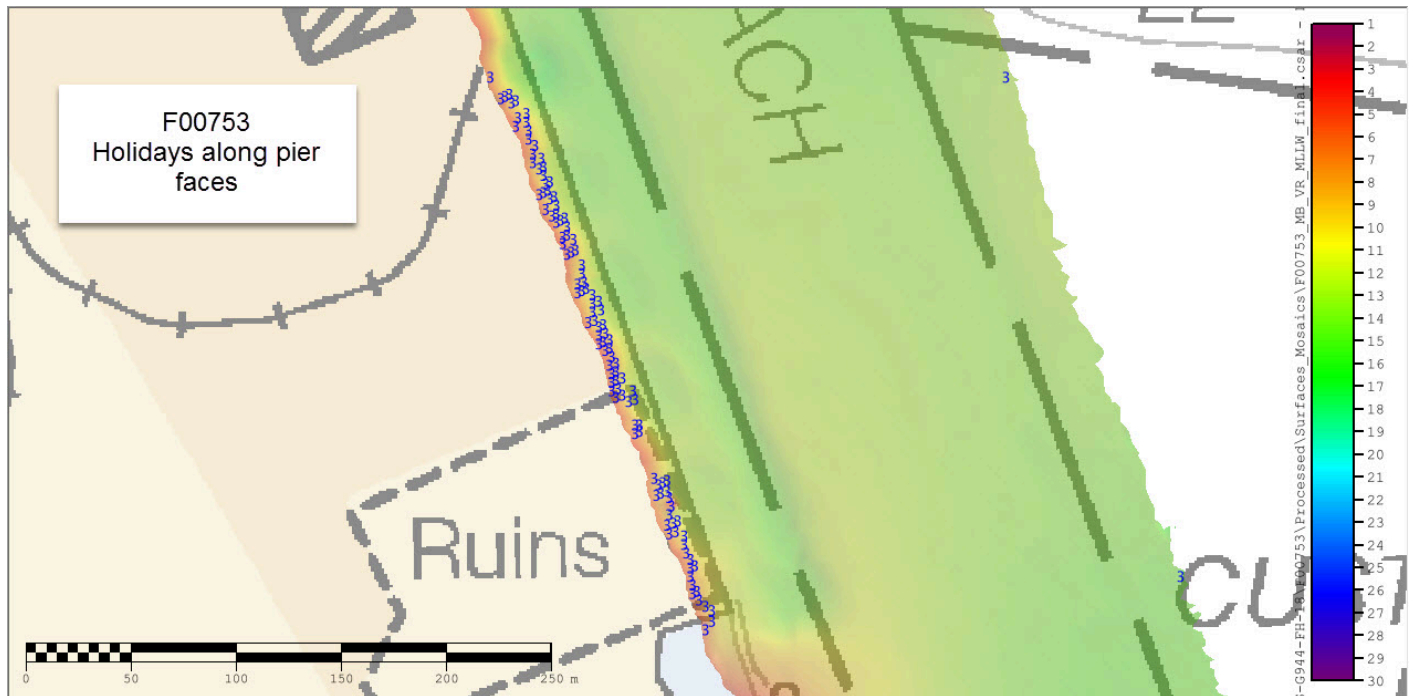


Figure 13: The image above demonstrates the edge holidays left in the final surface due to time and resource limitations.

G. Vertical and Horizontal Control

The vertical datum for this project is Mean Lower Low Water. The vertical control method used was VDatum.

All soundings were reduced to Mean Lower Low Water using VDatum.

Soundings were reduced to Mean Lower Low Water (MLLW) by VDatum transformation using the model named Charleston_Vdatum_Limits_xyNAD83-MLLW_geoid12b after the 5P processing solution was applied via SBET and RMS files. SBET and RMS file generation work flow can be found within the DAPR C.4 Vessel Position in Data Processing Methods and Procedures section.

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.

No DGPS stations were used for this survey.

H. Additional Results

There are no additional results for this survey.

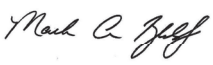

I. Approval

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 Specifications and 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.

No additional information

Approver Name	Title	Date	Signature
Mark Blankenship, CDR/NOAA	Chief of Party	03/02/2020	 2020.03.28 09:47:16 -04'00'
Steven J. Wall, LT/NOAA	Field Operations Officer	03/02/2020	WALL.STEVEN.JA MES.1459978298 <small>Digitally signed by WALL.STEVEN.JAMES.145997829 8 Date: 2020.03.27 12:45:44 -04'00'</small>
Taylor Krabel, ENS/NOAA	Sheet Manager	03/02/2020	 2020.03.29 10:30:20-04'00'