H13794

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13794

LOCALITY

State(s):	Maryland
General Locality:	Upper Chesapeake Bay
Sub-locality:	Elk River

2023

CHIEF OF PARTY
LTJG Jane Saunders

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Date:

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

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

H13794

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:	**Upper Chesapeake Bay**
Sub-Locality:	**Elk River**
Scale:	**5000**
Dates of Survey:	**04/25/2023 to 05/08/2023**
Instructions Dated:	**05/05/2023**
Project Number:	**S-E915-BH2-23**
Field Unit:	**NOAA R/V *Bay Hydro II***
Chief of Party:	**LTJG Jane Saunders**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	
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 H13794

Project: S-E915-BH2-23

Locality: Upper Chesapeake Bay

Sublocality: Elk River

Scale: 1:5000

April 2023 - May 2023

NOAA R/V *Bay Hydro II*

Chief of Party: LTJG Jane Saunders

A. Area Surveyed

The survey area is located in the Delaware River with the northern edge being parallel to Bellefonte and the southern edge ending just north of the mouth of the Christiana River.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
39° 29' 57.34" N 75° 55' 49.28" W	39° 25' 29.92" N 76° 0' 25.05" W

Table 1: Survey Limits

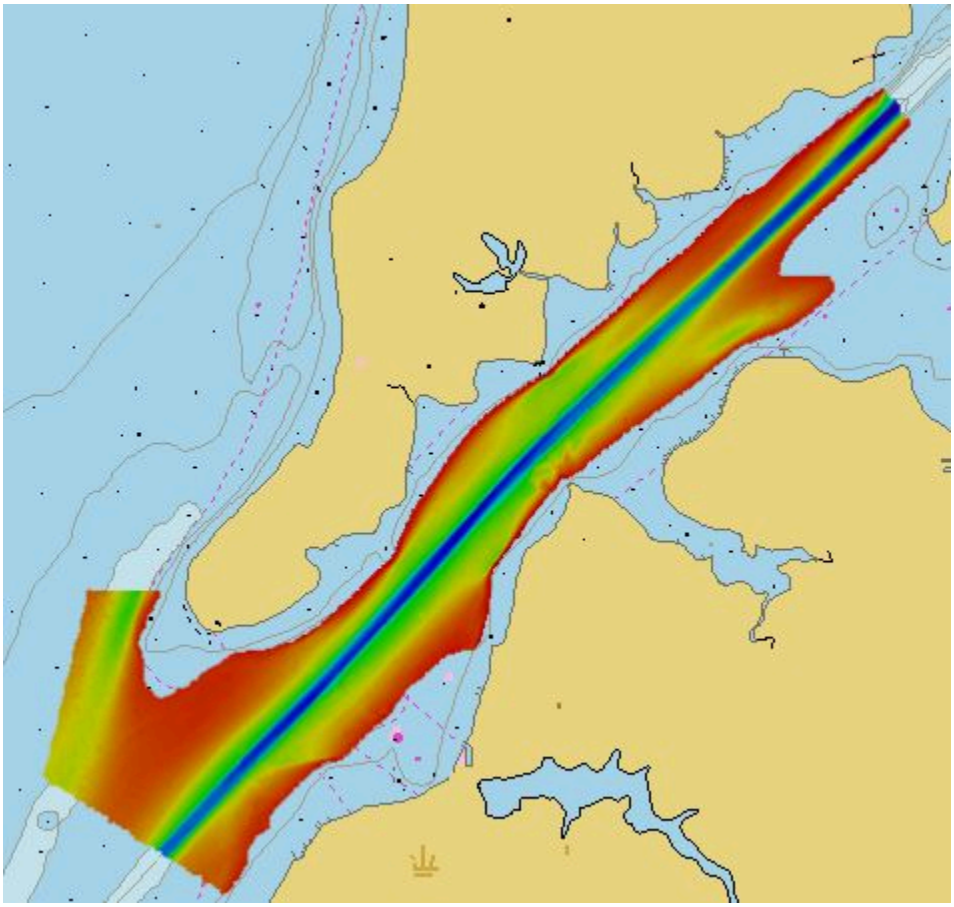


Figure 1: H13794 Surveyed Area

Data were acquired to the survey limits in accordance with the requirements in the Project Instructions (PIs) and the May 2022 NOS Hydrographic Surveys Specifications and Deliverable (HSSD). Sheet limits were only met in the south west corner where the survey limits extended into the Chesapeake Bay, see Figure 2.

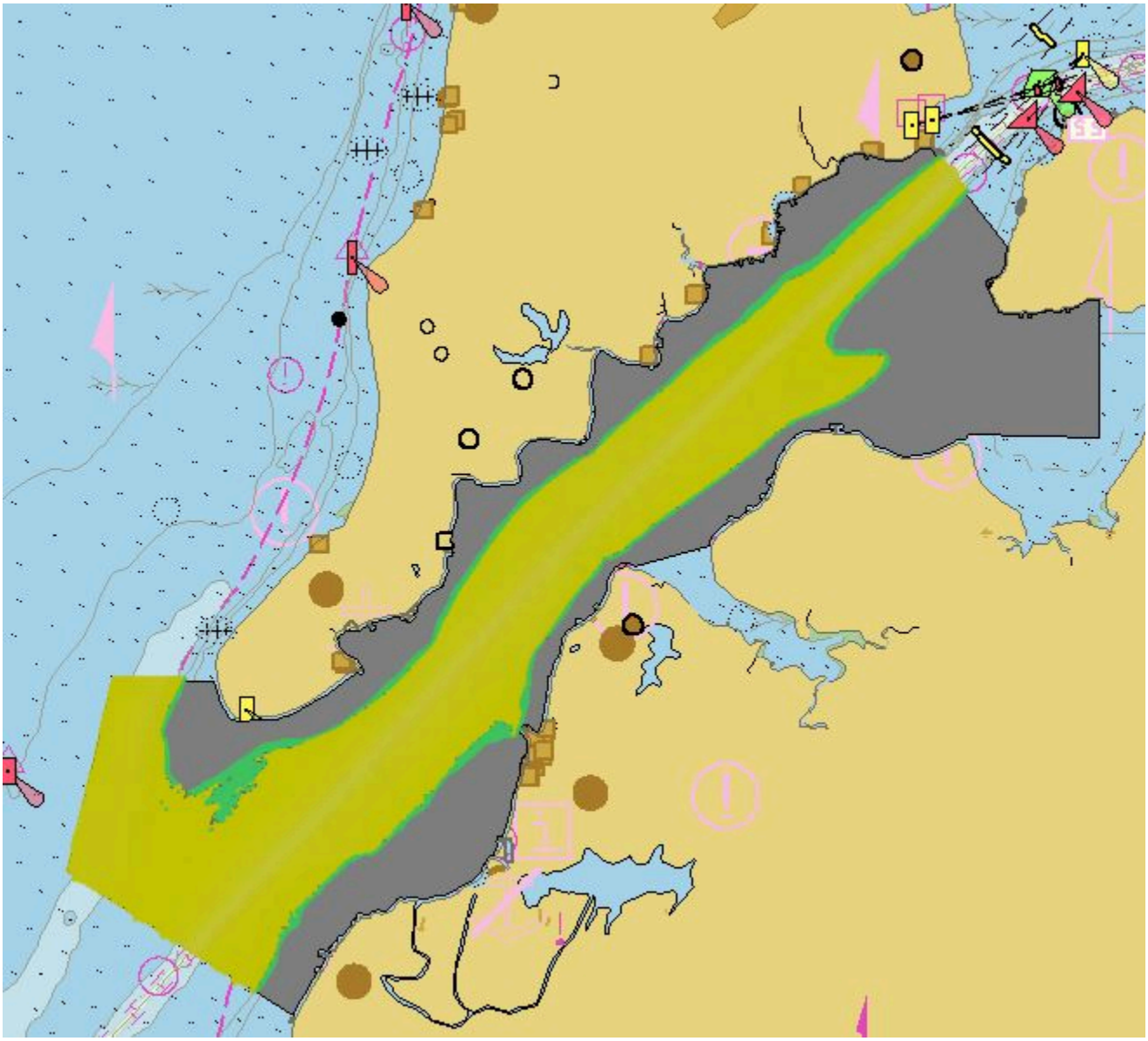


Figure 2: H13794 surveyed area, with depths deeper than 3.0m in mustard yellow and depths shallower than 3.0m in green; compared to H13794 Sheet limits in gray.

A.2 Survey Purpose

The purpose of H13794 is to fulfill the requirement of a modern survey in Elk River, which has not been surveyed since the early 1900s, and to update the hydro health model.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data acquired in H13794 meet multibeam echo sounder (MBES) coverage requirements for object detection, as required by the HSSD unless otherwise stated in this report. This includes crosslines (see Section B.2.1 of this document), NOAA allowable uncertainty (see Section B.2.2 of this document), and density requirements (see Section B.2.12 of this document). Additional compliance statistics can be found in the Digital Data folder located in Appendix II.

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 upto the navigable area limit line.	Full Coverage

Table 2: Survey Coverage

Survey coverage was by the requirements in the PIs and the HSSD except for holidays. In most cases, these holidays were acoustic shadows associated with non-reportable, small obstructions on the sea floor or the sea floor's topography. In other cases, these holidays were caused by schools of fish and/or other marine life prohibiting the MBES from identifying the true seafloor.; while others were the result of cleaning out artifacts associated with bad SBETs. A Holiday Line file was created and executed based solely on the uncleaned CARIS HIPS and SIPS surface; however, upon a thorough cleaning of the data, even more holidays were discovered. These new holidays could not be reacquired due to BHII being out of the region.

Each of these gaps in coverage was examined in CARIS HIPS and SIPS, Subset Editor, and determined not to degrade the confidence in the quality of the survey, nor do they limit the ability to adequately verify charted depths.

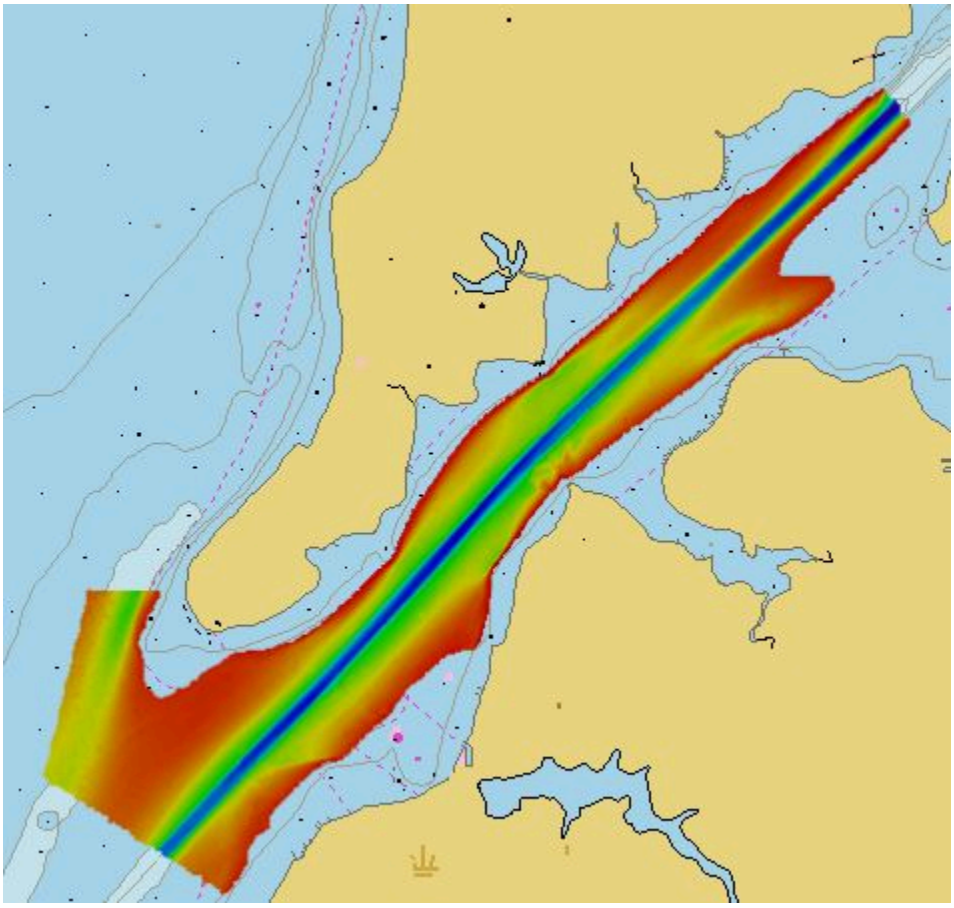


Figure 3: H13794 survey location, 33.4 miles northeast of Baltimore, MD and 3.8 miles southwest of the Chesapeake & Delaware Canal.

A.6 Survey Statistics

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

	HULL ID	*S5401*	*Total*
LNM	**SBES Mainscheme**	0.0	0.0
	MBES Mainscheme	298.57	298.57
	Lidar Mainscheme	0.0	0.0
	SSS Mainscheme	0.0	0.0
	SBES/SSS Mainscheme	0.0	0.0
	MBES/SSS Mainscheme	0.0	0.0
	SBES/MBES Crosslines	16.5	16.5
	Lidar Crosslines	0.0	0.0
Number of Bottom Samples			4
Number Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Investigated by Dive Ops			0
Total SNM			5.25

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
04/25/2023	115
04/26/2023	116

Survey Dates	Day of the Year
04/27/2023	117
04/28/2023	118
05/01/2023	121
05/02/2023	122
05/03/2023	123
05/04/2023	124
05/05/2023	125
05/08/2023	128

Table 4: Dates of Hydrography

No data was acquired on weekends due to previously scheduled obligations of the crew.

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	***S5401***
LOA	17.3 meters
Draft	1.8 meters

Table 5: Vessels Used

Figure 4: R/V Bay Hydro II, S5401

B.1.2 Equipment

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

Manufacturer	Model	Type
Kongsberg Maritime	EM 2040CD	MBES
Applanix	POS MV 320 v5	Positioning and Attitude System
Valeport	MiniSVS	Sound Speed System
SonTek	CastAway-CTD	Conductivity, Temperature, and Depth Sensor

Table 6: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Multibeam crosslines acquired for this survey totaled 5.53% of mainscheme acquisition.

Crosslines were collected, processed, and compared in accordance with Section 5.2.4.2 of the HSSD. To evaluate crosslines, a fifty centimeter Resolution (50cm) CUBE surface using strictly mainscheme lines, and a fifty centimeter (50cm) CUBE surface using strictly crosslines were created. From these two surfaces, a difference surface (mainscheme - crosslines = difference surface) was generated at a fifty centimeter (50cm) (See Figure 5). Statistics show the mean difference between the depths derived from mainscheme and crosslines was -0.03 meters with crosslines being slightly shallower and 95% of nodes falling within +/-0.14 meters (Figure 6). For the respective depths, the difference surface was compared to the allowable NOAA uncertainty standards using Pydro's Compare Grids tool. In total, 99.5% of the depth differences between F00853 mainscheme and crossline data were within allowable NOAA uncertainties (Figure 7).

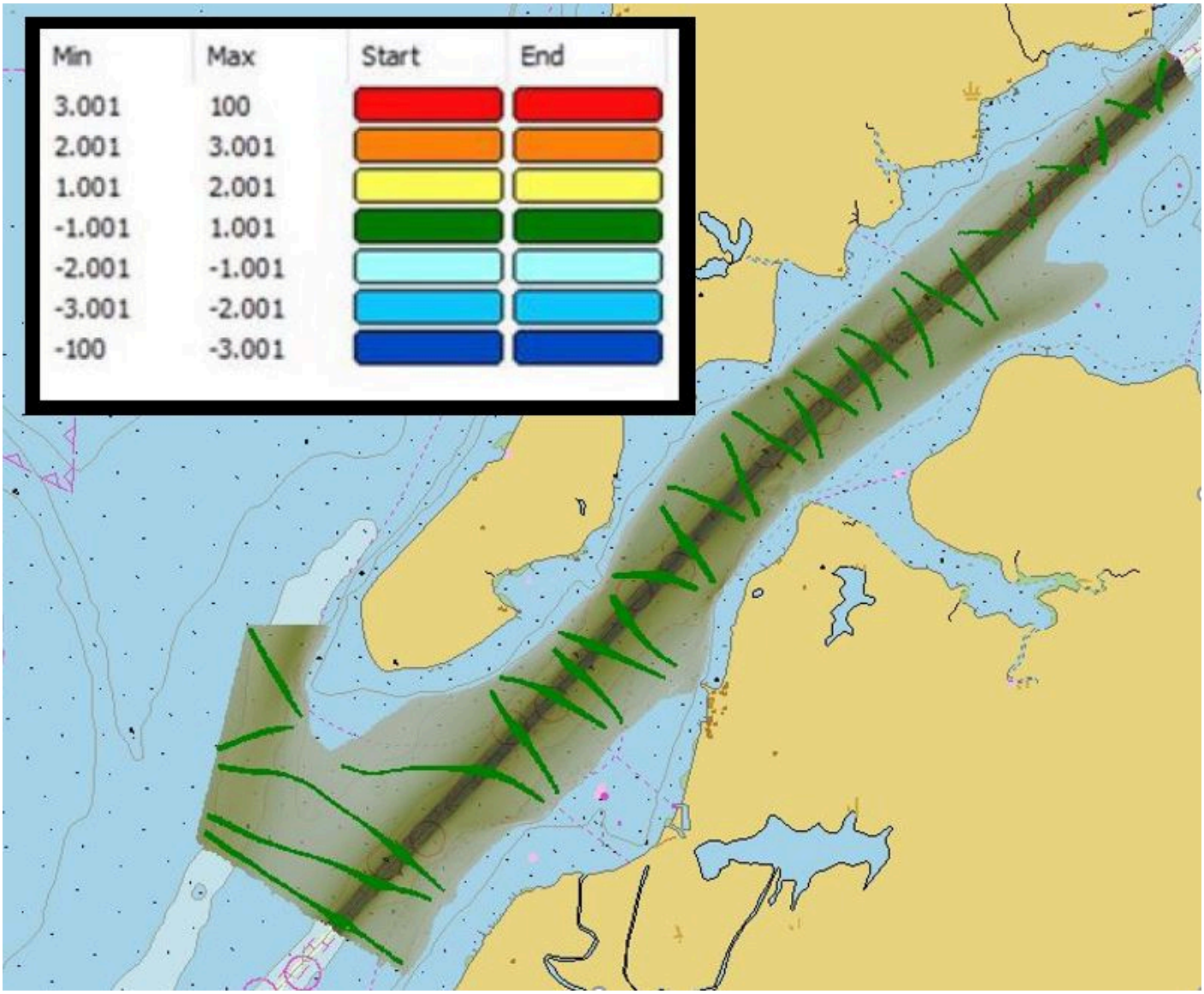
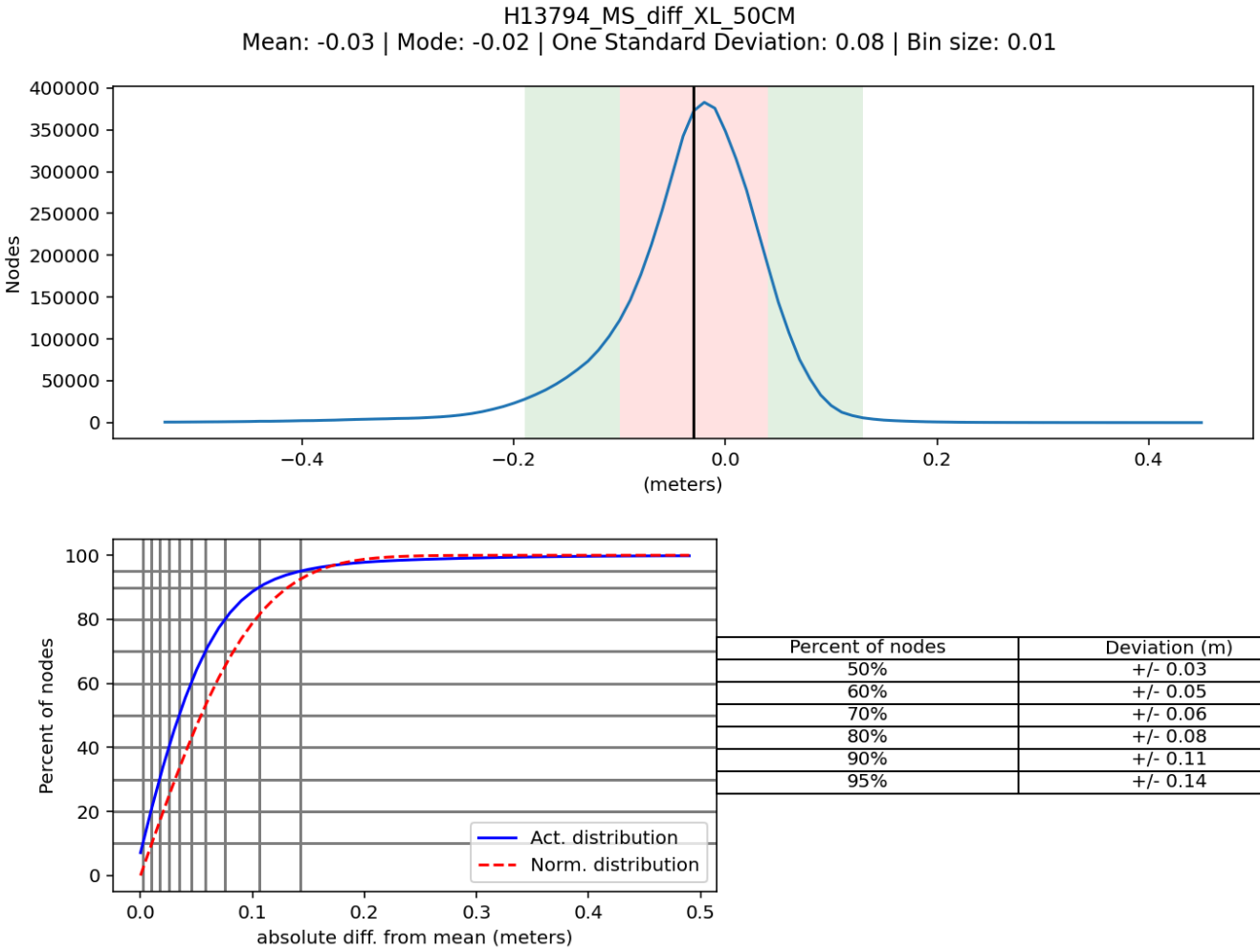


Figure 5: Depth differences between H13794 mainscheme (colored in olive) and H13794 crossline data.



Percent of nodes	Deviation (m)
50%	+/- 0.03
60%	+/- 0.05
70%	+/- 0.06
80%	+/- 0.08
90%	+/- 0.11
95%	+/- 0.14

Figure 6: H13794 mainscheme to crossline difference surface statistics.

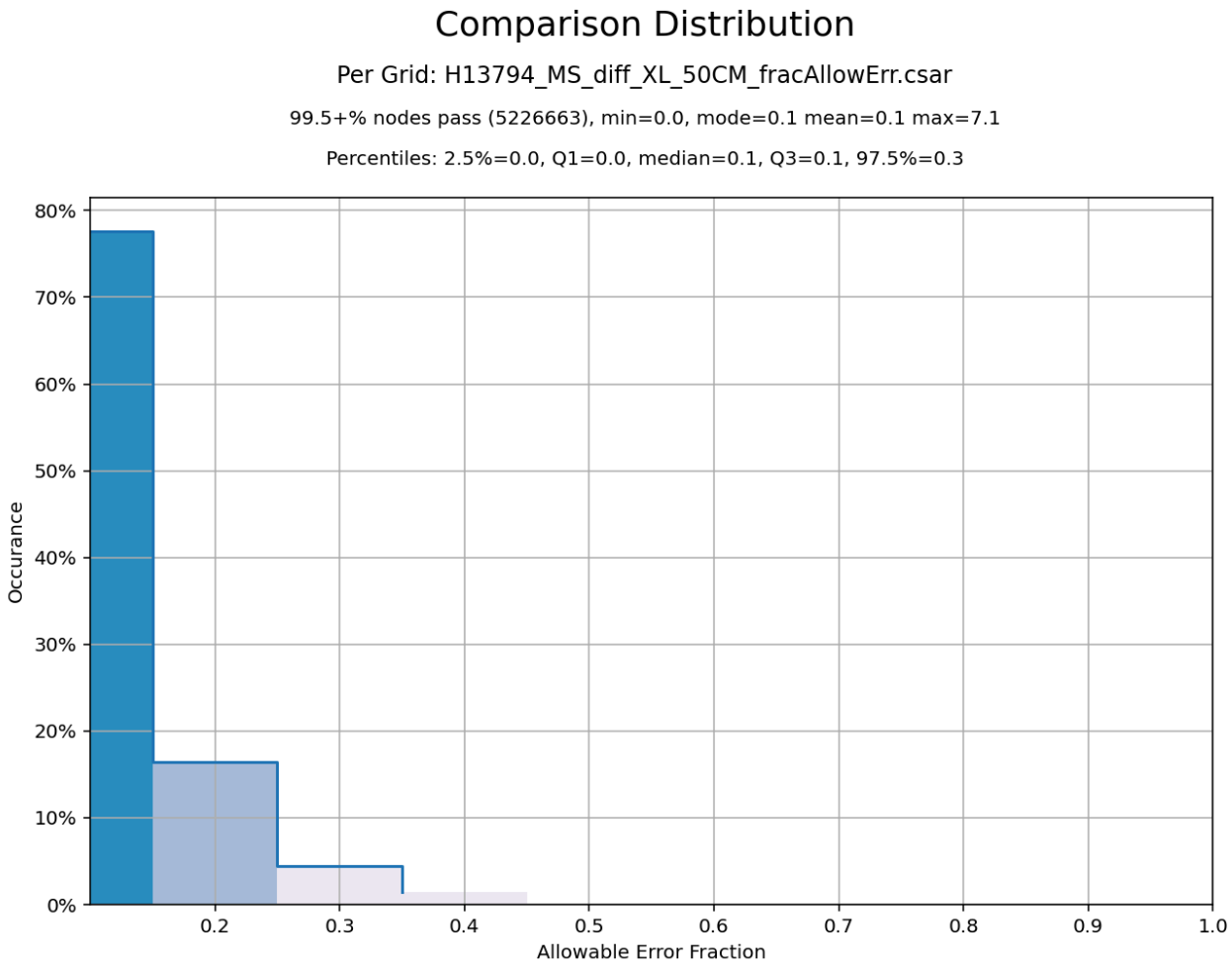


Figure 7: H13794 mainscheme to crossline difference NOAA allowable uncertainty statistics.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0.0 meters	0.09 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
S5401	2.0 meters/second	0.0 meters/second	0.0 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 H13794. Real-time uncertainties were provided via EM 2040 CH 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 junctions were assigned to this survey.

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 four hours during acquisition.

Casts were conducted more frequently in area where tidal shifts 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 a 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 SBET Issues

On day 124 (May 4th) some of the data presented a height offset associated with an SBET issue, see Figure 8. The reason for this issue was never determined, nor was an attempt made to fix the issue since it only affected three lines. The data was simply reacquire and the old data was flagged rejected, resolving the height offset.

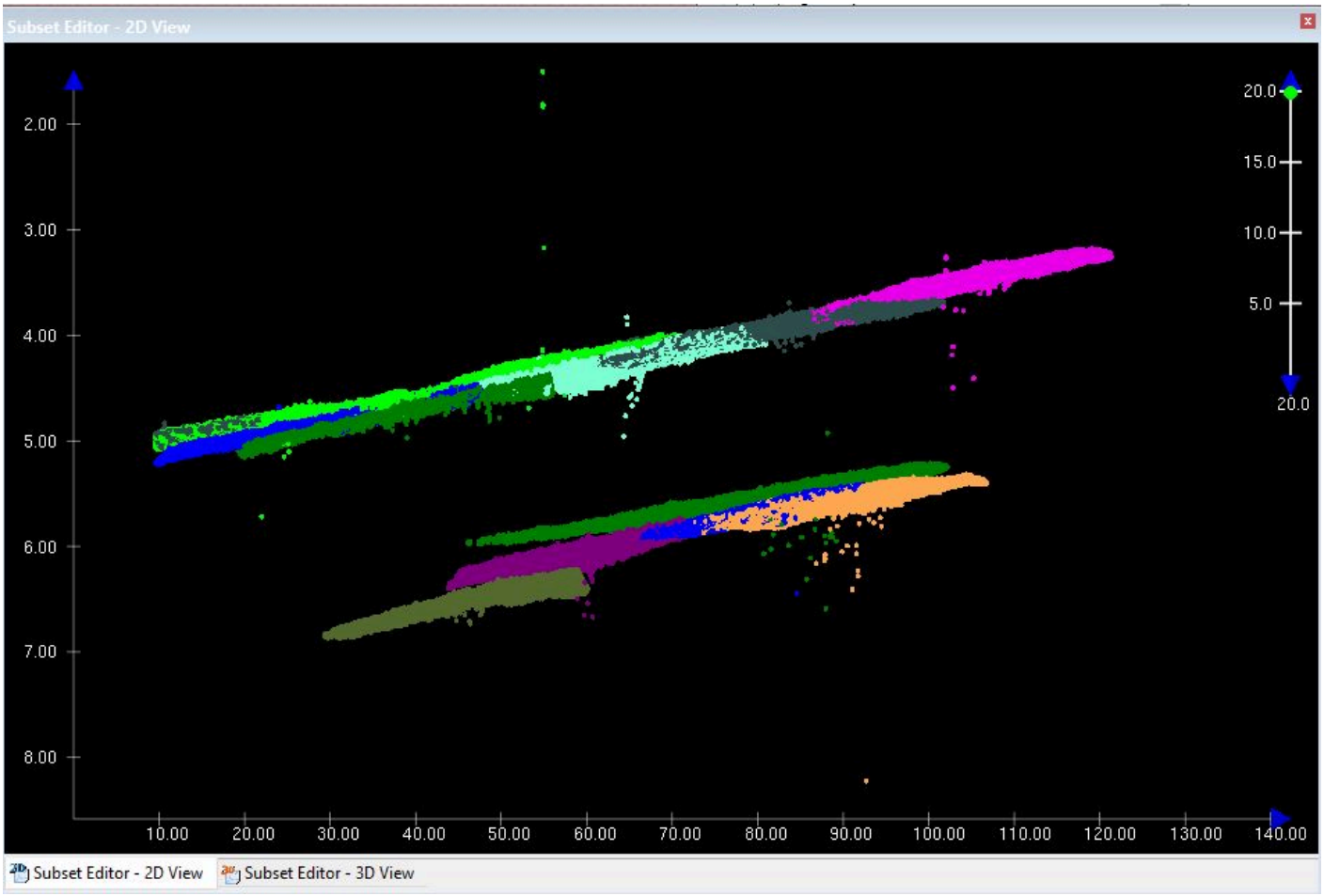


Figure 8: H13794 SBET issues.

B.2.10 Sound Speed Issues

On day 124 (May 4th) sound speed issues were seen in the data just off shore of the trailer park along the southeast edge of the survey area, see Figure 9. Casts were taken approximately every three hours during the entire survey, including this area, so the cause of this issue is not cast frequency. The issue could stem from an unseen or uncharted water runoff discharge pipe coming from the trailer park community; this community was the only congested group of houses or buildings along the shore of the entire survey area. The cause of the issue could have also been an unseen creek emptying into the river or it could be from an under water freshwater spring.

This issue was not discovered until BHII had left the area and in depth post processing had started. This issue was seen as frowning, see Figure 10. As a result, the hydrographer could only flag the outer edges of the swaths (the frowns) as rejected, and flag the near nadir region of the swath as accepted. This resulted in a vertical offset of approximately 0.1 to 0.2m and some holidays.

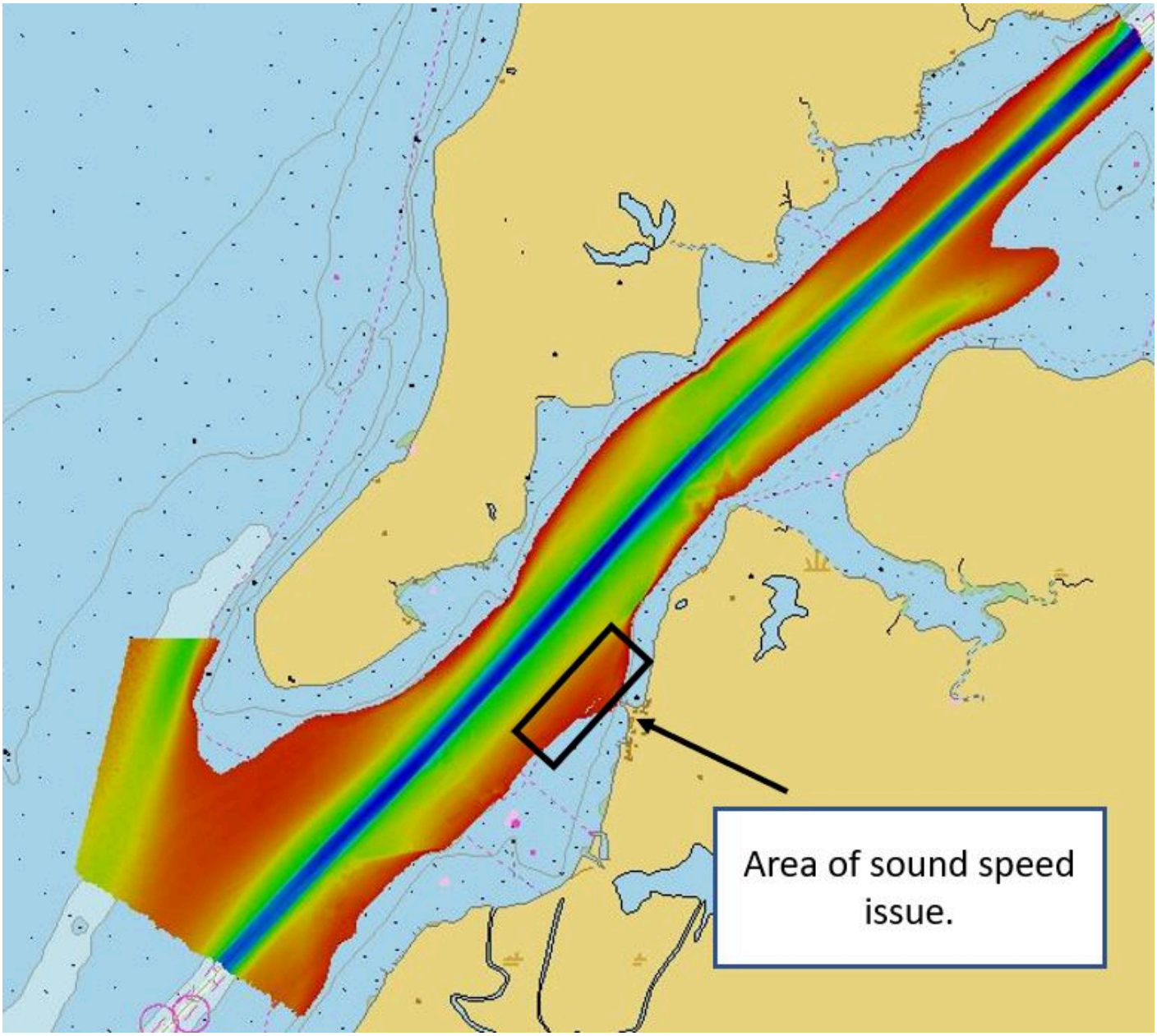


Figure 9: Area of H13794 survey encountering sound speed issues.

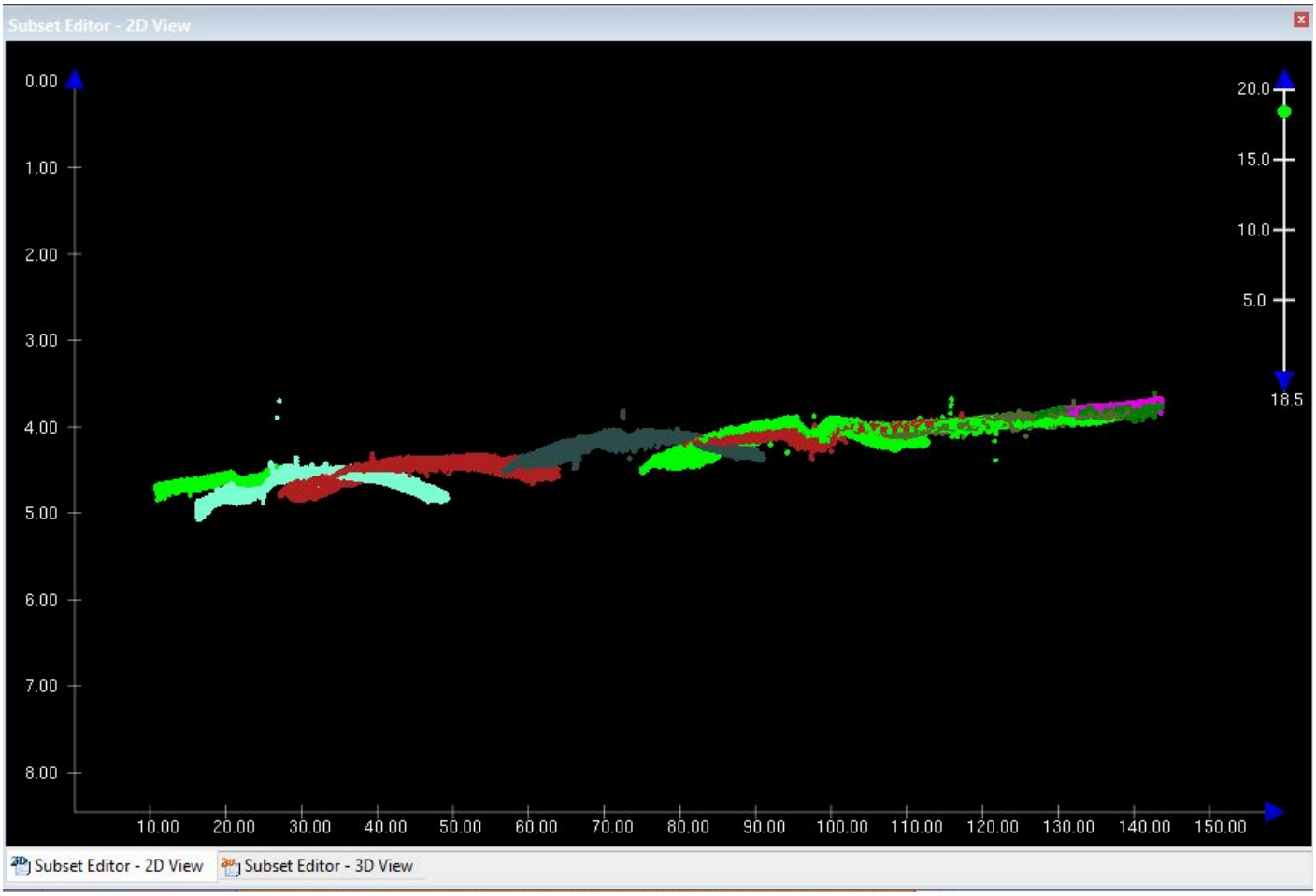


Figure 10: H13794 sound speed issue image.

B.2.11 Holidays

There are several holidays in the H13794 data, see Figure 11. In most cases, these holidays were the result of schools of fish and/or other marine life prohibiting the MBES from identifying the true seafloor, especially around bottom structure and gradients. Some were acoustic shadows associated with the sea floor's topography or non-reportable, small obstructions on the sea floor ; while others were the result of surface cleaning, especially in areas of SBET and sound speed issues.

Regardless of the cause, all holidays were examined in CARIS HIPS and SIPS, Subset Editor and determined not to degrade the confidence in the quality of the survey. These holidays do not limit the ability to adequately verify depths. See the H13794_Holiday.hob file in Appendices- II Supplemental_Records for the location of all of these gaps in coverage.

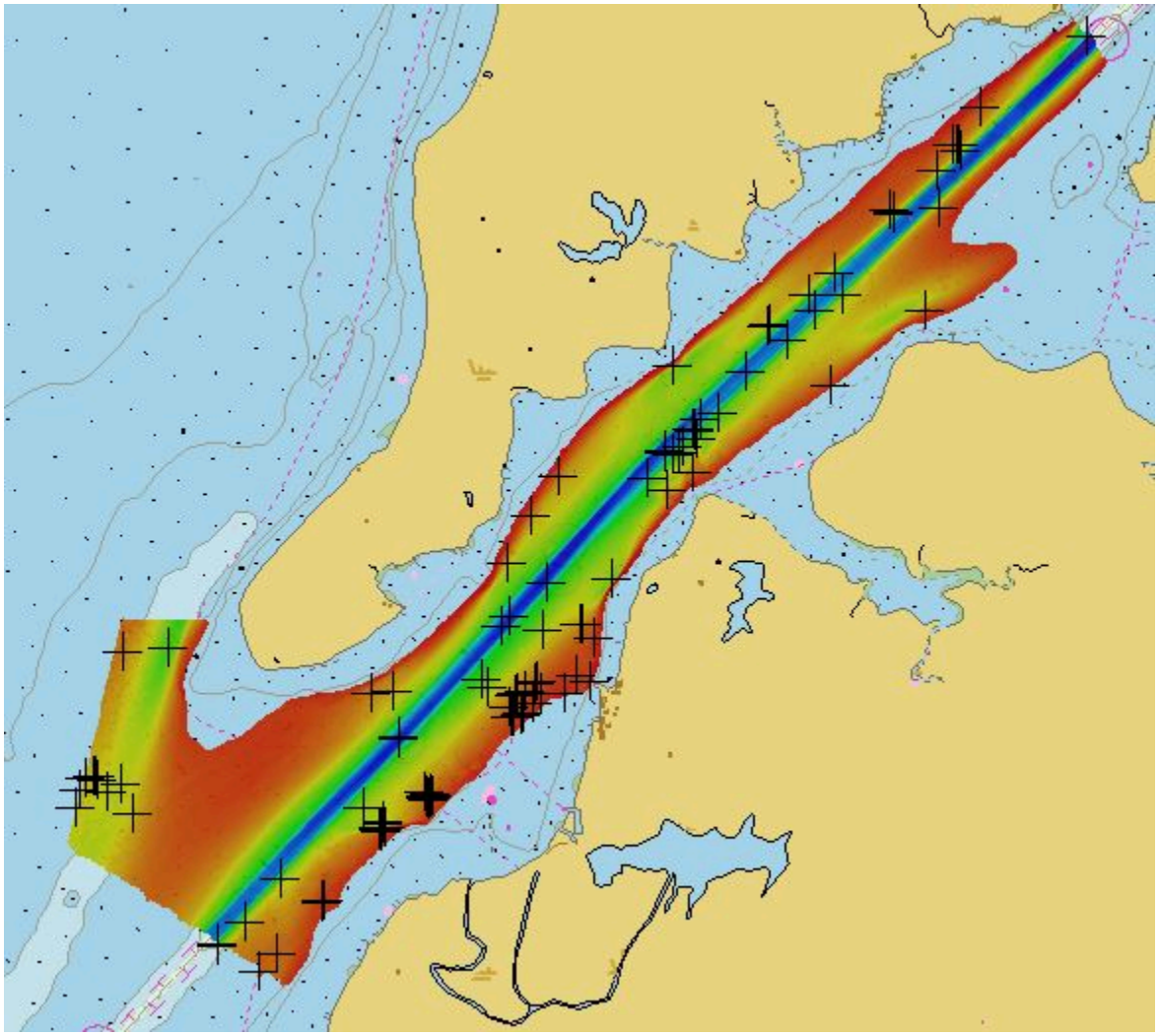


Figure 11: H13794 Holidays

B.2.12 NOAA Allowable Uncertainty

To verify that all data meet the accuracy specifications as stated in HSSD Section 5.1.3, the surface H13794_MB_50cm_MLLW was finalized. The finalized surface was then analyzed using Pydro's QC Tool, Grid QC. Figure 12 shows a graphical overview of the NOAA Allowable Uncertainty layer for the surface and corresponding statistics for the surface. Overall, over 99.5% of nodes from the surface meet or exceed NOAA Allowable Uncertainty specifications for H13794.

Uncertainty was the source used during the Caris surface finalization process.

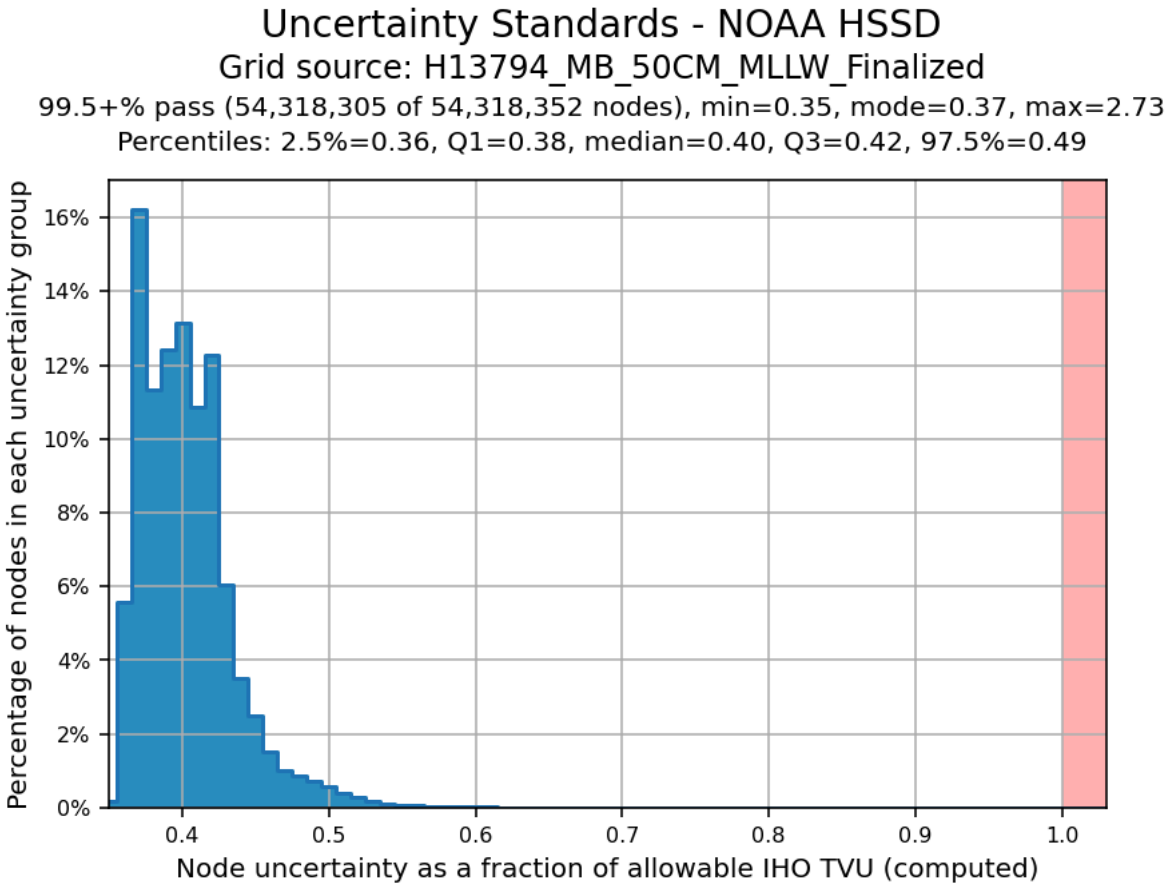


Figure 12: H13794 Allowable Uncertainty graph indicating that over 99.5% of soundings met NOAA Allowable Uncertainty.

B.2.13 Density

The H13794 finalized surface was analyzed using the Pydro QC Tools Grid QC feature and the results are shown in Figure 13. Density requirements for H13794 were achieved with at least 99.5% of finalized surface nodes containing five or more soundings as required by HSSD Section 5.2.2.2. The few nodes that did not meet density requirements are due to sparse data in the outer beams, especially near steep slopes, and at the edges of the survey limits.

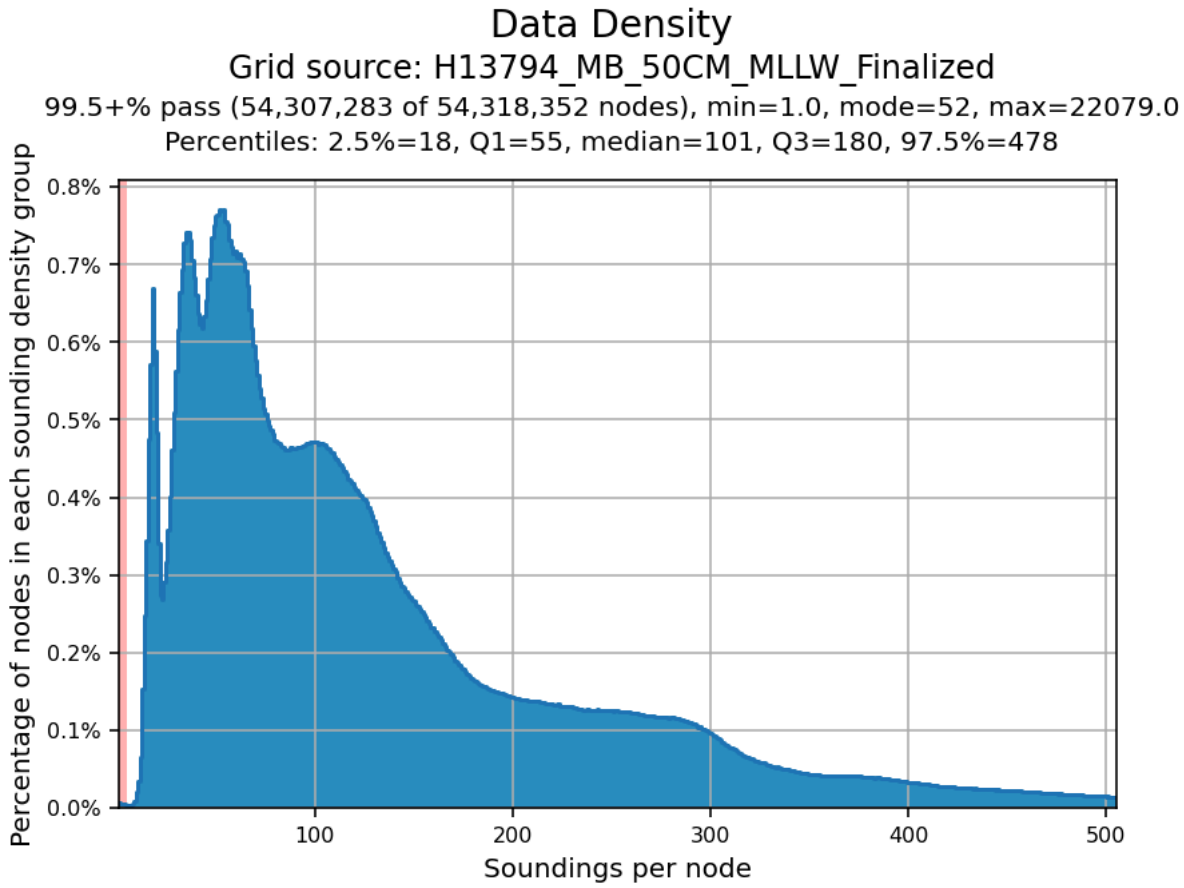


Figure 13: H13794 Density graph indicating that over 99.5% of soundings met NOAA density requirements.

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. Kongsberg EM2040C stores the raw backscatter data in the .all file. All backscatter data were processed to GSF files and a mosaic was created by the field unit via QPS FMGT Version 7.10.2. See Figure 14 for a greyscale representation of the complete backscatter mosaic overlaid onto US5BALFJ, US5BALFI, US5BALEI, and US5BALEJ.

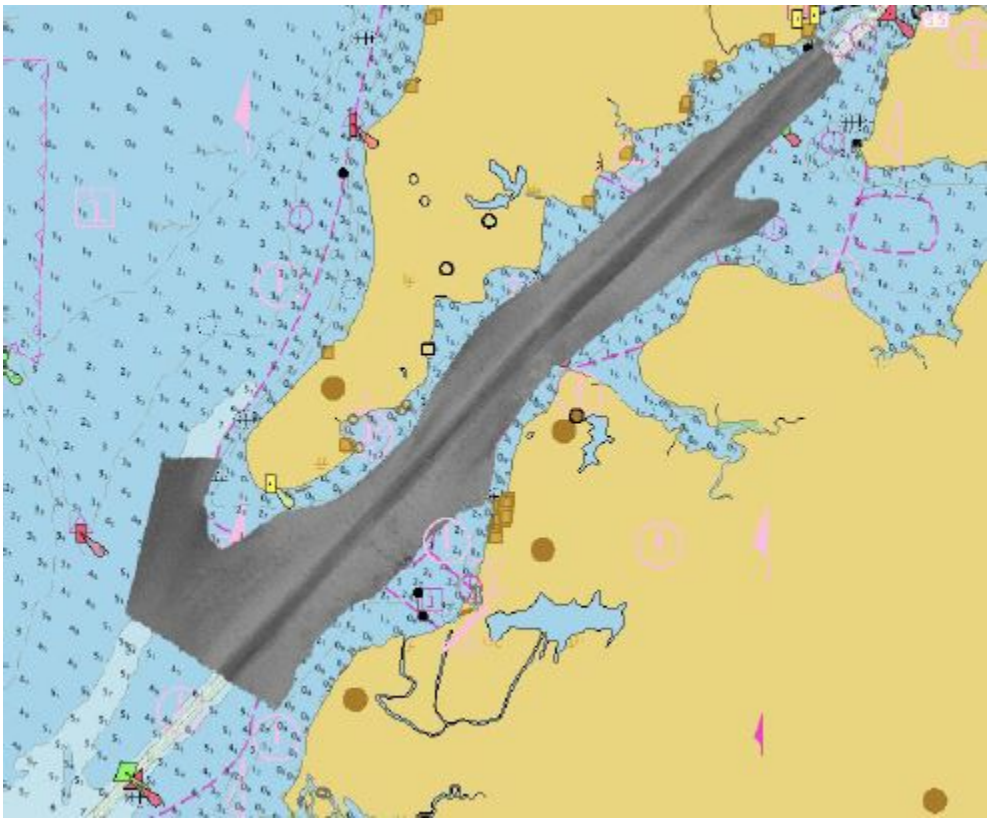


Figure 14: H13794 backscatter mosaic in greyscale

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	11.3.25
CARIS	BASE Editor	5.5.14

Table 9: Primary bathymetric data processing software

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

Manufacturer	Name	Version
QPS	Fledermaus	7.10.2

Table 10: Primary imagery data processing software

The following Feature Object Catalog was used: NOAA Profile Version 2023.

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
H13794_MB_50cm_MLLW.csar	CARIS Raster Surface (CUBE)	0.5 meters	1.9 meters - 14.1 meters	NOAA_0.5m	Object Detection
H13794_MB_50cm_MLLW_Final.csar	CARIS Raster Surface (CUBE)	0.5 meters	1.9 meters - 14.1 meters	NOAA_0.5m	Object Detection

Table 11: Submitted Surfaces

The NOAA CUBE parameters defined in the HSSD were used for the creation of all CUBE surfaces in Survey H13794. 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 3.10.3, part of the QC Tools package within Pydro, was used to assist the search for spurious

soundings following gross cleaning. Flier Finder was run multiple times for the surface, reducing the flier height value for each consecutive run. This allowed Flier Finder to accurately and quickly identify gross fliers, but as the flier height was reduced the effectiveness of the tool diminished. With smaller heights, Flier Finder began to incorrectly flag dynamic aspects of the seafloor such as steep drop offs resulting in hundreds of false positives. At this point, the hydrographer ceased using the tool and returned to manual cleaning for these dynamic regions of the seafloor.

C. Vertical and Horizontal Control

Additional information discussing the vertical or horizontal control for this survey can be found in the accompanying HVCR.

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-E915_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 H13794 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

Vessel kinematic data were post-processed using Applanix POSPac processing software and Smart Base Positioning methods using Charlene as 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 H13794 POSPAC Processing Logs located in the Separates folder.

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
Baltimore County Towson, MD	BACO
Delaware State U Dover, DE	DEDO
Univ of Delaware Newark, DE	DENE
Loyola F Annapolis, MD	LOYF
Loyola R Perryville, MD	LOYR
Coatesville, PA	PACO

Table 13: CORS Base Stations

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

The original PIs indicated that two ENCs (US5BALFJ and US5MD14M) covered survey H13794, and before BHII started the survey these two ENCs were available. However, during post processing, ENC US5MD14M was discontinued and replaced with multiple ENCs with a smaller geographical size. Therefore, the PIs were amended to delete ENC US5MD14M from the chart comparison requirements and replaced with ENCs US5BALEI, US5BALEJ and US5BALFI. Due to ENC US5BALEJ's overlap with the survey area being inside of the NALL, no data was collected that would affect this ENC, see Figure 15.

ENCs US5BALFJ, US5BALEI, and US5BALFI were TINed using the TINing tool in CARIS Base Editor 5.5.14, interpolated, and then Warped using the same program's Warping Tool. The depths from these three Warped and Tined ENC surfaces were then compared with the depths found in the H13794_MB_50cm_MLLW.csar surface from this survey, and a difference surface was made for each comparison to identify any areas of the surveyed area that deviate from the charted ENC soundings, see Figure 16.

In general, surveyed soundings outside of the channel agree with the majority of ENC charted depths, with some areas being deeper than charted. However, the channel that runs down the center of the survey area has recently been dredged in collaboration with US Army Corp of Engineers and therefore have significantly deeper than charted depths. Coast Pilot 3 (Atlantic Coast: Sandy Hook, NJ to Cape Henry, VA) indicates that the channel has a controlling depth of 35 feet (10.67m) between the Delaware Capes (Northeast of the surveyed area) and Baltimore (southwest of the surveyed area) via the Chesapeake and Delaware Canal for which this survey partially covers. This channel showed the largest difference between the ENCs and the survey data due to the recent dredging.

All data from H13518 should supersede charted data. A full discussion of the disagreements follows below.

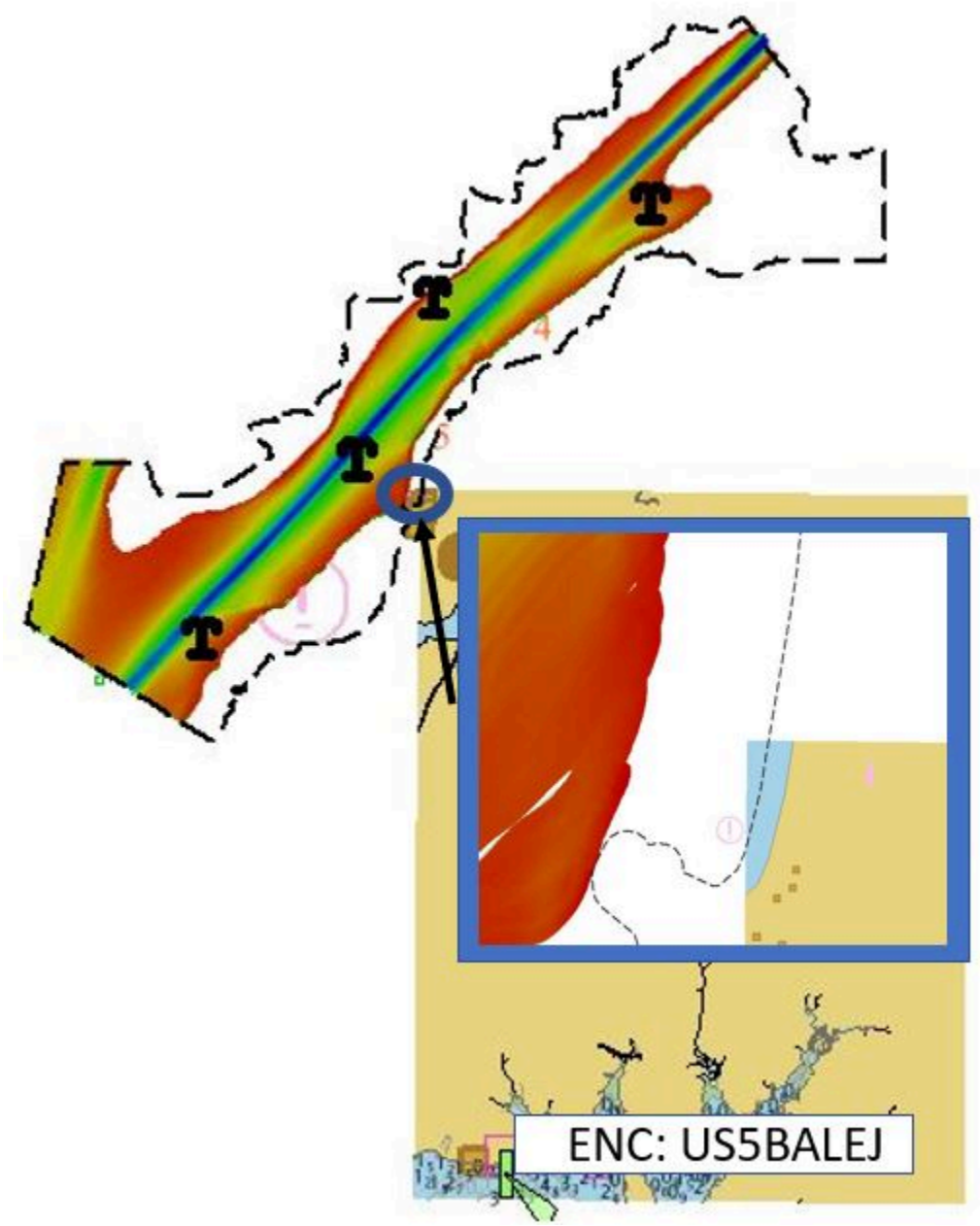


Figure 15: H13794's overlap onto ENC US5BALEJ

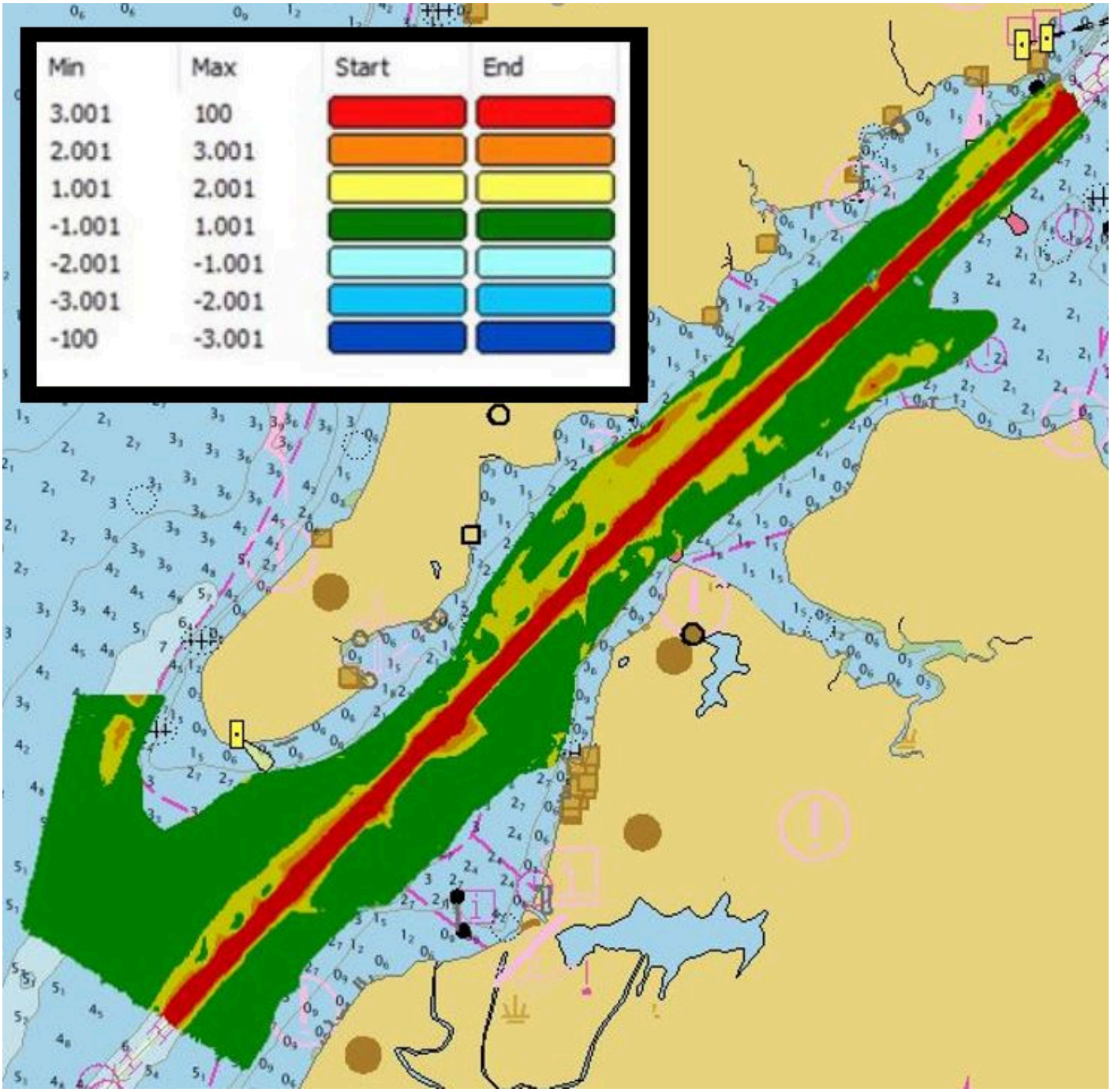


Figure 16: H13794 to ENCs difference surfaces overlaid onto ENC US

Sounding from H13749 are in a general agreement with charted depths on ENC US5BALEI, with most of the depths outside of the channel agreeing to 1 meter with the survey data being deeper than the charted depths on the ENC (See Figure 17).

A contour layer was created in CARIS Hips & Sips 11.4.25 using the program's contouring tool, see Figure 18. A three meter, six meter, nine meter, and twelve meter contour were created from the surface:

H13794_MB_50cm_MLLW_Finalized. Contours derived from H13794 are in general agreement with charted contours indicated on ENC US5BALEI.

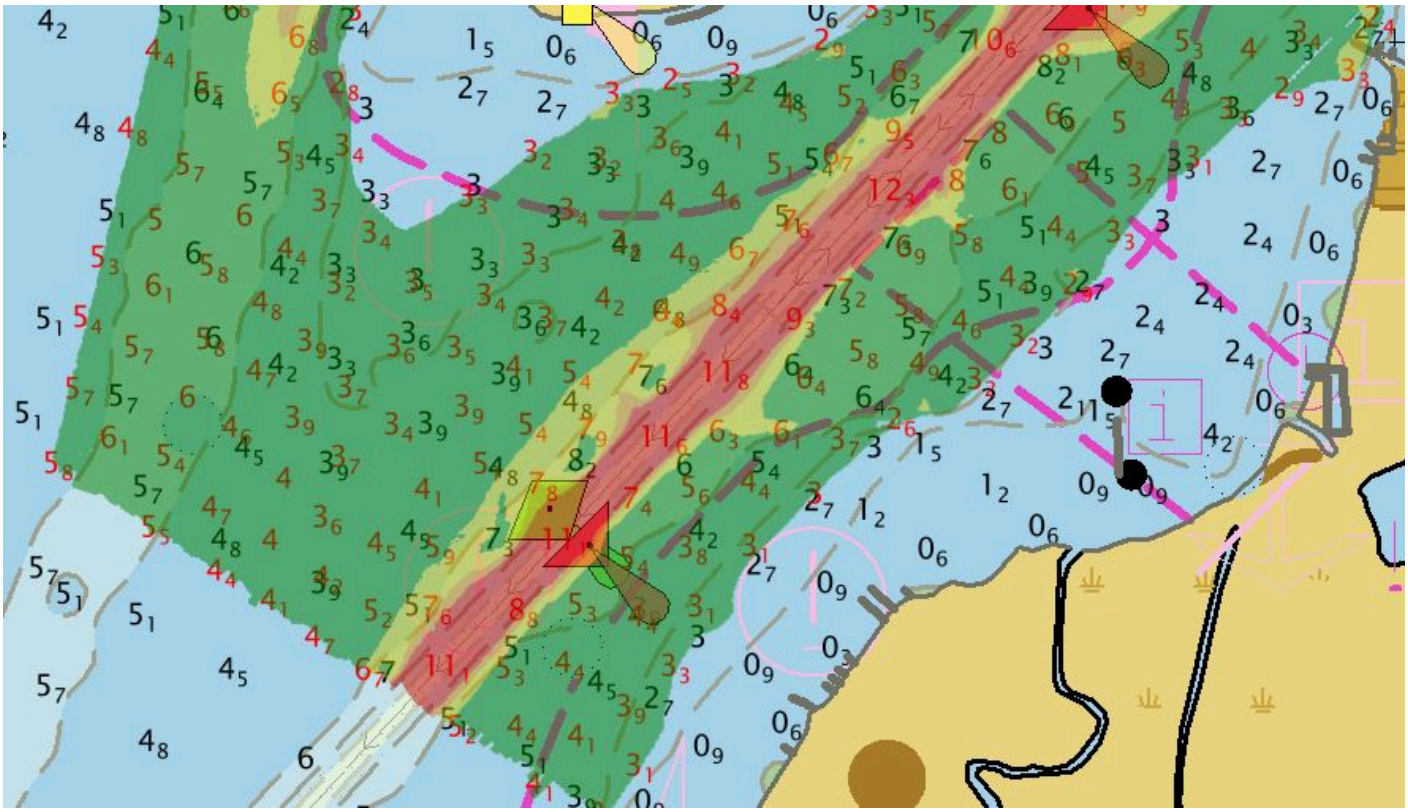


Figure 17: H13794 survey data differences with US5BALEI in green, yellow, and red; with H13794 survey depths in red and ENC US5BALEI charted depths in black.

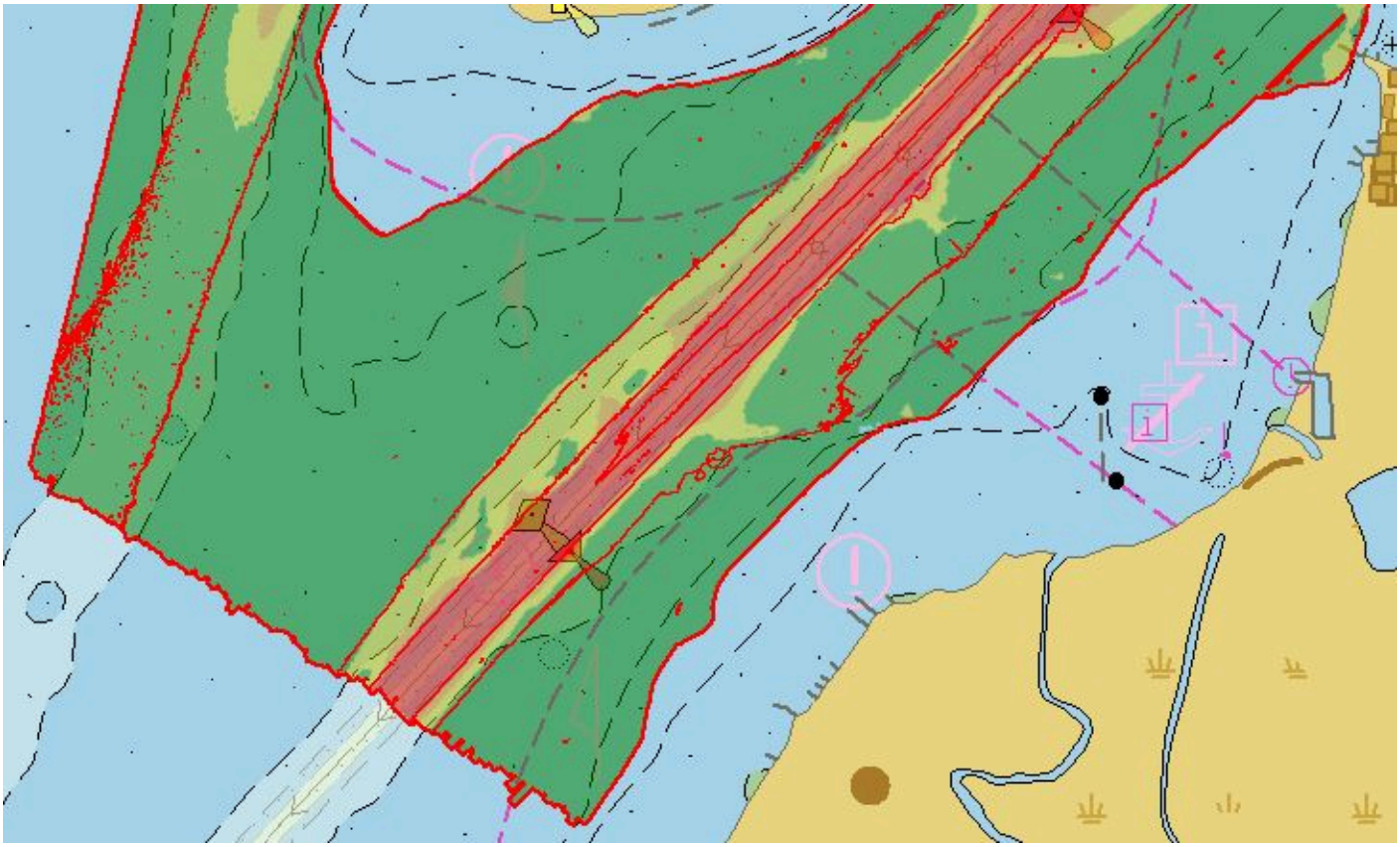


Figure 18: H13794 contour difference with ENC US5BALEI, with H13794 contours in red and ENC contours in black.

Sounding from H13749 are in a general agreement with charted depths on ENC US5BALFI, with most of the depths outside of the channel agreeing to 1 meter with the survey data being deeper than the charted depths on the ENC (See Figure 19).

A contour layer was created in CARIS Hips & Sips 11.4.25 using the program's contouring tool, see Figure 20. A three meter, six meter, nine meter, and twelve meter contour were created from the surface: H13794_MB_50cm_MLLW_Finalized. On the east side of the charted channel, contours derived from H13794 are in a general agreement with charted contours indicated on ENC US5BALFI. However, the H13794 derived contours on the west side of the channel indicate that they are shifting westward toward Turkey Point.

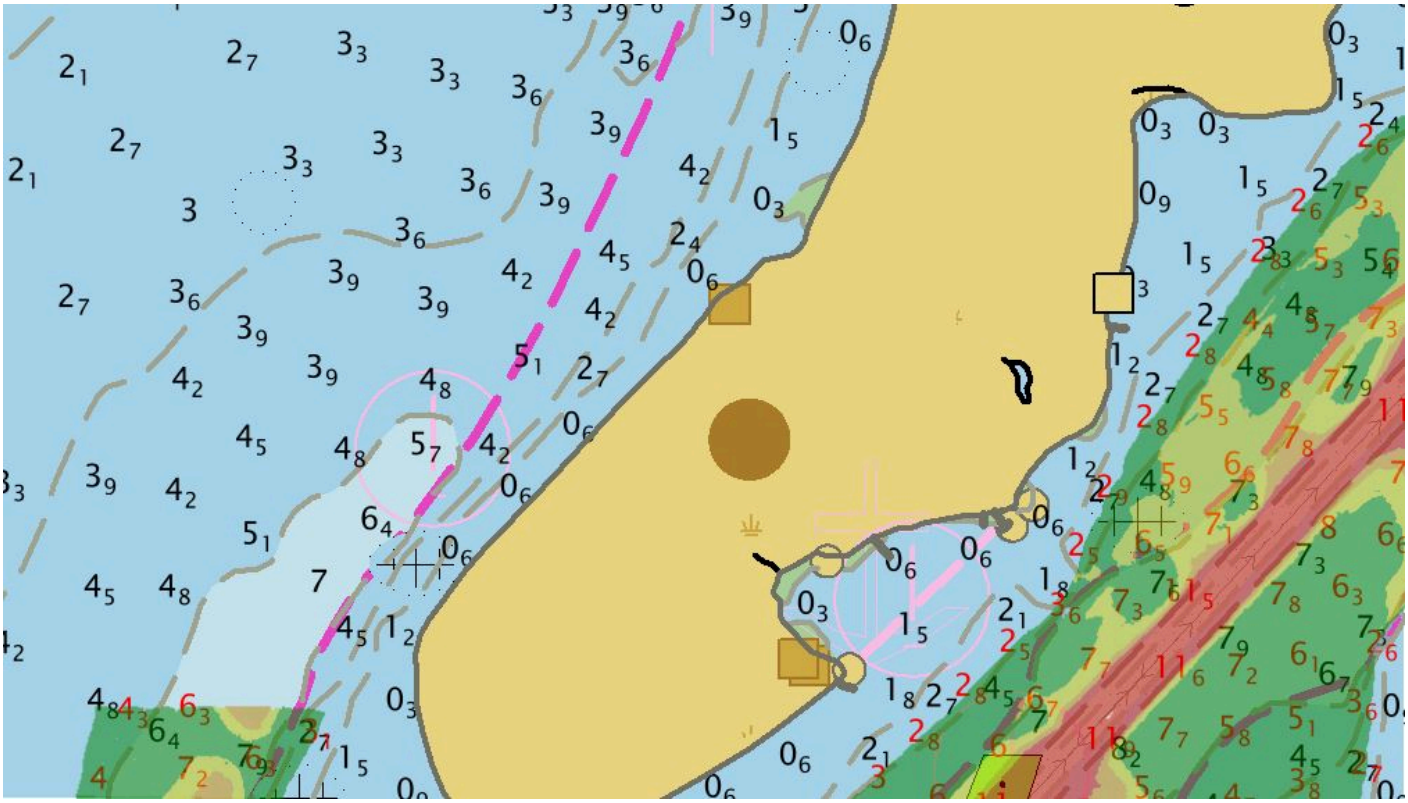


Figure 19: H13794 survey data differences with US5BALFI in green, yellow, and red; with H13794 survey depths in red and ENC US5BALFI charted depths in black.

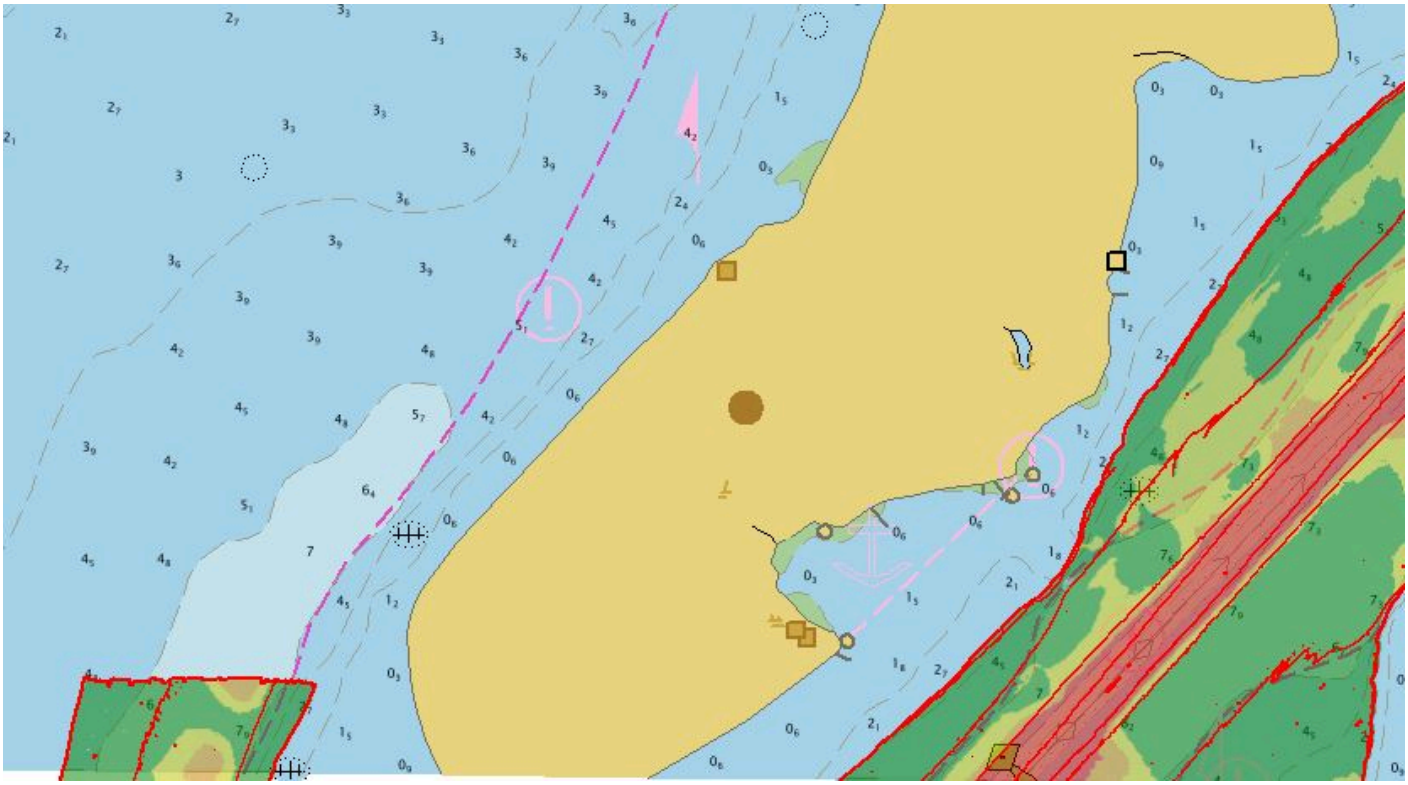


Figure 20: H13794 contour difference with ENC US5BALFI, with H13794 contours in red and ENC contours in black.

Sounding from H13749 are in a general agreement with charted depths on ENC US5BALFJ, with most of the depths outside of the channel agreeing to 1 meter with the survey data being deeper than the charted depths on the ENC (See Figure 21).

A contour layer was created in CARIS Hips & Sips 11.4.25 using the program's contouring tool, see Figure 22. A three meter, six meter, nine meter, and twelve meter contour were created from the surface: H13794_MB_50cm_MLLW_Finalized. Contours derived from H13794 are in general agreement with charted contours indicated on ENC US5BALFJ.

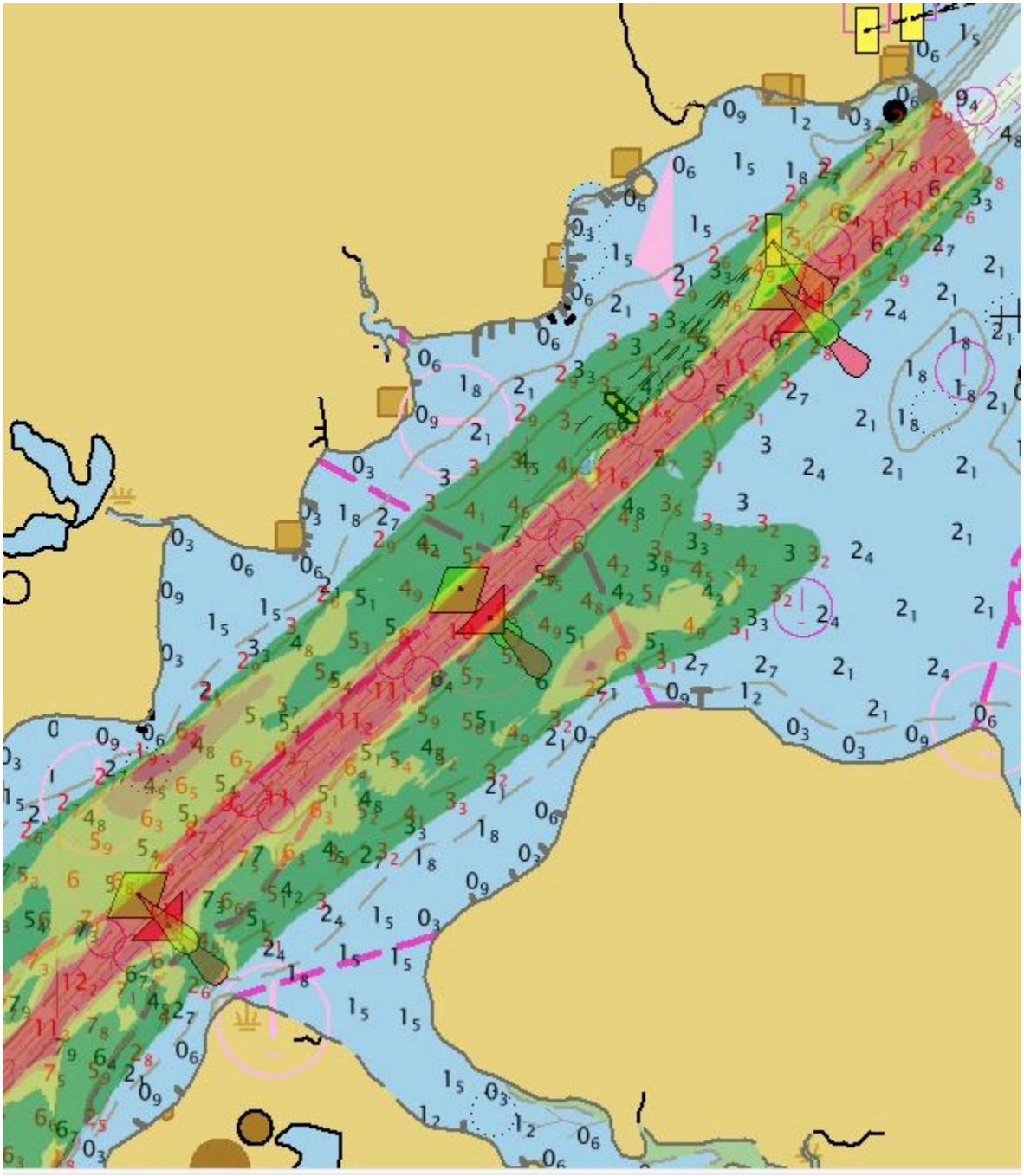


Figure 21: H13794 survey data differences with US5BALFJ in green, yellow, and red; with H13794 survey depths in red and ENC US5BALFI charted depths in black.

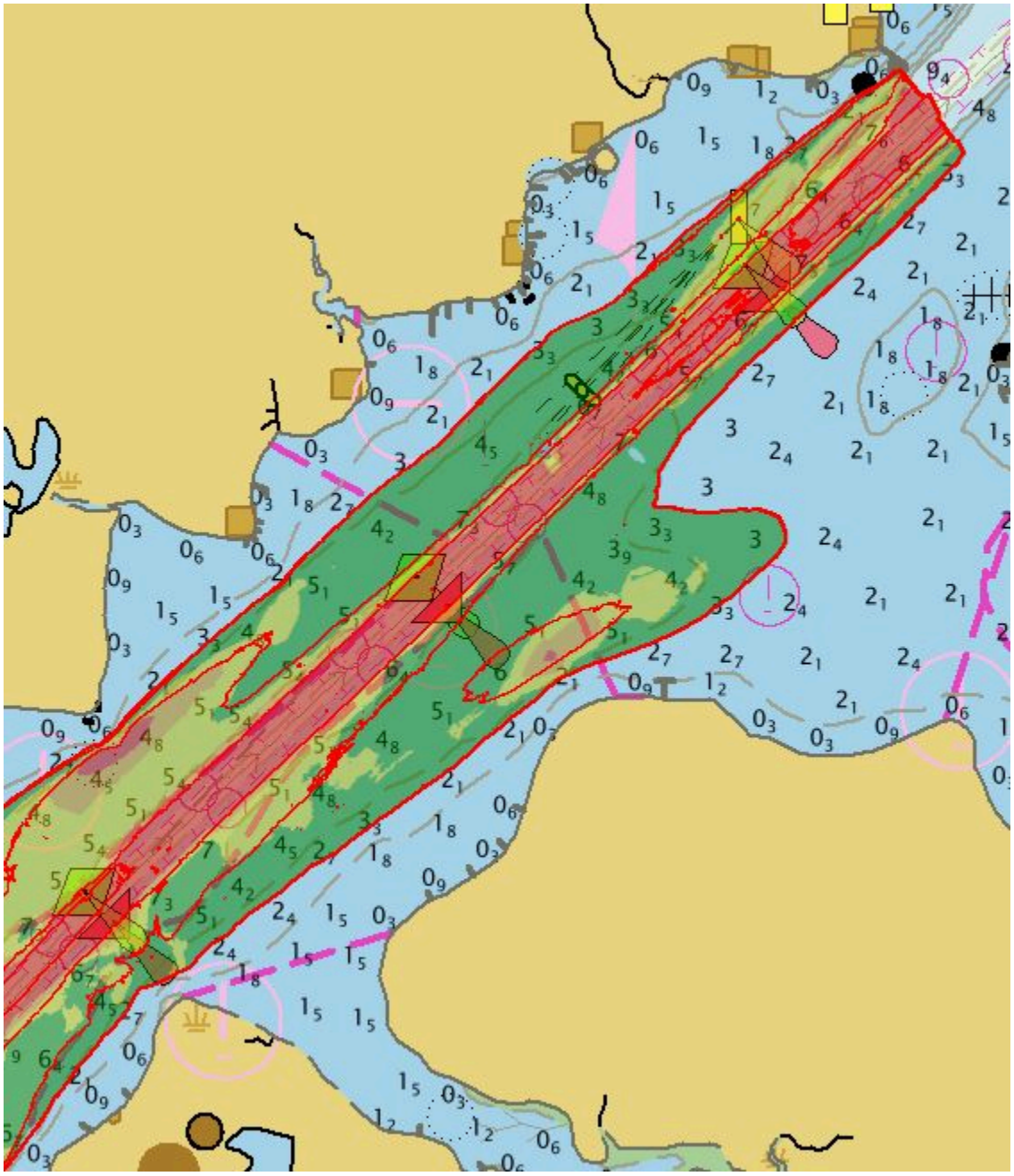


Figure 22: H13794 contour difference with ENC US5BALFJ, with H13794 contours in red and ENC contours in black.

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
US5BAlFJ	1:10000	3	06/15/2022	06/15/2022
US5BALEI	1:10000	1	05/30/2023	05/30/2023
US5BALFI	1:10000	1	05/30/2023	05/30/2023
US5BALEJ	1:20000	1	05/30/2023	05/30/2023

Table 14: 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

There are multiple features assigned to H13794, eight of which were Unverified Charted features; see the Final Feature File (H13794_FFF.000) for descriptions, remarks, and recommendations.

D.1.4 Uncharted Features

Four, non-dangerous, uncharted features were found during this survey, see Figure 23. Descriptions, remarks, and recommendations for these uncharted features can be found in the Final Feature File (H13794_FFF.000)

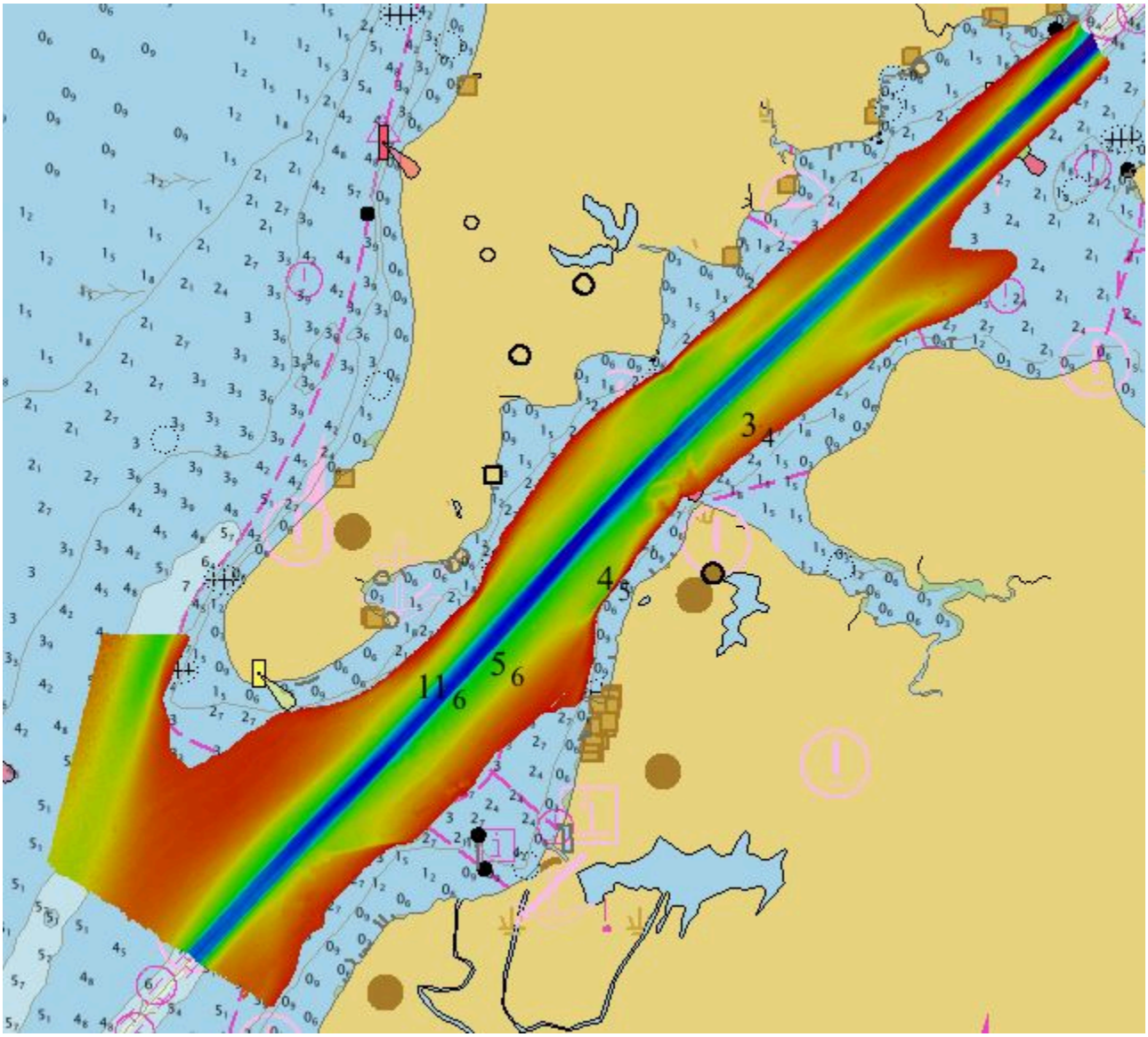


Figure 23: H13794 Uncharted Features locations.

D.1.5 Channels

One US Army Corp of Engineers maintained channel runs through the center of H13794 from the northern end of Chesapeake Bay at the southwest end of the survey to the Chesapeake & Delaware Canal north east of the survey. Descriptions, remarks, and recommendations for these uncharted features can be found in the Final Feature File (H13794_FFF.000)

D.2 Additional Results

D.2.1 Aids to Navigation

ATONS were investigated to the best of the field unit's ability to determine proper placement and to confirm they are serving their intended purpose, see the Final Feature File (H13794_FFF.000) for more details.

D.2.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.2.3 Bottom Samples

Four bottom samples were collected in conjunction with H13794, see Figure 24 for sample position. see H13794. A detailed description, remarks, and recommendations for each bottom sample can be found in the Final Feature File, H13794_FFF.000.

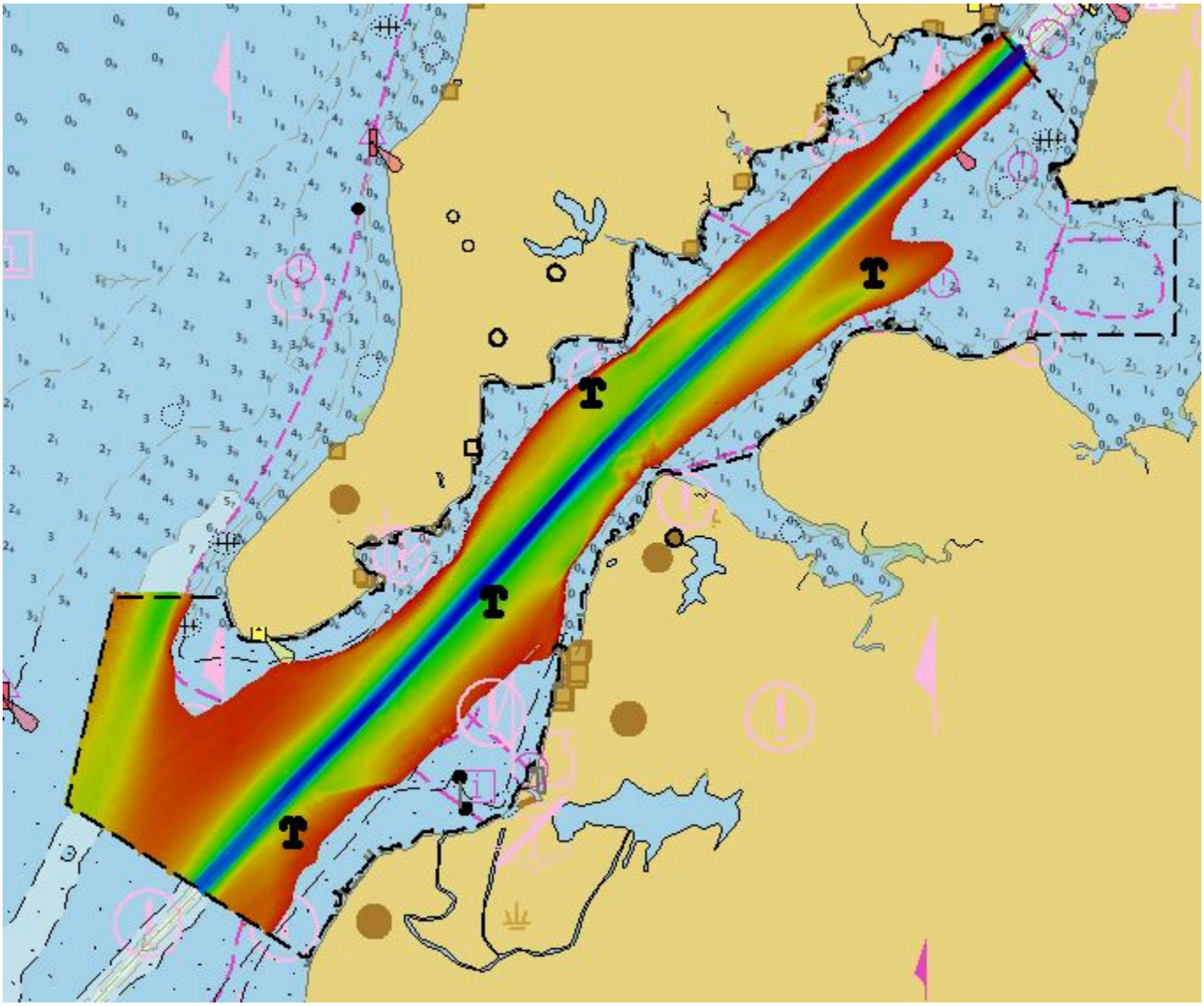


Figure 24: H13794 bottom sample locations, as indicated by a black letter "T"

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

There is currently a charted Pipeline Area on the southeast edge of the survey, near White Chrystal Beach approximately 1800m northeast of he southern edge of the survey area, that extends from shore to approximately 1425m off shore. This area was not assigned as a feature in H13794. However, it is was categorized as "For Info Only." This pipeline was found in the surface, extending from 39-26-28.5481N

by 75-59-27.4603W on the shoreward side, out to 39-26-34.7650N by 75-59-36.0953W on the offshore side; see Figure 25. This pipeline has no significant height off the seafloor and was not addressed in H13794_FFF.000.

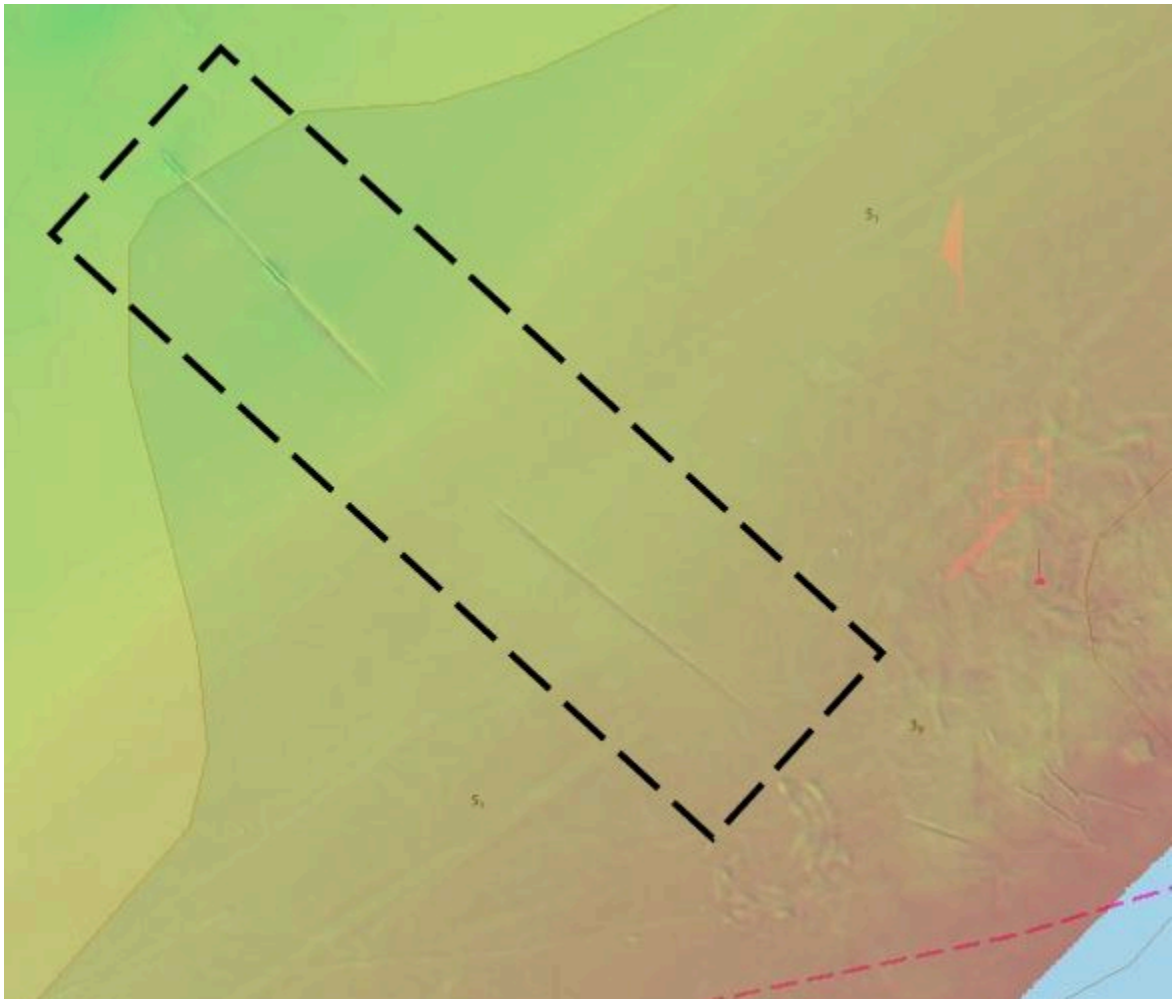


Figure 25: H13794 submerged pipeline offshore of White Chrystal Beach, along the southeast edge, approximately 1800m northeast of the southern edge of the survey area.

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 Jane Saunders	Chief of Party	11/17/2023	SAUNDERS.JANE.DEVEREAUX.1087825414 Digitally signed by SAUNDERS.JANE.DEVEREAUX.1087825414 Date: 2023.11.20 12:24:51 -05'00'
Robert W. Mowery	Sheet Manager	11/17/2023	MOWERY.ROBERT.WILLIAM.1379754488 Digitally signed by MOWERY.ROBERT.WILLIAM.1379754488 Date: 2023.11.20 12:47:48 -05'00'

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