

H13780

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

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: H13780

LOCALITY

State(s): Georgia

General Locality: Georgia Coast

Sub-locality: Savannah River and Delegal Creek

2023

CHIEF OF PARTY
James Kirkpatrick

LIBRARY & ARCHIVES

Date:

HYDROGRAPHIC TITLE SHEET

H13780

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): **Georgia**

General Locality: **Georgia Coast**

Sub-Locality: **Savannah River and Delegal Creek**

Scale: **10000**

Dates of Survey: **03/13/2023 to 03/16/2023**

Instructions Dated: **02/27/2023**

Project Number: **S-G924-NRTFB-23**

Field Unit: **NOAA Navigation Response Team - Fernandina**

Chief of Party: **James Kirkpatrick**

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 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.

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Descriptive Report to Accompany Survey H13780

Project: S-G924-NRTFB-23

Locality: Georgia Coast

Sublocality: Savannah River and Delegal Creek

Scale: 1:10000

March 2023 - March 2023

NOAA Navigation Response Team - Fernandina

Chief of Party: James Kirkpatrick

A. Area Surveyed

Survey H13780, located in the Savannah River and Delegal Creek, Georgia.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
32° 8' 6.72" N 81° 8' 34.04" W	31° 51' 49.87" N 81° 2' 53.05" W

Table 1: Survey Limits

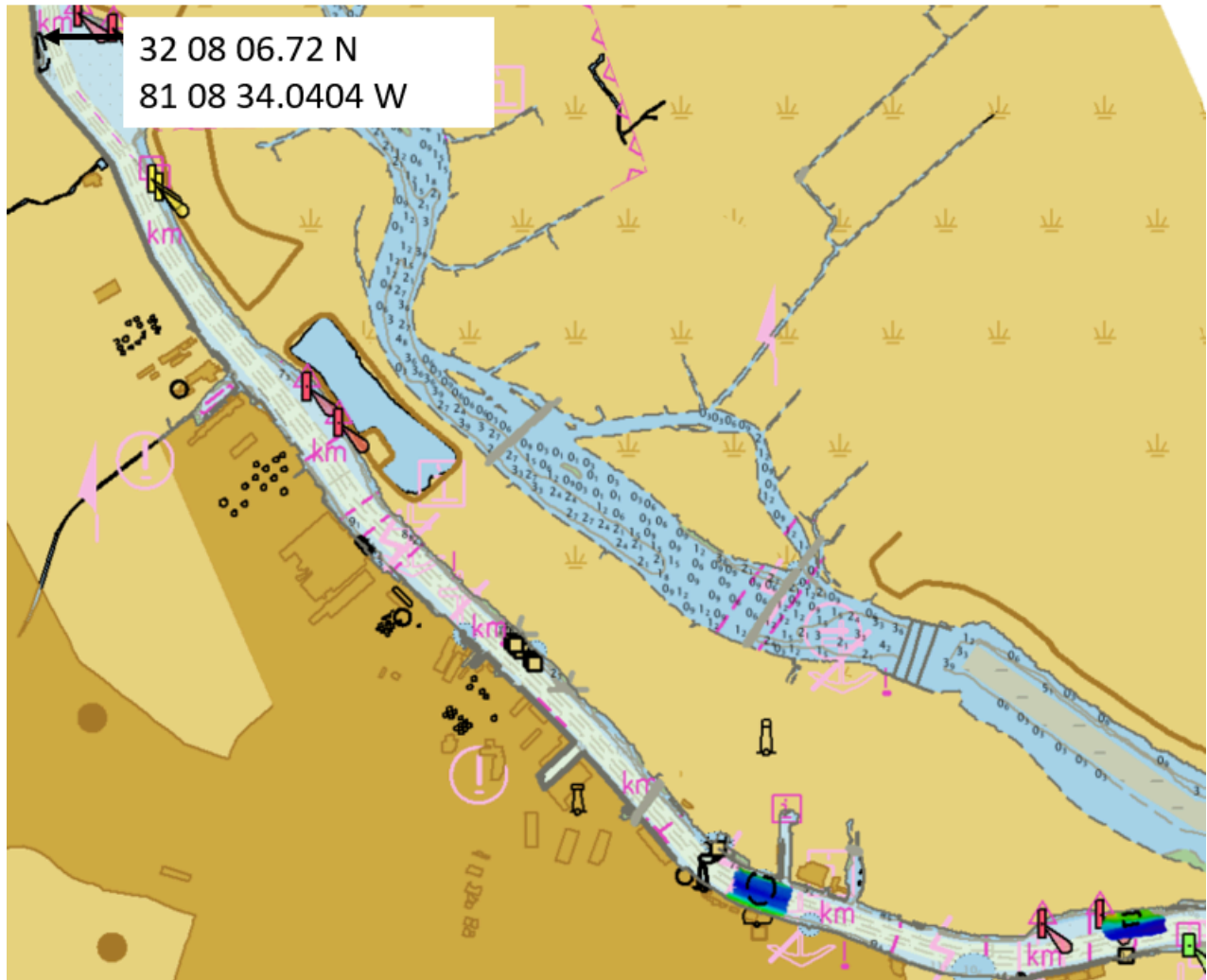


Figure 1: Survey layout in Savannah River, plotted over ENC US5GA22M with multibeam coverage

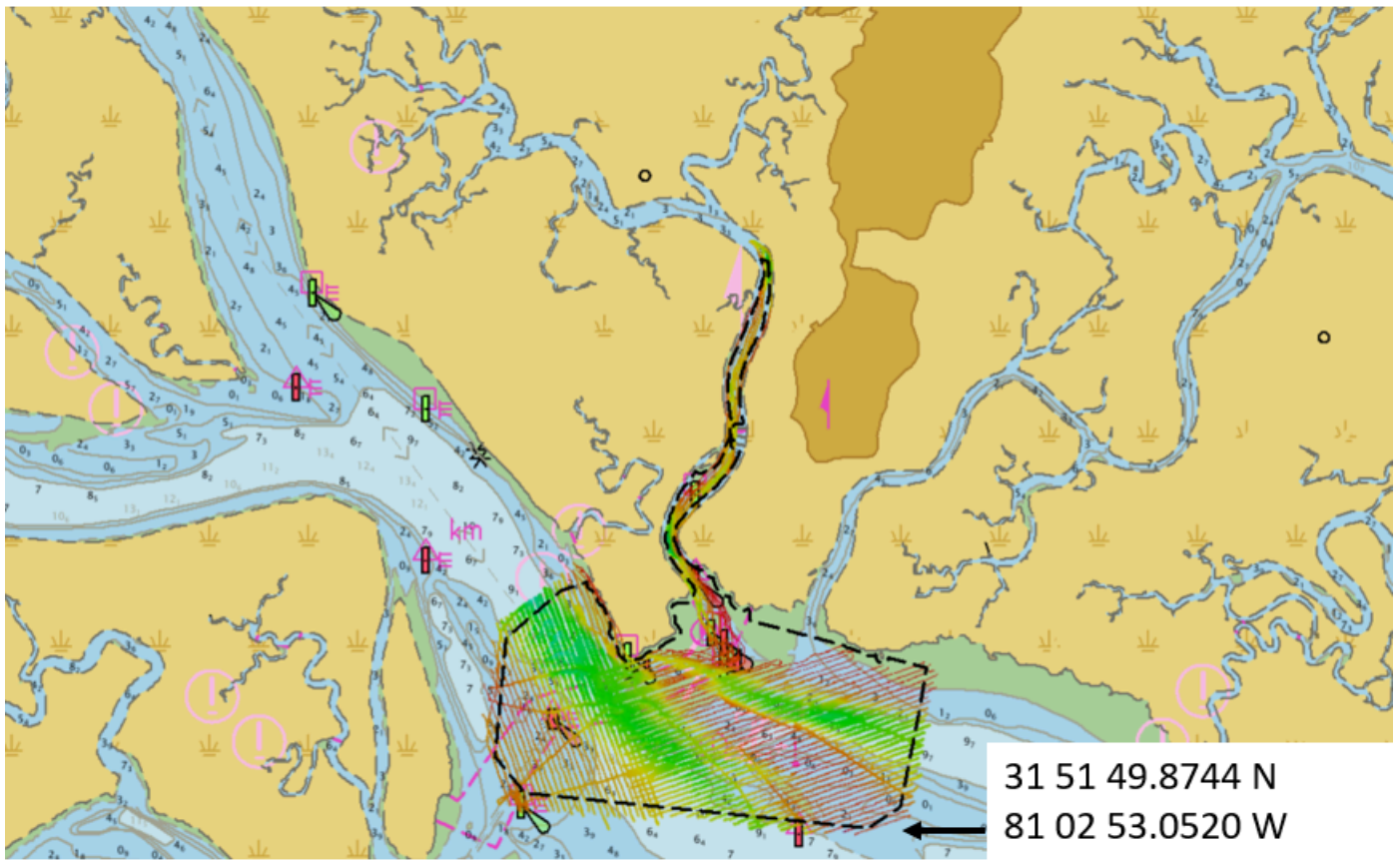


Figure 2: Survey layout in Delegal Creek, plotted over ENC US5GA24M with multibeam coverage

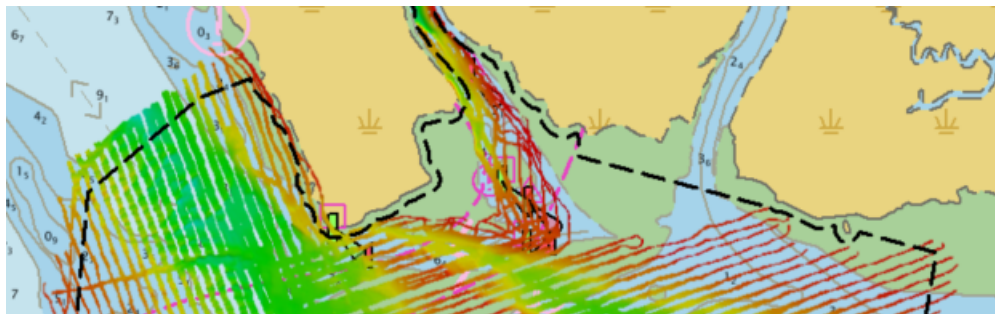


Figure 3: Survey areas of Delegal creek too shoal for surveying

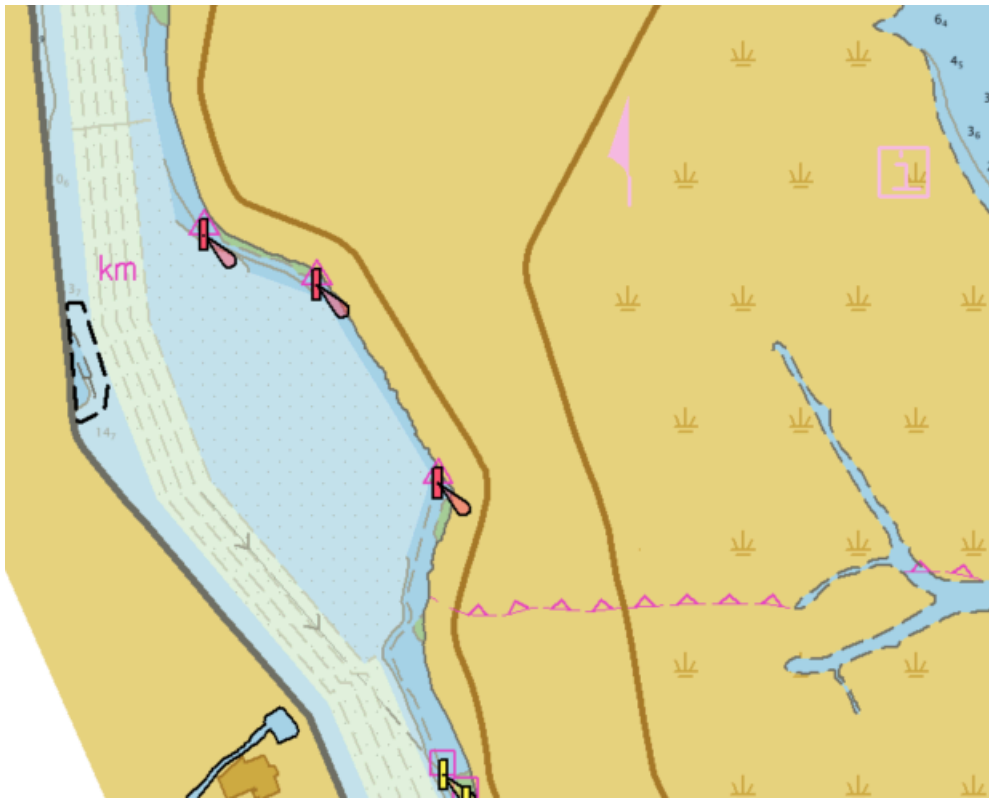


Figure 4: Investigation area in Savannah River unable to survey due to container ship docking

Survey limits were acquired in accordance with the requirements in the Project Instructions and the HSSD.

A.2 Survey Purpose

The Southeast Regional Navigation Manager has requested areas for new hydrographic surveys along the Georgia coast. The Pilots made a request to the Navigation Manager for investigation of three features in the Savannah River. First feature assigned for investigation is a pier in ruins at $32^{\circ}08'01.73'' - 081^{\circ}08'32.19''$. Second feature assigned for investigation is a 41 ft obstruction at $32^{\circ}05'00.32'' - 081^{\circ}05'27.04''$. The third feature assigned for investigation is a submerged wreck at $32^{\circ}04'53.53'' - 081^{\circ}03'51.66''$. The Navigation Manager has requested a hydrographic survey in Delegal Creek. Area is reported that the chart is not correctly charted and is in need of an update.

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.

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)

Table 2: Survey Coverage

Survey coverage was in accordance with the requirements listed above and in the HSSD.

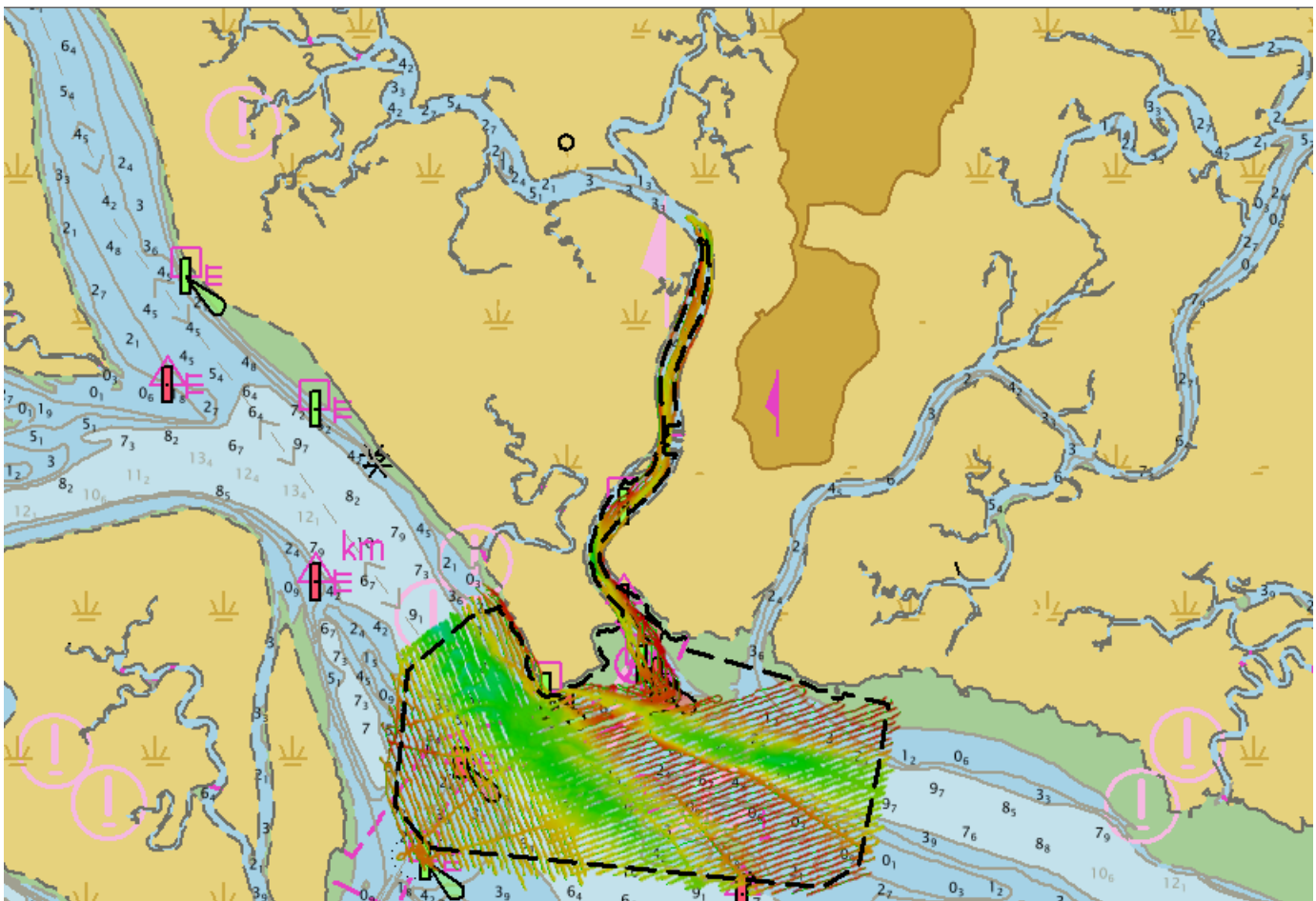


Figure 5: H13780 MBES coverage Delegal Creek

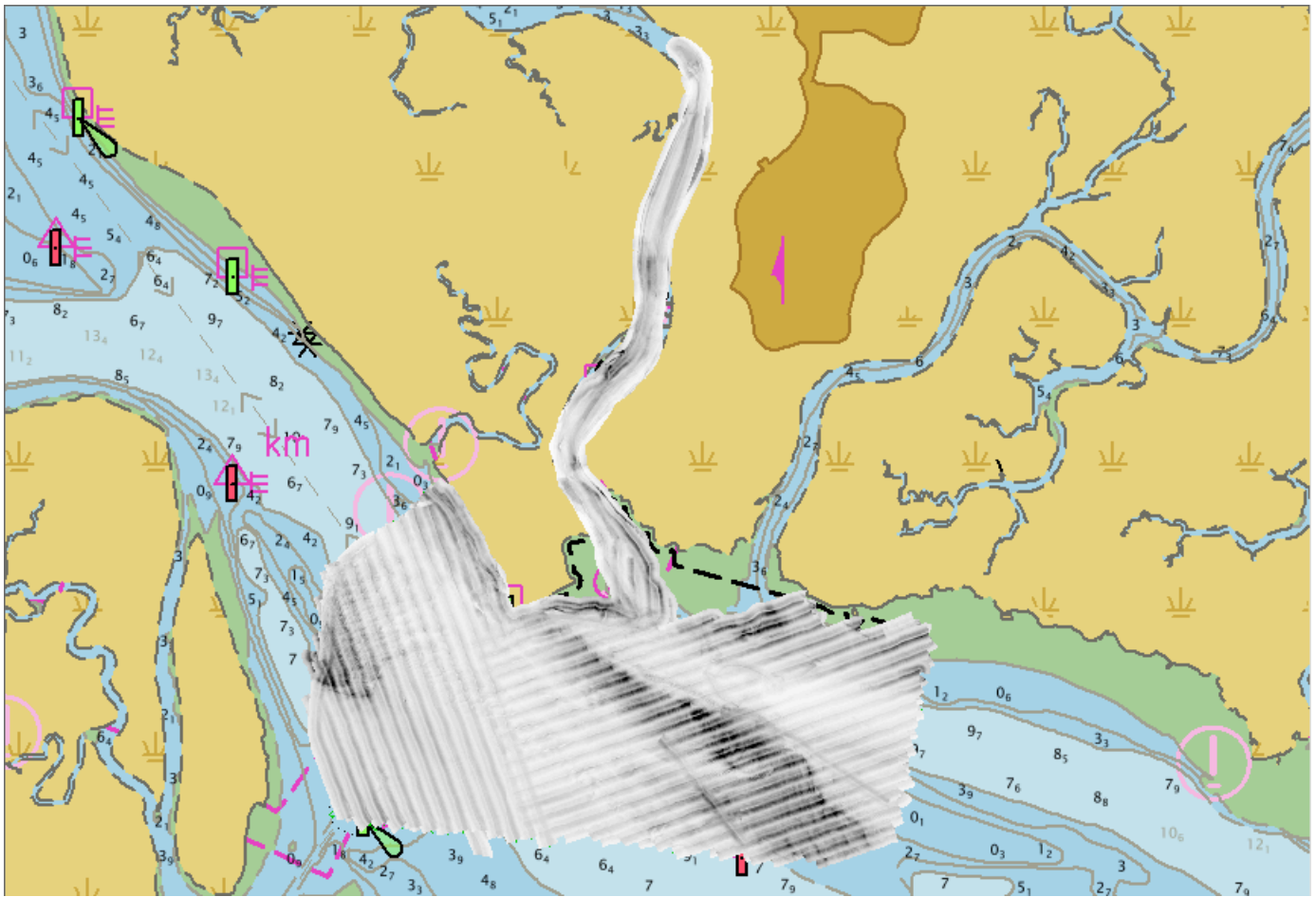


Figure 6: H13780 SSS coverage Delegal Creek

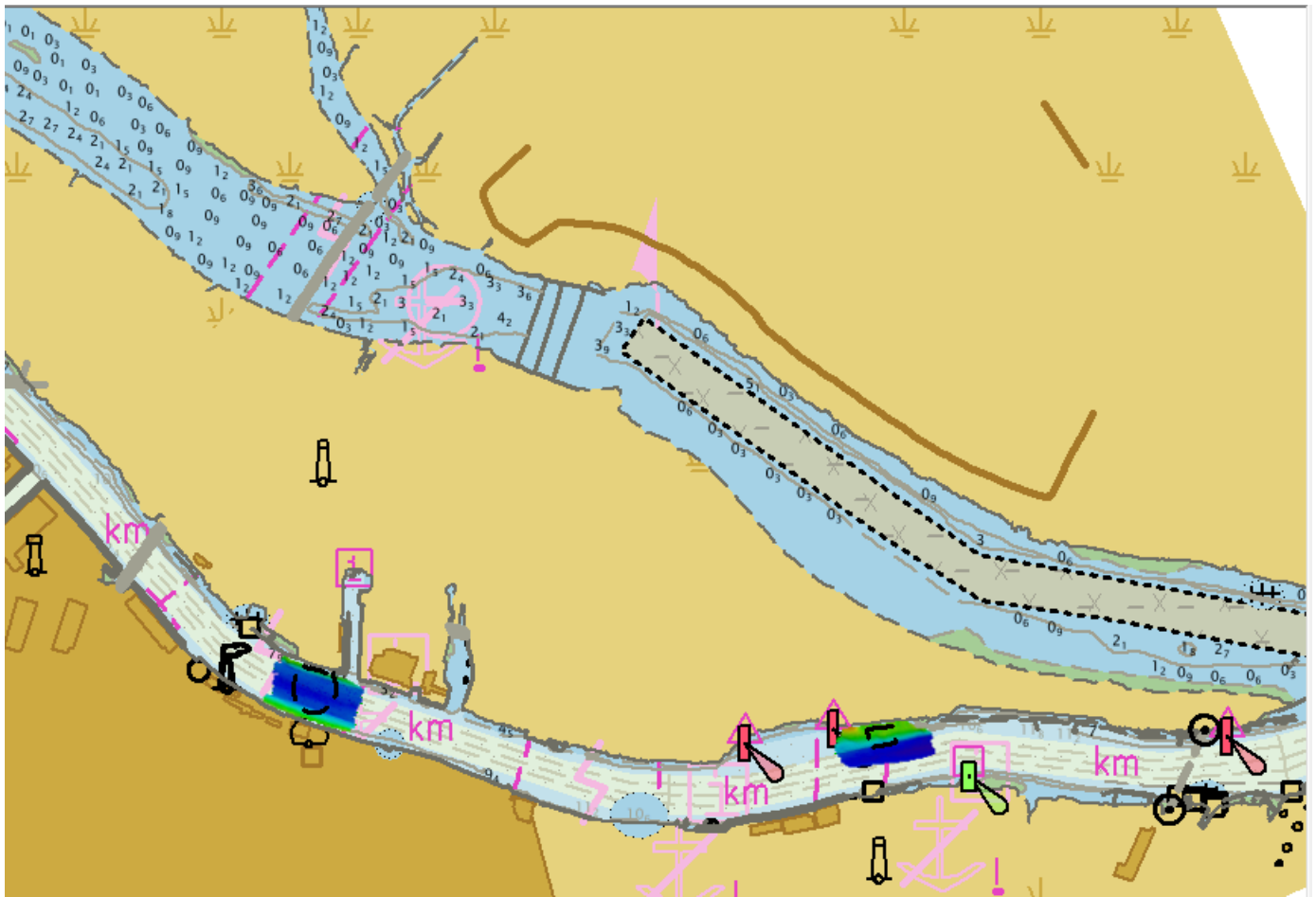


Figure 7: H13780 MBES coverage Savannah River

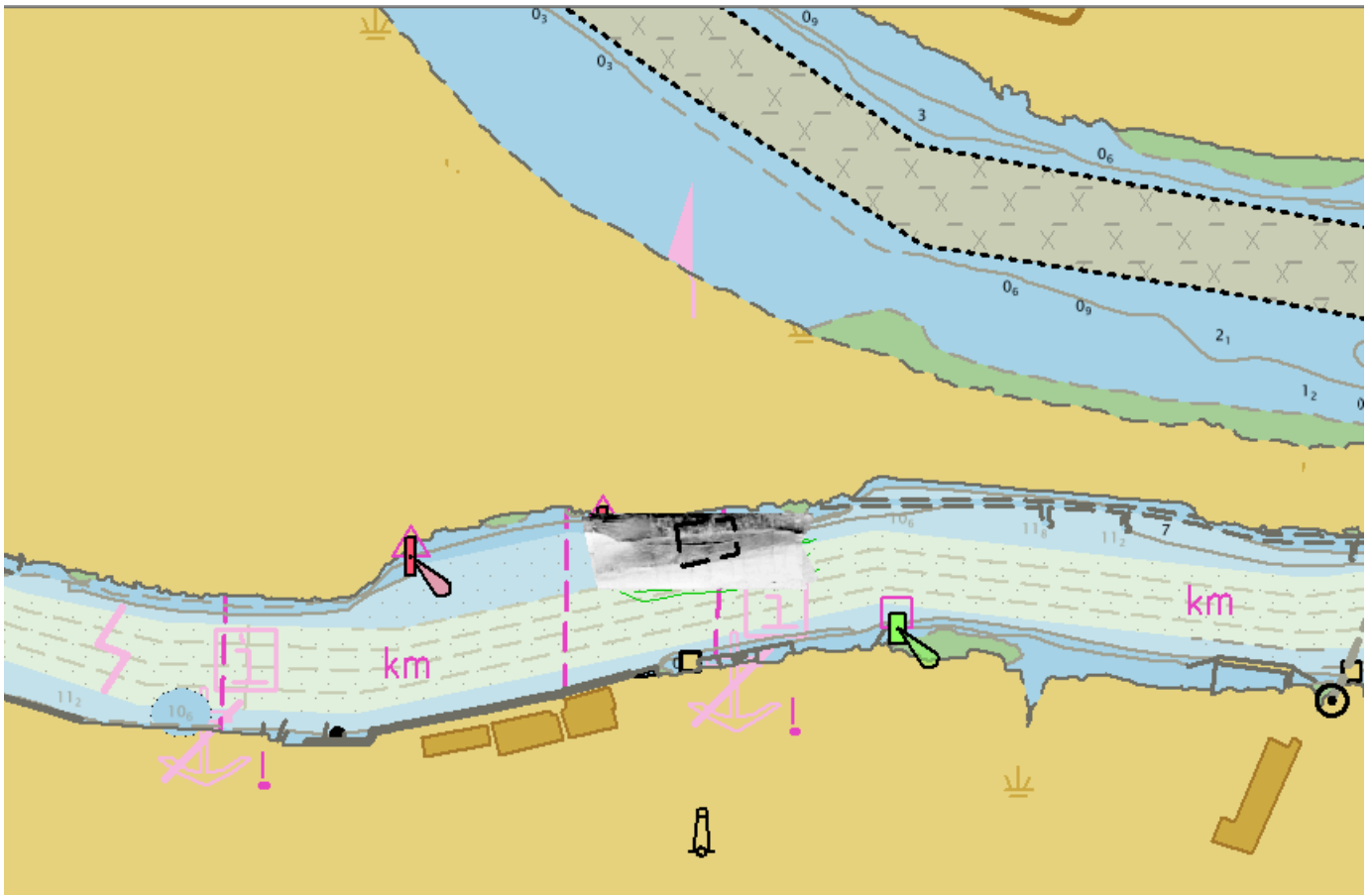


Figure 8: H13780 SSS coverage Savannah River

A.6 Survey Statistics

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

	HULL ID	<i>S3009</i>	<i>Total</i>
LNM	SBES Mainscheme	0.0	0.0
	MBES Mainscheme	83.8	83.8
	Lidar Mainscheme	0.0	0.0
	SSS Mainscheme	76.0	76.0
	SBES/SSS Mainscheme	0.0	0.0
	MBES/SSS Mainscheme	0.0	0.0
	SBES/MBES Crosslines	0.0	4.8
	Lidar Crosslines	0.0	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			1.2

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
03/13/2023	72
03/14/2023	73

Survey Dates	Day of the Year
03/15/2023	74
03/16/2023	75

Table 4: Dates of Hydrography

Acquisition spanned a total of 4 consecutive survey days.

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	<i>S3009</i>
LOA	10.5 meters
Draft	1.2 meters

Table 5: Vessels Used



Figure 9: S3009

All survey data for H13780 was collected by Navigation Response Team 2 and S3009.

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
Applanix	POS MV 320 v5	Positioning and Attitude System
AML Oceanographic	MicroX SV	Sound Speed System
YSI	CastAway-CTD	Conductivity, Temperature, and Depth Sensor

Table 6: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines were collected in the Delegal Creek portion of the survey. They exceeded the required 4% coverage of mainscheme lines with a total of 5.7%. Crosslines were in good agreement with the mainscheme lines over the survey area with a mean difference of 0.0 m and a standard deviation of 0.1 m comparing 341,667 data points.

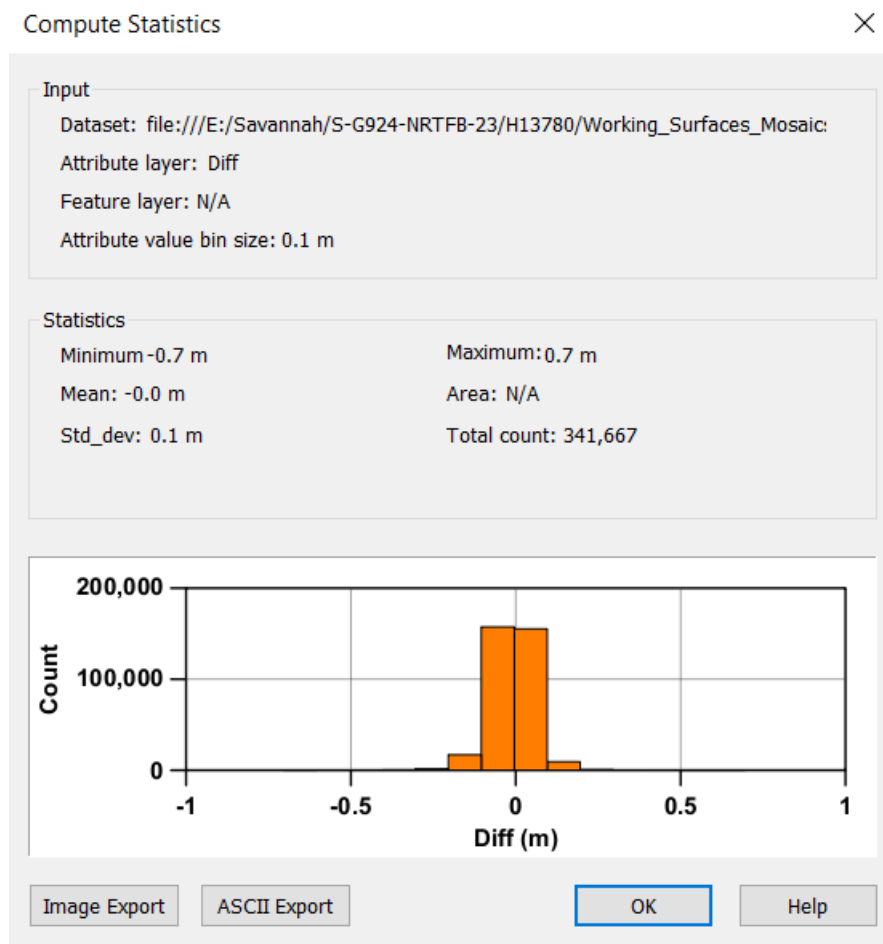


Figure 10: Crossline statistics

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0.0 centimeters	15.5 centimeters

Table 7: Survey Specific Tide TPU Values.

Method	Measured	Zoning
ERS via VDATUM	0.0 centimeters	12.5 centimeters

Table 8: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
S3009	2 meters/second	N/A meters/second	N/A meters/second	.5 meters/second

Table 9: Survey Specific Sound Speed TPU Values.

The vertical uncertainty of 15.5 cm refers to the Delegal Creek survey area while the 12.5 cm vertical uncertainty refers to the Savannah River survey area derived from project instructions. Sound speed uncertainty values derived from manufacturer specifications.

B.2.3 Junctions

No junction surveys assigned for H13780.

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

MBES data quality

There were areas of very shallow water where the multibeam system experienced blowouts. This is typical of the system used in shallow water and data quality was improved as best as possible during data processing. There were also some holes in the multibeam surface in Savannah River due to a cable running along the edge of the survey area. Cable area is charted and is not shoaler than the charted least depth of 5.4 m so is not a hazard to navigation.

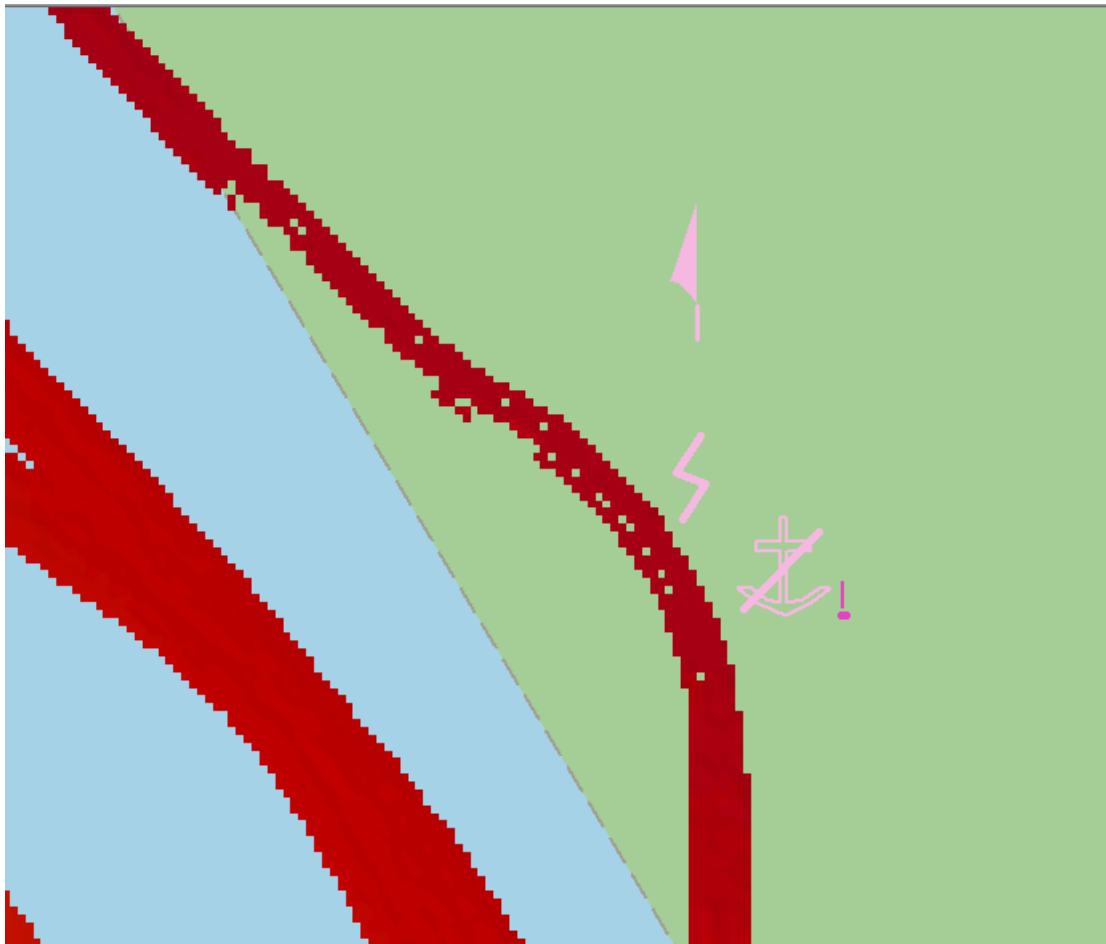


Figure 11: Multibeam Blowout in Delegal Creek

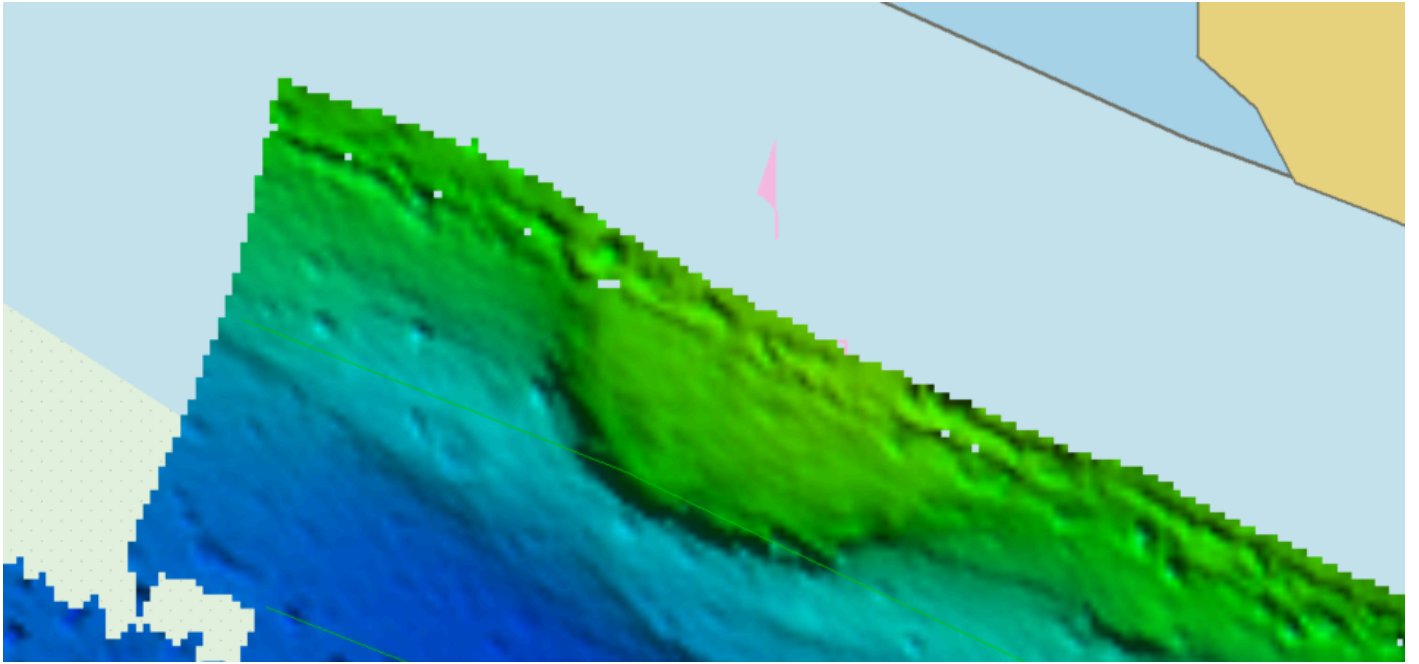


Figure 12: Savannah River multibeam coverage over cable

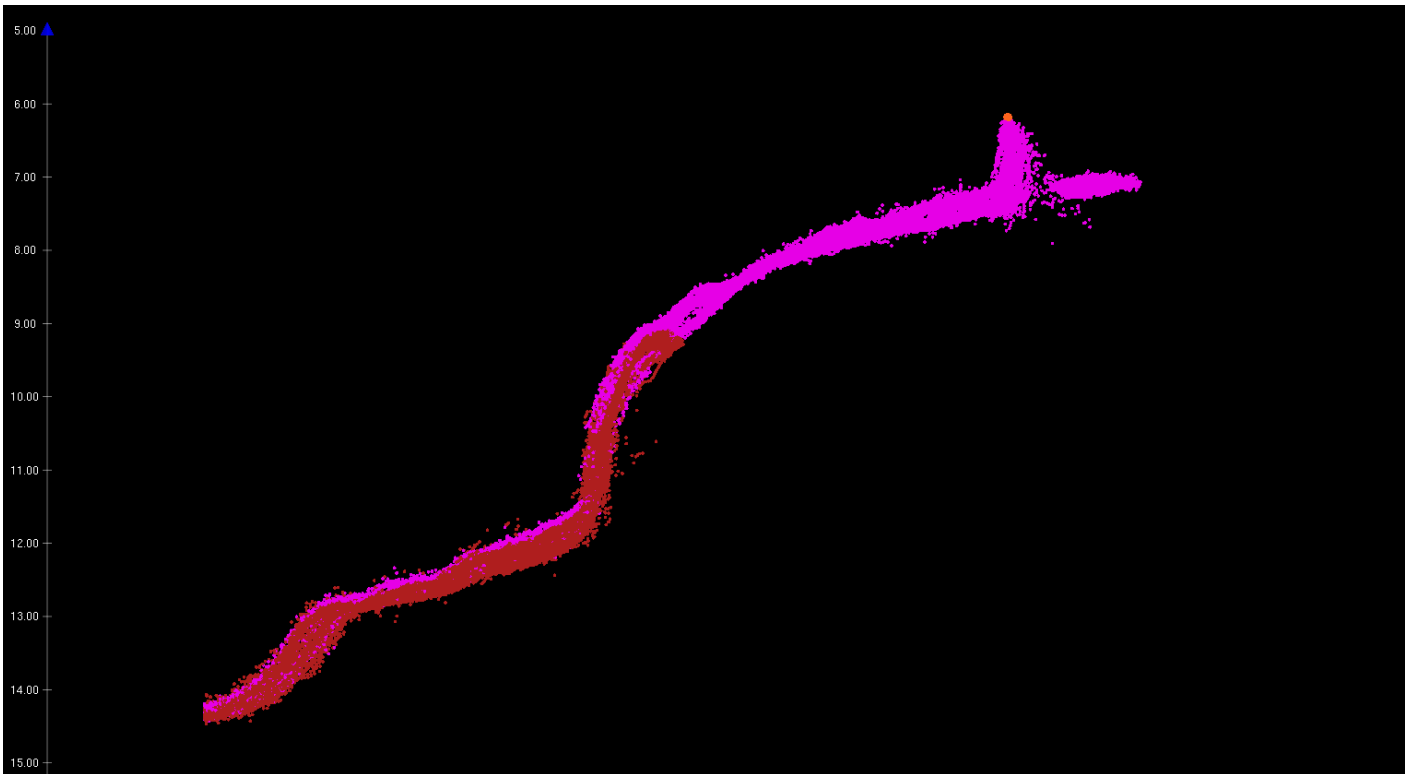


Figure 13: Savannah River cable in Caris Subset Editor

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: As close to every 2 hours as possible.

A total of 17 casts were taken during the 4 days of surveying. Real time sound speed was collected continuously at the multibeam transducer.

B.2.8 Coverage Equipment and Methods

200% SSS with concurrent MBES was used on the Delegal Creek area and part of the Savannah River Area. In the westward deeper section of Savannah River, 100% MBES was achieved.

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

A backscatter mosaic was created for this project. All equipment and survey methods were used as detailed in the DAPR.

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	11.4.20

Table 10: Primary bathymetric data processing software

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

Manufacturer	Name	Version
QPS	FMGT	7.10.2
CARIS	HIPS and SIPS	11.4.20

Table 11: Primary imagery data processing software

The following Feature Object Catalog was used: Caris_Support_Files_2022v2.

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
H13780_MB_50cm_MLLW_Final	CARIS Raster Surface (CUBE)	0.5 meters	-1.4 meters - 18.4 meters	NOAA_0.5m	Object Detection
H13780_SSSAB_1m_400kHz_1of2	SSS Mosaic	1 meters	-	N/A	100% SSS
H13780_SSSAB_1m_400kHz_2of2	SSS Mosaic	1 meters	-	N/A	200% SSS
H13780_SSSAB_1m_900kHz_1of2	SSS Mosaic	1 meters	-	N/A	100% SSS
H13780_SSSAB_1m_900kHz_2of2	SSS Mosaic	1 meters	-	N/A	200% SSS

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H13780_MBAB_2m_S3009_300kHz_1of1	MB Backscatter Mosaic	2 meters	-	N/A	Object Detection

Table 12: Submitted Surfaces

The 900kHz SSS mosaics refer to the Delegal Creek area of the survey while the 400kHz SSS mosaics refer to the Savannah River portion. The frequencies were varied due to the differences in depth in the two areas. The multibeam surface was analyzed using the HydrOffice QC Tools Grid QA feature and the results are shown below. Density requirements for H13780 were achieved with at least 99% of surface nodes containing five or more soundings as required by HSSD Section 5.2.2.3.

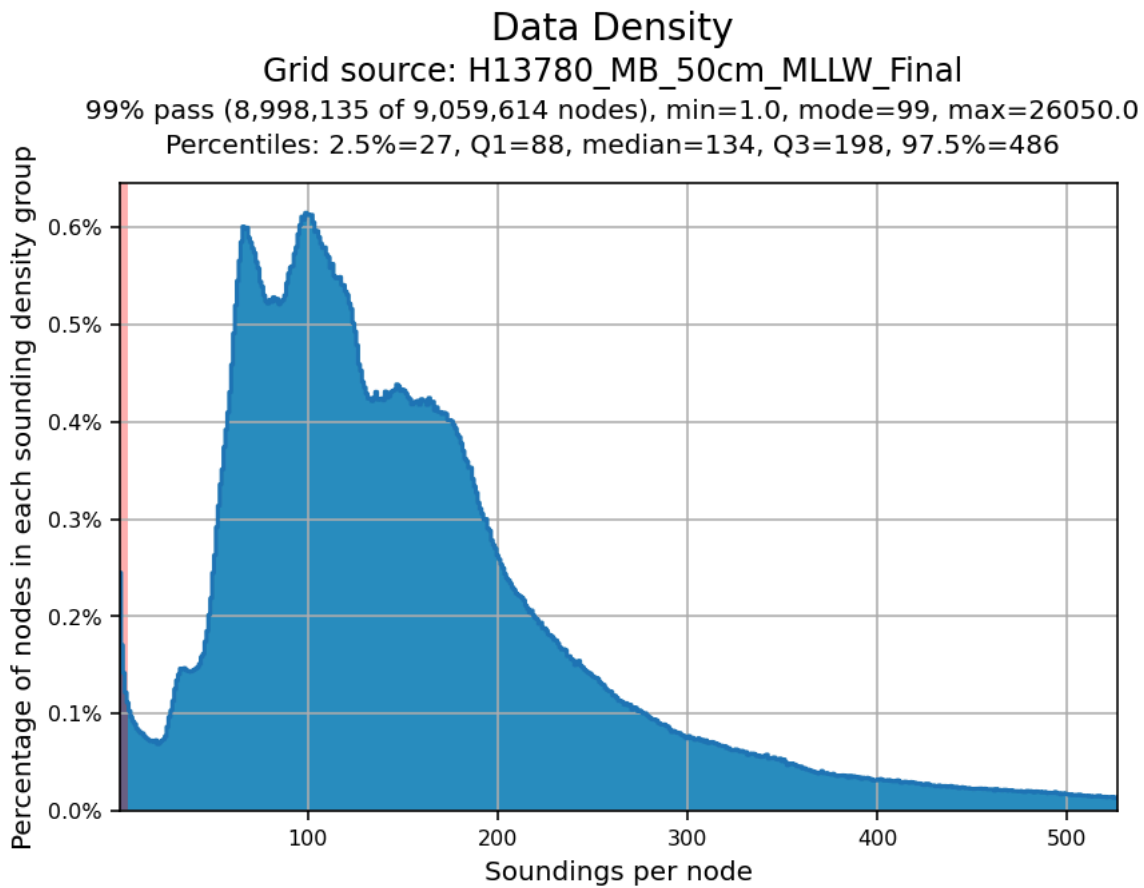


Figure 14: Pydro derived plot showing percent of nodes in compliance with HSSD density standards

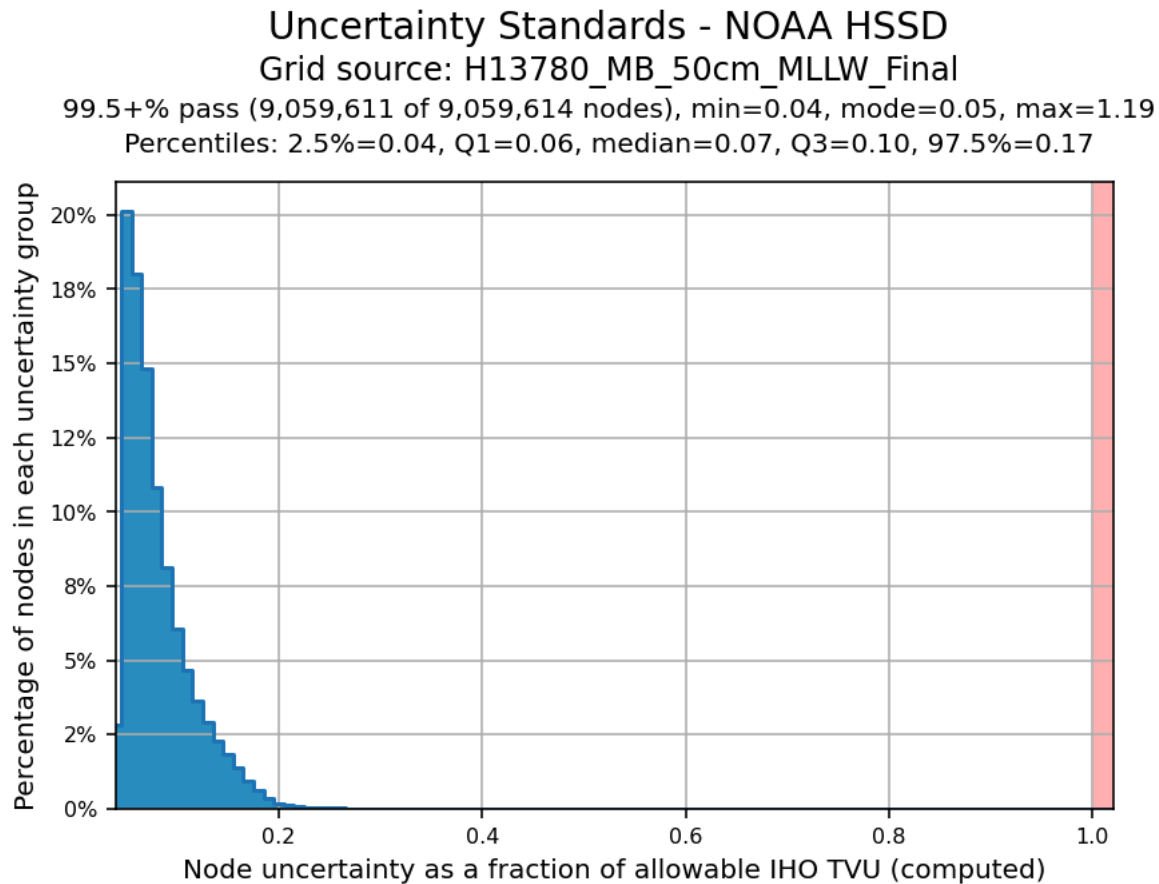


Figure 15: Pydro derived plot showing TVU compliance of H13780 multibeam surface

Two surfaces were created in review for submission to the NBS to differentiate the full bathy coverage on the northern area from the set line spacing full coverage in the southern area. These surfaces are named H13780_MB_50cm_MLLW_1of2 and H13780_MB_50cm_MLLW_2of2

C. Vertical and Horizontal Control

Per FPM section 5.2.3.2.3 a HVCR report was not filed as horizontal and vertical control stations were not established by the field party for this survey. POSPAC data was logged to create a statistical best estimate of trajectory file (SBET) to help improve horizontal positioning. Vertical control was established with ERS via VDATUM.

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-G924_VDatum Limits_100m_NAD83-MLLW_geoid12b S-G924-NRB-23_Ossabaw_NAD83(2011)-MLLW

Table 13: ERS method and SEP file

Two separation models were used to cover the survey area. S-G924-NRB-23_Ossabaw_NAD83(2011)-MLLW was used for the Delegal Creek portion of the survey while S-G924_VDatum Limits_100m_NAD83-MLLW_geoid12b was used for the Savannah River section.

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 17.

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.

C.3 Additional Horizontal or Vertical Control Issues

C.3.1 GPS Tide Dropout

There was an issue discovered during data processing on one of the survey lines in Delegal Creek where the GPS tide dropped out for a short period of time resulting in unreliable multibeam soundings. The multibeam data where dropout occurred was rejected from the surface.

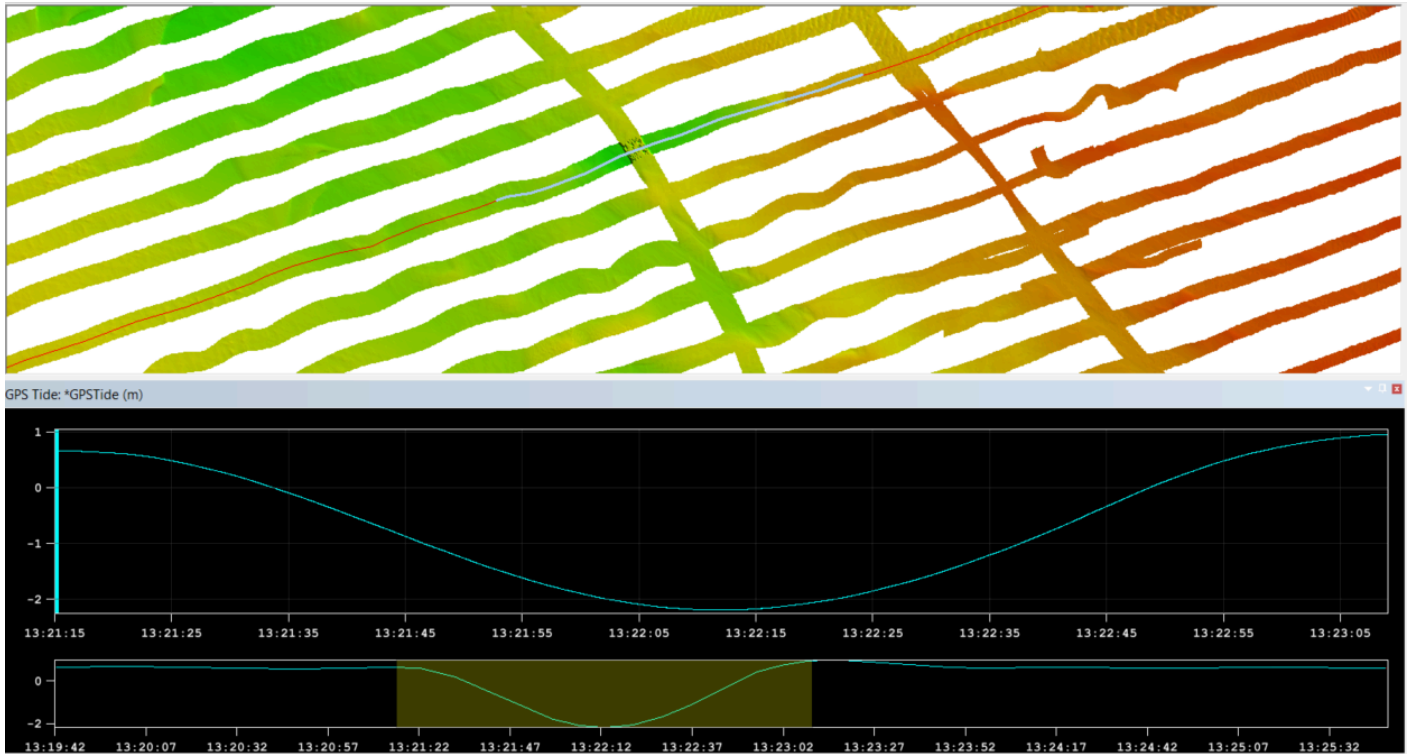


Figure 16: GPS Tide Dropout

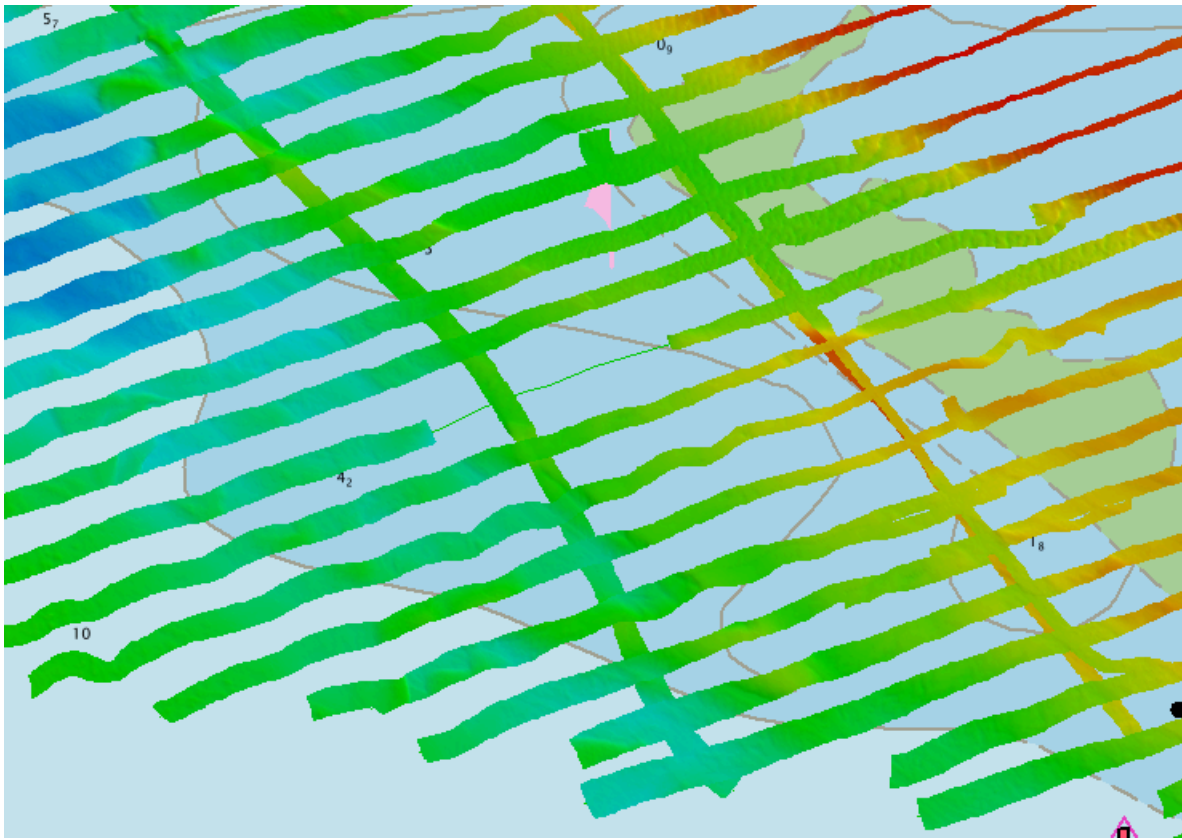


Figure 17: Multibeam soundings rejected from surface

D. Results and Recommendations

D.1 Chart Comparison

Many of the soundings taken in the Delegal Creek portion of the survey were not in agreement with the US5GA24M chart. Shoal areas are not charted correctly. The area has not been surveyed since 1934 and it is recommended to update the chart with the new soundings as quickly as possible. The soundings taken from the Savannah River portion of the survey are in agreement with the US5GA22M chart. Investigated features are included in the Final Feature File.



Figure 18: Soundings comparison to ENC US5GA24M

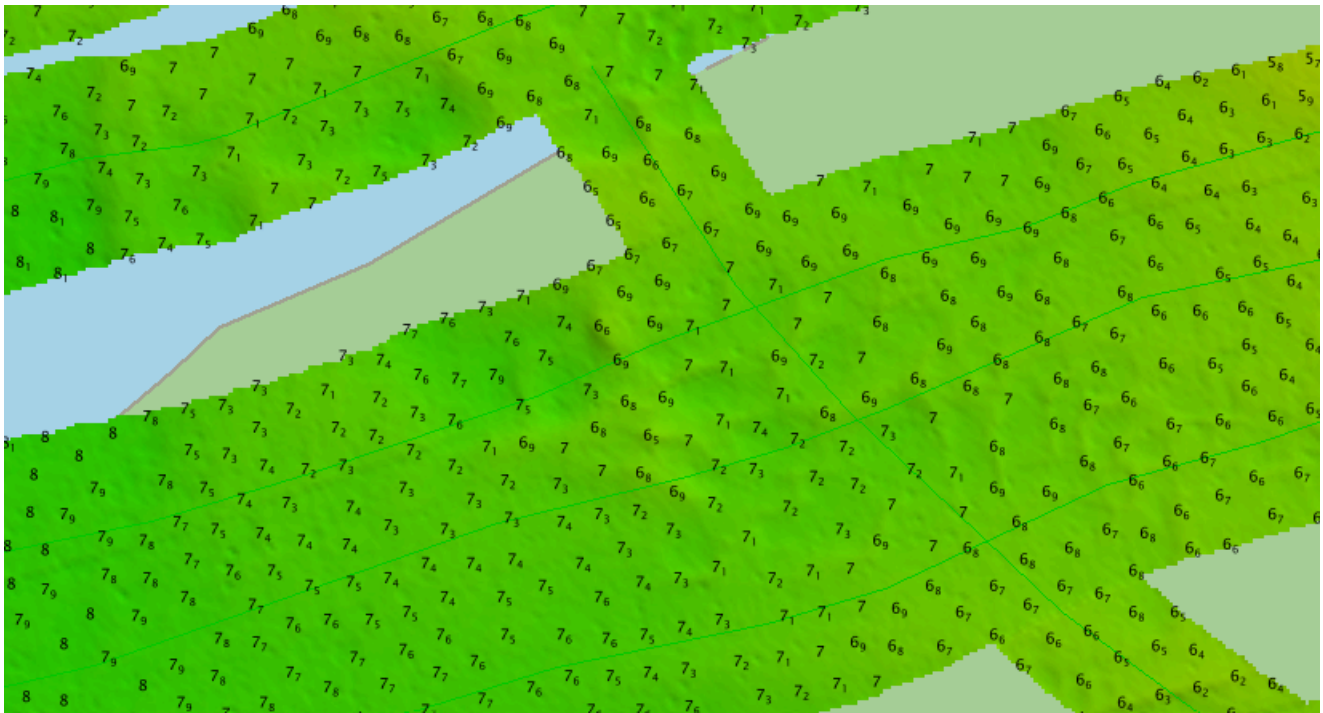


Figure 19: Charted shoal area on ENC US5GA24M with deep soundings

D.1.1 Electronic Navigational Charts

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

ENC	Scale	Edition	Update Application Date	Issue Date
US5GA22M	1:20000	58	04/11/2023	04/11/2023
US5GA24M	1:40000	31	04/18/2023	04/18/2023

Table 14: Largest Scale ENC's

D.1.2 Shoal and Hazardous Features

Shoal areas in Delegal Creek are not charted correctly and need to be updated. Three DTONs were discovered and reported during data processing for this survey. Correspondence on DTONs can be found in Appendix II supplemental records.

D.1.3 Charted Features

Features investigated can be found in the Final Feature File.

D.1.4 Uncharted Features

Uncharted features are detailed in the Final Feature File.

D.1.5 Channels

All channel depths in Savannah River are in agreement soundings on US5GA22. One DTON was reported near Hell's Gate Channel near Delegal Creek and can be found in the Final Feature File.

D.2 Additional Results

D.2.1 Aids to Navigation

Three ATONS in Delegal Creek were reported to the U.S. Coast Guard. Correspondence can be found in the Appendix II Supplemental Records.

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

Cables exist in the Savannah River area of survey. Cable areas are charted and soundings were deeper than charted least depths, no hazard to navigation exists.

D.2.6 Platforms

No platforms exist for this survey.

D.2.7 Ferry Routes and Terminals

There were ferrys operating from South Bank to North Bank in the Savannah River but no charted ferry routes on US5GA22M.

D.2.8 Abnormal Seafloor or Environmental Conditions

No abnormal seafloor or environmental conditions exist for this survey.

D.2.9 Construction and Dredging

Present and/or planned construction or dredging exists within the survey limits, but was not investigated. The assigned area in the Savannah River that was unable to be surveyed due to port activity appeared to have active dredging operations nearby.

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
James Kirkpatrick	Chief of Party	05/11/2023	KIRKPATRICK.JAMES.LEROY.IV.1400487398 Digitally signed by KIRKPATRICK.JAMES.LEROY.IV.1400487398 Date: 2023.06.07 15:11:55 -04'00'
Michael Coughlin	Assistant Survey Technician	05/11/2023	COUGHLIN.MICHAEL.JAMES.1617208080 Digitally signed by COUGHLIN.MICHAEL.JAMES.1617208080 Date: 2023.06.07 16:27:55 -04'00'

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