H12805

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H12805

LOCALITY

State(s):	South Carolina
General Locality:	Southeast Atlantic Ocean
Sub-locality:	Southeast of the Approaches to Charleston Harbor

2015

CHIEF OF PARTY
Shepard M. Smith, CAPT/NOAA

LIBRARY & ARCHIVES

Date:

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

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

H12805

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:	**Southeast Atlantic Ocean**
Sub-Locality:	**Southeast of the Approaches to Charleston Harbor**
Scale:	**20000**
Dates of Survey:	**11/05/2015 to 11/16/2015**
Instructions Dated:	**04/09/2015**
Project Number:	**OPR-G380-TJ-15**
Field Unit:	**NOAA Ship *Thomas Jefferson***
Chief of Party:	**Shepard M. Smith, CAPT/NOAA**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Side Scan Sonar**
Verification by:	**Atlantic 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 https://www.ncei.noaa.gov/.

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Descriptive Report to Accompany Survey H12805

Project: OPR-G380-TJ-15

Locality: Southeast Atlantic Ocean

Sublocality: Southeast of the Approaches to Charleston Harbor

Scale: 1:20000

November 2015 - November 2015

NOAA Ship *Thomas Jefferson*

Chief of Party: Shepard M. Smith, CAPT/NOAA

A. Area Surveyed

This hydrographic survey was completed using the coverage requirements specified by hydrographic survey project instructions OPR-G380-TJ-15, signed 9 April 2015. This survey is located southeast of the approaches to Charleston harbor.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
32° 37' 8.91" N 79° 49' 23.77" W	32° 30' 11.76" N 79° 30' 33.66" W

Table 1: Survey Limits

The area surveyed as H12805 is based on time remaining, traffic, and NOAA Ship Whiting junctions. This survey was run in the southern area working west. Charted wrecks, obstructions, and a fish haven where also investigated as part of this survey.

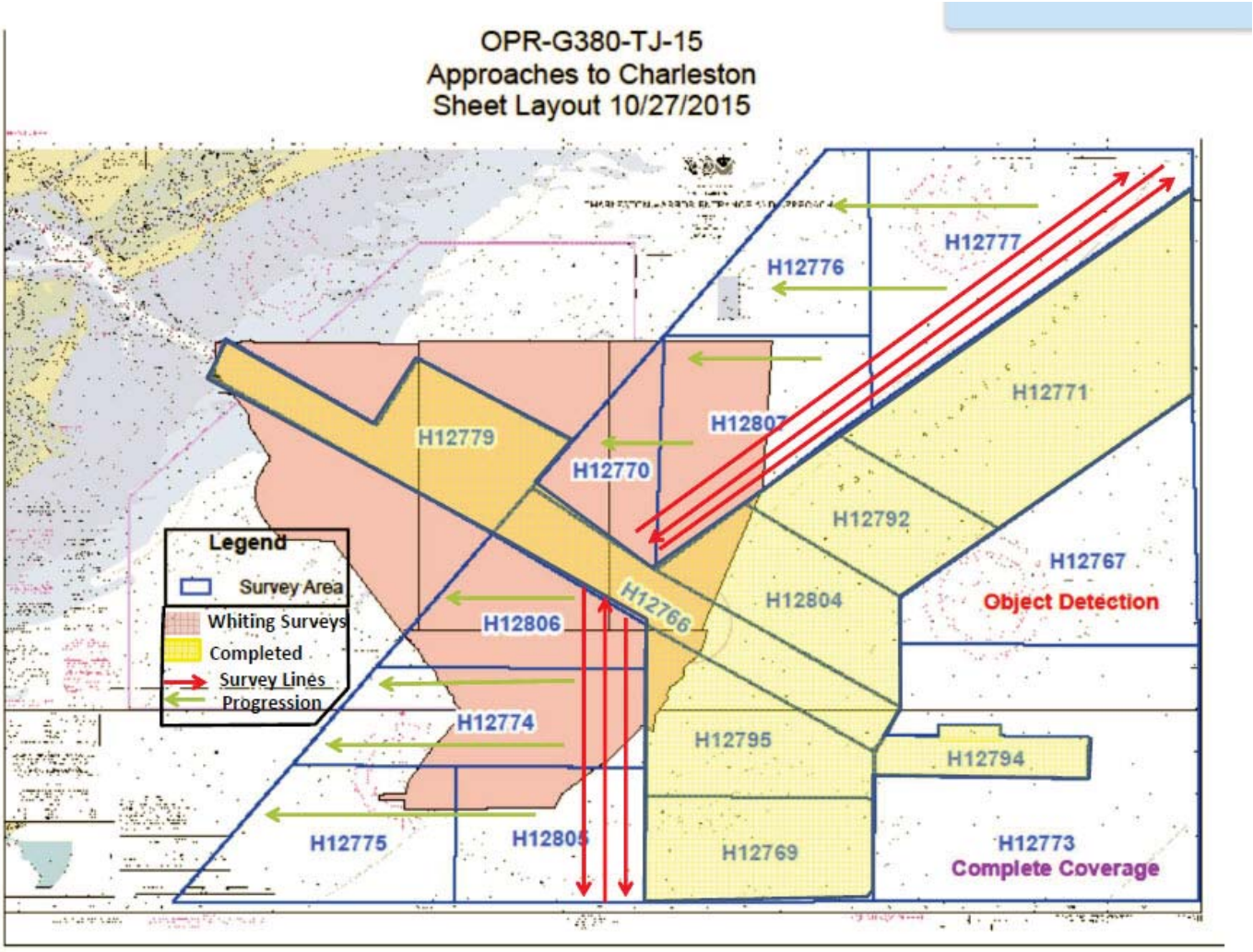


Figure 1: H12805 consists of the southern area with westward progression overlayed on RNC 11528

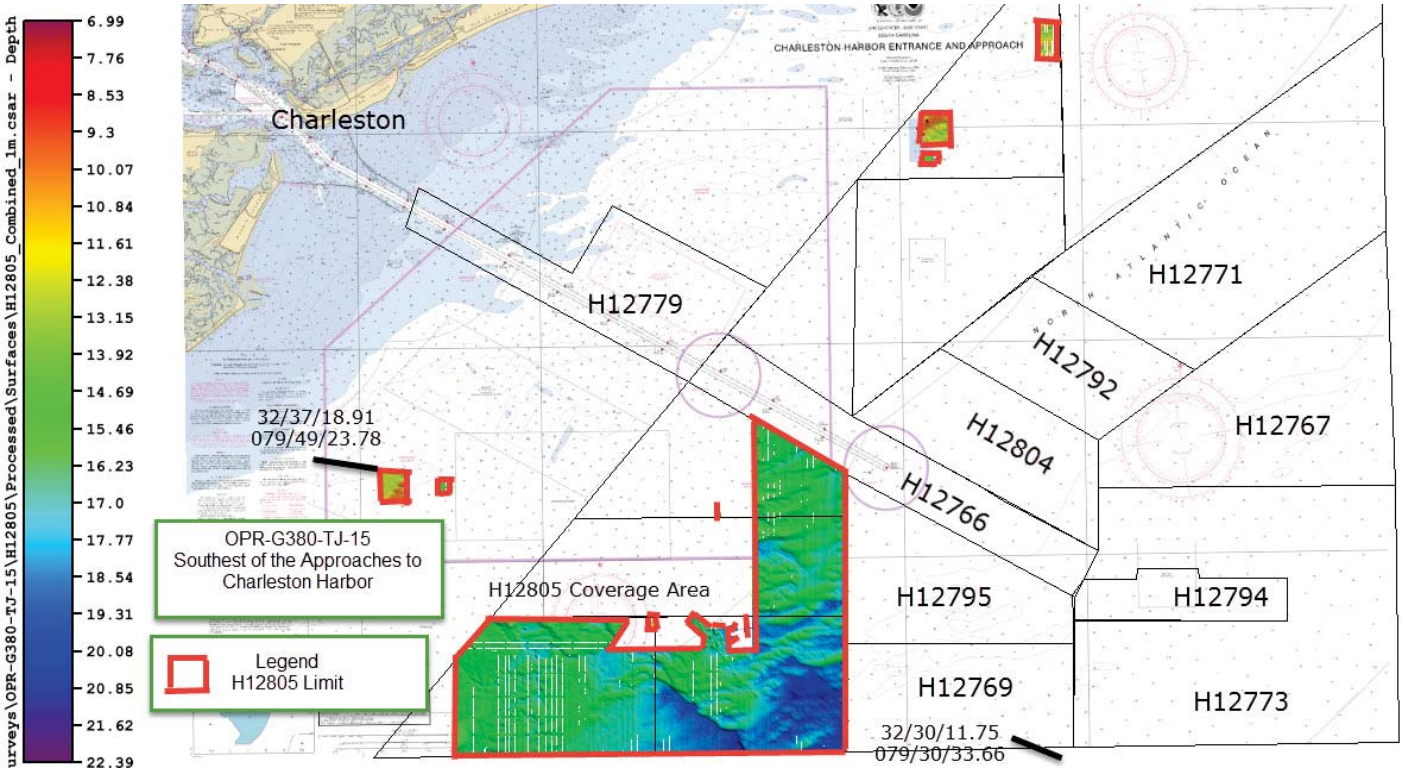


Figure 2: H12805 in relation to the project area overlayed on RNC 11528

A.2 Survey Purpose

This project is being conducted in support of NOAA's Office of Coast Survey to provide contemporary hydrographic data in support of a new nautical chart in this area and in response to a harbor deepening project in the Port of Charleston which will better serve deeper draft ships transiting the 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 the survey area. The hydrographer chose to use option A.	Object detection: either A) 200% SSS with concurrent set line spacing SBES or MBES with backscatter, or B) object detection MBES with backscatter.

Holidays are present in the 200% mosaic. Holidays are covered with multibeam or the other 100% percent of side scan sonar. Figures 3 and 4 show 200% side scan holidays that are covered with multibeam data and the other 100% coverage (magenta).

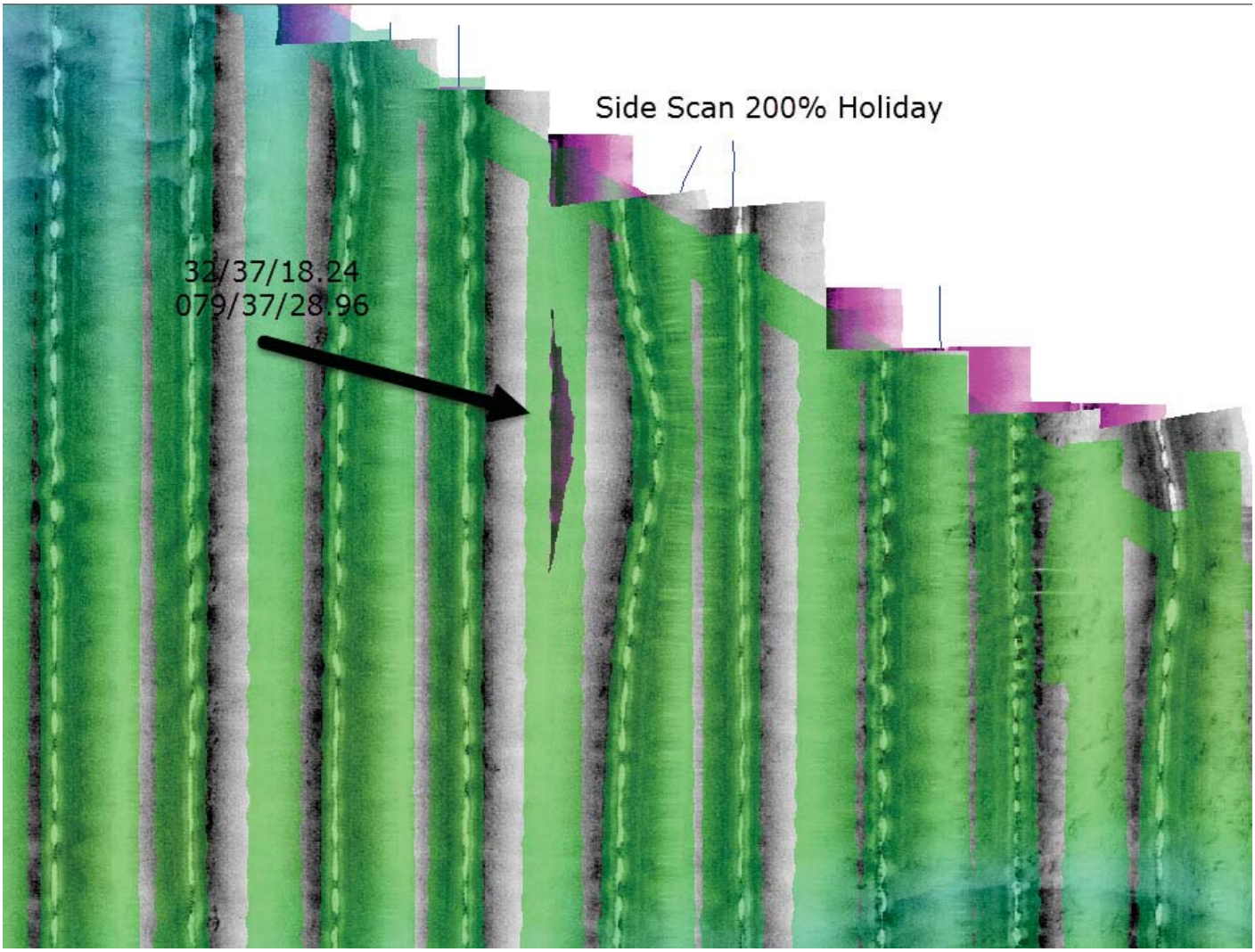


Figure 3: H12805 200% mosaic holiday example 1

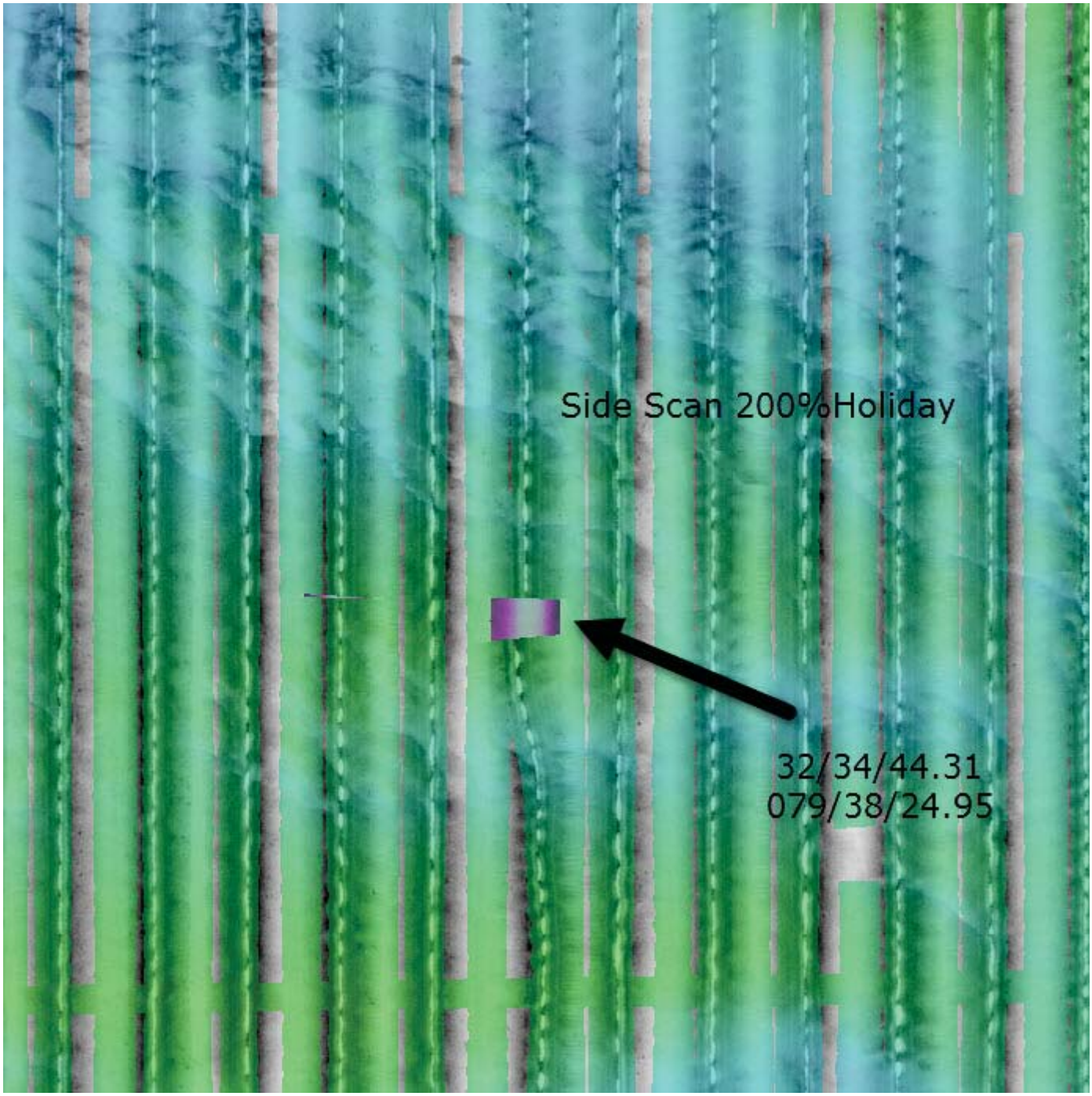


Figure 4: H12805 200% mosaic holiday example 2

A.5 Survey Statistics

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

	HULL ID	*S222*	*3101*	*3102*	*Total*
LNM	**SBES Mainscheme**	0	0	0	0
	MBES Mainscheme	0	24.14	37.18	61.32
	Lidar Mainscheme	0	0	0	0
	SSS Mainscheme	0	0	0	0
	SBES/SSS Mainscheme	0	0	0	0
	MBES/SSS Mainscheme	1105.01	7.3	0	1112.31
	SBES/MBES Crosslines	78.63	0	0.14	78.77
	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					34

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
11/05/2015	309
11/06/2015	310
11/07/2015	311
11/08/2015	312
11/09/2015	313
11/10/2015	314
11/11/2015	315
11/12/2015	316
11/13/2015	317
11/14/2015	318
11/15/2015	319
11/16/2015	320

Table 3: 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	*S222*	*3101*	*3102*
LOA	208 feet	31 feet	31 feet
Draft	15 feet	5.2 feet	5.2 feet

Table 4: Vessels Used

Data were acquired by NOAA Ship Thomas Jefferson and Hydrographic Survey Launches 3101 and 3102. NOAA Ship Thomas Jefferson acquired Reson 7125 SV2 multibeam echosounder soundings, multibeam backscatter data, Klein 5000 V2 side scan sonar data, Rolls Royce MVP100 sound velocity profiles, and Applanix POS/MV version 5 position and attitude data. NOAA Launch 3101 acquired Reson 7125 SV2 multibeam echosounder soundings, multibeam backscatter data, Klein 5000 side scan sonar data, Seabird Seacat 19+ sound velocity profiles and Applanix POS/MV version 4 position and attitude data. NOAA Launch 3101 acquired Reson 7125 SV1 multibeam echosounder soundings, multibeam backscatter data, Seabird Seacat 19+ sound velocity profiles and Applanix POS/MV version 4 position and attitude data.

B.1.2 Equipment

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

Manufacturer	Model	Type
Applanix	POS/MV version 4	Positioning and Attitude System
Applanix	POS/MV version 5	Positioning and Attitude System
Seabird	Seacat 19+	Conductivity, Temperature, and Depth Sensor
Rolls Royce	MVP 100	Conductivity, Temperature, and Depth Sensor
Reson	7215 SV1	MBES
Reson	7125 SV2	MBES
Reson	SV-71	Sound Speed System
Klein	5000	SSS
Klein	5000	SSS

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines acquired for this survey totaled 6.71% of mainscheme acquisition.

Crosslines were compared to mainscheme by creating a difference surface in Caris BathyData Base. A 1m CUBE surface was created using strictly mainscheme lines, while a second 1m CUBE surface was created using only crosslines. The depth layers of the two surfaces were then differenced. The minimum difference

value was -1.14m and and maximum difference value was 2.22m. The mean was 0.017m and the standard deviation was 0.133m. Survey H12805 complies with section 5.2.4.3 of the HSSD (2015 ed). The Chief Hydrographer chose to exceed the specifications of 4% crossline coverage for validation at closer intervals when given the option of interpolating ERS holidays versus re-acquiring bathymetry.

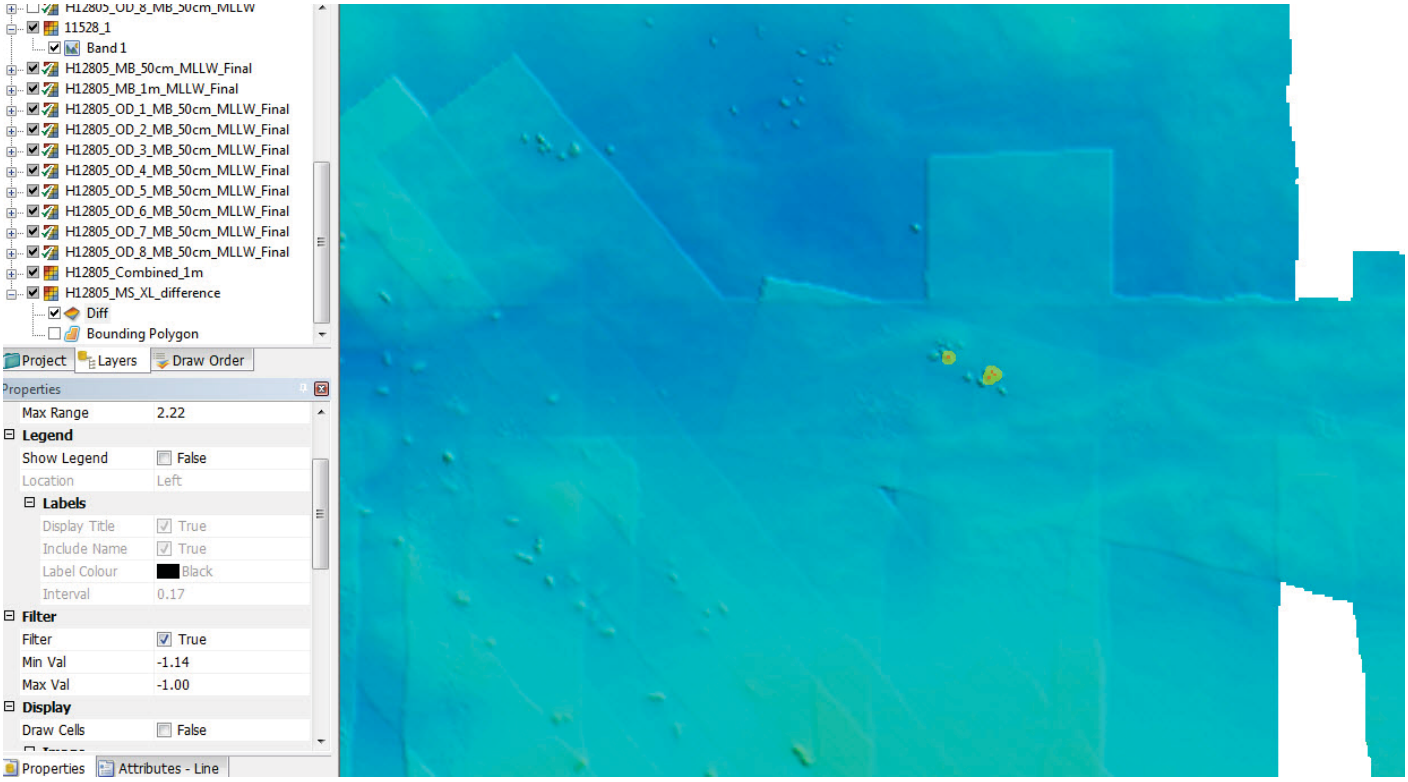


Figure 5: H12805 The minimum value of -1.14m occurs on obstructions

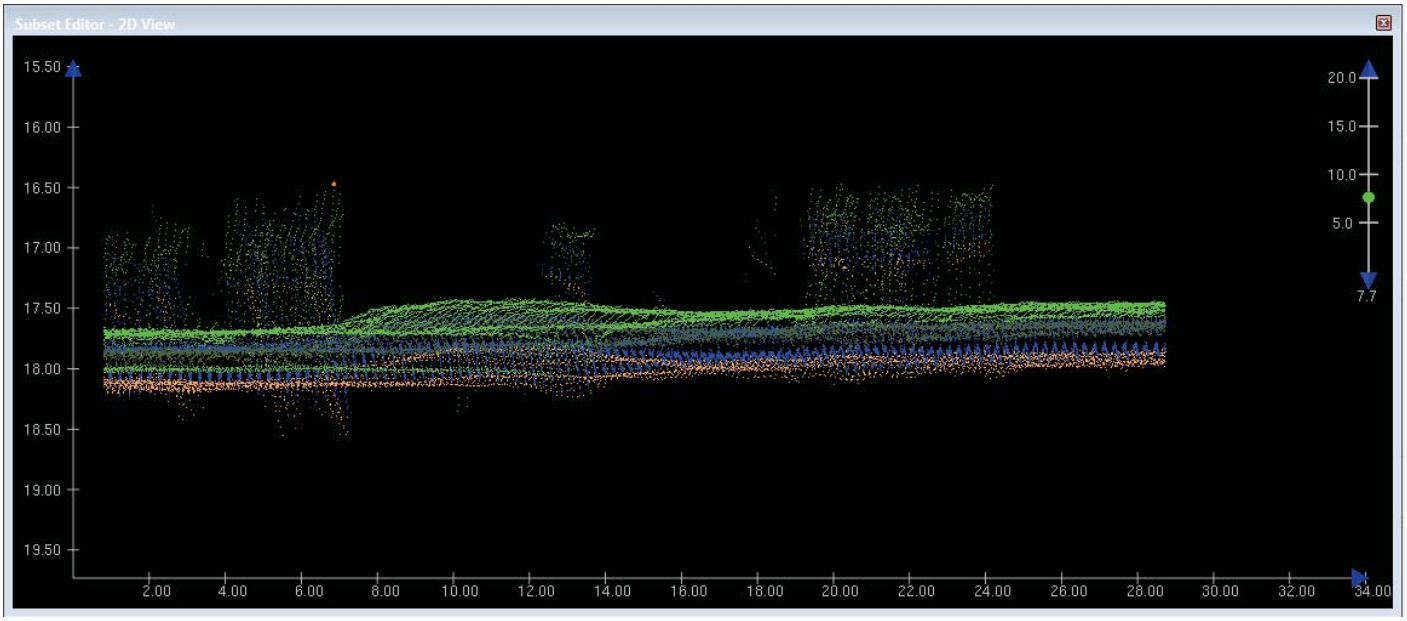


Figure 6: H12805 Subset of the obstructions

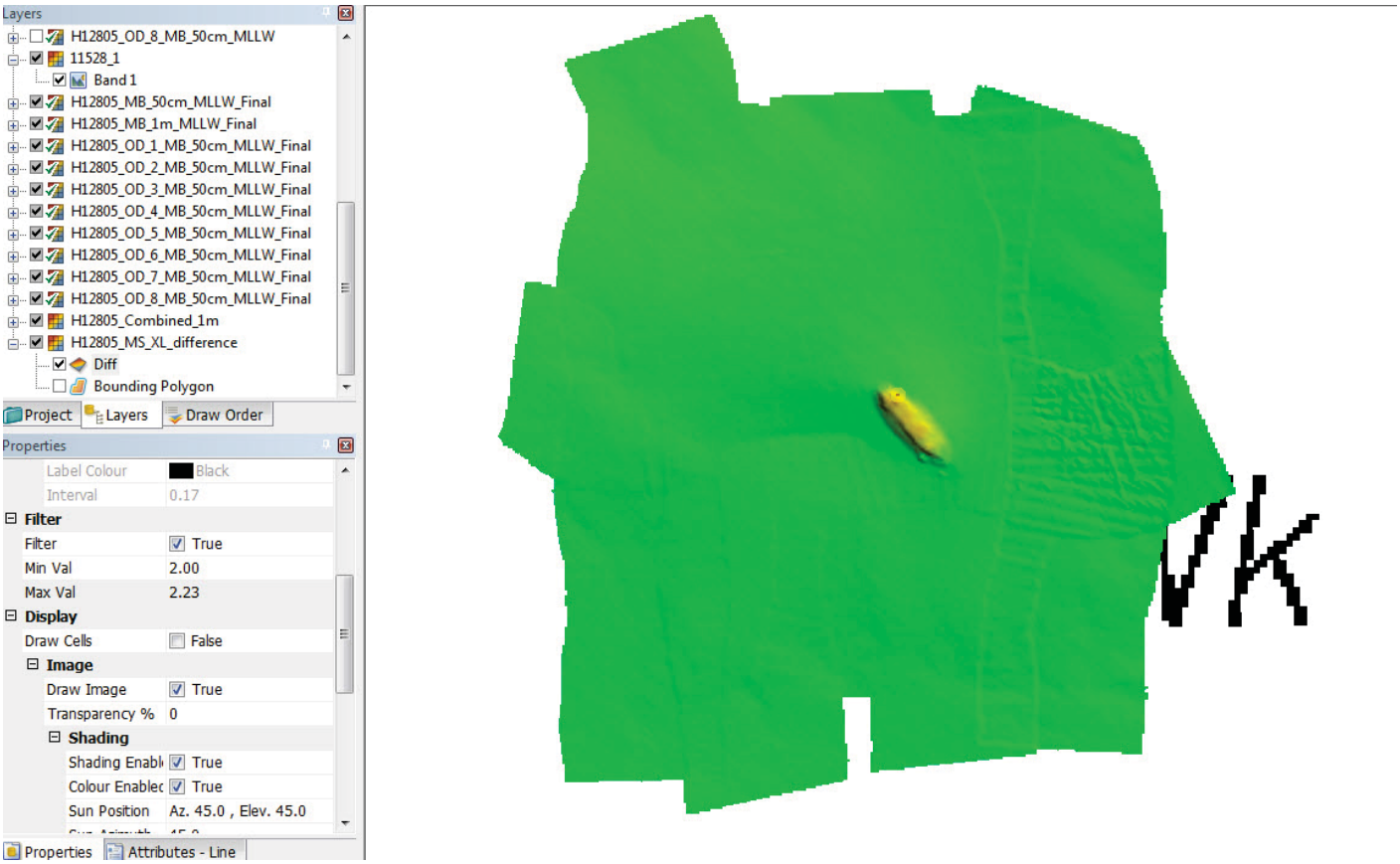


Figure 7: H12805 The maximum value of 2.22m occurs on a charted wreck

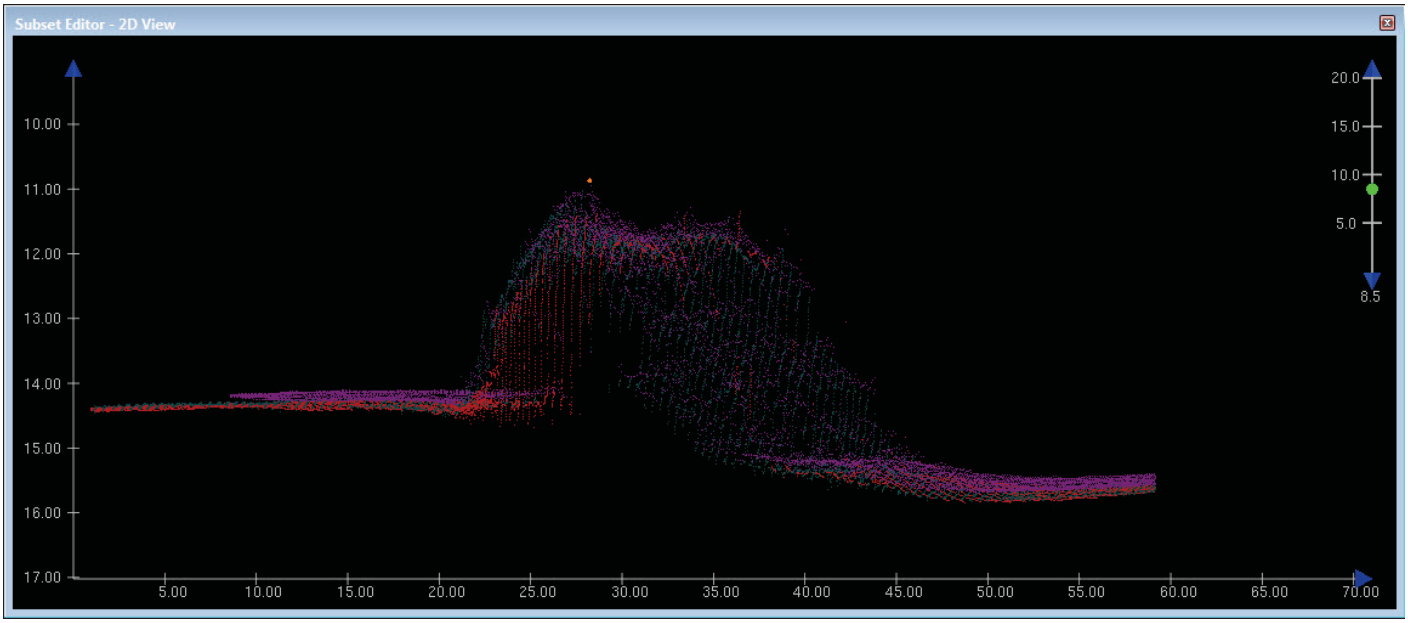


Figure 8: H12805 Subset of the charted wreck

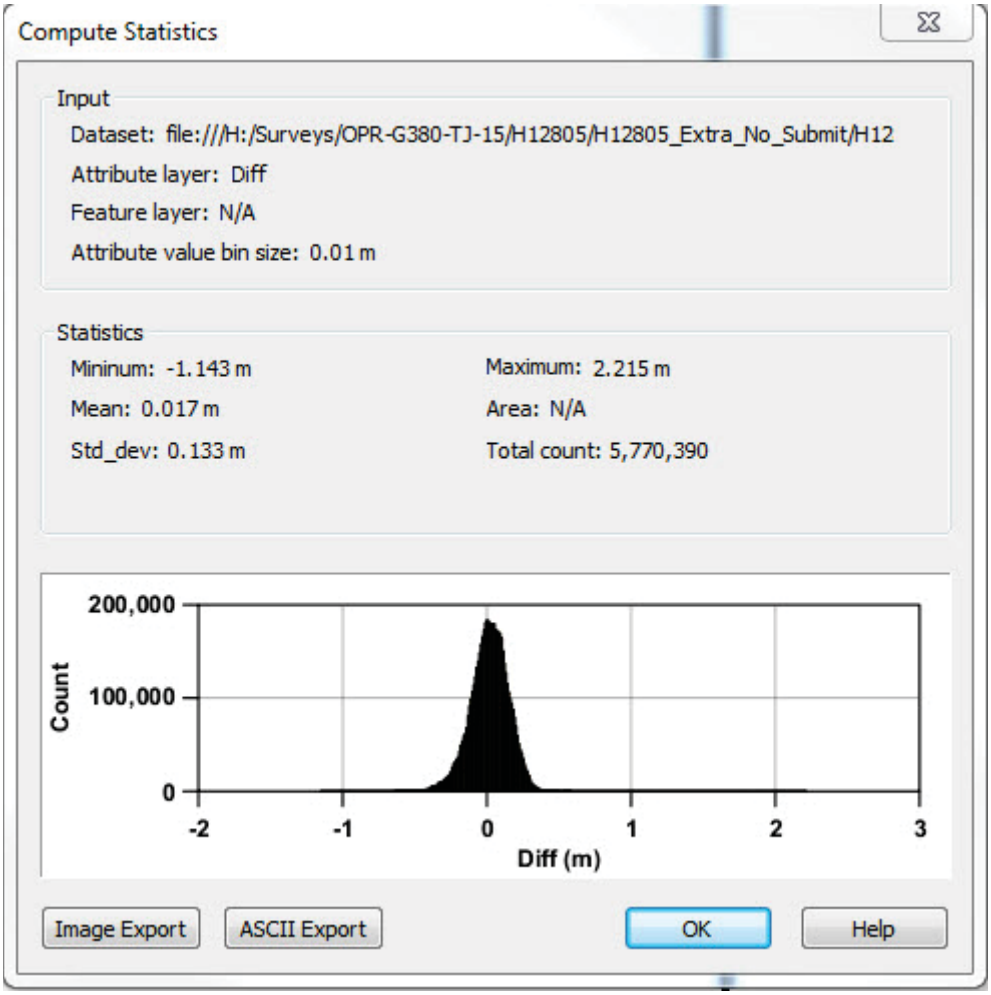


Figure 9: H12792 XL to MS depth difference surface statistics

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning	Method
0 meters	0.125 meters	Discrete Zoning

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
S222	4 meters/second	1 meters/second	0.2 meters/second
3101	4 meters/second	N/A meters/second	0.2 meters/second
3102	4 meters/second	N/A meters/second	0.2 meters/second

Table 7: Survey Specific Sound Speed TPU Values

Total Propagated Uncertainty values for survey H12805 were derived using a combination of: real time uncertainties for vessel motion; a priori values for equipment and vessel characteristics; assigned values for water level uncertainties; and field assigned values for sound speed uncertainties. The real time uncertainties for vessel motion include roll, pitch, gyro, navigation, and elevation. The uncertainties in these measurements were recorded as part of the POSPac post-processed Precise Point Position (5P) positional solution and were applied to the soundings via an SBET RMS file generated by Applanix POSPac. Uncertainties for sonar mounting and vessel speed were assigned using the a priori values found in Appendix 4, table 4.9 of the NOAA Field Procedures Manual (FPM) (ed 2014), and applied to the data via the CARIS HIPS Hydrographic Vessel File. Uncertainties associated with water level measurements and interpolation were automatically calculated as part of the TCARI water levels, and applied to the data during the Merge process. Finally, the uncertainty associated with sound speed measurements were based on the frequency and location of CTD casts, in accordance with the guidance set by Appendix 4 of the FPM (ed 2014).

Total Propagated Uncertainties for the entire survey were evaluated to ensure compliance with section 5.1.3 of NOAA's HSSD (ed 2015). First, the maximum allowable uncertainty for each node was calculated using the equation: -Uncertainty/((0.5^2+((Depth*0.013)^2))^0.5). Second, the ratio between the actual uncertainty and maximum allowed uncertainty was found for each node. For the surface H12805_MB_50cm_MLLW_Final out of 20,915,421 nodes, 10,737 did not meet IHO order 1 standards (or 99.99% meet IHO order 1 uncertainty requirements). Those nodes that do not pass are on obstructions and other features. For the surface H12805_MB_1m_MLLW_Final out of 106,635,473 nodes, 30 did not meet IHO order 1 standards (or 99.99% meet IHO order 1 uncertainty requirements). The nodes that do not pass are located on outer beams.

A custom layer was created for the finalized surface submitted in correlation with survey H12805. The layer was derived from the difference between the calculated uncertainties of individual nodes and the allowable uncertainty at the coupled node. This layer was examined using the CARIS QC report tool. The resulting statistical analysis identified 99.9% of nodes within H12805 met the vertical uncertainty standards of Section 5.1.3 of the 2015 Hydrographic Survey Specifications and Deliverables.

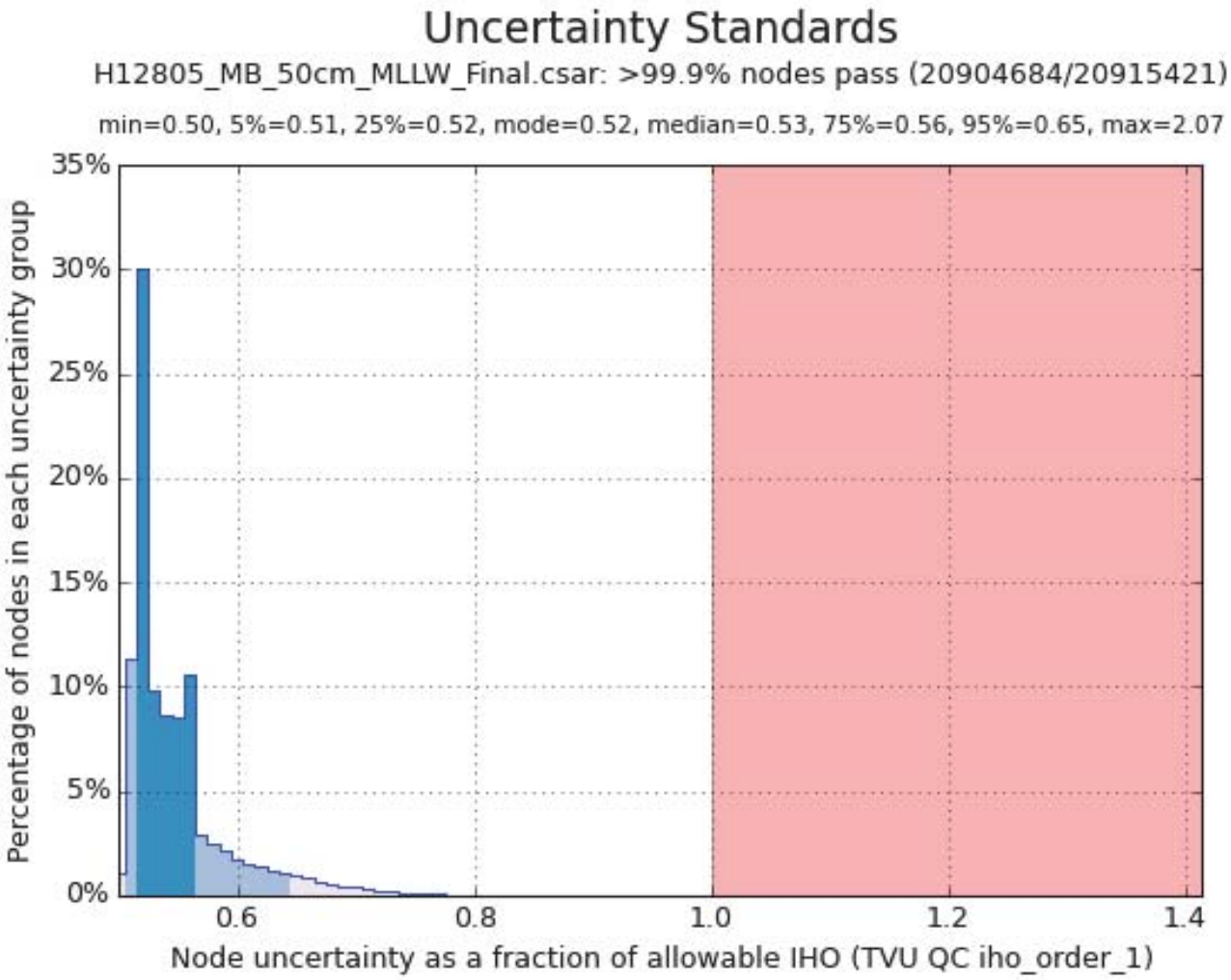


Figure 10: Surface H12805_MB_50cm_MLLW_Final uncertainty standards

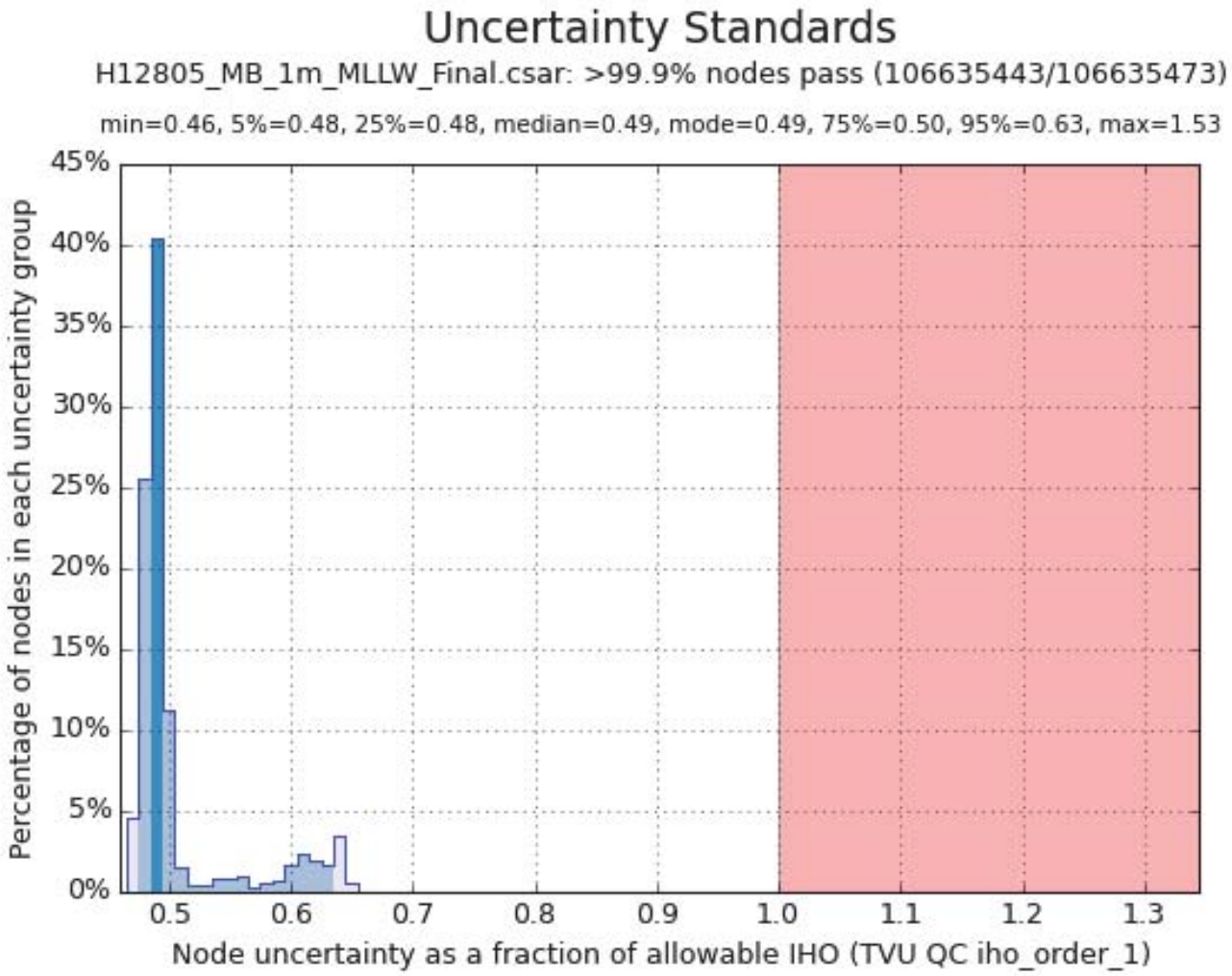


Figure 11: Surface H12805_MB_1m_MLLW_Final uncertainty standards

B.2.3 Junctions

The survey was compared with three juctions acquired by NOAA Ship Thomas Jefferson during the 2015 field season. Depth comparisons were made using a CARIS HIPS generated difference surface as a check that the sonar systems and application of correctors were in agreement within 0.3m.

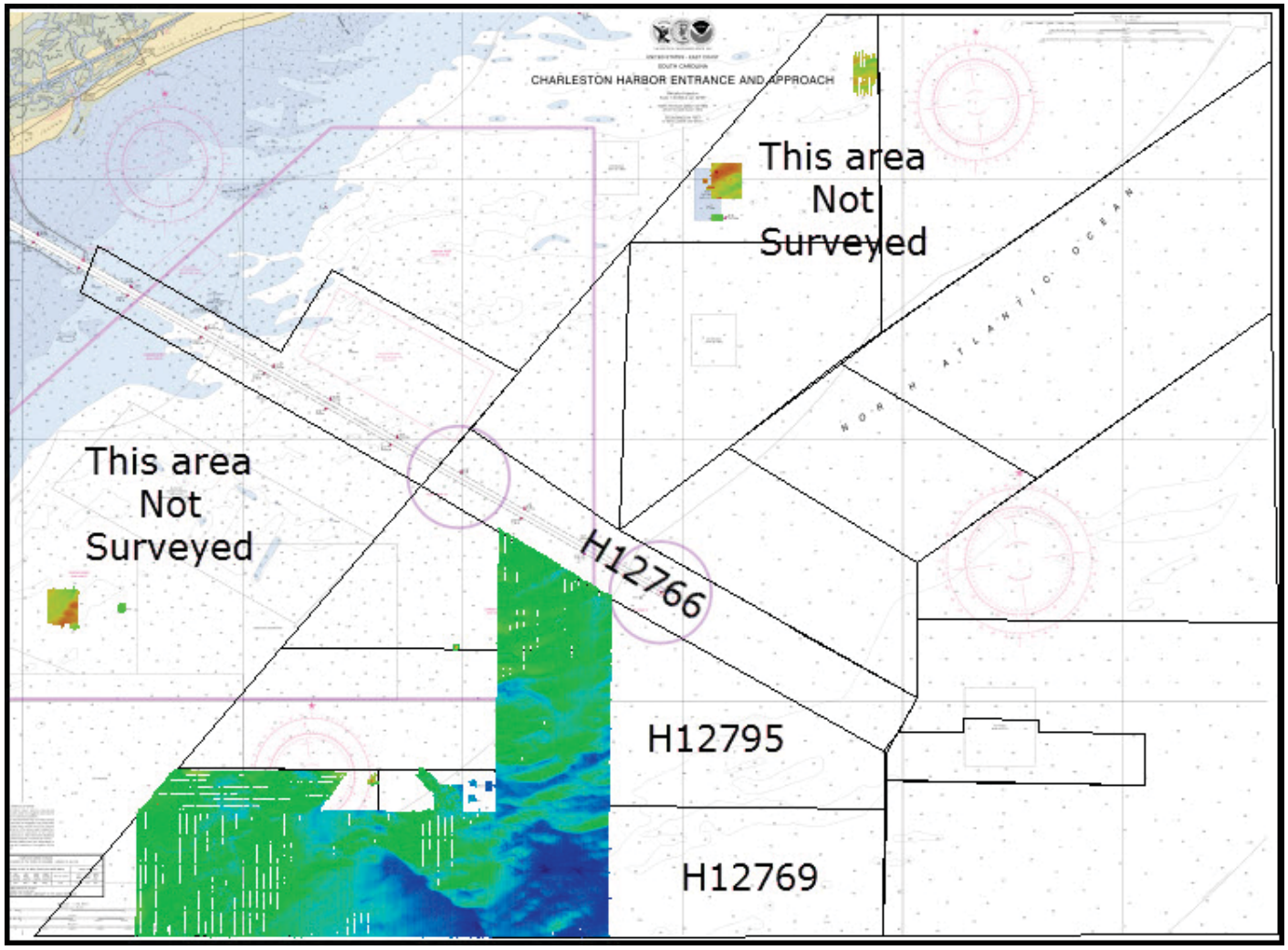


Figure 12: H12805 Junctions

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12766	1:20000	2015	NOAA Ship THOMAS JEFFERSON	N
H12795	1:20000	2015	NOAA Ship THOMAS JEFFERSON	E
H12769	1:20000	2015	NOAA Ship THOMAS JEFFERSON	SE

Table 8: Junctioning Surveys

H12766

The difference between survey H12805 and the junction survey H12766 ranged from -0.50m to 0.31m. The mean was -0.1m and the standard deviation was 0.1m. When differenced, 98.2% of sounding nodes agree within 0.3m

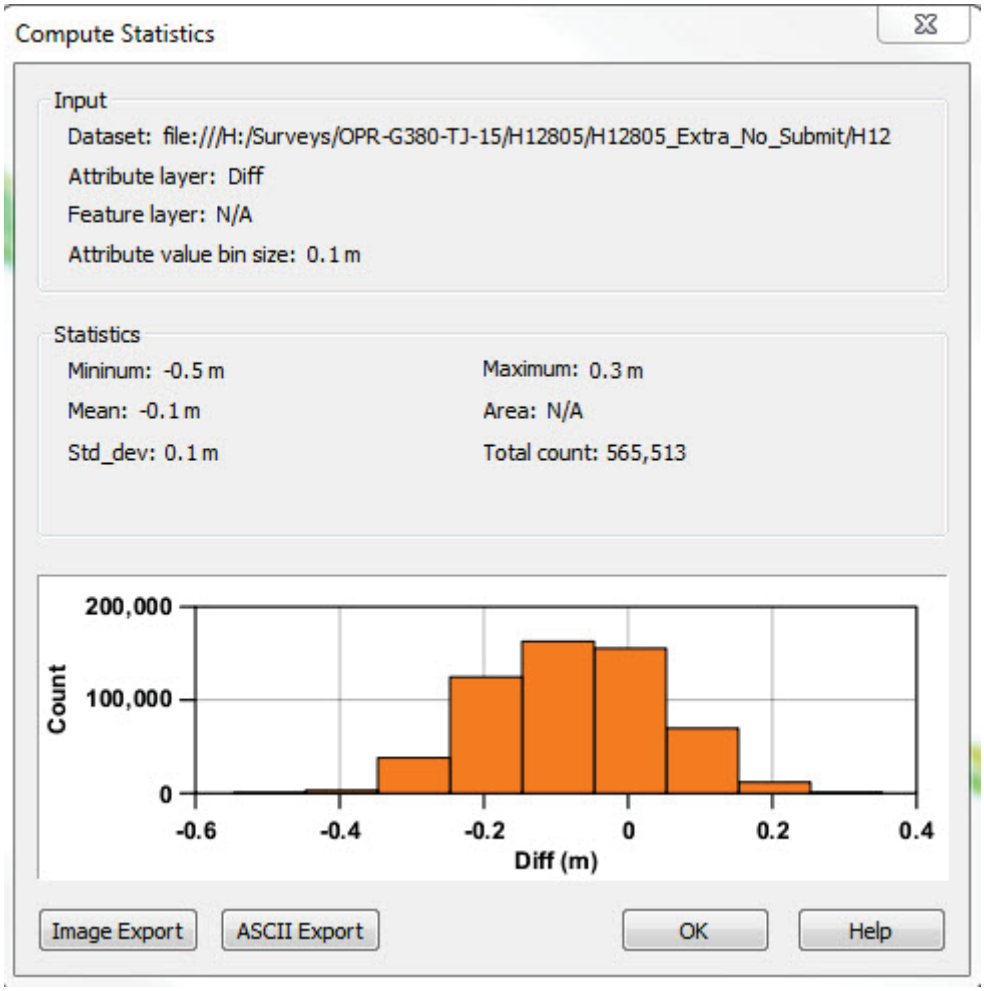


Figure 13: H12805 and junction H12766 statistics

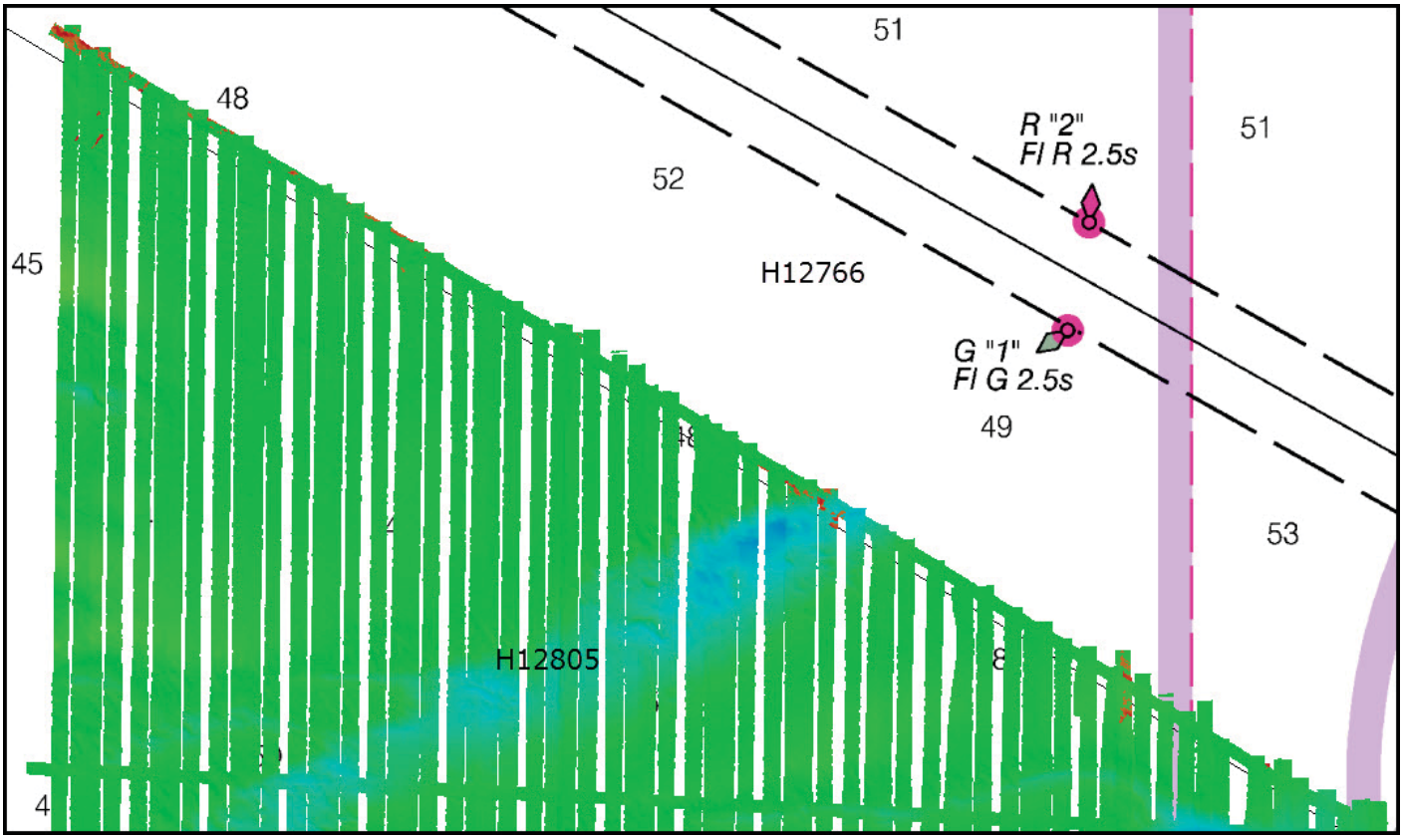


Figure 14: H12805 and junction H12766 orange areas range from -0.31m to -0.50m

H12795

The difference between survey H12805 and the junction survey H12795 ranged from -0.83m to 0.32m. The mean was -0.1m and the standard deviation was 0.1m. When differenced, 95.9% of sounding nodes agree within 0.3m

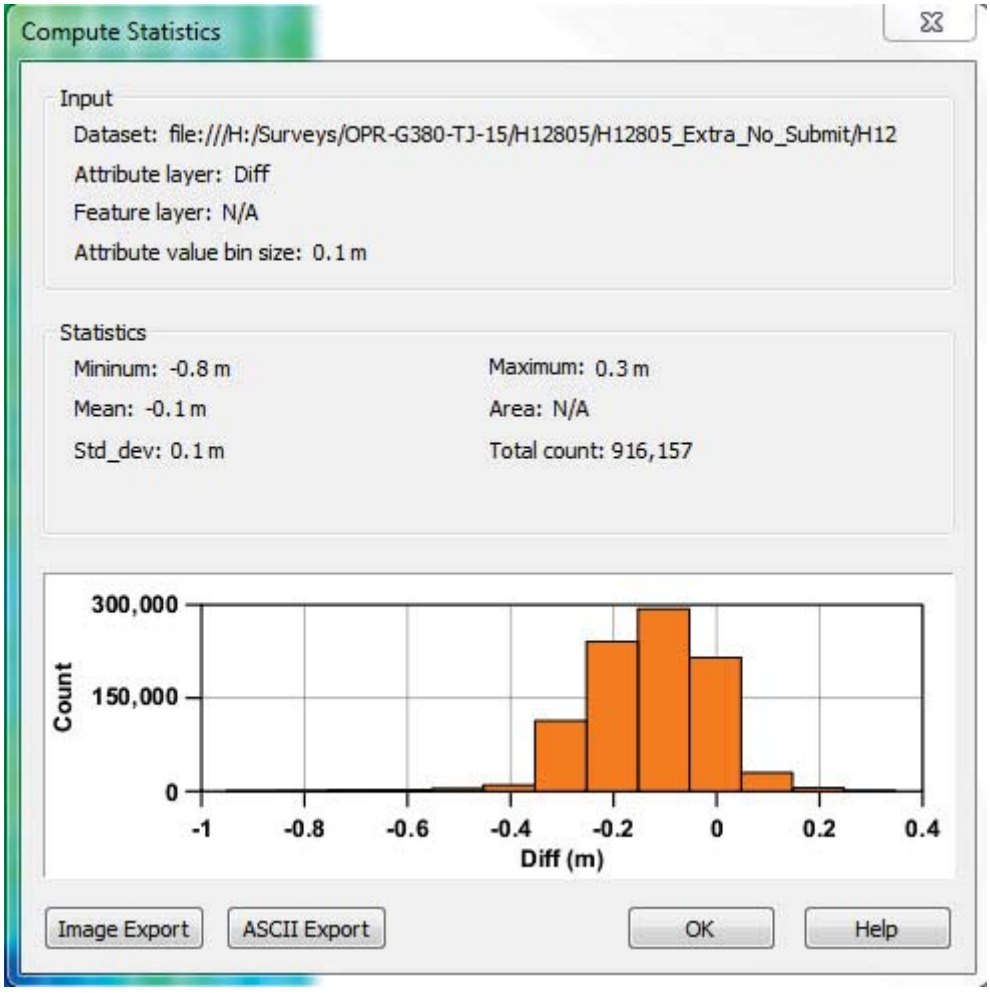


Figure 15: H12805 and junction H12795 statistics

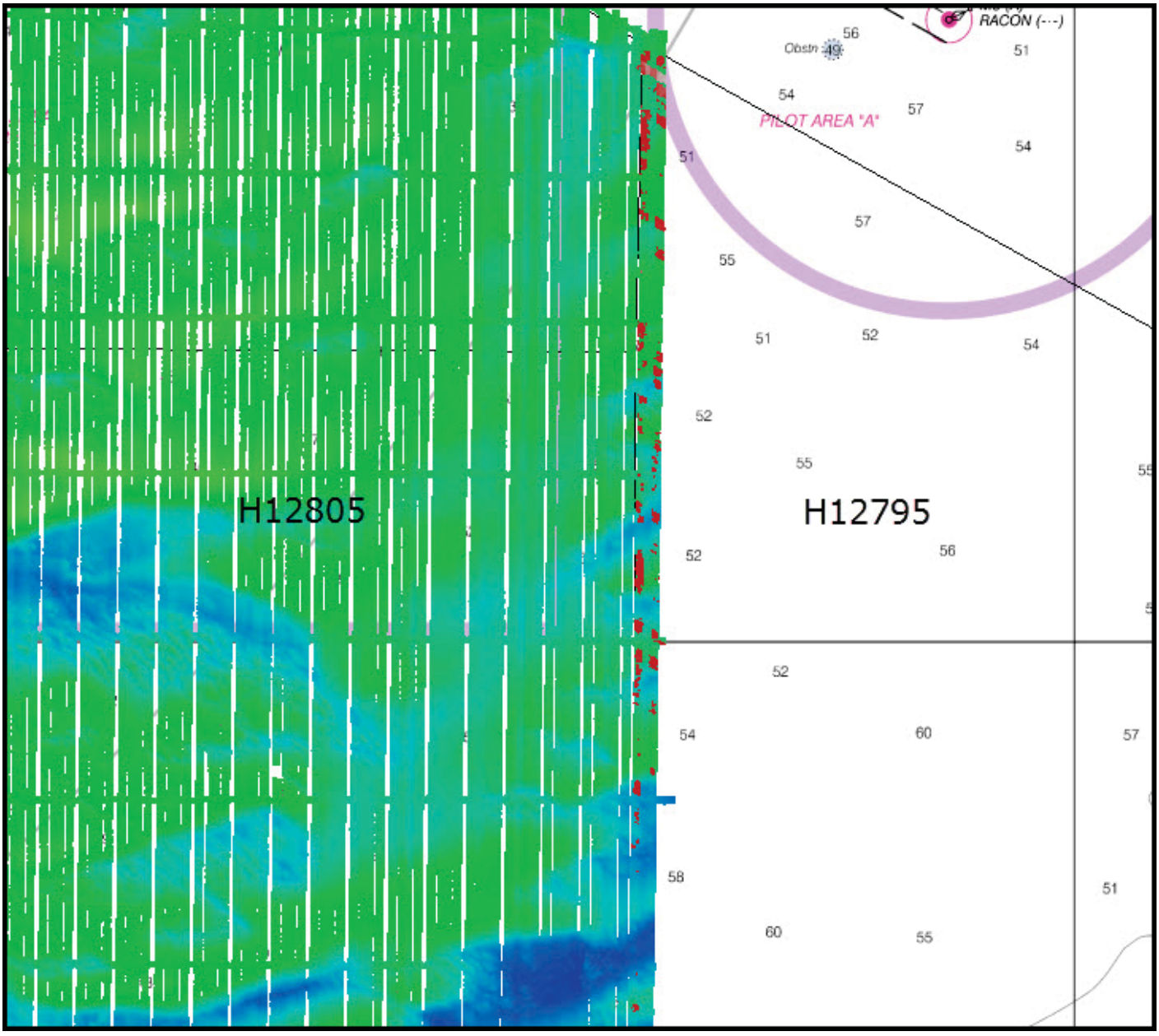


Figure 16: H12805 and junction H12795 red areas range from -0.31m to -0.83m

H12769

The difference between survey H12805 and the junction survey H12769 ranged from -0.30m to 0.26m. The mean was -0.1m and the standard deviation was 0.1m. When differenced, 100% of sounding nodes agree within 0.3m

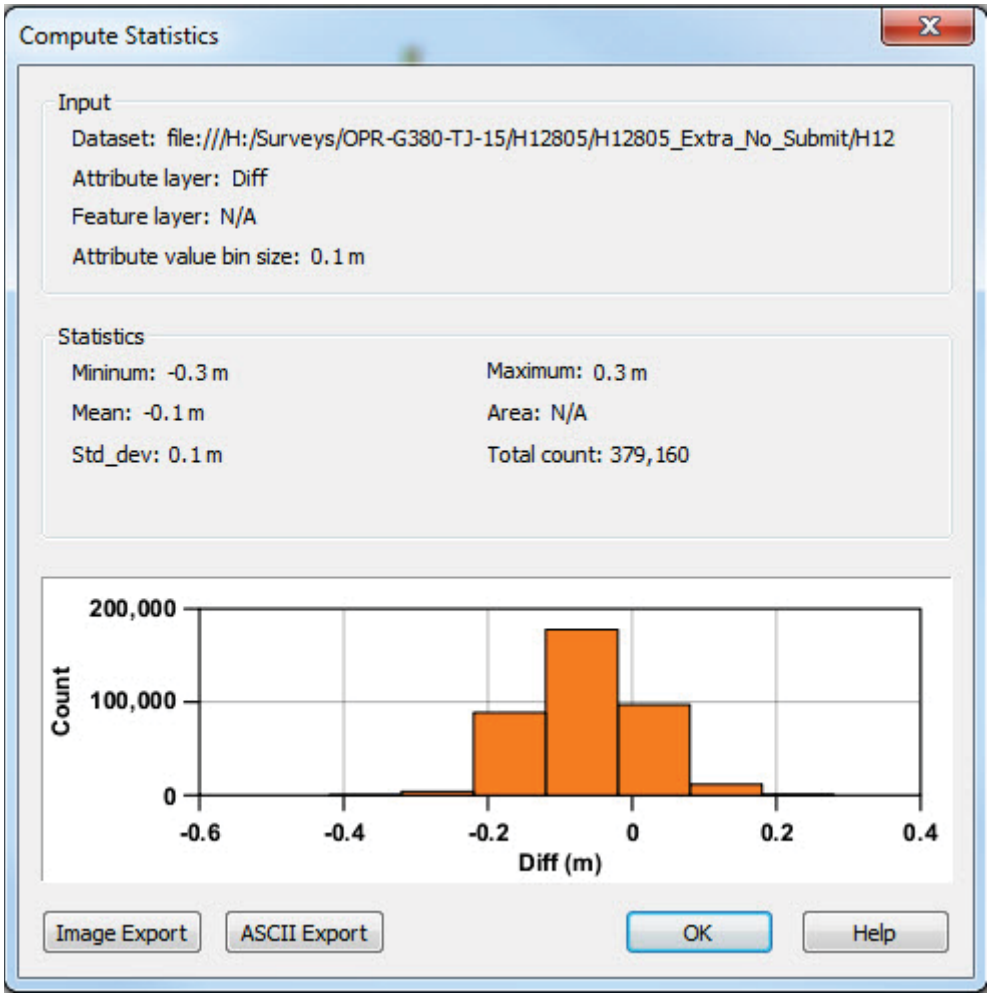


Figure 17: H12805 and junction H12769 statistics

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: Sound speed profiles were acquired from S222 in accordance with HSSD 2015 standards using a Rolls Royce Brooke Ocean MVP 100 approximately every hour with efforts made to evenly distribute the casts spatially and temporally across the survey area. All MVP casts were concatenated into a vessel master file and applied to multibeam data in CARIS using the parameter of nearest in distance within time 1 hour. Sound speed profiles were acquired from launches 3101 and 3102 in accordance with HSSD 2015 standards. The CTD casts were concatenated into vessel master files and applied to multibeam data in CARIS using the parameter of nearest in distance within time 4 hours.

Caris returned the following error when applying SVP nearest in distance within time 1 hour "no SVP was found for the specified time stamp". The following ship lines were applied nearest in distance within time 2 hours 317_173_1315, 317_174_1252, 317_175_1224, and 317_172_1339.

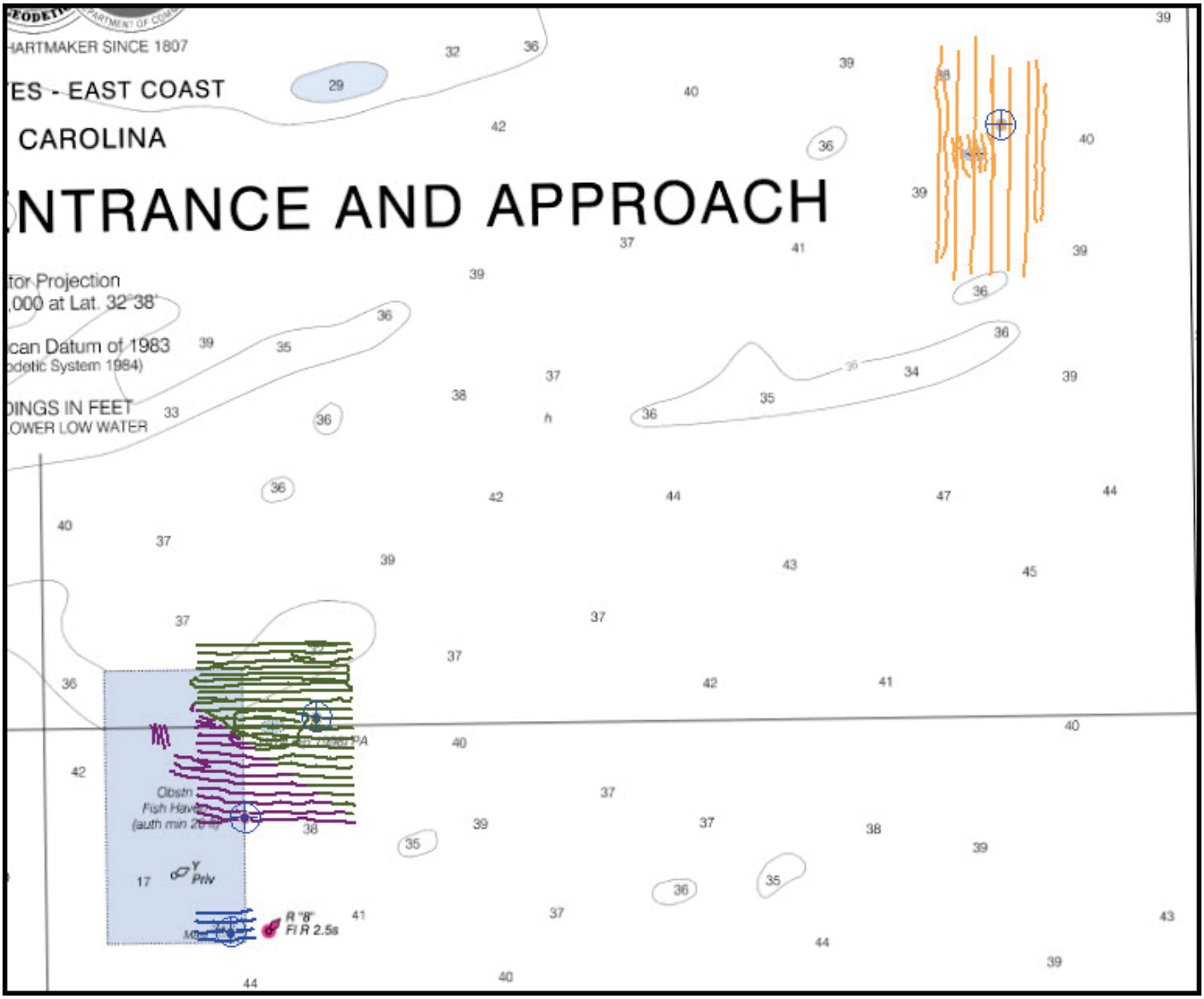


Figure 18: H12805 acquisition lines colored by the corresponding sound speed casts applied north

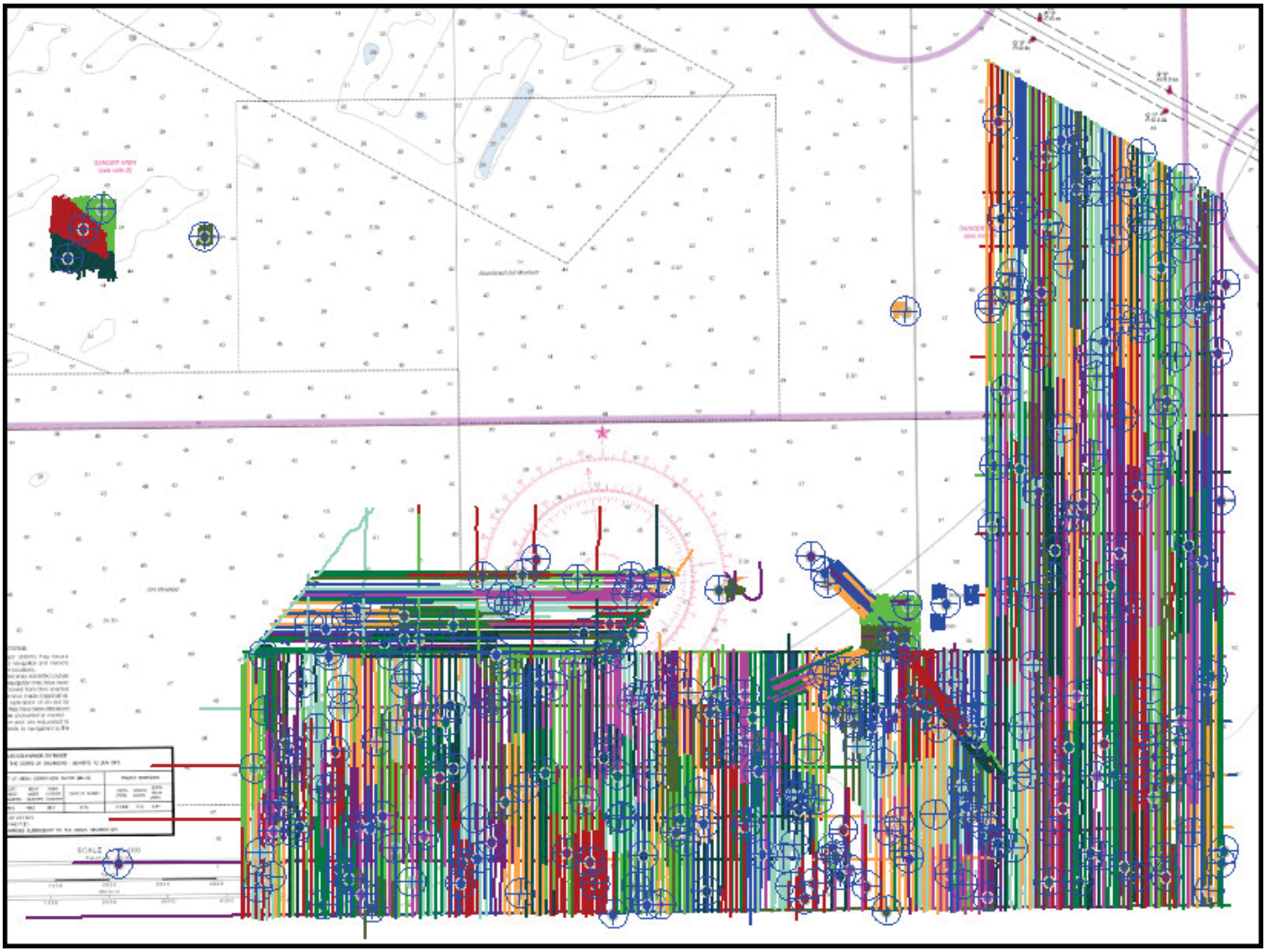


Figure 19: H12805 acquisition lines colored by the corresponding sound speed casts applied south

B.2.8 Coverage Equipment and Methods

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

B.2.9 H12805 Density compliance

Density requirements for H12805 were analyzed using the finalized CSAR QA tool in the Pydro Contributions program. The Chief Hydrographer chose to exceed the specifications for object detection with set line spacing because density requirements were met and bathymetry was better represented using a 1m resolution. The 1 meter surface meets density 99.7% of the time. The 0.5 meter grid meets density 95.4% of the time.

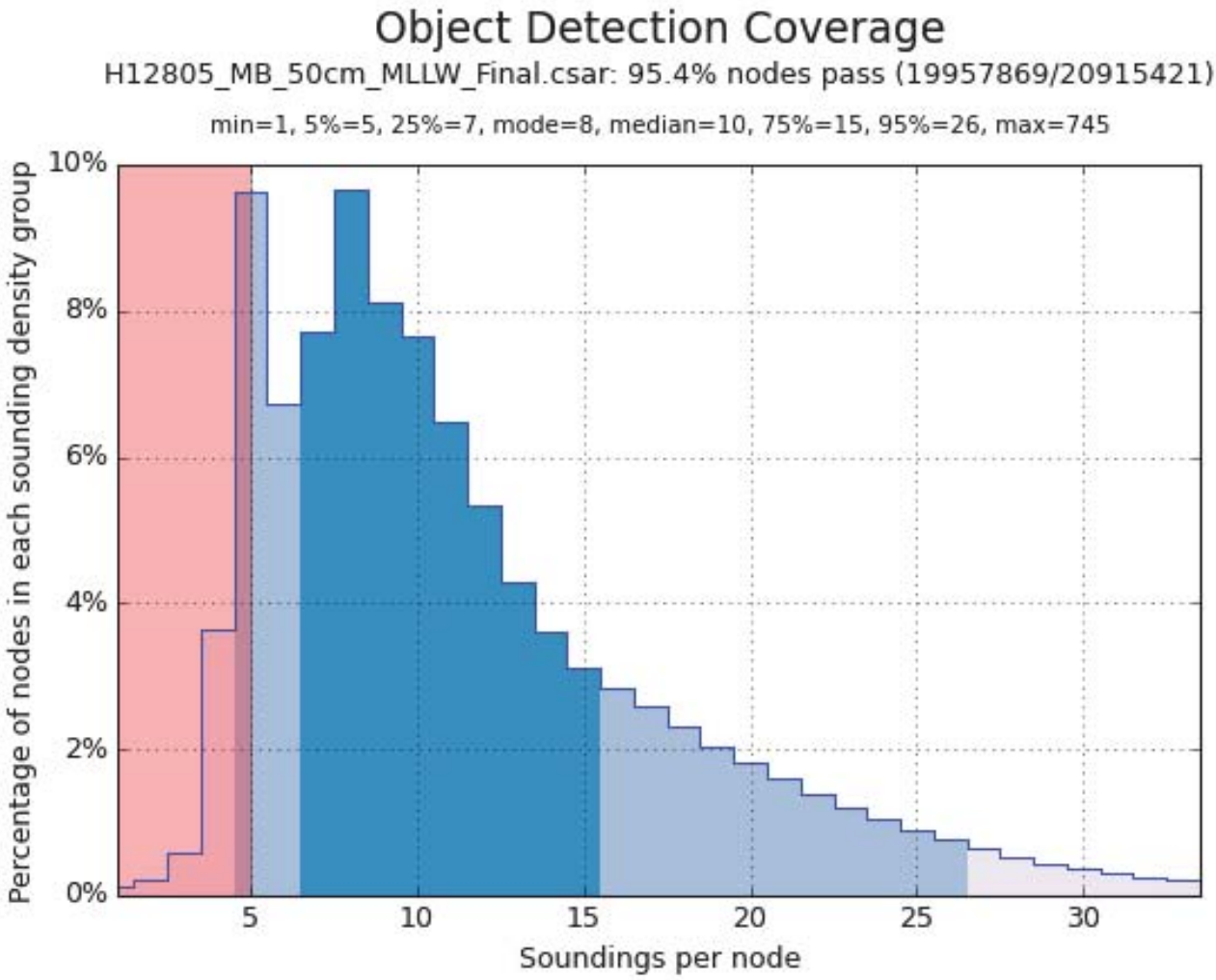


Figure 20: H12805 0.5 meter finalized surface density results

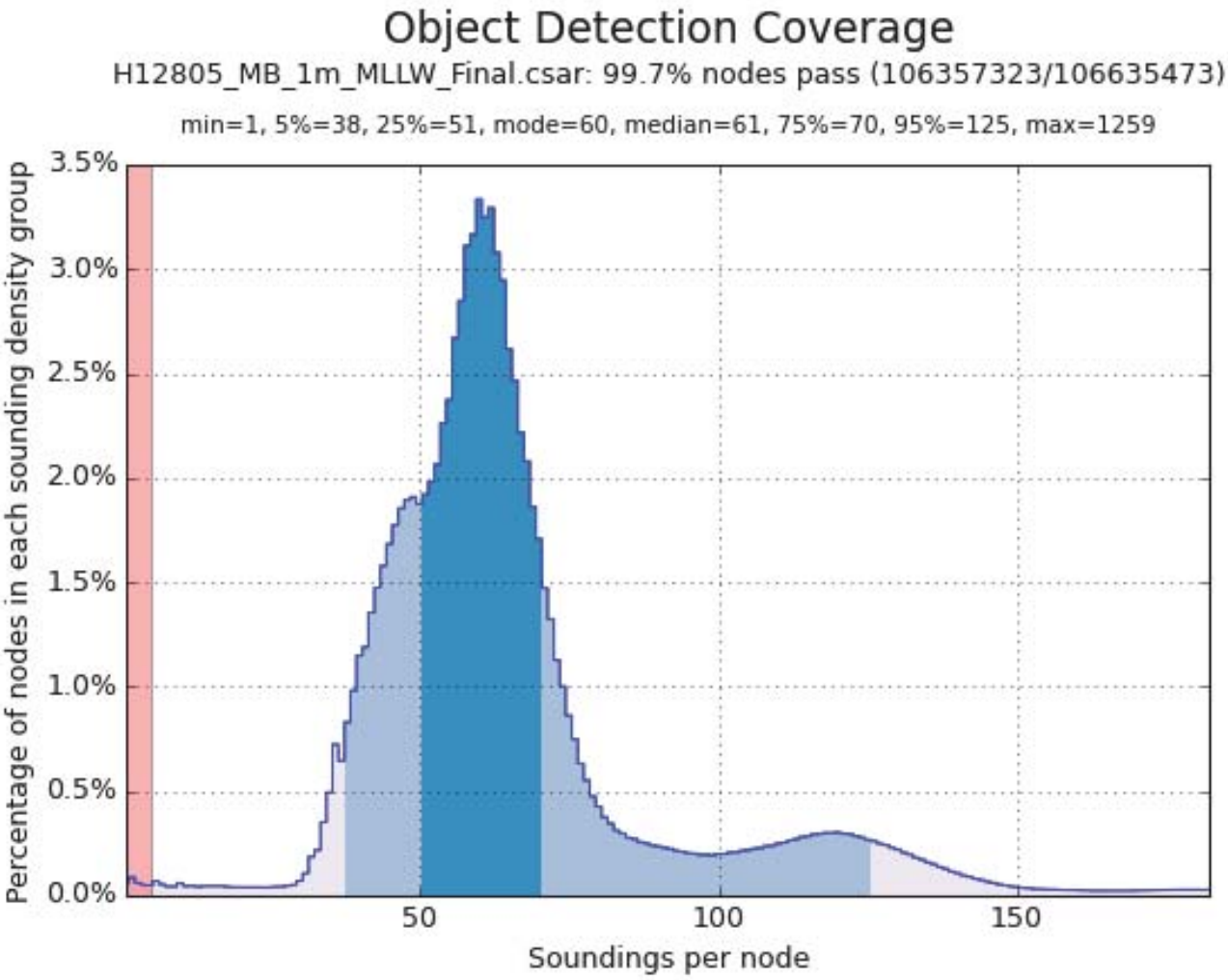


Figure 21: H12805 1 meter finalized surface density results

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

The following calibrations were conducted after the initial system calibration discussed in the DAPR:

Calibration Type	Date	Reason
GAMS	2015-06-15	New antennas were installed on S222

Table 9: Calibrations not discussed in the DAPR.

The following calibrations were conducted after the initial system calibration discussed in the DAPR:

B.4 Backscatter

Backscatter was logged as a 7k file and submitted to the Atlantic Hydrographic Branch for processing. One line per vessel, per day was processed aboard the Thomas Jefferson in order to assess and ensure quality. The only line acquired by S222 on DN313 line number 313_258_2336 failed to process backscatter.

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/SIPS	9.0.20

Table 10: Primary bathymetric data processing software

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

Manufacturer	Name	Version
Caris	HIPS/SIPS	9.0.20

Table 11: Primary imagery data processing software

The following Feature Object Catalog was used: NOAA Profile V_5_3.3

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
H12805_SSS_100_1m	SSS Mosaic	1 meters	0 meters - 0 meters	N/A	100% SSS
H12805_SSS_200_1m	SSS Mosaic	1 meters	0 meters - 0 meters	N/A	200% SSS
H12805_MB_50cm_MLLW_Final	CUBE	0.5 meters	6.99 meters - 19.89 meters	NOAA_0.5m	Object Detection
H12805_MB_1m_MLLW_Final	CUBE	1 meters	8.98 meters - 22.31 meters	NOAA_1m	MBES Trackline Set Line Spacing
H12805_OD_1_MB_50cm_MLLW_Final	CUBE	0.5 meters	13.09 meters - 19.89 meters	NOAA_0.5m	Object Detection
H12805_OD_2_MB_50cm_MLLW_Final	CUBE	0.5 meters	8.98 meters - 14.77 meters	NOAA_0.5m	Object Detection
H12805_OD_3_MB_50cm_MLLW_Final	CUBE	0.5 meters	15.37 meters - 16.62 meters	NOAA_0.5m	Object Detection
H12805_OD_4_MB_50cm_MLLW_Final	CUBE	0.5 meters	15.56 meters - 17.28 meters	NOAA_0.5m	Object Detection
H12805_OD_5_MB_50cm_MLLW_Final	CUBE	0.5 meters	14.74 meters - 15.78 meters	NOAA_0.5m	Object Detection
H12805_OD_6_MB_50cm_MLLW_Final	CUBE	0.5 meters	15.40 meters - 18.25 meters	NOAA_0.5m	Object Detection
H12805_OD_7_MB_50cm_MLLW_Final	CUBE	0.5 meters	14.58 meters - 17.88 meters	NOAA_0.5m	Object Detection
H12805_OD_8_MB_50cm_MLLW_Final	CUBE	0.5 meters	10.88 meters - 14.80 meters	NOAA_0.5m	Object Detection

Table 12: Submitted Surfaces

Object detection surfaces were created for features found and covered with multibeam in the set line spacing area. The object detection surfaces are labeled below.

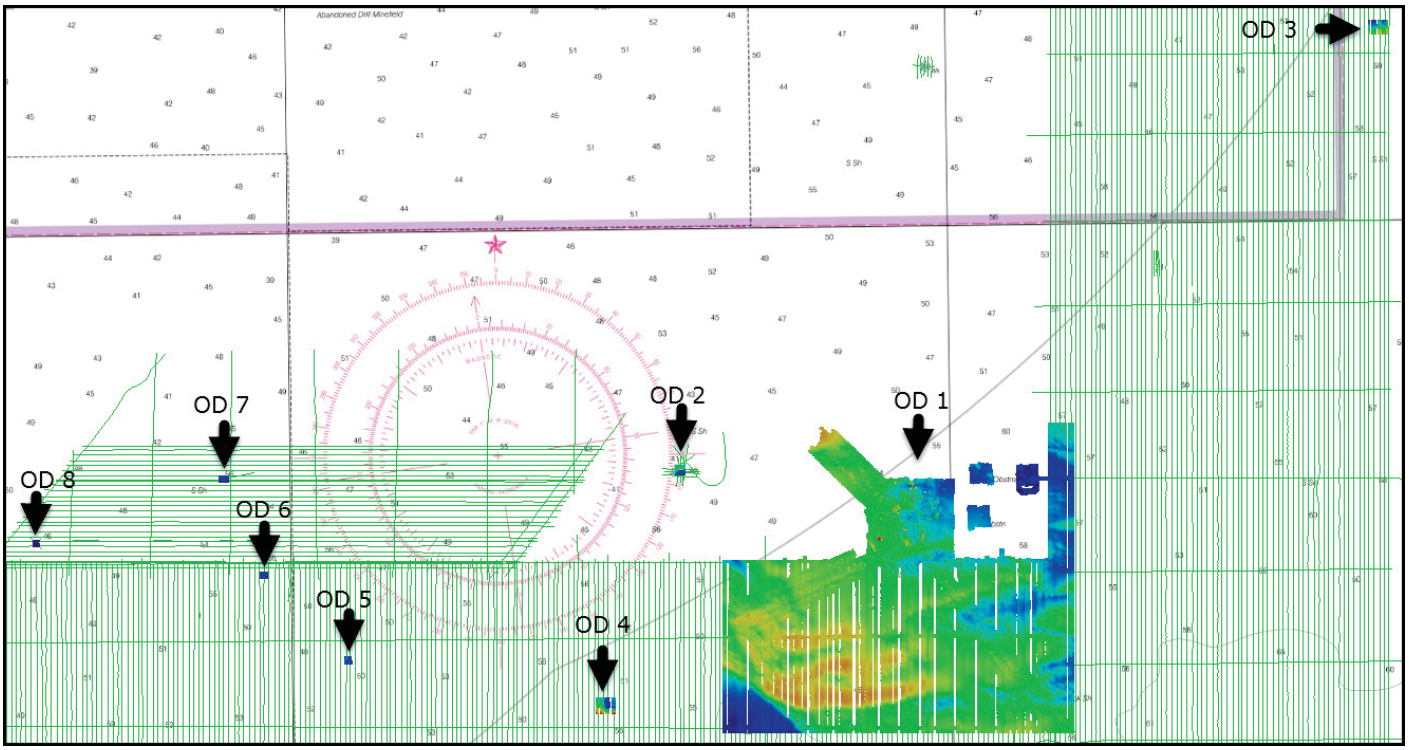


Figure 22: H12805 object detection surfaces layout

B.5.3 S222 Trueheave Problems

On DN312 the 111 box in the POS/MV controller was not checked for acquiring true heave. This is required for applying delayed heave in Caris.

ON DN319 gaps of greater than the allowable 4 seconds were present. There was also a Caris crash when trying to apply the delayed heave. This affects all of the lines acquired in the morning (lines 319_271_0010 to 319_268_1133). None of these lines have delayed heave applied. There is a higher uncertainty on the lines that do not have delayed heave applied. There is also higher uncertainty in the obstruction areas.

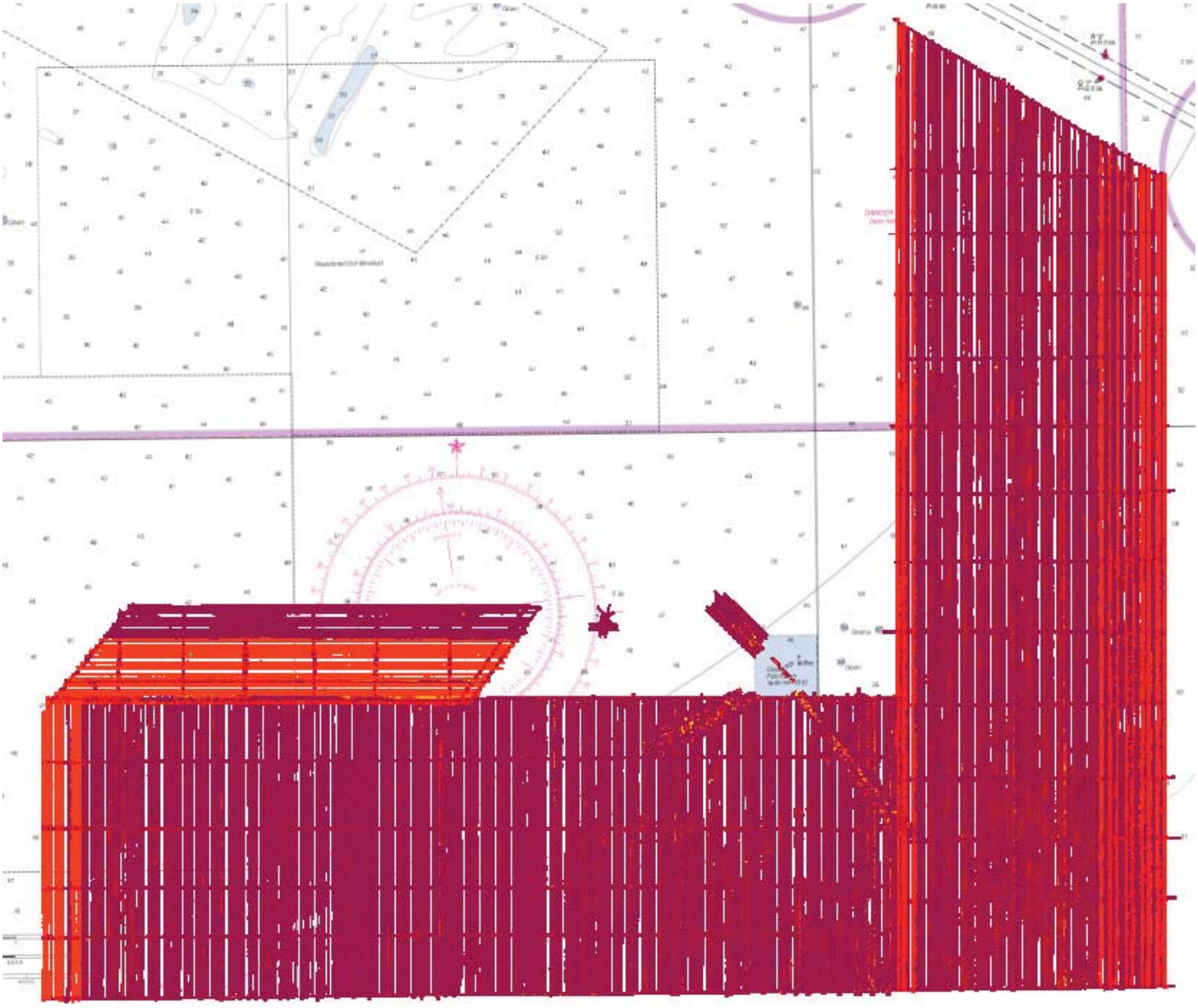


Figure 23: H12805 High uncertainty on lines without delayed heave (bright orange)

B.5.4 Multibeam Data Filters

A swath filter was applied to the data to remove sonar side lobe anomalies in the RESON SV2 system. The filter used logic that rejected bathymetric data points beyond 60 degrees on either side of nadir. The filter was only applied to cross lines. All other erroneous data was manually rejected by the hydrographer during normal data processing and editing.

B.5.5 H12805 Vertical Offsets

There are vertical offsets present. These are caused by slight ERS issues. There appears to be a slight offset issue as well. These do not exceed 0.46 meters.

Vertical offsets are present in the obstruction areas acquired by the ship. These do not exceed 0.50cm.

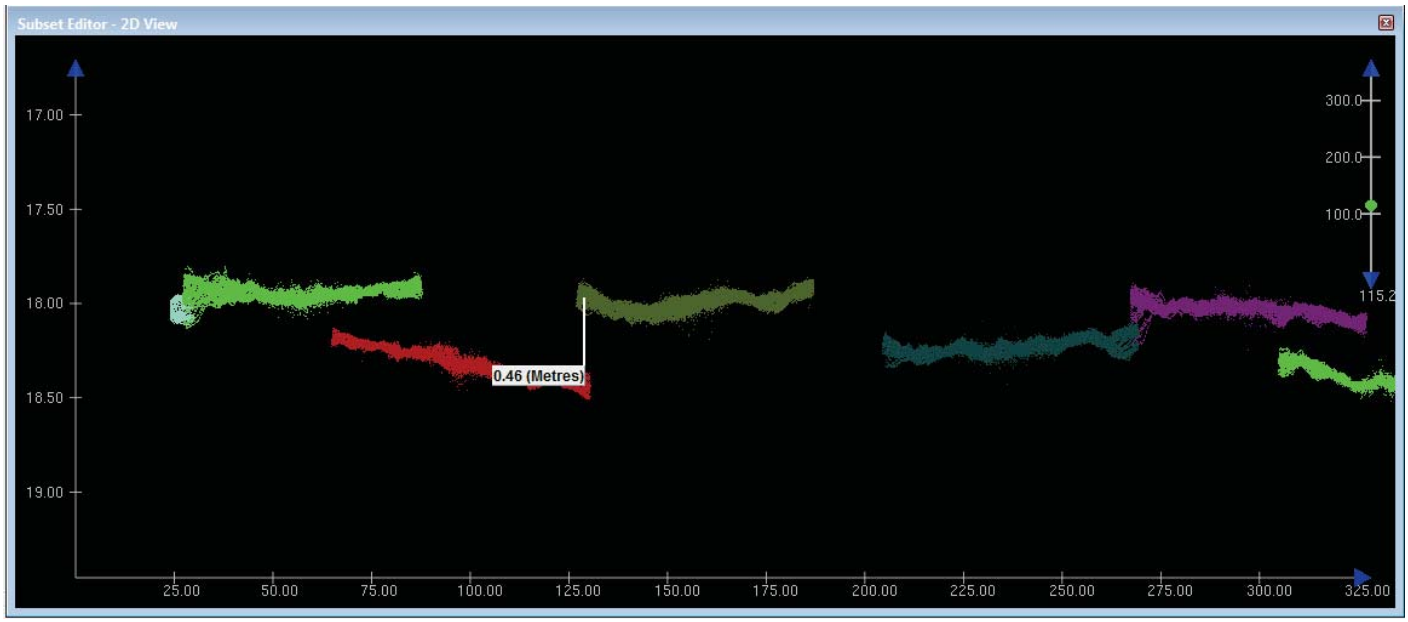


Figure 24: H12805 vertical offsets example

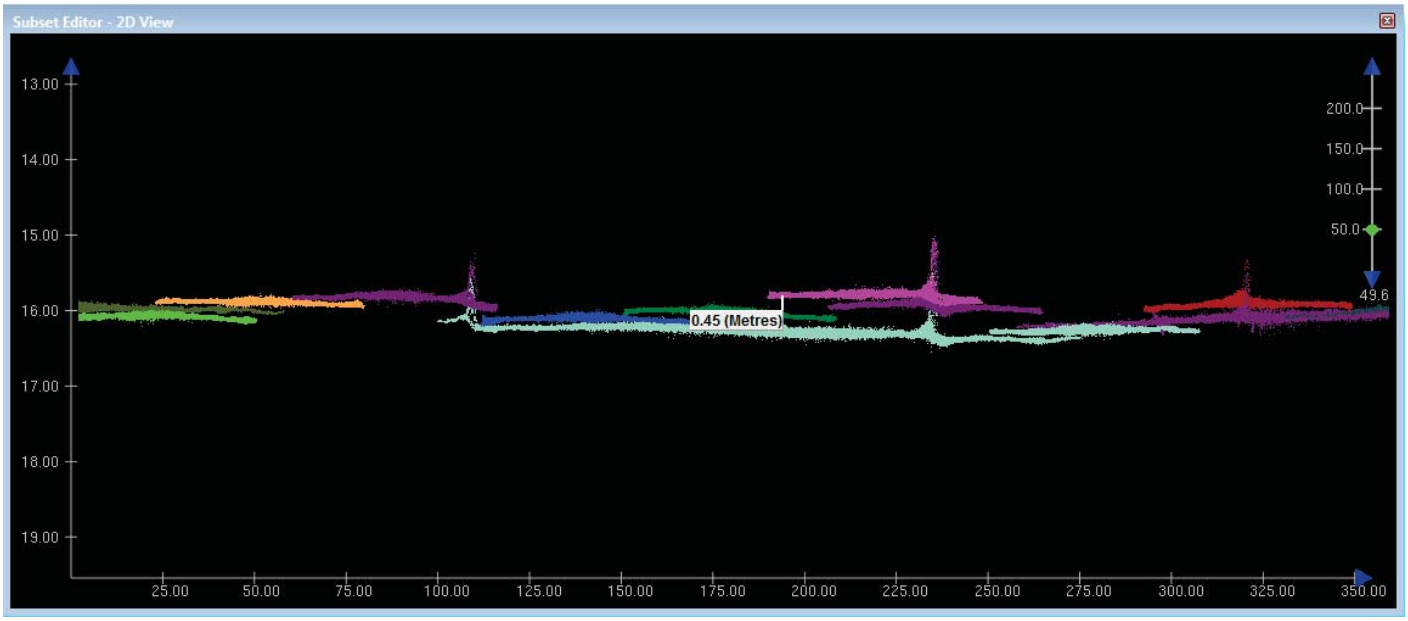


Figure 25: H12805 obstruction area offsets example

B.5.6 H12805 HDCS Division

This survey is divided into four HDCS processing projects. There are two projects for the multibeam as well as two projects for the side scan. Due to the size of the project this was deemed necessary to allow

multiple users to be able to process the data. Caris can open multiple hips files so the project can be treated as a whole.

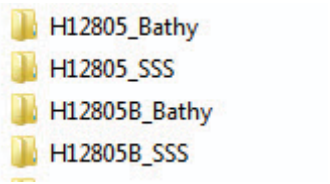


Figure 26: H12805 HDCS projects

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.

Non-Standard Vertical Control Methods Used:

VDatum

Ellipsoid to Chart Datum Separation File:

2015_G380_VDatum_NAD83_MLLW_rev2.csar

All soundings submitted as H12805 are reduced to MLLW using documented VDatum techniques. If it is deemed necessary to change the water level reduction method to discrete zoning the following additional information will be useful:
1) The National Water Level Observation Network (NWLON) stations serving as datum control for this survey is Charleston, SC (8665530).
2) The submitted water level files (8665530_Verified.tid) are the final approved water levels for the period of hydrography. These files have been loaded to all CARIS lines submitted as H12805.
3) The submitted tide corrector (G380TJ2015CORP.zdf) is the preliminary zoning file that was accepted as final per final tide note, submitted in Appendix I. This file has been loaded to all CARIS lines submitted as H12805.
4) A request for final approved tides was sent to COOPS on 17 November, 2015. The final tide note was received on 1 December 2015, stating that preliminary zoning is accepted as the final zoning for project OPR-G380-TJ-15, H12805,
during the time period between 5 November 2015 and 16 November 2015.

C.2 Horizontal Control

The horizontal datum for this project is North American Datum of 1983 (NAD83).

The projection used for this project is The projection used for this project is UTM zone 17 north. Additional information disucssing the use of 5P for this survey can be found in the accommapnying DAPR..

D. Results and Recommendations

D.1 Chart Comparison

Chart comparison procedures were followed as outlined in section 4.5 of the FPM (2014 ed) and section 8.1.4 sub section D.1 of the HSSD (2015 ed). The ENC and RNC versions of the relevant charts were reviewed to ensure that the latest USCG Local Notice to Mariners (LNM) has been applied.

Chart comparisons for survey H12805 were conducted using a selected sounding set over plot removed to a map scale of 1:30000. In CARIS BDB, the soundings were then converted into a point cloud, from which a 1m interpolated surface was generated. Contouring was run on the interpolated surface and the results are listed below.

D.1.1 Raster Charts

The following are the largest scale raster charts, which cover the survey area:

Chart	Scale	Edition	Edition Date	LNM Date	NM Date
11528	1:40000	11	05/2004	01/18/2014	01/07/2014

Table 13: Largest Scale Raster Charts

11528

Most of the soundings agree within two feet. The largest area of change is near a charted depth of 51 feet. There is a charted 51 foot wire drag that is no longer relevant. These images are shown below. There is some shifting of the contours. Some charted soundings were not surveyed due to the set line spacing of the survey. The Hydrographer recommends updating all contours and soundings with the digital data from survey H12805.

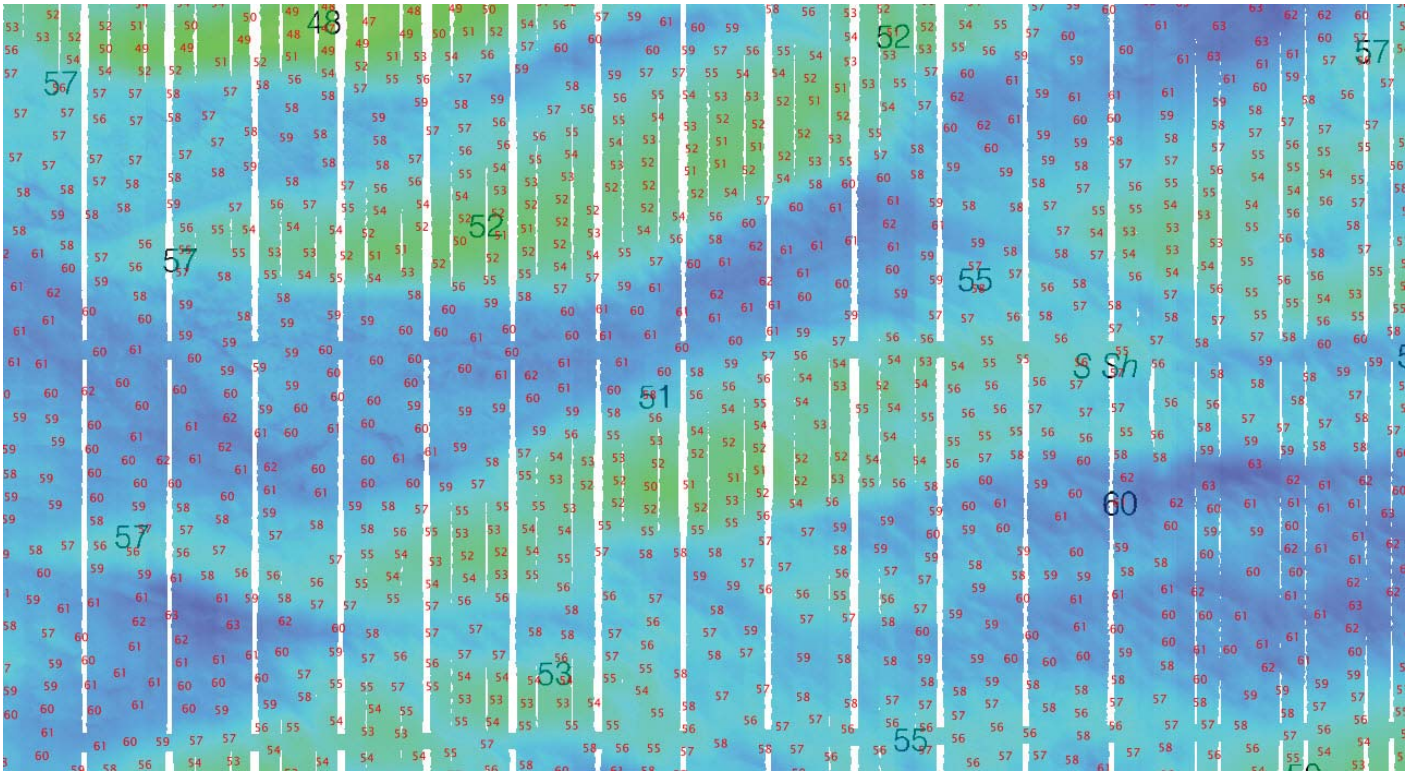


Figure 27: H12805 Soundings vs charted soundings

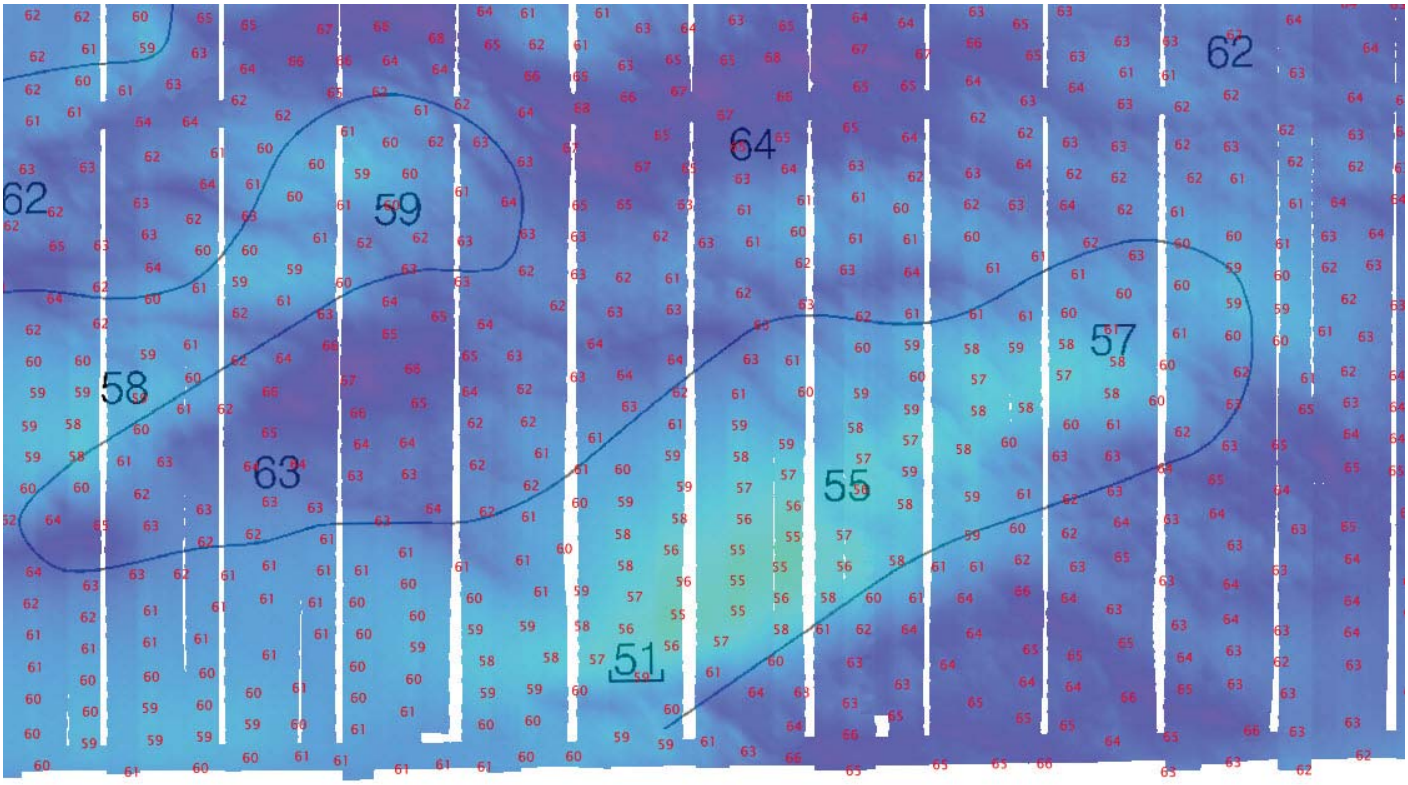


Figure 28: H12805 charted 51 foot wire drag

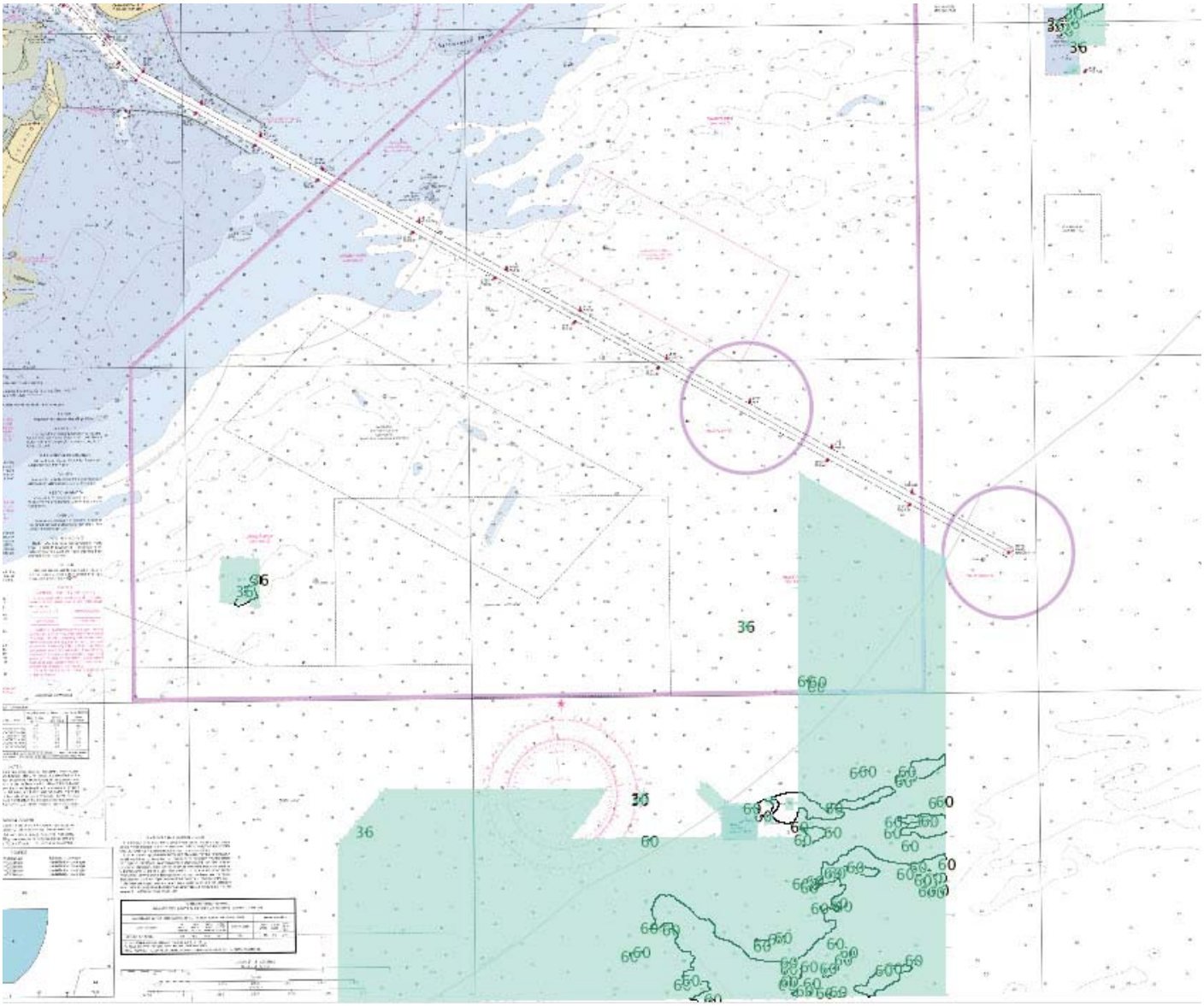


Figure 29: H12805 Contours layout

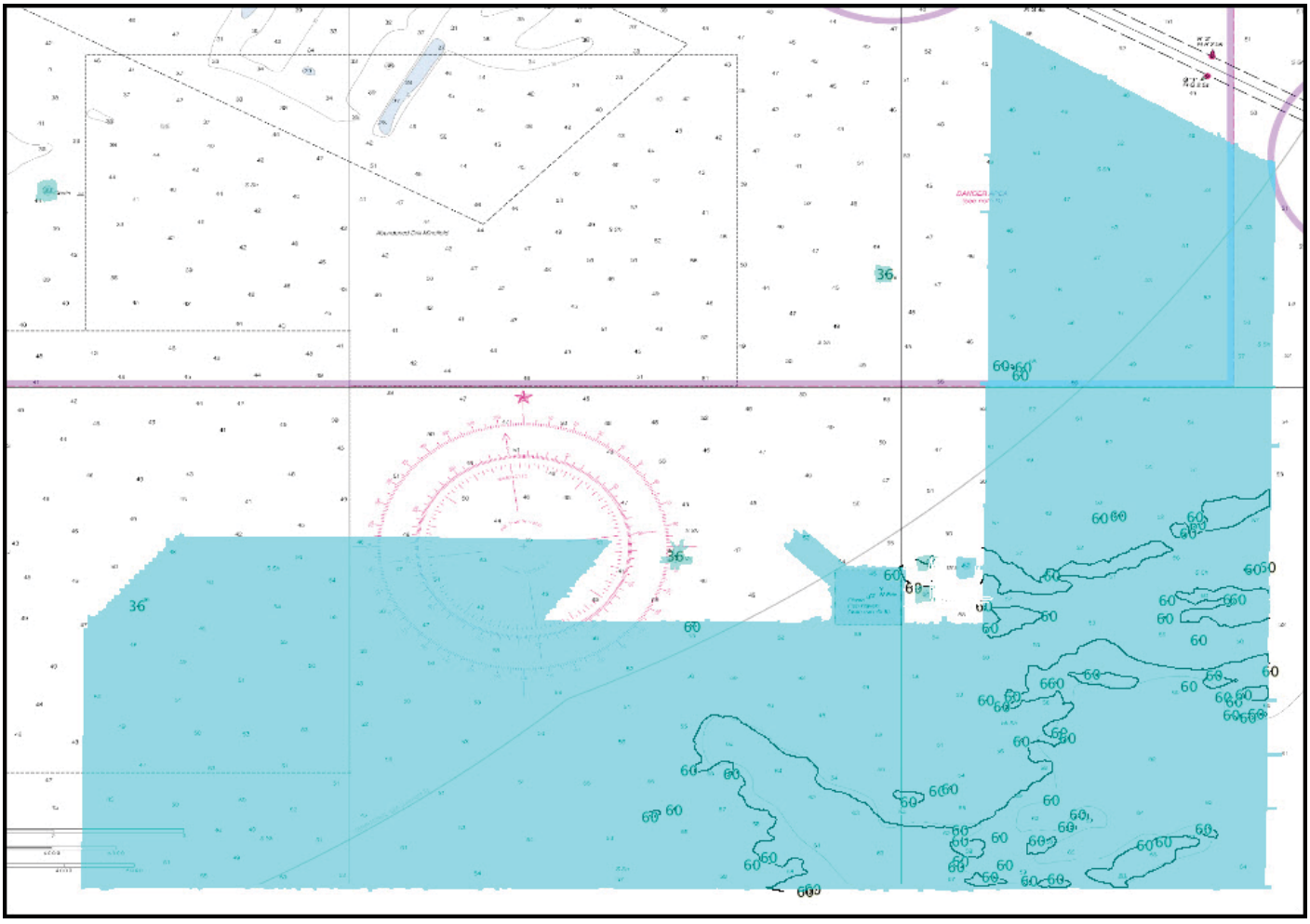


Figure 30: H12805 Contours main area

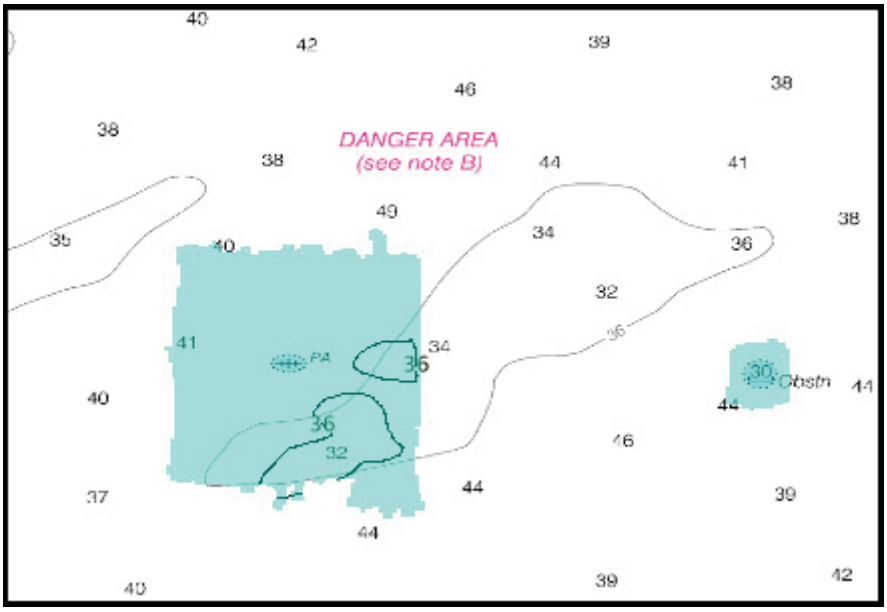


Figure 31: H12805 Contours west

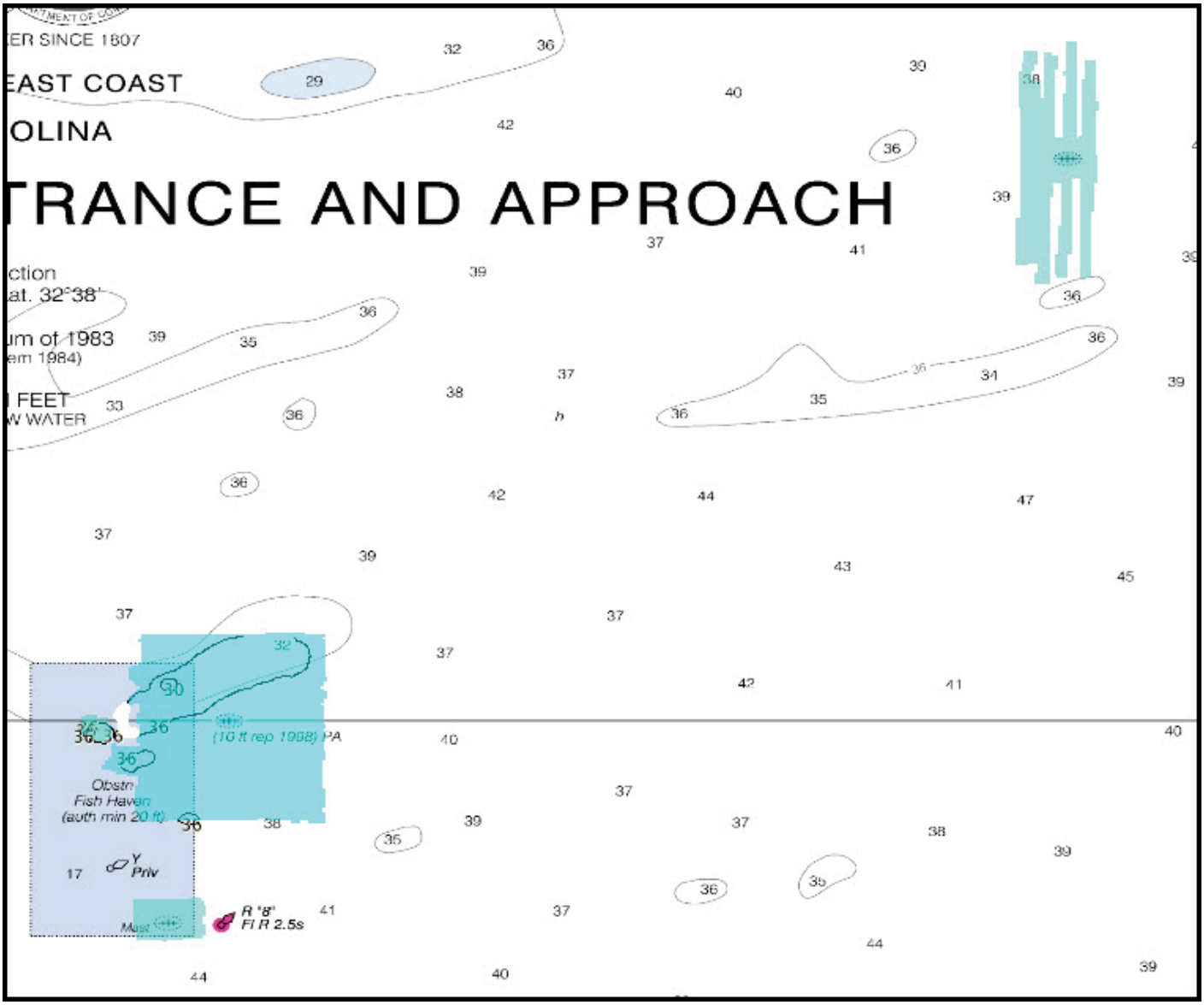


Figure 32: H12805 Contours north

D.1.2 Electronic Navigational Charts

The following are the largest scale ENCs, which cover the survey area:

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US5SC25M	1:40000	1	NaN/ NaN/NaN	11/19/2015	NO

Table 14: Largest Scale ENCs

US5SC25M

In general, survey H12805 is in agreement with ENC US5SC25M. Most of the soundings agree within 0.6meters. The largest area of change occurs on the east side. There are depths up to 0.9 meters deeper than charted.

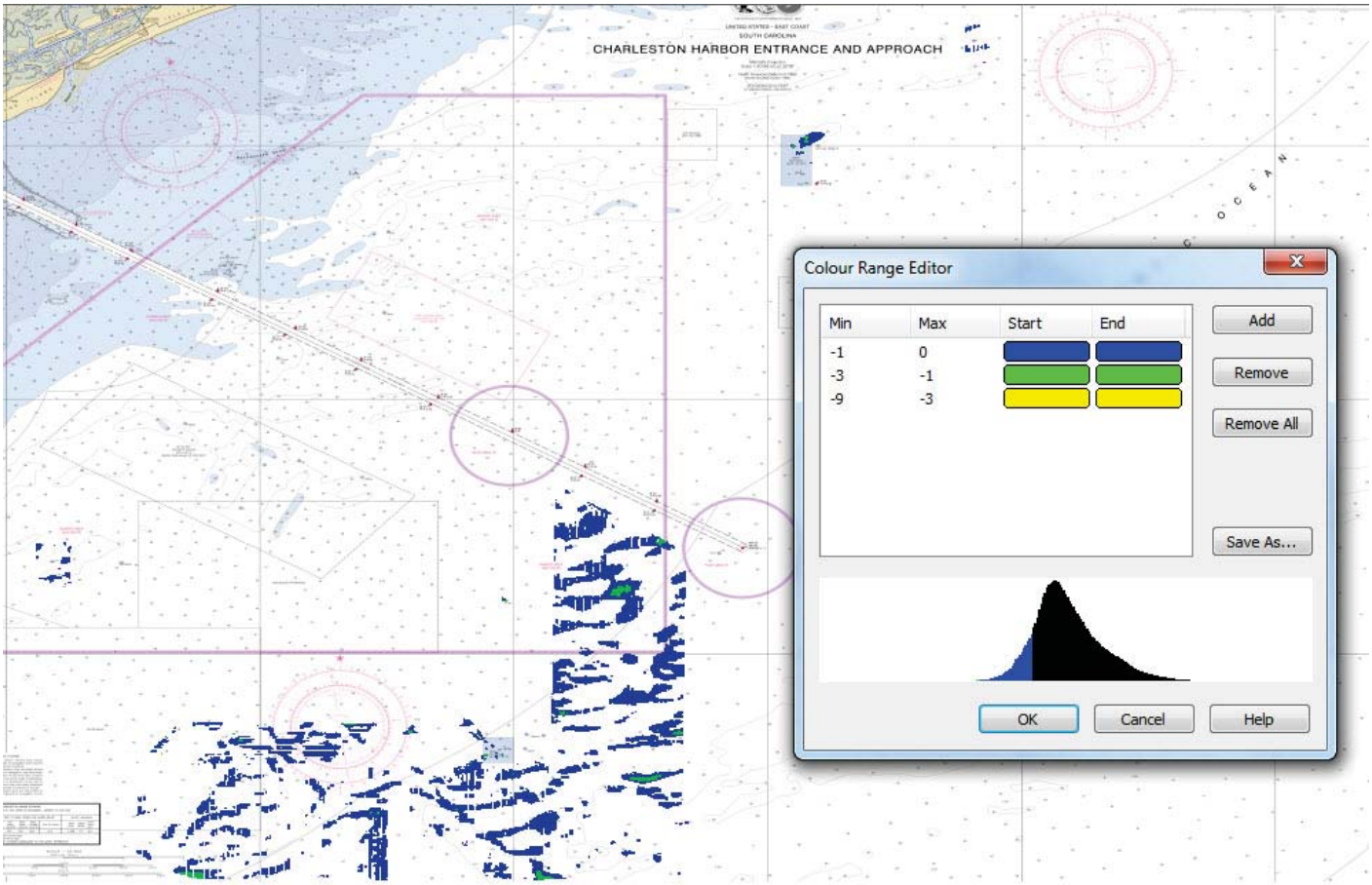


Figure 33: Shoal sounding differences observed between the ENC and H12805 are shown. Depth ranges are in meters.

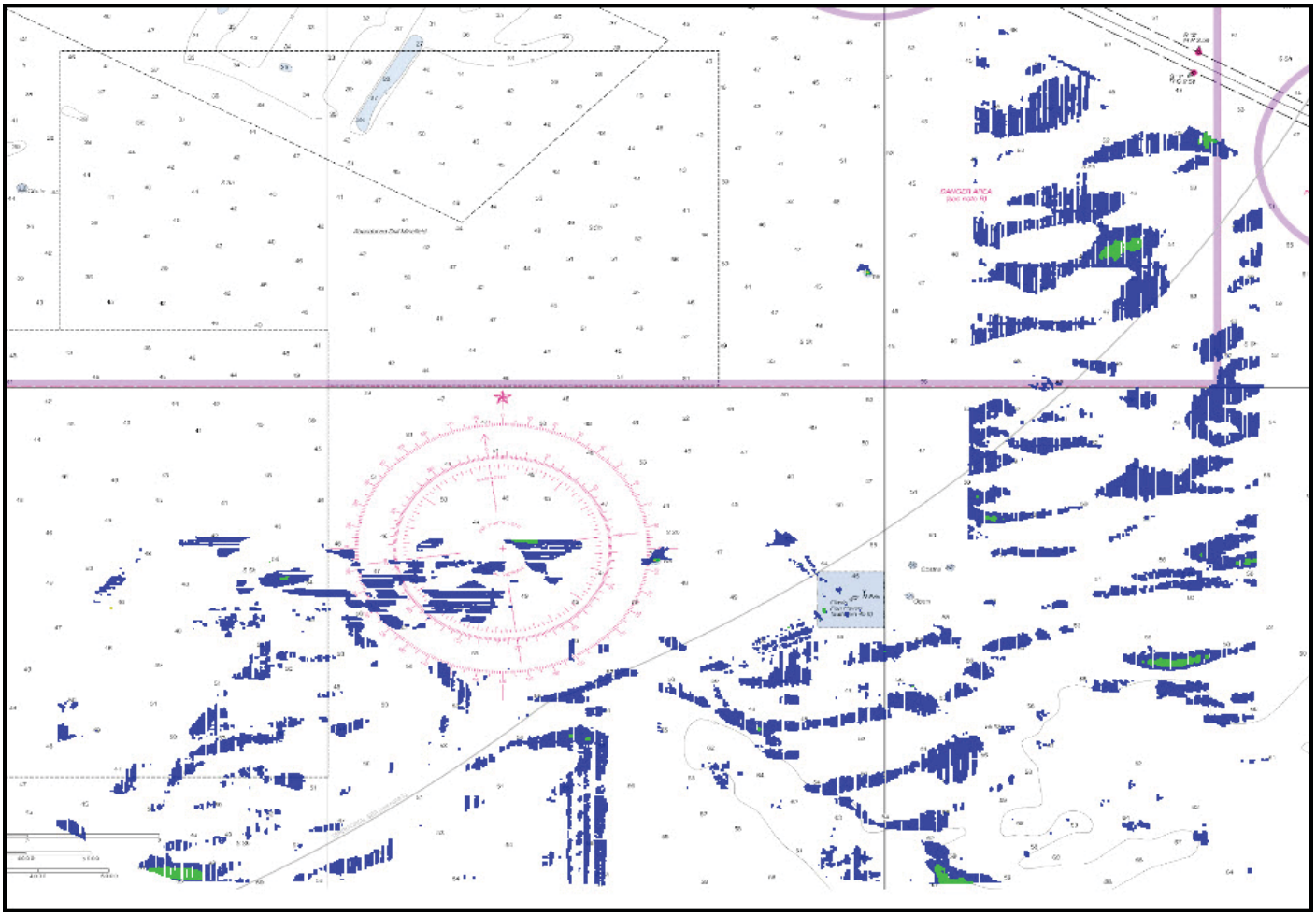


Figure 34: H12805 ENC shoal sounding difference main area

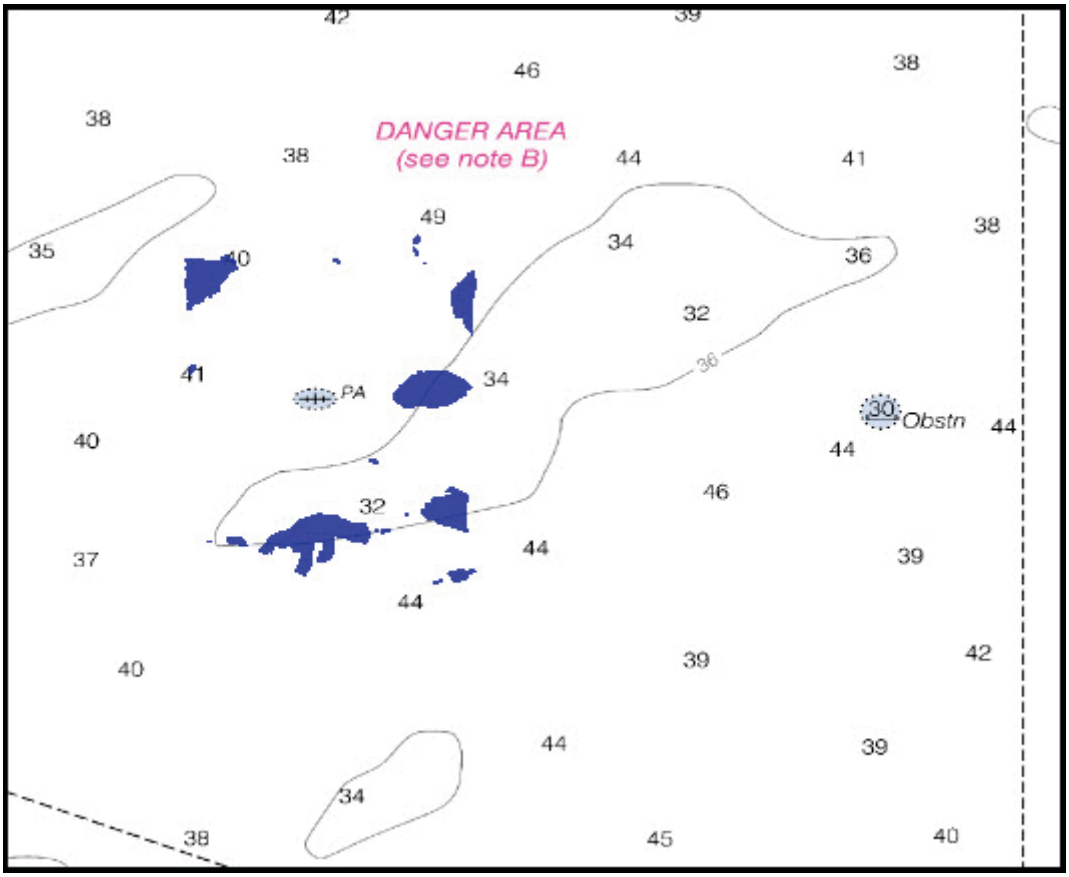


Figure 35: H12805 ENC shoal sounding difference west

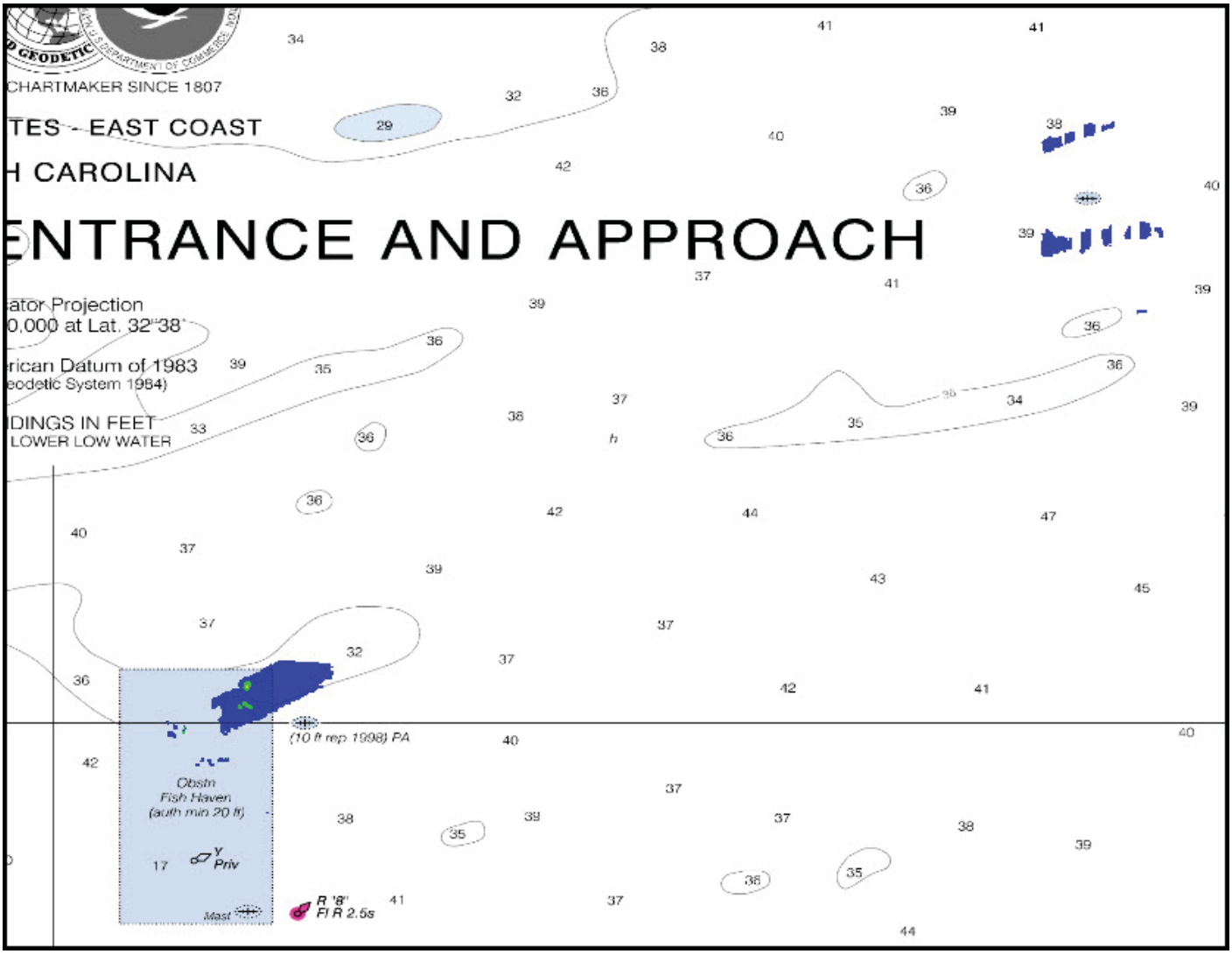


Figure 36: H12805 ENC shoal sounding difference north

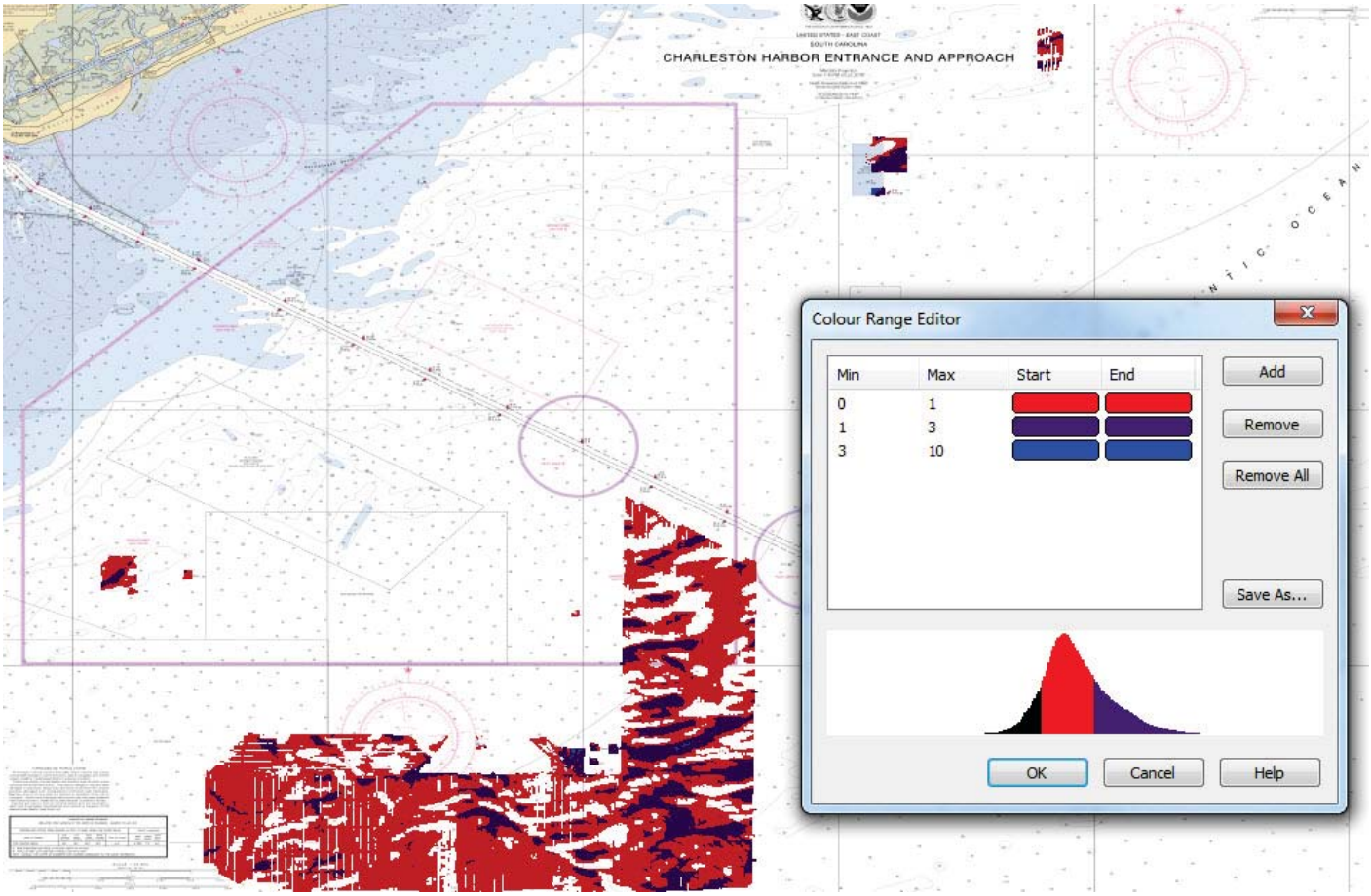


Figure 37: Deep sounding differences observed between the ENC and H12805 are shown. Depth ranges are in meters.

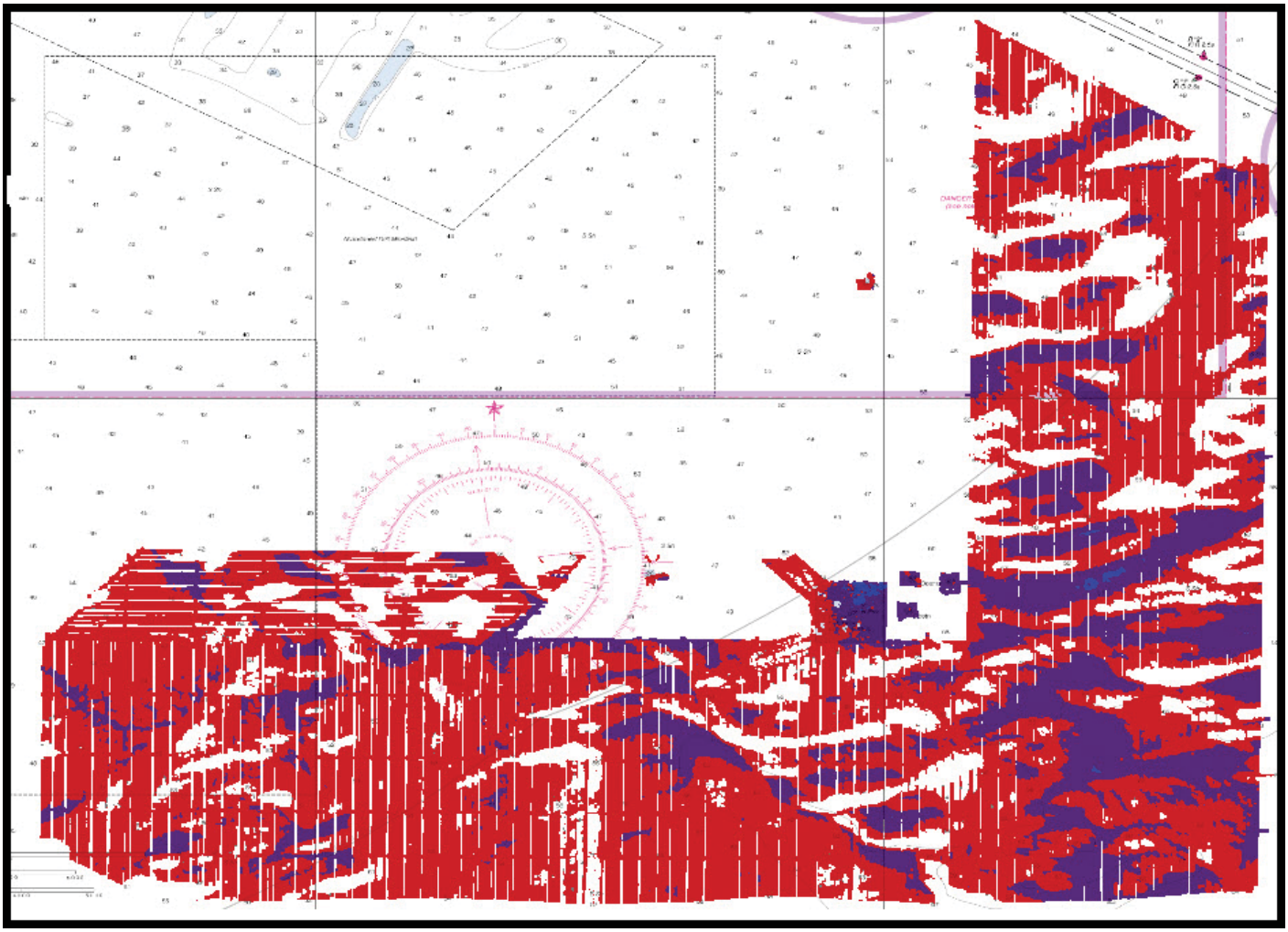


Figure 38: H12805 ENC deep sounding difference main area

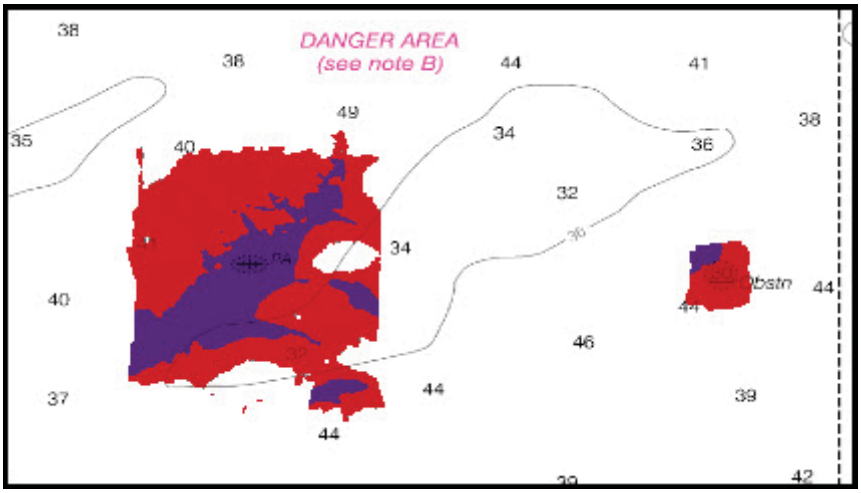


Figure 39: H12805 ENC deep sounding difference west

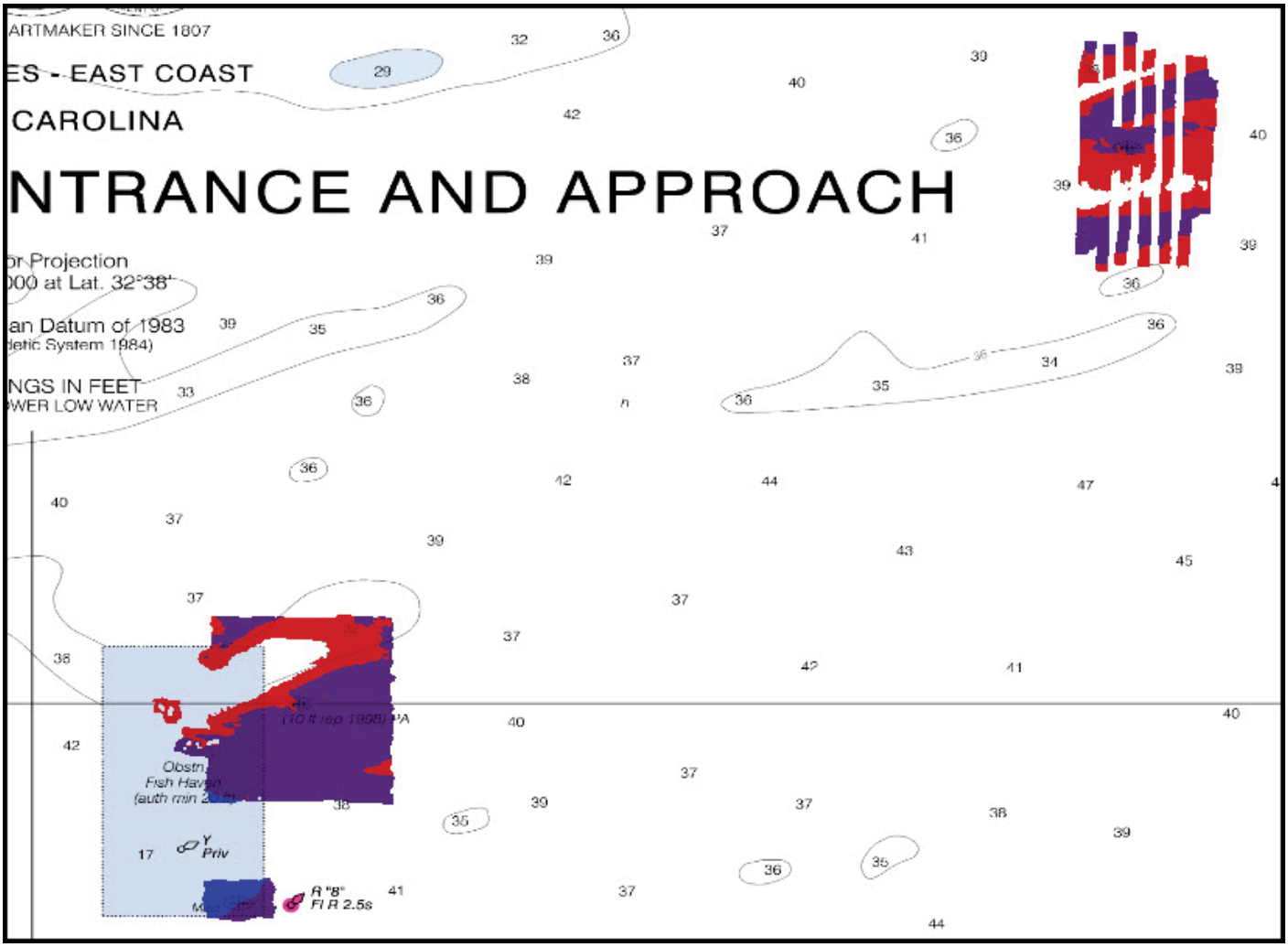


Figure 40: H12805 ENC deep sounding difference west

D.1.3 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.4 Charted Features

Eleven charted items were investigated in the survey area. Consult the H12805_FFF.hob file for more information about the charted features in the survey area.

D.1.5 Uncharted Features

Seven uncharted features were found. Consult the H12805_FFF.hob file for more information about the uncharted features in the survey area.

D.1.6 Dangers to Navigation

Danger to Navigation Reports are included in Appendix II of this report.

D.1.7 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.8 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.1.9 Bottom Samples

No bottom samples were required for this survey.

D.2 Additional Results

D.2.1 Shoreline

Shoreline was not assigned in the Hydrographic Survey Project Instructions or Statement of Work.

D.2.2 Prior Surveys

Comparisons were made only to the chart.

D.2.3 Aids to Navigation

One ATON R "8" was investigated and is on station serving its intended purpose as mentioned in the acquisition log.

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 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.7 Platforms

No platforms exist for this survey.

D.2.8 Significant Features

No Significant Features 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 Recommendation

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

D.2.11 Inset Recommendation

No new insets 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 and Specifications Deliverables Manual, 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
CAPT Shepard M. Smith, NOAA	Commanding Officer	02/09/2016	c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=NOAA, cn=SMITH.SHEPARD.M.1006778930 2016.02.09 12:47:56 -05'00'
LT Joseph K. Carrier III, NOAA	Field Operations Officer	02/09/2016	DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=NOAA, cn=CARRIER.JOSEPH.KELSO.III.1155373152 Date: 2016.02.09 17:29:42 Z
HST Kimberly Glomb	Sheet Manager	02/09/2016	P. P. LEWIT.PETER.G.1250929265 c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=LEWIT.PETER.G.1250929265 2016.02.09 17:28:17 Z

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	Continually Operating Reference Staiton
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
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
HSSD	Hydrographic Survey Specifications and Deliverables

Acronym	Definition
HSTP	Hydrographic Systems Technology Programs
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	Local Notice to Mariners
LNM	Linear Nautical Miles
MCD	Marine Chart Division
MHW	Mean High Water
MLLW	Mean Lower Low Water
NAD 83	North American Datum of 1983
NAIP	National Agriculture and Imagery Program
NALL	Navigable Area Limit Line
NM	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
PST	Physical Science Technician
RNC	Raster Navigational Chart
RTK	Real Time Kinematic
SBES	Singlebeam Echosounder
SBET	Smooth Best Estimate and Trajectory
SNM	Square Nautical Miles
SSS	Side Scan Sonar
ST	Survey Technician
SVP	Sound Velocity Profiler
TCARI	Tidal Constituent And Residual Interpolation
TPE	Total Propagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United Stated Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDA	Global Positiong System timing message
ZDF	Zone Definition File

APPENDIX I

TIDE NOTE AND GRAPHICS

UNITED STATES DEPARMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Silver Spring, Maryland 20910

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : November 19, 2015

HYDROGRAPHIC BRANCH: Atlantic
HYDROGRAPHIC PROJECT: OPR-G380-TJ-2015
HYDROGRAPHIC SHEET: H12805

LOCALITY: Southeast of the Approaches to Charleston Harbor, SC
TIME PERIOD: November 5 - November 16, 2015

TIDE STATION USED: 8665530 Charleston, SC
Lat. 32° 46.9'N Long. 79° 55.4' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.648 meters

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project OPR-G380-TJ-2015, H12805, during the time period between November 5 - 16, 2015.

Please use the zoning file G380TJ2015CORP submitted with the project instructions for OPR-G380-TJ-2015. Zones SA138, SA139 and SA162 are the applicable zones for H12805.

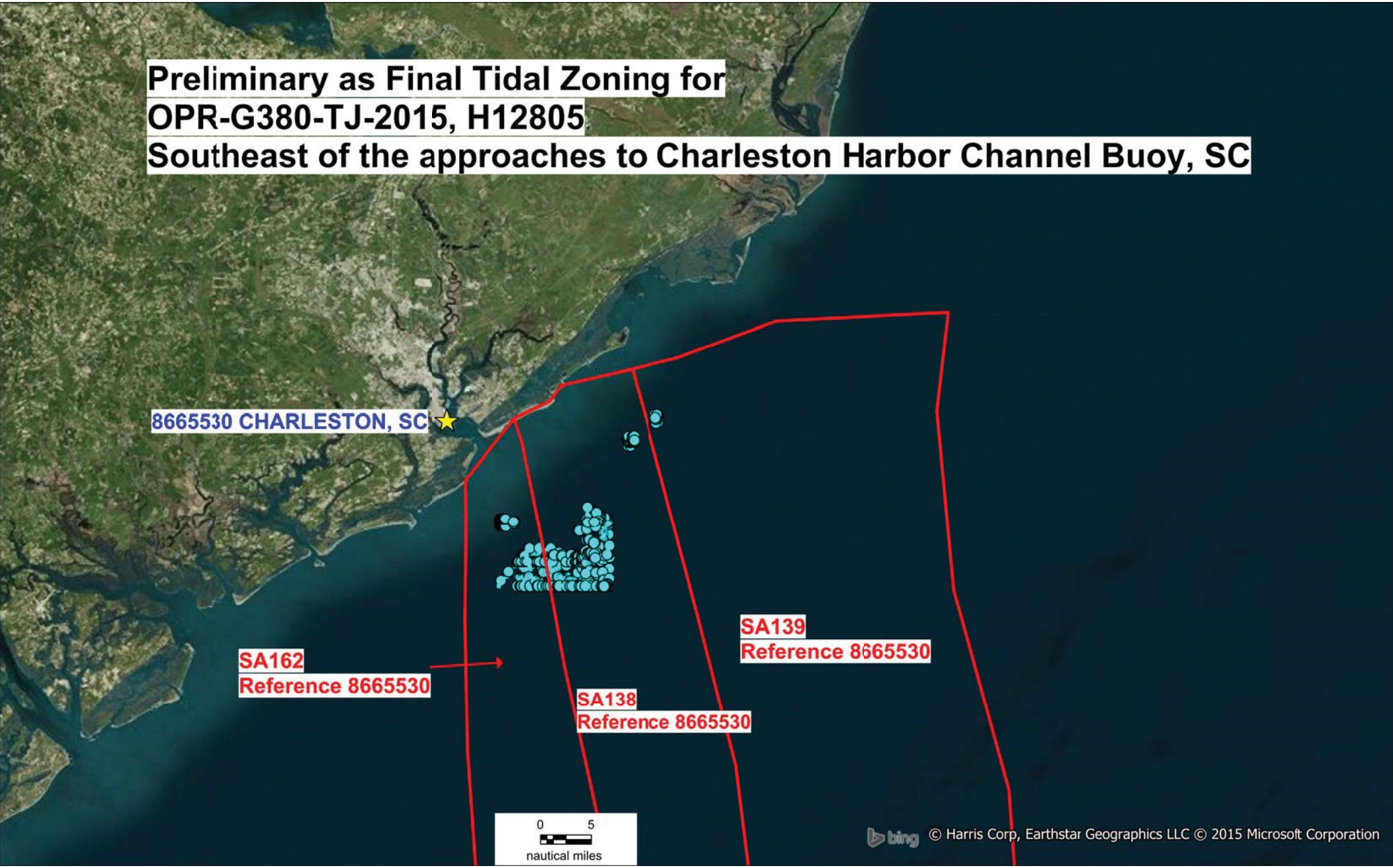
Refer to attachments for zoning information.

Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

HOVIS.GERALD.THOMAS.JR.1365860250

Digitally signed by HOVIS.GERALD.THOMAS.JR.1365860250
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=HOVIS.GERALD.THOMAS.JR.1365860250
Date: 2015.11.24 12:11:05 -05'00'

CHIEF, PRODUCTS AND SERVICES BRANCH


Preliminary as Final Tidal Zoning for
OPR-G380-TJ-2015, H12805
Southeast of the approaches to Charleston Harbor Channel Buoy, SC
8665530 CHARLESTON, SC
SA162
Reference 8665530
SA138
Reference 8665530
SA139
Reference 8665530
0 5
nautical miles
bing
© Harris Corp, Earthstar Geographics LLC © 2015 Microsoft Corporation

APPENDIX II

SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE

Subject: Danger to Navigation: OPR-G380-TJ-15
From: "OPS.Thomas Jefferson - NOAA Service Account" <ops.thomas.jefferson@noaa.gov>
Date: 11/16/2015 7:37 PM
To: OCS NDB - NOAA Service Account <OCS.NDB@noaa.gov>
CC: Matthew Jaskoski - NOAA Federal <matthew.jaskoski@noaa.gov>, Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>, Kathryn Pridgen - NOAA Federal <kathryn.pridgen@noaa.gov>, "CO.Thomas Jefferson - NOAA Service Account" <CO.thomas.jefferson@noaa.gov>, "OPS.Thomas Jefferson - NOAA Service Account" <ops.thomas.jefferson@noaa.gov>, Kimberly Glomb - NOAA Federal <kimberly.glomb@noaa.gov>, Kyle Ward - NOAA Federal <kyle.ward@noaa.gov>

Last night the TJ found an unknown object in 12m of water with a least depth of 8.9m.

Attached is the Danger To Navigation Report for H12805, South of the Charleston Harbor, Pilotage Area Bravo. Figure 1.1.6 shows the predominant AIS traffic for the area.

If you have any questions or concerns, please do not hesitate to ask.

Very Respectfully,
Joe Carrier, LT/NOAA

Field Operations Officer, NOAA Ship *Thomas Jefferson*
439 West York Street
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http://www.moc.noaa.gov/tj/

Attachments:

H12805_DTON_1.zip	1.5 MB

Subject: Fwd: OPR-G380-TJ-15 Oct/Nov Sheets update
From: Matthew Forrest - NOAA Federal <matthew.r.forrest@noaa.gov>
Date: 11/2/2015 5:21 PM
To: Kimberly Glomb - NOAA Federal <kimberly.glomb@noaa.gov>

---------- Forwarded message ----------
From: **Kathryn Pridgen - NOAA Federal** <kathryn.pridgen@noaa.gov>
Date: Tue, Oct 27, 2015 at 7:38 PM
Subject: OPR-G380-TJ-15 Oct/Nov Sheets update
To: Erin Weller - NOAA Federal <erin.weller@noaa.gov>, "OPS.Thomas Jefferson - NOAA Service Account" <ops.thomas.jefferson@noaa.gov>, Joseph Carrier - NOAA Federal <joseph.carrier@noaa.gov>, Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>, Corey Allen - NOAA Federal <corey.allen@noaa.gov>, Castle Parker - NOAA Federal <castle.e.parker@noaa.gov>, Matthew Jaskoski - NOAA Federal <matthew.jaskoski@noaa.gov>

All,
After much discussion (thank you to all who helped!) we have come up with a sheet limits outline shapefile and a plan for the rest of this survey in Charleston.

The OPR-G380-TJ-15_sheets.shp file should have all sheets in agreement between OPS/ TJ/ AHB, it includes H12794 cut out of H12773. Please review these sheet to make sure they match your records, let me know if any changes need to be made.

For the remainder of the survey we are going to first concentrate on the offshore sheets (H12773 and H12767) then we are going to attempt to survey the inshore sheets. This was picked as the course of action (as opposed to Chincoteague or Savannah) after the completion of the offshore sheets due to uncertainties in the survey schedule.

Instead of carving out a new sheet for the inshore limits north and south of the channel, we propose to survey inshore along the adjacent sheets and work our way inshore (west) as the graphic depicts. The TJ can chose any of the registry numbers within the inshore sheets for the file naming convention (ex. southern inshore sheet can be named either H12806,H12774,H12805, or H12775, northern inshore sheet can be named H12770, H12807, H12776, H12777). Since no one is completely sure how much of these inshore sheets we will be able to finish, we are not creating sheet boundaries, we will determine the sheet boundaries and H# (TJ picks) after acquisition is finish and adjust to the final surface submitted to AHB. We recommend starting with the southern inshore sheet as the AIS traffic is heavier there compared to the northern inshore sheet, but this is weather depending of course.

As far as the Whiting 1996 prior survey goes, we would like to see what a difference layer looks like of current survey data taken last leg compared to the Whiting survey. I know we had this discussion before about the Whiting survey, but with the new DTONs found right off the harbor

entrance we are concerned about the accuracy of the Whiting data. If we could prove with a difference surface that the Whiting data is still correct then we can adjust the survey boundaries.

Hopefully this plan will help to provide survey work for the remainder of the next leg of this survey. Please let me know if you have any other questions or concerns and I will endeavor to get back to you ASAP!

Kathryn Pridgen
Physical Scientist
NOAA-HSD OPS
301-713-2702 ext 178
kathryn.pridgen@noaa.gov

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Operations Officer in Training
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Attachments:

Survey Plan.ppt	767 KB
OPR-G380-TJ-15_sheets_1027.zip	9.3 KB

Subject: RE: H12805 Question
From: Castle Parker - NOAA Federal <castle.e.parker@noaa.gov>
Date: 12/14/2015 3:23 PM
To: Kimberly Glomb - NOAA Federal <kimberly.glomb@noaa.gov>
CC: Erin Weller - NOAA Federal <erin.weller@noaa.gov>

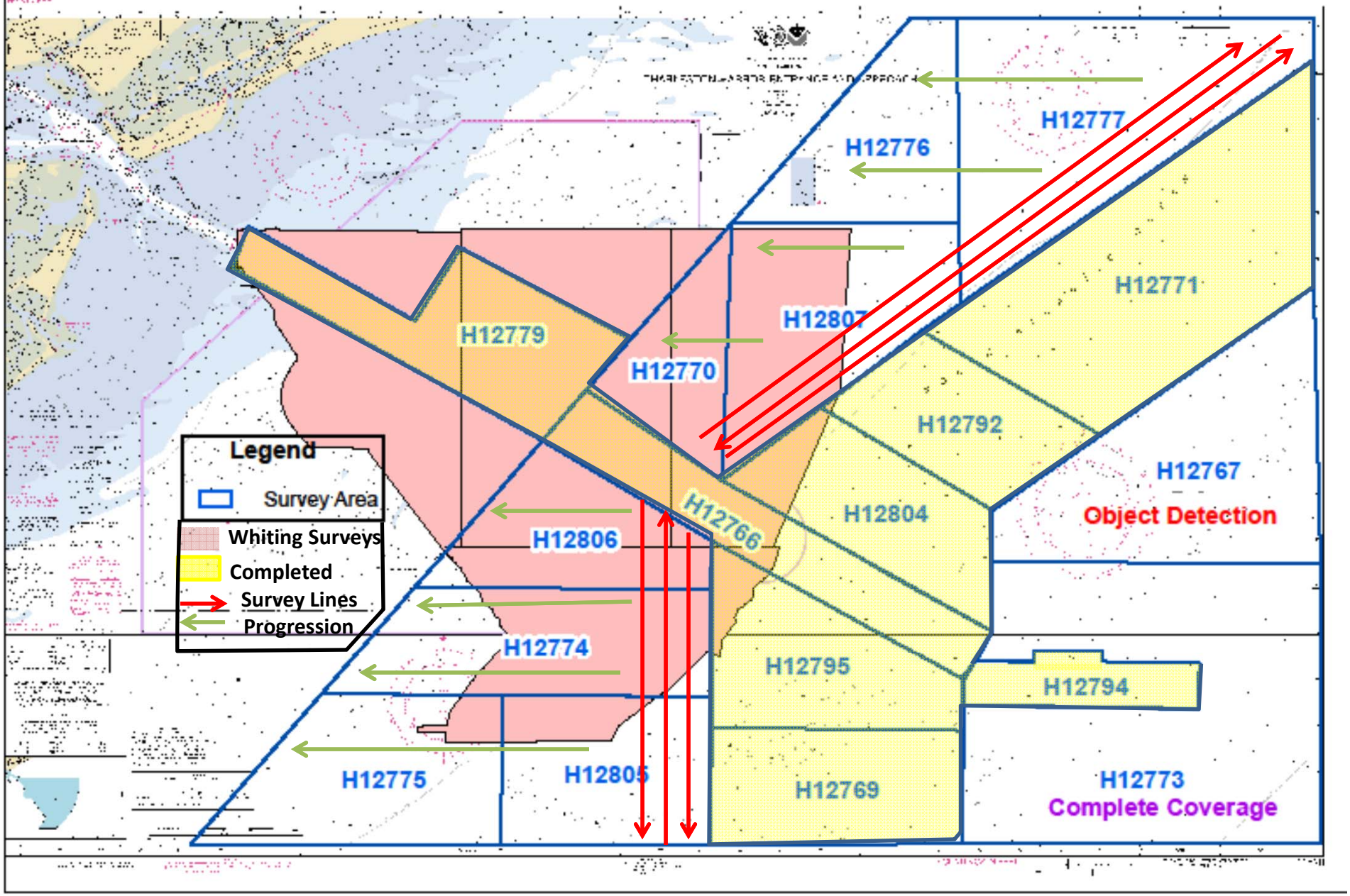
Good day Kim,
Area obstructions will be OK. It is suggested to create the polygon based upon the proximity of the obstructions referenced from the grid. By this I mean that one should arrange the polygon to the spatial arrangement of the obstructions, rather than creating a rectangular or circular obstruction polygon shape. VALSOU should be the shoalest depth within the polygon.

The guidance from Erin is valid.
Thanks,
Gene

-----Original Message-----
From: Kimberly Glomb [mailto:kimberly.glomb@noaa.gov]
Sent: Monday, December 14, 2015 9:29 AM
To: castle.e.parker@noaa.gov
Subject: H12805 Question

Hi Gene, I am working on another survey for this season H12805. I have a question about obstructions that were found outside of a charted fish haven. There are 3 different areas of obstructions. Two of the areas have side scan contacts and the other was found while turning. Is it ok to submit them as obstruction areas with a least depth on the shallowest obstruction? Erin agreed with me on this. Or is there another way that this should be submitted? Attached is an image.
Kimberly

OPR-G380-TJ-15
Approaches to Charleston
Sheet Layout 10/27/2015



APPROVAL PAGE

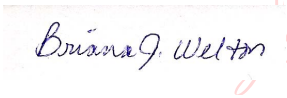
H12805

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

- H12805_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12805_GeoImage.pdf

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

Approved: 

Digitally signed by WELTON.BRIANA.JANE.1267667531
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=NOAA, cn=WELTON.BRIANA.JANE.1267667531
Date: 2017.03.09 15:53:11 -05'00'

Lieutenant Commander Briana Welton, NOAA
Chief, Atlantic Hydrographic Branch