H12696

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H12696

LOCALITY

State(s):	New Hampshire
General Locality:	Gulf of Maine
Sub-locality:	Ragged Neck Pt to Hampton Shoal Ledge

2014

CHIEF OF PARTY
LCDR Marc S. Moser, NOAA

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Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H12696**

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):	**New Hampshire**
General Locality:	**Gulf of Maine**
Sub-Locality:	**Ragged Neck Pt to Hampton Shoal Ledge**
Scale:	**10000**
Dates of Survey:	**04/17/2014 to 05/14/2014**
Instructions Dated:	**04/30/2014**
Project Number:	**OPR-A321-FH-14**
Field Unit:	**NOAA Ship *Ferdinand R. Hassler***
Chief of Party:	**LCDR Marc S. Moser, NOAA**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Multibeam Echo Sounder Backscatter**
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 Geophysical Data Center (NGDC) and can be retrieved via http://www.ngdc.noaa.gov/.***

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Descriptive Report to Accompany Survey H12696

Project: OPR-A321-FH-14

Locality: Gulf of Maine

Sublocality: Ragged Neck Pt to Hampton Shoal Ledge

Scale: 1:10000

April 2014 - May 2014

NOAA Ship *Ferdinand R. Hassler*

Chief of Party: LCDR Marc S. Moser, NOAA

A. Area Surveyed

The survey area is located in the Gulf of Maine, within the sub-locality of Ragged Neck Pt to Hampton Shoal Ledge as shown in Figure 1.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
43° 0' 52.47" N 70° 48' 20.07" W	42° 51' 57.91" N 70° 35' 35.45" W

Table 1: Survey Limits

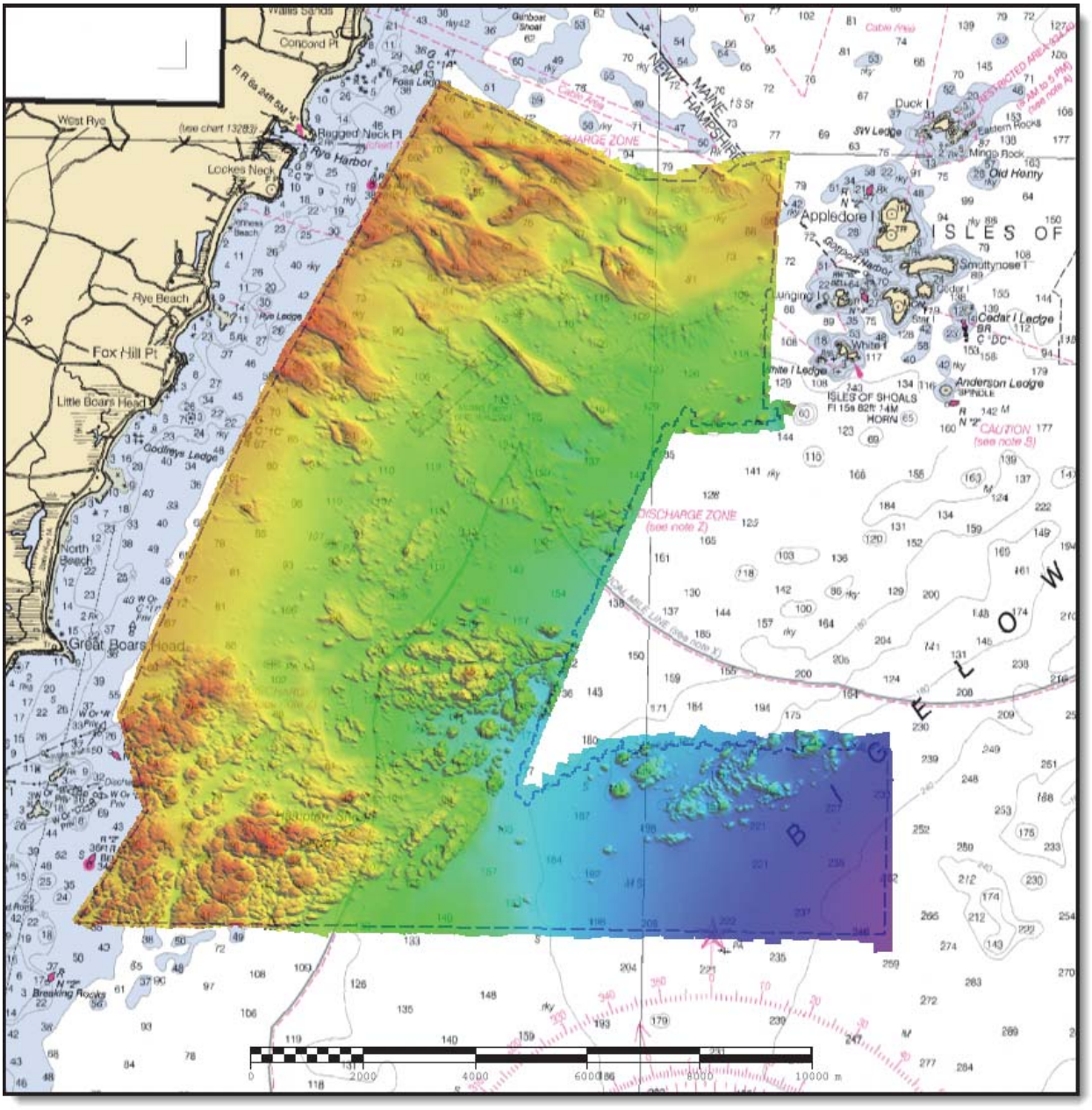

Figure 1: General locality of survey H12696

The survey overlaps completely with the assigned sheet limits provided from OPS. However, these sheet limits do not include the majority of areas with charted depths shoaler than the 60-foot depth curve. Additional work still needs to be completed at a future date utilizing a vessel that is capable of collecting data near shore. Figure 2 shows the limits of H12696 and the 60 foot depth curve (blue tint).

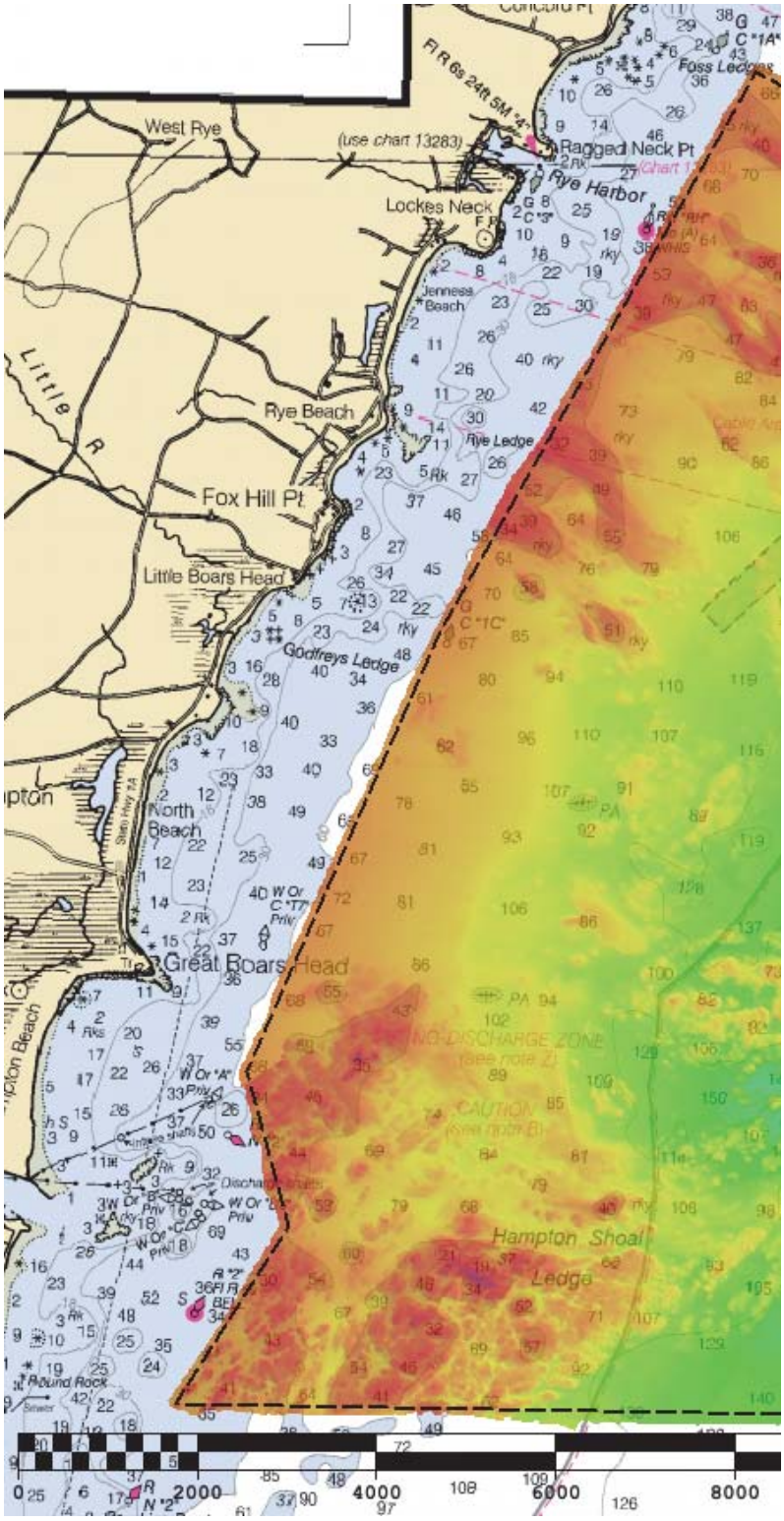

Figure 2: Extents of MBES coverage to approximately the 60-foot contour - future data will need to be acquired with a vessel especially suited for near shore work

A.2 Survey Purpose

The purpose of this project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charting products.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

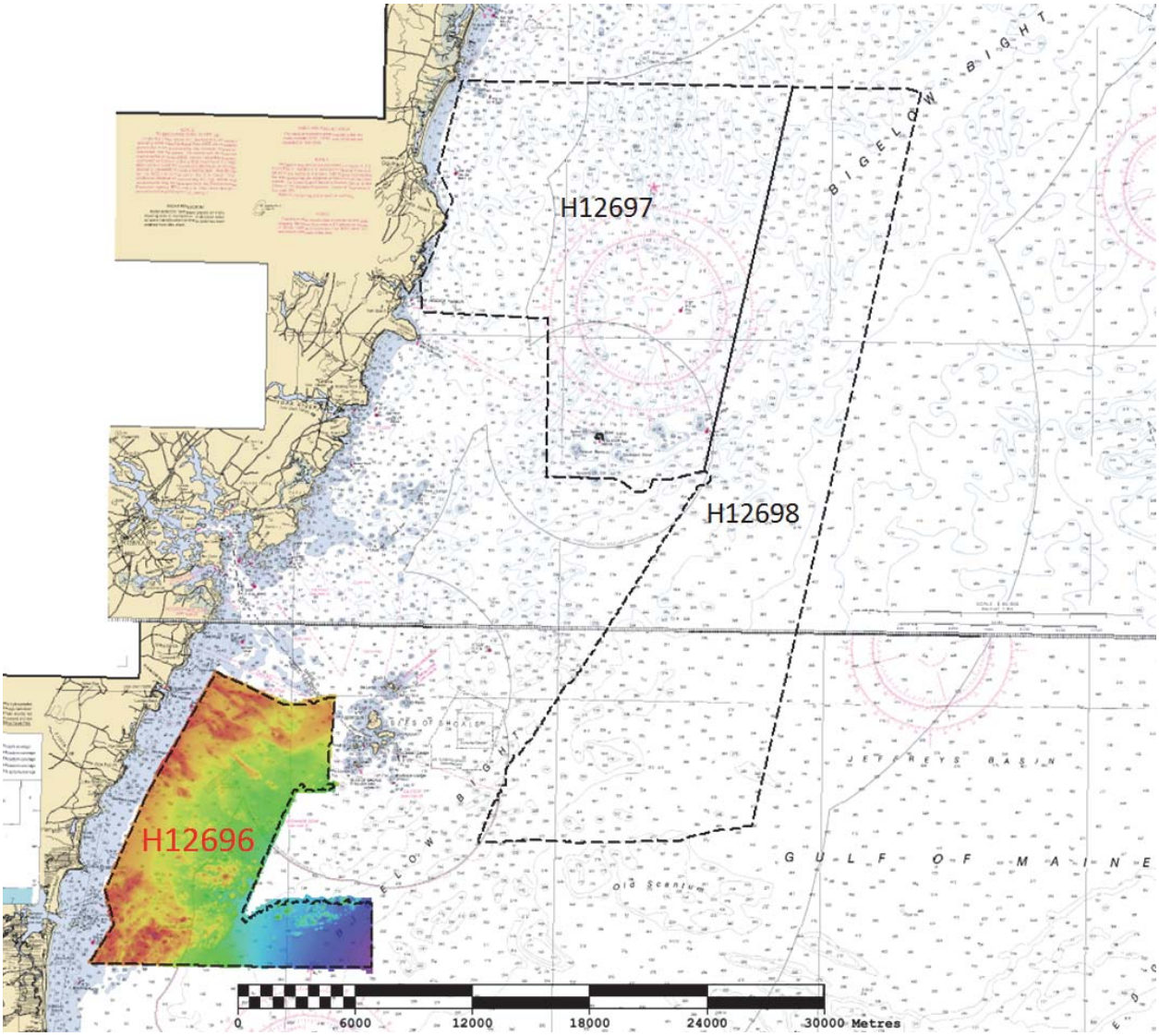

Figure 3: Survey layout for OPR-A321-FH-14 plotted over Chart 13278 and Chart 13286

Some holidays exist in the coverage for this survey. Analyses of surrounding data show that the least depths over features have been achieved and holidays do not compromise data integrity. Additional discussion can be found in section B.2.9.

A.5 Survey Statistics

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

	HULL ID	*S-250*	*Total*
LNM	**SBES Mainscheme**	0	0
	MBES Mainscheme	609.4	609.4
	Lidar Mainscheme	0	0
	SSS Mainscheme	0.8	0.8
	SBES/MBES Mainscheme	0	0
	SBES/SSS Mainscheme	0	0
	MBES/SSS Mainscheme	0	0
	SBES/MBES Crosslines	41.7	41.7
	Lidar Crosslines	0	0
Number of Bottom Samples			16
Number of AWOIS Items Investigated			3
Number Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Investigated by Dive Ops			0
Total SNM			38.8

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
04/17/2014	107
04/22/2014	112
04/23/2014	113
04/24/2014	114
04/25/2014	115
04/26/2014	116
04/27/2014	117
05/06/2014	126
05/07/2014	127
05/14/2014	134

Table 3: Dates of Hydrography

Mainscheme survey lines were run with a dual-head multibeam echosounder. Linear nautical miles for the dual-head system were calculated using statistics from the starboard head.

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	***S250***
LOA	37.7 meters
Draft	3.77 feet

Table 4: Vessels Used

Figure 4: NOAA Ship FERDINAND R. HASSLER alongside pier at Marine Operations Center - Atlantic

NOAA Ship FERDINAND R. HASSLER (S250), shown in Figure 4, acquired all data within the limits of H12696.

B.1.2 Equipment

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

Manufacturer	Model	Type
Reson	7125	MBES
Klein	5000 V2	SSS
Applanix	POS M/V 320 V5	Positioning and Attitude System
Hemisphere	MBX-4	Positioning System
Brooke Ocean	MVP-200	Sound Speed System
AML	MicroCTD	Conductivity, Temperature, and Depth Sensor
Reson	SVP-70	Sound Speed System

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines, acquired for this survey, totalled 6.8% of mainscheme acquisition.

Multibeam crosslines were acquired using the Reson 7125 on DN117. Crosslines were filtered to remove soundings greater than 45 degrees from nadir. The crossline percentage satisfy requirements stated in Section 5.2.4.3 of the HSSD. A 4-meter CUBE surface was created using the mainscheme lines, while a second 4-meter CUBE surface was created using only crosslines. These two surfaces were differenced at a 4-meter resolution (Figure 5). The average difference between the depths derived from the mainscheme and crosslines is 0.00 meters with a standard deviation of 0.14 meters; 95% of all differences are less than 0.17 meters from the mean (Figure 6).

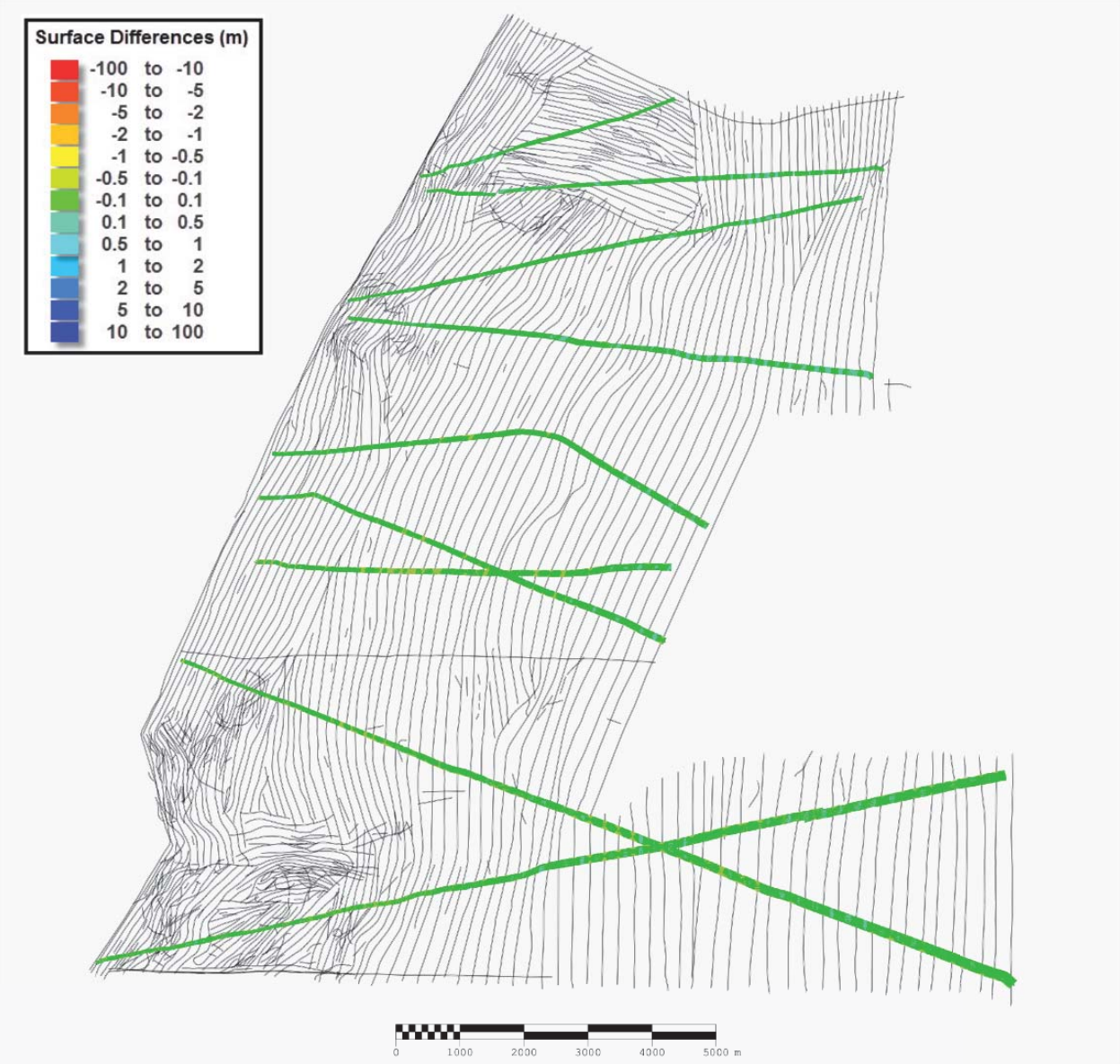

Figure 5: H12696 MBES crossline data overlaid on mainscheme lines

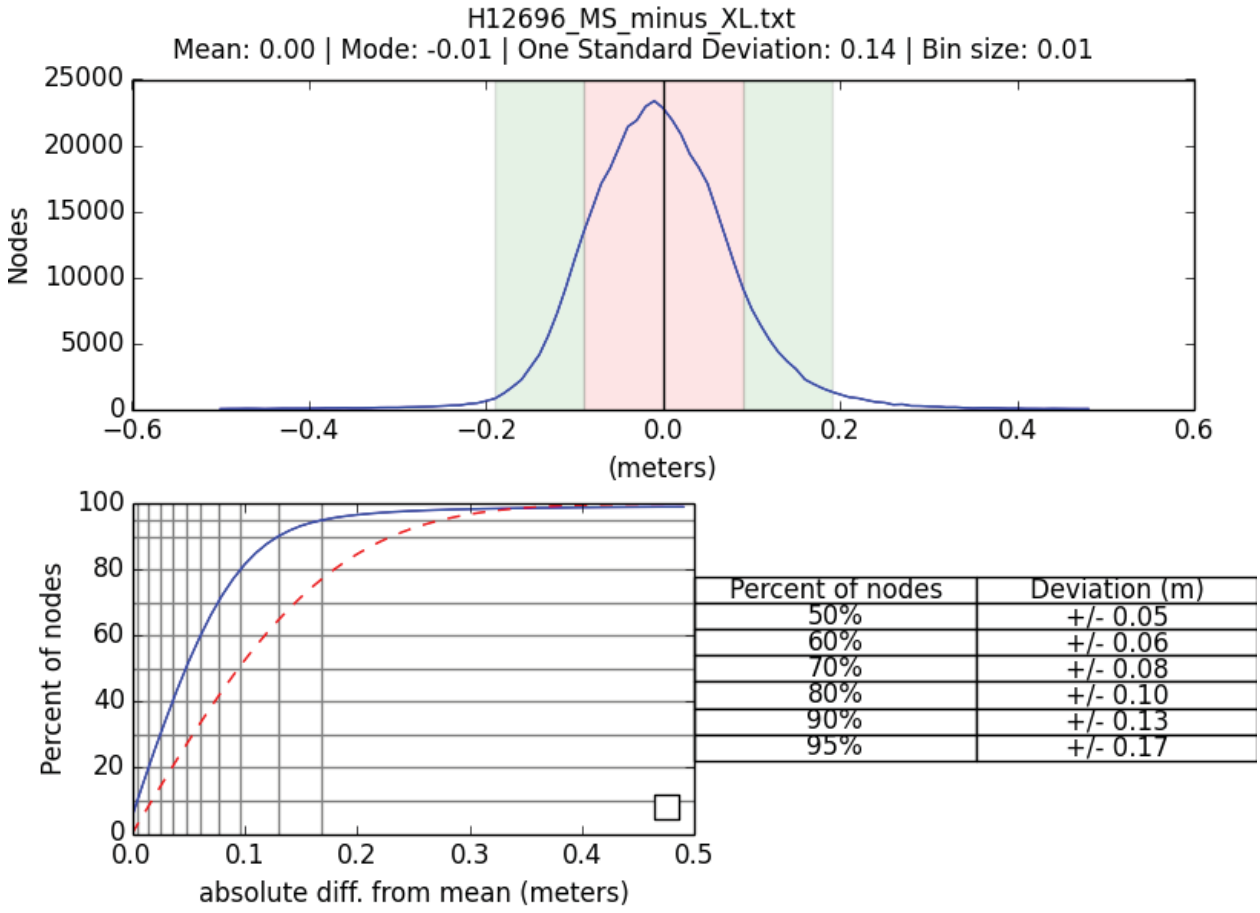

Figure 6: H12696 crossline difference statistics: mainscheme minus crosslines

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0.01 meters	0.21 meters
0.01 meters	0.081 meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
S250	1.0 m/s	1.0 m/s	0.5 ft/s

Table 7: Survey Specific Sound Speed TPU Values

CO-OPS provided the tidal zoning uncertainty of 0.21 meters in the Project Instructions for project OPR-A321-FH-14. Thirty three lines, listed below, were corrected with zoned tides and received this uncertainty estimate. For these lines the TPU was calculated using "vessel settings" in CARIS.

The 0.081 meter uncertainty value was provided by HSD in the project instructions and is based on the VDatum uncertainty of the area. For all lines except those noted below, TPU was calculated using the "realtime" selection in CARIS which uses uncertainty values from the SMRMSG files derived from SBETs.

The thirty three lines listed below exhibited unrealistic vertical offsets after Smooth Best Estimate of Trajectory (SBET) files were applied and GPS Tides computed. These lines have been reduced to chart datum using zoned water levels. Figures 7 and 8 show a generic example of soundings reduced via VDatum and discrete zoning, respectively. For the example illustrated, discrete zoning shows much better agreement. More information can be found in section C and the VDatum evaluation report submitted in Appendix II of this report.

Port
20140423_220233
20140423_000823
20140425_024228
20140425_034715
20140426_160049
20140426_160535
20140426_160913
20140426_161443
20140426_164655
20140426_164725
20140426_193226
20140427_033745
20140427_042202
20140427_063834
20140507_105838

Starboard
20140423_220231
20140423_000827
20140425_024228
20140425_034715
20140426_160049
20140426_160535

20140426_160912
20140426_161443
20140426_163156
20140426_193227
20140427_033745
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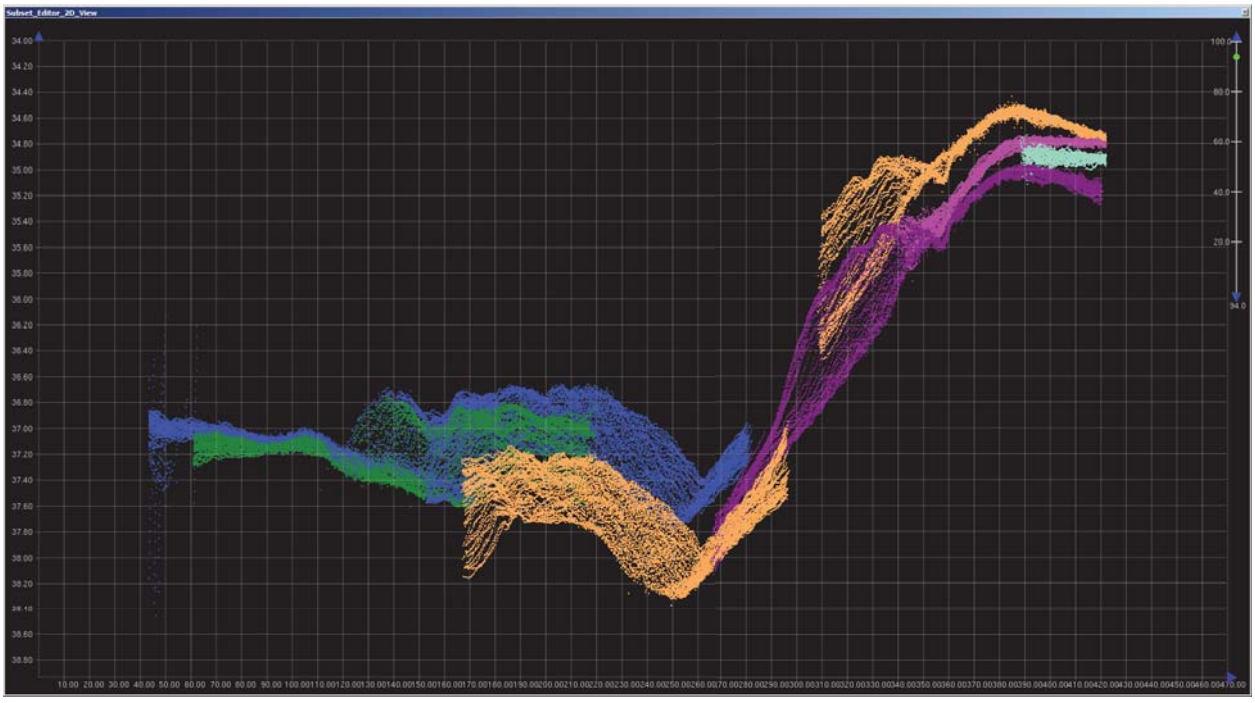


Figure 7: Soundings reduced via VDatum

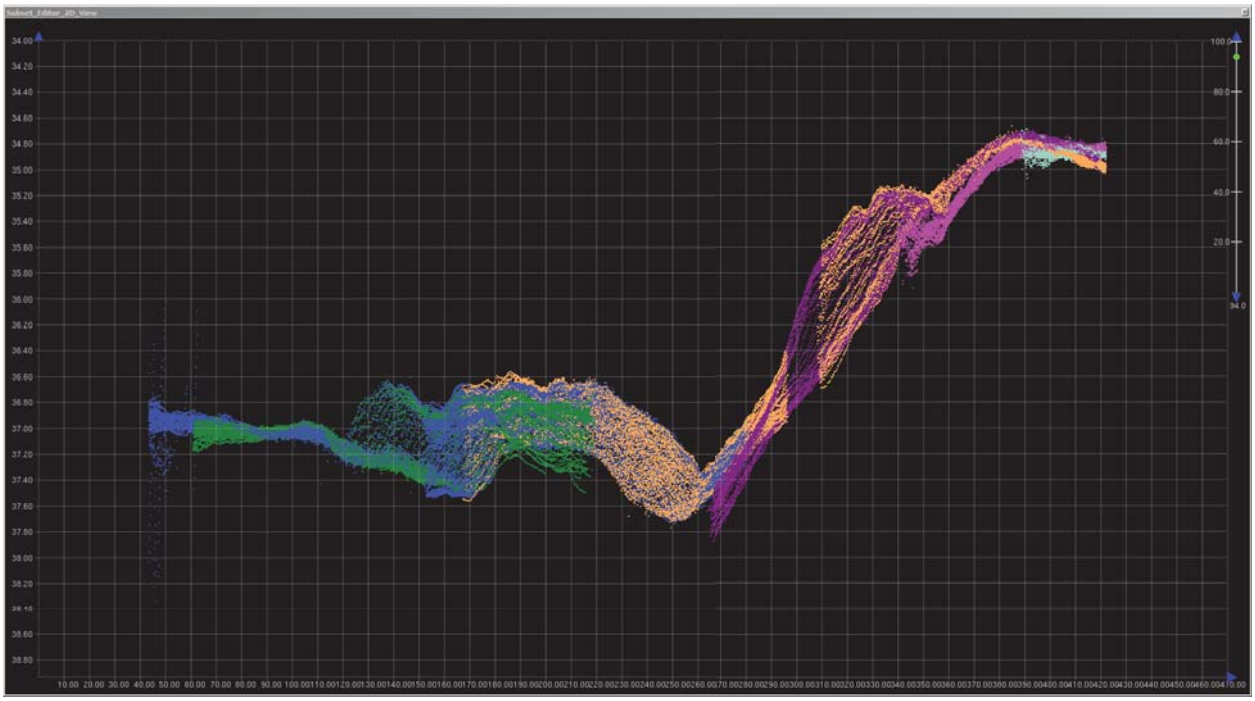


Figure 8: Soundings reduced via discrete tides

B.2.3 Junctions

Four junction comparisons were completed for H12696 (Figure 9). Two surveys were completed in 1997 by NOAA Ship RUDE (H10763 and H10771), one in 2005 by Fugro LADS (H11296), and one in 2013 by the NOAA Ship FERDINAND R. HASSLER (H12614). The areas of overlap between sheet H12696 and its junction sheets were reviewed in CARIS Subset Editor. The junction surfaces were subtracted from the surface of H12696 to assess sounding consistency.

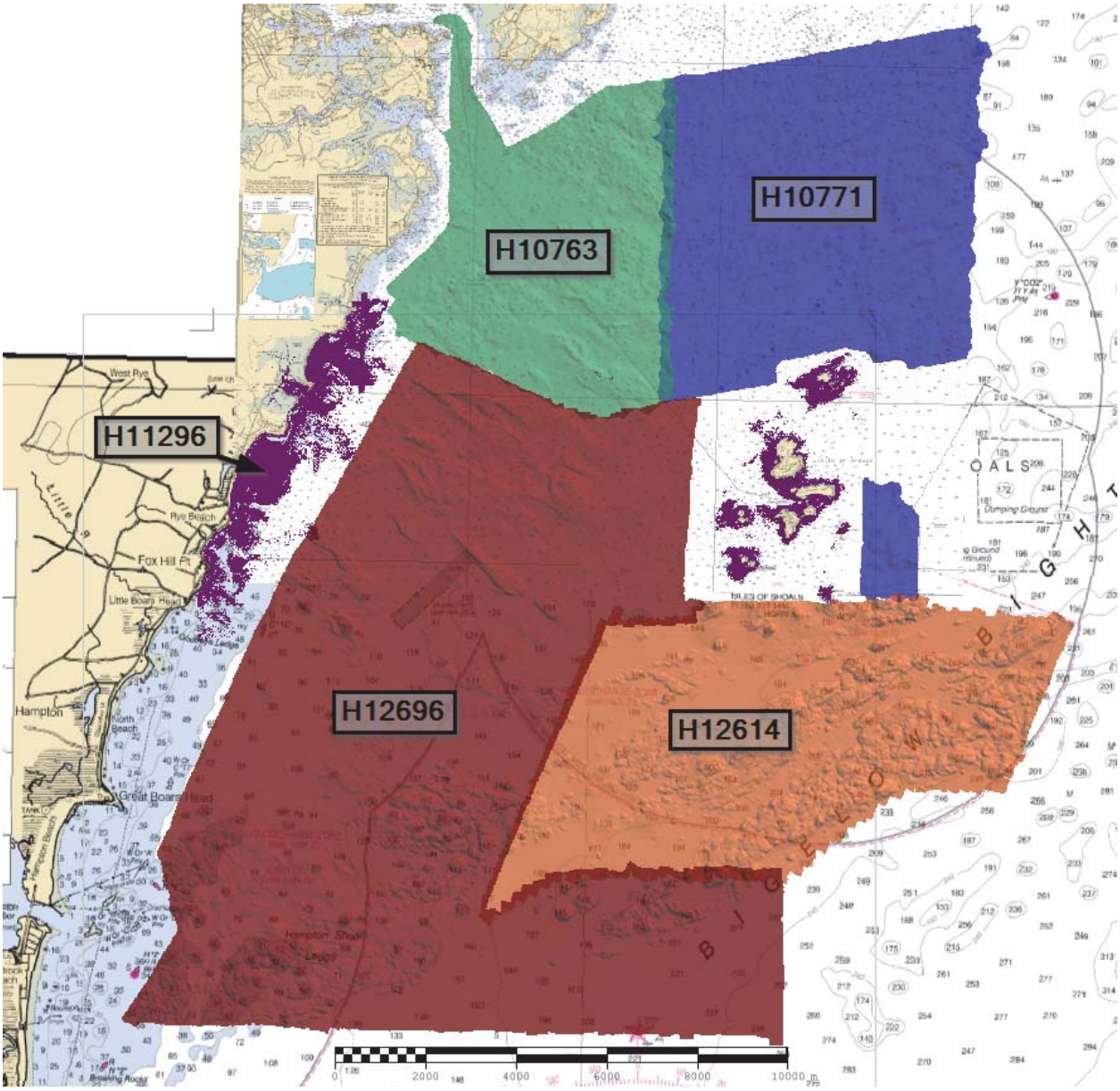


Figure 9: H12696 junctions

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H10763	1:10000	1997	NOAA Ship RUDE	N
H10771	1:10000	1997	NOAA Ship RUDE	NE
H11296	1:10000	2005	Fugro LADS	W
H12614	1:20000	2013	NOAA Ship FERDINAND R. HASSLER	E

Table 8: Junctioning Surveys

H10763

Data for survey H10763 was provided with the project instructions as a 15-meter irregular grid of shoal biased soundings in an .xyz format (see H10763 DR for submitted sounding selection). The .xyz file was imported into CARIS BASE Editor where a Triangular Interpolated Network (TIN) was created. A 4-meter interpolated surface was created from this TIN for the purposes of junction analysis. The 2-meter surface created for H12696 was differenced with the interpolated surface of H10763 (Figure 10). Depths in the junction area range from 18 to 30 meters. A statistical analysis was performed on the resulting differenced surface; the mean difference was 0.26 meters with a standard deviation of 0.36 meters (Figure 11). The differences can be attributed to the sparse data which was used to create the TIN and the accompanying interpolated surface. The hydrographer compared the .xyz data to the H12696 2-meter surface and found most soundings had a difference of no greater than 1 meter.

There are two areas where H12696 data does not overlap with H12763 data (Figure 12). The hydrographer recommends tasking the vessel assigned to complete the nearshore work in this vicinity to resurvey the two areas not surveyed by H12696 or H10763.

The hydrographer recommends that H12696 supersede H10763 in the common area.

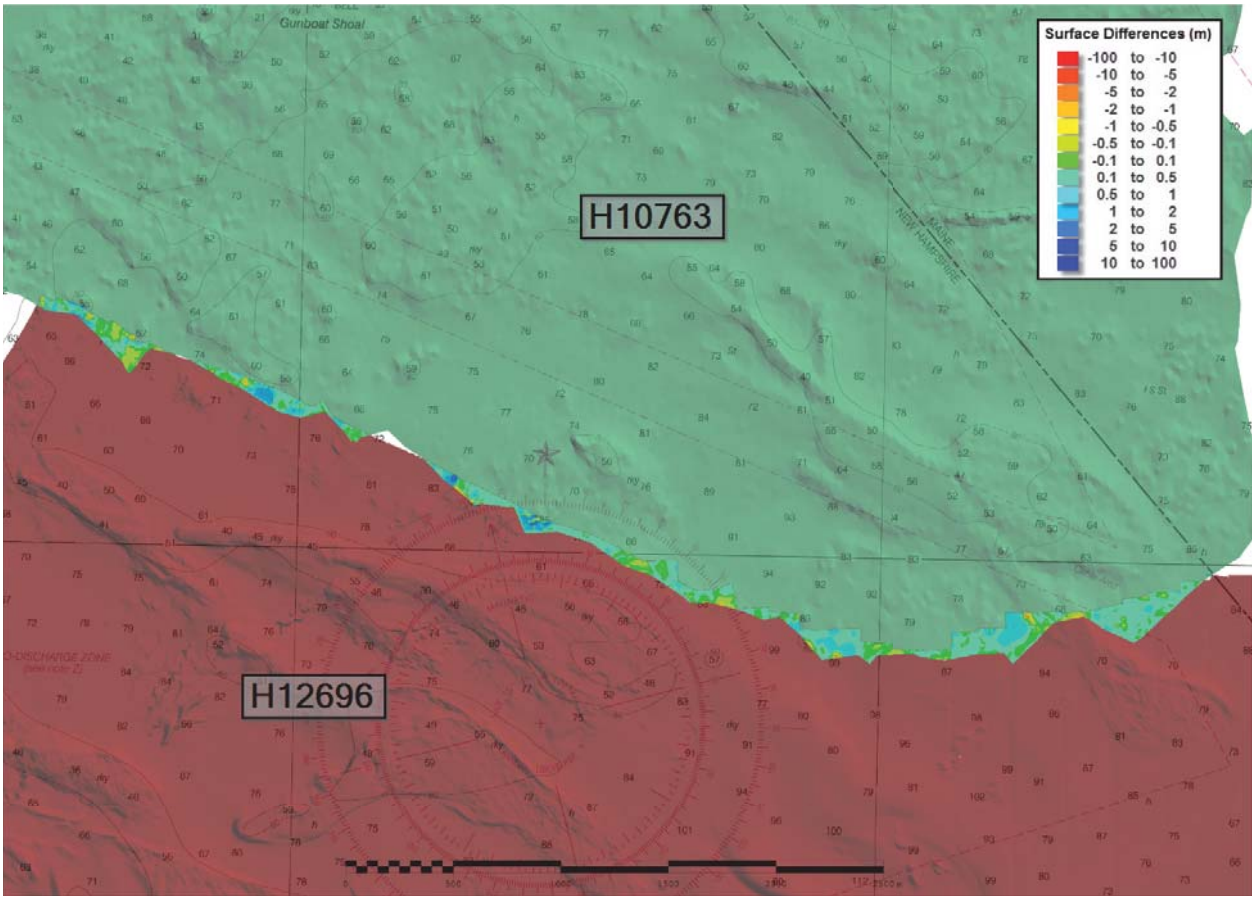


Figure 10: Junction between H12696 (red) and H10763 (green)

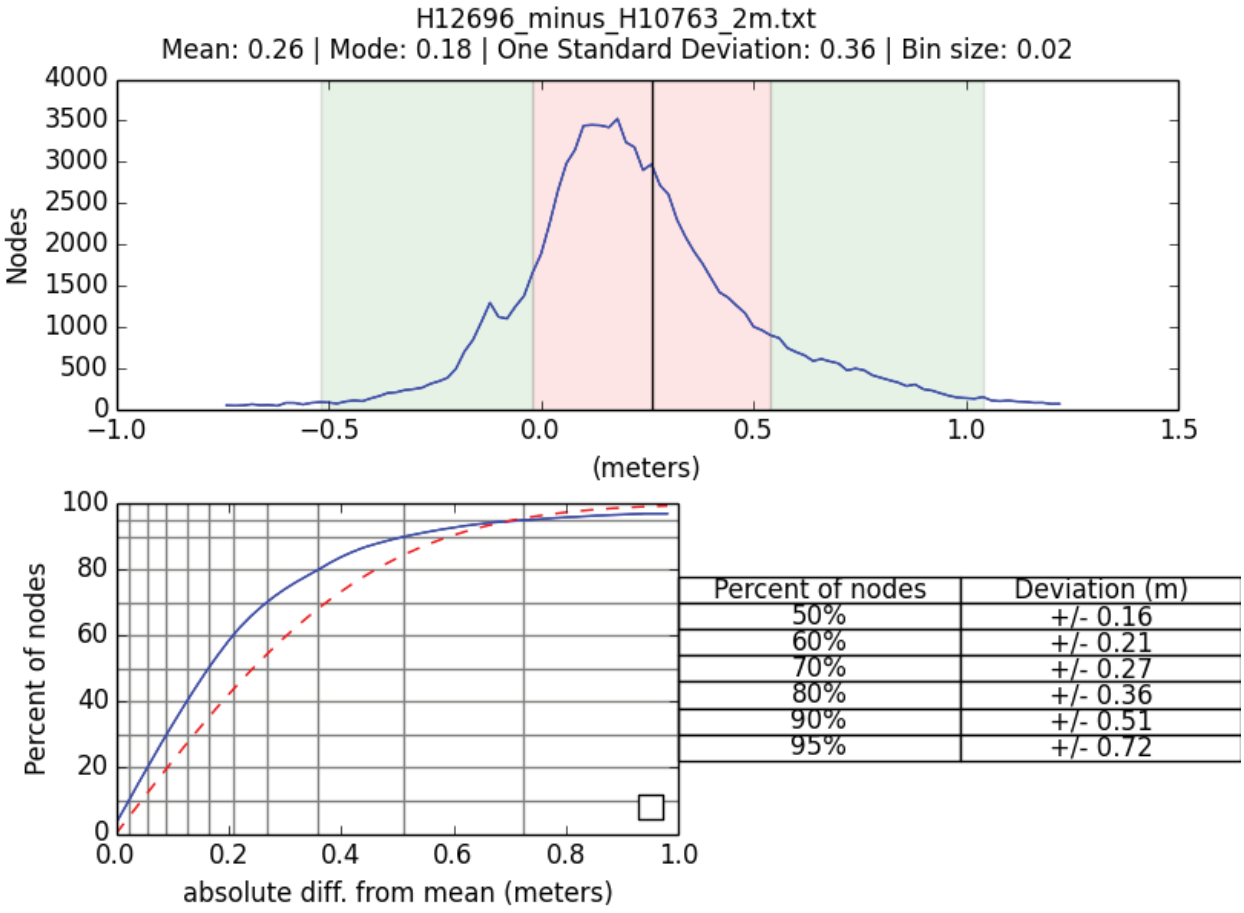


Figure 11: Differenced surface statistics, H12696 minus H10763

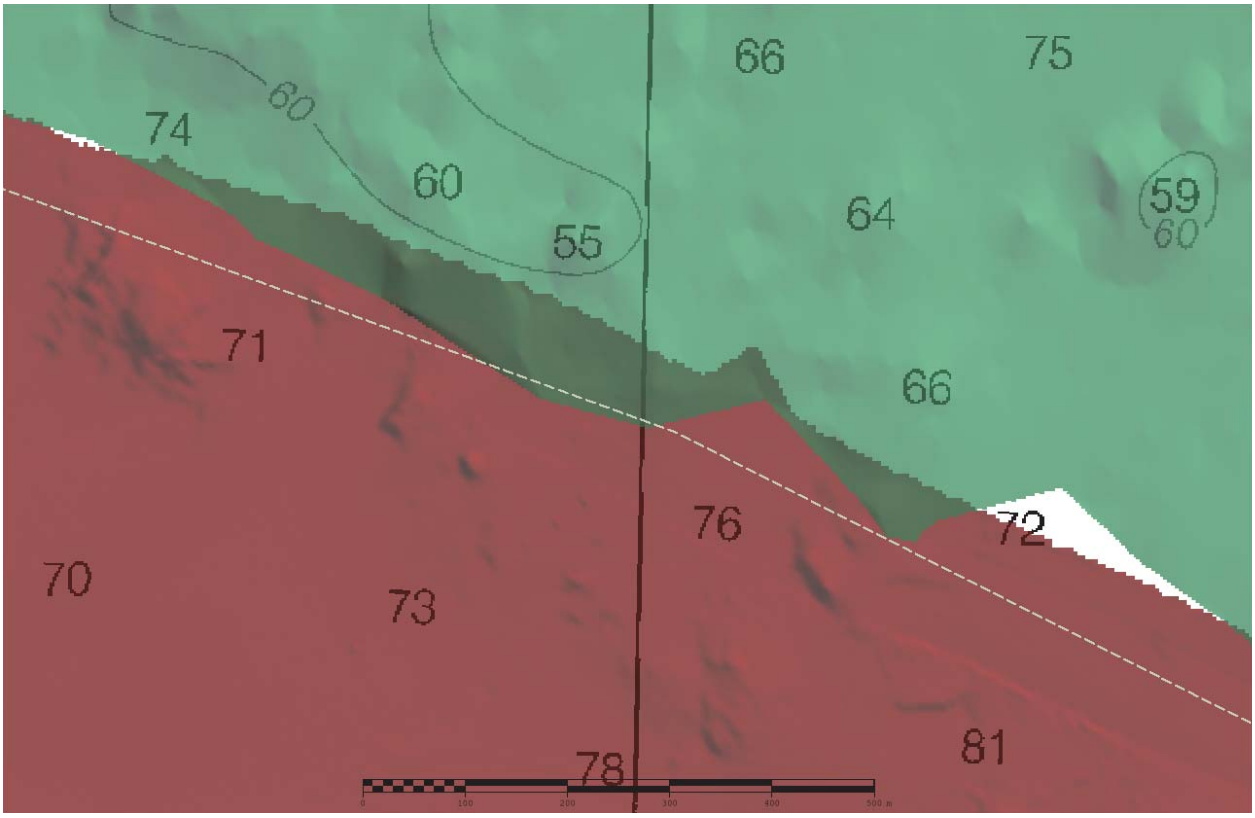


Figure 12: Gaps in overlap between H12696 (red) and H10763 (green). The assigned sheet limit is displayed as a gray dashed line

H10771

Data for survey H10771 was provided with the project instructions as a 15-meter irregular grid of shoal biased soundings in an .xyz format (see H10771 DR for submitted sounding selection). The .xyz file was imported into CARIS BASE Editor where a TIN was created. A 4-meter interpolated surface was created from this TIN for the purposes of junction analysis. The 2-meter surface created for H12696 was differenced with the interpolated surface of H10771 (Figure 13). Depths in the junction area range from 23 to 29 meters. Overlap with survey H10771 was minimal only creating 3,907 nodes along the northern boundary of H12696. A statistical analysis was performed on the resulting differenced surface; the mean difference was 0.34 meters with a standard deviation of 0.19 meters (Figure 14). The differences can be attributed to the sparse data which was used to create the TIN and the accompanying interpolated surface. The hydrographer compared the .xyz data to the H12696 2-meter surface and found most soundings had a difference of no greater than 1 meter.

H12696 data overlaps with junctioning survey H10771 by only 20 meters. The minimal amount of overlap fails the requirement established in section 2.5.3.1 of the FPM which requires 100-200 meters.

The hydrographer recommends that H12696 supersede H10771 in the common area.

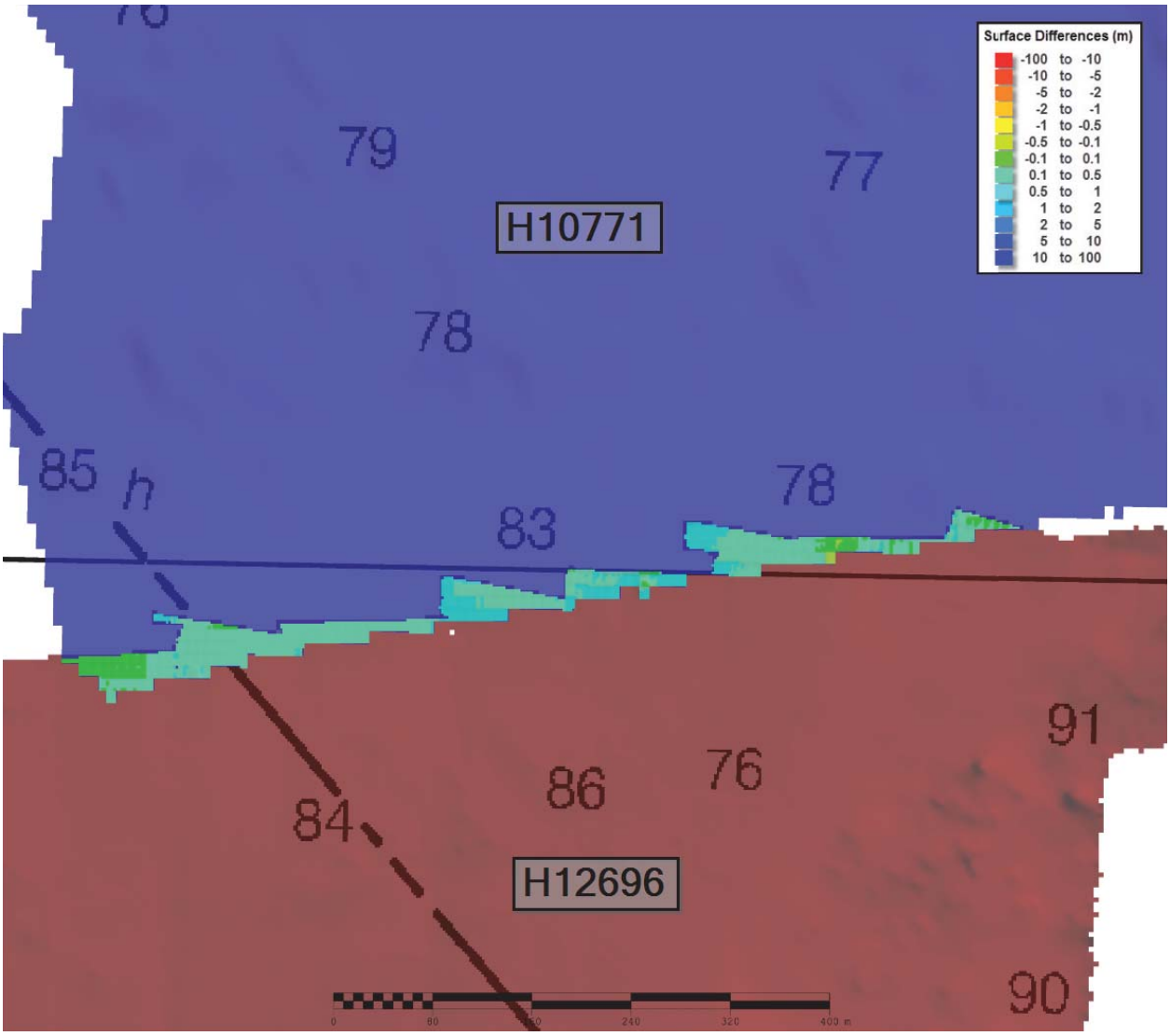


Figure 13: Junction between H12696 (red) and H10771 (blue)

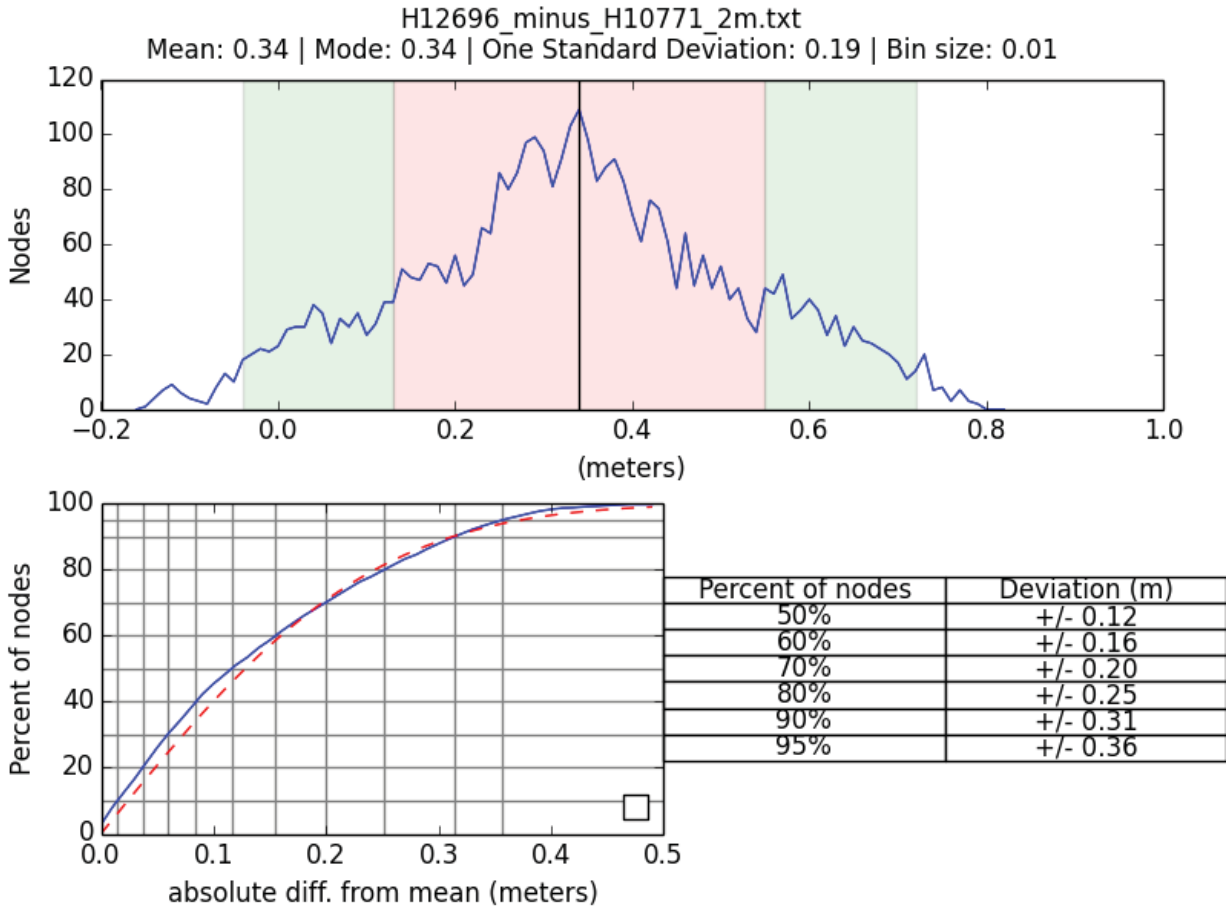


Figure 14: Differenced surface statistics, H12696 minus H10771

H11296

Overlap with LIDAR survey H11296 was minimal only creating 1,316 nodes at a 5-meter resolution along the western boundary of H12696 (Figure 15). Depths in the junction area range from 10 to 14 meters. A differenced surface analysis between a 5-meter surface for each survey showed H12696 to be an average of 0.97 meters deeper than H11296, with a standard deviation of 0.94 meters (Figure 16). 95% of all differences are less than 1.65 meters from the mean.

The hydrographer recommends that H12696 supersede H11296 in the common area.

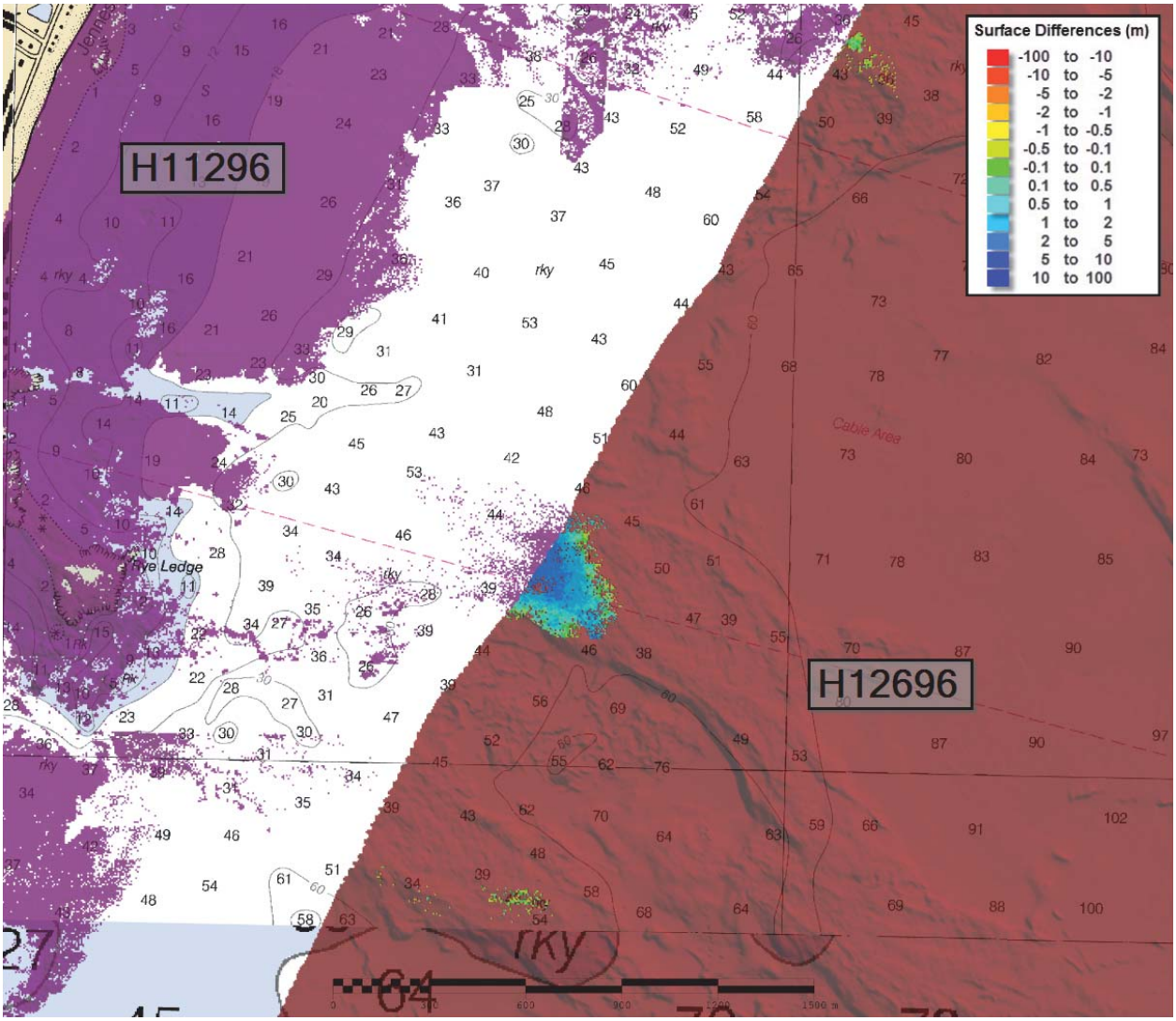


Figure 15: Junction between H12696 (red) and H11296 (purple)

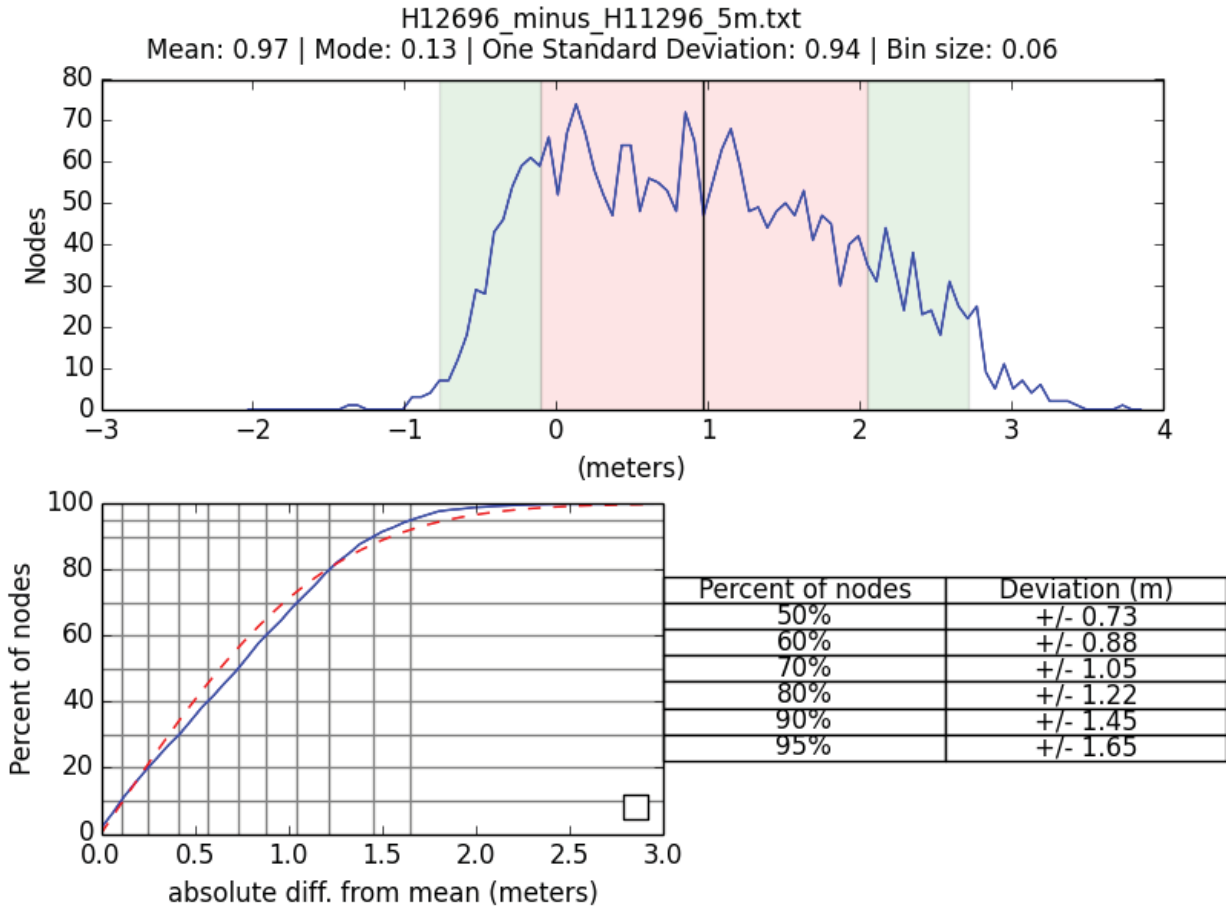


Figure 16: Differenced surface statistics, H12696 minus H11296

H12614

Overlap with survey H12614 was approximately 150 meters wide along the eastern boundary of H12696 (Figure 17). Depths in the junction area range from 34 to 69 meters. A differenced surface analysis between 4-meter CUBE depth surfaces for each survey showed H12696 to be an average of 0.07 meters deeper than H12614, with a standard deviation of 0.12 meters (Figure 18). 95% of all differences are less than 0.46 meters from the mean.

The hydrographer recommends that H12696 supersede H12614 in the common area.

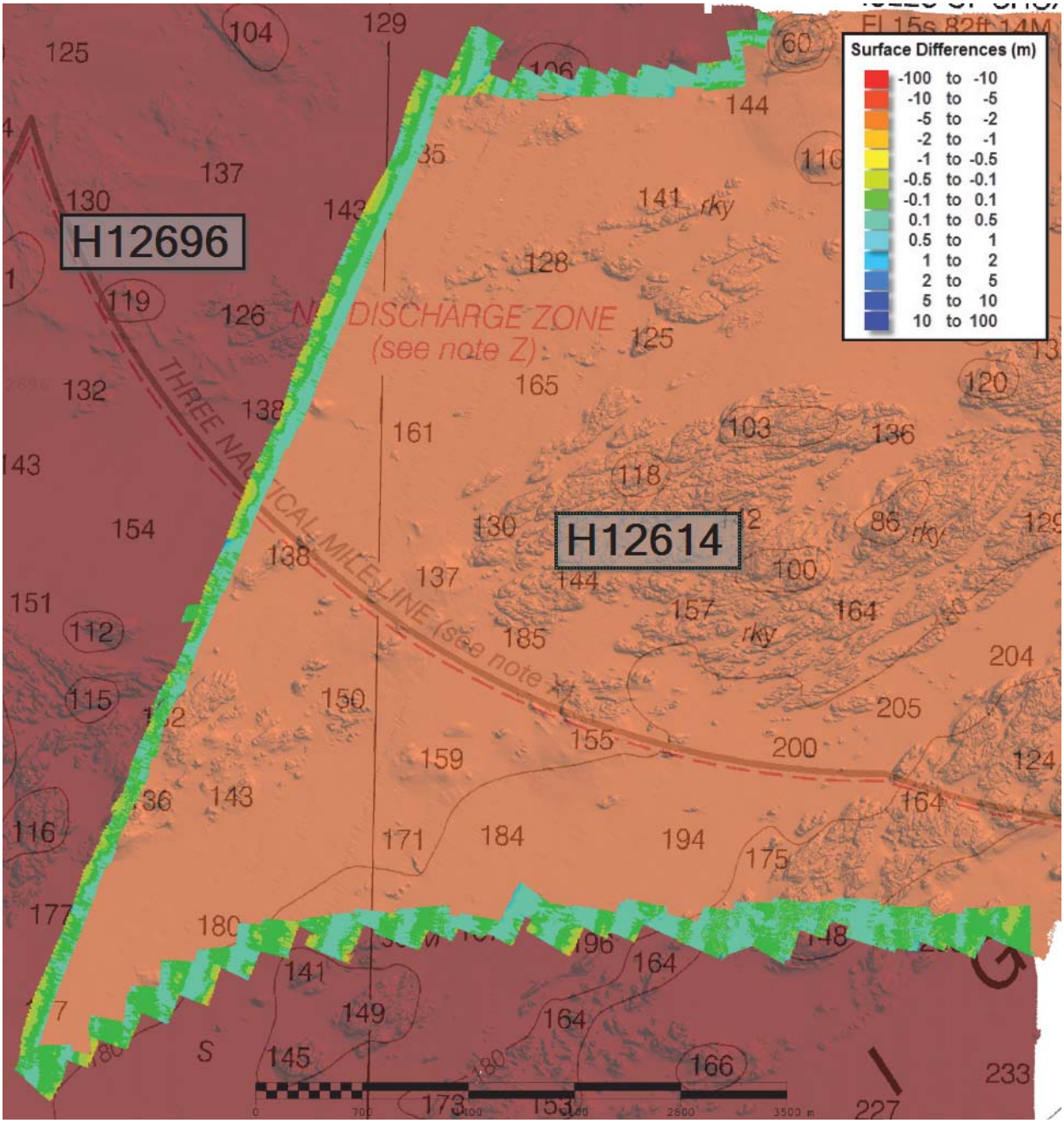


Figure 17: Junction between H12696 (red) and H12614 (orange)

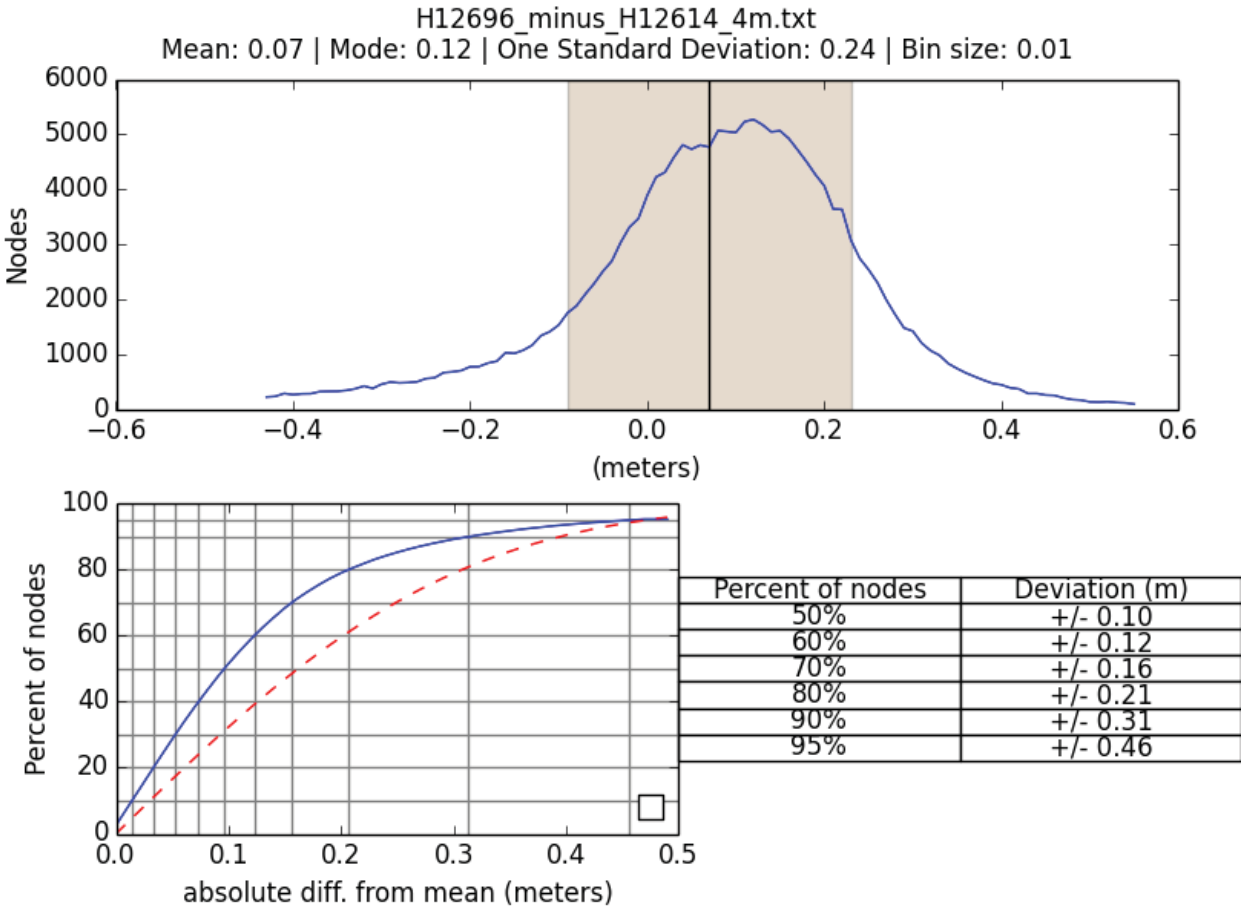


Figure 18: Differenced surface statistics, H12696 minus H12614

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

None Exist

There were no conditions or deficiencies that affected equipment operational effectiveness.

B.2.6 Factors Affecting Soundings

Deployed Fishing / Lobster Gear

Throughout the survey area for H12696 there were deployed lobster pots and buoys visible from the bridge and verified in the Reson display during acquisition. However, during data processing it was not possible to distinguish active lobster traps on the seabed from derelict traps, rocks, or other obstructions. Therefore, some temporary fishing gear may be reflected in the final dataset. These features may resemble small obstructions and meet the technical definition based on size alone, however, should not be designated as such (ref. HSSD 5.2.1.2 and FPM 4.2.6.1).

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: CTD casts using the MVP-200 were taken approximately every 3-4 hours (Figure 19). Comparisons were made by the survey watch and sound speed variation in the watercolumn was believed to be mainly a function of space, not of time.

Sound speed corrections were applied in CARIS using Nearest in Distance Within Time (NIDWT) of 4 hours for the entire survey.

Figure 19: Location of casts for H12696

B.2.8 Coverage Equipment and Methods

A density analysis was run to calculate the number of soundings per surface node. Five or more soundings per node are present in over 97.92% of the 0.5-meter surface, 99.97% of the 2-meter surface, and 99.95% of the 4-meter surface. For additional detail refer to H12696_Standards_Compliance report submitted in Appendix II of this report.

The density analysis only includes nodes which are populated by at least one sounding and does not account for holidays located within the surface, which will be discussed in the following section of this report.

B.2.9 Holidays

There are approximately 250 individual holidays (gaps in coverage spanning more than 3 nodes) within the limits of H12696 shown in Figure 20. A combination of factors contributed to this abnormally large quantity of holidays which include acoustic shadowing (Figure 21), surface sound speed blowouts (Figure 22), insufficient density (Figure 23), and high density of lobster pots in rocky areas. In all cases, the hydrographer individually assessed all holidays and is confident that least depths are achieved throughout H12696.

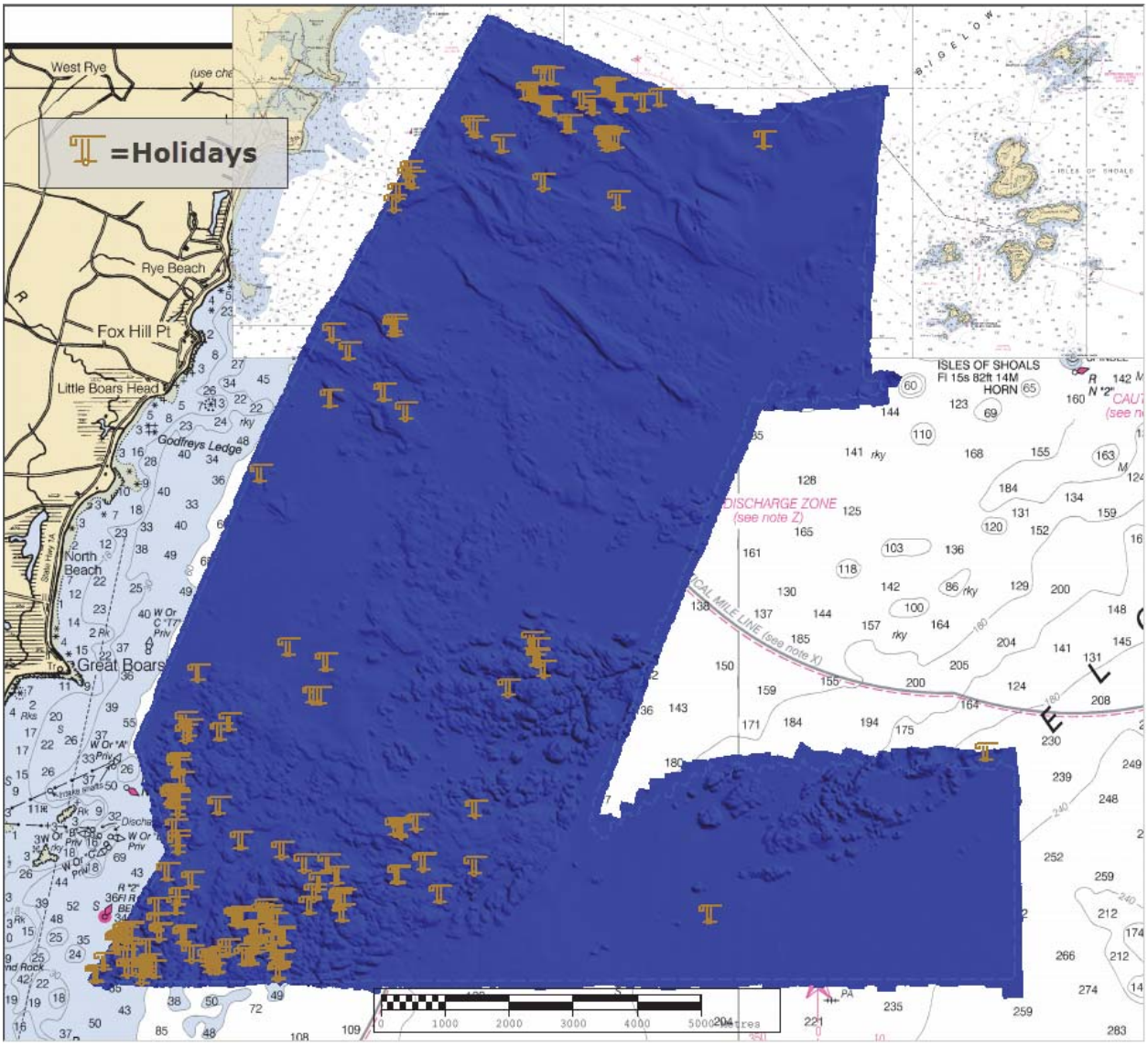


Figure 20: Holidays on H12696

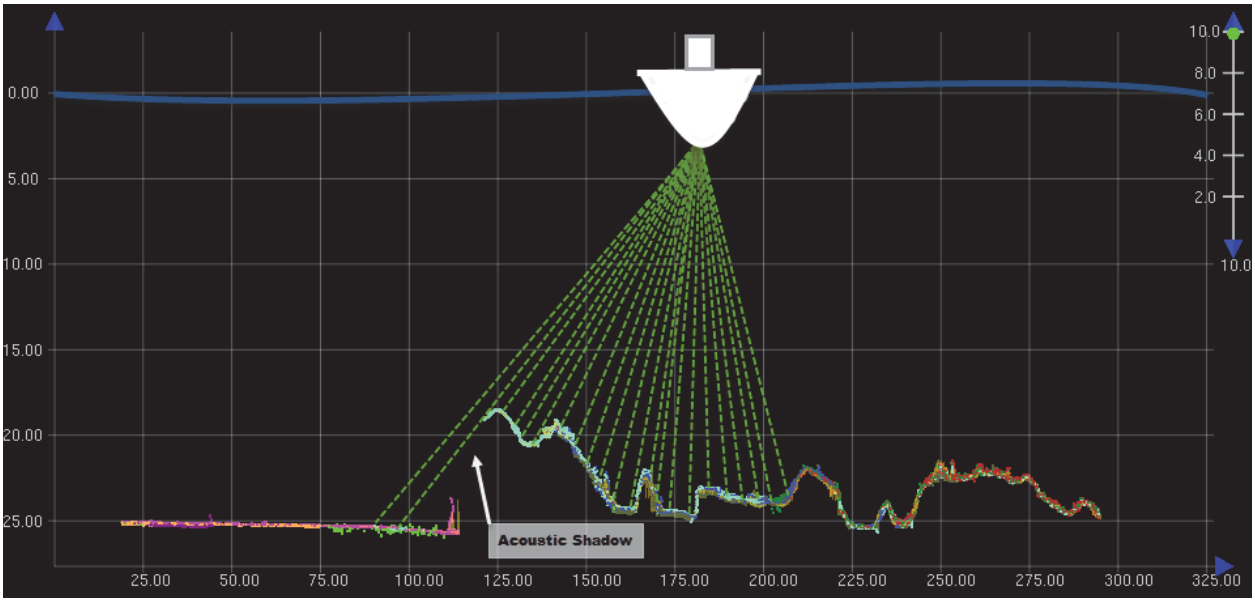


Figure 21: Example of a holiday due to acoustic shadowing

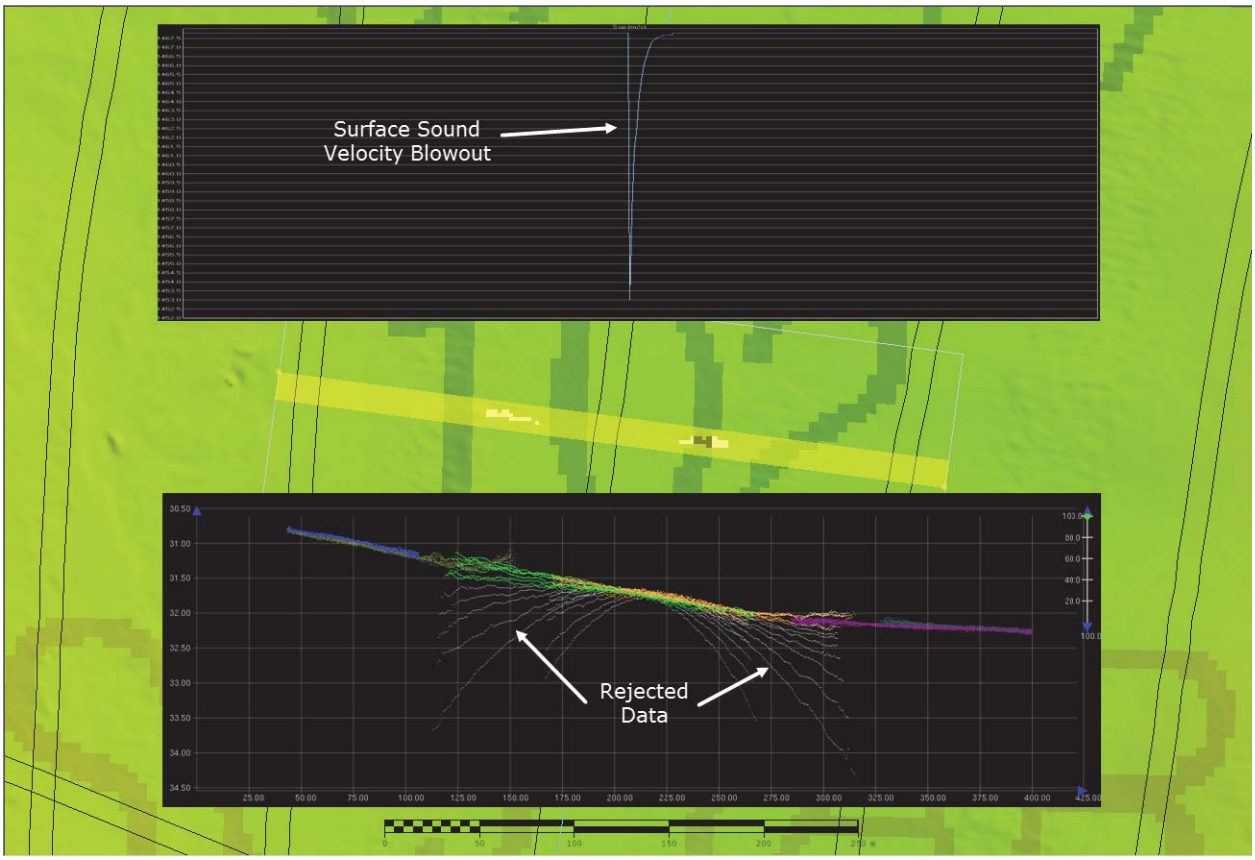


Figure 22: Example of a holiday due to surface sound velocity blow out

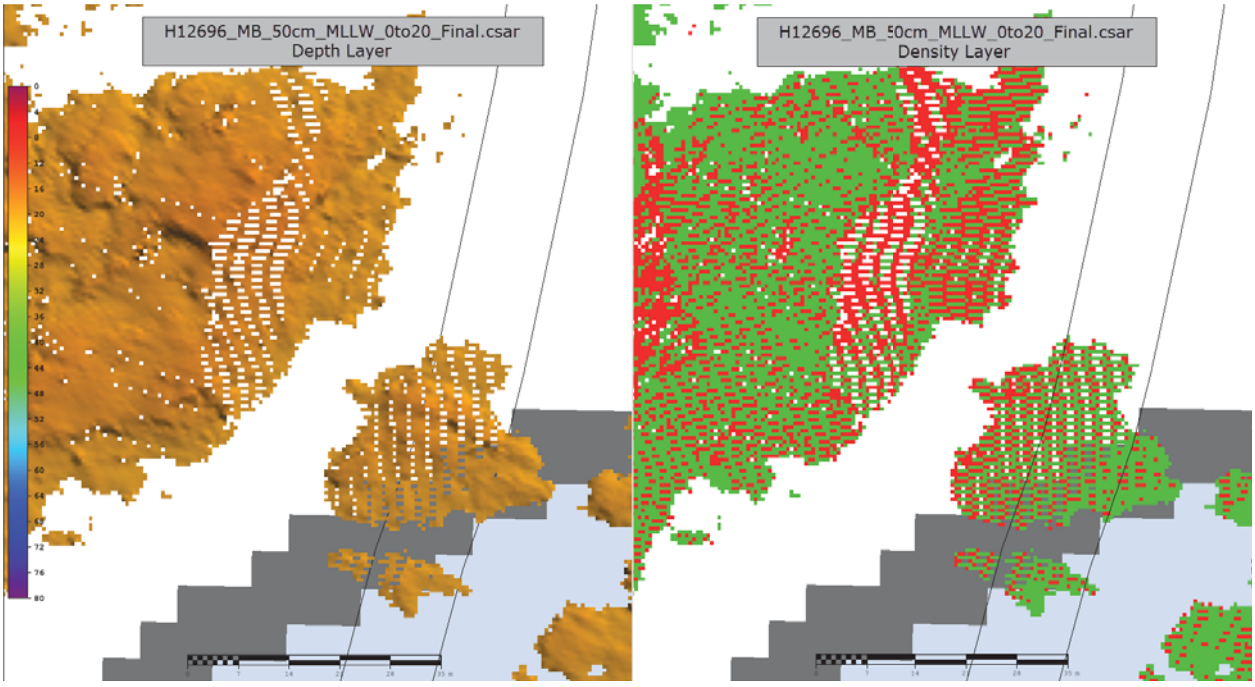


Figure 23: Example of a holiday due to insufficient density

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

Backscatter was logged in Reson datagram 7008 snippets record in the raw .s7k files. The .s7k file also holds the navigation record and bottom detections for all lines of survey H12696. The files were paired with the CARIS HDCS data, imported and processed using Fledermaus Geocoder Toolbox.

The GSF files containing the extracted backscatter are submitted with the data in this survey. The processed mosaic is saved as a Geo-Tiff and also submitted.

B.5 Data Processing

B.5.1 Software Updates

There were no software configuration changes after the DAPR was submitted.

The following Feature Object Catalog was used: NOAA Profile Version 5.3.2.

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
H12696_MB_50cm_MLLW	CUBE	0.5 meters	5.8 meters - 206.5 meters	NOAA_0.5m	Object Detection
H12696_MB_2m_MLLW	CUBE	2 meters	5.95 meters - 79.28 meters	NOAA_2m	Complete MBES
H12696_MB_4m_MLLW	CUBE	4 meters	5.95 meters - 79.28 meters	NOAA_4m	Complete MBES
H12696_MB_50cm_MLLW_Final	CUBE	0.5 meters	5.95 meters - 20 meters	NOAA_0.5m	Object Detection
H12696_MB_2m_MLLW_Final	CUBE	2 meters	18 meters - 40 meters	NOAA_2m	Complete MBES
H12696_MB_4m_MLLW_Final	CUBE	4 meters	36 meters - 79.18 meters	NOAA_4m	Complete MBES

Table 9: Submitted Surfaces

B.5.3 Designated Soundings

Within the limits of H12696, three soundings are submitted flagged as designated in CARIS HIPS and SIPS. All three soundings were submitted as DToNs.

B.5.4 Total Vertical Uncertainty Analysis

A custom layer was created on finalized surfaces showing the uncertainty of individual nodes in relation to the allowable uncertainty for their depths. This layer was exported and run through a custom Python script resulting in statistical analysis. 100.0% of nodes within survey H12696 meet the vertical uncertainty

standards of section 5.1.3 of the Hydrographic Surveys Specifications and Deliverables (2014). See H12696_Standards_Compliance report submitted in Appendix II of this report.

C. Vertical and Horizontal Control

All vertical and horizontal control activities conducted during the course of this survey are fully addressed in the following sections. Therefore, no separate HVCR is submitted.

C.1 Vertical Control

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

Standard Vertical Control Methods Used:

Discrete Zoning

The following National Water Level Observation Network (NWLON) stations served as datum control for this survey:

Station Name	Station ID
Fort Point, NH	8423898

Table 10: NWLON Tide Stations

File Name	Status
8423898.tid	Verified Observed

Table 11: Water Level Files (.tid)

File Name	Status
A321FH2013CORP.zdf	Preliminary

Table 12: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 05/08/2014. The final tide note was received on 05/16/2014.

Preliminary zoning is accepted as the final zoning for project OPR-A321-FH-2014, H12696, during the time period between April 17 - May 7, 2014.

Non-Standard Vertical Control Methods Used:

VDatum

Ellipsoid to Chart Datum Separation File:

2014_A321_VDatum_NAD83Ellip_MLLW.csar

Soundings submitted as H12696 are referenced to MLLW reduced by ellipsoidal methods using the ellipsoid to chart datum separation file, with the exception of those lines discussed in section B.2.2 that were reduced to chart datum using zoned water levels.

As required by the Project Instructions, the hydrographer evaluated VDatum for the survey area prior to H12696 final processing. Based on this evaluation, the hydrographer recommended VDatum for final datum reduction. The Chief, Hydrographic Surveys Division, concurred with this recommendation. See Appendix II for correspondence associated with the decision.

C.2 Horizontal Control

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

The projection used for this project is UTM Zone 19N.

The following PPK methods were used for horizontal control:

Smart Base

All data submitted as H12696 have SBETs and SMRMSGs applied for post-processed position/attitude and associate uncertainty values, respectively.

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
ACUSHNET 6, Acushnet, MA	ACU6
BAR HARBOR, Bar Harbor, ME	BARH
GORHAM, Gorham, ME	MEGO
NHDOT CONCORD, Concord, NH	NHCO
U NEW HAMPSHIRE, Durham, NH	NHUN
WESTFORD, Westford, MA	WES2
MTS FOX COOP, Foxborough, MA	XMTS
MTS YARMOUTH, Yarmouth, MA	YMTS
BOSTON WAAS 1, Nashua, NH	ZBW1

Table 13: CORS Base Stations

DGPS was used for real-time positioning during acquisition. All lines submitted are corrected using post-processed horizontal solutions.

The following DGPS Stations were used for horizontal control:

DGPS Stations
Brunswick NAS, ME (316 kHz)

Table 14: USCG DGPS Stations

D. Results and Recommendations

D.1 Chart Comparison

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
13278	1:80000	28	08/2013	04/29/2014	05/03/2014
13283	1:20000	22	04/2013	04/29/2014	05/03/2014

Table 15: Largest Scale Raster Charts

13278

A comparison was performed with Chart 13278 (1:80,000) using a CARIS sounding layer based on the 2m surface and contour layer based on a 50m generalized surface from H12696. Both soundings and contours were overlaid on Chart 13278 (Figure 24). Most charted depths compare to within 5 feet of H12696 data with the exception of ten soundings located in the vicinity of Hampton Shoal Ledge (Figure 24). It is recommended that H12696 data supersede all charted depths.

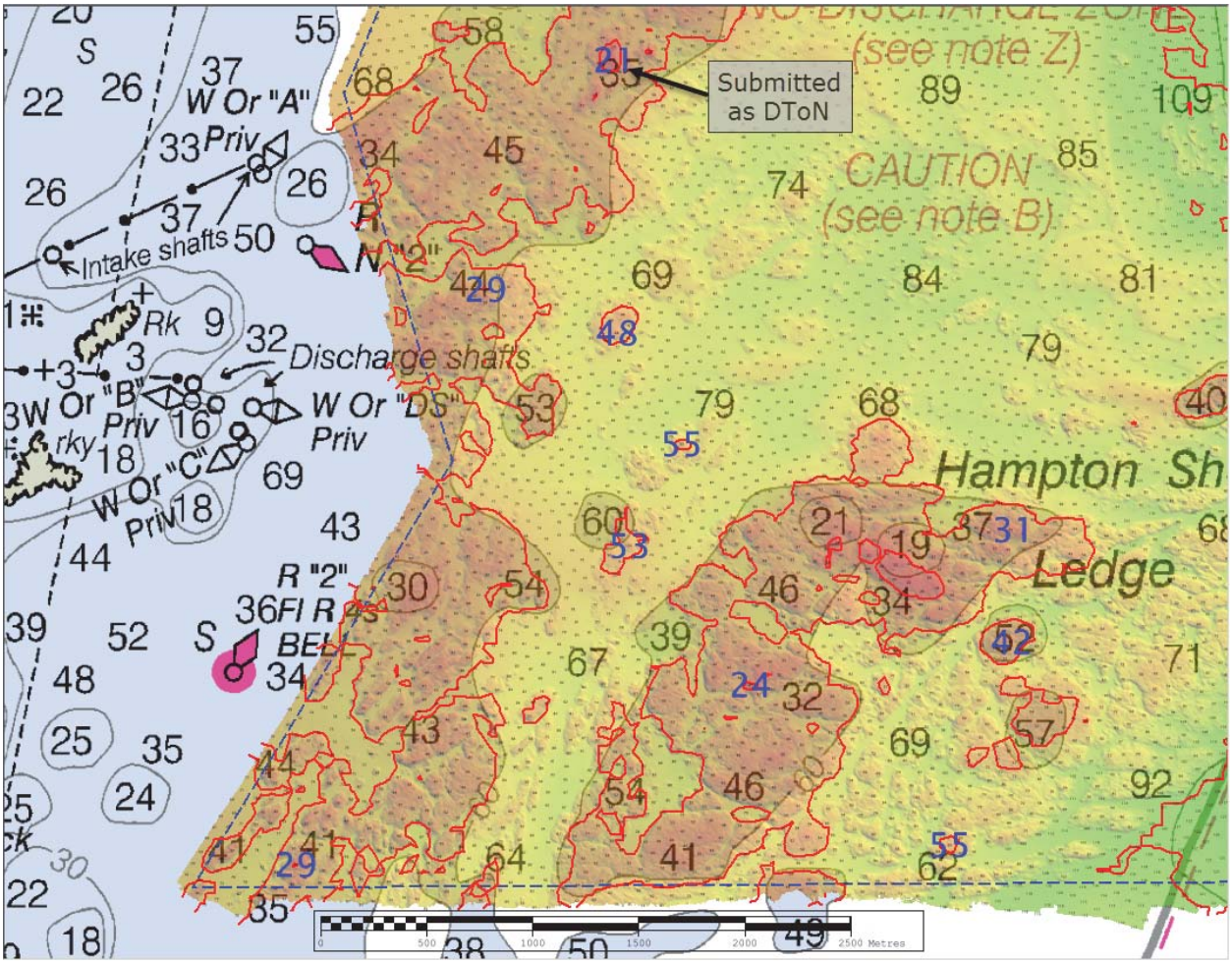


Figure 24: H12696 soundings overlaid on Chart 13278, surveyed soundings are colored blue and highlight areas of large differences

13283

A comparison was performed with Chart 13283 (1:20,000) using a CARIS sounding layer based on the 2m surface and contour layer based on a 50m generalized surface from H12696. Both soundings and contours were overlaid on Chart 13283 (Figure 25). Most charted depths compare to within five feet of H12696 data with the exception of four soundings located in the northwest area of H12696 (Figures 25). It is recommended that H12696 data supersede all charted depths.

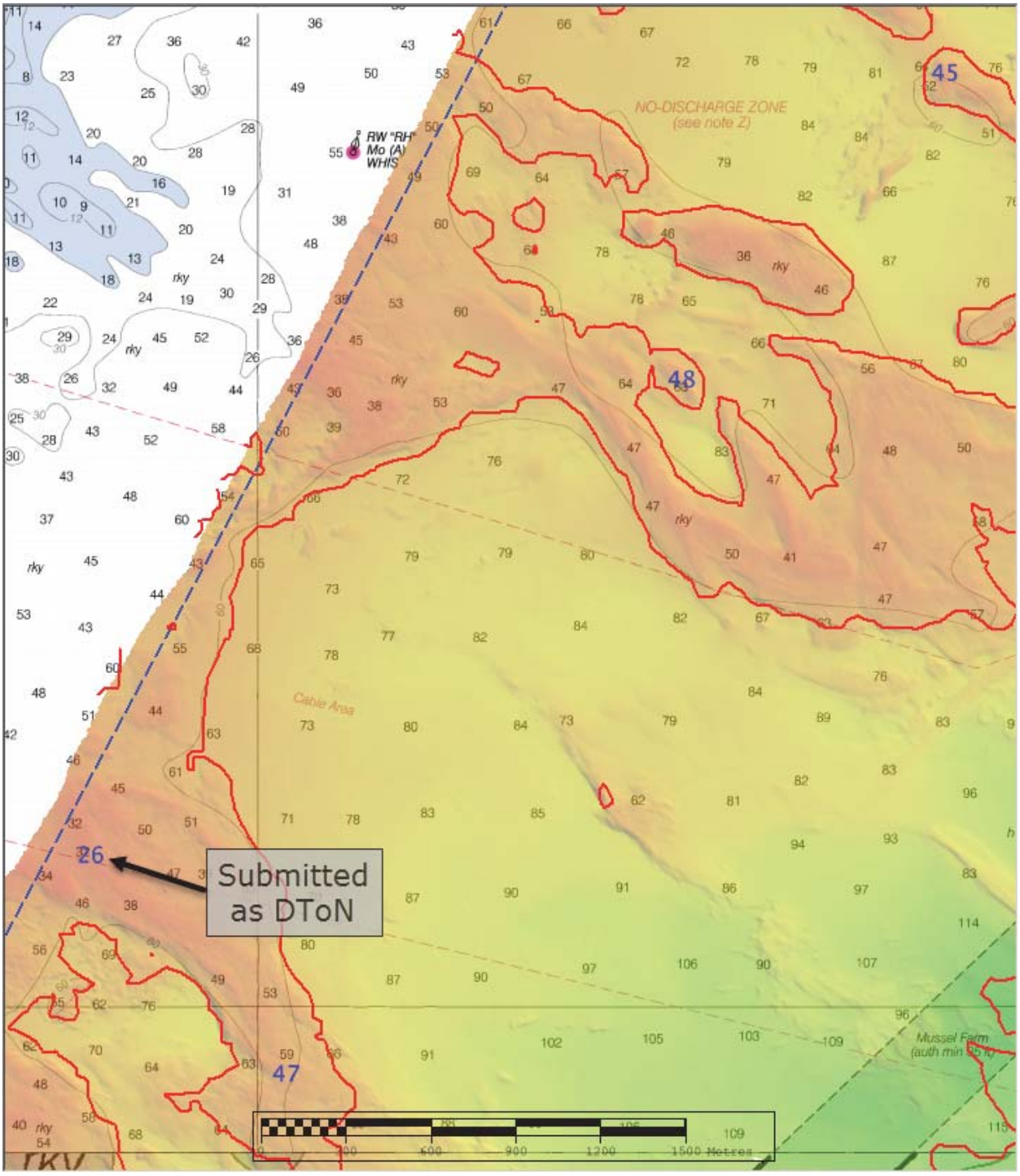


Figure 25: H12696 soundings overlaid on Chart 13283 surveyed soundings are colored blue and highlight areas of large differences

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?
US4MA04M	1:80000	23	07/14/2014	07/14/2014	NO
US5NH02M	1:20000	19	06/13/2014	06/19/2014	NO

Table 16: Largest Scale ENCs

US4MA04M

ENC US4MA04M contains no soundings different than RNC 13278. See previous discussion for comparison with RNC 13278.

US5NH02M

ENC US5NH02M contains no soundings different than RNC 13283. See previous discussion for comparison with RNC 13283.

D.1.3 AWOIS Items

Three AWOIS items exist within the sheet limits of H12696 but were not assigned. Limited information exist for these items and can be found in the AWOIS database. In all cases, AWOIS item locations had complete coverage with MBES and found no evidence of the wrecks. The AWOIS item in approximate position 42/56/11.1N 070/44/10.9W (reported as a submarine) was also investigated with 200% side scan sonar. Again, no evidence of the wrecks exist. The AWOIS item in approximate position 42/56/48.59N 070/40/26.84W was not in the delivered composite source file nor was it charted and therefore was not addressed in the final feature file. Refer to the final feature file for remarks and recommendations on the other two AWOIS items.

D.1.4 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.5 Charted Features

Two position approximate wrecks exist within the sheet limits of H12696. See section D.1.3 for information on these wrecks. A mussel farm exists within the limits of H12696. No soundings were found to be

shoaler than the authorized minimum depth of 35 feet. Refer to the final feature file for remarks and recommendations.

D.1.6 Uncharted Features

No uncharted features exist for this survey.

D.1.7 Dangers to Navigation

The following DTON reports were submitted to the processing branch:

DTON Report Name	Date Submitted
H12696_DToN_report.pdf	2014-06-23

Table 17: DTON Reports

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

D.1.8 Shoal and Hazardous Features

Hampton Shoal Ledge was investigated with complete MBES. The current charted depths agree within 1-2 feet of the surveyed soundings obtained on these hazardous features.

D.1.9 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.1.10 Bottom Samples

Sixteen bottom samples, chosen from acquired backscatter, were taken within the limits of H12696 and are submitted with the final feature file. Video coverage (limited to 40 meter depths) was obtained on nine of the sixteen bottom samples (Figure 26). One sample that was acquired without concurrent video coverage failed to collect sediment and was not included in the final feature file.

Figure 26: Bottom sampler used for H12696 with attached video camera

D.2 Additional Results

D.2.1 Shoreline

Shoreline was assigned in the Hydrographic Survey Project Instructions or Statement of Work, but was not investigated. Without availability of a survey launch, HASSLER acquired data as near shore as was deemed safe.

D.2.2 Prior Surveys

Prior survey comparisons exist for this survey, but were not investigated.

D.2.3 Aids to Navigation

All aids to navigation that are within the surveyed limits of H12696 were visually confirmed to be on station and serving intended purposes.

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

Submarine features including the cable area within the limits of H12696 were investigated and attributed in the final feature file if deemed significant. While no evidence of the cable was found in the survey data, the hydrographer recommends that the be retained as charted.

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 New Survey Recommendation

The inshore area of H12696 was surveyed near the safe navigable limit achievable by HASSLER without the use of a survey launch. Work inshore of the western limit of H12696 will require a survey launch due to high density of lobster fishing gear, proximity to hazards, and shallow depths. The hydrographer recommends these areas be addressed in a later survey by a platform suited for near shore work. See "Inshore_Junction.pdf" in Appendix II of this report.

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.

Report Name	Report Date Sent
OPR-A321-FH-14 Data Acquisition and Processing Report	2014-07-31
OPR-A321-FH-14 VDatum Validation Report	2014-06-13
2014 Hydrographic Systems Rediness Review Memo	2014-05-06

Approver Name	Approver Title	Approval Date	Signature
LCDR Marc S. Moser, NOAA	Chief of Party	08/01/2014	2014.08.01 14:06:08 -04'00'
LT Adam Reed, NOAA	Field Operations Officer	08/01/2014	Adam Reed 2014.08.01 17:38:41 Z
LTJG John R. Kidd, NOAA	Sheet Manager	08/01/2014	

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
TPU	Total Porpagated 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

TIDES AND WATER LEVELS

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

PROVISIONAL TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : May 9, 2014

HYDROGRAPHIC BRANCH: Atlantic
HYDROGRAPHIC PROJECT: OPR-A321-FH-2014
HYDROGRAPHIC SHEET: H12696
LOCALITY: Ragged Neck Pt to Hampton Shoal Ledge, Gulf of Maine, NH
TIME PERIOD: April 17 - May 7, 2014

TIDE STATION USED: 842-3898 Fort Point, NH
Lat. 43° 04.3'N Long. 70° 42.7' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.735 meters

REMARKS: RECOMMENDED ZONING Preliminary zoning is accepted as the final zoning for project OPR-A321-FH-2014, H12696, during the time period between April 17 - May 7,2014.

Please use the zoning file A321FH2014CORP submitted with the project instructions for OPR-A321-FH-2014. Zone NA169 is the applicable zone for H12696.

Refer to attachments for zoning information.

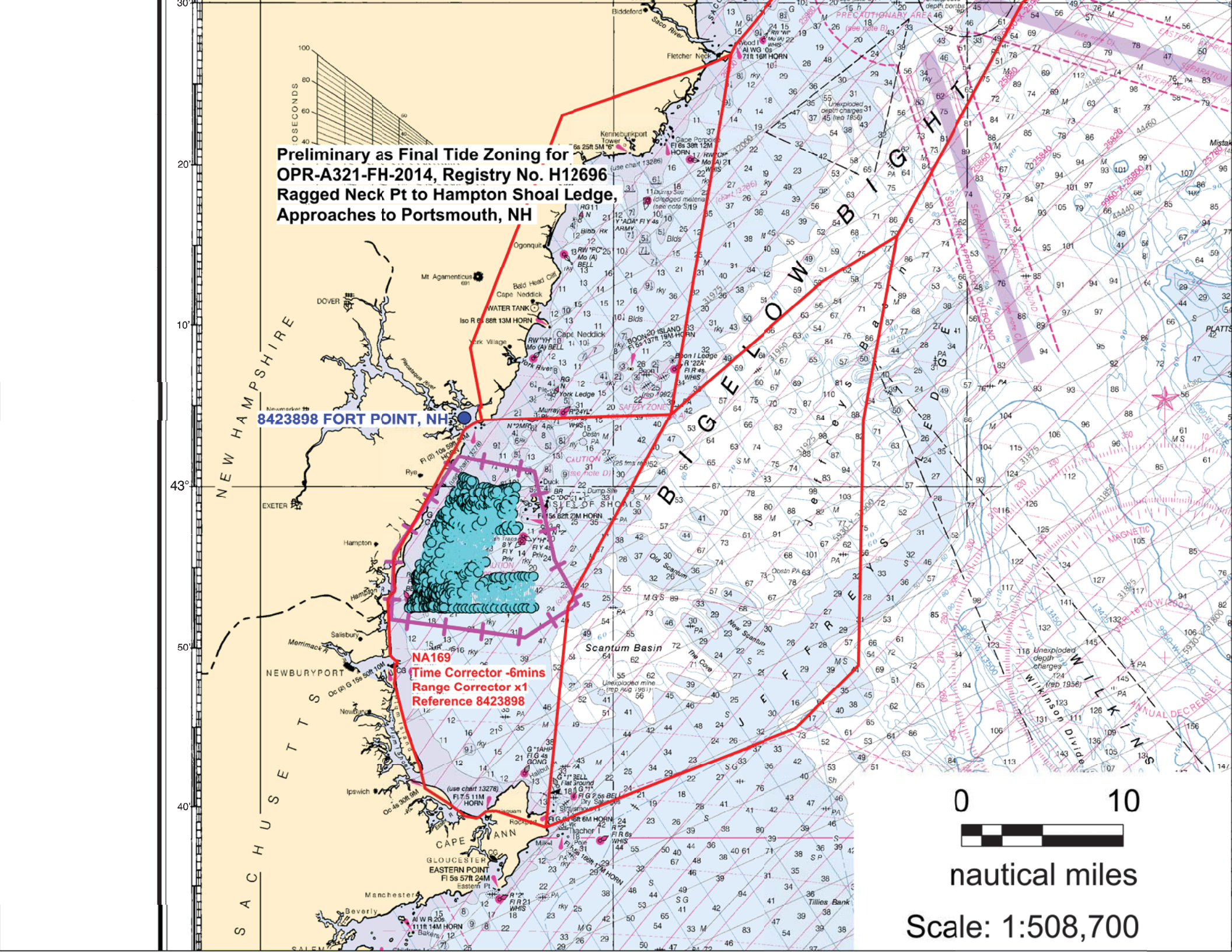
Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

Note 2: Annual leveling for Fort Point, NH (8423898) was not completed in FY13. A review of the verified leveling records from October 2002 - 2012 shows the tide station benchmark network to be stable within an allowable 0.009 m tolerance. This Tide Note may be used as final stability verification for survey OPR-A321-NF-2014, H12696. CO-OPS will immediately provide a revised Tide Note should subsequent leveling records indicate any benchmark network stability movement beyond the allowable 0.009 m tolerance.

HOVIS.GERALD.THOMAS.1365860250

Digitally signed by HOVIS.GERALD.THOMAS.1365860250
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=HOVIS.GERALD.THOMAS.1365860250
Date: 2014.05.16 06:45:42 -04'00'

CHIEF, PRODUCTS AND SERVICES BRANCH


Preliminary as Final Tide Zoning for
OPR-A321-FH-2014, Registry No. H12696
Ragged Neck Pt to Hampton Shoal Ledge,
Approaches to Portsmouth, NH
8423898 FORT POINT, NH
NA169
Time Corrector -6mins
Range Corrector x1
Reference 8423898
0
10
nautical miles
Scale: 1:508,700

APPENDIX II

SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE

John Kidd - NOAA Federal <john.kidd@noaa.gov>

OPR-A321-FH-14 - H12696 LIDAR junction

2 messages

John Kidd - NOAA Federal <john.kidd@noaa.gov> Wed, Jul 9, 2014 at 5:52 PM
To: Michael Gonsalves - NOAA Federal <Michael.Gonsalves@noaa.gov>

LCDR Gonsalves,

I am doing my junction analysis on project OPR-A321-FH-14 sheet H12696 and have a question about the Fugro LIDAR junction. Our survey limits were not drawn anywhere near where I think the LIDAR good line would be (not provided). Just wanted to know why the limits were drawn this way (because you knew that we wouldn't have a small boat or some other reason?).

Very Respectfully,
LTJG John Kidd

Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov> Thu, Jul 10, 2014 at 9:38 AM
To: John Kidd - NOAA Federal <john.kidd@noaa.gov>
Cc: Corey Allen - NOAA Federal <corey.allen@noaa.gov>

Hey John,

I'd need to double-check with Corey, but I believe your assumption is correct ... the inshore limits for the NH project were based upon what we thought the ship capable of achieving without a small boat. Knowing the proximity of your home port, we figured it would be easy enough, once the FH had a small boat in hand, to go back and mop up those closer to shore bits.

Is that your recollection as well Corey?

~~ mog
[Quoted text hidden]

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Office of Coast Survey
Silver Spring, Maryland 20910-3282

July 25, 2014

MEMORANDUM FOR: LCDR Marc S. Moser, NOAA
Commanding Officer, NOAA Ship *Ferdinand Hassler*

FROM: Jeffrey Ferguson
Chief, Hydrographic Surveys Division

SUBJECT: Vertical Datum Transformation Technique,
OPR-A321-FH-14, Approaches to Portsmouth, NH

Hydrographic surveys H12696, H12697 & H12698 are approved for vertical reduction to chart datum, Mean Lower Low Water (MLLW), using the NOAA Vertical Datum Transformation (VDatum) (http://vdatum.noaa.gov) derived separation (SEP) model..

Approval of VDatum, in lieu of the NOAA Center for Operational Oceanographic Products and Services (CO-OPS) discrete zoning package as per the Project Instructions, is based on your recommendation and the review of comparison results you included in your attached email from June 19, 2014.

The results of the data analysis show that ellipsoidally referenced survey (ERS) techniques with VDatum used as the vertical datum reducer meet or exceed horizontal and vertical specifications for hydrographic surveys.

The comparison techniques are in line with the procedures outlined in the NOS Hydrographic Surveys Specifications and Deliverables document.

You shall include a description of your ERS processing procedures and the comparisons you conducted between ERS and traditional tides or prior survey data in the appropriate Descriptive Report (DR), Horizontal and Vertical Control Report and/or Data Acquisition and Processing Report. As appropriate in the DR, document specific vessel day(s) or line(s) that have not been processed using VDatum as the vertical reducer to MLLW where discrete zoning provides better results and/or where vertical uncertainties of your post processed vertical positional data are inaccurate.

Include this memo in the supplemental correspondence Appendix of the DR.

APPENDIX III

SURVEY FEATURES REPORT

DToNs - none
AWOIS - none
Maritime Boundary - none
Wrecks - two

H12696_Wrecks

Registry Number: H12696
State: New Hampshire
Locality: Gulf of Maine
Sub-locality: Ragged Neck Pt to Hampton Shoal Ledge
Project Number: OPR-A321-FH-14
Survey Date: 04/17/2014 - 05/14/2014

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
13274	27th	06/01/2007	1:40,000 (13274_2)	[L]NTM: ?
13278	28th	08/01/2013	1:80,000 (13278_1)	USCG LNM: 12/2/2014 (12/9/2014) CHS NTM: None (11/28/2014) NGA NTM: 11/1/2008 (12/20/2014)
13260	40th	05/01/2007	1:378,838 (13260_1)	[L]NTM: ?
13009	33rd	05/01/2007	1:500,000 (13009_1)	[L]NTM: ?
13006	34th	05/01/2007	1:675,000 (13006_1)	[L]NTM: ?
13003	49th	04/01/2007	1:1,200,000 (13003_1)	[L]NTM: ?

* Correction(s) - *source: last correction applied (last correction reviewed--"cleared date")*

Features

No.	Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	Wreck PA, AWOIS 12455	GP	[None]	42° 54' 58.7" N	070° 44' 55.5" W	---
1.2	Wreck PA, AWOIS 2172	GP	[None]	42° 56' 09.3" N	070° 44' 10.3" W	---

1 - Wrecks

1.1) Wreck PA

Survey Summary

Survey Position: 42° 54' 58.7" N, 070° 44' 55.5" W

Least Depth: [None]

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 1981-001.00:00:00.000 (01/01/1981)

Dataset: H12696_wrecks.000

FOID: 0_ 0004714396 00001(FFFE0047EF9C0001)

Charts Affected: 13274_2, 13278_1, 13260_1, 13009_1, 13006_1, 13003_1

Remarks:

$CSYMB/remrks: No evidence of wreck found in multibeam

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12696_wrecks.000	0_ 0004714396 00001	0.00	000.0	Primary

Hydrographer Recommendations

Delete from chart

S-57 Data

Geo object 1: Cartographic symbol ($CSYMB)

Attributes: NINFOM - Delete wreck

NTXTDS - ENC US4MA04M,ED 23,Update 5

Office Notes

COMPILE: No evidence of wreck PA found. Delete charted wreck PA. Wreck is associated with AWOIS12455, but no AWOIS items were assigned for this survey.

1.2) Wreck PA 2

Survey Summary

Survey Position:	42° 56' 09.3" N, 070° 44' 10.3" W
Least Depth:	[None]
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	1981-001.00:00:00.000 (01/01/1981)
Dataset:	H12696_wrecks.000
FOID:	0_ 0004714395 00001(FFFE0047EF9B0001)
Charts Affected:	13274_2, 13278_1, 13260_1, 13009_1, 13006_1, 13003_1

Remarks:

$CSYMB/remrks: object disproven using 200% side scan sonar coverage and object detection MBES data

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12696_wrecks.000	0_ 0004714395 00001	0.00	000.0	Primary

Hydrographer Recommendations

Delete dangerous wreck from chart

S-57 Data

Geo object 1:	Cartographic symbol ($CSYMB)
Attributes:	NINFOM - Delete wreck
	NTXTDS - ENC US4MA04M,ED 23,Update 5

Office Notes

Charted feature was ensonified with complete coverage MBES and investigated with 200% SSS. No evidence of the feature exists.

COMPILE: Delete charted wreck PA. Wreck is associated with AWOIS2172, but no AWOIS items were assigned for this survey.

APPROVAL PAGE

H12696

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 NGDC for archive

- H12696_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12696_GeoImage.pdf

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

Approved:_____

Lieutenant Commander Matthew Jaskoski, NOAA
Chief, Atlantic Hydrographic Branch