H12615

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H12615

LOCALITY

State(s):	Maine
General Locality:	Gulf of Maine
Sub-locality:	York Harbor Entrance to Cape Neddick

2013

CHIEF OF PARTY
LCDR Benjamin K. Evans, NOAA

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Date:

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

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

H12615

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):	**Maine**
General Locality:	**Gulf of Maine**
Sub-Locality:	**York Harbor Entrance to Cape Neddick**
Scale:	**10000**
Dates of Survey:	**08/17/2013 to 09/09/2013**
Instructions Dated:	**07/25/2013**
Project Number:	**OPR-A321-FH-13**
Field Unit:	**NOAA Ship *Ferdinand R. Hassler***
Chief of Party:	**LCDR Benjamin K. Evans, 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/.

Table of Contents

List of Tables

List of Figures

Descriptive Report to Accompany Survey H12615

Project: OPR-A321-FH-13

Locality: Gulf of Maine

Sublocality: York Harbor Entrance to Cape Neddick

Scale: 1:10000

August 2013 - September 2013

NOAA Ship *Ferdinand R. Hassler*

Chief of Party: LCDR Benjamin K. Evans, NOAA

A. Area Surveyed

The survey area is located in the Gulf of Maine, within the sub-locality of York Harbor Entrance to Cape Neddick as shown in Figure 1.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
43° 11" 3.6' N 70° 38" 45.6' W	43° 5" 34.2' N 70° 30" 20.4' W

Table 1: Survey Limits

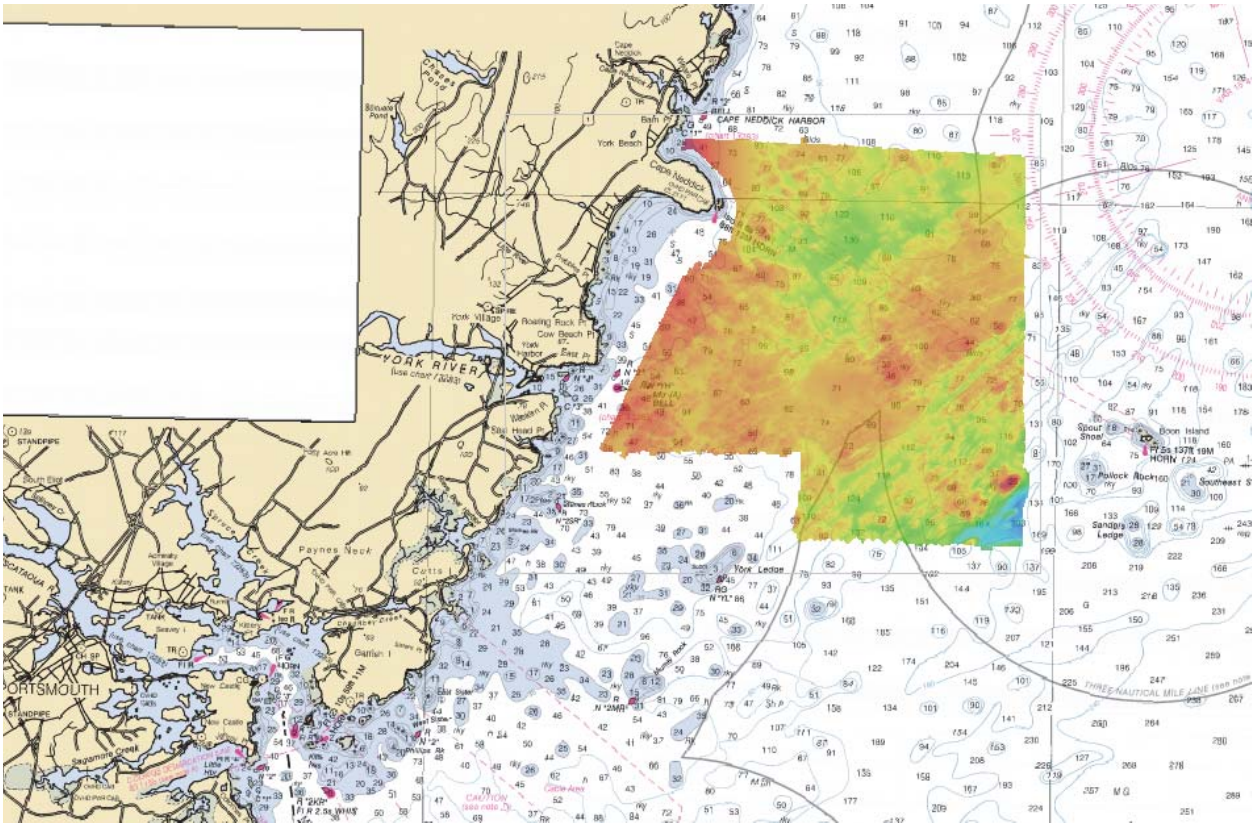


Figure 1: General locality of survey H12615

The survey does not reach the assigned inshore limit as provided from OPS. HASSLER defined an inshore limit line for ship hydrography at the beginning of acquisition. Work inshore of this limit will require a survey launch due to high density of lobster fishing gear and proximity of grounding hazards. As no survey launch was available at the time of the survey, this area went unaddressed. Figure 2 shows the planned sheet limits and the obtained coverage.

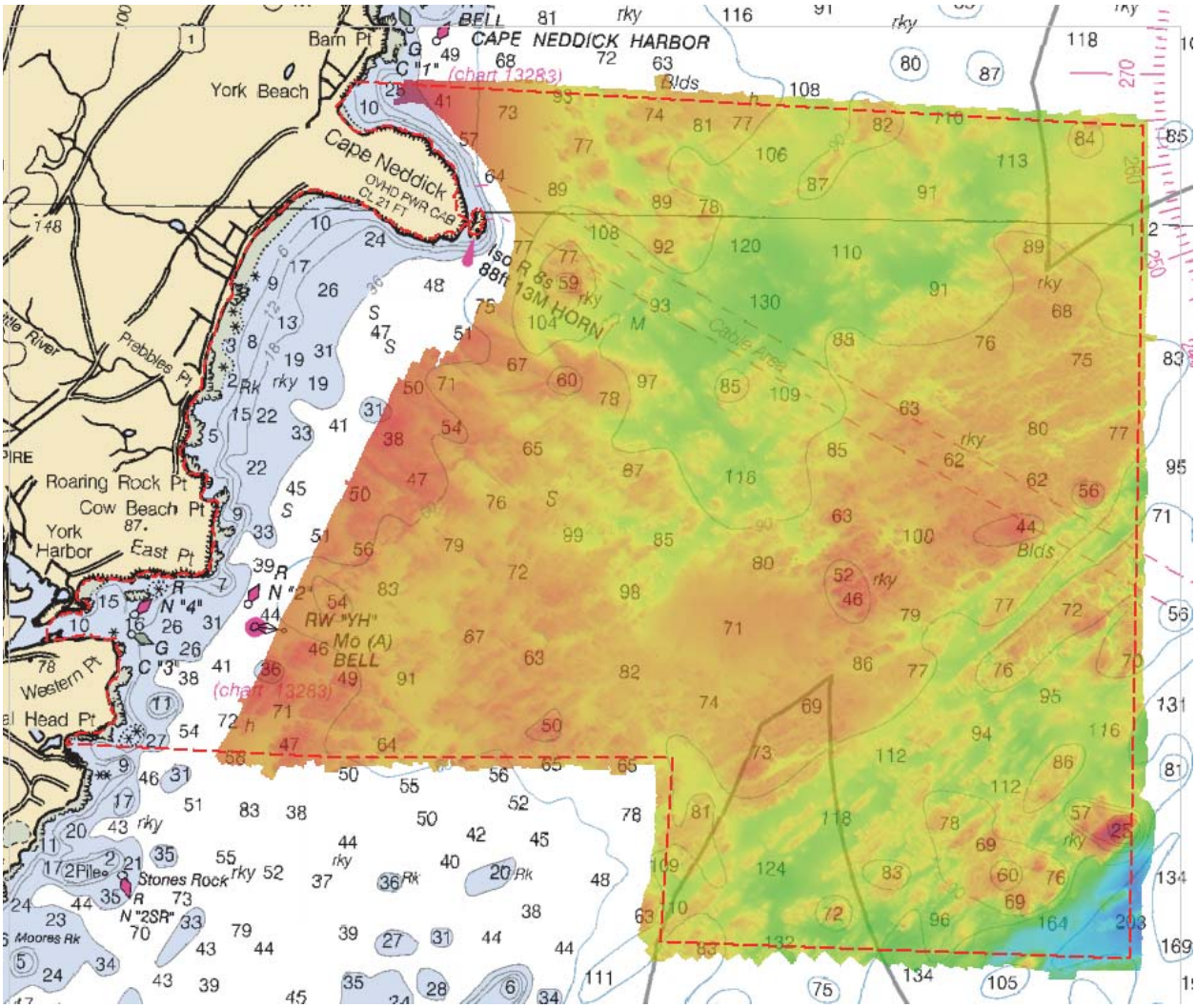


Figure 2: H12615 survey coverage compared to planned sheet limits.

A.2 Survey Purpose

The primary purpose of this project is to support safe navigation through the acquisition and processing of hydrographic data for updating National Ocean Service's (NOS) nautical charting products.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

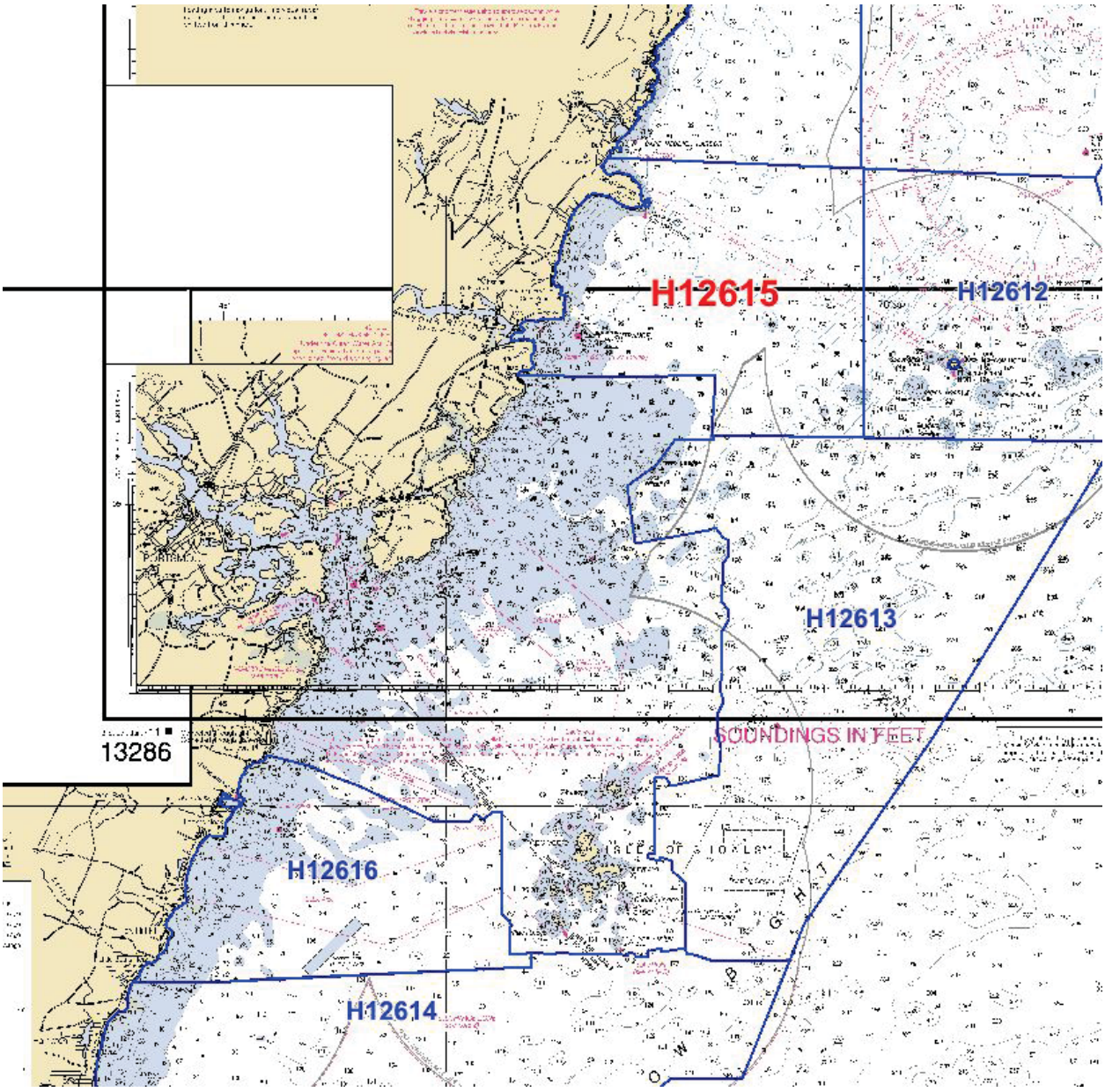


Figure 3: Survey layout for OPR-A321-FH-13 plotted over raster charts 13278_1 and 13286_1

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:

	Vessel	***S250***	***Total***
LNM	**SBES Mainscheme**	0	0
	MBES Mainscheme	348.95	348.95
	Lidar Mainscheme	0	0
	SSS Mainscheme	0	0
	SBES/MBES Combo Mainscheme	0	0
	SBES/SSS Combo Mainscheme	0	0
	MBES/SSS Combo Mainscheme	0	0
	SBES/MBES Combo Crosslines	15.55	15.55
	Lidar Crosslines	0	0
Number of Bottom Samples			15
Number AWOIS Items Investigated			0
Number Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Items Investigated by Dive Ops			0
Total Number of SNM			17.54

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Julian Day Number
08/17/2013	229
08/18/2013	230
08/19/2013	231
08/20/2013	232
09/07/2013	250
09/08/2013	251
09/09/2013	252

Table 3: Dates of Hydrography

Mainscheme survey lines were typically 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	3.80 meters

Table 4: Vessels Used

NOAA Ship FERDINAND R. HASSLER (S250) acquired all data within the limits of H12615.

B.1.2 Equipment

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

Manufacturer	Model	Type
Reson	7125	MBES
Reson	7111	MBES
Applanix	POS M/V 320 V5	Positioning and Attitude System
Hemisphere	MBX-4	Positioning System
Brooke Ocean	MVP-30	Sound Speed System
AML	Smart SV & P	Sound Speed System
Sea Bird	SBE 19+	Conductivity, Temperature, and Depth Sensor

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines, acquired for this survey, totalled 4.5% of mainscheme acquisition.

A geographic plot of crosslines is shown in Figure 4. Crosslines were filtered to remove soundings greater than 45 degrees from nadir. To evaluate crossline agreement, two 1-meter surfaces were created: one from crossline soundings, the other from mainscheme soundings. These two surfaces were differenced using CARIS HIPS and SIPS. The statistical analysis of the differences between the mainscheme and crossline surfaces are shown in Figure 5. The average difference between the surfaces is -0.13 meters with a standard deviation of 0.23 meters; 95% of all differences were less than 0.41 meters from the mean.

High standard deviation is thought to be attributed to two factors, the high relief within the survey and a known bottom detection algorithm artifact for the 7111 (Figure 6). Despite the artifacts, the crosslines provide a positive check of general internal consistency.

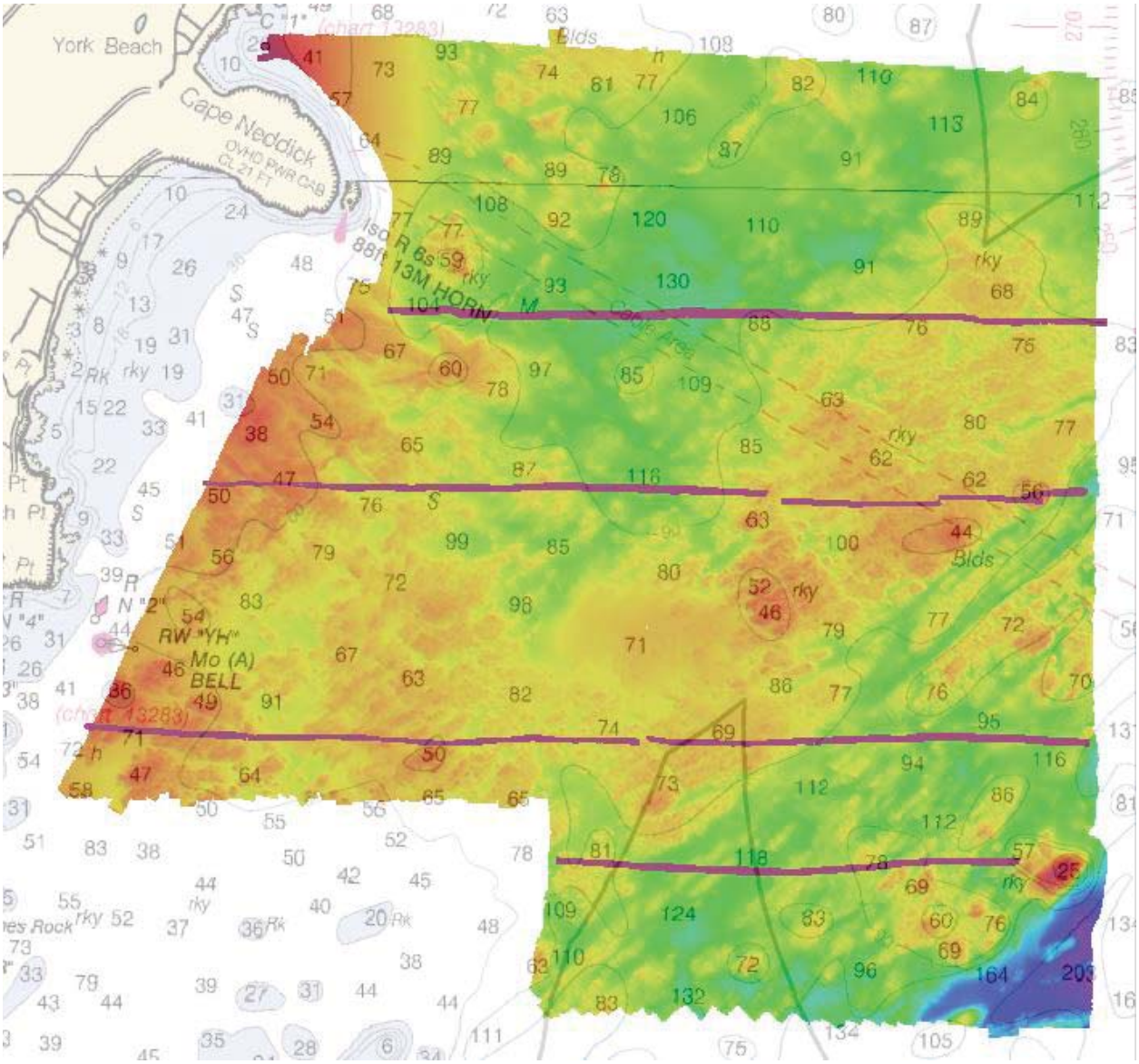
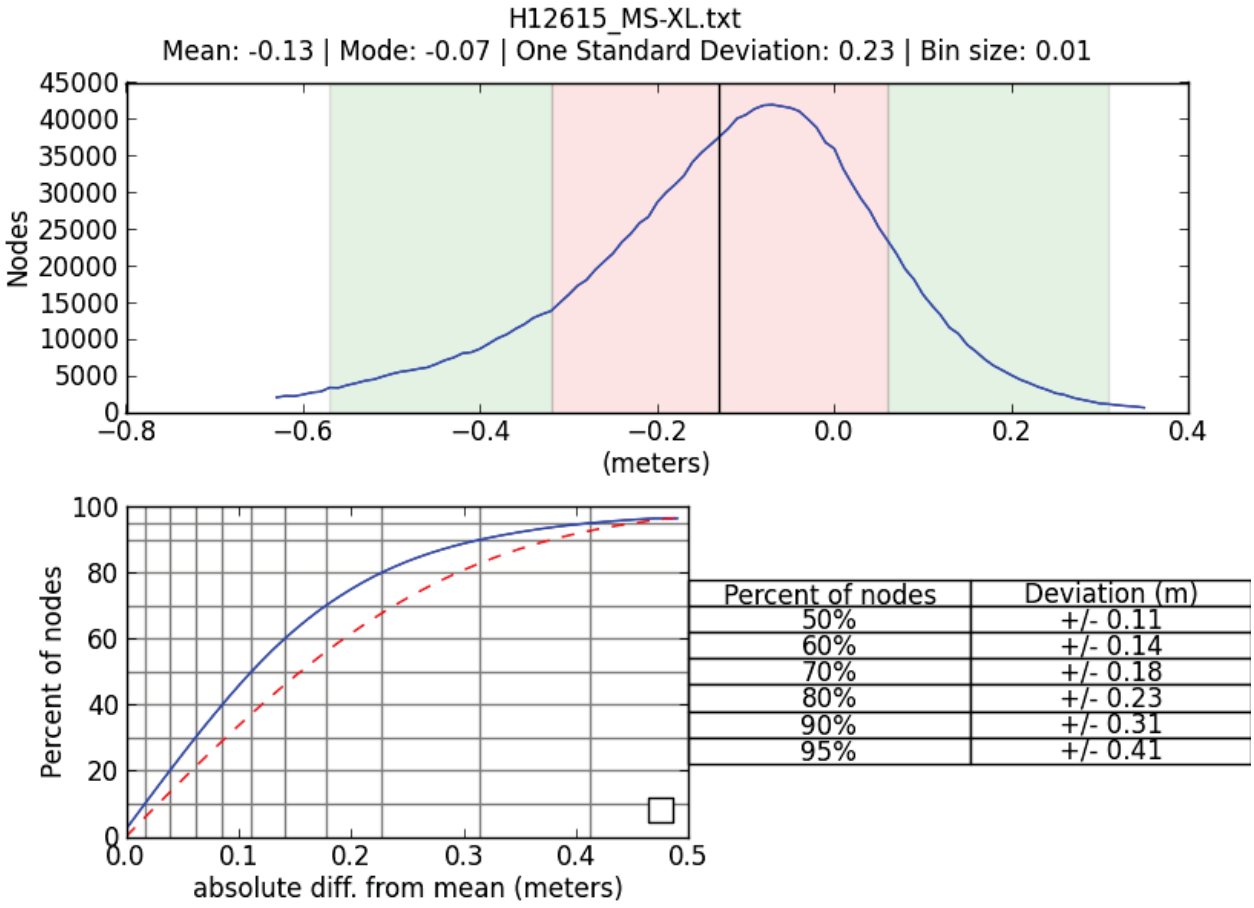


Figure 4: Location of crosslines, shown in purple, and mainscheme data for H12615



Percent of nodes	Deviation (m)
50%	+/- 0.11
60%	+/- 0.14
70%	+/- 0.18
80%	+/- 0.23
90%	+/- 0.31
95%	+/- 0.41

Figure 5: H12615 crossline difference statistics: mainscheme minus crossline

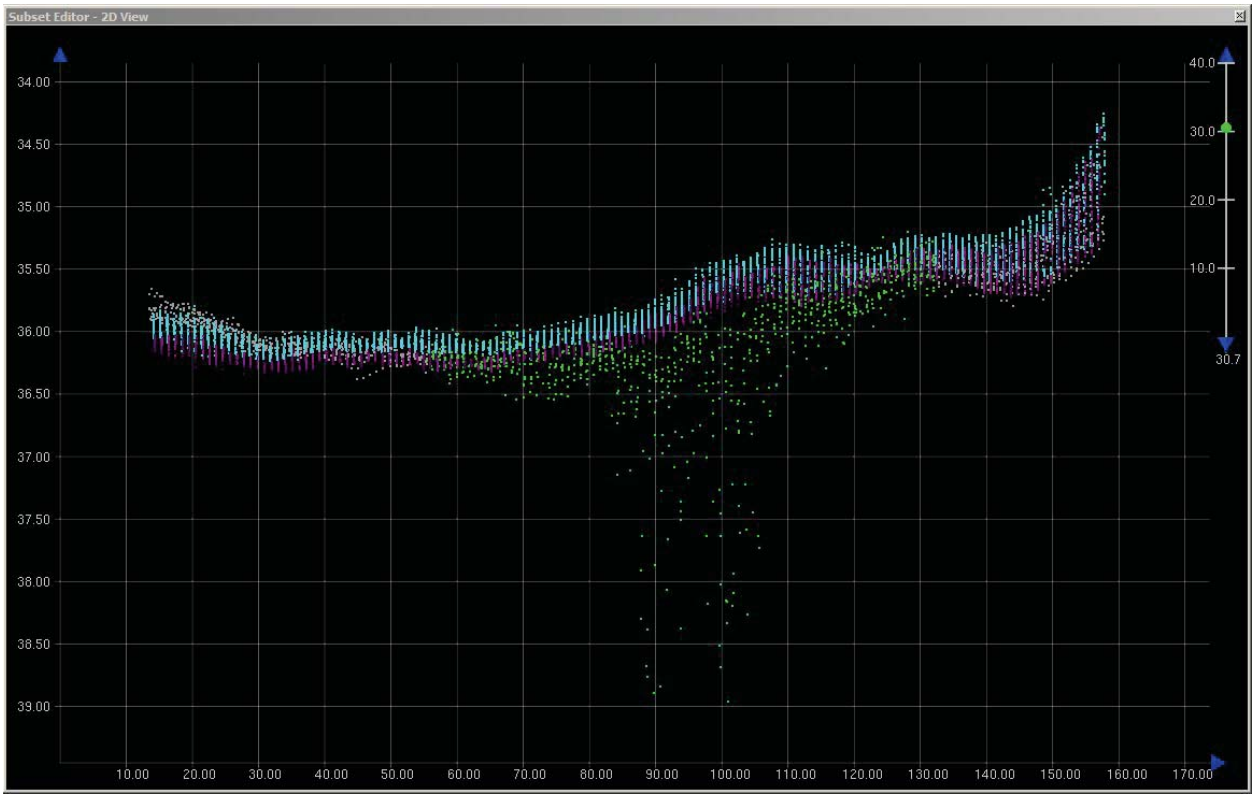


Figure 6: Example of 7111 nadir artifacts in CARIS Subset Editor. Soundings are colored by vessel. Reson 7111 soundings are shown in green.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0.01 meters	0.2 meters
0.01 meters	0.081 meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
S250	1.0 meters/second	0.5 meters/second	0.5 meters/second

Table 7: Survey Specific Sound Speed TPU Values

CO-OPS provided the tidal zoning uncertainty of 0.2 meters in the Project Instructions for project OPR-A321-FH-13. Only 6 lines, listed below, were corrected with zoned tides and received this uncertainty

estimate. For these lines Trueheave RMS was loaded and TPU was calculated using the "vessel settings" selection.

The 0.081 meter uncertainty value was provided by HSD and is based on the VDatum uncertainty of the area. For all lines except those noted below, Trueheave RMS records were manually deleted from CARIS HDCS folders to allow down RMS values to load from the SMRMSG files. TPU was calculated using the "error data" selection.

The lines listed below exhibited unrealistic vertical offsets after SBET files were applied. These lines have been reduced to chart datum using zoned water levels.

Port -
20130818_050633

Starboard -
20130818_050633
20130819_121047
20130820_172910
20130820_173934
20130820_174810

B.2.3 Junctions

The areas of overlap between sheet H12615 and its junction sheets, shown in Figure 7, were reviewed in CARIS Subset Editor. The junctioning surfaces were subtracted from the surface of H12615 to assess sounding consistency.

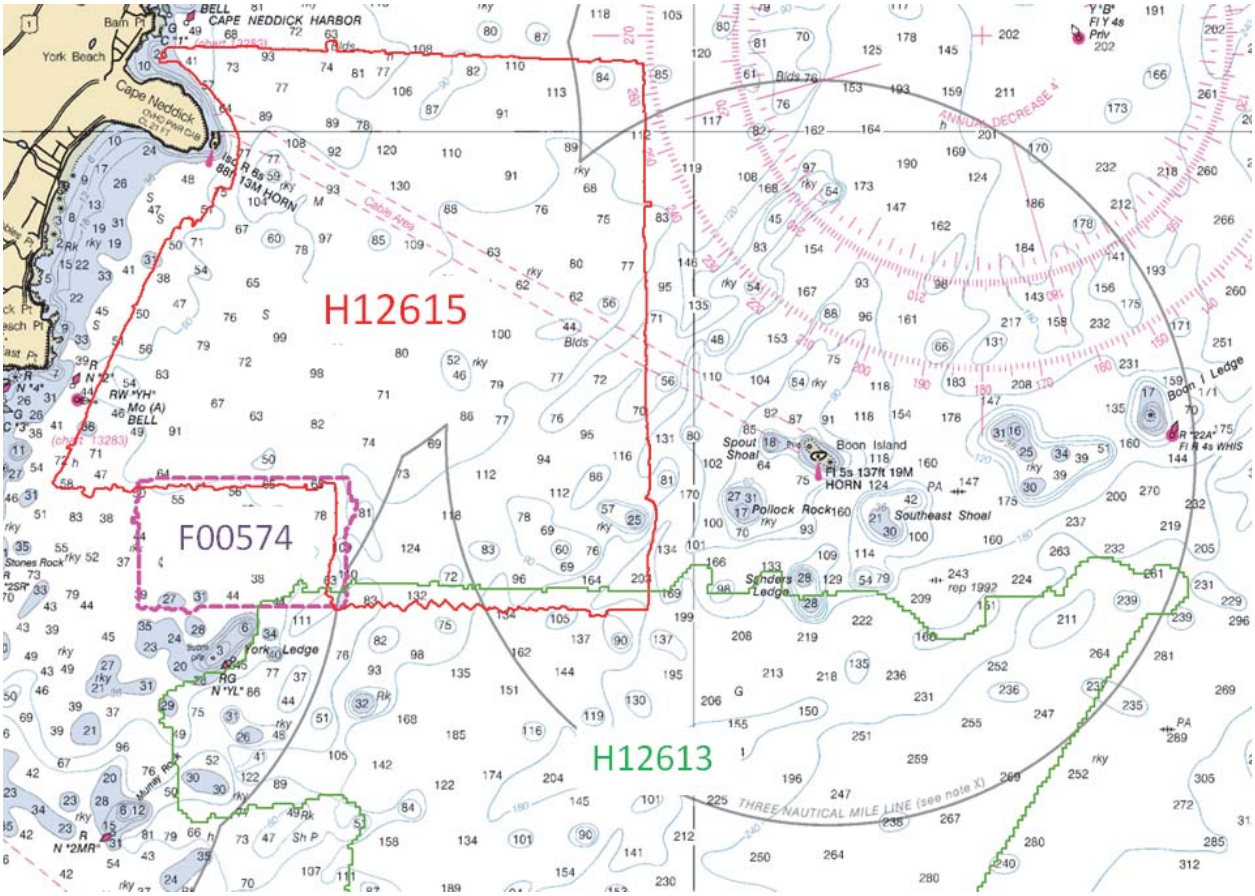


Figure 7: H12615 junctions

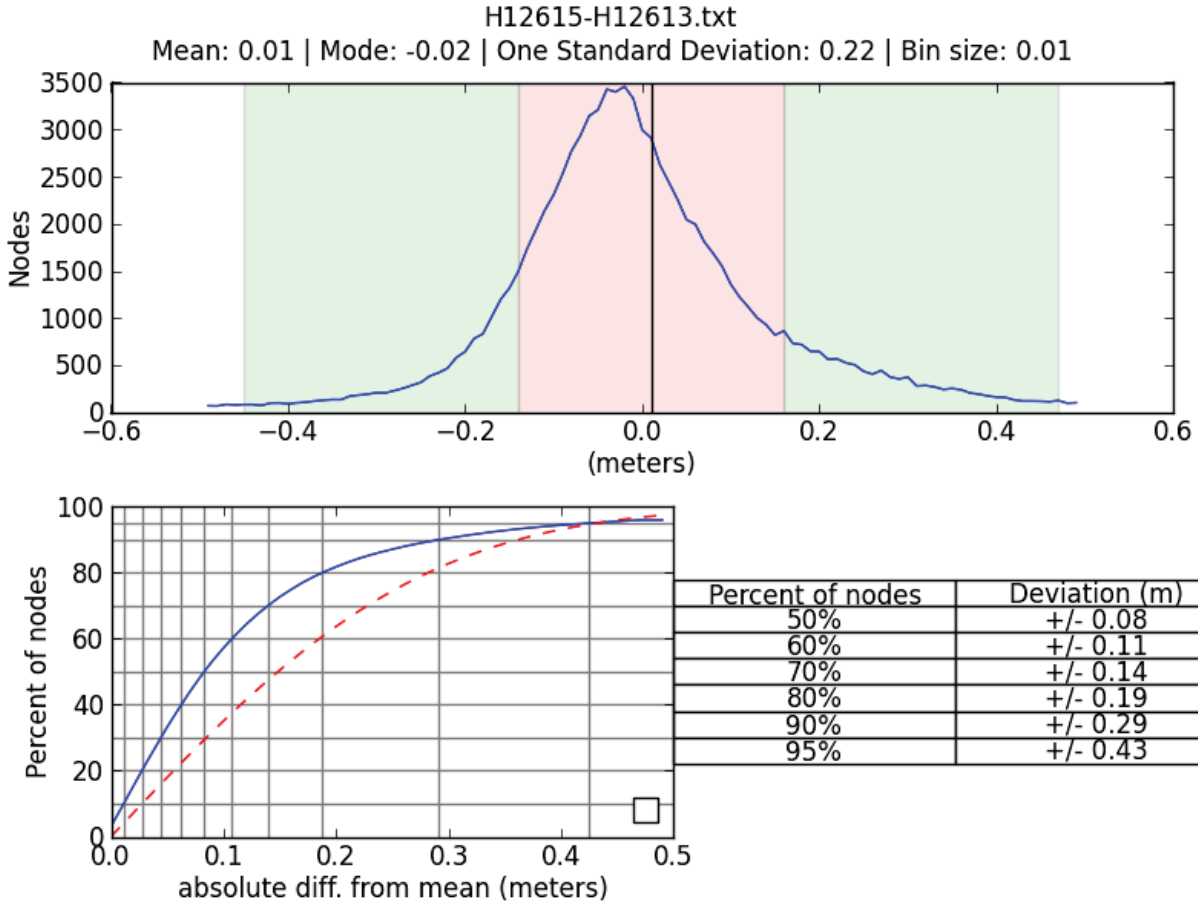
The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12613	1:40000	2013	NOAA Ship FERDINAND R. HASSLER	S
F00574	1:10000	***2009***	NOAA Ship THOMAS JEFFERSON	S

Table 8: Junctioning Surveys

H12613

This survey is from project OPR-A321-FH-13. The location is shown in Figure 7. Of the over 92 thousand overlapping nodes, the average difference is 0.01 meters with a standard deviation of 0.22 meters. 95% of all differences are less than +/- 0.43 meters from the mean, as shown in Figure 8. High standard deviation is attributed to areas of steep slopes, where differences are the largest.



Percent of nodes	Deviation (m)
50%	+/- 0.08
60%	+/- 0.11
70%	+/- 0.14
80%	+/- 0.19
90%	+/- 0.29
95%	+/- 0.43

Figure 8: Difference surface statistics - H12615 minus H12613

F00574

This survey is from project S-A936-TJ-09. The location is shown in Figure 7. Of the over 52 thousand overlapping nodes, the average difference is -0.16 meters with a standard deviation of 0.26 meters. 95% of all differences are less than +/- 0.48 meters from the mean, as shown in Figure 9. High standard deviation is attributed to areas of steep slopes, where differences are the largest.

The hydrographer recommends that H12615 supersede F00574 in the common area.

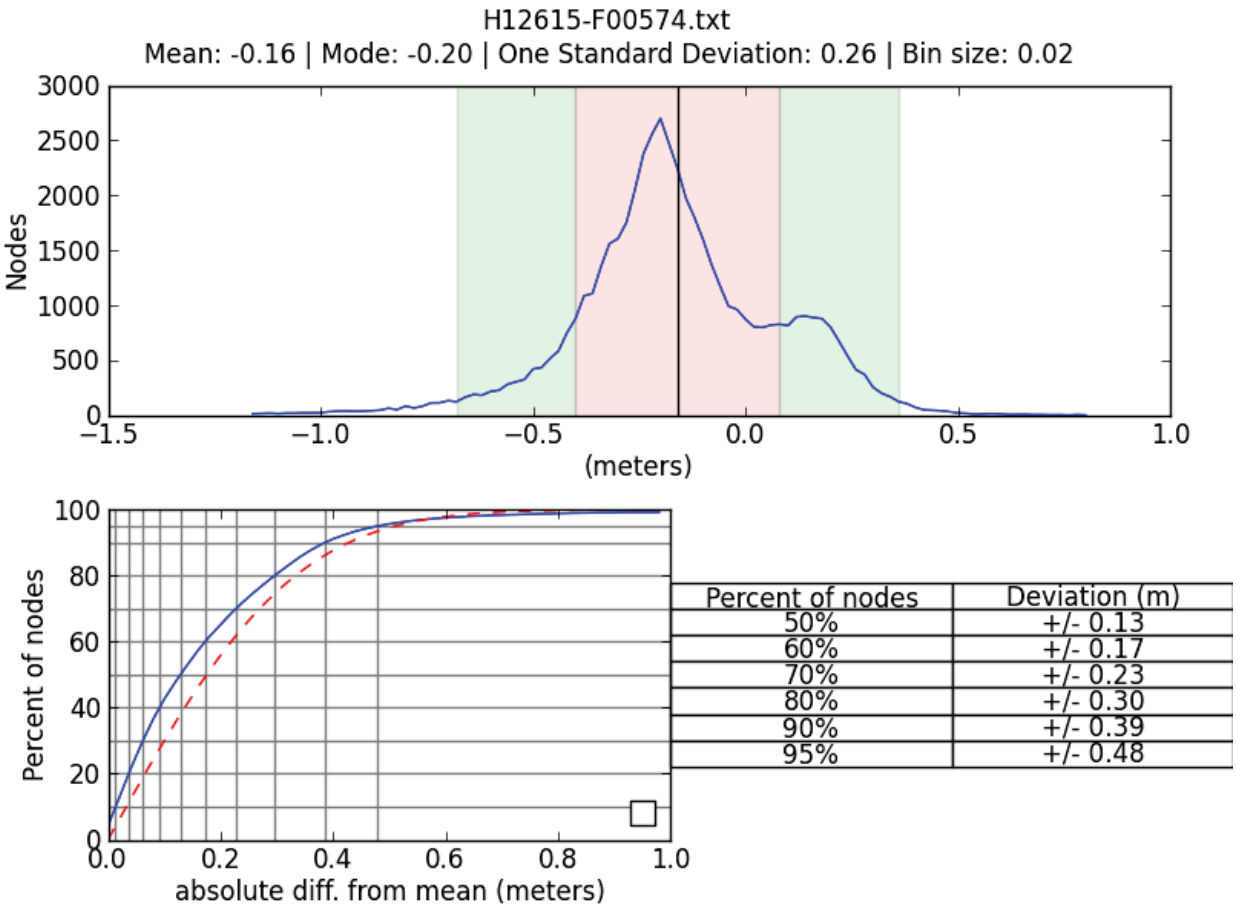


Figure 9: Difference surface statistics - H12615 minus F00574

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

Deployed Fishing / Lobster Gear

The majority of the survey area for H12615 contained 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, other obstructions, or rocks. 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 were taken approximately every 2.5 hours for mainscheme acquisition. A new towbody and SV&P sensor were installed on the MVP before acquisition on Dn251. This sensor was used for all subsequent SVP corrections. Sound speed corrections were applied with Nearest in Distance Within Time (NIDWT) of 3 hours for the entire survey.

Two casts were deleted from the master SVP file and are not submitted in the processed or raw data; 8/18/2013 @ 05:35 and 9/8/13 @ 14:46. These casts were deleted after it became visually apparent that they were causing sound velocity artifacts. After the removal of these casts resultant sound velocity errors were resolved.

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 were present in over 99% of the 2-meter and 4-meter surfaces. The 50-centimeter surface contains 97% of nodes with five or more soundings. For additional detail refer to the H12615_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

Survey H12615 contains one particularly large holiday approximately 25m by 10m (Figure 10). While there is no obvious reason for the missing data in the ship's navigation, there are no processed depths for this particular segment. This could be the result of a time synchronization error or buffering not working correctly. There are no signs of shoaling or features in the surrounding area.

Several along-track holidays are evident along the western edge of the sheet. These are density holidays in the 50-centimeter surface due to inadequate ship speed adjustments. Speed had likely been targeted for the 1-meter resolution. An example is shown below in Figure 11.

A few small coverage holidays are present in the 50-centimeter surface; the largest at 5 nodes. These holidays are shadows from the irregular topography of the seafloor and shown in Figure 12. Shoal soundings on peaks have been achieved.

Holidays are also evident in the finalized surface where junctions of different resolutions are in areas of steep slopes (Figure 13).

After careful review of the holidays above and their surrounding data, the hydrographer is confident that the gaps are insignificant and do not compromise the integrity of the survey.

There is a small section of potentially significant holidays in the 50-centimeter surface in the vicinity of the charted 36-foot depth in position 43 degrees 07.53' N, 070 degrees 36.95' W (Figure 14). These gaps are primarily in the area covered by the western-most survey line alone. The seabed was ensonified from only one angle without an adjacent line of coverage to densify the bathymetry from the opposite direction. While the coverage gaps are small, full coverage of the shoal was not achieved at the required resolution. Recommendations for charting and future work are made in the appropriate sections below.

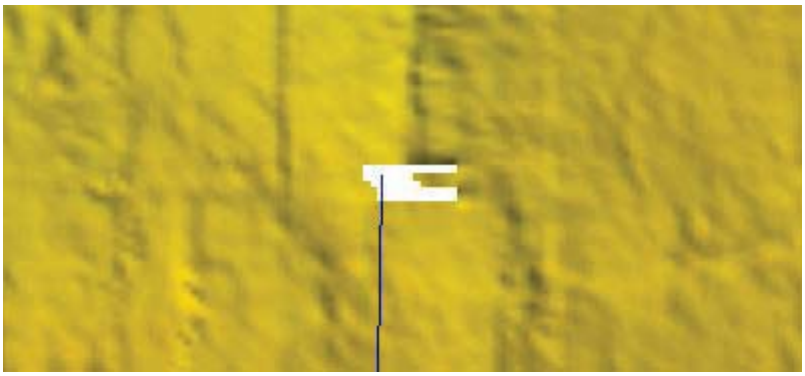


Figure 10: Large holiday within limits of H12615 - Holiday is 25 meters wide and 10 meters long

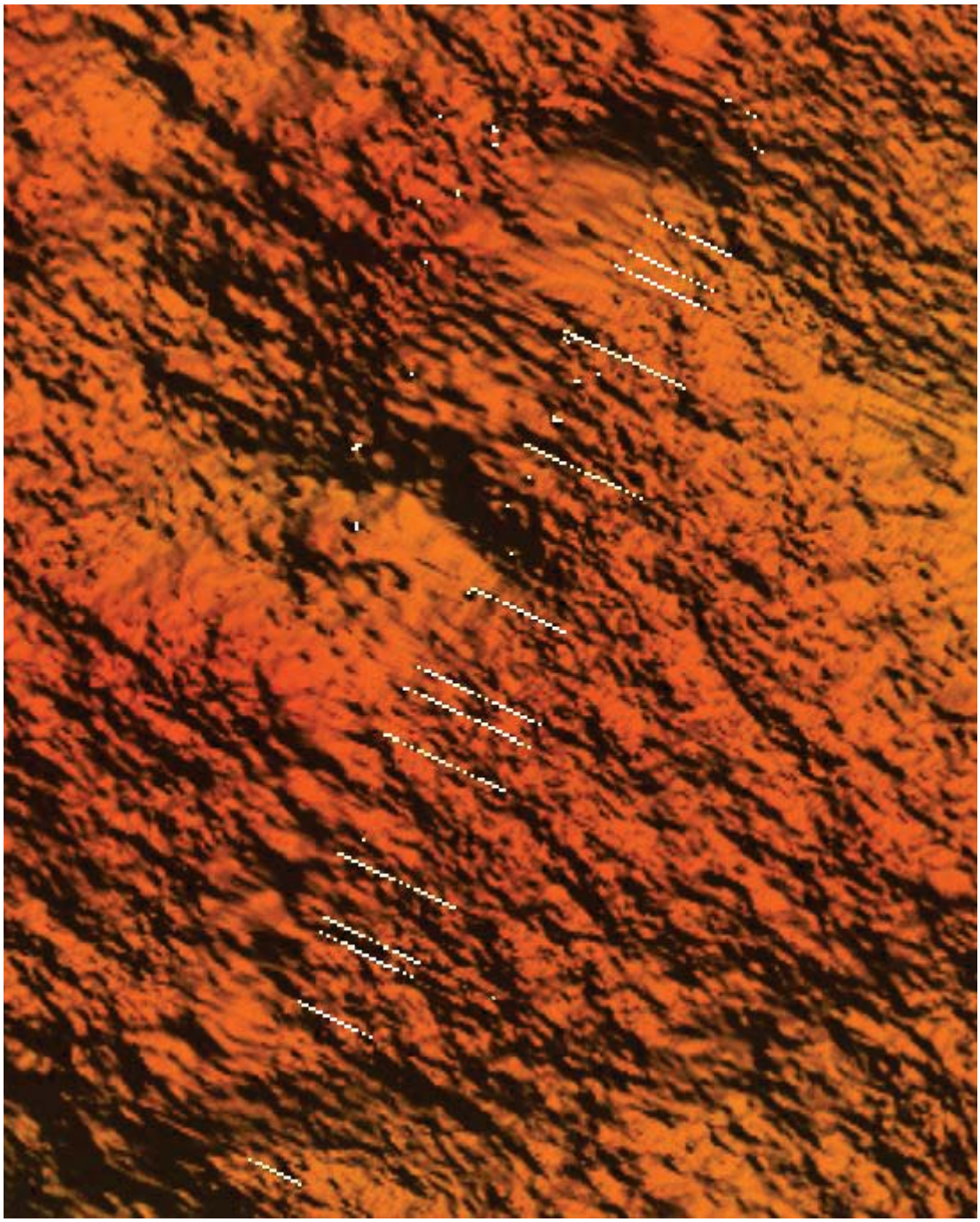


Figure 11: Alongtrack holidays in the 50-centimeter surface

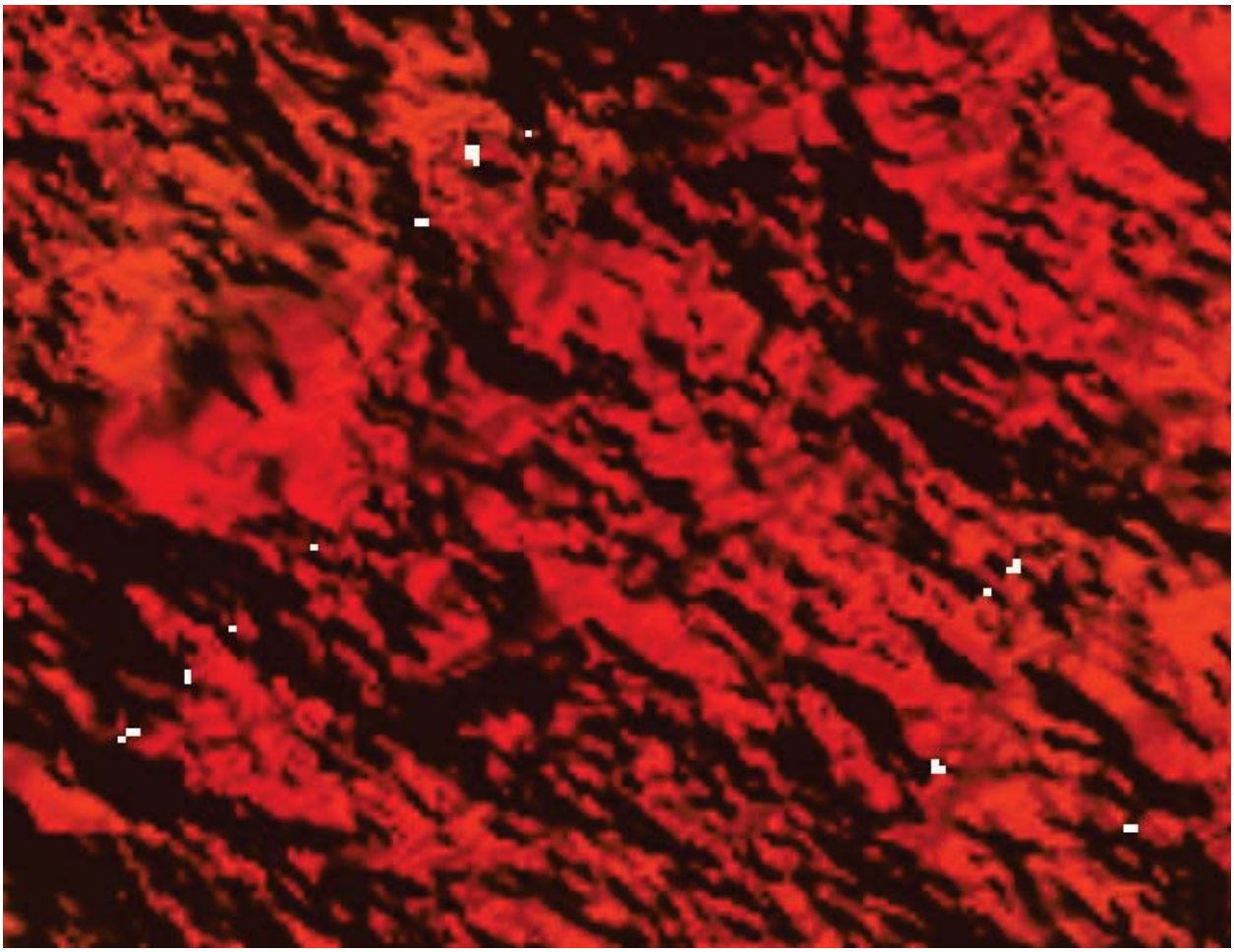


Figure 12: Holidays present in 50-centimeter surface - Maximum of 5 nodes

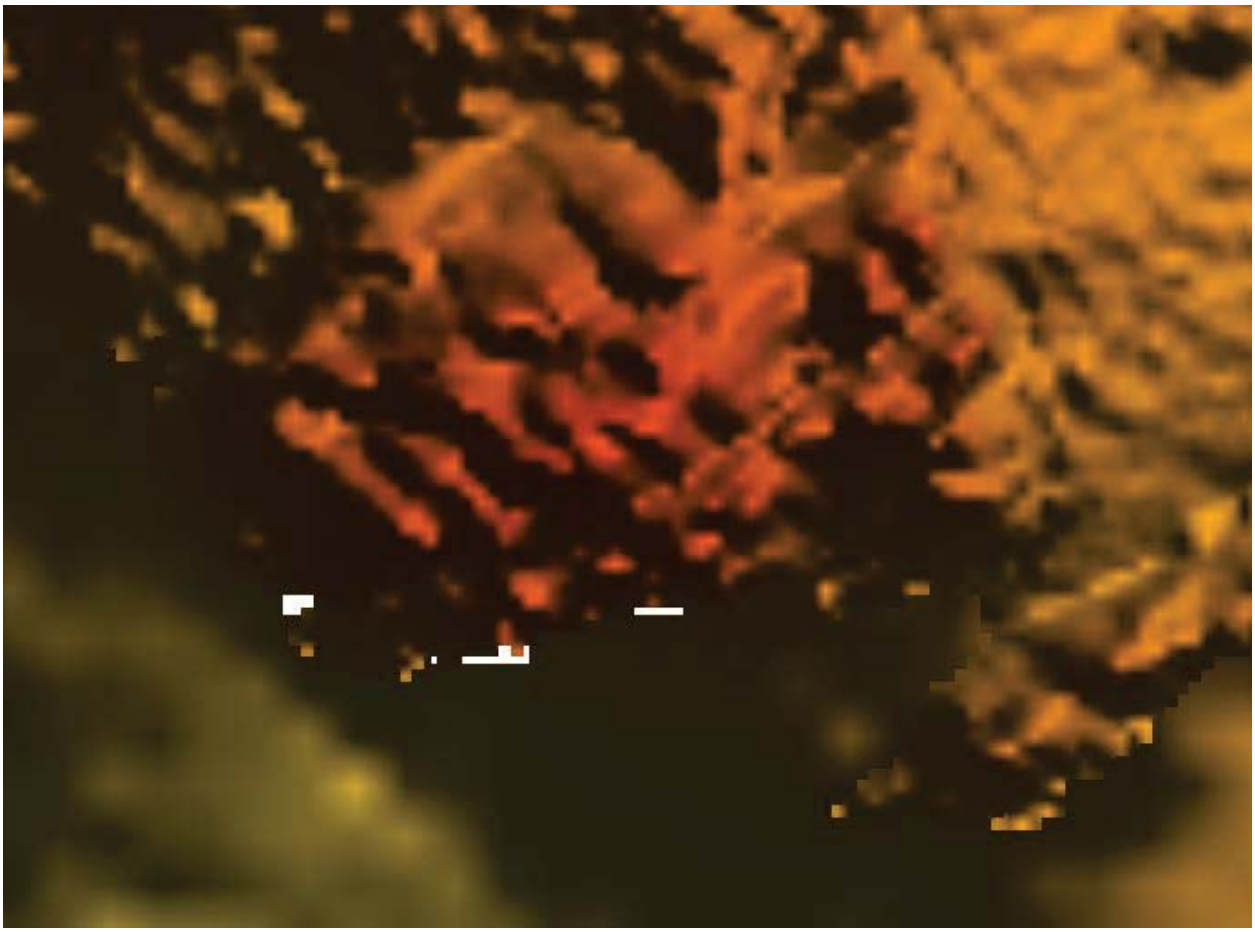


Figure 13: Holidays caused by finalized surface resolution overlap

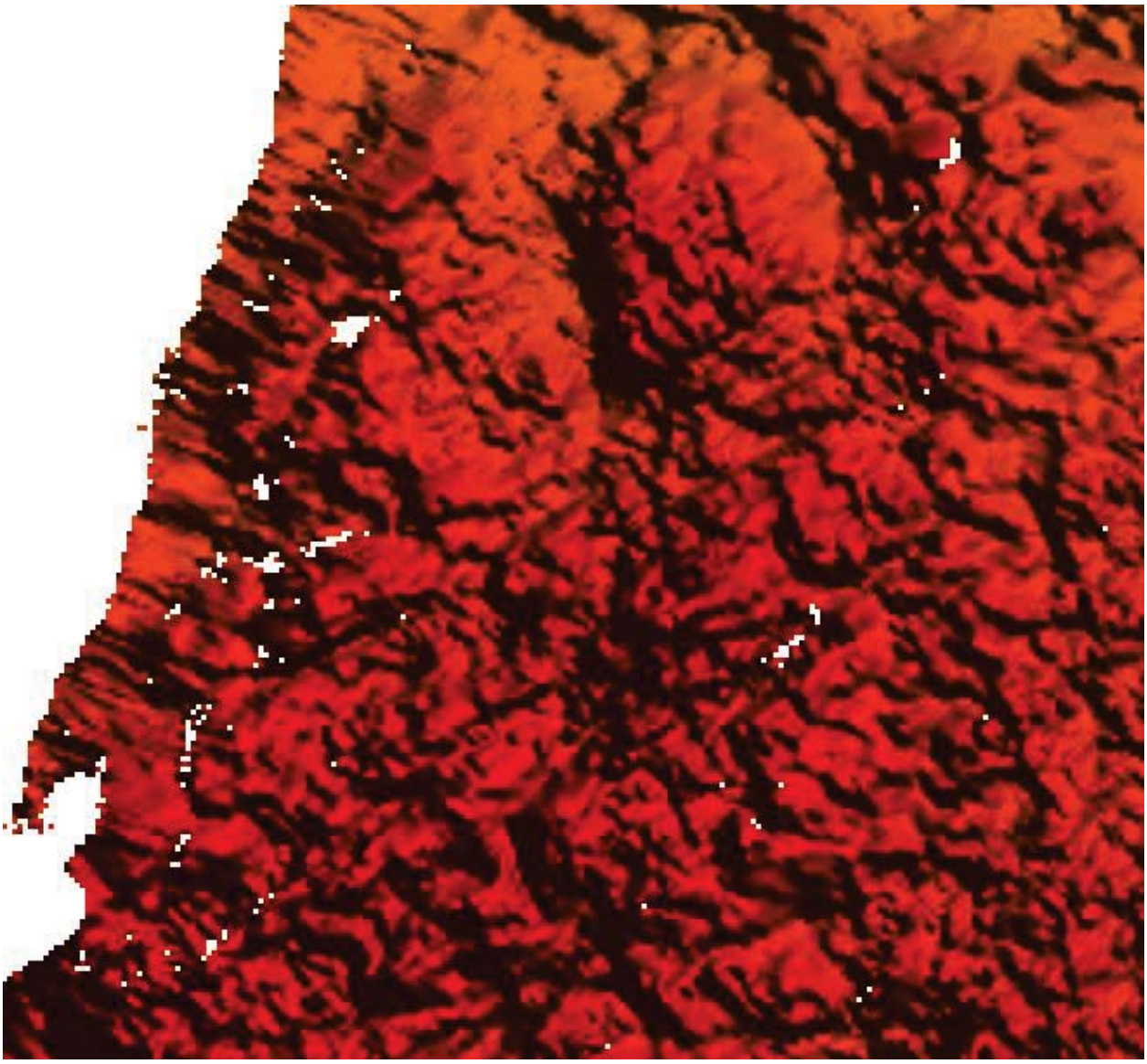


Figure 14: Holidays on outer edge of coverage - final survey coverage should be modified to account for lack of data on outer edges

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 H12503. The files were paired with the CARIS HDCS data, imported and processed using Fledermaus Geocoder Toolbox, version 7.3 4a, Build 371, 64-bit version.

The GSF files containing the extracted backscatter are submitted with the data in this survey. The processed mosaic is saved as a 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: 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
H12615_MB_4m_MLLW	CUBE	4 meters	7.51 meters - 63.39 meters	NOAA_4m	Complete MBES
H12615_MB_2m_MLLW	CUBE	2 meters	7.54 meters - 63.57 meters	NOAA_2m	Complete MBES
H12615_MB_50cm_MLLW	CUBE	0.5 meters	7.33 meters - 69.91 meters	NOAA_0.5m	Object Detection
H12615_MB_4m_MLLW_Final_36plus	CUBE	4 meters	36 meters - 63.39 meters	NOAA_4m	Complete MBES
H12615_MB_2m_MLLW_Final_18to40	CUBE	2 meters	18 meters - 40 meters	NOAA_2m	Complete MBES
H12615_MB_50cm_MLLW_Final_0to20	CUBE	0.5 meters	7.33 meters - 20 meters	NOAA_0.5m	Object Detection

Table 9: Submitted Surfaces

B.5.3 Designated Soundings

Within the limits of H12615, six soundings are submitted with the designated flagging in CARIS HIPS and SIPS. Of these six soundings; four were designated for feature creation and 2 were to preserve the shoal depth in the finalized surfaces.

B.5.4 Rejection of data outside survey area

Starboard and port lines 20130819_084649 were logged through a turn due to poor acquisition techniques. This data was rejected using CARIS HIPS and SIPS Swath Editor and should not be reaccepted.

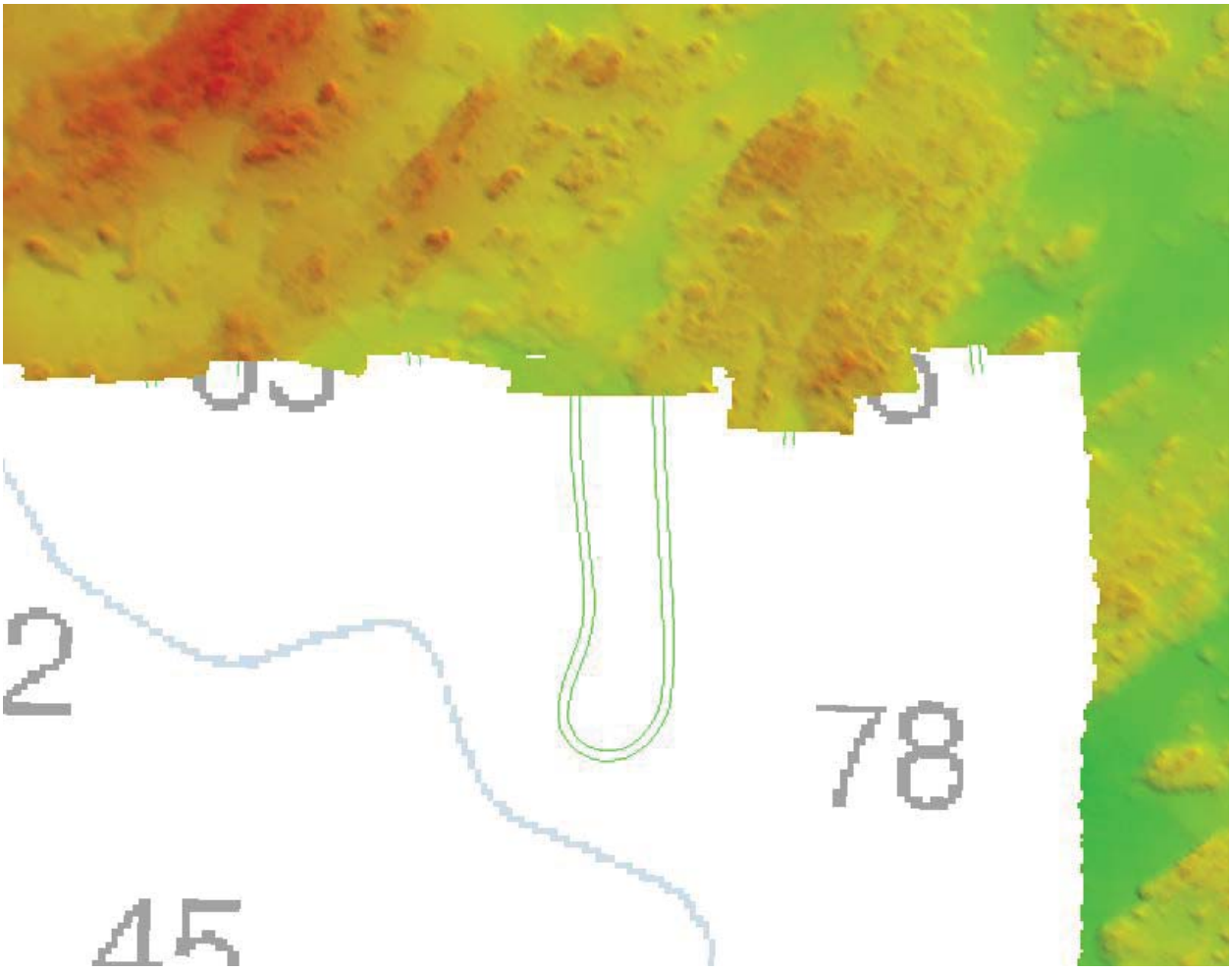


Figure 15: MBES data, outside of survey area, rejected from submitted surfaces

B.5.5 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% of nodes within survey H12615 met the vertical uncertainty standards of section 5.1.3 of the Hydrographic Surveys Specifications and Deliverables (2013). See H12615_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. Therfore, 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	Final

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

A request for final approved tides was sent to N/OPS1 on 09/18/2013. The final tide note was received on 09/19/2013.

Preliminary zoning is provisionally accepted as the final zoning for project OPR-A321-FH-13, H12615, during the time period between August 17 - September 9, 2013. See tide note included in Appendix I of this report for more information about the provisions stated.

Non-Standard Vertical Control Methods Used:

VDatum

Ellipsoid to Chart Datum Separation File:

2013_A321_VDatum_NAD83Ellip_MLLW.xyz

Soundings submitted as H12615 are referenced to MLLW reduced by ellipsoidal methods using the Ellipsoid to Chart Datum separation file, with the exception of the 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 H12615 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 H12615 (with the exception of the lines listed in section B.2.2) have SBETs and SMRMSGs applied for post-processed position/attitude and associated uncertainty values, respectively. Of the lines listed in section B.2.2, five have SBETs applied for horizontal positioning and attitude but do not use the associated error data or vertical solution for their processed depths. One line, starboard 20130819_121047, does not have SBETs or SMRMSGs loaded because the time extents for this line do not overlap entirely with the processed solution.

While planning for project A321-FH-13, a proposed smartbase network was analyzed. According to active CORS stations, a reference station (NHUN) is located on the University of New Hampshire Campus in Durham, New Hampshire. This station is within the 50km radius specified in the HSSD 2013. Data acquisition during the first leg of the project (8/12/13-8/21/13) revealed that this reference station rarely had continuous coverage throughout a 24-hour period. As a result of these gaps, data from station NHUN could

not be utilized in post-processing and the Smartbase project does not meet the specifications of the 2013 HSSD.

The hydrographer contacted the NHUN operators and learned that the station was not expected to be repaired in the near future. However, the University operates an alternate reference station on Odiorne Point, which is ideally situated for use on OPR-A321-FH-13. This station was found to be more reliable, and the hydrographer arranged to utilize the data. This station is referred to by either the name “Odiorne” or “8276” in the submitted data. Base station coordinates were computed by averaging three days of 24-hour OPUS solutions. With the use of this reference station, all data collected after September 4th meets specifications of the HSSD 2013.

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
ACUSHNET 5, Acushnet, MA	ACU5
ACUSHNET 6, Acushnet, MA	ACU6
BAR HARBOR, Bar Harbor, ME	BARH
GORHAM, Gorham, ME	MEGO
MACHIAS, Machias, ME	MEMA
NHDOT CONCORD, Concord, NH	NHCO
U NEW HAMPSHIRE, Durham, NH	NHUN
GUNSTOCKMRNH2008, Gilford, NH	P776
PENOBSCOT 6, Penobscot, ME	PNB6
WESTFORD, Westford, MA	WES2
MTS FOX COOP, Foxborough, MA	XMTS
MTS YARMOUTH, Yarmouth, MA	YMTS
BOSTON WAAS 1, Nashua, NH	ZBW1
ODIORNE, Odiorne Point, NH	8276

Table 13: CORS Base Stations

DGPS was used for real-time positioning for all lines and is used for final positioning on starboard line 20130817_121047.

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
13283	1:20000	22	04/2013	04/02/2013	04/13/2013
13286	1:80000	31	06/2011	05/31/2011	06/04/2011

Table 15: Largest Scale Raster Charts

13283

In general, soundings from H12615 agree within 3 to 4 feet of charted depths from RNC 13283. As shown in Figures 16 and 17, the 30-foot and 60-foot contours derived from survey data agree well with the corresponding charted depth curves.

Several isolated rocky outcroppings with least depths up to 20' less than charted depths are present in the current survey, but are not navigationally significant. Some charted shoals were also found to be incorrectly positioned.

As discussed in Section B.2.9, the charted 36-foot shoal in position 43 degrees 07.53' N, 070 degrees 36.95' W was not adequately surveyed. Survey data suggests the least depth in this area may be slightly deeper than charted, but the hydrographer recommends that this depth be retained until additional coverage from a junction survey is available.

With the exception of the 36-foot depth discussed above, the hydrographer recommends that survey soundings superseded charted data in the common area.

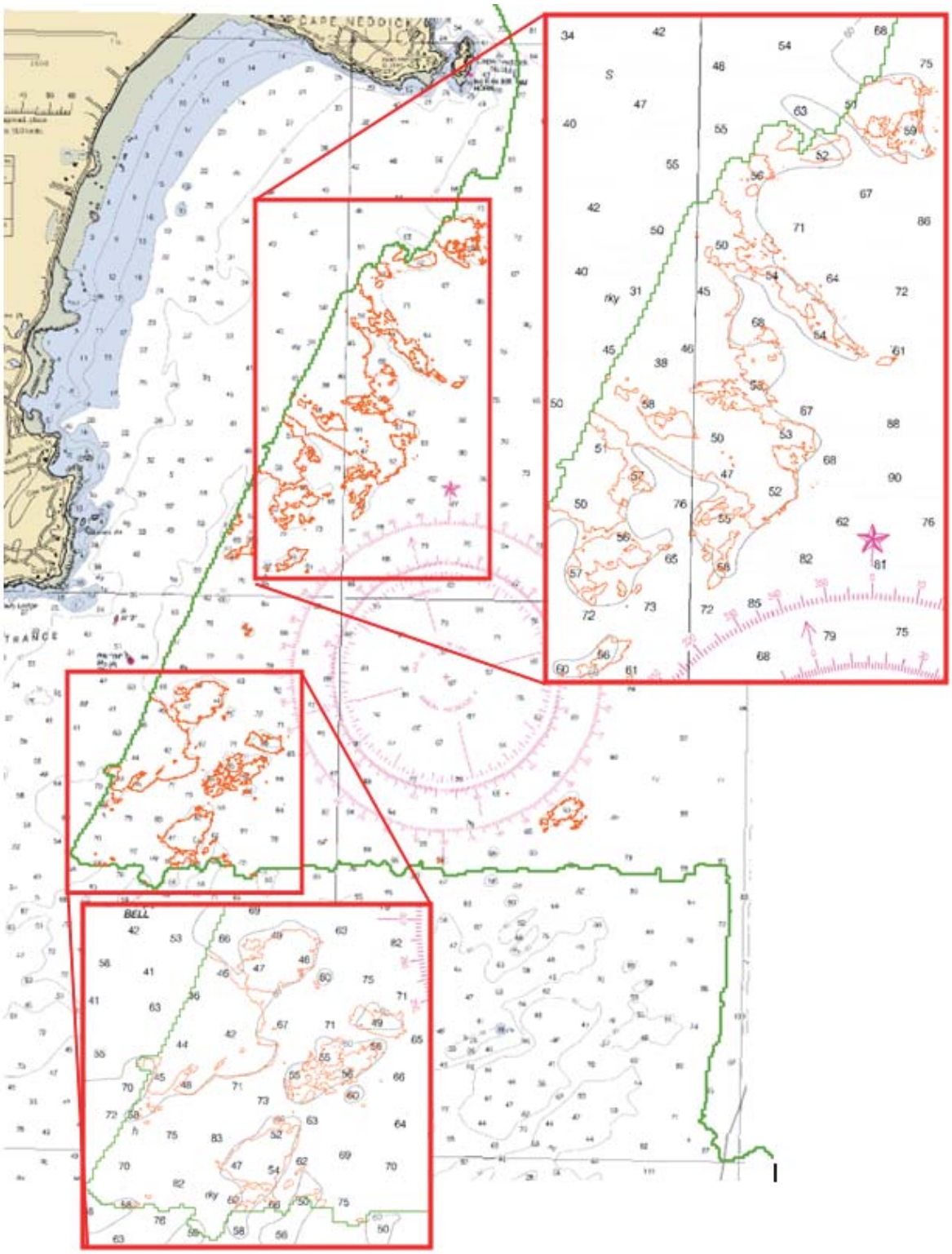


Figure 16: H12615 60-foot survey contour (shown in orange) compared to charted depth curve

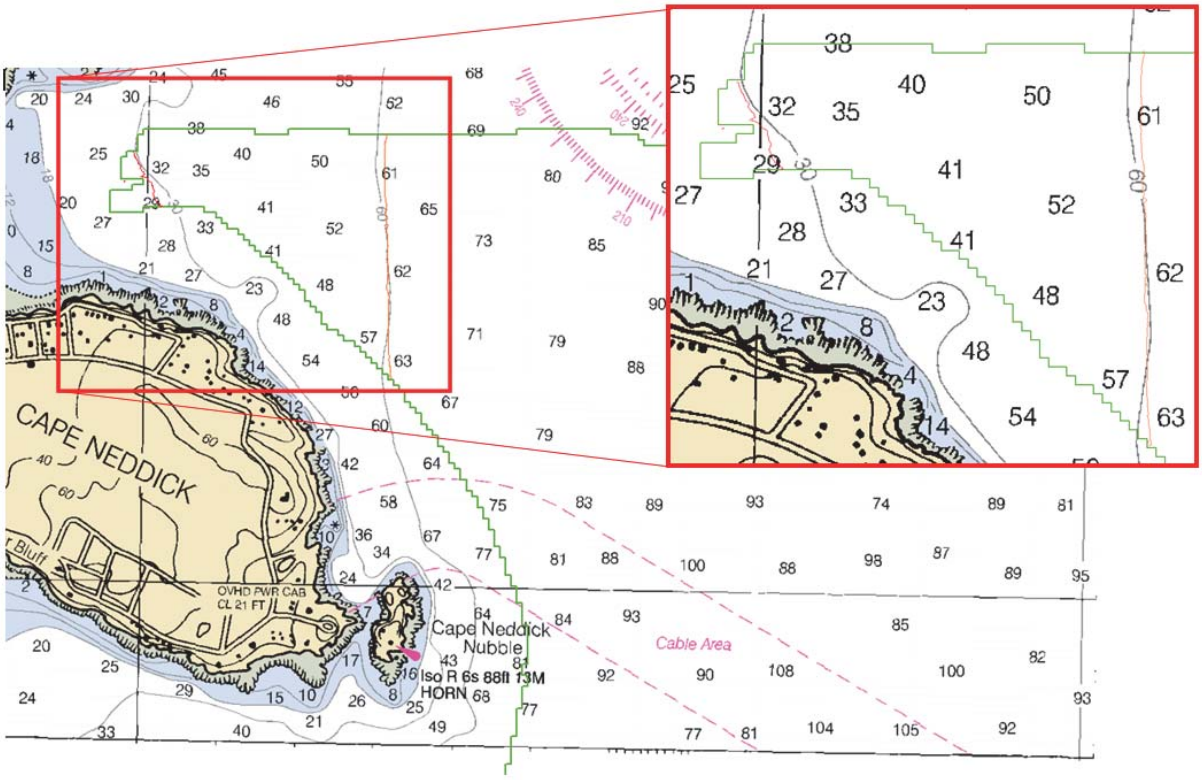


Figure 17: H12615 30-foot and 60-foot survey contour (shown in orange) compared to charted depth curve

13286

In general, soundings from H12615 agree within 6 feet of charted depths from RNC 13286 in the portion of the survey exclusively covered by this chart. In a few isolated areas, surveyed soundings differ from charted depths by a significant amount (particularly the SE section of survey H12615). These soundings are shown below in Figure 18 and should be used to update the current chart. In most cases the large difference can be attributed to the previous methods for collecting depth information and the irregular topography of the seafloor.

Contours derived from survey data agree well with charted depths curves with a few minor differences. It is apparent that the charted contours are highly generalized but still manage to capture the general trend of the seafloor. This can be seen below in Figure 19.

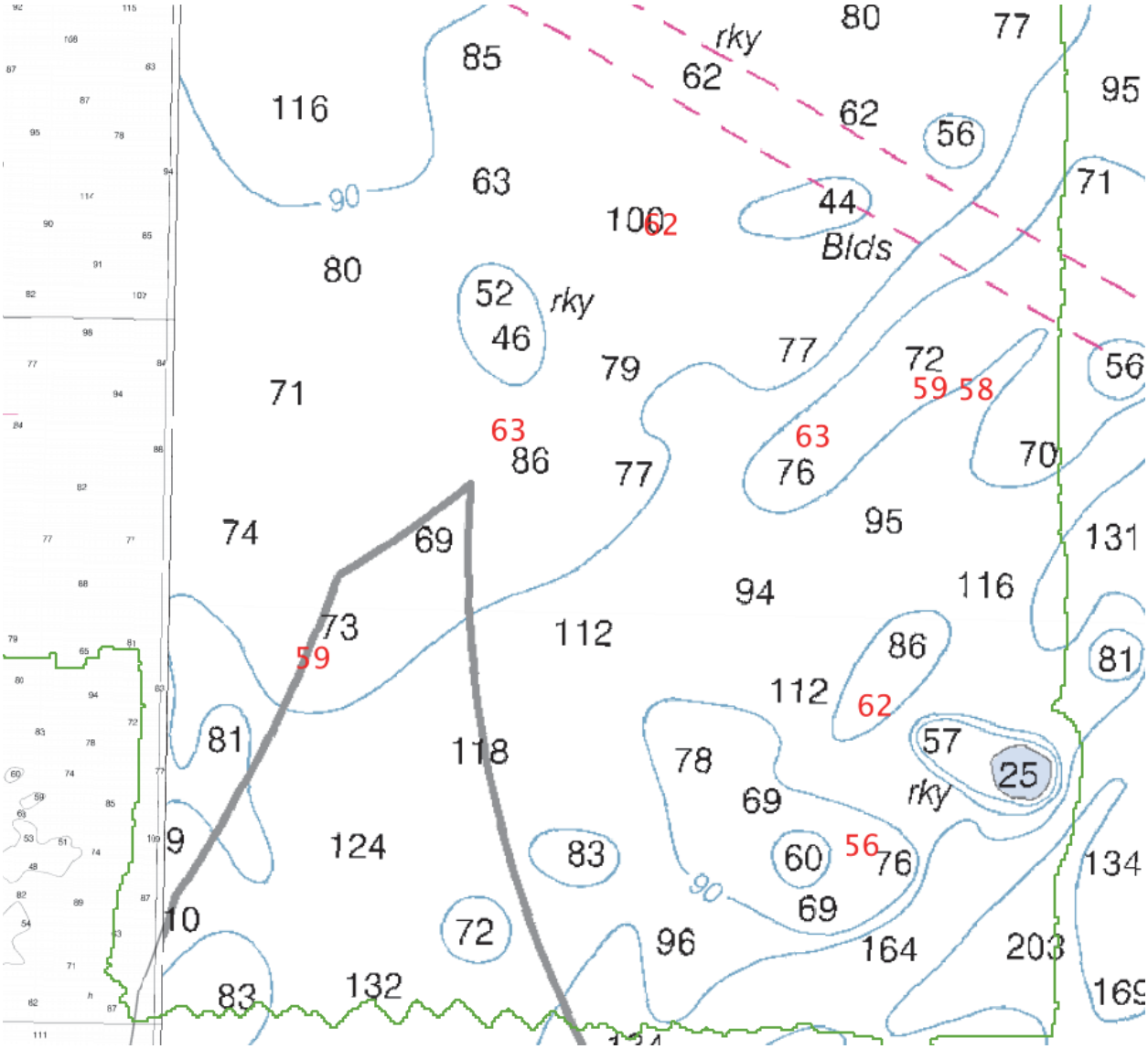


Figure 18: Surveyed soundings, in feet, showing the largest difference from charted depths

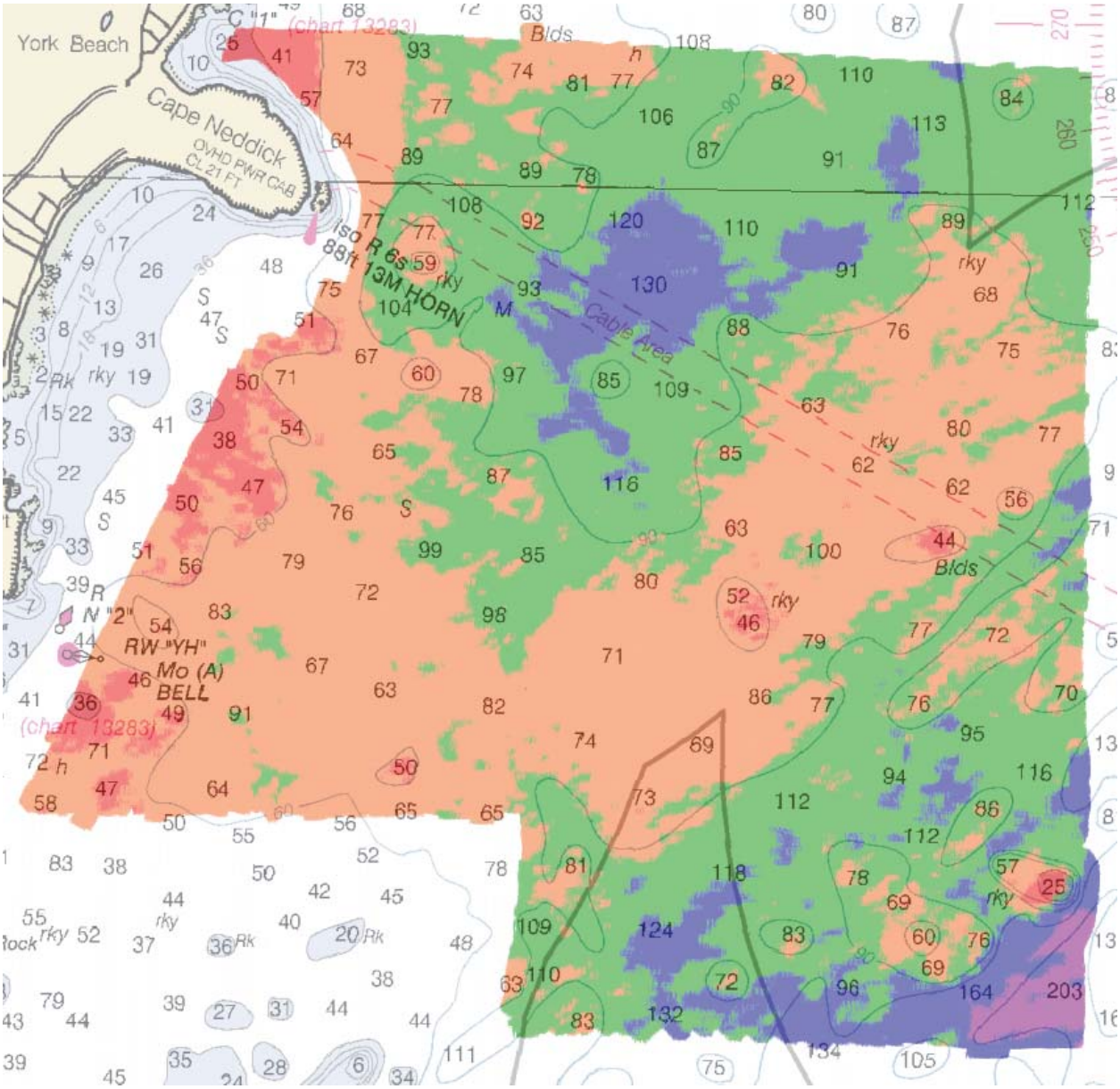


Figure 19: Surveyed soundings, colored by range in feet (0-60, red; 60-90, orange; 90-120, green; 120-180, blue; 180+, purple) overlayed on chart 13286. Charted depth curves, although generalized, agree strongly with the general trend of the seafloor.

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	21	04/08/2013	05/17/2013	NO
US4ME01M	1:80000	10	03/08/2013	04/02/2013	NO
US5NH02M	1:20000	16	09/27/2012	03/29/2013	NO

Table 16: Largest Scale ENCs

US4MA04M

ENC US4MS04M contains no soundings different that RNC 13286. See previous discussion for comparison with RNC 13286.

US4ME01M

ENC US4MS04M contains no soundings different that RNC 13286. See previous discussion for comparison with RNC 13286.

US5NH02M

ENC US5NH02M contains no soundings different that RNC 13283. See previous discussion for comparison with RNCs 13283_1 and 13283_3.

D.1.3 AWOIS Items

No AWOIS items were assigned for this survey.

D.1.4 Maritime Boundary Points

One Maritime Boundary Point was assigned for this survey but a survey vessel suitable for inshore work was not available, and the maritime boundary was not investigated.

D.1.5 Charted Features

The charted cable area, stretching from Cape Neddick to Boon Island, was fully investigated within the limits of sheet H12615. While no evidence of the cable was found in the survey data, the hydrographer recommends that this be retained as charted.

D.1.6 Uncharted Features

Obstructions found within the limits of sheet H12615 were attributed and recommendations were made in the sheet's final feature file.

D.1.7 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.8 Shoal and Hazardous Features

Numerous shoals exist within the extents of H12615. However, there are no new features which pose a hazard to surface navigation.

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

Fifteen bottom samples, chosen from analysis of acquired backscatter, were deemed significant within the limits of H12615 by the Chief of Party. Of these, 4 returned no sample on three consecutive attempts and therefore are omitted from the final feature file (FFF). Eleven bottom samples received appropriate S-57 attribution and are included in the submitted FFF.

Bottom samples were chosen in areas of differing bottom types found throughout the sheet from analysis of the backscatter mosaic and acquired bathymetry. From these sources it appears that charted rocky bottom types are correct for the majority of the sheet. Many of these different bottom types, obtained with bottom samples, are very small areas and do not adequately represent the predominate bottom type of that area, rocky. The cartographers discretion should be utilized for updating charted bottom types after analysis of all data sources.

D.2 Additional Results

D.2.1 Shoreline

Shoreline was assigned in the Hydrographic Survey Project Instructions, but was not investigated as a survey vessel suitable for inshore work was not available. Assigned features are included in the submitted final feature file with appropriate remarks.

D.2.2 Prior Surveys

Prior surveys were available, but not compared with current data.

D.2.3 Aids to Navigation

Aids to navigation (ATONs) exist for this survey, but were not investigated. These ATONs mark the entrance to York Harbor and are inshore of coverage obtained during survey H12615.

D.2.4 Overhead Features

Overhead features exist for this survey, but were not investigated. The overhead power cable (clearance 21 feet) between Cape Neddick and the Nubble Lighthouse is inshore of coverage obtained during survey H12615.

D.2.5 Submarine Features

Submarine features were investigated and attributed in the sheet's final feature file if deemed significant.

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 Recommendations

Near shore limits of hydrography were not achieved during the course of this survey due to the absence of a survey launch. The hydrographer recommends that additional coverage be obtained with the use of a survey launch at a future date.

The hydrographer further recommends that assigned limits for this inshore work be extended offshore slightly to provide additional overlap with H12615 in the SW corner of the current survey, particularly in the vicinity of the charted 36-foot depth in position 43 degrees 07.53' N, 070 degrees 36.95' W.

D.2.11 New Inset Recommendations

No new insets are recommended for this area.

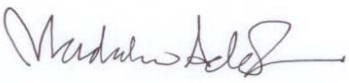
E. Approval Sheet

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.

Report Name	Report Date Sent
OPR-A321-FH-13 Data Acquisition and Processing Report	2013-12-06
OPR-A321-FH-13 VDatum Validation Report	2013-11-30

Approver Name	Approver Title	Approval Date	Signature
LCDR Benjamin K. Evans, NOAA	Chief of Party	12/06/2013	
LT Madeleine M. Adler, NOAA	Field Operations Officer	12/06/2013	
David T. Moehl	Senior Survey Technician	12/06/2013	

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: September 19, 2013

HYDROGRAPHIC BRANCH: Atlantic
HYDROGRAPHIC PROJECT: OPR-A321-FH-2013
HYDROGRAPHIC SHEET: H12615

LOCALITY: York Harbor Entrance to Cape Neddick, Gulf of Maine
TIME PERIOD: August 17 – September 9, 2013

TIDE STATION USED: 842-3898 Fort Point, NH
Lat: 43° 4.3'N Lon: 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 provisionally accepted as the final zoning for project OPR-A321-FH-2013, H12615, during the time period between August 17 -September 9, 2013.

Please use the zoning file A321NF2013CORP submitted with the project instructions for OPR-A321-FH-2013. Zone NA168 is the applicable zone for H12615.

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).

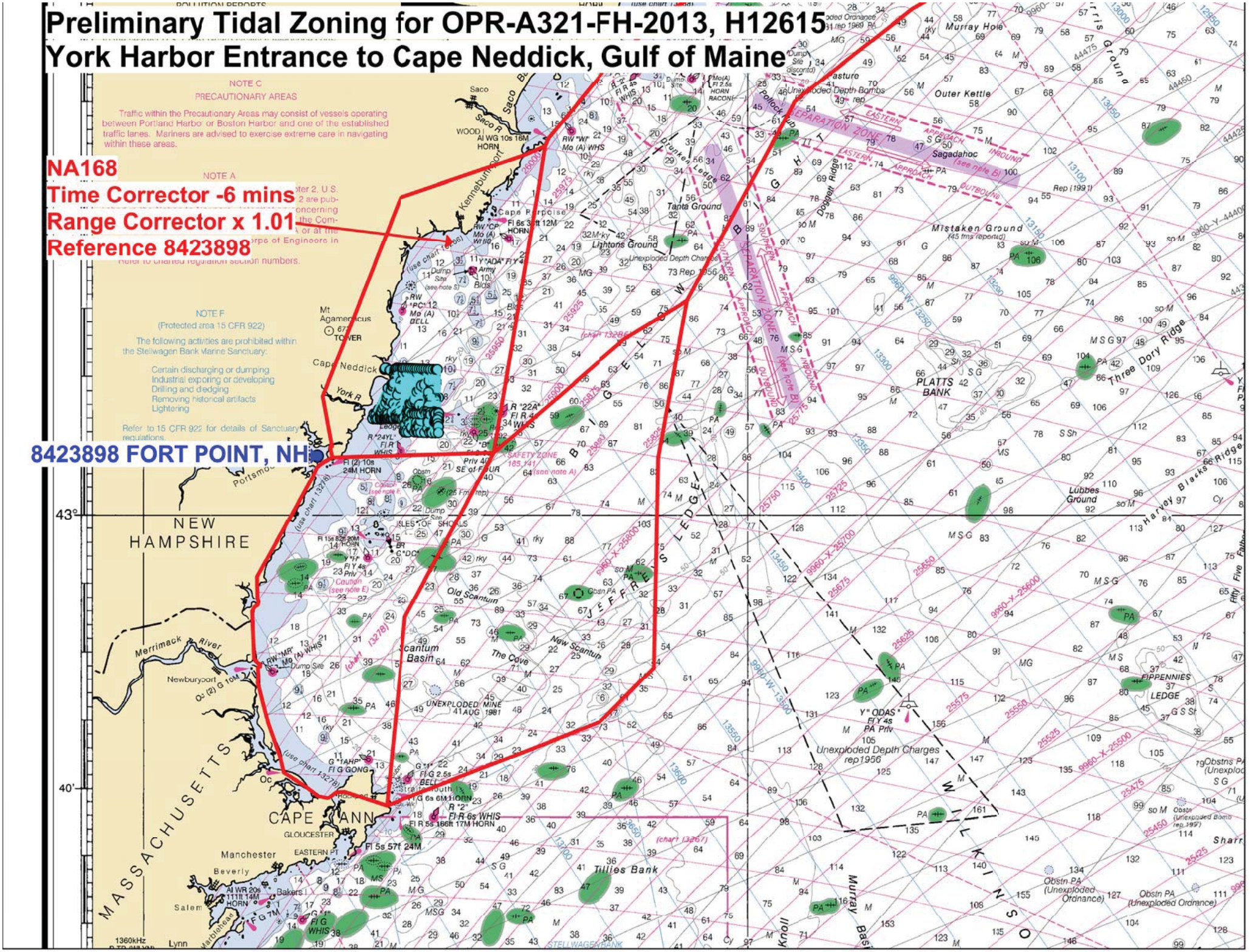
Note 2: Annual Leveling for the tide station at Fort Point, NH (8423898) was not completed in FY13. A review of the verified leveling records from October 2002 - 2012 show the tide station benchmark network to be stable within an allowable 0.009 m tolerance. This Tide Note may be used as final stability verification for the purposes of survey OPR-A321-FH-2013, H12615. 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: 2013.09.25 07:51:42 -04'00'

Chief, Products and Services Branch

Preliminary Tidal Zoning for OPR-A321-FH-2013, H12615
York Harbor Entrance to Cape Neddick, Gulf of Maine



APPENDIX II

SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE

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

December 5, 2013

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-13, Approaches to Portsmouth, NH

Hydrographic surveys H12614 & H12615 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 November 30, 2013.

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 that were developed and approved as part of the CSDL Ellipsoidally Referenced Survey (ERS) project. These procedures and deliverables were recently added to the April 2013 edition of 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

Danger to Navigation - none
AWOIS - none
Maritime Boundary - none
Wrecks - none

APPROVAL PAGE

H12615

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

- H12615_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12615_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 Matthew Jaskoski, NOAA
Chief, Atlantic Hydrographic Branch