

H12679

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

**DESCRIPTIVE REPORT**

Type of Survey: Navigable Area

Registry Number: H12679

**LOCALITY**

State(s): New York

General Locality: Eastern Long Island Sound, NY & CT

Sub-locality: Eastern Plain Pt to Pine Pt

**2014**

CHIEF OF PARTY  
CAPT James M. Crocker, NOAA

LIBRARY & ARCHIVES

Date:

**HYDROGRAPHIC TITLE SHEET**

**H12679**

**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 York**

General Locality: **Eastern Long Island Sound, NY & CT**

Sub-Locality: **Eastern Plain Pt to Pine Pt**

Scale: **10000**

Dates of Survey: **04/30/2014 to 10/25/2014**

Instructions Dated: **04/15/2014**

Project Number: **OPR-B370-TJ-14**

Field Unit: **NOAA Ship *Thomas Jefferson***

Chief of Party: **CAPT James M. Crocker, NOAA**

Soundings by: **Multibeam Echo Sounder**

Imagery by: **Multibeam Echo Sounder Backscatter Side Scan Sonar**

Verification by: **Atlantic Hydrographic Branch**

Soundings Acquired in: **meters at Mean Lower Low Water**

Remarks:

*The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Any revisions to the Descriptive Report (DR) generated during office processing are shown in bold red italic text. The processing branch maintains the DR as a field unit product, therefore, all information and recommendations within the body of the DR are considered preliminary unless otherwise noted. The final disposition of surveyed features is represented in the OCS nautical chart update products. All pertinent records for this survey, including the DR, are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via <https://www.ncei.noaa.gov/>.*

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## Descriptive Report to Accompany Survey H12679

Project: OPR-B370-TJ-14

Locality: Eastern Long Island Sound, NY & CT

Sublocality: Eastern Plain Pt to Pine Pt

Scale: 1:10000

April 2014 - October 2014

**NOAA Ship *Thomas Jefferson***

Chief of Party: CAPT James M. Crocker, NOAA

### A. Area Surveyed

Survey H12679 was conducted by NOAA Ship Thomas Jefferson in Eastern Long Island Sound in the vicinity of Plum Island and Gardiners Island.

#### A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
41° 10' 17.36" N 72° 12' 32.57" W	41° 6' 10.8" N 72° 4' 33.6" W

*Table 1: Survey Limits*

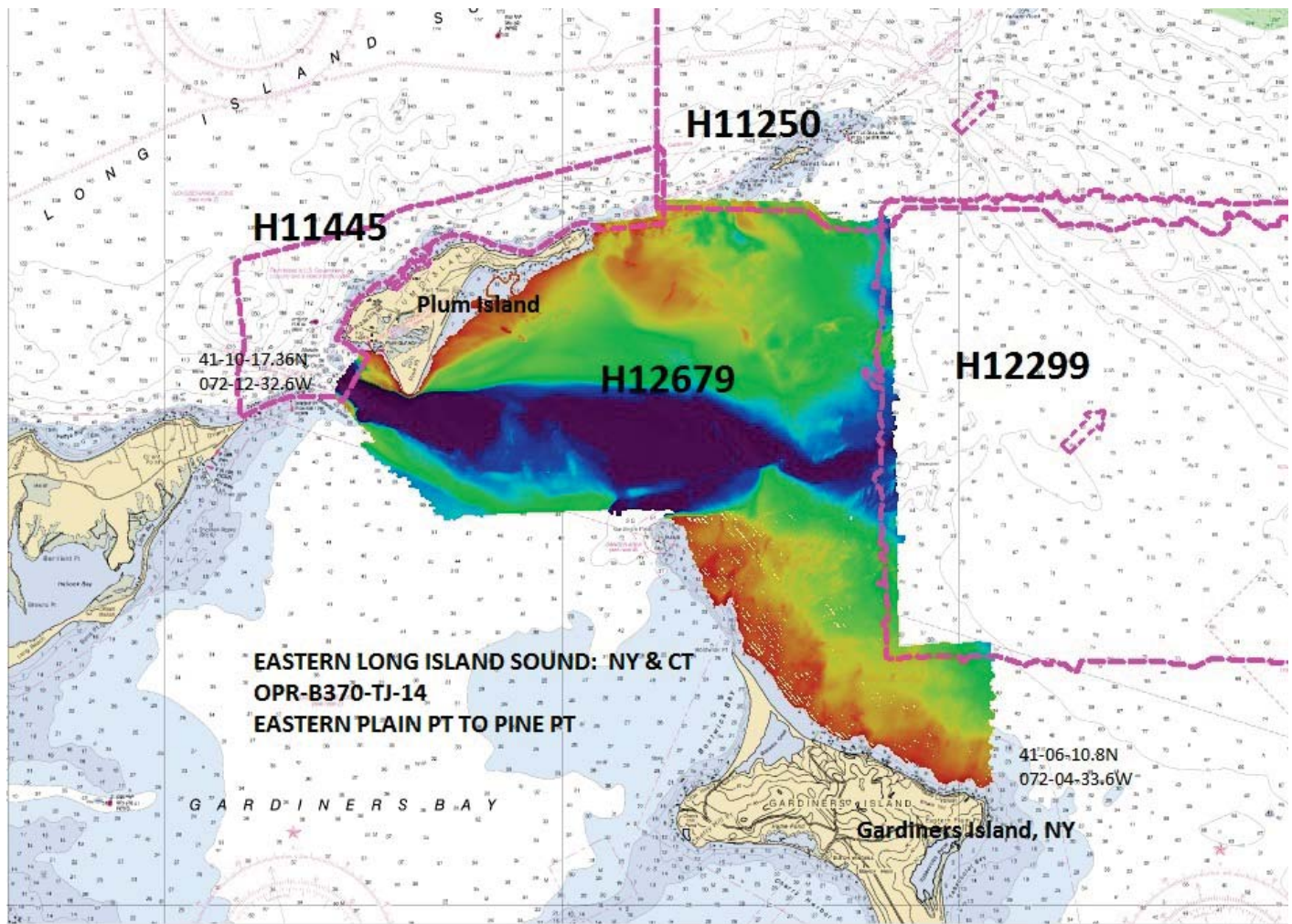


Figure 1: Overview of survey H12679

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

## A.2 Survey Purpose

This project is being conducted in support of NOAA's Office of Coast Survey to provide contemporary hydrographic data in order to update the nautical charting products in response to Hurricane Sandy and reduce the survey backlog within the area. In addition, data from this project will support the Long Island Sound Seafloor Mapping Initiative in New York and Connecticut. Data acquired for this project will be used by partners for species and habitat identification, infrastructure projects, ocean mapping, coastal hazards and geology. 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.

Data acquired on survey H12679 met complete multibeam coverage requirements, including the 5 soundings per node data density requirements outlined in section 5.2.2.2 of the HSSDM, as specified by Hydrographic Survey Eastern Long Island Sound Instructions, OPR-B370-TJ-14, dated 15th April, 2014. No additional work is needed to complete this survey.

### A.4 Survey Coverage

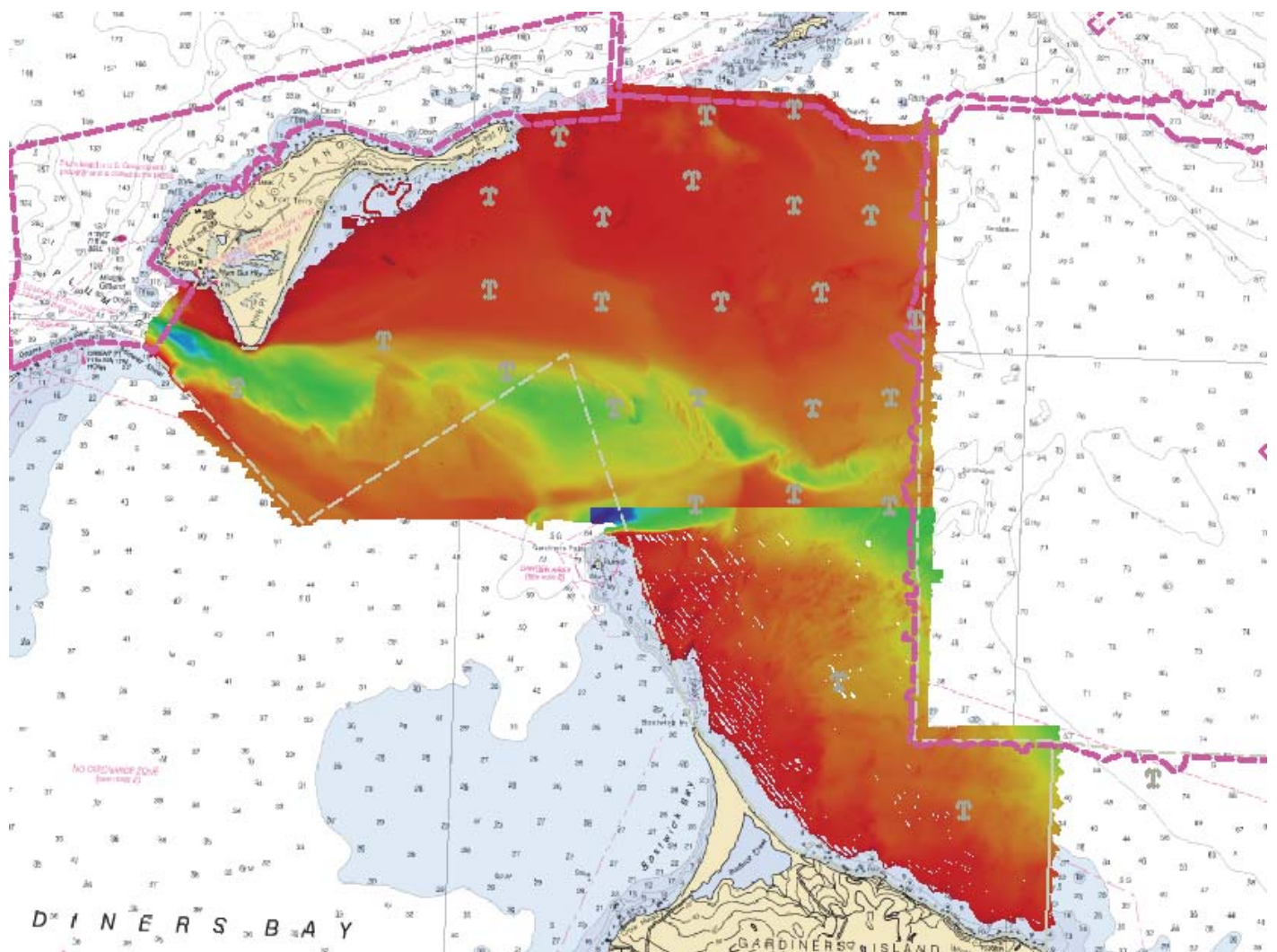


Figure 2: Large Scale view of survey H12679 coverage area.

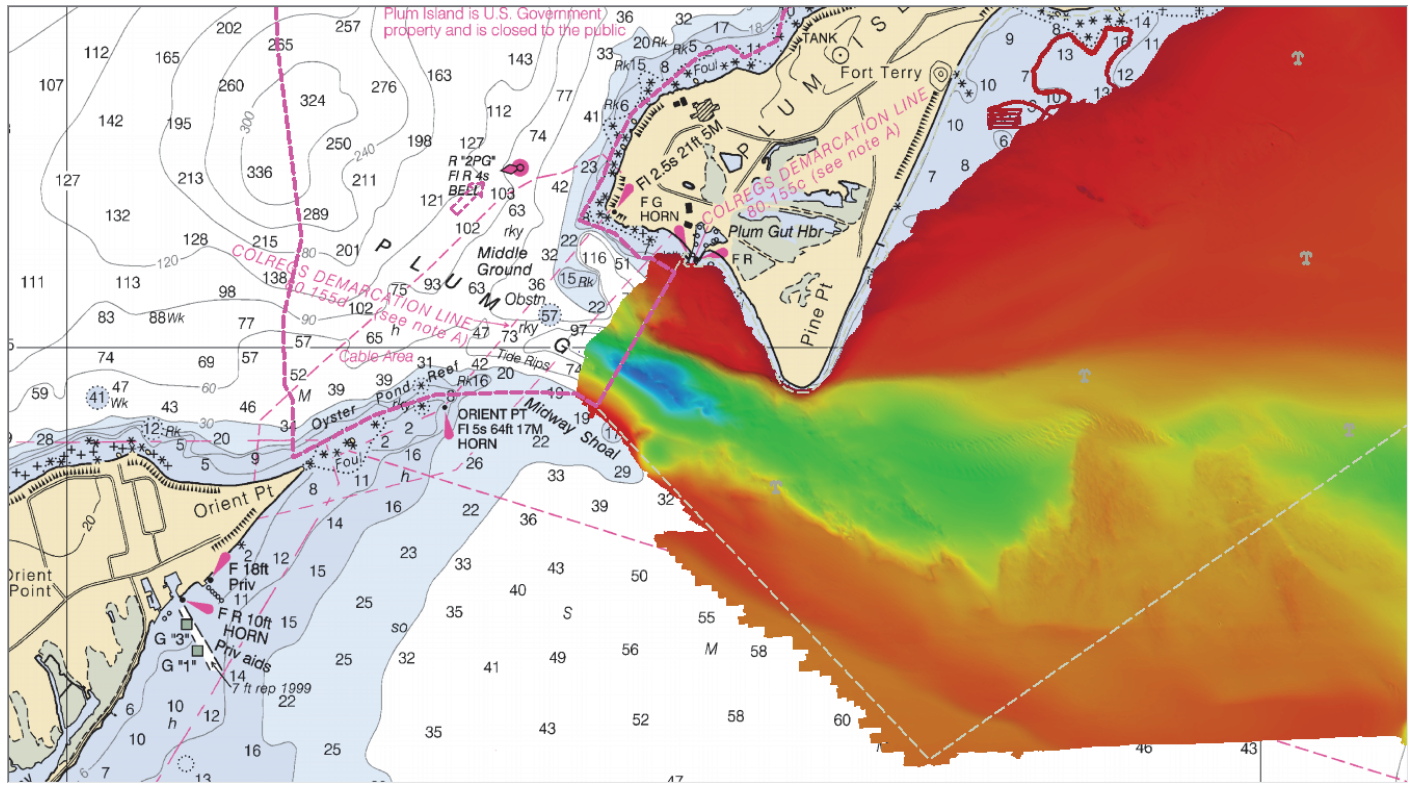


Figure 3: NW additional junction coverage.

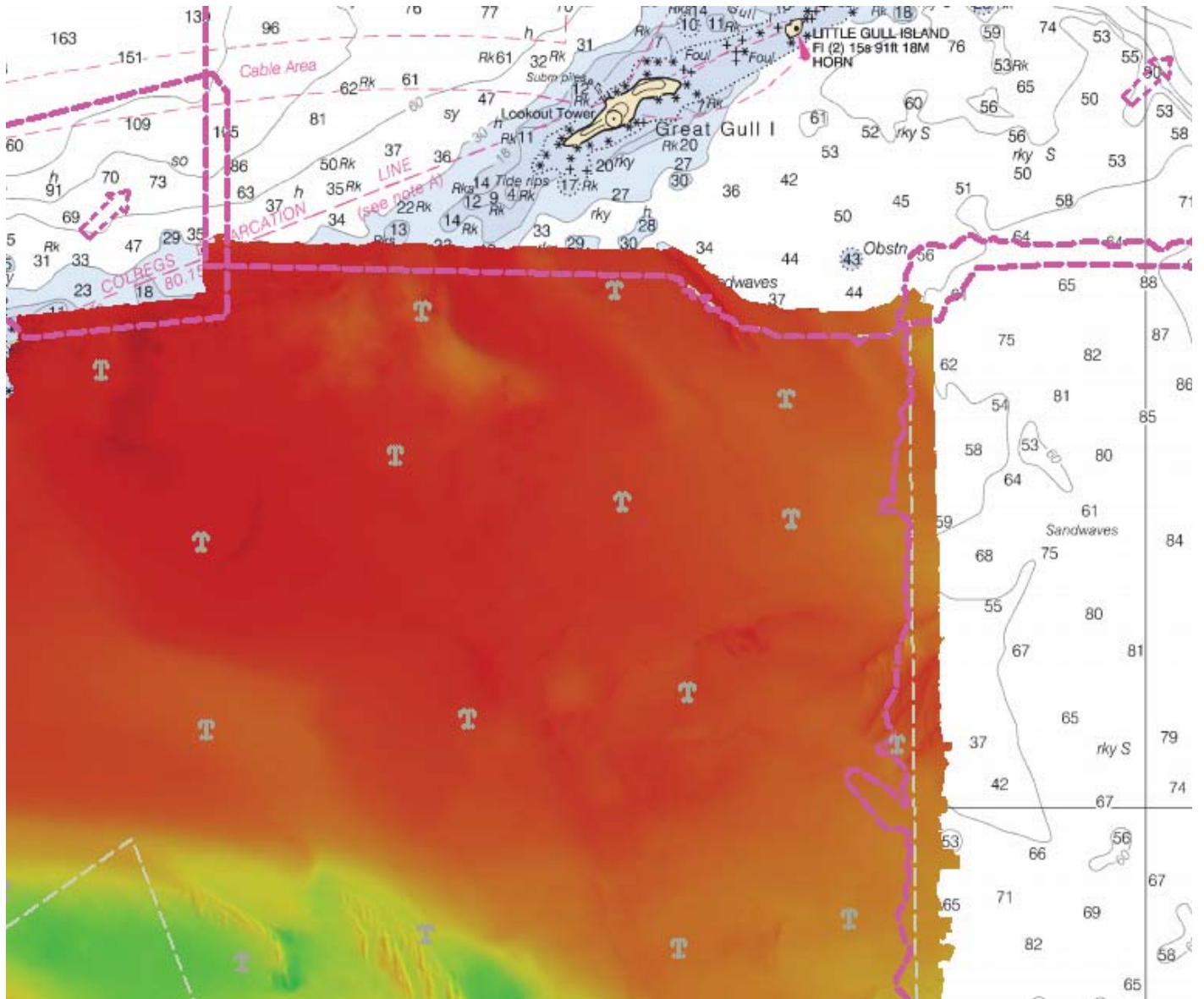


Figure 4: NE additional junction coverage.

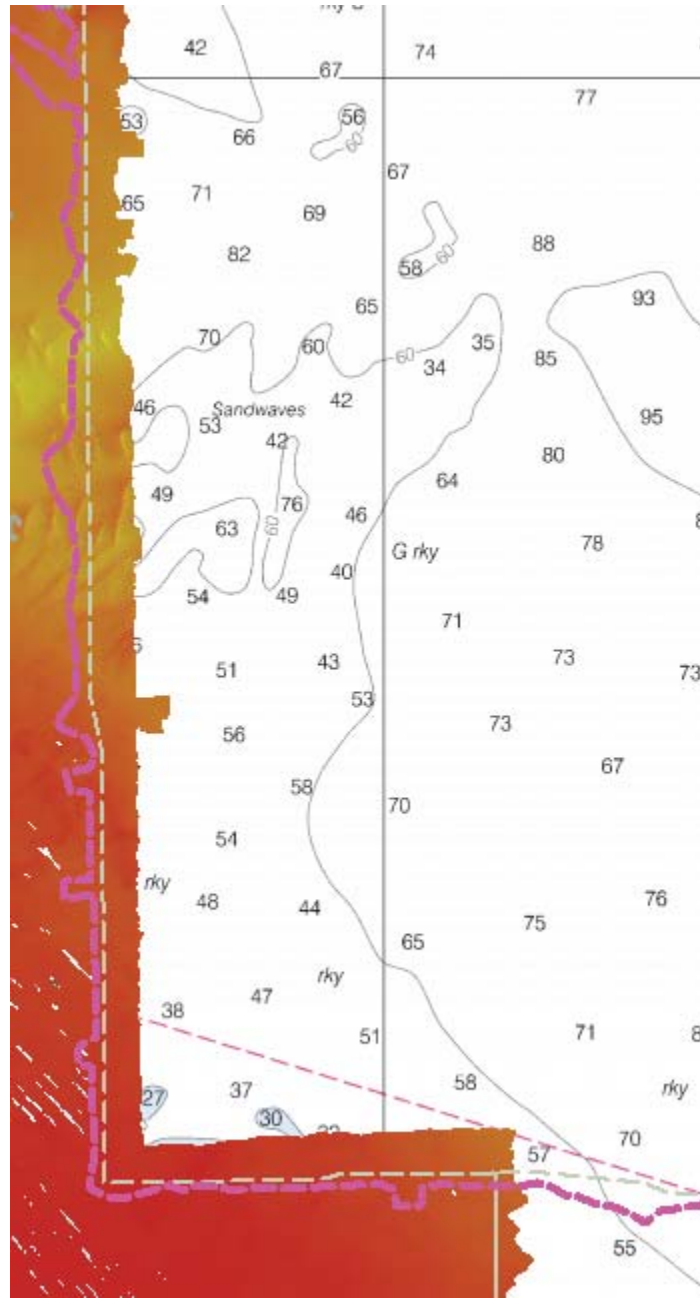
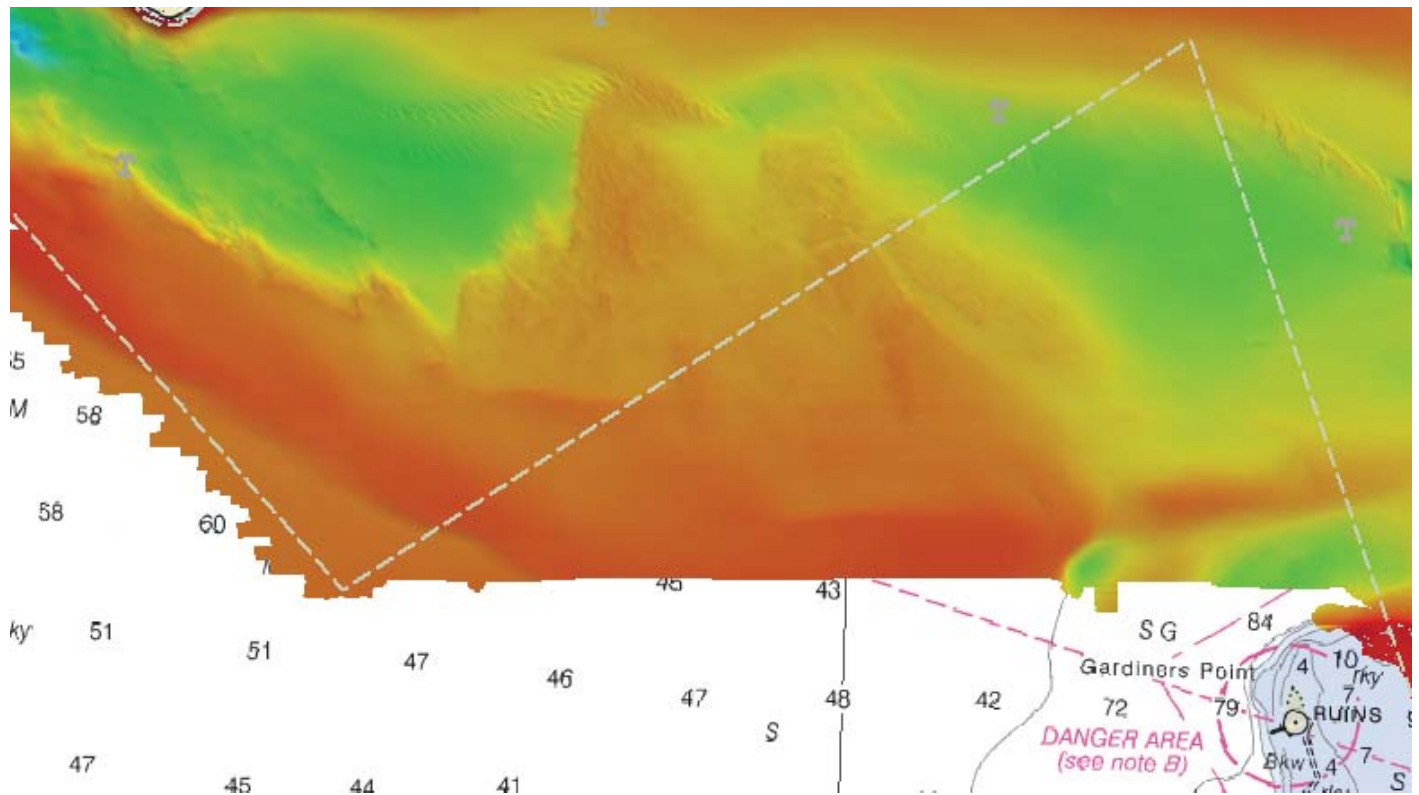


Figure 5: SE additional junction coverage.



*Figure 6: SW additional junction coverage.*

Survey Coverage was in accordance with the requirements in the Project Instructions and the HSSD.

## **A.5 Survey Statistics**

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

	<b>HULL ID</b>	<i>S-222</i>	<i>HSL 3101</i>	<i>HSL 3102</i>	<i>Total</i>
<b>LNM</b>	<b>SBES Mainscheme</b>	0	0	0	0
	<b>MBES Mainscheme</b>	286.0	778.2	17.40	1081.6
	<b>Lidar Mainscheme</b>	0	0	0	0
	<b>SSS Mainscheme</b>	0	0	0	0
	<b>SBES/SSS Mainscheme</b>	0	0	0	0
	<b>MBES/SSS Mainscheme</b>	0	216.7	0	216.7
	<b>SBES/MBES Crosslines</b>	9.21	39.6	0	48.81
	<b>Lidar Crosslines</b>	0	0	0	0
<b>Number of Bottom Samples</b>					19
<b>Number of AWOIS Items Investigated</b>					0
<b>Number Maritime Boundary Points Investigated</b>					0
<b>Number of DPs</b>					0
<b>Number of Items Investigated by Dive Ops</b>					0
<b>Total SNM</b>					16.70

*Table 2: Hydrographic Survey Statistics*

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

<b>Survey Dates</b>	<b>Day of the Year</b>
04/30/2014	120
05/01/2014	121
05/02/2014	122
05/03/2014	123
05/04/2014	124
05/05/2014	125
05/06/2014	126
05/07/2014	127
05/08/2014	128
05/21/2014	141
05/22/2014	142
08/06/2014	218
08/07/2014	219
08/08/2014	220
08/09/2014	221
08/10/2014	222
08/11/2014	223
08/12/2014	224
08/13/2014	225
08/14/2014	226
08/22/2014	234
08/24/2014	236
08/25/2014	237
08/26/2014	238
08/27/2014	239
09/05/2014	248
09/06/2014	249
09/07/2014	250
09/14/2014	257
10/12/2014	285
10/14/2014	287
10/25/2014	298

## 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:

<b>Hull ID</b>	<i>S222</i>	<i>HSL 3101</i>	<i>HSL 3102</i>
<b>LOA</b>	208 feet	31 feet	31 feet
<b>Draft</b>	15 feet	5.2 feet	5.2 feet

*Table 4: Vessels Used*

Data were acquired by NOAA Ship Thomas Jefferson, Hydrographic Survey Launch 3101 and Hydrographic Survey Launch 3102. NOAA Ship Thomas Jefferson collected multibeam echosounder soundings, multibeam backscatter data, sound velocity profiles, surface sound velocity, position and attitude data, and bottom samples. HSL 3101 acquired multibeam data, multibeam backscatter data, side scan sonar imagery, sound velocity data, surface sound velocity data, position and attitude data, detached positions, and bottom samples. HSL 3102 acquired multibeam data, multibeam backscatter data, surface sound velocity, sound velocity data, position and attitude data, and bottom samples.

### B.1.2 Equipment

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

Manufacturer	Model	Type
Reson	7125-SV1	MBES
Reson	7125-SV2	MBES
Applanix	POSM/V v4	Attitude System
Applanix	POSM/V v5	Attitude System
Trimble	SPS351 DGPS Beacon Receiver	Positioning System
Seabird	Seacat 19+	Conductivity, Temperature, and Depth Sensor
Brook Ocean Technology	MVP 100	Sound Speed System
Reson	SV-70	Sound Speed System
Reson	SV-71	Sound Speed System
Klein	5000 v1	SSS

Table 5: Major Systems Used

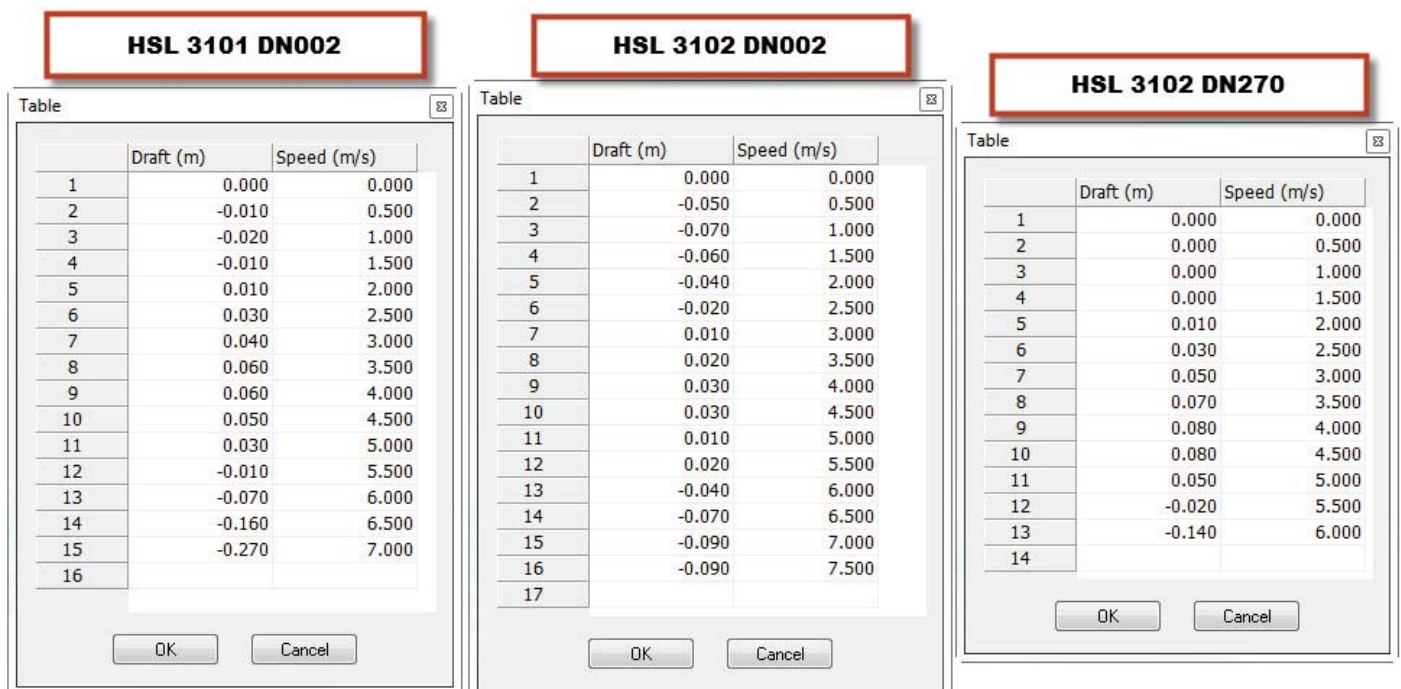


Figure 7: Updated Dynamic Draft Tables for HSL 3101 & 3102

The following changes were made to vessel configurations, equipment operation, and data acquisition & processing:

An error in the dynamic draft tables for HSL 3101 and 3102 was discovered after data acquisition for survey H12679 was completed. The corrected dynamic drafts were entered into each vessel's HVF, backdated to 2-Jan-2014;

The CARIS software was updated to 8.1.8 on 9-Aug-2014;

The CARIS software was updated to 8.1.10 on 25-Oct-2014;

HSL 3102 was re-patch tested on 27-Sept-2014. The system was recalibrated after a 3-month repair period;

A new dynamic draft table for HSL 3102 was acquired on 27-Sept. The updated dynamic draft table was entered into the vessel's HVF, dated 27-Sept-2014.

## **B.2 Quality Control**

### **B.2.1 Crosslines**

Crosslines acquired for this survey totaled 4% of mainscheme acquisition.

The Thomas Jefferson and her survey launches collected 59.64 total linear nautical miles of MBES crosslines. The northern crosslines equated to 4.53% of mainscheme multibeam bathymetry. The southern crosslines equated to 7.88% of mainscheme multibeam bathymetry. Crossline percentage for the SSS area was below the required 8%, due to additional overlap for junction coverage and time constraints. All crosslines were compared to mainscheme, using a difference surface, in CARIS BathyData Base. A 2m CUBE surface was created using strictly mainscheme lines, while a second 2m CUBE surface was created using only crosslines. The two surface were then differenced, with every instance of overlap evaluated.

The north mean was -0.01 m and the standard deviation was 0.18 m. The north section of Survey H12679 complies with section 5.2.4.3 of the HSSD (2014 ed).

The south mean was -0.05 m and the standard deviation was 0.1 m. The south section of Survey H12679 complies with section 5.2.4.3 of the HSSD (2014 ed).

Minor vertical offsets over features were observed during crossline comparison, particularly on 21-May-2014. This offset likely resulted from limited sound speed profiles collected. Survey area was not well mixed due to a strong current. The Sluiceway, the passage between Great Gull Island and Plum Island, has a tidal current velocity of 2.6 knots on the flood, and 3.2 knots on the ebb; flood sets 299°, and ebb 133°. Considerably higher velocities occur at times, and tide rips are very bad in heavy weather. The vertical difference is less than 10cm, and all surfaces remain with IHO Order 1 specifications. For further discussion, refer to Section B.2.6.1 - "Vertical Offsets" of this document.

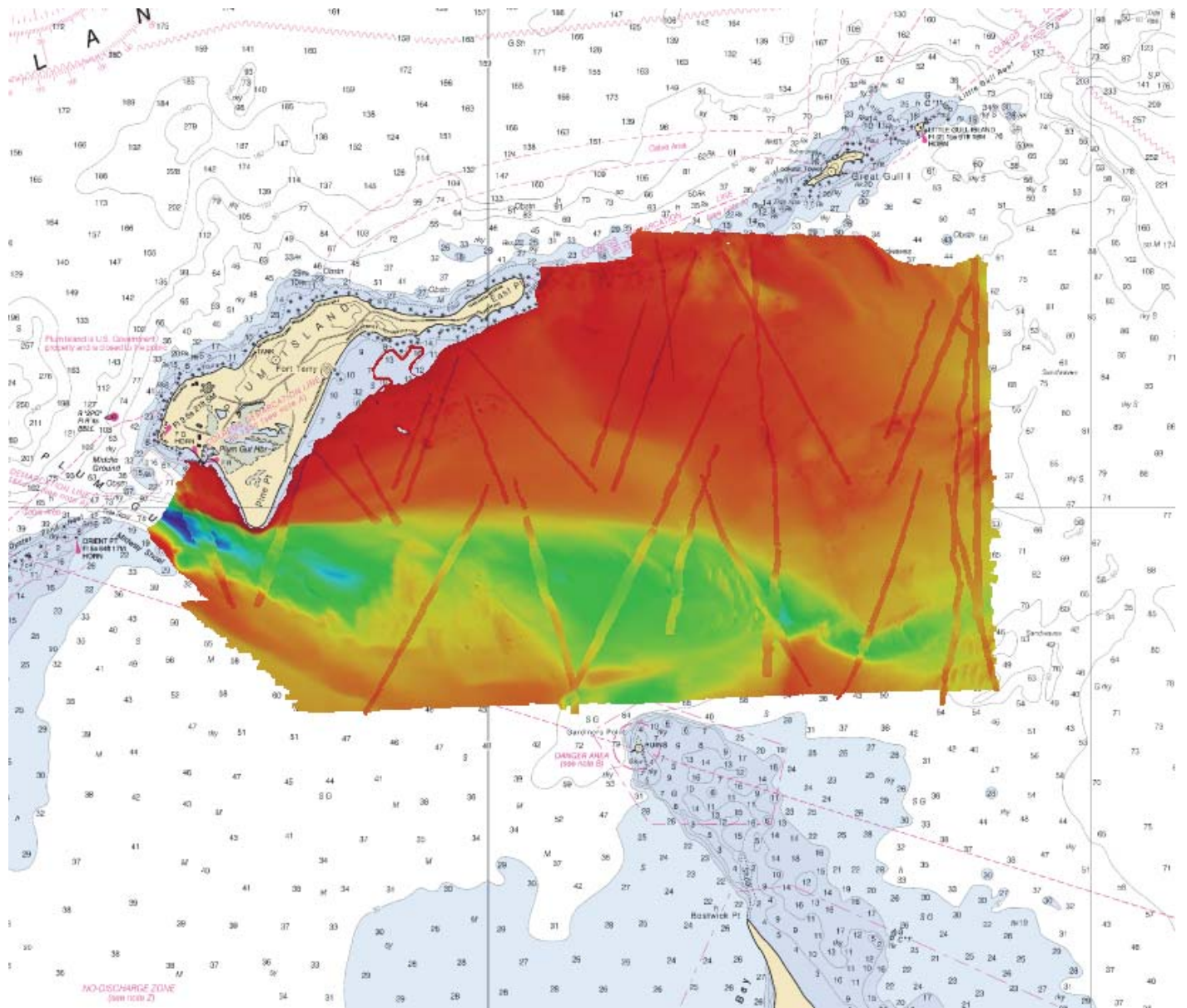


Figure 8: H12679 North XL Comparison

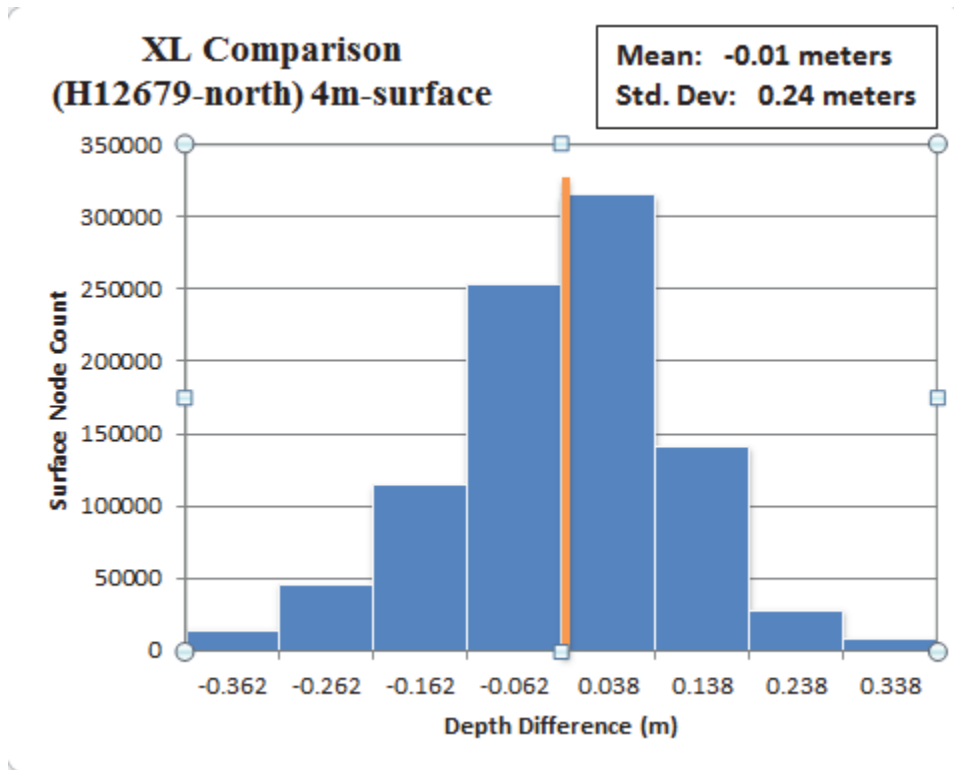


Figure 9: H12679 North XL Comparison Statistics

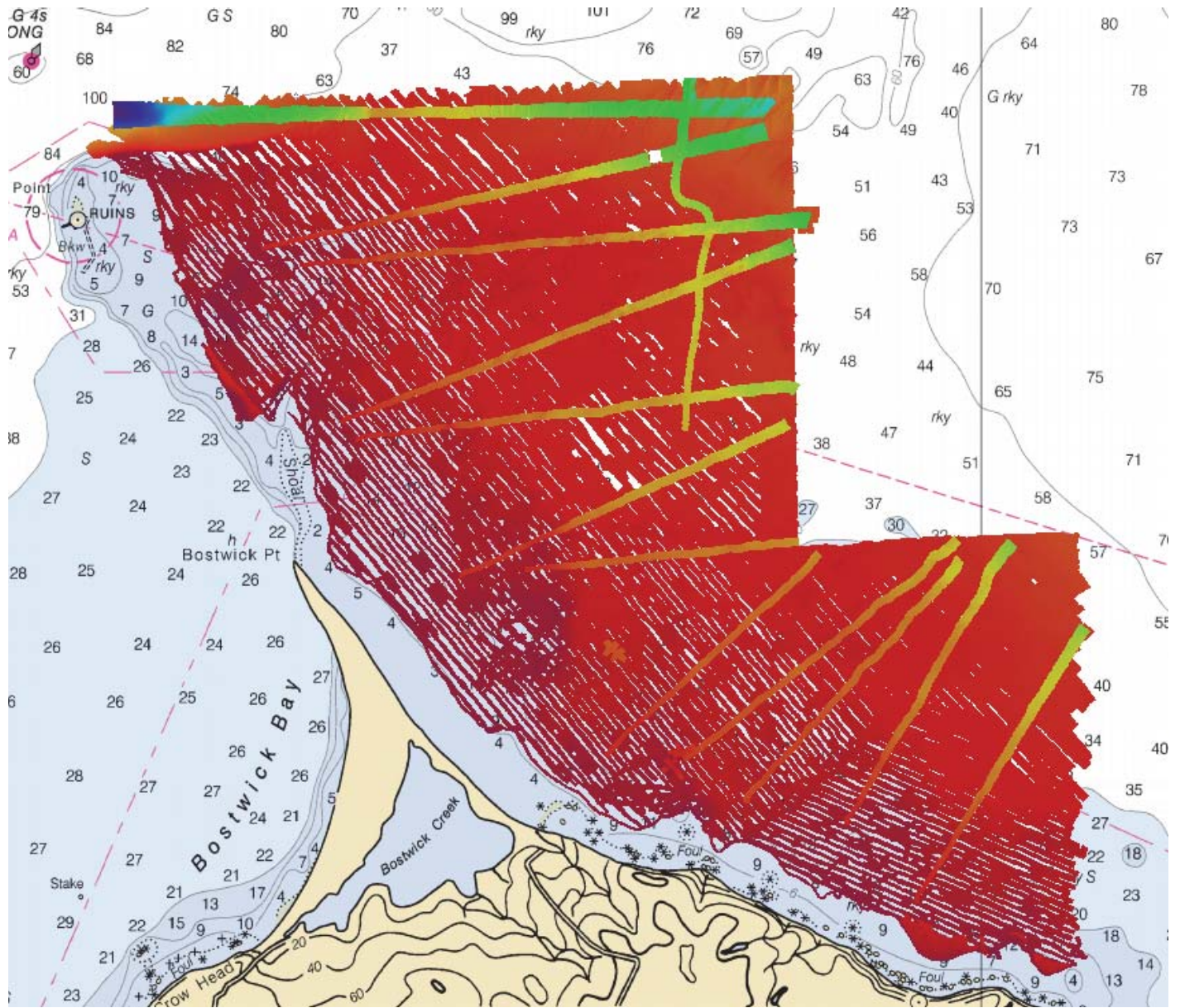


Figure 10: H12679 South XL Comparison

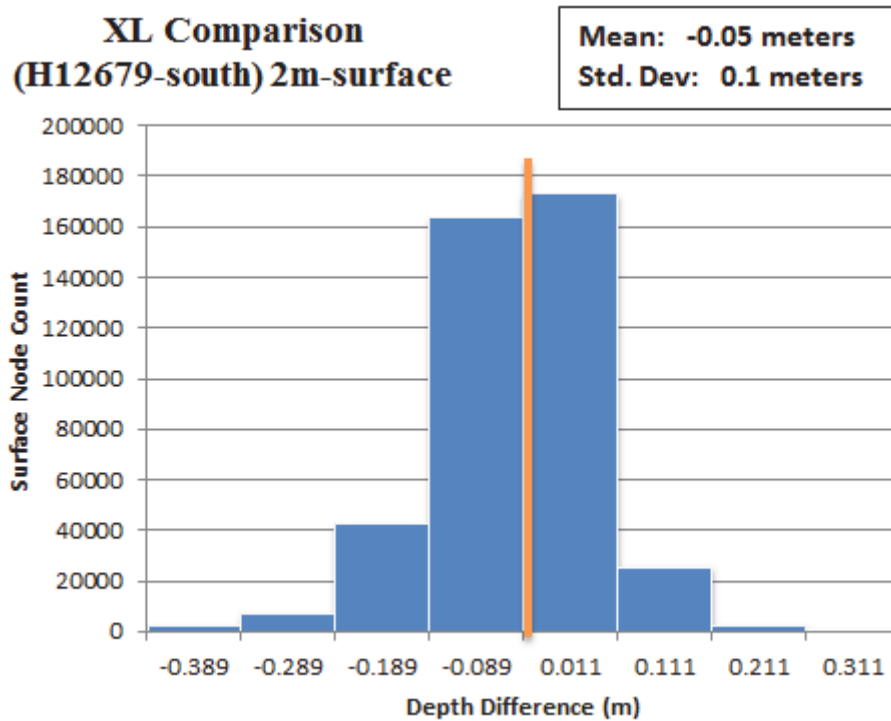


Figure 11: H12679 South XL Comparison Statistics

### B.2.2 Uncertainty

Hull ID	Measured - CTD	Measured - MVP	Surface
S-222	4 meters/second	1.0 meters/second	0.2 meters/second
3101	4 meters/second	0 meters/second	0.2 meters/second
3102	4 meters/second	0 meters/second	0.2 meters/second

Table 6: Survey Specific Sound Speed TPU Values

Total Propagated Uncertainty values for survey H12679 were derived using a combination of: real time uncertainties for vessel motion; a priori values for equipment and vessel characteristics; assigned values for water level uncertainties; and field assigned values for sound speed uncertainties. The real time uncertainties for vessel motion include roll, pitch, gyro, navigation, and elevation. The uncertainties in these measurements were recorded as part of the POSpac IAPPK 3D positional solution and were applied to the soundings via an SBET RMS file generated by Applanix POSpac. Uncertainties for sonar mounting and vessel speed were assigned using the a priori values found in Appendix 4, table 4.9 of the NOAA Field Procedures Manual (FPM) (ed 2014), and applied to the data via the CARIS HIPS Hydrographic Vessel File. Uncertainties associated with water level measurements and interpolation were automatically calculated as part of the TCARI water levels, and applied to the data during the Merge process. Finally, the uncertainty

associated with sound speed measurements were based on the frequency and location of CDT casts, in accordance with the guidance set by Appendix 4 of the FPM (ed 2014) (see Table 6).”

Total Propagated Uncertainty was then evaluated to ensure compliance with section 5.1.3 of HSSD (2014 ed). First the maximum allowable uncertainty for each node was calculated. Second the ratio between actual uncertainty and maximum allowed uncertainty was found for each node. Uncertainty values were analyzed by creating a new layer for the finalized surfaces of the survey with a ratio of node uncertainty divided by the IHO Order 1 allowable uncertainty. Specifically, this layer was calculated using the equation:  $-\text{Uncertainty} / ((0.5^2 + (\text{Depth} * 0.013)^2)^{0.5})$ . The resulting 'IHO\_order\_1' layer was filtered using a colour map to show any areas where actual uncertainty exceeded the allowed uncertainty. Using this method, any resulting values exceeding -1.0 indicate where the surface failed to meet IHO Order 1 standards.

For the north 50cm grid 128,656,244 nodes were evaluated and 99.9% were within IHO order 1a uncertainty. For the 2m grid 3,496,243 nodes were evaluated and 99.9% were within IHO order 1a uncertainty. For the 4m grid 65,297 nodes were evaluated and 99.9% were within IHO order 1a uncertainty.

For the south 4m grid 934,351 nodes were evaluated and 99.9% were within IHO order 1a uncertainty.

Horizontal disagreement between lines was observed over areas of sandwaves, particularly for data collected on 22-May, 6-8-Aug, 24-27-Aug, 5-7-Sept, 14-Sept, 12-Oct, and 14-Oct-2014. All horizontal differences remain within NOS specifications per section 3.1.3 of the HSSD (2014 ed).

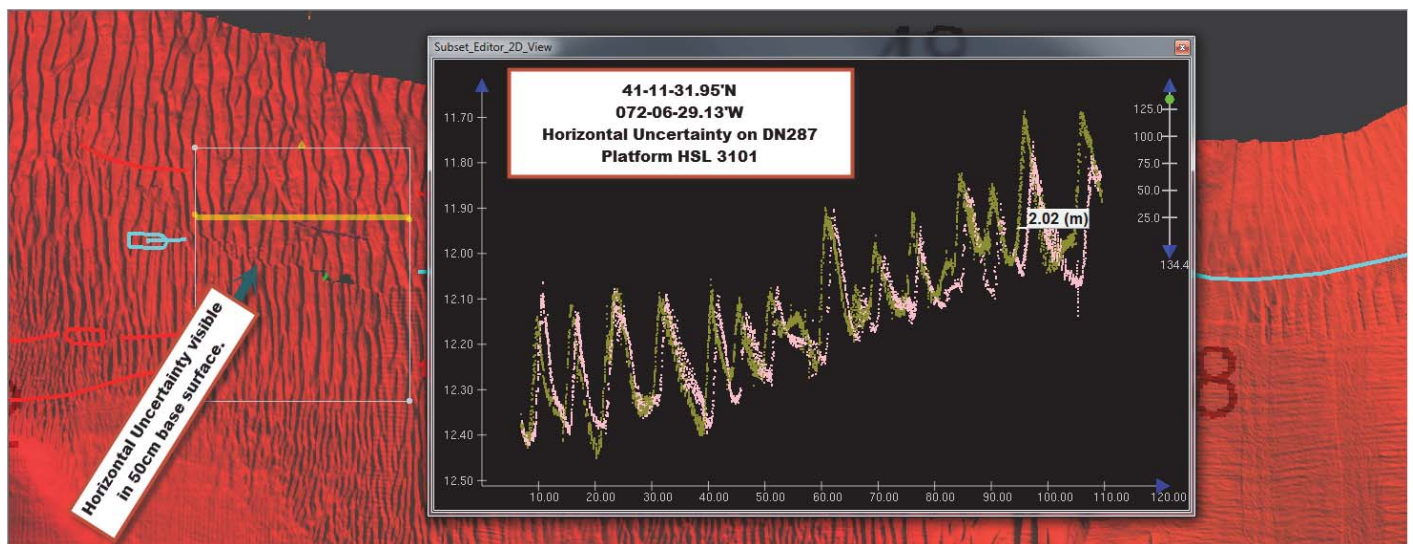


Figure 12: Horizontal differences between line 287\_000\_1412 and 287\_000\_1414, DN287.

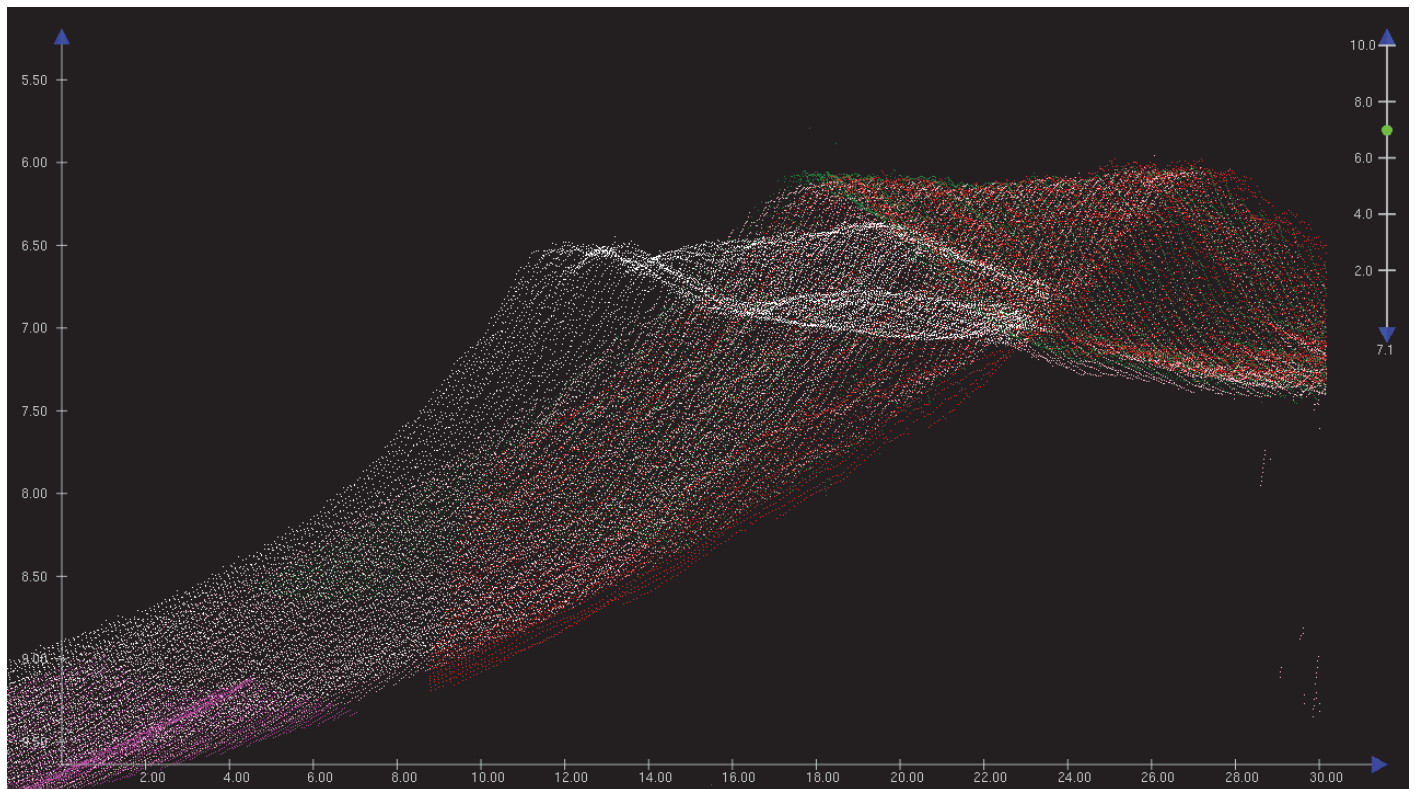


Figure 13: Horizontal differences between line 219\_000\_1535 and 287\_000\_1417, DN219.

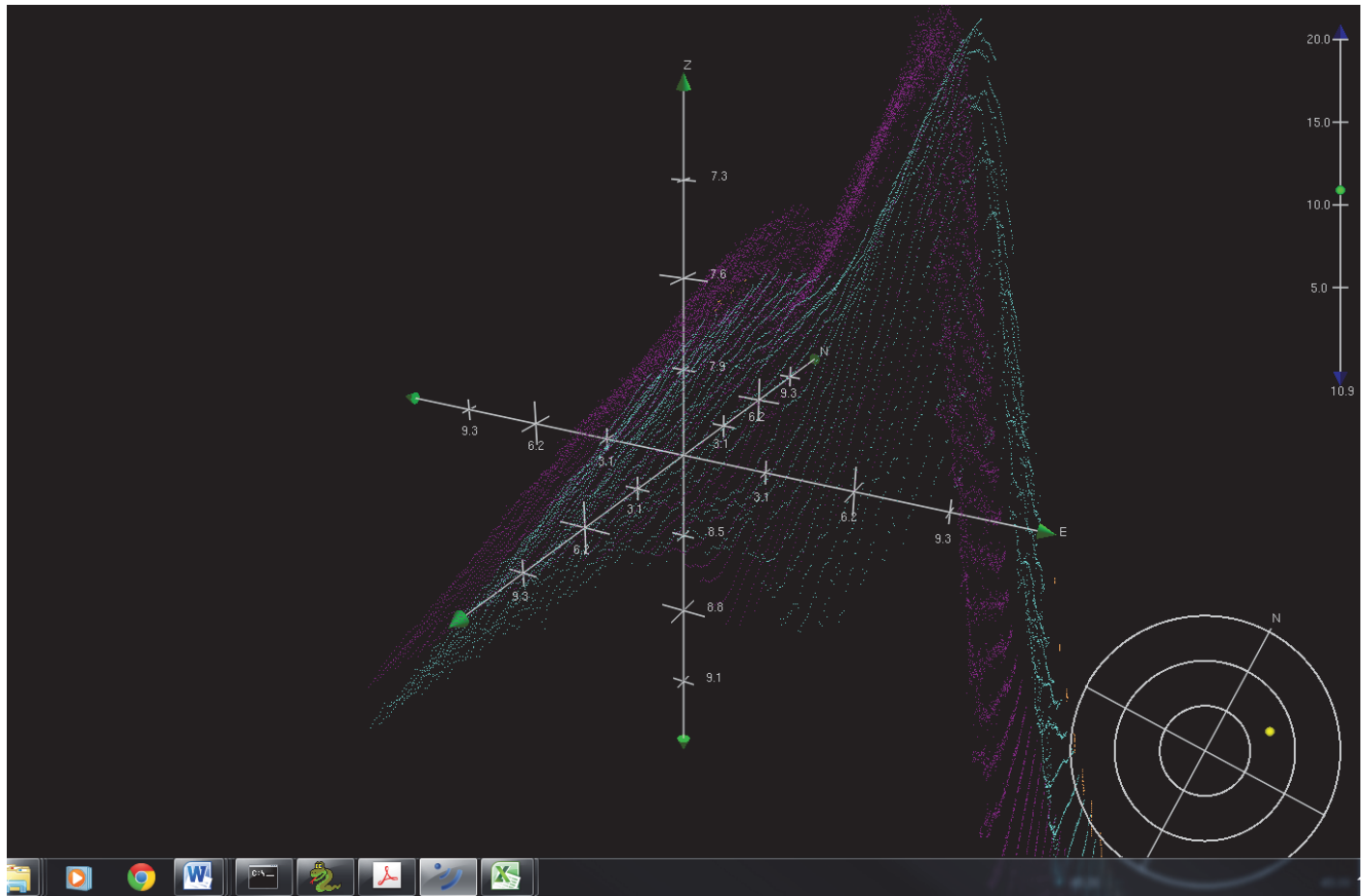


Figure 14: Horizontal differences between line 218\_000\_1756 and 218\_000\_1751, DN218

### B.2.3 Junctions

A total of 3 contemporary surveys junction with survey H12679: H11445 to the northwest; H12299 to the west; and H12250 to the northeast. All junctions were analyzed using statistics computed from a difference surface.

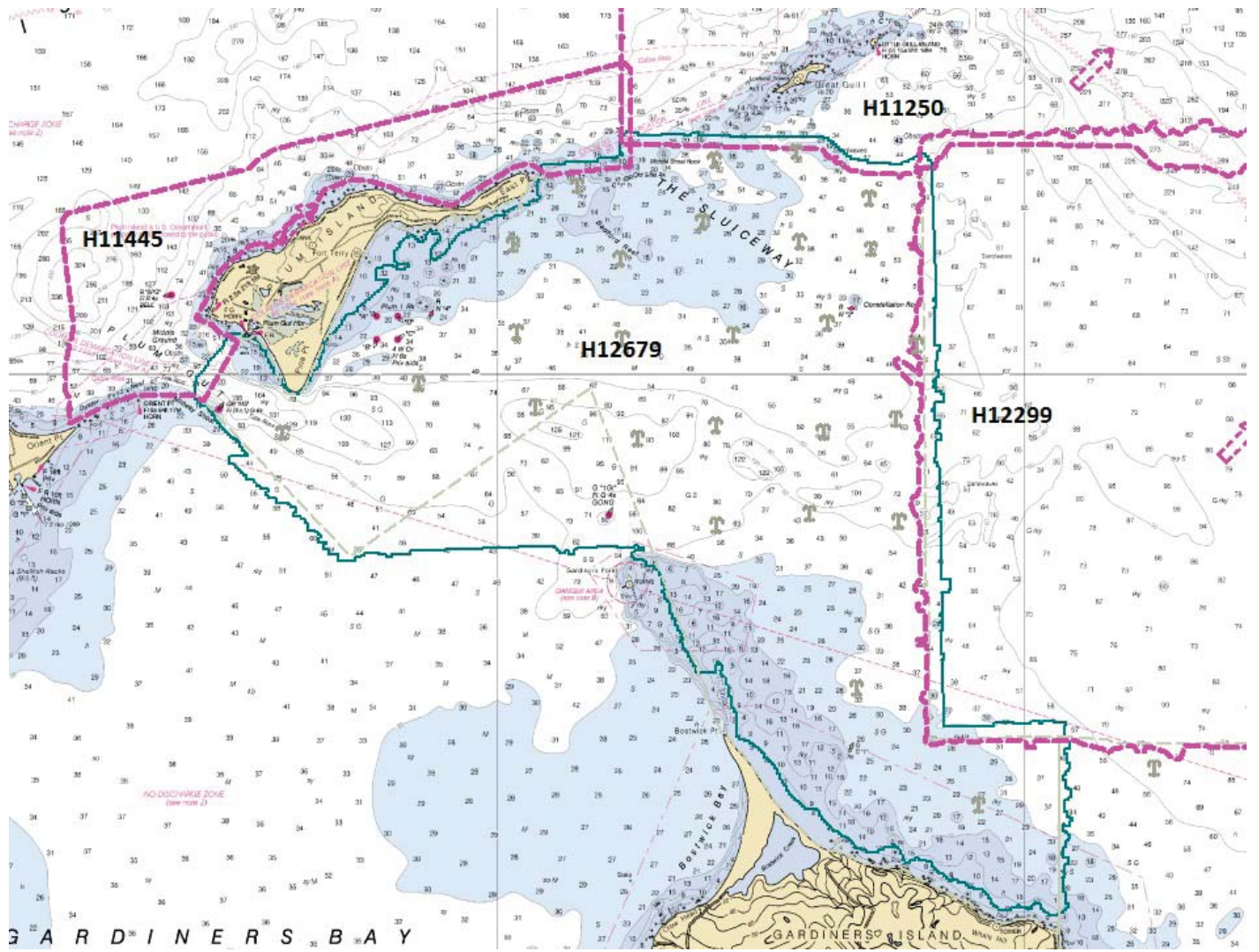


Figure 15: Survey H12679 junction boundaries

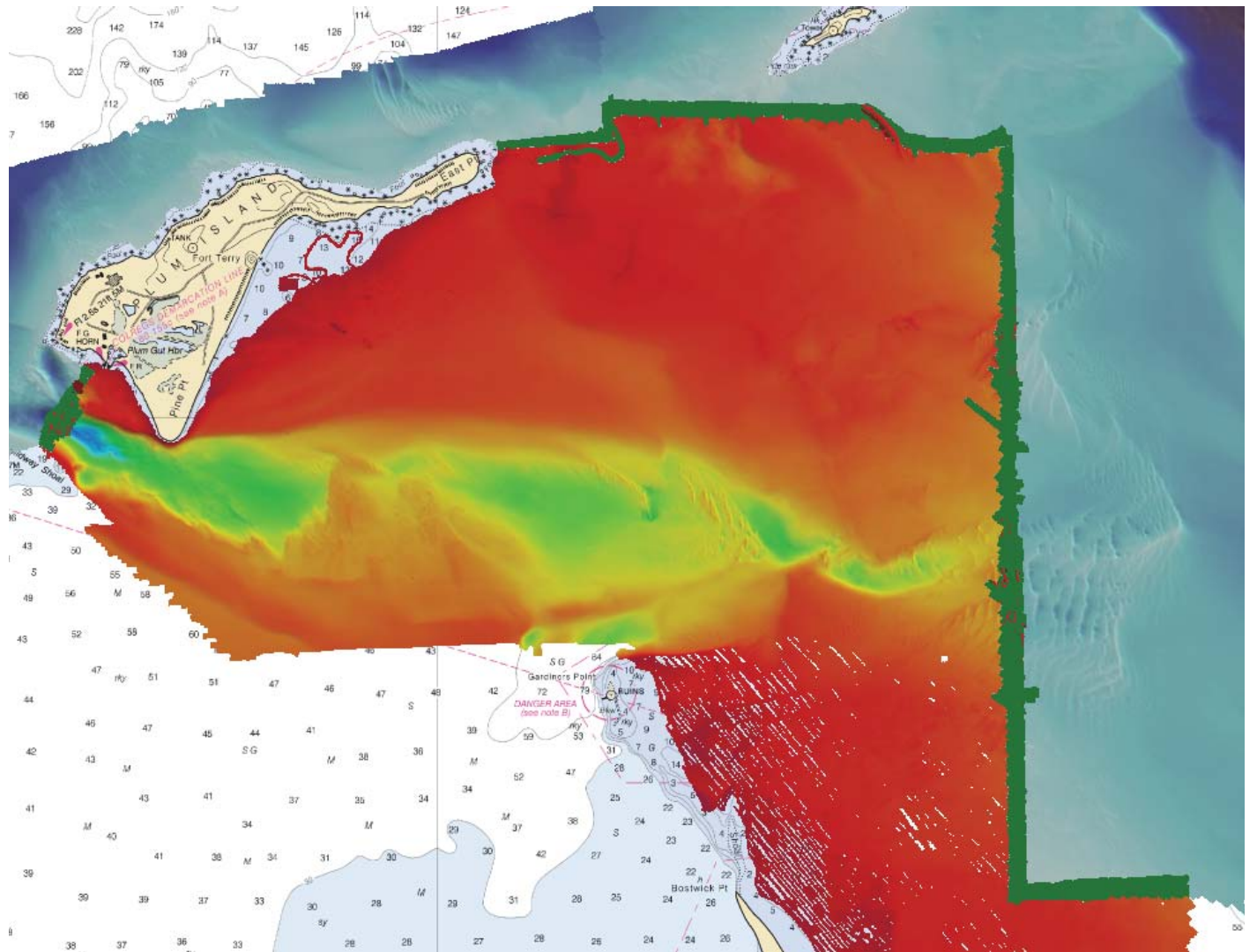


Figure 16: Survey H12679 junction difference

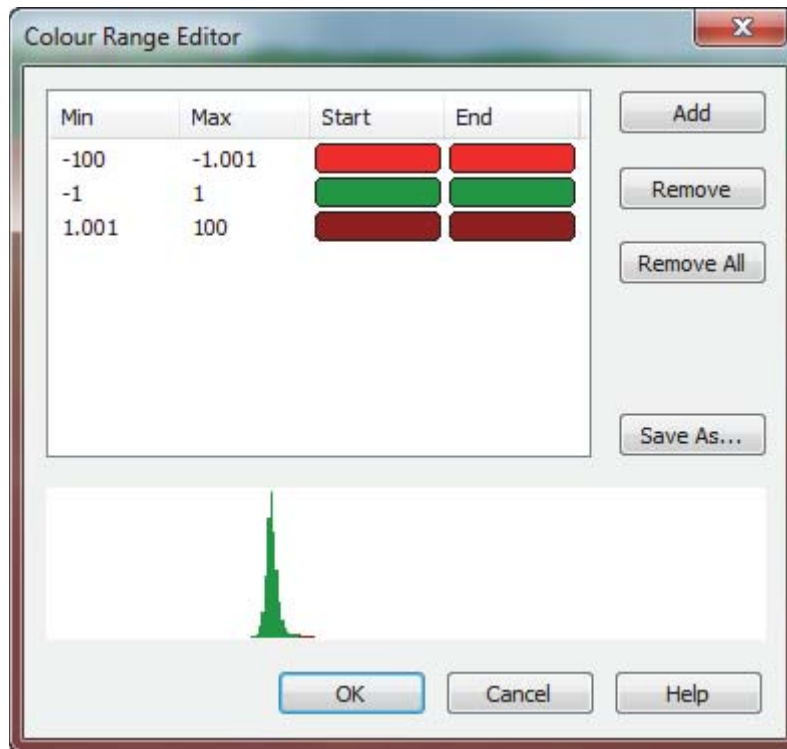


Figure 17: Survey H12679 junction difference range

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12299	1:20000	2011	NOAA Ship THOMAS JEFFERSON	E
H11445	1:10000	2008	NOAA Ship THOMAS JEFFERSON	NW
H11250	1:10000	2003	NOAA Ship THOMAS JEFFERSON	NE

Table 7: Junctioning Surveys

### H12299

The difference between survey H12679 and H12299 ranged from  $-4.3$  m to  $3.9$  m. The mean was  $0.1$  m, and the standard deviation was  $0.4$  m. Out of  $120,980$ ,  $117,246$  were within 1 meter, equating to  $96.9\%$ .

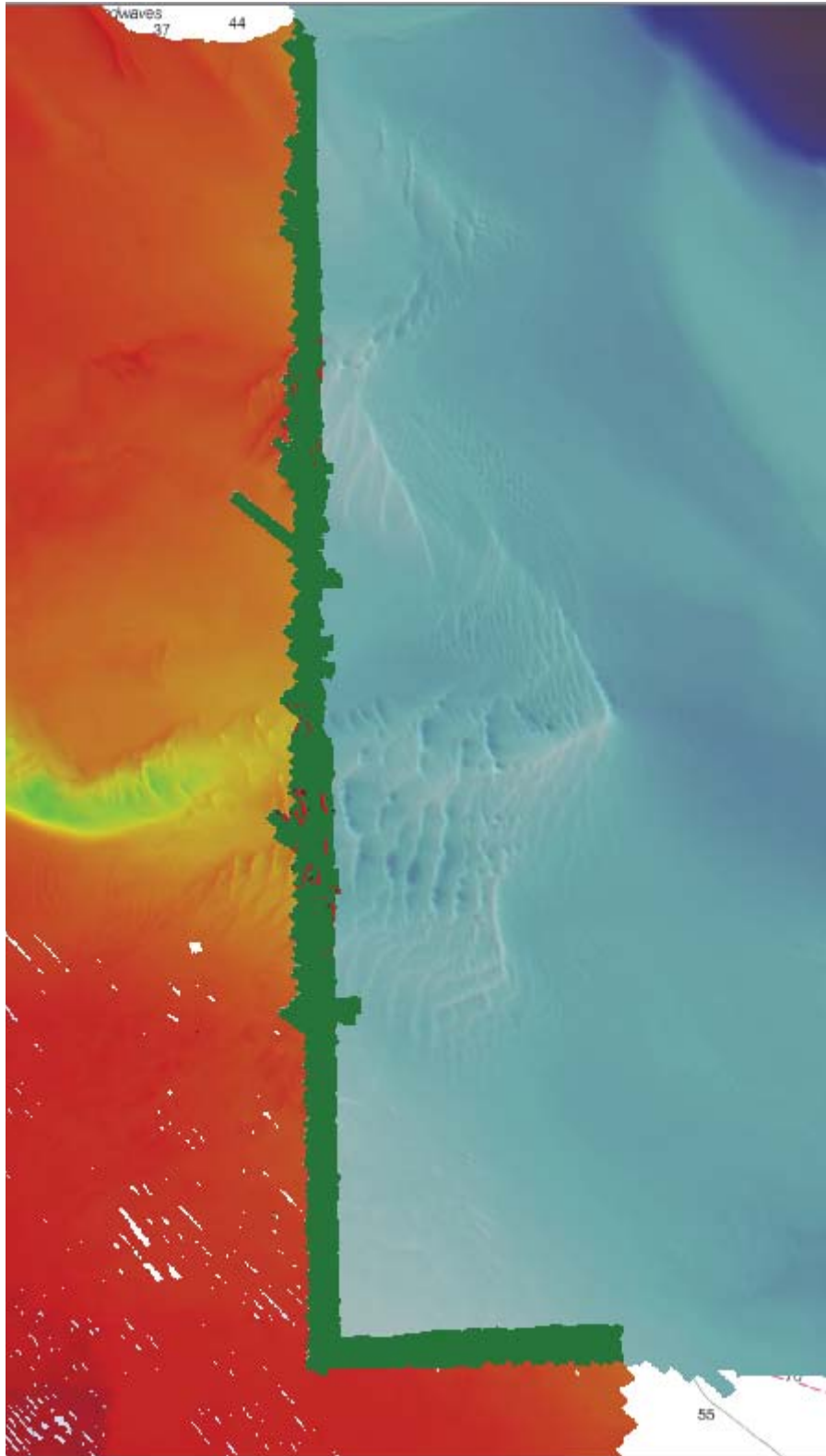
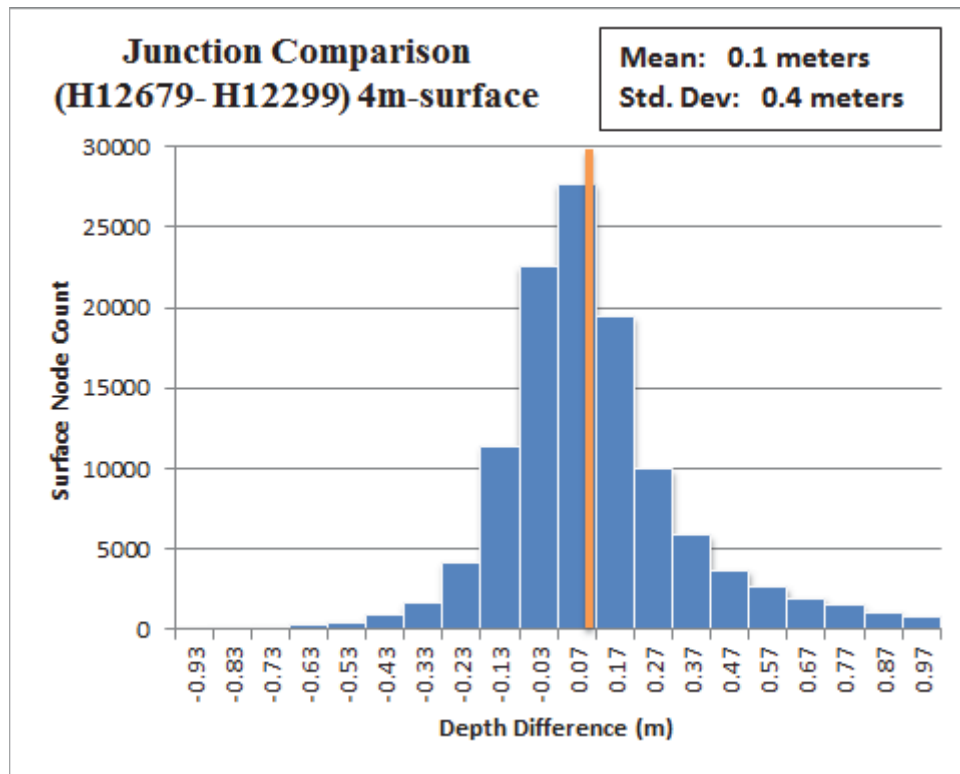


Figure 18: H12299 junction



*Figure 19: H12299 junction statistics*

#### H11445

The difference between survey H12679 and H11445 ranged from  $-2$  m to  $46.8$  m. The mean was  $0.1$  m, and the standard deviation was  $0.9$  m. Out of  $24,732$ ,  $23,275$  were within  $1$  meter, equating to  $94.1\%$ . Locations of sounding variance  $> 1$  m are attributed to poor dynamic draft from the high “Plum Gut” current. This variance was also due to the feature-rich area.

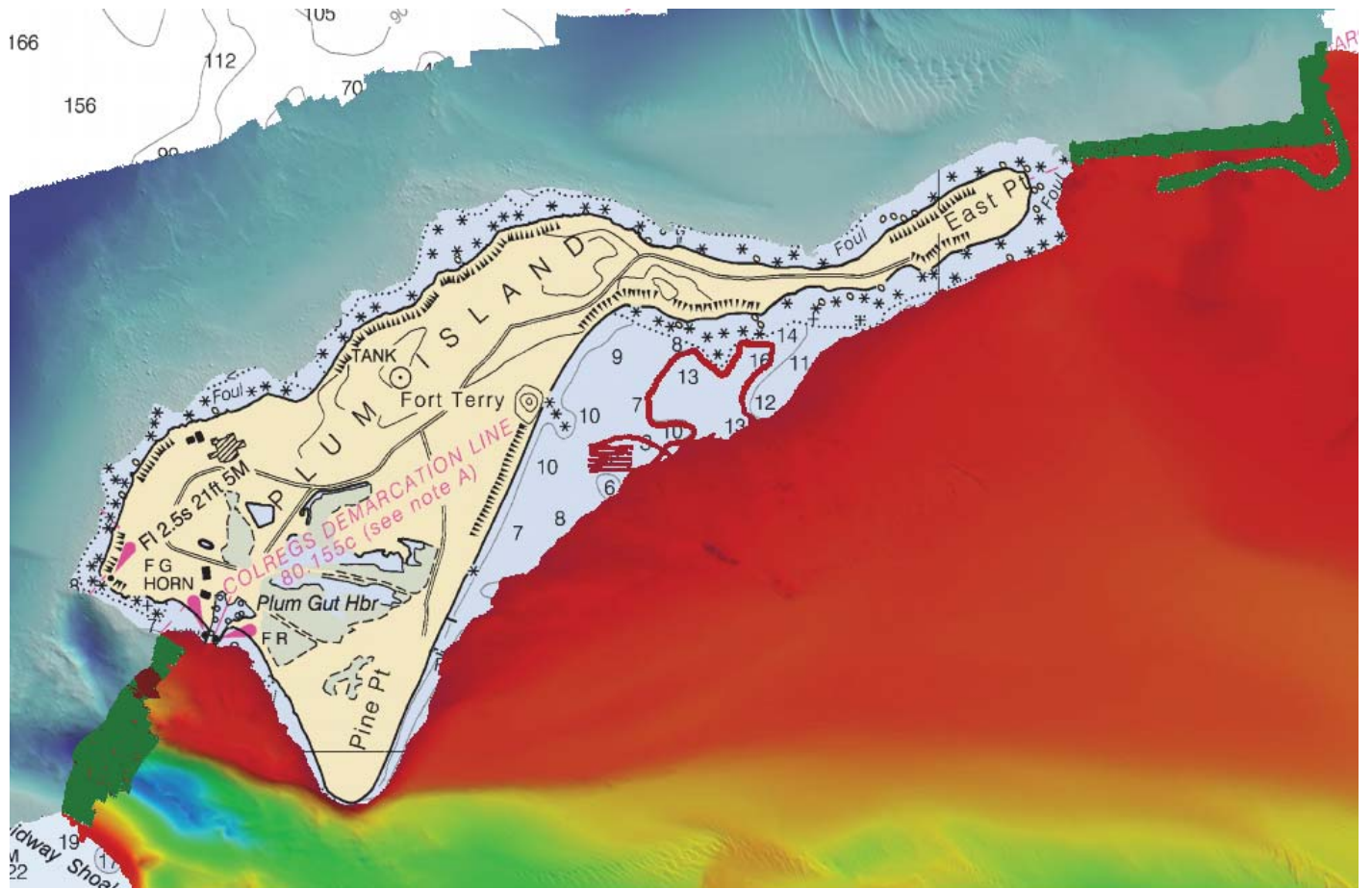


Figure 20: H11445 junction

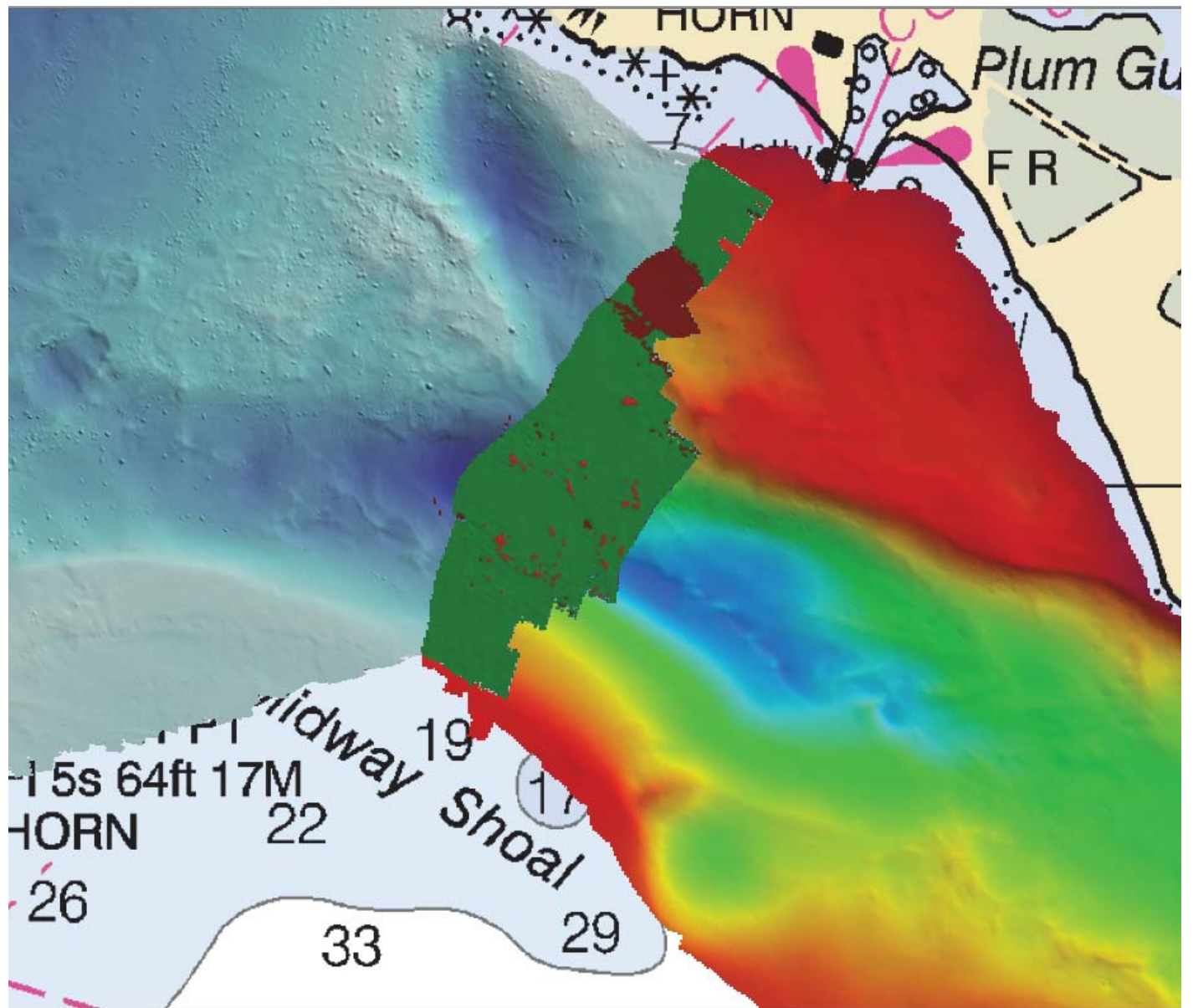
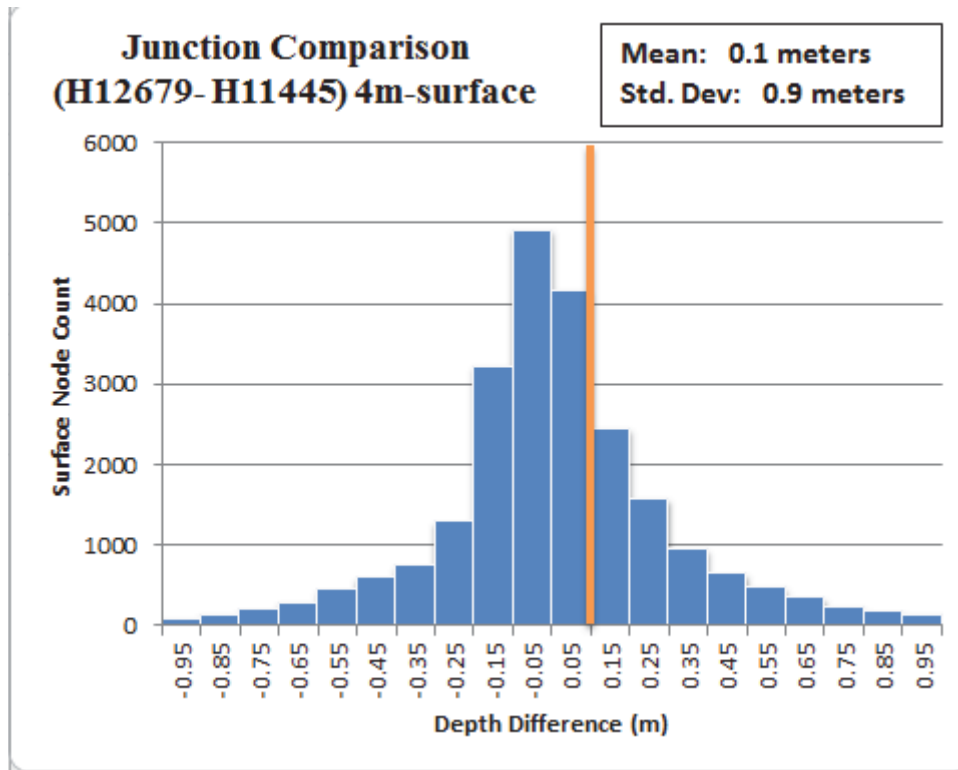


Figure 21: H11445 junction Plum Gut



*Figure 22: H11445 junction statistics*

### H11250

The difference between survey H12679 and H11250 ranged from  $-7.25$  m to  $16.25$  m. The mean was  $0.1$  m, and the standard deviation was  $0.6$  m. Out of  $42,791$ ,  $40,067$  were within  $1$  meter, equating to  $93.6\%$ . The H11250 junction discrepancies, with sounding variance of  $> 1$  meter, are attributed to poor dynamic draft from the high “Sluiceway” current. This variance was also due to the feature-rich areas.

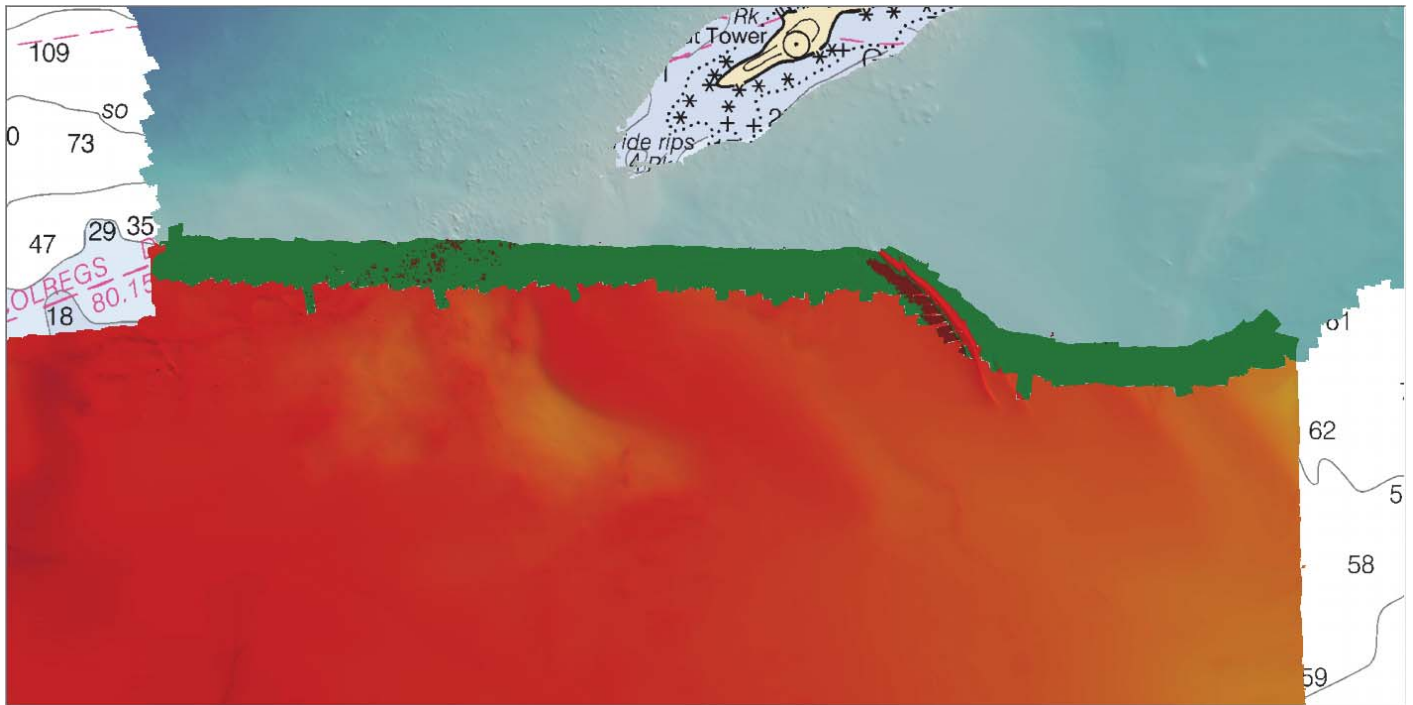


Figure 23: H11250 junction

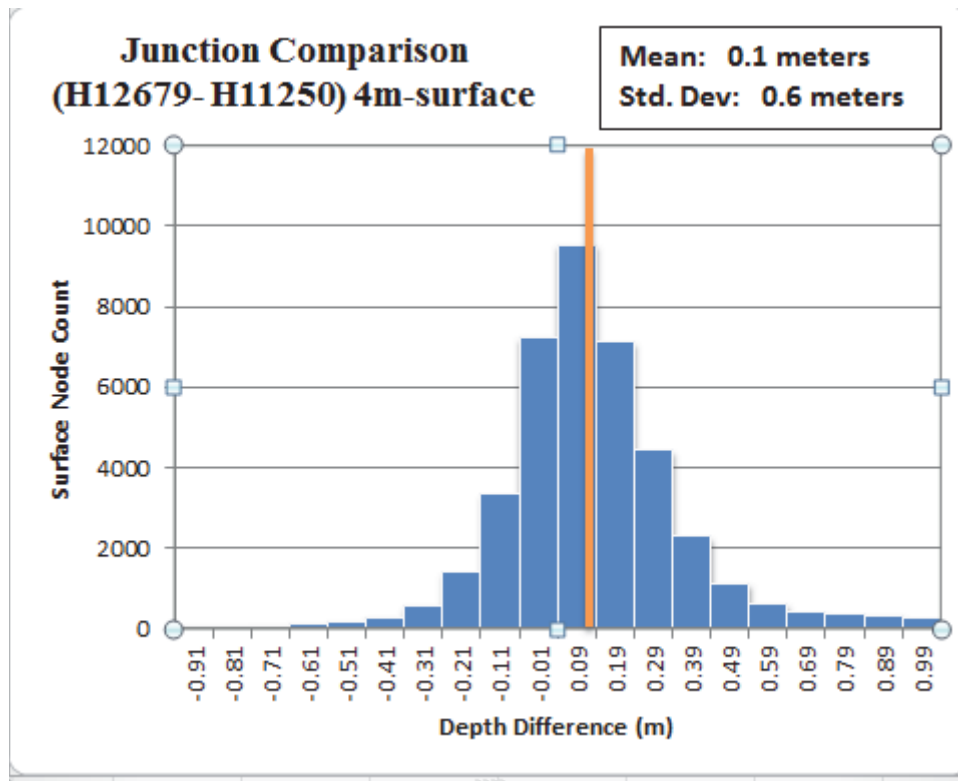


Figure 24: H11250 junction statistics

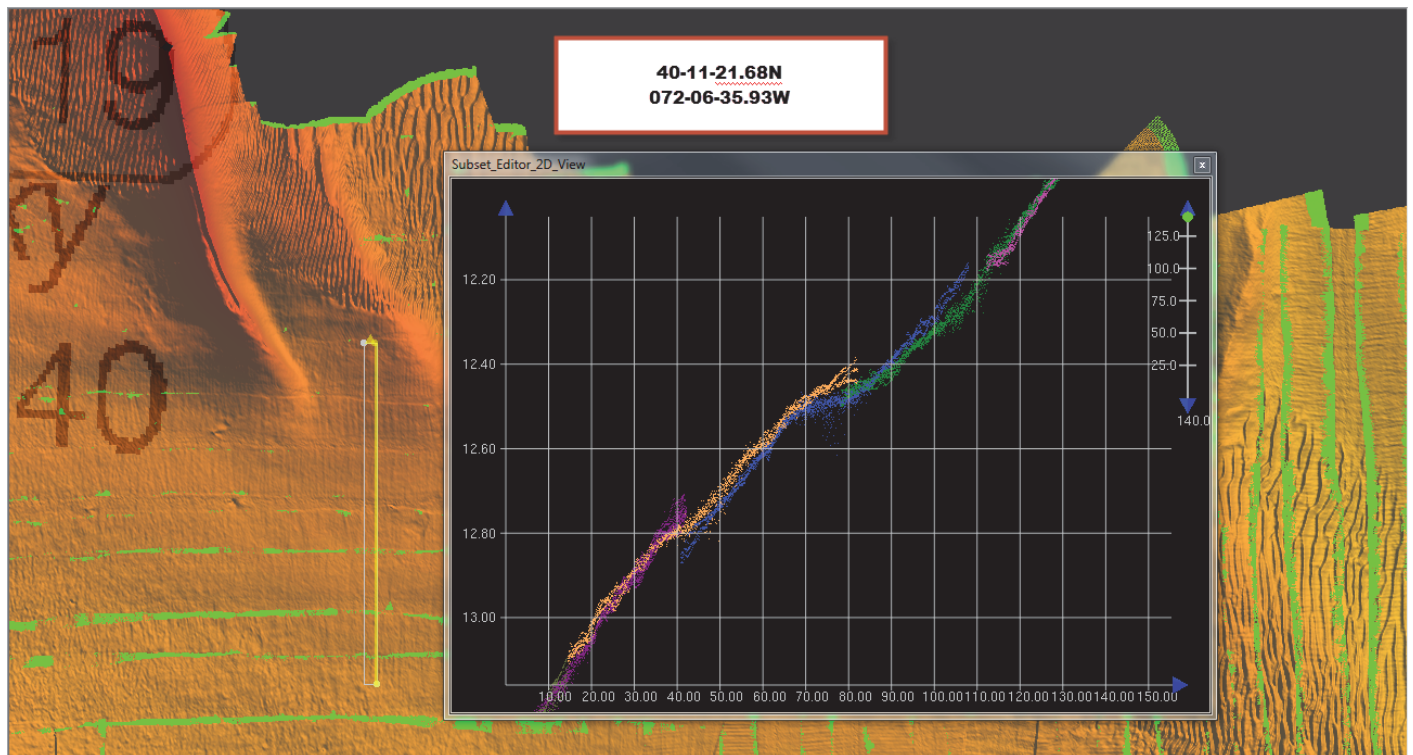
## B.2.4 Sonar QC Checks

Sonar system quality control checks were conducted as detailed in the quality control section of the DAPR.

## B.2.5 Equipment Effectiveness

### S-Shaped Curve in RESON Multibeam Data

An artifact of unconfirmed cause appears in the MB data collected by the Reson 7125-SV2 system aboard HSL 3101. The artifact has an elongated ‘S’ shape across the swath (see figure 27 below). The field unit has encountered the ‘S’ shape when using previous Reson systems, and has historically attributed the artifact to an error in the 7125’s sectoring and beam steering algorithm. The artifact is particularly prevalent in data collected on 9-Aug-2014, where it causes vertical jumps in the CUBE surface. All instances of this error remain within IHO order 1 specification.



*Figure 25: "S" shaped heave artifact*

### Vertical Offset

A vertical offset exists in the multibeam data collected by Thomas Jefferson S222. The offset is generally 5-10 cm, with the most extreme example approaching 30 cm (see figure 28 below). The offset is evident within each acquisition day, when comparing across different acquisition days, and when comparing to data from HSL 3101 and 3102. The origin of the offset is unknown, but has been tentatively attributed

to a combination of poor dynamic draft due to high current, in combination with inaccurate waterline measurements. The offset does not affect a shoal biased sounding set, and remains within IHO order 1 uncertainty specifications.

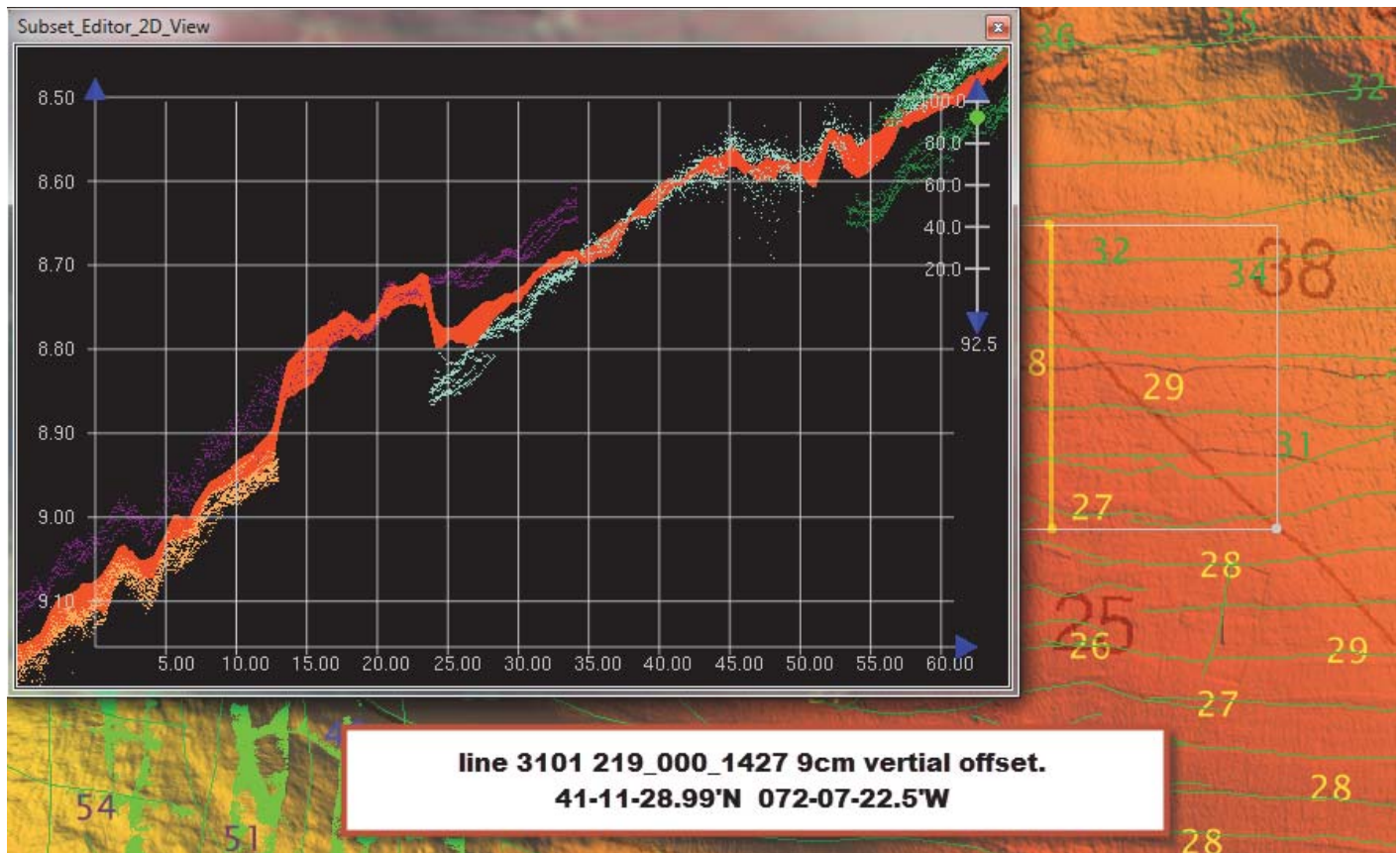


Figure 26: Vertical Offset

## B.2.6 Factors Affecting Soundings

### Non-standard Contact Selection

The southern section of survey H12679 was covered with set line spacing 200% SSS with concurrent MBES data. Per section 6.1.3.2 of HSSD (2014 ed) all SSS contacts with a computed target height of 1m or greater must be selected for development. Due to the rocky nature of the sea floor, the Operations Officer determined that picking all contacts > 1m would be too laborious. Only contacts with acoustical shadows, and contacts that fell between the set MBES lines were noted and developed. The method chosen left some rocks > 1m without the object detection multibeam coverage required by section 5.2.2.1 of the HSSD (2014 ed). In order to ensure the shoalest depths were cover by ODMB, a 400m grid was laid over the set line spacing section of the survey. A designated sounding was placed on the shallowest 1-3 rocks in each grid square, and each designated rock was examined for ODMB coverage. The 400m spacing was based on the 1:40,000 scale of chart 13209, which is the largest scale chart for the southern section of the survey.

The 400m grid used to control coverage has been preserved inside fieldsheet H12679\_2, and is named CST\_400m\_QC2.

### Weather Induced Heave Artifact

A weather induced motion artifact can be seen in the data for HSL 3101 on 22-May-2014 and HSL 3102 23-Sep-2014. The artifact is visible in the Cube surface, but all of the data remains within IHO Order 1a specifications for uncertainty.

## **B.2.7 Sound Speed Methods**

Sound Speed Cast Frequency: On survey HSL 3101 and 3102, sound speed data was collected with a CTD approximately every two hours. The ship used a Moving Vessel Profiler with casts occurring approximately every 20 minutes depending on safe deployment or traffic. Sound speed profiles are analyzed for data quality, concatenated and then applied to the bathymetry using the "nearest in distance within time - 4 hour" mode in Caris HIPS and SIPS. Efforts to minimize sound speed issues included the frequency of casts based on time and location. Surface sound speed was monitored during acquisition, for changes  $>$  or  $<$  3m/s, to determine if a new cast was needed.

No abnormal sound velocity issues were present in the data.

## **B.2.8 Coverage Equipment and Methods**

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

## **B.2.9 Density Requirements for survey H12679**

Density requirements for H12679 were analyzed using the Compute Statistics function within Caris HIPS & SIPS. The north section finalized surface nodes contained five or more soundings,  $>95\%$ , in compliance with section 5.2.2.1 of the HSSD (2014 ed). The south section contained three or more soundings,  $>95\%$ , in compliance with set line spacing density requirements, per ODMB standards.

For the north finalized 50cm grid 127,929,328 nodes were evaluated and 99.4% contain five or more soundings. For the 2m grid 3,495,908 nodes were evaluated and 99.9% contain five or more soundings. For the north 4m grid 65,288 nodes were evaluated and 99.9% contain five or more soundings. The north section of Survey H12679 complies with section 5.2.2.2 of the HSSD (2014 ed).

For the south finalized 4m grid 933,049 nodes were evaluated and 99.9% contain three or more soundings. The south section of Survey H12679 complies with section 5.2.2.3 of the HSSD (2014 ed).

## B.3 Echo Sounding Corrections

### B.3.1 Corrections to Echo Soundings

Soundings for survey H12679 were initially reduced to MLLW via ellipsoid heights and a VDatum separation model. However, application of SBETs induced vertical errors in 17% of all MB data. The errors have been ascribed to data lying outside available Smart Base and Single Base solutions, high PDOP, and loss of satellites. All MB soundings for survey H12679 were reduced to MLLW via verified water levels and a finalized TCARI grid. For a full description of VDatum verification and the determination to use TCARI, see 'H12679 VDatum Validation Request Memo.pdf, under Appendix I of this report.

### B.3.2 Calibrations

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

Calibration Type	Date	Reason
Patch Test	2014-09-27	HSL 3102 was re-patched after extensive repairs were made to the vessel's engine.

*Table 8: Calibrations not discussed in the DAPR.*

All data reduction procedures conform to those detailed in the DAPR.

## B.4 Backscatter

Raw Backscatter was logged as a 7k file and has been sent to the Atlantic Hydrographic Branch for processing. One line per vessel, per day was processed aboard the Thomas Jefferson in order to assess and ensure quality.

## B.5 Data Processing

### B.5.1 Software Updates

The following software updates occurred after the submission of the DAPR:

Manufacturer	Name	Version	Service Pack	Hotfix	Installation Date	Use
Caris	HIPS/SIPS	8.1.8			08/08/2014	Acquisition and Processing
Caris	HIPS/SIPS	8.1.10			10/25/2014	Acquisition and Processing

*Table 9: Software Updates*

The following Feature Object Catalog was used: NOAA Profile V\_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
H12679_1_MB_50cm_MLLW_Final	CUBE	0.5 meters	0.26 meters - 22.0 meters	NOAA_0.5m	Object Detection
H12679_1_MB_2m_MLLW_Final	CUBE	2.0 meters	18 meters - 40 meters	NOAA_2m	Complete MBES
H12679_1_MB_4m_MLLW_final	CUBE	4.0 meters	36.0 meters - 78.96 meters	NOAA_4m	Complete MBES
H12679_2_MB_4m_MLLW_Final	CUBE	4.0 meters	1.48 meters - 35.26 meters	NOAA_4m	MBES TracklineSBES Set Line Spacing
H12679_2_SSS_100%	SSS Mosaic	1.0 meters	-3.95 meters - 44.58 meters	NOAA_1m	100% SSS
H12679_2_SSS_200%	SSS Mosaic	1.0 meters	-9.91 meters - 59.80 meters	NOAA_1m	200% SSS

*Table 10: Submitted Surfaces*

This survey was processed using the Combined Uncertainty and Bathymetry Estimator (CUBE) algorithm. Per section 5.2.2.1 of the NOAA HSSD Manual (ed 2014), all northern MBES data was gridded according to depth: 0.5m resolution for depths ranging from 0 - 22m, 2m resolution for depths ranging from 18 - 40m, and 4m resolution for depths ranging from 36 - 80m. All SSS data was separated into percentages, then mosaicked at 1m resolution.

## C. Vertical and Horizontal Control

Per section 5.1.2.3 of the FPM, no Horizontal and Vertical Control Report has been generated for Survey H12679.

### C.1 Vertical Control

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

Standard Vertical Control Methods Used:

TCARI

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

Station Name	Station ID
Newport, RI	845-2660
New London, CT	846-1490
Montauk, NY	851-0560

*Table 11: NWLON Tide Stations*

File Name	Status
8452660_verified.tid	Final Approved
8461490_verified.tid	Final Approved
8510560_verified.tid	Final Approved

*Table 12: Water Level Files (.tid)*

File Name	Status
B370TJ2014.tc	Final

Table 13: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 10/27/2014. The final tide note was received on 11/05/2014.

HDCS sounding data were reduced to MLLW using verified water levels and finalized TCARI zoning.

## 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 19 N.

The following DGPS Stations were used for horizontal control:

DGPS Stations
Acushnet, MA (306 kHz)
Moriches, NY (293 kHz)

Table 14: USCG DGPS Stations

## D. Results and Recommendations

### D.1 Chart Comparison

Chart comparisons for survey H12679 were conducted using a 2m or 4m grid differenced against an interpolated TIN surfaces of ENC soundings. The chart comparison for the northern section of survey H12679 was conducted using a combined 2m grid, while the the southern section used a 4m grid. Survey H12679 soundings generally agree with raster charts 13209, 12358, and 13212, within 3 feet. Differences

tend to be deeper than the charted depths, in some cases greater than 10 ft. A colour map file highlights the areas of depth difference in the following figures.

### D.1.1 Raster Charts

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

<b>Chart</b>	<b>Scale</b>	<b>Edition</b>	<b>Edition Date</b>	<b>LNМ Date</b>	<b>NM Date</b>
13209	1:40000	27	05/2014	09/20/2014	09/20/2014
12358	1:40000	21	07/2011	10/18/2014	10/18/2014
13212	1:20000	39	06/2010	09/20/2014	09/20/2014

*Table 15: Largest Scale Raster Charts*

#### 13209

Soundings between Chart 13209 and ENC US5MA22M were found to match. See ENC US5MA22M comparison below.

#### 12358

Soundings between Chart 12358 and ENC US5NY11M were found to match. See ENC US5NY11M comparison below.

#### 13212

Soundings between Chart 13212 and ENC US5CN42M were found to match. See ENC US5CN42M comparison below.

### D.1.2 Electronic Navigational Charts

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

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US5MA22M	1:40000	20	02/20/2014	06/05/2014	NO
US5CN42M	1:20000	9	02/20/2014	09/30/2014	NO
US5NY1IM	1:40000	6	02/20/2014	11/08/2013	NO

*Table 16: Largest Scale ENC's*

#### US5MA22M

H12679 coincides with ENC US5MA22M. The depths and contours on the survey match the electronic navigational chart. Survey soundings correlated. There are areas where survey soundings are shoal of chart soundings.

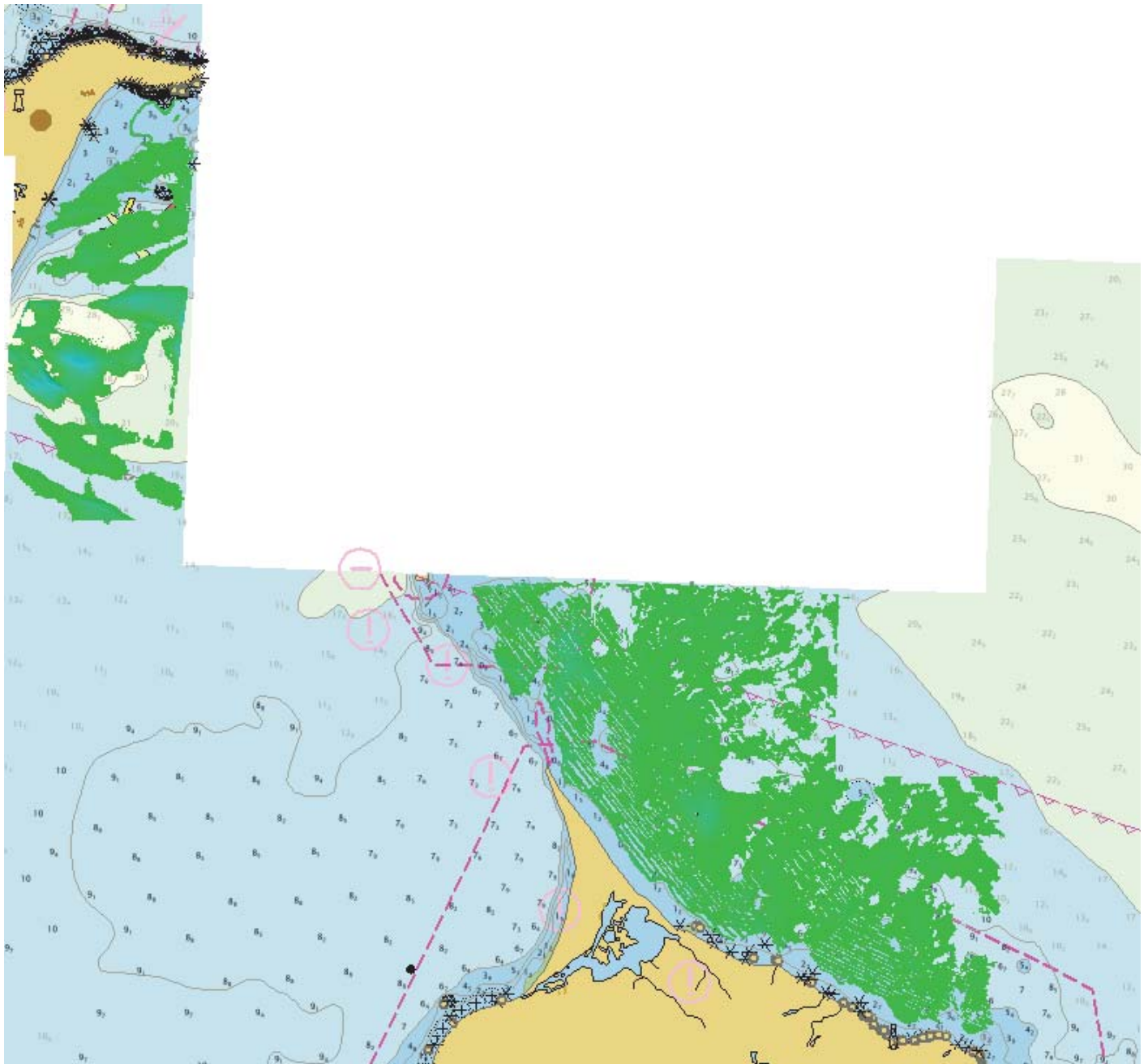


Figure 27: Difference surface displaying where the survey is deeper than the charted soundings.

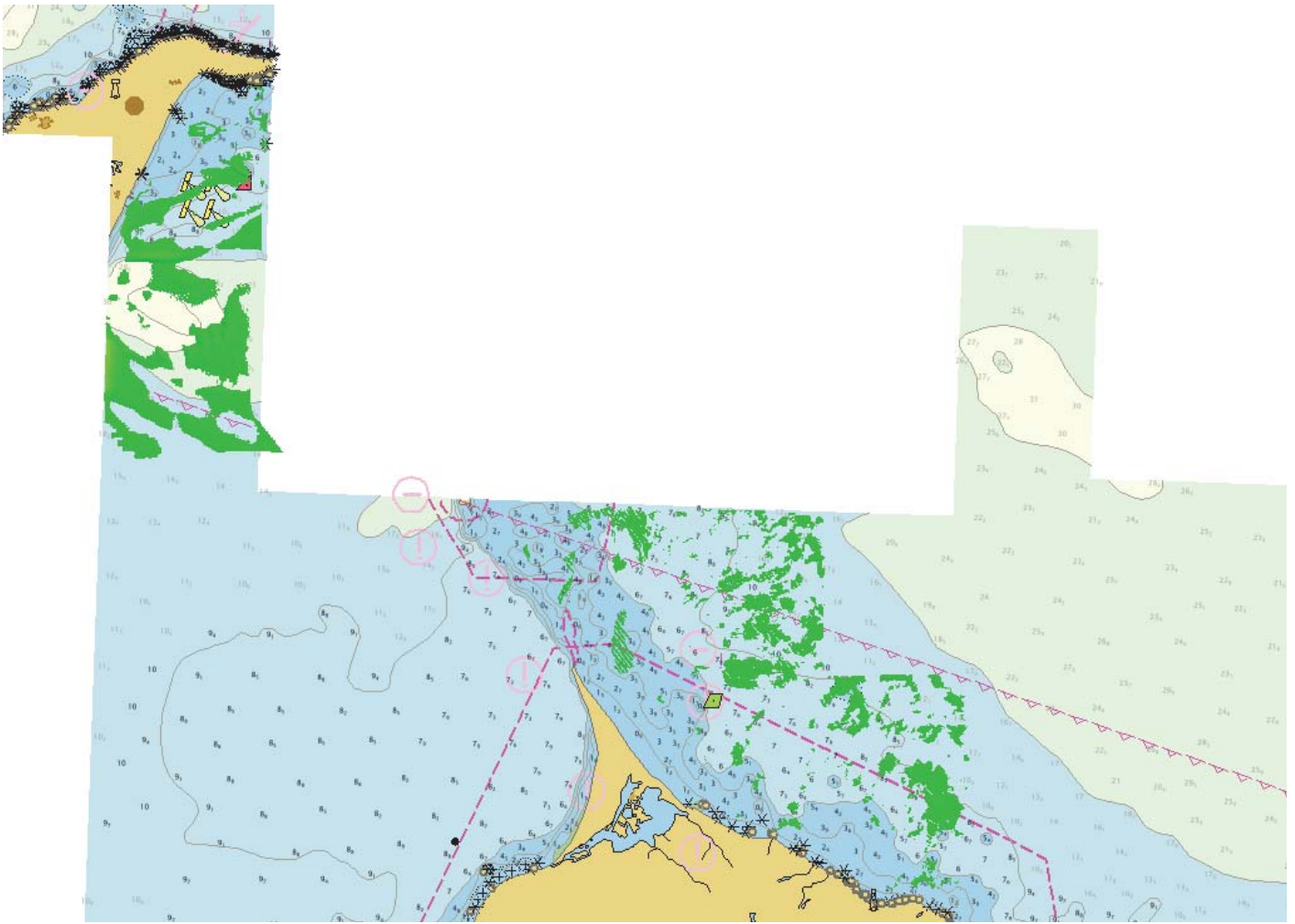


Figure 28: Difference surface displaying where the survey is shoaler than the charted soundings.  
US5CN42M

H12679 coincides with ENC US5CN42M. The depths and contours on the survey match the electronic navigational chart. Survey soundings correlated. There are areas where survey soundings are shoal of chart soundings.

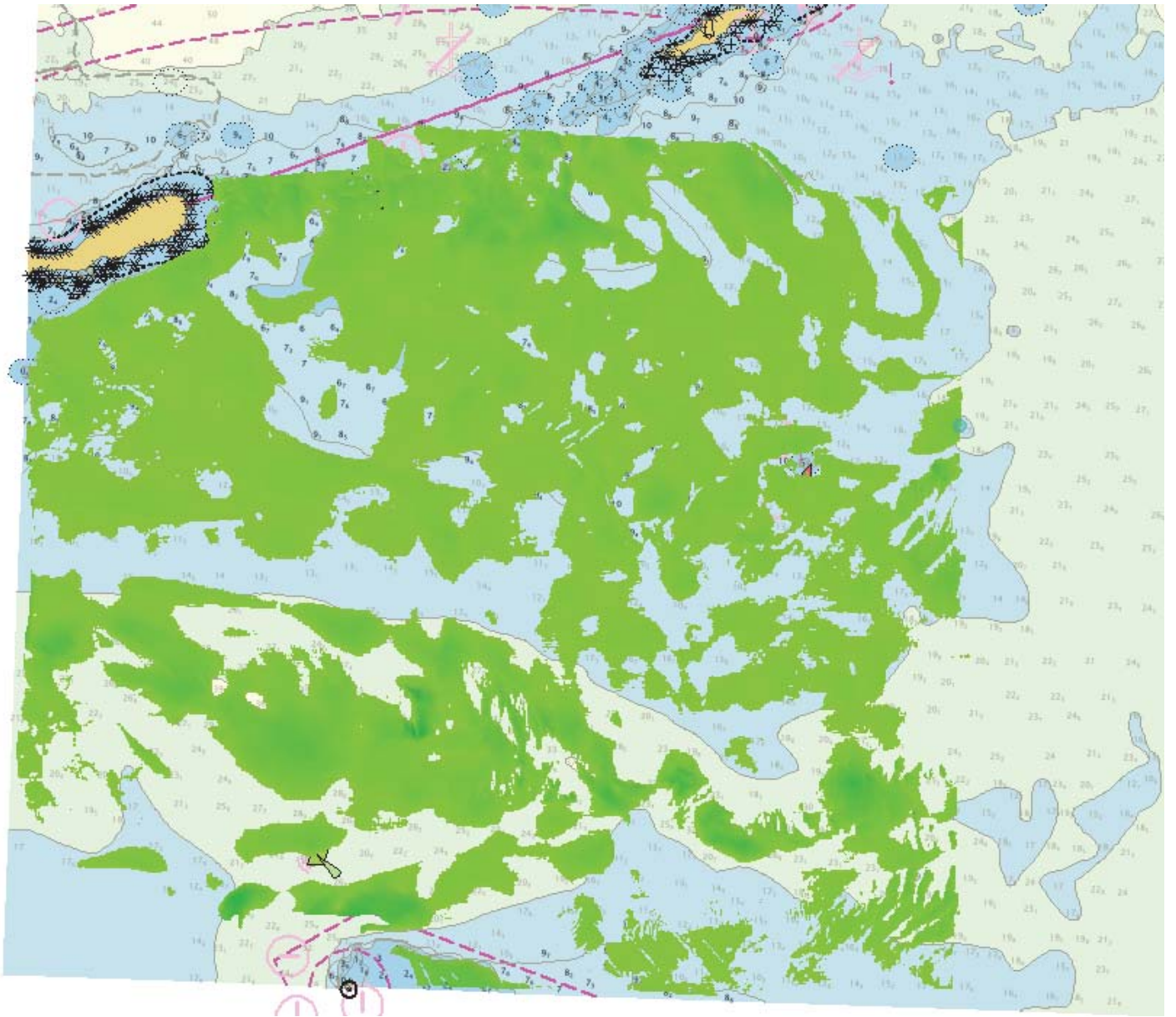
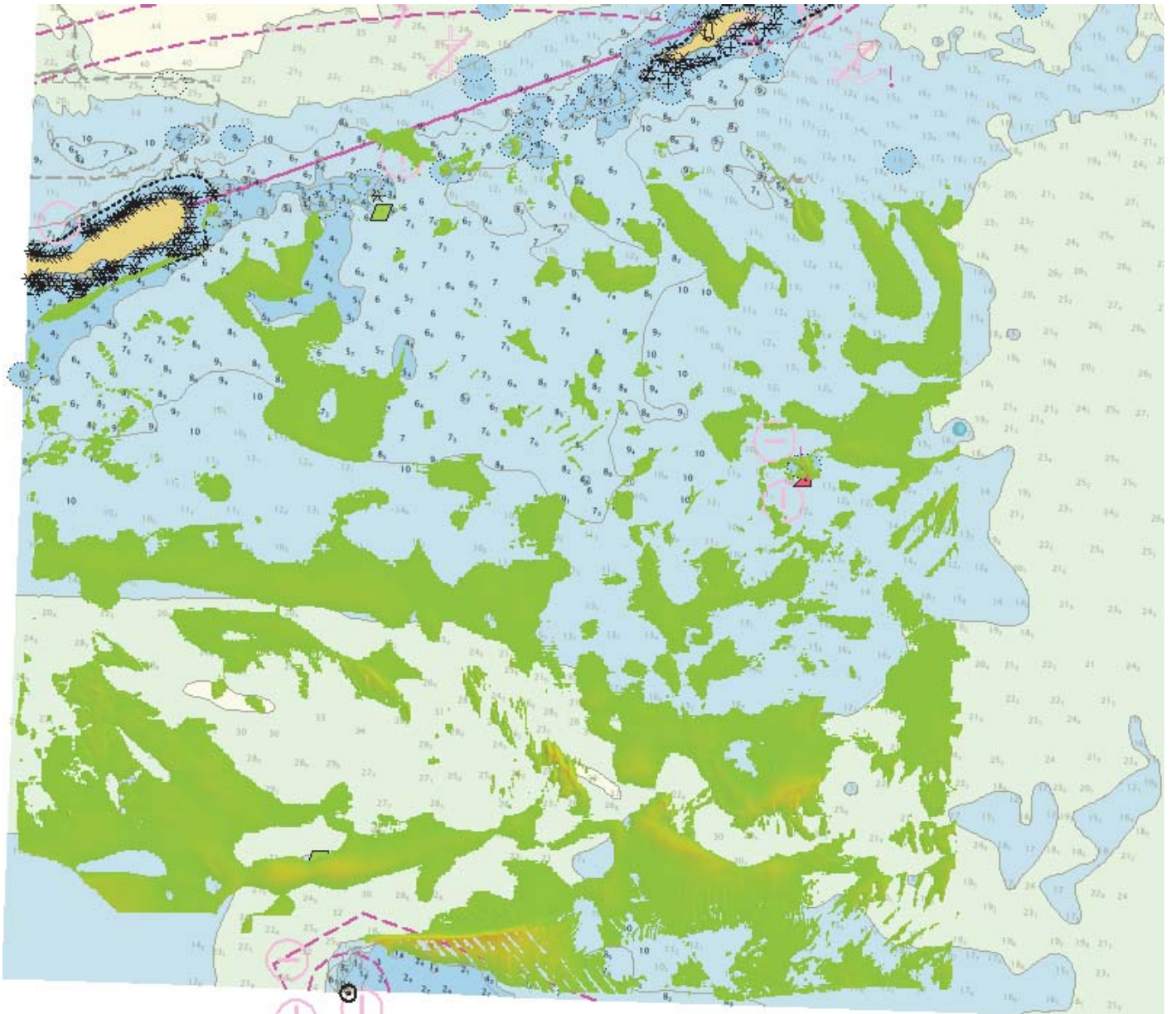


Figure 29: Difference surface displaying where the survey is deeper than the charted soundings.



*Figure 30: Difference surface displaying where the survey is shoaler than the charted soundings.*  
US5NY11M

H12679 coincides with ENC US5NY11M. The depths and contours on the survey match the electronic navigational chart. Survey soundings correlated. There are areas where survey soundings are shoal of chart soundings.

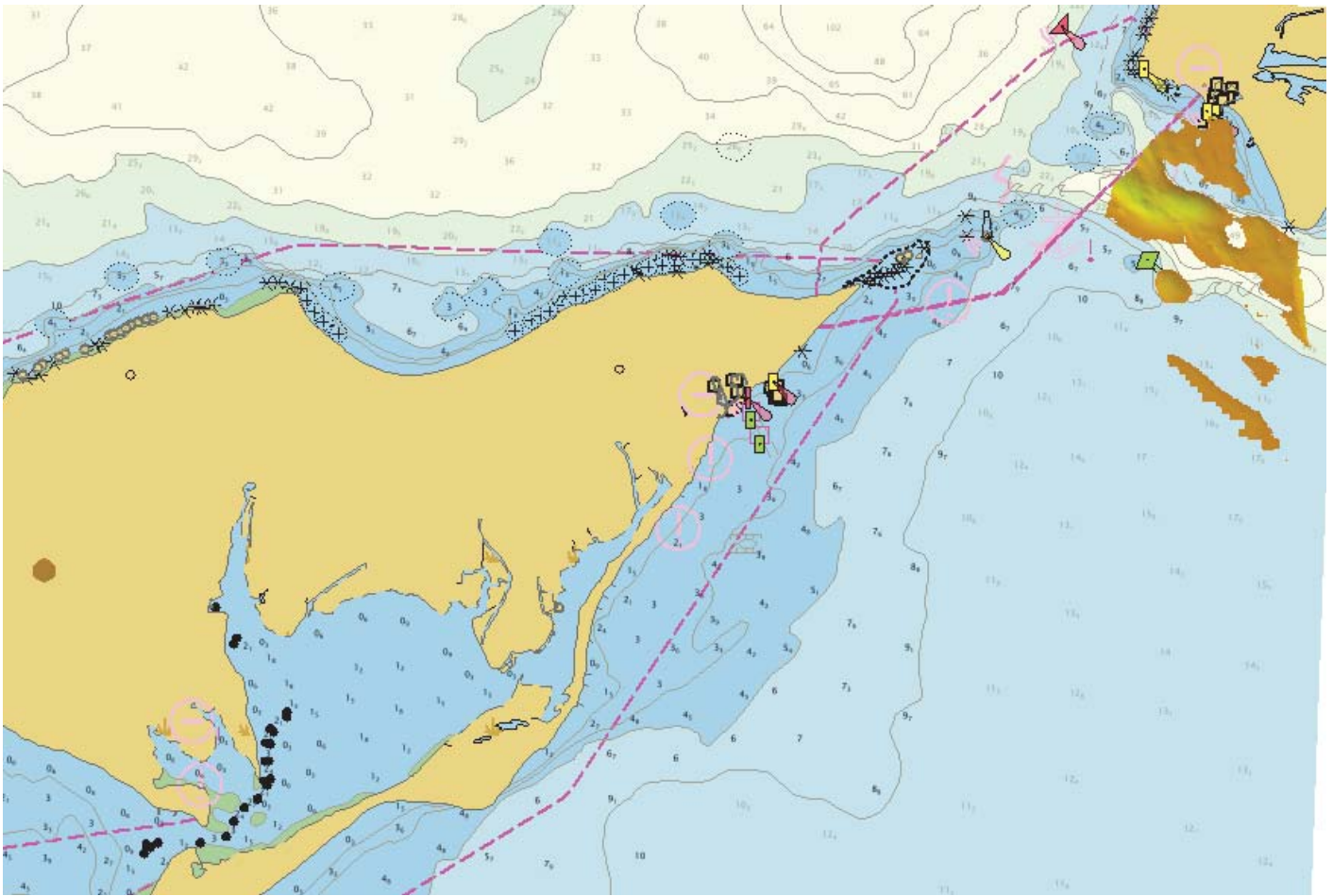
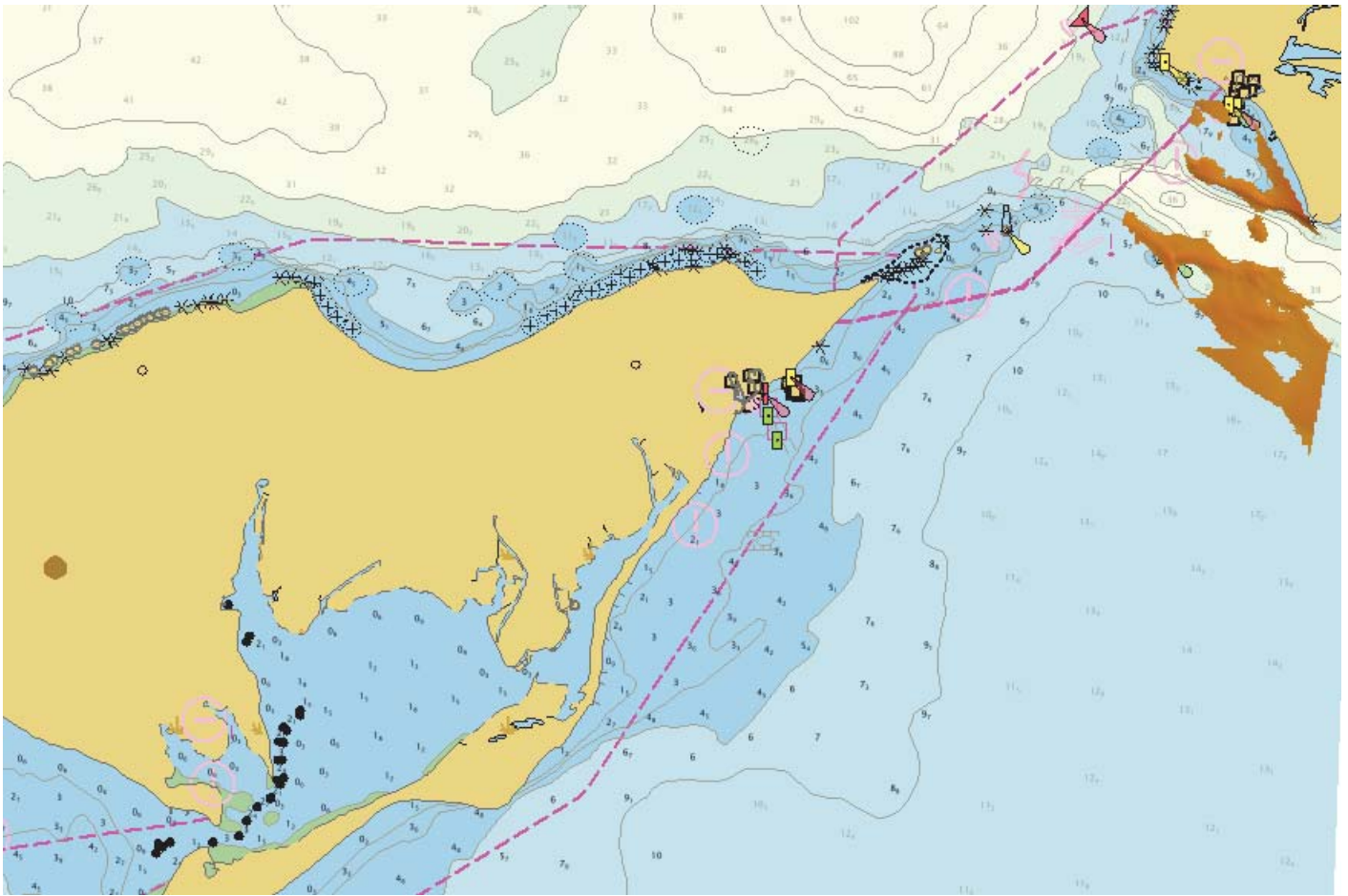


Figure 31: Difference surface displaying where the survey is deeper than the charted soundings.



*Figure 32: Difference surface displaying where the survey is shallower than the charted soundings.*

### **D.1.3 AWOIS Items**

No AWOIS items were assigned for this survey.

### **D.1.4 Maritime Boundary Points**

No Maritime Boundary Points were assigned for this survey.

### **D.1.5 Charted Features**

A total of 41 charted features were investigated during the course of survey H12679. For a full discussion, see the Final Feature File.

**D.1.6 Uncharted Features**

No uncharted features exist for this survey.

**D.1.7 Dangers to Navigation**

No Danger to Navigation Reports were submitted for this survey.

**D.1.8 Shoal and Hazardous Features**

Shoal and Hazardous features were investigated during the course of survey H12679. Several areas were selected for Sea Bed Area designation. For a full discussion, see the Final Feature File.

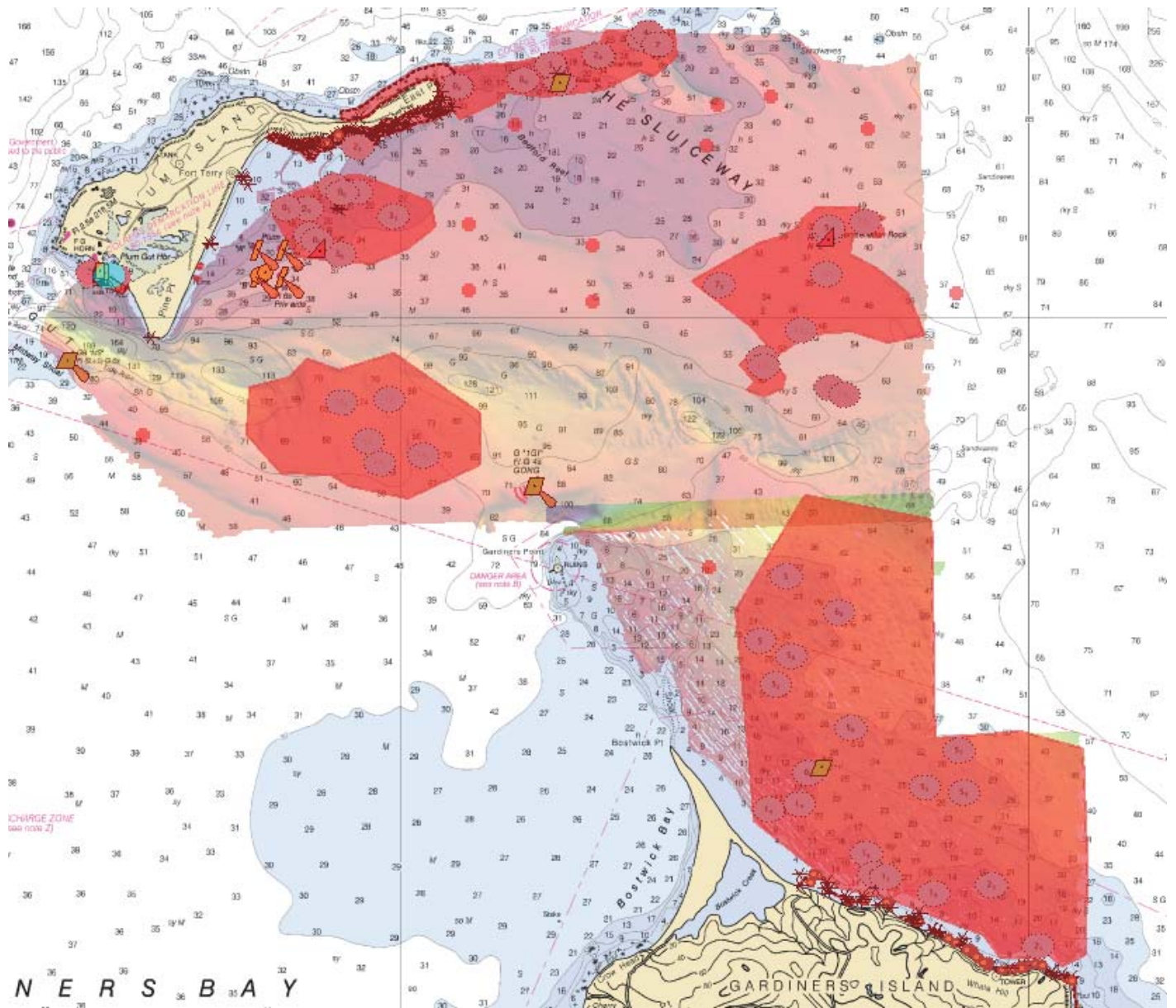


Figure 33: Sea bed selections

### 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

A total of 19 bottom samples were acquired for survey H12679. For further discussion, see the final feature file.

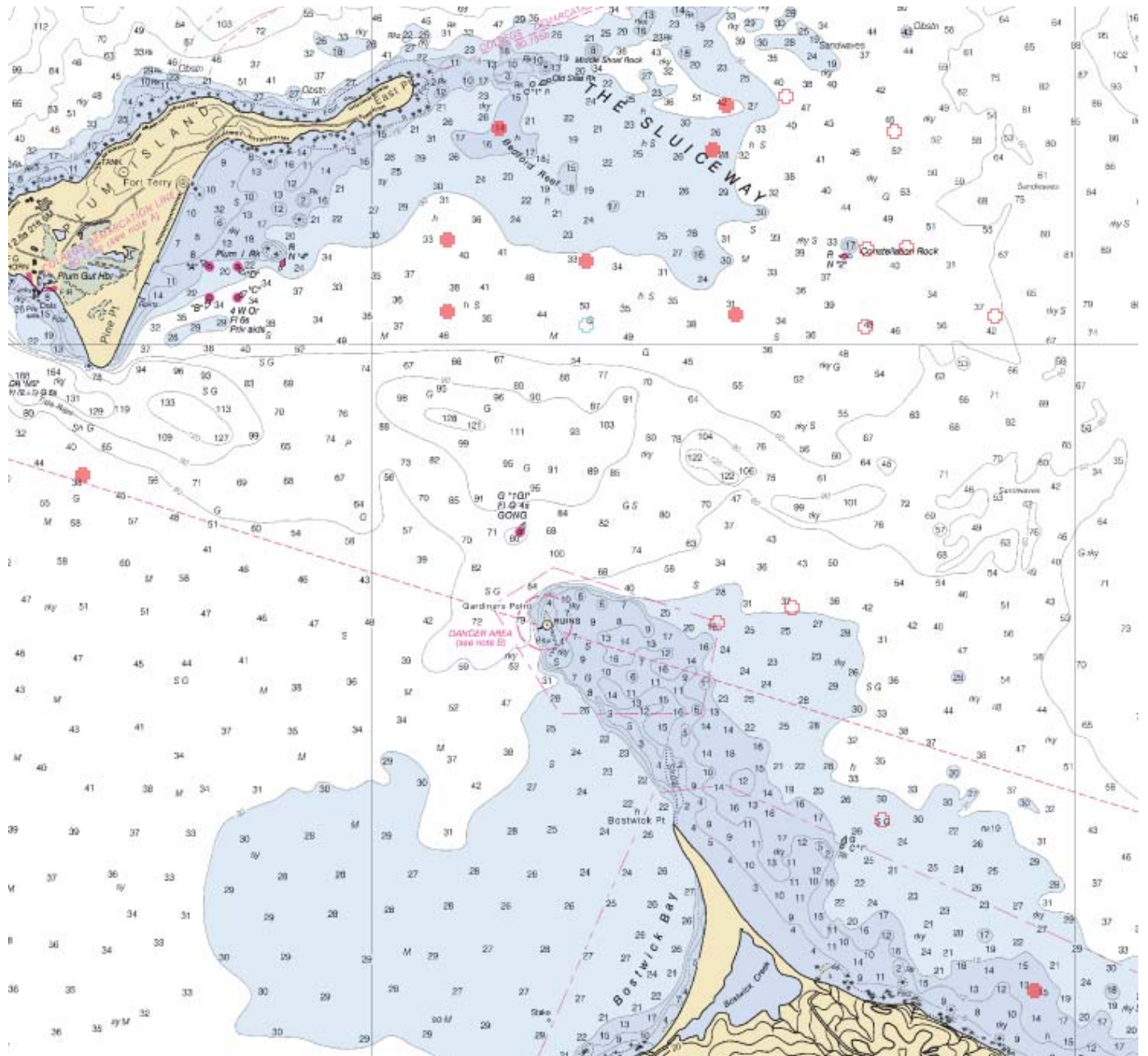


Figure 34: Bottom sample locations

## D.2 Additional Results

### D.2.1 Shoreline

Shoreline investigation for survey H12679 was completed to the 4m contour. Refer to the Final Feature File for a complete information pertaining to shoreline verification.

### **D.2.2 Prior Surveys**

Results of prior surveys are represented by charted features and soundings as discussed in chart comparisons above.

### **D.2.3 Aids to Navigation**

ATONS were investigated during the course of survey H12679. There are 15 aids to navigation within the area of H12679. Private aides on station and operational, serving their intended purpose, included: 03 Plum Gut Harbor dolphins; 02 Plum Gut Harbor beacons with 02 attached lights; and 02 "marine farm" buoys with 02 attached lights. 06 USCG aids to navigation on station and operational, serving their intended purpose, included: "Midway Shoal Buoy", MS, with attached light and fog signal; "Gardiners Island" gong buoy, 1GI, with attached light; "Constellation Rock" buoy 2; and "Gardiners Island Shoal" buoy 1. For a full discussion, see the Final Feature File.

### **D.2.4 Overhead Features**

No overhead features exist for this survey.

### **D.2.5 Submarine Features**

No submarine features exist for this survey.

### **D.2.6 Ferry Routes and Terminals**

There are several ferry routes within the survey area. Ferry routes exist between the U.S. Department of Agriculture research basin, 1 mile southwest of Orient Point Light, Plum Island, and New Haven. Ferries were observed actively following the charted routes.

### **D.2.7 Platforms**

No platforms exist for this survey.

### **D.2.8 Significant Features**

No significant features exist for this survey.

**D.2.9 Construction and Dredging**

No present or planned construction or dredging exist within the survey limits.

**D.2.10 New Survey Recommendation**

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

**D.2.11 Inset Recommendation**




No new insets are recommended for this area.

## E. Approval Sheet

As Chief of Party, Field operations for this hydrographic survey were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports.

All field sheets, this Descriptive Report, and all accompanying records and data are approved. All records are forwarded for final review and processing to the Processing Branch.

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual, Field Procedures Manual, Letter Instructions, and all HSD Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies noted in the Descriptive Report.

Approver Name	Approver Title	Approval Date	Signature
James M. Crocker	CAPT, NOAA	01/21/2015	 <small>CROCKER,JAMES.M.1160543635 c=US, o=U.S. Government, ou=Dod, ou=PKI, ou=NOAA, cn=CROCKER,JAMES.M.1160543635 2015.01.21 12:24:43 -0500</small>
Megan Guberski	LT, NOAA	01/21/2015	 <small>Megan R. Guberski NOAA</small>
Stephen Moulton	ENS, NOAA	01/21/2015	

## F. Table of Acronyms

<b>Acronym</b>	<b>Definition</b>
<b>AHB</b>	Atlantic Hydrographic Branch
<b>AST</b>	Assistant Survey Technician
<b>ATON</b>	Aid to Navigation
<b>AWOIS</b>	Automated Wreck and Obstruction Information System
<b>BAG</b>	Bathymetric Attributed Grid
<b>BASE</b>	Bathymetry Associated with Statistical Error
<b>CO</b>	Commanding Officer
<b>CO-OPS</b>	Center for Operational Products and Services
<b>CORS</b>	Continually Operating Reference Station
<b>CTD</b>	Conductivity Temperature Depth
<b>CEF</b>	Chart Evaluation File
<b>CSF</b>	Composite Source File
<b>CST</b>	Chief Survey Technician
<b>CUBE</b>	Combined Uncertainty and Bathymetry Estimator
<b>DAPR</b>	Data Acquisition and Processing Report
<b>DGPS</b>	Differential Global Positioning System
<b>DP</b>	Detached Position
<b>DR</b>	Descriptive Report
<b>DTON</b>	Danger to Navigation
<b>ENC</b>	Electronic Navigational Chart
<b>ERS</b>	Ellipsoidal Referenced Survey
<b>ERZT</b>	Ellipsoidally Referenced Zoned Tides
<b>FFF</b>	Final Feature File
<b>FOO</b>	Field Operations Officer
<b>FPM</b>	Field Procedures Manual
<b>GAMS</b>	GPS Azimuth Measurement Subsystem
<b>GC</b>	Geographic Cell
<b>GPS</b>	Global Positioning System
<b>HIPS</b>	Hydrographic Information Processing System
<b>HSD</b>	Hydrographic Surveys Division
<b>HSSD</b>	Hydrographic Survey Specifications and Deliverables

<b>Acronym</b>	<b>Definition</b>
<b>HSTP</b>	Hydrographic Systems Technology Programs
<b>HSX</b>	Hypack Hysweep File Format
<b>HTD</b>	Hydrographic Surveys Technical Directive
<b>HVCR</b>	Horizontal and Vertical Control Report
<b>HVF</b>	HIPS Vessel File
<b>IHO</b>	International Hydrographic Organization
<b>IMU</b>	Inertial Motion Unit
<b>ITRF</b>	International Terrestrial Reference Frame
<b>LNM</b>	Local Notice to Mariners
<b>LNM</b>	Linear Nautical Miles
<b>MCD</b>	Marine Chart Division
<b>MHW</b>	Mean High Water
<b>MLLW</b>	Mean Lower Low Water
<b>NAD 83</b>	North American Datum of 1983
<b>NAIP</b>	National Agriculture and Imagery Program
<b>NALL</b>	Navigable Area Limit Line
<b>NM</b>	Notice to Mariners
<b>NMEA</b>	National Marine Electronics Association
<b>NOAA</b>	National Oceanic and Atmospheric Administration
<b>NOS</b>	National Ocean Service
<b>NRT</b>	Navigation Response Team
<b>NSD</b>	Navigation Services Division
<b>OCS</b>	Office of Coast Survey
<b>OMAO</b>	Office of Marine and Aviation Operations (NOAA)
<b>OPS</b>	Operations Branch
<b>MBES</b>	Multibeam Echosounder
<b>NWLON</b>	National Water Level Observation Network
<b>PDBS</b>	Phase Differencing Bathymetric Sonar
<b>PHB</b>	Pacific Hydrographic Branch
<b>POS/MV</b>	Position and Orientation System for Marine Vessels
<b>PPK</b>	Post Processed Kinematic
<b>PPP</b>	Precise Point Positioning
<b>PPS</b>	Pulse per second

<b>Acronym</b>	<b>Definition</b>
<b>PRF</b>	Project Reference File
<b>PS</b>	Physical Scientist
<b>PST</b>	Physical Science Technician
<b>RNC</b>	Raster Navigational Chart
<b>RTK</b>	Real Time Kinematic
<b>SBES</b>	Singlebeam Echosounder
<b>SBET</b>	Smooth Best Estimate and Trajectory
<b>SNM</b>	Square Nautical Miles
<b>SSS</b>	Side Scan Sonar
<b>ST</b>	Survey Technician
<b>SVP</b>	Sound Velocity Profiler
<b>TCARI</b>	Tidal Constituent And Residual Interpolation
<b>TPE</b>	Total Propagated Error
<b>TPU</b>	Topside Processing Unit
<b>USACE</b>	United States Army Corps of Engineers
<b>USCG</b>	United States Coast Guard
<b>UTM</b>	Universal Transverse Mercator
<b>XO</b>	Executive Officer
<b>ZDA</b>	Global Positioning System timing message
<b>ZDF</b>	Zone Definition File

## **Addendum to Section B.2 of the Descriptive Report for Survey H12679**

Project: OPR-B370-TJ-14

Locality: Eastern Long Island Sound, NY & CT

Sub locality: Eastern Plain Pt to Pine Pt

Scale: 1:10000

April 2014 - October 2014

**NOAA Ship *Thomas Jefferson***

Chief of Party: CAPT James M. Crocker, NOAA

### **Purpose**

The following addendum describes the additional processing necessary to finalize surfaces in survey H12679 as a result of Caris' (Hips and Sips 8.1) inability to differentiate between multiple UTM zones.

### **Results**

1. Data for H12679 was acquired and processed in UTM zone 19. Further review determined the designated soundings were not honored by the finalized surfaces. A help desk ticket was submitted by the ship to Caris and AHB was actively involved in troubleshooting the issue (see correspondence). New finalized surfaces were processed in UTM zone 18 and parity between features and designated soundings were verified.
2. New finalized grids include:  
H12679\_2\_50cm\_MLLW\_Final for object detection 0-22m range.

H12679\_2\_1m\_MLLW\_Final object detection 1m 20-40 m range. HSSD 2.5% of the water depth in depths greater than 20m.

H12679\_2\_4m\_MLLW\_Final 0-40m for set line spacing general bathymetry

APPENDIX I  
TIDE NOTE AND GRAPHICS



PROVISIONAL TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : November 05, 2014

HYDROGRAPHIC BRANCH: Atlantic
HYDROGRAPHIC PROJECT: OPR-B370-TJ-2014
HYDROGRAPHIC SHEET: H12679

LOCALITY: Eastern Plain Pt to Pine Pt, Eastern Long Island Sound, NY
TIME PERIOD: April 30 - October 25, 2014

TIDE STATION USED: Newport, RI 845-2660
Lat. 41° 30.3' N Long. 71° 19.6' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.099 meters

TIDE STATION USED: New London, CT 846-1490
Lat. 41° 21.3' N Long. 72° 05.2' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 0.840 meters

Tide STATION USED: Montauk, NY 851-0560
Lat. 41° 02.9' Long. 71° 57.6' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 0.683 meters

REMARKS: RECOMMENDED GRID

Please use the TCARI grid "B370TJ2014.nc" as the final grid for project OPR-B370-TJ-2014, during the time period between April 30 - October 25, 2014.

Refer to attachments for grid information.

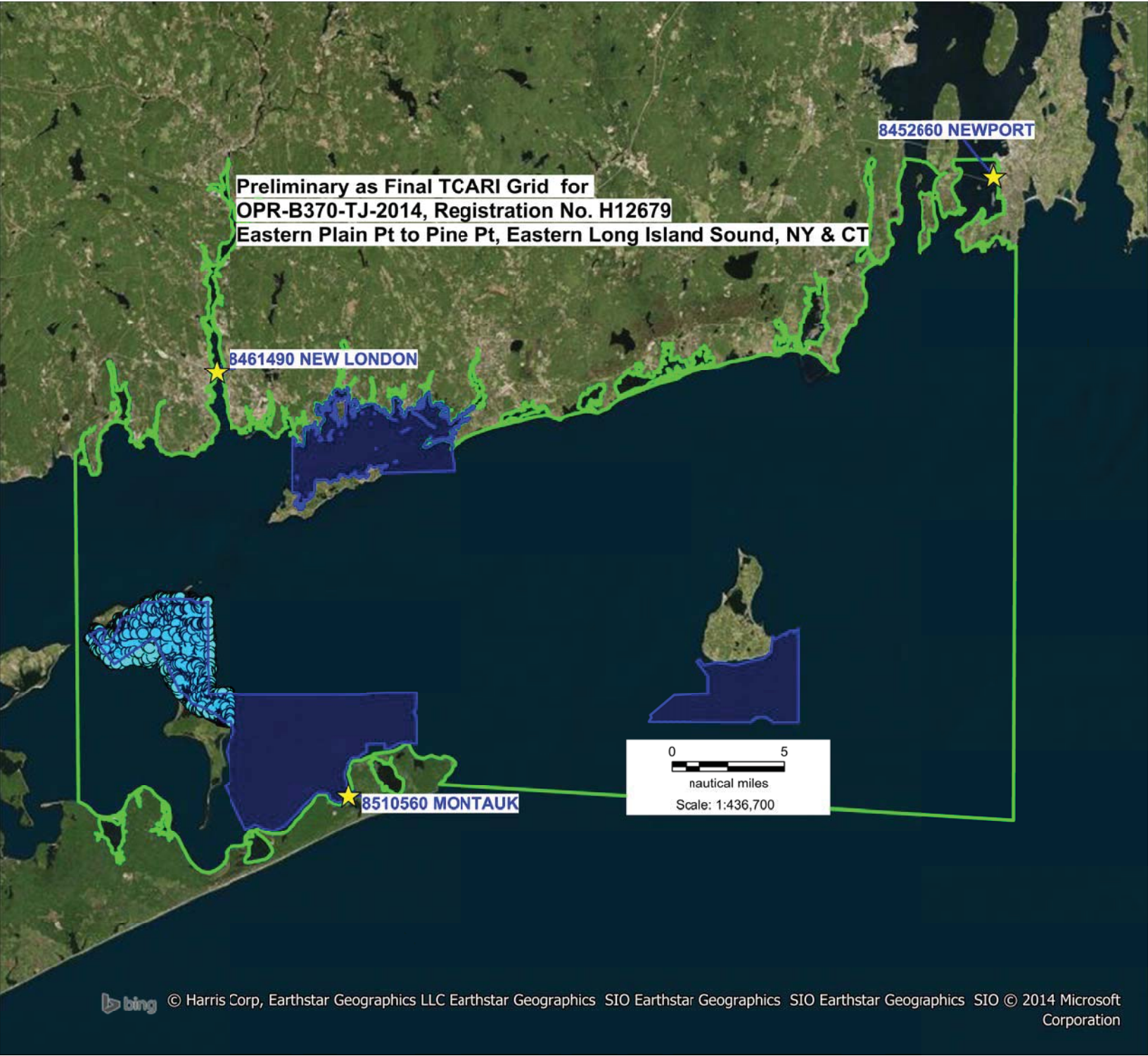
Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

Note 2: Annual leveling for Newport, RI (8452660) & New London, CT (8461490) was not completed in FY14. A review of the verified leveling records from 2003 - 2013 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-B370-TJ-2014, H12679. 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.

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DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=HOVIS.GERALD.THOMAS.JR.1365860250
Date: 2014.11.06 09:27:35 -05'00'

CHIEF, PRODUCTS AND SERVICES BRANCH



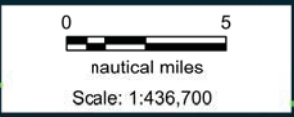


Preliminary as Final TCARI Grid for  
OPR-B370-TJ-2014, Registration No. H12679  
Eastern Plain Pt to Pine Pt, Eastern Long Island Sound, NY & CT

8461490 NEW LONDON

8452660 NEWPORT

8510560 MONTAUK



APPENDIX II

SUPPLEMENTAL SURVEY RECORDS  
AND CORRESPONDENCE

## Sound Speed Profile Thinning

Many of the sound speed profiles acquired by the Moving Vessel Profiler (MVP) on the NOAA Ship *Thomas Jefferson* during projects OPR-B367-TJ-14 and OPR-B370-TJ-14 were thinned in the SSP Editor of the Rolls-Royce MVP Controller software. The thinning routine is based on the procedure established in the paper entitled “Streamlining Sound Speed Profile Pre-Processing: Case Studies and Field Trials” by Jonathan Beaudoin, which was presented at the 2011 U.S. Hydrographic Conference in Tampa, Florida.

Sound speed profile thinning may be desired because removing redundant data points in a profile results in increasing the efficiency of ray tracing algorithms. Furthermore, some software designs may have a limitation in the number of data points allowed in a sound speed profile. Sound speed profile thinning is most desirable for those systems that perform the refraction correction in real-time (e.g. Kongsberg systems) and are operating in deep water. Neither of these conditions applied to NOAA Ship *Thomas Jefferson*, but nevertheless the thinning procedures were applied, as the shorter profiles might facilitate the organization, concatenation, and application of the profiles in post-processing.

The thinning procedure outlined by Beaudoin in 2011 and utilized by the Rolls-Royce MVP Controller software is a variant of the Douglas-Peucker line reduction algorithm, a common method utilized in computer display applications. A user-specified tolerance limits the amount by which the thinned line can stray from the original. The implementation of the user-specified tolerance is given in the MVP Controller software as the value Epsilon (eps), which is in units of m/s.

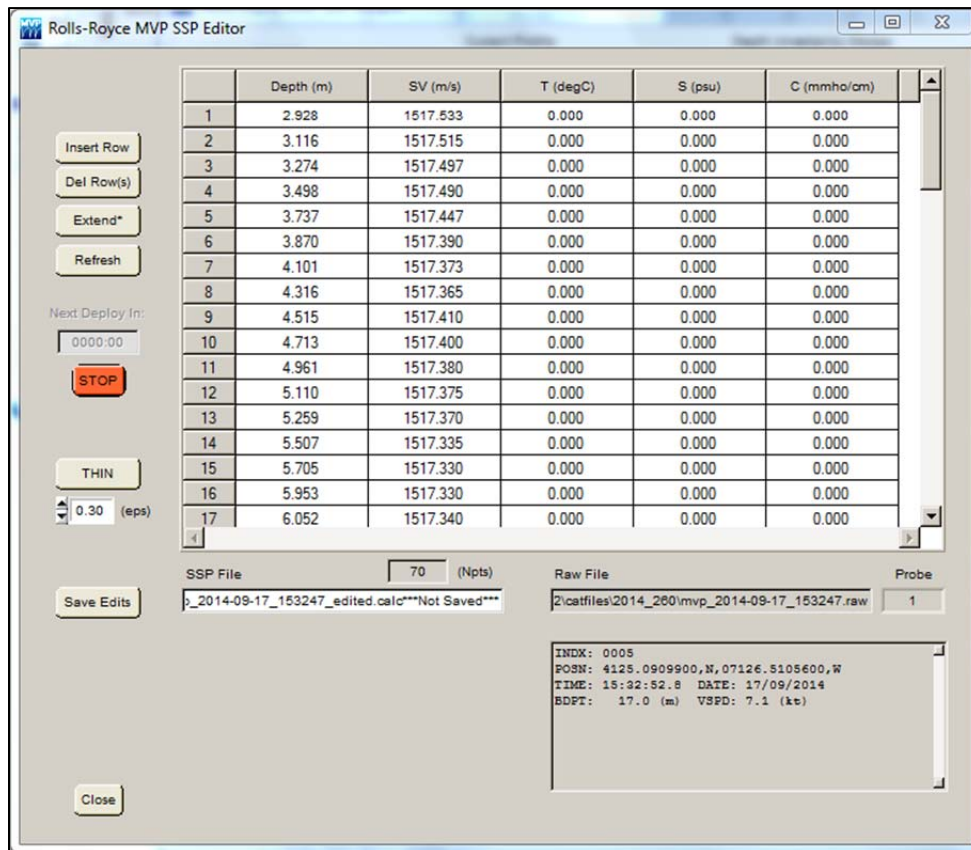


Figure 1. The SSP Editor of the Rolls-Royce MVP Controller software allows for profile thinning via the epsilon (eps) value, given in m/s. The thinned profile will retain enough data points such that it does not vary more than the set epsilon value from the original profile.

The higher the value of eps set, the more points will be removed from the sound speed profile. If it is set high enough, only two points will be retained, the first and last points of the profile! Examples of varying eps by orders of magnitude for a single profile (acquired by NOAA Ship *Thomas Jefferson* on 9/16/2014) are shown below in Figures 2-4. Also, the thinned profile was compared to the original profile using the CastTime cast comparison utility. Ray traces for both profiles are compared to quantitatively assess the effect the thinned profile has towards multibeam echo sounding. The vertical depth bias resulting from the comparison is almost always highest in the outermost beam (of a simulated  $\pm 70^\circ$ ), and those are the values reported in the figure captions below.

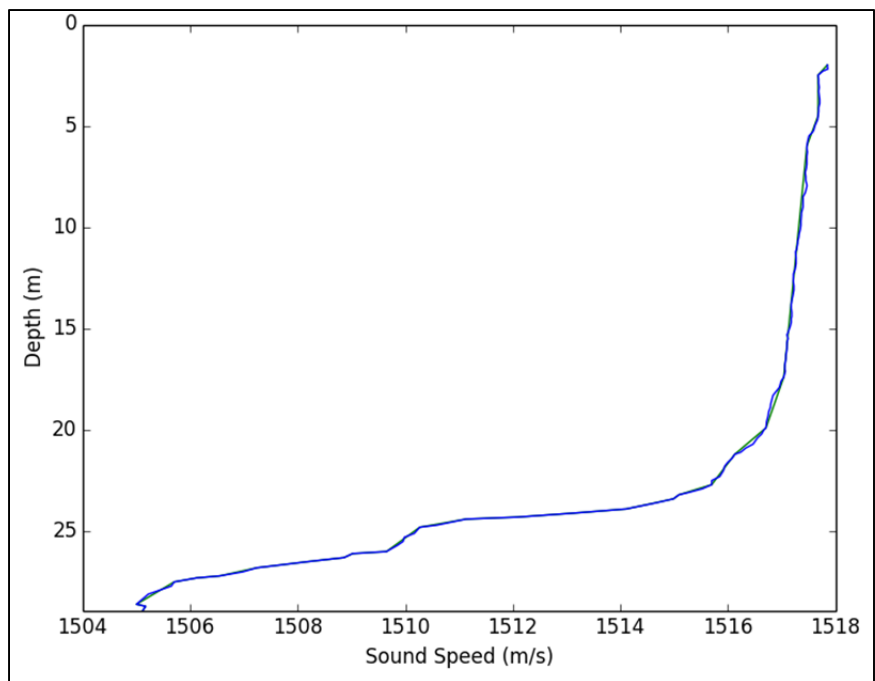


Figure 2. Sound speed profile thinning using an eps value of 0.1 m/s reduces the number of data points from 136 to 26. The thinning results in an estimated outer beam discrepancy of 1 mm, in a  $\pm 70^\circ$  degree swath (a value that is entirely negligible).

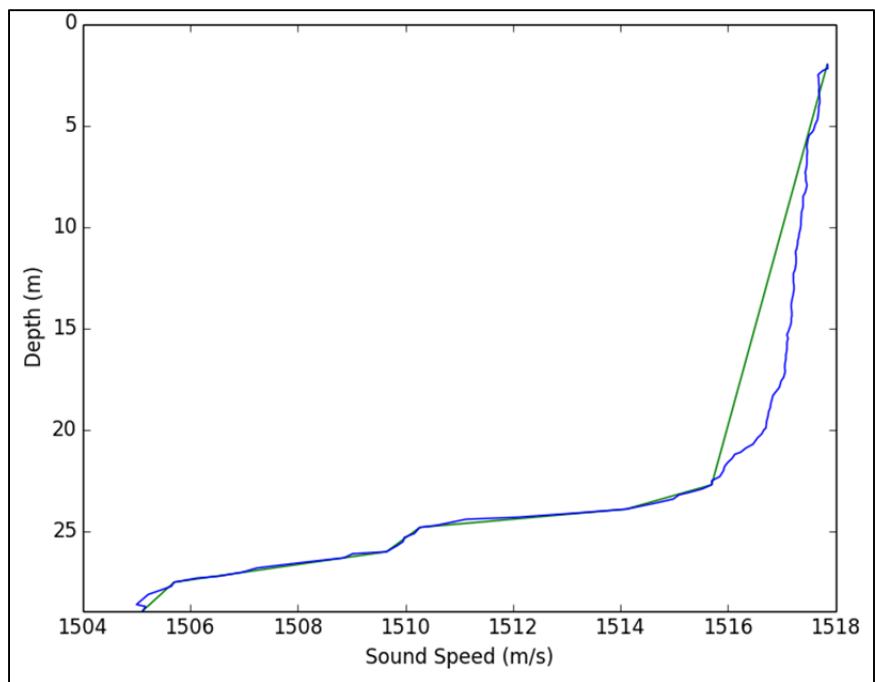


Figure 3. Sound speed profile thinning using an eps value of 1.0 m/s reduces the number of data points from 136 to 7. The thinning results in an estimated outer beam discrepancy of 3.2 cm, in a  $\pm 70^\circ$  degree swath (a value that is generally considered negligible).

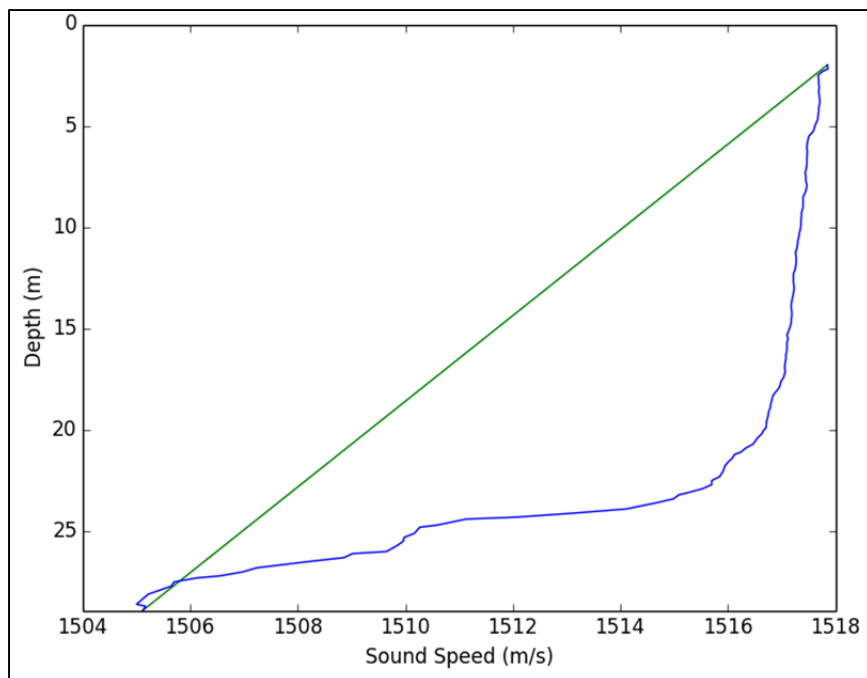


Figure 4. Sound speed profile thinning using an eps value of 10.0 m/s reduces the number of data points from 136 to 2! The thinning results in an estimated outer beam discrepancy of 45 cm, in a  $\pm 70^\circ$  degree swath.

Ultimately the value of 0.1 m/s for epsilon was utilized during the sound speed processing onboard NOAA Ship Thomas Jefferson. The 0.1 m/s value of epsilon effectively removes data points and has a negligible effect on echo sounding per NOAA specifications. In the example above, 0.1 m/s value of epsilon removed more than 80% of the data points, with a cost of only 1 mm in the outermost beam of a  $\pm 70^\circ$  swath. The epsilon value of 0.1 m/s was input into the MVP Controller software onboard NOAA Ship Thomas Jefferson in April, 2014 and was utilized for the remainder of the field season.

Other examples of the data thinning performed to sound speed profiles acquired by NOAA Ship *Thomas Jefferson* are given below, and the resulting effect towards echo sounding, are given in Figures 5-7. Note that the ship was often working in shallow depths with minimal sound speed variation; therefore many of the profiles were thinned significantly.

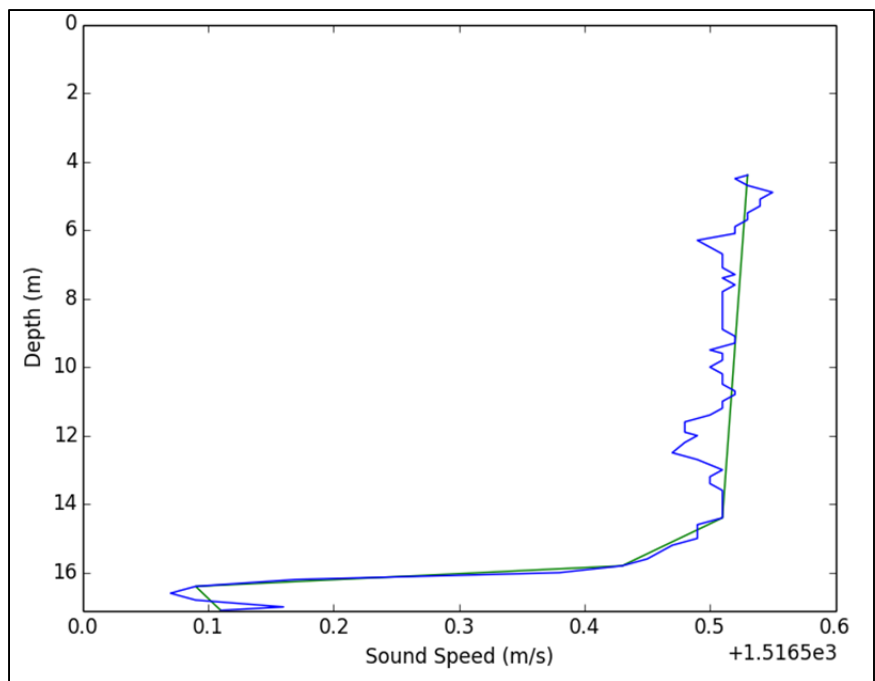


Figure 5. Sound speed profile thinning using an eps value of 0.1 m/s reduces the number of data points from 65 to 5. The thinning results in an estimated outer beam discrepancy less than half a mm, in a  $\pm 70^\circ$  degree swath.

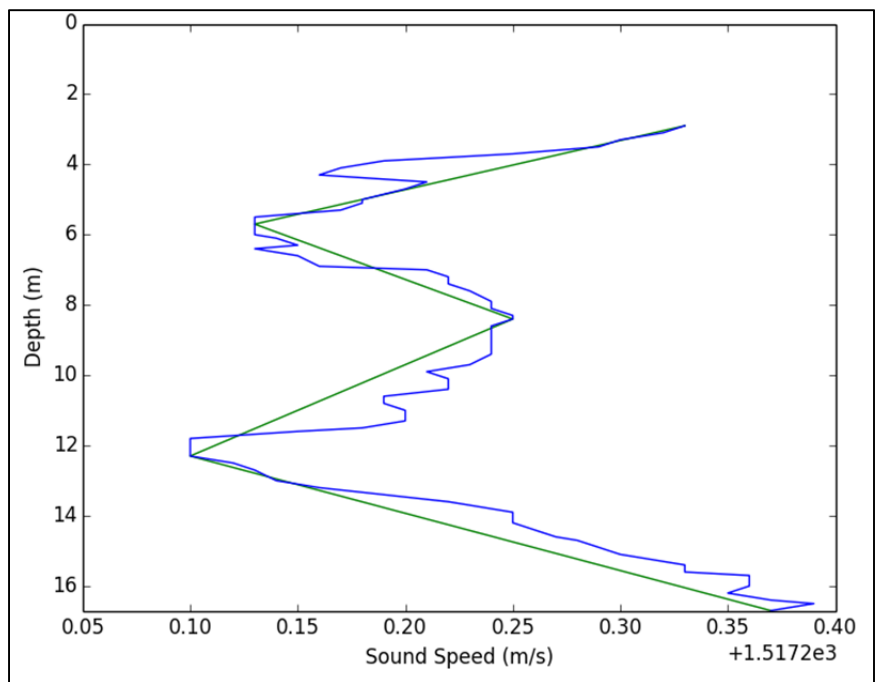


Figure 6. Sound speed profile thinning using an eps value of 0.1 m/s reduces the number of data points from 70 to 5. The thinning results in an estimated outer beam discrepancy less than half a mm, in a  $\pm 70^\circ$  degree swath.

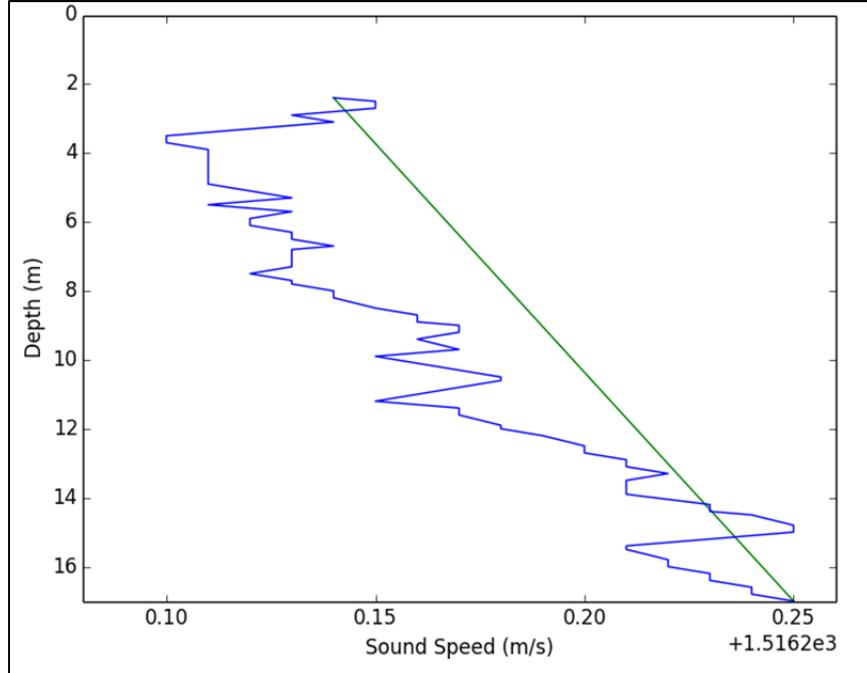


Figure 7. Sound speed profile thinning using an eps value of 0.1 m/s reduces the number of data points from 74 to 2. The thinning results in an estimated outer beam discrepancy of 1 mm, in a  $\pm 70^\circ$  degree swath.



Deborah Bland - NOAA Federal <deborah.a.bland@noaa.gov>

## USCG Private ATON Discrepancies for Coast Guard District 1 from NOAA Survey H12679

1 message

**AHB Chief - NOAA Service Account** <ahb.chief@noaa.gov>

Fri, Mar 17, 2017 at 10:42 AM

To: Steven.R.Pothier@uscg.mil, TIS-PF-NISWS@uscg.mil

Cc: Castle Parker - NOAA Federal <castle.e.parker@noaa.gov>, Jasmine Cousins - NOAA Federal <jasmine.cousins@noaa.gov>, Edward Owens - NOAA Federal <edward.owens@noaa.gov>, Corey Allen - NOAA Federal <corey.allen@noaa.gov>, Briana Welton - NOAA Federal <briana.welton@noaa.gov>, Deborah Bland - NOAA Federal <deborah.a.bland@noaa.gov>, Meghan McGovern - NOAA Federal <meghan.mcgovern@noaa.gov>

Mr. Pothier,

NOAA's Office of Coast Survey recently completed reviewing hydrographic survey H12679 in the vicinity of Gardiners Bay near Plum Island Rock (NOAA Chart 13209). The reviewing physical scientist identified that Private Aid to Navigation, LL#27671.3 Plum Island Aquaculture Lighted Buoy D charted in (41-10-24.999N, 072-10-57,000W) has been removed and should be deleted from the chart.

In the same area, during survey operations, two uncharted private Aids to Navigation were found. Yellow private buoy C (with 119 printed on it) in (41-10-16.644N, 072-11-04.740W) and yellow private buoy "B" in (41-10-15.600N, 072-11-07.944W).

As you may know, for nautical charting purposes NOAA sources the position and characteristics of all ATONs from IATONIS, and any discrepancies noted by the field surveyor are routed directly to the appropriate USCG district. As a result I wanted to pass this information along to you regarding this aid, and recommend updating the Light List position with the surveyed position.

Our most current contact information lists you as the PATON chief for District 1. If there is a more appropriate point of contact please let me know.

Please see attached for more information.

LCDR Briana J. Welton, NOAA  
Chief, Atlantic Hydrographic Branch  
439 W. York St.  
Norfolk, VA 23510  
Office: [757-441-6746](tel:757-441-6746) x200

### 2 attachments



**Priv Yellow Buoy B (west and towards shore).jpg**  
2472K

**Priv buoy C (east) with 119 printed on it.jpg**  
2460K



APPROVAL PAGE

H12679

Data meet or exceed current specifications as certified by the OCS survey acceptance review process. Descriptive Report and survey data except where noted are adequate to supersede prior surveys and nautical charts in the common area.

The following products will be sent to NCEI for archive

- H12679\_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12679\_GeoImage.pdf

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

Approved: \_\_\_\_\_

**Lieutenant Commander Briana Welton, NOAA**  
Chief, Atlantic Hydrographic Branch