H12674

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H12674

LOCALITY

State(s):	Maryland
General Locality:	Chesapeake Bay
Sub-locality:	Point No Point to 3NM North

2014

CHIEF OF PARTY
LTjg Bart Buesseler, NOAA

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Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H12674**

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):	**Maryland**
General Locality:	**Chesapeake Bay**
Sub-Locality:	**Point No Point to 3NM North**
Scale:	**10000**
Dates of Survey:	**05/19/2014 to 12/17/2014**
Instructions Dated:	**03/06/2014**
Project Number:	**OPR-E349-BHII-14**
Field Unit:	**R/V BAY HYDRO II**
Chief of Party:	**LTjg Bart Buesseler, NOAA**
Soundings by:	**Kongsberg EM2040 Multibeam**
Imagery by:	
Verification by:	**Pacific 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. Notes in red were generated during office processing. The processing branch concurs with all information and recommendations in the DR unless otherwise noted. Page numbering may be interrupted or non-sequential. All pertinent records for this survey, including the Descriptive Report, are archived at the National Centers for Environmental Information (NCEI): https://www.ncei.noaa.gov/.

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Descriptive Report to Accompany Survey H12674

Project: OPR-E349-BHII-14

Locality: Chesapeake Bay

Sublocality: Point No Point to 3NM North

Scale: 1:10000

May 2014 - December 2014

R/V BAY HYDRO II

Chief of Party: LTjg Bart Buesseler, NOAA

A. Area Surveyed

H12674 encompassed an area of the Central Chesapeake Bay in Maryland that is approximately 0.83 square nautical miles. The survey outline is approximately 4.25 nautical miles long, 0.27 nautical miles wide at its widest point, and 0.08 nautical miles wide at its narrowest point. The northern edge of the survey is approximately 3.24 nautical miles north of Point No Point, Maryland and extends southward to approximately 0.51 nautical miles south of Point No Point, Maryland. The survey area starts at the four meter curve on its western boundary and extends east to a depth of about six meters. The entire extent of this survey is northwest and shoreward of Point No Point Light (Figure 1).

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
38° 11' 23.99" N 76° 21' 19.93" W	38° 7' 47.32" N 76° 18' 20.15" W

Table 1: Survey Limits

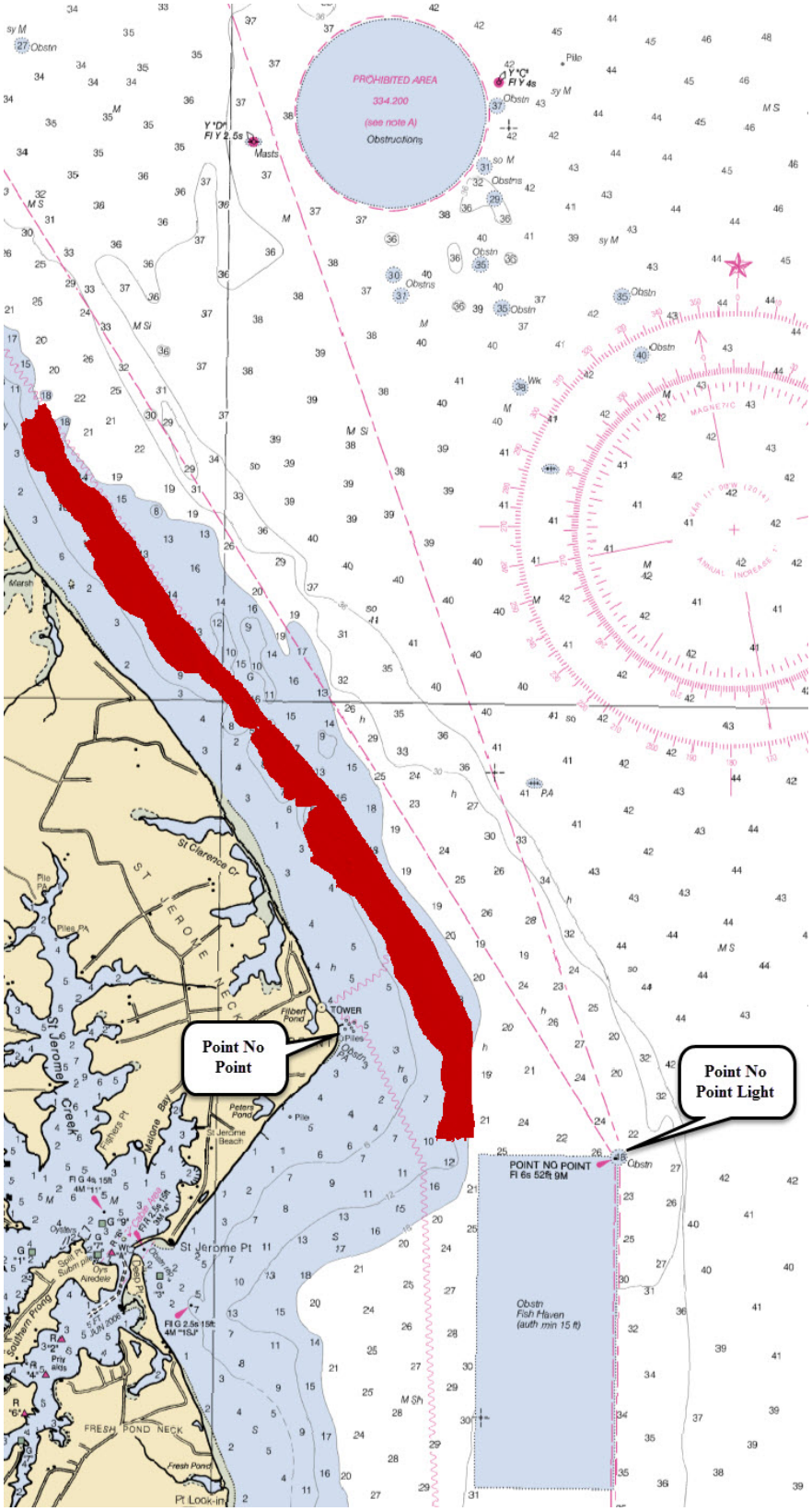


Figure 1: H12674 Survey limits, in red, relative to Point No Point, MD on NOAA Chart 12233.

As the western edge of H12674 extends to the shoreline, considerable time and effort was spent developing the 4m curve. Acquisition was performed using object detection Multibeam Echosounder (MBES) coverage to eliminate the high risks of towing a Side Scan Sonar (SSS) towfish in shallow water.

As near shore acquisition consumed the vast majority of the 2014 field season, H12674 was truncated from the originally assigned 12.00 square nautical mile area to 0.83 square nautical miles. Furthermore, H12674 identified 1.49 square nautical miles of the originally assigned survey area as being inshore of the 4m curve (Figure 2). Dividing H12674 into two areas greatly increased the timeliness of survey submission.

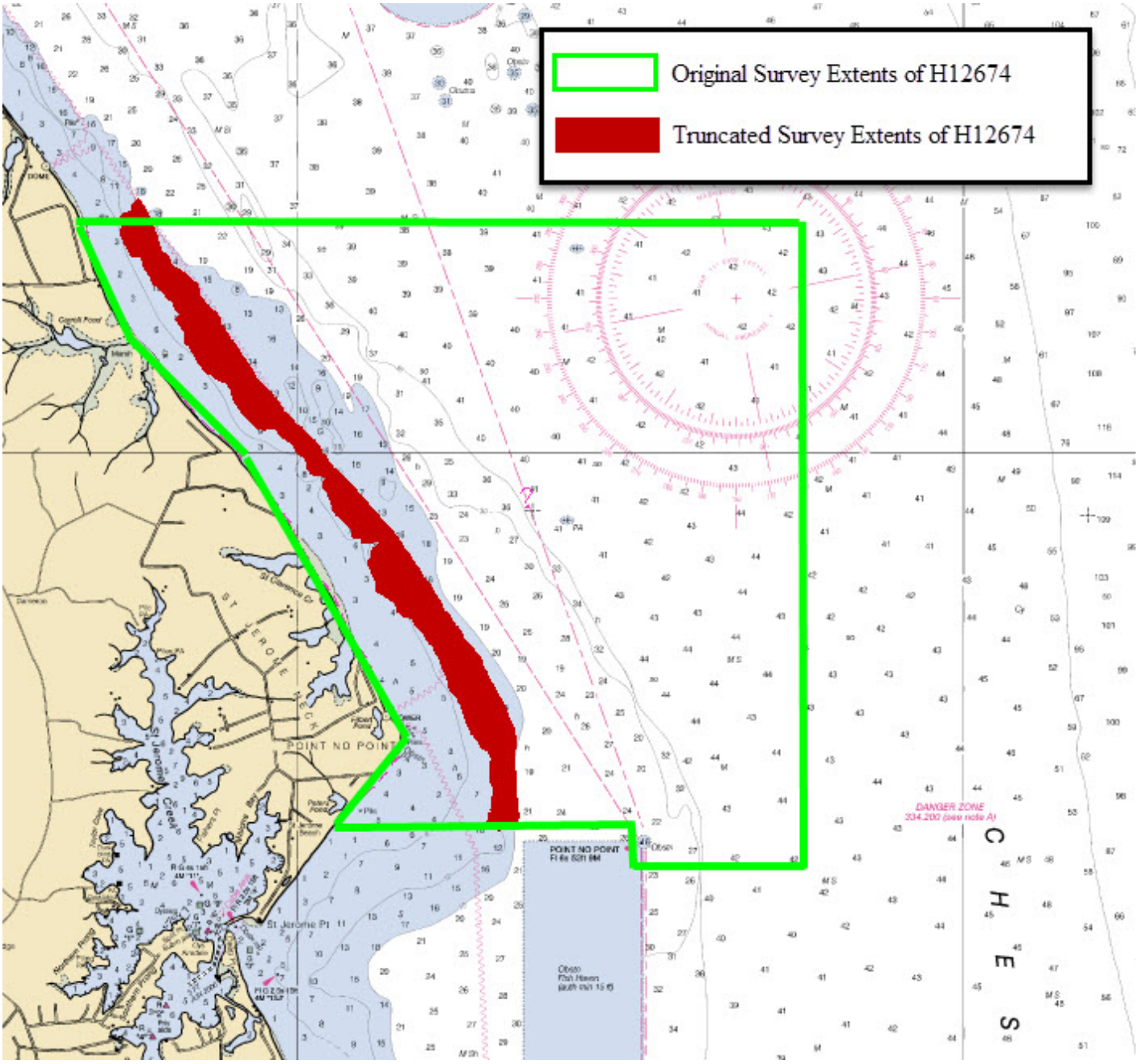


Figure 2: Truncated H12674 survey extent, in red, compared to original H12674 survey extent, in green.
The remainder of the assigned survey area was completed in 2015 and submitted under registry H12786.

A.2 Survey Purpose

This survey is a Navigable Area Survey that is intended to supersede all bathymetry, seafloor features, and bottom characteristics within the assigned survey area as defined by the Project Instructions (PI) for updating of NOAA Chart 12233 and NOAA Electron Navigational Chart (ENC) US5VA22M.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

All data was acquired and processed within the specifications set forth in the Hydrographic Surveys Specifications and Deliverables Manual (HSSD) and Field Procedures Manual for Hydrographic Surveying (FPM). In order to extract descriptive statistics of the data density achievements, the density layer of each finalized surface was queried within CARIS and examined in Excel (Figure 3). This analysis indicated that in both of the mainscheme surfaces (0.5M and 1M) exceeded the 95% requirement as set forth in the HSSD (Figure 4).

Sounding Density of H12674 MBES BASE Surfaces				
Resolution	Depth range	Number of nodes	Fewer than five soundings per node	Percent of nodes with greater than five soundings per node
0.5M	0-10M	11,464,468	12,898	99.9%
1m	0-10M	2,866,215	3,267	99.9%
	TOTAL:	14,330,683	16,165	99.9%

Figure 3: H12674 Sounding density statistics for the 0.5M & 1M CUBE Surface.

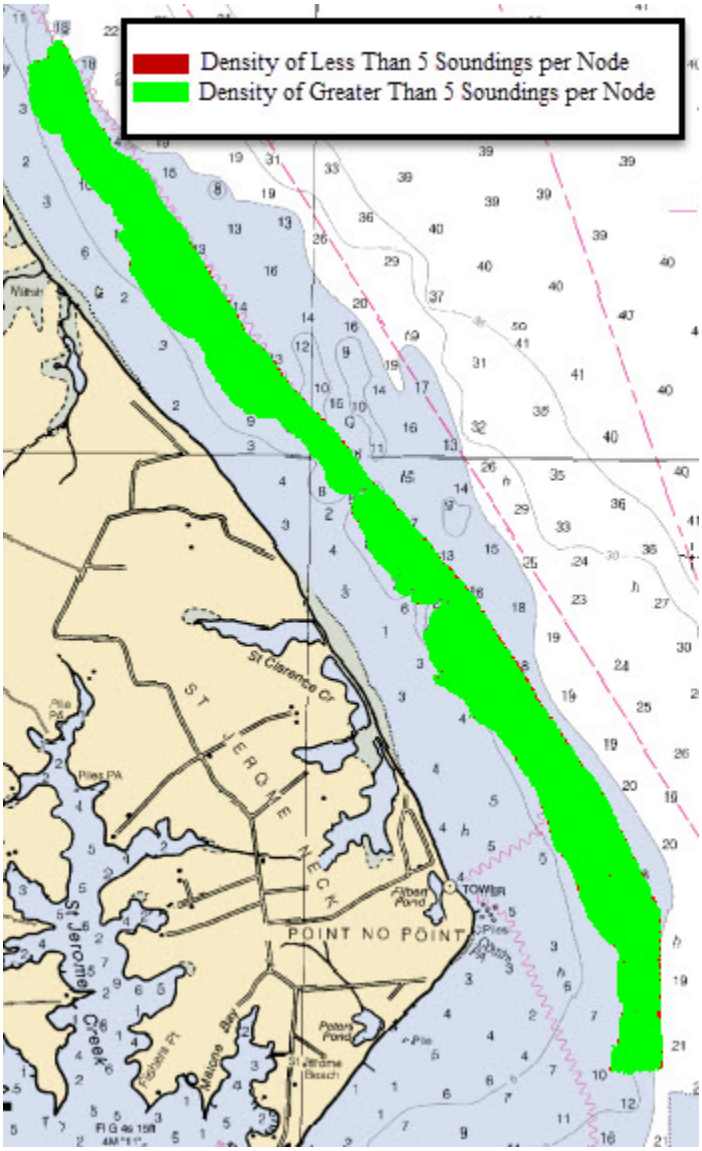


Figure 4: Sounding density for H12674, 50cm surface.

A.4 Survey Coverage

The following table lists the coverage requirements for this survey as assigned in the project instructions:

Water Depth	Coverage Required
Inshore limit to 20 meters	200% SSS with concurrent SBES or MBES, or Object Detection MBES
Greater than 20 meters	Multibeam
AWOIS item search areas	200% SSS with concurrent SBES or MBES, or Object Detection MBES

H12674 did not deviate from PI or HSSD requirements, reference Figure 5 for this survey's MBES coverage.

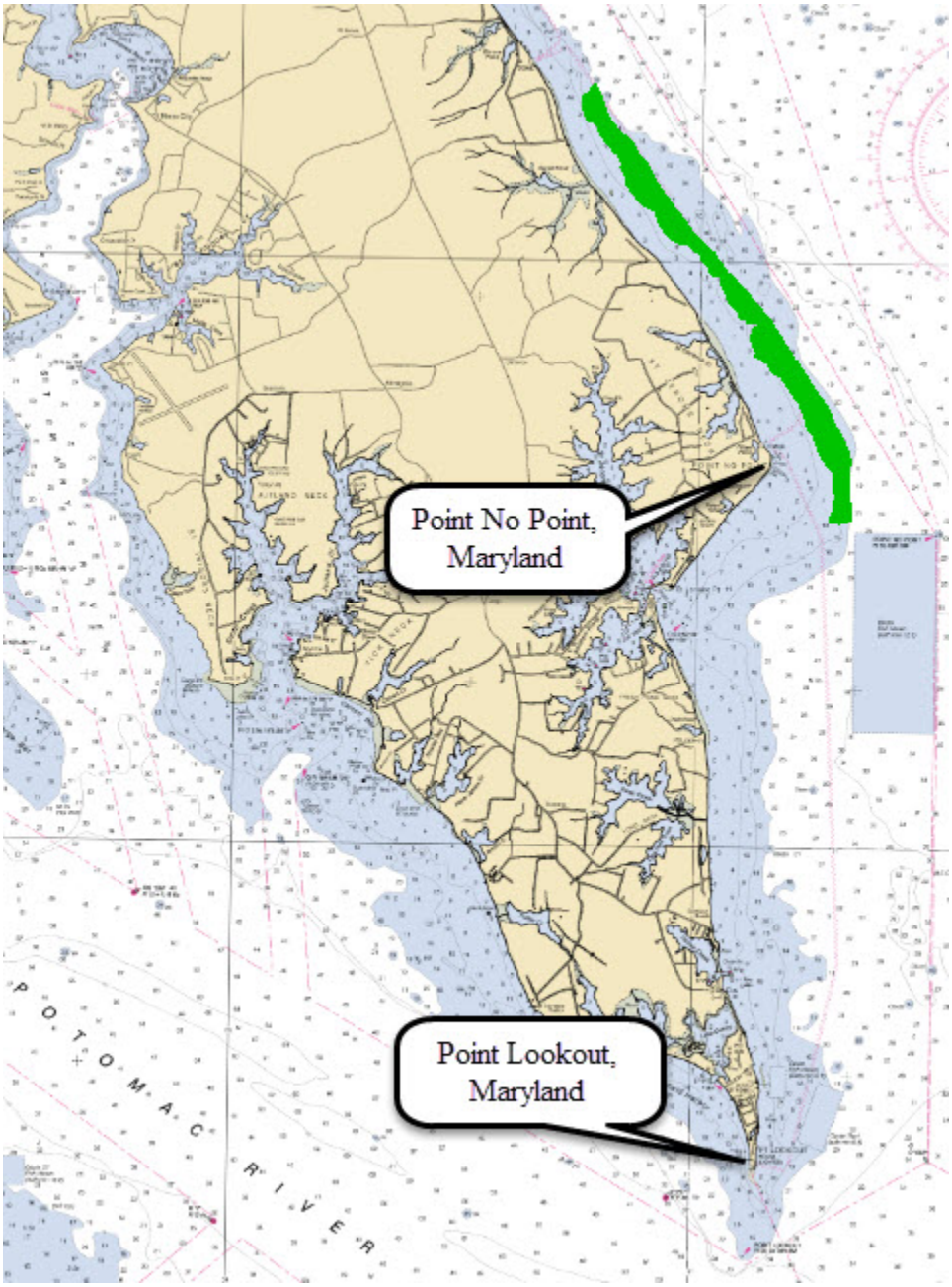


Figure 5: Object detection MBES coverage, in green, overlaid onto Chart 12233. The western extent of coverage delineates the 4 meter curve.

A.5 Survey Statistics

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

	HULL ID	*S5401*	*Total*
LNM	**SBES Mainscheme**	0.00	0
	MBES Mainscheme	230.66	230.66
	Lidar Mainscheme	0.00	0
	SSS Mainscheme	0.00	0
	SBES/SSS Mainscheme	0.00	0
	MBES/SSS Mainscheme	0.00	0
	SBES/MBES Crosslines	13.87	13.87
	Lidar Crosslines	0.00	0
Number of Bottom Samples			0
Number Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Investigated by Dive Ops			0
Total SNM			0.83

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
05/19/2014	139
05/20/2014	140
06/16/2014	167
06/18/2014	169
07/02/2014	183
07/09/2014	190
07/10/2014	191
07/21/2014	202
07/24/2014	205
07/29/2014	210
08/05/2014	217
08/06/2014	218
08/18/2014	230
10/10/2014	283
12/01/2014	335
12/15/2014	349
12/17/2014	351

Table 3: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Refer to the Data Acquisition and Processing Report (DAPR) for a complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods. Additional information to supplement sounding and survey data, and any deviations from the DAPR are discussed in the following sections.

B.1.1 Vessels

The following vessels were used for data acquisition during this survey:

Hull ID	***S5401***
LOA	17.3 meters
Draft	1.8 meters

Table 4: Vessels Used

R/V BAY HYDRO II collected all MBES data, sound velocity data, and attitude date for H12674.

B.1.2 Equipment

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

Manufacturer	**Model**	**Type**
Kongsberg	EM2040	MBES
Applanix	POS M/V V5	Positioning and Attitude System
SonTek	CastAway	Conductivity, Temperature, and Depth Sensor
Valport	miniSVS	Sound Speed System

Table 5: Major Systems Used

Vessel configurations, equipment operations, and data acquisition and processing were consistent with specifications described in the Data Acquisition & Processing Report (DAPR).

B.2 Quality Control

B.2.1 Crosslines

Crosslines acquired for this survey totaled 6.01% of mainscheme acquisition.

Crosslines were collected, processed and compared in accordance with section 5.2.4.3 of the HSSD. R/V Bay Hydro II collected 13.87 linear nautical miles of MBES crosslines, equating to 6.01% of mainscheme MBES data (Figure 6); which exceeds the 4% requirement for object detection MBES

To evaluate the crosslines, a 50cm CUBE surface was created using strictly mainscheme line, and a second 50cm CUBE surface was created using only crosslines. From these two surfaces, a difference surface was generated at a 50cm resolution. This difference surface is submitted digitally in the Separates IV folder. The comparison indicated that the two surfaces had a mean difference of 0.02m and a standard deviation of 0.06m, showing good internal consistency (Figure 7).

In addition to performing a crossline comparison using surface differencing, the CARIS QC Report was used to compare the MBES crossline soundings to the depth estimates of the of the 50cm CUBE surface. The depth differences are calculated between each MBES crossline ping and mainscheme surface; and that depth difference is then compared to allowable NOAA uncertainties. The output QC Report classifies the percentage of pings meeting NOAA orders by beam angle. This table was copied and examined in Excel (Figure 8). Over 95% of the crosslines analyzed were within NOAA Order 1a for the entire swath width. For further discussion of NOAA standards, refer to Section B.2.2,Uncertainty.

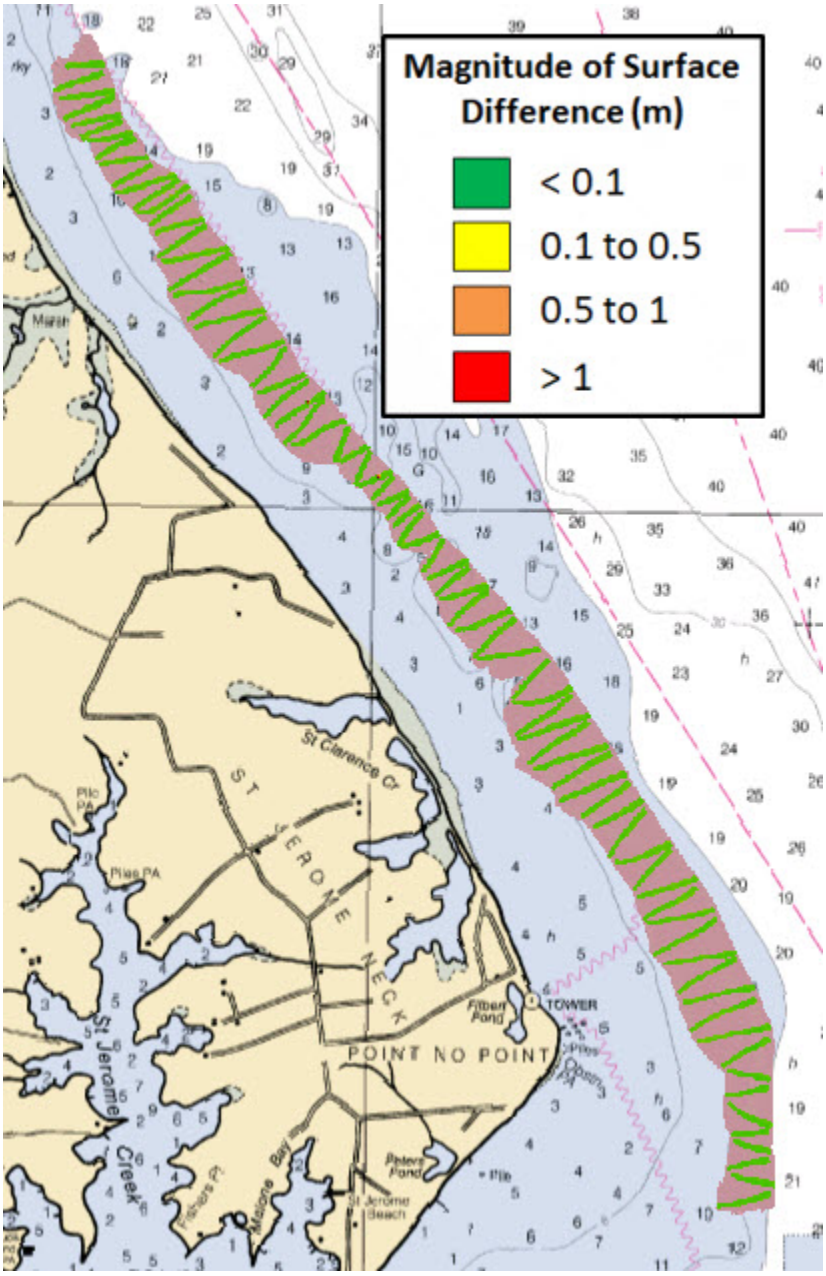


Figure 6: Magnitude of the crossline difference surface, overlaid onto H12674 (in pink) and Chart 12233.

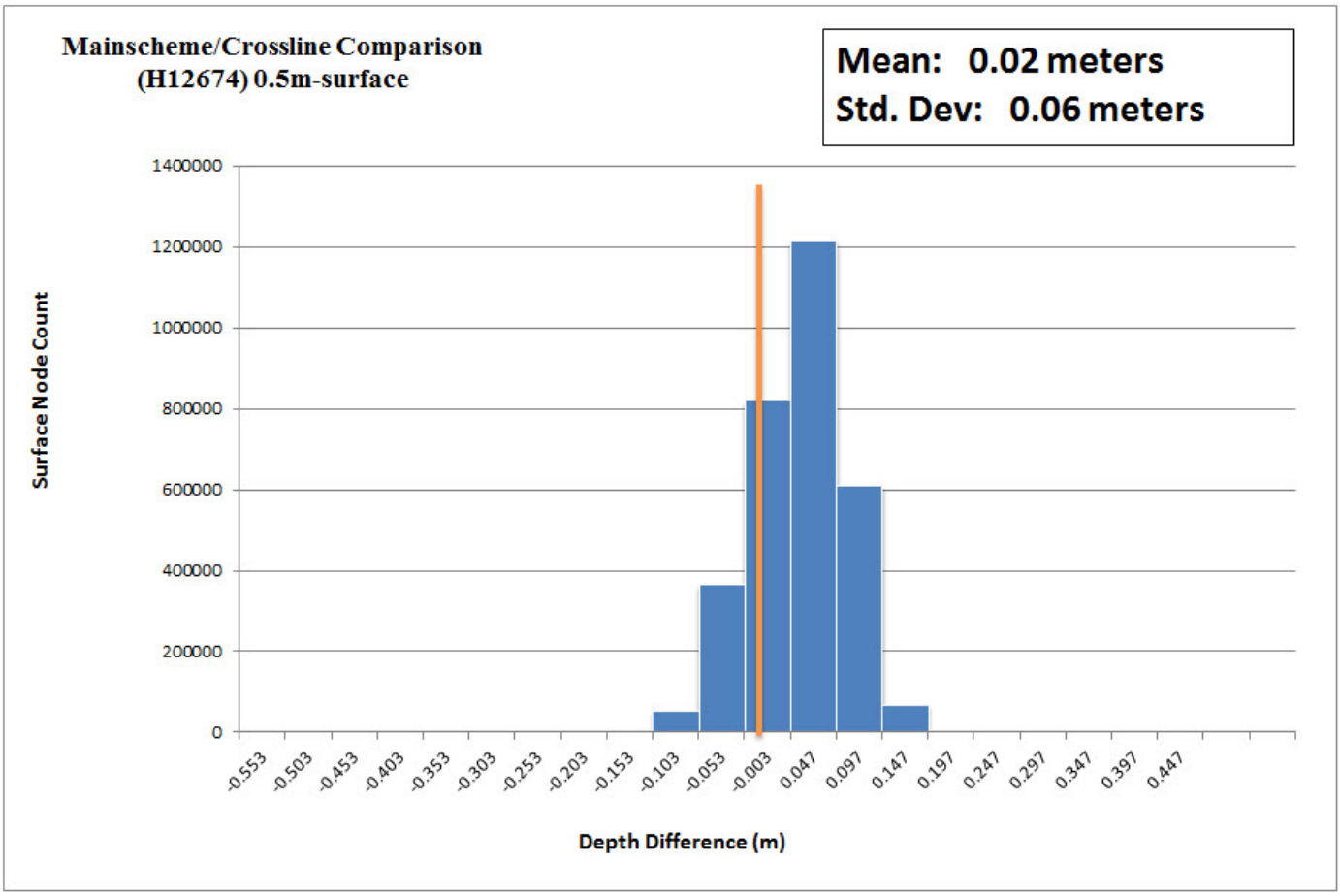


Figure 7: Mainscheme verses crossline difference comparison graph, with zero difference being represented by an orange line.

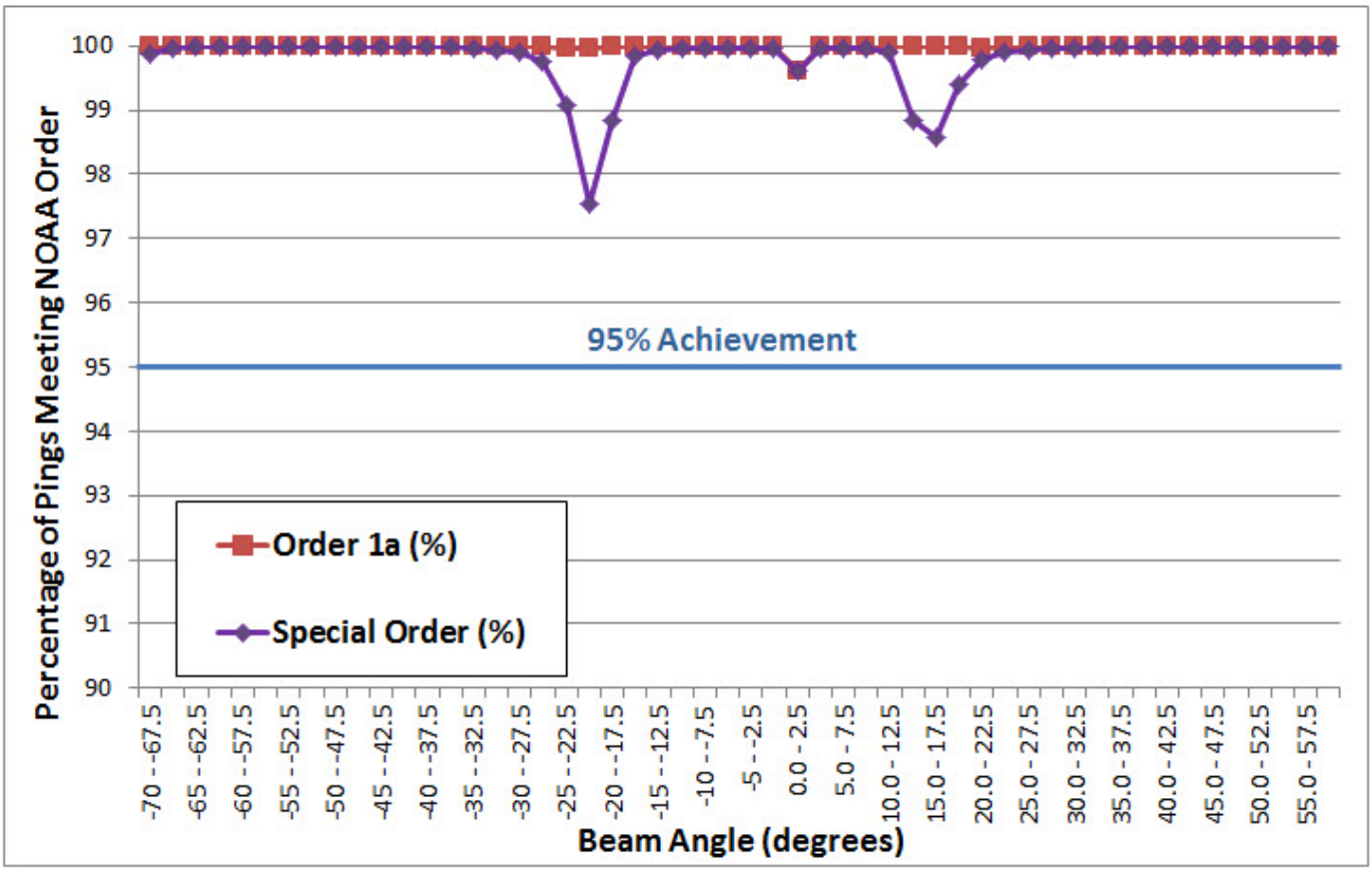


Figure 8: CARIS crossline quality control report.

B.2.2 Uncertainty

Hull ID	Measured - CTD	Measured - MVP	Surface
S5401	4.0 meters/second	N/A meters/second	0.5 meters/second

Table 6: Survey Specific Sound Speed TPU Values

In addition to the a priori estimates of sound speed uncertainty, real-time and post-processed uncertainty sources were also incorporated into the depth estimates of H12674. Real-time uncertainties from the EM2040 were recorded and applied in CARIS. The Tidal Constituent and Residual Interpolation (TCARI) grid used to apply tidal correctors also calculates real time uncertainty measurements associated with water level interpolation. These real time uncertainty values are then applied in CARIS. Finally, the post-processed uncertainties associated with vessel heave and navigation were applied in CARIS via the SBET's RMS file generated in POSPac.

Uncertainty values of submitted finalized grids were calculated in CARIS using the "Greater of the Two" of uncertainty and standard deviation (scaled to 95%). To visualize the locations in which accuracy

requirements were met for each finalized surface, a custom predicted NOAA-compliance layer was created, based on the difference between calculated uncertainty of the nodes and the allowable NOAA uncertainty (Figure 9). To quantify the extent to which accuracy requirements were met, the preceding predicted NOAA compliance layers were queried within CARIS and examined in Excel (Figure 10). Overall, 100% by node of H12674 met the accuracy requirements stated in Section 5.1.3 of the HSSD.

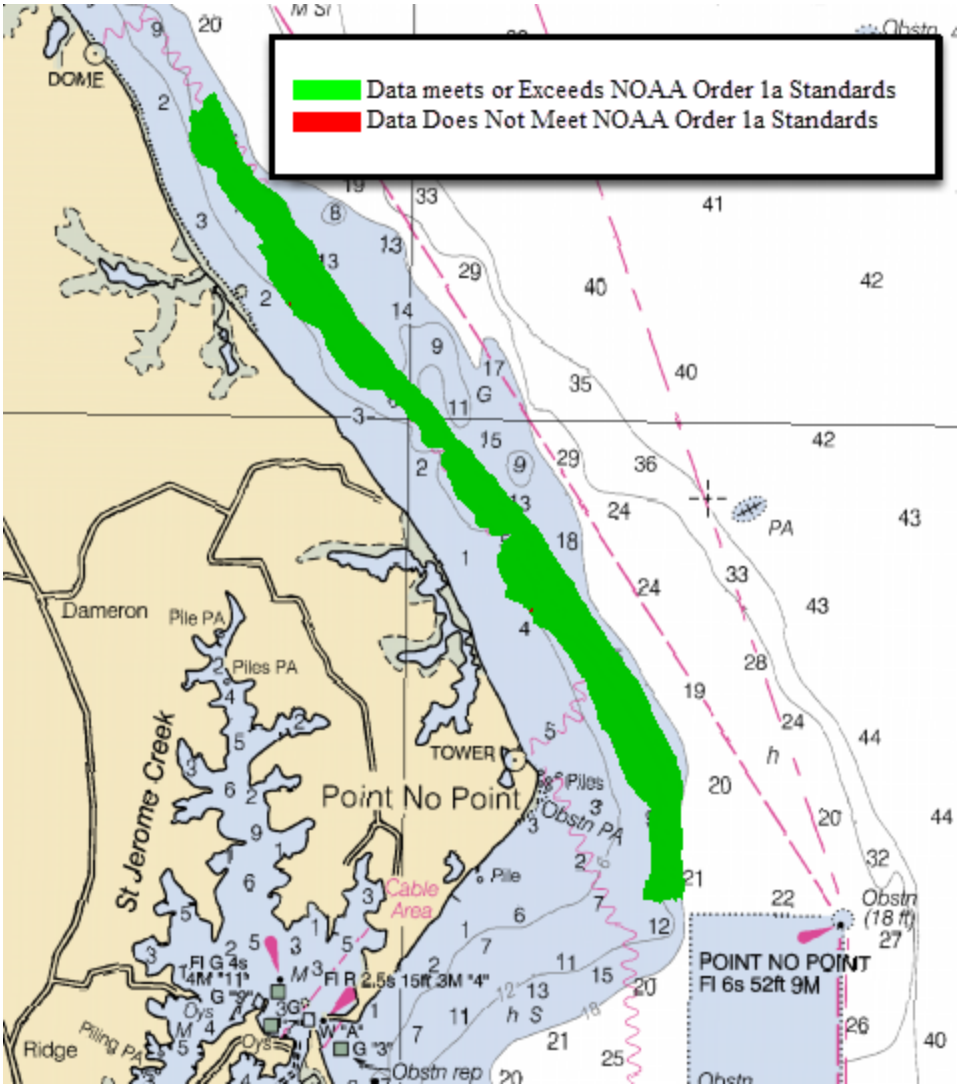


Figure 9: H12674 MBES data colored by NOAA-compliance and overlaid onto Chart 12233.

H12674 CARIS BASE Surface NOAA Statistics					
Resolution	Depth range	NOAA Order	Number of nodes	Nodes satisfying NOAA accuracy	Percent nodes satisfying NOAA accuracy
50cm	0 - 20m	Order 1	11,464,468	11,464,344	100.0%
1m	0 - 20m	Order 1	2,866,215	2,866,075	100.0%
		TOTAL:	14,330,683	14,330,419	100.0%

Figure 10: Summary table showing the percentage of nodes satisfying applicable NOAA accuracy levels for H12674.

The actual percentages of nodes satisfying NOAA accuracy are 99.9%

B.2.3 Junctions

H12674 junctions two prior, modern surveys; H12321 to the north and H12240 to the south (Figure 11). Junctions were analyzed by creating a difference surface of the available combined surfaces of each survey. A 4m combined surface was used for H12321 differencing and a 4m combined surface was used for H12240 differencing. These difference surfaces were evaluated using the CARIS Compute Statistics tool.

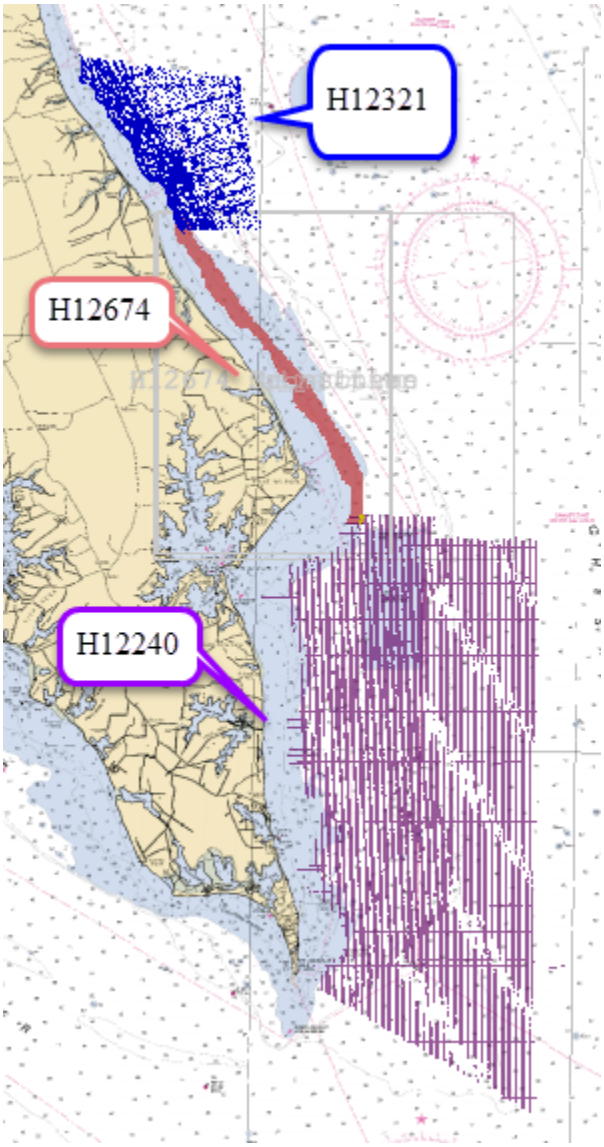


Figure 11: Overview of surveys that junction with H12674.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12240	1:10000	2010	David Evans & Associates, Inc.	S
H12321	1:10000	2011	NOAA R/V BAY HYDRO II	N

Table 7: Junctioning Surveys

H12240

H12240 junctions with approximately 348 meters along the southern edge of H12674 (Figure 12). The junction averages 210 meters of north/south overlap. The difference surface between the 4m resolution H12674 grid and the 4m resolution H12240 grid show strong agreement between the two surveys. The difference range is -0.21m and -0.01m with a mean difference of -0.08m and a standard deviation of 0.04m (Figure 13).

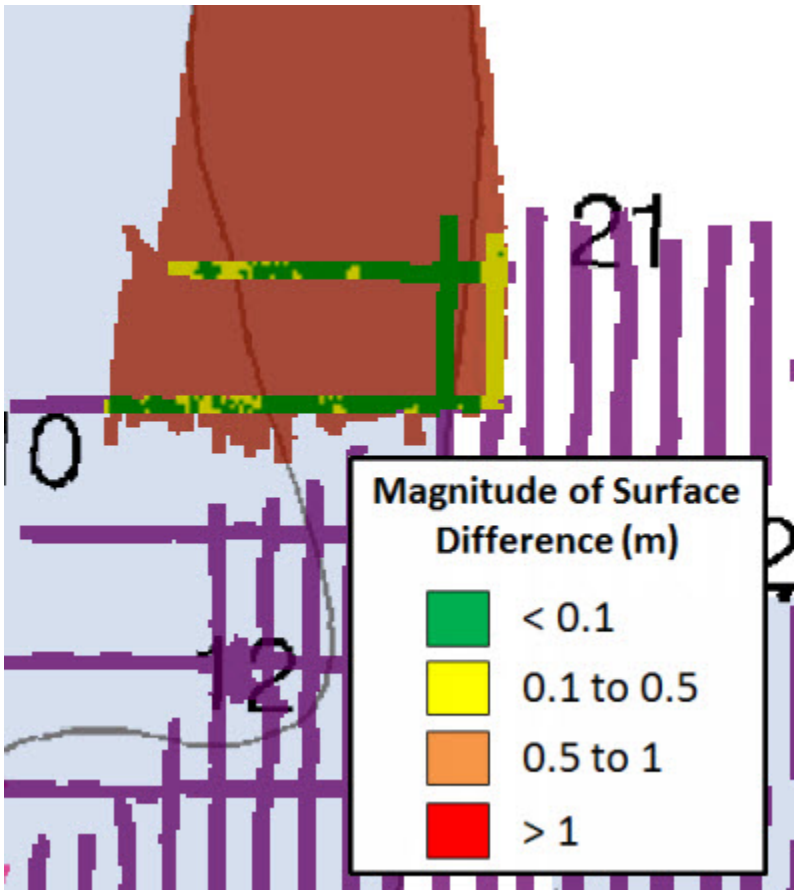


Figure 12: Difference surface between H12674, in rose, and junction survey H12240, in purple.

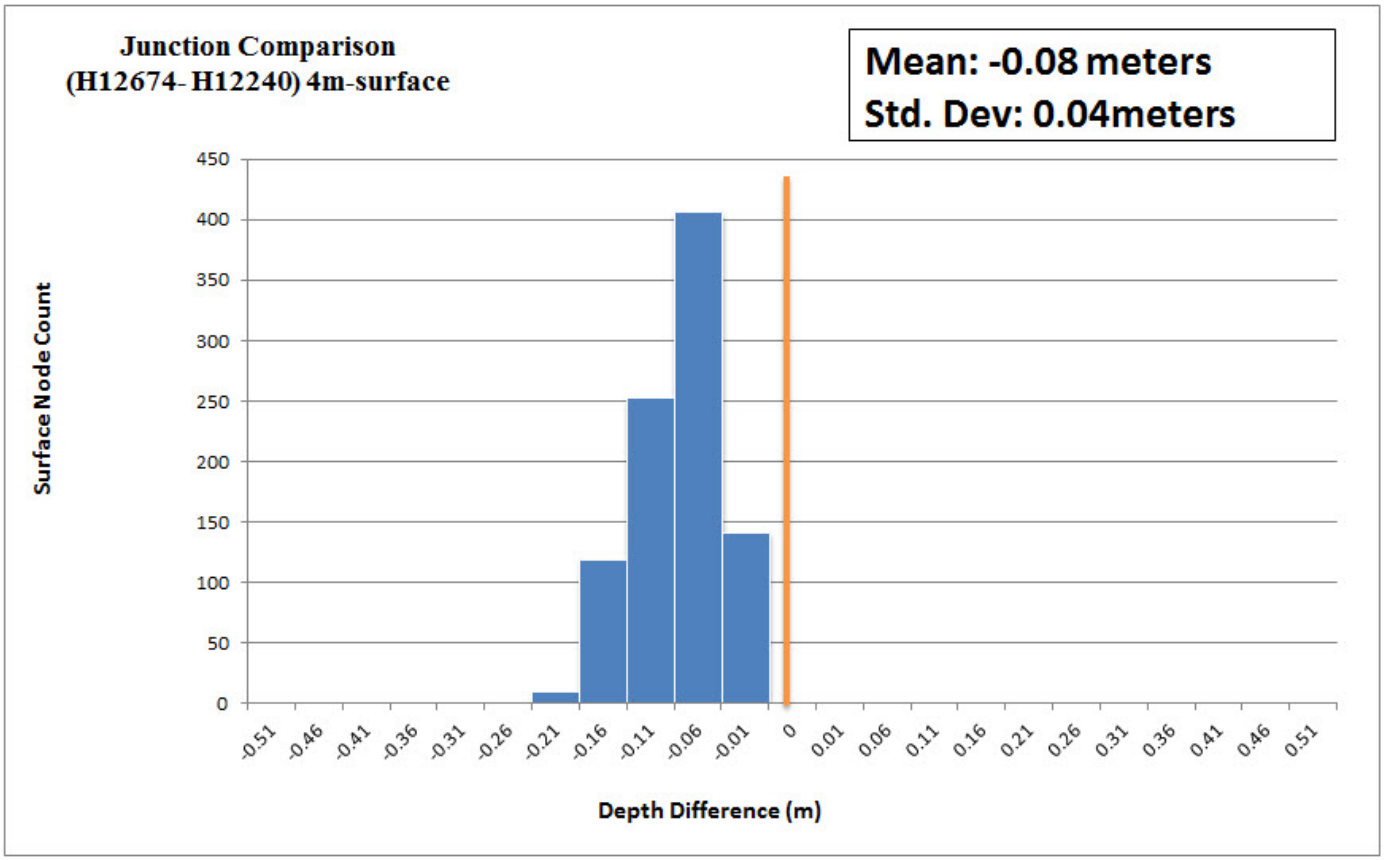


Figure 13: Difference surface statistics between H12674 and H12240 CUBE depth layers (4m grid size), with zero difference being referenced by an orange line. H12674 is an average of 0.08m shoaler.

H12321

H12321 junctions with approximately 340 meters along the northern edge of H12674 (Figure 14). the junction averages 300 meters of north/south overlap. The difference surface between the 4m resolution H12674 grid and the 4m resolution H12321 grid show strong agreement between the two surveys with a mean difference of -0.04m and a standard deviation of 0.08m (Figure 15).

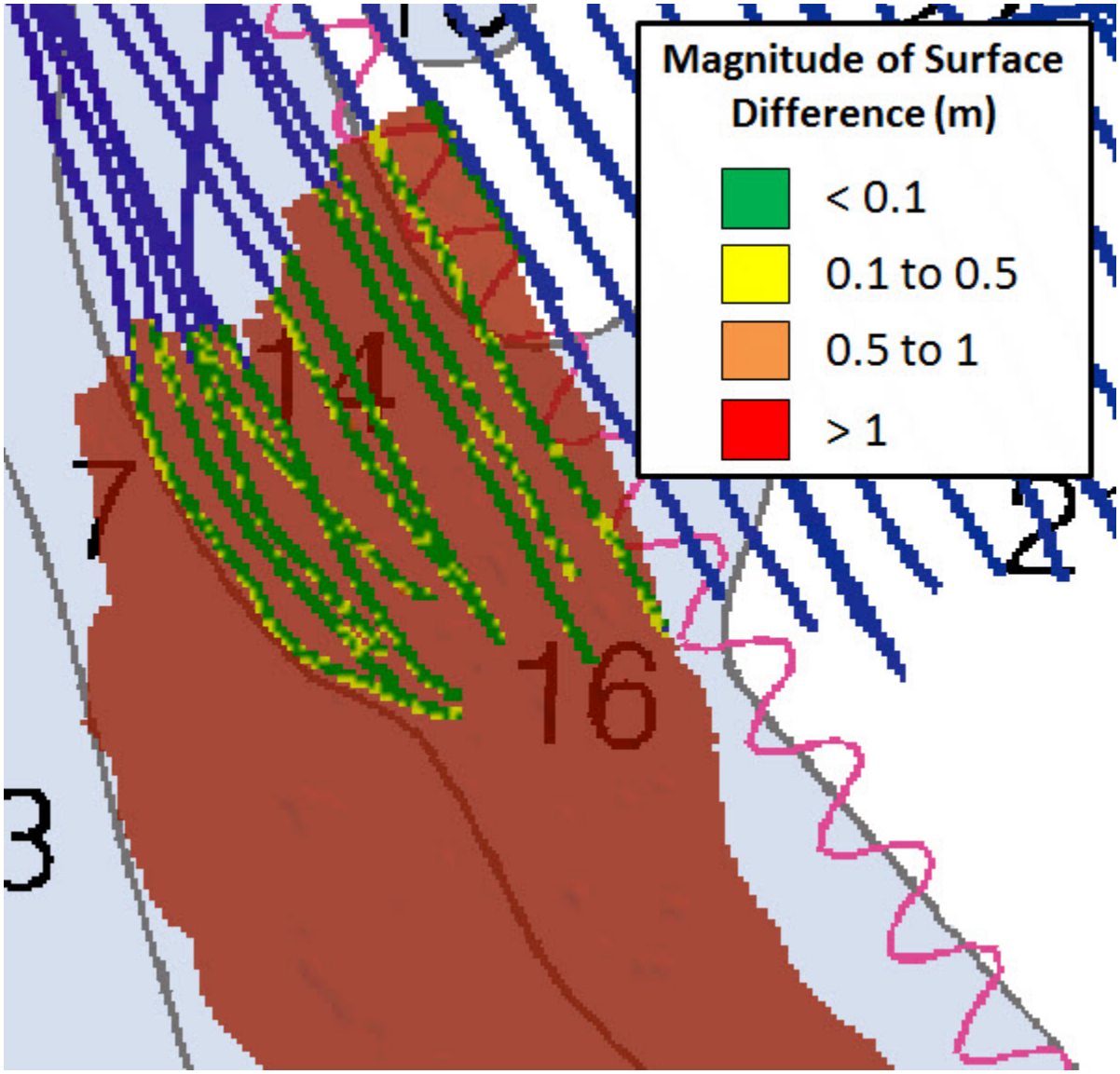


Figure 14: Difference surface between H12674, in rose, and junction survey H12321, in blue.

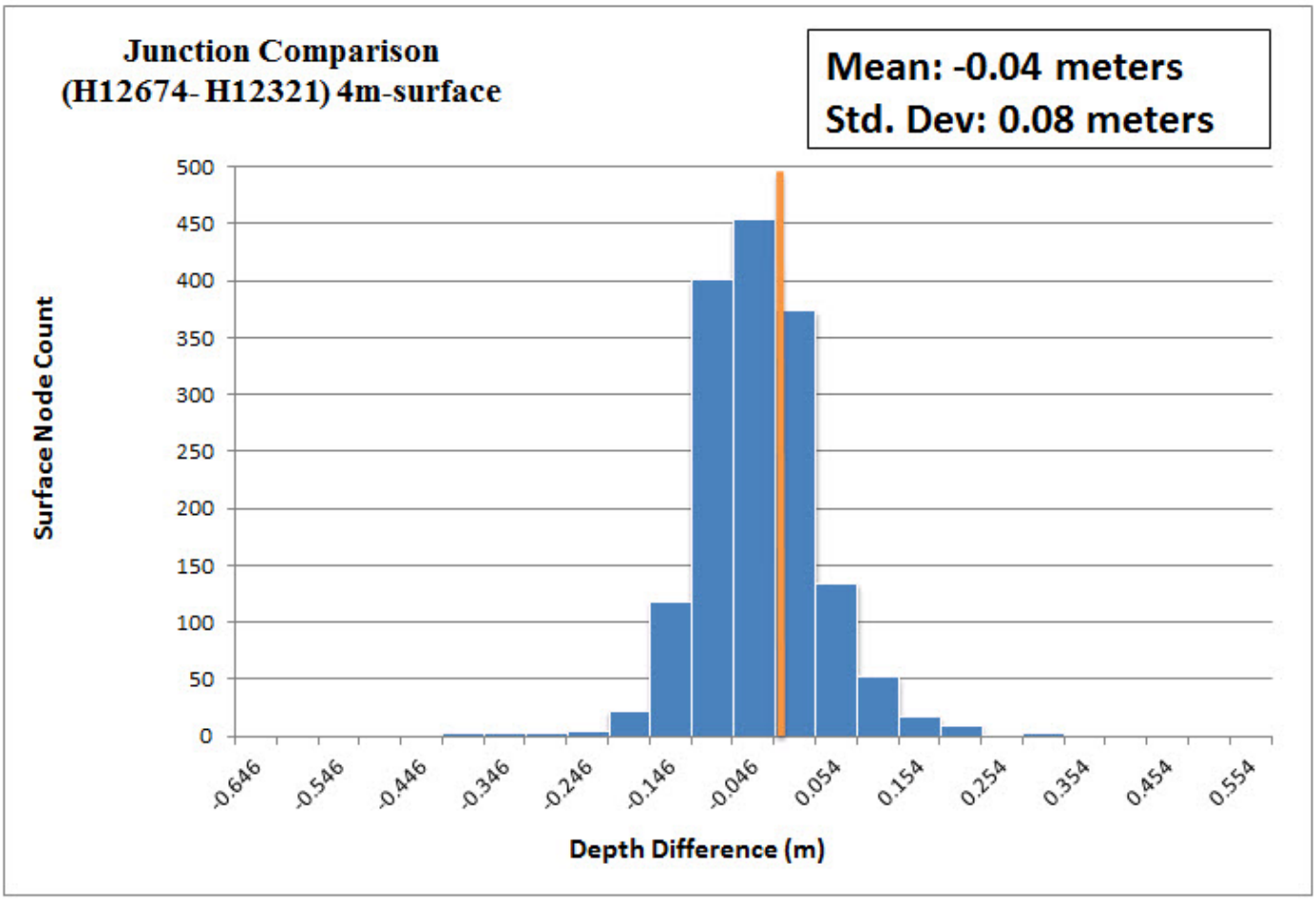


Figure 15: Difference surface statistics between H12674 and H12321 CUBE depth layers (4m grid size), with zero difference being referenced by an orange line. H12674 is an average of 0.04m shoaler.

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

Unsafe Environment for SSS

H12674 is located in an area of the Chesapeake Bay that is heavily used as a crabbing grounds by commercial fishermen. These pots, attached to a floating buoy, typically are deployed in early spring and not removed until early to mid December. Since these pots tend to stay in the same general location, the holidays in data created by avoiding them tend to be impossible to reacquire.

H12674 is also located in an area that is shallow, H12674 has a depth range of 2.36m to 6.71m. While trying to keep the SSS towfish within the towfish height specifications mandated in FPM section 3.3.1, in water this shallow, it is extremely difficult to keep the towfish out of the boat's own wake. The air bubbles resulting from the boat's propellers decreases the quality of the SSS data.

Keeping these two inefficiencies of towed SSS in mind, it was determined that data quality would suffer too much by collecting 200% SSS as mandated by the Project Instructions (PI). Therefore, object detection MBES data collection was determined to be the best method by the crew of Bay Hydro II and the chief of the Navigational Response Branch (NRB).

B.2.6 Factors Affecting Soundings

There were no other factors that affected corrections to soundings.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Sound speed casts for MBES survey were acquired via CTD profiles. Casts were conduced at the start of the day, the midpoint of the day, and at the end of the day. This generally resulted in a cast interval of 3 hours. Additional casts were conducted if the interval was nearing 4 hours as required by the HSSD, or when sound speed variations of greater than 1 m/s were observed.

The distribution of the sound speed profiles casts is shown in Figure 16 below.

Surface sound speed was collected in real time and integrated into the Kongsberg EM2040 bathymetric data.

Sound speed was corrected for in CARIS HIPS via the "Nearest in Time" option for all days except Day Number 351 (DN351). Since DN351 covered a large geographic area in a minimal amount of time and there was a fresh water input at the southern end of the survey area that dispersed via the tidal cycle, the traditional "Nearest in Time" application of sound speed correction resulted in large refraction errors as seen in Figure 17. By changing to the "Nearest in Distance Within Time (4hrs)" application method within CARIS, localized sound speed variations were accurately reflected, as seen in Figure 18.

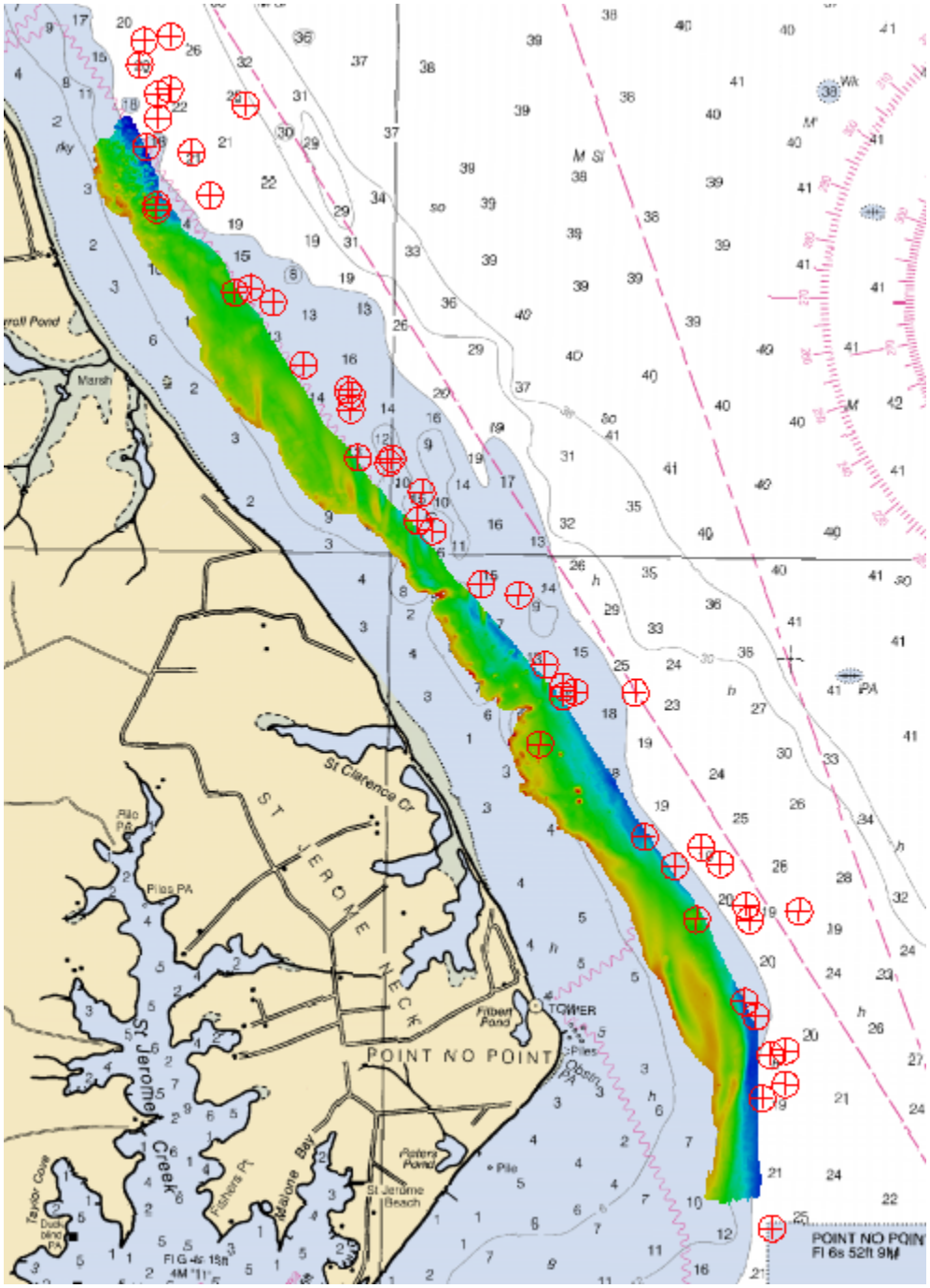


Figure 16: H12674 CTD cast positions, in red, relative to survey area.

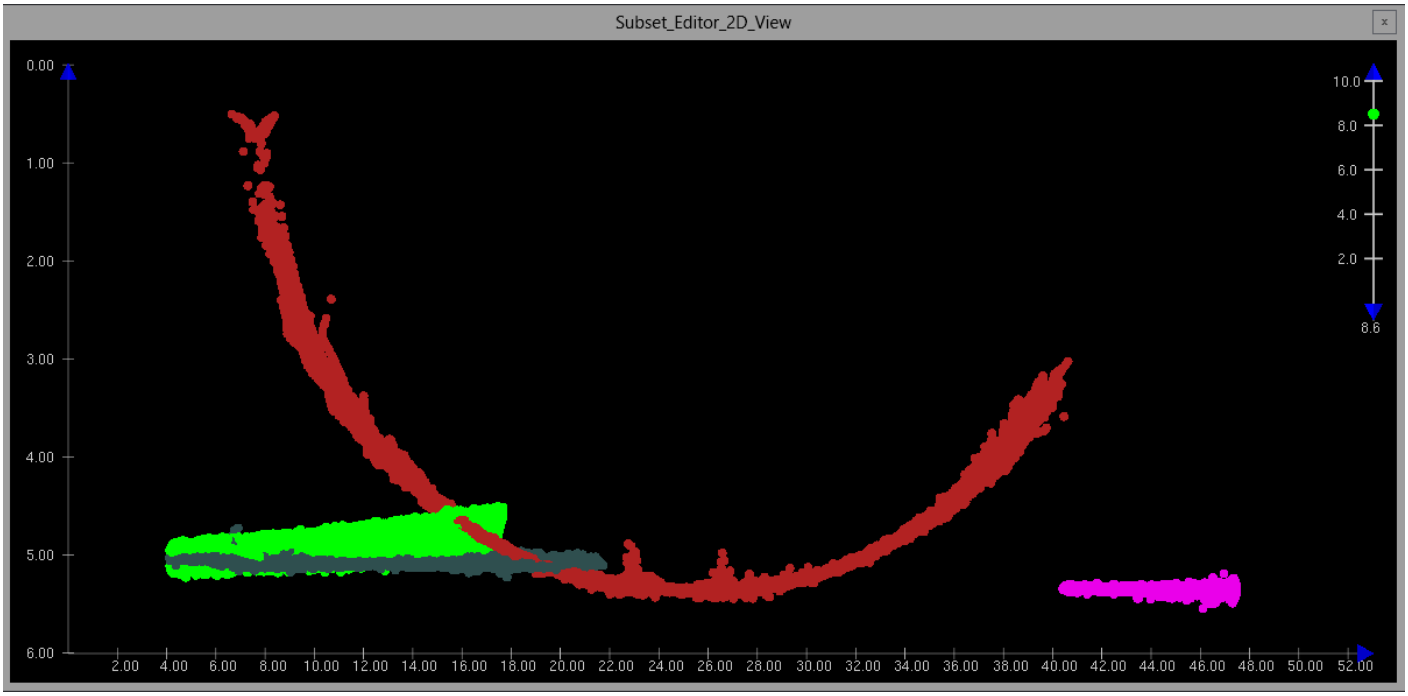


Figure 17: CARIS Subset Editor view of the data for DN351, in red, using CARIS's "Nearest in Time" SVP correction method, with an 8 magnitude exaggeration.

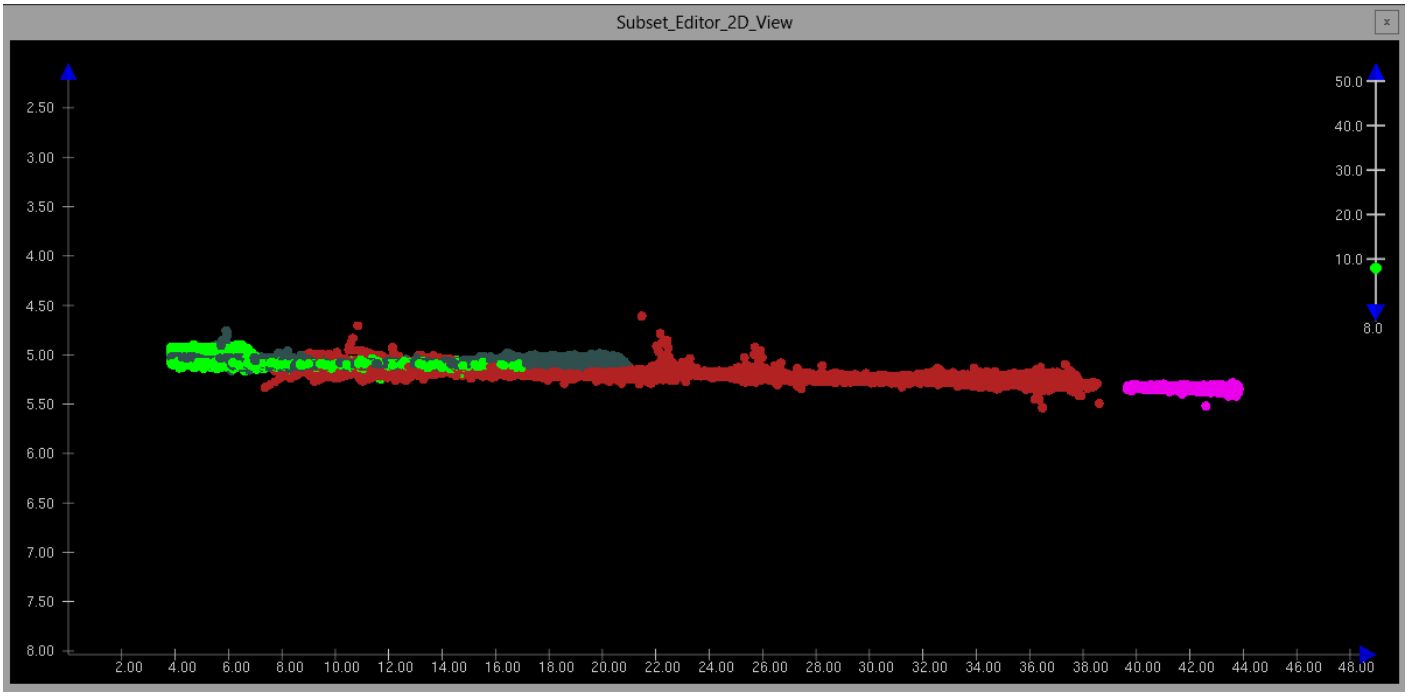


Figure 18: CARIS Subset Editor view of the data for DN351, in red, using CARIS's "Nearest in Distance within Time" SVP correction method and a 4 hour timing interval, also with an 8 magnitude exaggeration.

B.2.8 Coverage Equipment and Methods

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

B.2.9 Holiday Assessment

Two holidays occurred along the eastern extent of the survey area, approximately 1150m northeast of Point No Point (Figure 19). These two holidays were not recognized until after survey acquisition was completed and the Request for Final Tides was sent to CO-OPS; therefore, the holidays were not addressed. For further detail on these holidays, refer to the H12674_Holiday_and_Data_gaps.hob located in the S-57 Features file submitted with this survey package.

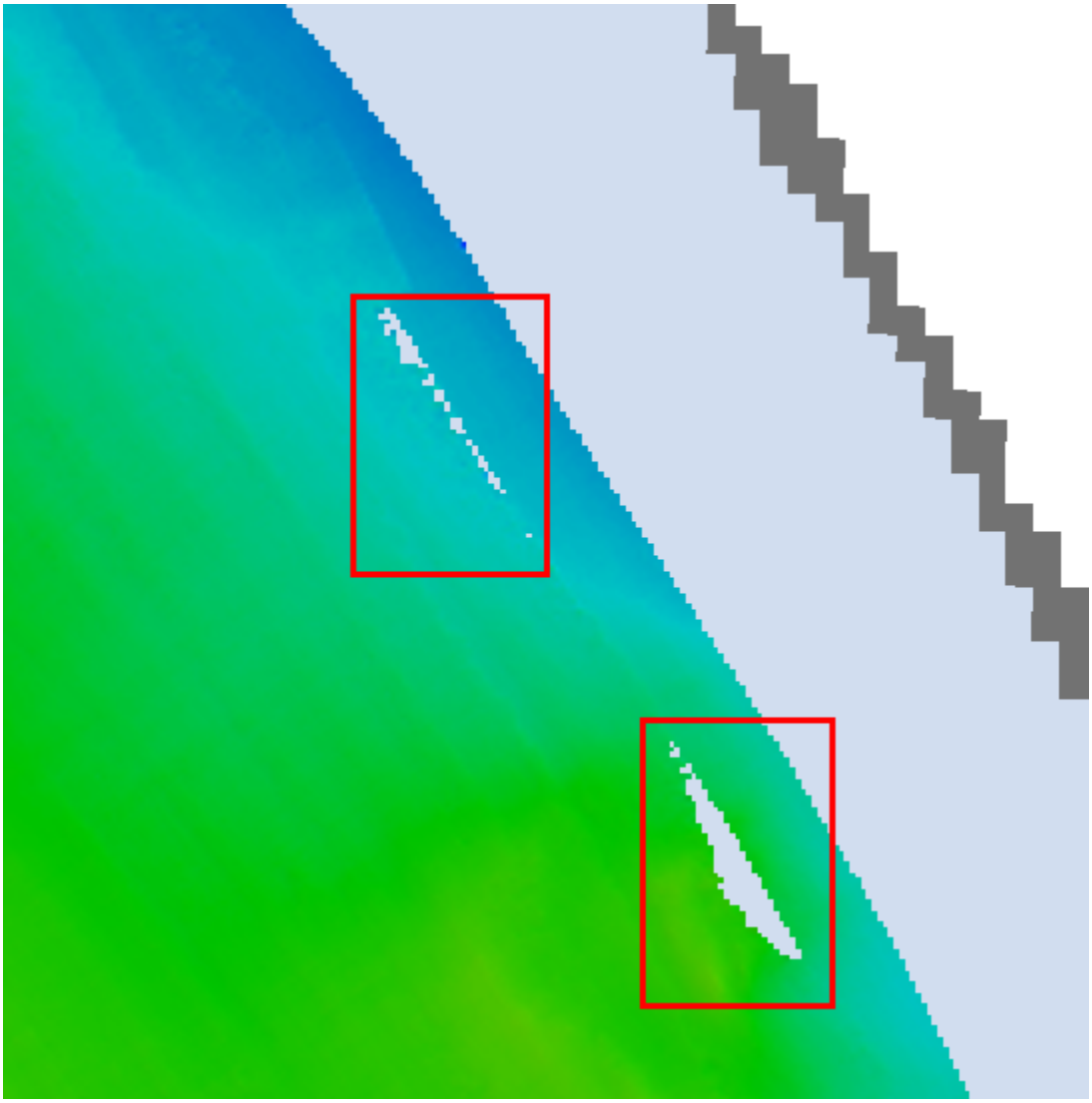


Figure 19: MBES holidays, in red boxes, located at the eastern extents of H12674.

The largest of the two significant MBES holidays is approximately 45 x 7 meters in size. There is no indication of shoaling or features in the area. All data is adequate for charting.

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

Raw Backscatter was logged as a Kongberg .all file and has been sent to the Processing Branch. Backscatter was not processed by the field unit.

B.5 Data Processing

B.5.1 Primary Data Processing Software

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

Manufacturer	Name	Version
CARIS	HIPS	

Table 8: Primary bathymetric data processing software

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
H12674_MLLW_50cm	CUBE	50 centimeters	2.29 meters - 6.71 meters	NOAA_0.5m	Object Detection
H12674_MLLW_50cm_Final	CUBE	50 centimeters	2.29 meters - 6.71 meters	NOAA_0.5m	Object Detection
H12674_MLLW_1m	CUBE	1.0 meters	2.33 meters - 6.7 meters	NOAA_1m	Object Detection
H12674_MLLW_1m_Final	CUBE	1.0 meters	2.33 meters - 6.7 meters	NOAA_1m	Object Detection
H12674_MLLW_Final_Combined	CUBE	1.0 meters	2.29 meters - 6.71 meters	NOAA_1m	Object Detection
H12674_ERS_50cm	CUBE	50 centimeters	37.82 meters - 41.92 meters	NOAA_0.5m	Object Detection

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12674_ERS_1m	CUBE	1 meters	37.87 meters - 41.95 meters	NOAA_1m	Object Detection

Table 9: Submitted Surfaces

The surfaces have been reviewed where noisy data, or 'fliers' are incorporated into the gridded solution causing the surface to be shoaler than the true seafloor. Where these spurious soundings cause the gridded surface to be shoaler than the reliably measured seabed by greater than the maximum allowable vertical uncertainty at that depth, the noise was rejected and the surface recomputed.

In addition, a VDatum evaluation was performed for the survey (See Section B.5.3, VDatum Tidal Reduction Evaluation). Surfaces referenced to the ellipsoid have also been included for evaluation by the branch.

B.5.3 VDatum Tidal Reduction Evaluation

Data from H12674 was reduced to MLLW using VDatum. This was accomplished by using the GPS height determined from the Smoothed Best Estimate of Trajectories (SBET's) file (see Section C.1, Vertical Control). The VDatum surface was then compared to the Zone Tides reduced surface. As both VDatum and Zone Tides reduce depths to MLLW, there should be no difference between the surfaces. Any significant differences would be the result of an error intrinsic to either the VDatum or Zone Tides processing work flow. For example, misprojected SBETs, current-induced dynamic draft, incorrect waterline measurements, corrupt TrueHeave files, or poorly-modeled water levels / separation models are all examples of artifacts that can be identified through the difference of the VDatum and Zone Tides surfaces.

To check these intrinsic errors, a difference surfaces was created in CARIS to compare the VDatum and Zone Tides surfaces. Statistics were then derived form the difference surface. The overall comparison between VDatum and Zone Tides surfaces show close continuity (Figure 20). The Zone Tides surface is shoaler by an average of 0.01 meters, with a standard deviation of 0.02 meters (Figure 21). Given the good agreement, no intrinsic errors are likely present, in any substantial amount, for H12674.

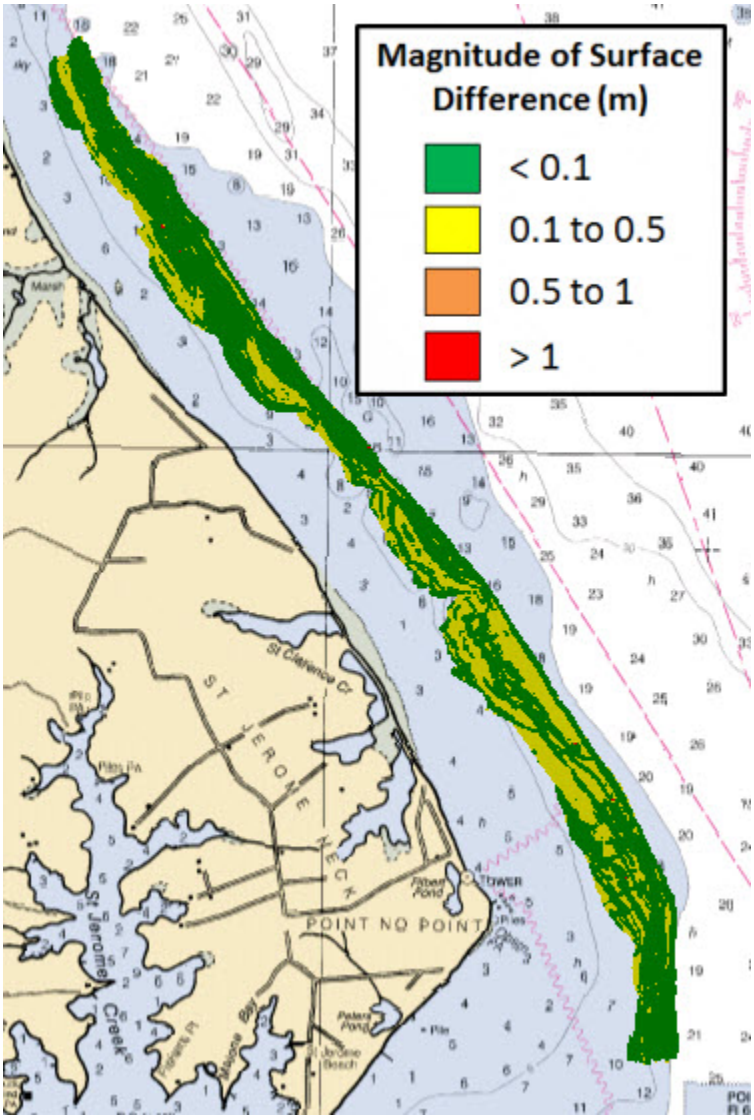


Figure 20: Difference surface between H12674 VDatum data and H12674 TCARI tidal data, overlaid onto Chart 12233.

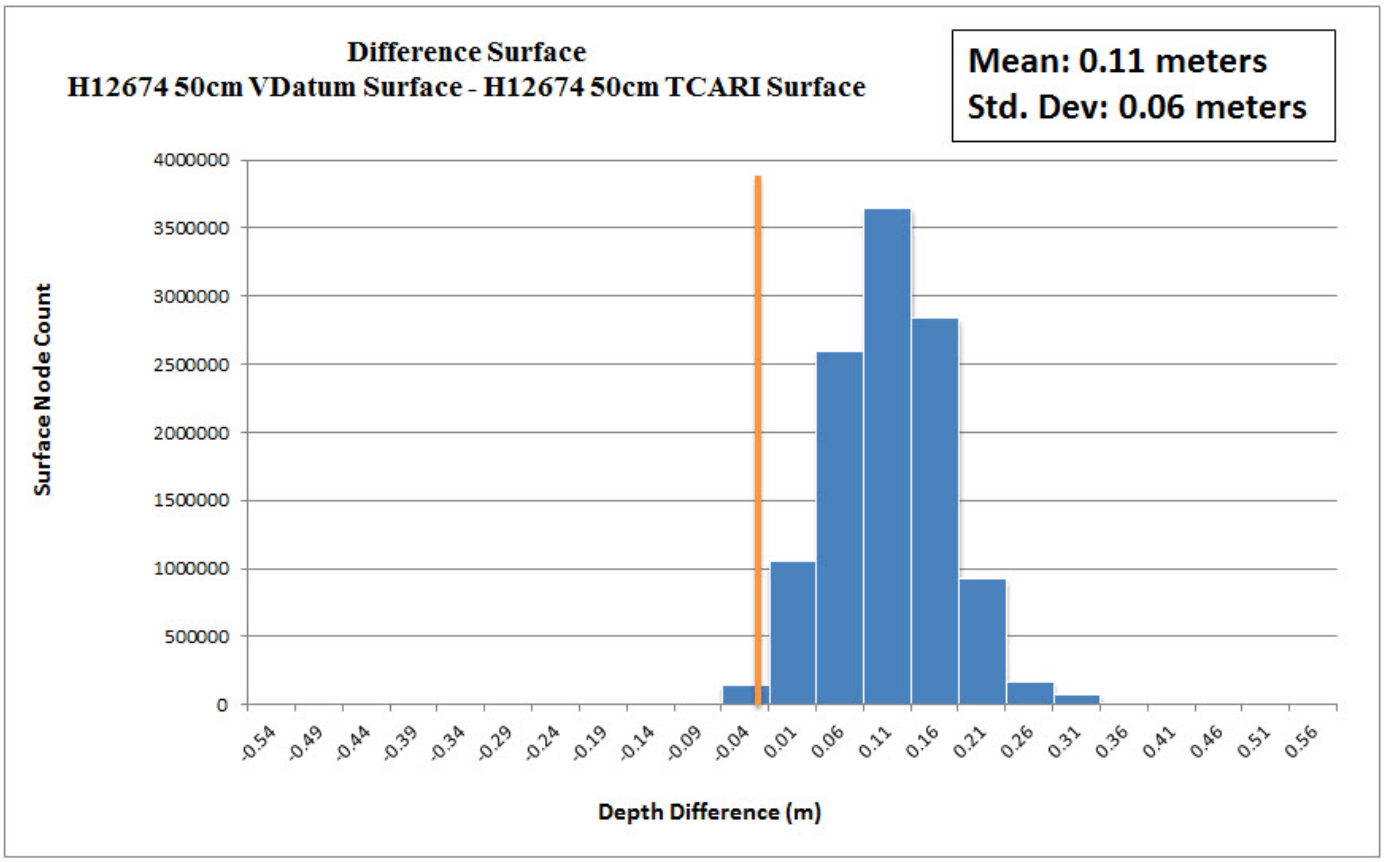


Figure 21: Difference graph of the differences between H12674 50cm VDatum surface and the H12674 50cm TCARI Tidal surface. With orange line indicating zero difference.

C. Vertical and Horizontal Control

Vertical and horizontal control was achieved via established tidal networks and CORS stations. No user installed reference stations were required for H12674.

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
Bishops Head, MD	8571421
Lewisetta, VA	8635750

Table 10: NWLON Tide Stations

There was no Water Level file associated with this survey.

File Name	Status
E349BH22014_Rev.tc	Final

Table 11: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 12/18/2014. The final tide note was received on 12/29/2014.

The Tide Note is attached.

Non-Standard Vertical Control Methods Used:

VDatum

Ellipsoid to Chart Datum Separation File:

H12674_SEP_CORRECT_2m

As referenced in Section B.5.3, VDatum was performed for this survey. A separation file was provided to the field by HSD OPS for evaluation purposes. The separation file is included with the data submission of the DR.

SBET'S were used to calculate ellipsoid heights required for the VDatum process. SBET's were processed using Applanix SmartBase and a QC log can be found in Separates I of the data submission.

VDatum was used for evaluation purposes only. Final bathymetry was reduced to MLLW with TCARI.

C.2 Horizontal Control

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

The projection used for this project is The projection used for this project was UTM-18N.

DGPS was used to provide positioning for H12674.

Vessel kinematic data was post processed using Applanix POSPac processing software as described in the DAPR. Smart Base processing was used, which automatically selects local CORS stations to provide best coverage of the survey area.

DGPS was used for primary positioning during acquisition. Following PPK processing, DGPS position data was replaced with improved SBET navigation data.

The following DGPS Stations were used for horizontal control:

DGPS Stations
Annapolis, MD (301 kHz)

Table 12: USCG DGPS Stations

D. Results and Recommendations

D.1 Chart Comparison

A sounding selection was created, in feet, at a scale of 1:40000 from the combined 1m resolution surface for comparison with raster Chart 12233 and ENC US5VA22M. These soundings were then compared to each of the soundings located on the charts for continuity.

Soundings between Chart 12233 and ENC US5VA22M were compared and evaluated for agreement. The two were found to be in close agreement with differences of one foot or less.

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
12233	1:40000	38	01/2014	04/28/2015	05/02/2015

Table 13: Largest Scale Raster Charts

12233

NOAA Chart 12233 overlaps with all H12674 data and is generally one to four feet shallower than H12674 throughout the entire survey area (Figure 22). The data indicates that the natural slope of the area is shifting westward toward the shore. This is clearly evident in Figure 23, a small area subset taken from the southern end of the survey area.

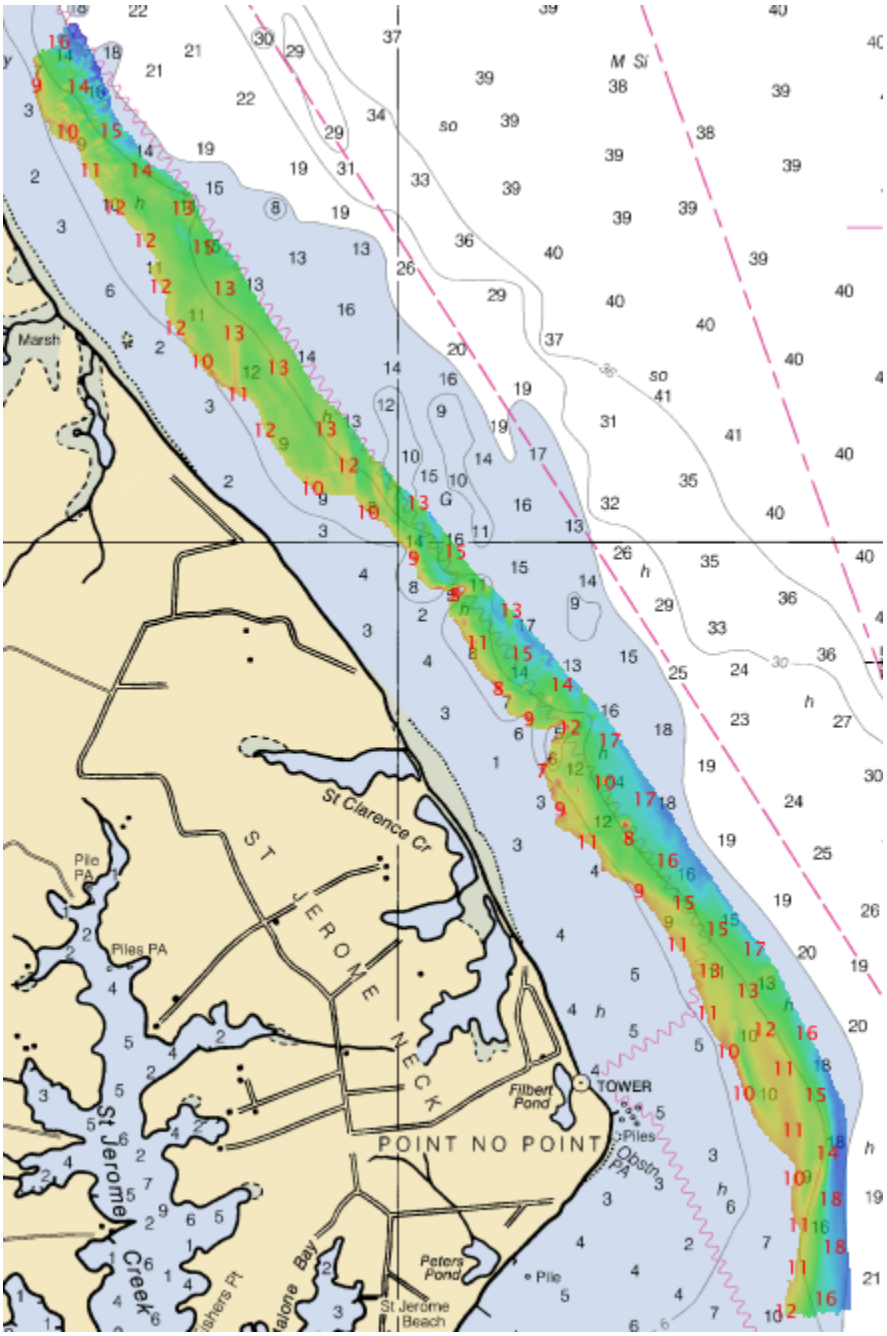


Figure 22: H12674 sounding, in red, compared with soundings from Chart 12233, in black. Soundings are in feet.

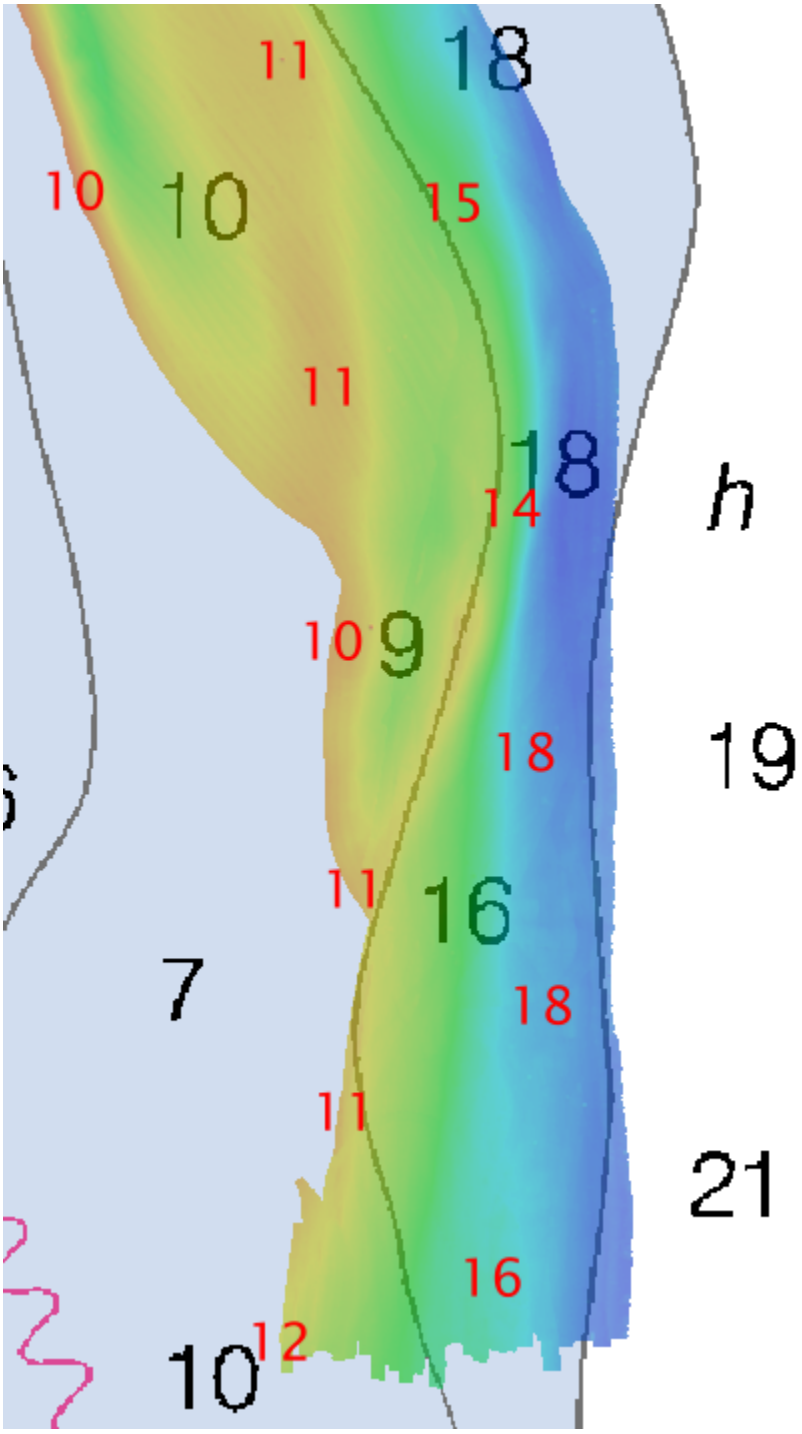


Figure 23: H12674 soundings, in red, compared with soundings from Chart 12233, in black. Subset taken from an area middle of the survey area. Sounding are in feet.

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?
US5VA22M	1:40000	24	06/13/2014	11/06/2014	NO

Table 14: Largest Scale ENCs

US5VA22M

Analysis shows ENC US5VA22M to be on average 3.21 feet shoaler than H12674 data (Figure 24). As with the comparison to Chart 12233, the large average difference is due to the shifting seafloor in the area (Figure 25). Depths outside the 12 foot contour were observed to be largely in agreement between H12674 and ENC US5VA22M.

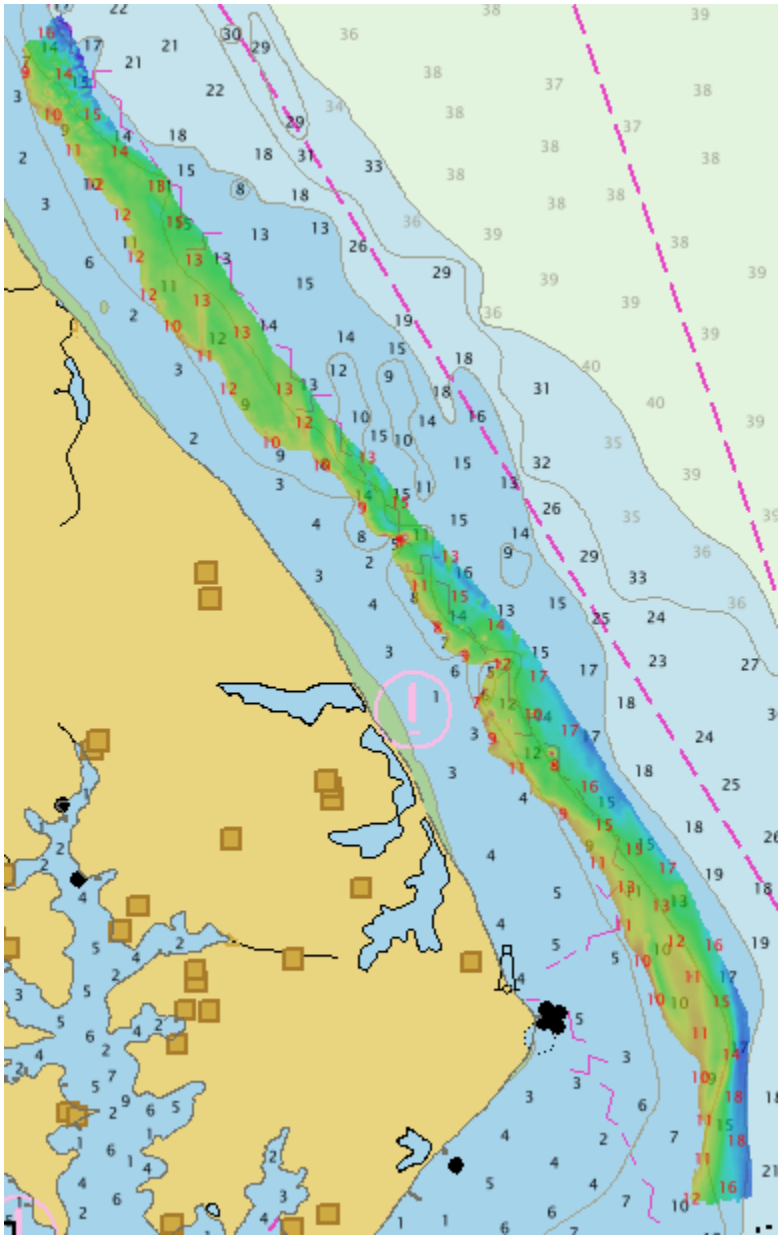


Figure 24: H12674 soundings, in red, compared with soundings from NOAA ENC US5VA22M, in black. Soundings are in feet.

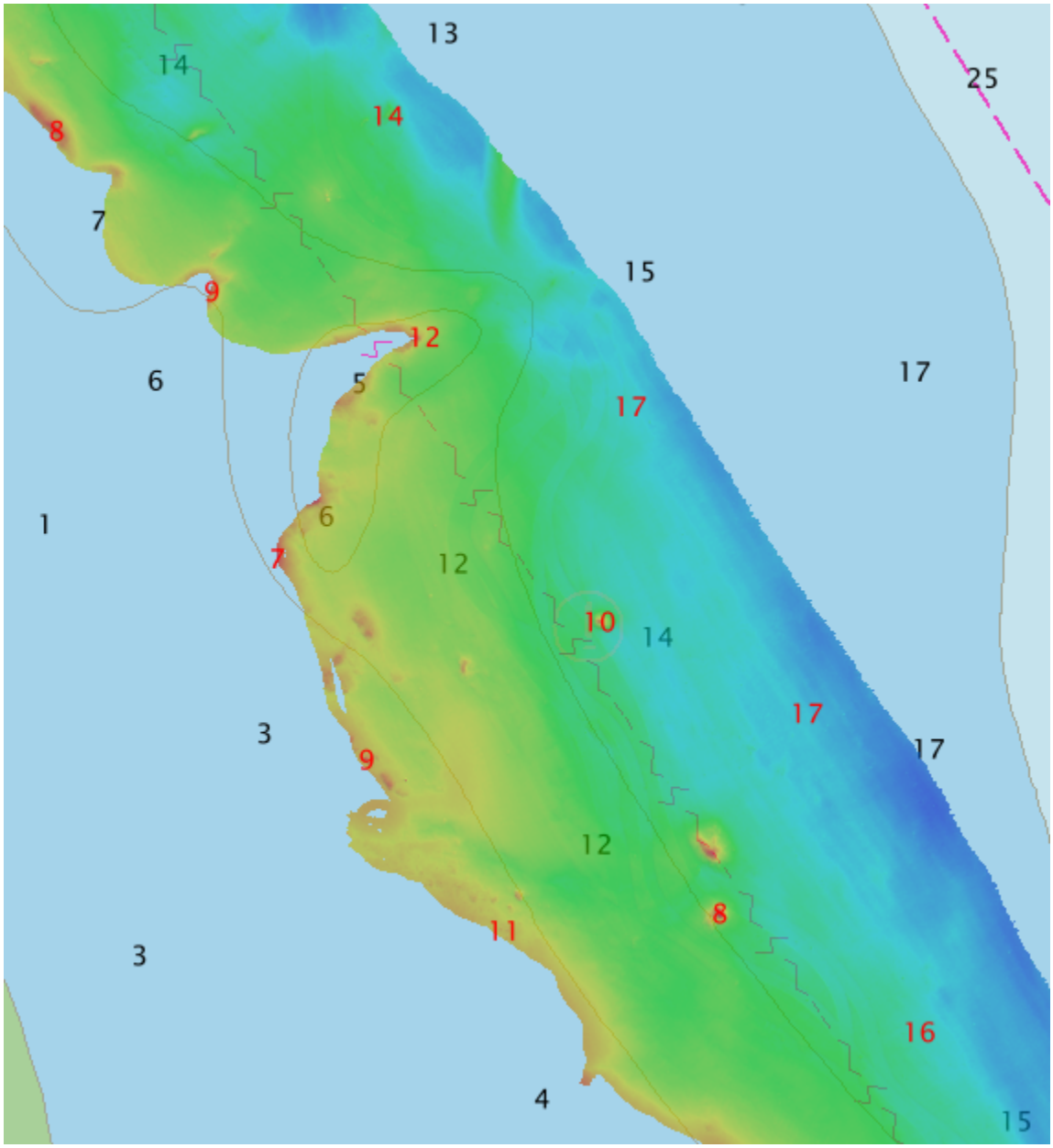


Figure 25: Northern subset of H12674 soundings, in red, compared with soundings from NOAA ENC US5VA22M, in black. Soundings are in feet.

D.1.3 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.4 Charted Features

There were fifteen unassigned charted features in H12674. All were inside of the 4m curve and unapproachable by Bay Hydro II. Features that were visible from the extents of the 4m curve were given a

cursory visual inspection and no gross deviations were seen. Photographs and further details can be found in the Final Feature File accompanying this submission.

D.1.5 Uncharted Features

Three small uncharted shoals were discovered during H12674 and are included in the Final Feature File. See Section D.1.8 for more information.

D.1.6 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.7 Shoal and Hazardous Features

There are three small, uncharted shoals that lie approximately 850m offshore of St. Clarence Creek (Figure 26). All three of the shoals are approximately 1 meter shoaler than Chart 12233 and range in size from 10m to 24m in diameter. See Final Feature File for more information.

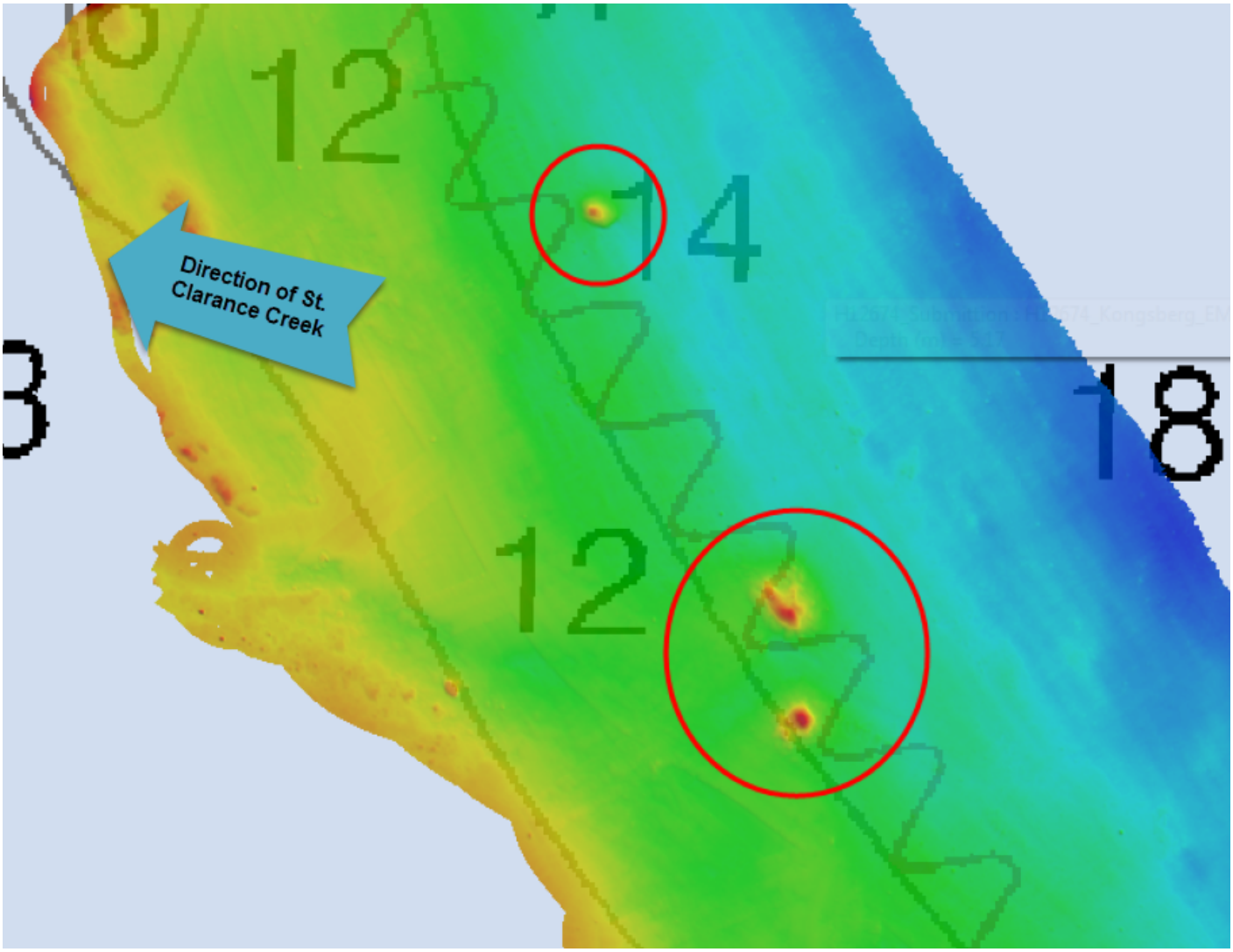


Figure 26: H12674 shoaling not indicated on Chart 12233. Areas of shoaling are encompassed in red circles.

D.1.8 Channels

No channels exist for this survey. There are no designated anchorages, precautionary areas, safety fairways, traffic separation schemes, pilot boarding areas, or channel and range lines within the survey limits.

D.1.9 Bottom Samples

The original H12674 project area had assigned bottom samples, however, after the project was truncated, no bottom samples were required by the new H12674.

D.2 Additional Results

D.2.1 Shoreline

A limited shoreline verification was assigned via the Project Instructions, where all submerged or visible cultural features inside the survey limit were to be addressed. BAY HYDRO II personnel were unable to gain access to private lands to position conspicuous shoreline features, however a cursory visual inspection from the extents of the 4m curve was performed. Photographs and further details can be found in the Final Feature File accompanying this submission.

D.2.2 Prior Surveys

No prior survey comparisons exist for this survey.

D.2.3 Aids to Navigation

No Aids to navigation (ATONs) exist for this survey.

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

There is a charted submarine cable that runs almost the entire length of the survey area; from the northern boundary, south to approximately 700m north of Point No Point, and then turns west ward toward shore. This cable is not apparent in the object detection MBES data.

D.2.6 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.7 Platforms

No platforms exist for this survey.

D.2.8 Significant Features

No significant features exist for this survey.

D.2.9 Construction and Dredging

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

D.2.10 New Survey Recommendation

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

D.2.11 Inset Recommendation

No new insets are recommended for this area.

E. Approval Sheet

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

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

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

Approver Name	Approver Title	Approval Date	Signature
LTjg Bart Buesseler, NOAA	Chief of Party	05/21/2015	Digitally signed by BUESSELER.BART.OWEN.1396600559 Date: 2015.05.21 08:46:04 -04'00'
Robert W. Mowery, NOAA	Senior Survey Technician	05/21/2015	MOWERY.ROBERT.WILLIAM.1379754488 Digitally signed by MOWERY.ROBERT.WILLIAM.1379754488 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=MOWERY.ROBERT.WILLIAM.1379754488 Date: 2015.05.21 08:42:29 -04'00'

F. Table of Acronyms

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

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

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

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : December 29, 2014

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-E349-BH2-14
HYDROGRAPHIC SHEET: H12674

LOCALITY: Point No Point to 3NM North, Central Ches. Bay, MD
TIME PERIOD: May 19 - December 17, 2014

TIDE STATION USED: Lewisetta, VA 863-5750
Lat.37° 59.8′ N Long. 76° 27.9' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 0.416 meters

TIDE STATION USED: Bishops Head, MD 857-1421
Lat. 38° 13.2' N Long. 76° 2.3' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 0.575 meters

REMARKS: RECOMMENDED GRID

Please use the TCARI grid "E349BH22014_Rev.tc" as the final grid for project OPR-E349-BH2-14, H12674, during the time period between May 19 and December 17, 2014.

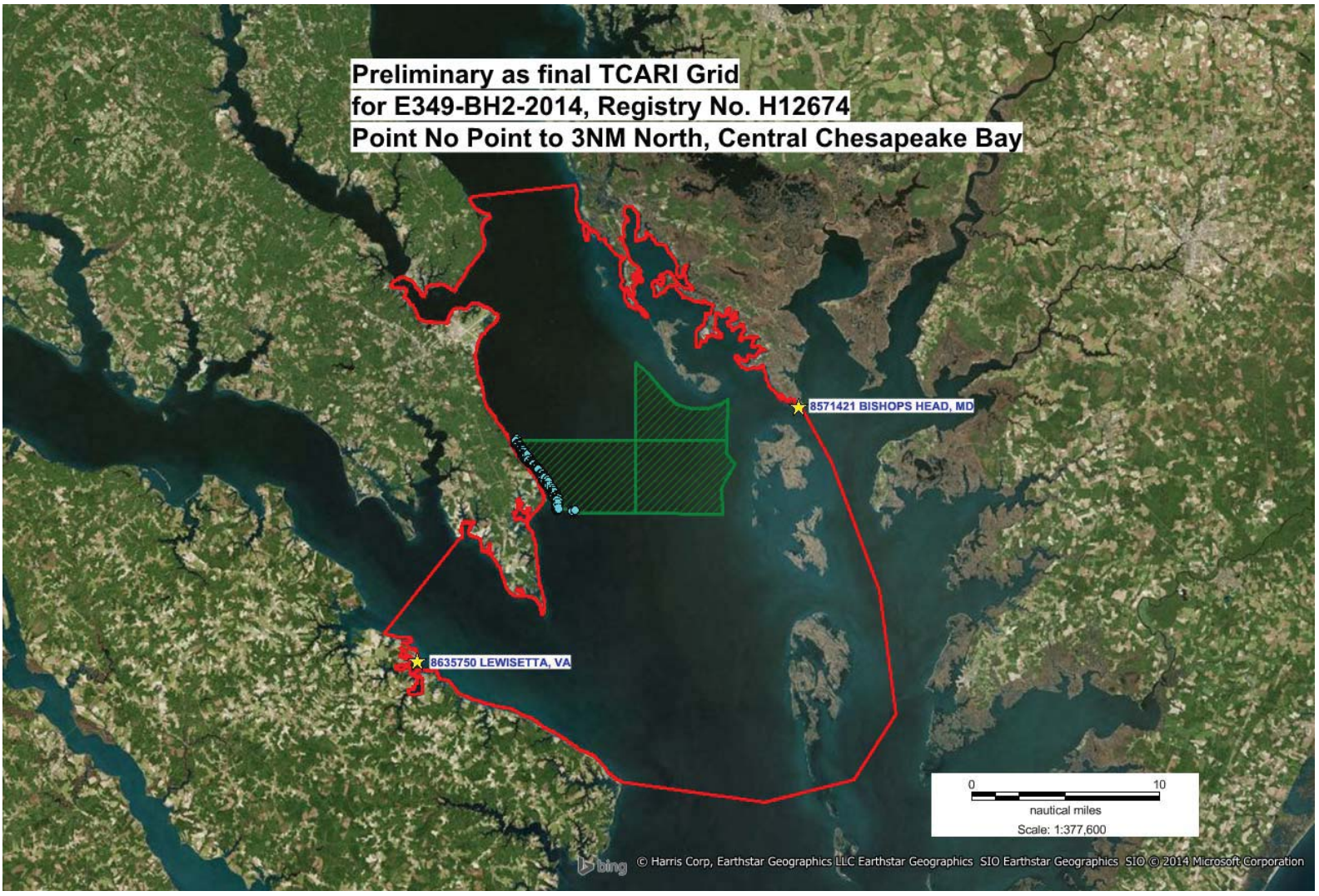
Refer to attachments for grid information.

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).

HOVIS.GERALD.THOMAS.JR.1365860250

Digitally signed by HOVIS.GERALD.THOMAS.JR.1365860250
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=HOVIS.GERALD.THOMAS.JR.1365860250
Date: 2014.12.30 16:33:04 -05'00'

CHIEF, PRODUCTS AND SERVICES BRANCH


Preliminary as final TCARI Grid
for E349-BH2-2014, Registry No. H12674
Point No Point to 3NM North, Central Chesapeake Bay
8571421 BISHOPS HEAD, MD
8635750 LEWISETTA, VA
0
10
nautical miles
Scale: 1:377,600
bing
© Harris Corp, Earthstar Geographics LLC Earthstar Geographics SIO Earthstar Geographics SIO © 2014 Microsoft Corporation

APPROVAL PAGE

H12674

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

- H12674_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12674_GeoImage.pdf

The survey evaluation and verification has been conducted according current OCS Specifications.

Approved:_____ Digitally signed by RAYMOND.ANNEMIEKE.S.1365883048 Date: 2016.05.17 11:07:00 -07'00'

Annie Raymond
Acting Cartographic Team Lead, Pacific Hydrographic Branch

The survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.

Approved:_____ Digitally signed by HOLMBERG.PETER.SCOTT.1365886101 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=HOLMBERG.PETER.SCOTT.1365886101 Date: 2016.05.17 10:49:54 -07'00'

Peter Holmberg
Acting Chief, Pacific Hydrographic Branch