

H12304

NOAA Form 76-35A

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

DESCRIPTIVE REPORT

Type of Survey: Basic Hydrographic Survey

Registry Number: H12304

LOCALITY

State: Maryland

General Locality: Chesapeake Bay

Sub-locality: 4 NM North by Northeast of Point No Point

2011

CHIEF OF PARTY
Lt Megan Guberski

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Date:

| | | | |
|--|---|--|------------------|
| NOAA FORM 77-28 (11-72) | | U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION | REGISTRY NUMBER: |
| HYDROGRAPHIC TITLE SHEET | | | H12304 |
| 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: | Maryland | | |
| General Locality: | Chesapeake Bay | | |
| Sub-Locality: | 4 NM North by Northeast of Point No Point | | |
| Scale: | 10000 | | |
| Dates of Survey: | 04/18/2011 to 06/18/2012 | | |
| Instructions Dated: | 05/16/2011 | | |
| Project Number: | OPR-E349-BH-11 | | |
| Field Unit: | NOAA R/V Bay Hydro II | | |
| Chief of Party: | Lt Megan Guberski | | |
| Soundings by: | Singlebeam Echo Sounder Multibeam Echo Sounder | | |
| Imagery by: | Side Scan Sonar | | |
| Verification by: | Pacific Hydrographic Branch | | |
| Soundings Acquired in: | meters at Mean Lower Low Water | | |
| H-Cell Compilation Units: | <i>meters at Mean Lower Low Water</i> | | |
| Remarks: <i>The purpose of this survey is to provide contemporary survey to update National Ocean Service (NOS) charts. All separates are filed with the hydrographic data. Revisions and 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 Geophysical Data Center (NGDC) and can be retrieved via http://www.ngdc.noaa.gov/.</i> | | | |

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Descriptive Report to Accompany Survey H12304

Project: OPR-E349-BH-11

Locality: Chesapeake Bay

Sublocality: 4 NM North by Northeast of Point No Point

Scale: 1:10000

April 2011 - June 2012

NOAA R/V *Bay Hydro II*

Chief of Party: Lt Megan Guberski

A. Area Surveyed

Sheet H12304 is a seventeen square nautical mile (SNM) area positioned four nautical miles north of Point No Point, Maryland. The sheet's north western edge start 5,600m east of Cedar Point on the Patuxent River's southern edge and extends east to 7,700 m east of Cedar Point. The sheet extends 6.69 linear nautical miles (LNM) south from the northwestern edge so that the southwestern edge is 4,500m east of the bay's western shore. From the southwestern edge of the survey area, the sheet then extends to 12,200m east of the western shore.

A.1 Survey Limits

Data was acquired within the following survey limits:

| Northeast Limit | Southwest Limit |
|-----------------|-----------------|
| 38.3019278611 N | 38.1904164167 N |
| 76.2857109444 W | 76.3085698333 W |

Table 1: Survey Limits

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

A.2 Survey Purpose

This survey is intended to supersede all bathymetry, seafloor features, and benthic characteristics within the critical survey area as designated in the 2010 edition of the NOAA Hydrographic Survey Priorities. The assigned survey area as define by the project instructions is intended to update NOAA charts 12231, 12233, 12261, and 12264.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

As per the letter instruction, OPR-E349-BH-11, H12304 was conducted using 200% Side Scan Sonar coverage with concurrent Vertical Beam Echosounder coverage. The hydrographer recommends that all affected charts be updated to reflect the current bathymetric data acquired over the survey area.

A.4 Survey Coverage

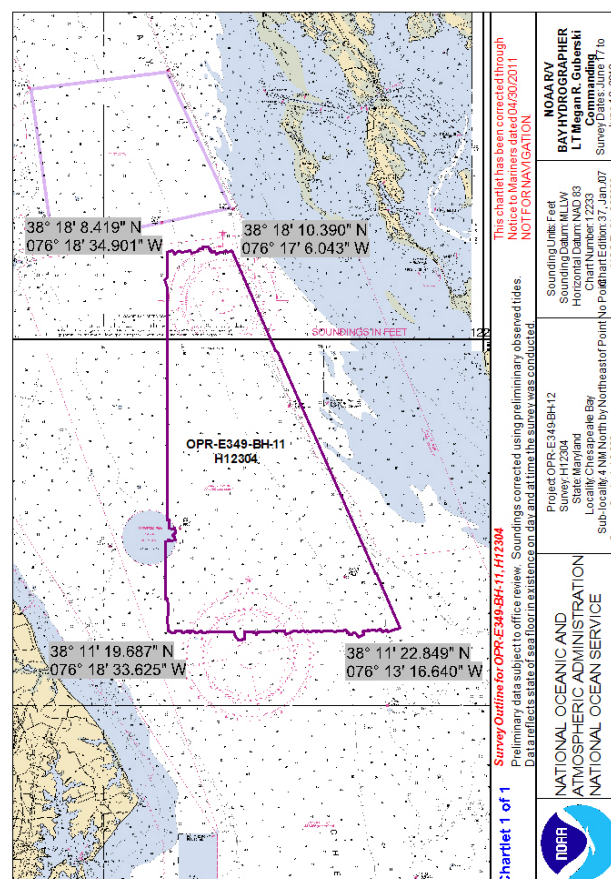


Figure 1: OPR-E349-BH-11 Survey Outline

There were two deviations from the survey coverage requirements listed in the Project Instructions. The first is was a 100m x 13,000m swath of MBES data collected on the eastern edge of the survey. Late in 2011 the R/V Bay Hydro II's Side Scan Sonar towfish failed and no replacement could be found. In an effort to continue surveying, the team began collecting mainscheam MBES data. An amendment to the original project instructions was issued, however it was found that the MB data did not meet NOAA's density

requirements. Once the failure was discovered, the area was re-surveyed with the repaired Side Scan Sonar, however the mainscheam MB data was retained for use in contact development and generalized bathymetry.

A second deviation occurred in the Southwest corner of the survey, where a 1900m x 1300m square of MB data was collected. This area was also covered by Object Detection MB in support of an OCS Backscatter project. Sounding density for this section met NOAA's requirement, and the data was used to meet Object Detection requirements for feature development.

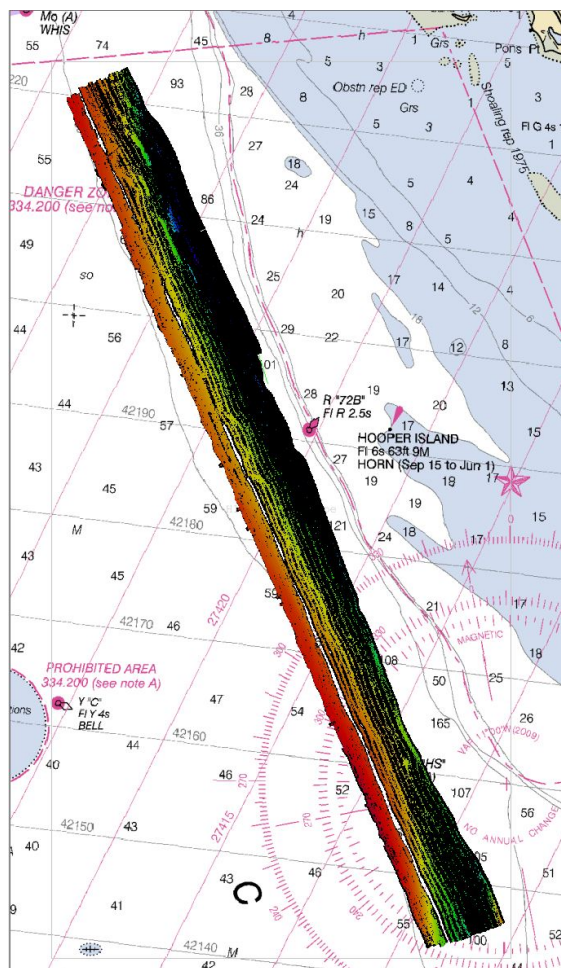


Figure 2: Deviation 1: Area covered by mainscheam multibeam. Nodes colored black failed to meet 5 pings/node.

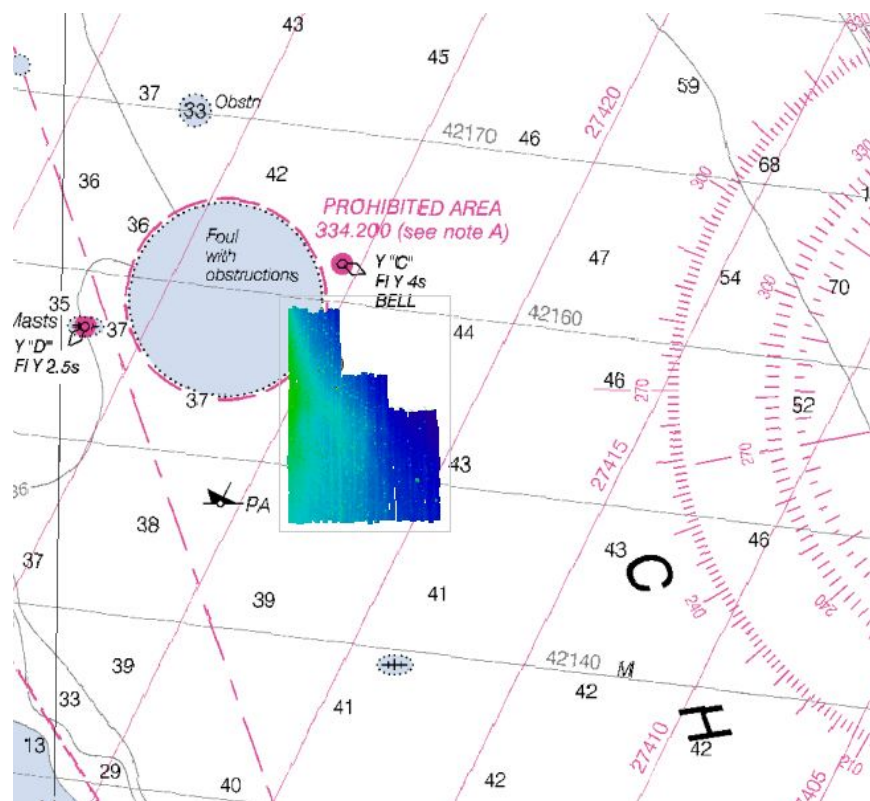


Figure 3: Deviation 2: Area covered by Object Detection multibeam.

A.5 Survey Statistics

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

| | HULL ID | <i>S5401</i> | <i>Total</i> |
|---|---|---------------------|---------------------|
| LNM | SBES Mainscheme | 491.563 | 491.563 |
| | MBES Mainscheme | 48.43 | 48.43 |
| | Lidar Mainscheme | 0.0 | 0.0 |
| | SSS Mainscheme | 491.563 | 491.563 |
| | SBES/MBES Combo Mainscheme | 0.00 | 0.00 |
| | SBES/SSS Combo Mainscheme | 491.563 | 491.563 |
| | MBES/SSS Combo Mainscheme | 0.00 | 0.00 |
| | SBES/MBES Combo Crosslines | 49.357 | 49.357 |
| | Lidar Crosslines | 0.0 | 0.0 |
| Number of Bottom Samples | | | 6 |
| Number of DPs | | | 3 |
| Number of Items Items Investigated by Dive Ops | | | 0 |
| Total Number of SNM | | | 17.0 |

Table 2: Hydrographic Survey Statistics

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

| <i>Survey Dates</i> |
|----------------------------|
| 06/17/2011 |
| 06/28/2011 |
| 06/30/2011 |
| 07/06/2011 |
| 07/18/2011 |
| 07/19/2011 |
| 07/20/2011 |
| 07/21/2011 |
| 07/26/2011 |
| 09/12/2011 |
| 10/18/2011 |
| 12/13/2011 |
| 12/14/2011 |
| 01/09/2012 |
| 01/10/2012 |
| 02/02/2012 |
| 05/14/2012 |
| 05/15/2012 |
| 05/16/2012 |
| 05/22/2012 |
| 05/23/2012 |
| 05/24/2012 |
| 01/11/2012 |
| 02/21/2012 |
| 11/15/2011 |
| 11/16/2011 |
| 11/21/2011 |
| 04/25/2012 |
| 05/02/2012 |
| 06/07/2012 |
| 06/11/2012 |
| 06/18/2012 |
| 03/01/2012 |

Table 3: Dates of Hydrography

A.6 Shoreline

Shoreline was investigated in accordance with the Project Instructions and the HSSD.

A.7 Bottom Samples

A total of 10 bottom samples were assigned to survey H12304, however only 6 could be acquired. The remaining four were in depths greater than the grab sampler could operate.

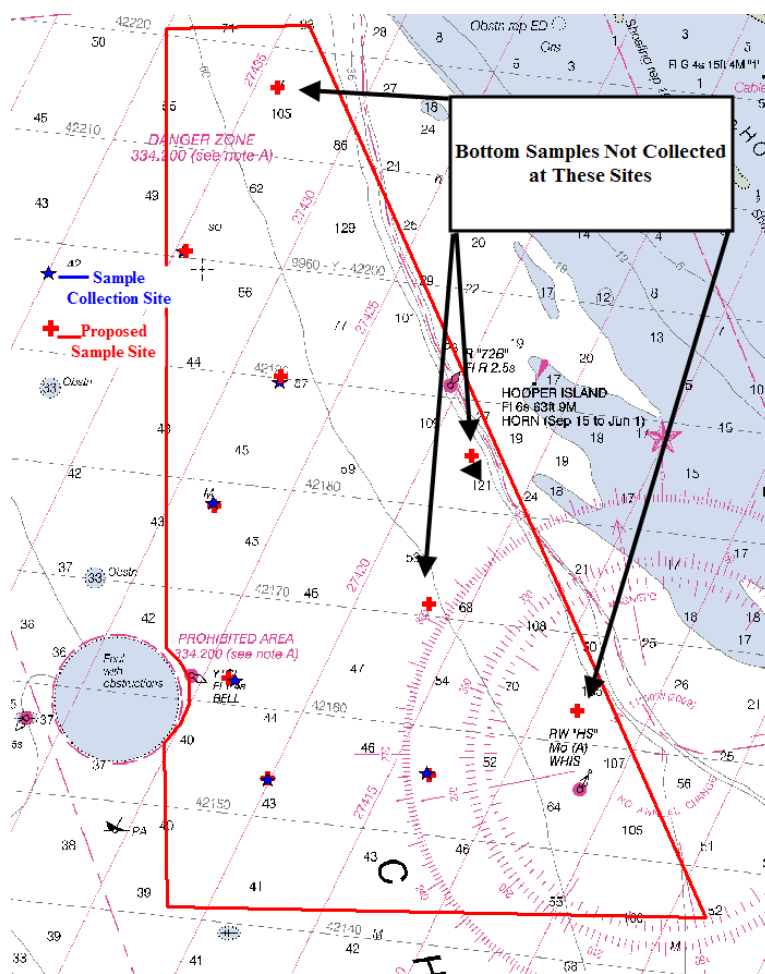


Figure 3: Bottom Sample Locations

Nine bottom samples were submitted from the field, three of which are outside the survey area. All nine were included in the chart update product.

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 | <i>S5401</i> |
| LOA | 17.3 meters |
| Draft | 1.8 meters |

Table 4: Vessels Used

The R/V Bay Hydro II collected all Multibeam data, Side Scan Sonar data, Vertical Beam data, Sound Velocity data, and Attitude data for Survey H12304.

B.1.2 Equipment

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

| Manufacturer | Model | Type |
|---------------------|------------------|------------------------|
| ODOM | Echotrac CV-200 | SBES |
| RESON | SeaBat 7125 | MBES |
| Klein | 5000 Lightweight | SSS |
| Applanix | POS M/V V4 | Vessel Attitude System |
| Applanix | POS M/V V4 | Positioning System |
| Sea-Bird | 19+ | Sound Speed System |
| ODOM | Digi-Bar Pro | Sound Speed System |

Table 5: Major Systems Used

Vessel configurations, equipment operations, and data acquisition & processing were consistent with specifications described in the DAPR.

B.2 Quality Control

B.2.1 Crosslines

The R/V Bay Hydro II collected 49.2 linear nautical miles of VBES crosslines, equating to 10.0% of mainscheme VBES data. Crosslines were compared to mainscheme in two ways. The first was a through the creation of 25 Pydro checkpoints, placed in areas where the VBES crosslines overlapped VB and MB mainscheme. The depth at each checkpoint was assumed to be equal to the depth of the crossline, and all other soundings were evaluated according to that depth. The mean difference for all checkpoints is 0.00m, and the cumulative standard deviation is 0.10m. For the full report, see H12304 Checkpoint Report in the Separates section of this report.

Further evaluation of crosslines was accomplished using a Difference Surface, created in CARIS BathyData Base. Using a Difference Surface, every instance of overlap was evaluated. When VBES crosslines were compared to just VBES mainscheme, the Mode was 0.04m, and the Standard Deviation was 0.31m. When VBES crosslines were compared to MBES mainscheme, the Mode was 0.14m and the Standard Deviation was 0.21m. The higher values are due to poor Sound Speed resolution. For a full discussion, see section B.2.6.1 of this report.

B.2.2 Uncertainty

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

Table 6: Survey Specific Sound Speed TPU Values

Survey H12304 used a Tidal Constituent and Residual Interpolator (TCARI) grid to apply tidal correctors. TCARI automatically calculates the error associated with water level interpolation, which is then included in the Total Propagated Error for the survey. For this reason, no Tidal Uncertainties values were put into CARIS. For a full discussion of uncertainties due to water levels, see the Water Level Instruction report, section 1.3.3, located in Appendix I of this report.

Uncertainties due to Sound Speed were set by the field unit, in accordance with the parameters listed in the NOAA Field Procedures Manual (ed 2012), Appendix 4, table 4.9. Sound Velocity profiles were taken at 4 hour intervals, and inspection of the MB data shows poor sound velocity resolution. For this reason uncertainty due to Measured CTD was set to 4 meters/second. Surface uncertainty is equal to the standard deviation of all Velocity generated DQA reports.

B.2.3 Junctions

There were a total of 7 junction surveys assigned in the Project Instructions for survey H12304, however only 2 overlap with the current survey. Survey H11598 bounds to the west, and H11450 bounds to the North. Depths differences were evaluated using difference surfaces created in CARIS BathyData Base. All junctions were found to be within the 1 meter variance specified by NOAA Field Procedure Manual, section 4.5.2 (2012 ed).

The following junctions were made with this survey:

| Registry Number | Scale | Year | Field Unit | Relative Location |
|-----------------|---------|------|-----------------------|-------------------|
| H11598 | 1:10000 | 2006 | NOAA R/V BAY HYDRO II | W |
| H11450 | 1:10000 | 2008 | NOAA R/V BAY HYDRO II | N |

Table 7: Junctioning Surveys

H11598

The east edge of survey H11598 overlaps the west edge of H12304. The depth differences between the surveys ranged from -0.6m (H12304 shallower) to 0.9m (H12304 deeper). The difference surface contains 4464 nodes. The mode was 0.3m, and the standard deviation was 0.26m.

H11450

The south edge of survey H11450 overlaps the north edge of H12304. The depth differences between the surveys range from -0.3m (H12304 shallower) to 0.5m (H12304 deeper). The difference surface contains 88 nodes. The mode of the overlap was 0.0m, and the standard deviation was 0.16m.

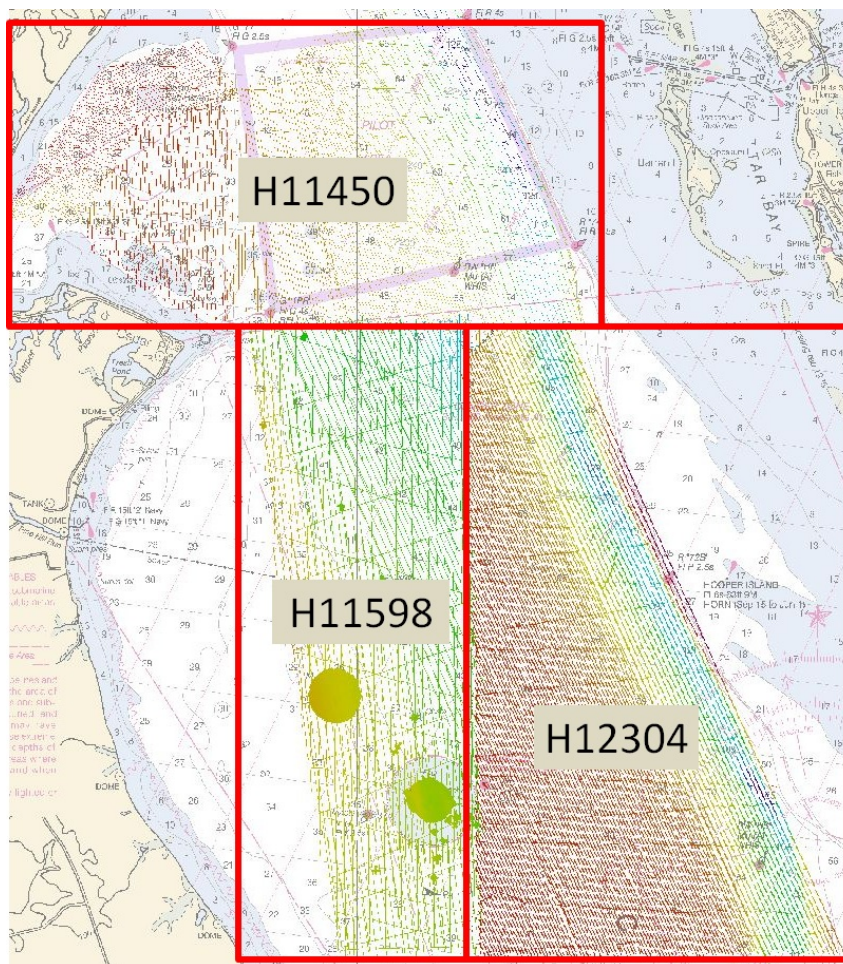


Figure 4: Junctions with Survey H12304

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

B.2.5.1 Large Depth Differences Between MBES and VBES Surfaces.

During post-processing CARIS BathyData Base was used to find the difference in depth between the survey's MB and VB surfaces. Inspection of this Difference Surface showed areas with a high degree of separation. Figure 5 shows the Difference Surface. Areas colored green have less than 0.25m of depth difference between the VB and MB surfaces. Conversely, the black areas show depth differences greater than 0.25m.

This error appears to have been caused by insufficient number of sound velocity casts. Several areas of the MB mainsream show the effects of poor SVP resolution, with the outerbeams 'bowing' upward. As a result, any VB data that overlaps an off-nadir section of a MB line shows depth differences. Figure 6 shows an example: the green VB line in the upper right correlates well with the near-nadir section of the orange MB

line. In contrast, the blue VB line appears between the the upward bowing outerbeams of the purple and orange MB lines.

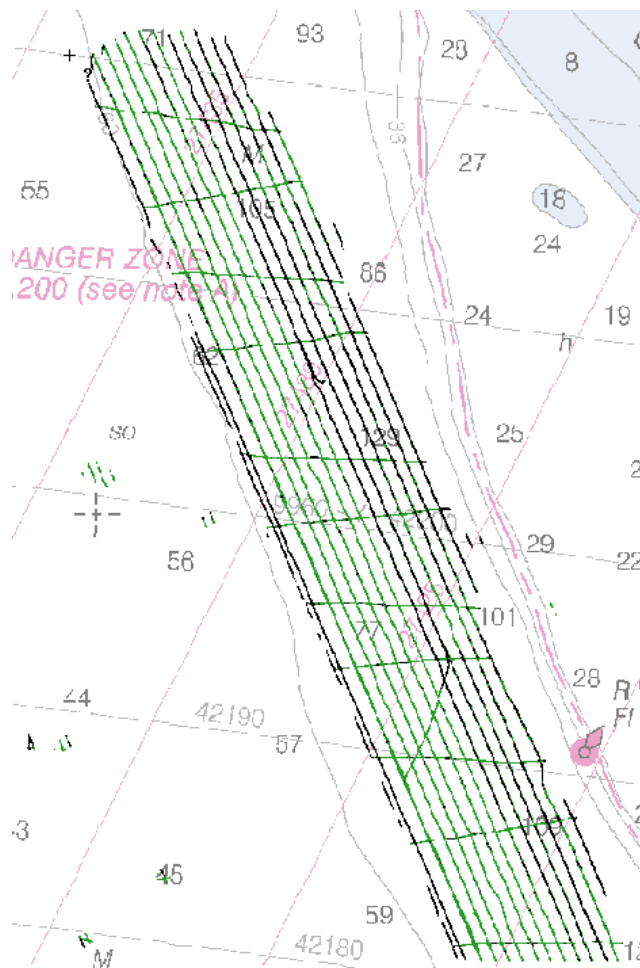


Figure 5: Area of VB and MB overlap.

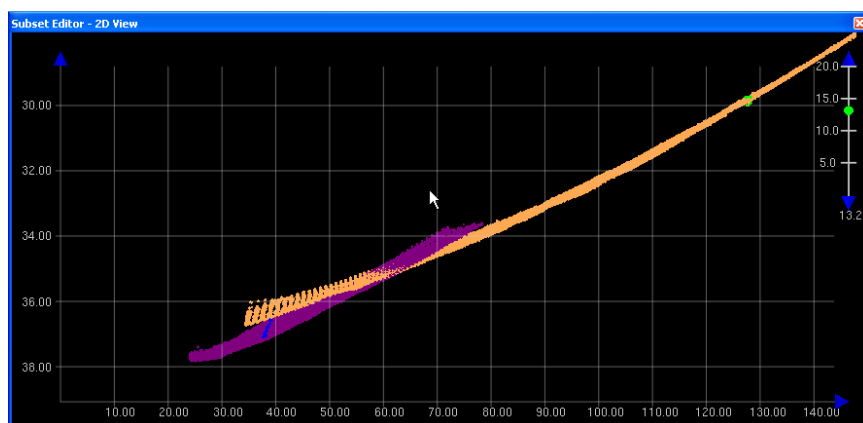


Figure 6: Subset showing overlapping VB and MB lines.

B.2.5.1 Multibeam Mainscans Sounding Density

Late in 2011 the R/V Bay Hydro II's Side Scan Sonar towfish failed and no replacement could be found. In an effort to continue surveying, the team began collecting mainscans MBES data. It was later discovered that the RESON 7125 could not meet density requirements in the deeper sections of the survey. Once the failure was discovered, the area was re-surveyed with the repaired Side Scan Sonar, however the mainscans MB data was retained for use in contact development.

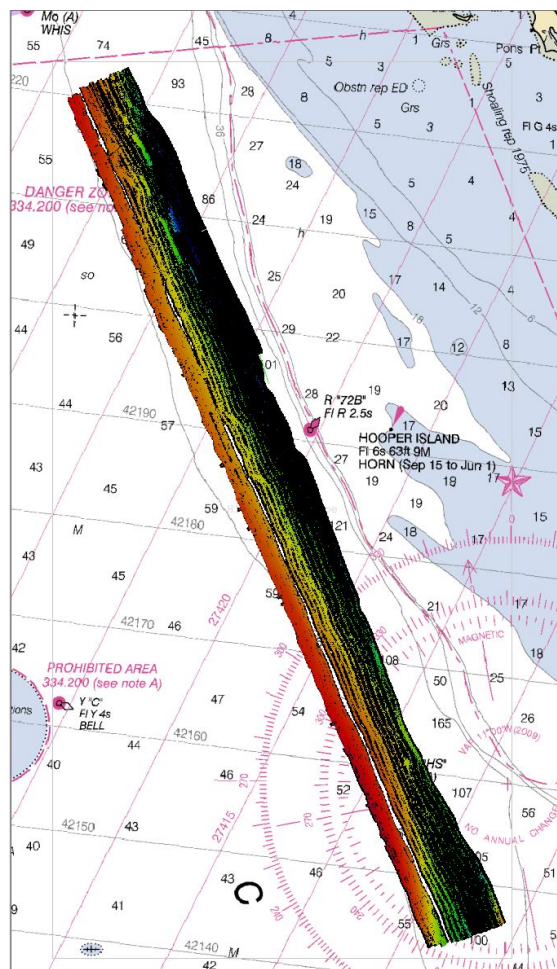


Figure 7: A Density surface, filtered to show only nodes with 5 pings or greater.

B.2.5.1 Multibeam Development Sounding Density

Due to an aging system, the Bay Hydro II's RESON 7125 Multibeam cannot acquire above 256 beams at the equi-angular setting. In deeper water the lower number of beams and footprint spreading caused low

density in the outer beams. As a result NOAA density requirements were met in only 81% of nodes for MB developments in depths greater than 20 meters. It should be noted that the density failure occurs only on the edge of a swath, and does not affect detection of least depth.

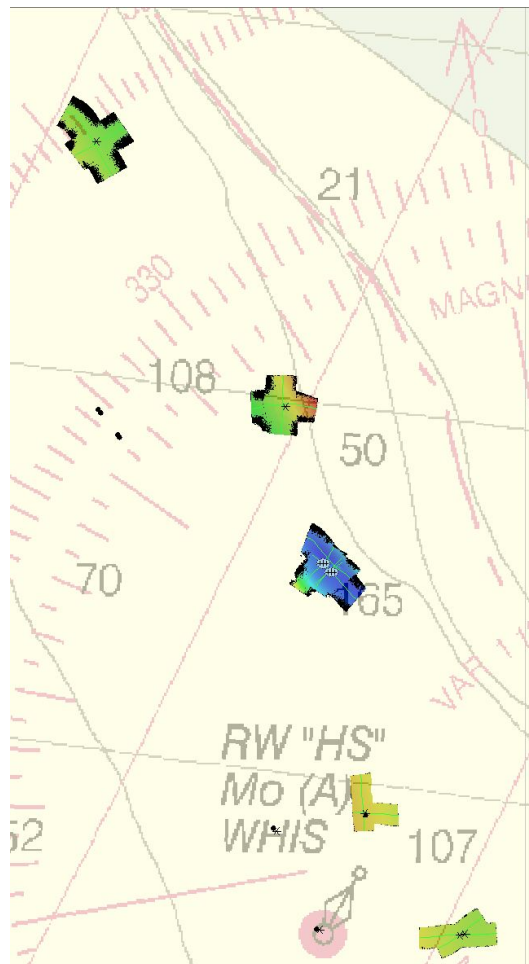


Figure 8: MB developments in waters greater than 20 meters. Nodes colored black failed to meet 5 pings/node.

B.2.5.1 Artifact in MB data

All Multibeam data for survey H12304 contains a data artifact. The artifact appears as an elongated S that goes from port to starboard across the swath. The port outerbeams are consistently lower and generally flat, the middle beams slope up, and the starboard outerbeams are again flat, but higher than the port side. The height of the slope is ~0.08m.

The following method was used to ensure that survey H12304 remained within allowed Total Propagated Uncertainty values despite the data artifact. First the shallowest point of the survey area was found, and the Total Vertical Uncertainty for that depth was calculated. The shallowest depth in survey H12304 is 8.83

meters, and the associated maximum TVU is 0.513m (5.1.3 of NOAA's HSSD (2012 ed)). Using this value as a ceiling, all CUBE surface nodes were then binned according to TVU value, then the associated TVU value was increased by 0.10 meters, ie: a TVU value of 0.23 was considered to be 0.33. The percentage of nodes with TVU value ≤ 0.413 (equivalent to 0.513 when including the data artifact) was found to be 99.73% (31,275,987 out of 31,359,906). Despite the data artifact, over 99% of surface nodes are under the uncertainty value of the shallowest depth.

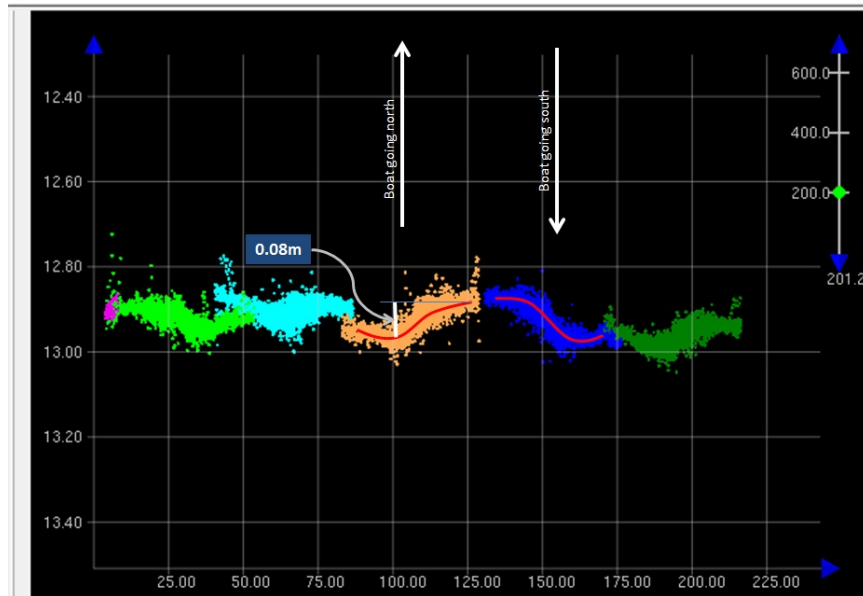


Figure 9: CARIS 2d subset of the MB artifact.

The data is within spec and acceptable for charting despite the artifact.

B.2.6 Factors Affecting Soundings

B.2.6.1 None Exist

There were no other factors that affected corrections to soundings.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Surface Sound speed was collected in real time, and integrated into the RESON 7125 bathymetric data.

Sound Velocity Profile casts were generally acquired at approximately four hour intervals when acquiring MB data, and weekly for VB data. Sound speed values were then applied to the data in CARIS HIPS. For

MB data the Nearest in Distance within Time option was used, with the Time parameter set to 4 hours. For VB data the Nearest in Time option was used.

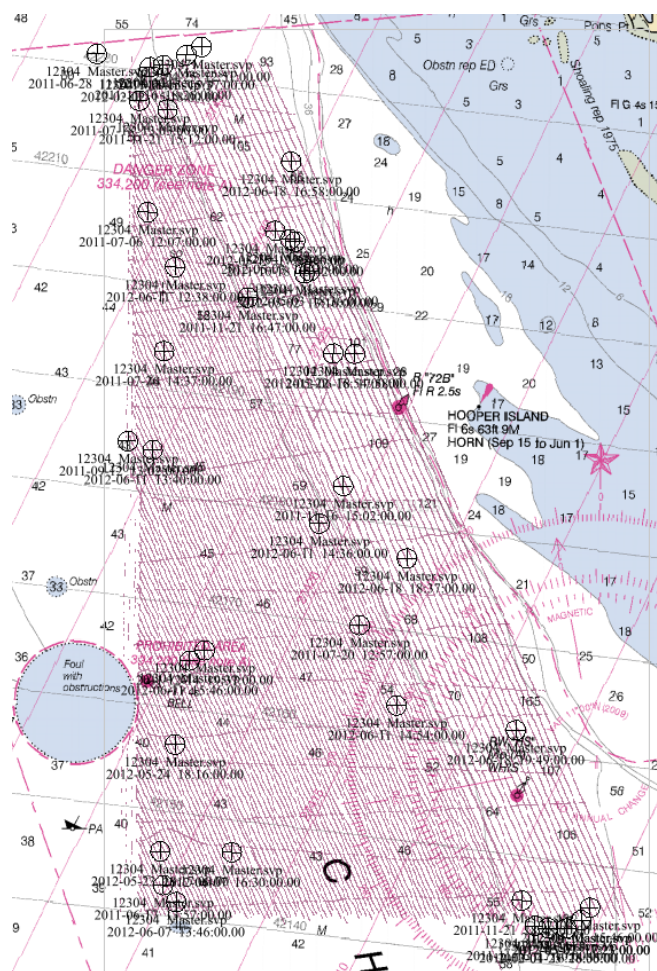


Figure 10: H12340 SVP cast distribution

B.2.8 Coverage Equipment and Methods

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

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

On day 2012_144 a roll error was noticed in the MB data. The Calibration tool within CARIS HIPS was used to find a new roll value. This value was used for day 2012_144 and all subsequent days.

B.4 Backscatter

Backscatter was logged as a s7k file and submitted to the IOCM processing center and/or directly to NGDC, and is not included with the data submitted to the Branch.

B.5 Data Processing

B.5.1 Software Updates

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

The following Feature Object Catalog was used: NOAA Extended Attributes, V5.2

B.5.2 Surfaces

The following CARIS surfaces were submitted to the Processing Branch:

| Surface Name | Surface Type | Resolution | Depth Range | Surface Parameter | Purpose |
|------------------------|------------------|----------------|-----------------------------|-------------------|-----------------------|
| H12304_1m_MBES_Final | CUBE | 1 meters | 19.00 meters - 53.92 meters | NOAA_1m | Object Detection |
| H12304_50cm_MBES_Final | CUBE | 50 centimeters | 8.86 meters - 20.00 meters | NOAA_0.5m | Complete MBES |
| H12304_VBES_Final | BASE Uncertainty | 4 meters | 8.32 meters - 48.61 meters | N/A | SBES Set Line Spacing |
| H12304_1m_SSS_100 | SSS Mosaic | 1 meters | 8.32 meters - 53.92 meters | N/A | 100% SSS |
| H12304_1m_SSS_200 | SSS Mosaic | 1 meters | 8.32 meters - 53.92 meters | N/A | 100% SSS |

Table 8: CARIS Surfaces

Per section 5.2.2.1 of the NOAA HSSD Manual (2012 ed), all MBES data was gridded according to depth: 0.5m resolution for depths ranging from 0 - 20m, and a 1m for depths 19m and greater.

All VB data was incorporated into a single Uncertainty surface, gridded at 4m resolution.

All SSS data was separated into percentages, then mosaiced at 1m resolution.

C. Vertical and Horizontal Control

Additional information discussing the vertical or horizontal control for this survey can be found in the accompanying HVCR.

C.1 Vertical Control

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

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 |
|-----------------|------------|
| Solomons Island | 8577330 |
| Lewisetta, VA | 8635750 |
| Bishops Head | 8571421 |

Table 9: NWLON Tide Stations

There was no Water Level file associated with this survey.

| File Name | Status |
|----------------------|--------|
| E349BH2011 | Final |
| 8577330_verified.tid | Final |
| 8635750_verified.tid | Final |
| 8571421_verified.tid | Final |

Table 10: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 06/19/2012. The final tide note was received on 08/01/2012.

The Tide Note is attached.

C.2 Horizontal Control

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

The following DGPS Stations were used for horizontal control:

| DGPS Stations |
|-------------------------|
| Annapolis, MD (301 kHz) |

Table 11: USCG DGPS Stations

D. Results and Recommendations

D.1 Chart Comparison

D.1.1 Raster Charts

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

| Chart | Scale | Edition | Edition Date | LNLM Date | NM Date |
|-------|---------|---------|--------------|------------|------------|
| 12233 | 1:40000 | 29 | 01/2007 | 07/31/2012 | 08/04/2012 |
| 12261 | 1:40000 | 29 | 06/2006 | 07/31/2012 | 07/28/2012 |
| 12264 | 1:40000 | 30 | 07/2007 | 05/22/2012 | 07/28/2012 |

Table 12: Largest Scale Raster Charts

12233

All applicable RNC and ENC chart scale soundings differ around a meter with H12304 survey data. The natural deep draft channel, located on the eastern side of the survey, differs around 2m.

12261

All applicable RNC and ENC chart scale soundings differ around a meter with H12304 survey data. The natural deep draft channel, located on the eastern side of the survey, differs around 2m.

12264

All applicable RNC and ENC chart scale soundings differ around a meter with H12304 survey data. The natural deep draft channel, located on the eastern side of the survey, differs around 2m.

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? |
|--------------|---------|---------|-------------------------------|------------|--------------|
| JS5MD21M.002 | 1:40000 | 17 | 05/17/2012 | 07/10/2012 | NO |

Table 13: Largest Scale ENCs

US5MD21M.002

All applicable RNC and ENC chart scale soundings differ around a meter with H12304 survey data. The natural deep draft channel, located on the eastern side of the survey, differs around 2m.

D.1.3 AWOIS Items

No AWOIS items exist for this survey.

D.1.4 Charted Features

No charted features exist for this survey.

D.1.5 Uncharted Features

A total of 36 uncharted significant features were found in survey H12304. For a full discussion, see the Final Feature File.

All features were reviewed and selected features were included in the chart update product as appropriate to the chart's scale

D.1.6 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.7 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.8 Channels

No channels with controlling depths 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.2 Additional Results

D.2.1 Shoreline

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

D.2.2 Prior Surveys

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

D.2.3 Aids to Navigation

A total of three ATONS were investigated. They were found to be serving their intended purpose, and match the characteristics found on the chart and in the Light List.

D.2.4 Overhead Features

Overhead features do not exist for this survey.

D.2.5 Submarine Features

Submarine features do not exist for this survey.

D.2.6 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.7 Platforms

No platforms exist for this survey.

D.2.8 Significant Features

Significant features exist for this survey. For a full description, see the feature report.

A feature report was not submitted with the survey. Features were submitted in the H12304_Final_Feature_File.000 and reviewed during office processing.

D.2 Construction and Dredging

There is no present or planned construction or dredging within the survey limits.

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, Standing and Letter Instructions, and all HSD Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies noted in the Descriptive Report.

| Report Name | Report Date Sent |
|--|------------------|
| Data Acquisition and Processing Report | 2012-09-04 |
| Tides and Water Levels Package | 2012-09-04 |

| Approver Name | Approver Title | Approval Date | Signature |
|----------------------|----------------|---------------|---|
| LT Megan R. Guberski | Chief of Party | 09/04/2012 | <div><div>GUBERSKI.MEGAN.R.1283261189</div><div><small>Digitally signed by GUBERSKI.MEGAN.R.1283261189 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=NOAA, cn=GUBERSKI.MEGAN.R.1283261189 Date: 2012.09.04 14:14:02 -0400</small></div></div> |

F. Table of Acronyms

| Acronym | Definition |
|----------------|--|
| AFF | Assigned Features File |
| 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 Station |
| 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 |
| 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 |
| HSSDM | Hydrographic Survey Specifications and Deliverables Manual |

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

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



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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : July 26, 2012

HYDROGRAPHIC BRANCH: Atlantic
HYDROGRAPHIC PROJECT: OPR-E349-BH2-2012
HYDROGRAPHIC SHEET: H12304

LOCALITY: 4 NM North of Point No Point, Chesapeake Bay, MD
TIME PERIOD: June 17, 2011 - June 18, 2012

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: Solomons Island, MD 857-7330
Lat. 38° 19' N Long. 76° 27.1' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 0.405 meters

Tide STATION USED: Bishophs Head, MD 857-1421
Lat. 38° 13.2' Long. 76° 2.3' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 0.573 meters

REMARKS: RECOMMENDED GRID

Please use the TCARI grid "E349BH2012.tc" as the final grid for project OPR-E349-BH2-2012, during the time period between June 17, 2011 and June 18, 2012.

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).

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CHIEF, PRODUCTS AND SERVICES BRANCH

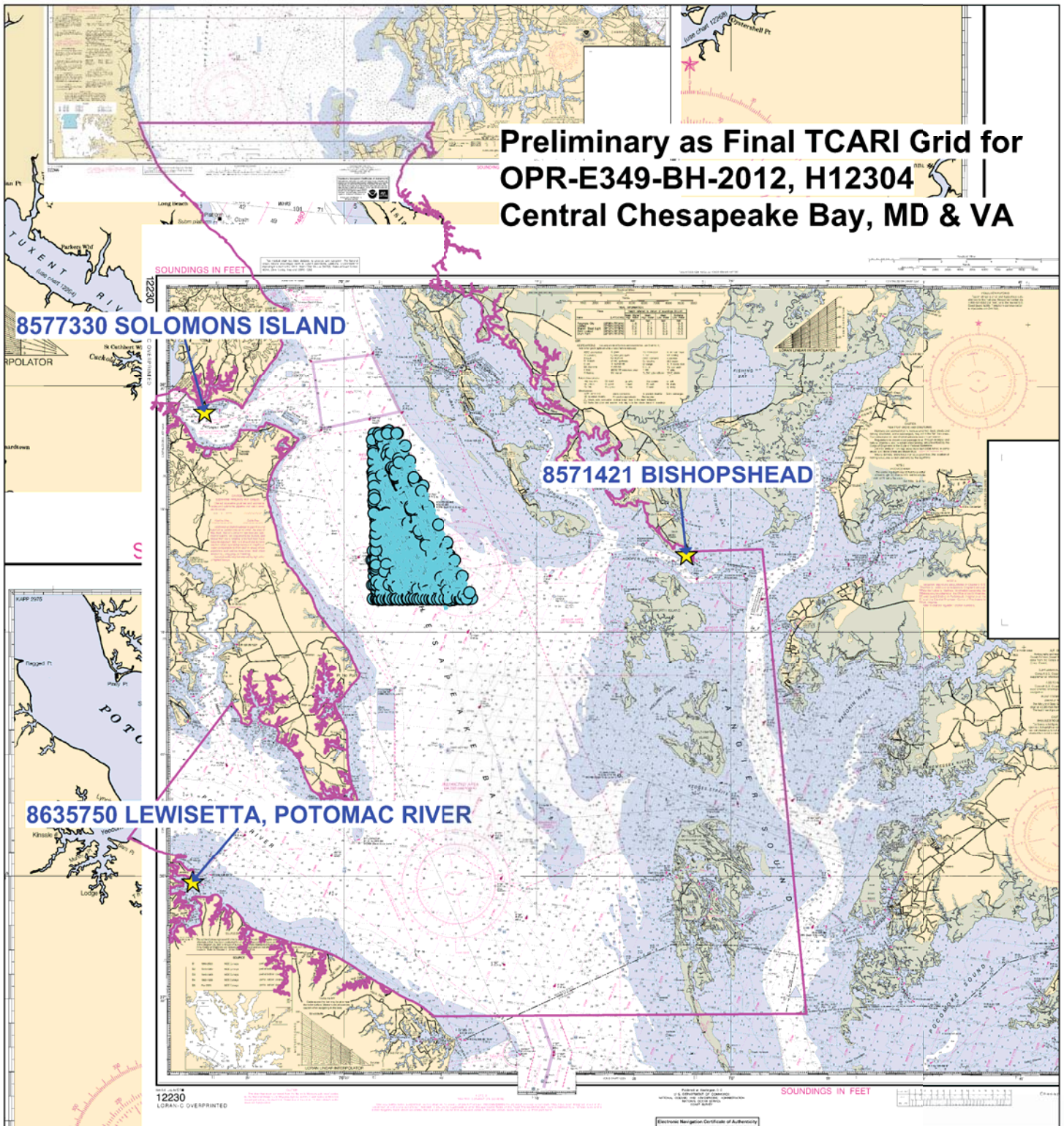


**Preliminary as Final TCARI Grid for
OPR-E349-BH-2012, H12304
Central Chesapeake Bay, MD & VA**

8577330 SOLOMONS ISLAND

8571421 BISHOPSHEAD

8635750 LEWISSETTA, POTOMAC RIVER

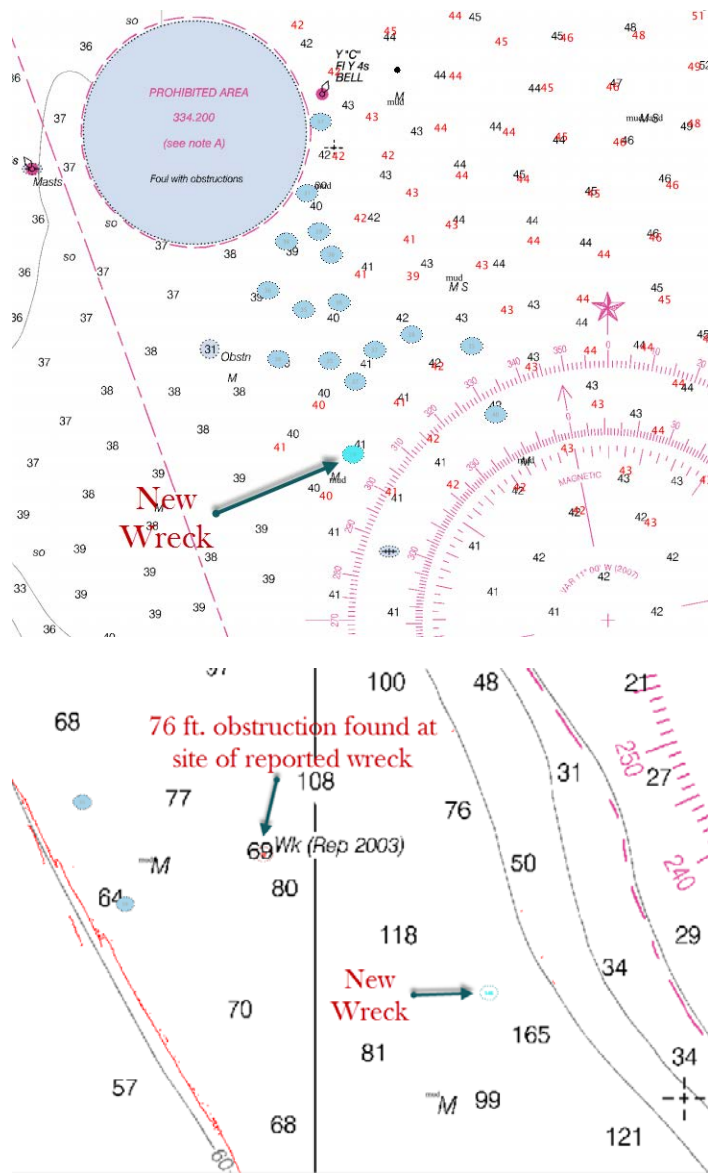


H12304 Wreck Report

Two uncharted wrecks were identified by the field in the SSS and multibeam data at locations 38-11-37.4 N, 076-18-05.9 W and 38-13-08.1 N, 076-14-32.5 W. The wrecks are included in the HCell and recommended to be added to the AWOIS database.

A 76 ft. obstruction was identified at the location of the wreck “Wk (Rep 2003)” shown on chart 12261 at location 38-13-25.3 N, 076-15-08.2 W. Although the field submitted this as an obstruction the compiler included it in the HCell as a new wreck due to the previously reported wreck.

The wrecks are shown in the figures below.



APPROVAL PAGE

H12304

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

- H12304_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12304_GeoImage.pdf

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

Approved: _____

Peter Holmberg

Cartographic Team Lead, Pacific Hydrographic Branch

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

Approved: _____

CDR David Zezula, NOAA

Chief, Pacific Hydrographic Branch