H12505

NOAA Form 76-35A

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

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: H12505

LOCALITY

State: Virginia

General Locality: Approaches to Chesapeake Bay, VA

Sub-locality: 35 NM East of Fishermans Island

2012

CHIEF OF PARTY
LCDR Benjamin K. Evans, NOAA

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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		**H12505**

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:	**Virginia**
General Locality:	**Approaches to Chesapeake Bay, VA**
Sub-Locality:	**35 NM East of Fishermans Island**
Scale:	**40000**
Dates of Survey:	**10/11/2012 to 12/13/2012**
Instructions Dated:	**09/18/2012**
Project Number:	**OPR-D304-FH-12**
Field Unit:	**NOAA Ship *Ferdinand R. Hassler***
Chief of Party:	**LCDR Benjamin K. Evans, NOAA**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Multibeam Echo Sounder Backscatter**
Verification by:	**Atlantic Hydrographic Branch**
Soundings Acquired in:	**meters at Mean Lower Low Water**

Remarks:

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

Table of Contents

List of Tables

List of Figures

Descriptive Report to Accompany Survey H12505

Project: OPR-D304-FH-12

Locality: Approaches to Chesapeake Bay, VA

Sublocality: 35 NM East of Fishermans Island

Scale: 1:40000

October 2012 - December 2012

NOAA Ship *Ferdinand R. Hassler*

Chief of Party: LCDR Benjamin K. Evans, NOAA

A. Area Surveyed

A.1 Survey Limits

Data was acquired within the following survey limits:

Northeast Limit	Southwest Limit
37.1668611111 N 75.1675416667 W	37.0881527778 N 75.3391916667 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

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

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

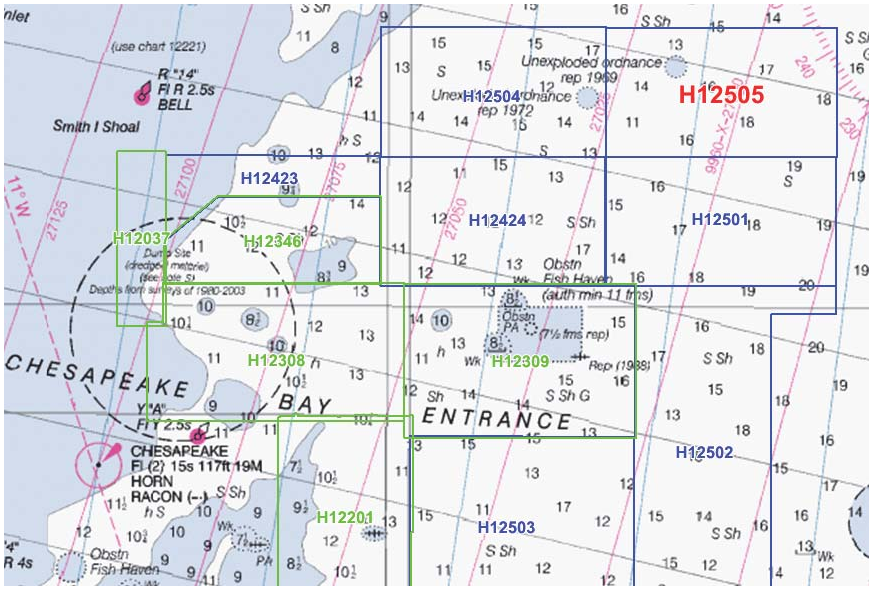


Figure 1: H12505 Sheet Layout

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:

	HULL ID	*S250*	*Total*
LNM	**SBES Mainscheme**	0	0
	MBES Mainscheme	589.37	589.37
	Lidar Mainscheme	0	0
	SSS Mainscheme	0	0
	SBES/MBES Combo Mainscheme	0	0
	SBES/SSS Combo Mainscheme	0	0
	MBES/SSS Combo Mainscheme	0	0
	SBES/MBES Combo Crosslines	28.44	28.44
	Lidar Crosslines	0	0
Number of Bottom Samples			6
Number of DPs			0
Number of Items Items Investigated by Dive Ops			0
Total Number of SNM			38.84

Table 2: Hydrographic Survey Statistics

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

Survey Dates
10/11/2012
10/15/2012
10/16/2012
10/17/2012
12/10/2012
12/11/2012
12/12/2012
12/13/2012

Table 3: Dates of Hydrography

Survey lines were run with a dual-head multibeam echo sounder. LNM for the dual-head system was calculated using statistics from the starboard head.

A.6 Shoreline

The survey area is offshore and no shoreline investigation was required in the project instructions.

A.7 Bottom Samples

Bottom samples were taken to adequately sample the different bottom types apparent in the backscatter mosaic. Six bottom samples were taken within the limits of H12505. All bottom samples received S-57 attribution and are included in the submitted final feature file (FFF).

B. Data Acquisition and Processing

B.1 Equipment and Vessels

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

B.1.1 Vessels

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

Hull ID	***S250***
LOA	37.7 meters
Draft	3.85 meters

Table 4: Vessels Used

NOAA Ship FERDINAND R. HASSLER (S250) acquired all data within the limits of H12505.

B.1.2 Equipment

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

Manufacturer	**Model**	**Type**
Reson	7125	MBES
Applanix	POS M/V 320 V4	Positioning and Attitude System
Hemisphere	MBX-4	Positioning System
Brooke Ocean	MVP-30	Sound Speed System
AML	MicroCTD	Conductivity, Temperature and Depth Sensor
AML	Smart SV&P	Sound Speed System
Sea Bird	MicroTSG 45	Sound Speed System

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

A geographic plot of crosslines is shown in Figure 2. 28.44 nautical miles of crosslines were acquired within the limits of H12505. This accounts for 4.8% of mainscheme distance, which satisfies NOS Specifications and Deliverables (2012). Crosslines were filtered to remove soundings greater than 45 degrees from nadir. To evaluate crossline agreement, two 1-meter surfaces were created: one from cross line soundings, the other from mainscheme soundings. These two surfaces were differenced using CARIS HIPS and SIPS. The

statistical analysis of the differences between the mainscheme and crossline surfaces are shown in Figure 3. The average difference between the surfaces is -0.05 meters; 95% of all differences were less than +/- 0.23 meters.

The Non-Gaussian distribution of the differences is most likely a result of the vertical offsets present in this survey due to tidal zoning or vessel loading. A discussion of these results continues in section B.2.9 of this report. Figure 4 shows the crossline difference surface with brackets separating the days on which mainscheme lines were run. Looking at the color ranges of the figure it is obvious that the disagreement was higher on certain days. There is a 12 hour gap in time of acquisition between days 289 and 290, 10 hour between days 346 and 347, and 6 hour between days 347 and 348. Primarily mainscheme was acquired during the night while cleanup (holidays, developments, SSS and bottom samples) on other sheets took place during daylight. Because acquisition was not continuous differences between days are more easily highlighted and not a steadily increasing difference from the crosslines.

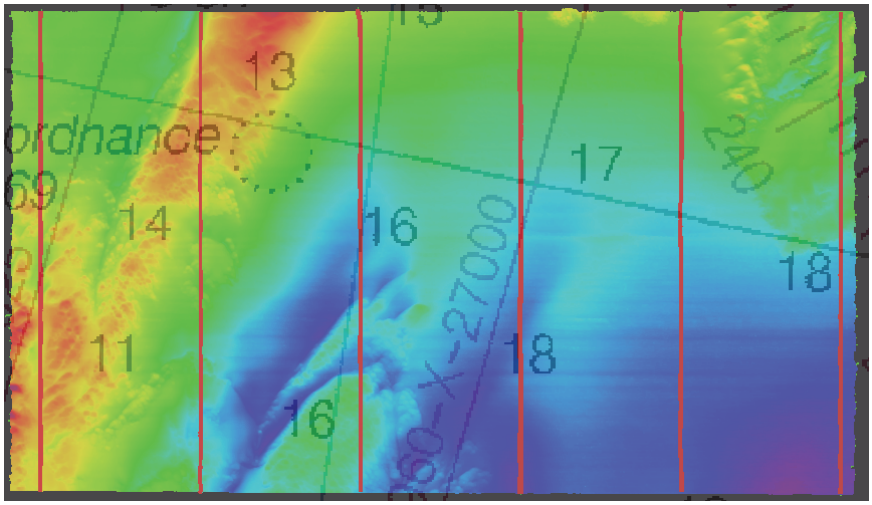
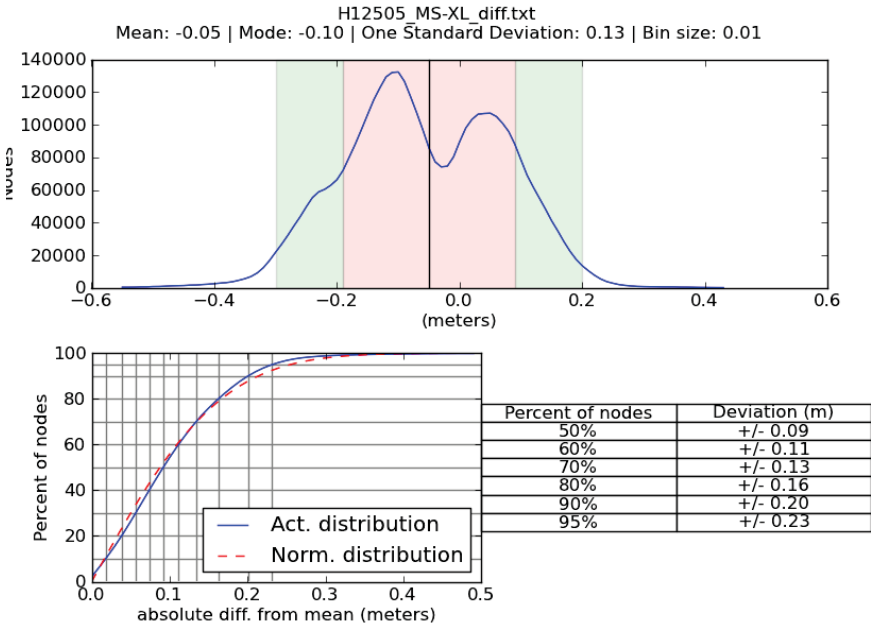


Figure 2: Location of crosslines, shown in red, overlaid onto the 1-meter MBES surface.



Percent of nodes	Deviation (m)
50%	+/- 0.09
60%	+/- 0.11
70%	+/- 0.13
80%	+/- 0.16
90%	+/- 0.20
95%	+/- 0.23

Figure 3: Statistical analysis of the mainscheme and crossline difference surface.

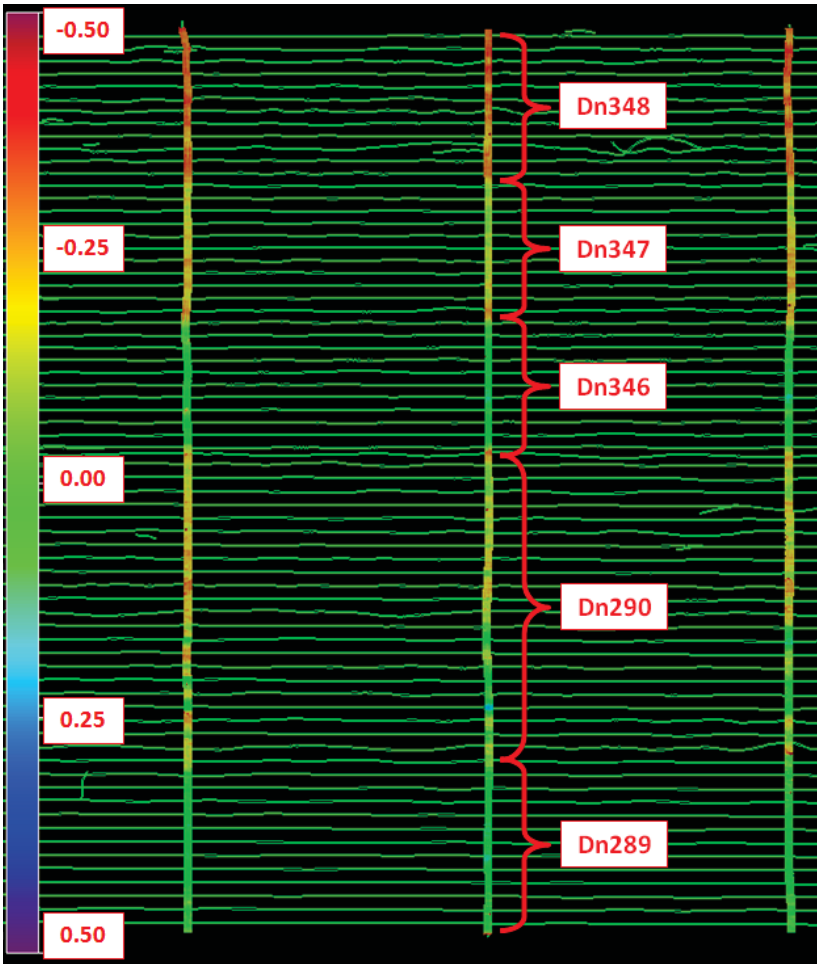


Figure 4: H12505 MS-XL difference surface. Green colors show agreement while reds and violets show larger differences. Brackets show days of mainscheme acquisition.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0.01meters	0.09meters

Table 6: Survey Specific Tide TPU Values

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

Table 7: Survey Specific Sound Speed TPU Values

CO-OPS did not provide a tidal uncertainty in the Project Instructions due to lack of available water level time series data. Tide uncertainties provided by CO-OPS for the adjoining sheets in the 2011 project OPR-D304-FH-11 were used for this project.

B.2.3 Junctions

The areas of overlap between sheet H12505 and its junctions sheets were reviewed in CARIS Subset Editor. The junctioning surfaces were subtracted from the surface of H12505 to assess sounding consistency.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12501	1:40000	2012	NOAA Ship FERDINAND R. HASSLER	S
H12504	1:40000	2012	NOAA Ship FERDINAND R. HASSLER	W

Table 8: Junctioning Surveys

H12501

This survey is from project OPR-D304-FH-12. The location is shown below in Figure 5. The average difference of the overlapping areas is -0.13 meters with a standard deviation of 0.06 meters. 95% of all differences were less than +/-0.11 meters, as shown in Figure 6.

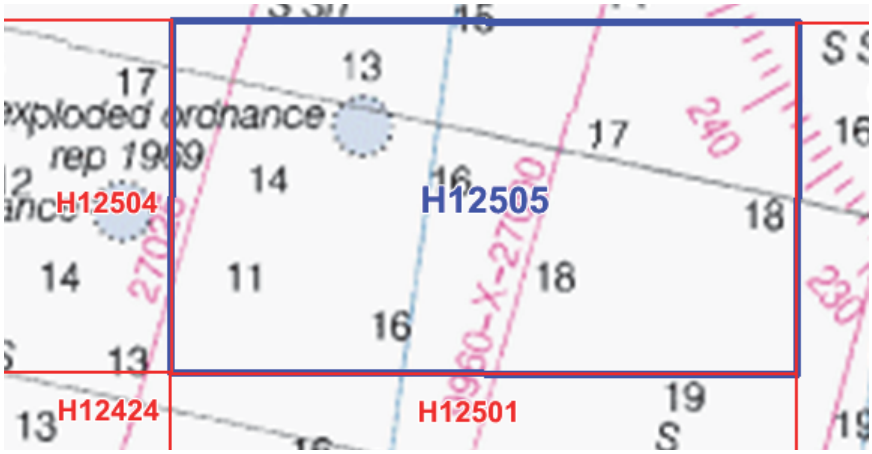
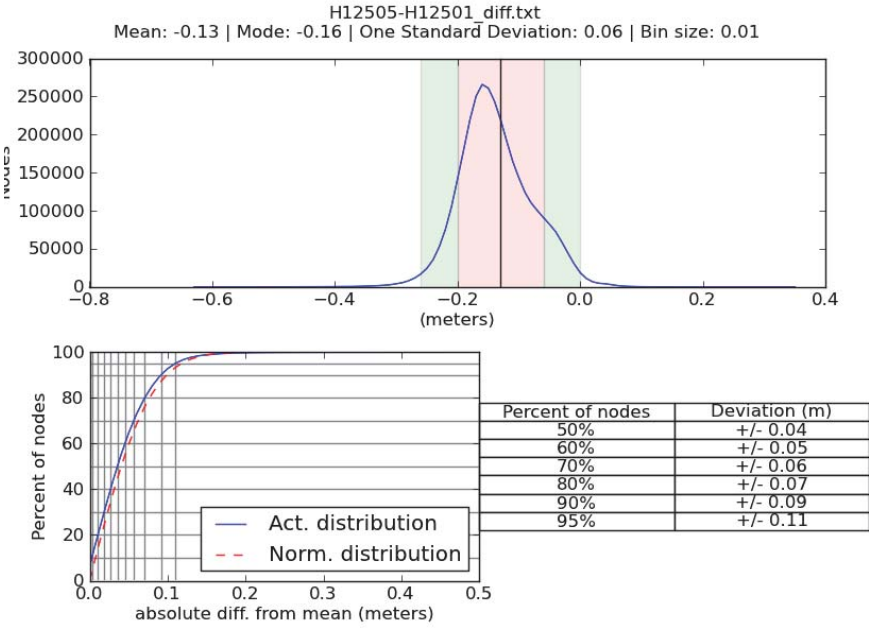


Figure 5: H12505 Junctions

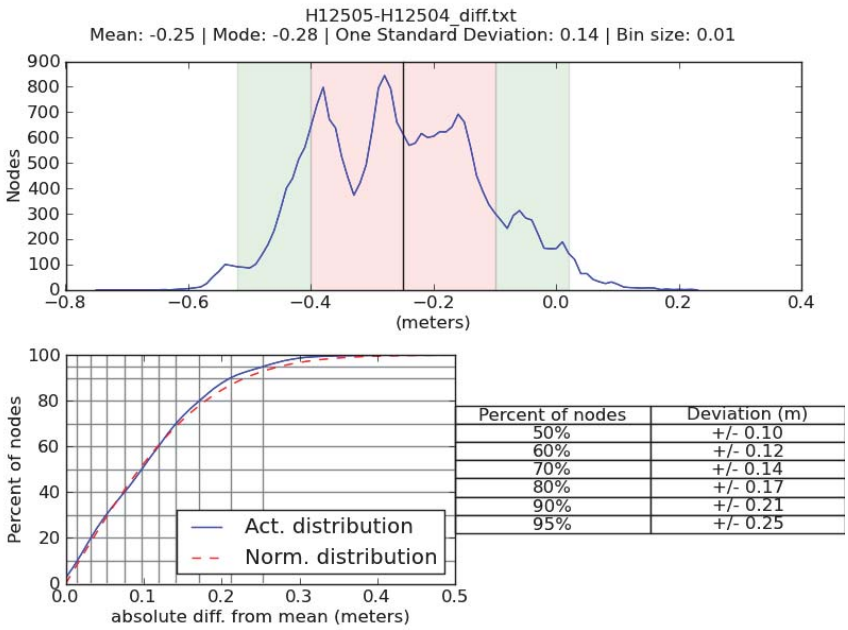


Percent of nodes	Deviation (m)
50%	+/- 0.04
60%	+/- 0.05
70%	+/- 0.06
80%	+/- 0.07
90%	+/- 0.09
95%	+/- 0.11

Figure 6: Difference surface statistics computed for the difference surface of H12505 minus H12501

H12504

This survey is from project OPR-D304-FH-12. The location is shown in Figure 5. H12505 and H12504 had minimal overlapping nodes due to poor planning during acquisition on sheet H12504. The average difference of the overlapping areas is -0.25 meters with a standard deviation of .14 meters. 95% of all differences were less than +/- 0.25 meters, as shown in Figure 7.



Percent of nodes	Deviation (m)
50%	+/- 0.10
60%	+/- 0.12
70%	+/- 0.14
80%	+/- 0.17
90%	+/- 0.21
95%	+/- 0.25

Figure 7: Difference surface statistics computed for the difference surface of H12505 minus H12504

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.2.5.1Cast-by-Cast Field Calibration of MVP Sound Speed Sensor

Before the start of acquisition on H12505, the MVP sound velocity sensor (SN: 5466) was examined and found to be in need of repair. The base of the three rods supporting the sound speed chamber of the singaround system were rusted and two of the three screws holding the reflector to the rods were loose. The assembly was dissembled, cleaned of rust, and reassembled with new screws and thread-lock compound.

While these in-house repairs improved the stability of the sensor, the length of the rod was changed, and unknown. The sensitivity of the instrument is such that a difference in length of less than 0.10 mm could cause a sound speed change of over 1m/s. Therefore, the instrument was considered out of calibration.

The repaired sensor was used for acquisition on Dn285 and verified against the ship's hull-mounted thermosalinograph (TSG) for each cast. A correction coefficient was calculated by dividing the average sound speed value computed from one minute of TSG data at the time of each MVP cast by the average value of the MVP sound speed sensor within 1 meter of the TSG intake. The full MVP cast was multiplied by the correction coefficient to correct for any length change in the sound speed chamber. These correctors were only applied to the crosslines acquired on the first day of acquisition only. All subsequent data was collected when a calibrated sensor was in use.

The Python scripts used for this analysis and a table of the correction coefficient for each cast are included in Separates II. The sound speed values used for this field calibration are shown in Figure 8 and the correction coefficient is shown in Figure 9. SV data on this sheet was within specification once corrections were applied.

A replacement AML Smart SV&P sensor (SN:5466) was installed before acquisition of mainscheme data. This sensor was confirmed to be within specification by a comparison cast with the SeaBird 19+ CTD. No other corrections were made to the sound speed.

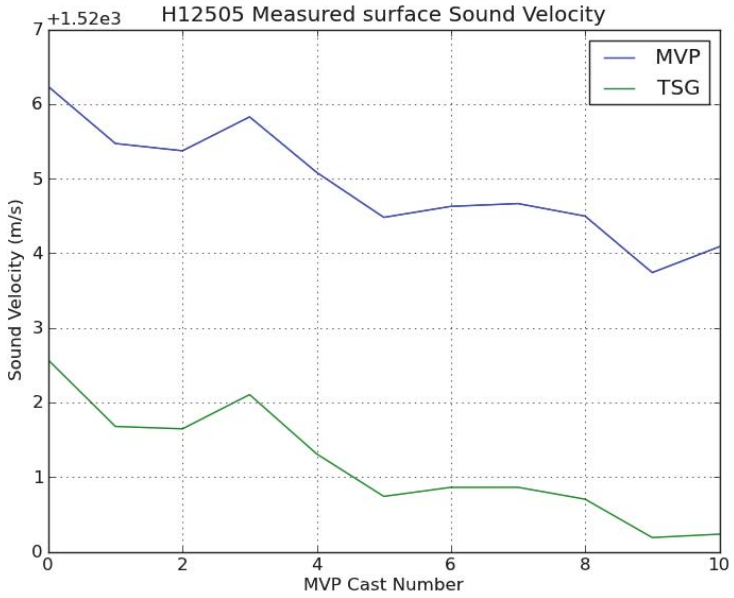


Figure 8: Sound speed at 4 meters depth from MVP and TSG at each MVP cast.

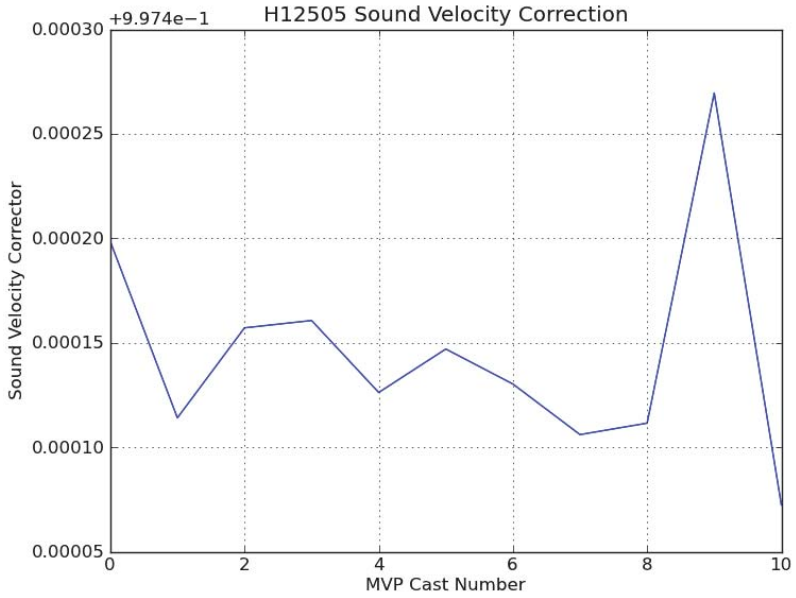


Figure 9: Correction coefficient calculated from the ratio of TSG sound speed to MVP sound speed. The MVP data for each cast was multiplied by this coefficient.

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: Casts were taken approximately every 20 minutes.

The sound speed correction method of nearest in distance within time of one hour was used for all lines with the exception of a few holiday lines on Dn348. Port and starboard holiday lines collected on Dn348, between 1400 and 1615 UTC, were corrected with the nearest in distance within time of 4 hours due to the MVP not being deployed to allow for higher transit speeds.

B.2.8 Coverage Equipment and Methods

A density analysis was run to calculate number of soundings per surface node. Five or more soundings per node were present in over 99% of the 1-meter surface. For additional detail refer to

H12505_Standards_Compliance report submitted in Appendix II of this report. Due to limitations of the analysis script, the 1-meter surface was split into sections.

B.2.9 Vertical Offsets

Vertical offsets, ranging from 1-40 cm, are present throughout sheet H12505. Many of these are likely to be due to errors from the zoned tide approach as this offshore survey area is approximately 60 nautical miles from the controlling gauge. Additionally, uncorrected variations in vessel loading could have contributed to these offsets. Without robust GPS derived vertical heights on this sheet, it is difficult to identify the source of these offsets and determine how to appropriately correct for them.

In some areas, the depth hypotheses selected by CUBE alternate between soundings associated with overlapping but vertically displaced lines, creating artifacts in the final surface. This effect is especially prevalent in adjacent lines acquired on different days. The magnitude of the most extreme artifacts approach but do not exceed the total allowable vertical uncertainty.

Some of the most significant of these surface artifacts occur in the overlap between temporally displaced main scheme and development lines (see Figure 11). Where the development lines were found to include no significant features or bathymetry, they were removed from the project to restore the cosmetic uniformity of the surface. This is the case for the following lines:

Port -	Starboard -
20121213_142108	20121213_142106
20121213_143150	20121213_143150
20121213_143346	20121213_143246
20121213_143352	20121213_143352

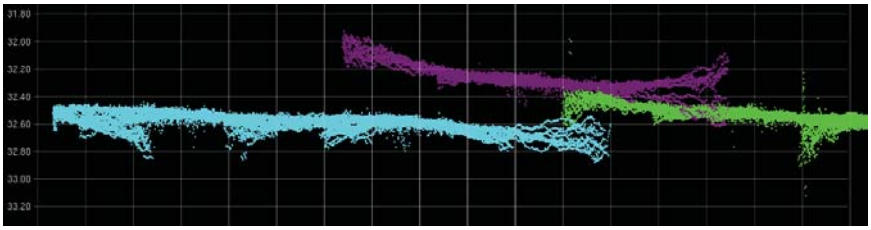


Figure 10: Approximate 35cm vertical offset shown in Subset Editor. Lines colored by day acquired.

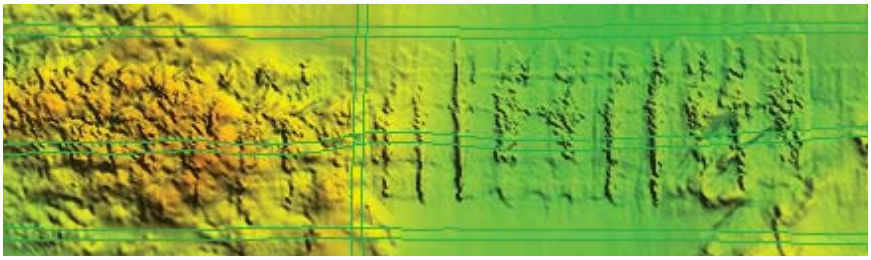


Figure 11: Surface artifacts created from development lines which were subsequently removed from the project.

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

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

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Backscatter was logged in Reson datagram 7008 snippets record in the raw .s7k files. The .s7k file also holds the navigation record and bottom detections for all lines of survey H12505. The files were paired with the CARIS HDCS data, imported and processed using Fledermaus Geocoder Toolbox, version 7.3.2b-beta, build 406, 64-bit version.

The GSF files containing the extracted backscatter are submitted with the data in this survey.

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	Bathy DataBASE	4	0	3	02/05/2013	Processing
Caris	HIPS/SIPS	7.1	2	6	02/05/2013	Processing

Table 9: Software Updates

The following Feature Object Catalog was used: 5.2

B.5.2 Surfaces

The following CARIS surfaces were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12505_1m	CUBE	1 meters	23.27 meters - 36.95 meters	NOAA_1m	Object Detection
H12505_1m_Final	CUBE	1 meters	23.27 meters - 36.95 meters	NOAA_1m	Object Detection

Table 10: CARIS Surfaces

B.5.3 Total Vertical Uncertainty Analysis

A custom layer was created on finalized surfaces showing the uncertainty of individual nodes in relation to the allowable uncertainty for their depths. This layer was exported and run through a custom Python script resulting in statistical analysis. 100% of nodes within survey H12505 met the vertical uncertainty standards of section 5.1.3 of the Hydrographic Surveys Specifications and Deliverables (2012). See H12505_Standards_Compliance report submitted in Appendix II of this report.

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:

Discrete Zoning

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

Station Name	Station ID
Duck, NC	8651370

Table 11: NWLON Tide Stations

File Name	Status
8651370.tid	Verified Observed

Table 12: Water Level Files (.tid)

File Name	Status
D304FH2012CORP.zdf	Final

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

A request for final approved tides was sent to N/OPS1 on 12/19/2012. The final tide note was received on 01/14/2013.

Preliminary zoning is accepted as final zoning for project OPR-D304-FH-12, H12505 during the time period between October 11 to December 13, 2012 per Tide Note submitted in Appendix I of this report.

Non-Standard Vertical Control Methods Used:

VDatum

Ellipsoid to Chart Datum Separation File:

2012_D304_VDatum_Ellip_MLLW_rev1.xyz

VDatum was evaluated prior of data submittal. Due to unexplainable vertical anomalies in the post processed trajectory, VDatum was not the chosen vertical transformation tool for H12505. GPS Tides have been computed using the aforementioned separation file but all data being submitted is vertically corrected using discrete zoning verified tides. For additional detail, refer to the VDatum Evaluation Report and Memo submitted in Appendix II of this report.

C.2 Horizontal Control

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

The following PPK methods were used for horizontal control:

Smart Base

All data submitted as H12505, with the exception of starboard line 20121213_142106, has SBETs and SMRMSGs applied for post-processed position/attitude and TPU values, respectively. Refer to the D304-FH-12 HVCR for specific values used while processing and applying these files.

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
Acushnet 6	ACU6
Chesapeake Light	COVX
Millsboro	DEMI
Loyola W	LOYW
Loyola	LS03
Moriches 5	MOR5
Moriches 6	MOR6
Buxton	NCBX
Cedar Island	NCCI
Duck 3	NCDU
Middle Township	NJCM
Riverhead	NYRH
Gloucester Point	VAGP
Wallops Island	VAWI

Table 14: CORS Base Stations

All data was collected real-time with DGPS corrector applied to the navigation solution.

The following DGPS Stations were used for horizontal control:

DGPS Stations
Driver, Virginia (289kHz)

Table 15: USCG DGPS Stations

D. Results and Recommendations

D.1 Chart Comparison

D.1.1 Raster Charts

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

Chart	Scale	Edition	Edition Date	LNM Date	NM Date
12200	1:419706	50	07/2011	06/28/2011	07/09/2011

Table 16: Largest Scale Raster Charts

12200

Survey soundings of H12505 agree within 1 fathom of charted depths of raster chart 12200 with the exception of the SW corner, where the charted depth is 11 fathoms. Surveyed soundings in the vicinity of this depth are 14-15 fathoms. There is a surveyed 12 fathom sounding two kilometers west of the charted "11" on the edge of the sheet. Figure 12 shows the general area of the charted 11 fathom depth.

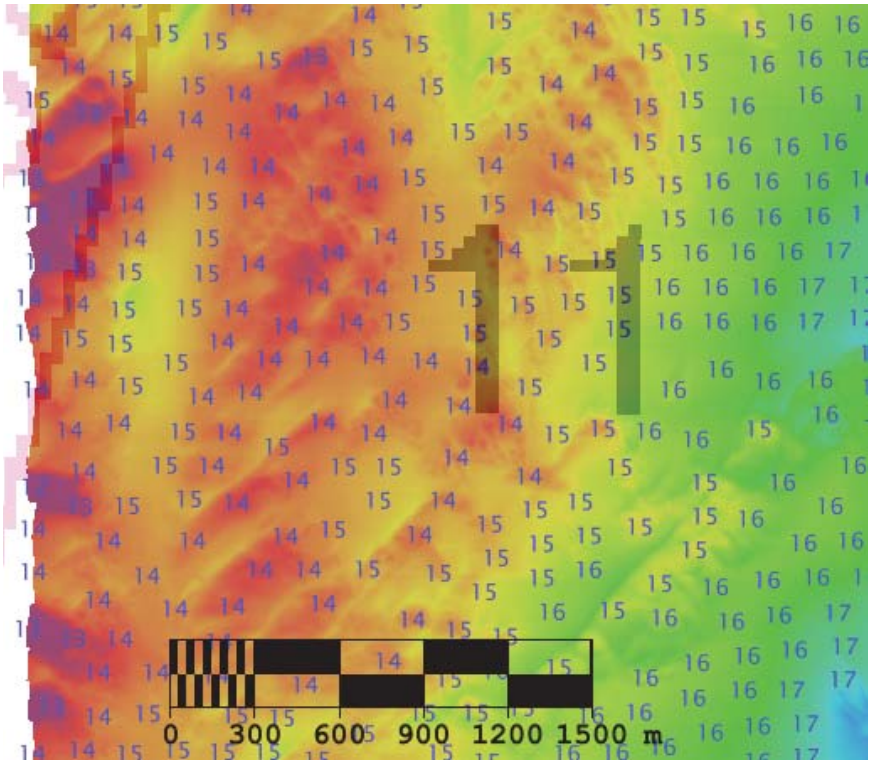


Figure 12: Charted 11 fathom and surveyed soundings on sheet H12505

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?
US3DE01M	1:419706	13	08/02/2012	10/23/2012	NO

Table 17: Largest Scale ENCs

US3DE01M

ENC US3DE01M contains no soundings different than RNC 12200. See previous discussion for comparison with chart 12200.

D.1.3 AWOIS Items

Number of AWOIS Items Addressed: 1
Number of AWOIS Items Not Addressed: 0

One hundred percent multibeam was accomplished for the full search radius of AWOIS item #15018. Although no significant features were located, several small depressions in the seabed were found within the AWOIS search radius and in the immediate vicinity. These depressions are approximately 15-30 meters across, 0.5 - 1.0 meters deep, and generally consistent with the appearance of scours which typically form around hard objects on a sandy sea floor. Examples of these depressions are shown in Figures 13-15.

There are no identifiable features in the depressions which extend above the level of the surrounding seabed, and the hydrographer would ordinarily consider them insignificant. However, given the "unexploded ordnance" chart annotation, the hydrographer sought additional information from the Operations Branch, Hydrographic Surveys Division. Operations responded that the source of AWOIS 15018 and the chart annotation was a 1972 report from the U.S. Navy, notifying NOAA that a "3-inch 50-caliber ordnance" had been jettisoned in 12 fathoms of water in position 37/07.5 N, 075/21.4W (email correspondence filed in Appendix II).

The hydrographer's research indicates that a 3-inch, 50-caliber round (shell and casing) is approximately 1 meter long by 0.12 meter in diameter. In 25-30 meters of water, this size is below the object detection and recognition capability of the systems utilized for this survey. However, an object this size could produce a larger scour which could be detectable.

Based on the 0.5 minute precision and era of the report, the hydrographer assumes the reported position is accurate to approximately 0.5 nautical mile. The hydrographer has included the positions of the six depressions surveyed within 1.0 nautical mile of the reported jettison position as cartographic symbols in the Final Feature File. The hydrographer recommends that these positions be relayed to the U.S. Navy for

investigation at their discretion. However, the hydrographer notes that a there is a ridge of harder, rougher sediment passing through this search area on which it is unlikely that a scour would form.

The hydrographer recommends that "Unexploded Ordnance" notation and associated danger circle be retained as charted. The hydrographer does not recommend that the depression positions be charted in any way.

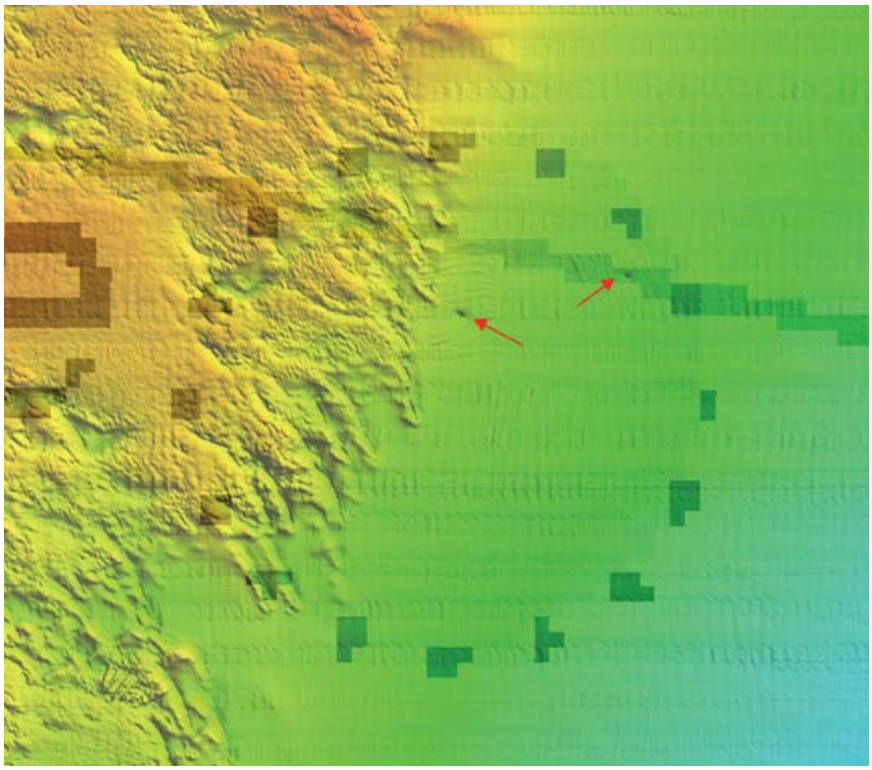


Figure 13: RNC 12200 with H12505 BASE surface overlay of AWOIS item #15018. Red arrows are pointing to depressions found with multibeam. BASE surface is vertically exaggerated 35 times.

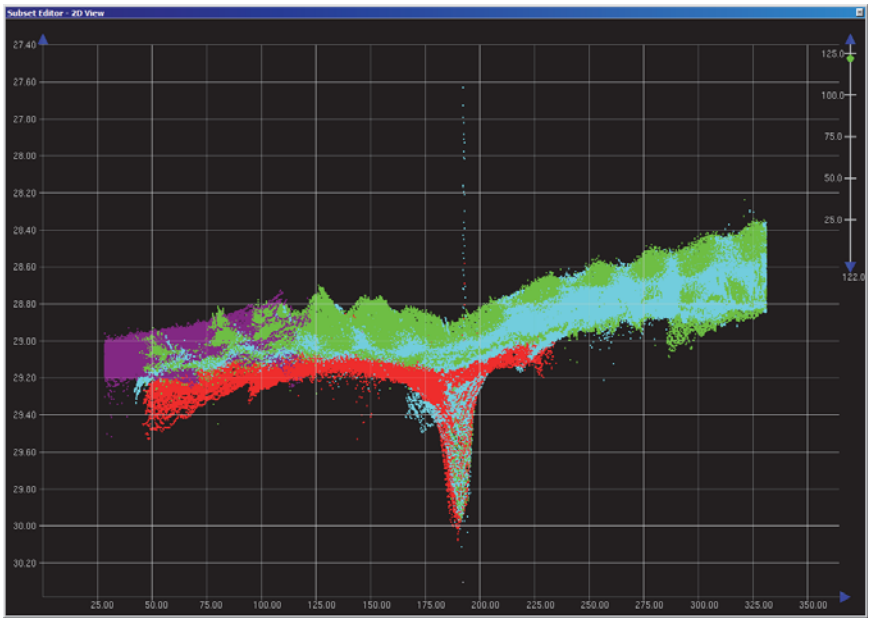


Figure 14: West depression viewed in CARIS Subset Editor. Soundings above the surface are outer beam noise and were not confirmed with subsequent development lines.

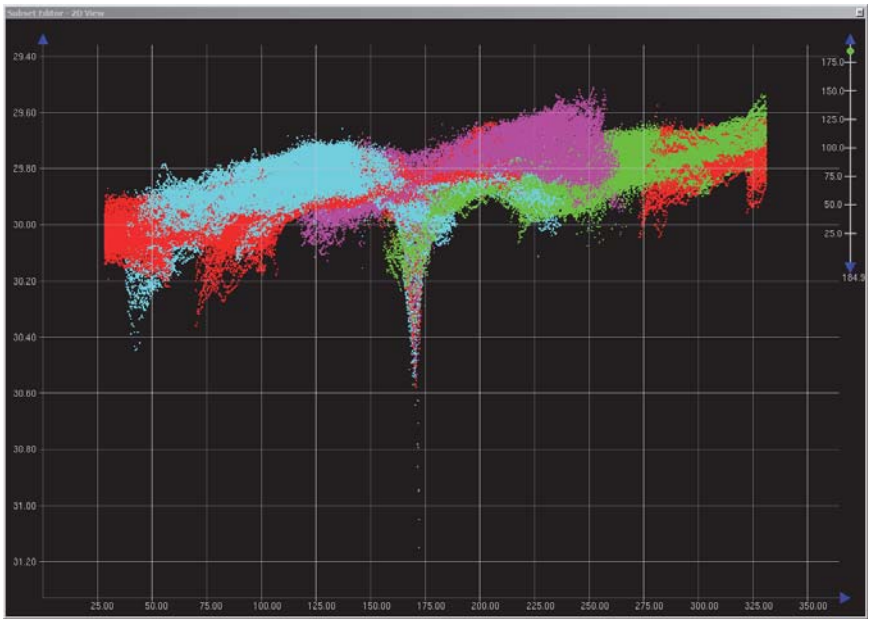


Figure 15: East depression viewed in CARIS Subset Editor

D.1.4 Charted Features

One charted feature exists for this survey and is discussed above in the previous section.

D.1.5 Uncharted Features

No uncharted features exist for this survey.

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 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

Aids to navigation (ATONs) do not exist for this survey.

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

No significant features exist for this survey.

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 with the exception of the discrepencies noted in the report. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies noted in the Descriptive Report.

Report Name	Report Date Sent
OPR-D304-FH-12 Data Acquisition and Processing Report	2013-01-07
Hydrographic Survey Readiness Review Memo	2012-07-03

Approver Name	Approver Title	Approval Date	Signature
LCDR Benjamin K. Evans, NOAA	Chief of Party	04/01/2013	Benjamin K. Evans 2013.04.01 15:21:51 -04'00'
LT Samuel F. Greenaway, NOAA	Field Operations Officer	04/01/2013	
David T. Moehl	Senior Survey Technician	04/01/2013	Digitally signed by David Moehl Date: 2013.04.01 07:44:48 -04'00'

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 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
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 Porpagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United Stated Coast Guard
UTM	Universal Transverse Mercator
XO	Exectutive Officer
ZDA	Global Positiong System timing message
ZDF	Zone Definition File

APPENDIX I

TIDES AND WATERLEVELS

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : January 8, 2013

HYDROGRAPHIC BRANCH: Atlantic
HYDROGRAPHIC PROJECT: OPR-D304-FH-2012
HYDROGRAPHIC SHEET: H12505

LOCALITY: 35 NM East of Fishermans Island, Approaches to Chesapeake Bay, VA
TIME PERIOD: October 11 - December 13, 2012

TIDE STATION USED: 8651370 Duck, NC
Lat. 36° 11.0'N Long. 75° 44.8' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.026

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project OPR-D304-FH-2012, H12505, during the time period between October 11 to December 13, 2012.

Please use the zoning file D304FH2012CORP submitted with the project instructions for OPR-D304-FH-2012. Zone SA46 is the applicable zone for H12505.

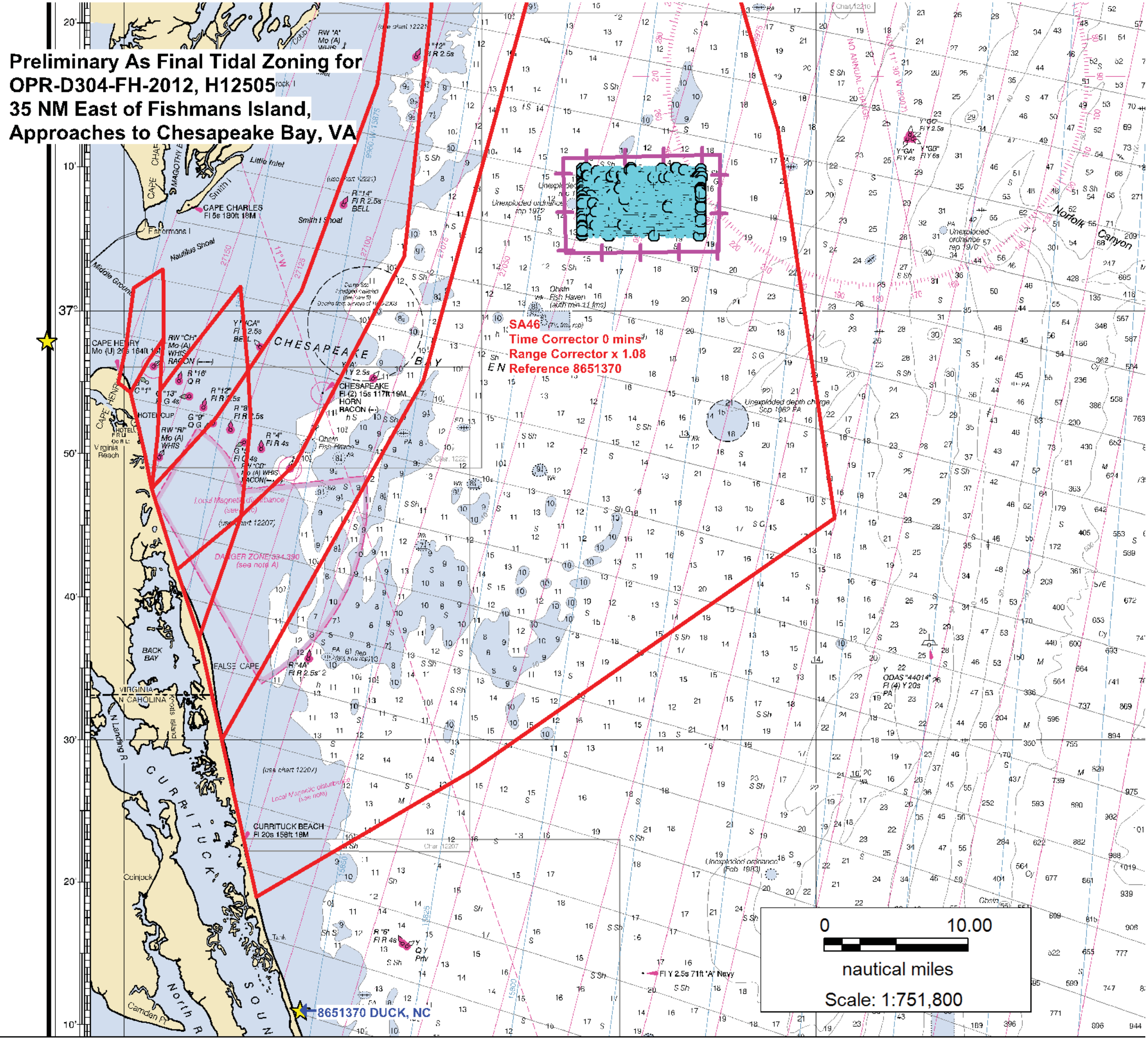
Refer to attachments for zoning information.

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

HOVIS.GERALD.THOMAS.1365860250

Digitally signed by HOVIS.GERALD.THOMAS.1365860250
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=HOVIS.GERALD.THOMAS.1365860250
Date: 2013.01.14 12:48:27 -05'00'

CHIEF, PRODUCTS AND SERVICES BRANCH



Preliminary As Final Tidal Zoning for
OPR-D304-FH-2012, H12505
35 NM East of Fishmans Island,
Approaches to Chesapeake Bay, VA
SA46
Time Corrector 0 mins
Range Corrector x 1.08
Reference 8651370
8651370 DUCK, NC
0
10.00
nautical miles
Scale: 1:751,800
CHESAPEAKE BAY
CAPE CHARLES
CAPE HENRY
FALSE CAPE
CURRITUCK BEACH
VIRGINIA
N CAROLINA
Norfolk Canyon

APPENDIX II

SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NOAA Marine and Aviation Operations
NOAA Ship *Ferdinand R. Hassler* S-250
326 West York Street
Norfolk, VA 23510

January 4, 2013

MEMORANDUM FOR: Jeffrey Ferguson
Chief, Hydrographic Survey Branch

FROM: LCDR Benjamin K. Evans, NOAA
Commanding Officer

TITLE: OPR-D304-FH-12 VDatum Evaluation and Deliverable Recommendation

Ferdinand R. Hassler personnel conducted a comparison of VDatum based Ellipsoid Referenced Survey (ERS) versus discrete tidal zoning vertical transformation techniques using crossline data per the Hydrographic Survey Project Instructions (PI). In addition we conducted comparisons using the difference between crosslines and mainscheme to give a better recommendation on internal consistency. While there are differences between the two data reduction methods, there is no justification to disprove or suspect the VDatum separation model. Results and analysis of the comparison are in the attached report.

When successful, ERS methods generally result in a more internally consistent sounding set. However, we experienced a number of problems in reliably processing the vessel trajectory relative to the ellipsoid. Due to these difficulties rather than any suspicion of the VDatum mode, we recommend that some sheets be submitted with zoned water level correctors and others with ERS. The sheet by sheet recommendation is tabulated below.

Sheet	Recommended Method	Reason
H12423	zoned	FM related vertical offsets
H12424	zoned	FM related vertical offsets
H12501	zoned	Data gaps, may be too far from network
H12502	ERS	No solution for three lines. Many small issues, but should be solvable
H12503	ERS	Good solutions. A few small issues
H12504	ERS	Good solutions. A few small issues
H12505	To be determined	May be too far from network.

Attachment

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 Introduction

This document is an interim report describing methods and results of the vertical datum analysis component in the vertical control requirements of the Hydrographic Survey Project Instructions for *OPR-D304-FH-12 Approaches to Chesapeake Bay* (March 2, 2012). The project is located in the vicinity of the Approaches to Chesapeake Bay, Virginia and encompasses hydrographic surveys H12423, H12424, H12501, H12502, H12503, H12504 and H12505. According to the Project Instructions the field unit is to provide a recommendation on the vertical transformation technique after an analysis using crossline data. This interim report and supporting data constitutes the recommendation and will be used by Hydrographic Survey Division (HSD) to support a decision on whether to use Ellipsoidally-Referenced Survey (ERS) methods in lieu of traditional tides for final water level correctors for the OPR-D304-FH-12 surveys.

The basis of this analysis is a comparison of discrete tidal zoning and Vertical Datum Transformation (VDatum) as methods for vertical control. Because discrete tidal zoning is the conventional and accepted method, it is regarded as a baseline for this evaluation.

2.0 Procedure

The VDatum evaluation was conducted according to the instructions in Appendix 1 of the project instructions. Additional guidance found in the Pydro 12.9 distribution (Pydro\Lib\site-packages\HSTP\Pydro\ PostAcqTools_CompareTSeries.docx) was followed for the direct comparison of data.

Project crossline data was reduced to Mean Lower Low Water (MLLW) via conventional discrete tidal zoning and also via VDatum. Time series data for the nadir depth was extracted from both data sets and differenced using the Pydro PostAcq toolset.

In addition, CARIS surfaces of crosslines and mainscheme were analyzed in both discrete zoning and VDatum methods to evaluate the internal consistency of data as well as look for any spatial patterns in the difference that may have suggested problems with the VDatum model.

Sheets H12501, H12502, H12503 and H12504 were chosen for evaluation because these sheets contained higher quality POSPac solutions. In addition, these sheets span project OPR-D304-FH-12, as shown in Figure 1 below.

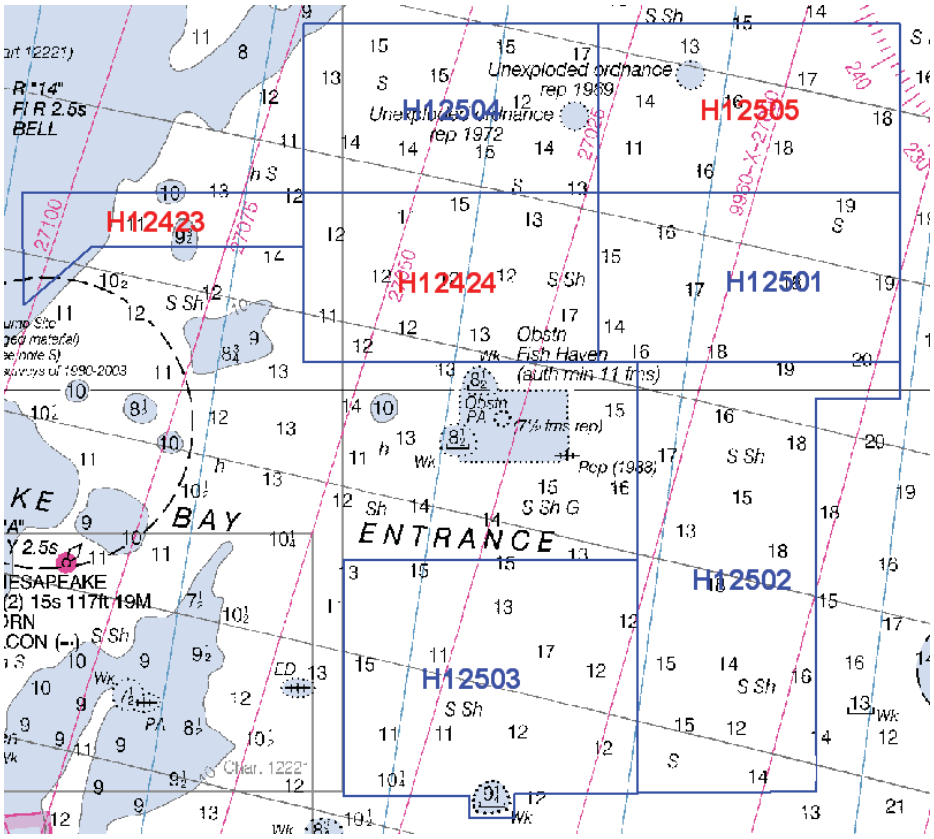


Figure 1: D304 sheets where VDatum Evaluation was performed shown in blue, sheets not evaluated shown in red.

3.0 Results and Discussion

This report addresses two questions:

1) Is the VDatum model correct in the geographic location of this project?
2) Is the internal consistency of the data improved from the use of ERS methods?

The following discussion will attempt to answer these questions.

3.1 VDatum Model Accuracies

To analyze the VDatum model, an approximately 100 meter surface was created using the ellipsoid to MLLW .xyz separation file provided by HSD Operations. The resulting surface was analyzed by looking for blunders in the model as well as an overall assessment of the change expected in the separation between MLLW and the ellipsoid. This surface is represented below in Figure 2.

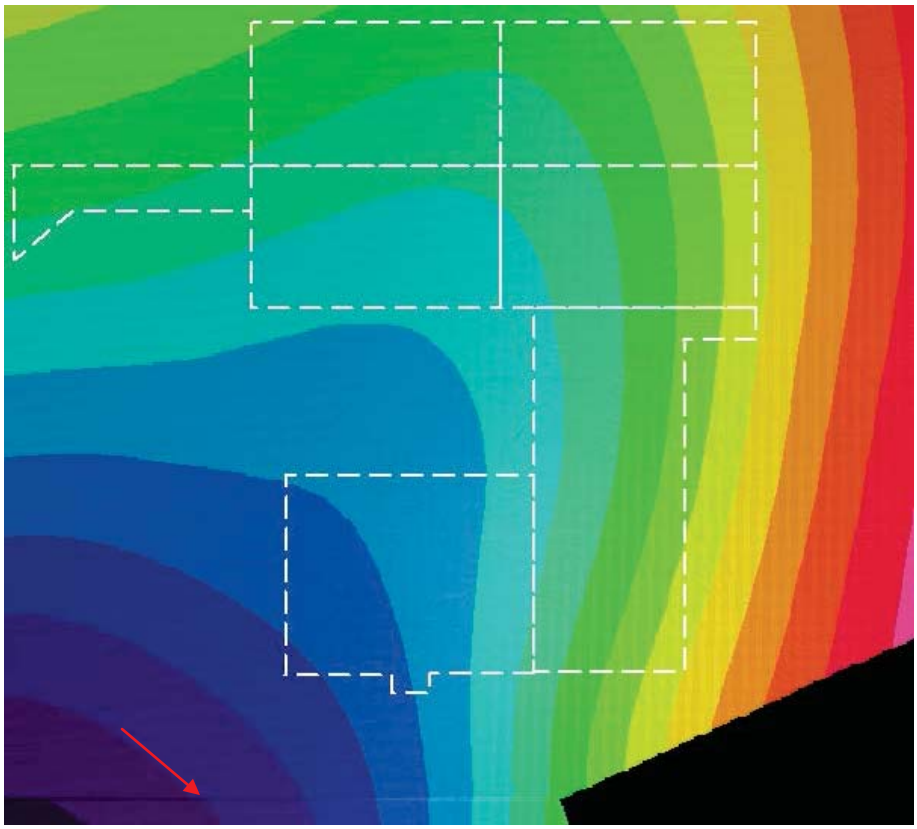


Figure 2: D304 sheets shown with gridded 2012_D304_VDatum_Ellip_MLLW_rev1.xyz VDatum Separation Model (colored bands correspond to 10 cm interval) NOTE: arrow pointing to model artifact outside of project area

As the above figure shows, the grid is absent of obvious blunders. One 0.01 meter discontinuity artifact in the VDatum model is apparent south of the project area which does not affect these results. There is a significant slope in the VDatum model across the project extents at approximately 1 meter overall. This is thought to be driven by close proximity of the continental shelf and the geoid slope that accompanies this geographic feature.

In accordance with Appendix I of the Project Instructions, Pydro was used to compare the nadir depths using both vertical models. As shown in Table 1, there are significant differences between zoned tides and VDatum, with values ranging from 0.02 to -0.23. These differences may arise from many different sources including: poor vertical GPS solutions, poor zoning model, errors in dynamic draft values and loading errors.

XL Discrete-Vdatum (Pydro)			
Sheet	**Head**	**Mean (m)**	**StDev (m)**
H12501	Port	0.02	0.05
H12502	Port	-0.07	0.07
	Starboard	0.01	0.14
H12503	Port	0.00	0.13
	Starboard	0.05	0.11
H12504	Port	-0.23	0.07
	Starboard	-0.22	0.07

Table 1: Results of D304 VDatum Evaluation (Pydro analysis)

Sheets H12501, H12502 and H12503 show average differences within the VDatum uncertainty of 0.08 meters. However, H12504 contains average differences in the twenty centimeter range, which exceeds the uncertainty model.

From these results (using Pydro as was recommended in Appendix I) it is difficult to form a recommendation for H12504. There is clearly a large difference between ERS and zoned tides for this sheet, but the nadir analysis alone is insufficient to understand why.

Comparison of the CARIS crossline difference surfaces referenced to discrete zoning or VDatum, rather than statistical analysis of just the nadir depths, was performed in order to see spatial trends in the data.

For the crossline surface comparisons, crossline surfaces contained data from both heads: the crosslines were not filtered, as is common practice amongst the fleet to eliminate erroneous outer beams. Before submission, the crosslines will be filtered, however for this evaluation SV errors on the outer beams would affect both discrete and VDatum equally and therefore cancel out. The results of the surface differences are shown in Table 2. As expected the average differences and standard deviation are similar to the Pydro nadir analysis shown in Table 1.

XL Discrete-Vdatum (CARIS)				
Sheet	Mean (m)	Mode (m)	StDev (m)	95% +/- (m)
H12501	0.02	0.00	0.05	0.08
H12502	-0.08	-0.05	0.12	0.22
H12503	0.02	0.11	0.12	0.23
H12504	-0.26	-0.31	0.08	0.15

Table 2: Additional results of D304 VDatum Evaluation (CARIS surface analysis)

In particular, H12504 shows the same large difference in the CARIS surfaces as the Pydro analysis. Figure 3 shows the Discrete – VDatum crossline surface over the separation model.

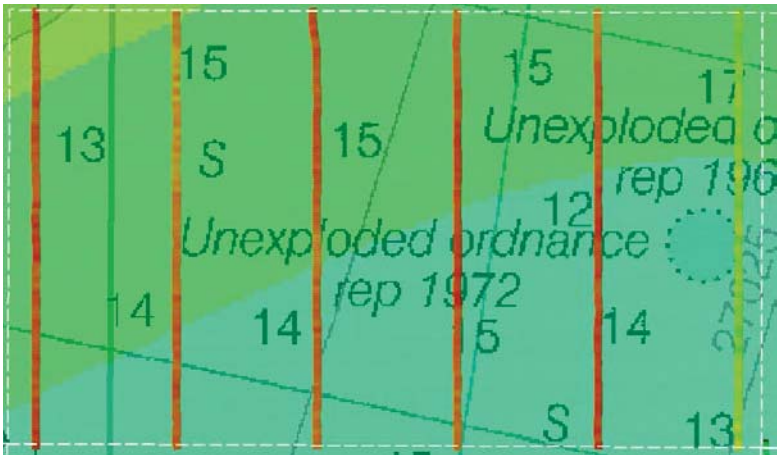


Figure 3: H12504 Discrete minus VDatum XL CUBE surface – average differences for green line on right are -0.14 m while average of red/orange lines are -0.31 m.

The tides were examined for the particular day of crosslines and are shown below in Figure 4. The dark green lines show the time period of the crosslines and the orange line marks the time period in between the first crossline (east line) and the subsequent lines. Take note of the high residual values recorded at the tide gauge. Because the gauge is 60 nautical miles from this sheet, water level residuals driven by local effects may not be well modeled in the zoned methods. The black dotted line represents when mainscheme acquisition was started.

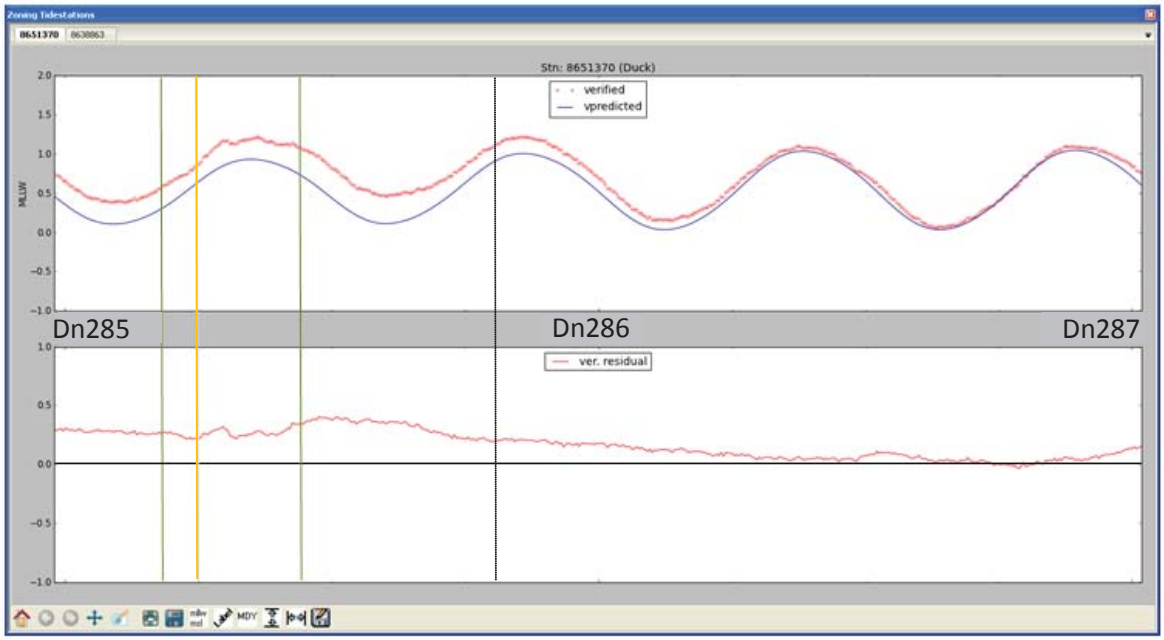


Figure 4: Verified tidal signature for Duck, NC and accompanying residual values.

Sheet H12504 was analyzed further to determine which vertical model is more likely to contain correct values. Results from this further analysis can be seen below in Table 3. A complete difference between an ERS and zoned approach was made with the mainscheme lines and again with the holiday and development lines, which were collected two months later. During the acquisition of multibeam, the water level residual at the controlling gauge varied from 0 to 0.25 meters. When waterline residuals were close to zero, ERS - zoned differences were approximately 0.15 meters. When waterline residuals were higher ERS - zoned differences were approximately 0.30 meters.

This result suggests that the large differences between ERS and zoned are the result of water level errors, not VDatum.

H12504 Analysis				
	Mean (m)	Mode (m)	StDev (m)	95% +/- (m)
Mainscheme Dn285-288 (Discrete - VDatum)	-0.24		0.07	
Development Dn345-348 (Discrete - Vdatum)	-0.14	-0.16	0.10	0.19

Table 3: Additional H12504 Statistics

After careful examination of all data it is our belief that on average H12504 discrete zoning contains a separation from VDatum of around 15 cm. This is most likely the result of a poor zoning model and is not the result of an erroneous VDatum model.

3.2 Data Internal Consistency

To analyze the internal consistency of ERS methods a crossline analysis was completed over the entire sheet for both discrete zoning and VDatum. The results of these differences are shown in Table 4.

	Discrete MS-XL Differences				VDatum MS-XL Differences			
Sheet	Mean (m)	Mode (m)	StDev (m)	95% +/- (m)	Mean (m)	Mode (m)	StDev (m)	95% +/- (m)
H12501	-0.07	-0.07	0.11	0.21	unsucessful			
H12502	-0.04	-0.10	0.14	0.26	0.05	0.05	0.10	0.19
H12503	-0.14	-0.28	0.15	0.24	0.01	0.00	0.06	0.12
H12504	0.06	0.09	0.11	0.24	0.02	0.01	0.12	0.17

Table 4: D304 Internal Consistency Comparison from CARIS Difference Surfaces

The results show that ERS generally improves the internal consistency of the data. As can be seen in the result of sheet H12503, averaged differences of -0.14 with a standard deviation of 0.15 under discrete zoning went to an average of 0.01 with standard deviation 0.06 with VDatum. For sheets H12502, and H12503 the standard deviation of the differences was significantly lowered with VDatum compared to discrete zoning. As seen in Figure 5; with VDatum, the distribution of differences is generally Gaussian, while the zoned distribution often shows multiple peaks and other anomalies.

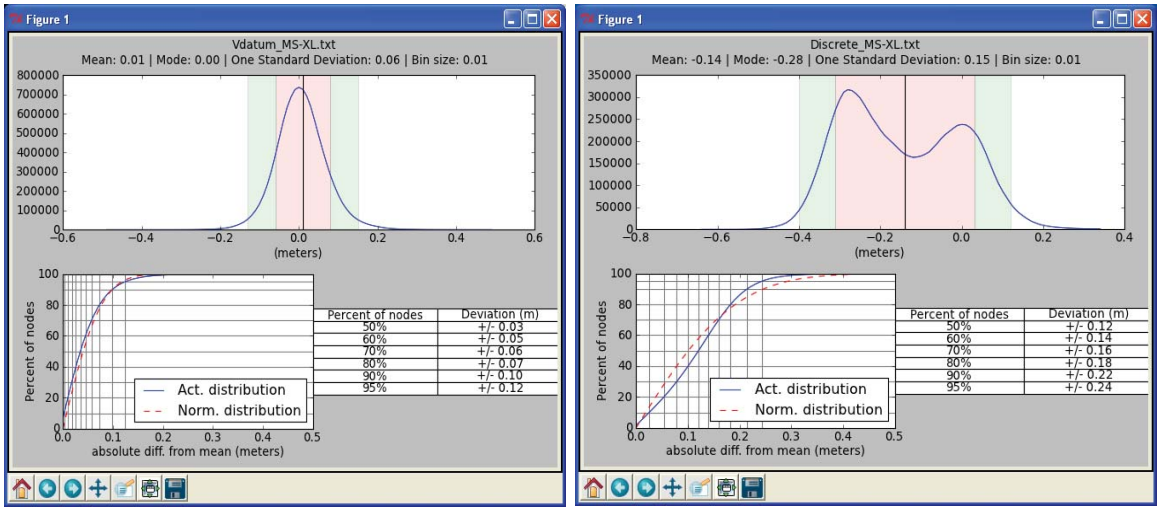


Figure 5: Surface Difference Distribution for Sheet H12503; VDatum on left and Discrete on right.

Sheet H12501 proved to be more troublesome. While the SBETs for the cross-lines were acceptable for this analysis, processing the SBETs for the main-scheme coverage was difficult, resulting in many split projects and incomplete SBETs for five lines. In addition to the troubles with processing, solutions derived in POSPac contained high RMS values as well as unexplainable vertical position jumps. This demonstrates the limits of an ERS approach; if poor or no vertical GPS solution exists, then there is an ERS holiday. To collect these holidays would take additional time at sea and therefore is not feasible in most cases.

4.0 Recommendation

ERS with VDatum is a tool to help us eliminate many vertical errors that can be attributed to traditional tide models and ship water line estimators. For D304, the difference between ERS and zoned were generally within the anticipated VDatum uncertainty. Where they were not (H12504) we have shown that this is likely the result of water level errors rather than an issue with VDatum. While this analysis does not rigorously verify the VDatum model, it gives us no reason to doubt it. Therefore, we believe the VDatum model is accurate in this area.

In addition, we have shown that ERS improves the internal consistency of the data when compared with traditional tide zoning methods, especially noticeable during times of increased wind and weather.

However, poor POSPac solutions can result in inferior data compared to the traditional methods and therefore should not be applied to all data on all sheets. It is our recommendation to use ERS on a sheet by sheet basis. We recommend an ERS approach when the majority of the sheet contains good solutions, i.e. free of data gaps and vertical jumps. Additionally H12423 and H12424 had vertical offsets related to newly implemented FM hardware that complicate application of ERS methods. This issue is discussed in detail in the Data Acquisition and Processing report submitted with this project. The sheet by sheet recommendation is tabulated below.

Sheet	Recommended Method	Reason
H12423	zoned	FM related vertical offsets
H12424	zoned	FM related vertical offsets
H12501	zoned	Data gaps, may be too far from network
H12502	ERS	No solution for three lines. Many small issues, but should be solvable
H12503	ERS	Good solutions. A few small issues
H12504	ERS	Good solutions. A few small issues
H12505	To be determined	May be too far from network.

In all cases the vertical data reduction method will be discussed in the individual sheet descriptive report and the D304 Horizontal and Vertical Control Report to avoid confusion in the quality control process that follows.

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

February 25, 2013

MEMORANDUM FOR: LCDR Benjamin K. Evans, NOAA
Commanding Officer, NOAA Ship *Ferdinand Hassler*

FROM: Jeffrey Ferguson
Chief, Hydrographic Surveys Division

SUBJECT: Vertical Datum Transformation Technique,
OPR-D304-FH-12, Long Island Sound, NY

Hydrographic surveys H12502, H12503, and H12504 are approved for vertical reduction to chart datum, Mean Lower Low Water (MLLW), using the NOAA Vertical Datum Transformation (VDatum) (http://vdatum.noaa.gov) derived separation (SEP) model provided on the project CD/DVD.

Approval of VDatum, in lieu of the NOAA Center for Operational Oceanographic Products and Services (CO-OPS) TCARI package as per the Project Instructions, is based on your recommendation and the review of comparison results you included in your memos from January 4, 2013, Subject "OPR-D304-FH-12 VDatum Evaluation".

The results of the data analysis show that ellipsoidally referenced survey (ERS) techniques with VDatum used as the vertical datum reducer to MLLW in this area indicate a better internal consistency of the survey data and produces final sounding values that meet or exceed horizontal and vertical specifications for hydrographic surveys.

The comparison techniques are in line with the procedures that were developed and approved as part of the CSDL Ellipsoidally Referenced Survey (ERS) project. These procedures and deliverables were added to the April 2012 edition of the NOS Hydrographic Surveys Specifications and Deliverables Manual and Field Procedures Manual documents.

You shall include a description of your ERS processing procedures and the comparisons you conducted between ERS and traditional tides in the appropriate Descriptive Report (DR), Horizontal and Vertical Control Report and/or Data Acquisition and Processing Report.

This memo and your memo, shall be included in the supplemental correspondence Appendix of the DR.

OPS.Ferdinand Hassler - NOAA Service Account <ops.ferdinand.hassler@noaa.gov>

OPR-D304-FH-12; H12504 and H12505

4 messages

OPS.Ferdinand Hassler - NOAA Service Account <ops.ferdinand.hassler@noaa.gov> Thu, Dec 20, 2012 at 10:01 AM
To: _NOS OCS Survey Outlines <survey.outlines@noaa.gov>
Cc: David Moehl - NOAA Federal <david.t.moehl@noaa.gov>

Good Morning,
Attached, please find survey outlines for OPR-D304-FH-12; H12504 and H12505. Areas agree with the progress report and project instructions.
Very respectfully,
Madeleine

2 attachments

H12504_Survey_Outline.zip
6K

H12505_Survey_Outline.zip
4K

OPS.Ferdinand Hassler - NOAA Service Account <ops.ferdinand.hassler@noaa.gov> Wed, Mar 13, 2013 at 3:35 PM
To: _NOS OCS Survey Outlines <survey.outlines@noaa.gov>
Cc: "CO.Ferdinand Hassler - NOAA Service Account" <co.ferdinand.hassler@noaa.gov>, Marc Moser - NOAA Federal <Marc.S.Moser@noaa.gov>

Good Afternoon,
Attached, please find the survey outline for OPR-D304-FH-12; H12502
Thank you.
V/r,
Madeleine

–
Field Operations Officer, *NOAA Ship Ferdinand R. Hassler*
MOC-A, 439 West York Street
Norfolk, VA 23510

H12502_Survey_Outline.zip
2K

CO HASSLER <co.ferdinand.hassler@noaa.gov> Wed, Mar 13, 2013 at 3:42 PM
To: "OPS.Ferdinand Hassler - NOAA Service Account" <ops.ferdinand.hassler@noaa.gov>

Mud,

Thanks. Please double check that we have submitted survey outlines for all surveys completed last year.

CO
[Quoted text hidden]

--
LCDR Ben Evans, NOAA
Commanding Officer
NOAA Ship FERDINAND R. HASSLER (S-250)
mobile: (240) 687-4602
ship's cell: (603) 812-8748

OPS.Ferdinand Hassler - NOAA Service Account <ops.ferdinand.hassler@noaa.gov> Wed, Mar 13, 2013 at 3:59 PM
To: CO HASSLER <co.ferdinand.hassler@noaa.gov>

Hi CO,
I went through the OPS email and saw that H12502 was never sent (from this account).

I sent H12504 and H12505 in December. This afternoon, I asked the XO if he sent anything from his personal account before I resubmit anything.

When I hear back, I will ensure anything remaining is sent in.

V/r,
Mud
[Quoted text hidden]

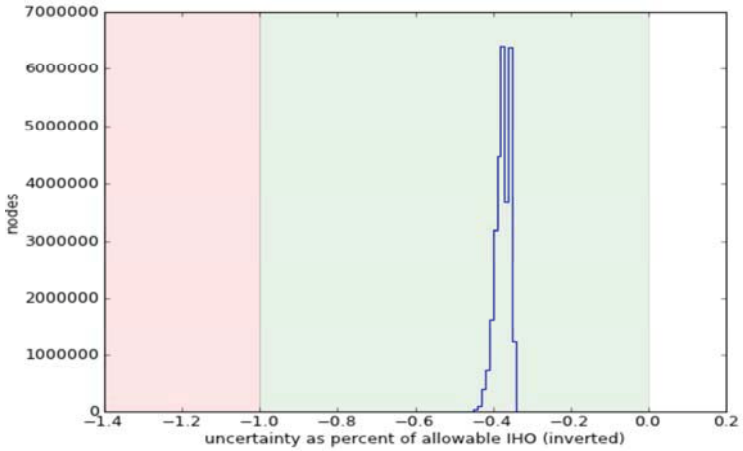
H12505_Standards_Compliance000

The finalized surface has 28301450 nodes with 431205158 soundings.

Uncertainty Standards

100.00% | PASS

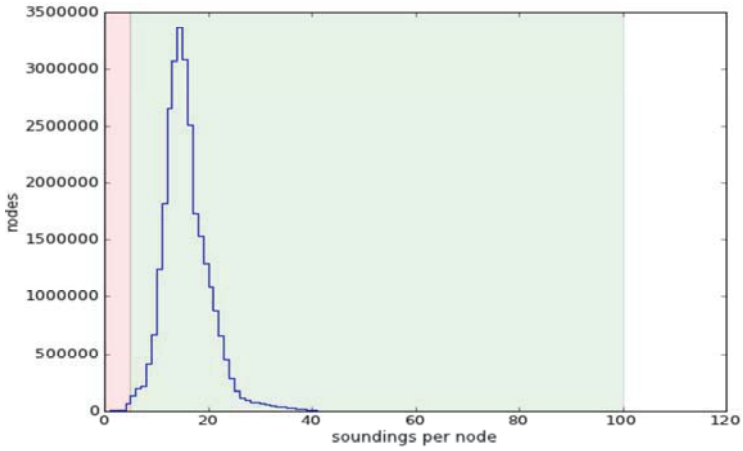
Nodes with Uncertainty less then or equal allowable IHO error **100.00%** (28301450/28301450).



Object Detection Coverage

99.69% | PASS

Nodes with 5 or more soundings **99.69%** (28213968/28301450).
Sounding count average is **15.24** soundings per node.
Sounding count mode is **15** soundings per node.



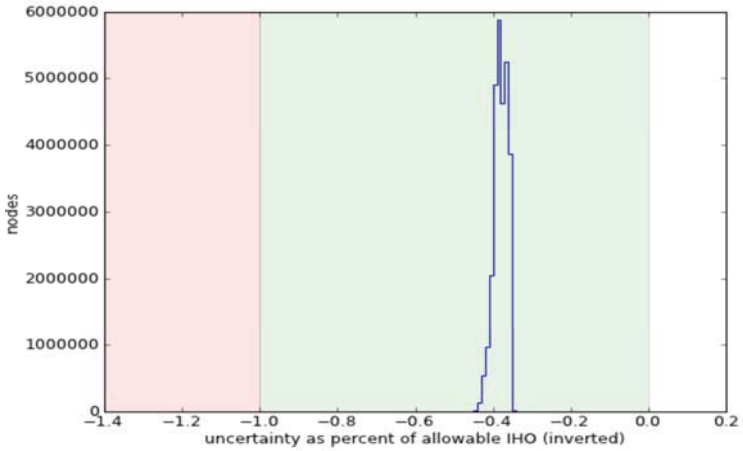
H12505_Standards_Compliance001

The finalized surface has 28289758 nodes with 445150736 soundings.

Uncertainty Standards

100.00% | PASS

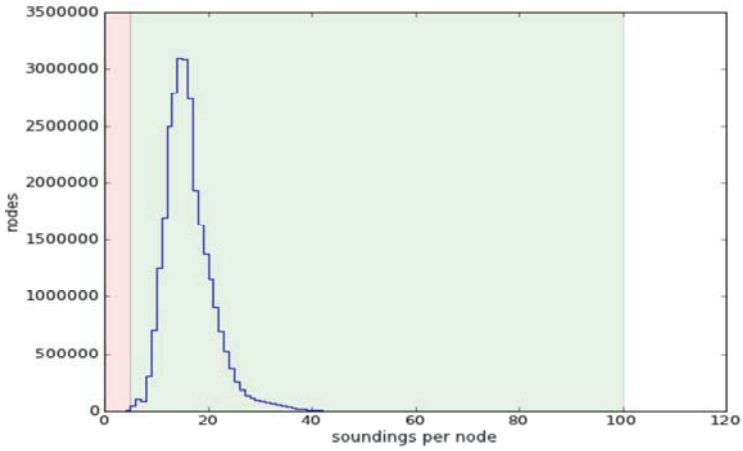
Nodes with Uncertainty less then or equal allowable IHO error **100.00%** (28289758/28289758).



Object Detection Coverage

99.96% | PASS

Nodes with 5 or more soundings **99.96%** (28277586/28289758).
Sounding count average is **15.74** soundings per node.
Sounding count mode is **15** soundings per node.



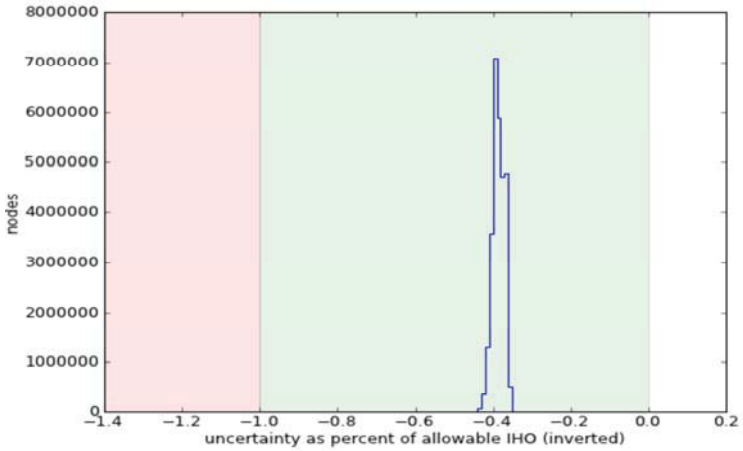
H12505_Standards_Compliance002

The finalized surface has 28275237 nodes with 498939016 soundings.

Uncertainty Standards

100.00% | PASS

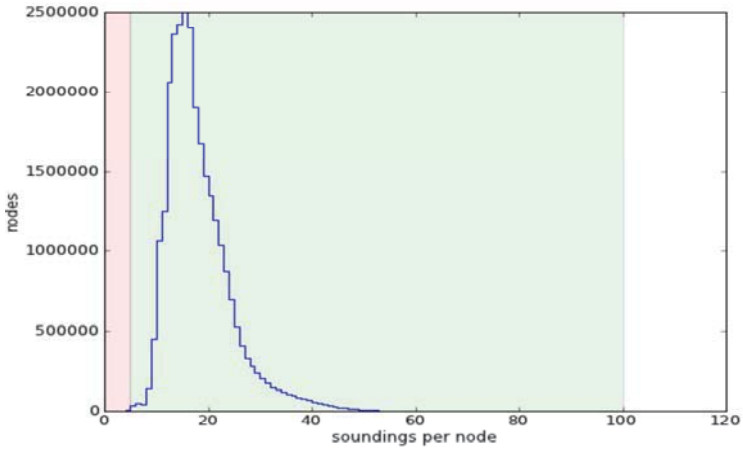
Nodes with Uncertainty less then or equal allowable IHO error **100.00%** (28275237/28275237).



Object Detection Coverage

99.97% | PASS

Nodes with 5 or more soundings **99.97%** (28268091/28275237).
Sounding count average is **17.65** soundings per node.
Sounding count mode is **16** soundings per node.



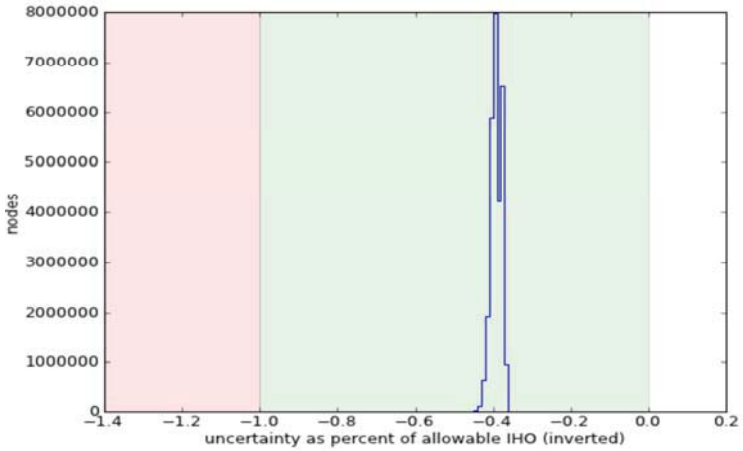
H12505_Standards_Compliance003

The finalized surface has 28266222 nodes with 509701313 soundings.

Uncertainty Standards

100.00% | PASS

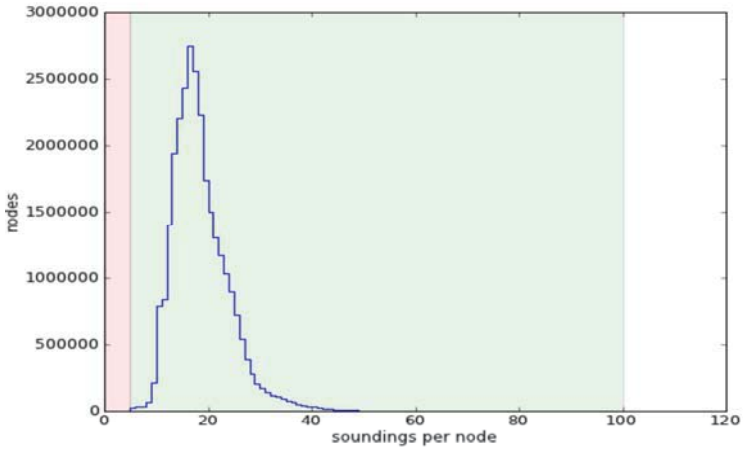
Nodes with Uncertainty less then or equal allowable IHO error **100.00%** (28266222/28266222).



Object Detection Coverage

99.98% | PASS

Nodes with 5 or more soundings **99.98%** (28261166/28266222).
Sounding count average is **18.03** soundings per node.
Sounding count mode is **17** soundings per node.



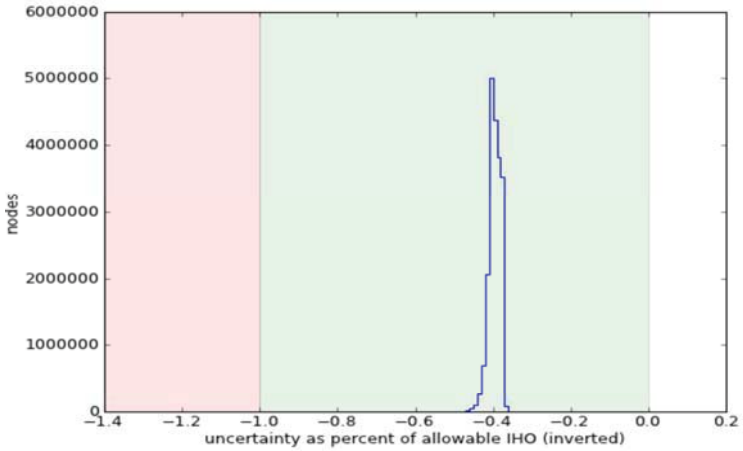
H12505_Standards_Compliance004

The finalized surface has 20020103 nodes with 339913288 soundings.

Uncertainty Standards

100.00% | PASS

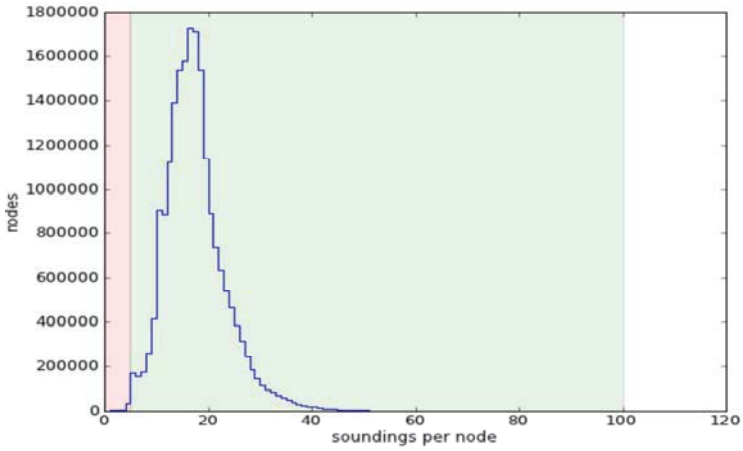
Nodes with Uncertainty less then or equal allowable IHO error **100.00%** (20020103/20020103).



Object Detection Coverage

99.75% | PASS

Nodes with 5 or more soundings **99.75%** (19969433/20020103).
Sounding count average is **16.98** soundings per node.
Sounding count mode is **17** soundings per node.



OPS.Ferdinand Hassler - NOAA Service Account <ops.ferdinand.hassler@noaa.gov>

Final Tide Request for OPR-D304-FH-12; H12503, H12504 & H12505

4 messages

OPS.Ferdinand Hassler - NOAA Service Account <ops.ferdinand.hassler@noaa.gov>
To: Final.Tides@noaa.gov

Wed, Dec 19, 2012 at 1:03 PM

Good Afternoon,
Attached, please find three (3) final tides requests for OPR-D304-FH-12. While we already submitted a request for H12503, this sheet was reopened last week to pick up a holiday.
Thank you.
Very respectfully,
Madeleine

--
Field Operations Officer - FH
MOC-A 439 West York Street
Norfolk, VA 23510

3 attachments

H12503_final_tides_request_revised.pdf
35K

H12504_Final_Tide_Request.pdf
35K

H12505_Final_Tide_Request.pdf
35K

OPS.Ferdinand Hassler - NOAA Service Account <ops.ferdinand.hassler@noaa.gov>
To: Final.Tides@noaa.gov

Wed, Dec 19, 2012 at 1:08 PM

Good Afternoon,
Please find tide request attachments with this email.
V/r,
Madeleine
[Quoted text hidden]

3 attachments

H12504_Final_Tide_Request.mif
252K

H12503_final_tides_request_revised.mif
362K

H12505_Final_Tide_Request.mif
297K

Final Tides <final.tides@noaa.gov> Wed, Dec 19, 2012 at 3:01 PM
To: "OPS.Ferdinand Hassler - NOAA Service Account" <ops.ferdinand.hassler@noaa.gov>
Cc: Corey Allen <Corey.Allen@noaa.gov>, "_NOS.CO-OPS.HPT" <NOS.COOPS.HPT@noaa.gov>

Hi Madeleine,

The mid files are still missing.

A single zip file per H sheet with the pdf, the mid file, and the mif file would be easiest for us.

Thanks.

[Quoted text hidden]

[Quoted text hidden]

OPS.Ferdinand Hassler - NOAA Service Account <ops.ferdinand.hassler@noaa.gov> Wed, Dec 19, 2012 at 4:29 PM
To: Final Tides <final.tides@noaa.gov>
Cc: Corey Allen <Corey.Allen@noaa.gov>, "_NOS.CO-OPS.HPT" <NOS.COOPS.HPT@noaa.gov>

Good Afternoon Corey,
Please find the zipped files attached. My apologies for the first two emails.
V/r,
Madeleine

[Quoted text hidden]

---

3 attachments

H12505_Final_Tide_Request.zip
191K

H12504_Final_Tide_Request.zip
170K

H12503_Final_Tides_Request_revised.zip
229K

OPS.Ferdinand Hassler - NOAA Service Account <ops.ferdinand.hassler@noaa.gov>

Final Tide Notes for OPR-D304-FH-2012, Registry Nos. H12502 and H12503

1 message

Hua Yang - NOAA Affiliate <hua.yang@noaa.gov> Mon, Jan 14, 2013 at 1:53 PM
To: CO.Ferdinand.Hassler@noaa.gov, OPS.Ferdinand.Hassler@noaa.gov
Cc: marc.s.moser@noaa.gov, corey.allen@noaa.gov, abigail.higgins@noaa.gov, nos.coops.hpt@noaa.gov

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

DATE: 01/14/2013

MEMORANDUM FOR: LCDR Benjamin K. Evans
Commanding Officer, NOAA Ship Ferdinand Hassler

FROM: Gerald Hovis
Chief, Products and Services Branch, N/OPS3

SUBJECT: Delivery of Tide Requirements for Hydrographic Surveys

This is notification that the preliminary zoning is accepted as the final zoning for survey project OPR-D304-FH-2012, Registry Nos. H12503Rev, H12504, and H12505 during the time period of September 23 to December 13, 2012. The accepted reference station for them is Duck, NC (8651370).

Included with this memo are the Tide Notes in .PDF format, stating the preliminary zoning has been accepted as the final zoning.

Hua Yang

Hydrographic Planning Team
Oceanographic Division
NOAA/National Ocean Service
Center for Operational Oceanographic Products and Services
1305 East-West Highway
Silver Spring, MD 20910
Hua.Yang@noaa.gov
Phone (work):(301) 713-2890 x 210

3 attachments

H12505.pdf
481K

H12504.pdf
482K

H12503Rev.pdf
478K

David Moehl - NOAA Federal <david.t.moehl@noaa.gov>

AWOIS items #15017 & #15018

7 messages

OPS.Ferdinand Hassler - NOAA Service Account <ops.ferdinand.hassler@noaa.gov> Tue, Mar 19, 2013 at 11:23 AM
To: Paul Turner - NOAA Federal <Paul.Turner@noaa.gov>
Cc: David Moehl - NOAA Federal <david.t.moehl@noaa.gov>

Good Morning Mr. Turner,
The FH completed acquisition on OPR-D304-FH-12 sheets H12504 & H12505. Each sheet had an AWOIS assigned, #15017 & #15018 respectively.

Would you please provide more information on these AWOIS items? Specifically, what they are suspected to be and perhaps when they we added to the chart? There are some evidence in the data of depressions or possible something man-made. Until we know what we are looking for, it is difficult to make a charting recommendation and determine if these are features.

Many thanks.
Very respectfully,
Madeleine

--
Field Operations Officer, *NOAA Ship Ferdinand R. Hassler*
MOC-A, 439 West York Street
Norfolk, VA 23510

OPS.Ferdinand Hassler - NOAA Service Account <ops.ferdinand.hassler@noaa.gov> Thu, Mar 21, 2013 at 8:41 AM
To: Corey Allen - NOAA Federal <Corey.Allen@noaa.gov>
Cc: David Moehl - NOAA Federal <david.t.moehl@noaa.gov>

Good Morning Corey,
It is my understanding that you have taken on some of Paul Turner's work while he is on leave. Would you please assist us with some questions regarding some AWOIS items?
[Quoted text hidden]

Corey Allen - NOAA Federal <corey.allen@noaa.gov> Fri, Mar 22, 2013 at 10:32 AM
To: "OPS.Ferdinand Hassler - NOAA Service Account" <ops.ferdinand.hassler@noaa.gov>
Cc: David Moehl - NOAA Federal <david.t.moehl@noaa.gov>, Lucy Hick - NOAA Federal <lucy.hick@noaa.gov>

Madeleine,
We're looking into this today and will get back to you shortly.

Corey
[Quoted text hidden]
--
J. Corey Allen
Operations Branch Team Lead
Hydrographic Surveys Division
Office of Coast Survey, NOAA
Corey.Allen@noaa.gov

301.713.2777 x119 (Office)
301.717.7271 (Cell)

Lucy Hick - NOAA Federal <lucy.hick@noaa.gov> Fri, Mar 22, 2013 at 5:13 PM
To: Corey Allen - NOAA Federal <corey.allen@noaa.gov>
Cc: "OPS.Ferdinand Hassler - NOAA Service Account" <ops.ferdinand.hassler@noaa.gov>, David Moehl - NOAA Federal <david.t.moehl@noaa.gov>

Madeline & Corey,

Here the info that I could find on AWOIS 15017 & 15018. I'll update the AWOIS database to reflect this.

Regards,
Lucy

AWOIS 15017: NM 51/69 -- Unexploded ordnance reported in position (NAD27) 37/08.5 N, 75/17.2 W.

AWOIS 15018: LNM 15/72; CGD5 – U.S. Navy advises that unexploded 3-inch 50-caliber ordnance has been jettisoned in 12 fathoms of water in position (NAD27) 37/07.5N, 75/21.4W.

[Quoted text hidden]

--
Lucy Hick
Physical Scientist / COR Level 1
Hydrographic Surveys Division - Operations Branch
Office of Coast Survey
National Oceanic & Atmospheric Administration
(301) 713-2702 x125
Lucy.Hick@noaa.gov

David Moehl - NOAA Federal <david.t.moehl@noaa.gov> Mon, Mar 25, 2013 at 8:27 AM
To: "CO.Ferdinand Hassler - NOAA Service Account" <co.ferdinand.hassler@noaa.gov>, "XO.Ferdinand Hassler - NOAA Service Account" <xo.ferdinand.hassler@noaa.gov>

CO and XO,

In case you guys haven't seen the additional information sent from Lucy.

AWOIS # 15018 is on H12505 and I think it is safe to say that a 3 inch shell dropped 40 years ago is beyond our capabilities of detection. Please advise on how we would like to proceed with the AWOIS on both sheets.

Thank you,
Dave

[Quoted text hidden]

--
David Moehl
Hydrographic Senior Survey Technician
NOAA Ship *Ferdinand R. Hassler*

Corey Allen - NOAA Federal <corey.allen@noaa.gov> Mon, Mar 25, 2013 at 10:05 AM
To: "OPS.Ferdinand Hassler - NOAA Service Account" <ops.ferdinand.hassler@noaa.gov>, David Moehl - NOAA Federal <david.t.moehl@noaa.gov>
Cc: Lucy Hick - NOAA Federal <lucy.hick@noaa.gov>

Mud & Moehl,
Please find attached MI files and a csv. How would you like OPS to proceed? Would you like a new PRF delivered or you guys ok making updates in BDB to the existing PRF?

Corey
[Quoted text hidden]

D304_AWOIS_Update.zip
9K

David Moehl - NOAA Federal <david.t.moehl@noaa.gov> Mon, Mar 25, 2013 at 10:15 AM
To: Corey Allen - NOAA Federal <corey.allen@noaa.gov>
Cc: "OPS.Ferdinand Hassler - NOAA Service Account" <ops.ferdinand.hassler@noaa.gov>, Lucy Hick - NOAA Federal <lucy.hick@noaa.gov>

Corey,

Thanks for looking into this. We will make the updates to the existing PRF. I will let you know if I we need additional guidance.

Cheers,
[Quoted text hidden]
--
David Moehl
Hydrographic Senior Survey Technician
NOAA Ship *Ferdinand R. Hassler*

APPENDIX III

FEATURES REPORT

DTONS - 0
AWOIS - 1
WRECK - 0
MARITIME BOUNDARIES - 0

H12505 AWOIS

Registry Number: H12505
State: Virginia
Locality: Approaches to Chesapeake Bay, VA
Sub-locality: 35 NM East of Fishermans Island
Project Number: OPR-D304-FH-12
Survey Date: 10/11/2012 - 12/13/2012

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
12200	50th	07/01/2011	1:419,706 (12200_1)	USCG LNM: 7/23/2013 (10/15/2013) NGA NTM: 12/29/2012 (10/26/2013)
13003	49th	04/01/2007	1:1,200,000 (13003_1)	[L]NTM: ?

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

Features

No.	Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	AWOIS 15018	Obstruction	[None]	37° 08' 33.1" N	075° 17' 10.8" W	15018

1 - AWOIS

1.1) AWOIS 15018

Primary Feature for AWOIS Item #15018

Search Position: 37° 08' 32.7" N, 075° 17' 08.1" W
Historical Depth: [None]
Search Radius: 1000
Search Technique: [None]
Technique Notes: SSS, SWMB, DI

History Notes:

Source unknown. Entered 9/17/2012 by JCA.

Survey Summary

Survey Position: 37° 08' 33.1" N, 075° 17' 10.8" W
Least Depth: [None]
TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp: 2012-348.00:00:00.000 (12/13/2012)
Dataset: H12505_AWOIS.000
FOID: 0_ 0001519809 00001(FFFE001730C10001)
Charts Affected: 12200_1, 13003_1

Remarks:

[None]

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12505_AWOIS.000	0_ 0001519809 00001	0.00	000.0	Primary
OPR-D304-FH-12	AWOIS # 15018	67.68	280.7	Secondary (grouped)

Hydrographer Recommendations

[None]

S-57 Data

Geo object 1: Obstruction (OBSTRN)

Attributes:
NINFOM - Retain Obstuction Unexploded Ordnance
QUASOU - 2:depth unknown
SORDAT - 20121213
SORIND - US,US,graph,H12505
TECSOU - 3:found by multi-beam
WATLEV - 3:always under water/submerged

Office Notes

COMPILE: Retain obstruction unexploded ordnance, AWOIS item 15018, at survey position.

APPROVAL PAGE

H12505

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

- H12505_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12505_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.

Digitally signed by HIGGINS.ABIGAIL.SARAH.1267671750
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=NOAA, cn=HIGGINS.ABIGAIL.SARAH.1267671750
Date: 2014.03.28 10:48:06 -04'00'

Approved: _____

LCDR Abigail Higgins
Chief, Atlantic Hydrographic Branch