

H12569

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

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: H12569

LOCALITY

State(s): Delaware

General Locality: Delaware Bay

Sub-locality: Overfalls Shoal

2013

CHIEF OF PARTY
CAPT Lawrence T. Krepp, NOAA

LIBRARY & ARCHIVES

Date:

HYDROGRAPHIC TITLE SHEET

H12569

INSTRUCTIONS: The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

State(s): **Delaware**

General Locality: **Delaware Bay**

Sub-Locality: **Overfalls Shoal**

Scale: **20000**

Dates of Survey: **08/25/2013 to 09/24/2013**

Instructions Dated: **05/03/2013**

Project Number: **OPR-D332-TJ-13**

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

Chief of Party: **CAPT Lawrence T. Krepp, NOAA**

Soundings by: **Multibeam Echo Sounder**

Imagery by: **Side Scan Sonar**

Verification by: **Atlantic Hydrographic Branch**

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

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

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Descriptive Report to Accompany Survey H12569

Project: OPR-D332-TJ-13

Locality: Delaware Bay

Sublocality: Overfalls Shoal

Scale: 1:20000

August 2013 - September 2013

NOAA Ship *Thomas Jefferson*

Chief of Party: CAPT Lawrence T. Krepp, NOAA

A. Area Surveyed

This hydrographic survey was completed as specified by hydrographic survey project instructions OPR-D332-TJ-13, signed 3 May 2013 and all other applicable direction. This survey is located in the vicinity of Overfalls Shoal, Delaware.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
38° 53' 28.27' N 75° 1' 54.91' W	38° 49' 15.77' N 74° 55' 40.09' W

Table 1: Survey Limits

The sheet limits were extended in the west to cover the entire radius of AWOIS 2765. The shoal in the northeast corner was surveyed up to the 4 meter curve and was not completely covered.

A.2 Survey Purpose

The purpose of this project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charting products in response to Hurricane Sandy.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

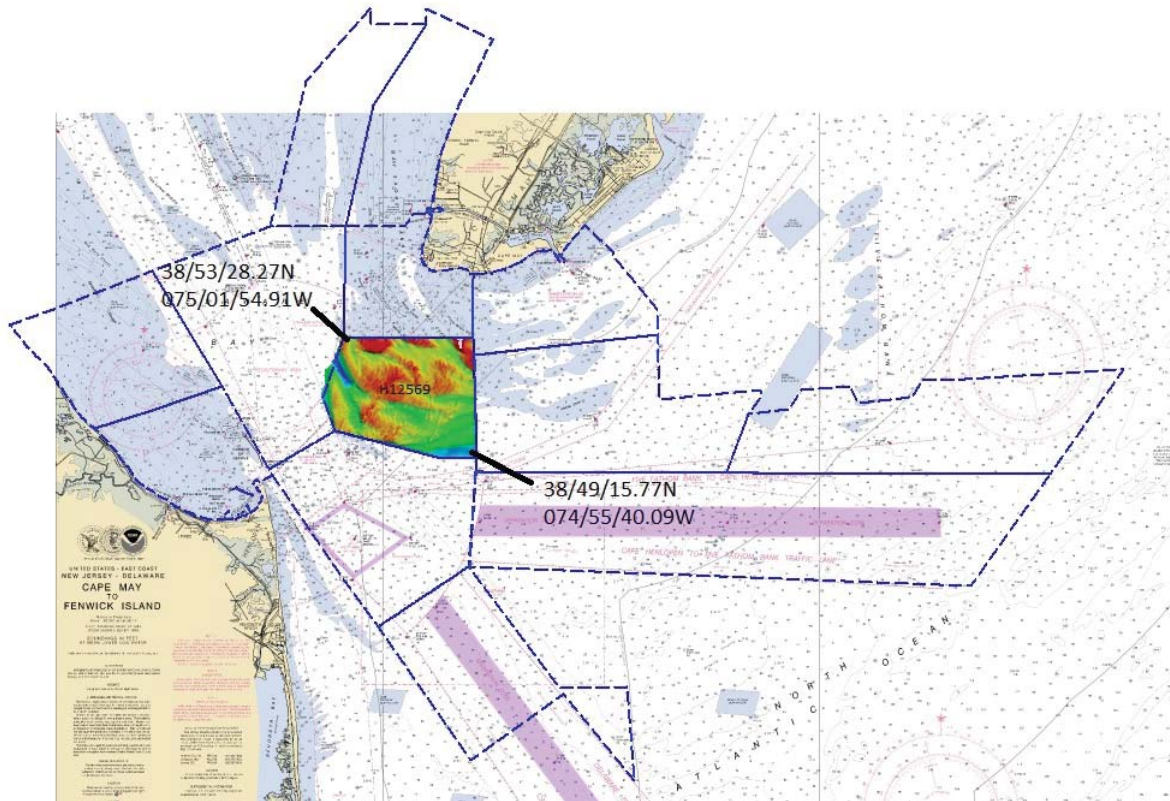


Figure 1: H12569 in relation to the project area.

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:

	Vessel	<i>3101</i>	<i>3102</i>	<i>Total</i>
LNM	SBES Mainscheme	0	0	0
	MBES Mainscheme	0	0	0
	Lidar Mainscheme	0	0	0
	SSS Mainscheme	0	0	0
	SBES/MBES Combo Mainscheme	0	0	0
	SBES/SSS Combo Mainscheme	0	0	0
	MBES/SSS Combo Mainscheme	434.750	431.20	865.95
	SBES/MBES Combo Crosslines	39.68	31.84	71.52
	Lidar Crosslines	0	0	0
Number of Bottom Samples			0	
Number AWOIS Items Investigated			4	
Number Maritime Boundary Points Investigated			0	
Number of DPs			4	
Number of Items Items Investigated by Dive Ops			0	
Total Number of SNM			20	

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Julian Day Number
08/25/2013	237
08/26/2013	238
08/27/2013	239
09/05/2013	248
09/06/2013	249
09/07/2013	250
09/08/2013	251
09/09/2013	252
09/10/2013	253
09/11/2013	254
09/12/2013	255
09/15/2013	258
09/16/2013	259
09/18/2013	261
09/19/2013	262
09/24/2013	267

Table 3: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

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

B.1.1 Vessels

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

Hull ID	3101	3102
LOA	31 feet	31 feet
Draft	5.2 feet	5.2 feet

Table 4: Vessels Used

Data were acquired by NOAA Hydrographic Survey Launches 3101 and 3102. Both platforms acquired Reson 7125-SV1 multibeam echosounder soundings, multibeam backscatter data; Klein 5000 side scan sonar imagery, Seabird sound velocity profiles, SV-71 surface sound velocity readings, and Applanix position and attitude data.

B.1.2 Equipment

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

Manufacturer	Model	Type
Applanix	POS/MV version 4	Positioning and Attitude System
Seabird	Seacat 19+	Conductivity, Temperature, and Depth Sensor
Reson	7125 SV1	MBES
Klein	5000	SSS
Trimble	SPS351 DGPS Beacon Receiver	Positioning and Attitude System
Reson	SV-71	Sound Speed System

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines, acquired for this survey, totalled 8% of mainscheme acquisition.

Multibeam crosslines totaling 71.52 lineal nautical miles comprising 8% of hydrography, were acquired during the course of the survey. Crosslines were compared to mainscheme using a difference surface created in CARIS Bathymetry Data Base. Using the difference surface, every instance of overlap was evaluated. The mean was -0.012m and the standard deviation was 0.112m. Survey H12569 complies with section 5.2.4.3 of the HSSD (2013 ed).

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0 meters	0.085 meters
0 meters	0.14 meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
3101	4 meters/second	N/A meters/second	0.2 meters/second
3102	4 meters/second	N/A meters/second	0.2 meters/second

Table 7: Survey Specific Sound Speed TPU Values

The method used to calculate Total Propagated Uncertainty values for survey H12569 varied based on the process used to apply water level values to the data. The first method was applied to data reduced to MLLW using a POSPac IAPPK 3D positional solution and a VDatum separation model. For this data, realtime uncertainty values for roll, pitch, gyro, navigation, and elevation were supplied via a SBET RMS file generated by Applanix POSPac. The remaining sources of uncertainty were a combination of: field assigned values for sound speed uncertainties; Operations Branch assigned values for VDatum separation model uncertainty; and a priori values for sonar mounting and vessel speed based on Appendix 4, table 4.9 of the NOAA Field Procedures Manual (ed 2013). Field assigned values for TPU calculation are in tables 6 and 7, Operations Branch assigned values for the VDatum model are in row 2 of Table 6.

The second method used to calculate Total Propagated Uncertainty was applied to data reduced to MLLW via zoned tides. This data again used a POSPac IAPPK 3D positional solution, but used a zoned tide grid to reduce the data to MLLW. Uncertainties for this data also used an SBET RMS file for realtime pitch, roll, gyro, navigation, and elevation uncertainties, as well as a priori values for sonar mounting and vessel speed. However, uncertainties for tide gauge measurement, tidal datum computation error, and tidal zoning error were provided by the Center for Operational Oceanographic Products and Services (CO-OPS). CO-OPS assigned values for tidal uncertainty are in row 1 of Table 6. The CO-OPS uncertainty value was provided at the 95% confidence interval. It was divided by 1.96 to provide the 1-sigma value needed by CARIS.

Total Propagated Uncertainties for the entire survey were evaluated to ensure compliance with section 5.1.3 of NOAA's HSSD (ed 2013). First, the maximum allowable uncertainty for each node was calculated using the equation: $-\text{Uncertainty}/(0.5^2 + ((\text{Depth} * 0.013)^2)^{0.5})$. Second, the ratio between the actual uncertainty and maximum allowed uncertainty was found for each node. Out of 3,905,993 nodes, 3385 did not meet IHO order 1 standards (or 99.99% meet IHO order 1 uncertainty requirements). Most of the nodes that do not pass are on the crests and slopes of sandwaves.

B.2.3 Junctions

Four junction comparisons were made with this survey.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12571	1:20000	2013	NOAA Ship THOMAS JEFFERSON	E
H12568	1:20000	2013	NOAA Ship THOMAS JEFFERSON	N
H12605	1:20000	2013	NOAA Ship THOMAS JEFFERSON	W
H12570	1:20000	2013	NOAA Ship THOMAS JEFFERSON	S

Table 8: Junctioning Surveys

H12571

The difference between survey H12526 and H12571 ranged from -2.874m to 1.571m. The mean was 0.024m and the standard deviation was 0.152m. Out of 50,585 nodes, 50,531 nodes, or 99.9% are within 1 meter. The nodes exceeding 1 meter of difference are located in areas of sandwave movement, or outerbeam distortion.

H12568

The difference between survey H12526 and H1568 ranged from -5.032m to 1.906m. The mean was 0.016m and the standard deviation was 0.230m. Out of 61,473 nodes, 60,895 nodes, or 99.9% are within 1 meter. There are numerous sandwaves in the area. The nodes exceeding 1 meter of difference are located in areas of sandwave movement, or outerbeam distortion.

H12605

The difference between survey H12526 and H15605 ranged from -16.921m to 0.873m. The mean was -0.011m and the standard deviation was 0.198m. Out of 44,778 nodes, 44,768 nodes, or 99.9% are within 1 meter. The nodes exceeding 1 meter of difference are located in areas of sandwave movement, or outerbeam distortion.

H12570

At the time of writing this DR, it was not ready for a junction comparison.

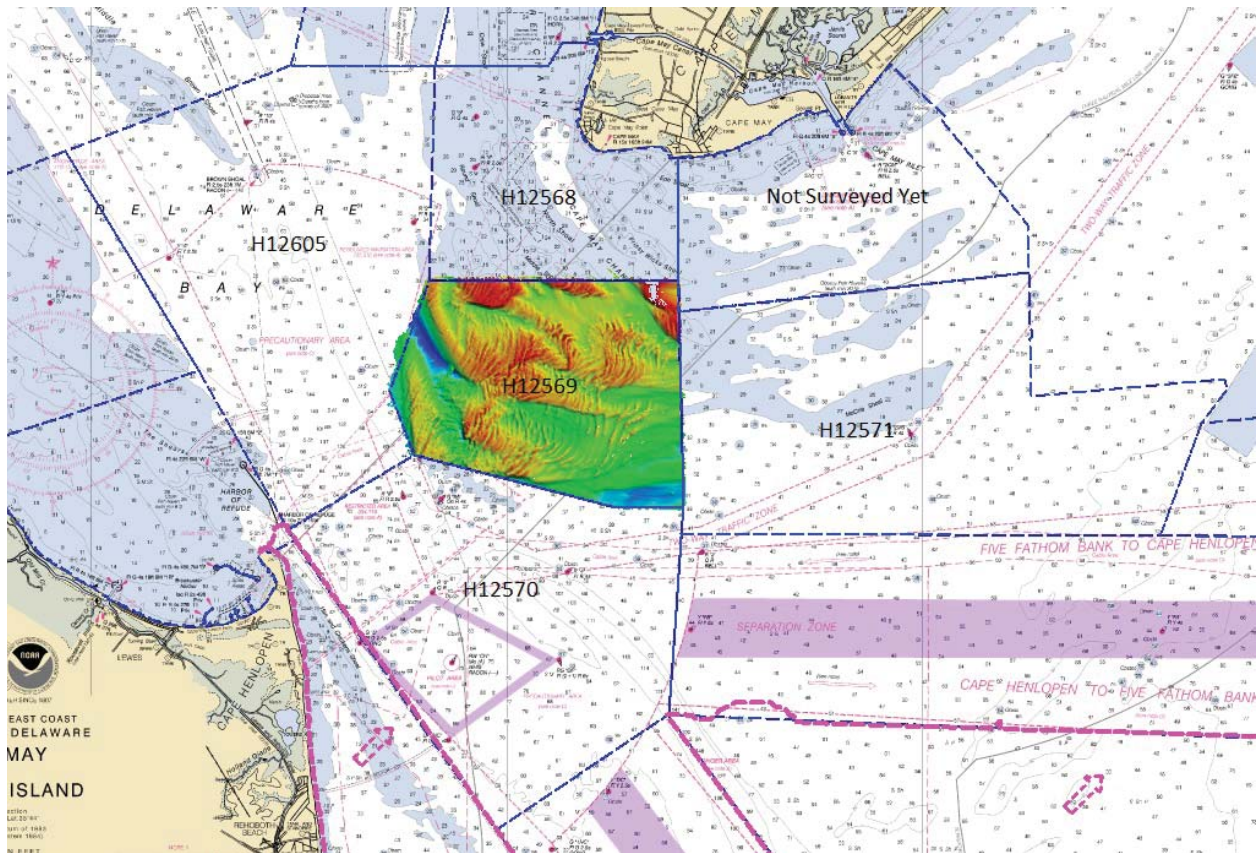


Figure 2: H12569 Junctions

B.2.4 Sonar QC Checks

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

B.2.5 Equipment Effectiveness

There were no conditions or deficiencies that affected equipment operational effectiveness.

B.2.6 Factors Affecting Soundings

There were no other factors that affected corrections to soundings.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: 3101 and 3102 took CTDs about every four hours.

No sound speed zoning was required for this survey.

B.2.8 Coverage Equipment and Methods

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

B.2.9 H12569 Density Compliance

Data acquired on survey H12569 met set line spacing multibeam coverage with concurrent 200% side scan sonar coverage requirements, including the 3 nodes soundings per node data density requirements outlined in section 5.2.2.3 of the HSSD in 99.998% of the nodes. The nodes that did not meet density are located on the outer beams.

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

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

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Raw Backscatter was logged as a 7k file and has been sent to the Atlantic Hydrographic Processing Branch. One line per vessel, per day was processed aboard the Thomas Jefferson in order to assess and ensure quality. No deficiencies were noted.

B.5 Data Processing

B.5.1 Software Updates

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

Manufacturer	Name	Version	Service Pack	Hotfix	Installation Date	Use
Caris	HIPS/SIPS	8.1.1	N/A	N/A	10/01/2013	Processing

Table 9: Software Updates

The following Feature Object Catalog was used: NOAA Profile V_5_3_2

B.5.2 Surfaces

The following surfaces and/or BAGs were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12569_MB_4M_MLLW.csar_Final	CUBE	4 meters	2.16 meters - 18.16 meters	NOAA_4m	MBES TracklineSBES Set Line Spacing
H12569_MB_50cm_MLLW.csar_Final	CUBE	0.5 meters	4.06 meters - 14.49 meters	NOAA_0.5m	Object Detection
H12569_SSS_3101_100%	SSS Mosaic	1 meters	0 meters - 0 meters	N/A	100% SSS
H12569_SSS_3101_200%	SSS Mosaic	1 meters	0 meters - 0 meters	N/A	200% SSS
H12569_SSS_3102_100%	SSS Mosaic	1 meters	0 meters - 0 meters	N/A	100% SSS
H12569_SSS_3102_200%	SSS Mosaic	1 meters	0 meters - 0 meters	N/A	200% SSS

Table 10: Submitted Surfaces

B.5.3 Lines Without SBETs

Launch 3101

DN 255 Line 255_233_1745 CARIS gave the following error when applying SBETs. The SBET time extents does not overlap the line. It was processed using trueheave only.

Launch 3102

DN 248 Line 248_433_1822 had a vertical offset of 0.8 meters.

B.5.4 Vertical Offset Anomaly

There are vertical offsets between concurrent lines in the northwest and southeast section of survey H12569, which can be seen as banding in the 4 meter CUBE surface. The most noticeable separation is in the deep section west of Overfalls Shoal, where the maximum value is 0.37 meters. The offset is caused by an unknown error causing the vertical element of the IAPPK solution to fail. Despite the offset the data remains within IHO order 1 specification.

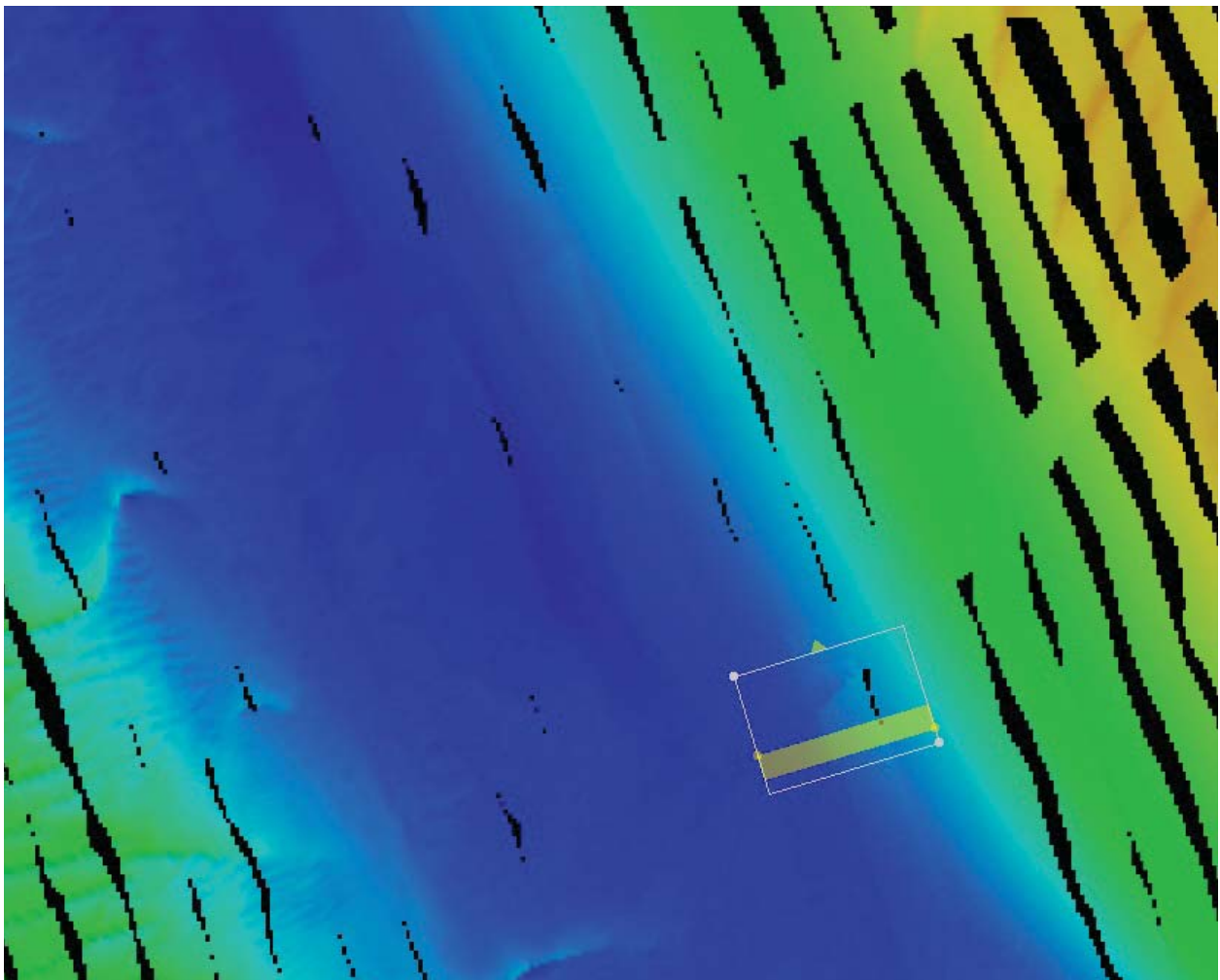


Figure 3: H12569 Vertical Offsets

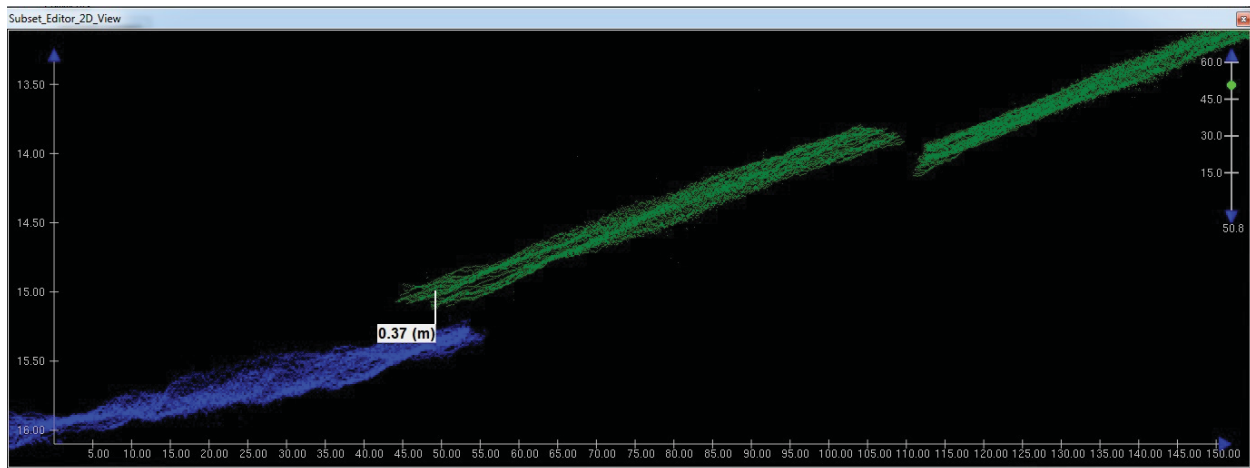


Figure 4: H12569 Vertical Offset in Subset Editor

B.5.5 SSV Blowouts

Surface sound speed input into the RESON 7125-SV1 unit was periodically lost due to high sea state. The loss caused heavy refraction in the outerbeams, which were later filtered out. Areas where this occurred had the outer beams removed.

B.5.6 Recompute Towfish Navigation

During acquisition on survey H12569 there was an error with the Recompute Towfish Navigation process in CARIS 8.1. Due to this, HSL 3101 and 3102 did not have the Recompute Towfish Navigation process applied. Positioning errors in the side scan data remain below 0.25m due to the hard mounting of the towfish body to the launch hull.

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
Atlantic City, NJ	8534720
Cape May, NJ	8536110
Lewes, DE	8557380

Table 11: NWLON Tide Stations

File Name	Status
8534720.tid	Final Approved
8536110.tid	Final Approved
8557380.tid	Final Approved

Table 12: Water Level Files (.tid)

File Name	Status
D332TJ2013CORP.zdf	Final

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

A request for final approved tides was sent to N/OPS1 on 09/26/2013. The final tide note was received on 10/01/2013.

Preliminary zoning was accepted as final.

Non-Standard Vertical Control Methods Used:

VDatum

Ellipsoid to Chart Datum Separation File:

2013_D332_VDatum_Ellip_MLLW.xyz

C.2 Horizontal Control

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

The projection used for this project is UTM Zone 18.

The following PPK methods were used for horizontal control:

Smart Base

The following user installed stations were used for horizontal control:

HVCR Site ID	Base Station ID
NJGT	NJGT
DHRC	DHRC
NJCM	NJCM
DEMI	DEMI
VAWI	VAWI
NCBX	NCBX
COVX	COVX
RED5	RED5
MOR6	MOR6
SHK5	SHK5
NJBR	NJBR

Table 14: User Installed Base Stations

Reedy Point, Delaware (309kHz)

The following DGPS Stations were used for horizontal control:

DGPS Stations

Table 15: USCG DGPS Stations

D. Results and Recommendations

D.1 Chart Comparison

A sounding plot of H12569 was created from the ENC and RNC charts.

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
12214	1:80000	49	11/2010	11/06/2010	11/02/2010
12304	1:80000	46	05/2011	05/10/2011	05/14/2011

Table 16: Largest Scale Raster Charts

12214

Significant changes were noticed when survey H12569 was compared to the chart. There are numerous sandwaves that have moved. In some areas changes in depth of up to 20 feet have been noticed. Figure 5 shows the areas that are shallower than charted and figure 6 shows the areas that are deeper than charted. The greatest changes are west and north of Overfalls Shoal where it has become shallower.

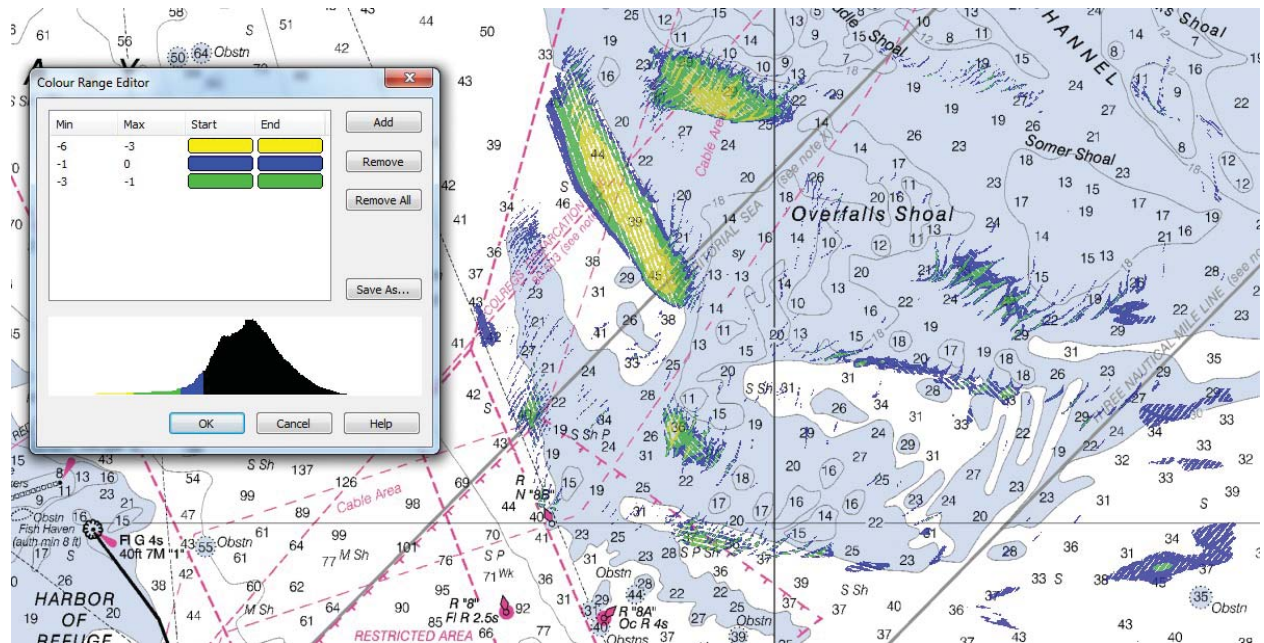


Figure 5: H12569 Shallower Areas

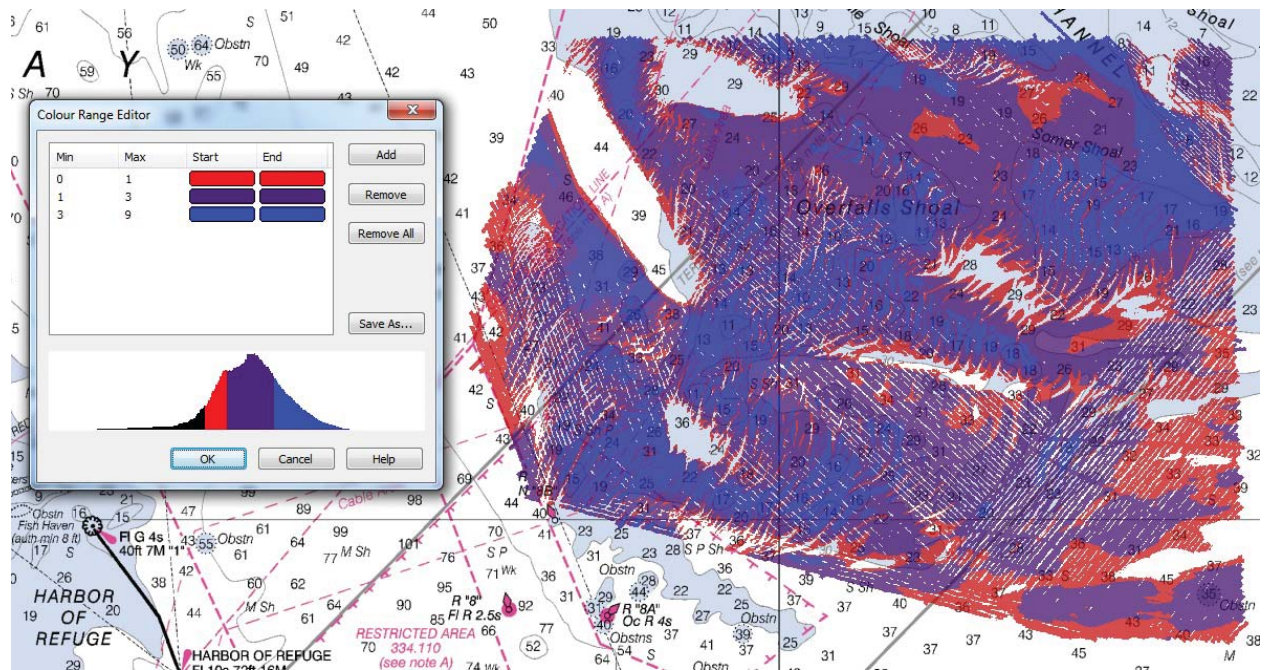


Figure 6: H12569 Deeper Areas

12304

Comparisons between chart 12304 and survey H12569 are remarkably similar to the comparisons made to chart 12214. Overall this area has undergone significant changes due to currents and recent storms. There are numerous sandwaves that have moved. In some areas changes in depth up to 20 feet have been noticed.

D.1.2 Electronic Navigational Charts

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

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US4DE11M	1:80000	27	NaN/NaN/NaN	02/13/2013	NO

Table 17: Largest Scale ENC's

US4DE11M

Overall this area has undergone significant changes due to currents and recent storms. There are numerous sandwaves that have moved. In some areas changes in depth up to 9 meters have been noticed.

D.1.3 AWOIS Items

Four AWOIS items are present in the survey area. All four are addressed. Consult the H12569_FFF.hob for more information.

D.1.4 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.5 Charted Features

One charted item is present in the survey area. Consult the H12526_FFF.hob for more information about the charted features in the survey area.

D.1.6 Uncharted Features

Two uncharted features were found. Consult the H12526_FFF.hob for more information about the uncharted features in the survey area.

D.1.7 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.8 Shoal and Hazardous Features

Middle shoal, Overfalls Shoal, and Somer Shoal have shifted to the southeast. The area south of Prissy Wicks Shoal is also showing some movement to the southeast. For more information, refer to the chart comparisons.

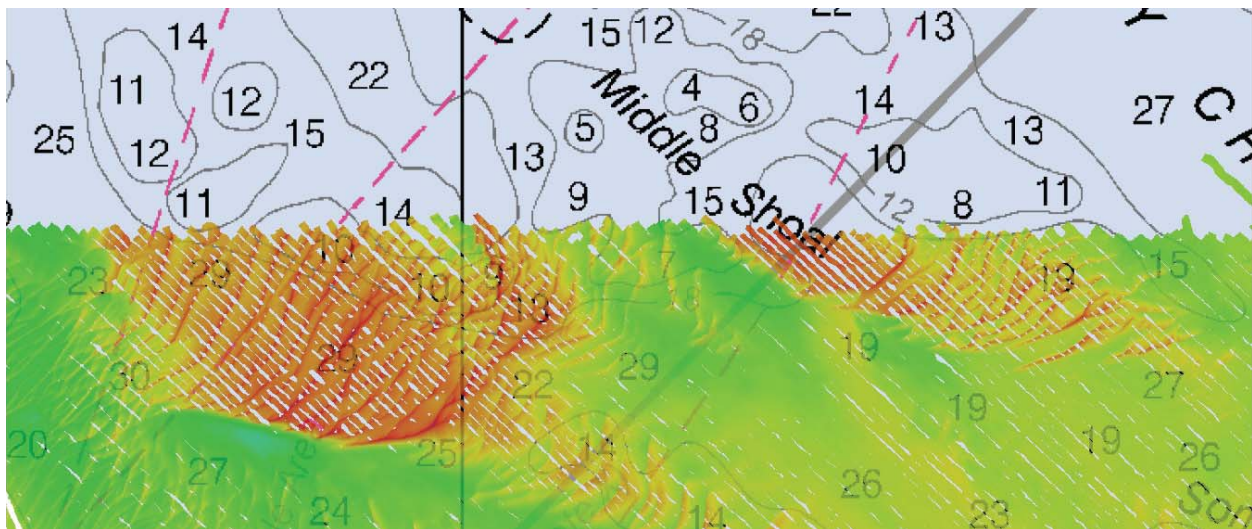


Figure 7: H12569 Middle Shoal

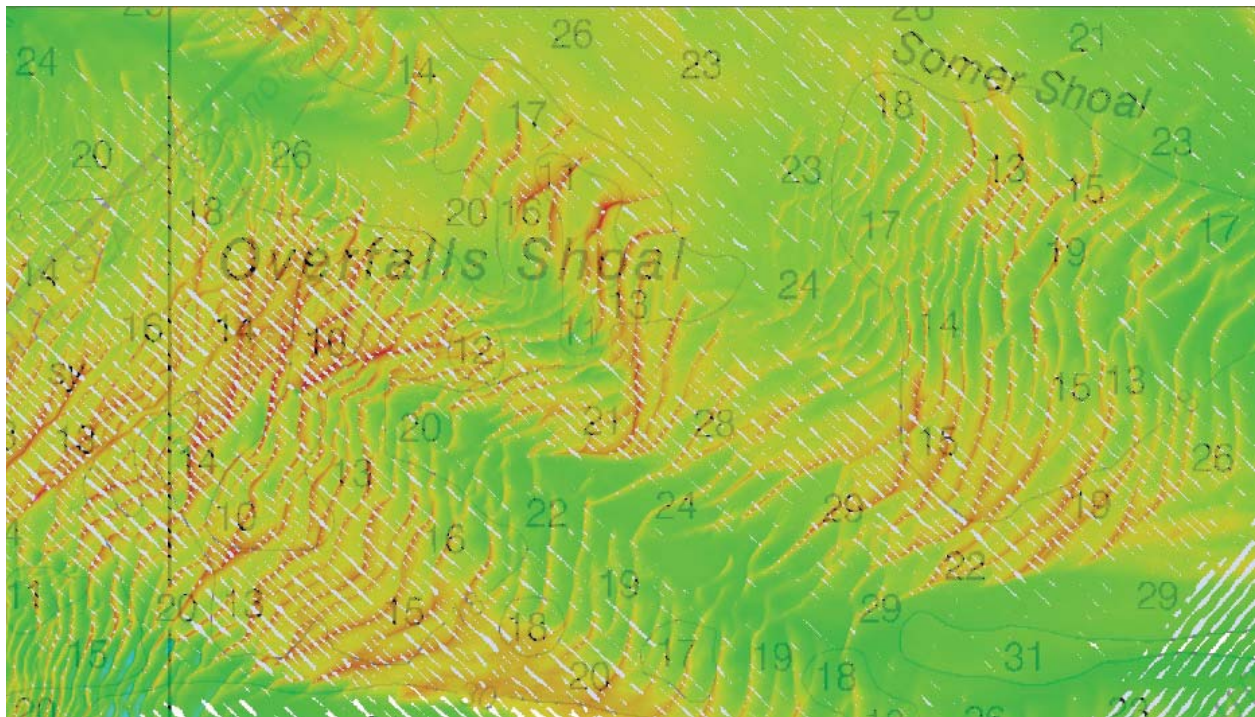


Figure 8: H12569 Overfalls Shoal and Somer Shoal

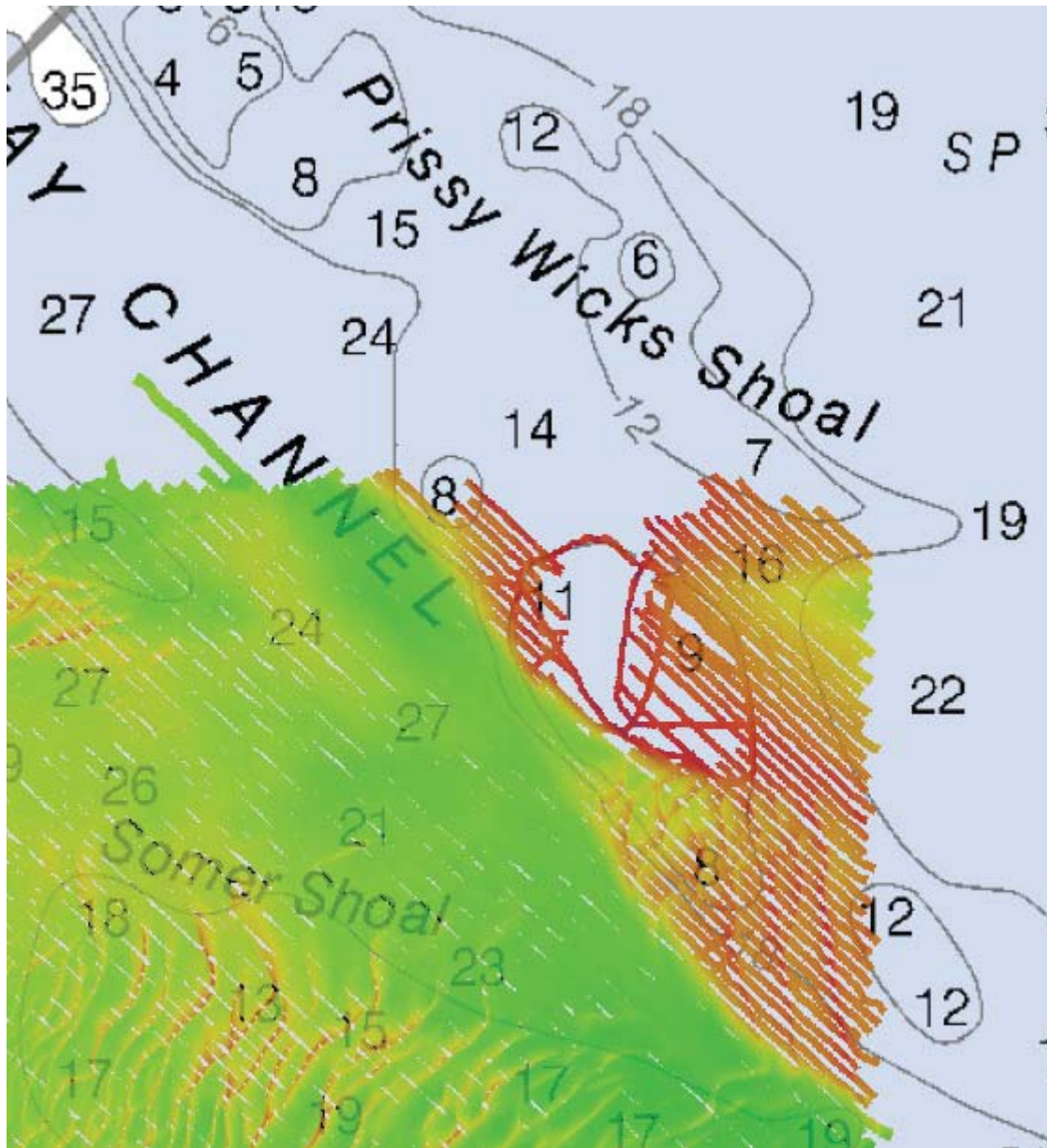


Figure 9: H12569 South of Prissy Wicks Shoal

D.1.9 Channels

Cape May Channel runs through part of the northern area. No controlling depths are provided.

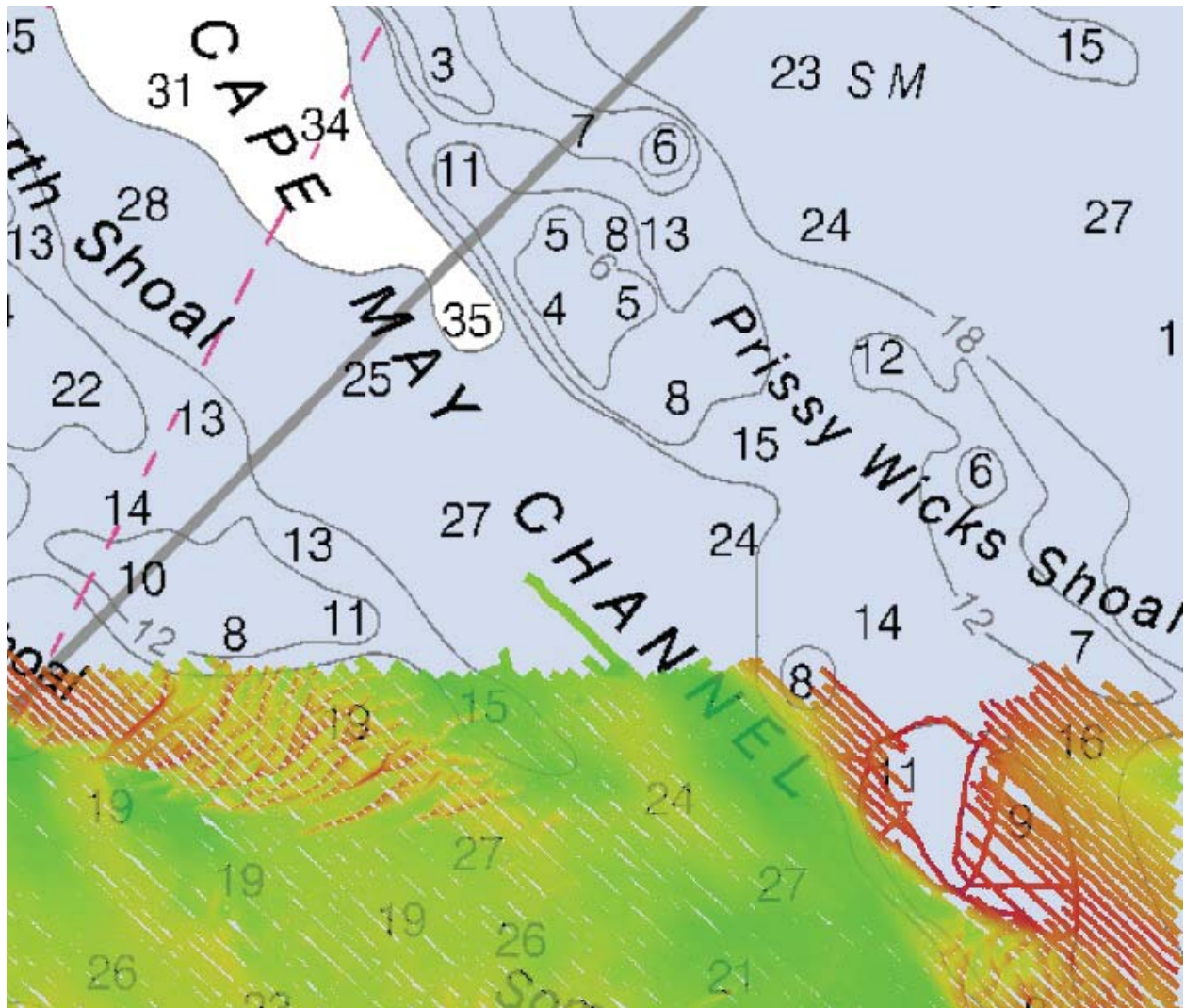


Figure 10: H12569 Cape May Channel Area

D.1.10 Bottom Samples

No bottom samples were required for this survey.

D.2 Additional Results

D.2.1 Shoreline

No Shoreline is present.

D.2.2 Prior Surveys

Comparisons were only made to the chart.

D.2.3 Aids to Navigation

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

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

There is a charted cable area within the survey area. No cables are seen in the data and are assumed to be properly buried.

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

There are numerous sandwaves present in the survey area. Those located on charted shoals have some southeast movement.

D.2.9 Construction and Dredging

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

D.2.10 New Survey Recommendations

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

D.2.11 New Inset Recommendations




No new insets are recommended for this area.

E. Approval Sheet

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

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

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

Approver Name	Approver Title	Approval Date	Signature
CDR James M. Crocker, NOAA	Commanding Officer	02/13/2014	 James Crocker cn=James Crocker, o=CO, NOAA Ship Thomas Jefferson, ou=CDR/ NOAA, email=james.m.crocker@noaa.gov, c=US
LT Megan Guberski, NOAA	Field Operations Officer	02/13/2014	 Megan R. Guberski LT NOAA
HST Kimberly Glomb	Sheet Manager	02/13/2014	 Kimberly Glomb

F. Table of Acronyms

Acronym	Definition
AHB	Atlantic Hydrographic Branch
AST	Assistant Survey Technician
ATON	Aid to Navigation
AWOIS	Automated Wreck and Obstruction Information System
BAG	Bathymetric Attributed Grid
BASE	Bathymetry Associated with Statistical Error
CO	Commanding Officer
CO-OPS	Center for Operational Products and Services
CORS	Continually Operating Reference 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
FFF	Final Feature File
FOO	Field Operations Officer
FPM	Field Procedures Manual
GAMS	GPS Azimuth Measurement Subsystem
GC	Geographic Cell
GPS	Global Positioning System
HIPS	Hydrographic Information Processing System
HSD	Hydrographic Surveys Division
HSSD	Hydrographic Survey Specifications and Deliverables

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

Acronym	Definition
PRF	Project Reference File
PS	Physical Scientist
PST	Physical Science Technician
RNC	Raster Navigational Chart
RTK	Real Time Kinematic
SBES	Singlebeam Echosounder
SBET	Smooth Best Estimate and Trajectory
SNM	Square Nautical Miles
SSS	Side Scan Sonar
ST	Survey Technician
SVP	Sound Velocity Profiler
TCARI	Tidal Constituent And Residual Interpolation
TPU	Total 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

APPENDIX I
TIDES AND WATER LEVELS



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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : September 30, 2013

HYDROGRAPHIC BRANCH: Atlantic
HYDROGRAPHIC PROJECT: OPR-D332-TJ-2013
HYDROGRAPHIC SHEET: H12569

LOCALITY: Overfalls Shoal, Delaware Bay, DE
TIME PERIOD: August 25 - September 24, 2013

TIDE STATION USED: 855-7380 Lewes, DE
Lat. 38° 46.9'N Long. 75° 07.2' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.290 meters

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project OPR-D332-TJ-2013, H12569, during the time period between August 25 - September 24, 2013.

Please use the zoning file D332TJ2013CORP submitted with the project instructions for OPR-D332-TJ-2013. Zones DB6, SA33, SA34, SA38, SA39, SA43 and SA 44 are the applicable zones for H12569.

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).

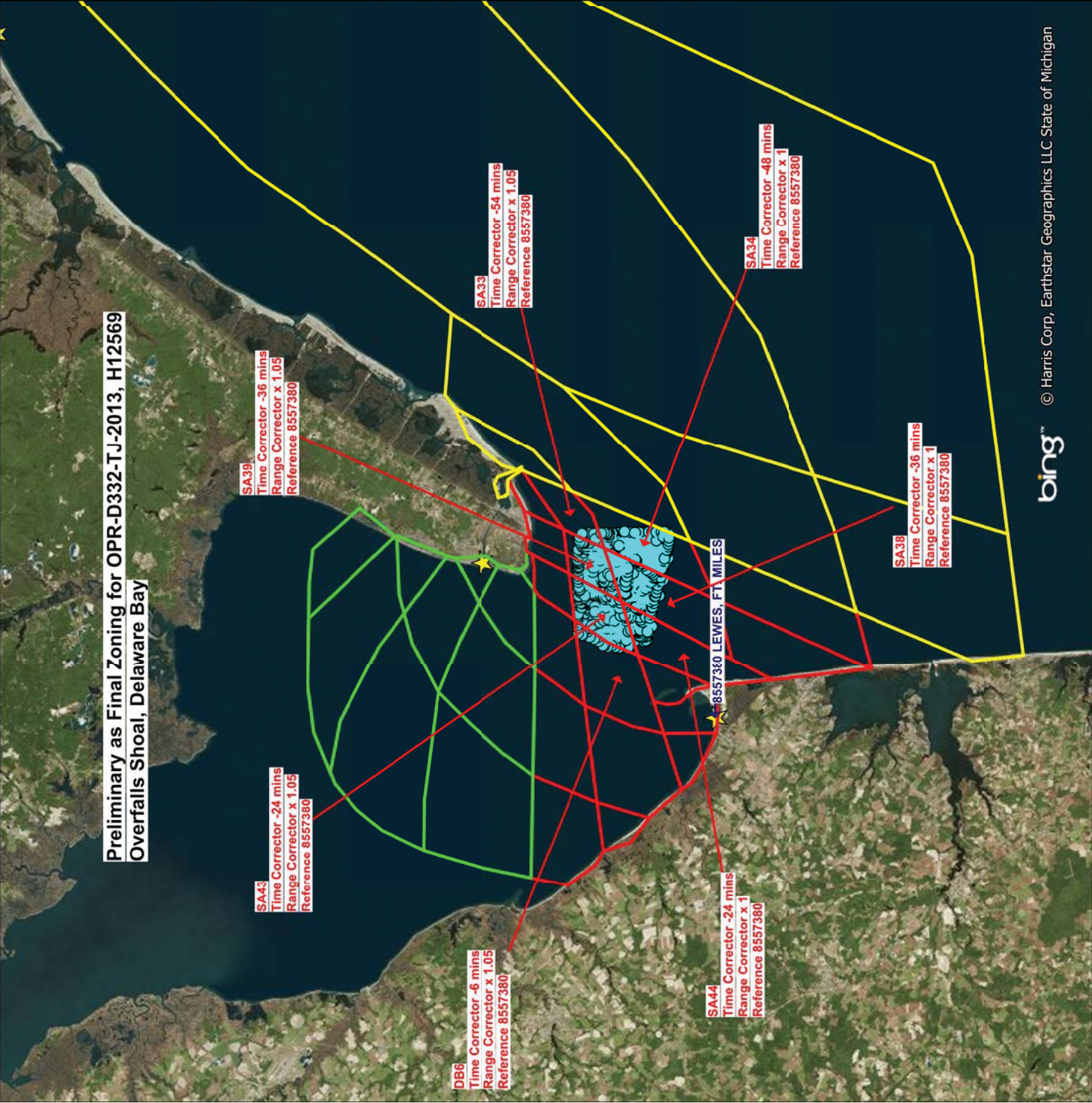
HOVIS.GERALD.
THOMAS.13658
60250

Digitally signed by
HOVIS.GERALD.THOMAS.1365860250
DN: c=US, o=U.S. Government,
ou=DoD, ou=PKI, ou=OTHER,
cn=HOVIS.GERALD.THOMAS.1365860
250
Date: 2013.10.01 10:08:05 -04'00'

CHIEF, PRODUCTS AND SERVICES BRANCH



**Preliminary as Final Zoning for OPR-D332-TJ-2013, H12569
Overfalls Shoal, Delaware Bay**



SA39
Time Corrector -36 mins
Range Corrector x 1.05
Reference 8557380

SA43
Time Corrector -24 mins
Range Corrector x 1.05
Reference 8557380

DB6
Time Corrector -6 mins
Range Corrector x 1.05
Reference 8557380

SA33
Time Corrector -54 mins
Range Corrector x 1.05
Reference 8557380

SA44
Time Corrector -24 mins
Range Corrector x 1
Reference 8557380

SA34
Time Corrector -48 mins
Range Corrector x 1
Reference 8557380

SA38
Time Corrector -36 mins
Range Corrector x 1
Reference 8557380

LEWES, FT. MILES

APPENDIX II

SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE



UNITED STATES DEPARTMENT COMMERCE

National Oceanic and Atmospheric Administration
Office of Marine and Aviation Operations
NOAA Ship Thomas Jefferson S-222
439 West York Street
Norfolk, VA 23510-1114

20 November 2013

MEMORANDUM TO: Jeffrey Ferguson
Chief, Hydrographic Surveys Division

FROM: CDR Lawrence T. Krepp, NOAA
Commanding Officer

SUBJECT: H12569 Interim Deliverables

As per the project instructions for OPR-D332-TJ-13, NOAA Ship *Thomas Jefferson* was tasked with providing a recommendation on the vertical transformation technique to be used for each sheet. This recommendation is based upon an analysis of crossline data processed with TCARI tidal zoning and VDatum ERS. This analysis was performed using Pydro's Post Acquisition Tools.

Crossline Analysis

Crosslines from H12569 were parallel processed with one set of depths reduced to MLLW via TCARI tidal zoning and the other set reduced via VDatum ERS. Pydro's Post Acquisition Tool "Compare Time Series Data" yielded the following results:

File-wise Statistics

H12569_GPS_Tides_3101_TJ_3101_Reson7125_400khz_2013_MiddlePD.txt |
G:\H12569\Data\Processed\Time series
- (minus)
H12569_Zoned_Tides_3101_TJ_3101_Reson7125_400khz_2013_MiddlePD.txt |
G:\H12569\Data\Processed\Time series
=====
N,mean,stdev = 340802,0.009,0.044

H12569_GPS_Tides_3102_TJ_3102_Reson7125_400KHZ_2013_MiddlePD.txt |
G:\H12569\Data\Processed\Time series
- (minus)
H12569_Zoned_Tides_3102_TJ_3102_Reson7125_400KHZ_2013_MiddlePD.txt |
G:\H12569\Data\Processed\Time series
=====
N,mean,stdev = 246870,-0.040,0.046

Sensor-wise Statistics

MiddlePD: N,mean,stdev = 587672,-0.012,0.051

Discussion

Results of the analysis showed that the mean difference between ERS and TCARI tidal corrections was 4.4 cm for HSL 3101, and 4.6 cm for HSL 3102. The overall average is less than the uncertainty associated with the separation model.

Recommendation

Our recommendation is to utilize ERS VDatum for tidal corrections for this survey. The results of the analysis indicate that there is not a problem with the VDatum model. We also feel that ERS better accounts for differences seen in static draft and dynamic draft and provides us with more accurate depths.



Megan Guberski - NOAA Federal <megan.guberski@noaa.gov>

Data deliverable for H12569

Megan Guberski - NOAA Federal <megan.guberski@noaa.gov>

Fri, Feb 14, 2014 at 3:54 PM

To: Castle Parker - NOAA Federal <castle.e.parker@noaa.gov>

Cc: Abigail Higgins - NOAA Federal <abigail.higgins@noaa.gov>

Mr. Parker,

This email is to inform the Atlantic Hydrographic Branch that survey H12569, under project OPR-D332-TJ-13, is being submitted without raw POS data. The data was submitted to NGDC in Nov 2013, then deleted from the Thomas Jefferson's servers.

A copy of this correspondence will be placed in Appendix II of the Descriptive Report. Please let me know if you have any questions or concerns.

Very Respectfully,
LT Guberski

--

LT Megan Guberski, NOAA
Operations Officer, NOAA Ship *Thomas Jefferson*
439 W. York Street
Norfolk, VA 23510
cell: 757 647-0187
land: 757 451-6322



Megan Guberski - NOAA Federal <megan.guberski@noaa.gov>

Coverage Mosaics in HIPS 8.1

Abigail Higgins - NOAA Federal <abigail.higgins@noaa.gov>

Wed, Feb 5, 2014 at 10:56 AM

To: Megan Guberski - NOAA Federal <megan.guberski@noaa.gov>

Cc: Castle Parker - NOAA Federal <castle.e.parker@noaa.gov>

LT Guberski,

I agree with your synopsis of the conversation, and concur with the proposal of submitting mosaics by platform and percent coverage. This is a necessary change due to the processing changes of CARIS HIPS/SIPS 8.1

Abigail

[Quoted text hidden]

—

LCDR Abigail Higgins, NOAA
Chief, Atlantic Hydrographic Branch
439 W York Street
Norfolk, VA 23510
 [\(757\) 441-6746 x200](tel:(757)441-6746)



Megan Guberski - NOAA Federal <megan.guberski@noaa.gov>

Coverage Mosaics in HIPS 8.1

Megan Guberski - NOAA Federal <megan.guberski@noaa.gov>

Wed, Feb 5, 2014 at 10:32 AM

To: Abigail Higgins - NOAA Federal <abigail.higgins@noaa.gov>

LCDR Higgins,

I'm sending this email as a follow up to our phone conversation regarding side scan mosaics in HIPS 8.1. Per our agreement, the *Thomas Jefferson* will submit all coverage mosaics processed in version 8.1 by acquisition platform and percent of coverage. This is a change from the traditional method of submitting 100% and 200% mosaic, each containing data from multiple acquisition platforms. The platform-specific mosaic is necessary in version 8.1 because beam pattern correction is now applied to an entire mosaic, as opposed to version 7.1's ability to apply beam pattern to specific lines.

Please let me know if you have questions, or need more information

V/R,
LT Guberski

—
LT Megan Guberski, NOAA
Operations Officer, NOAA Ship *Thomas Jefferson*
439 W. York Street
Norfolk, VA 23510
cell: [757 647-0187](tel:7576470187)
land: [757 451-6322](tel:7574516322)

APPENDIX III

SURVEY FEATURES REPORT

Dangers to Navigation - none
AWOIS - four
Maritime Boundary - none
Wrecks - none

H12569 AWOIS

Registry Number: H12569
State: Delaware
Locality: Delaware Bay
Sub-locality: Overfalls Shoal
Project Number: OPR-D332-TJ-13
Survey Dates: 08/25/2013 - 09/24/2013

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
12316	34th	06/01/2008	1:40,000 (12316_4)	[L]NTM: ?
12304	45th	02/01/2008	1:80,000 (12304_1)	[L]NTM: ?
12214	48th	10/01/2007	1:80,000 (12214_1)	[L]NTM: ?
12200	49th	06/01/2007	1:419,706 (12200_1)	[L]NTM: ?
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 2765	GP	[None]	38° 52' 00.4" N	075° 01' 58.6" W	2765
1.2	AWOIS 1157	GP	[None]	38° 49' 28.9" N	074° 57' 09.1" W	1157
1.3	AWOIS 12032	Obstruction	8.99 m	38° 53' 13.1" N	074° 56' 59.3" W	12032
1.4	AWOIS 8242	Obstruction	11.78 m	38° 49' 25.6" N	074° 56' 01.0" W	8242

1 - AWOIS Features

1.1) AWOIS 2765

Feature for AWOIS Item #2765

Search Position: 38° 52' 00.4" N, 075° 01' 58.6" W
Historical Depth: [None]
Search Radius: 1000
Search Technique: Type: SUNRISE, Itemstatus: ASSIGNED, Searchtype: FULL, Technique: S2 MBES

Technique Notes:

History Notes:

History

20 SHP; SANK APRIL 6 1889 WITH CARGO OF COAL; 1811 TONS

Survey Summary

Survey Position: 38° 52' 00.4" N, 075° 01' 58.6" W
Least Depth: [None]
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 1981-001.00:00:00.000 (01/01/1981)
Dataset: H12569_AWOIS.000
FOID: 0_0004440626 00001(FFFE0043C2320001)
Charts Affected: 12214_1, 12304_1, 12200_1, 13003_1

Remarks:

\$CSYMB/remrks: AWOIS #2765 investigated with 200% Klein 5000 side scan sonar. Nothing matching the AWOIS description was found.

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12569_AWOIS.000	0_0004440626 00001	0.00	000.0	Primary

Hydrographer Recommendations

Remove AWOIS #2765.

S-57 Data

Geo object 1: Cartographic symbol (\$CSYMB)
Attributes: NINFOM - Update AWOIS information
NTXTDS - ENC US4DE11M,ED28,Update 3

Office Notes

SAR Note: The 20 foot barge AWOIS item is disproven with set line spaced MBES and 200% side scan sonar data.

COMPILE: AWOIS item 2765 is disproven and not currently charted. Update AWOIS item 2765.

1.2) AWOIS 1157

Feature for AWOIS Item #1157

Search Position: 38° 49' 28.9" N, 074° 57' 09.1" W
Historical Depth: [None]
Search Radius: 200
Search Technique: Type: UNKNOWN, Itemstatus: ASSIGNED, Searchtype: FULL, Technique: S2 MBES

Technique Notes:

History Notes:

History

01157 DESCRIPTION 19 FISHING OBSTR. OLD LORAN C 9930Y-52245.3
 9930Z-70213.6=9960W-15786.8 9960Z-59251.7 NAD-27 GP CONVERTED FROM ORIGINAL DATA
 USING 1980 CORRECTIONS.

Survey Summary

Survey Position: 38° 49' 28.9" N, 074° 57' 09.1" W
Least Depth: [None]
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2013-267.00:00:00.000 (09/24/2013)
Dataset: H12569_AWOIS.000
FOID: 0_0004440625 00001(FFFE0043C2310001)
Charts Affected: 12214_1, 12304_1, 12200_1, 13003_1

Remarks:

\$CSYMB/remrks: AWOIS # 1157 investigated with 200% Klein 5000 side scan sonar. Nothing was found.

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12569_AWOIS.000	0_0004440625 00001	0.00	000.0	Primary

Hydrographer Recommendations

Remove AWOIS #1157.

S-57 Data

Geo object 1: Cartographic symbol (\$CSYMB)
Attributes: NINFOM - Update AWOIS information
NTXTDS - ENC US5DE11M,ED28,Update 3
SORDAT - 20130924
SORIND - US,US,graph,H12569

Office Notes

SAR Note: The object is disproven using set line spaced MBES and 200% side scan sonar data.

COMPILE: AWOIS item 1157 is disproven and not currently charted. Update AWOIS item 2765.

1.3) AWOIS 12032

Feature for AWOIS Item #12032

Search Position: 38° 53' 13.1" N, 074° 56' 59.3" W
Historical Depth: 8.99 m
Search Radius: [unknown]
Search Technique: Type: OBSTRUCTION, Itemstatus: COMPLETED, Searchtype: INFORMATION, Technique:

Technique Notes:

History Notes:

History

H11104/02--OPR-C303-KR; FOUND OBSTRUCTIONS IN LAT. 38/53/12.89N LONG. 074/56/59.14W (NAD83) WITH A LEAST DEPTH OF 27 FT. MLLW. (ENTERED 12/03 BY MBH)

Survey Summary

Survey Position: 38° 53' 13.1" N, 074° 56' 59.3" W
Least Depth: 8.99 m (= 29.51 ft = 4.918 fm = 4 fm 5.51 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2013-267.00:00:00.000 (09/24/2013)
Dataset: H12569_AWOIS.000
FOID: 0_0004440628 00001(FFFE0043C2340001)
Charts Affected: 12316_4, 12214_1, 12304_1, 12200_1, 13003_1

Remarks:

OBSTRN/remrks: AWOIS #12032 investigated with 200% Klein 5000 side scan sonar and Reson 7125 object detection multibeam. Soundings are corrected to MLLW with VDatum solution. The obstruction was found.

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12569_AWOIS.000	0_0004440628 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart obstruction

Cartographically-Rounded Depth (Affected Charts):

29ft (12316_4, 12214_1, 12304_1)

4 ¾fm (12200_1, 13003_1)

S-57 Data

Geo object 1: Obstruction (OBSTRN)

Attributes: NINFOM - Chart obstruction

QUASOU - 6:least depth known

SORDAT - 20130924

SORIND - US,US,graph,H12569

TECSOU - 2,3:found by side scan sonar,found by multi-beam

VALSOU - 8.994 m

WATLEV - 3:always under water/submerged

Office Notes

SAR Note: The AWOIS item is verified with object detection MBES coverage and 200% side scan sonar data.

COMPILE: Obstruction not charted, determined insignificant. Shoaler soundings are charted in the surrounding area.

Feature Images

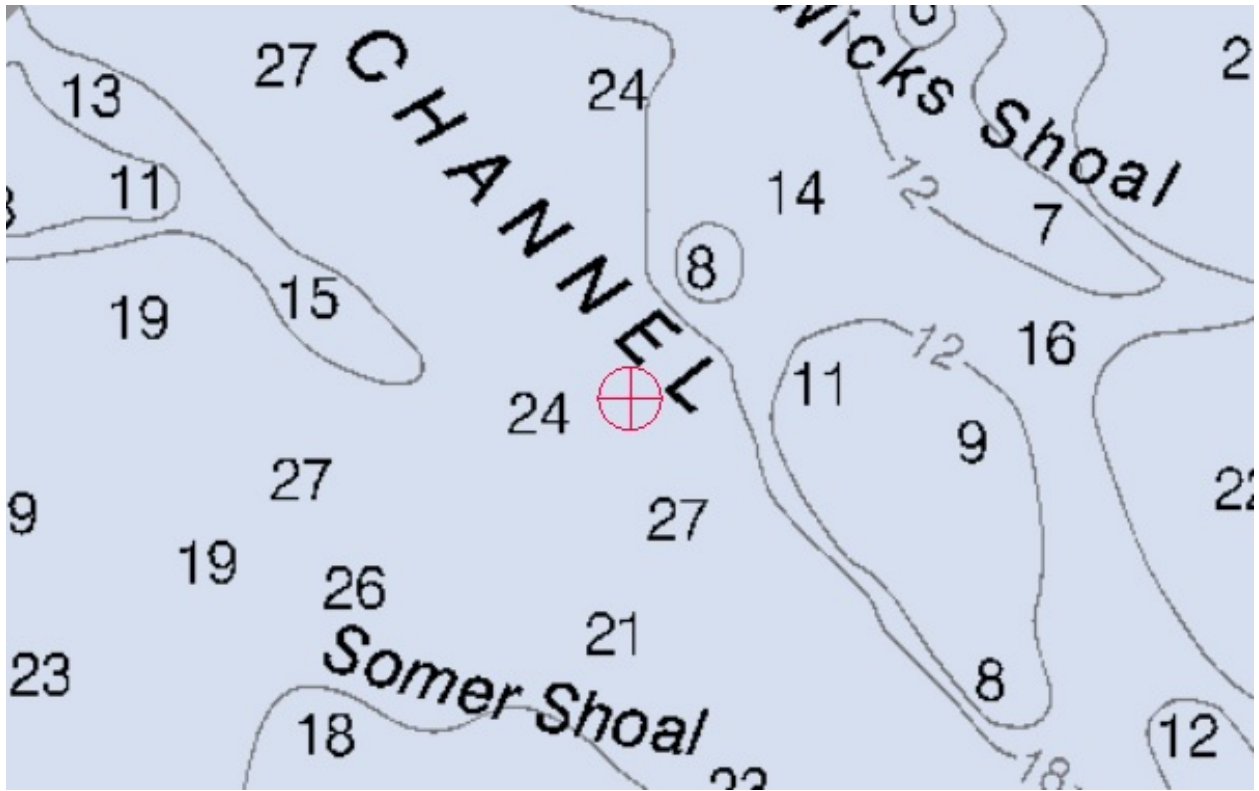


Figure 1.3.1

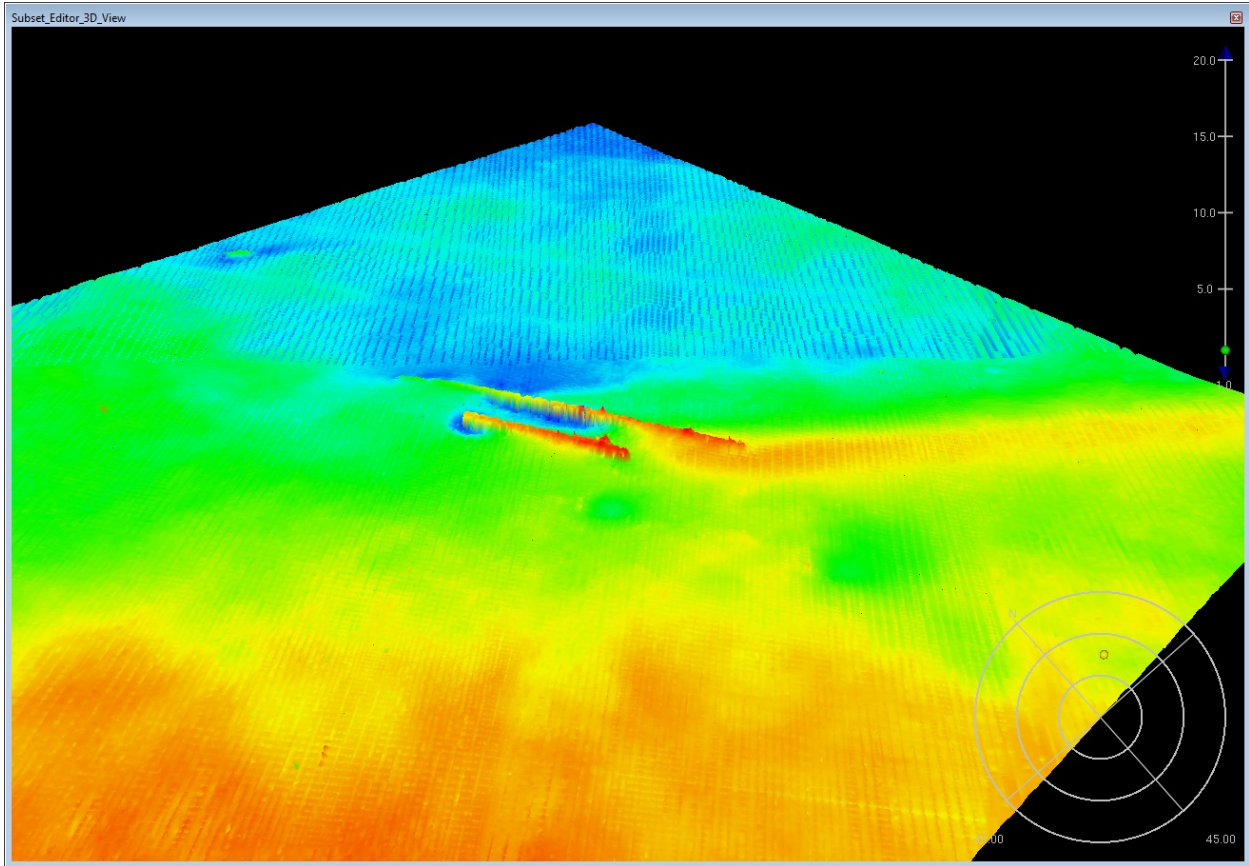


Figure 1.3.2

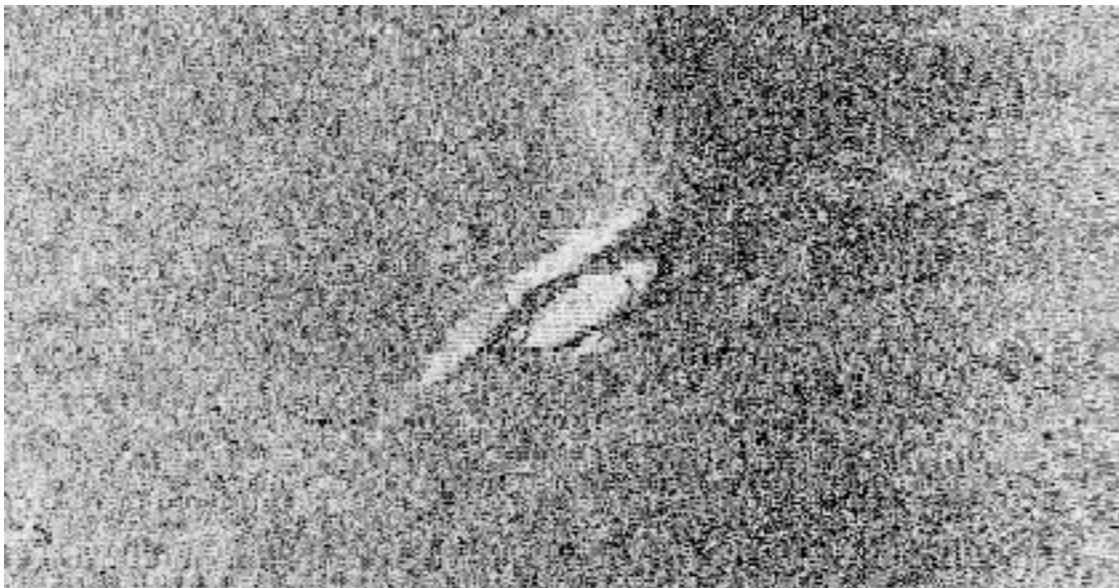


Figure 1.3.3

1.4) AWOIS 8242

Feature for AWOIS Item #8242

Search Position: 38° 49' 25.6" N, 074° 56' 01.0" W
Historical Depth: 11.78 m
Search Radius: [unknown]
Search Technique: Type: OBSTRUCTION, Itemstatus: COMPLETED, Searchtype: INFORMATION, Technique: S2 MBES

Technique Notes:

History Notes:

History

HISTORY CL1193/70-- R/H TO CGD5; OBSTRUCTION LOCATED IN LAT. 38-49-24N ì LONG. 74-55-58W. LD 28 FEET. SUNKEN NAVIGATION BUOY 12 FEET OFF ì BOTTOM. H9173/70WD-- OPR-480-R/H-70; OBSTRUCTION CLEARED TO 34 FEET IN ì LAT. 38-49-24N LONG. 74-55-58W. (ENT 4/14/92 SJV) H10241/94-- OPR-D368-WH; OBSTRUCTION LOCATED BY SIDE SCAN ì SONAR. DIVERS DESCRIBE A NAVIGATION BUOY ORIENTED 120 DEG. - 300 ì DEG. PNEUMO. LD OF 36 FEET (11 METERS) AT WEST END IN LAT. ì 38-49-25.566N LONG. 74-56-00.737W. 2 FEET OF CHAIN HANGING OFF ì BOTTOM END OF BUOY. LORAN-C RATES (9960 CHAIN): W= 15782.6N X= ì 27019.0 Y= 42659.6 Z= 59256.0. EVALUATOR RECOMMENDS CHARTING ì OBSTRUCTION AS SURVEYED. (UP 11/14/95 SJV)

Survey Summary

Survey Position: 38° 49' 25.6" N, 074° 56' 01.0" W
Least Depth: 11.78 m (= 38.65 ft = 6.441 fm = 6 fm 2.65 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2013-267.00:00:00.000 (09/24/2013)
Dataset: H12569_AWOIS.000
FOID: 0_0004440627 00001(FFFE0043C2330001)
Charts Affected: 12214_1, 12304_1, 12200_1, 13003_1

Remarks:

OBSTRN/remrks: AWOIS #8242 Found with 200% Klein 5000 side scan sonar and Reson 7125 object detection multibeam. The soundings are corrected to MLLW with VDatum solution.

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12569_AWOIS.000	0_0004440627 00001	0.00	000.0	Primary

Hydrographer Recommendations

Update AWOIS #8242

Cartographically-Rounded Depth (Affected Charts):

38ft (12214_1, 12304_1)

6 ½fm (12200_1, 13003_1)

S-57 Data

Geo object 1: Obstruction (OBSTRN)

Attributes: NINFOM - Chart obstruction

QUASOU - 6:least depth known

SORDAT - 20130924

SORIND - US,US,graph,H12569

TECSOU - 2,3:found by side scan sonar,found by multi-beam

VALSOU - 11.780 m

WATLEV - 3:always under water/submerged

Office Notes

SAR: The obstruction is verified with object detection coverage MBES data and 200% side scan sonar data.

COMPILE: Delete charted 35 ft obstruction. Chart AWOIS 8242 as a 38 ft sounding.

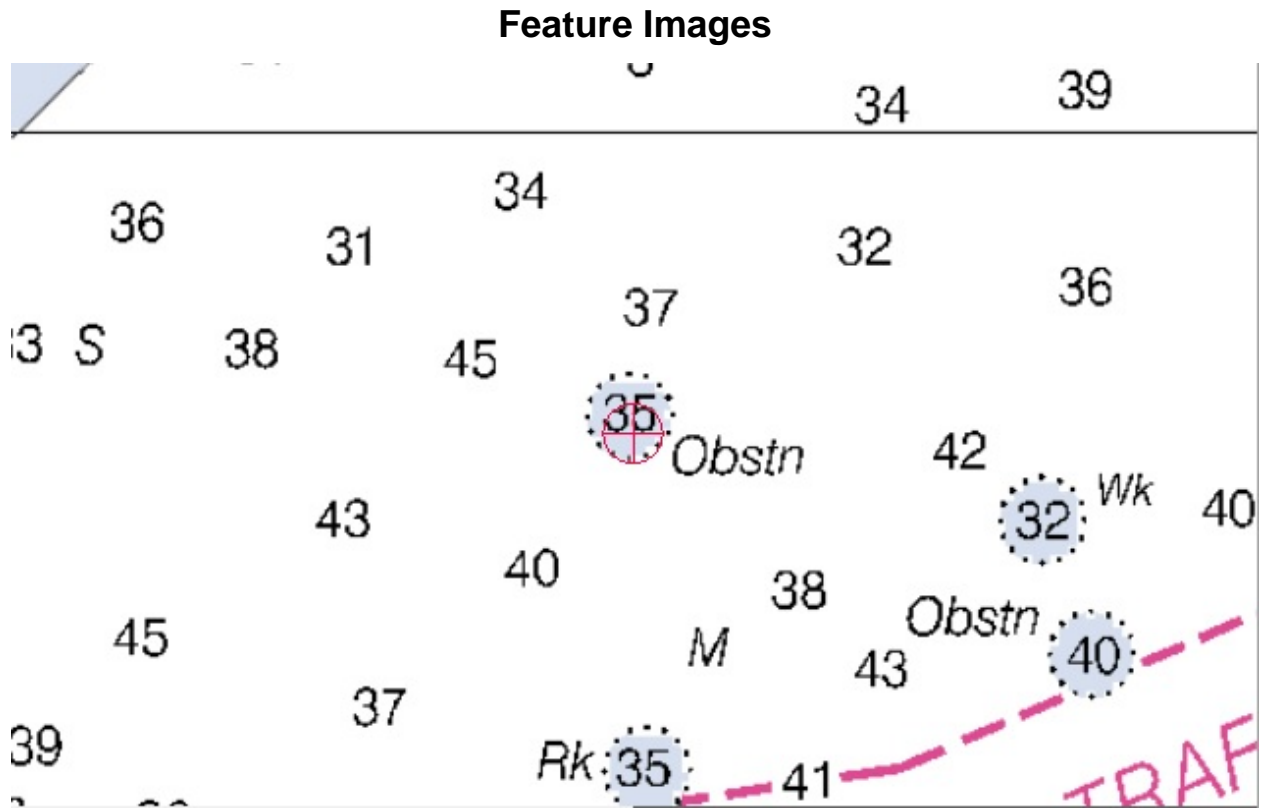


Figure 1.4.1

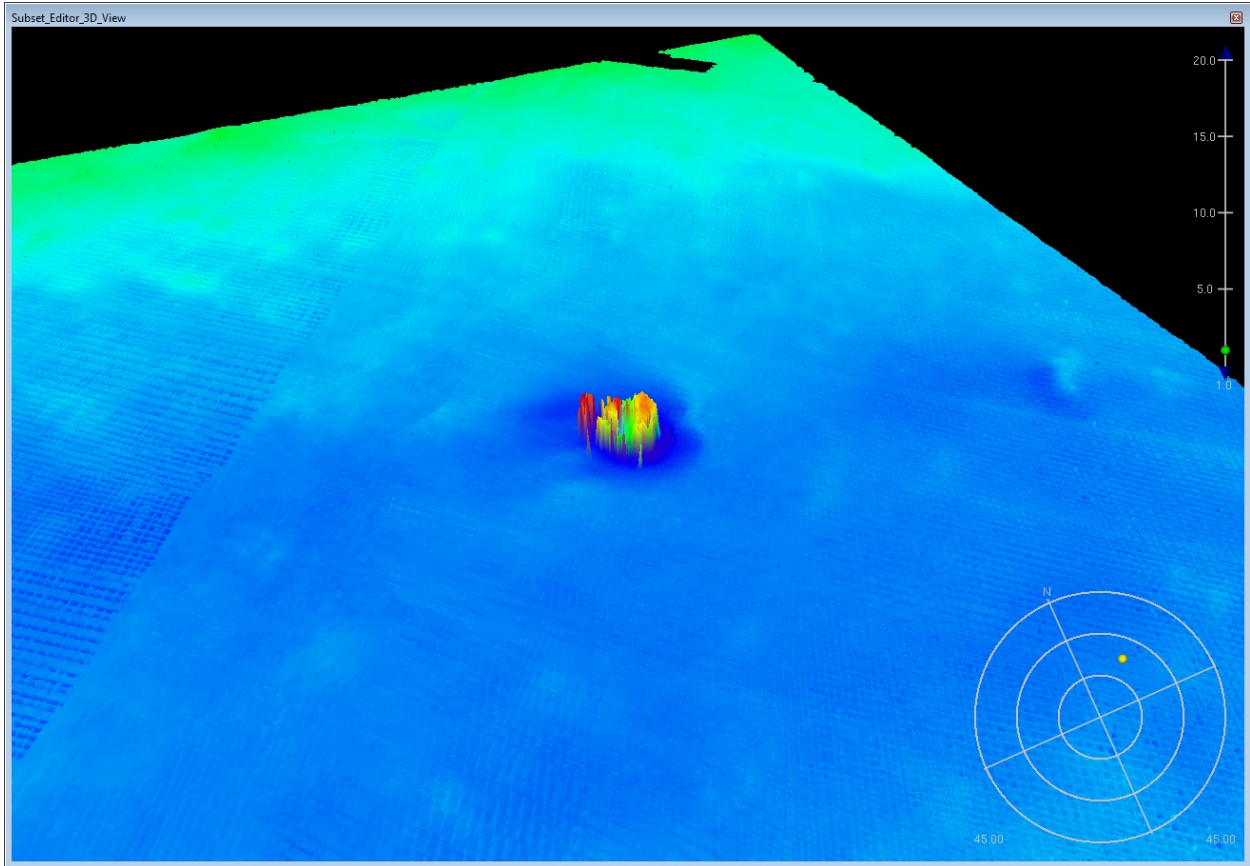


Figure 1.4.2



Figure 1.4.3

APPROVAL PAGE

H12569

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

- H12569_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12569_GeoImage.pdf

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

Approved: _____

Lieutenant Commander Matthew Jaskoski, NOAA
Chief, Atlantic Hydrographic Branch