U.S. Department of Commerce National Oceanic and Atmospheric Administration National Ocean Survey		
	DESCRIPTIVE REPORT	
Type of Survey:	Navigable Area	
Registry Number:	H12568	
	LOCALITY	
State(s):	New Jersey	
General Locality:	Delaware Bay	
Sub-locality:	Cape May Point	
	2013	
CHIEF OF PARTY CAPT Lawrence T. Krepp, NOAA		
	LIBRARY & ARCHIVES	
Date:		

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NATIONAL	U.S. DEPARTMENT OF COMMERCE OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:	
HYDROGRAPHIC TITLE SHEETH12568			
INSTRUCTIONS: The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.			
State(s):	New Jersey		
General Locality:	Delaware Bay		
Sub-Locality:	Cape May Point		
Scale:	20000		
Dates of Survey:	06/25/2013 to 08/27/2013		
Instructions Dated:	05/11/2013		
Project Number:	OPR-D332-TJ-13		
Field Unit:	I Unit: NOAA Ship Thomas Jefferson		
Chief of Party:	ty: CAPT Lawrence T. Krepp, NOAA		
Soundings by:	Multibeam Echo Sounder		
Imagery by:	Side Scan Sonar 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/.

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## **Descriptive Report to Accompany Survey H12568**

Project: OPR-D332-TJ-13 Locality: Delaware Bay Sublocality: Cape May Point Scale: 1:20000 June 2013 - August 2013 NOAA Ship Thomas Jefferson

Chief of Party: CAPT Lawrence T. Krepp, NOAA

## A. Area Surveyed

This survey was conducted in Delaware Bay in the vicinity of Cape May Point, NJ.

### **A.1 Survey Limits**

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
38° 57" 31.64' N	38° 53" 23.63' N
75° 1" 46 83' W	74° 55" 48 87' 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 purpose of this project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charting products in response to Hurricane Sandy. Survey H12568 encompasses approximately 16 SNM off Cape May Point, NJ.

### A.3 Survey Quality

The entire survey is adequate to supersede previous data.

## A.4 Survey Coverage



Figure 1: Survey H12568 coverage area.

Certain areas of survey H12568 did not meet coverage requirements listed in the project instructions. Areas of Prissy Wicks shoal, and Middle shoal were developed using only 100% Side Scan Sonar coverage, with concurrent Multibeam Echo Sounder (MBES) coverage. The Command deemed the depths found on the initial coverage of sections of Middle and Prissy Wicks Shoals too shoal for further safe development. Instead, the shoals were developed up to, and in some cases, beyond the 4 meter curve. A DtoN Report pertaining to Prissy Wicks Shoal was submitted 29 September 2013. For a full discussion of the DtoN report, see Appendix II of this report.

## A.5 Survey Statistics

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

	Vessel	NOAA Ship Thomas Jefferson Hydrographic Survey Launch 3101	NOAA Ship Thomas Jefferson Hydrographic Survey Launch 3102	Total
	SBES Mainscheme	0	0	0
	MBES Mainscheme	36.38	18.35	54.73
	Lidar Mainscheme	0	0	0
	SSS Mainscheme	0	0	0
LNM	SBES/MBES Combo Mainscheme	0	0	0
	SBES/SSS Combo Mainscheme	0	0	0
	MBES/SSS Combo Mainscheme	254.48	438.25	692.73
	SBES/MBES Combo Crosslines	27.13	30.05	57.18
	Lidar Crosslines	0	0	0
Number of Bottom Samples				0
Numb Invest	er AWOIS Items igated			1
Number Maritime Boundary Points Investigated				0
Number of DPs				0
Number of Items Items Investigated by Dive Ops				0
Total Number of SNM				16

 Table 2: Hydrographic Survey Statistics

Survey Dates	Julian Day Number
06/25/2013	176
06/26/2013	177
06/27/2013	178
06/29/2013	180
08/13/2013	225
08/15/2013	227
08/16/2013	228
08/17/2013	229
08/18/2013	230
08/19/2013	231
08/20/2013	232
08/21/2013	233
08/23/2013	235
08/24/2013	236
08/27/2013	239

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

Table 3: Dates of Hydrography

MBES/SSS combined mileage was calculated using total Side Scan Sonar mileage per vessel. Mainscheme MBES figures come from the difference of total multibeam mileage minus total side scan mileage and includes reconnaissance, holiday, and development mileage. Crossline mileage was calculated and used to determine the percentage of crosslines to MSMB/SSS.

## **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	HSL 3101	HSL 3102	
LOA	31 feet	31 feet	
Draft	5.2 feet	5.2 feet	

Table 4: Vessels Used

HSL 3101 and HSL 3102 acquired Multibeam data, Side Scan Sonar data, Sound Speed data, Backscatter, and Attitude data.

#### **B.1.2** Equipment

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

Manufacturer	Model	Туре
Reson	SeaBat 7125-SV1	MBES
Klein	5000	SSS
Reson	SV-71	Sound Speed System
Applanix	POS/MV	Positioning and Attitude System
Sea-Bird Electronics	19+	Conductivity, Temperature, and Depth Sensor

#### Table 5: Major Systems Used

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.

### **B.2 Quality Control**

#### **B.2.1** Crosslines

Crosslines, acquired for this survey, totalled 8.25% of mainscheme acquisition.

Multibeam crosslines were acquired by survey launches 3101 and 3102 on the first day of survey. Collectively, 57.18 linear nautical miles of MBES crosslines were acquired equating to 8.25% of mainscheme MBES data. Separate CUBE surfaces were created comprising only mainscheme and crossline hydrography respectively from which difference surfaces were generated at a 4m grid resolution. Summary statistics are presented in Figure 2. Crosslines compared to corresponding mainscheme lines with a mean difference of -0.015 m and standard deviation of 0.22 m. Survey H12568 complies with section 5.2.4.3 of the HSSD (2013 ed).

Despite overall agreement, multiple localized sources of disagreement were discovered in the survey area. In areas of high bathymetric relief, such as sandwaves, different depths were chosen by the gridding algorithm for the crosslines, resulting in depth differences in the 4m surface greater than allowable IHO Order 1 error. No significant differences were observed over local least depths.



Figure 2: H12568 Mainscheme to crossline comparison.

#### **B.2.2 Uncertainty**

The following survey specific parameters were used for this survey:

Measured	Zoning
0.0 meters	0.085 meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
HSL 3101	4.0 meters/second	0.0 meters/second	0.2 meters/second
HSL 3102	4.0 meters/second	0.0 meters/second	0.2 meters/second

#### Table 7: Survey Specific Sound Speed TPU Values

The Total Propagated Uncertainty values for survey H12568 were derived from four sources: a priori values for equipment and vessel characteristics; realtime uncertainties from post-processed POSPac Smoothed Best Estimate of Trajectory (SBET); water level uncertainty as assigned by NOAA's Center for Operational Oceanographic Products and Services (CO-OPS); field assigned values for water level and sound speed uncertainties. The a priori values for survey equipment and vessel configuration were set in accordance with Appendix 4, table 4.9 of the NOAA Field Procedure Manual (ed 2013). Realtime uncertainty values for roll, pitch, gyro, navigation, and elevation were supplied via SBET RMS error files generated by Applanix POSPac. Tidal uncertainties were provided by CO-OPS and were applied to the depth soundings via the Tide Value section of the CARIS Compute TPU function. Please note that 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 (see table 6). Sound speed uncertainties were based on the frequency and location of CTD casts, in accordance with the guidance set by Appendix 4 of the FPM (see table 7).

The hydrographer noted portions of Reson 7125 multibeam data with no concurrent POSPac RMS error data. Uncertainty values for this data was derived solely from a priori values. For a full listing, refer to section B.5.3 of this report.

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: -Uncertainty/( $(0.5^2 + ((Depth*0.013)^2))^{0.5}$ ). Second the ratio between the actual uncertainty and maximum allowed uncertainty was found for each node. The resulting 'IHO\_Order1' layer was filtered using a colour map to show any areas where the ratio exceeded -1.0, indicating the surface failed to meet IHO Order 1 standards.

The hydrographer noted increased uncertainty on the slopes of the larger sandwaves as well as in areas of high turbidity, however, the greatest majority of the survey is considered to be within IHO uncertainty limits. 2,788,607 of 2,788,799 (or 99.99%) nodes were within IHO Order 1 uncertainty specifications.

#### **B.2.3 Junctions**

There were a total of two contemporary surveys that junction with Survey H12568: H12605 and H12569.



Figure 3: Junction Surveys to H12568.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12569	1:20000	2013	NOAA Ship THOMAS JEFFERSON	S
H12605	1:20000	2013	NOAA Ship THOMAS JEFFERSON	W

Table 8: Junctioning Surveys

#### <u>H12569</u>

The difference between survey H12568 and junction H12569 ranged from -4.576 m to 5.032 m. The mean was -0.0160 m, and the standard deviation was 0.231 m. 61,966 of 62,648 nodes, or 98.9%, were within 1

meter. The extremes of the range were caused by slight horizontal offsets along the slopes of sand waves along both Middle and Prissy Wicks Shoals, which comprise the majority of the junction overlap between H12568 and junction H12569.



Figure 4: Survey H12568 and junction H12569 in meters.

#### <u>H12605</u>

The difference between survey H12568 and H12605 ranged from 4.06 m to -0.893 m. The mean was -0.011 m, and the standard deviation was 0.107 m. 35,784 of 35,840 nodes, or 99.8%, were within 1 meter. The range was affected by the shifting shoals on the western portion of survey H12568. The steep slopes of the shoals effected the algorithm selection of surface depths.



Figure 5: Survey H12568 and junction H12605 in meters.

#### **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**

#### Strong Currents and Turbitdity

Strong currents and turbidity around Cape May Point negatively affected the ability of the SV71 to correctly steer the sonar beams. The Reson 7125 sonars on HSL launches 3101 and 3102 could not resolve the true depth in several areas due to interference of air bubbles around the sound velocity probe. The currents also caused the vessels to experience a settlement that was not resolved by the dynamic draft table input in the vessels CARIS HVF. The resulting vertical offset can be seen in the surface, but does not exceed IHO Order 1 specifications. This error was not correlated to a specific vessel nor day.

Side Scan Sonar data was also negatively affected by the turbidity and current in the area of Cape May Point. Some outer beam pings were lost due to conditions during survey, however, the area was fully covered by 200% SSS data.



Figure 6: Turbidity negatively affecting standard deviation around Cape May Point.



Figure 7: Subset location.



Figure 8: Thoroughly processed data.

#### Sound Speed Blowout

During acquisition on survey H12568 a combination of choppy sea states and current produced extraneous amounts of sound speed blowout. There are several sections of data where sound speed blowout occurred in such duration and degree that the data had to be edited to near-nadir depths. Blowout was caused by air bubbles running under the hull and interfering with the SV71 probe, which caused the sonar to be unable to resolve beam formation.

#### Sand Waves and Shoal Movement

Between 20130629 and 20130813 no data was collected on survey H12568. Temporal gaps in data acquisition produced higher uncertainty in areas of sandwaves. It is believed the sandwaves are migrating. There are several examples of this shift throughout the survey, but one of the clearest is found in the vicinity of the 20 and 21 ft soundings charted on the western edge of Crow and Middle Shoals, approximate location 38-56-22.5 N 074-59-48.8 W.



Figure 9: Evidence of shifting sand waves.



Figure 10: Temporal shift of sand waves.

#### GPS Tide Issue

Zoned tides were used to reduce survey H12568 to Mean Lower Low Water (MLLW) as GPS tide application did not provide a viable option. GPS tide application added additional error in the form of a heave-like motion artifact visible in the surface after application. The source of this error most likely stems from an unsuccessful application in the CARIS 8.0.4 software. Attitude and navigation, as well as real time RMS were applied using the post-processed IAPPK solution correlating to the data, but the data was not reduced using GPS tides.

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

Sound Speed Cast Frequency: CTD casts were preformed every 2-4 hours from 3101 and 3102 using SBE 19+ CTD equipment.

No sound speed zoning was required for survey H12568.

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

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

#### **B.2.9 Density Requirements**

The density of all surfaces was calculated using the compute statistics function in CARIS Base Editor. It was found that greater than 99.6% of nodes contain 5 or more soundings.

### **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 Branch. One line per vessel, per day was processed aboard the Thomas Jefferson in order to assess and ensure quality. No processing or visualization errors 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	8.0	NA	1-4	07/18/2013	Processing

#### Table 9: Software Updates

The following Feature Object Catalog was used: NOAA Profile Field 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
H12568_MB_MLLW_4m_Final	CUBE	4.0 meters	0 meters - 40 meters	NOAA_4m	MBES TracklineSBES Set Line Spacing

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12568_SSS_100%	SSS Mosaic	1 meters	0 meters - 100 meters	N/A	100% SSS
H12568_SSS_200%	SSS Mosaic	1 meters	0 meters - 100 meters	N/A	200% SSS
H12568_ODMBES_MLLW_50cm_Final	CUBE	50 centimeters	0 meters - 22 meters	NOAA_0.5m	Object Detection

#### Table 10: Submitted Surfaces

This survey was processed using the Combined Uncertainty and Bathymetry Estimator (CUBE) algorithm. Per section 5.2.2.1 of NOAA HSSD Manual (2013 ed), MBES surfaces were gridded according to the Project Instructions for OPR-D332-TJ-13 guidelines for 200% side scan sonar with set multibeam line spacing.

#### **B.5.3 Lines without Associated POS Data**

Six lines of data for survey H12568 do not have SBET files applied due to errors in POSPac acquisition. Of these six lines, 4 also lack RMS error data. See below for a listing of lines:

3102, DN 177: line 177\_208\_1543 has no SBET;
3102, DN 177: line 177\_203\_1503 has no SBET or RMS;
3102, DN 178: line 178\_224\_1259 has no SBET;
3102, DN 178: line 178\_224\_1311 has no SBET or RMS;
3101, DN 228: line 228\_141\_2015 has no SBET;
3101, DN 228: line 228\_142\_2022 has not SBET or RMS;
3101, DN 232: line 232\_106\_2051 has no SBET or RMS.

## **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
Cape May, New Jersey	853-6110
Lewes, Delaware	855-7380

Table 11: NWLON Tide Stations

File Name	Status
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 08/28/2013. The final tide note was received on 09/12/2013.

Preliminary zoning was accepted as final zoning.

## **C.2 Horizontal Control**

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

The projection used for this project is 18 N.

The following PPK methods were used for horizontal control:

Smart Base

Post processed IAPPK 3D positioning was used on the horizontal position of soundings for survey H12568.

HVCR Site ID	<b>Base Station ID</b>
NJGT	NJGT
NJCM	NJCM
DEMI	DEMI
VAWI	VAWI
DNRC	DNRC
COVX	COVX
DNRC	DNRC
NJBR	NJBR
NCBX	NCBX
MOR5	MOR5
RED5	RED5
RED6	RED6

The following CORS Stations were used for horizontal control:

Table 14: CORS Base Stations

The following DGPS Stations were used for horizontal control:

### **DGPS Stations**

Reedy Point, Delaware 309.0 kHz

Table 15: USCG DGPS Stations

## C.3 Additional Horizontal or Vertical Control Issues

#### 3.3.1 Zoned Tides

Zoned tides were used to reduce survey H12568 to Mean Lower Low Water (MLLW), as GPS tide application added an additional error in the form of a heave-like motion artifact, visible in the CUBE surface. The source of this error most likely stems from a malfunction in the CARIS 8.0.4 software. Attitude and navigation, as well as real time RMS error data were applied using the post-processed IAPPK solution correlating to the data, but the data was not reduced to chart datum using GPS tides.

## **D. Results and Recommendations**

### **D.1** Chart Comparison

Survey H12568 is characterized by large, migrating sandwaves comprising Eph, Prissy Wicks, North, Middle, Round, and Crow Shoals. A chart comparison was conducted using a difference surface of the final 4m grid and an interpolated TIN of ENC soundings. A general trend of westward movement of Prissy Wicks, North, and Middle Shoals is evident.

#### **D.1.1 Raster Charts**

Chart	Scale	Edition	Edition Date	LNM Date	NM Date
12316	1:40000	35	10/2012	10/20/2012	10/16/2012
12214	1:80000	49	10/2010	11/02/2010	11/06/2010
12304	1:80000	46	05/2011	05/10/2011	05/14/2011

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

Table 16: Largest Scale Raster Charts

#### 12316

Chart 12316 is the largest scale chart for survey H12568. Alongshore currents have caused a westerly migration of shoal areas denoted on chart 12316. Prissy Wicks, North, and Middle Shoals have experienced the greatest amount of movement. Description of feature investigations are included in the Final Feature File. It is recommended that survey H12568 data supersede all charted depths on chart 12316.



Figure 11: Surveyed depths at least 1ft shoal to charted depths on chart 12316.



Figure 12: Surveyed depths at least 1ft deeper than charted on chart 12316.



Figure 13: Surveyed depths within 1ft of charted soundings on chart 12316.

#### <u>12214</u>

Alongshore currents have caused a westerly migration of shoal areas denoted on chart 12214. Prissy Wicks, North, and Middle Shoals have experienced the greatest amount of movement. Description of feature investigations are included in the Final Feature File. It is recommended that survey H12568 data supersede all charted depths on chart 12214.



Figure 14: Surveyed depths at least 1ft shoal to charted depths on chart 12214.



Figure 15: Surveyed depths at least 1ft deeper than charted on chart 12214.



Figure 16: Surveyed depths within 1ft of charted soundings on chart 12214.

#### 12304

Alongshore currents have caused a westerly migration of shoal areas denoted on chart 12304. Prissy Wicks, North, and Middle Shoals have experienced the greatest amount of movement. Description of feature investigations are included in the Final Feature File. It is recommended that survey H12568 data supersede all charted depths on chart 12304.



Figure 17: Areas that were surveyed to be at least 1ft shoal of charted depths.



Figure 18: Areas surveyed to be at least 1ft deeper than charted depths.



Figure 19: Areas surveyed to be within 1ft of charted depths.

#### **D.1.2 Electronic Navigational Charts**

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US4DE11M	1:80000	27	01/10/2013	10/09/2013	NO
US5NJ24M	1:10000	10	11/08/2012	11/19/2013	NO

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

Table 17: Largest Scale ENCs

#### US4DE11M

Comparison of ENC US4DE11M agrees with raster chart analysis for the area of survey H12568. It is recommended that survey H12568 data supersede all charted depths on ENC US4DE11M.



Figure 20: Areas of surveyed soundings shoal to charted depths. ENC US4DE11M shown.

#### US5NJ24M

Comparison of ENC US5NJ24M agrees with raster chart analysis for the area of survey H12568. It is recommended that survey H12568 data supersede all charted depths on ENC US5NJ24M.



Figure 21: Areas of surveyed soundings shoal to charted depths. ENC US5NJ24M shown.

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

Survey H12568 contains one AWOIS item, the wreck of the U.S.S. Atlantus. The wreck remains accurately charted, but the search radius was not extended inshore of safe operational limits. Refer to the Final Feature File for a full discussion.



Figure 22: Wreck of U.S.S. Atlantus restored photograph from Sunset Beach, Cape May, New Jersey. Photo by Russ Norcross Jr. 1926



Figure 23: Wreck of U.S.S. Atlantus, Remains Of Boat, Cape May Point, New Jersey, 1940-60s. Post Card.



Figure 24: U.S.S. Atlantus, Cape May, NJ. 2013

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

No Maritime Boundary Points were assigned for this survey.

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

No charted features labeled PA, ED, PD, or Rep exist for survey H12568.

#### **D.1.6 Uncharted Features**

Survey H12568 found 5 uncharted features. Refer to the Final Feature File for further information

#### **D.1.7 Dangers to Navigation**

Two dangers to navigation are present within the area of survey H12568. Danger to Navigation Reports are included in Appendix II of this report.

#### **D.1.8 Shoal and Hazardous Features**

Portions of shoals within survey H12568 have migrated westward and present a hazard to navigation. For more information see section D.1.1 of this report and the Final Feature File.

#### **D.1.9** Channels

Cape May Channel is a non-tabulated, unregulated passage used primarily by fishing boats and other small craft. See Section D.1.1 of this report for further details of change in the area.

#### **D.1.10 Bottom Samples**

No bottom samples were required for this survey.

### **D.2 Additional Results**

#### **D.2.1 Shoreline**

Shoreline investigation for survey H12568 was completed to the 4m contour. Refer to the Final Feature File for complete information pertaining to shoreline features.

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

Prior survey comparisons exist for this survey, but were not investigated. See section D.1.1 on chart comparisons for most recent updates.

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

There are two ATONS present within survey H12568. Each ATON was visually checked in the field against the digital raster chart and was found to be functioning properly.

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

No overhead features exist for this survey.

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

Pipes originating from shoreline exist to the North of the wreck of the U.S.S. Atlantus, and were investigated. For further details, refer to the Final Feature File.

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

The Cape May-Lewes Ferry line regularly transits across the Northwest portion of survey H12568. The hydrographer recommends charting a ferry route between the terminals at Cape May NJ, and Lewes, DE.

#### **D.2.7 Platforms**

No platforms exist for this survey.

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

Significant features exist for this survey, and were investigated. Refer to the Final Feature File for a complete discussion. The area of survey H12568 is characterized by migrating shoals of large sandwaves.

#### **D.2.9** Construction and Dredging

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

#### **D.2.10 New Survey Recommendations**

Further surveys are planned adjacent (North and East) to H12568 for the 2014 survey season, in a continuance of NOAA's support of Hurricane Sandy response.

#### **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	Chief of Party	01/28/2013	James Grocker cn=James Grocker, o=CO, NOAA Ship Thomas Jefferson, ou=CORNOAA, email=james.m.crocker@noaa.gov, c=US
LT Megan Guberski	Field Operations Officer	01/28/2013	Mugan R. Caberski Man
HST Allison C. Stone	Sheet Manager	01/28/2013	Allison Clare Stone Dit: cm=Allison Clare Stone, Dit: cm=Allison Clare Stone, CMOAA, ou=Thomas Dit: cm=Allison cstone; cm=AOAA, ou=Thomas Date: 2014;02:03 13:10:36-05'00'

## F. Table of Acronyms

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

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

## APPENDIX I

## TIDES AND WATER LEVELS



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

#### TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : September 12, 2013

HYDROGRAPHIC BRANCH: Atlantic HYDROGRAPHIC PROJECT: OPR-D332-TJ-2013 HYDROGRAPHIC SHEET: H12568

LOCALITY: Cape May Point, Delaware Bay, NJ TIME PERIOD: June 25 - August 27, 2013

TIDE STATION USED: 853-6110 Cape May, NJ Lat. 38° 58.1' N Long. 74° 57.6' W PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.527 meters

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, H12568, during the time period between June 25 - August 27, 2013.

Please use the zoning file D332TJ2013CORP submitted with the project instructions for OPR-D332-TJ-2013. Zones DB6, DB7, DB13, DB14, DB15, SA33, SA39, SA40, SA41, SA42 and SA43 are the applicable zones for H12568.

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).







## APPENDIX II

## SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE



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

## DTON Report - OPR-D332-TJ-13, H12568

#### NDB E-Mailbox <ocs.ndb@noaa.gov>

Mon, Sep 30, 2013 at 4:10 PM aa.gov>, Richard T Brennan

To: Travis Newman <Travis.Newman@noaa.gov>, Tara Wallace <Tara.Wallace@noaa.gov>, Richard T Brennan <Richard.T.Brennan@noaa.gov>, Pramod Singh <Pramod.Singh@noaa.gov>, OCS NDB <OCS.NDB@noaa.gov>, Michael Gaeta <Michael.Gaeta@noaa.gov>, Matt Kroll <Matt.Kroll@noaa.gov>, Mark Griffin <Mark.Griffin@noaa.gov>, Kevin Shaw <Kevin.Shaw@noaa.gov>, Ken Forster <Ken.Forster@noaa.gov>, Jon Swallow <Jon.Swallow@noaa.gov>, John Barber <John.Barber@noaa.gov>, James M Crocker <James.M.Crocker@noaa.gov>, Gerald Koehl <Gerald.Koehl@noaa.gov>, David Merke <David.Merke@noaa.gov>, Craig Winn <Craig.Winn@noaa.gov>, Castle E Parker <Castle.E.Parker@noaa.gov>, Brent Pounds <Brent.Pounds@noaa.gov>, Andrew Kampia <Andrew.Kampia@noaa.gov>, Allen Taylor <Allen.Taylor@noaa.gov>, \_NOS OCS NSD Coast Pilot <coast.pilot@noaa.gov>, Megan Guberski - NOAA Federal <megan.guberski@noaa.gov>, peter Lewit <peter.lewit@noaa.gov>, Abigail Higgins <abigail.higgins@noaa.gov>, Marc Moser <marc.s.moser@noaa.gov>

L-1852/13 and DD-23738 have been registered by the Nautical Data Branch and directed to PBC for processing.

The DtoN reported is a shoal area in the vicinity of the Prissy Wicks Shoal in Cape May Channel, NJ.

The following charts are affected: 12316 kapp 677 12214 kapp 554 12304 kapp 667

The following ENCs are affected: US5NJ24M US4DE11M

References: H12568 OPR-D332-TJ-13

This information was discovered and submitted by the NOAA ship THOMAS JEFFERSON.

Original Message ----- Subject:Re: Re: DTON Report - OPR-D332-TJ-13, H12568
 Date:Sun, 29 Sep 2013 22:03:46 +0000
 From:Megan Guberski - NOAA Federal <megan.guberski@noaa.gov>
 To:John Barber - NOAA Federal <john.barber@noaa.gov>
 CC:Tara Wallace - NOAA Federal <tara.wallace@noaa.gov>, OCS NDB - NOAA Service Account 
 <ocs.ndb@noaa.gov>

[Quoted text hidden]

H12568\_DTON\_1.zip
 498K



Allison Stone - NOAA Federal < allison.c.stone@noaa.gov>

## DTON Report OPR-D332-TJ-13, H12568

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

Wed, Dec 4, 2013 at 7:40 PM

To: Allison Stone - NOAA Federal <Allison.C.Stone@noaa.gov>

Your DTON has been registered. The acknowledgement needs to go in Appendix II.

------ Forwarded message ------From: NDB E-Mail Account <ocs.ndb@noaa.gov> Date: Wed, Dec 4, 2013 at 7:04 PM Subject: FW: DTON Report OPR-D332-TJ-13, H12568 To: coast.pilot@noaa.gov, allen.taylor@noaa.gov, Andrew Kampia <Andrew.Kampia@noaa.gov>, Brent Pounds <brent.pounds@noaa.gov>, castle.e.parker@noaa.gov, craig.winn@noaa.gov, david.merke@noaa.gov, gerald.koehl@noaa.gov, james.m.crocker@noaa.gov, john.barber@noaa.gov, jon.swallow@noaa.gov, ken.forster@noaa.gov, kevin.shaw@npoaa.gov, mark.griffin@noaa.gov, matt.kroll@noaa.gov, michael.gaeta@noaa.gov, ocs.ndb@noaa.gov, pramod.singh@noaa.gov, richard.t.brennan@noaa.gov, Tara Wallace - NOAA Federal <tara.wallace@noaa.gov>, Travis Newman -NOAA Federal <travis.newman@noaa.gov>, \_OMAO MOA XO Thomas Jefferson <xo.thomas.jefferson@noaa.gov>, Megan Guberski - NOAA Federal <megan.guberski@noaa.gov>, Peter Lewit - NOAA Federal <peter.lewit@noaa.gov>, Abigail Higgins - NOAA Federal <abigail.higgins@noaa.gov>, Allison Stone - NOAA Federal <allison.c.stone@noaa.gov> Cc: megan.guberski@noaa.gov</a>

L-2353/13 and DD-23887 have been registered by the Nautical Data Branch and directed to PBC for processing.

The DtoN reported is an obstruction just off Cape May Point, NJ.

The following charts are affected: 12316 kapp 677 12214 kapp 554 12304 kapp 667

The following ENCs are affected: US5NJ24M US4DE11M

References: H12568 OPR-D332-TJ-13

This information was discovered and submitted by the NOAA ship THOMAS JEFFERSON.

From:#Phjdq#Jxehuvn###QRDD#Thghud#Ppdbx=phjdq1jxehuvnCqrdd1jry# Sent:#Wxhvgd|#Ghfhpehu#6/#5346#7=39#SP To:#RFV#QGE###QRDD#VhuyEh#Dffrxqw Cc:#bRPDR#PRD#[R#Wkrpdv#Mnihuvrq>#Shvhu#Dhzlw#QRDD#Ihghudo#Deljdb#Kljjbv#0#QRDD#Ihghudo Davrq#Vwrqh#0#QRDD#Ihghudo#Plfkdh#Jrqvdayhv#0#QRDD#Ihghud Subject:#SWRQ#Jhsru#RSUCG6650WM046/#K4589;

Good Afternoon,

Attached is a DTON report for OPR-D332-TJ-13, Registry H12568. This the second DTON report for the survey. Please let me know if you have any questions, or need further information.

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

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

H12568\_DTON\_2.zip
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## APPENDIX III

## SURVEY FEATURES REPORT

AWOIS - one Dangers to Navigation - two Maritime Boundary - none Wrecks - one (see AWOIS)

## H12568 Features Report

Registry Number:	H12568
State:	New Jersey
Locality:	Delaware Bay
Sub-locality:	Cape May Point
Project Number:	OPR-D332-TJ-13
Survey Dates:	12/01/2005 - 11/21/2013

## **Charts Affected**

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
12316	35th	10/01/2012	1:40,000 (12316_4)	USCG LNM: 4/28/2015 (5/19/2015) NGA NTM: 7/31/2004 (5/30/2015)
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	US 0000687093 00001	Obstruction	4.87 m	38° 57' 12.7" N	074° 59' 29.2" W	
1.2	AWOIS 1210 - Wreck (USS Atlantus)	Wreck	[None]	38° 56' 38.9" N	074° 58' 19.9" W	

## 1.1) US 0000687093 00001

## DANGER TO NAVIGATION

### **Survey Summary**

Survey Position:	38° 57' 12.7" N, 074° 59' 29.2" W
Least Depth:	4.87 m (= 15.98 ft = 2.663 fm = 2 fm 3.98 ft)
<b>TPU (±1.96</b> σ):	THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp:	2013-325.13:45:57.000 (11/21/2013)
Dataset:	H12568_DTON.000
FOID:	US 0000687093 00001(0226000A7BF50001)
Charts Affected:	12316_4, 12214_1, 12304_1, 12200_1, 13003_1

#### **Remarks:**

OBSTRN/remrks: Uncharted obstruction found using 200% SSS and ODMB. Reduced to MLLW via final tidal zoning and verified water levels. DtoN #2 for H12568.

### **Feature Correlation**

Source	Feature	Range	Azimuth	Status
H12568_DTON.000	US 0000687093 00001	0.00	000.0	Primary

## **Hydrographer Recommendations**

Chart obstruction.

#### Cartographically-Rounded Depth (Affected Charts):

16ft (12316\_4, 12214\_1, 12304\_1)

2 ½fm (12200\_1, 13003\_1)

### S-57 Data

- Geo object 1: Obstruction (OBSTRN)
- Attributes: NINFOM add Obstruction QUASOU - 6:least depth known SORDAT - 20130827 SORIND - US,US,graph,H12568

TECSOU - 3,2:found by multi-beam,found by side scan sonar VALSOU - 4.870 m WATLEV - 3:always under water/submerged

## **Office Notes**

SAR: Feature was ensonified with object detect SSS and MBES. Feature is considered significant and verified as per survey data. Defer the final charting disposition to AHB Compile Team.

Compile: Add Obstruction.

## Feature Images



Figure 1.1.1



Figure 1.1.2



Figure 1.1.3



Figure 1.1.4

## 1.2) AWOIS 1210 - Wreck (USS Atlantus)

### **Survey Summary**

Survey Position:	38° 56' 38.9" N, 074° 58' 19.9" W
Least Depth:	[None]
<b>TPU (±1.96</b> თ <b>)</b> :	THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp:	2005-335.00:00:00.000 (12/01/2005)
Dataset:	H12568_AWOIS.000
FOID:	US 0000687153 00001(0226000A7C310001)
Charts Affected:	12316_4, 12214_1, 12304_1, 12200_1, 13003_1

#### Remarks:

WRECKS/remrks: Retain wreck awash as charted.

## **Feature Correlation**

Source	Feature	Range	Azimuth	Status
H12568_AWOIS.000	US 0000687153 00001	0.00	000.0	Primary
OPR-D332-TJ-13_PRF.000	0_ 0000001399 00001	-1.00	000.0	Secondary (grouped)
OPR-D332-TJ-13_PRF.000	0_000001398 00001	-1.00	000.0	Secondary (grouped)
H12568_AWOIS.000	US 0000687141 00001	263.66	353.2	Secondary (grouped)

## Hydrographer Recommendations

Retain as charted.

### S-57 Data

Geo object 1: Wreck (WRECKS)

Attributes:CATWRK - 5:wreck showing any portion of hull or superstructure<br/>NINFOM - retain (note discrepancy between enc's and raster)<br/>QUASOU - 2,6:depth unknown,least depth known<br/>SORDAT - 20051200<br/>SORIND - US,US,graph,Chart 12316<br/>TECSOU - 2,3:found by side scan sonar,found by multi-beam<br/>WATLEV - 2:always dry

## **Office Notes**

SAR: Confirmed with orthoimagery, MBES and SSS. Least depth was not obtained on feature as the feature is baring; the field unit did not obtain a height. Retain as charted.

Compile: AWOIS 1210 is present, retain as charted (update positioning from project PRF)

## Feature Images



Figure 1.2.1



Figure 1.2.2



Figure 1.2.3

## H12568 DToN Cape May Channel

Registry Number:	H12568
State:	New Jersey
Locality:	Delaware Bay
Sub-locality:	Cape May Point
Project Number:	OPR-D332-TJ-13
Survey Dates:	20130725 – 20130827

#### **Remarks:**

Hydrographic survey H12568 showed significant discrepancies between the survey data and the charted depths in the south end of Cape May Channel. The area is dominated by sandwaves, the crests of which are not well represented by the soundings on chart 12214 and 12316.

During field acquisition, the channel was initially investigated using 100% side scan coverage with concurrent set line spacing multibeam. At the time of acquisition the Operations Officer instructed the HIC's to stop data acquisition at the draft corrected 4m curve. After review of the 100% coverage the command deemed the area too shoal for further investigation (sub-4m depths), acquisition ceased at the observed 4m curve, and approximately 0.10 sq nm was left unsurveyed. A survey scale sounding plot was generated, and is included in this report along with a digitization of the unsurveyed area.

Verified water level and Final Zoning have been applied.

#### Hydrographer Recommendations:

Update charts 12214 and 12316 to reflect current survey data.



Figure 1: Survey scale soundings of the DToN shoal are colored by depth, and laid over a semi-transparent DTM. The background chart is 12316.

#### APPROVAL PAGE

#### H12568

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

- H12568\_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12568\_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