

H12298

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: H12298

LOCALITY

State: New York

General Locality: Block Island Sound

Sub-locality: 3 NM Southeast of Fisher Island

2011

CHIEF OF PARTY
CDR Lawrence T Krepp

LIBRARY & ARCHIVES

Date:

HYDROGRAPHIC TITLE SHEET

H12298

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: **New York**

General Locality: **Block Island Sound**

Sub-Locality: **3 NM Southeast of Fisher Island**

Scale: **10000**

Dates of Survey: **08/31/2011 to 11/16/2011**

Instructions Dated: **06/29/2011**

Project Number: **OPR-B363-TJ-11**

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

Chief of Party: **CDR Lawrence T Krepp**

Soundings by: **Multibeam Echo Sounder**

Imagery by: **Side Scan Sonar**

Verification by: **Atlantic Hydrographic Branch**

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

H-Cell Compilation Units: ***meters at Mean Lower Low Water***

Remarks:

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Descriptive Report to Accompany Survey H12298

Project: OPR-B363-TJ-11

Locality: Block Island Sound

Sublocality: 3 NM Southeast of Fisher Island

Scale: 1:10000

August 2011 - November 2011

NOAA Ship *Thomas Jefferson*

Chief of Party: CDR Lawrence T Krepp

A. Area Surveyed

Survey sheet area is southeast of Fishers Island, NY

A.1 Survey Limits

Data was acquired within the following survey limits:

Northeast Limit	Southwest Limit
41.3000247222 N 71.83906 W	41.1815455556 N 72.0184713889 W

Table 1: Survey Limits

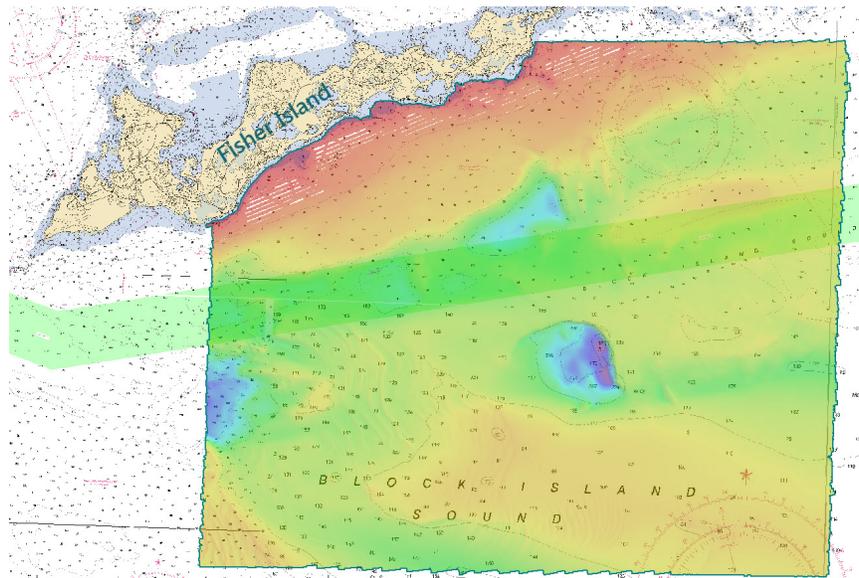


Figure 1: H12298 Survey Outline

The 4 meter curve was not reached in all nearshore areas.

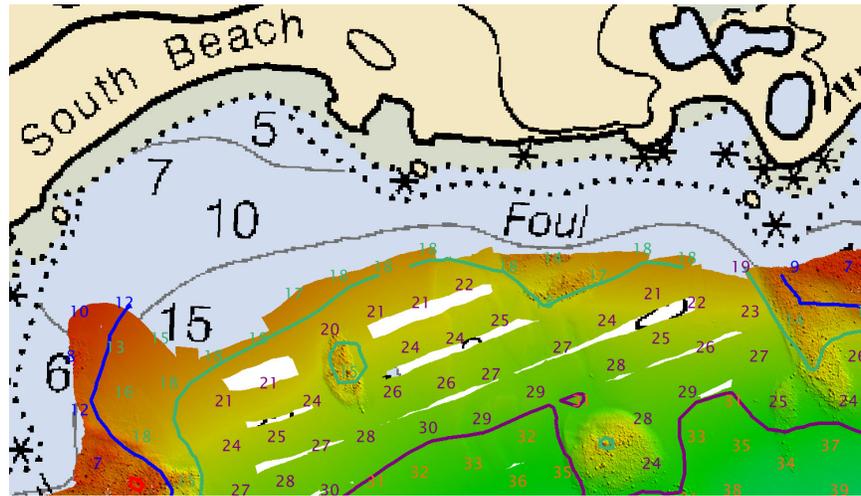


Figure 2: Example of an area off South Beach where the 4m curve was not completely identified

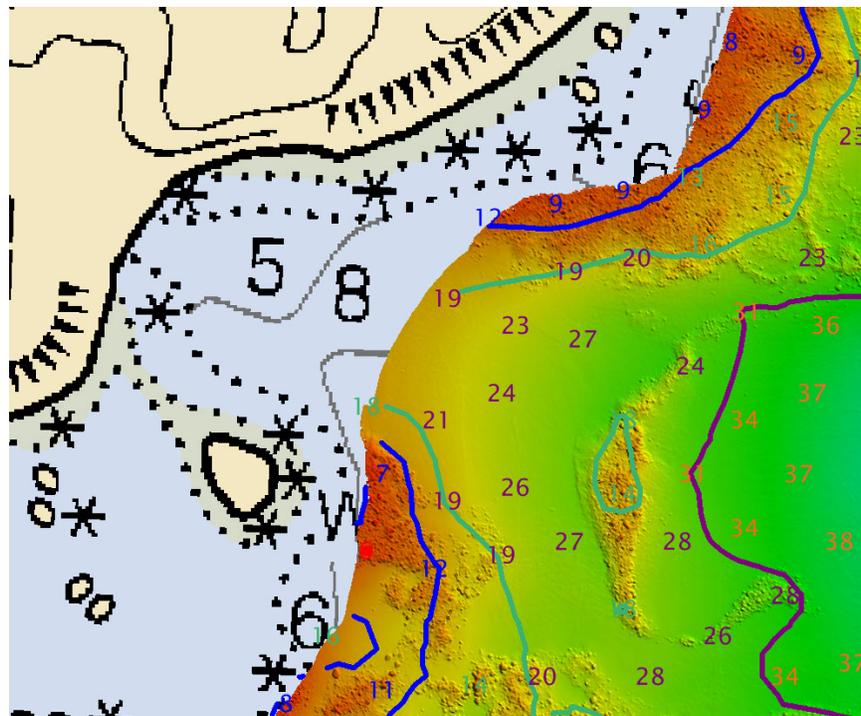


Figure 3: Example of an area off Wreck Island where the 4m curve was not completely identified

A.2 Survey Purpose

This project is being conducted in support of NOAA's Office of Coast Survey to provide contemporary hydrographic data in order to update the nautical charting products and reduce the survey backlog within the area. In addition, data from this project will support the Long Island Sound Seafloor Mapping Initiative for the States of Connecticut and New York. This project also responds, in part, to the concerns raised by the Northeast Marine Pilots for new hydrographic surveys to support deep draft (60') vessels transiting the areas traffic lanes.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions OPR-B363-TJ-11, dated 29th July, 2011. No additional work is needed to complete this survey. No changes significant to navigation have been noted and it is recommended that this survey receive normal processing priority.

A.4 Survey Coverage

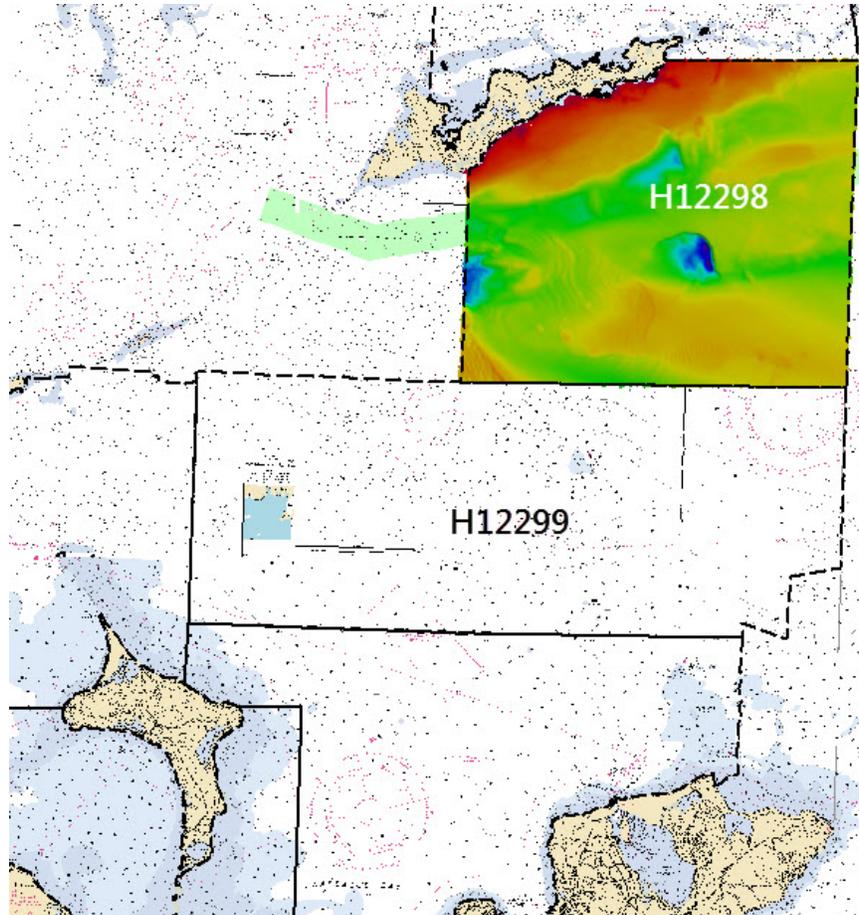


Figure 4: Overview of survey area H12298 location

Concurrent MB and SSS data was collected in areas less than 20m and, in addition, ODMB data was collected over the rocky seabed areas. The 1m ODMB surface was extended to a depth of 30m instead of 20m (see email in Appendix V) in order to support deep draft vessels in the area.

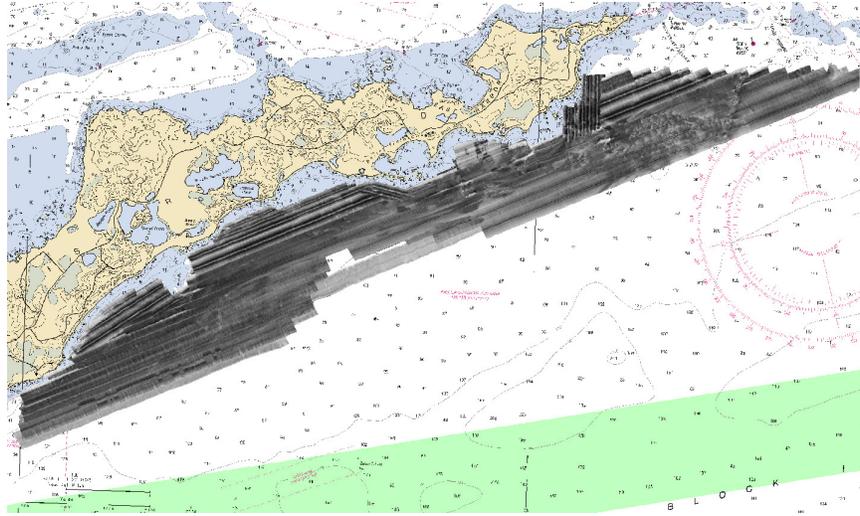


Figure 5: Survey H12298 100% and 200% Side Scan Sonar coverage

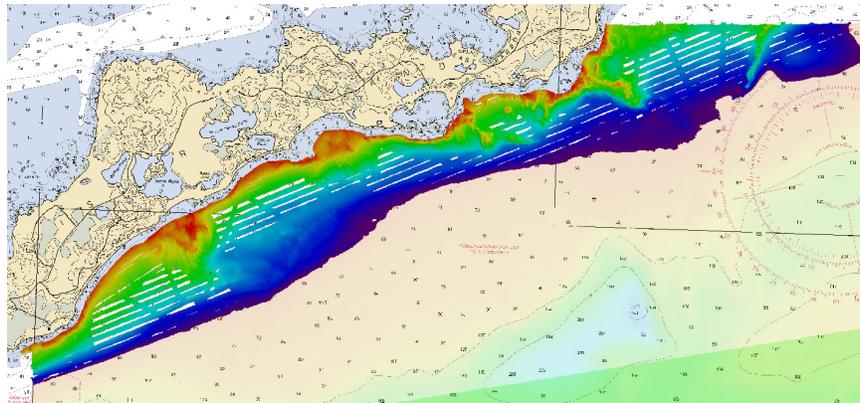


Figure 6: H12298 multibeam data run concurrently with SSS data and ODMB over rocky seabed areas

A.5 Survey Statistics

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

	HULL ID	S222	3101	3102	Total
LNM	SBES Mainscheme	0	0	0	0
	MBES Mainscheme	773.66	102.73	9.88	886.27
	Lidar Mainscheme	0	0	0	0
	SSS Mainscheme	0	0	0	0
	SBES/MBES Combo Mainscheme	0	0	0	0
	SBES/SSS Combo Mainscheme	0	0	0	0
	MBES/SSS Combo Mainscheme	0	53.3	34.36	87.66
	SBES/MBES Combo Crosslines	31.02	7.72	0	38.74
	Lidar Crosslines	0	0	0	0
	Number of Bottom Samples				
Number of DPs					0
Number of Items Items Investigated by Dive Ops					0
Total Number of SNM					33.27

Table 2: Hydrographic Survey Statistics

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

<i>Survey Dates</i>
08/31/2011
09/01/2011
09/07/2011
09/08/2011
09/10/2011
09/11/2011
09/12/2011
09/20/2011
09/21/2011
09/26/2011
09/29/2011
09/30/2011
10/02/2011
10/03/2011
10/18/2011
10/19/2011
10/24/2011
10/27/2011
11/06/2011
11/07/2011
11/09/2011
11/16/2011

Table 3: Dates of Hydrography

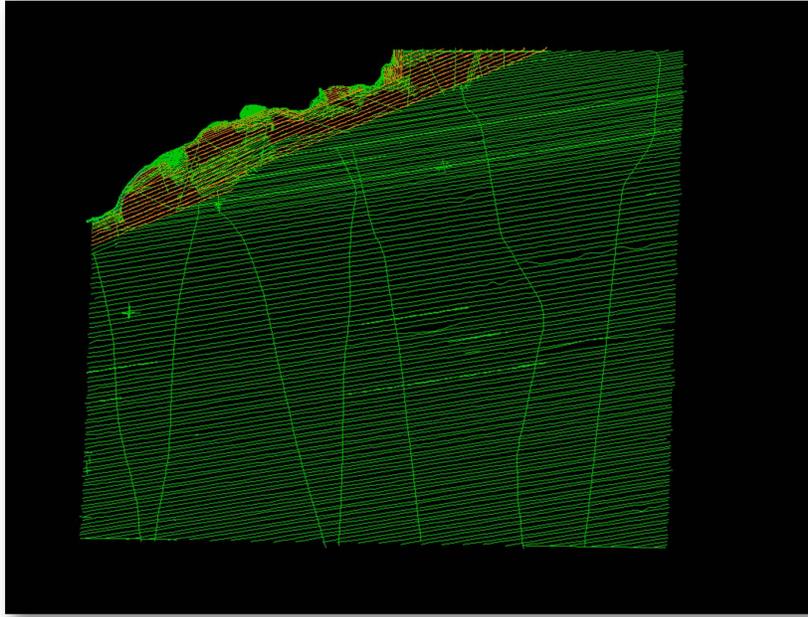


Figure 7: H12298 Mainscheme and Crosslines

A.6 Shoreline

The project instructions indicated a limited shoreline verification requirement. The tasked assigned feature file (AFF) was not filtered to the NALL line/.08mm MHW buffer line and, therefore, many of the assigned shoreline features in the AFF were not investigated due to safety concerns and vessel limitations. All shoreline features, addressed and not addressed, are included in the Final Feature File (FFF) with appropriate attribution.

A.7 Bottom Samples

16 bottom samples were acquired based on existing bottom sample locations and variability seen in the MB and SSS data.

B. Data Acquisition and Processing

B.1 Equipment and Vessels

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

B.1.1 Vessels

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

Hull ID	<i>S222</i>	<i>3101</i>	<i>3102</i>
LOA	208 feet	31 feet	31 feet
Draft	15 feet	4 feet	4 feet

Table 4: Vessels Used

B.1.2 Equipment

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

Manufacturer	Model	Type
Applanix	POS MV	Vessel Attitude System
Reson	7125 SV1	MBES
Reson	7125 ROV	MBES
Klein	5000	SSS
Applanix	POS MV	Positioning System
Sea-Bird	Seacat 19+	Sound Speed System
Brooke Ocean	MVP100	Sound Speed System

Table 5: Major Systems Used

Data were acquired by NOAA Ship Thomas Jefferson, launch 3101 and launch 3102. NOAA Ship Thomas Jefferson, launch 3101 and launch 3102 acquired Reson 7125 multibeam echo sounder (MBES) soundings and sound velocity profiles. Launch 3101 and 3102 collected side scan sonar (SSS) data. Seabed samples were collected by NOAA Ship Thomas Jefferson. Vessel configurations, equipment operation and data acquisition and processing were consistent with specifications described in the DAPR.

B.2 Quality Control

B.2.1 Crosslines

Crossline comparison was completed using a difference surface created in CARIS BASE Editor. Mainscheme data generally agreed well, with maximum disagreement occurring near the outer beams. The

computed statistics of the difference surface were: mean: 0.052m, stdev: 0.075m. Data was also compared visually using standard deviation surfaces and no large standard deviations were discovered.

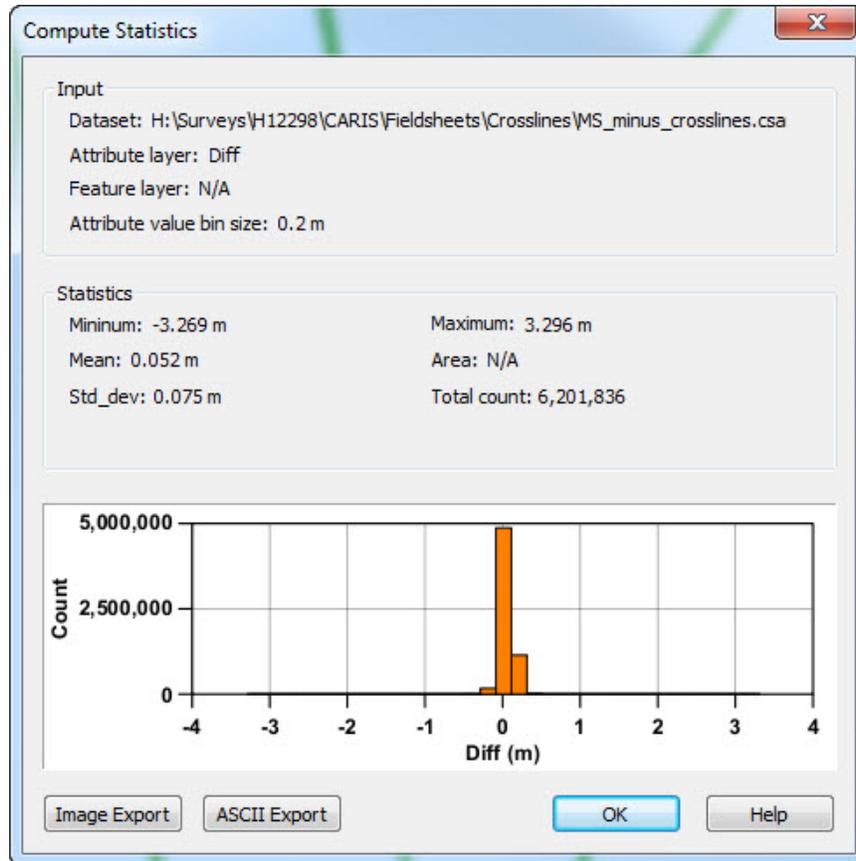


Figure 8: H12298 Crossline vs Mainscheme surface difference statistics

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0.102meters	0.000meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
S222, 3101, 3102	4meters/second	1meters/second	0.2meters/second

Table 7: Survey Specific Sound Speed TPU Values

CO-OPS provided tide uncertainty values for the TCARI surface and the VDATUM solution as part of the Total Propagated Uncertainty (TPU) calculation performed within CARIS HIPS and SIPS. TPU is calculated and written to each line's HDCS file (CARIS processed data format). When surfaces are created, an uncertainty child layer is created. This child layer represents the amount of uncertainty for individual nodes in the surface based on a combination of a priori values from equipment vendors, values determined from environmental observation in the field, and from automated empirical analysis of data in real-time.

For this survey, data were processed to the ellipsoid and reduced to MLLW using VDATUM. The tidal uncertainty component of VDATUM for this area was 0.102m and this value was used for the TPU computations.

Once all investigated features have been reviewed and least depths have been designated, surfaces are finalized. In finalization, the standard deviation for each node in the surface is multiplied by 1.96 to provide the 95% (2-sigma) confidence value for the node. This 2-sigma standard deviation is compared to the computed Total Vertical Uncertainty (TVU) for each node. The larger of the two values is retained as the finalized Uncertainty for each node. Uncertainty is reported in meters. IHO has established allowable TVU values for each order of survey. This survey meets IHO Order I TVU requirements in at least 99.69% of nodes in the each of the seven finalized MB surfaces. Areas that did not meet IHO Order1 were located in rocky areas with high standard deviation values.

B.2.3 Junctions

H12298 was compared to H12299 from the same project

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12299	1:10000	2011	NOAA Ship THOMAS JEFFERSON	S

Table 8: Junctioning Surveys

H12299

The junction with H12299 was compared using a difference surface in CARIS BASE Editor. The surveys had a mean difference of 0.1m and a standard deviation of 0.2m.

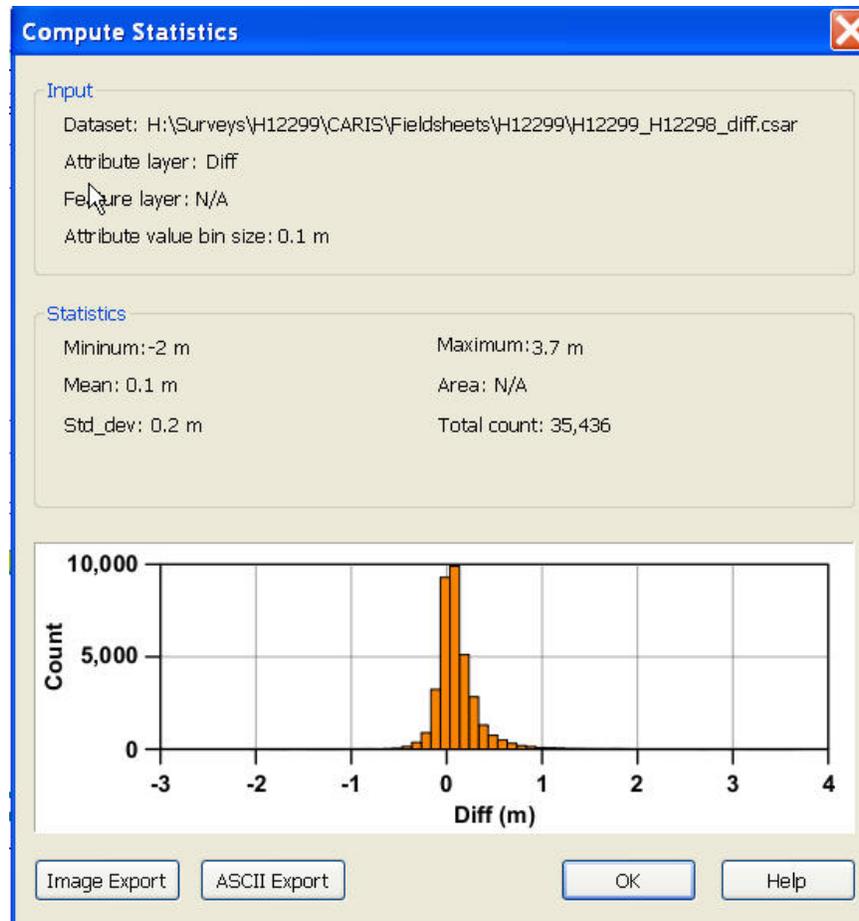


Figure 9: Summary of the H12298 and H12299 Difference Surface

B.2.4 Sonar QC Checks

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

B.2.5 Equipment Effectiveness

B.2.5.1 None Exist

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

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: On survey launch 3101 and 3102, sound speed data was collected with a CTD approximately every two hours. The ship used a Moving Vessel Profiler with casts occurring approximately every 20 minutes.

Sound speed profiles are analyzed for data quality, concatenated and then applied to the bathymetry using the "nearest in distance within time - 2 hours" mode in Caris HIPS and SIPS. No abnormal sound velocity issues were present in the data.

B.2.8 Coverage Equipment and Methods

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

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

HDCS sounding data were reduced to mean lower low (MLLW) primarily with a VDATUM solution. Six lines of data were processed to TCARI when issues with ERS processing did not allow for an SBET solution. See the Vertical and Horizontal Control Section for more information.

The following lines had errors during TrueHeave application and only have heave applied:

S222 DN 254 Time 0007-1135,
DN 273 Line 008_1916, 009_1901 and
Launch 3101 DN 320 Line 559_1253

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

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

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	7.1	2	2	08/24/2012	Processing
Caris	Bathy DataBASE	4.0			10/04/2012	Processing

Table 9: Software Updates

The following Feature Object Catalog was used: NOAAProfileField.xml

B.5.2 Surfaces

The following CARIS surfaces were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12298_MB_50cm_MLLW_1_Final	CUBE	0.5 meters	0 meters - 20 meters	NOAA_0.5m	Object Detection
H12298_MB_50cm_MLLW_2_Final	CUBE	0.5 meters	0 meters - 20 meters	NOAA_0.5m	Object Detection
H12298_MB_50cm_MLLW_3_Final	CUBE	0.5 meters	0 meters - 20 meters	NOAA_0.5m	Object Detection
H12298_MB_1m_MLLW_4_Final	CUBE	1 meters	19 meters - 30 meters	NOAA_1m	Object Detection
H12298_MB_2m_MLLW_5_Final	CUBE	2 meters	28 meters - 40 meters	NOAA_2m	Complete MBES
H12298_MB_4m_MLLW_6_Final	CUBE	4 meters	36 meters - 80 meters	NOAA_4m	Complete MBES
H12298_MB_8m_MLLW_7_Final	CUBE	8 meters	72 meters - 160 meters	NOAA_8m	Complete MBES
H12298_MB_8m_MLLW_Combined	CUBE	8 meters	0 meters - 160 meters	N/A	Complete MBES
H12298_SSS_100	SSS Mosaic	1 meters	-	N/A	100% SSS
H12298_SSS_200	SSS Mosaic	1 meters	-	N/A	200% SSS

Table 10: CARIS Surfaces

See Appendix V for the email that discusses why the 1m resolution ODMB grid was extended to a depth of 30m instead of 20m.

B.5.3 MB Filter

A filter was applied to S222 data for outer beam noise and low quality data flags. The filter rejected beams 1-37 and 475-512 as well as quality flags 0,1, and 2. Where density was negatively affected or holidays created, which occurred mostly in the deep areas, data were re-accepted as needed. Also, designated soundings and features were re-examined after the filter was applied.

C. Vertical and Horizontal Control

As per FPM section 5.2.3.2.3, no HVCR was filed as horizontal or vertical control stations were not established by the field party for this survey. A summary of horizontal and vertical control for this survey follows.

C.1 Vertical Control

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

Standard Vertical Control Methods Used:

TCARI

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

Station Name	Station ID
Newport, RI	845-2660
New London, CT	846-1490
Montauk, NY	851-0560

Table 11: NWLON Tide Stations

The following subordinate water level stations were established for this survey:

Station Name	Station ID
Orient Harbor	851-1671

Table 12: Subordinate Tide Stations

File Name	Status
B363TJ2011_final.tc	Final Approved
8452660.tid	Verified Observed
8461490.tid	Verified Observed
8510560.tid	Verified Observed
8511671.tid	Verified Observed

Table 13: Water Level Files (.tid)

There was no Tide Corrector file associated with this survey.

A request for final approved tides was sent to N/OPS1 on 11/22/2011. The final tide note was received on 01/06/2012.

Non-Standard Vertical Control Methods Used:

VDatum

Ellipsoid to Chart Datum Separation File:

2011_B363_VDatum_Ellip_MLLW_SEP.txt

The majority of H12298 was processed to the ellipsoid and used the OPs provided VDATUM separation model to reduce data to the MLLW datum.

Six lines did not have GPS tides applied and instead were processed with TCARI tides: Launch 3101: DN 292 Line 011_1542, DN 320 Lines 559_1253, 900_1201, 900_1203, S222 DN 273 Liens 008_1916, 009_1901.

Of the majority of H12298 that was transformed to MLLW with VDATUM, the following had errors in the HIPS RMS error data application: S222 DN 253 Time 1249-1851, Launch 3101 DN 297 Line 514_1249, 909_1346

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

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
MOR5	MOR5
CTGR	CTGR
CTGU	CTGU
CTMA	CTMA
CTPU	CTPU
NCDU	NCDU
URIL	URIL
ACU6	ACU6
COVX	COVX
NYRH	NYRH
VAMI	VAMI

Table 14: CORS Base Stations

The following DGPS Stations were used for horizontal control:

DGPS Stations
Sandy Hook, NJ (286kHz)
Moriches, NY (293kHz)

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	LNМ Date	NM Date
13214	1:20000	29	12/2010	09/25/2012	10/06/2012
13212	1:20000	39	06/2010	09/25/2012	10/06/2012
13209	1:40000	26	08/2011	09/25/2012	10/06/2012

Table 16: Largest Scale Raster Charts

13214

The survey generally agreed well with charted depths, with certain areas of discrepancy occurring with the addition of full bottom coverage where previously only singlebeam data existed:

The charted 180ft depth contour in figure 10 has grown up to 300m.

There is an uncharted 180ft depth contour seen in figure 11.

The charted 120ft depth contour was based on sparse data. With the complete coverage MB from H12298, the 120ft depth curve is now fully defined (figure 12).

See the H12298_FFF.000 for all new feature information.

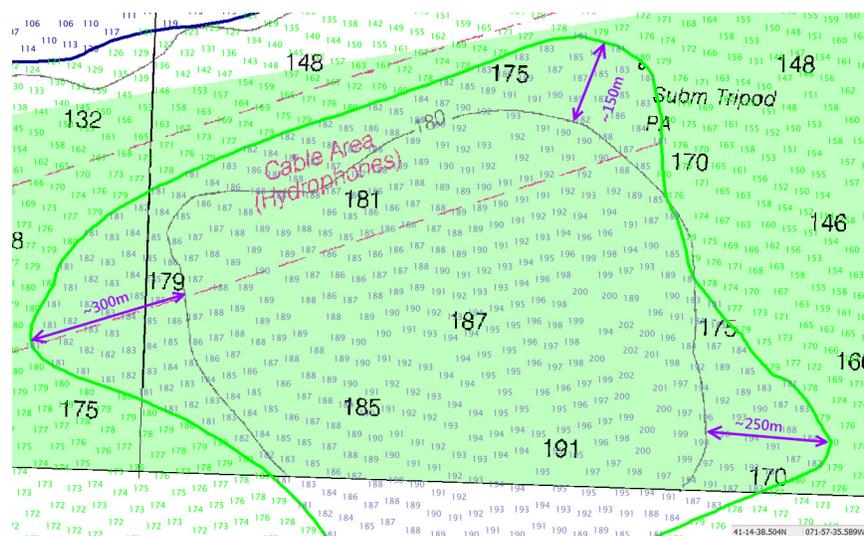


Figure 10: Raster Chart 13214 charted 180ft depth contour (black) and H12298 180ft depth contour (green)

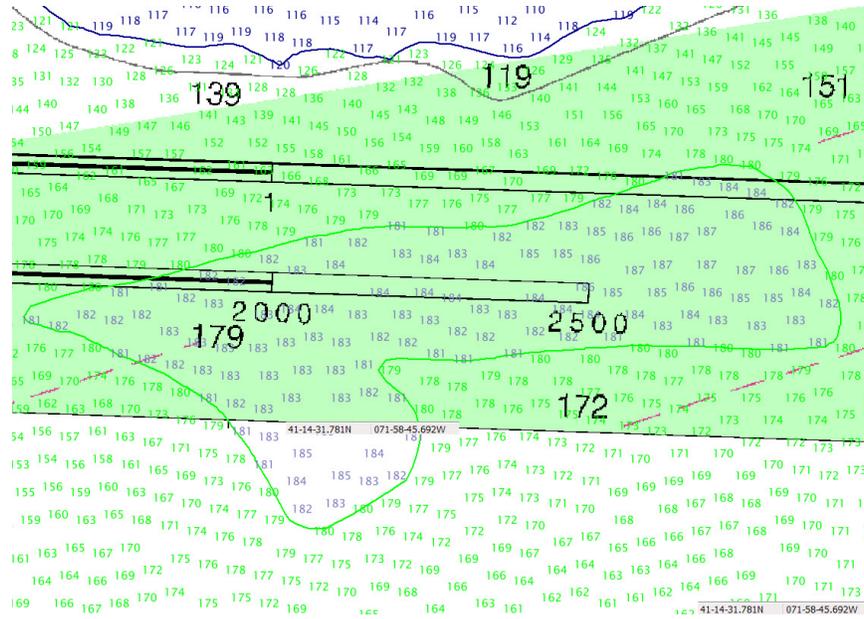


Figure 11: Raster Chart 13214 uncharted 180ft depth contour (in green)

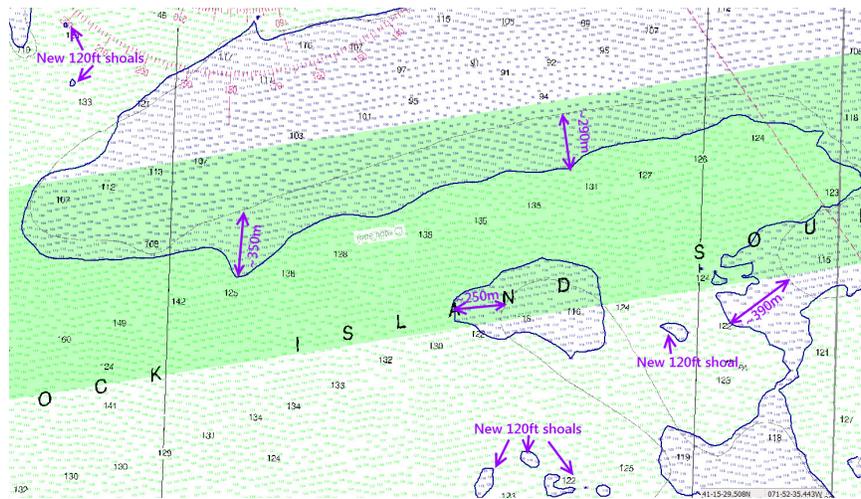


Figure 12: Raster Chart 13214 charted 120ft depth contour (black) and H12298 120ft depth contour (blue)

13212

The survey generally agreed well with charted depths. An isolated 172ft shoal has been expanded with H12298 data, figure 13. See the H12298_FFF.000 for all new feature information.

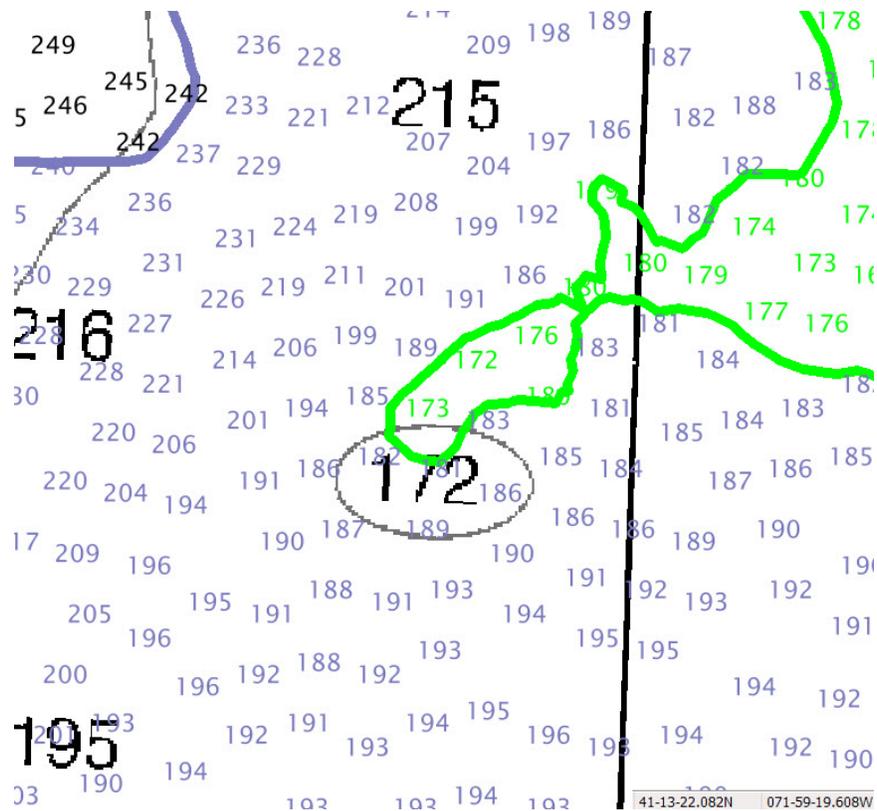


Figure 13: Raster Chart 13212 charted 180ft contour (black) and H12298 120ft depth contour (green)

13209

The survey generally agreed well with charted depths, with certain areas of discrepancy occurring where shoals have shifted over time:

The charted 120ft contour has shifted by as much as 700m and new isolated shoals have formed (Figure 14). A charted 90ft contour has separated into three isolated shoals (Figure 15).

Two 90ft isolated shoals have shifted as seen in Figure 16.

A charted 120ft contour has shifted to the north northeast and individual 120ft shoals have developed (Figure 17).

See the H12298_FFF.000 for all new feature information.

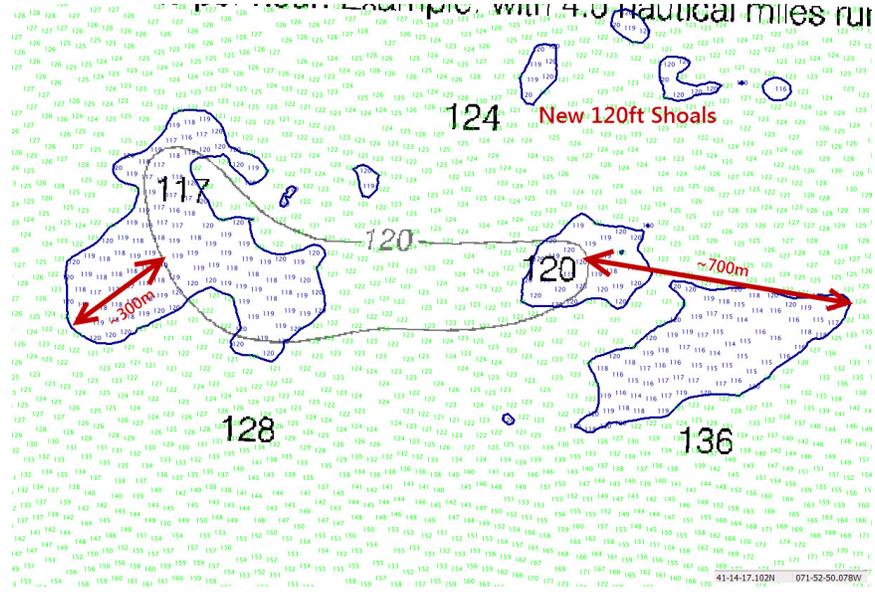


Figure 14: Raster Chart 13209 charted 120ft contour (black) and H12298 120ft depth contours (blue)

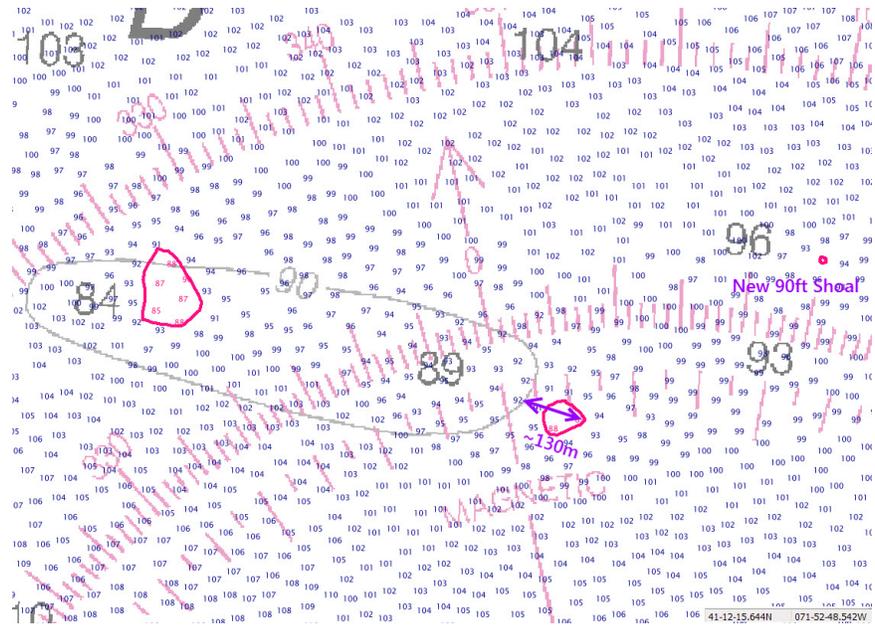


Figure 15: Raster Chart 13209 charted 120ft contour (black) and H12298 120ft depth contours (pink)

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?
US5CN44M	1:20000	6	08/24/2012	09/05/2012	NO
US5CN42M	1:20000	8	09/20/2012	09/20/2012	NO
US5MA22M	1:40000	20	07/13/2012	09/25/2012	NO

Table 17: Largest Scale ENC's

US5CN44M

See discussion above for Raster Chart 13214, Ed 29.

US5CN42M

See discussion above for Raster Chart 13212, Ed 39.

US5MA22M

See discussion above for Raster Chart 13209, Ed 26.

D.1.3 AWOIS Items

Number of AWOIS Items Addressed: 5

Number of AWOIS Items Not Addressed:

All AWOIS information is located in H12298_FFF.000.

AWOIS #7276, charted submerged tripod. The entire AWOIS radius was investigated and no contacts were found that resemble a tripod. There is one feature within the radius but it is not navigationally or hydrographically significant and does not resemble a tripod. Recommend to delete charted submerged tripod PA and update AWOIS database (Feature 18).

AWOIS #2515, charted submerged tripod. The entire AWOIS radius was investigated with 200% SSS and concurrent MB and no contacts were found that resemble a tripod. Recommend to delete charted submerged tripod PA and update AWOIS database (Figure 19).

AWOIS #13676, history describes uncharted hydrophone. The described hydrophone was located within the AWOIS radius and is included in the feature file as an obstruction. Recommend to add an obstruction and update the AWOIS database (Figure 20).

AWOIS #7476, wreck Storm Petrel. The entire AWOIS radius was investigated and no contacts were found that resemble a wreck. The AWOIS history reports the 100ft schooner is now a "pile of sanded-in debris." As no evidence of a wreck was found, survey H12298 recommends to delete charted wreck PA and update the AWOIS database (Figure 21).

AWOIS #2635, wreck Olinda. The entire AWOIS radius was not investigated. Where data was collected, no contacts resembled the wreck described in the AWOIS history. Nothing is charted so there is no charting recommendation for this item (Figure 22).

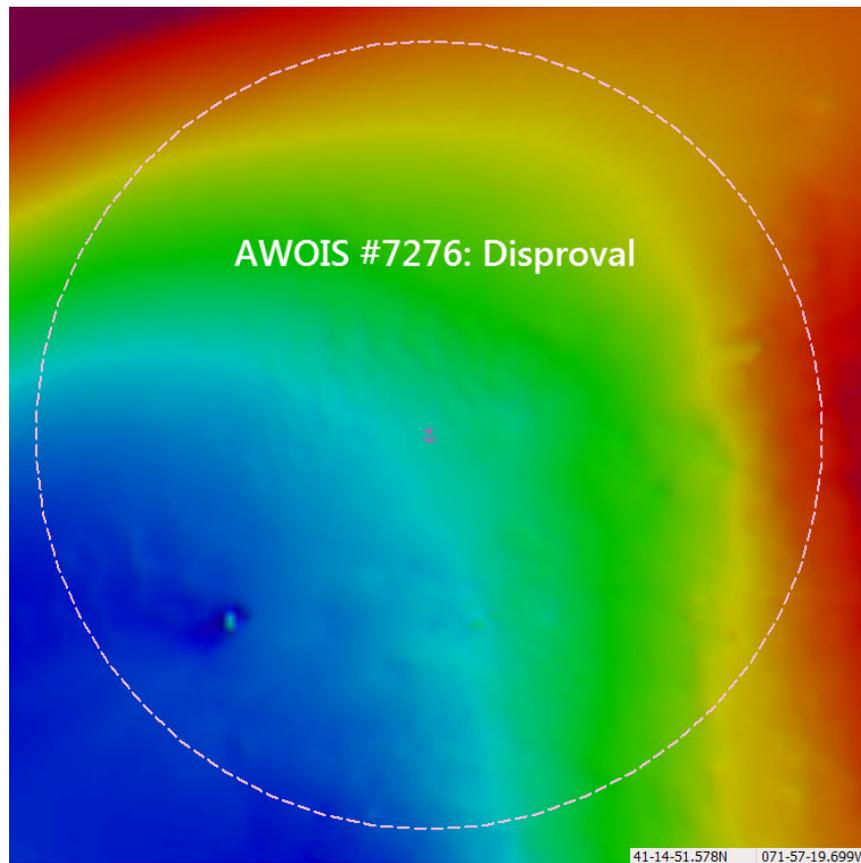


Figure 18: AWOIS #7276: Disproved

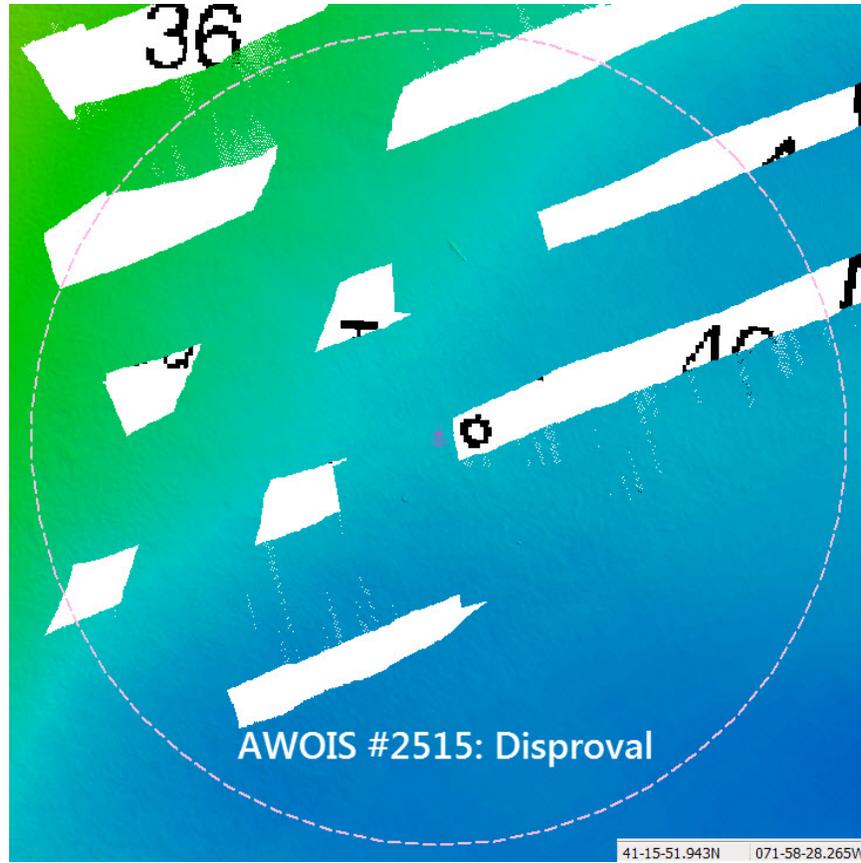


Figure 19: AWOIS #2515: Disproved

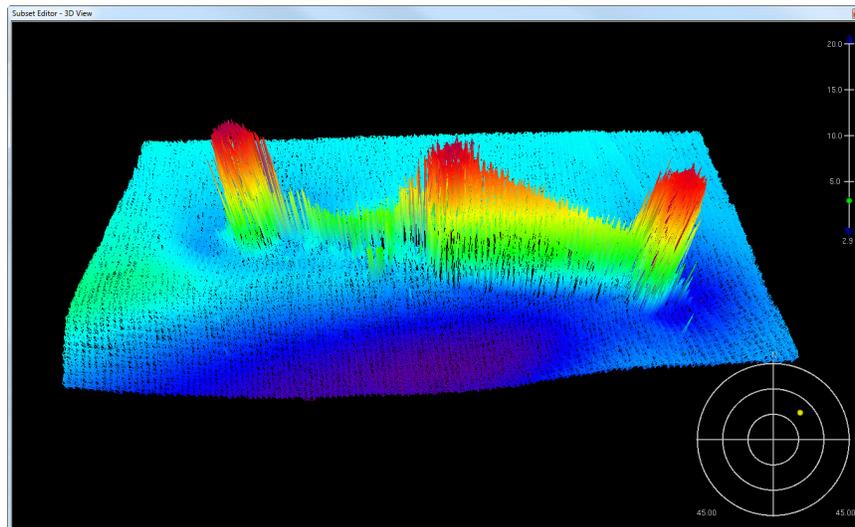


Figure 20: AWOIS 13676: Uncharted obstruction (Hydrophone)

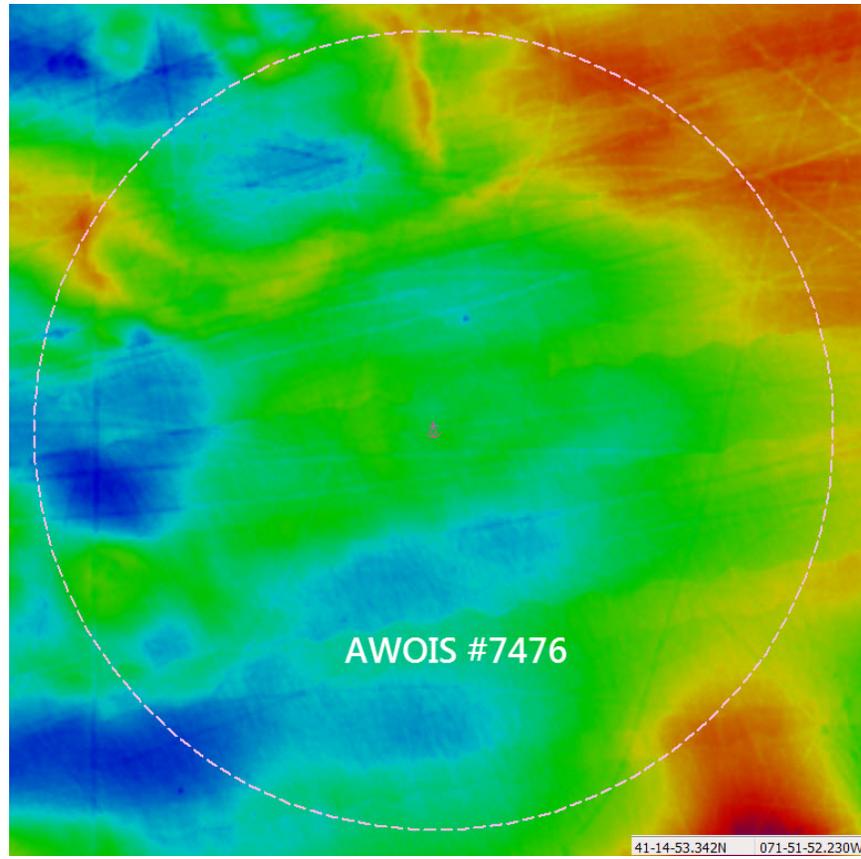


Figure 21: AWOIS #7476: Storm Petrel

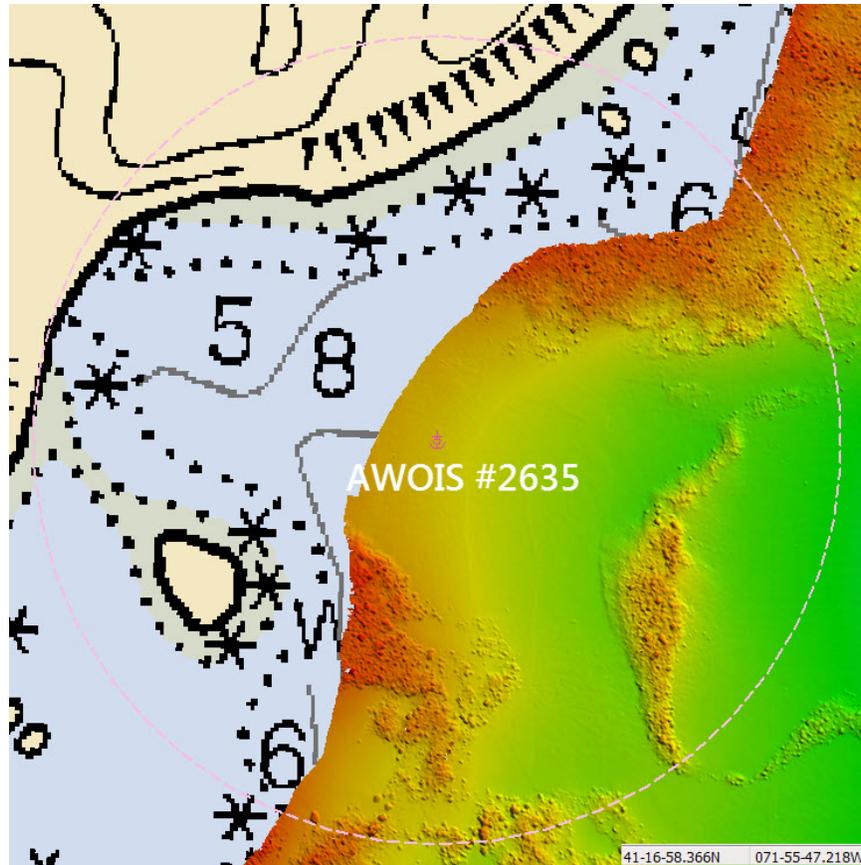


Figure 22: AWOIS #2635: Olinda

D.1.4 Charted Features

See H12298_FFF.000 for all feature discussion

D.1.5 Uncharted Features

See H12298_FFF.000 for all feature discussion

D.1.6 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.7 Shoal and Hazardous Features

See H12298_FFF.000 for all feature discussion. There are some new rocks nearshore that were not submitted as DtoNs due to vessel traffic considerations but they are all included in the final feature file. General shoaling is described in the chart comparison section of this DR, above.

D.1.8 Channels

No channels exist for this survey.

D.2 Additional Results

D.2.1 Shoreline

See H12298_FFF.000 for all feature discussion.

D.2.2 Prior Surveys

No prior survey comparisons exist for this survey.

D.2.3 Aids to Navigation

One aid to navigation (ATON) exists in this survey, located at 41-15-54.312N, 71-58-21.92W. While there is no field record of visually disproving this buoy, there is no evidence of the AtoN in the MB or SSS data.

D.2.4 Overhead Features

Overhead features do not exist for this survey.

D.2.5 Submarine Features

There is a charted Hydrophone cable area in survey H12298. No cables were observed in this survey so any which do exist are assumed to be properly buried. The hydrographer has no recommendations regarding these.

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 construction or dredging within the survey limits.

E. Approval Sheet

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

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

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

The Data Acquisition and Processing Report for OPR-D304-TJ-11 is submitted separately and contains additional information relevant to this survey.

Report Name	Report Date Sent
Data Acquisition and Processing Report	2011-06-19
Tides and Water Levels Package	2011-01-06

Approver Name	Approver Title	Approval Date	Signature
LT William Winner, NOAA	Field Operations Officer	10/10/2012	
CDR Lawrence T. Krepp, NOAA	Commanding Officer	10/10/2012	

F. Table of Acronyms

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

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

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