U.S. DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SURVEY

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: H12756

LOCALITY

State: USVI

Sub-locality: 12 NM North of St. Thomas

2015

CHIEF OF PARTY
Timothy Battista

LIBRARY & ARCHIVES

DATE: April 2015

NOAA FORM 76-35A U.S. DEPARTMENT OF COMMERCE
(11-72) NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTRY NUMBER:

H12756

HYDROGRAPHIC TITLE SHEET

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:	**USVI**
General Locality:	**Caribbean Sea**
Sub-Locality:	**12 NM North of St Thomas**
Scale:	**1:40,000** Date of Survey: **April 1 to April 7, 2015**
Instructions Dated:	**4 March 2015** Project Number: **M-I907-NF-15**
Vessel:	**NOAA Ship *Nancy Foster***
Chief of Party:	**Timothy Battista**
Surveyed by:	**CCMA Biogeography Branch**
Soundings by:	**Reson 7125 SV2, Kongsberg EM710**
Graphic record scaled by:	**N/A**
Graphic record checked by:	**N/A**
Protracted by:	**N/A**
Automated Plot:	**N/A**
Verification by:	
Soundings in:	**Meters at MLLW**

Remarks:
1) All Times are in UTC.
2) This is a Coral Reef Mapping Project and Hydrographic Survey.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

AtoN	Aid to Navigation
CUBE	Combined Uncertainty and Bathymetry Estimator
DAPR	Data Acquisition and Processing Report
DGPS	Differential Global Positioning System
DN	Day Number
DtoN	Danger to Navigation
GPS	Global Positioning System
HIPS	Hydrographic Information Processing System
HSSD	Hydrographic Surveys Specifications and Deliverables
IHO	International Hydrographic Organization
MBES	Multibeam Echosounder System
MLLW	Mean Lower Low Water
NAD83	North American Datum of 1983
QC	Quality Control
RNC	Raster Navigational Chart
TPU	Total Propagated Uncertainty
UTM	Universal Transverse Mercator
RNC	Raster Navigation Chart
ENC	Electronic Navigation Chart

Descriptive Report to Accompany Hydrographic Survey H12756
Project M-I907-NF-15
Locality: Caribbean Sea
Sub-locality: 12NM North of St. Thomas
Scale 1:40,000
April 2015
NOAA Ship Nancy Foster
Chief Scientist: Tim Battista
Lead Hydrographer: Mike Stecher

A. AREA SURVEYED

The Center for Coastal Monitoring and Assessment (CCMA) conducted hydrographic survey operations in the Caribbean Sea, 12NM North of St Thomas, US Virgin Islands. The survey H12756 was conducted in accordance with the Hydrographic Survey Project Instructions dated March 04, 2015 for project M-I907-NF-15.

A1. SURVEY LIMITS

The extents of the H12756 survey limits are listed in Table 1.

Table 1. H12756 survey limits

Northeast Limit	Southwest Limit
18.63 N	18.52 N
64.95 W	65.36 W

A2. SURVEY PURPOSE

The project is being conducted in support of the National Center for Coastal Ocean Science (NCCOS) to provide bathymetric data of critical benthic habitats in selected areas off of the coast of St. Thomas, USVI. Bathymetric data from the project was collected with multibeam echsounder (MBES) and will be utilized by the Office of Coast Survey (OCS) to update the nautical charts in the surveyed area.

A3. SURVEY QUALITY

The entire survey is adequate to supersede previous surveys.

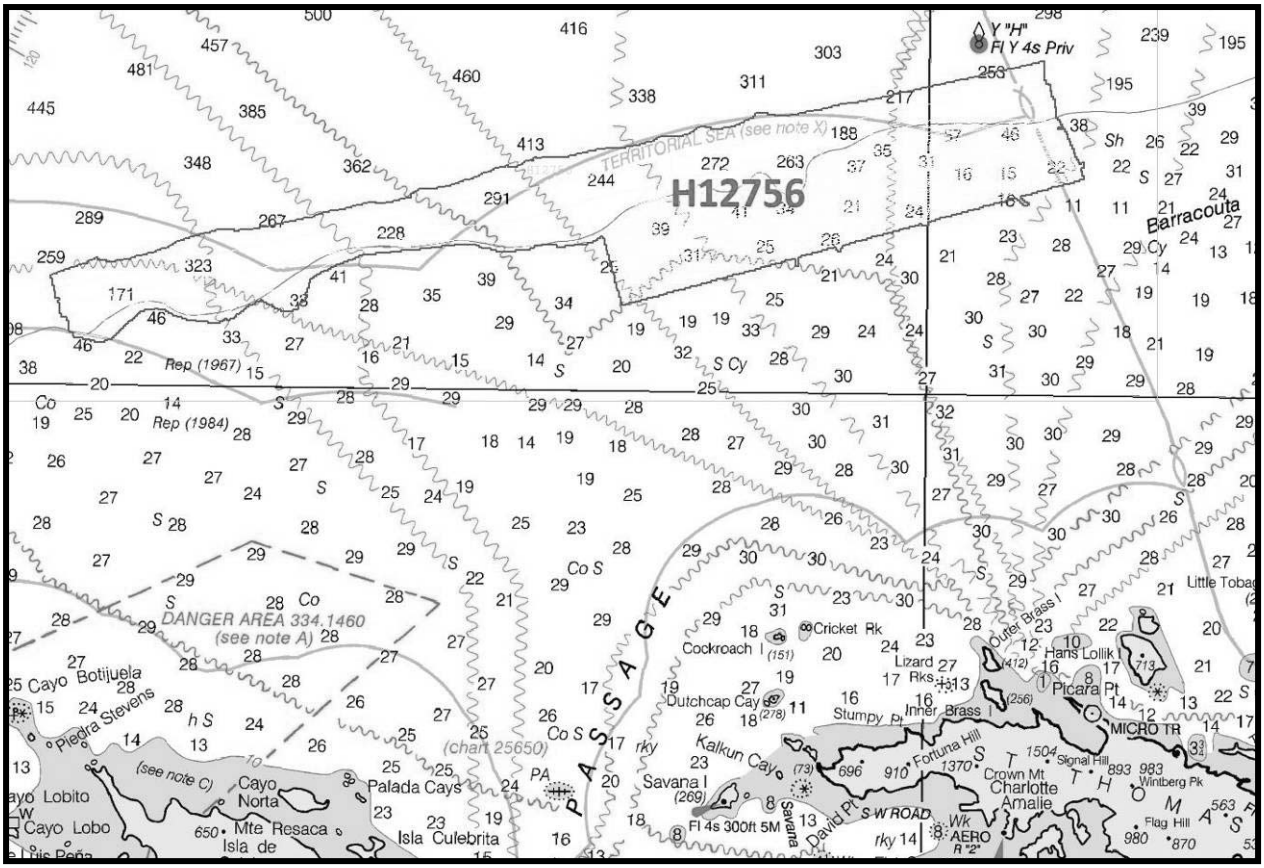
A4. SURVEY COVERAGE

As per the Project Instructions, this survey was conducted using the complete coverage MBES specification as defined in the Hydrographic Survey Specifications and Deliverables April 2014 (HSSD). While conducting the survey, bathymetric coverage was monitored by creating CUBE surfaces with 2m, 4m, 8m and 16m resolutions as per HSSD. Sounding densities generally meet the 95% of all nodes population criteria, except in areas where MBES data were shadowed by features of significant height and from ping drop outs from the 7125-SV2.

Due to a balance between coverage and time allotment the entire survey sheet was not completed. A fill plan was created for all holidays greater than the required specifications. There are no holidays over the tops of potentially significant features. For depths up to 30m there were no holidays spanning more than 3 nodes observed; for depths greater than 30m, some insignificant holidays are present.

Sheet H12756 had water depths between approximately 27-750m. The reef shelf, from approximately 27m to 100m, was surveyed with a Reson 7125-SV2. The EM710 was used to QC the 7125 SV-2, and in the deeper locations for complete MBES coverage of the area surveyed.

Figure 1. H12756 survey outline



A5. SURVEY STATISTICS

Detailed survey statistics for H12756 are provided in Table 2.

Table 2. H12756 hydrographic survey statistics

Survey Statistics	MBES
MBES main scheme (nm)	438.3
Crosslines (MBES nm)	22.8
Additional full coverage MBES (nm)	0
Additional full coverage MBES crosslines (nm)	0
Number of item investigations that required additional survey effort	0
Number of bottom samples	0
Total number of square nautical miles	58.4

Data acquisition was conducted from April 1, 2015 (DN 092) to April 7, 2015 (DN 097). Table 3 lists specific dates of survey and patch test data acquisition. Patch test data was used to determine system biases in support of the survey and are also included with the digital deliverable.

Table 3. H12756 days of acquisition

Dates of Acquisition	
April	1-7, 2015
Dates of Patch Test Acquisition	
March	31, 2015

A6. SHORELINE

Shoreline investigation was not required for M-I907-NF-15.

A7. BOTTOM SAMPLES

Bottom Samples were not required for M-I907-NF-15.

B. DATA ACQUISITION AND PROCESSING

B1. EQUIPMENT AND VESSELS

The M-I907-NF-15 *Data Acquisition and Processing Report* (DAPR), submitted under supplemental reports, cover equipment details and vessel information as well as the data acquisition and processing procedures used for this survey. There were no vessel or equipment configurations used during data acquisition that deviated from those described in the DAPR.

B1.a Vessels

The vessel used during this survey is listed in Table 4.

Table 4. Vessel specifications

NOAA Ship Nancy Foster	
	
Hull Number	R352
Builder	McDermott, Inc
Year Built	1990
Weight	1190 long tons
Length Overall	187’
Beam	40’
Draft, Maximum	11.2’
Cruising Speed	10.5 knots
Max Survey Speed	7 knots

B1.b Equipment

Equipment systems used during data acquisition are listed in Table 5.

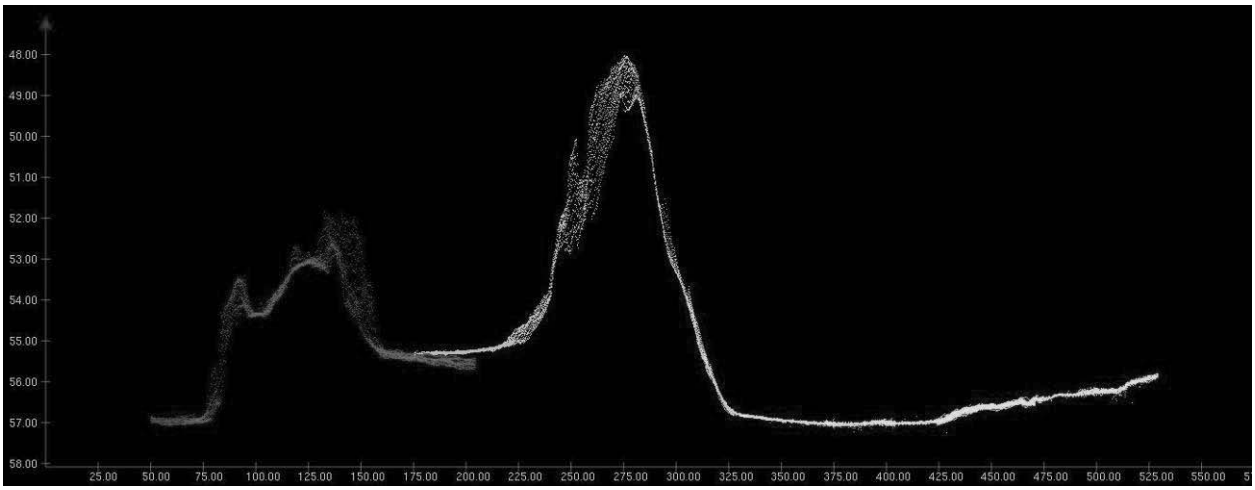
Table 5. Equipment used

Type	Manufacturer	Model
Multibeam Echosounder	Kongsberg	EM710
Multibeam Echosounder	Reson	7125-SV2
Surface Sound Speed	Reson	SVP-71 (2)
Primary Sound Speed Profiler	OceanScience	uCTD
Secondary Sound Speed Profiler	Sea-Bird	SBE-19Plus
Positioning & Attitude	Applanix	POS/MV 320 v4
Positioning & Attitude	Trimble	DSM132

B2. QUALITY CONTROL

The Reson 7125-SV2 exhibited some minor internal data consistency issues. Although the survey meets the desired IHO specifications, some occasional vertical offsets were observed in the overlap of lines acquired on different days (water levels, true heave). Also observed were some instances of outer beams not in agreement. Based on analysis of the acquired sound speed profiles, it is not believed that refraction was an issue. The outer beam issues could be in part related to water levels, a POS/MV configuration that prioritizes the EM710 (which requires an extraneous lever arm and rotation to the 7125-SV2), real time roll stabilization or simply DGPS positioning accuracies.

Figure 2. Example of outter beam offset (0.5m)



Overall, the survey data showed acceptable internal consistency. Results from the crossline analysis, final CUBE surface uncertainties, the Total Vertical Uncertainties (TVU QC), and standard deviation statistics computed between the 7125-SV2 and the EM710 indicate acceptable internal consistency of the MBES data. Additionally, chart and junction survey comparisons with previously collected MBES data sets support data confidence.

B2.a Crosslines

A total of 22.8 nautical miles of crosslines, or 5.2% of all survey lines, were run for analysis of survey accuracy. Crosslines were run in a direction of less than 45 degrees to main scheme lines across most of the surveyed area, providing a good representation for analysis of consistency and IHO compliance. For water depths less than 100m, IHO Order 1 was used for compliance, and for water depths greater that 100m IHO Order 2 was used.

Crossline analysis was performed using the CARIS Hydrographic Information Processing System (HIPS) QC Report tool. This tool compares crossline data to a gridded surface and reports results by beam number and IHO compliance. Crosslines were compared to a 4m CUBE surface encompassing mainscheme data for depths less than 100m for IHO Order 1. Crosslines were compared to a 16m CUBE surface encompassing mainscheme data for depths more than

100m for IHO Order 2. The QC Report plots are included in Separate II Digital Data. The results of the analysis meet the requirements as stated in the HSSD.

B2.b Uncertainty

Survey specific uncertainty parameters for tide and sound speed are included in Table 6. Additional discussion of these parameters is included in the M-I907-NF-15 DAPR.

Table 6. TPU values for tide and sound speed

Total Propagated Uncertainty Computation in CARIS HIPS*		
Tide Values	**Uncertainty* (m)**	**Day Number Range**
Tide Value Measured	0.02	all
Tide Value Zoning	0.06	all
Sound Speed Values	**Uncertainty* (m/s)**	
Sound Speed Measured (SN 5510)	4.0	all
Surface Sound Speed	0.50	all

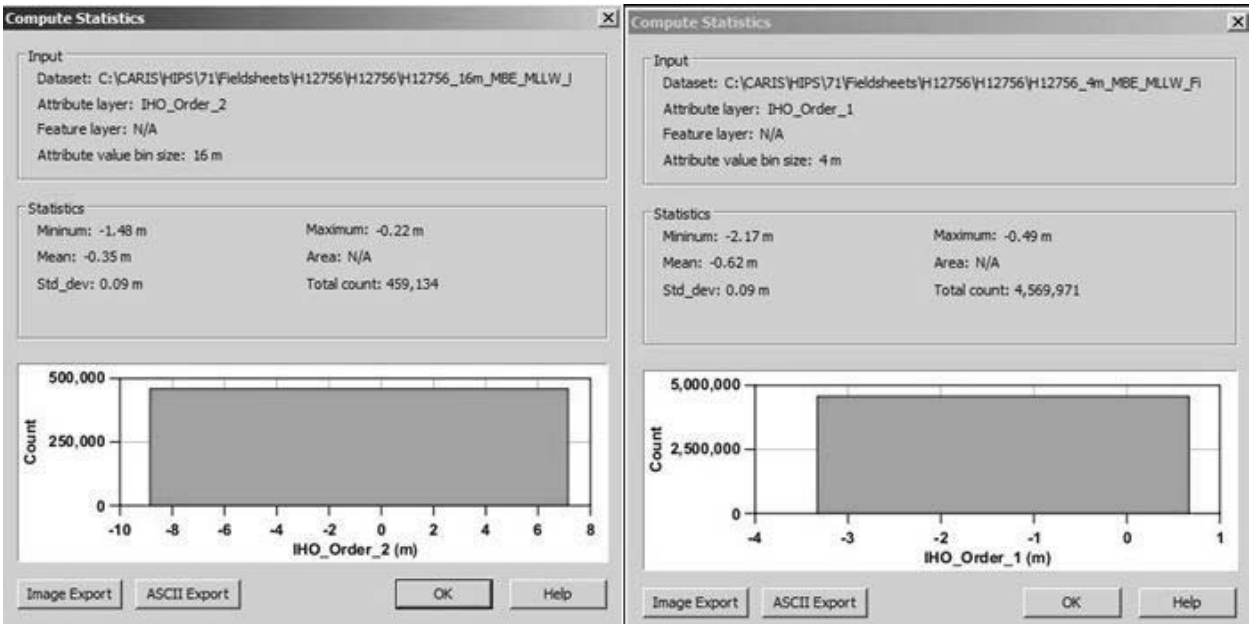
During surface finalization in HIPS, the "greater of the two" option was selected, where the calculated uncertainty from Total Propagated Uncertainty (TPU) is compared to the standard deviation (StdDev) of the soundings influencing the node, and where the greater value is assigned as the final uncertainty of the node. The uncertainty of the finalized surface increased for nodes where the StdDev of the node was greater than the TPU. The resulting calculated uncertainty values of all nodes in the 4m finalized surfaces range from 0.47m to 2.42m. The resulting calculated uncertainty values of all nodes in the 16m finalized surfaces range from 0.83m to some nodes up to 14.0m. The maximum uncertainty values are associated with a high standard deviation in the depth surface caused by steep and irregular seafloor features.

To determine if surface grid nodes met IHO Order 1 and 2 specifications a TVU QC check was performed in addition to the HIPS QC Report tool. This routine is used to identify nodes in the finalized CUBE surfaces that have estimated uncertainties that exceed specifications. Specifically, the TVU QC layer compares the estimated uncertainty of the depth to the allowable uncertainty of the depth estimate node by node.

This routine uses the ratio method which visualizes the ratio of the uncertainty at a node to the maximum allowed IHO uncertainty for each node via a computed layer in CARIS. The TVU QC layer scales with depth and demonstrates what fraction of the total allowable error budget is consumed by the estimated uncertainty. The TVU QC layers are labeled as IHO_Order_1 or 2, and reside as child layers within the finalized 2m, 4m 8m and 16m CUBE surfaces. The TVU QC layers were reviewed with filters set to -1 to -100, and areas that had populated node values were further examined by the data processor. These nodes generally reside in areas of dynamic seafloor features.

As shown in Figure 3, the results from the TVU QC method show that both the 16m and 4m both have low standard deviations (0.09m), mean values (-0.35, -0.062m) and meet the IHO Order 1 and 2 specifications.

Figure 3. TVU QC Histograms for both 4m and 16m CUBE surfaces



B2.c Junctions

One junction survey for H12756 was noted in the project instructions, survey W00222. A 16m bin sized difference surface was created between the W00222 BAG and the current H12756 finalized CUBE surface. A surface statistics calculation was performed; the resulting StdDev and min/max outliers are noticeably high (fig. 5). The reason being is that a very steep slope and erosion channel were part of the statistics calculation. The values are more reasonable when looked at along the sloped area with the section tool and the difference surface enabled, as depicted in figure 4. The value basically trends slightly above zero with spikes occurring within the erosion channel.

Figure 4. W00222 and H12756 overlap area (purple) and difference section

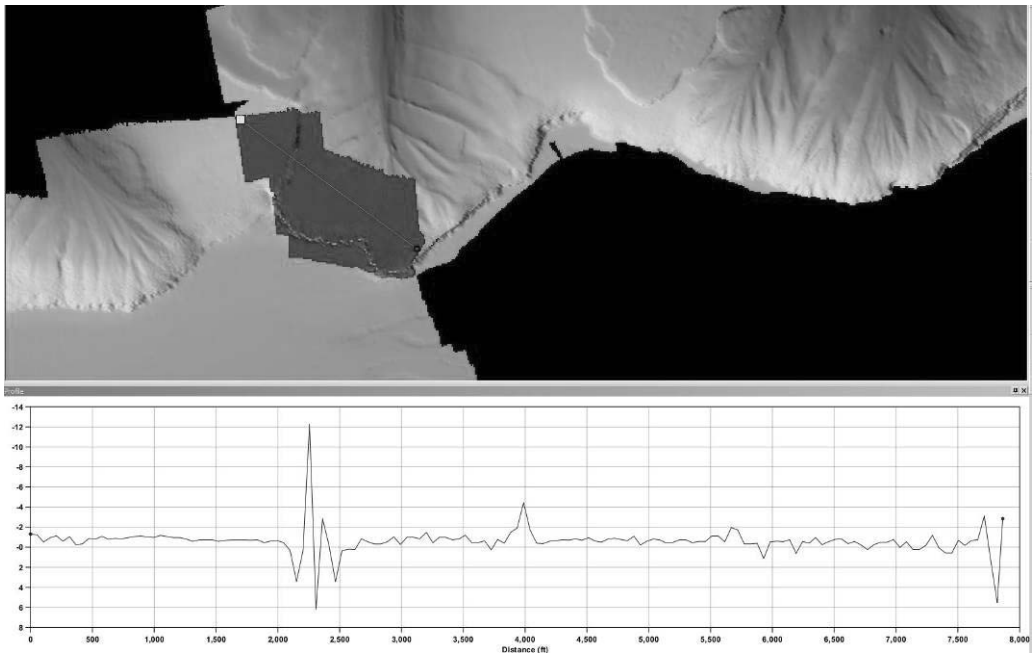
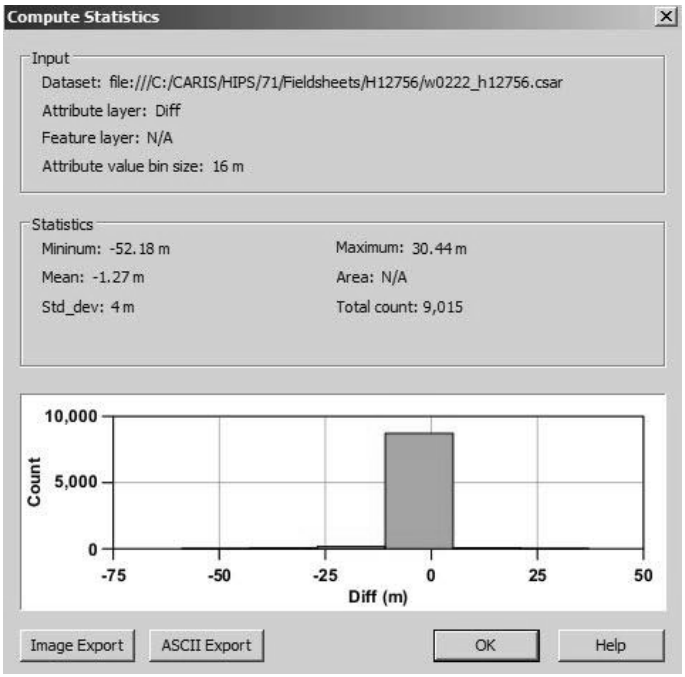


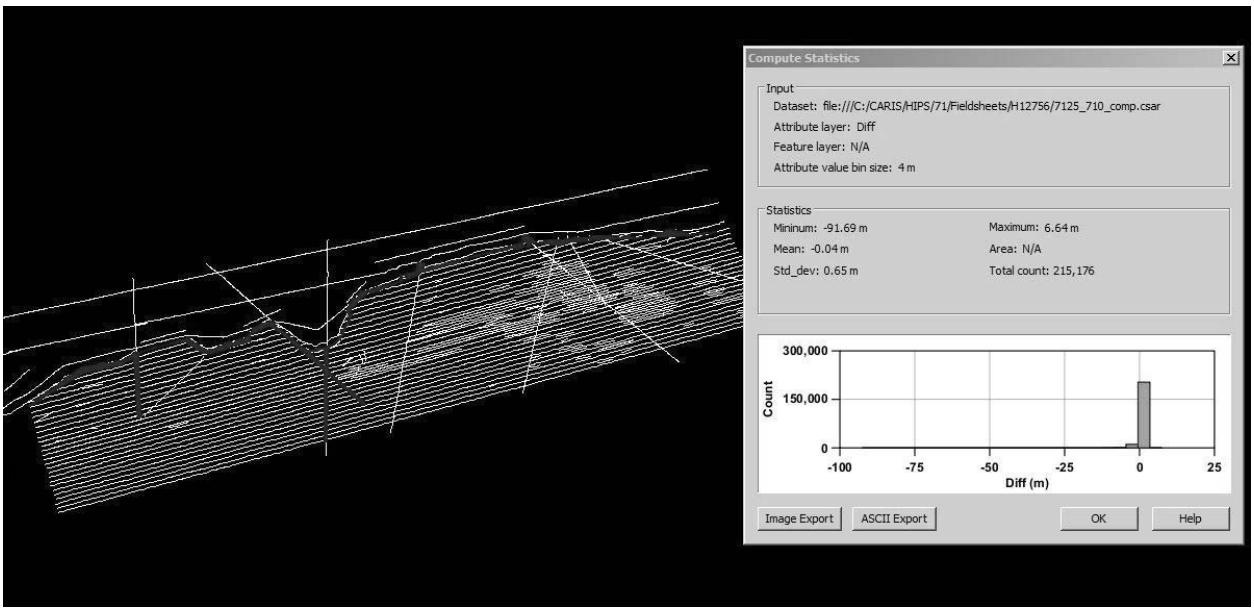
Figure 5. W00222 and H12756 diffrence surface statistics



B2.d Sonar QC Checks

Within the H12756 survey area, there was some 7125-SV2 overlap with the EM710 to allow for a 4m difference surface comparison. Surface statistics were calculated on the 4m difference surface with an agreeable StdDev of 0.65m. Additional sonar system quality control checks are discussed in the quality control section of the M-I907-NF-15 DAPR.

Figure 6. 7125-SV2 and EM710 diffrence surface statistics



B2.e Equipment Effectiveness

The Nancy Foster's Reson 7125-SV2 system has historically had problems with dropped pings, system crashes and minor swath issues that seem to reflect sound velocity and/or DGPS positioning and/or roll stabilization. All resources have been consulted about these continuing issues including Reson, Applanix, HSTP, Chief Survey Tech, Chief Electronic Tech and others to no avail. Some 7125-SV2 components were replaced prior to this cruise which included a new receiver, topside processor and SVP-71. This has seemed to resolve most of the problems that have been observed over the past few years. Although the system does collect data to IHO specifications, there still seems to be some minor internal inconsistencies that are evident within the data as mentioned previously. Overall the EM710 performed well, though on some occasions there was noise observed, which was attributed to sea states and cavitation under the hull.

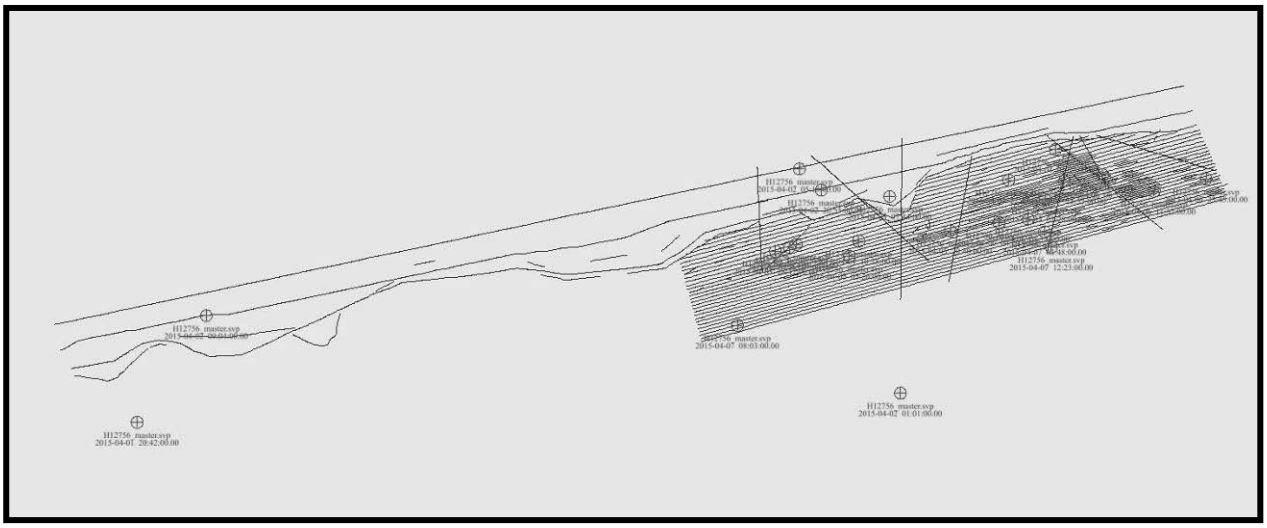
B2.f Factors Affecting Soundings

Four lines of 7125-SV2 HDCS data did not take the Trueheave corrections. The lines affected are from DN094: 050_0950, 050_0905, 050_0820 and 052_1002. The real time heave was used instead of Trueheave for the four mentioned files. The EM710 data used real time heave only.

B2.g Sound Speed Methods

An OceanScience uCTD was the primary sound velocity acquisition device. The uCTD were deployed at no more than 5 hour increments during survey while underway and actions were taken to try and distribute the casts evenly throughout out the survey area. Additional discussion of sound speed methods can be found in the M-I907-NF-15 DAPR.

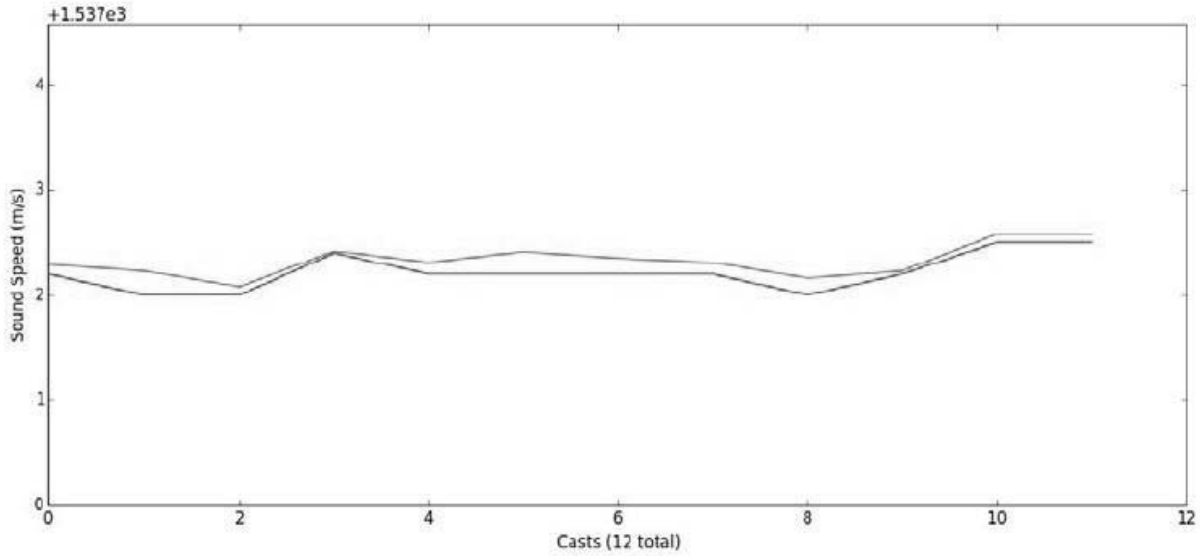
Figure 7. Spatial distribution of H12756 uCTD SV casts



Comparisons between the uCTD data and real-time transducer level sound speed sensors were performed via a python utility for both MBES systems. The utility pulls uCTD surface sound velocity from the casts and then compares that value with the logged surface sound speed stored in the HDCS data files at the same instance in time. Figure 8 shows the comparisons between 12 uCTD casts and the SVP71 that provides sound speed to the EM710. Of 13 total uCTD casts

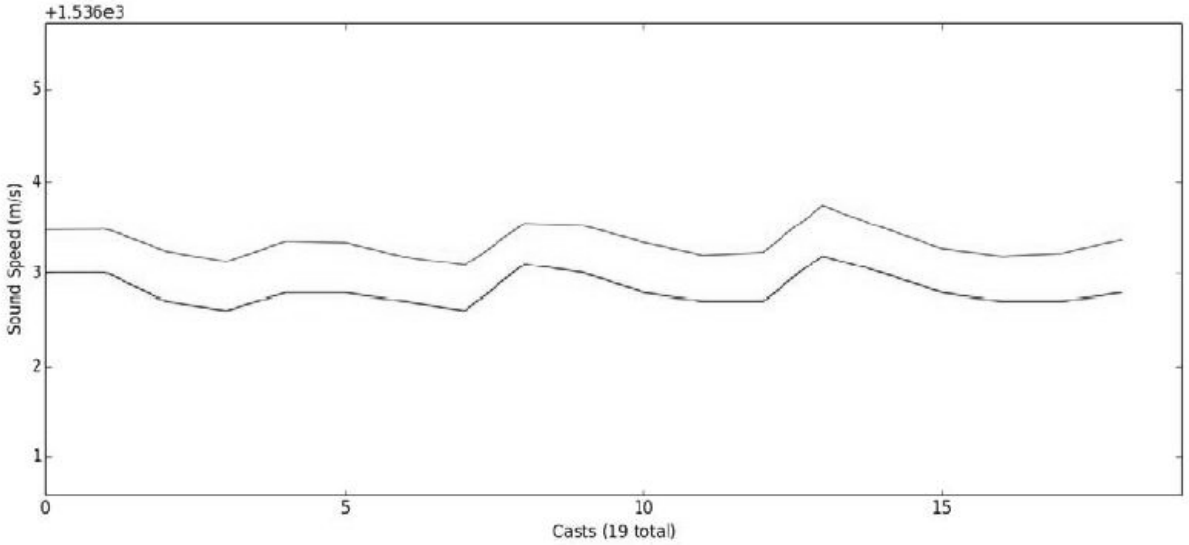
(green), 12 were acquired during EM710 acquisition and are used to compare to the SVP71(blue). The mean and standard deviations of the comparisons is 0.113 +/-0.062 m/s.

Figure 8. EM710 SVP71 vs uCTD real-time SV comparisons



The uCTD casts acquired during acquisition with the 7125-SV2 were also compared to the SVP71 using the same python routine. The results show a systematic offset that has the SVP71 consistently 0.5 m/s less than the uCTD at transducer level. Of 24 total uCTD casts (green), 19 were acquired during 7125-SV2 acquisition and are compared to the SVP71 values (blue). The mean and standard deviations of the comparisons is 0.517 +/-0.031 m/s.

Figure 9. 7125 SV-2 SVP71 vs uCTD real-time SV comparisons



B2.h Coverage Equipment and Methods

All equipment and survey methods were used as detailed in the M-I907-NF-15 DAPR

B3. ECHO SOUNDING CORRECTIONS

B3.a Corrections to Echo Soundings

All data reduction procedures conform to those detailed in the M-I907-NF-15 DAPR.

B3.b Calibrations

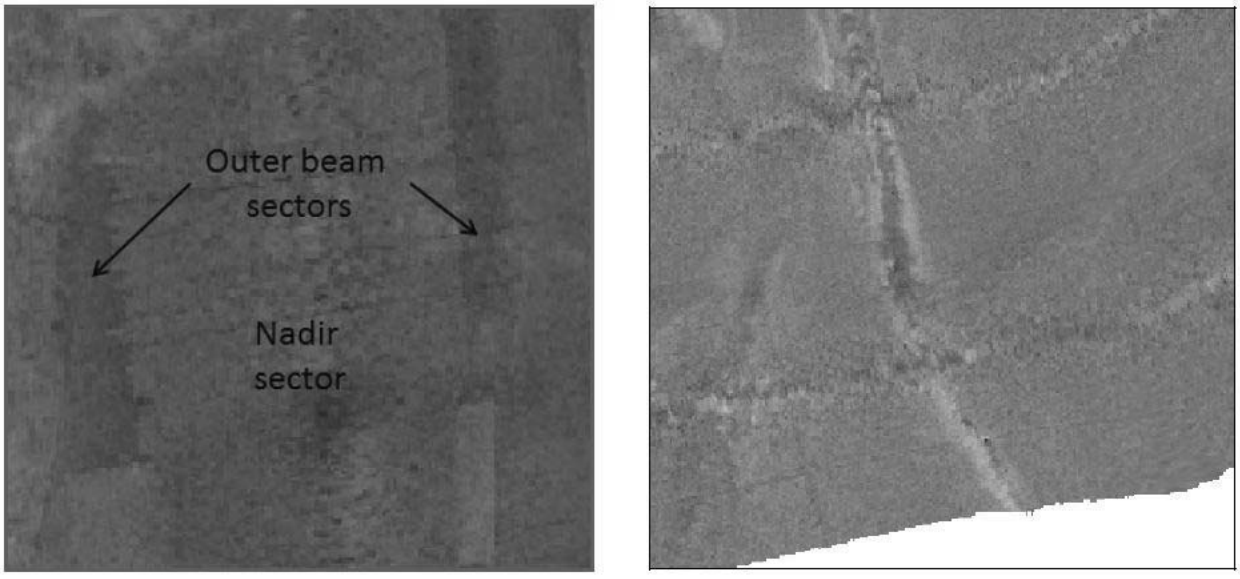
No additional calibration tests were conducted beyond those discussed in the M-I907-NF-15 DAPR.

B4. BACKSCATTER

MBES backscatter from both MBES systems was logged in the Hypack .7K and SIS .all formats. Data was processed and evaluated with a combination of Fledermaus FMGT and the Hypack implementation of Geocoder. The backscatter data was used in combination with the bathymetry to create Principal Component Analysis surfaces in GIS to delineate areas of difference. This information was then used to plan ROV transects to characterize benthic habitats in the surveyed regions.

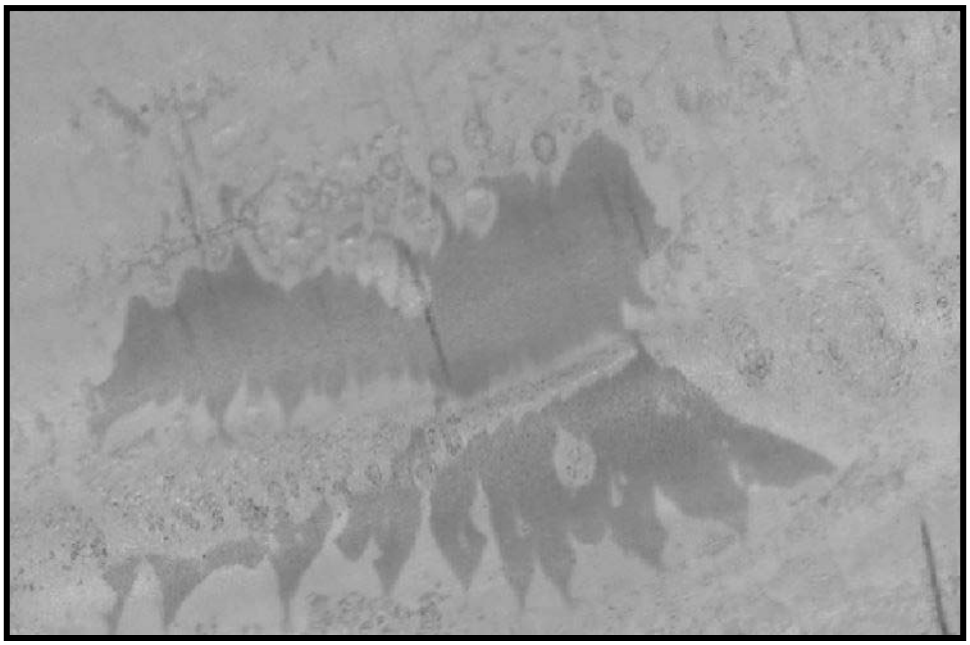
The quality of the backscatter from the EM710 was compromised due to the EM710's use of slightly different frequencies across the swath. The variable frequencies used in different ping modes and MBE sectors are evident in the backscatter. The negative effect of the use of variable frequencies in the backscatter was mitigated by a series of adjustments made to each ping mode across the swath, one for each ping mode employed by the EM710. The adjustments to the backscatter strength were effective, and the delineations of the sectors were resolved. However, the backscatter adjustments entered into SIS did not always "stick" and the original default values would occasionally reappear within SIS degrading the quality of the backscatter.

Figure 10. EM710 seafloor backscatter before (left) and after (right) applying sector adjustments



After acquisition of the 7125 SV-2 .7K files and subsequent post processing in CARIS, the data was exported in GSF format from CARIS for backscatter processing in FMGT. Occasional along-track gaps and degraded imagery from the intermittent sonar drop-outs and excessive roll are evident within the 7125 SV-2 backscatter data.

Figure 11. 7125 SV-2 backscatter data example



B5. DATA PROCESSING

B5.a Software Updates

There was a combination of CARIS 7.1.2 SP2 and 9.0.9 used to convert and process the data for this sheet. The *Nancy Foster's* main processing machine had both versions loaded and it was found that the application of true heave was problematic with the 9.0.9 version. Therefore, this data set was post-processed and delivered in CARIS version 7.1.2SP2.

B5.b Surfaces

Bathymetric grids were created relative to Mean Lower Low Water (MLLW) in CUBE format using complete coverage resolution requirements as described in the HSSD and using the CUBEParams_NOAA.xml file. BAGs were exported from CARIS with the identical name as the surface from which they were derived from.

Finalized CUBE surfaces are delivered with and without depth thresholds. CUBE surfaces appended with "Final" are not depth thresholded. Depth thresholds were applied as defined in the HSSD and surfaces are appended with the "DT" description. The NCCOS and CCMA groups prefer not to have depth thresholded surfaces for benthic habitat classification reasons.

Thorough analysis determined that the 2m resolution CUBE surface is an accurate representation of the seafloor in the shallow regions and the surface honors the shoalest reliable soundings within 1/2 of the allowable TVU, therefore no designated sounding were used on this survey sheet. Table 7 lists the finalized CUBE surfaces submitted with this survey.

Table 7. H12756 MBES CUBE surfaces

Surface Name	Resolution
H12756_16m_MBE_MLLW_Final (DT)	16.0m
H12756_8m_MBE_MLLW_Final (DT)	8.0m
H12756_4m_MBE_MLLW_Final (DT)	4.0m
H12756_2m_MBE_MLLW_Final (DT)	2.0m

C. VERTICAL AND HORIZONTAL CONTROL

No HorCon or VertCon operations were performed for this survey. A summary of horizontal and vertical control for this survey follows.

C1. VERTICAL CONTROL

The vertical datum for this project is MLLW 83-01 NTDE. Tidal data was applied with a finalized discrete zoning ZDF file supplied by CO-OPS with verified tides values obtained from the assigned NWLON tide gauges. Information related to tide correctors is included in Tables 9, 10 and 11.

Table 8. Tide stations

Station Name	Station ID
Christiansted, USVI	9751364
Lime tree Bay, USVI	9751401
San Jaun, PR	9755371

Table 9. HIPS water level files

File Name	Status
9751364.tid	Verified
9751401.tid	Verified
9755371.tid	Verified

Table 10. HIPS zoning files

File Name	Status
I907NF2015CORP.zdf	Final Zoning

C2. HORIZONTAL CONTROL

The horizontal datum for this project is North American Datum of 1983 (NAD83) projected in Universal Transverse Mercator (UTM) Zone 20 with units in meters. All of the real-time navigation data were collected in DGPS mode. DGPS corrections were received from a U.S. Coast Guard transmission station broadcasting at 295 kHz located at Isabel, Puerto Rico.

D. RESULTS AND RECOMMENDATIONS

D1. CHART COMPARISON

The chart comparison was performed by comparing a shoal biased sounding layer generated in CARIS to the largest scale chart affecting the charts listed in the Project Instructions. A 900-meter shoal biased sounding surface of the entire survey area was generated from the finalized 4m CUBE depth surface. The chart comparison was conducted by visually reviewing the resultant surface and charted soundings.

D1.a Raster Charts

The raster chart comparison was performed by comparing RNCs covering the survey area to H12756 using visual comparison techniques. The RNCs compared are listed in Table 11.

Table 11. RNCs compared to H12756

Chart	Scale	Edition Number	Edition Date	LNM Date	NM Date
25650	1:100,000	37	02/2014	02/03/2015	02/14/2015
25640	1:326856	45	01/2013	01/20/2015	01/31/2015

RNC 25650/25640

Surveyed soundings generally compare to within a few fathoms on the reef shelf with the charted soundings. There are some exceptions of several areas where previously surveyed soundings appear to be deeper (pink circles). Multiple shoal soundings surveyed and charted match exactly (blue circles).

Figure 12. 25650/25640 chart comparison East, red soundings from shoal biased H12756 surface

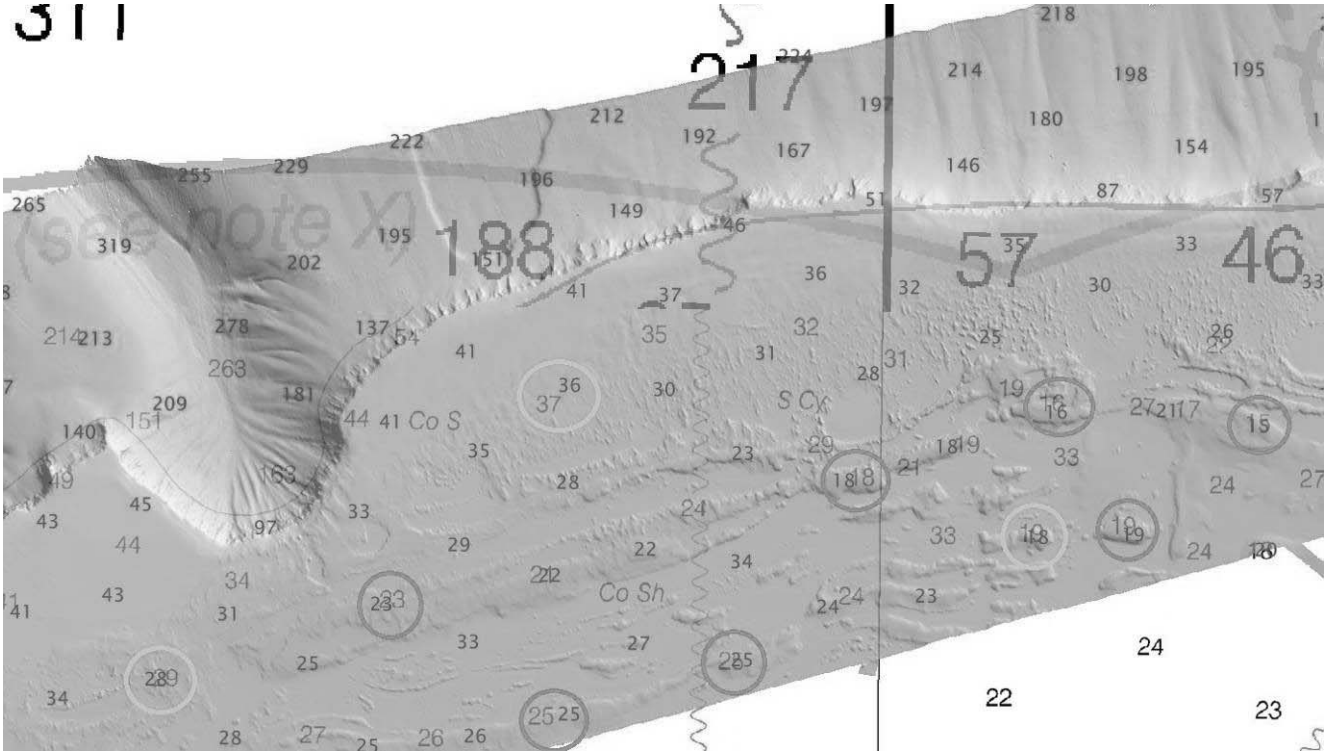
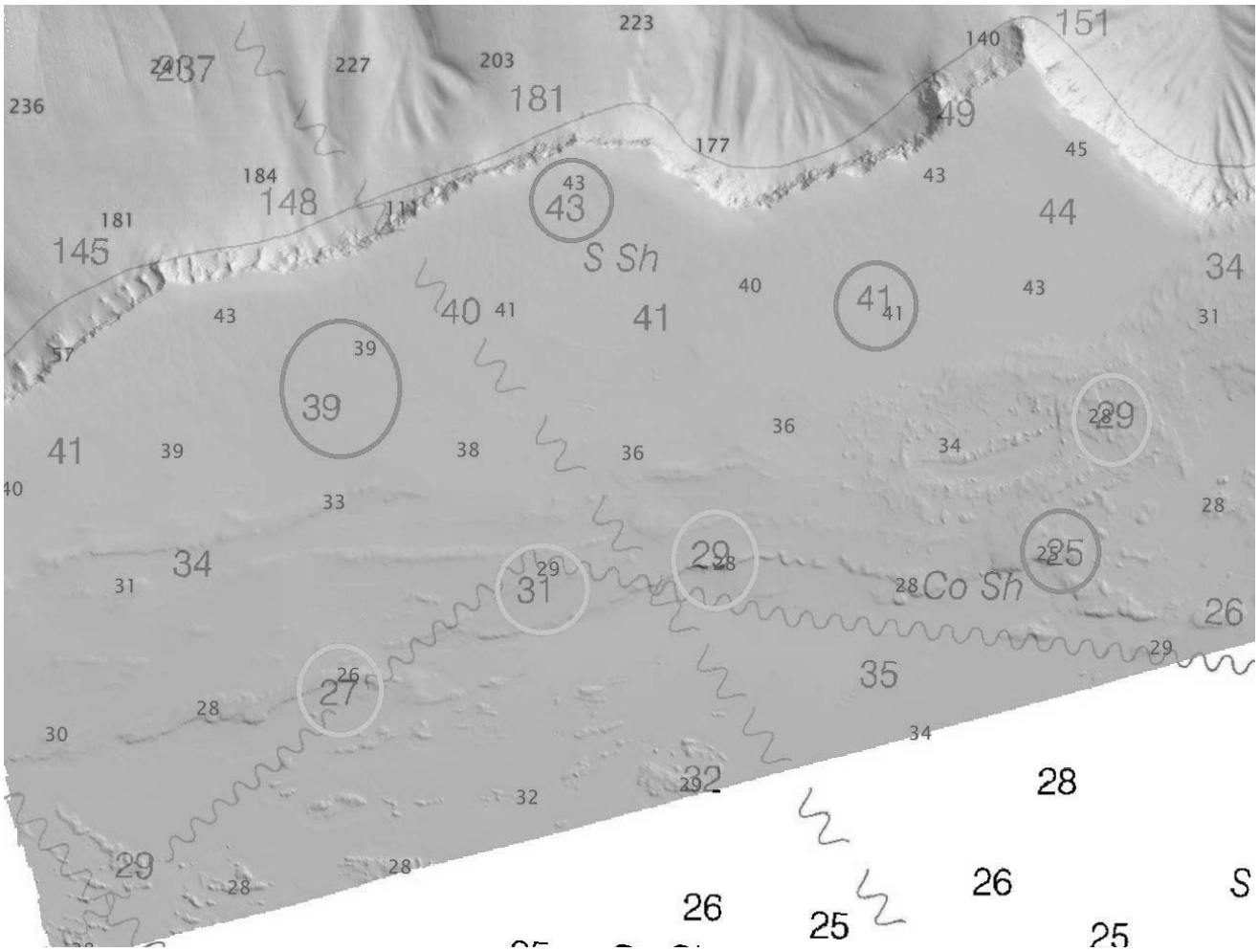


Figure 13. 25650/25640 chart comparison West, red soundings from shoal biased H12756 surface



D1.b Electronic Navigational Charts

Table 12 lists the ENCs compared to H12756

Table 12. ENCs Compared to H12756

ENC Name	Scale	Edition Number	Update Application Date	Issue Date
US4PR30M	1:100,000	8	02/18/2015	02/25/2015
US3PR10M	1:326,856	11	05/06/2013	10/23/2014

An ENC to RNC comparison reveals that the same sounding information was used to derive both types of charts and the agreements noted previously are also evident in the ENC charts.

Figure 14. RNC 25640 (black) to ENC US3PR10M (red) chart comparison and overlay

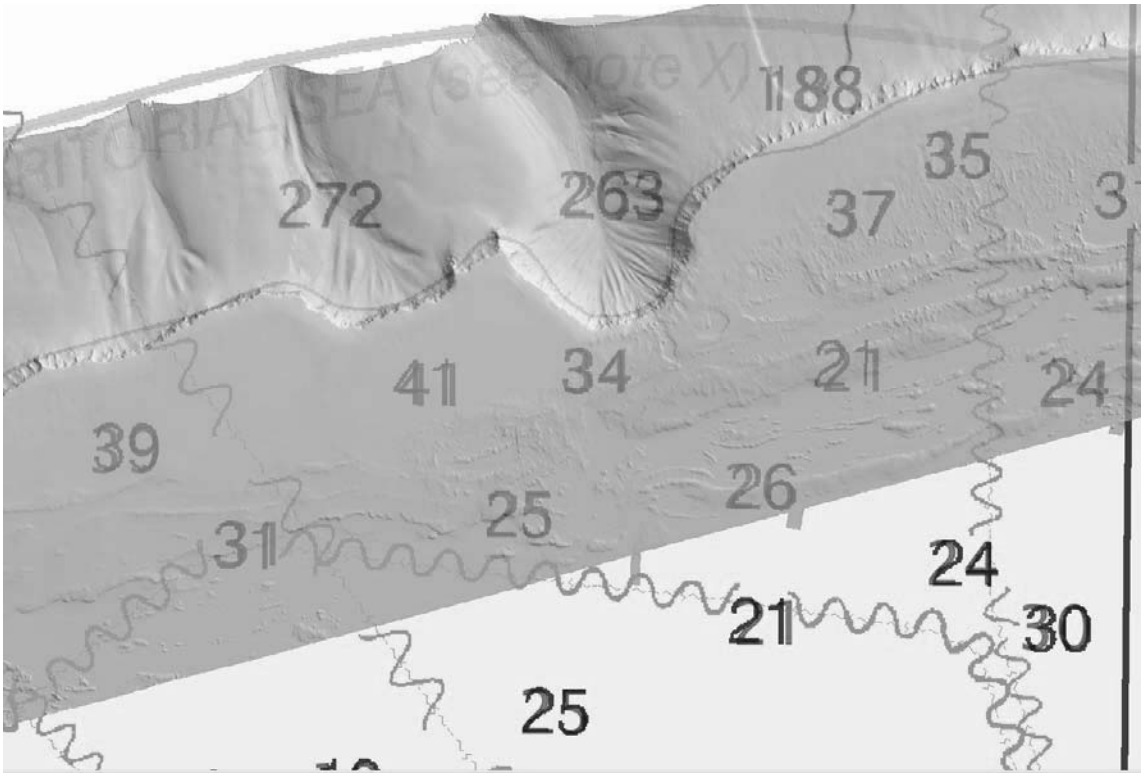
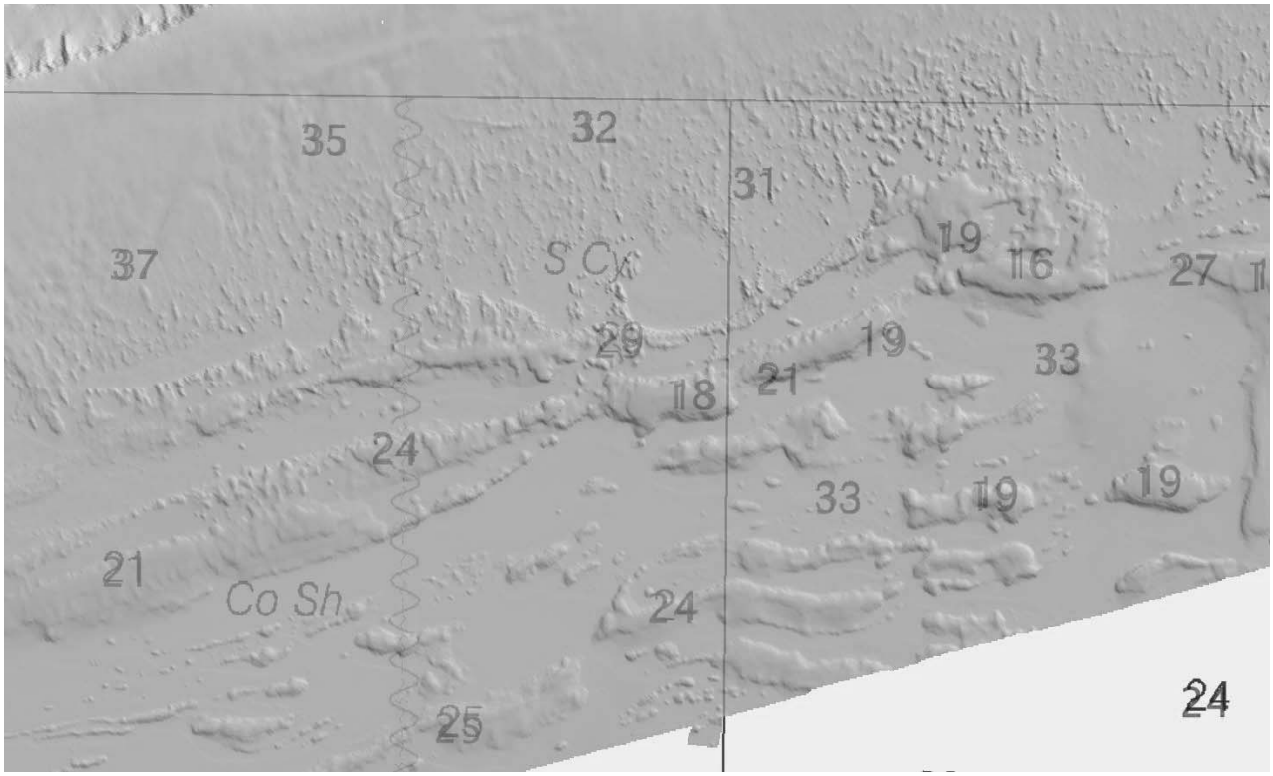


Figure 15. RNC 25650 (black) to ENC US4PR30M (red) chart comparison and overlay



D1.c AWOIS Items

There were no AWOIS investigations required for this project.

D1.d Charted Features

No charted features were located within the H12756 survey area.

D1.e Uncharted Features

No uncharted features were located within the H12756 survey area.

D1.f Dangers to Navigation

No Dangers to Navigation (DtoNs) were reported for this survey.

D1.g Shoal and Hazardous Features

No shoals or potentially hazardous features were located within the H12756 survey area.

D1.h Channels

The H12756 survey area does not contain any anchorage areas, maintained navigation channels or channel lines.

D1.i Bottom Samples

There was no bottom sample requirement for this survey.

D2. ADDITIONAL RESULTS

D2.a Shoreline

Shoreline investigation was not assigned for this project.

D2.b Prior Surveys

Aside from previously discussed charted comparisons, no comparisons with prior surveys were conducted.

D2.c Aids to Navigation

No Aids to Navigation (AtoNs) were charted or located within the H12756 survey area.

D2.d Overhead Features

There were no overhead bridges, cables, or other structures which would impact overhead clearance in the survey area.

D2.e Submarine Features

The H12756 survey area contained no submarine features.

D2.f Ferry Routes and Terminals

There were no ferry routes or terminals within the survey area.

D2.g Platforms

There were no platforms within the survey area.

D2.h Significant Features

No additional information of scientific or practical value was observed during the survey other than the benthic habitat characterization maps created by the CCMA scientific party. No anomalous tidal or environmental conditions were observed during the survey that impacted the quality of the survey.

D2.i Construction and Dredging

There was no construction or dredging activities observed during survey operations.

D3. NEW SURVEY RECOMMENDATIONS

It is recommended that this survey H12756 is used to supersede and update the existing nautical charts within the survey area.

D3.a Inset Recommendations

No inset recommendations are requested at this time for the surveyed area.

E. APPROVAL SHEET

As Lead Hydrographer, I have ensured that standard field surveying and processing procedures were followed in producing this examination in accordance with the Office of Coast Survey Hydrographic Surveys Division's Field Procedures Manual, and the Hydrographic Surveys Specifications and Deliverables. Field operations for this basic hydrographic survey were conducted under my daily supervision with frequent checks of progress and adequacy.

All field sheets, this Descriptive Report, and all accompanying records and data are approved. All records are forwarded for final review and processing to N/CS33, Atlantic Hydrographic Branch.

The Data Acquisition and Processing Report for M-I907-NF-15 is submitted separately and contains additional information relevant to this survey.

Michael Stecher
NOAA Contractor
Lead Hydrographer
CCMA Biogeography Branch

Mike Stecher

Digitally signed by Mike Stecher
DN: cn=Mike Stecher, o, ou=Solmar Hydro Inc, email=solmarhydro@gmail.com, c=US
Date: 2015.11.17 14:13:17 -08'00'