W00288

NOAA FORM 76-35A

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SURVEY

DESCRIPTIVE REPORT

Type of Survey **Hydrographic Survey**
Project No. **OPR-OSD-AHB-14**
Registry No. **W00288**

LOCALITY

State **Maine**

General Locality **Gulf of Maine**

Sub-locality **Offshore of Cape Porpoise**

2014

CHIEF OF PARTY
Matt Nixon and David Armstrong
HYDROGRAPHER
Matt Nixon and David Armstrong

LIBRARY & ARCHIVES

DATE October **6, 2014**

NOAA FORM 77-28 (11-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTRY NUMBER: W00288

HYDROGRAPHIC TITLE SHEET

State: Maine

General Locality: Gulf of Maine

Sub-Locality: Offshore of Cape Porpoise

Scale: 1:40,000 Date of Survey: July 2014 to October 2014

Instructions Dated: December 5, 2014 Project Number: OPR-OSD-AHB-14

Field Unit: Amy Gale

Chiefs of Party: Matt Nixon and David Armstrong

Surveyed by: Matt Nixon and David Armstrong

Soundings by: Kongsberg EM2040C multibeam echosounder

Verification by: Atlantic Hydrographic Branch

Soundings in: Feet: _____ Fathoms: _____ Meters: x _____ at MLW: _____ MLLW: X

Remarks: Tidal Zones: discrete tide zoning
Tidal Station: Portland 8418150
UTM Zone 19

NOAA FORM 77-28 SUPERSEDES FORM C & GS - 537

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/.

DR SUMMARY

Descriptive Report Summary to Accompany W00288	
Project	OSD-AHB-14
Survey	W00288
State	Maine
Locality	Gulf of Maine
Sub Locality	Offshore of Cape Porpoise
Scale of Survey	1:40,000
Sonars Used	Kongsberg EM2040C 300kHz
Horizontal Datum	North American Datum of 1983 (NAD83)
Vertical Datum	Mean Lower Low Water (MLLW)
Vertical Datum Correction	Tide Zone
Projection	Latitude-Longitude (NAD83) - UTM Zone 19N
Field Unit	Amy Gale
Survey Dates	07/18/2014 – 10/06/2014
Chief of Party	Matt Nixon and David Armstrong

A. Area Surveyed

W00288 was surveyed with a Kongsberg EM2040C onboard a 35 foot lobster boat named Amy Gale. The survey area was covered over the course of three months (07/18 through 10/06) in 2014. The data was not collected in accordance to NOS Hydrographic Surveys Specifications and Deliverables and the Field Procedures Manual requirements but were post-processed by the NOAA IOCM Processing Center to meet the standards as best possible.

The W00288 survey is within the following limits:

Northeast Limit	Southwest Limit
43°22-37.2 N	43°16-58.9 N
70°11-23.6 W	70°28-24.9 W

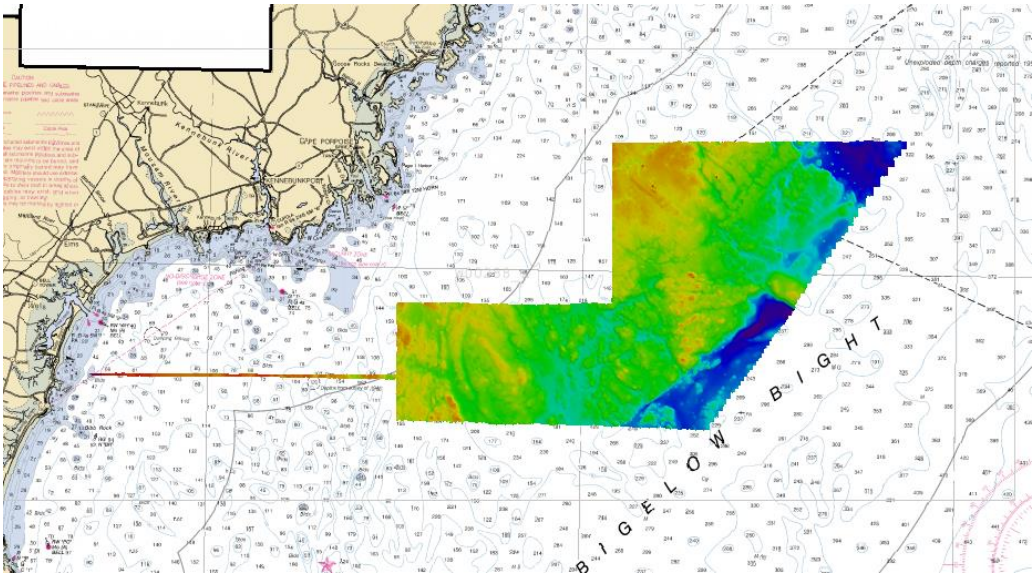

Figure 1: Survey W00288 4m CUBE surface overlaying Chart 13286.

B. Survey Purpose

Data was acquired by the Maine Coastal Mapping Initiative (MCMI) in response to a post-Sandy BOEM grant to locate sand in federal waters off the coast of Maine for the intended use of beach restoration. Prior to data acquisition, communication with NOAA Ship *Ferdinand Hassler* lead to the discovery of an overlap of survey intention. In response, NOAA changed the *Hassler* 2015 survey areas so as not to cover the same area twice (Figure 2).

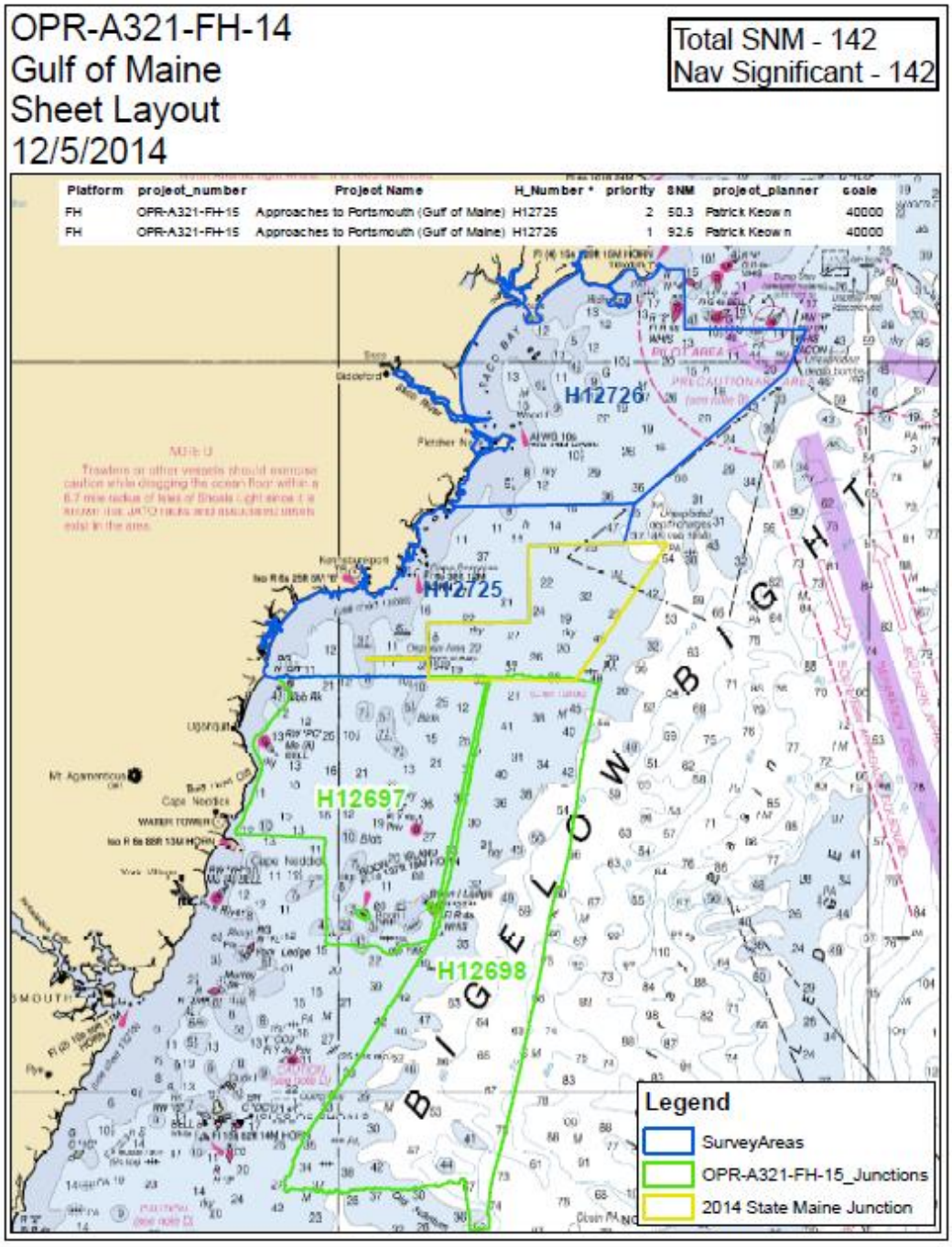

Figure 2: State of Maine overlap with *Hassler* survey areas. Image from *Hassler* Project Instructions 2014.

Refer to the Report for MCMI 2014 (R MCMI) written by David Armstrong submitted with this data for more information on the survey purpose.

C. Intended Use of Survey

Although the survey was completed for other than charting purposes, with the processing by the IOCM Center, the data are adequate to supersede prior data and should be used for chart compilation.

D. Data Acquisition and Processing

W00288 was post processed with CARIS Hips and Sips 8.1. Each raw Simrad .all file includes bathymetry, acoustic backscatter, navigation, patch test values, sound-speed profiles, orientation and sound speed at the transducer. A creation of a CARIS vessel file was required to process the data. While most of the reference frame offsets were entered into Seapath during data acquisition, a waterline offset of 0.933m was provided by MCMI and was applied to the data in CARIS Hips and Sips 8.1 during post-processing.

Instrument	X	Y	Z
Antenna 1	-0.098	-1.250	-2.969
Antenna 2	-0.098	-1.248	-3.024
Sonar	-0.192	0	0.194
Sonar to waterline	Middle	Bottom	
	0.883	0.933	

Table 1: Table represents the offset values. Duplicated from MCMI Descriptive Report.

Please reference the R MCMI written by David Armstrong for more complete information on data acquisition, vessel configuration, processing hardware and software, data quality and offsets.

E. Uncertainty

E.1 Total Propagated Uncertainty (TPU)

A customized Caris device model for the EM2040c was created and the TPU was calculated for the submitted base surfaces based on the following values. Discrete zoned tides were applied to the data and a one sigma tidal uncertainty estimate of 0.08m from the Tide Note was used. Sound speed data was collected using a Digibar S and an AML xchange was used for surface sound speed data. These profiles were applied to the data in real time. Sound speed was not reapplied during post processing. The raw casts were examined in Velocipy and the frequency of casts and variation in surface sound speed were used to determine uncertainty values. Figure 3 shows the values that were used to calculate TPU. The survey meets IHO Order 1.

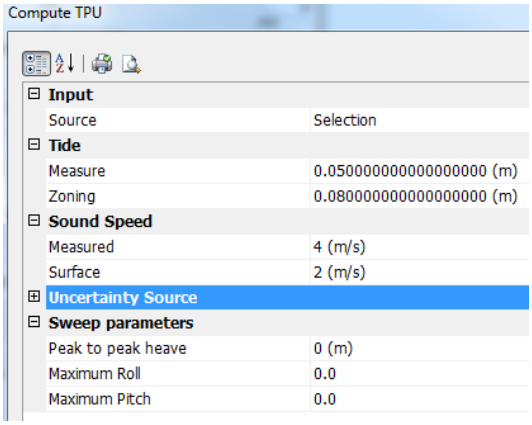

Figure 3: Shows the TPU values used to calculate CUBE surfaces

E2. Uncertainty

The vertical uncertainty meets IHO standards for Order 1 with an average uncertainty of 0.5m and standard deviation of 0.1m for the entire survey. Using Pydro, the vertical uncertainty was plotted for the whole survey area. It was found that 99.92% of all nodes meet the allowable vertical uncertainty IHO standards per depth (Figure 5).

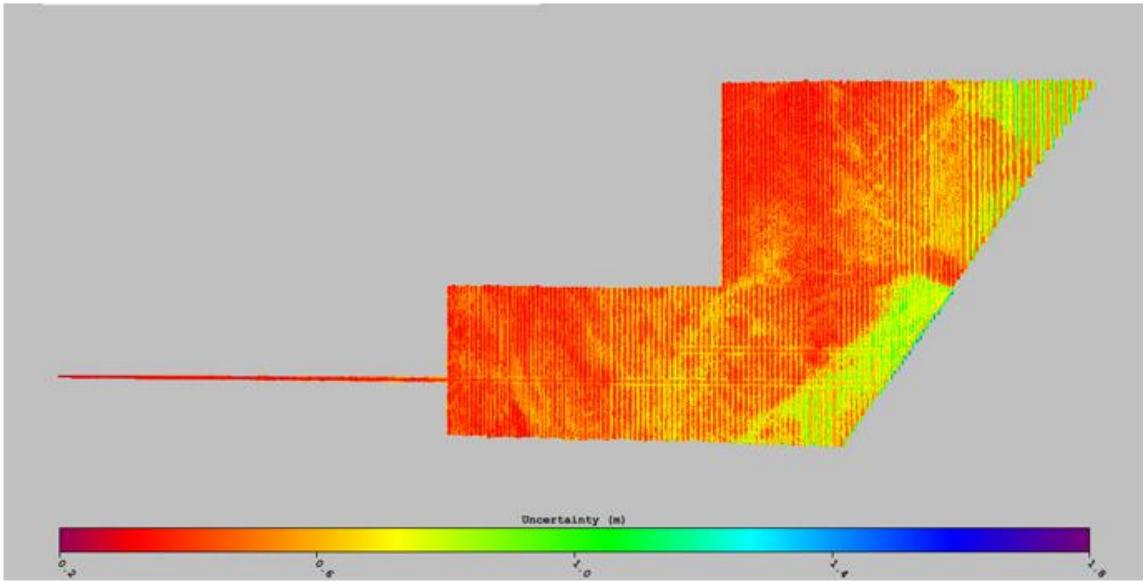

Figure 4: Uncertainty map of W00288 4m CUBE surface with uncertainty statistics. There is an average uncertainty of 0.5m.

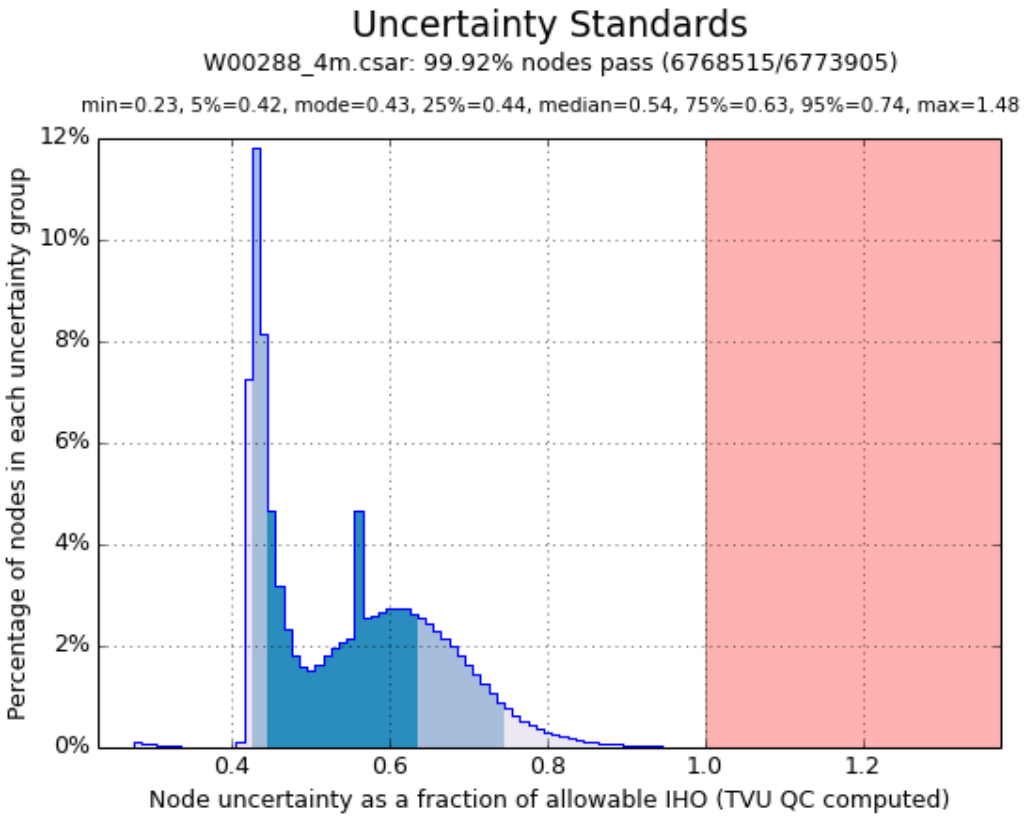

Figure 5: A graph representing the vertical uncertainty of each W00288 survey node in relation to IHO standards. 99.92% meet IHO standards.

E3. Internal Consistency

The internal consistency was checked using CARIS subset editor. A subset area was selected where multiple track lines came together to determine the uniformity of the data from all directions (Figure 6).

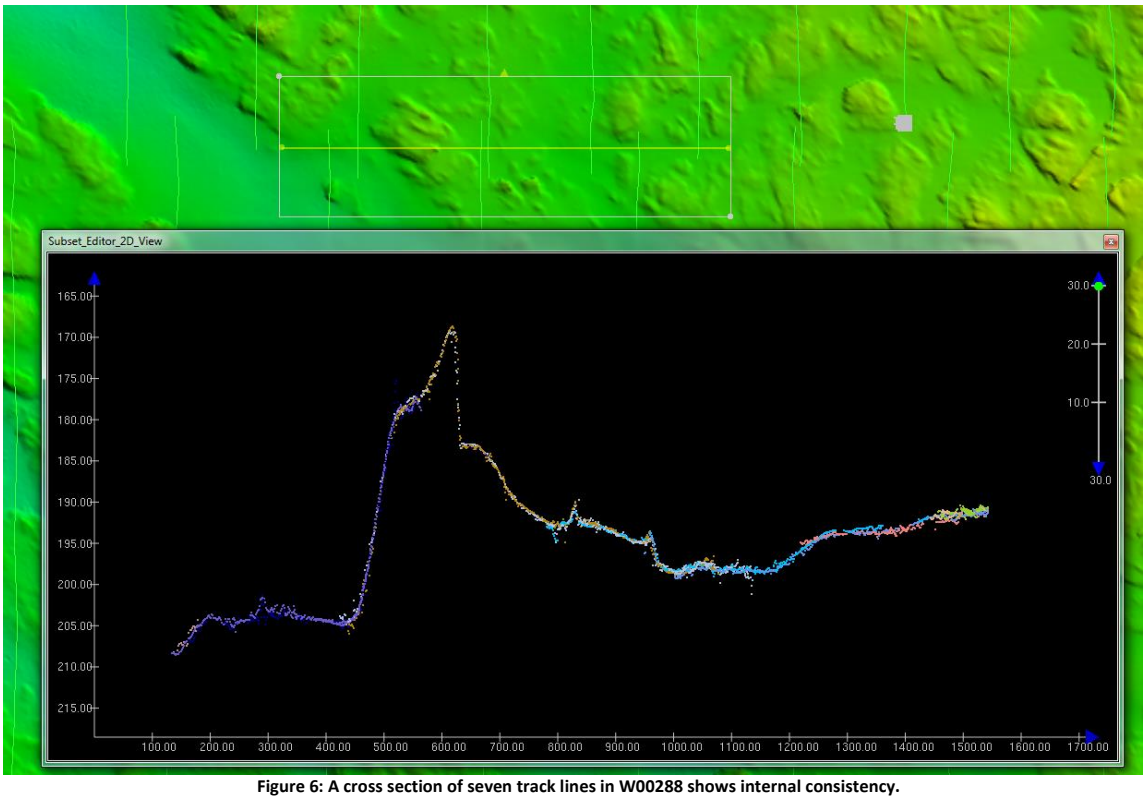

Figure 6: A cross section of seven track lines in W00288 shows internal consistency.

F. Results and Recommendations

The following surfaces were created from the processed data:

Surface Name	Surface Type	Resolution (m)	Depth Range (m)
W00288_1m_0to20	CUBE Base Surface	1	0-20
W00288_2m_18to40	CUBE Base Surface	2	18-40
W00288_4m_36to80	CUBE Base Surface	4	36-80
W00288_8m_72to160	CUBE Base Surface	8	72-160
W00288_1m	CUBE Base Surface	1	0-110m
W00288_2m	CUBE Base Surface	2	0-110m
W00288_4m	CUBE Base Surface	4	0-110m
W00288_8m	CUBE Base Surface	8	0-110m
W00288_AmyGale_300kHz	Backscatter Mosaic	3	0-110m

Table 2: List of surfaces and mosaics created for this project.

F1. Chart Comparisons

It is recommended that this survey supersede the chart data. In comparison to current NOAA RNCs and ENCs (Table 3), it is clear that the full-bottom coverage of W00288 has consistently identified depths shoaler than the soundings the charts identify (Figure 7). W00288 was compared with the following RNC and ENC, which cover the survey area:

Chart	Scale	Edition	Edition Date	NM Date
13286	1:80,000	32	12/1/2013	09/18/2014
13260	1:378,838	41	08/1/2012	01/08/2015

13009	1:675,000	36	05/1/2014	01/08/2015
13006	1:500,000	36	07/1/2012	01/08/2015
13003	1:1,200,000	51	09/1/2012	01/08/2015
US4ME01M	1:80,000	11.1	06/03/2014	09/18/2014
US3EC10M	1:378,838	36.3	01/06/2015	01/08/2015
US2EC04M	1:675,000	18.1	01/07/2015	01/08/2015

Table 3: List of ENCs and RNCs that include W00288

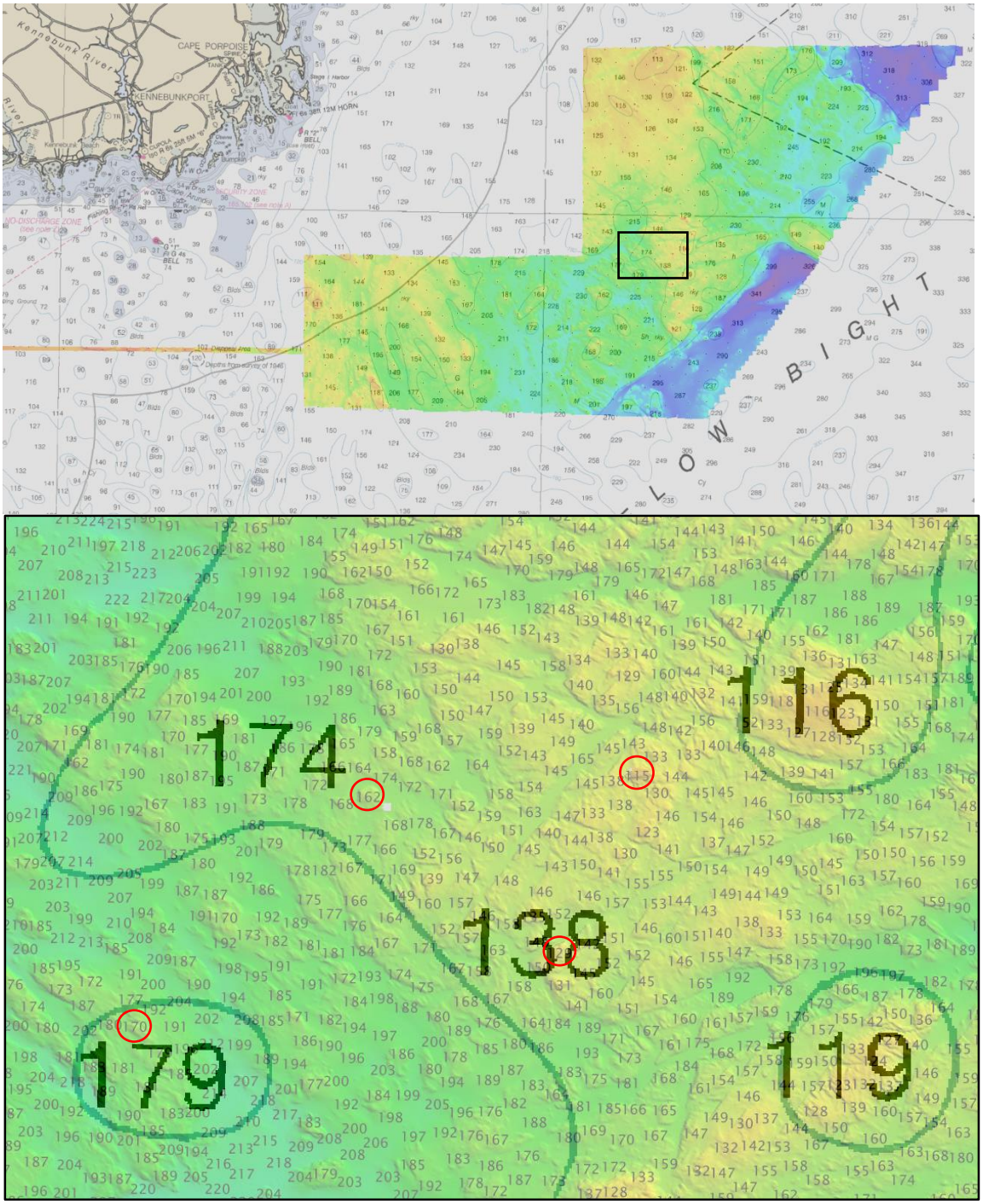

Figure 7: Top image is Chart 13286 over W00288 2m CUBE surface with a subset identified in the black box. Bottom image is the same subset with selected soundings with 5m spacing. The soundings in a red circle are shoaler soundings than those identified on the chart.

F2. Features

A number of features have been identified throughout the processing of W00288 that are not identified on the charts. The specific nature of these features is not known; however, they were confirmed as objects by their shape in Subset Editor, appearances on CUBE surfaces, and intensity differences in the 3m backscatter mosaic (Figures 8). A total of 6 features have been identified in this data (Table 4). A feature file has been created and submitted along with this project. None were identified as DTONs and all were in waters deeper than 20m. Features were not further investigated during acquisition. Bottom samples were collected with this survey; their locations and descriptions are found in Appendix A.

Latitude	Longitude	Depth (m)
43-22-03.96N	070-18-26.78W	30.4
43-21-51.94N	070-16-28.16W	23.47
43-21-58.91N	070-12-57.17W	74.48
43-22-21.95N	070-13-31.22W	73.19
43-22-03.47N	070-13-07.48W	68.86
43-21-28.40N	070-13-31.30W	58.76

Table 4: Table of feature locations and depths.

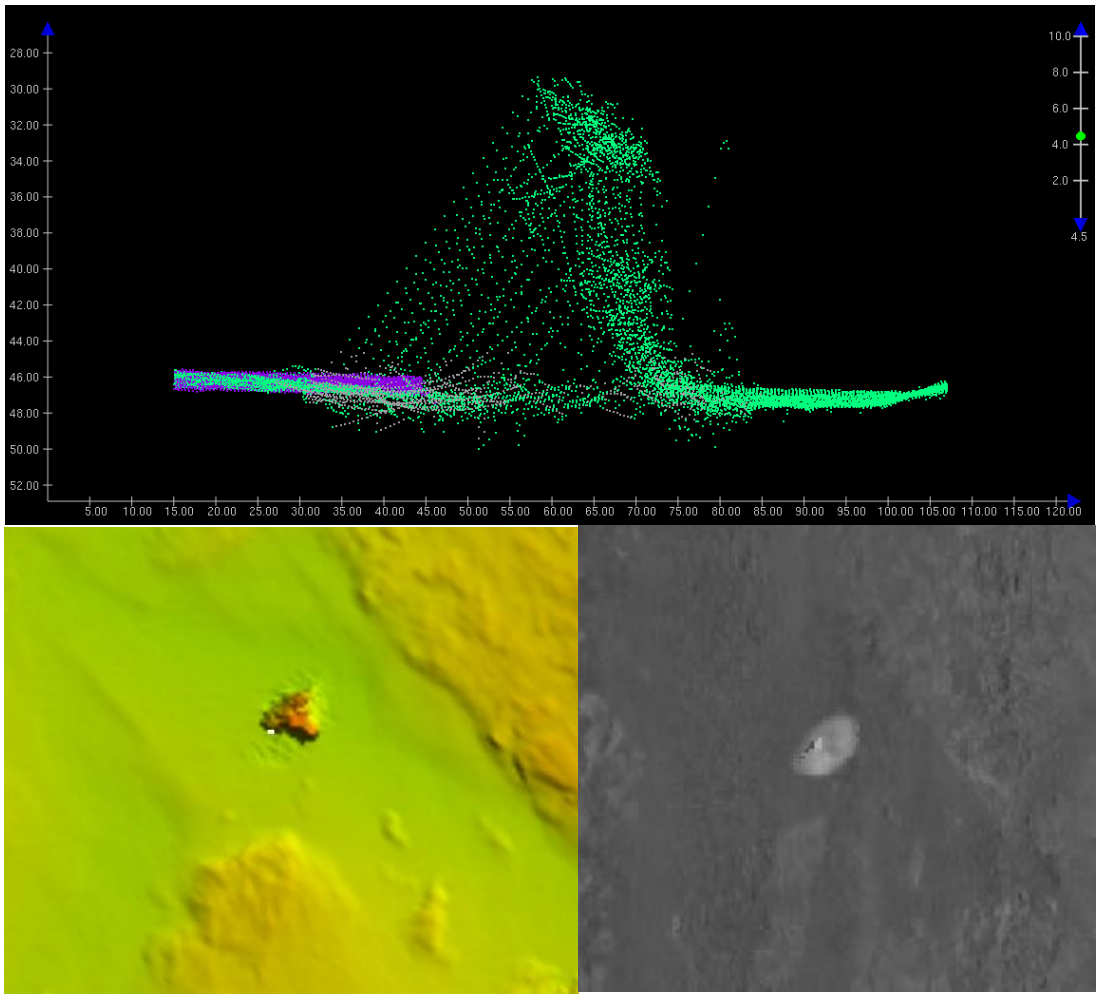

Figure 8: Top image depicts the soundings of a feature in subset editor, the bottom left image represents the same object in the CUBE surface, and the bottom right image is of the same object in the backscatter mosaic.

F3. Cross-line Comparison

At the request of the NOAA IOCM Center at UNH, the NOAA ship *Ferdinand Hassler* ran cross-lines through the body of the survey area (Figure 9). The 2m W0028 surface was compared with a 2m surface from the *Hassler* cross-lines. The surfaces had a mean difference of 0.06m with a standard deviation of 0.25m.

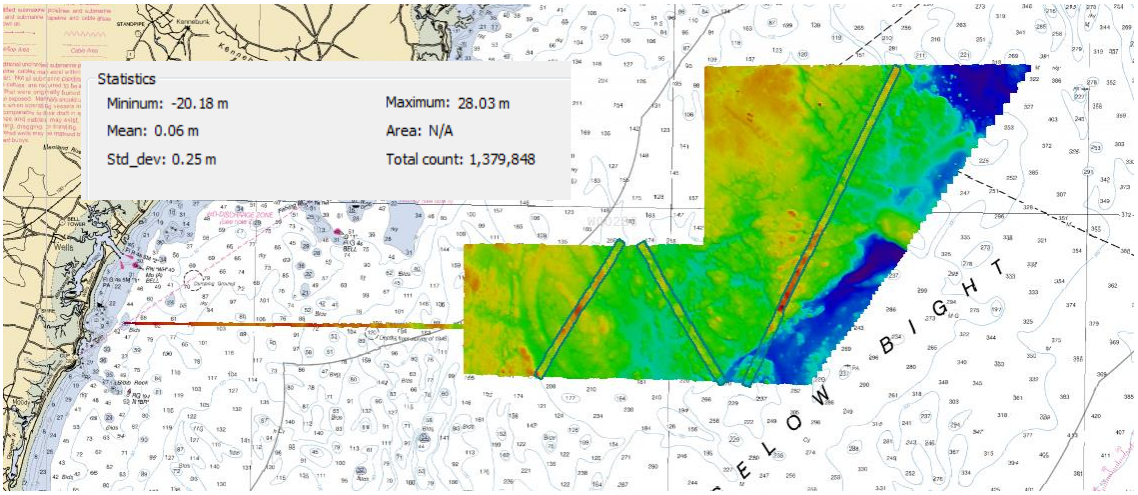

Figure 9: NOAA Ship *F. Hassler* cross-lines on top of the W00288 survey and Chart 13286.

F4. Junction Surveys

The 2014 summer field season yielded two NOAA OCS surveys that junction with W00288 (Figure 10). While the overlap was small, the surveys were used to validate our processed depths. Comparison of the 2m surfaces demonstrate good agreement with a mean offset of -0.14m with H12679 and -0.11m with H12698.

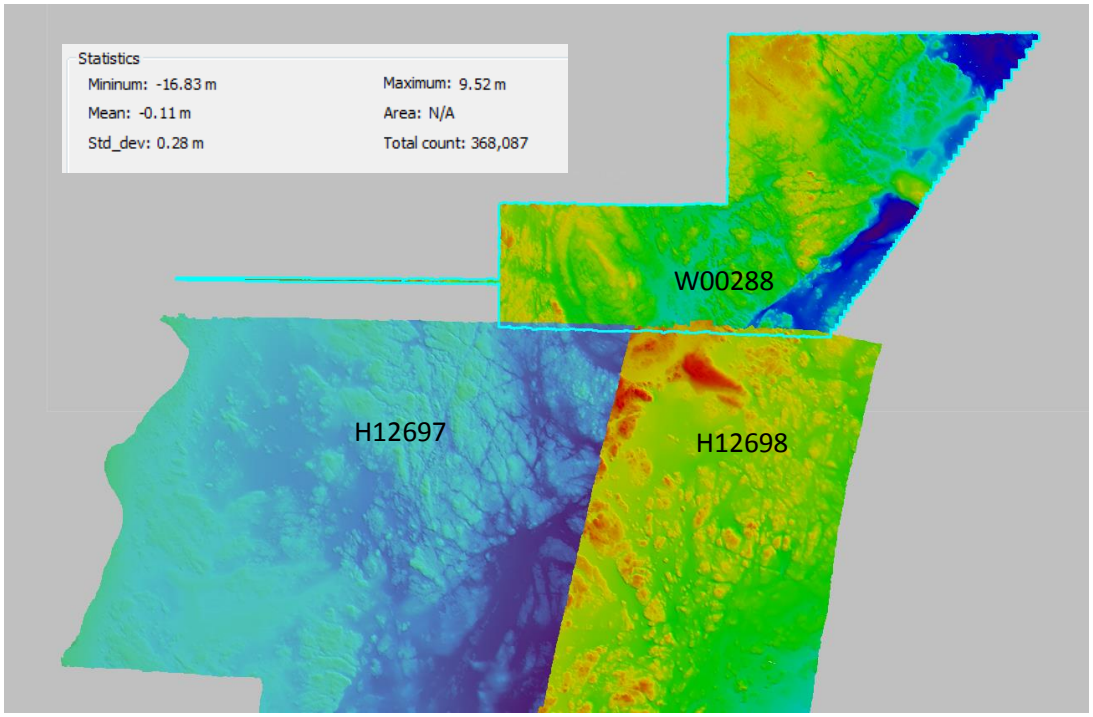

Figure 10: NOAA Ship *Ferdinand Hassler* surveys H12697 and H12698 overlap with W00288 survey area.

F5. Density

The W00288 survey meets NOS density standards of 5 soundings per node (Figure 11). 99.96% of all nodes in the survey have at least 5 soundings, with the majority having between 50-100 soundings.

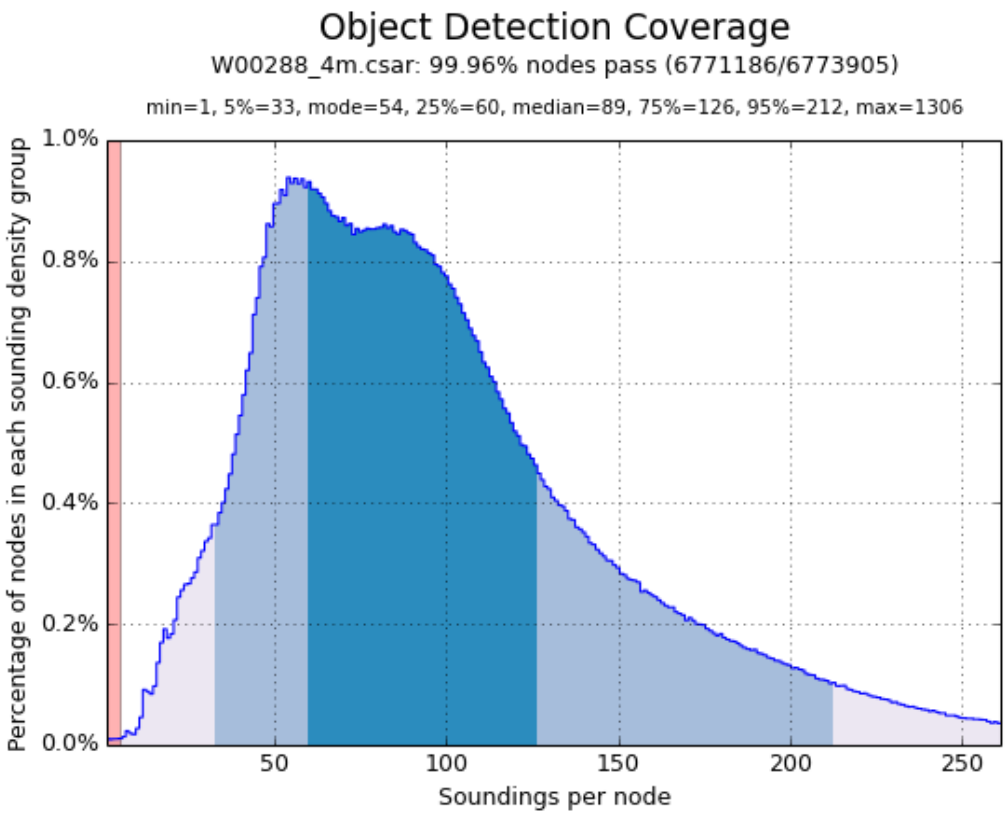

Figure 11: Graph created in Pydro of W00288 4m CUBE surface statistics verifying 99.96% of the survey meets NOS specifications of 5 soundings per node.

F5. Acoustic Backscatter

Backscatter was processed in FMGT as described in the NOAA Standard Operating Procedure (SOP). Due to a bug with FMGT version 7.4.1c and 7.4.2, the data was processed in version 7.4.0. .gsf files and a 3m resolution mosaic were created for the W00288 survey area (Figure 12).

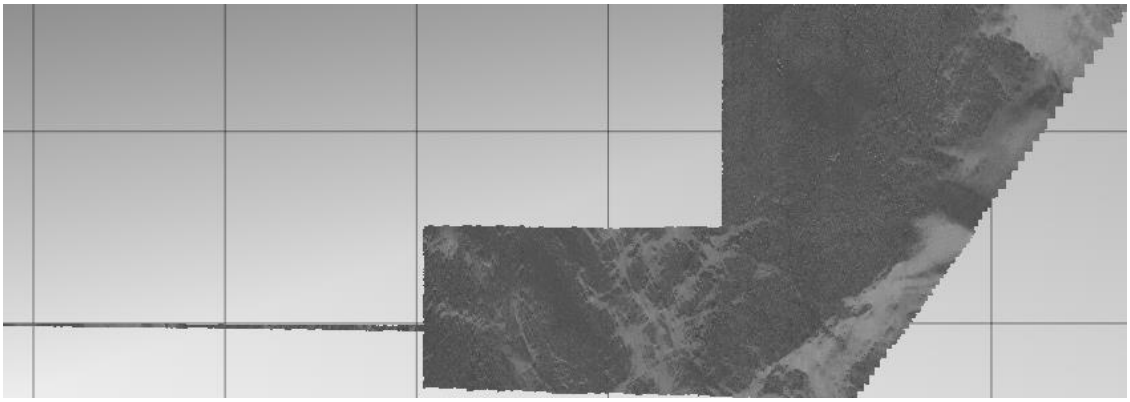

Figure 12: 3m backscatter mosaic of W00288, histogram range -70 to 10.

G. Vertical and Horizontal Control

The vertical datum for this project is Mean Lower Low Water. Discrete Zoning was the vertical control method used. A compilation of verified tides for the dates of this survey were obtained from CO-OPS and entered into CARIS. The following National Water Level Observation Network (NWLON) stations served as datum control for this survey:

Station Name	Station ID
Portland	8418150

The horizontal datum for this project is North American Datum of 1983 (NAD83). RTK positioning was not enabled with the Seapath 330 during the survey. Instead differential GPS was used for horizontal positioning.

Refer to the R MCMI for more information.

H. Approval

The survey data meets the requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual. 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 Survey Summary Report. All records are forwarded for final review and processing to the Processing Branch.

Approver Name	Approver Title	Approval Date	Signature
Andrew A. Armstrong, III	Co-Director, Joint Hydrographic Center	March 20, 2015	Digitally signed by Andrew A. Armstrong, III DN: cn=Andrew A. Armstrong, III, o=NOAA/NOS/OCS, ou=Joint Hydrographic Center, email=andy.armstrong@noaa.gov, c=US Date: 2015.04.06 16:15:24 -04'00'

APPROVAL PAGE

W00288

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

- W00288_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- W00288_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