W00502

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

DESCRIPTIVE REPORT

Type of Survey:	Basic Hydrographic Survey
Registry Number:	W00502

LOCALITY

State(s):	New Hampshire
General Locality:	Atlantic Ocean
Sub-locality:	Concord Point to Rye Beach

2014

CHIEF OF PARTY
Semme Dijkstra and Andrew Armstrong

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Date:

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

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

W00502

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 Hampshire**
General Locality:	**Atlantic Ocean**
Sub-Locality:	**Concord Point to Rye Beach**
Scale:	**10000**
Dates of Survey:	**06/12/2014 to 07/01/2014**
Instructions Dated:	**05/26/2014**
Project Number:	**ESD-PHB-20**
Field Unit:	**CCOM/JHC**
Chief of Party:	**Semme Dijkstra and Andrew Armstrong**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Multibeam Echo Sounder Backscatter**
Verification by:	**Atlantic Hydrographic Branch**
Soundings Acquired in:	**meters at Mean Lower Low Water**

Remarks:

Survey Personnel: Daishi Horiuchi, Ramli Mohd, Nilton Sanchez, Katrina Wyllie Gustavo Crespo, Ricardo Freire, Bo Lawson, Ravi Runghen Cesar Borba, Tomer Ketter, Kelly Nifong

Any revisions to the Descriptive Report (DR) applied during office processing are shown in red italic text. The DR is maintained as a field unit product, therefore all information and recommendations within this report are considered preliminary unless otherwise noted. The final disposition of survey data is represented in the NOAA nautical chart products. All pertinent records for this survey are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via https://www.ncei.noaa.gov/. Products created during office processing were generated in NAD83 UTM 19N, MLLW. All references to other horizontal or vertical datums in this report are applicable to the processed hydrographic data provided by the field unit.

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Descriptive Report to Accompany Survey W00502

Project: ESD-PHB-20

Locality: Atlantic Ocean

Sublocality: Concord Point to Rye Beach

Scale: 1:10000

June 2014 - July 2014

CCOM/JHC

Chief of Party: Semme Dijkstra and Andrew Armstrong

A. Area Surveyed

The survey area extends from Concord Point, NH to Rye Beach, NH. The inshore limit of the survey is defined by the boat captain's judgment for safety of equipment and personnel. The survey junctions to the north with the 2013 Summer Hydro survey data and to the east with 2014 NOAA Ship Hassler survey H12696.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
43° 1" 12" N 70° 45" 36' W	42° 57" 36" N 70° 42" 36" 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 primary purpose of this survey is to educate the students enrolled in the UNH Center for Coastal and Ocean Mapping Joint Hydrographic Center's Summer Hydrographic Field Course in the planning, acquisition, and processing of a hydrographic survey. The data and deliverables are prepared to NOAA National Ocean Service 2014 specifications and are deemed suitable for nautical chart updates.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

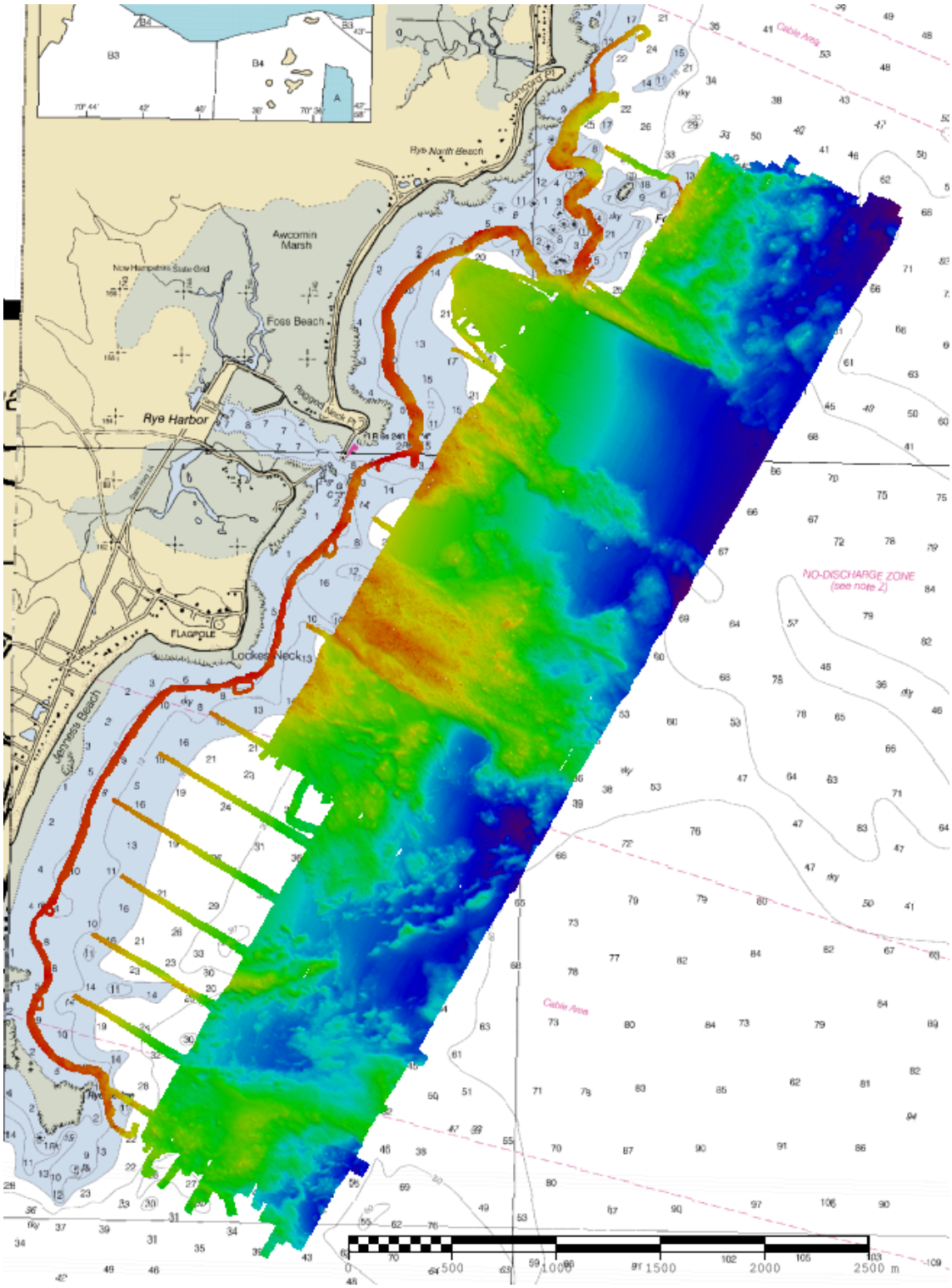


Figure 1: Summer Hydro 2014 survey area displayed on chart 13283

Numerous small coverage holidays exist in this survey and are discussed in section B.2.8 of this DR.

A.5 Survey Statistics

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

	Vessel	***R/V Coastal Surveyor***	***Total***
LNM	**SBES Mainscheme**	0	0
	MBES Mainscheme	162.38	162.38
	Lidar Mainscheme	0	0
	SSS Mainscheme	0	0
	SBES/MBES Combo Mainscheme	0	0
	SBES/SSS Combo Mainscheme	0	0
	MBES/SSS Combo Mainscheme	0	0
	SBES/MBES Combo Crosslines	14.16	14.16
	Lidar Crosslines	0	0
Number of Bottom Samples			12
Number AWOIS Items Investigated			0
Number Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Items Investigated by Dive Ops			0
Total Number of SNM			2.10

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Julian Day Number
06/12/2014	163
06/16/2014	167
06/17/2014	168
06/18/2014	169
06/19/2014	170
06/20/2014	171
06/23/2014	174
06/25/2014	176
06/26/2014	177
06/27/2014	178

Table 3: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

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

B.1.1 Vessels

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

Hull ID	*R/V Coastal Surveyor*	*R/V Cocheco*
LOA	12.2 meters	10.4 meters
Draft	1.13 meters	1.7 meters

Table 4: Vessels Used

Length	12.2 m
Beam	3.6 m
Maximum Draft	1.13 m
Flag	U.S.
Registry	U.S. Coastwise and Registry
Top Speed	10 knots
Roll Stabilization	Niad Active Fins
GPS	Garmin GPS17, WAAS Enabled
GNSS Antennas (GPS)	2 Trimble Zephyr Antennas
Telemetry	Trimble Trimark 3
GNSS Receiver (RTK GPS)	Applanix POSMV 320 V4 with IMU 200
Attitude	Applanix POSMV 320 V4 with IMU 200
Data acquisition software	Hypack
Sound Speed measurement	Digibar Pro – Profile Casts
Primary Echosounder	Kongsberg EM2040

Figure 2: R/V Coastal Surveyor

R/V Cocheco	**Vessel Specifications**	
	**Length**	10.4 m
	Beam	3.6 m
	Maximum Draft	1.7 m
	Flag	U.S.
	Top Speed	16 knots
	GPS	Garmin GPS17, WAAS Enabled
	GPS Antennas	Trimble 27207
	Differential GPS	Trimble DSM212h
	Bottom Sampler	Wildco Shipek Grab Sampler
	Data Acquisition Software	Hypack

Figure 3: R/V Cocheco

B.1.2 Equipment

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

Manufacturer	Model	Type
Sea-Bird	SeaCAT Profiler CTD SBE 19plus V2	Conductivity, Temperature, and Depth Sensor
Odom	Digibar-Pro	Sound Speed System
Applanix	POS/MV 320 V4	Positioning and Attitude System
Kongsberg	EM 2040	MBES

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines, acquired for this survey, totalled 8.7% of mainscheme acquisition.

14.16 nautical miles of crosslines were acquired. This accounts for 8.7% of mainscheme distance which satisfies NOS Specifications and Deliverables (2014). To evaluate crossline agreement, two 1m surfaces were created; one from crossline soundings and one from mainscheme soundings. A difference surface was performed in CARIS BDB and the average difference between the surfaces is 0.03m with a standard deviation of 0.11m. Some of this difference can be attributed to different waterline values entered on different days (see waterline discussion below),as well as some crosslines surveyed to Odiorne RTK (WGS84) where the majority of the survey data was surveyed to Rye RTK (NAD83). The datum difference accounts for a horizontal shift of about 2m.

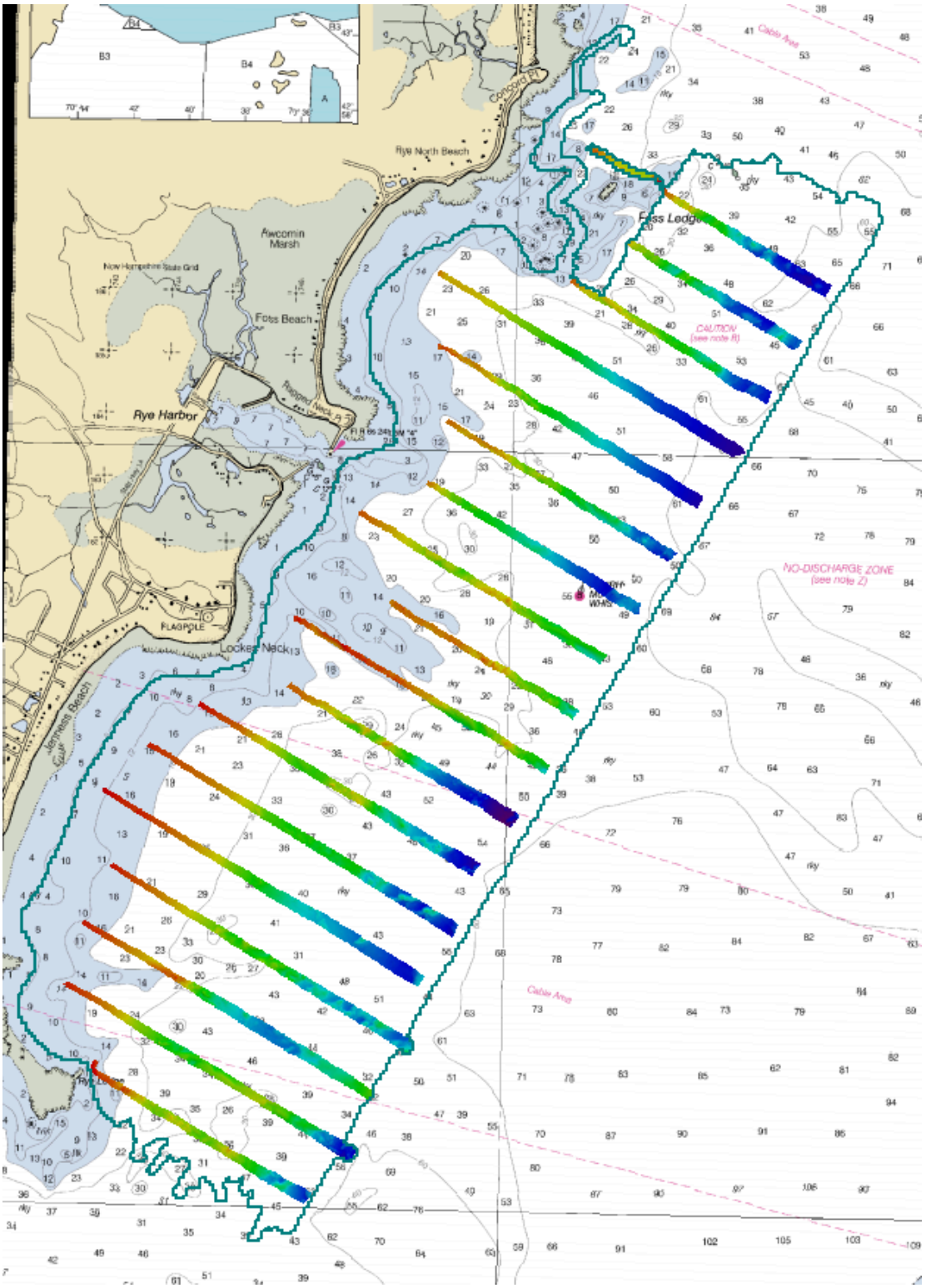


Figure 4: Crosslines

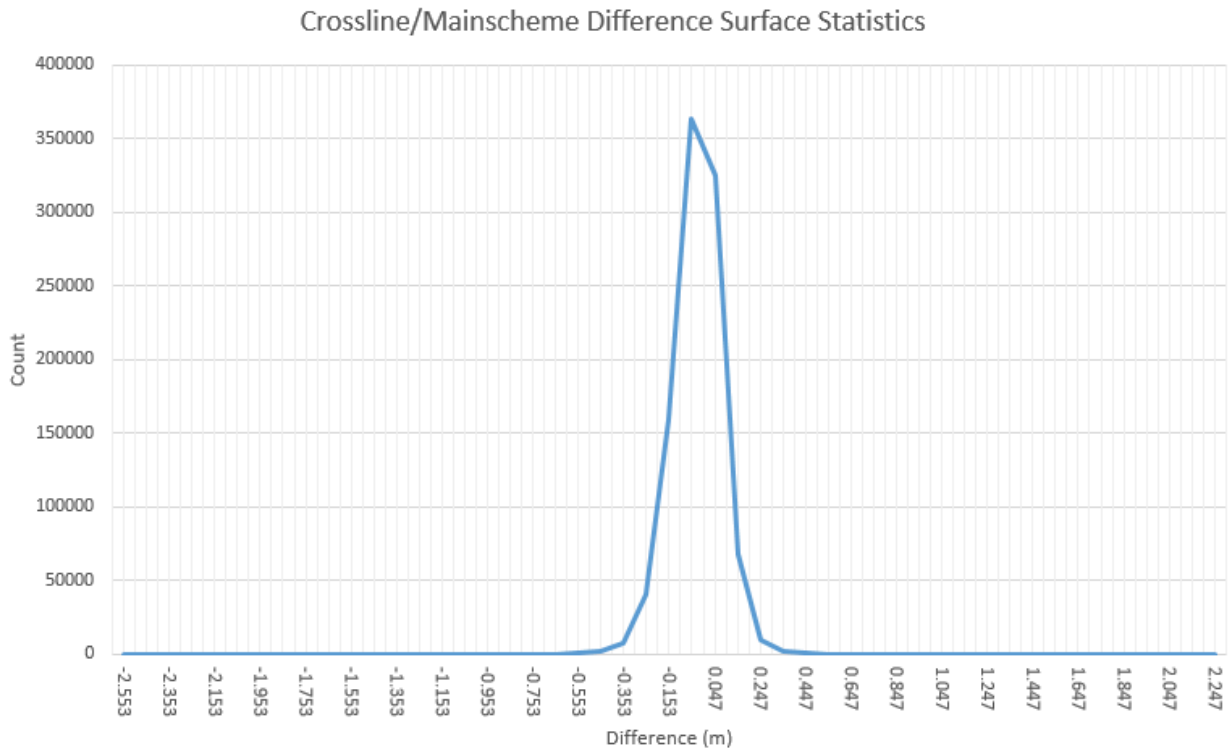


Figure 5: Difference Surface Statistics

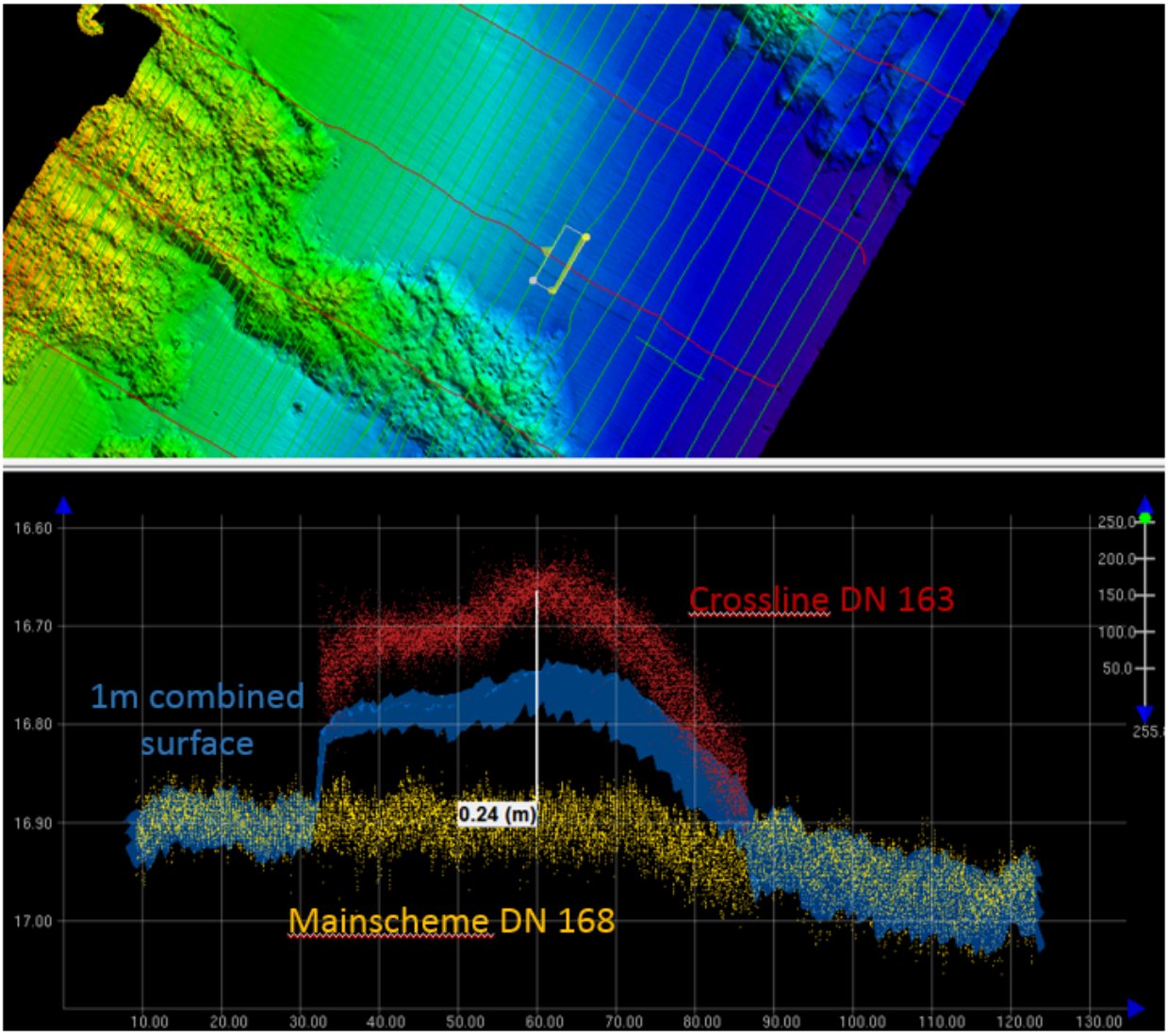


Figure 6: Example of crossline vs mainscheme

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0.02 meters	0.10 meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
RVCS	0.5 meters/second		0.2 meters/second

Table 7: Survey Specific Sound Speed TPU Values

The finalized bathymetry surfaces have node uncertainty values estimated as the higher of either the standard deviation or total propagated uncertainty as suggested by the NOAA Field Procedures Manual (2014). The estimated uncertainty values were compared to the IHO Order1a allowed total vertical uncertainty for each node. 99.39% of all nodes had estimated uncertainty within the allowable total vertical uncertainty.

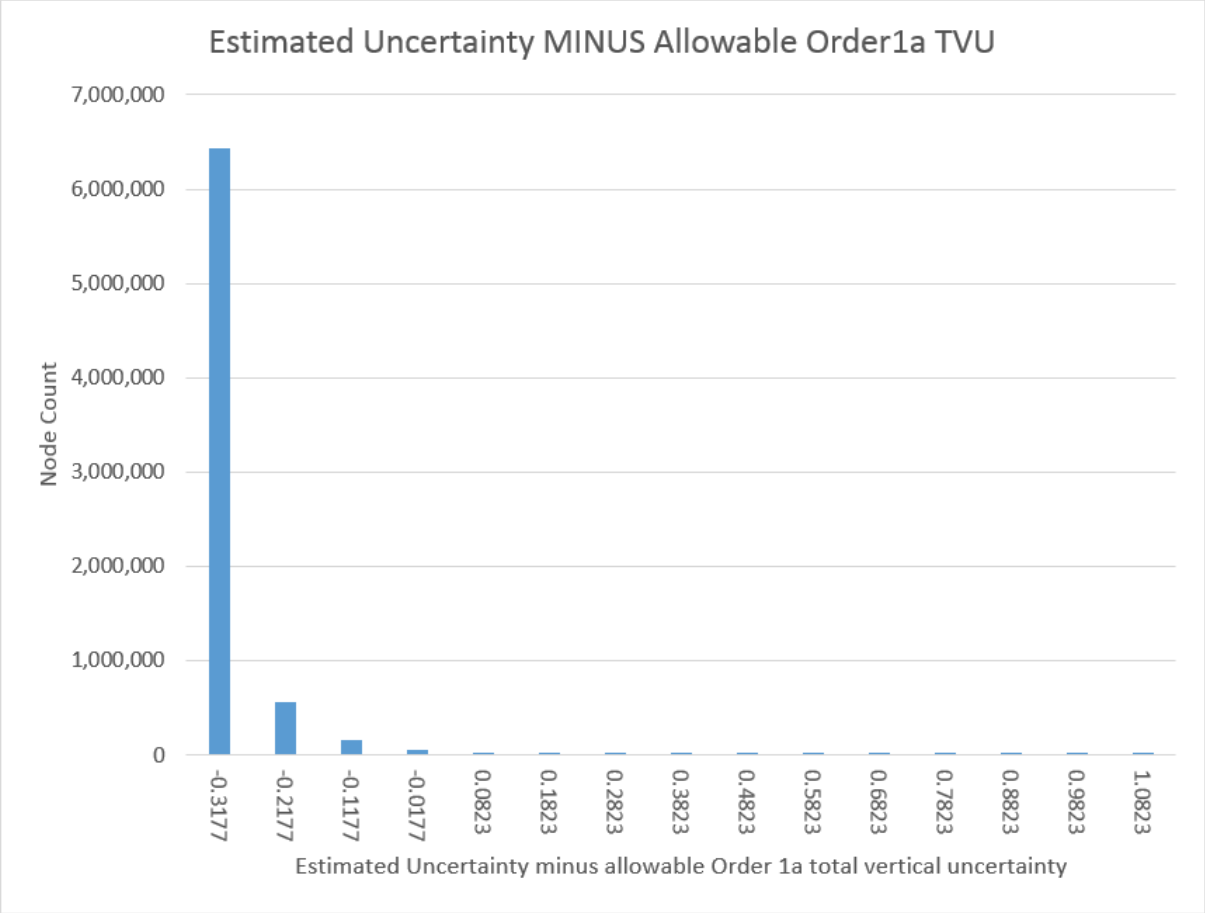


Figure 7: Uncertainty analysis statistics. Positive values exceed allowable vertical uncertainty at depth.

B.2.3 Junctions

This survey junctions with one NOAA survey conducted by NOAA Ship Hassler in 2014, one UNH survey conducted by the 2013 Summer Hydro class, and one FUGRO lidar survey conducted in 2005. The junction surfaces were differenced in CARIS BDB with the 1m combined surface from this survey and the difference statistics were analyzed.

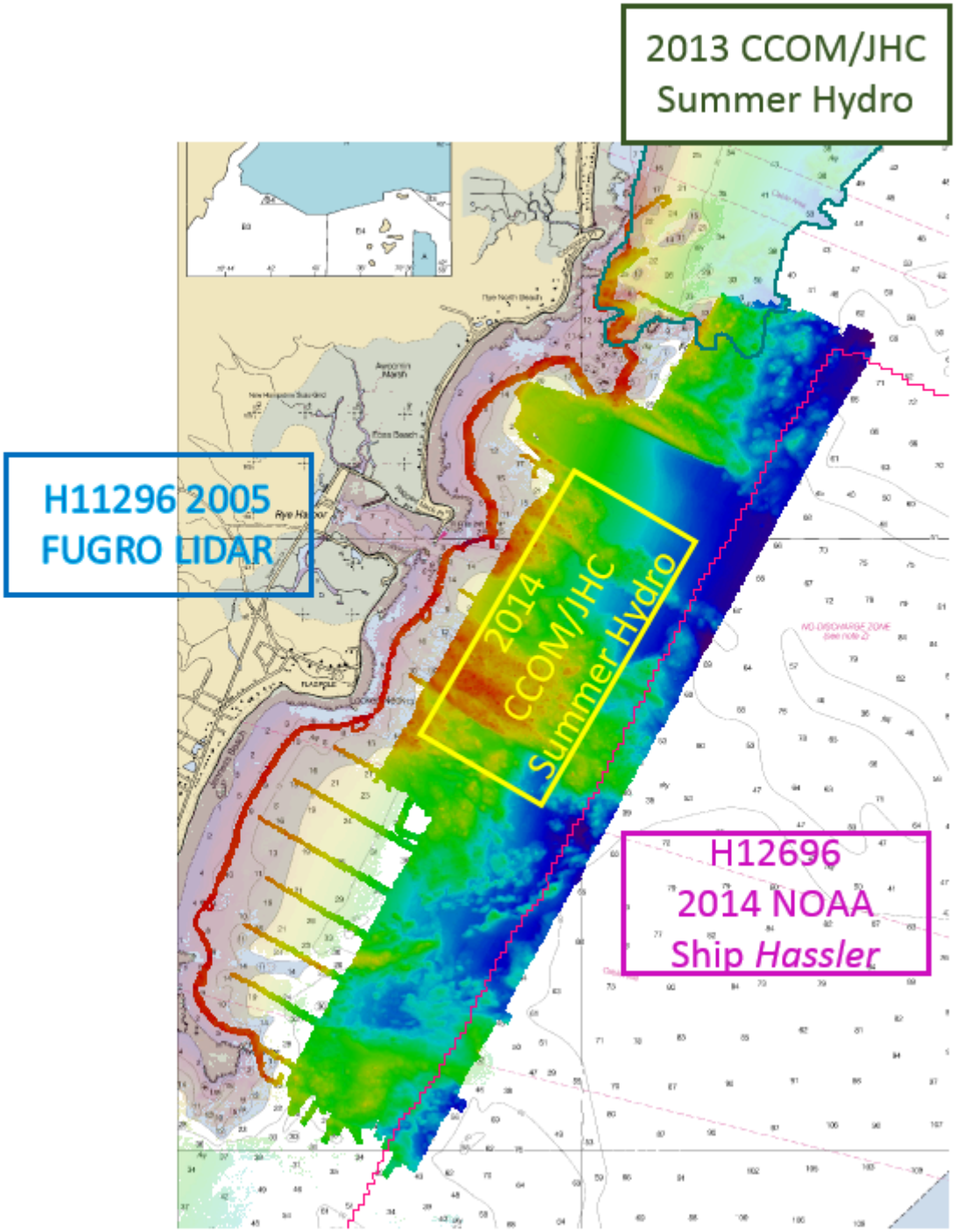


Figure 8: Junctions

The following junctions were made with this survey:

H11296

The mean difference between this survey and H11296 is 0.16m with a standard deviation of 0.66m. The lidar data is overall shoaler than the bathymetry collected in this 2014 survey. The larger differences are seen in deeper water and over rock features. Differences over flat areas can be attributed to sand erosion and accretion that has occurred in the almost 10 year time between acquisition dates.

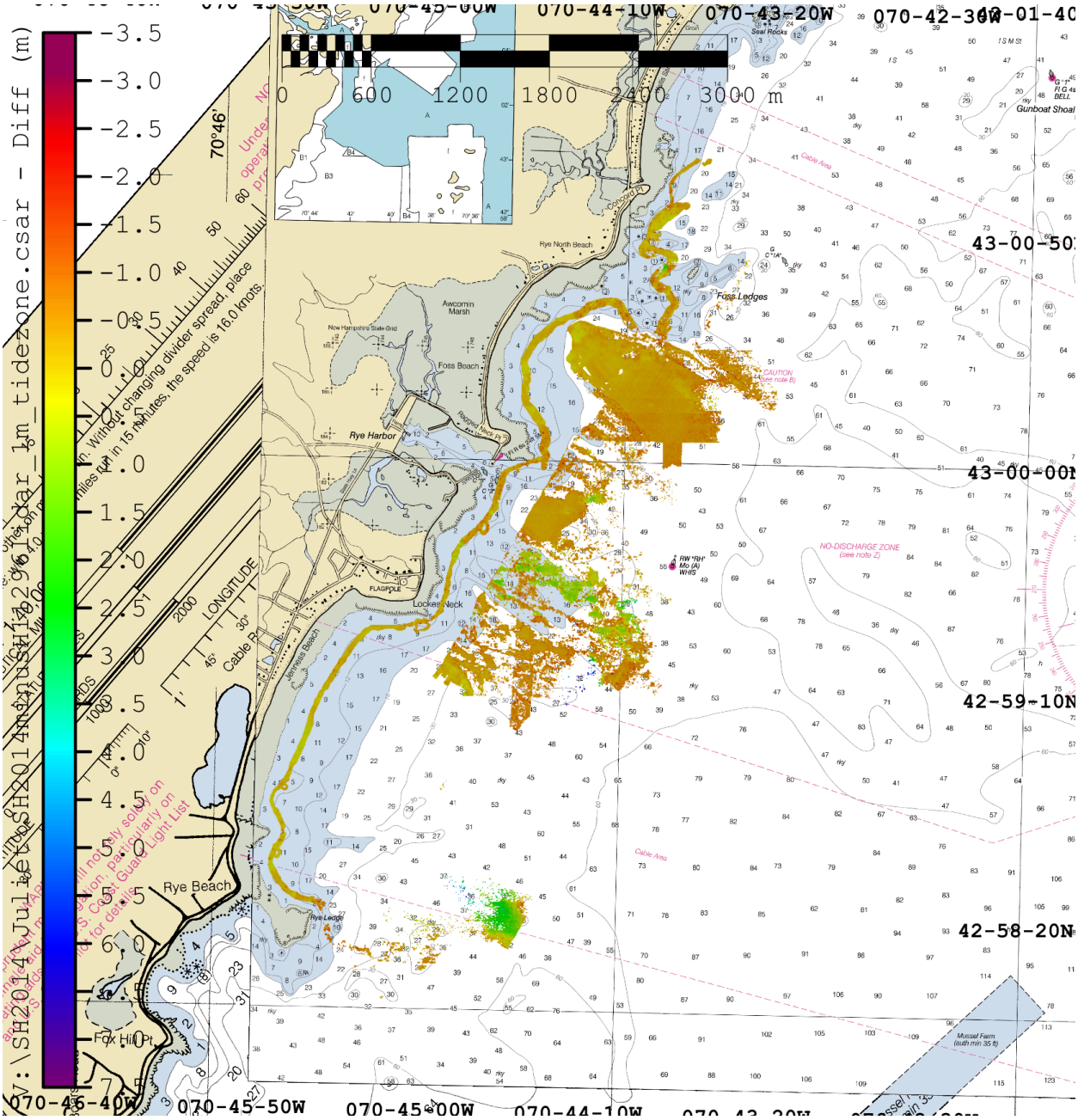


Figure 9: Surface Difference area with H11296

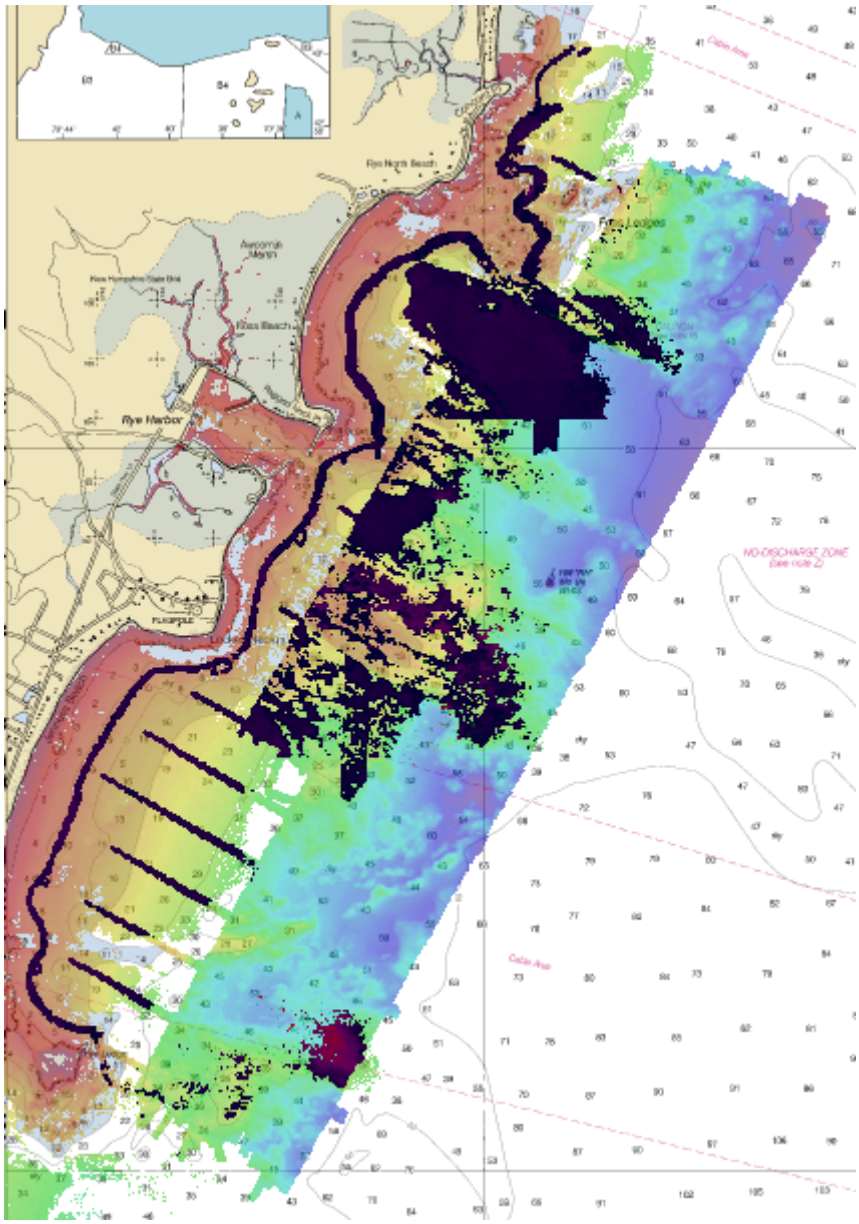


Figure 10: Junction area with H11296

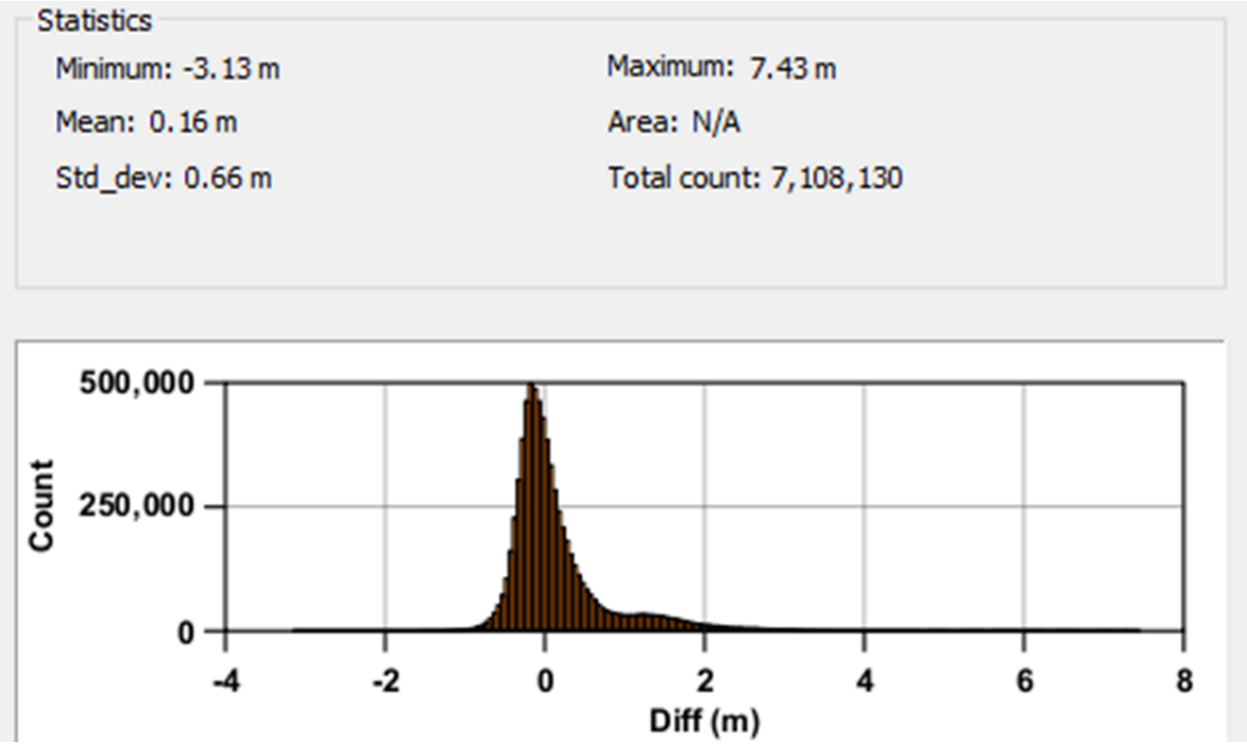


Figure 11: Junction statistics with H11296

H12696

Survey H12696 was not available for a junction comparison as the data was still being processed and finalized aboard the NOAA Ship Hassler at the time of the survey, but was added later for comparison. There is a mean offset of 0.30m between H12696 4m grid and this survey. The standard deviation of the difference surface is 0.19m. There may be a difference between the use of tides versus and ellipsoidal surface converted with VDatum for this area that may account for some of the difference. The 4m Hassler surface was used for comparison with the 1m 2014 surface.

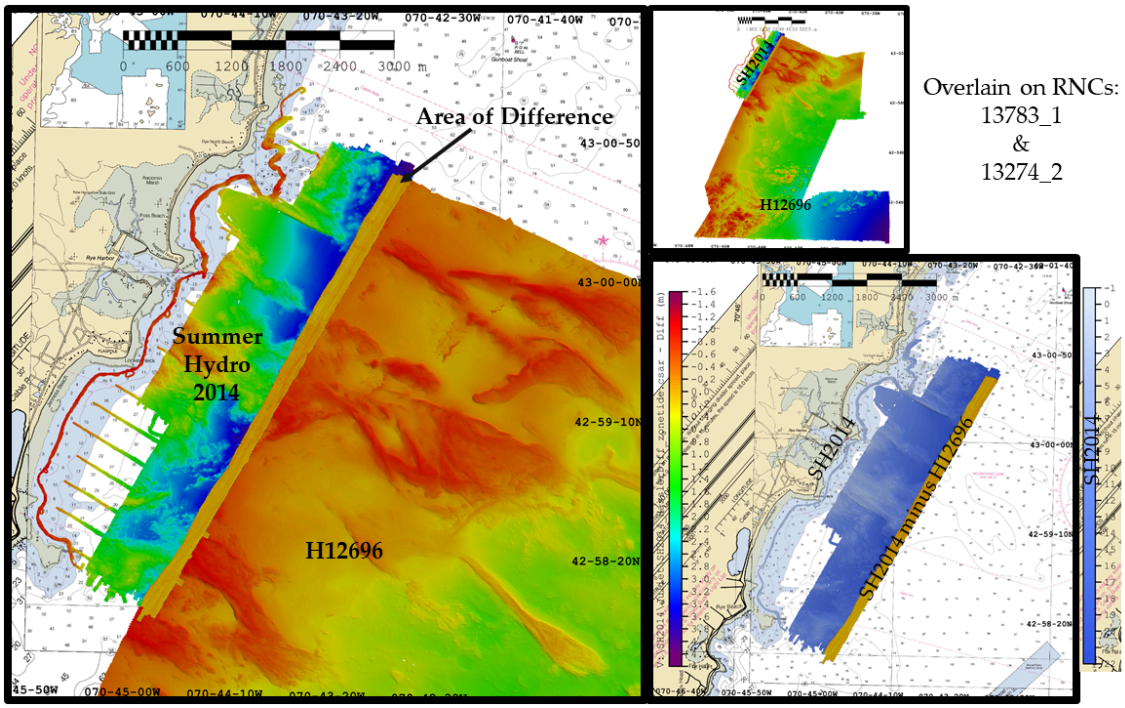


Figure 12: H12696 Junction

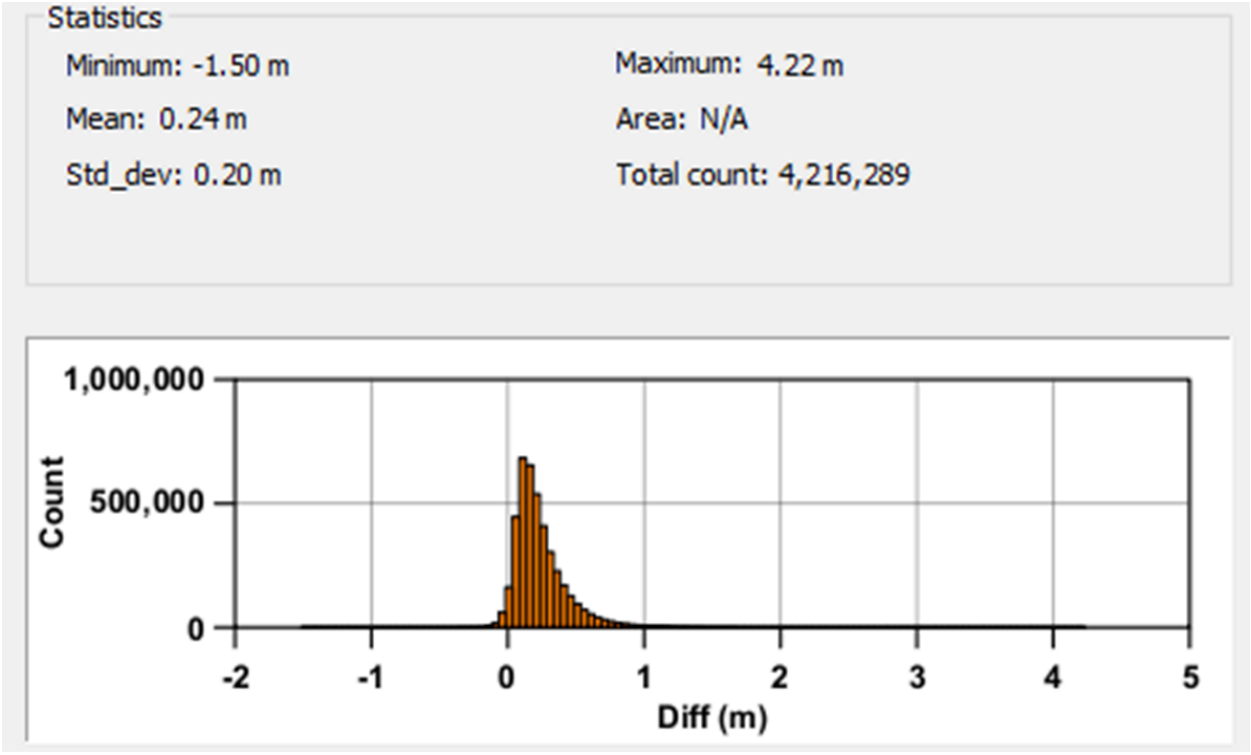


Figure 13: Junction statistics with H12696 4m

W02013

The mean difference between this survey and the 2013 Summer Hydro survey is 0.03m with a standard deviation of 0.19m. The difference between the two surveys in neglible. The 2013 Summer Hydro data is referenced to WGS84 while the 2014 Summer Hydro data is referenced to NAD83 ellipsoid. This causes an approximate 2m horizontal shift which might be noticeable on rock features.

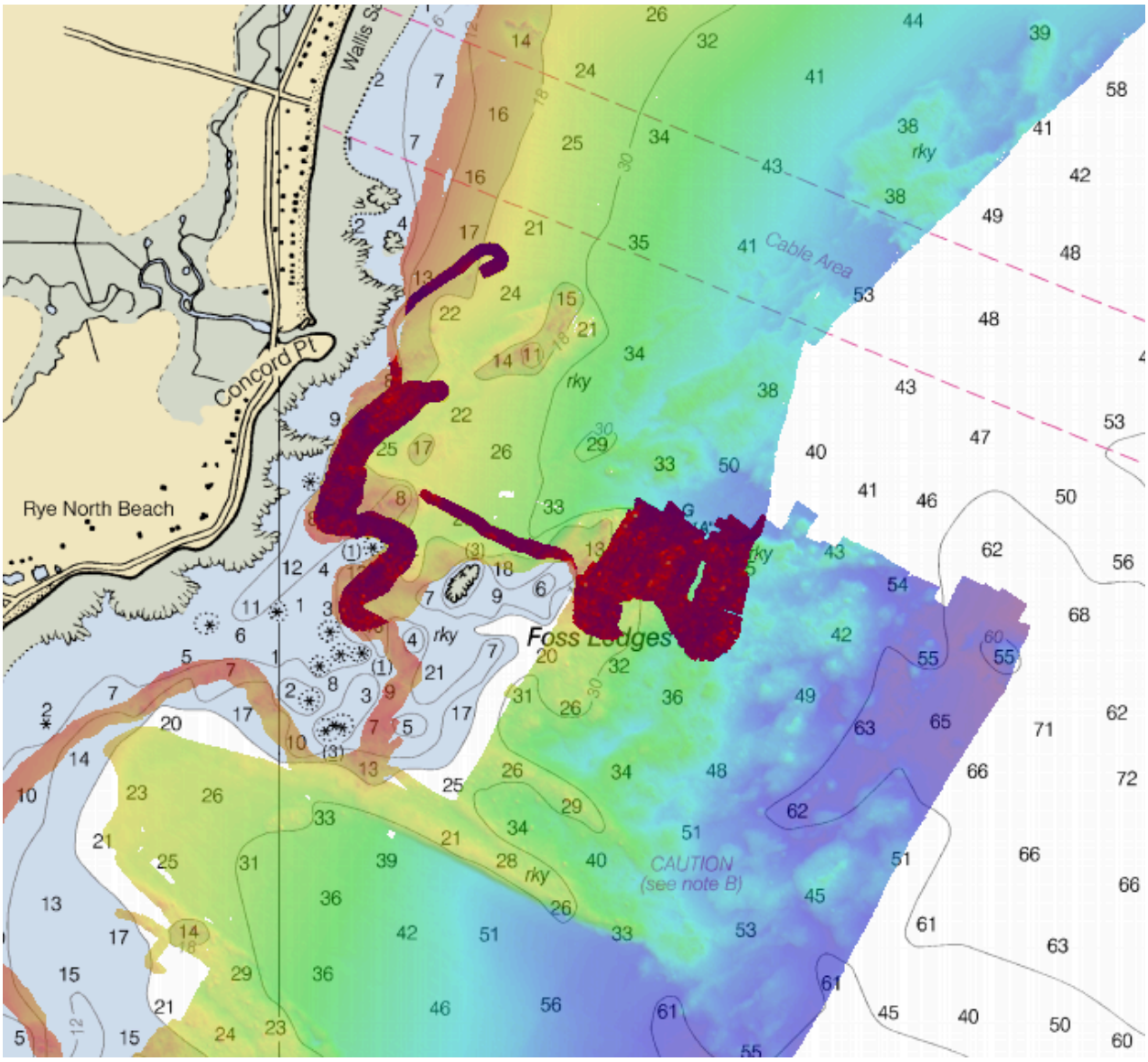


Figure 14: 2013 Junction

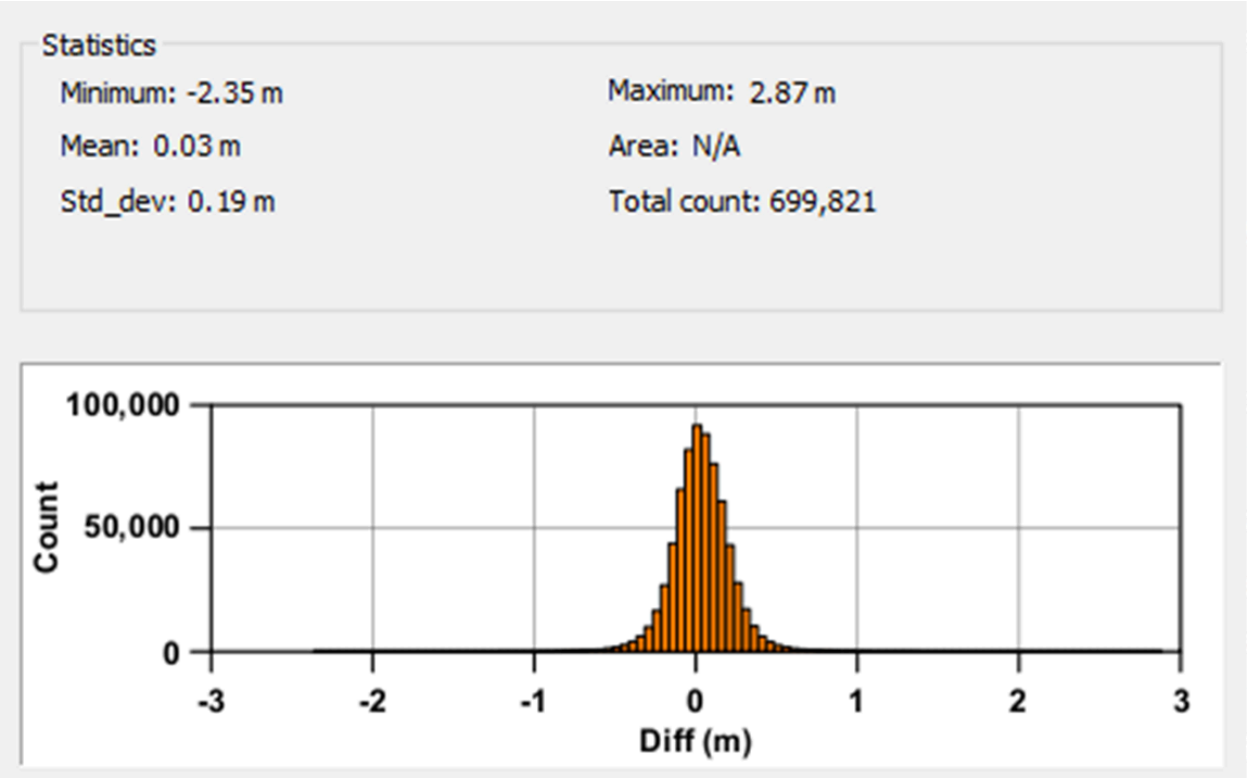


Figure 15: 2013 Junction Statistics

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

Dynamic Draft

A dynamic draft survey was not completed for this survey. Instead, the same values used for the last several years were applied to the data. These values are from a 2006 dynamic draft survey completed by CCOM/ JHC where 18 measurement runs at varying speeds were conducted to determine the ellipsoid height vs ship speed through water referenced to IMU. The dynamic draft values are entered into the RVCS hvf file and applied on the Merge step in CARIS HIPS.

With an exaggeration of 10 in Figure 13 below, the dynamic draft artifact is clearly visible on the very flat sea floor. This figure also illustrates the crossline offset that was discussed in the crossline section above. The HVF file was updated after this figure was made to fix an error in the dynamic draft table in the HVF

file. The CARIS vessel editor may show dynamic draft in m/s, but the text of the file is recorded in knots. One must be careful of where one enters the values and which units are being used.

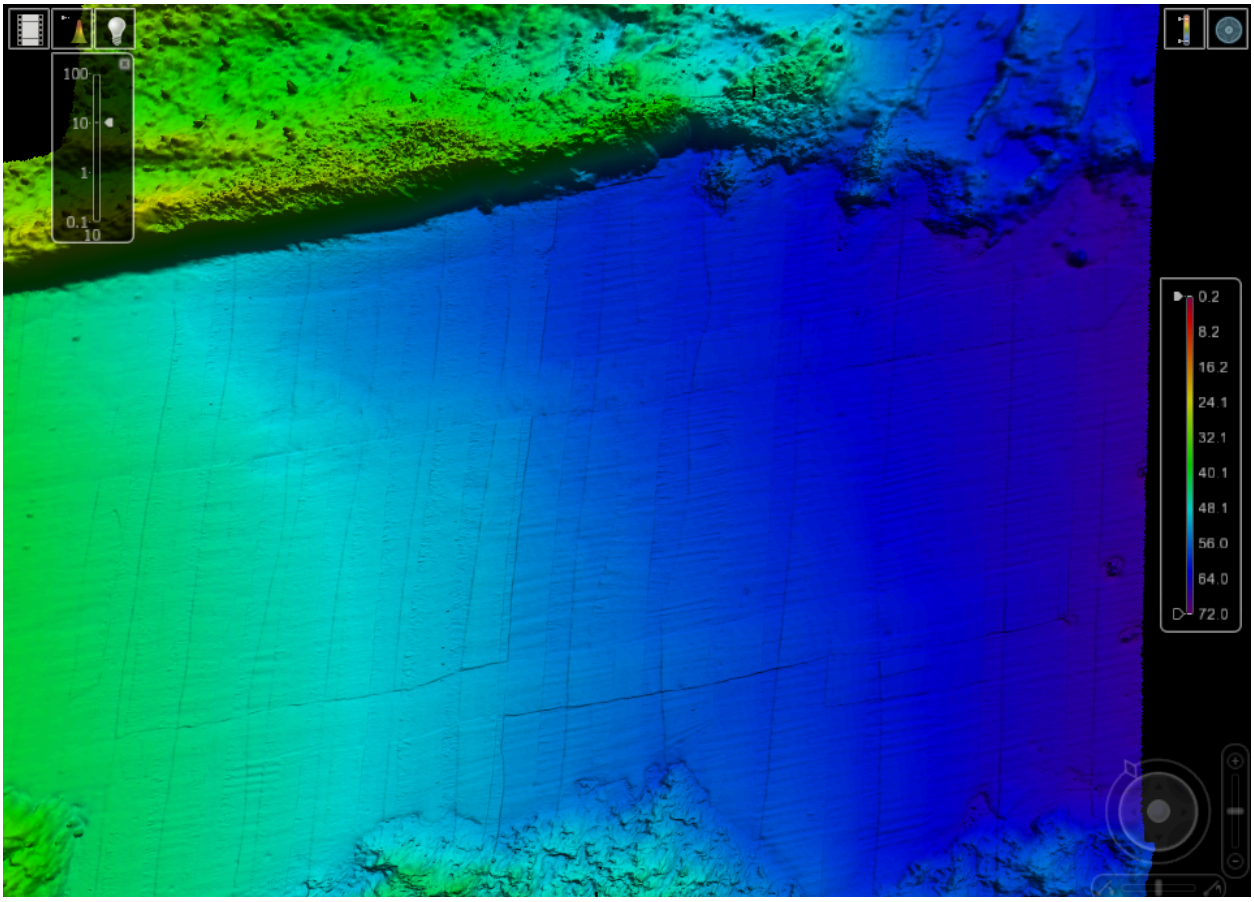


Figure 16: Dynamic draft artifact

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: A Seabird 19 CTD sound speed profiler was used to acquire profile measurements of the water column. The CTD was lowered over the side by hand at an approximate rate of 1m/s. The .hex file was uploaded from the CTD and processed in Matlab using Dr. Semme Dijkstra's code into .asvp file formats. The .asvp sound velocity file was immediately entered into the SIS machine and applied real-time to the data acquisition. At least two CTD casts were acquired each day and more were acquired when the surface sound velocity from the Digibar varied more than 4m/s from the Seabird CTD. This happened more frequently in shallow areas where sound velocity is more variable. Data was also processed in real time and evaluated for any sound velocity concerns that would warrant additional CTD casts.

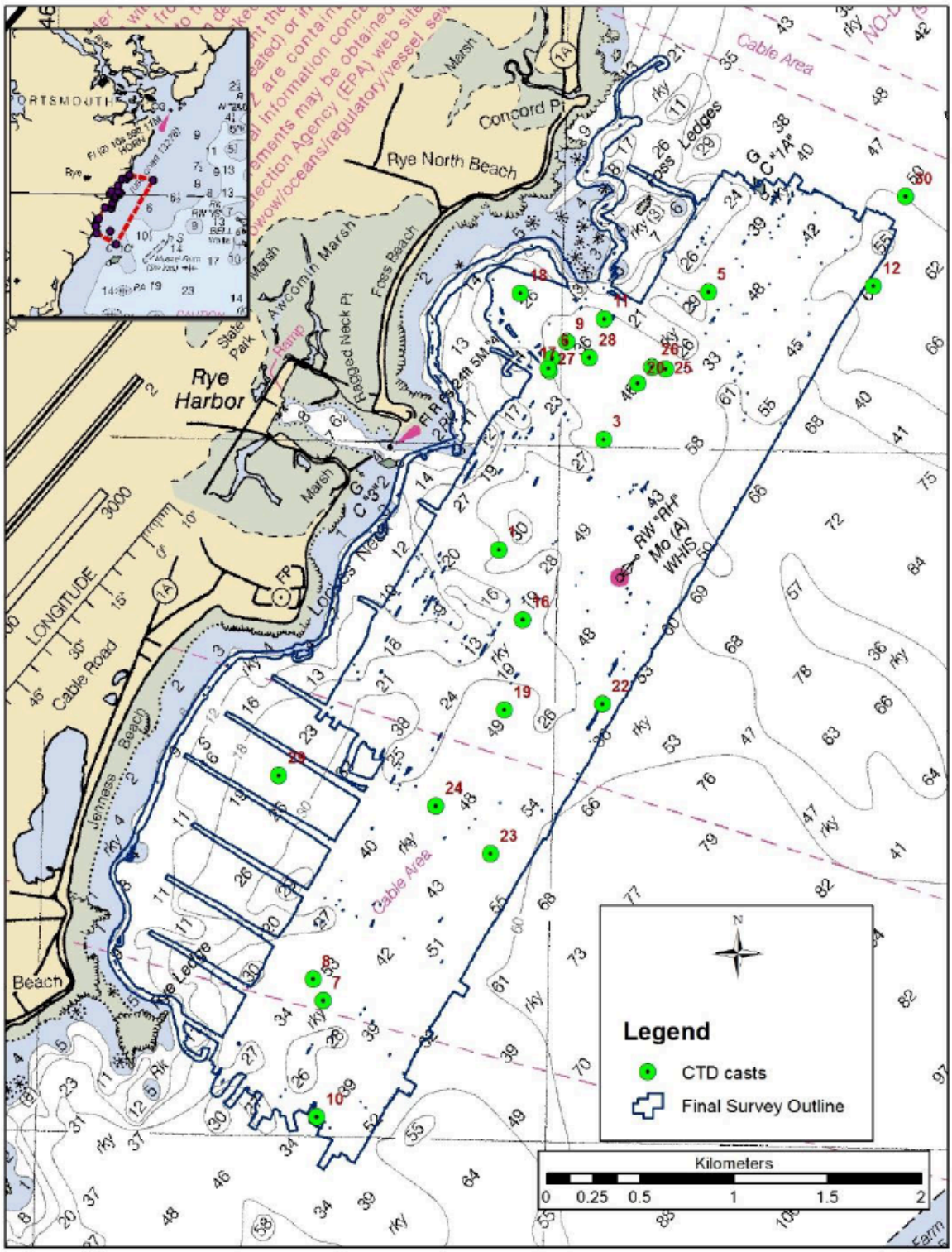


Figure 17: Locations of CTD casts

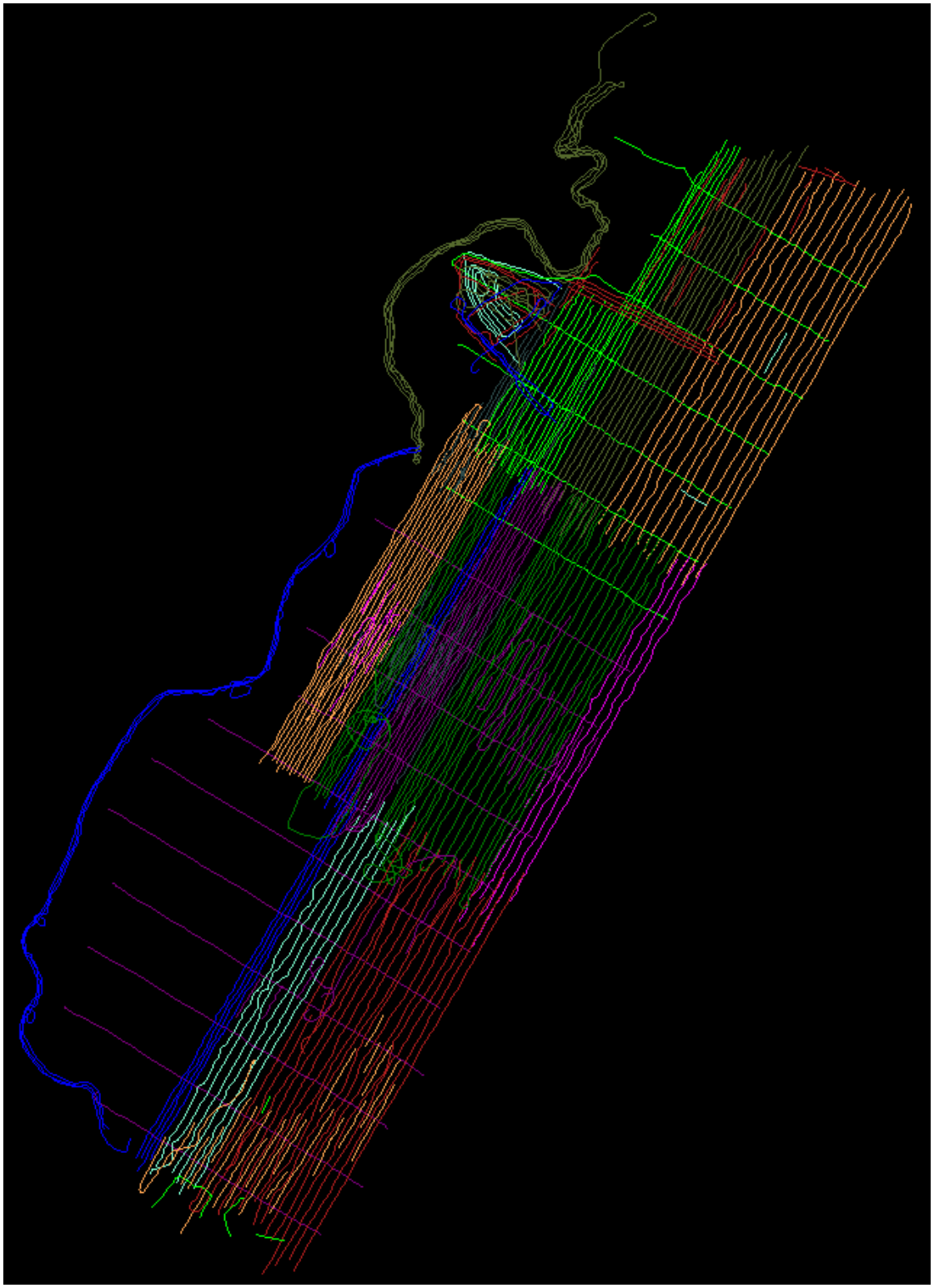


Figure 18: Survey lines colored by SVP file applied

B.2.8 Coverage Equipment and Methods

A density analysis was run to calculate the number of soundings per surface node. Five or more soundings per node were present in 99.08% of the 1 meter combined surface. The density analysis only includes nodes that are populated by one sounding and do no account for holidays located within the surface. This survey contained numerous small coverage holidays and are from the lack of adequate overlap and most can be blamed on the copious amount of lobster pots in the area.

Longitude	Latitude
-70.7491509	42.97071008
-70.7487801	42.96974833
-70.74957398	42.97005535
-70.74902624	42.97073042
-70.74923382	42.97034875
-70.74452795	42.98911767
-70.73805338	42.99019473
-70.74156121	42.99238094
-70.74097454	42.99248612
-70.74356629	42.99193596
-70.74338347	42.99287954
-70.74175478	42.99259738
-70.74249199	42.99330382
-70.73918301	42.99079446
-70.73745831	42.99093692
-70.74057353	42.9940679
-70.74124783	42.99395072
-70.73895245	42.9987607
-70.73699625	42.99881523
-70.73671278	42.99990675
-70.73549138	43.00141199
-70.73605671	43.00059963
-70.73508856	43.00080989
-70.73573683	43.00047523
-70.73534743	43.0004693
-70.73372515	43.00042021
-70.73684197	43.00069414
-70.73285954	43.00165706
-70.73488021	43.00222072
-70.73688116	43.00658388
-70.73690545	43.00616365
-70.73638144	43.00567332
-70.73450941	43.0049679
-70.73500032	43.00452333
-70.73446177	43.0045951
-70.73581344	43.00423981
-70.73512048	43.0039316
-70.72976287	43.00748081
-70.72792572	43.00666498

Figure 19: List of holiday locations

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

The sonar installation, sensor integration and initial patch test was performed so all vessel offsets and angular mounting biases were entered into SIS computer in order for soundings to be corrected in real-time referenced to the center of the POS MV IMU. No offsets from the additional Patch Tests were applied in CARIS during final processing as the initial patch test values were already applied directly in SIS. The HVF is set to 0 in the pitch, roll, timing and yaw patch section.

B.3.2 Calibrations

The following calibrations were conducted after the initial system calibration discussed in the DAPR:

Calibration Type	Date	Reason
Patch Test	2014-06-12	SIS calibration

Table 9: Calibrations not discussed in the DAPR.

A patch test was performed on June 12, 2014. The values were entered into the Kongsberg SIS acquisition software allowing for corrections to be applied to the data in real-time referenced to the vessel RP (center of the POS MV IMU).
The timing lines were run first. The first line was run at 4 knots and the second line, which was in the same position and direction as the first, was run at 8 knots. No timing correction was applied. The pitch line was run next. The timing line run at 8 knots was used as the first pitch line, and the second pitch line was run in the same position and opposite direction of the first. A pitch correction of 1.0 degrees was applied. The roll correction was determined using the same lines used for the pitch correction (same position and speed, different direction) and a roll correction of -0.6 degrees was applied. The yaw lines were run last at the same speed, parallel to each other and close enough that the outer beams overlapped, and in opposite direction. A yaw correction of -1.4 was applied.

B.3.3 Waterline

Waterline (static draft) values were taken before survey lines were acquired each day and entered into the SIS acquisition computer for real-time application. The method varied between groups and some groups acquired a waterline value while tied up to the dock which increased the uncertainty of the results because the water mass differed from the water mass of the survey area. The morning waterline values were entered into SIS real time and no additional corrections were applied in the Caris HVF to account for the various methods. This results in a few centimeter differences between days. Figure 15 lists the waterline values; only the morning values were applied in SIS. Figure 16 lists an example of the offset seen between days. For this example, the waterline on DN 171 was 0.510m and on DN 168 was 0.536m. The difference between the two

days is closer to 25cm instead of the 2.6cm waterline difference so the majority of the day offset is due to a tide step. The day offset is more noticeable in the flat sea floor areas of this survey.

Date	Julian Day	Group	Waterline (m)		
			Morning	Afternoon	Average
June 12	163	Green	-	-	.50
June 16	167	Blue	0.472	0.536	0.504
June 17	168	Sunfish	0.536	-	0.536
June 18	169	Green	0.520	-	0.520
June 19	170	Blue	0.492	0.505	0.498
June 20	171	Sunfish	0.510	0.530	0.520
June 23	172	Green	0.512	-	0.512
June 25	176	Blue	0.49	-	0.49
June 26	177	Sunfish	0.51	0.49	0.50
June 27	178	Green	0.442	-	0.442

Figure 20: Waterline values

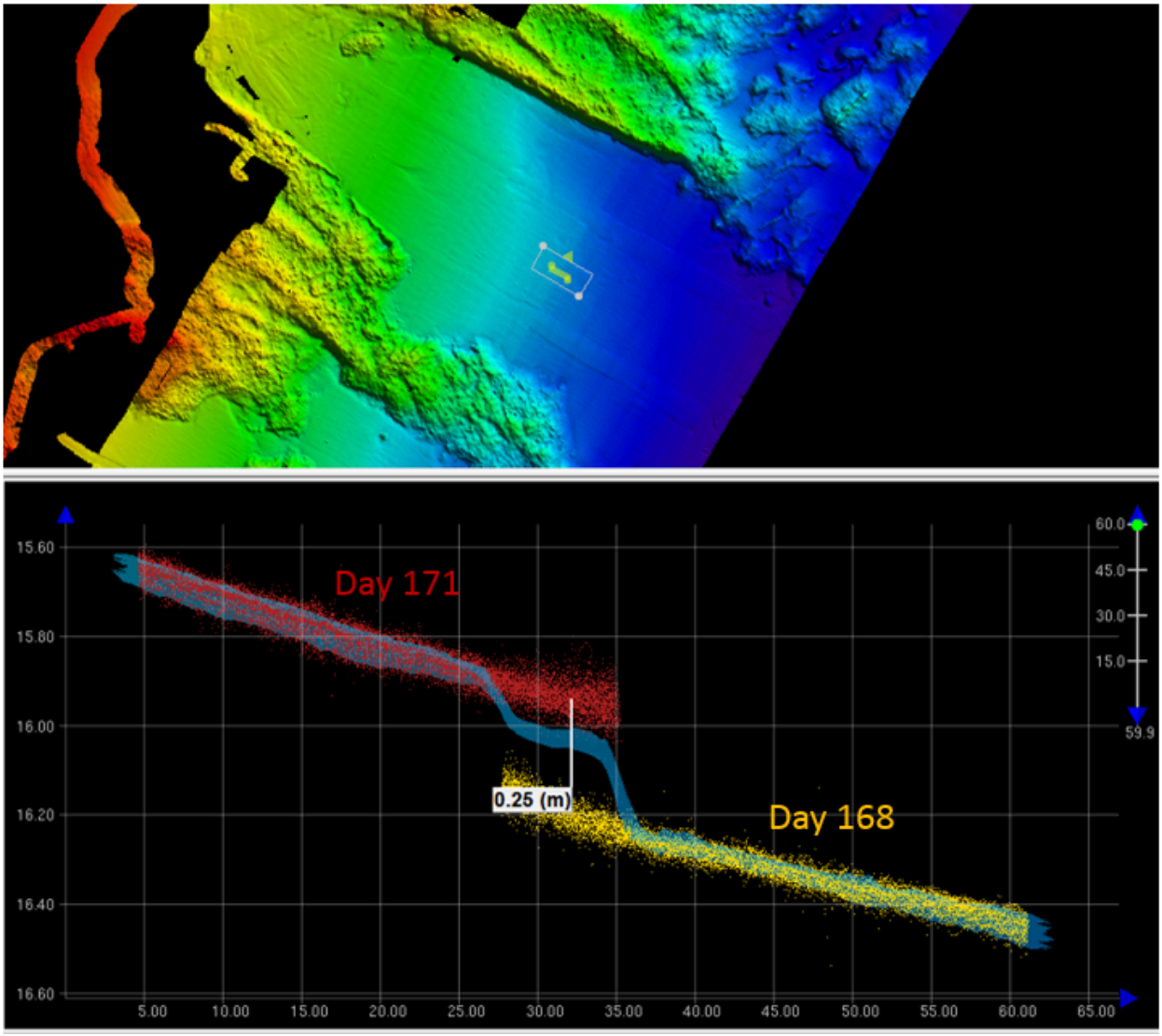


Figure 21: Day offset

B.4 Backscatter

The raw .all files were loaded into FMGT. A 50cm mosaic was created for the survey area.

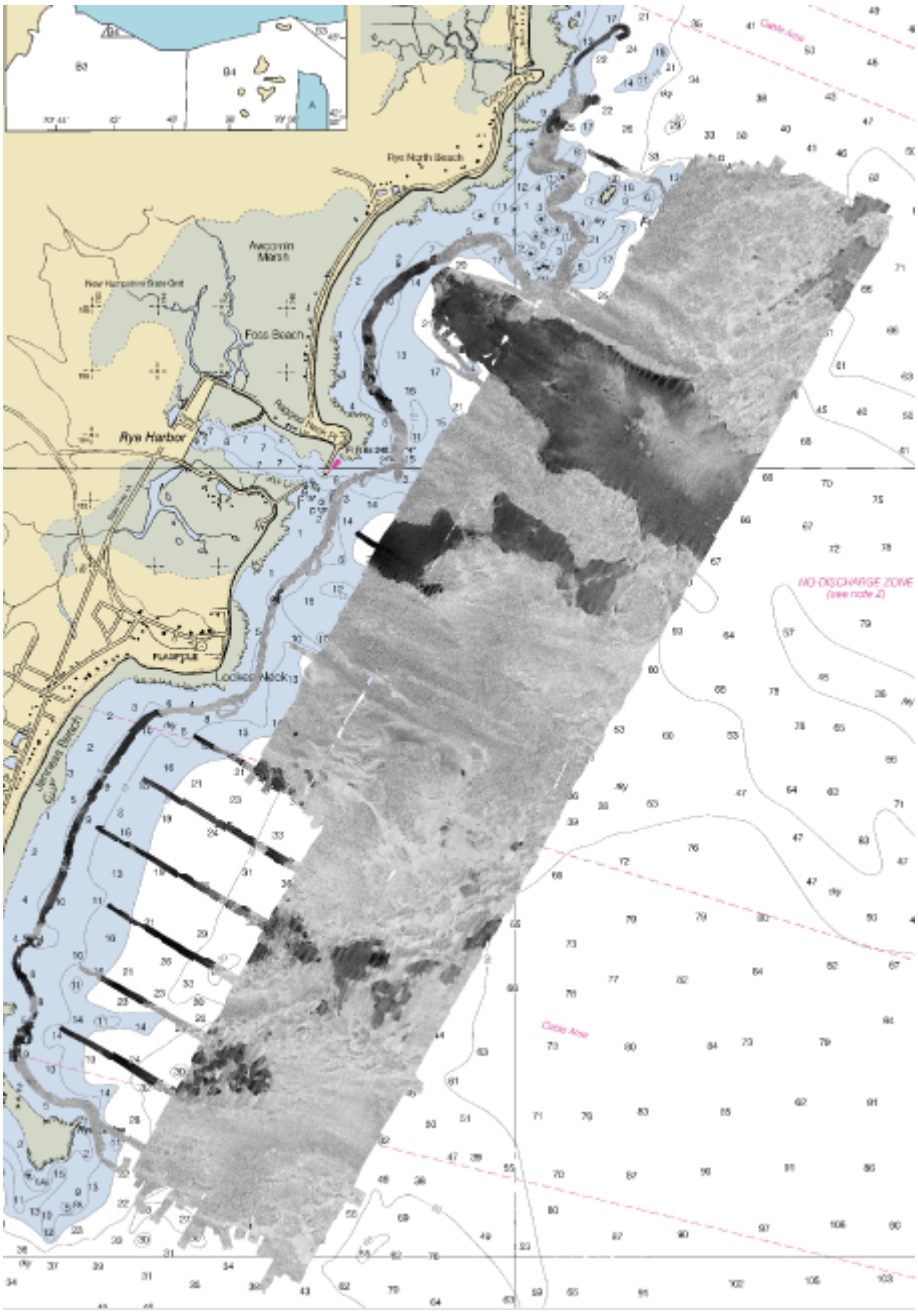


Figure 22: 50cm Backscatter Mosaic

B.5 Data Processing

B.5.1 Software Updates

There were no software configuration changes after the DAPR was submitted.

The following Feature Object Catalog was used: BathyDatabase

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
MB_1m_MLLW_Final.bag	CUBE	1 meters	0 meters - 10 meters	NOAA_1m	Complete MBES
MB_50cm_MLLW_Final.bag	CUBE	0.5 meters	8 meters - 22 meters	NOAA_0.5m	Complete MBES
MB_1m_MLLW_Combined.bag	CUBE	1 meters	0 meters - 22 meters	N/A	Complete MBES

Table 10: Submitted Surfaces

The guidance put forth in the 2014 HSSD for complete coverage is 1m for 0-20m and 2m for 18-40m. Because of the nature of the rocky sea floor and to reduce the number of designated soundings, a 50cm resolution surface was created for depths 0-10m and a 1m resolution surface was created for depths 8-22m. These selected resolutions exceed the recommended complete coverage resolutions. The combined 1m surface was created with a rule file with the attribute depth least.

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
Fort Point	8423898

Table 11: NWLON Tide Stations

File Name	Status
8423898_Verified2014.tid	Verified Observed

Table 12: Water Level Files (.tid)

File Name	Status
UNH2014CORP.zdf	Final

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

The entire survey area fell within one tide zone, NA169, provided by CO-OPS, NOS. This zone is based off the primary station of Fort Point, NH with no subordinate guage. The time correction is -6mins and the range ratio is 1x. Originally the preliminary tides were used with a tide file applied to the data is the observed data from Fort Point, NH with the -6 minute time correction applied. For the final surface the verified tide file and the tide zone file were applied.

C.2 Horizontal Control

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

The projection used for this project is UTM zone 19N.

For precisely positioning, two GNSS base stations are established at neighborhood of survey area for broadcasting RTK corrections to R/V Coastal Surveyor via Trimble Trimmark 3 radio Modems in CMR+ format. One is located on the roof of the Seacoast Science Center at Odiorne State Park, New Hampshire. Another base station is established at the Rye Harbor State Park to provide RTK corrections for the areas where are not covered by the first base station at Odiorne State Park. The reference point of the base station is located on the bedrock. The coordinates of reference point are provided by Online Positioning User Service (OPUS, http://www.ngs.noaa.gov/OPUS/) depending on 6 hours observation on June 12, 2014. The majority of this survey had corrections from the RTK base station at Rye.

C.3 Additional Horizontal or Vertical Control Issues

3.3.1 WGS84 vs NAD83 ellipsoid

Although instructed to survey to WGS84, this survey is referenced to the NAD83 ellipsoid. This occurred because the OPUS solution of the Rye RTK base station was recorded with the NAD83 solution instead of WGS84 solution that are both included in the OPUS report.

D. Results and Recommendations

D.1 Chart Comparison

The ENC and RNC were compared visually using Caris BDB. The soundings and contours agreed between the RNC and ENC. A sounding set was derived from the 1m combined surface and exported to a point cloud. A TIN surface was generated from the point cloud sounding set. From the TIN surface, contours at 6, 12, 18, 30 and 60ft were generated. The generalized contours were compared to the existing ENC/RNC contours to look for general trends in the data. The results are discussed below.

D.1.1 Raster Charts

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

Chart	Scale	Edition	Edition Date	LNM Date	NM Date
13283	1:20000	22	04/2013	05/20/2014	06/24/2014

Table 14: Largest Scale Raster Charts

13283

In general this survey and chart soundings agree. Areas of shoaling and accreation are highlighted in the images below.

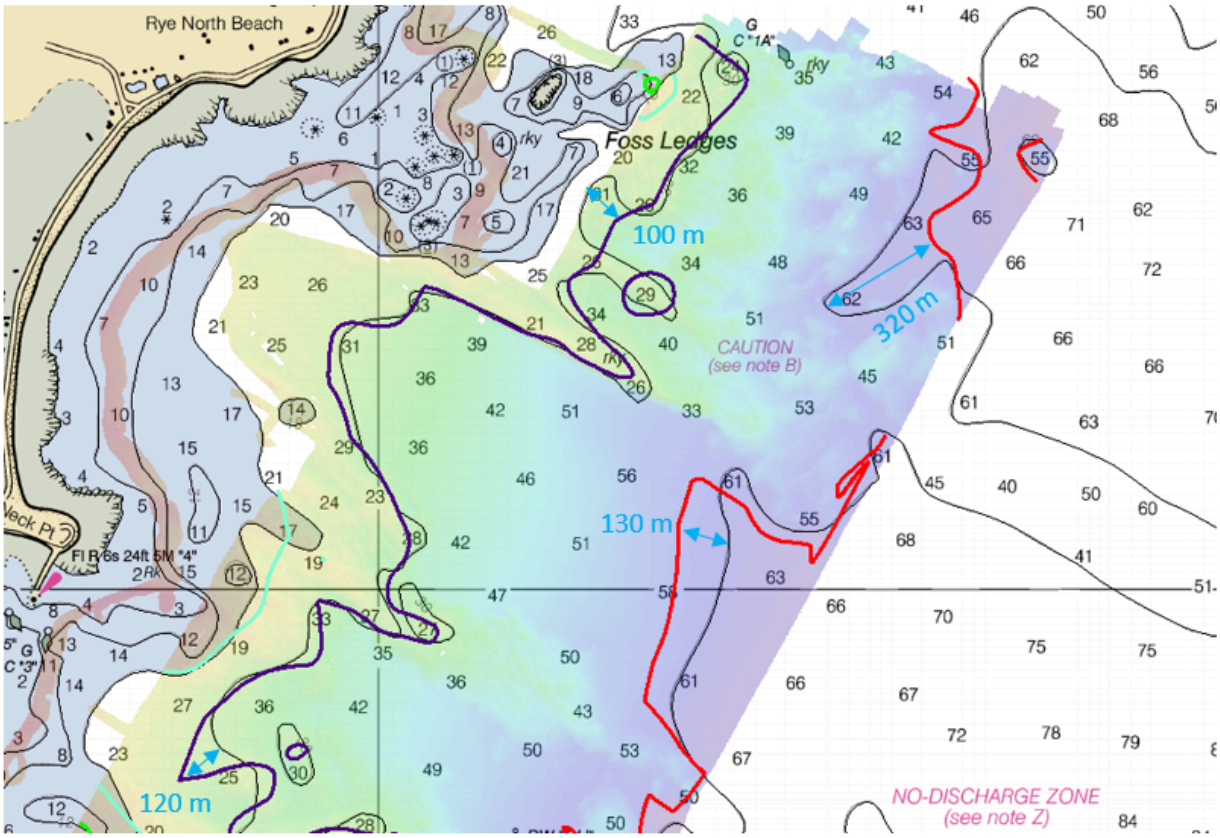


Figure 23: Chart comparison of North end of survey. Colored contours are from current survey.

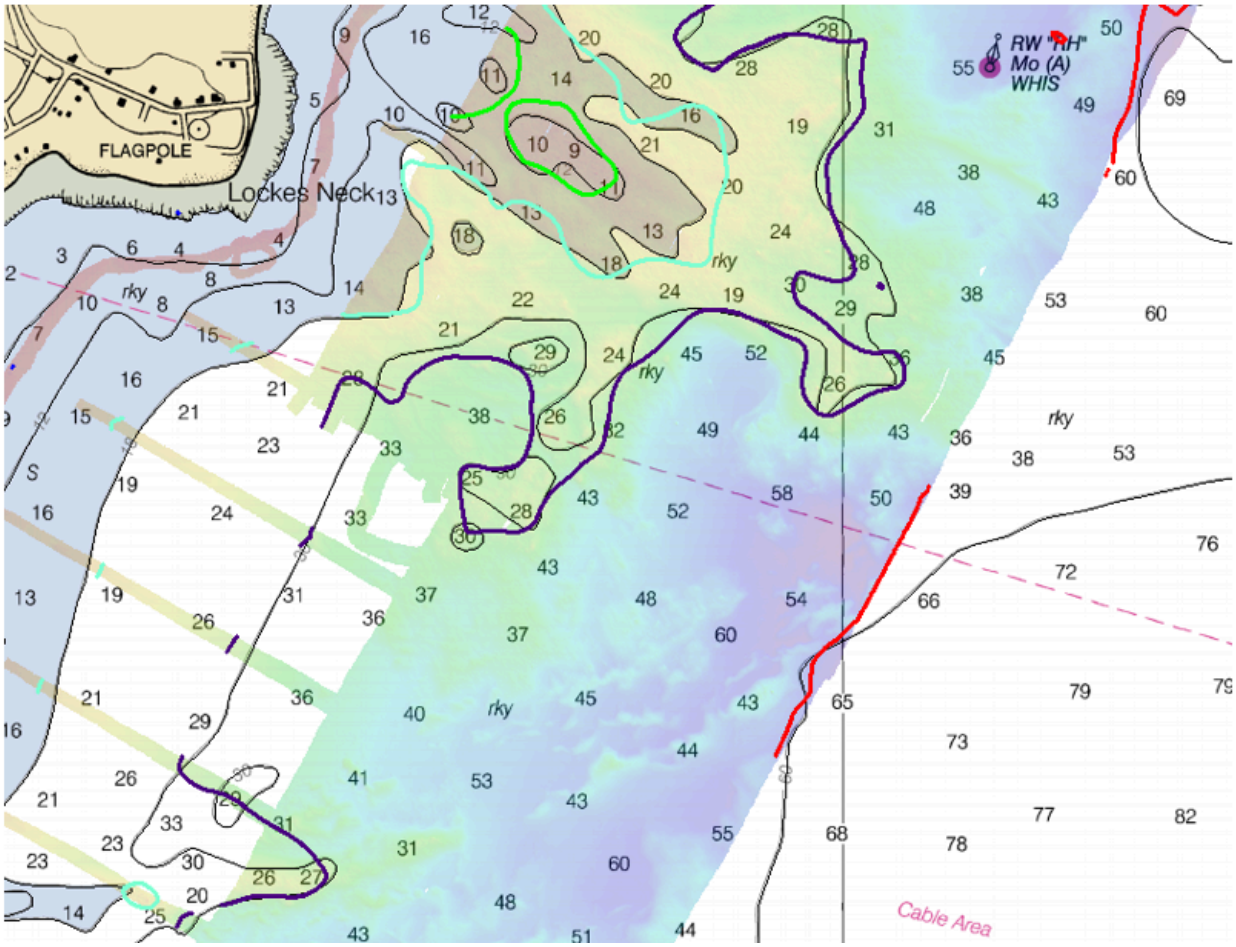


Figure 24: Chart comparison of middle survey area. Colored contours are from current survey.

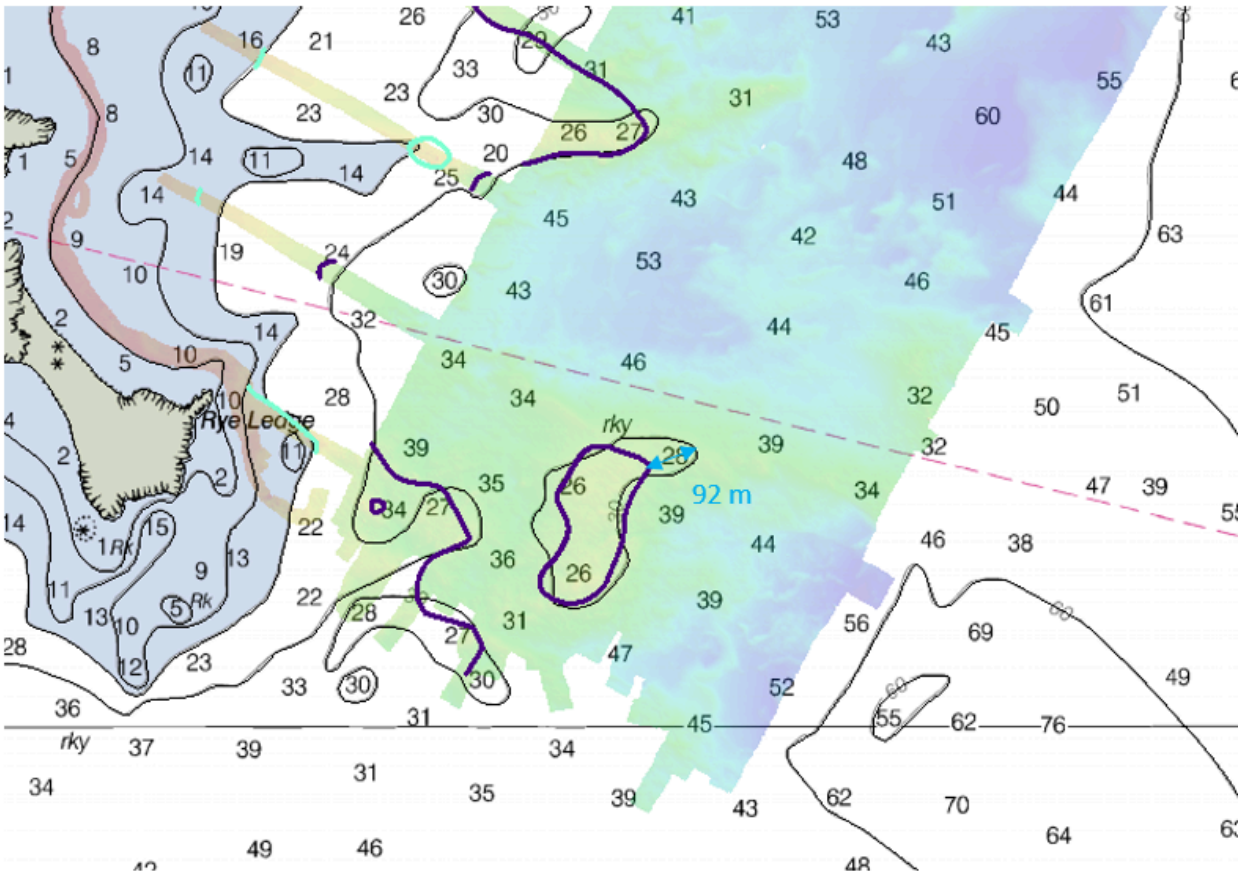


Figure 25: Chart comparison of southern survey area. Colored contours are from current survey.

D.1.2 Electronic Navigational Charts

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

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US5NH02M	1:20000	18	10/01/2013	04/30/2014	NO

Table 15: Largest Scale ENCs

US5NH02M

The ENC agrees with the associated RNC discussed above. See above for comparison to current survey.

D.1.3 AWOIS Items

No AWOIS items were assigned for this survey.

D.1.4 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.5 Charted Features

No charted features exist for this survey. Figure 22 shows the distribution of rock point features (including DtoNs) as well as the seabed characteristics from bottom sample grabs and Figure 23 shows the distribution of rock area features.

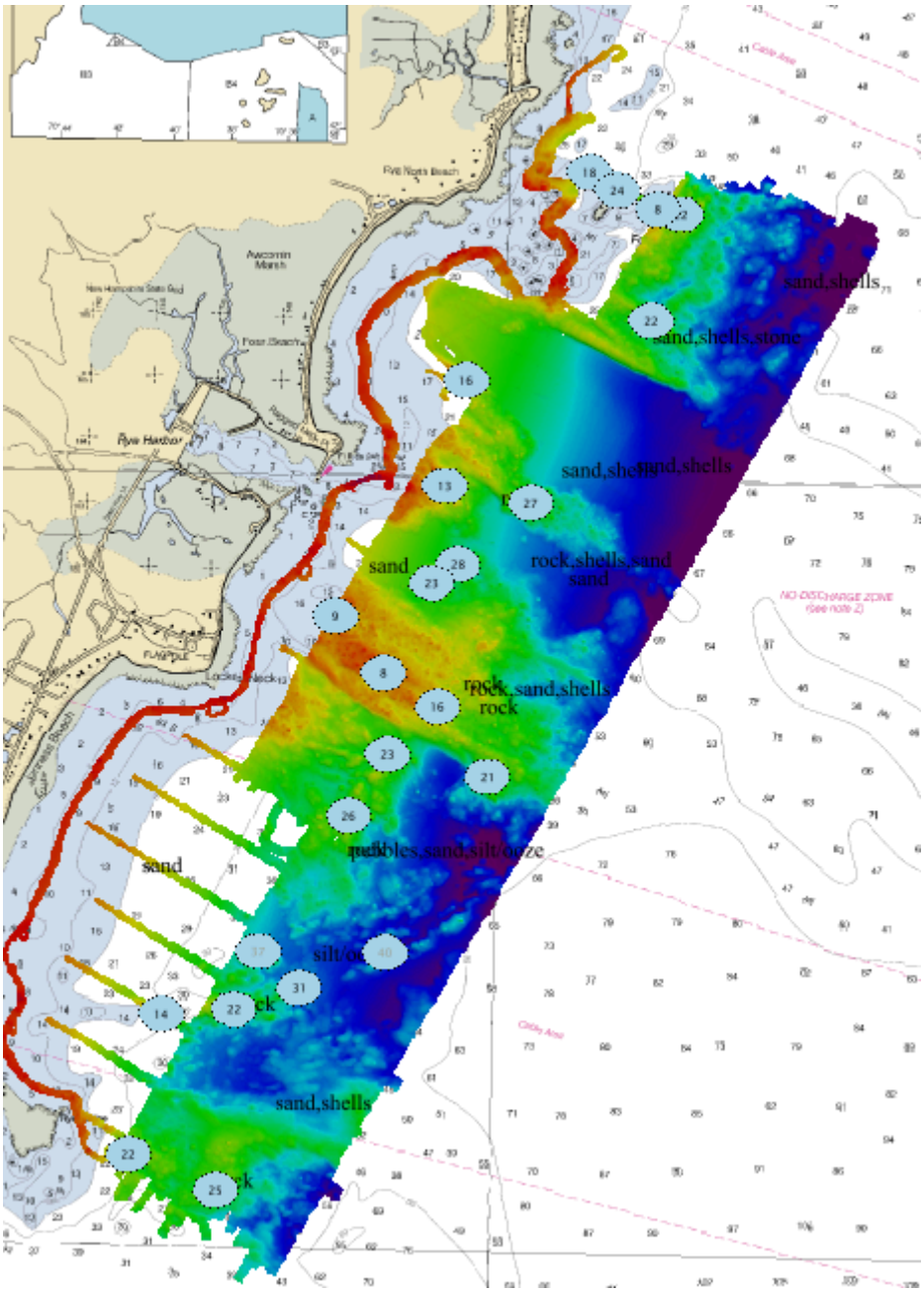


Figure 26: Rock Point features and seabed characteristics

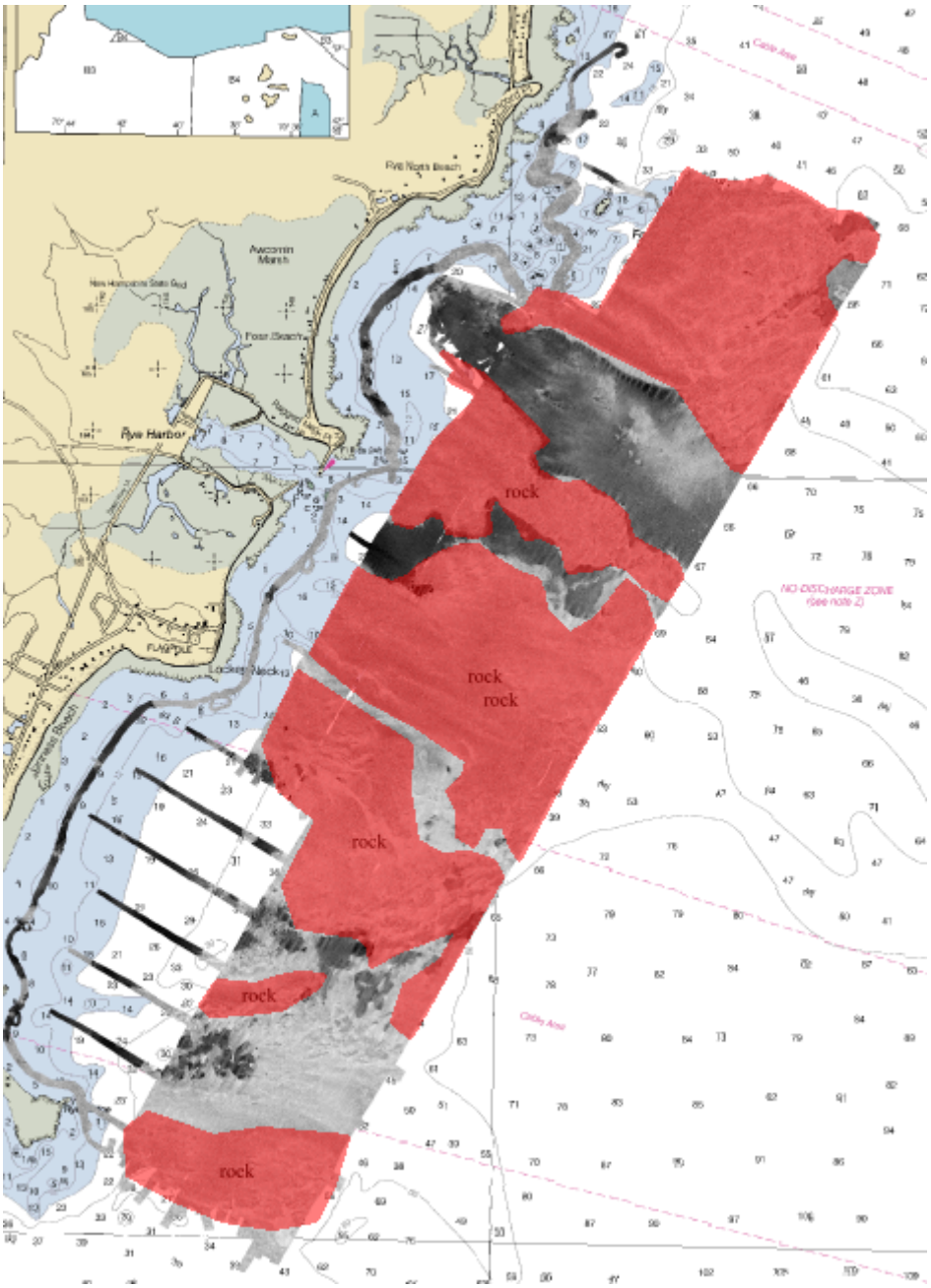


Figure 27: Rock area features

D.1.6 Uncharted Features

All features are included in the final feature file.

D.1.7 Dangers to Navigation

Danger to Navigation Reports are included in Appendix II of this report.

D.1.8 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.9 Channels

No channels exist for this survey. There are no designated anchorages, precautionary areas, safety fairways, traffic separation schemes, pilot boarding areas, or channel and range lines within the survey limits.

D.1.10 Bottom Samples

12 bottom samples were acquired on day 181 and 182. The locations of the bottom samples were selected based on the backscatter mosaic. Results of bottom samples are included in Separates as well as the digital bottom sample .hob file.

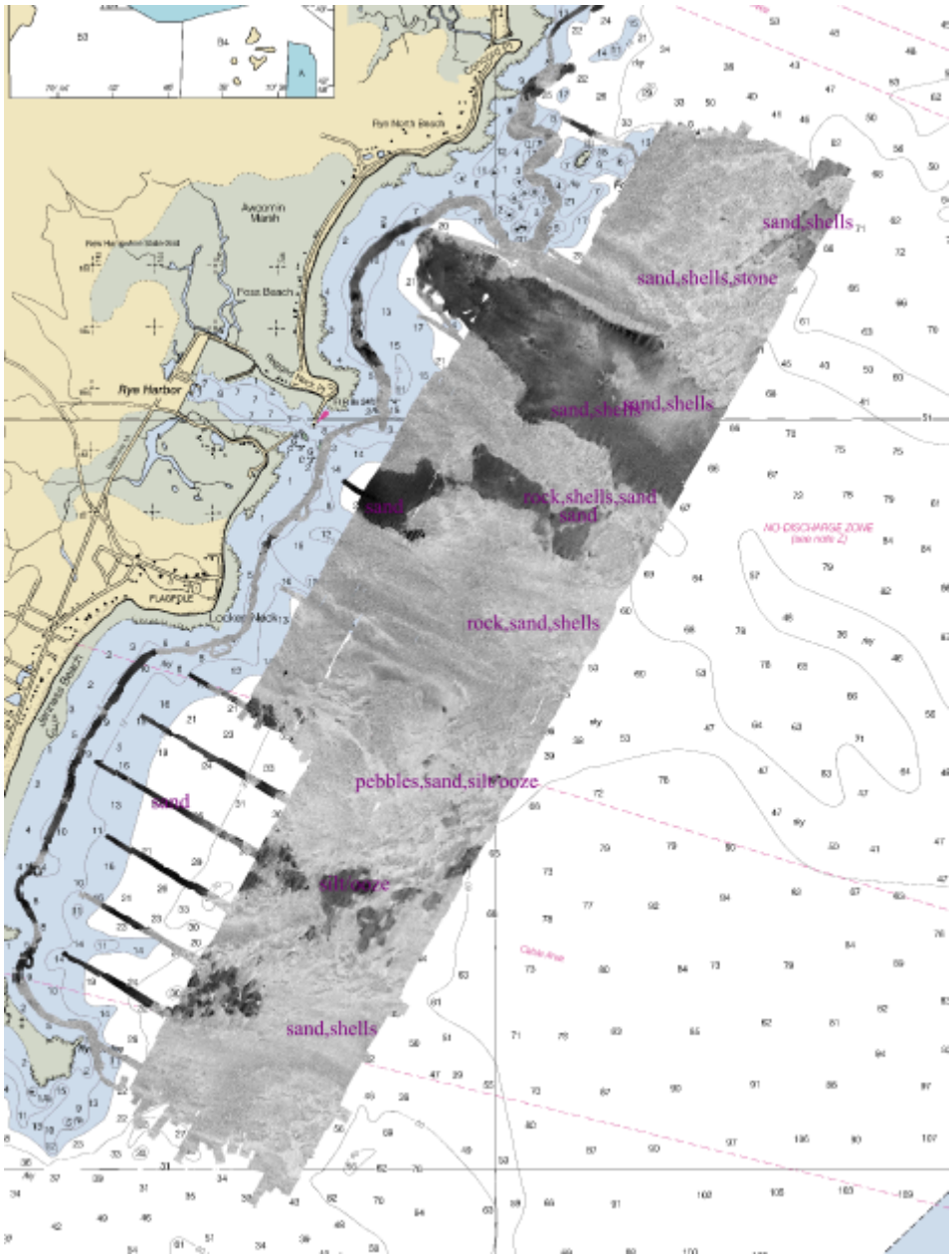


Figure 28: Bottom Sample locations

D.2 Additional Results

D.2.1 Shoreline

Shoreline data was collected but for the time constraint of the 2014 Summer Hydro Class, this data was NOT investigated for features or DtoNs and was NOT cleaned.

D.2.2 Prior Surveys

Prior survey comparisons were discussed in the junction analysis section of this DR.

D.2.3 Aids to Navigation

Aids to navigation (ATONs) exist for this survey, but were not investigated.

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

No submarine features exist for this survey.

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.2.9 Construction and Dredging

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

D.2.10 New Survey Recommendations

Additional data between the 2005 FUGRO lidar data and this survey was not collected due to time constraints and is recommended to be surveyed.

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.

Report Name	Report Date Sent
Data Acquisition and Processing Report	2014-07-11
Horizontal and Vertical Control Report	2014-07-11

Approver Name	Approver Title	Approval Date	Signature
Semme Dijkstra	Chief of Party	07/11/2014	
Andrew Armstrong	Chief of Party	07/11/2014	

F. Table of Acronyms

Acronym	Definition
AHB	Atlantic Hydrographic Branch
AST	Assistant Survey Technician
ATON	Aid to Navigation
AWOIS	Automated Wreck and Obstruction Information System
BAG	Bathymetric Attributed Grid
BASE	Bathymetry Associated with Statistical Error
CO	Commanding Officer
CO-OPS	Center for Operational Products and Services
CORS	Continually Operating Reference 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
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 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

APPROVAL PAGE

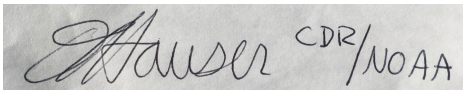
W00502

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 NCEI for archive

- Descriptive Report
- Collection of Bathymetric Attributed Grids (BAGs)
- Collection of backscatter mosaics
- Processed survey data and records
- Bottom Samples
- GeoPDF of survey products

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.



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Approved:_____

Commander Olivia Hauser, NOAA
Chief, Pacific Hydrographic Branch