H12964

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H12964

LOCALITY

State(s):	Michigan
General Locality:	Lake Huron
Sub-locality:	5 NM North of Thunder Bay Island

2016

CHIEF OF PARTY
Tyanne Faulkes

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

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

H12964

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):	**Michigan**
General Locality:	**Lake Huron**
Sub-Locality:	**5 NM North of Thunder Bay Island**
Scale:	**60000**
Dates of Survey:	**08/09/2016 to 08/30/2016**
Instructions Dated:	**08/24/2016**
Project Number:	**S-X937-ONMS-16**
Field Unit:	**NOAA R/V Storm**
Chief of Party:	**Tyanne Faulkes**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Side Scan Sonar**
Verification by:	**Atlantic Hydrographic Branch**
Soundings Acquired in:	**meters at Low Water Datum**

Remarks:

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Any revisions to the Descriptive Report (DR) generated during office processing are shown in bold red italic text. The processing branch maintains the DR as a field unit product, therefore, all information and recommendations within the body of the DR are considered preliminary unless otherwise noted. The final disposition of surveyed features is represented in the OCS nautical chart update products. All pertinent records for this survey, including the DR, are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via https://www.ncei.noaa.gov/.

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Descriptive Report to Accompany Survey H12964

Project: S-X937-ONMS-16

Locality: Lake Huron

Sublocality: 5 NM North of Thunder Bay Island

Scale: 1:60000

August 2016 - August 2016

NOAA R/V Storm

Chief of Party: Tyanne Faulkes

A. Area Surveyed

Survey H12964 was conducted 5 nautical miles north of Thunder Bay Island as shown in Figure 2.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
45° 8' 38.93" N 83° 15' 33.94" W	45° 4' 54.31" N 83° 10' 31.86" W

Table 1: Survey Limits

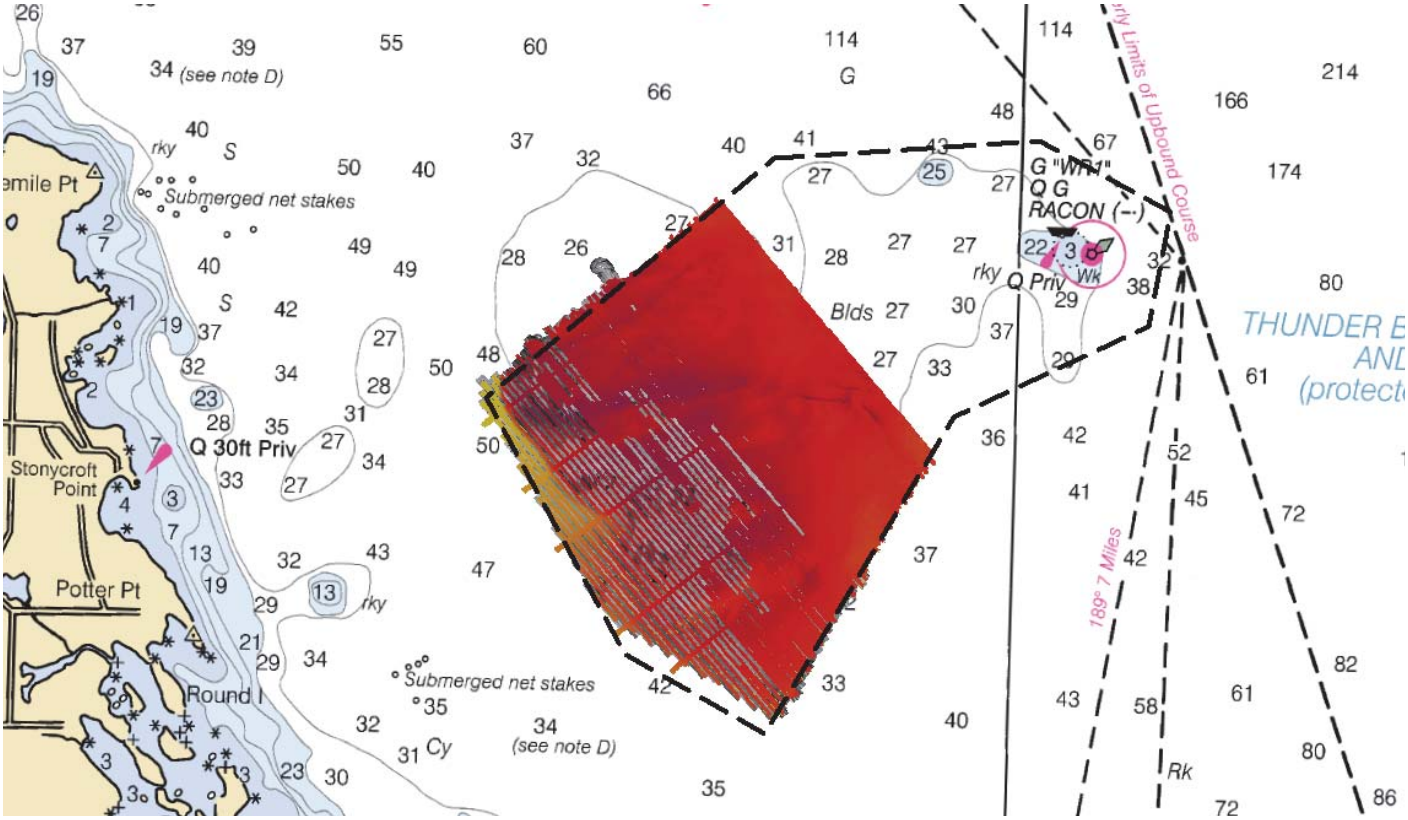


Figure 1: Survey coverage shown with project area assigned in the Project Instructions.

Deviations from the survey limit requirements did occur on survey H12964. Preliminary project instructions were not submitted to the field party until a week into the survey. The hydrographer created a preliminary survey boundary utilizing an image provided in email correspondence. The southwest portion of the assigned sheet differed from what was estimated by the hydrographer (See Figure 1). The hydrographer used their discretion to focus survey efforts on defining the charted shoal rather than surveying the deeper area.

Due to weather and time constraints the entirety of the survey area was not completed.

A.2 Survey Purpose

This project was conducted to support the Great Lakes Environmental Research Laboratory (GLERL) and Thunder Bay National Marine Sanctuary (TBNMS) hydrographic survey project off the coast of Alpena, MI. This survey is located in NW Lake Huron within the Thunder Bay National Marine Sanctuary. Survey data from H12964 of this project is intended to supersede all prior survey data in the common area.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

The following table lists the coverage requirements for this survey as assigned in the project instructions:

Water Depth	Coverage Required
All waters in survey area	For H12964, Complete Coverage accomplished using either: A) Complete covereage MBES depth and backscatter data, or B) 100% SSS coverage with concurrent set line spacing MBES depth and backscatter data. Refer to HSSD Section 5.2.2.3.

Due to limited field resources, backscatter was not collected for this survey.

To accomplish the coverage requirements for H12964 the hydrographer utilized both complete multibeam coverage and 100% SSS coverage. 100% SSS coverage was initially attempted but due to a thermocline in the area refraction greatly impacted the quality of the sidescan imagery (See Section B.2.6 for more discussion on this topic). Complete multibeam coverage commenced on DN231.

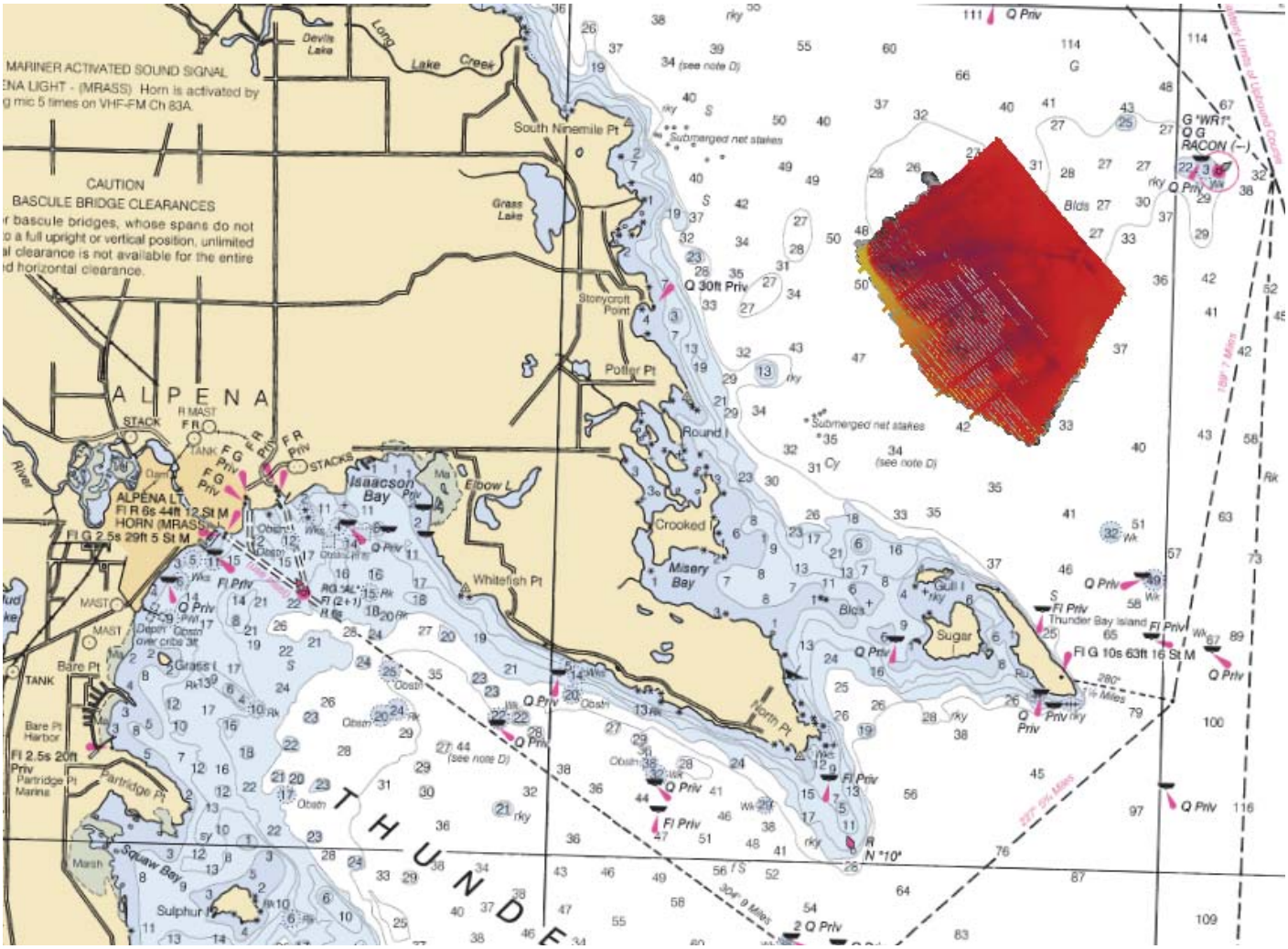


Figure 2: Coverage area of survey H12964.

A.5 Survey Statistics

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

	HULL ID	*R5002*	*Total*
LNM	SBES Mainscheme	0	0
	MBES Mainscheme	116.32	116.32
	Lidar Mainscheme	0	0
	SSS Mainscheme	0	0
	SBES/SSS Mainscheme	0	0
	MBES/SSS Mainscheme	135.40	135.4
	SBES/MBES Crosslines	11.65	11.65
	Lidar Crosslines	0	0
Number of Bottom Samples			0
Number Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Investigated by Dive Ops			0
Total SNM			6.10

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
08/09/2016	222
08/10/2016	223

Survey Dates	Day of the Year
08/11/2016	224
08/12/2016	225
08/15/2016	228
08/16/2016	229
08/26/2016	239
08/29/2016	242
08/30/2016	243

Table 3: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

There is no Data Acquisition and Processing Report associated with this survey as it is an outside source survey. The hydrographer intends on providing relevant information in the Descriptive Report.

B.1.1 Vessels

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

Hull ID	***R5002***
LOA	15.4 meters
Draft	1.1 meters

Table 4: Vessels Used

Figure 3: Research Vessel STORM.

The Research Vessel STORM (R5002), shown in Figure 3, acquired all surveyed sounding during operation for H12964.

B.1.2 Equipment

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

Manufacturer	Model	Type
Reson	8101	MBES
Applanix	POSMV V4	Positioning and Attitude System
Klein	3000	SSS
Trimble	DSM-132	Positioning System
Sontek	Castaway CTD	Conductivity, Temperature, and Depth Sensor

Table 5: Major Systems Used

A spatial reference survey was performed by the National Geodetic Survey on April 9th, 2010 in Muskegon, Michigan. Offsets from this report were utilized in the data acquisition systems as well as the HIPS Vessel File (HVF).

The Reson 8101 is a 240 kHz multibeam system with a swath coverage of 150°. The swath is made up of 101 discrete beams with an along-track and across-track beamwidth of 1.5°. It has a specified depth range of up to 500 meters.

B.2 Quality Control

B.2.1 Crosslines

Crosslines acquired for this survey totaled 4.63% of mainscheme acquisition.

Crosslines were run on DN243 with the expectation that there would be two more days of data acquisition on project. Due to inclement weather additional survey days were not performed. This left some swaths of crossline data that had no corresponding mainscheme overlap (Figure 4). The hydrographer rejected the navigation of these lines where overlap did not exist to not over-inflate total linear nautical mileage statistics associated with said crosslines.

A geographic plot of crosslines is shown in Figure 5. To evaluate crossline agreement, two 1-meter surfaces were created: one from crossline depths, the other from mainscheme depths. These two surfaces were differenced using CARIS HIPS/SIPS. More than 856 thousand nodes have a difference value range from -23.84 meters and 0.85 meters. Large differences were examined by the reviewer. It was found that these differences were due to fliers in the crossline surface that does not impact the final bathymetry product. The statistical analysis of the differences between the mainscheme and crossline surfaces is shown in Figure 6. The average difference between the surfaces is -0.01 meters with a standard deviation of 0.32 meters; ninety

five percent of nodes agree within +/- 0.15 meters of the mean. These values are well within the total vertical uncertainty for the depth of this survey.

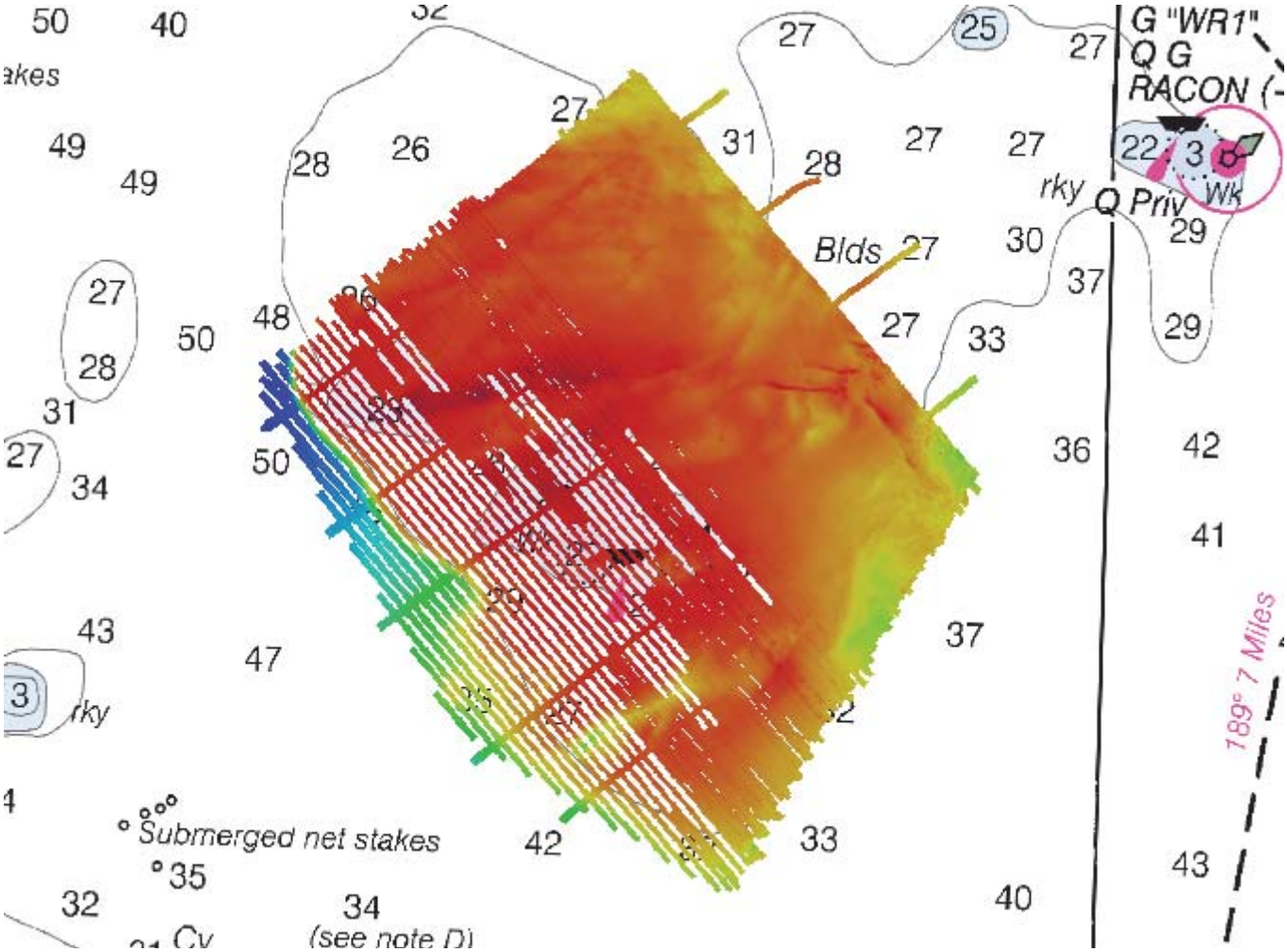


Figure 4: The ends of the crosslines to the east were trimmed during data processing.

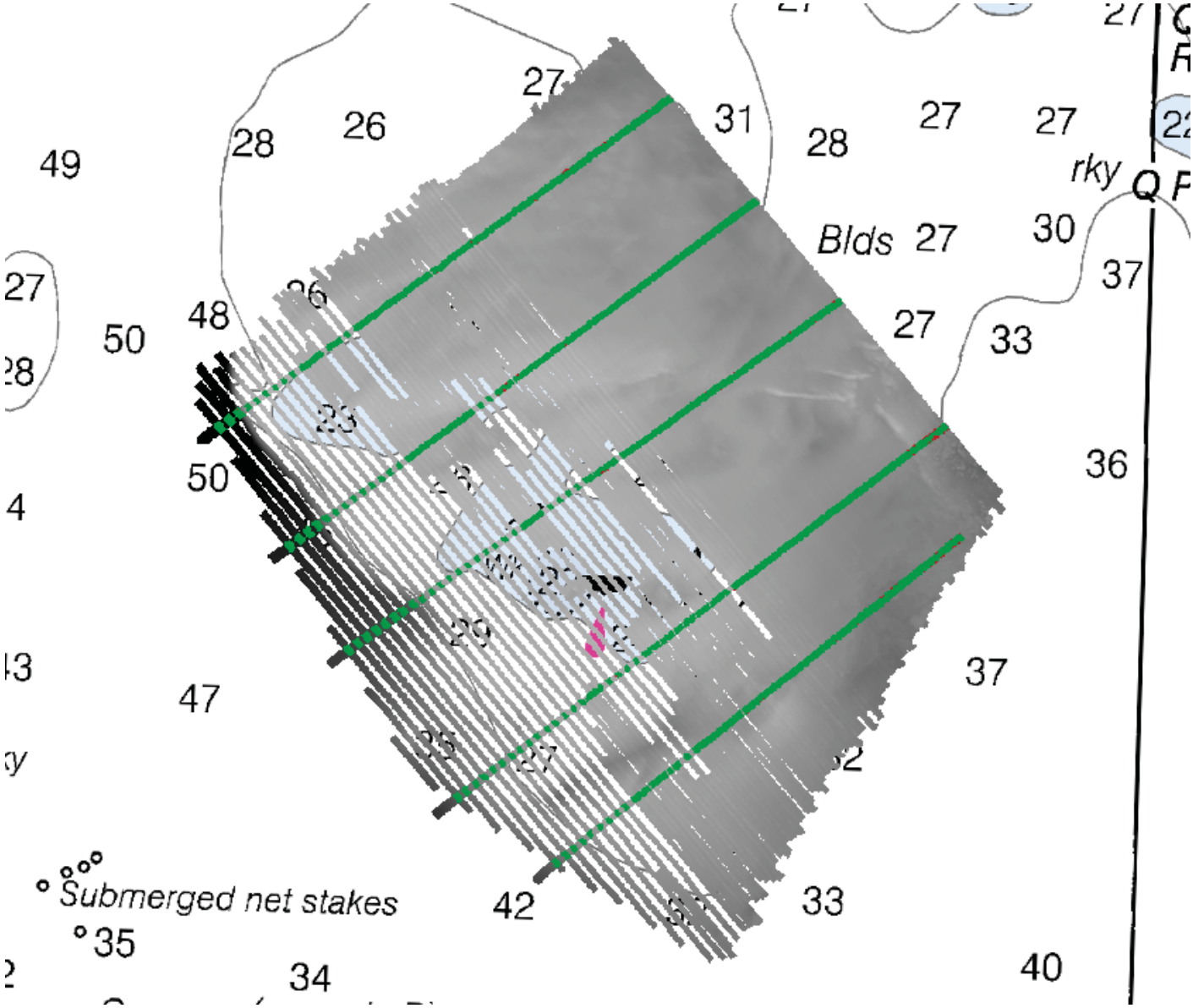
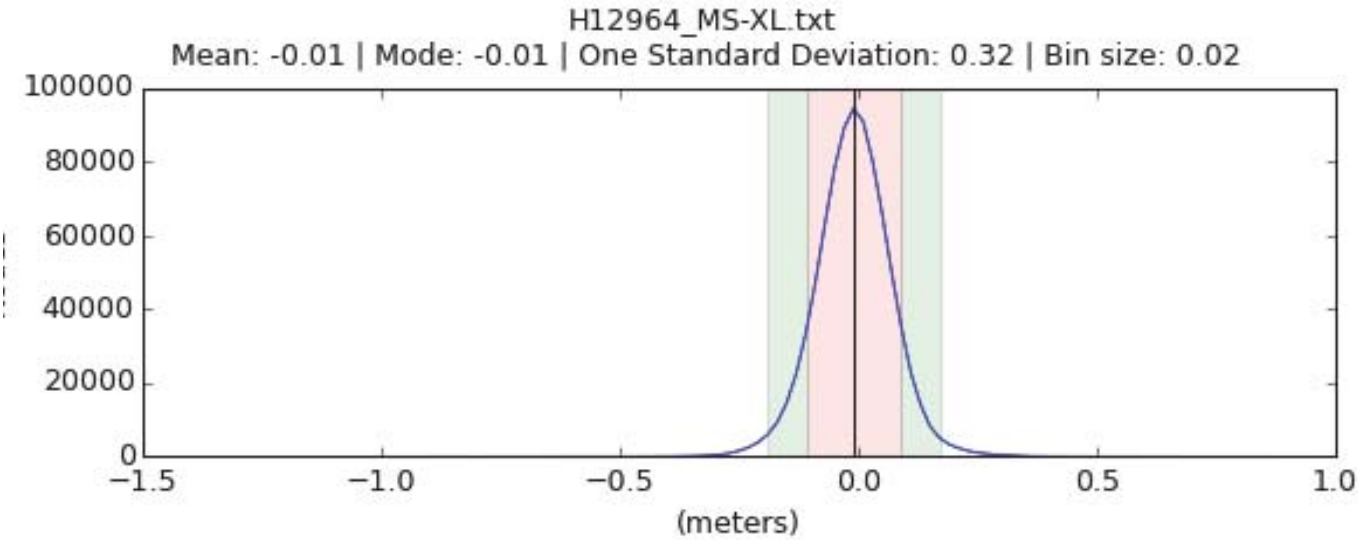
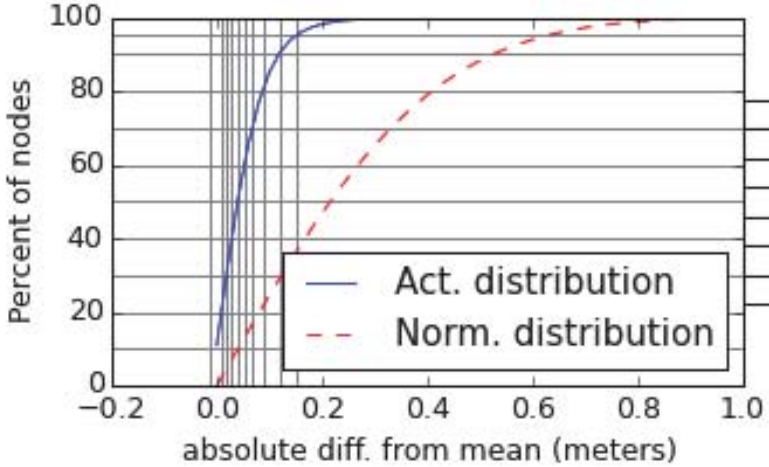


Figure 5: H12964 MBES crossline data overlaid on mainscheme data, shown in gray. Nodes failing total vertical uncertainty standards are shown in red.





Percent of nodes	Deviation (m)
50%	+/- 0.04
60%	+/- 0.05
70%	+/- 0.07
80%	+/- 0.09
90%	+/- 0.12
95%	+/- 0.15

Figure 6: H12964 crossline difference statistics: mainscheme minus crossline.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning	Method
0.031 meters	0 meters	Discrete Zoning

Table 6: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Surface
R5002	1 meters/second		1 meters/second

Table 7: Survey Specific Sound Speed TPU Values.

Total Propagated Uncertainty (TPU) parameters for sound speed and tide data for H12964 are shown in Table 6 and 7. Because of the very small tidal range on Lake Huron, tide zoning errors are not likely to be significant therefore CO-OPS did not provide an uncertainty value to their zoning files. The hydrographer requested further information from CO-OPS, namely the uncertainty of the tide gauge. The tidal measured value was derived from adding the sensor, leveling error (at the third order), and the data processing uncertainties provided in their response (See Supplemental Correspondence in Appendix II).

B.2.3 Junctions

There are no junction surveys which are associated with this project.

There are no contemporary surveys that junction with this survey.

B.2.4 Sonar QC Checks

There is no DAPR associated with this survey. Further information about sonar calibrations can be found in Section B.3.1 in this report.

B.2.5 Equipment Effectiveness

Issues with System Integration

After data collection on DN222 it was made apparent that the integration between the Reson 8101, POSMV, and Hypack were not integrated properly. Motion and timing information was not being relayed to the Reson. This caused motion artifacts that greatly impacted the MBES data. Michael Annis with the Navigation Response Branch was called to assist with the integration issue which was subsequently fixed on DN223. The MBES lines were acquired again. The integration did not impact the SSS data, therefore it was not re-acquired.

Unfortunately the settings in the POSMV did not save properly and the timing was once again not being relayed to the Reson from DN224-228 which resulted in a latency offset. By examining the HSX timestamps, the hydrographer discovered the timing offset was progressively getting worse. This issue was resolved on DN231.

To account for this timing offset, the hydrographer calculated the timing offset for each line by subtracting the time stamp from the sonar from the GPS time stamp. In a spreadsheet located in Separates II the hydrographer recorded the GPS time and the sonar time from the HSX from every line. These times were differenced and then averaged per day to develop a latency offset that was then used in the time correction entry in Transducer 1 in the HVF. On the occasion where the average time offset did not improve the data quality, the hydrographer input the exact time offset for the line. This also appears in the HVF and the spreadsheet provided.

This does not alleviate all instances of motion artifacts in the data but drastically reduces them (See Figure 7). The uncertainty of the product surfaces are within TVU specifications but when examining these artifacts in CARIS Subset Editor, one can see that the differences between the peaks and valleys are greater than the total allowable uncertainty (See Figure 8).

To further improve the data roll timing bias values were derived by using the calibration editor in HIPS. The artifacts caused the data to look like bow ties within the line (See Figure 9). These values were then entered into the roll entry of the HVF. It is not known what caused these artifacts to appear in the data but one hypothesis is that there is a loose connection between the POSMV and the Reson which provides the sonar with motion data.

With the steps taken above, all motion errors were reduced to be within specification.

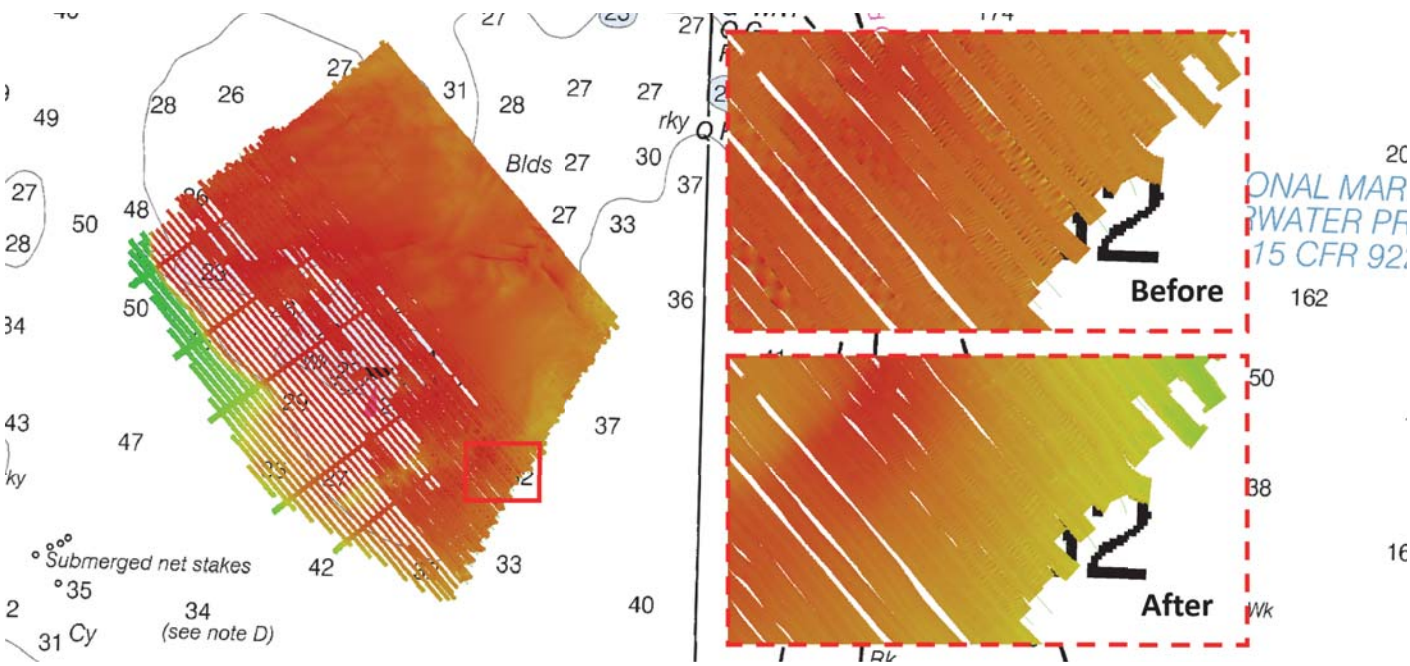


Figure 7: Example of area where no timing offset was applied and the resultant corrections to the data after timing offset was applied.

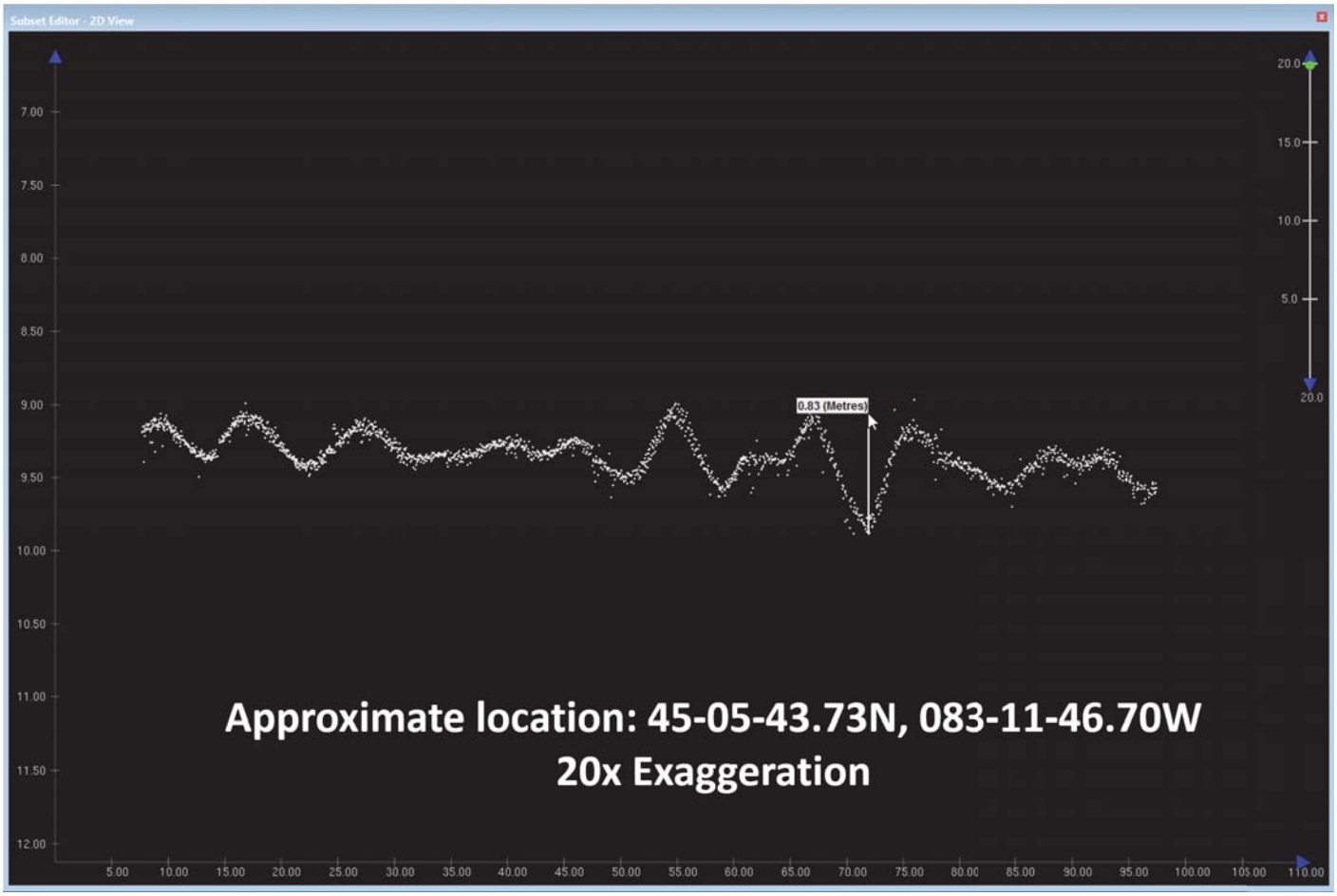


Figure 8: Example of motion artifacts from line 128_1343.

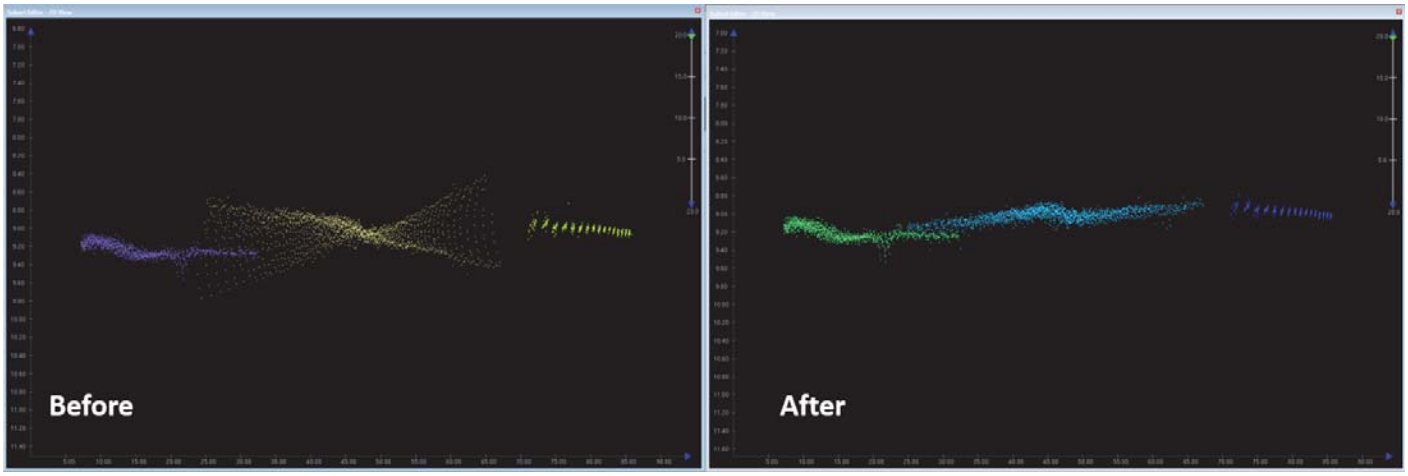


Figure 9: Before and after of application of roll timing error values.

Heave artifacts

Heave artifacts are present in the crossline data but are within uncertainty specifications.

Multibeam Refraction

Multibeam data collected on DN223 and 224 exhibit "smiling" and "frowning" which is typically due to refraction in the water column. These errors are minor at approximately 0.30m.

B.2.6 Factors Affecting Soundings

Refraction in Sidescan Coverage

Refraction does impact the quality of the SSS data (Figure 10). The hydrographer attempted to change the altitude of the fish but was unable to alleviate the refraction problem. To identify holidays in the SSS data caused by refraction, the hydrographer created two 50cm mosaics which consisted of every other line to identify the refraction. By using the mosaics as a guide, the hydrographer inspected impacted lines in side scan editor to confirm that the imagery was indeed of poor quality. When that was confirmed, the hydrographer created polygons of areas where holidays exist. These holiday polygons were then used as guides for the holiday line plan created by the hydrographer. Holiday fill lines were run on DN228-231.

Due to refraction in the sidescan data, the field party decided that there was no efficiency gained by using this tool. On DN239 the field party commenced full multibeam coverage.

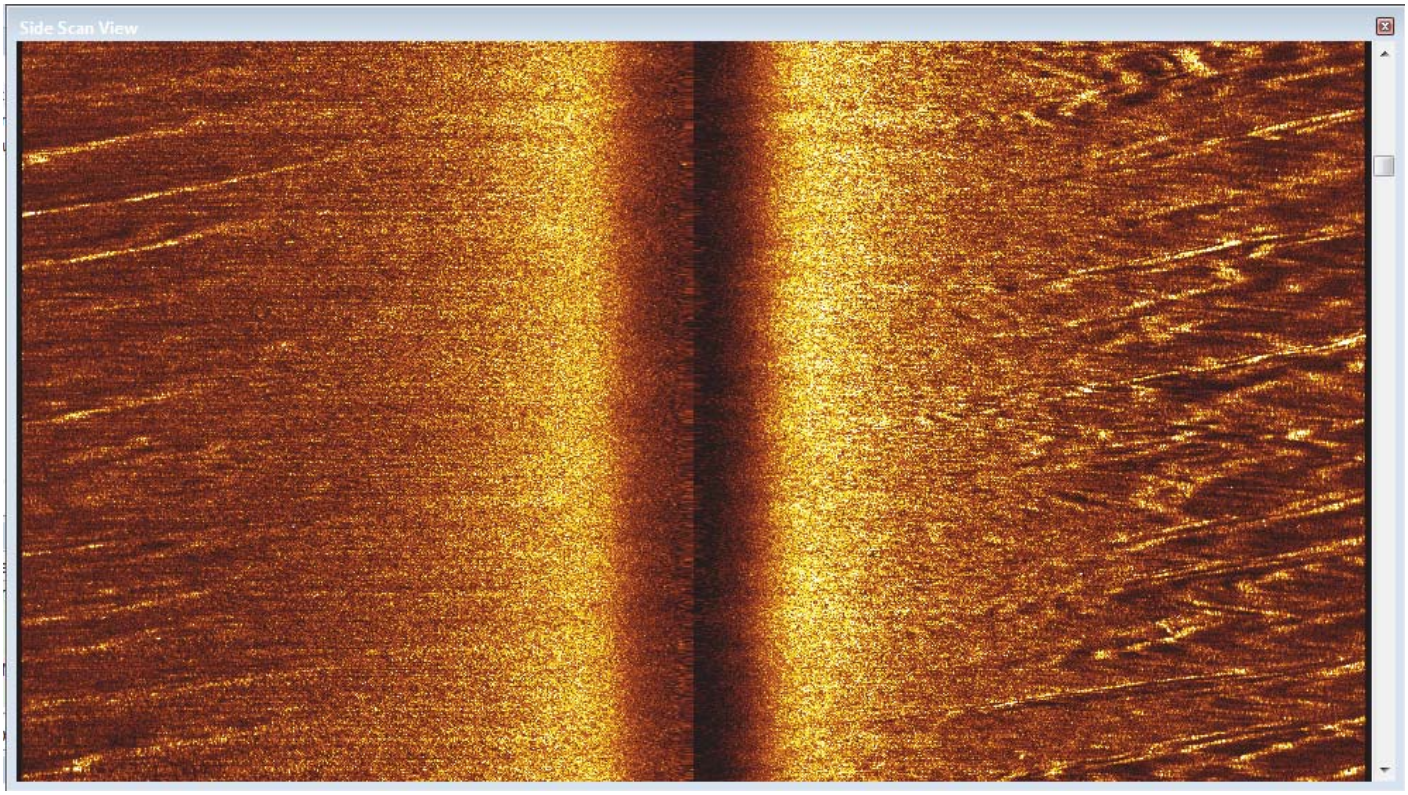


Figure 10: Example of refraction found in sidescan imagery.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: A total of fourteen (14) sound speed casts were taken throughout survey H12964. In general two casts were taken, one prior to the start of survey, the second at the end of the day. Some casts were taken greater than 250 meters from the survey grounds. Sound speed refraction does not negatively impact the quality of the multibeam data.

Majority of the data utilized the sound speed application method of nearest in distance within 4 hours. Three (3) lines utilized nearest within 6 hours (111_2115, 112_2140, and 113_2203).

Due to limited resources, annual calibrations and weekly confidence checks were not performed on this survey.

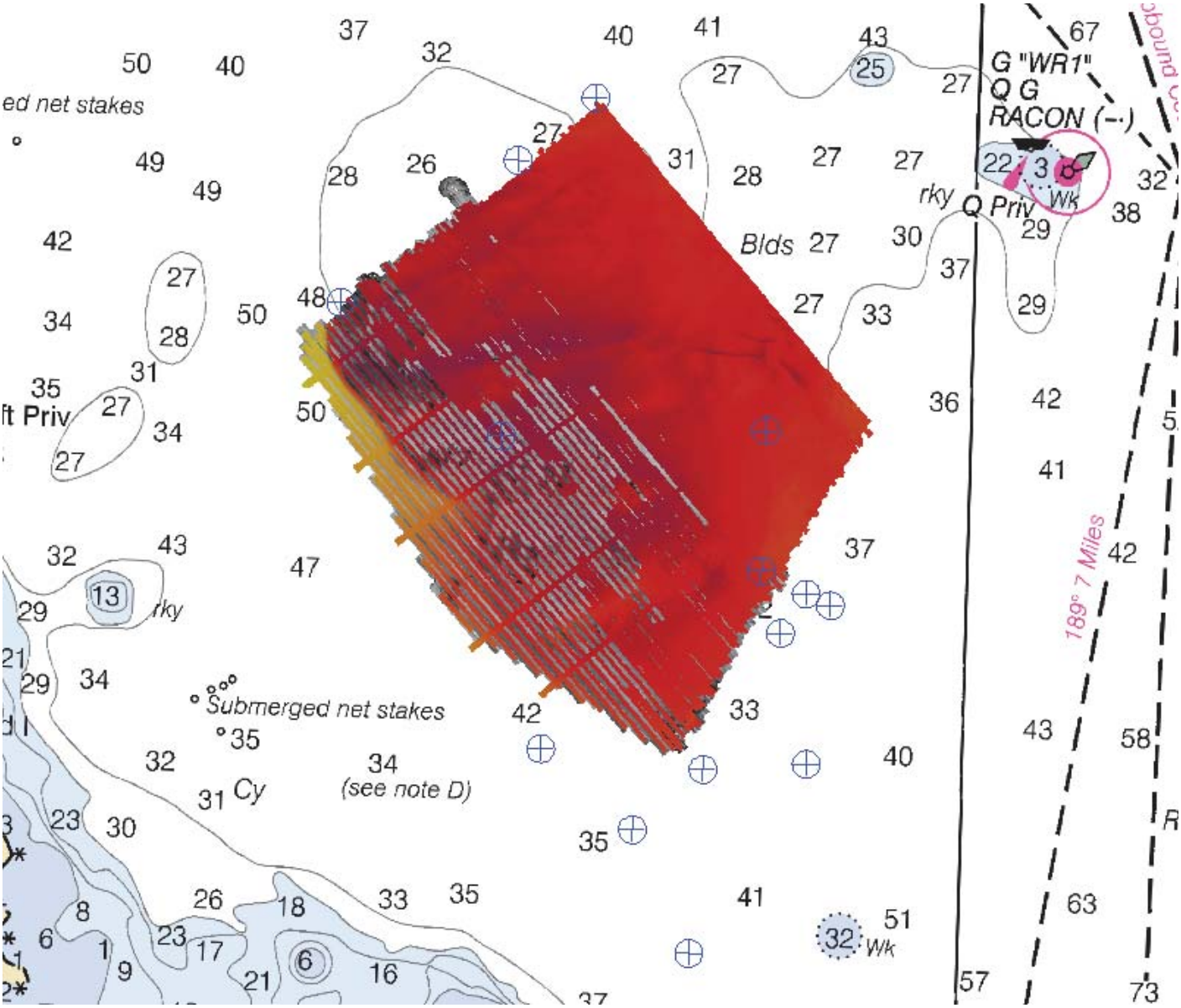


Figure 11: Spatial distribution of casts for survey H12964.

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

As there is no DAPR associated with this Descriptive Report, the following describes the Corrections to Echo Sounding utilized for this survey.

Vessel Offsets

Vessel offset correctors are the values used to describe the location of all hydrographic sensors in relation to a defined reference point. These values are needed to compute sensor lever arms needed to correct for vessel orientation and ultimately produce the final geographic position for every sounding collected. Included in the Separates II is the “2016 HVF summary” report. This report is a compilation of vessel reports for the R/V STORM. This vessel report is created by the CARIS HIPS and SIPS Vessel Editor and include values used for depth sensor bias angles, sensor offset and time corrections, dynamic draft, TPU values, SVP sensor offset and mounting angle, and waterline values.

For STORM the reference point (RP) is defined as the IMU. Offsets are entered account in the POSMV for offsets between the sonar to the IMU along with the sonar to the port antenna. For the STORM's HVF, all vessel offset values have been set to 0,0,0 in the Transducer 1 section of the HVF to avoid double-correction. The only exceptions to this are the SVP 1 offset values and waterline that are required for SV application.

Static and Dynamic Draft

Static draft correctors are the z-values used to describe the difference between the measured waterline on the hull and the reference point while the vessel is at rest. Since the distance between the reference point and transducers is known, it is elementary to derive the difference between the water line and the transducer. This value is required to correct for the draft of the transducer when computing the corrected water depths. Static draft corrector values are stored in the CARIS HVF as the waterline value. It is assumed that this value remains relatively unchanged since little difference in draft has been seen under various fuel loading conditions. The static draft was measured from a known benchmark on the hull of the STORM to the waterline utilizing a lead line and a steel tape.

Due to limited time and resources, a dynamic draft model was not derived for the STORM therefore is not utilized in the vessel's HVF.

System Alignments

System alignments were determined by running a patch test. Timing, pitch and yaw bias was determined using a target on the seafloor. And finally, roll bias was determined using the standard flat bottom method.

Biases were determined using the CARIS HIPS Calibration tool by the hydrographer. The multiple values determined for each bias by the hydrographer, and obvious outliers rejected before an average was determined. This average value was then applied to the bias in question and applied to the data before moving on to the next bias determination. Bias values were determined in the following order; timing, pitch, roll, and finally yaw. In addition to average values, standard deviation was also determined for each bias. These values were then used to adjust the Timing (s), MRU Roll/Pitch, and MRU Gyro uncertainties under TPU values in the HVF.

Positioning and Attitude

The STORM utilizes a heave filter integration method known as “TrueHeave” as described in Section 3 of the OCS Field Procedures Manual. It is standard procedure to begin logging the POS/MV Applanix .000 file at least 5 minutes before starting bathymetric data acquisition and letting it run for at least 5 minutes afterward. TrueHeave is loaded to lines in CARIS/HIPS and SIPS and is applied in post processing during SVP Correct and Merge in CARIS HIPS.

B.3.2 Calibrations

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

Calibration Type	Date	Reason
Patch Test	2016-08-10	Patch test prior to survey.

Table 8: Calibrations not discussed in the DAPR.

A patch test was run on DN223 by the field party though the time stamp in the HVF does not reflect this date. The sidescan (which is not used on this survey) receives its positioning information from the Trimble DSM-132 DGPS box. There is a known issue with some Trimble firmware which "will interpret the GPS time in error by 1024 weeks, receiver data outputs will have the wrong time reference" (See email from LT Charles Wisotzkey for further information). The Klein 3000 believes that the year is 1996 therefore without having that date in the HVF, data will not convert. The date issue does not impact multibeam data or the imagery data from the Klein 3000.

B.3.3 Side Scan Sonar Layback

Layback correctors are the values used to describe the location of side scan sonar sensors in relation to a defined reference point. The values for the STORM are referenced to the towpoint on the ship’s sheave block. The coordinates of this tow-point in addition the length of cable out are used to find the position of the side-scan sonar fish. These values are needed to correctly geo-reference imagery collected by the side scan sonar unit.

B.4 Backscatter

Raw Backscatter was required by the Project Instructions but due to limited field resources, backscatter was not collected for this survey.

B.5 Data Processing

B.5.1 Primary Data Processing Software

The following software program was the primary program used for bathymetric data processing:

Manufacturer	Name	Version
Caris	HIPS/SIPS	9.1.7

Table 9: Primary bathymetric data processing software

The following Feature Object Catalog was used: NOAA Extended Attribute Files V5_4.

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
H12964_MB_1m_LSW	CUBE	1 meters	6.75 meters - 16.92 meters	NOAA_1m	Complete MBES
H12964_MB_1m_LSW_Final	CUBE	1 meters	6.75 meters - 16.92 meters	NOAA_1m	Complete MBES

Table 10: Submitted Surfaces

B.5.3 Data Density

A density analysis performed on surface H12964_MB_1m_LWD_Final would result in 93% of nodes meeting the density specification. This would appear that the data does not meet specifications, but this is not the case. In the 2016 HSSD, the data density requirements differ between complete coverage multibeam (95% of nodes shall be populated with 5 or more soundings) and 100% side scan sonar coverage (80% of nodes shall be populated with 5 or more soundings). Because this survey uses both techniques, the hydrographer created two different surfaces to perform the density analysis. The first surface consisted of data collected from DN223 to 231 which was 100% side scan data. The second surface consisted of data collected from DN239 to 243 which was complete coverage multibeam. It was found that both surfaces meet the density requirements (Figures 14 and 16). Data density was an issue generally in the outerbeams even though there was appropriate overlap. For future surveys the field party should reduce survey speed to compensate for the sparse data in the outer edges of the swath at these depths.

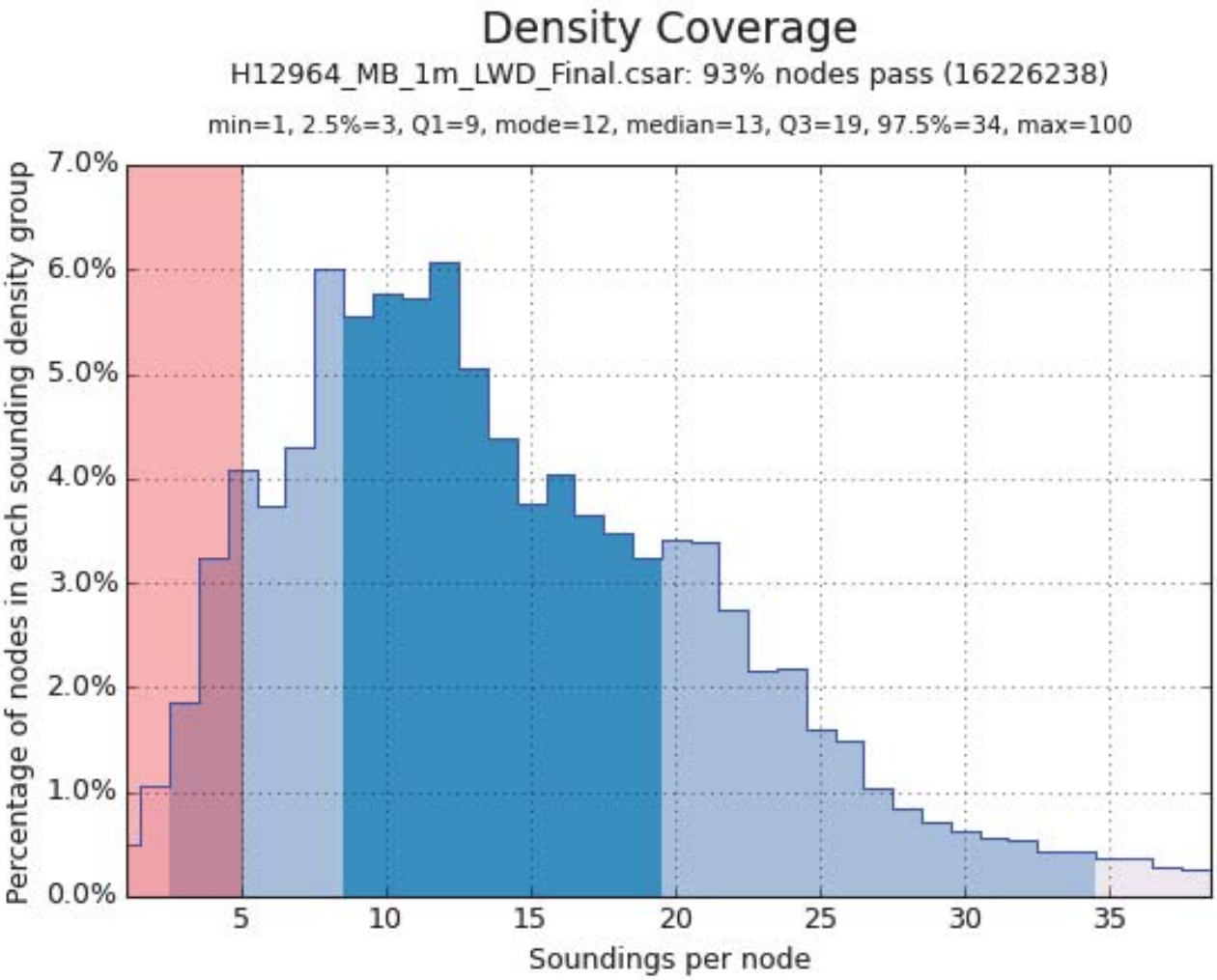


Figure 12: Data density statistics of finalized surface.

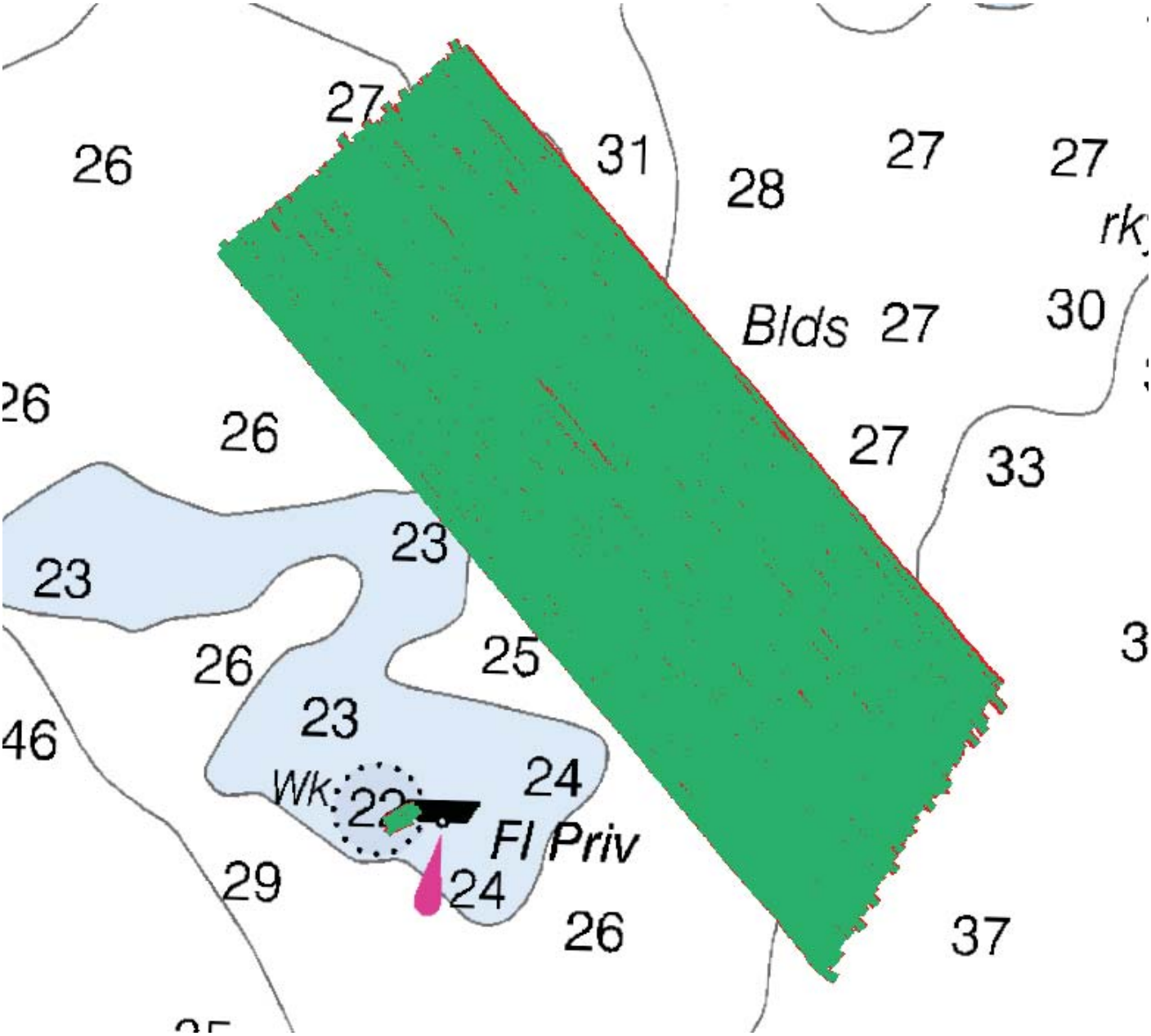


Figure 13: Complete multibeam coverage area. Nodes that fail are shown in red.

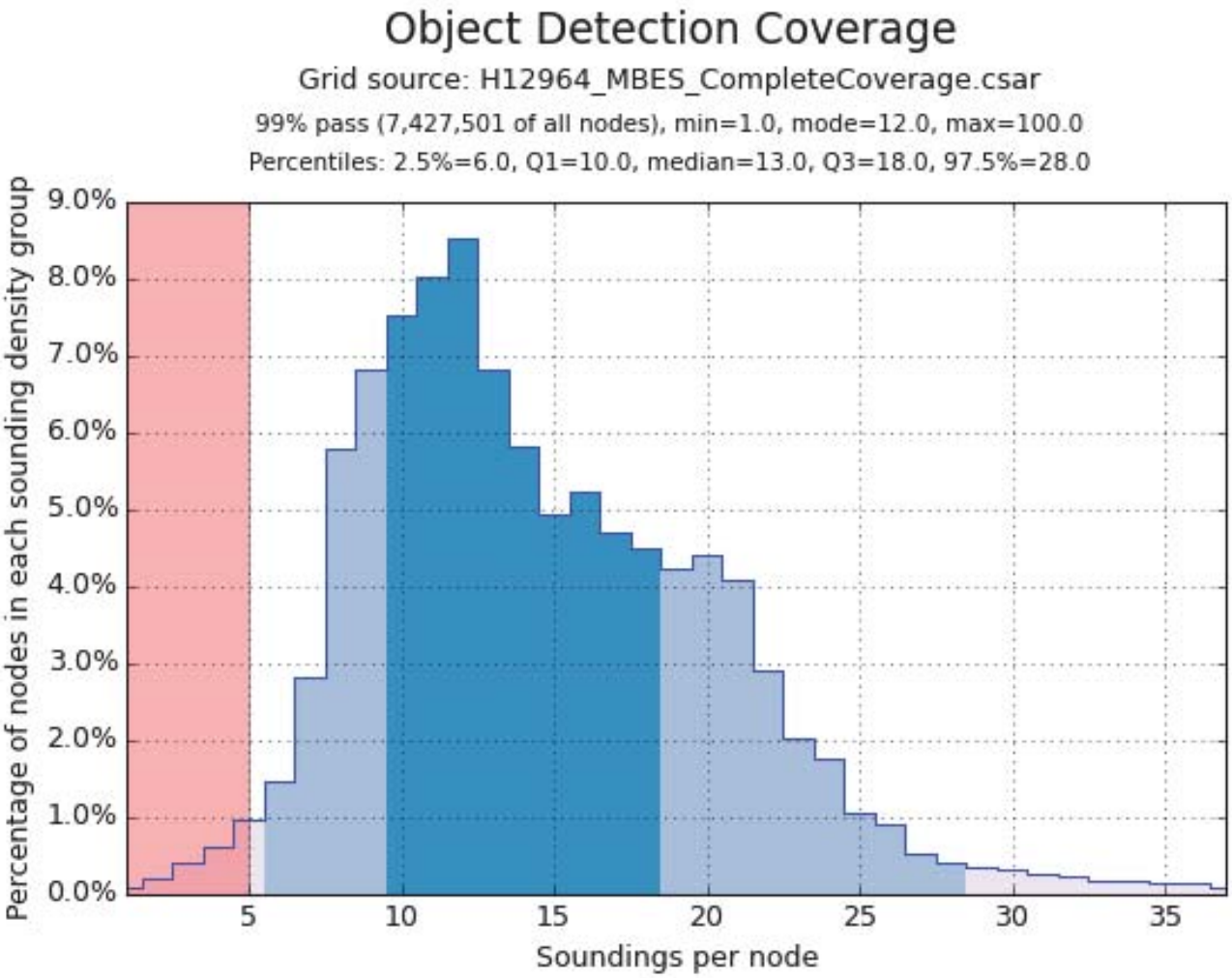


Figure 14: Data density statistics of complete multibeam coverage.

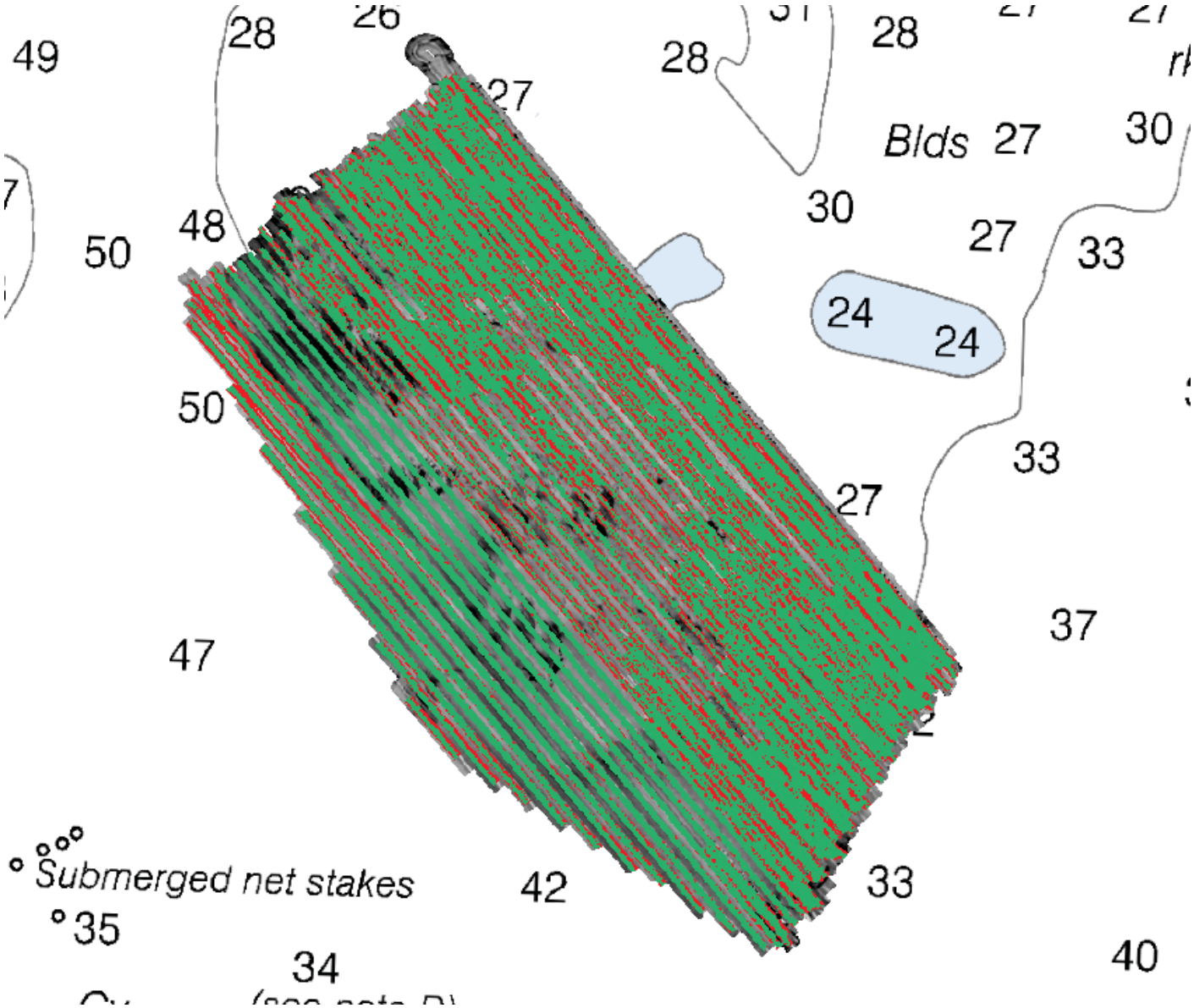


Figure 15: 100% SSS coverage area. Nodes that fail are shown in red.

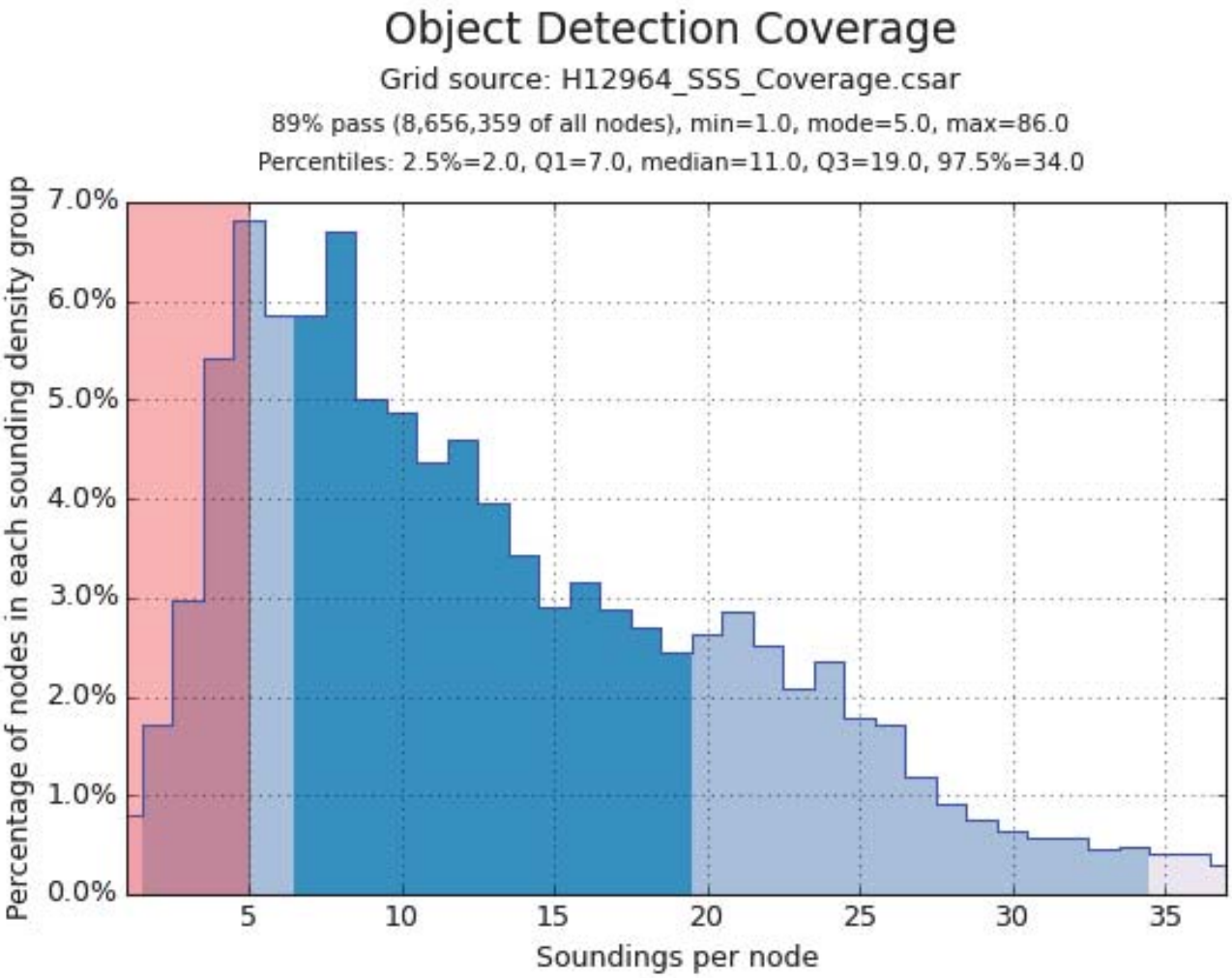


Figure 16: Data density statistics of 100% SSS data.

B.5.4 Total Vertical Uncertainty Analysis

HydrOffice QA tool was used to calculate the percentage of nodes which meet total vertical uncertainty (TVU) specifications. The resulting statistical analysis yielded 99.5% nodes both surfaces meet TVU specifications (See Figure 17). In addition, a custom layer was created for the finalized surfaces submitted in correlation with H12964. The layer was derived from the difference between the calculated uncertainties of individual nodes and the allowable uncertainty at the coupled node.

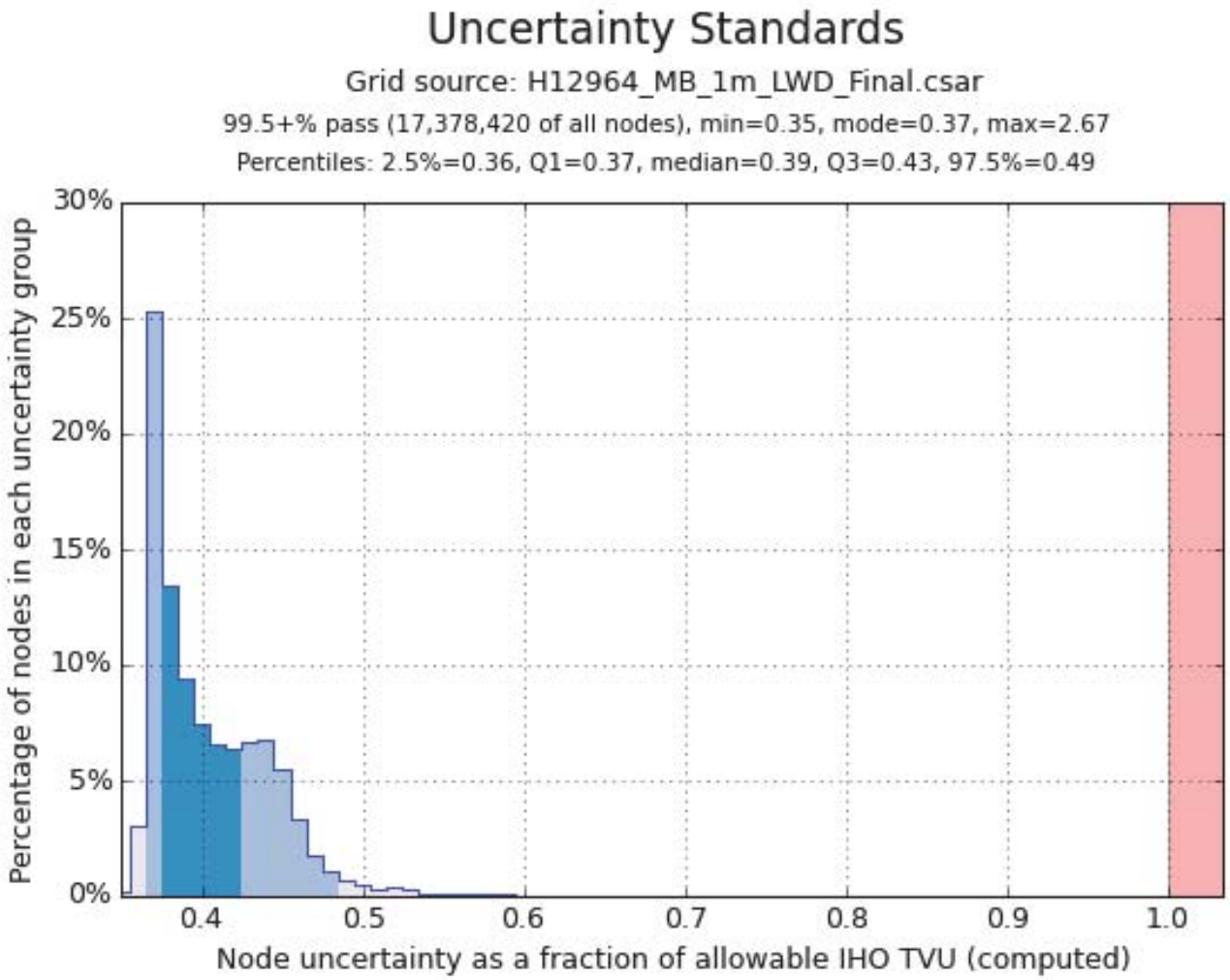


Figure 17: Total vertical uncertainty analysis for 1-meter finalized surface.

B.5.5 Filters

The RESON 8101 on the STORM is installed at a slight angle to the port. As a result the port-side beams are projected further through the water column and as a result those outerbeams tend to be more variable and more unreliable. The hydrographer utilized a bathymetric filter to filter out some of said outerbeams. The hydrographer has reviewed the data to ensure no significant features were eliminated by this filtering tool.

C. Vertical and Horizontal Control

Because the field unit did not install additional vertical and horizontal control stations an HVCR was not required for this survey.

C.1 Vertical Control

The vertical datum for this project is Low Water Datum.

Traditional Methods Used:

Discrete Zoning

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

Station Name	Station ID
Alpena, MI	9075065

Table 11: NWLON Tide Stations

File Name	Status
9075065.tid	Final Approved

Table 12: Water Level Files (.tid)

File Name	Status
X937NMS2016CORP.zdf	Final

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

A request for final approved tides was sent to N/OPS1 on 09/01/2016. The final tide note was received on 09/16/2016.

C.2 Horizontal Control

The horizontal datum for this project is World Geodetic System 1984 (WGS84).

The projection used for this project is 17N (EPSG: 32617).

DGPS was used for real-time positioning during acquisition.

The following DGPS Stations were used for horizontal control:

DGPS Stations
Cheboygan, MI (292kHz)

Table 14: USCG DGPS Stations

D. Results and Recommendations

D.1 Chart Comparison

The hydrographer has compared a sounding plot from the surveyed area to the charted soundings. There are no charted contours to compare.

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
14869	1:60000	27	11/2013	08/23/2016	08/20/2016

Table 15: Largest Scale Raster Charts

14869

A comparison was performed with Chart 14869 (1:60,000) using soundings derived from the 1-meter surface. Charted depths agree within 3 meters with H12964 surveyed soundings. Figure 18 depicts the surveyed depth curves in red in comparison to the chart.

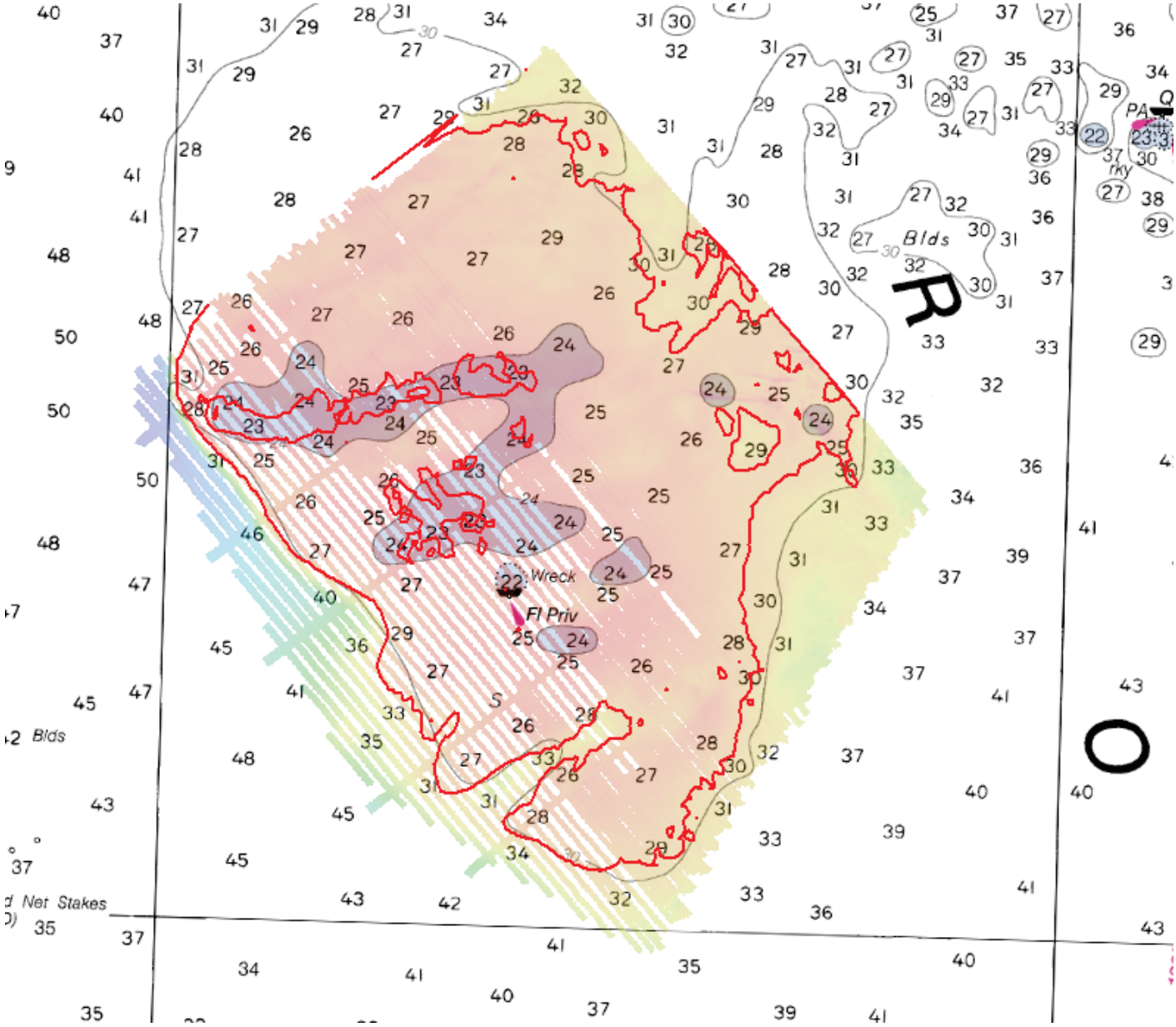


Figure 18: Survey contours shown in red overlaid on chart 14869.

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?
US4MI66M	1:60000	7	03/05/2014	10/14/2015	NO

Table 16: Largest Scale ENCs

US4MI66M

ENC soundings were extracted from the S-57 file and used to create a 1-meter interpolated .csar surface. The interpolated surface was then differenced with the 1-meter finalized surface from survey H12964. The depth differences range from -2.52 to 5.46 meters. In this case, negative values indicate that the new surveyed soundings are shallower than charted. In general, the surveyed data is 0.45 meters deeper than charted.

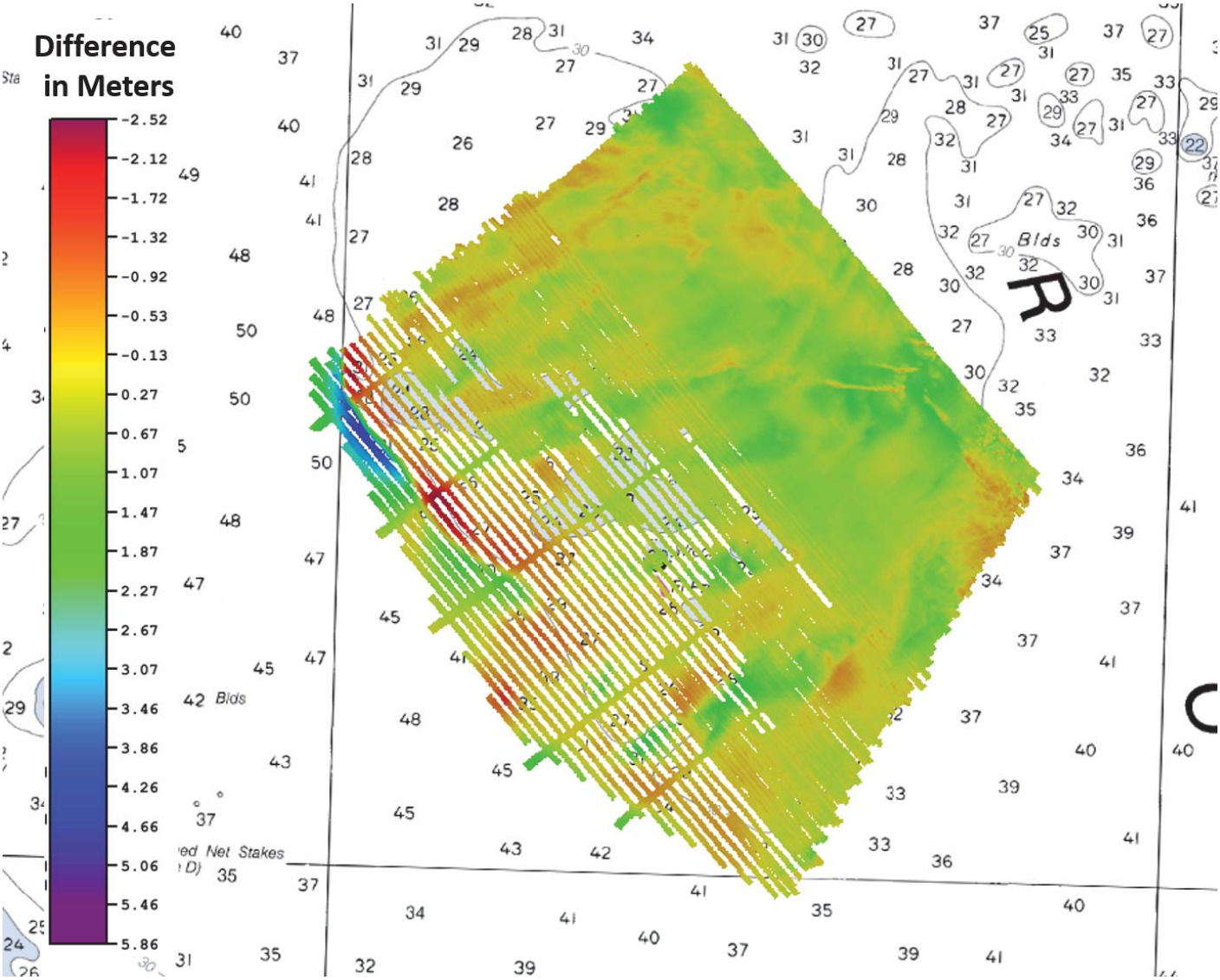
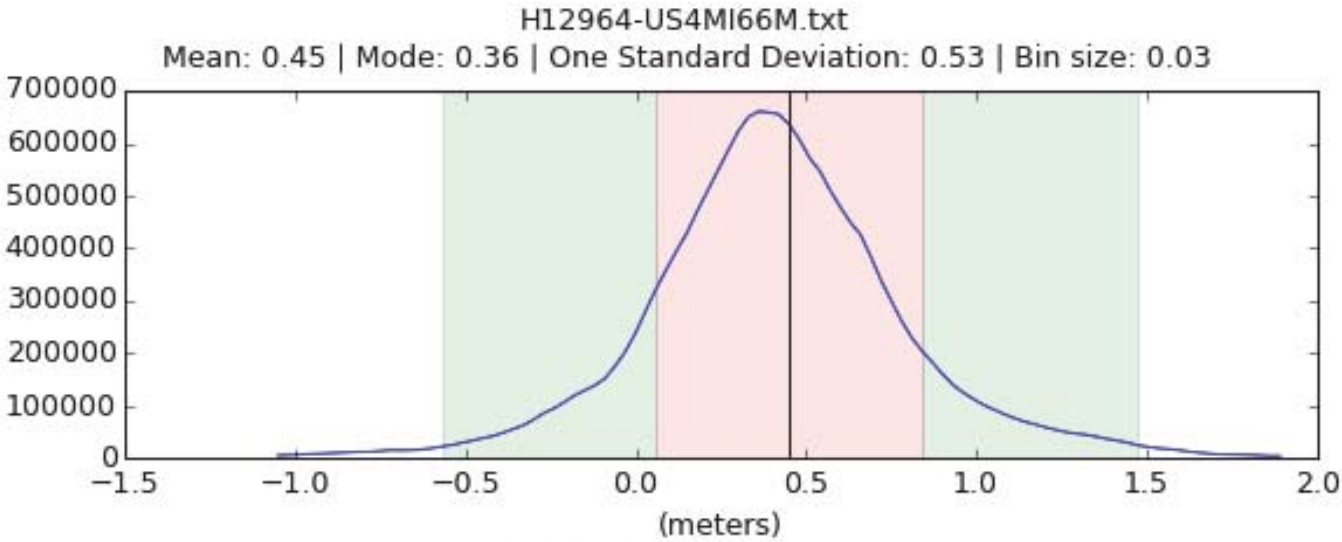
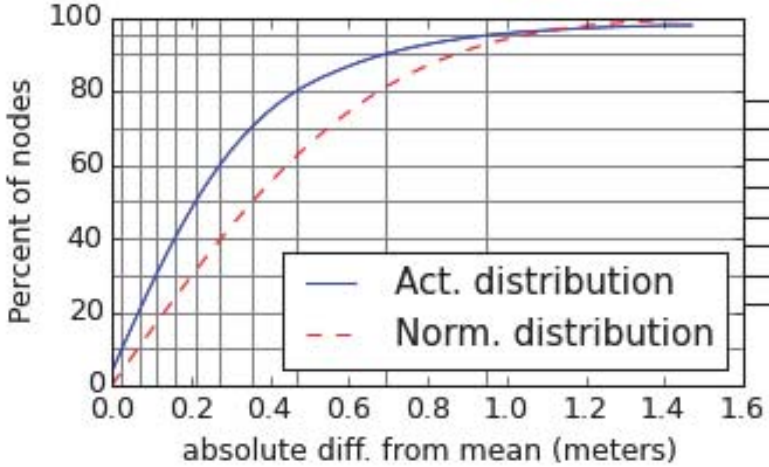


Figure 19: Difference surface between H12964 and US4MI66M. Negative values represent areas where the survey is shallower than the chart.





Percent of nodes	Deviation (m)
50%	+/- 0.21
60%	+/- 0.28
70%	+/- 0.35
80%	+/- 0.47
90%	+/- 0.69
95%	+/- 0.95

Figure 20: ENC US4MI66M comparison.

D.1.3 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.4 Charted Features

Two charted wrecks are found within the assigned survey boundary of H12964. One feature was surveyed and an updated position and depth have been obtained. Due to time constraints the other wreck to the northeast was not investigated. See the final feature file for more information.

D.1.5 Uncharted Features

No uncharted features exist for this survey.

D.1.6 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.7 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.8 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.1.9 Bottom Samples

No bottom samples were required for this survey.

D.2 Additional Results

D.2.1 Shoreline

A new position and depth on a charted wreck was found during survey operations and is included in the final feature file.

D.2.2 Prior Surveys

No prior survey comparisons exist for this survey.

D.2.3 Aids to Navigation

One private aid to navigation exists in the survey area and was verified with visual inspection.

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 Recommendation

No new surveys or further investigations are recommended for this area.

D.2.11 Inset Recommendation

No new insets are recommended for this area.

E. Approval Sheet

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

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

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

Approver Name	Approver Title	Approval Date	Signature
Tyanne Faulkes	Physical Scientist	10/11/2016	Tyanne Faulkes Digitally signed by FAULKES.TYANNE.M.1381291550 Date: 2016.12.13 13:58:33 -08'00'

F. Table of Acronyms

Acronym	Definition
AHB	Atlantic Hydrographic Branch
AST	Assistant Survey Technician
ATON	Aid to Navigation
AWOIS	Automated Wreck and Obstruction Information System
BAG	Bathymetric Attributed Grid
BASE	Bathymetry Associated with Statistical Error
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
TPE	Total Propagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United Stated Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDA	Global Positiong System timing message
ZDF	Zone Definition File

APPENDIX I

TIDES AND WATER LEVELS

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Atlantic Hydrographic Branch (N/CS33)
439 West York St
Norfolk, VA 23510

September 01, 2016

MEMORANDUM FOR: Gerald Hovis, Chief, Products and Services Branch, N/OPS3

FROM: Tyanne Faulkes, Atlantic Hydrographic Branch (N/CS33)

SUBJECT: Request for Approved Tides/Water Levels

Please provide the following data:

1. Tide Note
2. Final TCARI grid
3. Final zoning in MapInfo and .MIX format
4. Six Minute Water Level data (Co-ops web site)

Transmit data to the following:

Atlantic Hydrographic Branch (N/CS33)
439 West York St
Norfolk, VA 23510

These data are required for the processing of the following hydrographic survey:

Project No.:	S-X937-ONMS-16
Registry No.:	H12964
State:	Michigan
Locality:	Lake Huron
Sublocality:	5 NM North of Thunder Bay Island

Attachments containing:

1) an Abstract of Times of Hydrography,
2) digital MID & MIF files of the track lines from Pydro

cc: N/CS33

Year_DOY	Min Time	Max Time
2016_223	17:27:06	22:25:24
2016_224	17:41:40	23:11:46
2016_225	13:43:43	16:45:56
2016_228	15:33:13	19:00:11
2016_231	20:15:42	23:59:58
2016_239	13:47:49	20:40:27
2016_242	16:05:11	20:19:07
2016_243	13:36:55	20:56:05

APPENDIX II

SUPPLEMENTAL SURVEY RECORDS AND CORRESPONDENCE

Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>

Fwd: Potential Thunder Bay project area.

6 messages

Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov> Tue, Aug 2, 2
To: Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>

Requirement 1 of 2...
~~ mog

Forwarded conversation

Subject: **Potential Thunder Bay project area.**

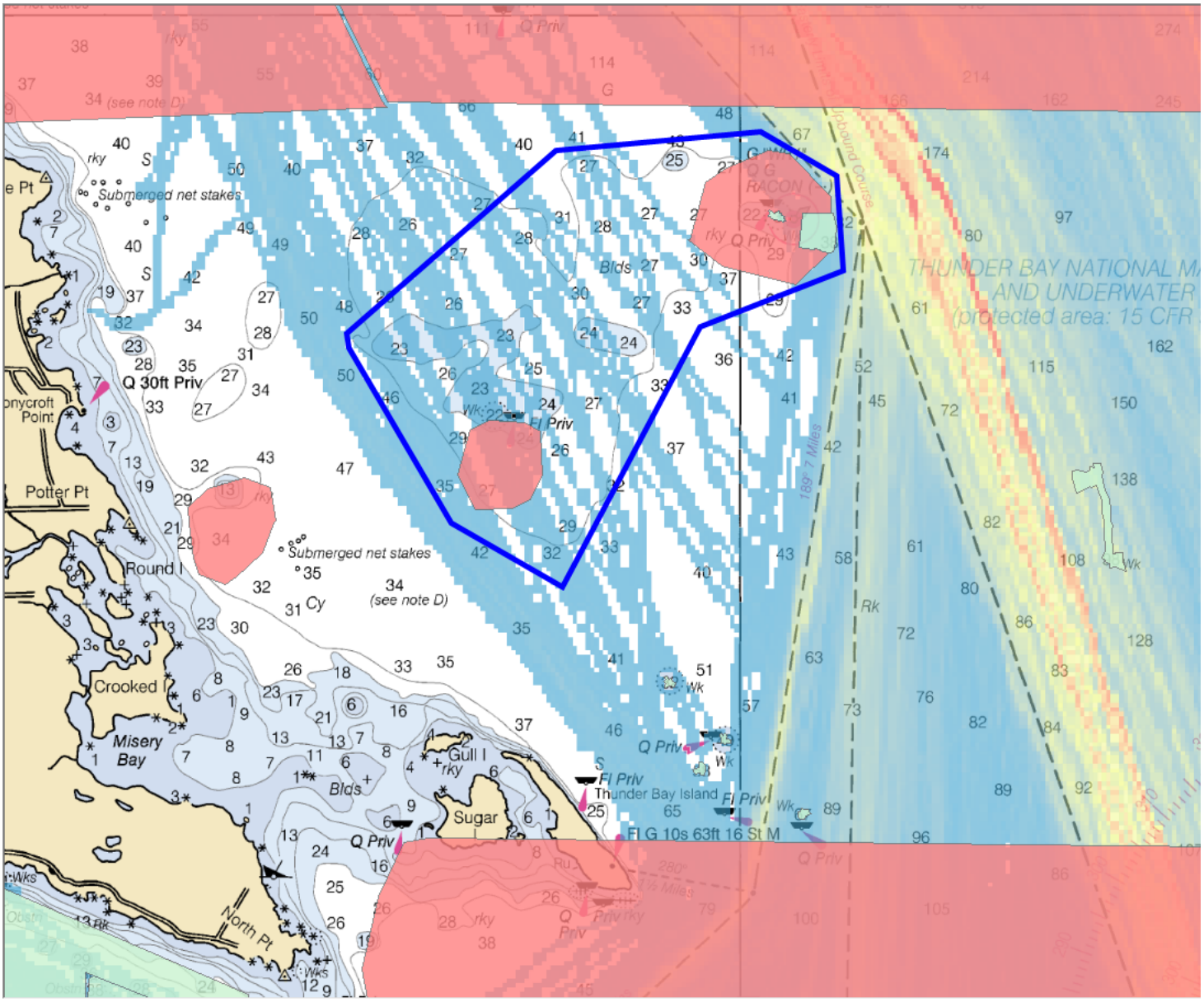
From: **Michael Gonsalves - NOAA Federal** <michael.gonsalves@noaa.gov>
Date: Wed, Jun 29, 2016 at 1:34 PM
To: Thomas Loeper - NOAA Federal <thomas.loeper@noaa.gov>
Cc: Rachel Medley - NOAA Federal <rachel.medley@noaa.gov>, Corey Allen - NOAA Federal <corey.allen@noaa.gov>, Russ Green - NOAA Federal <russ.green@noaa.gov>

Greetings folks,

Shown below is a preliminary project area (highlighted in blue) Tom and I identified in the vicinity of Thunder Bay for the purposes of conducting an Ad-Hoc hydrographic survey.

For context, AIS tracklines are layered in background (warmer colors = higher density traffic). The red polygons are partial bottom coverage surveys from the 1970's - 1980's. Where you d
polygon, there is no registered survey - I couldn't tell you how old that data is.

Cheers!
~~ mike.g.



From: **Russ Green - NOAA Federal** <russ.green@noaa.gov>
Date: Wed, Jun 29, 2016 at 6:23 PM
To: Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>
Cc: Thomas Loeper - NOAA Federal <thomas.loeper@noaa.gov>, Rachel Medley - NOAA Federal <rachel.medley@noaa.gov>, Corey Allen - NOAA Federal <corey.allen@noaa.gov>, John
NOAA Affiliate <john.bright@noaa.gov>

Hi Tom and All-

Wow- you guys work fast.

Would be great to do this, and we can dedicate boat time to it; scheduling will be the tricky part. The bonus for us (and the region), is that your hydrographer would help us bring our RESON completely on line. Then we're off and running on our own. That's a huge triple dip for us: getting the data, collaborating with OCS, and getting our multibeam online.

All the parts/pieces for the multibeam are set up and functioning. We're logging data. We're using Hypack 2016.

Additionally, we would very much like to conduct a survey in the Air National Guard's live fire training area, which is in the sanctuary. Clear it for cultural material, etc. We've worked with the area; we've set up a lines plan, etc. (attached). A great scenario for us would be to knock out part of this survey with help from the OCS hydrographer. It's deep, and we'd like to get the son correctly.

One possible window for all of this is August 8-19. But we'd have to work with GLERL to schedule a captain.

Alternatively, we could do something in September.

We can provide housing, boat, fuel, sonar and crew.

Could be a great "one NOAA" story. I'll catch up with Dennis too.

CC'ing John Bright here. He's a maritime archaeologist at the sanctuary and our sonar guy; the guy to hook up with your hydrographer about the RESON details. As I transition out to WI in r John will be the sanctuary POC for this.

On that note...let's talk Wisconsin- another good story. I think we can leverage some NCCOS funds to help with survey costs over there. Would be 2017. They're doing a biogeographical stu as we define mapping needs, we'll try to use some of the funds for actual survey. The OCS help makes it way more doable. If "pre-designation" we could map some of the proposed sanctua with four NOAA programs collaborating- that would be a nice way to kick things off...

Will be in the field tomorrow and may be slow to respond. Thanks again for the note!

Best,
Russ
--
Russ Green
Deputy Superintendent / Research Coordinator
NOAA Thunder Bay National Marine Sanctuary
500 West Fletcher St.
Alpena, MI 49707
phone: 989-356-8805 ext. 16
cell: 989-766-3359
fax: 989-354-0144
www.thunderbay.noaa.gov

Follow Thunder Bay on:

Facebook: **facebook.com/ThunderBayShipwrecks**
Twitter: **twitter.com/ThunderBayNMS**
YouTube: **youtube.com/TBNMS**

Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> Thu, Aug 4, 2016 at 8:39 AM
To: Michael Annis - NOAA Federal <michael.j.annis@noaa.gov>

Area of interest for HSD.

---------- Forwarded message ----------
From: **Michael Gonsalves - NOAA Federal** <michael.gonsalves@noaa.gov>
[Quoted text hidden]

--
Tyanne Faulkes
Physical Scientist
NOAA's National Ocean Service
Office of Coast Survey, Hydrographic Surveys Division
Atlantic Hydrographic Branch
757.441.6746 x 103

Michael Annis - NOAA Federal <michael.j.annis@noaa.gov> Thu, Aug 4, 2016 at 9:02 AM
To: Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>

Tyanne-

Follow on question - would anyone else be there during OPS? Possibly another qualified AUV person? I'm wondering if we could knock out some of the SSS in the shallow areas with the small AUV. Could probably get 50m range scale in there...but it might be adding a bit more complexity that would make it not really worth the effort, especially if I'm only there for a week.

MJA

Michael J. Annis
Physical Scientist
NOAA Office of Coast Survey
1315 East West Highway
SSMC3 room 6325

Silver Spring, MD 20910
NEW NUMBER 301-713-2730 x167

[Quoted text hidden]

Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> Thu, Aug 4, 2016 at 9:22 AM
To: Michael Annis - NOAA Federal <michael.j.annis@noaa.gov>

As far as I know it is just me. I was wondering if the AUV would help with that deep area....

Tyanne
[Quoted text hidden]

Michael Annis - NOAA Federal <michael.j.annis@noaa.gov> Thu, Aug 4, 2016 at 9:24 AM
To: Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>

Unfortunately it's too deep. The small AUV is only rated to 100 meters.

Do you have SHP files of the 2 survey areas? I can bring those into Hypack.

MJA

Michael J. Annis
Physical Scientist
NOAA Office of Coast Survey
1315 East West Highway
SSMC3 room 6325
Silver Spring, MD 20910
NEW NUMBER 301-713-2730 x167

[Quoted text hidden]

Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> Thu, Aug 4, 2016 at 9:25 AM
To: Michael Annis - NOAA Federal <michael.j.annis@noaa.gov>

I don't but let me try to draw something up using those images.
[Quoted text hidden]

Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>

Fwd: Alpena Survey

4 messages

Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov> Tue, Aug 2, 2016 at 10:56 AM
To: Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>

Requirement 2 of 2...
~~ mog

Forwarded conversation

Subject: **Alpena Survey**

From: **Thomas Loeper - NOAA Federal** <thomas.loeper@noaa.gov>
Date: Wed, Jul 13, 2016 at 2:16 PM
To: Dennis Donahue - NOAA Federal <dennis.donahue@noaa.gov>, Russ Green - NOAA Federal <russ.green@noaa.gov>, Michael Gonsalves - NOAA Federal <Michael.Gonsalves@noaa.gov>, Corey Allen - NOAA Federal <corey.allen@noaa.gov>
Cc: Rachel Medley - NOAA Federal <rachel.medley@noaa.gov>

All

Here is the latest. Just talked to Dennis about boat availability. Please correct me if I am wrong here. It looks like the first window for the STORM would be the week of 8 Aug through Friday 19 Aug. Dennis said there is a 3 day project scheduled for the STORM on 22, 23 and 24 August then it is free for more survey work. To reduce travel costs, Corey thought it would be best to have the survey team stay in Alpena for those three days (processing data maybe) and start back with the survey work again as soon as the STORM is free from the previously scheduled work.

Dennis, we will check with our handlers here to see if there is a few thousand dollars to kick in for gas money and such. I'll check with my Boss on Tuesday when I get back from vacation and we'll also check if there are any small pots of end-of-year cash rattling anywhere else in the office.

Thanks to everyone for working on this with such short notice. - you guys are making me feel like an actual, full-time Nav Manager!

--
Tom Loeper
Chief, Coast Pilot Branch
Great Lakes Navigation Manager
Voice: (301)713-2750 x165
Cell: (301)367-5680

Like us on Facebook. Follow us on Twitter. Check out our blog.

From: **Russ Green - NOAA Federal** <russ.green@noaa.gov>
Date: Wed, Jul 13, 2016 at 3:16 PM
To: Thomas Loeper - NOAA Federal <thomas.loeper@noaa.gov>
Cc: Dennis Donahue - NOAA Federal <dennis.donahue@noaa.gov>, Michael Gonsalves - NOAA Federal <Michael.Gonsalves@noaa.gov>, Corey Allen - NOAA Federal <corey.allen@noaa.gov>, Rachel Medley - NOAA Federal <rachel.medley@noaa.gov>

Sounds good.

In follow up to your earlier email, here's a look at that portion of the live fire range we'd like to survey. Even a day or two would be incredibly valuable to the sanctuary. It's much deeper than we've ever surveyed, and we want to make sure

were collecting the best data we can.

One small point...there's an actual live fire exercise scheduled for the last week in August...so we'll want to pick another week...

I should say too, that an MOA between TBNMS and Air National Guard (who operates the range) is now in review. Our hope was to have the area surveyed before their exercise in late August. But acquiring even some data would be an important step to help cement this relationship with ANG.

Will pass along a polygon when our GIS person is back in the office.

Russ

--
Russ Green
Deputy Superintendent / Research Coordinator
NOAA Thunder Bay National Marine Sanctuary
500 West Fletcher St.
Alpena, MI 49707
phone: 989-356-8805 ext. 16
cell: 989-766-3359
fax: 989-354-0144
www.thunderbay.noaa.gov

Follow Thunder Bay on:

Facebook: **facebook.com/ThunderBayShipwrecks**
Twitter: **twitter.com/ThunderBayNMS**
YouTube: **youtube.com/TBNMS**

From: **Corey Allen - NOAA Federal** <corey.allen@noaa.gov>
Date: Thu, Jul 21, 2016 at 1:55 PM
To: Thomas Loeper - NOAA Federal <thomas.loeper@noaa.gov>
Cc: Michael Gonsalves - NOAA Federal <Michael.Gonsalves@noaa.gov>, Rachel Medley - NOAA Federal <rachel.medley@noaa.gov>

Loeper,
Just looping back around on this before I go on paternity leave. I think we were waiting on a GIS layer from the sanctuary, as well as some prioritization within the original polygon given that we likely wont' have enough time to do it all.

If you could birddog those last few things and then coordinate with Mike to get a PS assigned to this project and the final logistics hammered out.

Cheers, Corey
--
J. Corey Allen
Team Lead, Operations Branch
Hydrographic Surveys Division
Office of Coast Survey, NOAA
Corey.Allen@noaa.gov
301.713.2777 x119 (Office)
301.717.7271 (Cell)

From: **Michael Gonsalves - NOAA Federal** <michael.gonsalves@noaa.gov>
Date: Tue, Jul 26, 2016 at 4:20 PM
To: Corey Allen - NOAA Federal <corey.allen@noaa.gov>

Cc: Thomas Loeper - NOAA Federal <thomas.loeper@noaa.gov>, Rachel Medley - NOAA Federal <rachel.medley@noaa.gov>, Lorraine Robidoux - NOAA Federal <lorraine.robidoux@noaa.gov>

Yeah, what Corey wrote. Is there a final prioritization that was determined?
We can just have the field start working on the first area we proposed and survey until they run out of time, or we could narrow it a little more smartly to ensure the areas you would most like to be addressed get addressed.

~~ mog

R4207 Survey Map.pdf
251K

Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> Thu, Aug 4, 2016 at 8:38 AM
To: Michael Annis - NOAA Federal <michael.j.annis@noaa.gov>

This is the area of interest of the sanctuary.

---------- Forwarded message ----------
From: **Michael Gonsalves - NOAA Federal** <michael.gonsalves@noaa.gov>
[Quoted text hidden]

--
Tyanne Faulkes
Physical Scientist
NOAA's National Ocean Service
Office of Coast Survey, Hydrographic Surveys Division
Atlantic Hydrographic Branch
757.441.6746 x 103

R4207 Survey Map.pdf
251K

Michael Annis - NOAA Federal <michael.j.annis@noaa.gov> Thu, Aug 4, 2016 at 8:41 AM
To: Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>

Well, that's pretty deep. I'm wondering if they have the ability to tow SSS that deep? Slow speeds and A LOT of cable out, even with a depressor wing (if they have one).

Michael J. Annis
Physical Scientist
NOAA Office of Coast Survey
1315 East West Highway
SSMC3 room 6325
Silver Spring, MD 20910
NEW NUMBER 301-713-2730 x167

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Reference to any specific commercial products, process, or service by trade name, trademark, manufacturer, or otherwise, does not constitute or imply its endorsement, recommendation, or favoring by the United States Government. The views and opinions of authors do not necessarily state or reflect those of the United States Government, and shall not be used for advertising or product endorsement purposes

[Quoted text hidden]

Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> Thu, Aug 4, 2016 at 9:21 AM
To: Michael Annis - NOAA Federal <michael.j.annis@noaa.gov>

Right my thoughts exactly.
[Quoted text hidden]

Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>

Thunder Bay PI's and Files

10 messages

Paul Turner - NOAA Federal <paul.turner@noaa.gov> Fri, Aug 12, 2016 at 1:37 PM
To: Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>
Cc: Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>, Thomas Loeper - NOAA Federal <thomas.loeper@noaa.gov>

Hi Tyanne-

The PI's and feature files are attached for the Thunder Bay project. Please note that the PI's are not signed just yet and are considered draft until I can get you a signed copy.

I am also waiting on Tides from CO-OPS which I will send out once I receive them.

Please let me know if you need anything else.

Paul

--
Paul Turner
Physical Scientist
NOAA's National Ocean Service
Office of Coast Survey

301-713-2700 ext 106
Paul.Turner@noaa.gov

S-X937-ONMS-16.zip
13425K

Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> Fri, Aug 12, 2016 at 3:04 PM
To: John Bright - NOAA Affiliate <john.bright@noaa.gov>, Phil Hartmeyer - NOAA Affiliate <Phil.hartmeyer@noaa.gov>

FYI
[Quoted text hidden]
--
Tyanne Faulkes
Physical Scientist
NOAA's National Ocean Service
Office of Coast Survey, Hydrographic Surveys Division
Atlantic Hydrographic Branch
757.441.6746 x 103

S-X937-ONMS-16.zip
13425K

Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> Tue, Aug 23, 2016 at 3:35 PM
To: Paul Turner - NOAA Federal <paul.turner@noaa.gov>
Cc: Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>, Thomas Loeper - NOAA Federal <thomas.loeper@noaa.gov>

Hey Paul,

Any word on the tides? We have wrapped up the deeper survey and I am ready to start buttoning up that survey and writing the reports.

Thanks,

Tyanne
[Quoted text hidden]
--
Tyanne Faulkes
Physical Scientist
NOAA's National Ocean Service
Office of Coast Survey, Hydrographic Surveys Division
Atlantic Hydrographic Branch
757.441.6746 x 103

Paul Turner - NOAA Federal <paul.turner@noaa.gov> Wed, Aug 24, 2016 at 10:23 AM
To: Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>
Cc: Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>, Thomas Loeper - NOAA Federal <thomas.loeper@noaa.gov>

Hi Tyanne

I spoke with CO-OPS this morning and they are working out a few issues with generating a TCARI grid for this project (assessment graphic attached). I've asked if they can provide discrete tides for the interim period until the TCARI grid is worked out. I will hopefully have the discrete tides to you today or tomorrow.

Paul
[Quoted text hidden]

X937NMS2016_AssessmentGraphic.png
683K

Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> Wed, Aug 24, 2016 at 10:24 AM
To: Paul Turner - NOAA Federal <paul.turner@noaa.gov>
Cc: Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>, Thomas Loeper - NOAA Federal <thomas.loeper@noaa.gov>

Fantastic. Thanks for the update.

Tyanne
[Quoted text hidden]

Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> Thu, Sep 8, 2016 at 8:20 AM
To: Paul Turner - NOAA Federal <paul.turner@noaa.gov>
Cc: Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>, Thomas Loeper - NOAA Federal <thomas.loeper@noaa.gov>, John Bright - NOAA Affiliate <john.bright@noaa.gov>, Phil Hartmeyer - NOAA Affiliate <Phil.hartmeyer@noaa.gov>

Hi Paul,

I wanted to touch base with you on survey W00319. We did not fully complete the survey last month but with talking with John and Phil, they are planning on returning to the range and surveying through the month of October. I am confident that if the field party maintains the same line spacing and cast frequency they will most likely be able to meet specifications. I would like to hold off on completing W00319 until after they have completed the acquisition for this year. Would that be fine with you? Would I need to send an email to CO-OPS telling them to hold off on final tides for this survey if we go down this route?

Thanks,

Tyanne
[Quoted text hidden]

Paul Turner - NOAA Federal <paul.turner@noaa.gov> Thu, Sep 8, 2016 at 9:18 AM
To: Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>
Cc: Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>, Thomas Loeper - NOAA Federal <thomas.loeper@noaa.gov>, John Bright - NOAA Affiliate <john.bright@noaa.gov>, Phil Hartmeyer - NOAA Affiliate <Phil.hartmeyer@noaa.gov>

Hi Tyanne

That's fine to have the TBNMS folks complete the acquisition for that sheet. Please email CO-OPS and let them know that the field acquisition for this survey has been extended. And also ask if the Alpena station will remain operational for the period of time that you will be completing the survey.

Paul
[Quoted text hidden]

Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> Thu, Sep 8, 2016 at 9:18 AM
To: Paul Turner - NOAA Federal <paul.turner@noaa.gov>
Cc: Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>, Thomas Loeper - NOAA Federal <thomas.loeper@noaa.gov>, John Bright - NOAA Affiliate <john.bright@noaa.gov>, Phil Hartmeyer - NOAA Affiliate <Phil.hartmeyer@noaa.gov>

Roger. I will cc you on that convo.

Tyanne
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Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov> Thu, Sep 8, 2016 at 11:02 AM
To: Paul Turner - NOAA Federal <paul.turner@noaa.gov>
Cc: Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>, Thomas Loeper - NOAA Federal <thomas.loeper@noaa.gov>, John Bright - NOAA Affiliate <john.bright@noaa.gov>, Phil Hartmeyer - NOAA Affiliate <Phil.hartmeyer@noaa.gov>

Concur on all. I applaud the efforts of the folks at TBNMS and look forward to seeing the results of their survey.

Cheers!
~~ michael.gonsalves, LCDR/NOAA
HSD Operations Branch, Chief
[Quoted text hidden]

Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> Mon, Sep 19, 2016 at 8:28 AM
To: Paul Turner - NOAA Federal <paul.turner@noaa.gov>

Hey Paul,

I have a quick question on how to attribute the tidal error to be used in the TPU calculation for this survey. In Section 1.3.3 of the Water Level Instructions it states, "The estimated water level error contribution to the total survey error budget in the vicinity of Thunder Bay, MI is considered insignificant in the Great Lakes, where is non-tidal." I looked back to the most recent survey done in the area (NRT4 in 2010) and they had the same comment in their project instructions. They used a zero uncertainty. Should I follow suit? This is a unique situation as there is no tidal influence but there is a datum shift happening....

Thanks,

Tyanne

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Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>

Reson 8101

Charles Wisotzkey - NOAA Federal <charles.j.wisotzkey@noaa.gov> Mon, Aug 15, 2016 at 12:45 PM
To: Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>

Old Trimble receiver cards have that issue. My guess is that the receiver is some old yellow box that is out of warranty and/or support. I have not yet found any fix for these old units and it doesn't look like Trimble will do anything about it.

More info from Trimble:

On February 14, 2016, certain older versions of Trimble firmware will experience what is akin to a GPS week rollover. Trimble 4700 and 4800 GPS receivers, that are long obsolete and end of service, will not handle this rolloverevent properly and will experience erratic and unreliable behavior for time and date reporting. As those receivers will interpret the GPS time in error by 1024 weeks, receiver data outputs will have the wrong time reference. This will negatively impact subsequent systems that are communicating with that receiver, potentially including the rejection of data packages.

More recent Trimble GPS/GNSS receivers types, including Trimble 5700, NetRS, NetR3, NetR5, NetR8, and NetR9 with current firmware are not impacted by the upcoming rollover on February 14, 2016.

Further testing has shown the 4000SE/SSE/SSi will also handle the rollover without issue.

- Charles
[Quoted text hidden]

Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>

Final Tide Notes for S-X937-ONMS-2016, Registry Nos. W00319, H12964

7 messages

David Wolcott - NOAA Federal <david.wolcott@noaa.gov> Fri, Sep 16, 2016 at 9:48 AM
To: Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>, Paul Turner - NOAA Federal <paul.turner@noaa.gov>, Gerald Hovis - NOAA Federal <gerald.hovis@noaa.gov>, Corey Allen - NOAA Federal <corey.allen@noaa.gov>, Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>, "_NOS.CO-OPS.HTP" <nos.coops.hpt@noaa.gov>

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

DATE: 09/16/2016

MEMORANDUM FOR: Tyanne Faulkes
Atlantic Hydrographic Branch (N/CS33)

FROM: Gerald Hovis
Chief, Products and Services Branch, N/OPS3

SUBJECT: Delivery of Tide Requirements for Hydrographic Surveys

This is notification that the preliminary zoning is accepted as the final zoning for survey project S-X937-ONMS-2016, Registry Numbers W00319 and H12964 during the time period between August 10 and August 30, 2016. The accepted reference station for Registry Numbers W00319 and H12964 is Alpena, MI (9075065).

Included with this memo is a Tide Note for each Registry Number in .PDF format, stating the preliminary zoning has been accepted as the final zoning.

--
David Wolcott
Oceanographic Division
Center for Operational Oceanographic Products and Services
National Ocean Service
National Oceanic and Atmospheric Administration

1305 East-West Highway, 7133
Silver Spring, MD 20910
Office: 240-533-0614
Fax: 301-713-4437

2 attachments

H12964.pdf
333K

W00319.pdf
334K

Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> Fri, Sep 23, 2016 at 6:00 AM
To: David Wolcott - NOAA Federal <david.wolcott@noaa.gov>, Paul Turner - NOAA Federal <paul.turner@noaa.gov>

Good morning David,

I wanted to check in on something, I noticed that in the project instructions we did not receive an error/uncertainty value associated with the zoning for these surveys. I know that the value is nominal and in past surveys in the area they used a value of zero. Is that the case for this survey?

Thanks for the clarification,

Tyanne
[Quoted text hidden]
--
Tyanne Faulkes
Physical Scientist
NOAA's National Ocean Service
Office of Coast Survey, Hydrographic Surveys Division
Atlantic Hydrographic Branch
757.441.6746 x 103

David Wolcott - NOAA Federal <david.wolcott@noaa.gov> Fri, Sep 23, 2016 at 6:34 AM
To: Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>, "_NOS.CO-OPS.HTP" <nos.coops.hpt@noaa.gov>, Gerald Hovis - NOAA Federal <gerald.hovis@noaa.gov>
Cc: Paul Turner - NOAA Federal <paul.turner@noaa.gov>

Hi Tyanne,

copying some others so they are aware. Typically with a tidal area we are able to provide an error value because we can use basic statistics to compare our modeled tide solution (some combination of range/phase corrections to observations) to a representative dataset in the area of interest, and obviously this is easier in tidal areas because there is a pattern with tides. In the case of Great Lakes projects it's not really a deterministic solution, we basically say that the water levels are what they are, which is unfortunately not completely representative of the entire survey area. If a value is needed for processing we might be able to take a look at the differences between water level gauges within the lake and come up a number, but it won't necessarily represent the true "error" in your vertical control.

Does that help?
David
[Quoted text hidden]

Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> Fri, Sep 23, 2016 at 6:48 AM
To: David Wolcott - NOAA Federal <david.wolcott@noaa.gov>
Cc: "_NOS.CO-OPS.HTP" <nos.coops.hpt@noaa.gov>, Gerald Hovis - NOAA Federal <gerald.hovis@noaa.gov>, Paul Turner - NOAA Federal <paul.turner@noaa.gov>, Briana Welton - NOAA Federal <briana.welton@noaa.gov>

David,

Ok that makes sense. Over here at Coast Survey we are very interested in modeling our uncertainty. How about the uncertainty of the gauge? I think that would be a reasonable value for this instance.

Tyanne
[Quoted text hidden]

David Wolcott - NOAA Federal <david.wolcott@noaa.gov> Fri, Sep 23, 2016 at 7:29 AM
To: Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>
Cc: "_NOS.CO-OPS.HTP" <nos.coops.hpt@noaa.gov>, Gerald Hovis - NOAA Federal <gerald.hovis@noaa.gov>, Paul Turner - NOAA Federal <paul.turner@noaa.gov>, Briana Welton - NOAA Federal <briana.welton@noaa.gov>

Hi Tyanne,

no problem, this is out of my expertise so I will need to kick it to our engineering folks. Instead of creating a monster email chain at the moment, let me poke a bit and then get back to you.

David
[Quoted text hidden]

Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> Mon, Oct 3, 2016 at 10:31 AM
To: David Wolcott - NOAA Federal <david.wolcott@noaa.gov>
Cc: "_NOS.CO-OPS.HTP" <nos.coops.hpt@noaa.gov>, Gerald Hovis - NOAA Federal <gerald.hovis@noaa.gov>, Paul Turner - NOAA Federal <paul.turner@noaa.gov>, Briana Welton - NOAA Federal <briana.welton@noaa.gov>

Hi David,

Just wanted to follow up with you on this. Any word from the engineers?

Thanks,

Tyanne
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David Wolcott - NOAA Federal <david.wolcott@noaa.gov> Mon, Oct 3, 2016 at 10:57 AM
To: Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>
Cc: "_NOS.CO-OPS.HTP" <nos.coops.hpt@noaa.gov>, Gerald Hovis - NOAA Federal <gerald.hovis@noaa.gov>, Paul Turner - NOAA Federal <paul.turner@noaa.gov>, Briana Welton - NOAA Federal <briana.welton@noaa.gov>

Hi Tyanne,

apologies for the delay. This is what was provided to me last week:

""David,

We do not have an error computation for IGLD HC values. I will talk to Cary (he is out today) and Adam on this and hopefully have some estimate for you all shortly. As for the rest of the associated errors see below

Parameter	Component Accuracy (CM)
Sensor	0.9
Leveling error 3rd order	1.2
Leveling error 2nd order	0.6
Data Processing	1.0""

"As this stations elevation is tied back to the 1991 adjustment (aka IGLD 85 publication), no additional uncertainty needs to be factored in pertaining to the hydraulic corrector."

Hope that helps. Feel free to poke again if there are more questions lingering.

Regards,
David

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APPROVAL PAGE

H12964

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

- H12964_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12964_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.

Briana Welton Hillstrom

Digitally signed by HILLSTROM.BRIANA.WELTON.1267667531
Date: 2017.10.06 13:41:55 -04'00'

Approved:_____

Lieutenant Commander Briana Hillstrom, NOAA
Chief, Atlantic Hydrographic Branch