F00777

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

DESCRIPTIVE REPORT

Type of Survey:	Support USCG
Registry Number:	F00777

LOCALITY

State(s):	Rhode Island
General Locality:	Block Island Sound
Sub-locality:	Southeast of Block Island

2019

CHIEF OF PARTY
LT Dylan A. Kosten

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**F00777**

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):	**Rhode Island**
General Locality:	**Block Island Sound**
Sub-Locality:	**Southeast of Block Island**
Scale:	**5000**
Dates of Survey:	**02/10/2019 to 06/20/2019**
Instructions Dated:	**06/06/2019**
Project Number:	**S-B902-NRT5-19**
Field Unit:	**NOAA Navigation Response Team - New London**
Chief of Party:	**LT Dylan A. Kosten**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Multibeam Echo Sounder**
Verification by:	**Pacific Hydrographic Branch**
Soundings Acquired in:	**meters at Mean Lower Low Water**

Remarks:

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.

Table of Contents

List of Tables

List of Figures

Descriptive Report to Accompany Survey F00777

Project: S-B902-NRT5-19

Locality: Block Island Sound

Sublocality: Southeast of Block Island

Scale: 1:5000

February 2019 - June 2019

NOAA Navigation Response Team - New London

Chief of Party: LT Dylan A. Kosten

A. Area Surveyed

This hydrographic survey was acquired in accordance with the requirements defined in the Project Instructions S-B902-NRT5-19. The survey area F00777 extends south and east from the south easternmost point of Block Island, RI and covers approximately 7 square nautical miles.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
41° 10' 19.2" N 71° 32' 31.2" W	41° 6' 3.6" N 71° 28' 40.8" W

Table 1: Survey Limits

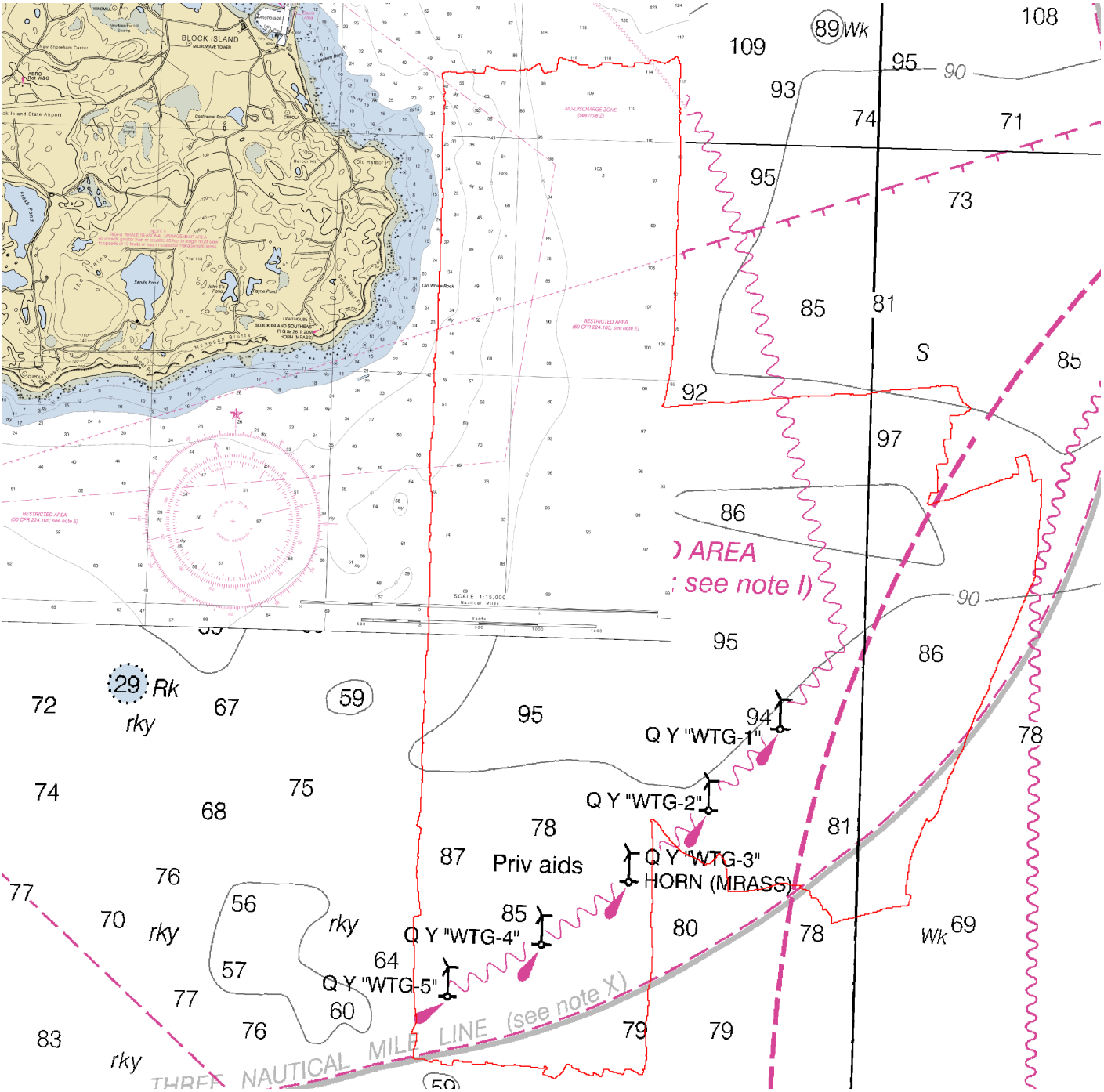


Figure 1: F00777 survey limits.

Survey limits were acquired in accordance with the requirements in the Project Instructions and HSSD.

A.2 Survey Purpose

The United States Coast Guard has requested an emergency response hydrographic survey off of Block Island to assist in locating a sunken fishing vessel.

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	Object Detection Coverage (Refer to HSSD Section 5.2.2.2)

Table 2: Survey Coverage

Survey coverage was in accordance listed above and in the HSSD with some exceptions. The following are examples of areas that do not meet the coverage requirement.

Some areas of the survey show very large boulder fields which include boulders that are flagged by flier finder. Acoustic shadowing is prevalent in the boulder fields and as a result many small object detection holidays are present.

Holidays from sonar blowouts while working in poor sea states are present across the survey. Heavy fog was present during the entire June survey period and eventually caused the cancellation of survey operations, resulting in existing holidays not being acquired over.

F00777 was acquired during two different time periods. The first time period, Feb 10th and 11th, was the initial response to the sinking of F/V Mistress. This time frame was originally planned to be 4 days but was shortened to 2 because of weather. During this initial response the objective was to cover as much area as quickly as possible, because of this, no XLs were run and very limited holiday hunting was performed.

The second time period, June 18-20th, was authorized by the Chief, Navigation Services Division, under the requirement that survey not exceed three days, all new data be of chart quality, and the area surveyed be without existing MBES data.

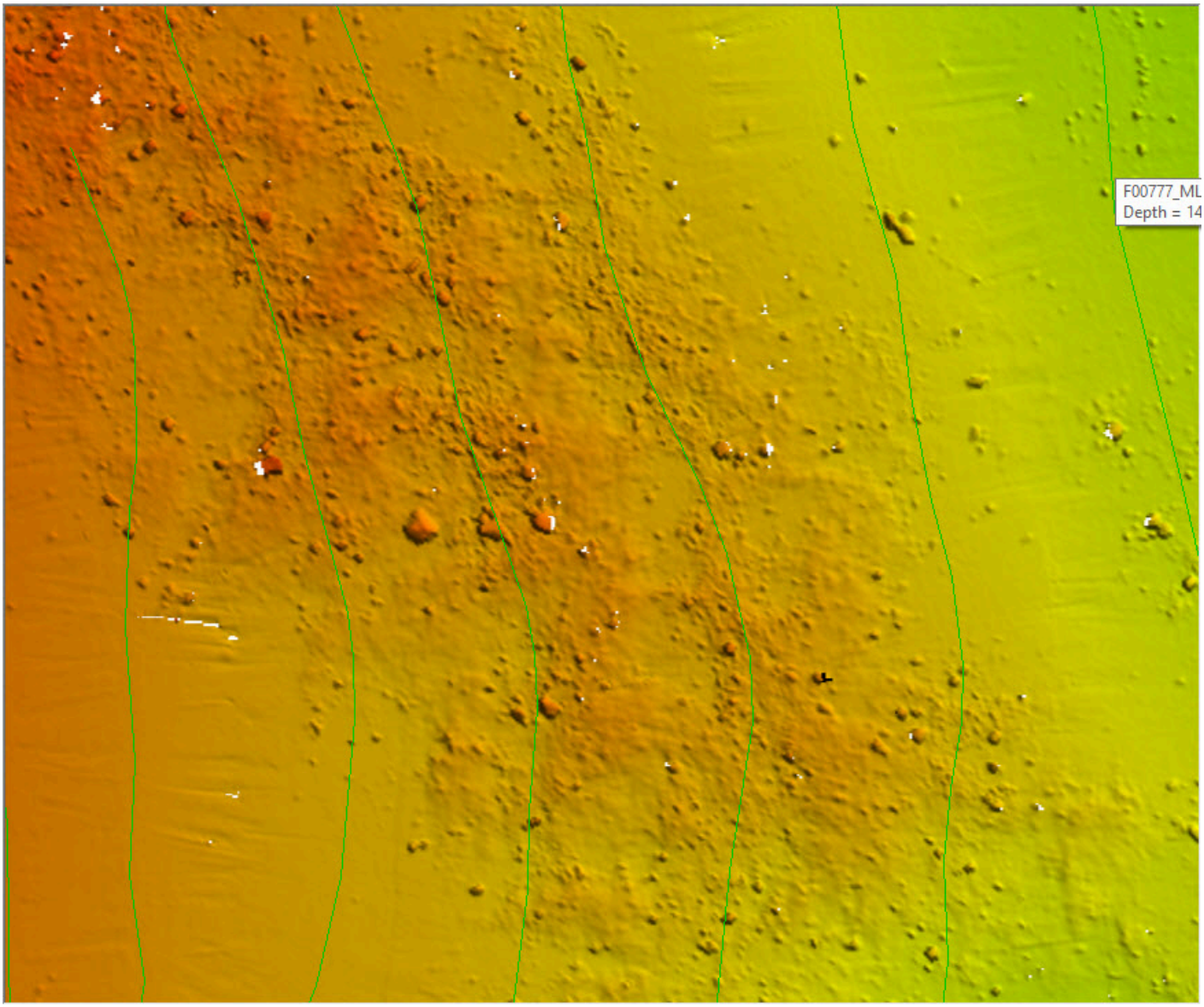


Figure 2: Object Detection holidays caused by acoustic shadowing in boulder fields.

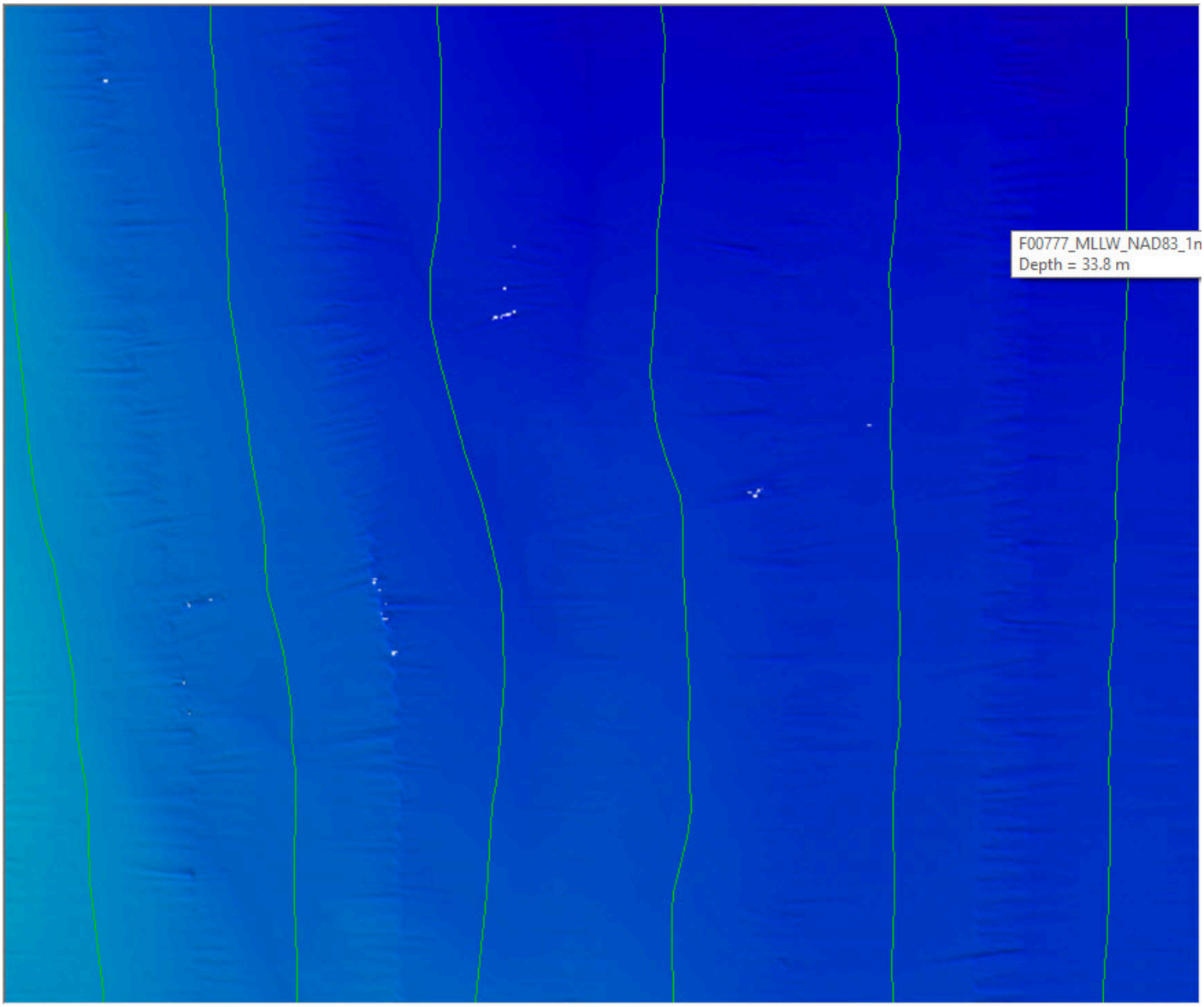


Figure 3: Holidays within MBES coverage where sonar blowouts occurred.

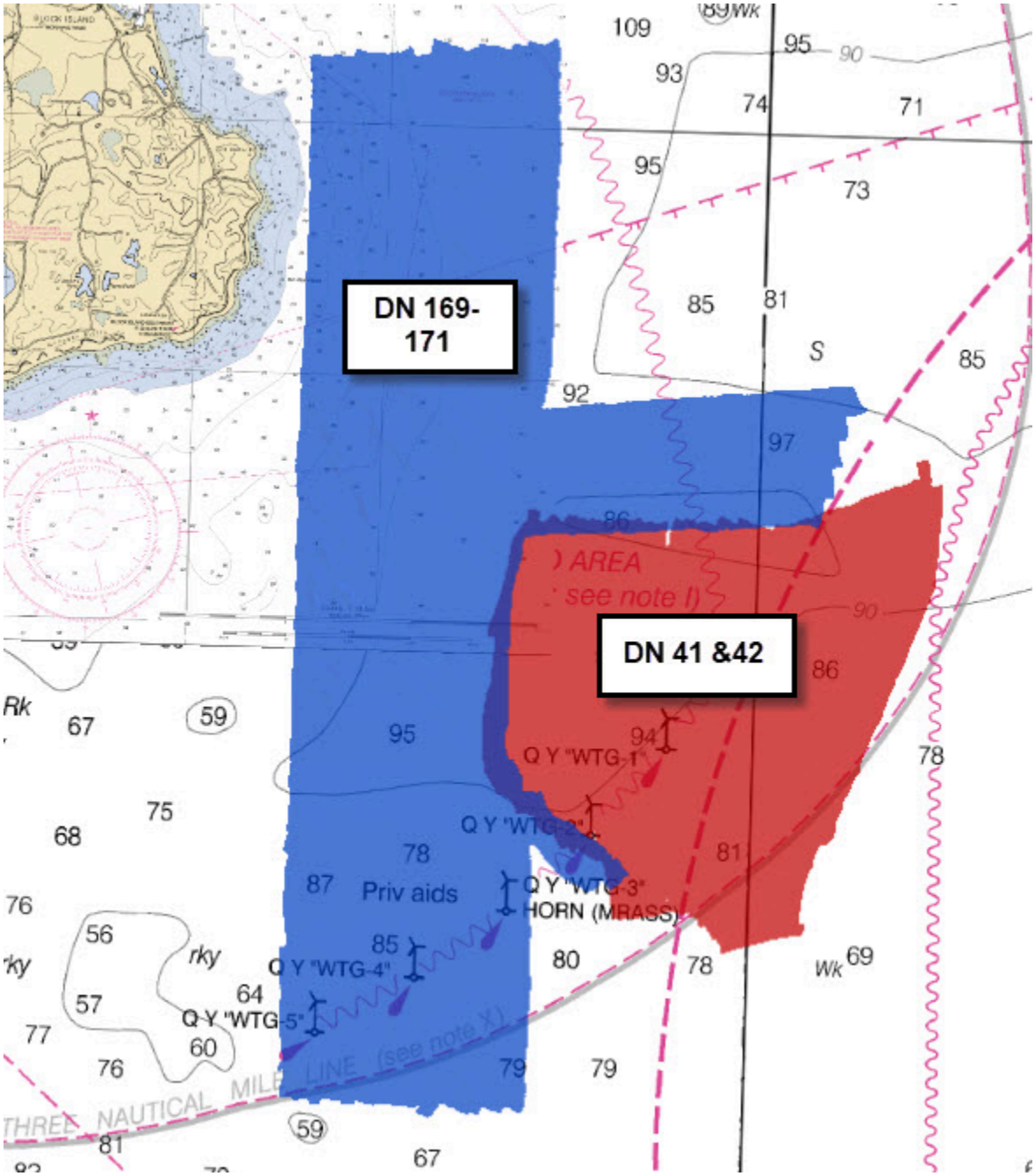


Figure 4: February Survey Efforts (Red) and June Survey Efforts (Blue).

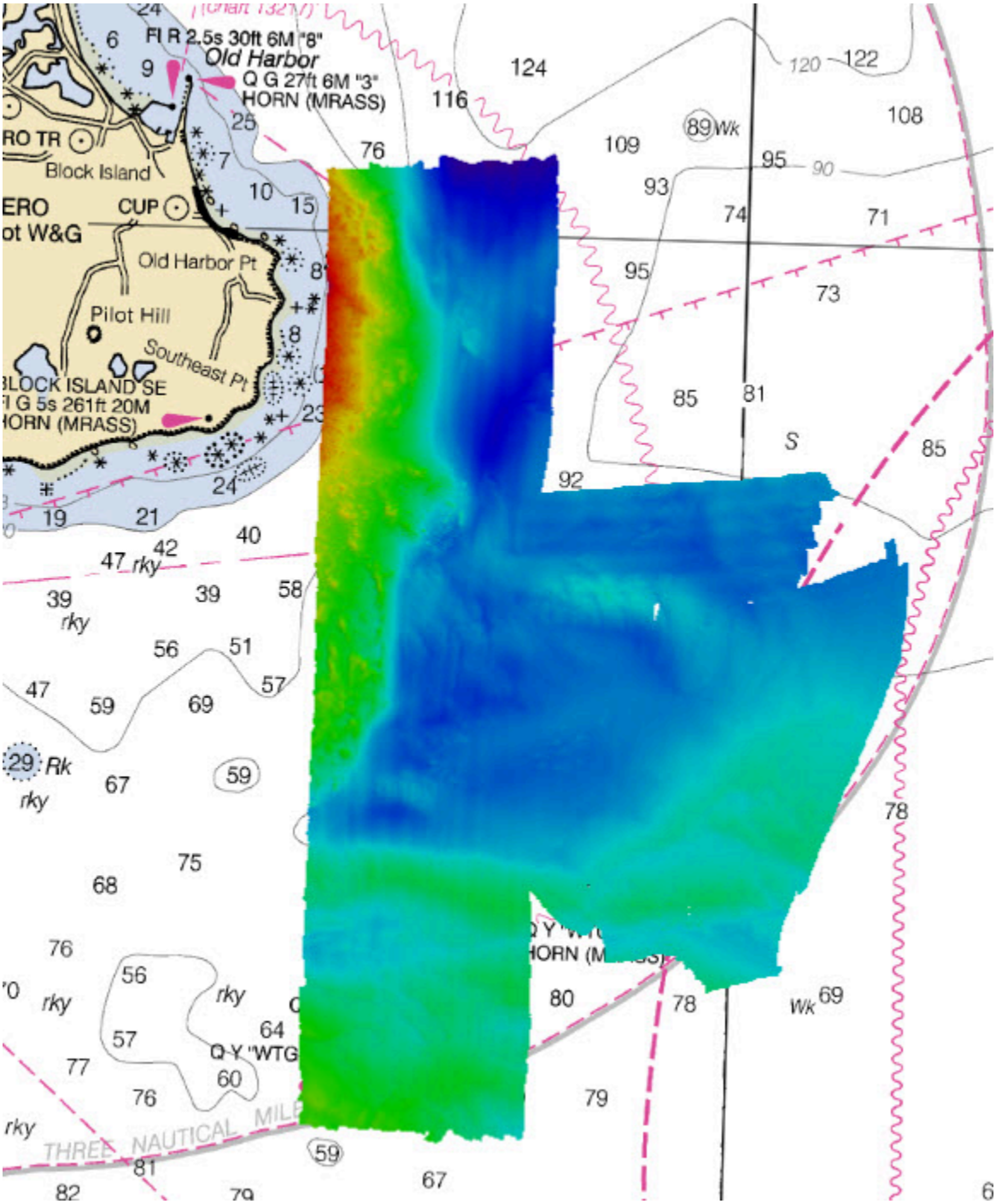


Figure 5: Overview of F00777 survey area MBES coverage.

A.6 Survey Statistics

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

	HULL ID	*S3007*	*Total*
LNM	**SBES Mainscheme**	0	0
	MBES Mainscheme	173.889	173.889
	Lidar Mainscheme	0	0
	SSS Mainscheme	0	0
	SBES/SSS Mainscheme	0	0
	MBES/SSS Mainscheme	0	0
	SBES/MBES Crosslines	3.44	3.44
	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			6.901

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
02/10/2019	41
02/11/2019	42

Survey Dates	Day of the Year
06/18/2019	169
06/19/2019	170
06/20/2019	171

Table 4: 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. Additional information to supplement sounding and survey data, and any deviations from the DAPR are discussed in the following sections.

B.1.1 Vessels

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

Hull ID	***S3007***
LOA	10.38 meters
Draft	0.6 meters

Table 5: Vessels Used

Figure 6: NRT5 being backed on to Point Judith to Block Island Ferry.

B.1.2 Equipment

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

Manufacturer	Model	Type
Kongsberg Maritime	EM 2040C	MBES
Applanix	POS MV 320 v5	Positioning and Attitude System
AML Oceanographic	MicroX SV	Sound Speed System
YSI	CastAway-CTD	Conductivity, Temperature, and Depth Sensor

Table 6: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

S3007 acquired 177.329 linear nautical miles of mainscheme bathymetry and 3.49 linear nautical miles of crosslines. 1-meter CUBE surfaces of mainscheme and crossline coverage were compared using the Pydro Compare Grids tool.

The initial response effort on DN041 and DN042 was intended solely to provide USCG support in the search for F/V Mistress. No XL's were acquired over these days of MBES data, rather, all time surveying was spent expanding the searched area. Data acquired on these two days totaled 67.042 linear nautical miles.

The remaining survey days, DNs 168, 169, 170, and 171 totaled 110.287 linear nautical miles. Data acquired on these days were intended to meet object detection requirements. XL percentage for these days is 3.16%.

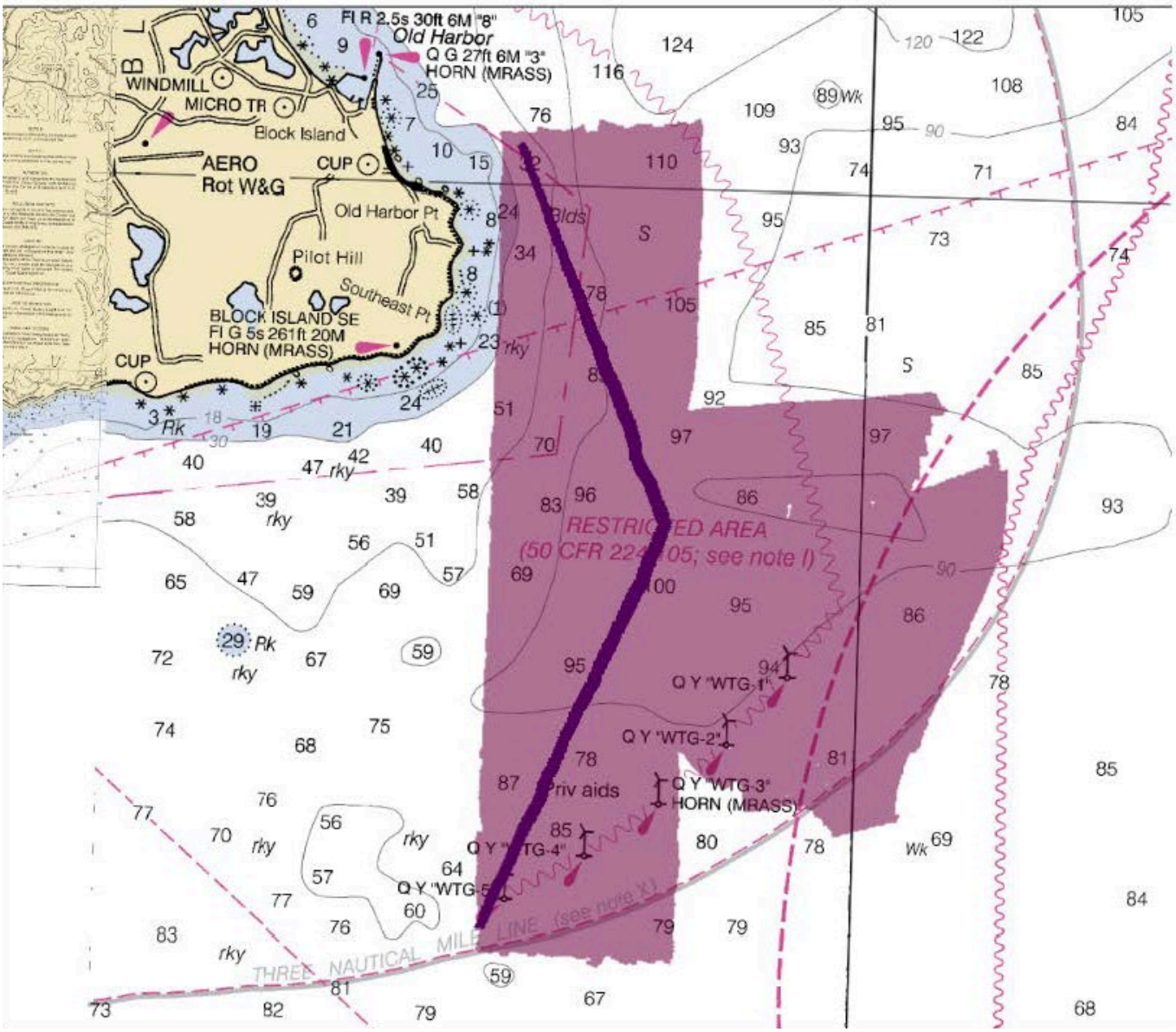


Figure 7: Crosslines acquired over mainscheme coverage (Charts 13217 and 13218).

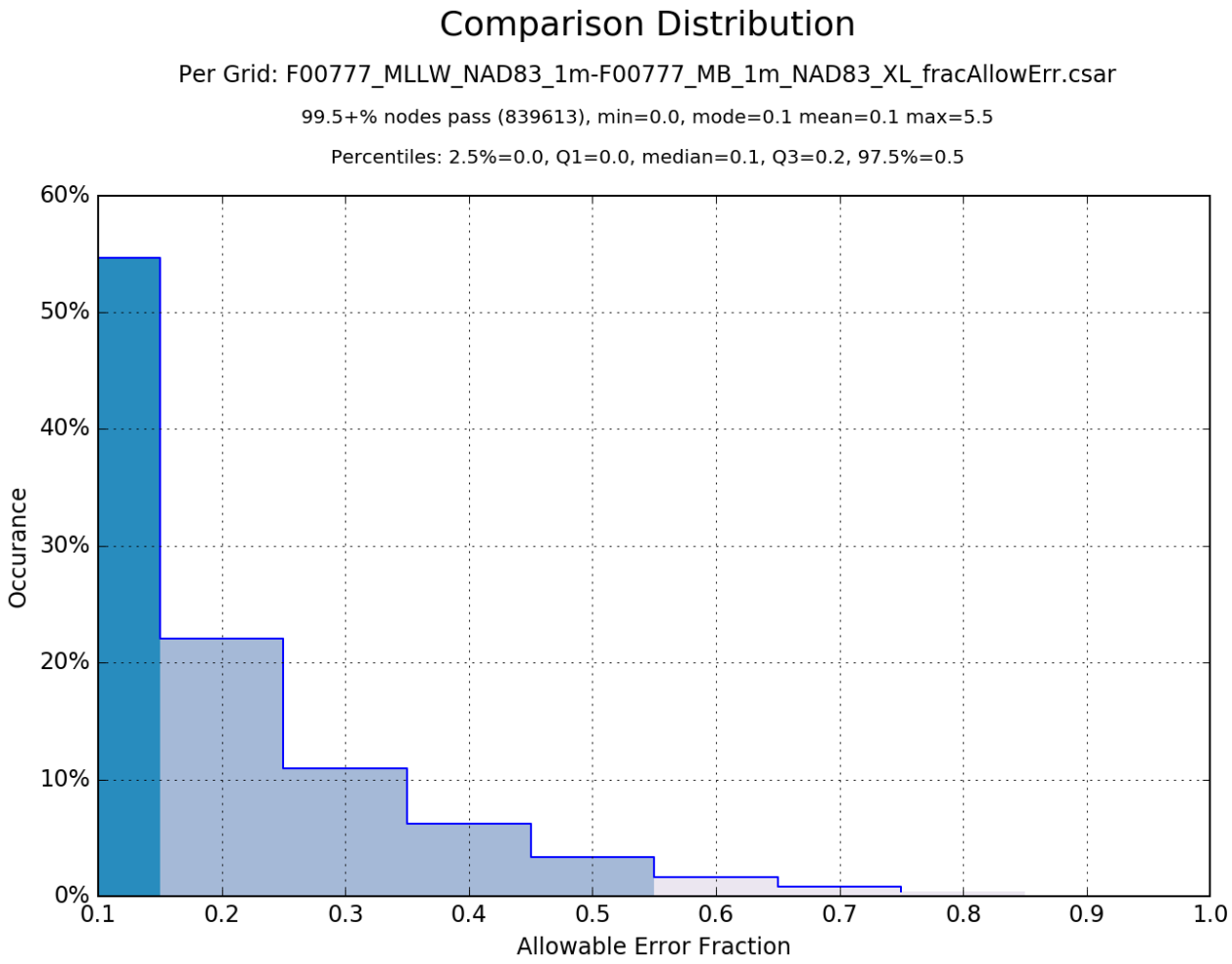
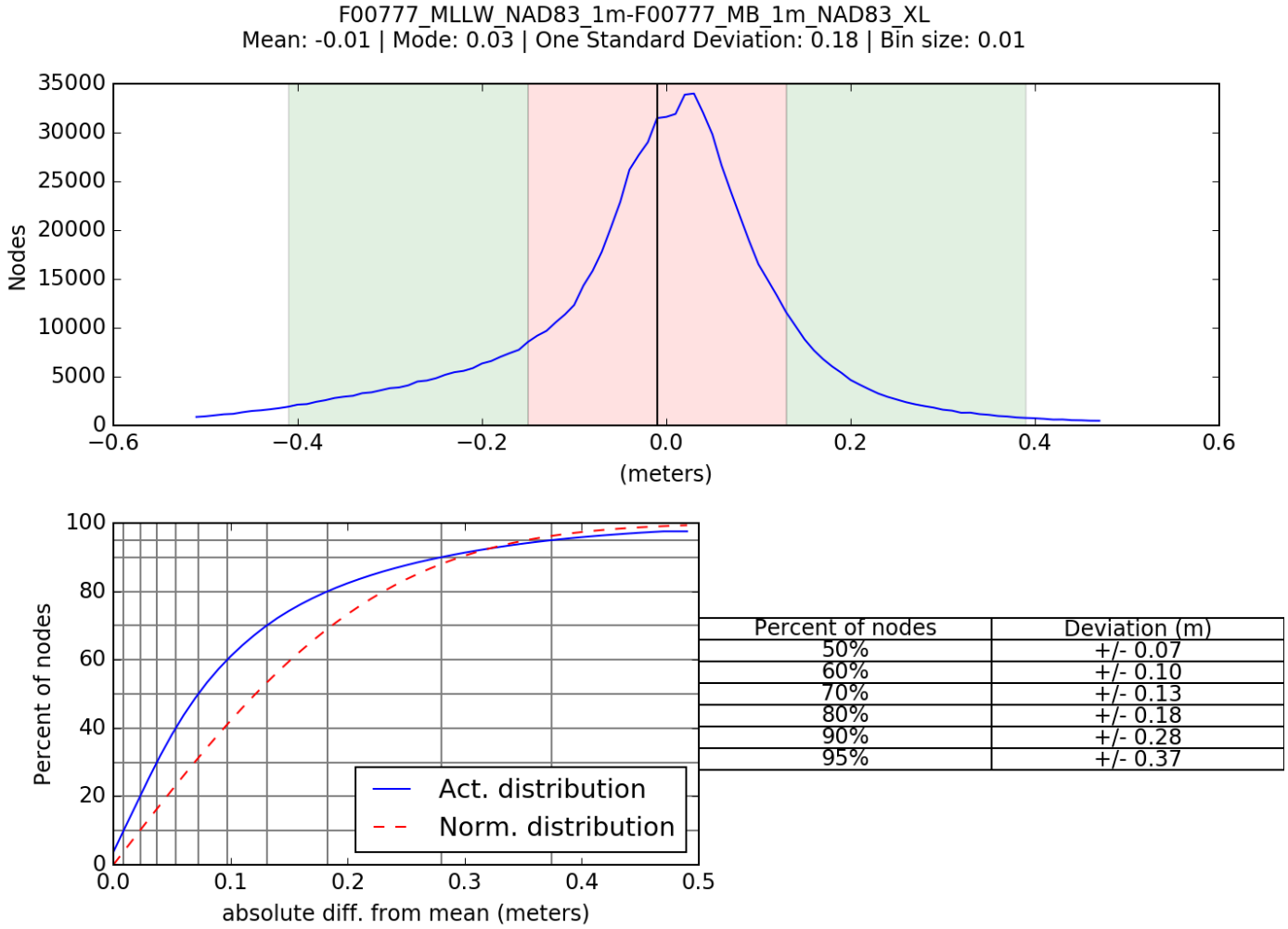


Figure 8: Distribution Statistics.



Percent of nodes	Deviation (m)
50%	+/- 0.07
60%	+/- 0.10
70%	+/- 0.13
80%	+/- 0.18
90%	+/- 0.28
95%	+/- 0.37

Figure 9: Statistics and distribution summary plots.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0.095 meters	0 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
S3007	2 meters/second	0 meters/second	0 meters/second	0.5 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

Total Propagated Uncertainty (TPU) values for F00777 were derived from a combination of fixed values for equipment and vessel characteristics, as well as field assigned values for sound speed uncertainties. The uncertainty for the VDatum model was provided to the field units in the Project Instructions. A visual inspection of the Uncertainty layer revealed the areas of higher uncertainty occur in the outer beams, and a visual inspection of the Density layer revealed the areas of lowest density are in the deepest areas of the survey. In addition to the usual a priori estimates of uncertainty, some real time and post processed uncertainty sources were also incorporated into the depth estimates of the survey. Real-time uncertainties from the
Kongsberg MBES sonars were incorporated and applied during post processing. Uncertainties associated with vessel roll, pitch, gyro, navigation, and heave were applied during post-processing. All of the aforementioned uncertainties were applied in CARIS. As stated, F00777 is an ellipsoidally referenced survey (ERS) and the tidal component was accomplished with a separation model.

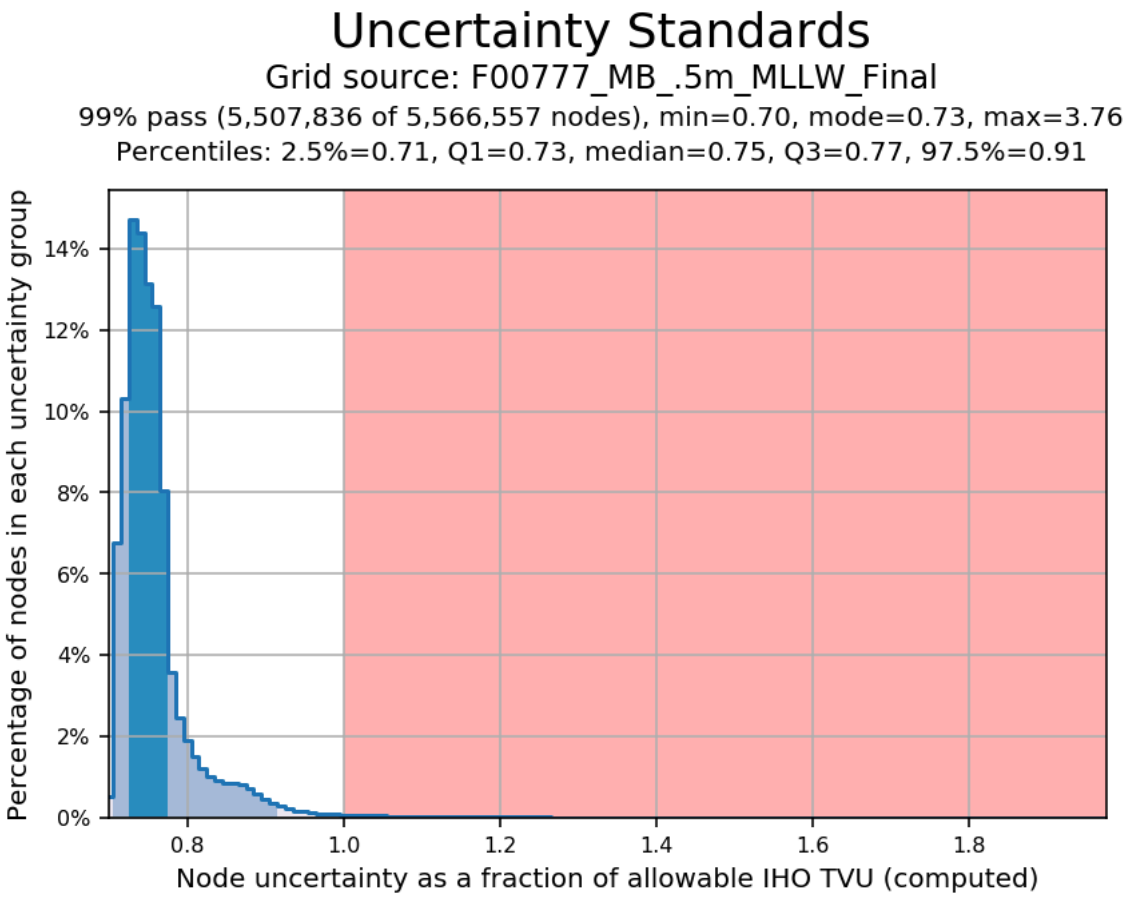


Figure 10: Pydro derived histogram plot showing HSSD uncertainty standards compliance of F00777 MBES data within the finalized 0.5m CUBE surface.

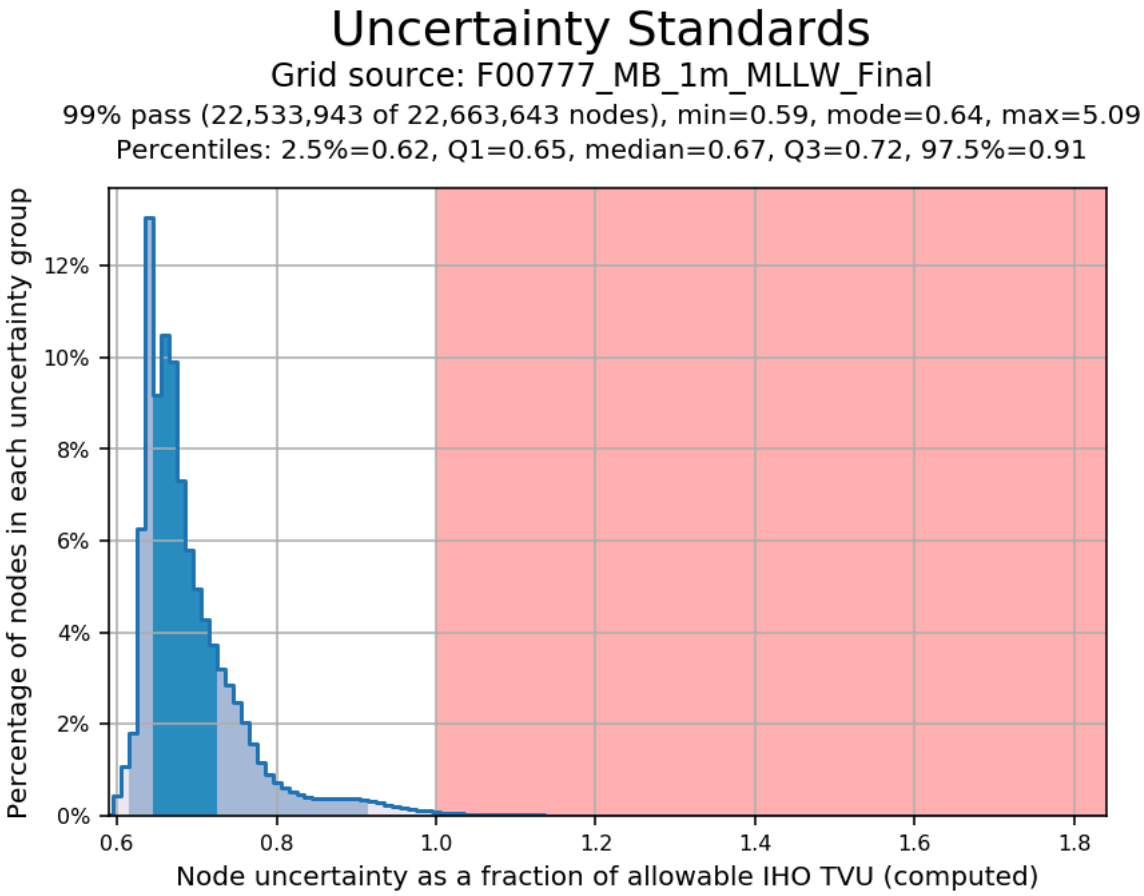


Figure 11: Pydro derived histogram plot showing HSSD uncertainty standards compliance of F00777 MBES data within the finalized 1m CUBE surface.

Concur with clarification. The correct Tide TPU values are 0.098 meters and 0.02 meters instead the 0.95 meters and 0 meters as shown in table 7.

B.2.3 Junctions

There are three junctions with F00777: H12010, H12700, and H12431. All junctions show acceptable agreement with F00777 when run through Pydro's Compare Grids tool.

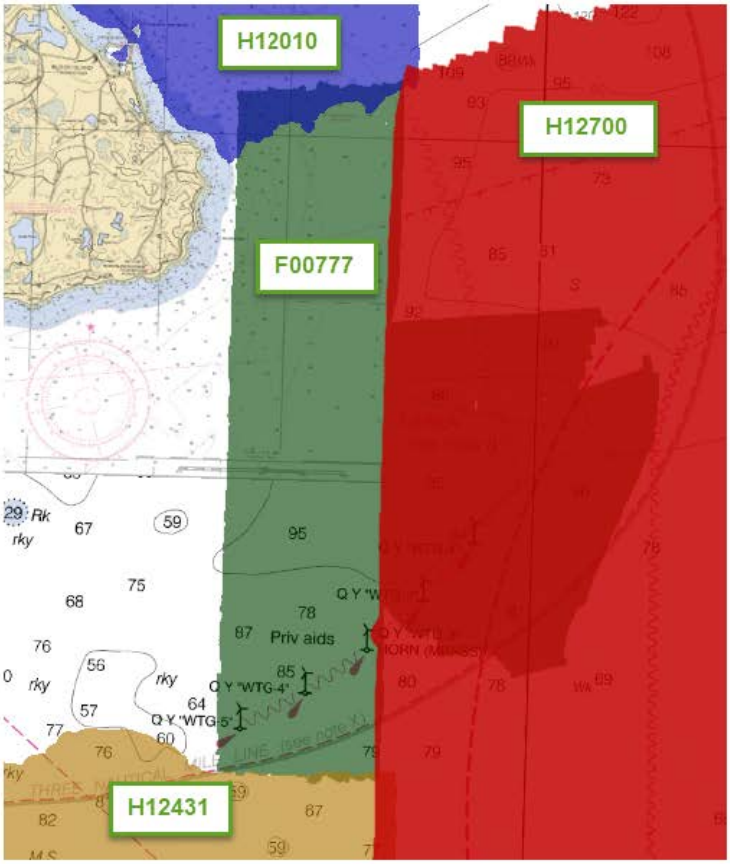


Figure 12: Surveys Junctioning with F00777.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12010	1:7500	2009	NOAA Ship THOMAS JEFFERSON	N
H12700	1:20000	2014	NOAA Ship FERDINAND R. HASSLER	E
H12431	1:20000	2012	NOAA Ship THOMAS JEFFERSON	S

Table 9: Junctioning Surveys

H12010

Overlap between H12010 and F00777 averaged about 100m in width. Using the compare grids tool within Pydro, the differences in the areas of overlap were analyzed and 99% of nodes were found to meet HSSD standards.

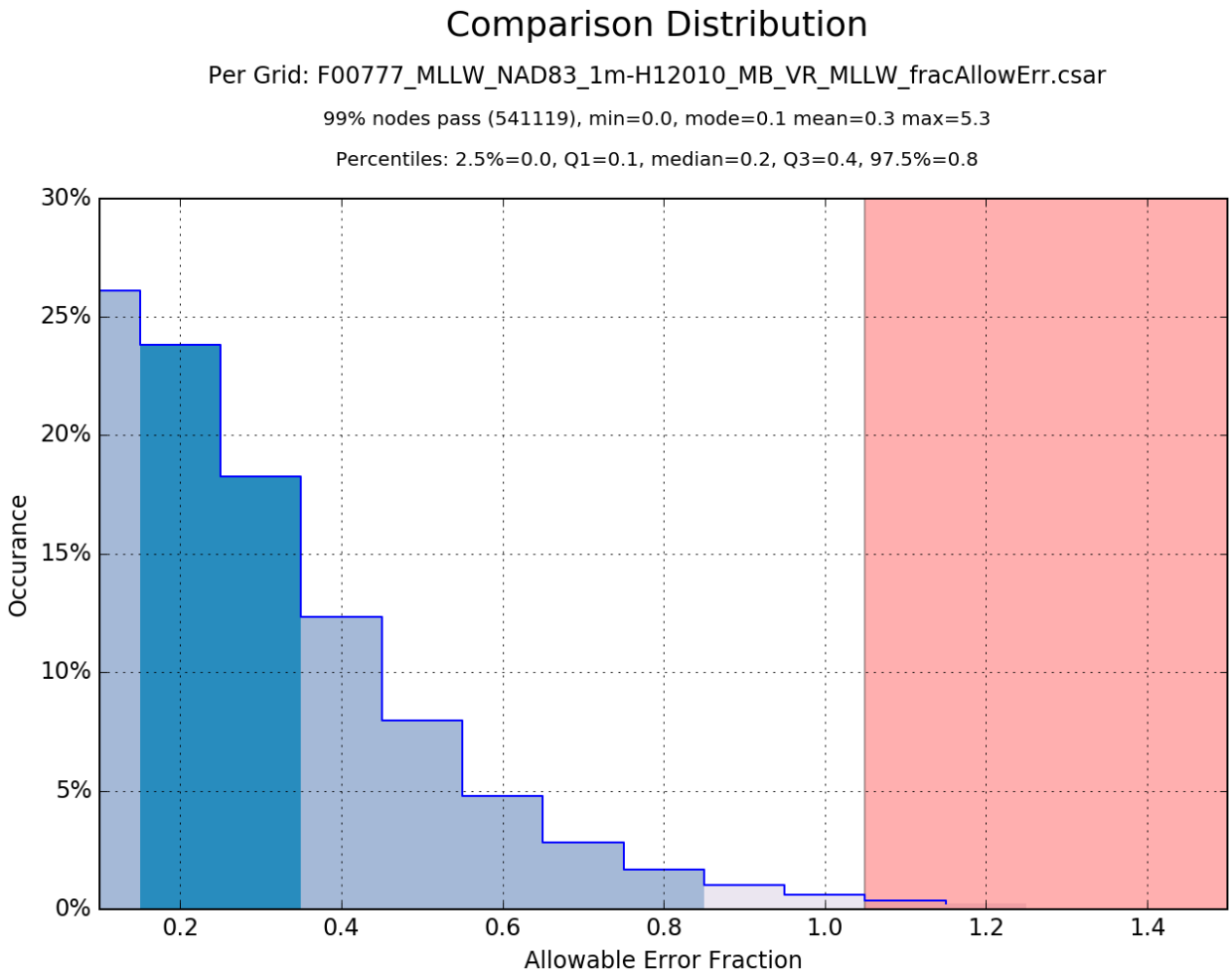


Figure 13: Pydro generated graph comparing H12010 to F00777.

H12700

Overlap between H12700 and F00777 averaged about 100m in width. Using the compare grids tool within Pydro, the differences in the areas of overlap were analyzed and 99.5% of nodes were found to meet HSSD standards.

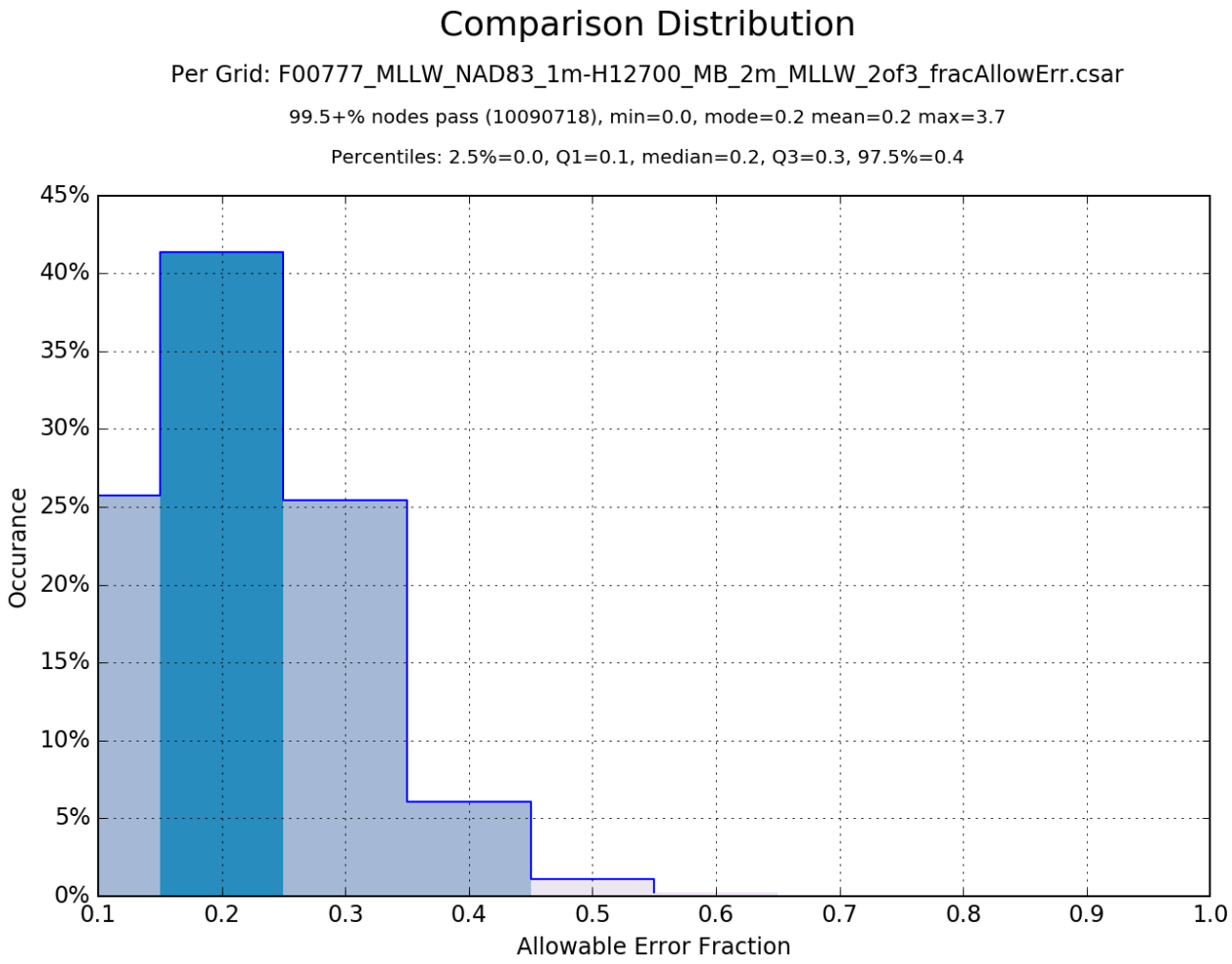


Figure 14: Pydro generated graph comparing H12700 to F00777.

H12431

Overlap between H12431 and F00777 averaged about 100m in width. Using the compare grids tool within Pydro, the differences in the areas of overlap were analyzed and 99% of nodes were found to meet HSSD standards.

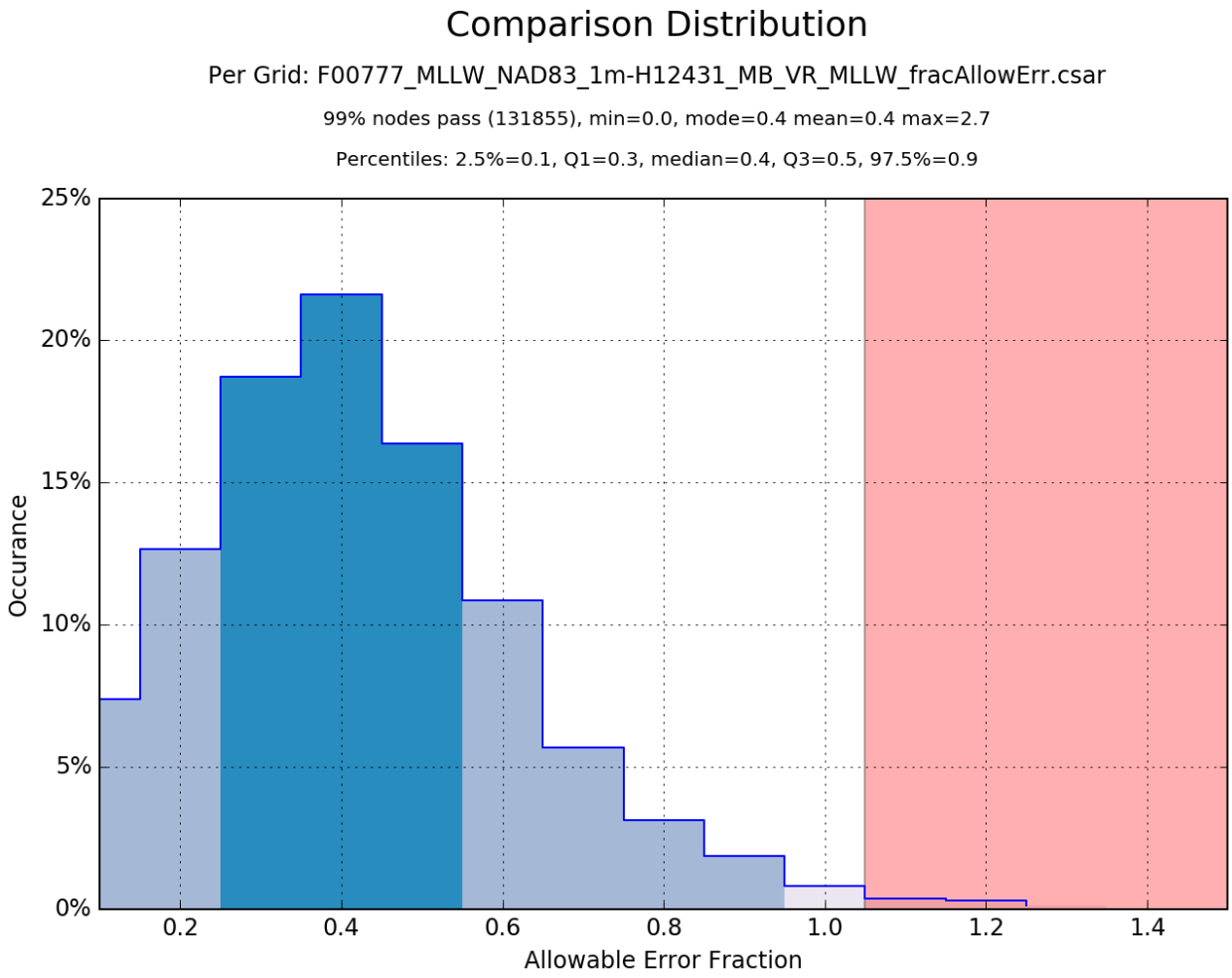


Figure 15: Pydro generated graph comparing H12431 to F00777.

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

There were no other factors that affected corrections to soundings.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: At least once every 4 hours

B.2.8 Coverage Equipment and Methods

All equipment and survey methods were used as detailed in the DAPR with the exception of cast frequency as detailed in section B.2.7

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

All data reduction procedures conform to those detailed in the DAPR.

B.3.2 Calibrations

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

Calibration Type	Date	Reason
Patch Test	2019-05-17	HSRR

Table 10: Calibrations not discussed in the DAPR.

All sounding systems were calibrated as detailed in the DAPR. F00777 spanned over an HSRR period. As a result slight differences are noted in offset measurements as well as patch test values.

B.4 Backscatter

Raw Backscatter was logged in the .all file and will be sent to the Processing Branch

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 and SIPS	11.1
NOAA	Pydro	19.4
Applanix	POSPac	8.4

Table 11: Primary bathymetric data processing software

The following Feature Object Catalog was used: NOAA Profile Version 2019.

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
F00777_MB_50cm_MLLW	CARIS Raster Surface (CUBE)	0.5 meters	3.9 meters - 20 meters	NOAA_0.5m	Object Detection
F00777_MB_1m_MLLW	CARIS Raster Surface (CUBE)	1 meters	18 meters - 37.5 meters	NOAA_1m	Object Detection
F00777_MB_50cm_MLLW_Final	CARIS Raster Surface (CUBE)	0.5 meters	3.9 meters - 20 meters	NOAA_0.5m	Object Detection

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
F00777_MB_1m_MLLW_Final	CARIS Raster Surface (CUBE)	1 meters	18 meters - 37.5 meters	NOAA_1m	Object Detection

Table 12: Submitted Surfaces

Flier Finder was used to analyze the multibeam surfaces for data cleanliness, and all fliers have been addressed.

C. Vertical and Horizontal Control

Field installed tide or GPS stations were not utilized for this survey, so no HVCR is included.

C.1 Vertical Control

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

ERS Datum Transformation

The following ellipsoid-to-chart vertical datum transformation was used:

Method	Ellipsoid to Chart Datum Separation File
ERS via VDATUM	S-B902-NRT5-19_VDatum_100m_NAD83-MLLW_geoid12b.csar

Table 13: ERS method and SEP file

C.2 Horizontal Control

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

The projection used for this project is Universal Transverse Mercator (UTM) Zone 19.

The following PPK methods were used for horizontal control:

- Smart Base

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
NCBI	NCBI
MOR5	MOR5
CTGR	CTGR
NPRI	NPRI
MADA	MADA
MAFA	MAFA

Table 14: CORS Base Stations

C.3 Additional Horizontal or Vertical Control Issues

C.3.1 Altitude Spikes in SBET

Areas of the survey showed vertical disagreement between lines. Inspection of the SBET showed maximum altitude spikes of .5m with a duration of less than ten minutes. These spikes were interpolated through using Pydro's AutoQC tool.

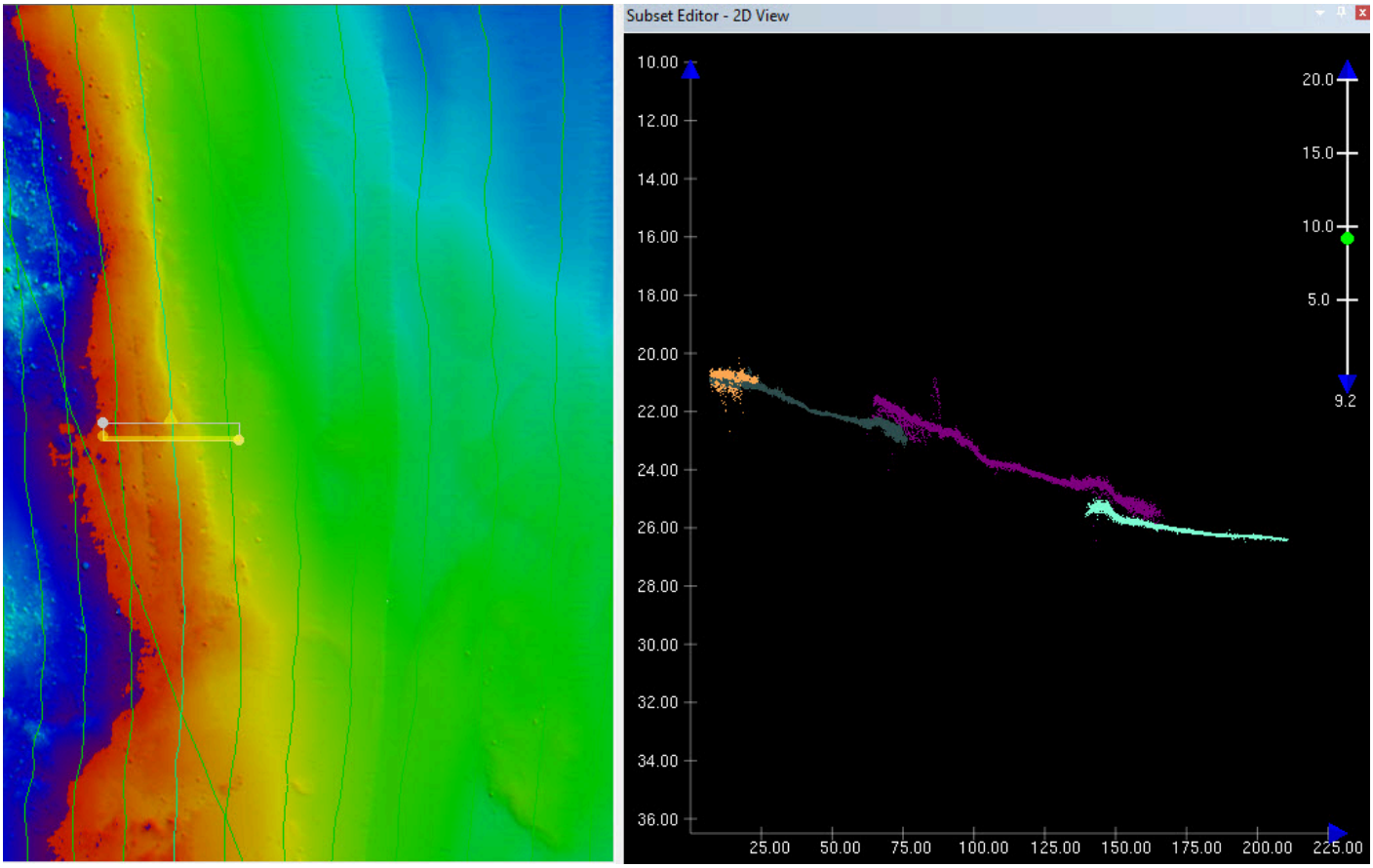


Figure 16: Offset in data caused by a spike in altitude.

D. Results and Recommendations

D.1 Chart Comparison

Chart comparisons were made using CARIS sounding and contour layers derived from CUBE surfaces. The contours and soundings were overlaid on the latest ENC and compared for general agreement and to identify areas of significant change.

D.1.1 Electronic Navigational Charts

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

ENC	Scale	Edition	Update Application Date	Issue Date
US5RI11M	1:15000	14	12/11/2017	04/08/2019
US5RI10M	1:40000	14	04/08/2019	04/08/2019

Table 15: Largest Scale ENCs

D.1.2 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.3 Charted Features

No charted features exist for this survey.

D.1.4 Uncharted Features

No uncharted features exist for this survey.

D.1.5 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.2 Additional Results

D.2.1 Aids to Navigation

Four lights located on windmills SE of Block Island were not investigated while on the water. These lights were seen from shore at night, but the lighting did not allow for clear photographs to be taken, therefore, no images are submitted in the multimedia folder.

Figure 17: Five windmills SE of Block Island operated by Deepwater Wind, RI.

D.2.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.2.3 Bottom Samples

No bottom samples were required for this survey.

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

Submarine features exist for this survey, but were not investigated.

D.2.6 Platforms

No platforms exist for this survey.

D.2.7 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.8 Abnormal Seafloor or Environmental Conditions

No abnormal seafloor and/or environmental conditions 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

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

D.2.11 ENC Scale 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 Specifications and Deliverables, 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
LT Dylan A. Kosten	Sheet Manager	03/09/2020	Dylan Kosten Digitally signed by KOSTEN.DYLAN.ANDREW.1504527405 Date: 2020.03.09 11:29:59 -04'00'
LT Dylan A. Kosten	Chief of Party	03/09/2020	Dylan Kosten Digitally signed by KOSTEN.DYLAN.ANDREW.1504527405 Date: 2020.03.09 11:30:29 -04'00'

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	Continuously Operating Reference Station
CTD	Conductivity Temperature Depth
CEF	Chart Evaluation File
CSF	Composite Source File
CST	Chief Survey Technician
CUBE	Combined Uncertainty and Bathymetry Estimator
DAPR	Data Acquisition and Processing Report
DGPS	Differential Global Positioning System
DP	Detached Position
DR	Descriptive Report
DTON	Danger to Navigation
ENC	Electronic Navigational Chart
ERS	Ellipsoidal Referenced Survey
ERTDM	Ellipsoidally Referenced Tidal Datum Model
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

Acronym	Definition
HSSD	Hydrographic Survey Specifications and Deliverables
HSTB	Hydrographic Systems Technology Branch
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	Linear Nautical Miles
MBAB	Multibeam Echosounder Acoustic Backscatter
MCD	Marine Chart Division
MHW	Mean High Water
MLLW	Mean Lower Low Water
NAD 83	North American Datum of 1983
NALL	Navigable Area Limit Line
NTM	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
RNC	Raster Navigational Chart
RTK	Real Time Kinematic
RTX	Real Time Extended
SBES	Singlebeam Echosounder
SBET	Smooth Best Estimate and Trajectory
SNM	Square Nautical Miles
SSS	Side Scan Sonar
SSSAB	Side Scan Sonar Acoustic Backscatter
ST	Survey Technician
SVP	Sound Velocity Profiler
TCARI	Tidal Constituent And Residual Interpolation
TPU	Total Propagated Uncertainty
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDF	Zone Definition File

APPROVAL PAGE

F00777

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
- 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.

Approved: Digitally signed by HOLMBERG.PETER.SCOTT.1365886101
Reason: I am approving this document
Date: 2022.02.11 12:59:41 -08'00'

Peter Holmberg

Hydrographic Team Lead, Pacific Hydrographic Branch