F00773

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	F00773

LOCALITY

State(s):	New York
General Locality:	Long Island, NY
Sub-locality:	Moriches and Shinnecock Inlets and Bays

2019

CHIEF OF PARTY
LTJG Dylan Kosten

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**F00773**

INSTRUCTIONS: The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

State(s):	**New York**
General Locality:	**Long Island, NY**
Sub-Locality:	**Moriches and Shinnecock Inlets and Bays**
Scale:	**10000**
Dates of Survey:	**05/30/2019 to 06/07/2019**
Instructions Dated:	**05/21/2019**
Project Number:	**S-C903-NRT5-19**
Field Unit:	**NOAA Navigation Response Team 5**
Chief of Party:	**LTJG Dylan Kosten**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	
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 18N, MLLW. All references to other horizontal or vertical datums in this report are applicable to the processed hydrographic data provided by the field unit.

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Descriptive Report to Accompany Survey F00773

Project: S-C903-NRT5-19

Locality: Long Island, NY

Sublocality: Moriches and Shinnecock Inlets and Bays

Scale: 1:10000

May 2019 - June 2019

NOAA Navigation Response Team 5

Chief of Party: LTJG Dylan Kosten

A. Area Surveyed

This hydrographic survey was acquired in accordance with the requirements defined in the Project Instructions S-C903-NRT5-19. The survey area F00773 encompasses two bays and inlets near Hampton Bays, NY and Center Moriches, NY, and covers approximately 1.47 square nautical miles.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
41° 6' 17.75" N 72° 15' 51.71" W	40° 45' 16.64" N 72° 45' 26" W

Table 1: Survey Limits

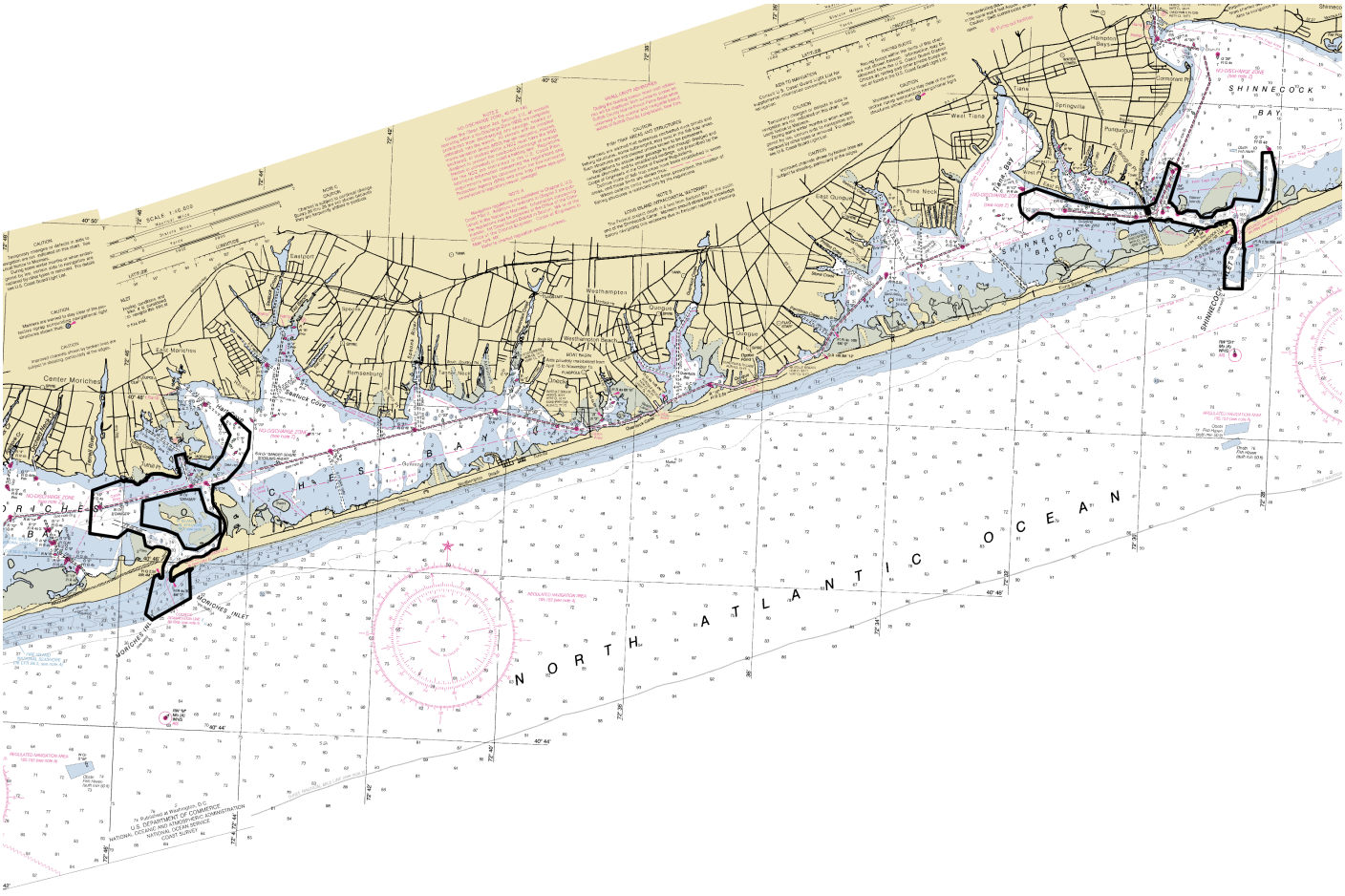


Figure 1: F00773 sheet limits.

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

A.2 Survey Purpose

USCG has reported charting discrepancies in Moriches Bay and Shinnecock Bay. Survey data from 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.

The Grid QA tool within QC Tools was used to analyze multibeam echosounder (MBES) data density. The finalized surfaces meet the HSSD data density requirement.

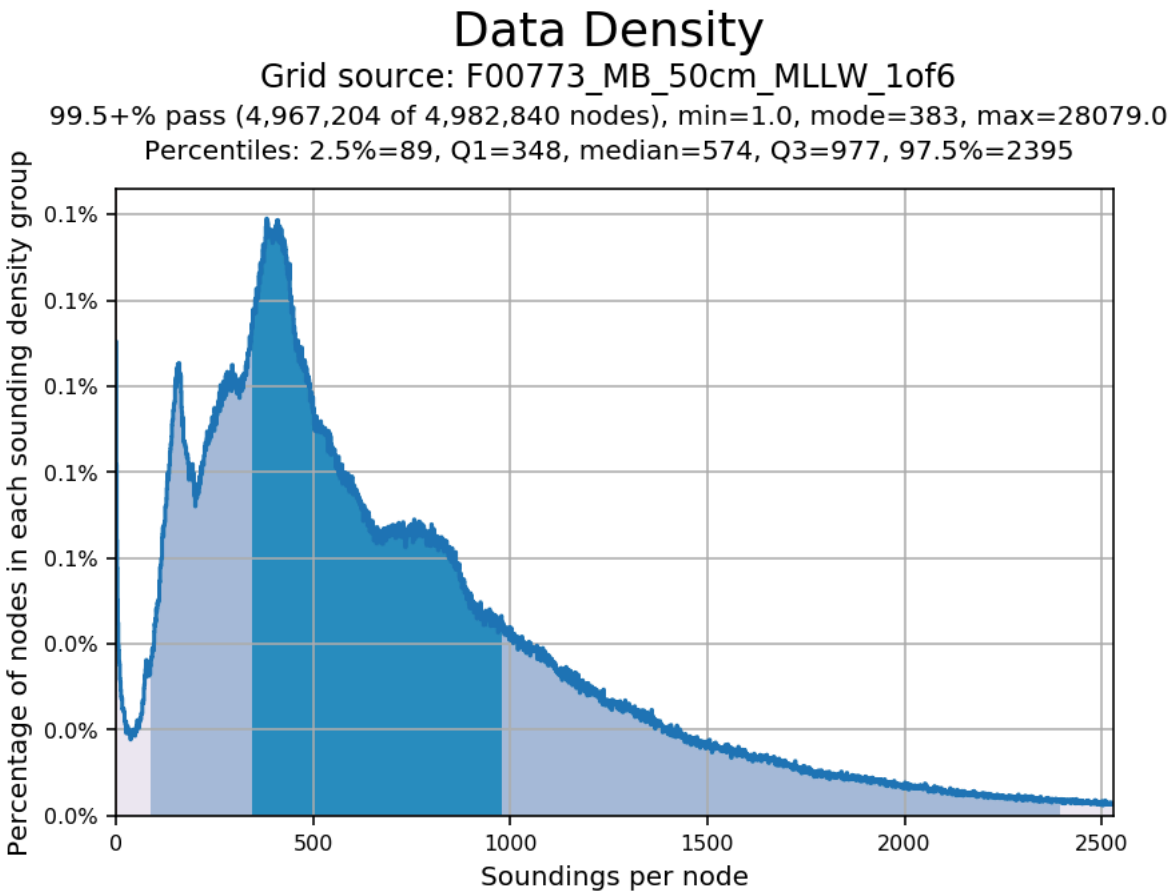


Figure 2: Pydro derived histogram plot showing HSSD object detection compliance of F00773 MBES data within the 1of6 finalized CUBE surface.

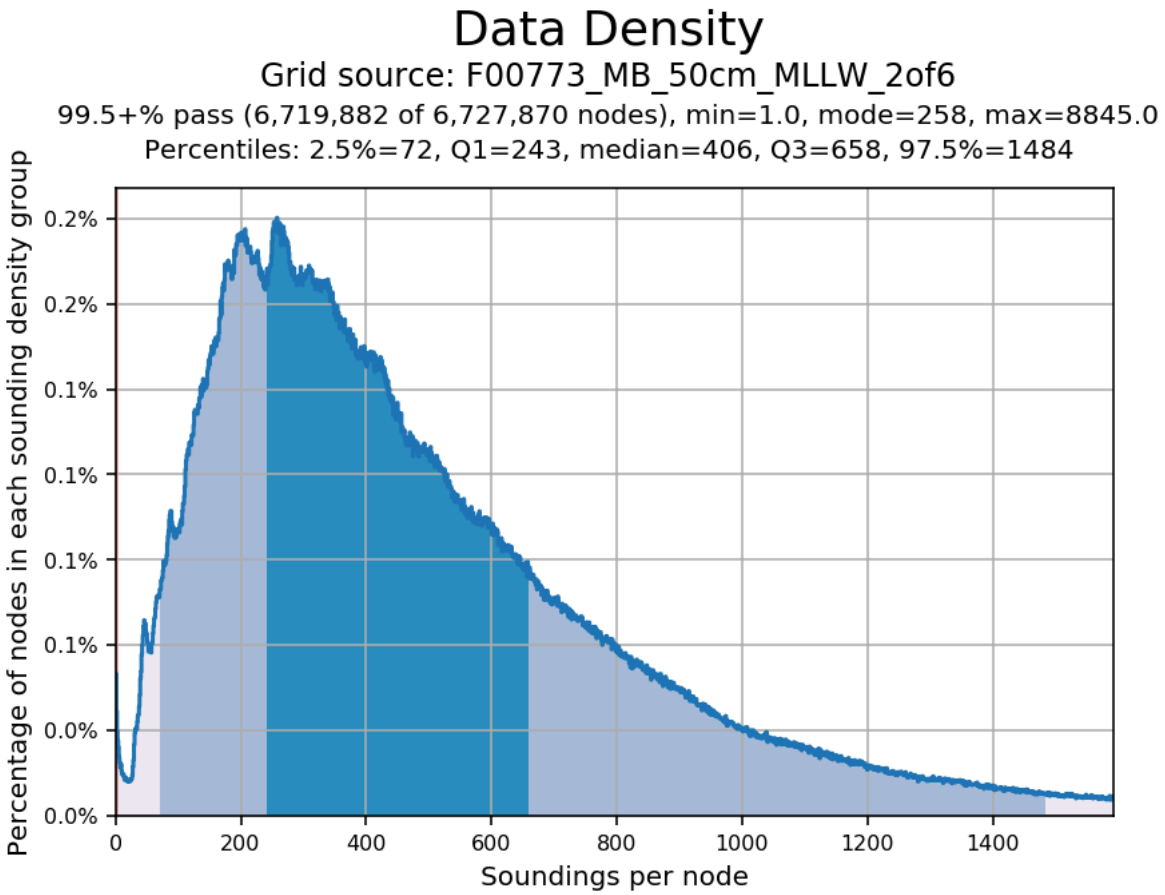


Figure 3: Pydro derived histogram plot showing HSSD object detection compliance of F00773 MBES data within the 2of6 finalized CUBE surface.

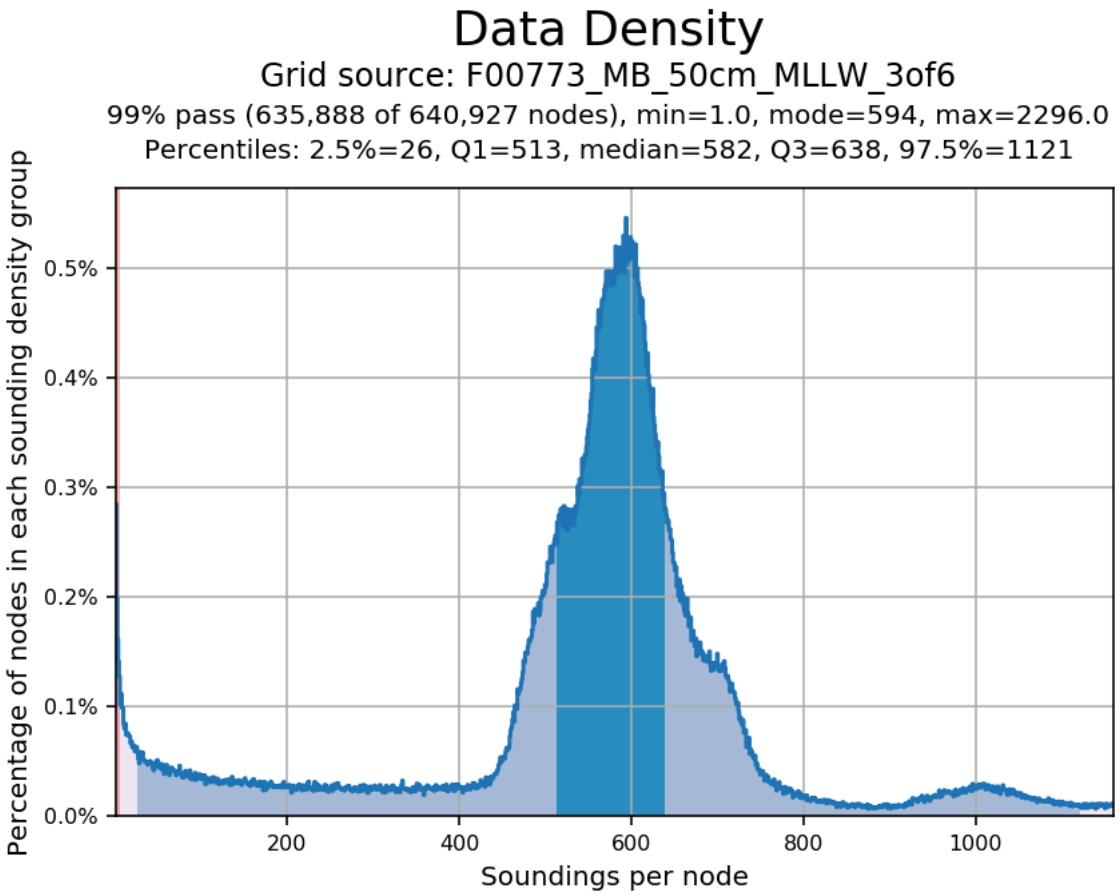


Figure 4: Pydro derived histogram plot showing HSSD object detection compliance of F00773 MBES data within the 3of6 finalized CUBE surface.

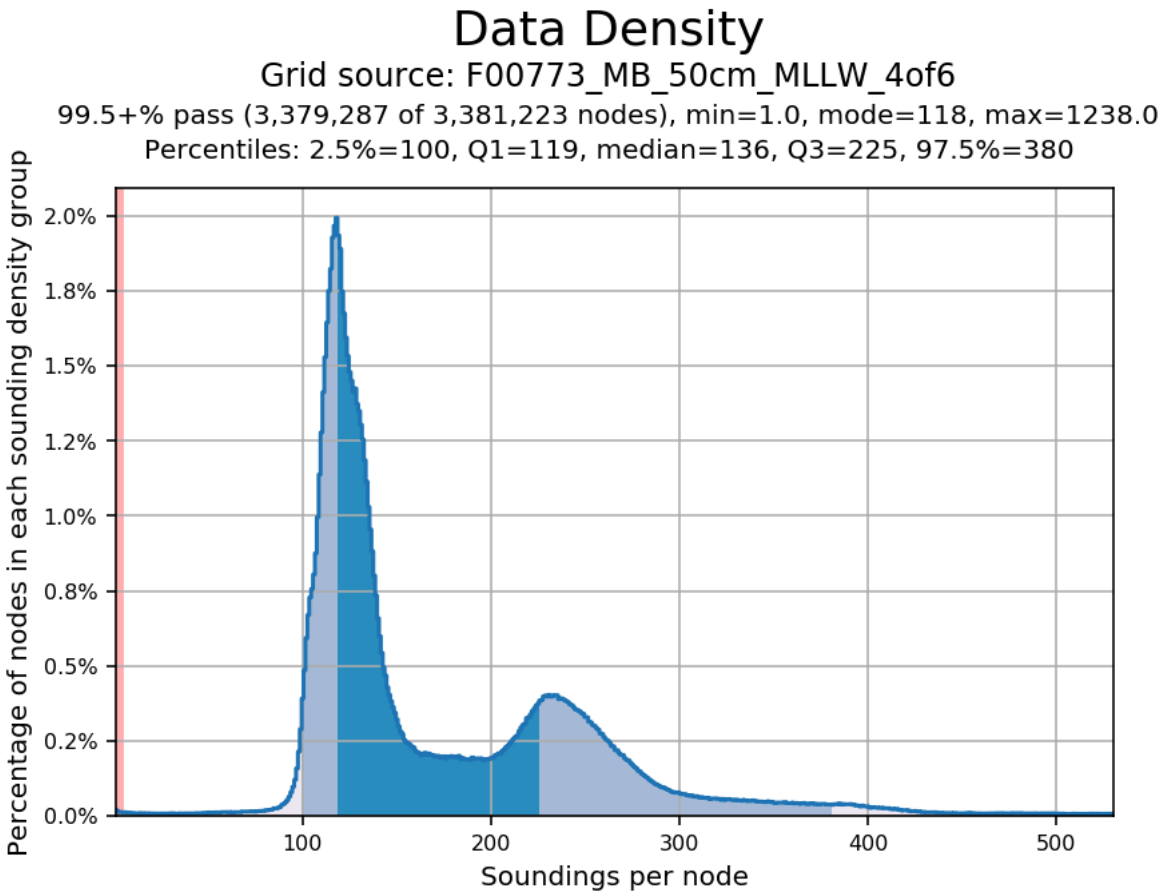


Figure 5: Pydro derived histogram plot showing HSSD object detection compliance of F00773 MBES data within the 4of6 finalized CUBE surface.

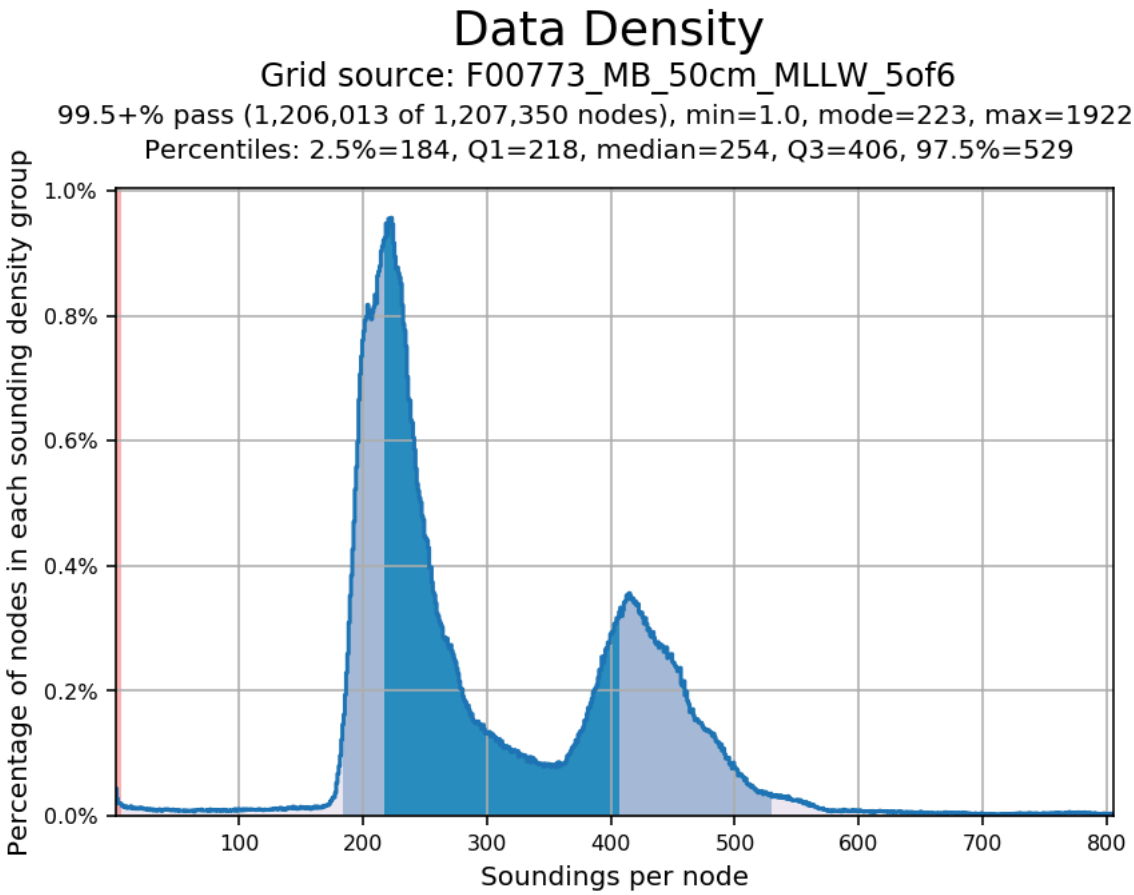


Figure 6: Pydro derived histogram plot showing HSSD object detection compliance of F00773 MBES data within the 5of6 finalized CUBE surface.

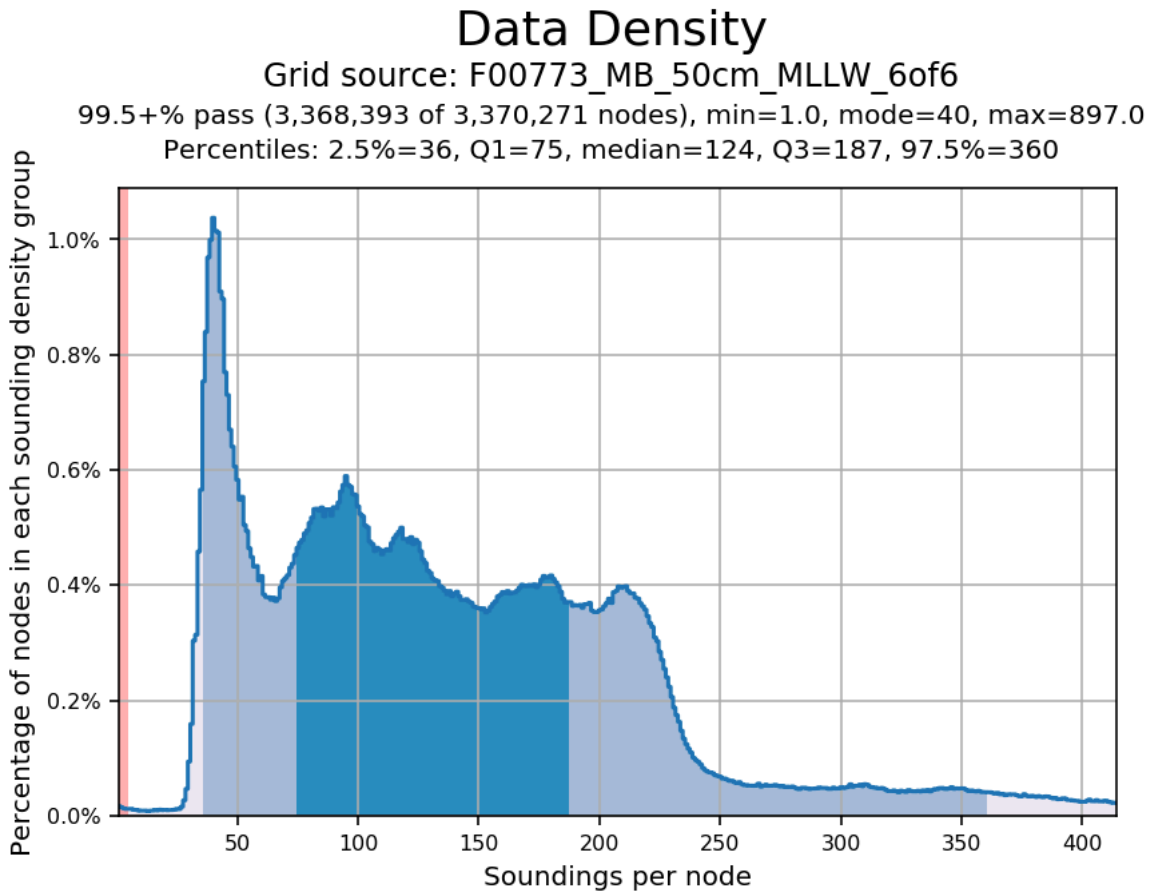


Figure 7: Pydro derived histogram plot showing HSSD object detection compliance of F00773 MBES data within the 6of6 finalized CUBE surface.

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 with the requirements listed above and in the HSSD with some exceptions. Set line spacing was used in Moriches Bay to minimize risk associated with surveying over shoals and fast currents. In Moriches Inlet set line spacing was also used as the waters were unprotected and the inlet shoals could only be surveyed going into the seas. Some holidays were located outside both Moriches and Shinnecock Inlet, and were not able to be addressed because of limited weather windows. Other holidays within F00773 were primarily caused by surveying around bridge supports and blowouts in

the outerbeams. These holidays were investigated and do not appear to contain navigationally significant features.

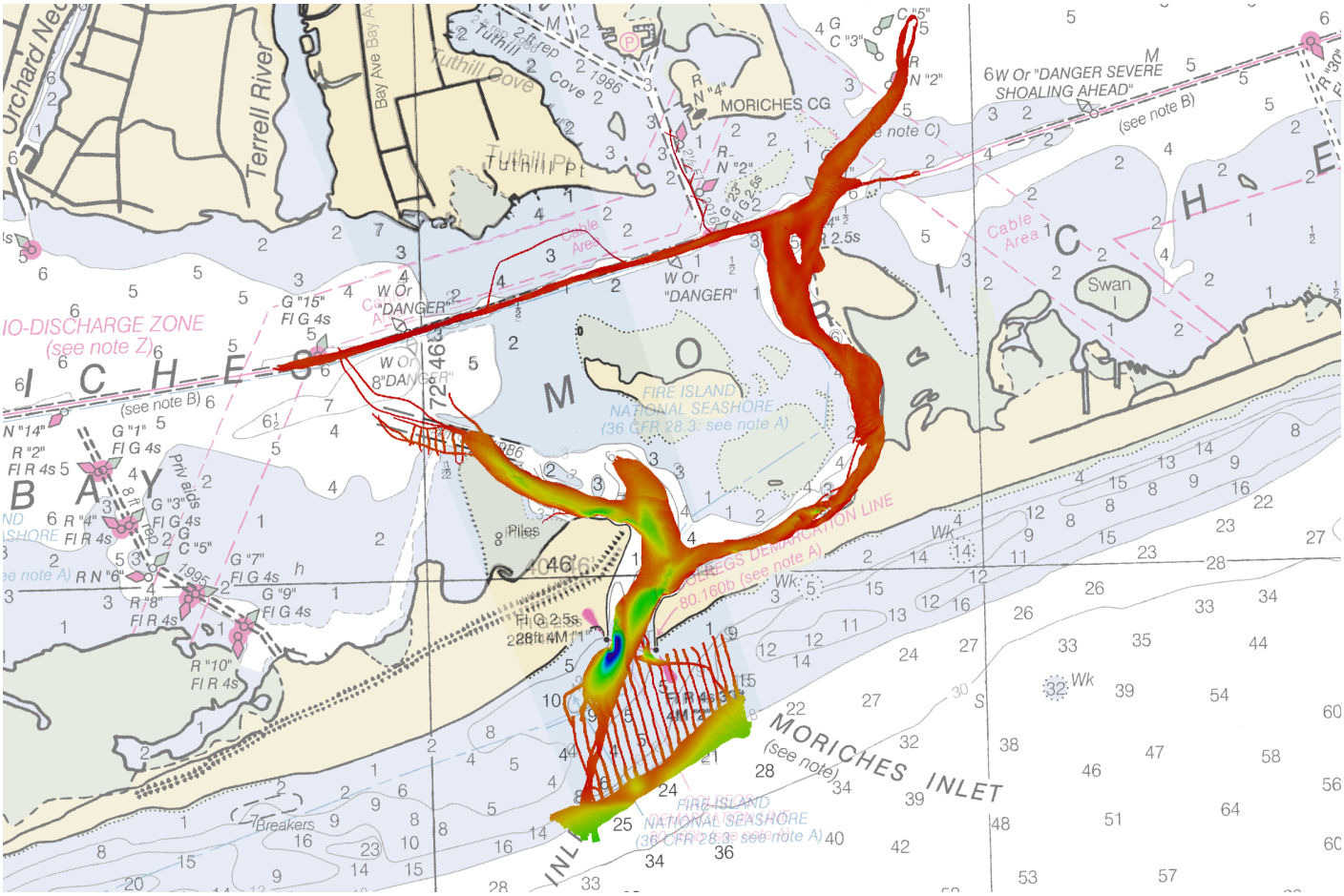


Figure 8: Survey coverage in Moriches Inlet.

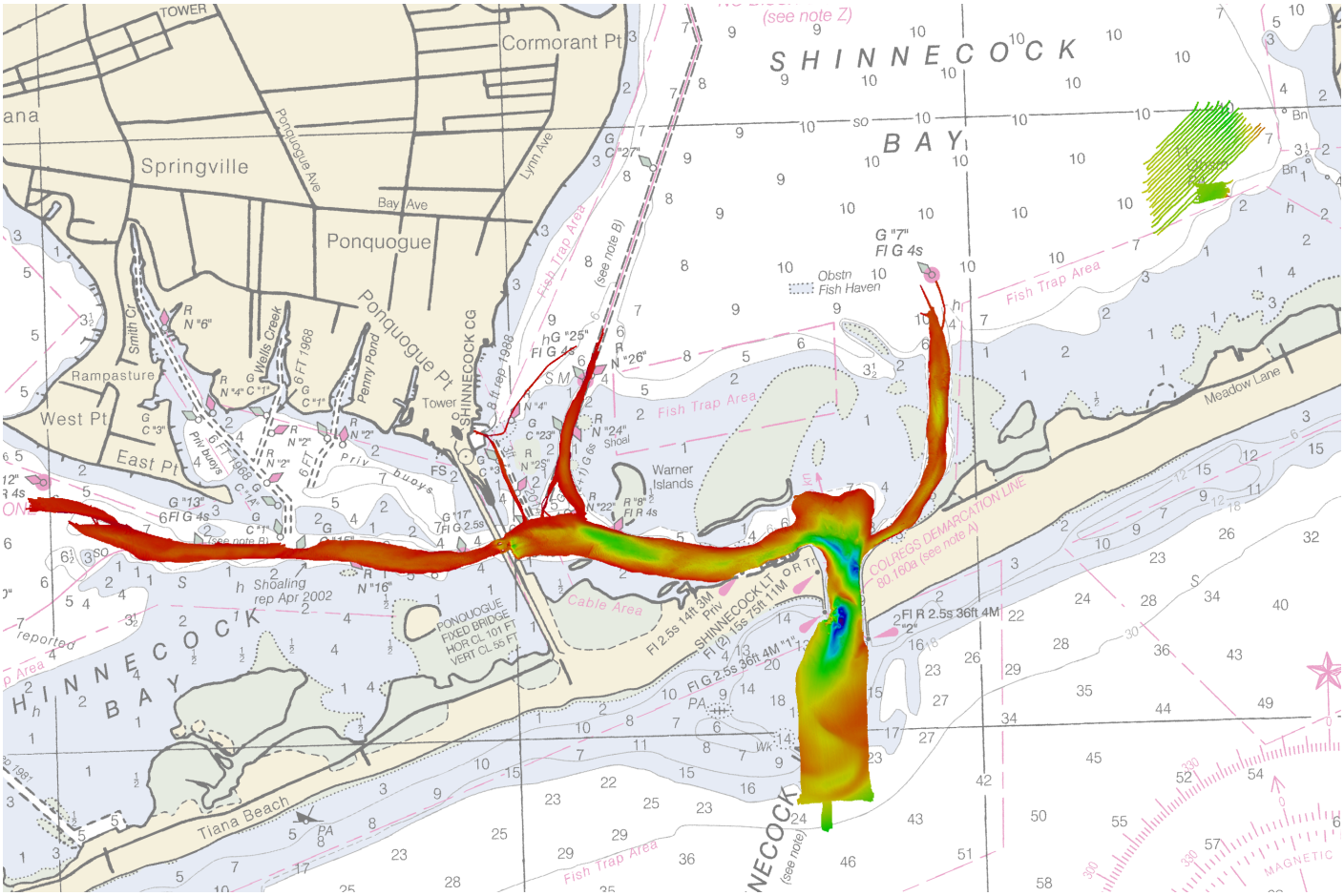


Figure 9: Survey coverage in Shinnecock Inlet and chart discrepancy in Shinnecock Bay.

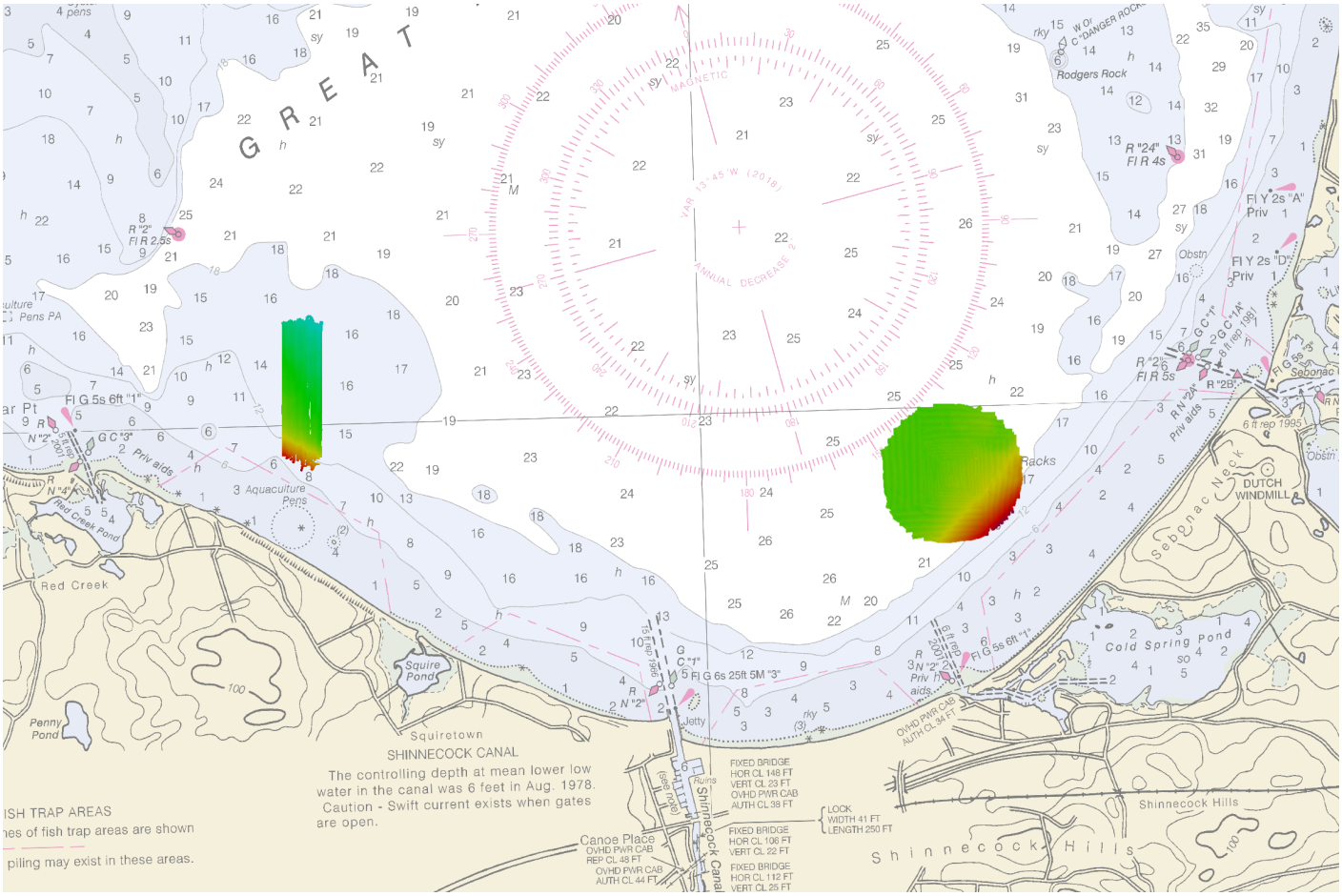


Figure 10: Survey coverage over discrepancies in Great Peconic Bay.

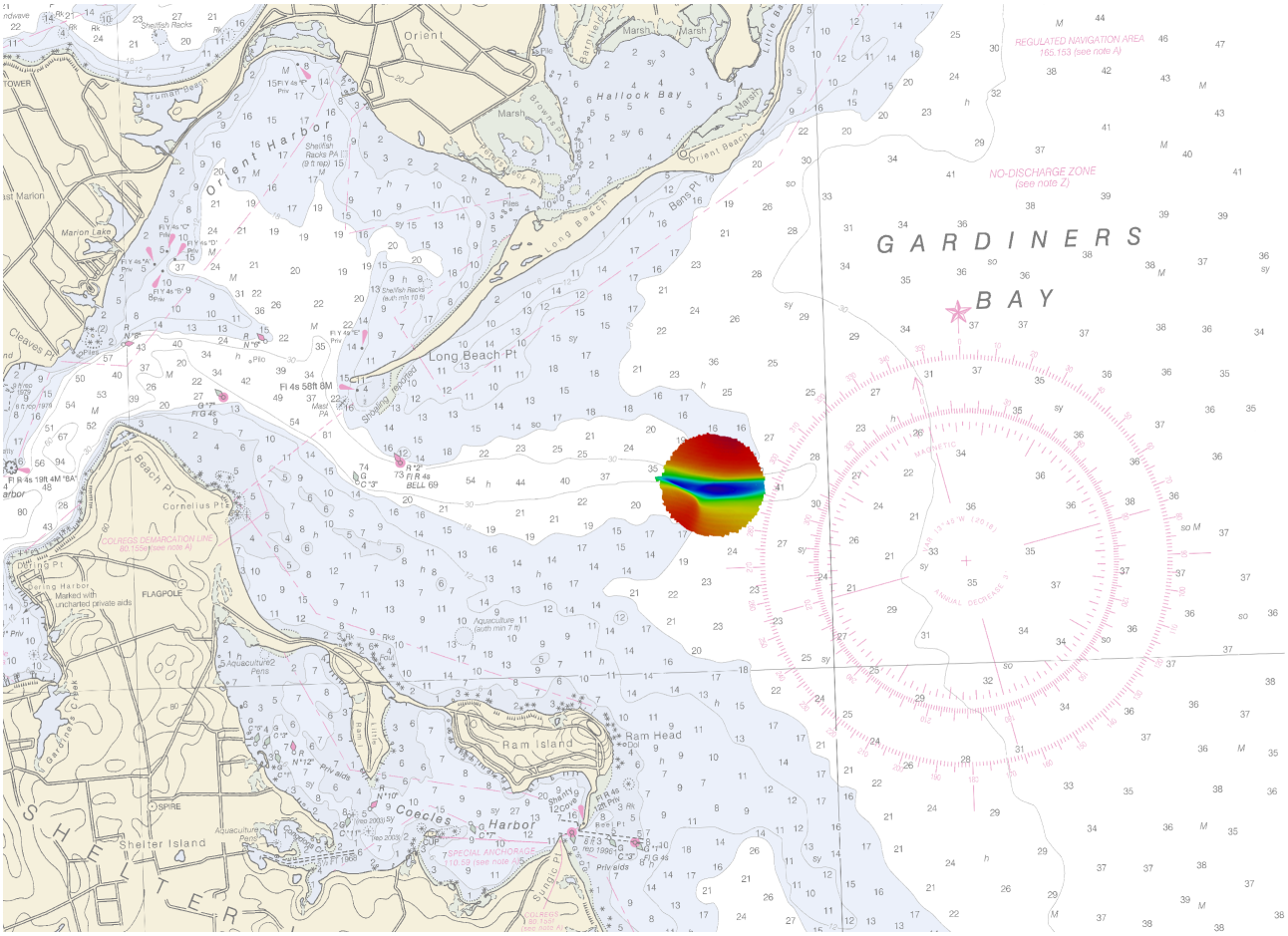


Figure 11: Survey coverage over discrepancy in Gardiners Bay.

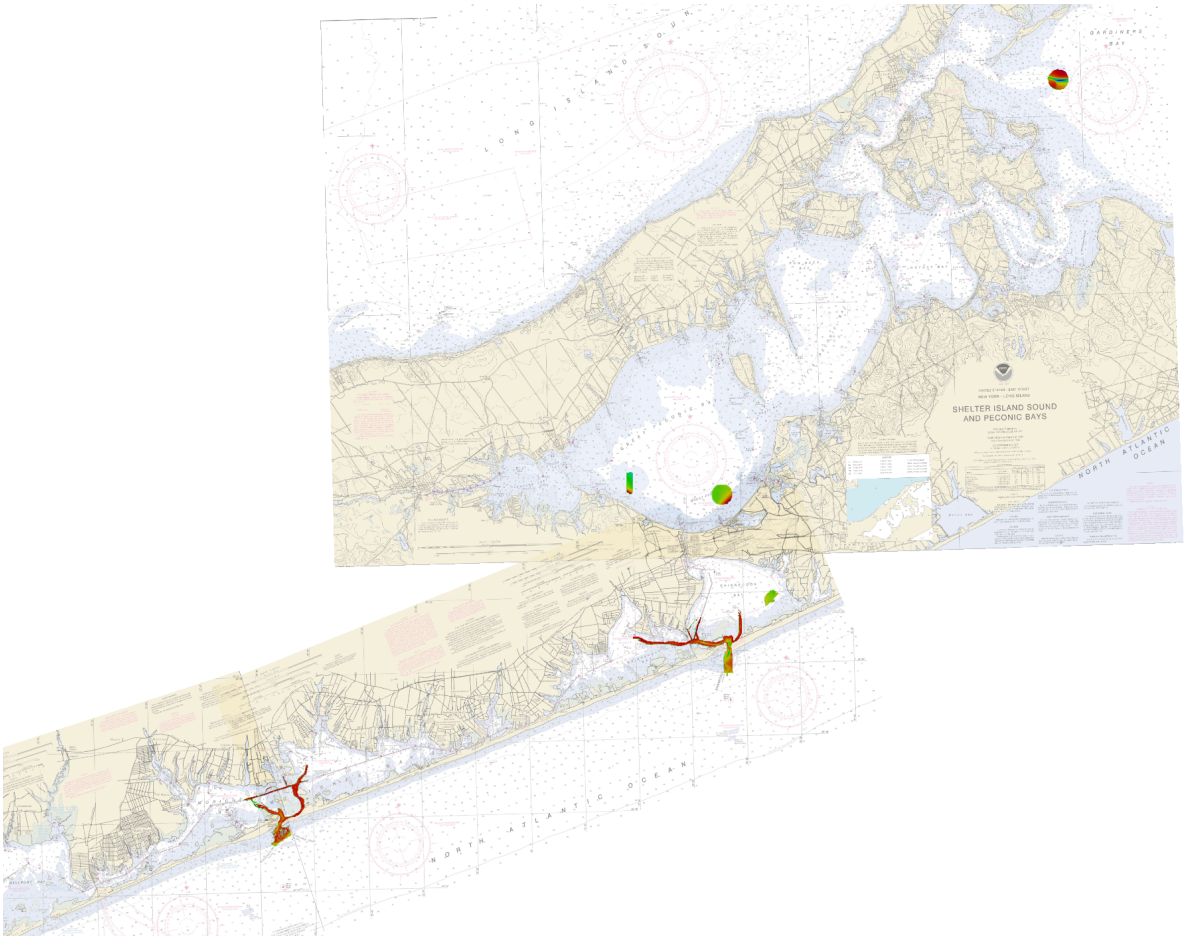


Figure 12: Survey coverage over entire project.

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	231.92	231.92
	Lidar Mainscheme	0	0
	SSS Mainscheme	0	0
	SBES/SSS Mainscheme	0	0
	MBES/SSS Mainscheme	0	0
	SBES/MBES Crosslines	8.43	8.43
	Lidar Crosslines	0	0
Number of Bottom Samples			3
Number Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Investigated by Dive Ops			0
Total SNM			1.67

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
05/30/2019	150
05/31/2019	151

Survey Dates	Day of the Year
06/01/2019	152
06/02/2019	153
06/03/2019	154
06/04/2019	155
06/05/2019	156
06/06/2019	157
06/07/2019	158

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

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

Multibeam/single beam echo sounder/side scan sonar crosslines acquired for this survey totaled 3.63% of mainscheme acquisition.

For both Shinnecock and Moriches Inlet, a 50cm CUBE surface was created using only mainscheme lines and a second 50cm CUBE surface was created using only crosslines. These surfaces were then input into the Pydro Tool "Compare Grids". Both comparisons passed HSSD specifications.

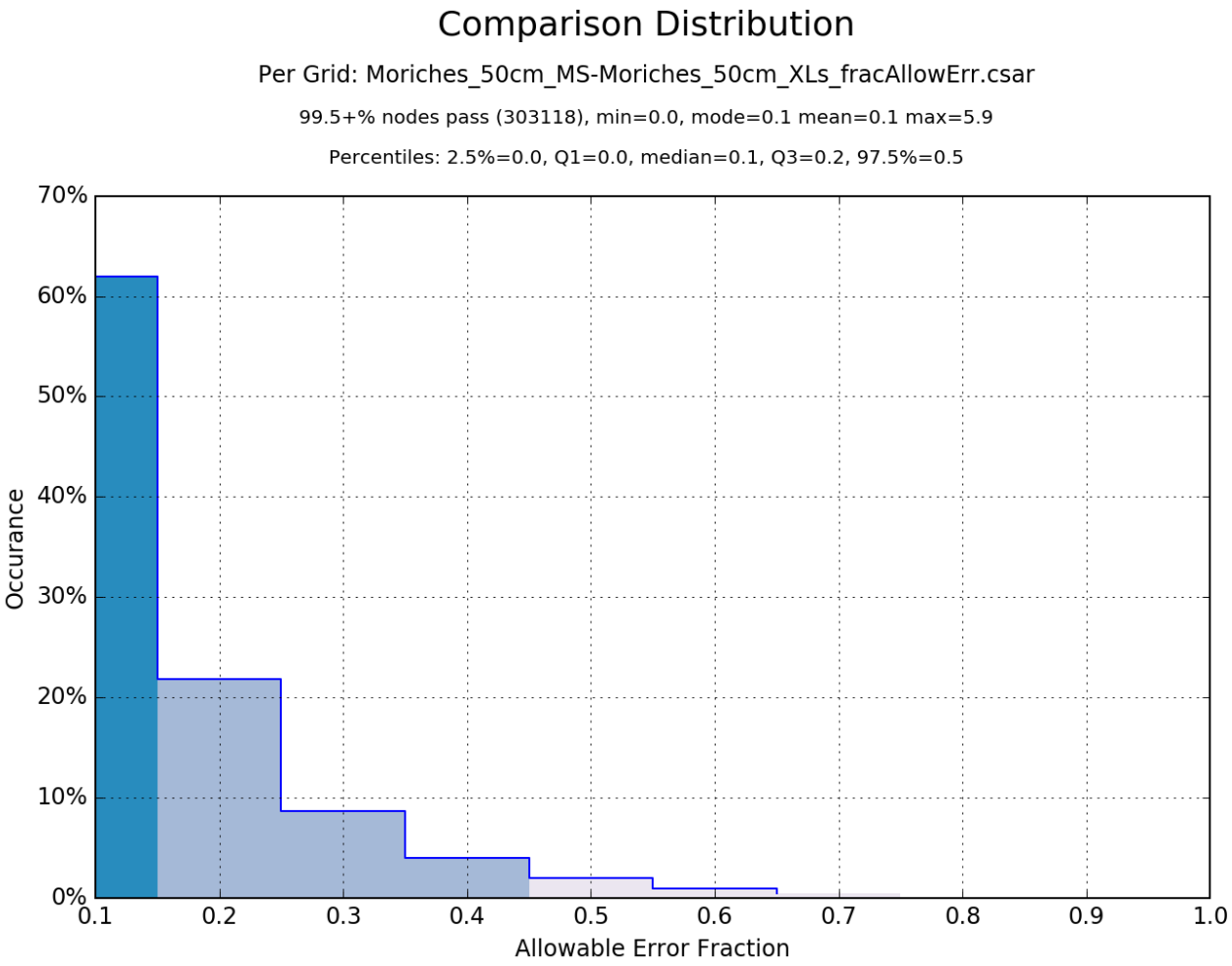


Figure 13: Pydro generated graph showing comparison between mainscheme and crosslines in Moriches Inlet.

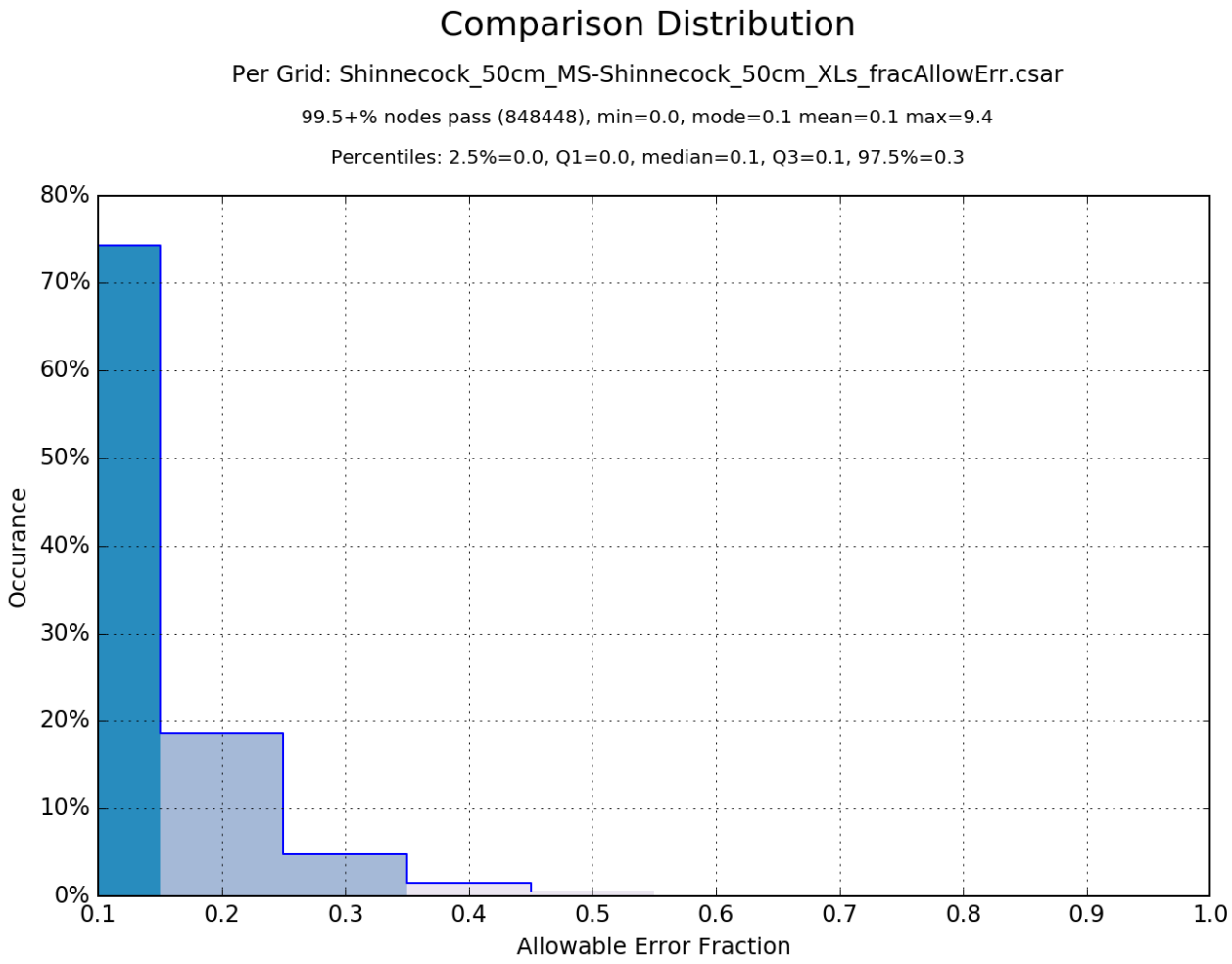


Figure 14: Pydro generated graph showing comparison between mainscheme and crosslines in Shinnecock Inlet.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0 centimeters	11.7 centimeters

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	0.2 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

Total Propagated Uncertainty (TPU) values for F00773 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, F00773 is an ellipsoidally referenced survey (ERS) and the tidal component was accomplished with a separation model.

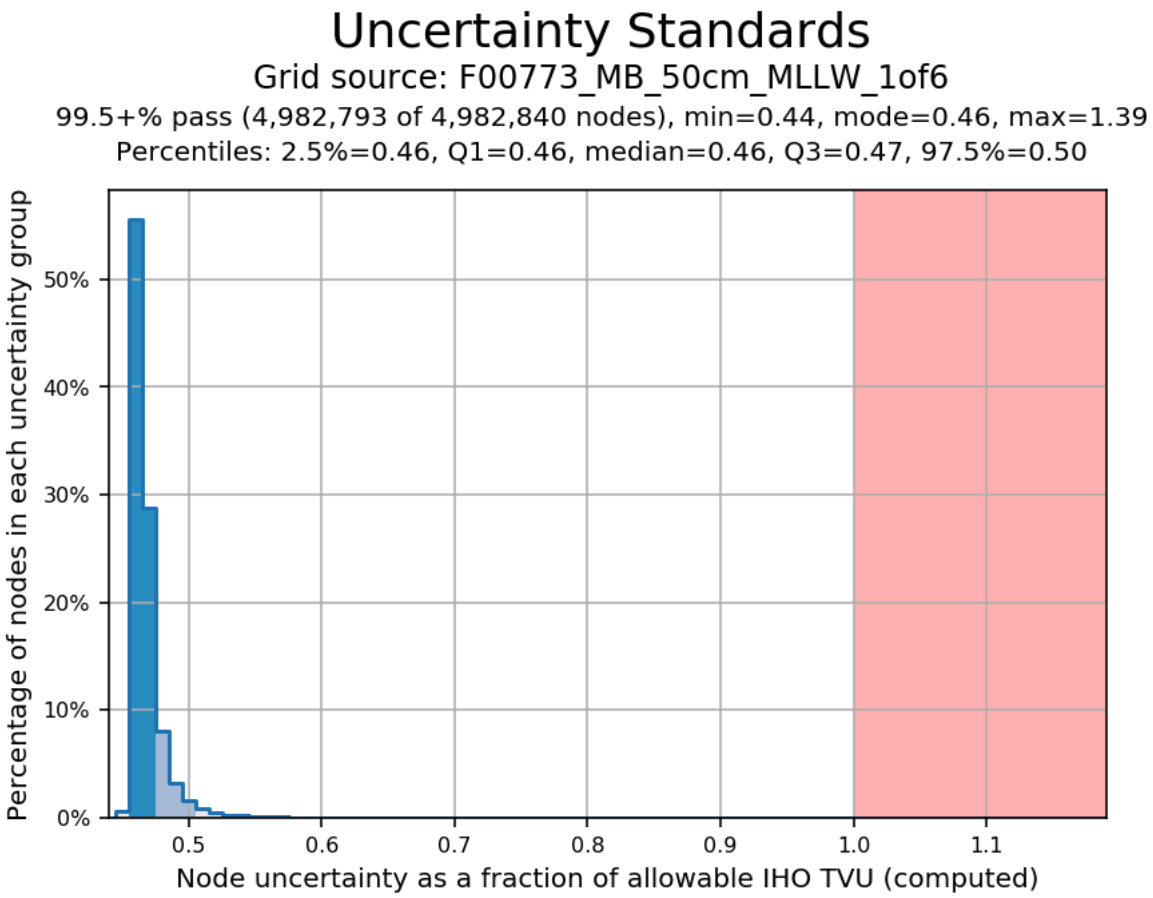


Figure 15: Pydro derived histogram plot showing HSSD uncertainty standards compliance of F00773 MBES data within the 1of6 finalized CUBE surface.

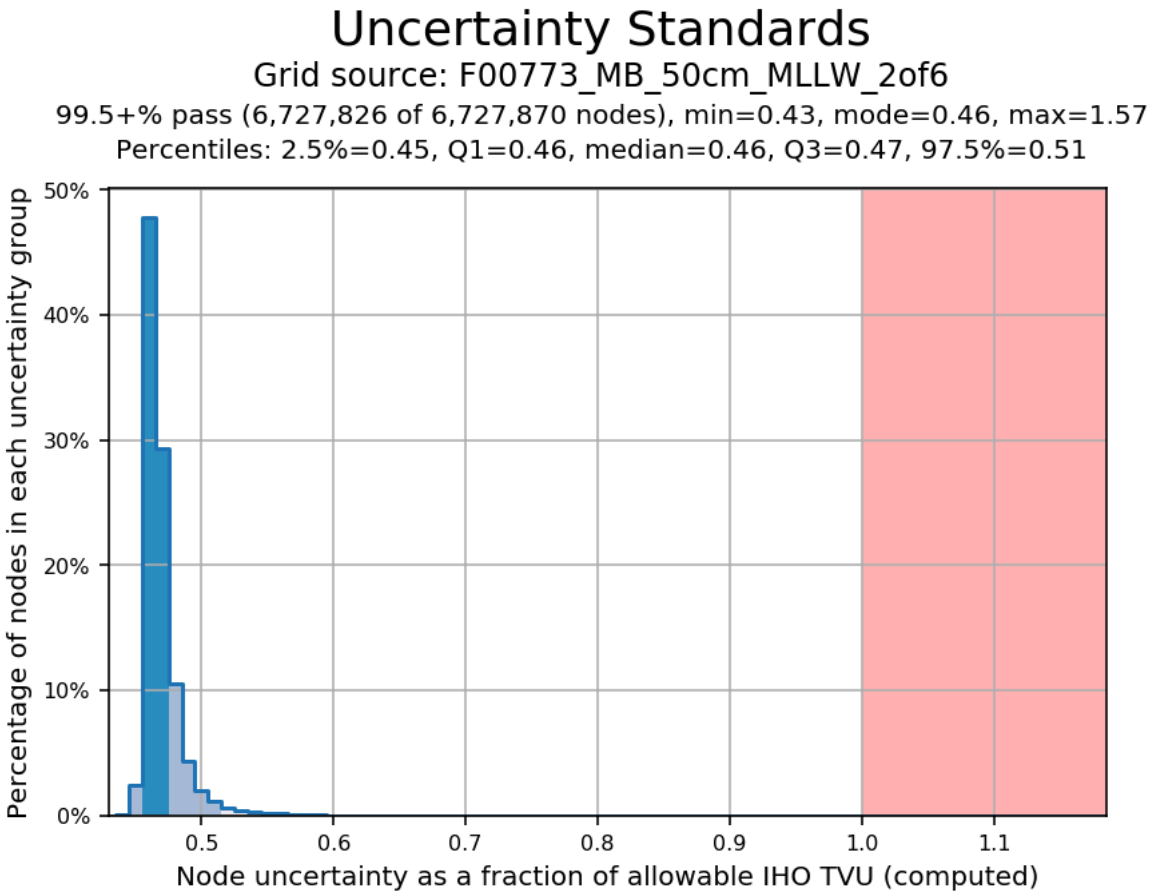


Figure 16: Pydro derived histogram plot showing HSSD uncertainty standards compliance of F00773 MBES data within the 2of6 finalized CUBE surface.

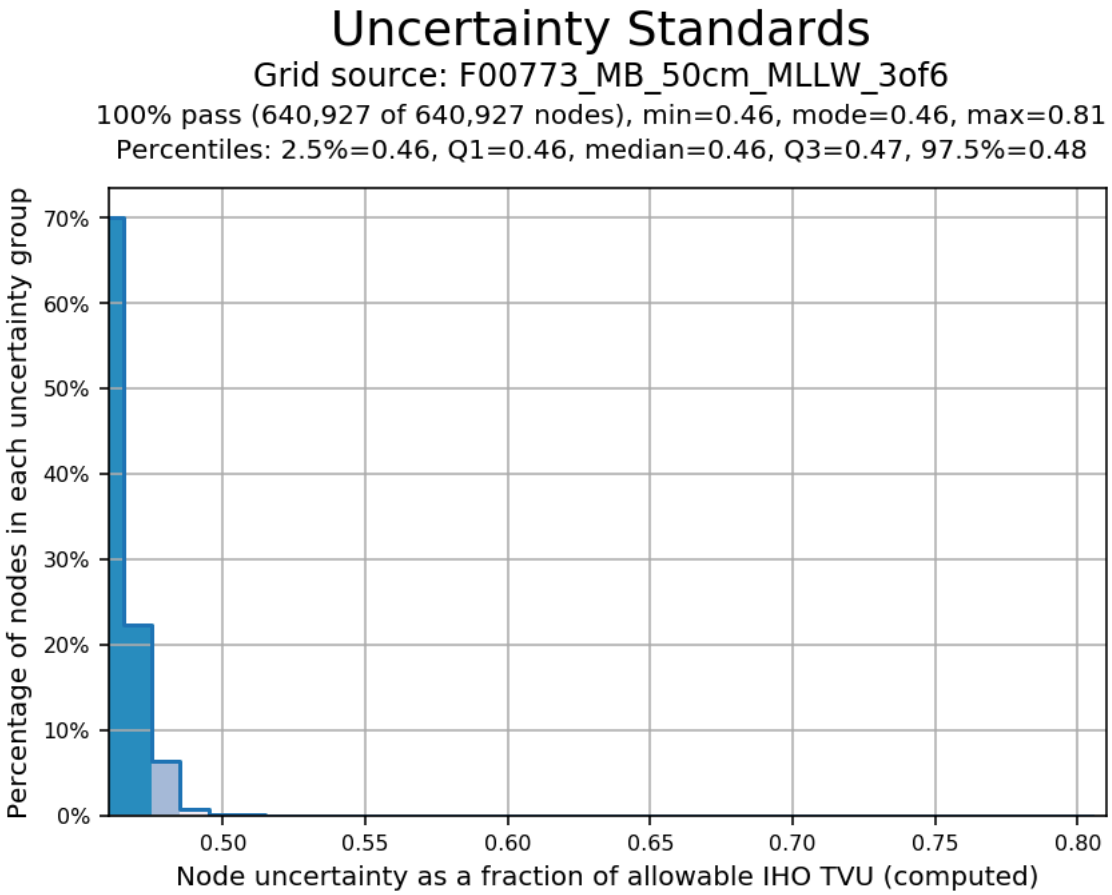


Figure 17: Pydro derived histogram plot showing HSSD uncertainty standards compliance of F00773 MBES data within the 3of6 finalized CUBE surface.

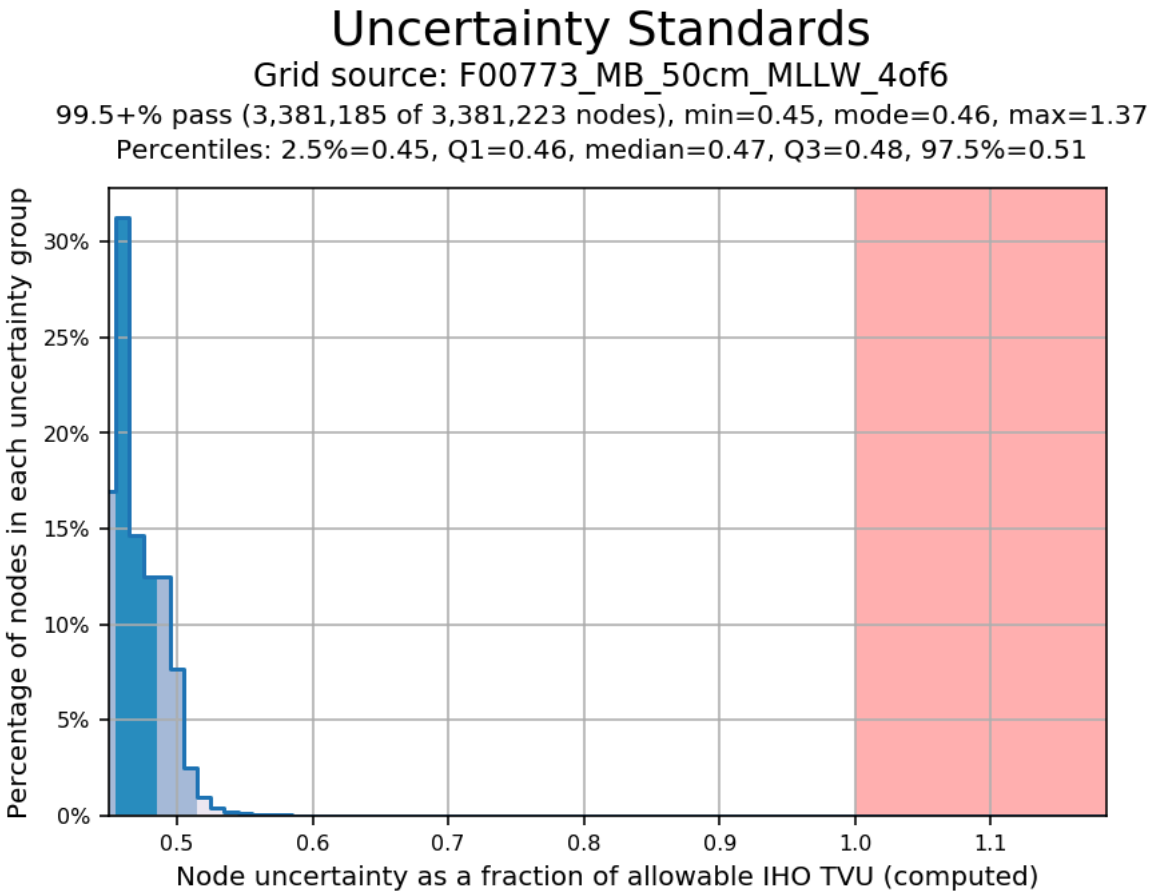


Figure 18: Pydro derived histogram plot showing HSSD uncertainty standards compliance of F00773 MBES data within the 4of6 finalized CUBE surface.

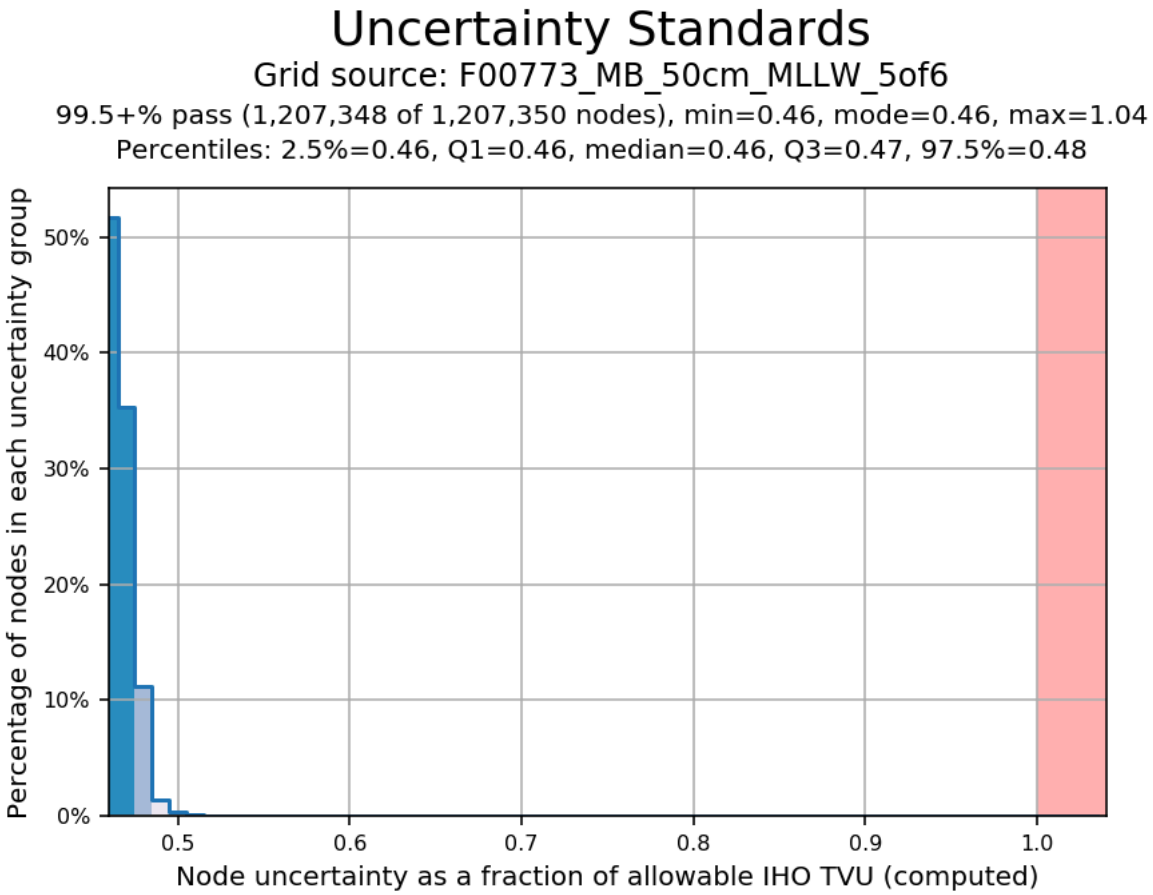


Figure 19: Pydro derived histogram plot showing HSSD uncertainty standards compliance of F00773 MBES data within the 5of6 finalized CUBE surface.

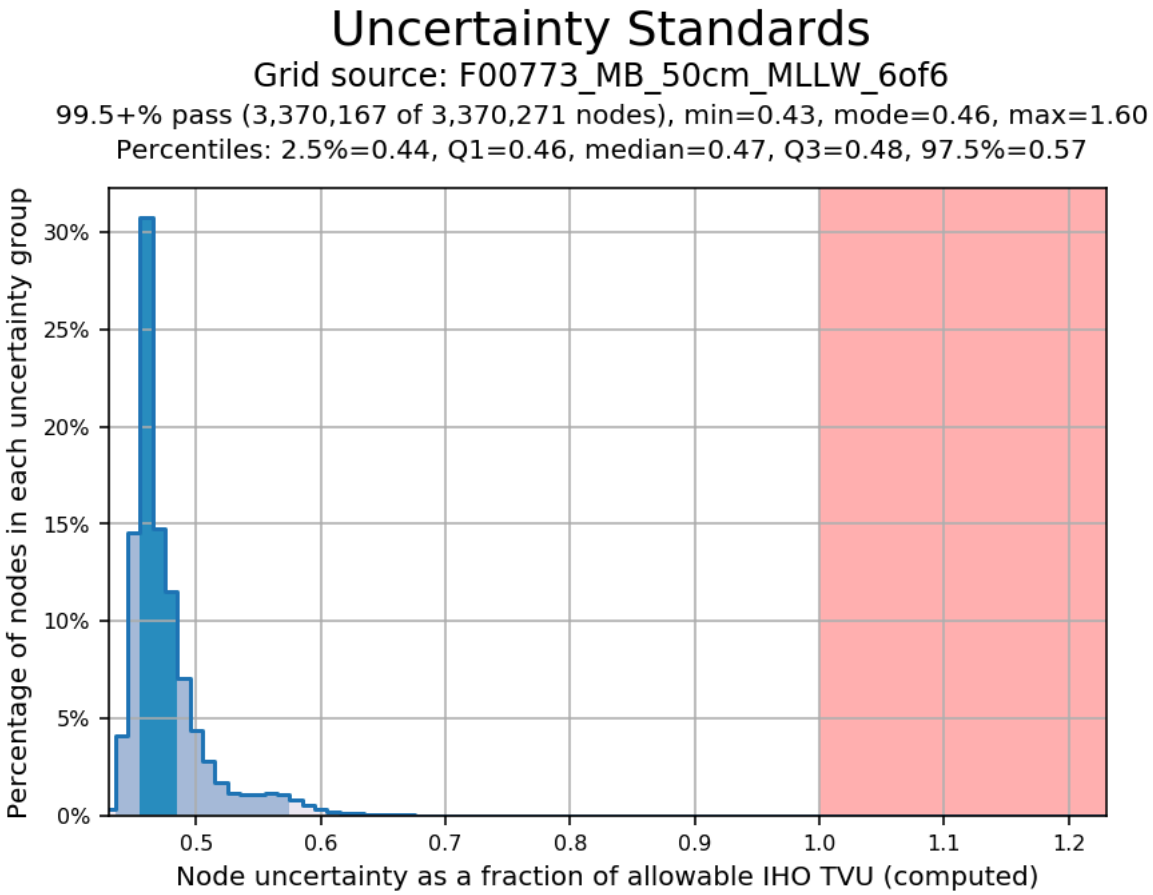


Figure 20: Pydro derived histogram plot showing HSSD uncertainty standards compliance of F00773 MBES data within the 6of6 finalized CUBE surface.

B.2.3 Junctions

F00773 junctions with two prior surveys, H12601 and H12602. H12601 junctions with F00773 in Shinnecock Inlet, while H12602 junctions with F00773 in Moriches Inlet.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12602	1:20000	2013	Williamson & Associates, Inc.	S
H12601	1:20000	2014	Williamson & Associates, Inc.	S

Table 9: Junctioning Surveys

H12602

H12602 overlaps with F00773 data in the main entrance to Moriches Inlet. Using the Compare Grids tool within pydro, an analysis showed 64% of nodes passed the comparison. Due to the survey taking place over a sandy inlet and bay during different years, there are multiple instances of large vertical differences in the surfaces. Generally, areas where water moves slower and is shoaler did not change as much as areas with faster water and deeper depths. Depth differences of 3 meters are present in certain areas due to shifting sand waves.

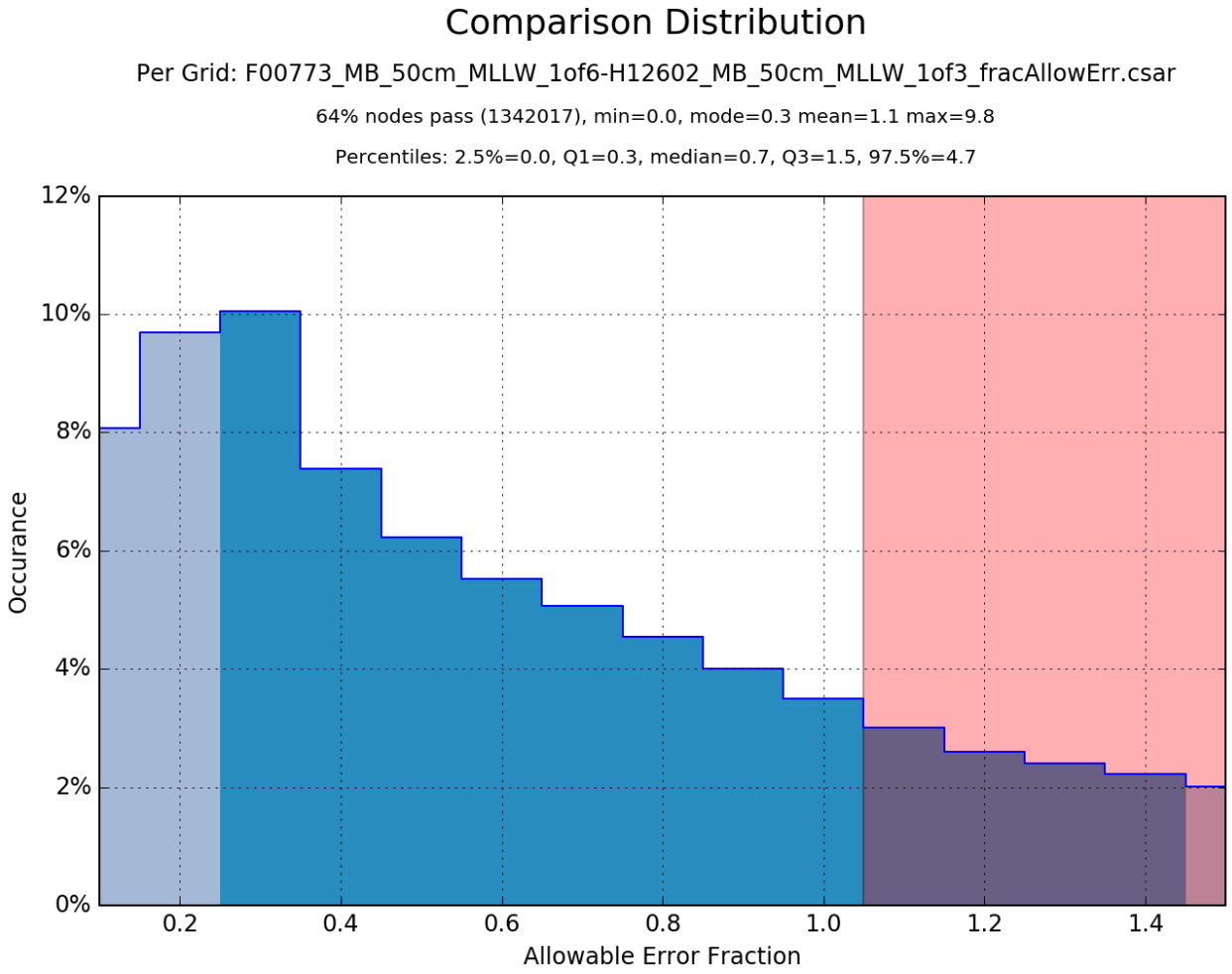


Figure 21: Moriches Inlet comparison between F00773 and H12602.

H12601

H12601 overlaps the majority of F00773 data. Using the Compare Grids tool within pydro, an analysis showed 72% of nodes passed the comparison. Due to the survey taking place over a river and in different years, there are multiple instances of large vertical differences in the surfaces. Generally, areas where water moves slower and is shoaler did not change as much as areas with faster water and deeper depths. Depth differences of 4 meters are present in certain areas due to shifting sand waves.

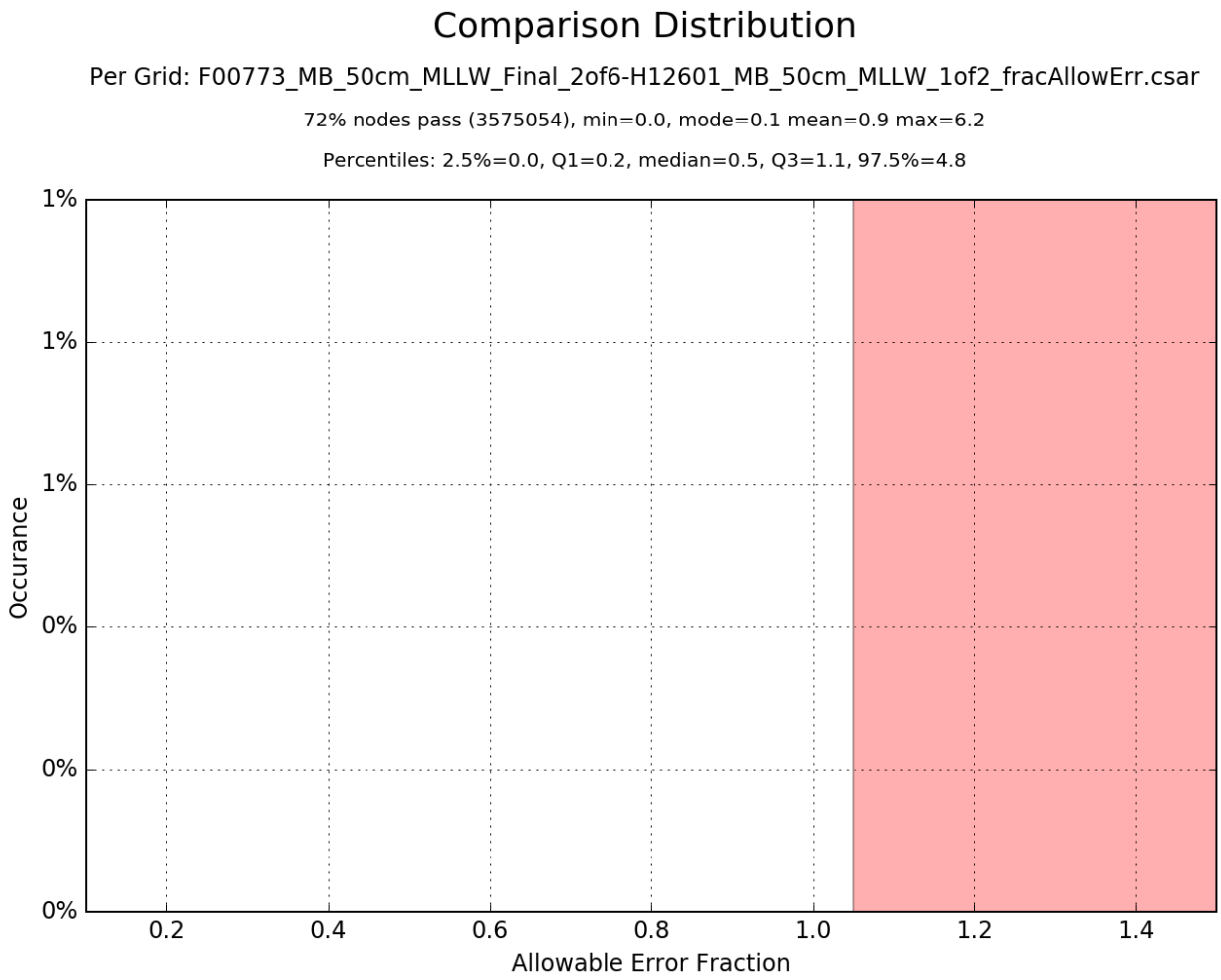


Figure 22: Shinnecock Inlet comparison between F00773 and H12601.

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

Current Driven Sand Transportation

In survey areas with the strongest currents it was noted that bathymetry changed on a daily basis due to water driven sand transportation. As a result several days of data show horizontal and vertical offsets when compared to each other.

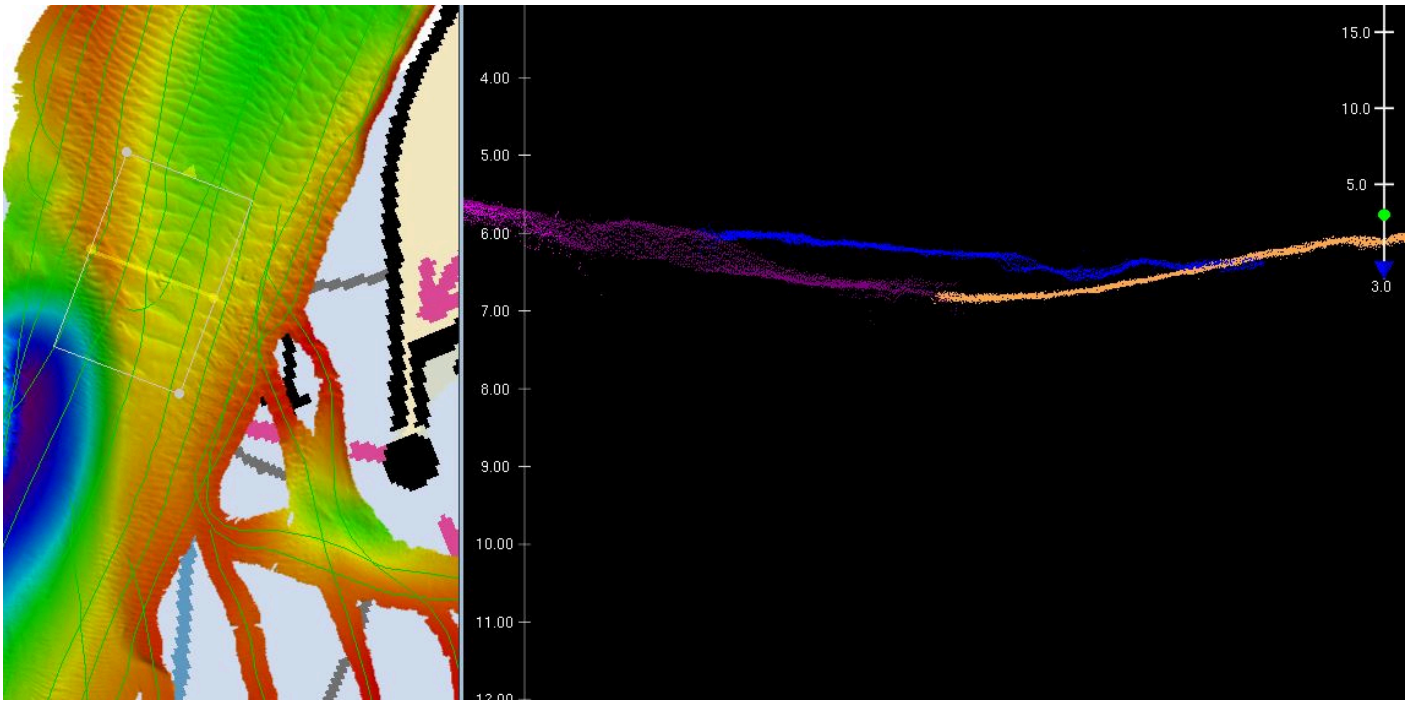


Figure 23: Vertical differences in bathymetry between DN154 and DN155 due to currents.

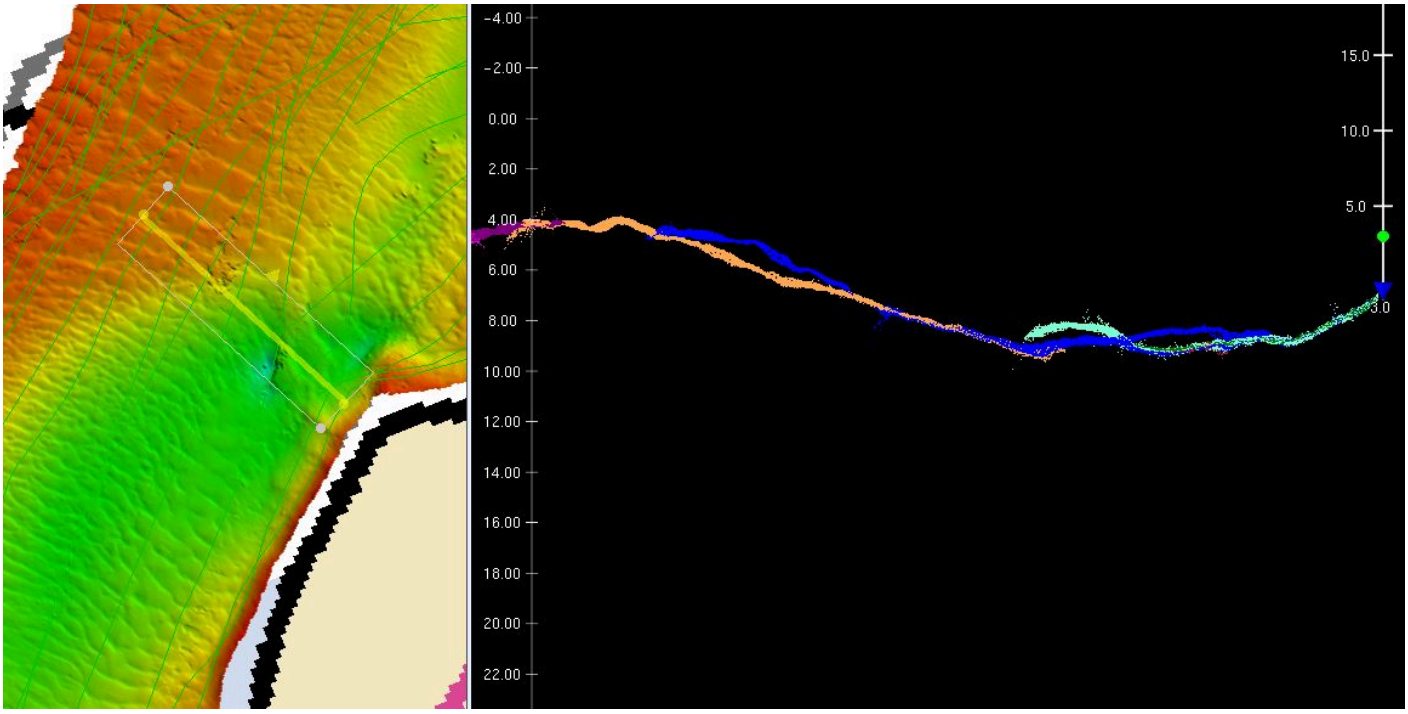


Figure 24: Vertical differences in bathymetry between DN154 and DN155 due to currents.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: At least once every 4 hours.

SVP casts were taken at least once every four hours in the deepest water nearest to the survey area being worked on. The SVP casts were applied to the MBES lines in CARIS using the "nearest in distance within time of 4 hours" method.

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

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

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

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 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
F00773_MB_50cm_MLLW_1of6	CARIS Raster Surface (CUBE)	50 centimeters	0.606 meters - 16.661 meters	NOAA_0.5m	Object Detection
F00773_MB_50cm_MLLW_Final_1of6	CARIS Raster Surface (CUBE)	50 centimeters	0.606 meters - 16.661 meters	NOAA_0.5m	Object Detection
F00773_MB_50cm_MLLW_2of6	CARIS Raster Surface (CUBE)	50 centimeters	0.798 meters - 17.467 meters	NOAA_0.5m	Object Detection
F00773_MB_50cm_MLLW_Final_2of6	CARIS Raster Surface (CUBE)	50 centimeters	0.798 meters - 17.467 meters	NOAA_0.5m	Object Detection

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
F00773_MB_50cm_MLLW_3of6	CARIS Raster Surface (CUBE)	50 centimeters	1.309 meters - 4.274 meters	NOAA_0.5m	Object Detection
F00773_MB_50cm_MLLW_Final_3of6	CARIS Raster Surface (CUBE)	50 centimeters	1.309 meters - 3.378 meters	NOAA_0.5m	Object Detection
F00773_MB_50cm_MLLW_4of6	CARIS Raster Surface (CUBE)	50 centimeters	4.657 meters - 10.531 meters	NOAA_0.5m	Object Detection
F00773_MB_50cm_MLLW_Final_4of6	CARIS Raster Surface (CUBE)	50 centimeters	4.657 meters - 8.466 meters	NOAA_0.5m	Object Detection
F00773_MB_50cm_MLLW_5of6	CARIS Raster Surface (CUBE)	50 centimeters	2.655 meters - 6.422 meters	NOAA_0.5m	Object Detection
F00773_MB_50cm_MLLW_Final_5of6	CARIS Raster Surface (CUBE)	50 centimeters	2.655 meters - 5.547 meters	NOAA_0.5m	Object Detection
F00773_MB_50cm_MLLW_6of6	CARIS Raster Surface (CUBE)	50 centimeters	4.344 meters - 16.434 meters	NOAA_0.5m	Object Detection
F00773_MB_50cm_MLLW_Final_6of6	CARIS Raster Surface (CUBE)	50 centimeters	4.344 meters - 15.716 meters	NOAA_0.5m	Object Detection

Table 10: Submitted Surfaces

Flier Finder was used to analyze the multibeam surfaces for data cleanliness, and all fliers have been addressed. The fliers that continue to be flagged are located on the surface edges and were found to not be fliers. The VALSOU check reported two discrepancies between the surface and features in the FFF. These features have been fixed yet still continue to get flagged.

C. Vertical and Horizontal Control

Field installed tide or GPS stations were not utilized for this survey, so no HVCR report 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-C930_VDatum Limits_xyNAD83-MLLW_geoid12b_extended.csar

Table 11: ERS method and SEP file

C.2 Horizontal Control

The horizontal datum for this project is North American Datum of 1983 (NAD 83).

The projection used for this project is Universal Transverse Mercator (UTM) Zone 18.

The following PPK methods were used for horizontal control:

- Smart Base
- RTX

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
CTGU	GUILFORD
MAFA	FALMOUTH
CTGR	GROTON
NYRH	RIVERHEAD
ZNY1	NEW YORK WAAS 1
NJCM	MIDDLE TOWNSHIP

Table 12: CORS Base Stations

WAAS

The Wide Area Augmentation System (WAAS) was used for real-time horizontal control during data acquisition.

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	Preliminary?
US5NY52M	1:40000	21	11/07/2018	05/06/2019	NO

Table 13: Largest Scale ENCs

US5NY52M

F00773 and US5NY52M generally agree on soundings and contours, with some exceptions. In Moriches Inlet, a channel that leads to the jetty has moved further south and is currently located over charted land. Over in Shinnecock Inlet, a channel has widened from its previously charted location. In the images below, black soundings are from F00773 data, and red soundings are from the ENC.

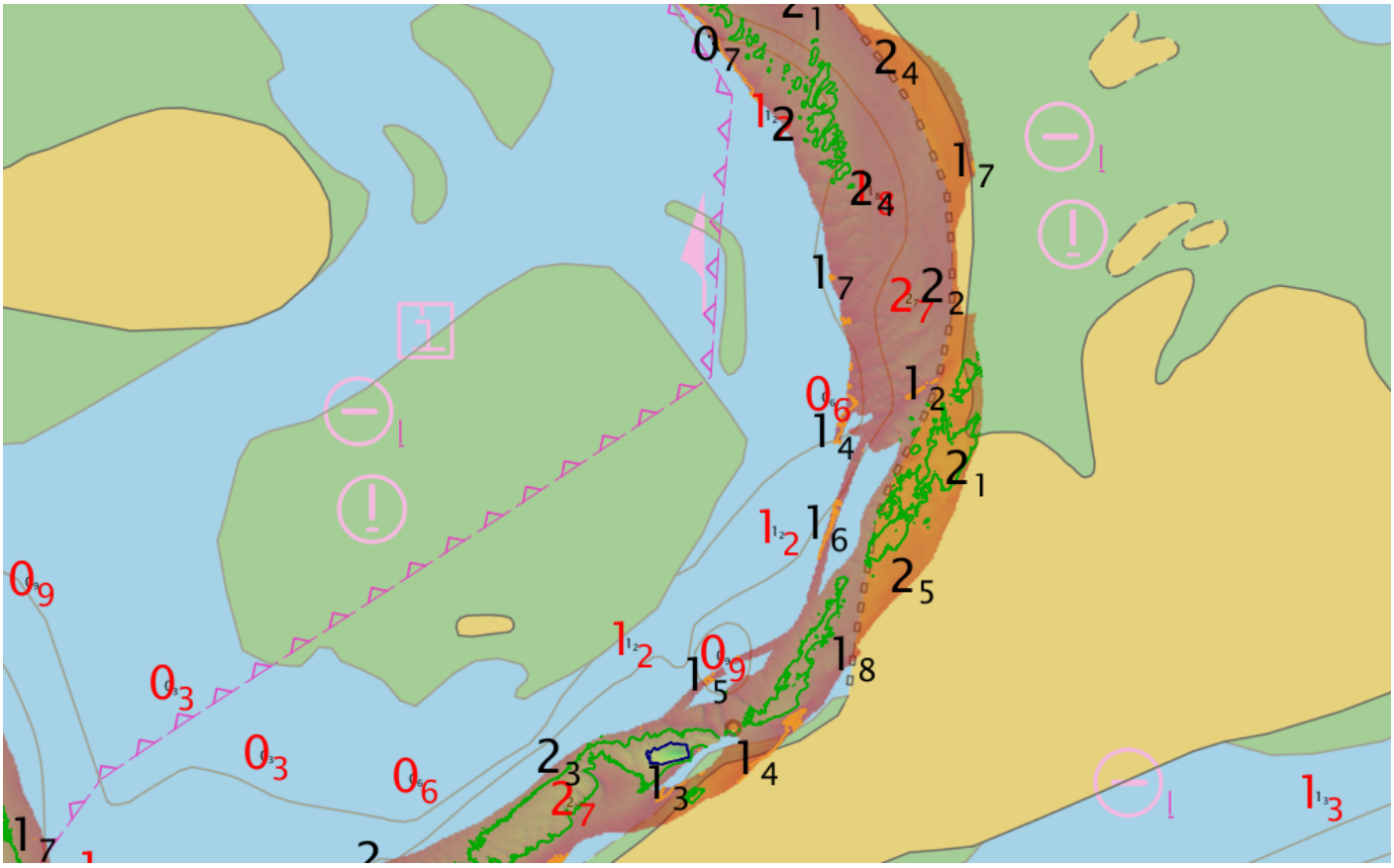


Figure 25: Moriches Inlet comparison to the electronic chart.

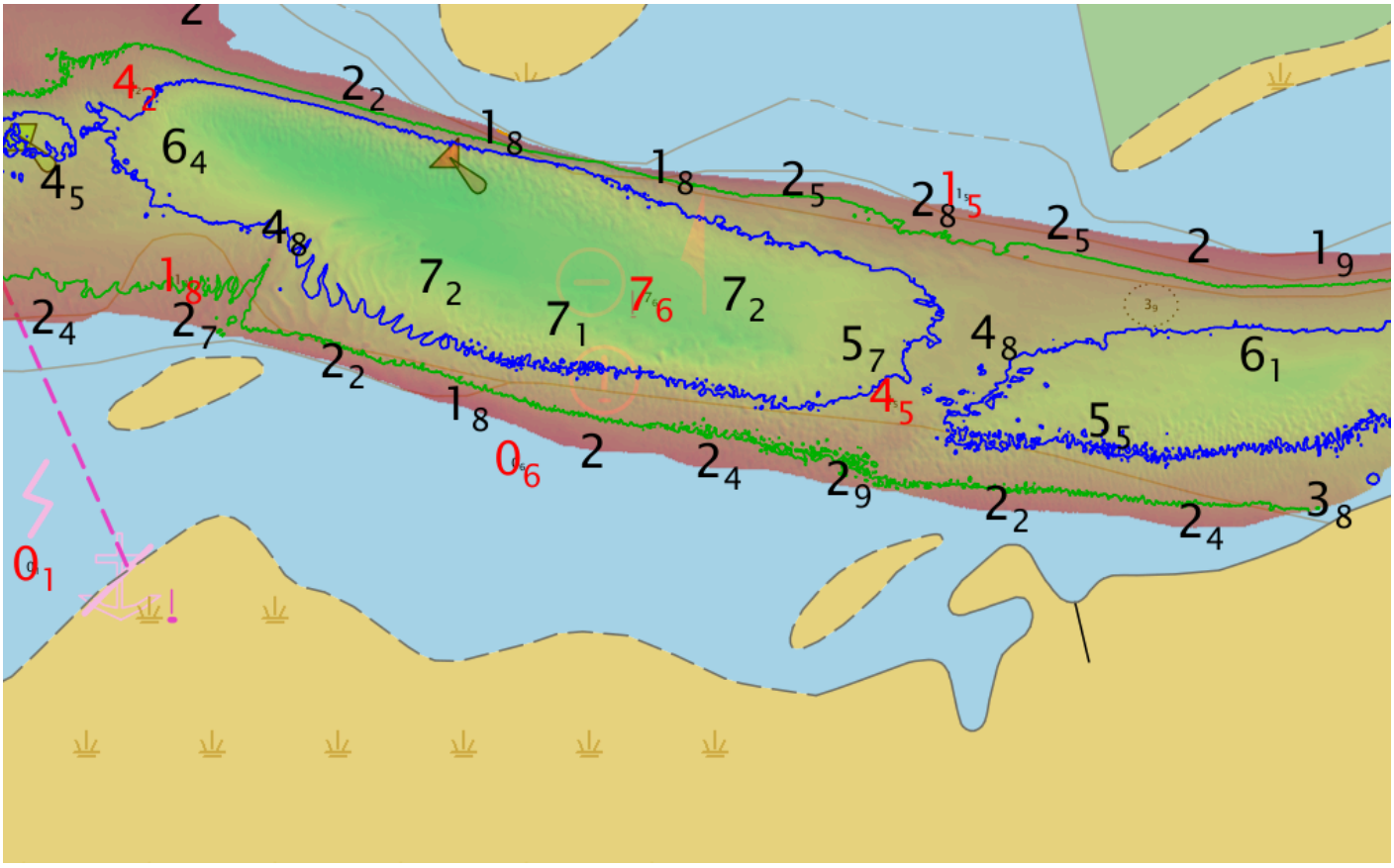


Figure 26: Shinnecock Inlet comparison to the electronic chart.

D.1.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.3 Charted Features

F00773 has four charted PA's, including two wrecks, one shellfish racks, and one obstruction. In all four, the charted discrepancy was not found. Due to the shallow conditions and time constraints, two of the four discrepancies were not able to be fully surveyed.

D.1.4 Uncharted Features

Several new features were found and are detailed in the Final Feature File. All but one of the new features are buoys that were not charted, however, one new obstruction area was found and has been submitted as a DTON.

D.1.5 Shoal and Hazardous Features

One DToN report was submitted for F00773 on June 10th, 2019. The feature was an obstruction that included rocky points.

Figure 27: Obstruction reported as a DToN.

D.1.6 Channels

Survey depths within dredged areas and charted channels are equal to or deeper than charted.

D.1.7 Bottom Samples

Three bottom samples were acquired for F00773 and are attributed in the FFF.

D.2 Additional Results

D.2.1 Shoreline

Shoreline investigation was conducted for this entire survey area. During survey operations, the vessel operator transited slowly along the shoreline while the hydrographer took photographs and notes of visible shoreline features. These notes and photographs were compared to the assigned features found in the Composite Source File. Additionally, efforts were made to confirm (photograph) any assigned features inshore of the NALL. These results were compiled to the Final Feature File submitted with this survey.

Feature Scan within QC Tools was used to verify features had correct attributions.

D.2.2 Aids to Navigation

All but three charted ATONs were found to be on station, however, all ATONs were serving their intended purpose. Many new ATONs were found that were not on the chart. The new positions of existing charted ATONs and the newly found ATONs have been added to the FFF.

D.2.3 Overhead Features

A bridge in Shinnecock Bay exists and is functioning normally.

Figure 28: Ponquogue Bridge in Shinnecock Bay

D.2.4 Submarine Features

No submarine features exist for this survey.

D.2.5 Platforms

No platforms exist for this survey.

D.2.6 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.7 Abnormal Seafloor and/or Environmental Conditions

Currents near the mouth of the bay resulted in bathymetry changing on a day by day basis. See section B.2.6 for more information.

D.2.8 Construction and Dredging

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

D.2.9 New Survey Recommendation

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

D.2.10 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 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
LTJG Dylan Kosten	Chief of Party	11/08/2019	Dylan Kosten Digitally signed by KOSTEN.DYLAN.ANDREW.1504527405 Date: 2019.11.12 07:31:25 -05'00'
PST Michael Bloom	Sheet Manager	11/08/2019	BLOOM.MICHAEL.GRAHAM.1029463049 Digitally signed by BLOOM.MICHAEL.GRAHAM.1029463049 Date: 2019.11.08 11:07:18 -05'00'

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

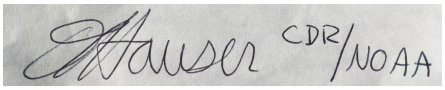
F00733

Data meet or exceed current specifications as certified by the OCS survey acceptance review process. Descriptive Report and survey data except where noted are adequate to supersede prior surveys and nautical charts in the common area.

The following products will be sent to NCEI for archive

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

The survey evaluation and verification has been conducted according current OCS Specifications, and the survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.



Digitally signed by HAUSER.OLIVIA.A.1275636009
Date: 2020.10.19 15:38:53 -07'00'

Approved:_____

Commander Olivia Hauser, NOAA
Chief, Pacific Hydrographic Branch