

F00828

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

DESCRIPTIVE REPORT

Type of Survey: Field Examination

Registry Number: F00828

LOCALITY

State(s): Rhode Island

General Locality: Narragansett Bay

Sub-locality: Allen Harbor

2021

CHIEF OF PARTY
LTJG Mark Meadows

LIBRARY & ARCHIVES

Date:

HYDROGRAPHIC TITLE SHEET

F00828

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: **Narragansett Bay, RI**

Sub-Locality: **Allen Harbor**

Scale: **10000**

Dates of Survey: **05/18/2021 to 05/18/2021**

Instructions Dated: **04/28/2021**

Project Number: **S-B905-NRTNL-21**

Field Unit: **NOAA Navigation Response Team - New London**

Chief of Party: **LTJG Mark Meadows**

Soundings by: **Multibeam Echo Sounder**

Imagery by: **Multibeam Backscatter**

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.

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Descriptive Report to Accompany Survey F00828

Project: S-B905-NRTNL-21

Locality: Narragansett Bay, RI

Sublocality: Allen Harbor

Scale: 1:10000

May 2021 - May 2021

NOAA Navigation Response Team - New London

Chief of Party: LTJG Mark Meadows

A. Area Surveyed

Allen Harbor supports multiple marinas and moorings for recreational vessels of all kinds. The harbor also supports research vessels for the University of Rhode Island, and local law enforcement vessels. Shoaling in the entrance channel has made it increasingly precarious for vessels to safely enter and depart the harbor.

A.1 Survey Limits

Data were acquired within the following survey limits:

| Northwest Limit | Southeast Limit |
|--------------------------------------|--------------------------------------|
| 41° 37' 23.16" N 71° 24' 43.04" W | 41° 36' 55.63" N 71° 23' 33.89" W |

Table 1: Survey Limits

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

A.2 Survey Purpose

The regional navigation manager has received requests for a hydrographic surveys in Narragansett Bay. The USCG request in Allen Harbor is for bathymetry data to help with the USCG ATON season. The Navy request in Bristol Harbor is for contemporary bathymetry data. The Navy reports at southwest Prudence Island that the charted obstructions are higher than the charted obstructions and are a danger to navigation. The Navy request at southeast Gould Island is to locate a known missing unexploded ordnance in the area. 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 QC tool within QC Tools was used to analyze multibeam echosounder (MBES) data density. The MBES surface meets the HSSD data density requirement. There are no holidays or fliers for this dataset.

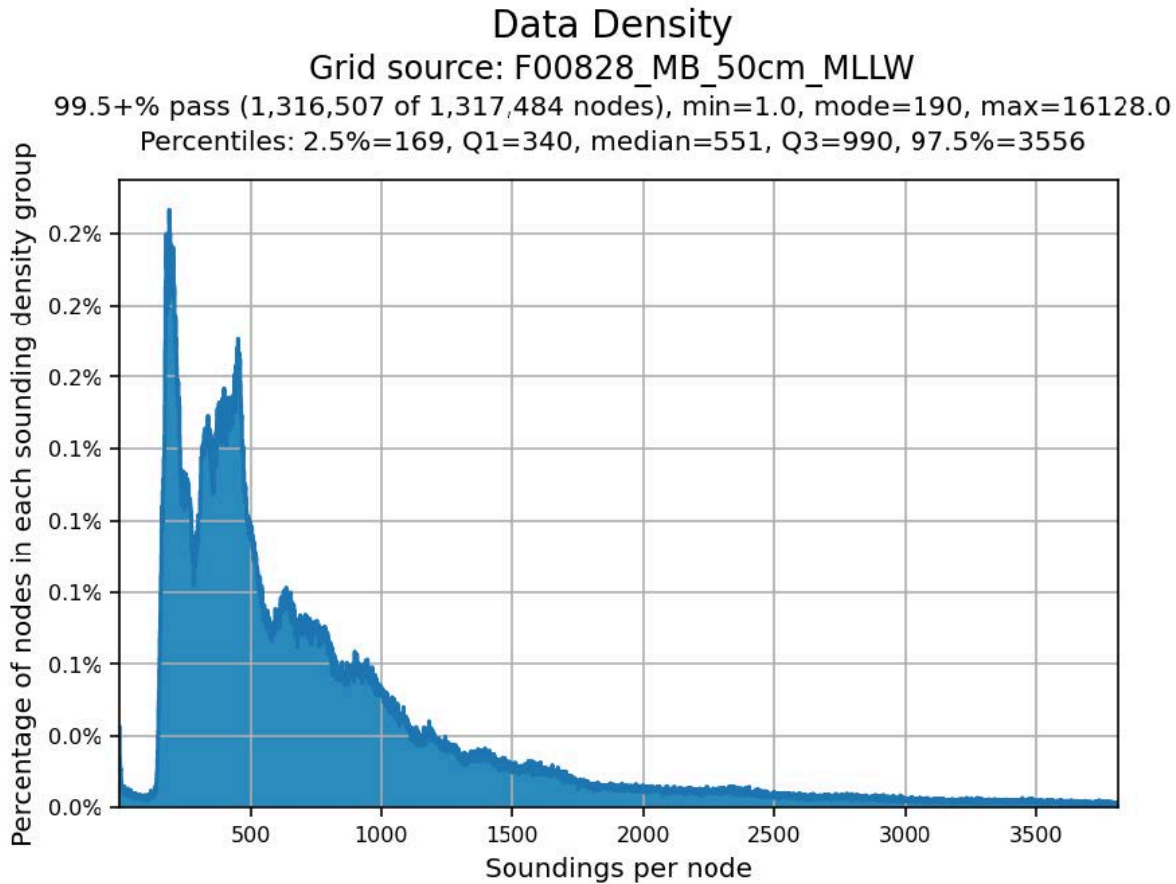


Figure 1: Pydro derived histogram plot showing HSSD object detection compliance of F00828 MBES data within the CUBE 50cm surface.

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.

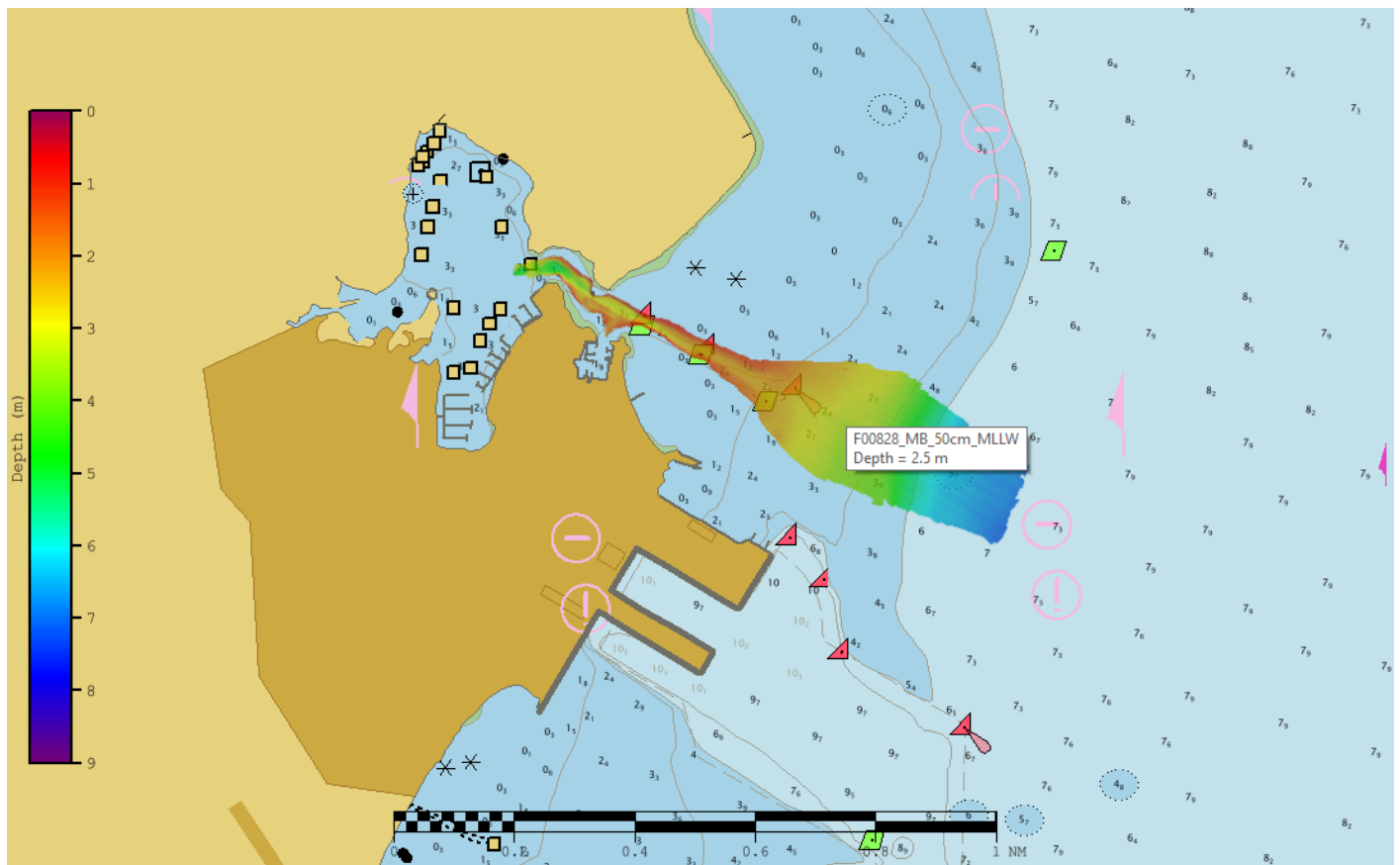


Figure 2: Survey MBES coverage overlaid on ENC USPVDEC and USPVED

A.6 Survey Statistics

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

| | HULL ID | <i>S3007</i> | <i>Total</i> |
|---|-----------------------------|--------------|--------------|
| LNM | SBES Mainscheme | 0.0 | 0.0 |
| | MBES Mainscheme | 23.4472 | 23.4472 |
| | Lidar Mainscheme | 0.0 | 0.0 |
| | SSS Mainscheme | 0.0 | 0.0 |
| | SBES/SSS Mainscheme | 0.0 | 0.0 |
| | MBES/SSS Mainscheme | 0.0 | 0.0 |
| | SBES/MBES Crosslines | 0.8016 | 0.8016 |
| | Lidar Crosslines | 0.0 | 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 | | | 0.0961 |

Table 3: Hydrographic Survey Statistics

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

| Survey Dates | Day of the Year |
|---------------------|------------------------|
| 05/18/2021 | 138 |

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 | <i>S3007</i> |
| LOA | 10.38 meters |
| Draft | 0.6 meters |

Table 5: Vessels Used



Figure 3: NRT-NL Vessel S3007 with Detroit in background.

B.1.2 Equipment

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

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

Table 6: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Multibeam crosslines acquired for this survey totaled 3.4% of mainscheme acquisition.

A 0.5m CUBE surface was created using only mainscheme lines and a second 0.5m CUBE surface was created using only crosslines. These surfaces were then input into the Pydro Tool "Compare Grids". The comparison passed HSSD specifications.

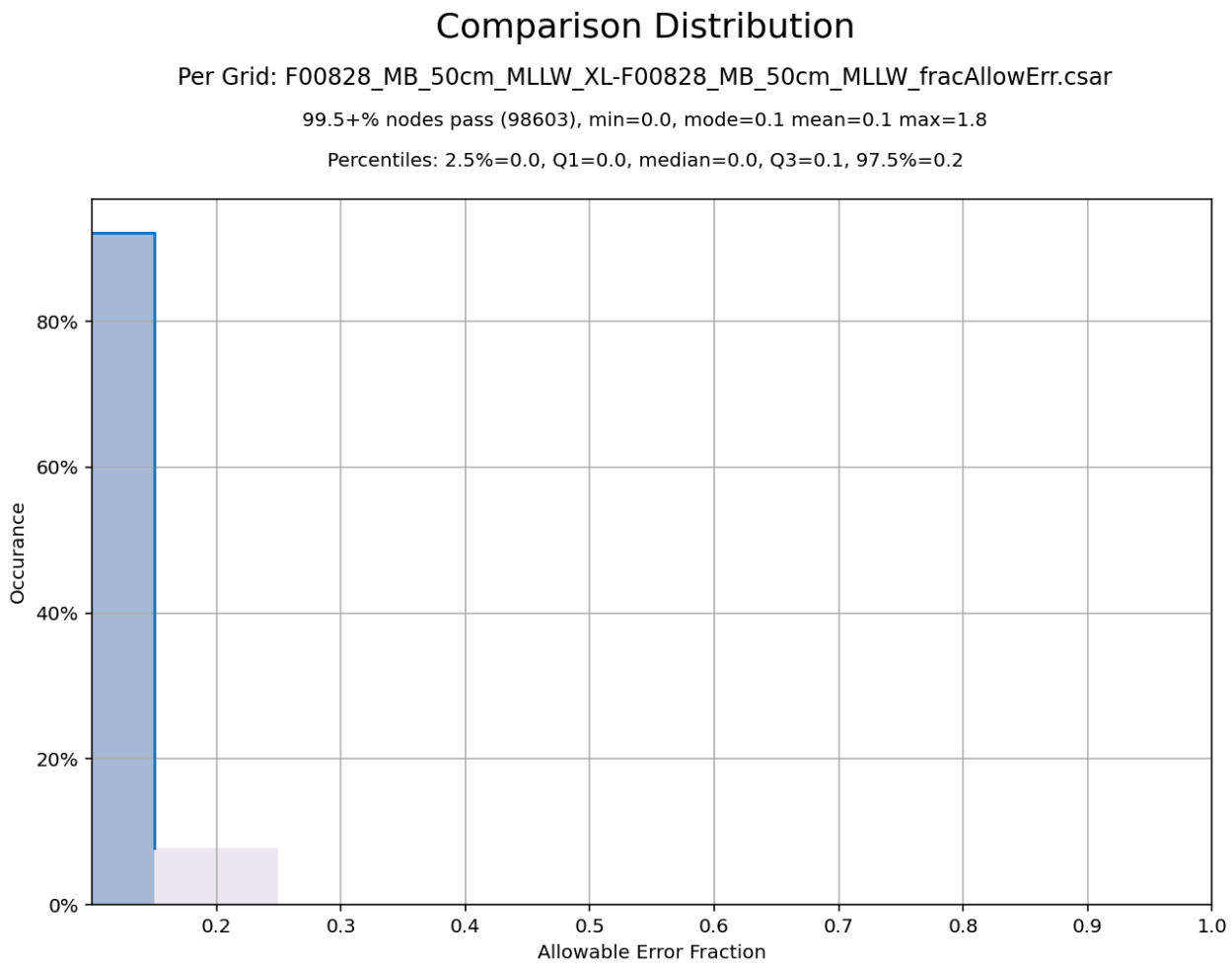


Figure 4: Pydro generated graph showing comparison between mainscheme and crosslines in F00828.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

| Method | Measured | Zoning |
|----------------|-----------------|---------------|
| ERS via VDATUM | 0.0 meters | 0.095 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 F00828 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, F00828 is an ellipsoidally referenced survey (ERS) and the tidal component was accomplished with a separation model.

Uncertainty Standards - NOAA HSSD

Grid source: F00828_MB_50cm_MLLW

99.5+% pass (1,317,480 of 1,317,484 nodes), min=0.37, mode=0.38, max=1.36

Percentiles: 2.5%=0.37, Q1=0.37, median=0.38, Q3=0.38, 97.5%=0.40

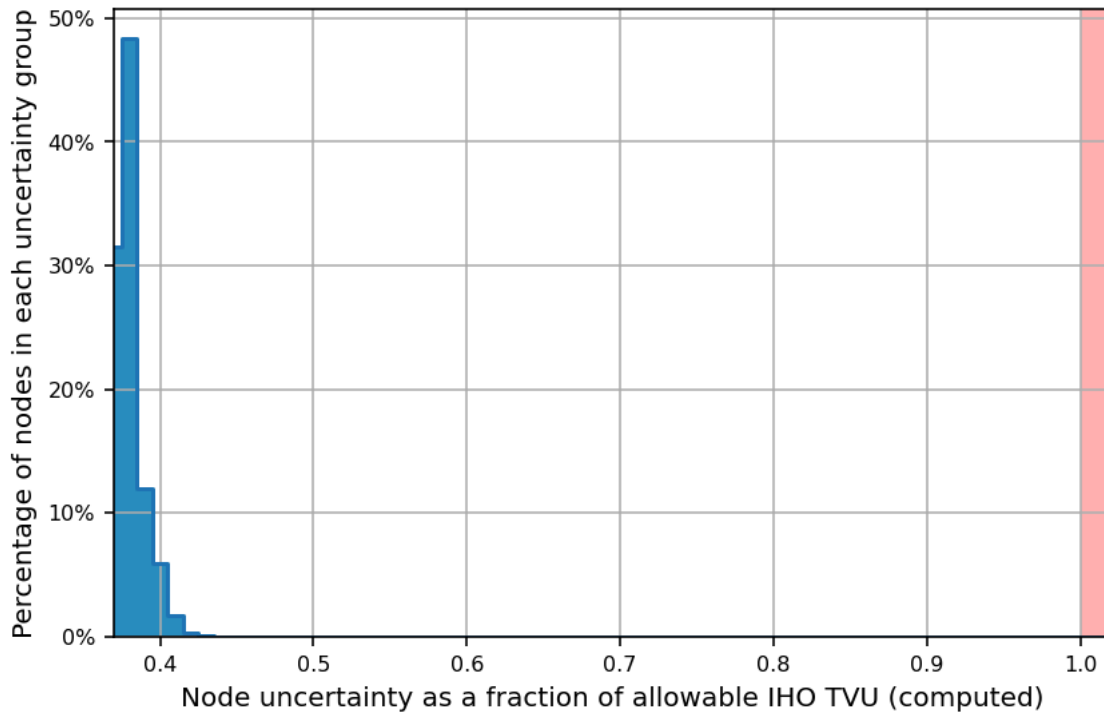


Figure 5: Pydro derived histogram plot showing HSSD Uncertainty Standards compliance of F00828 MBES data within the CUBE 50cm surface.

B.2.3 Junctions

There are no contemporary surveys that junction with this survey.

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.

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

Multibeam Backscatter was acquired but not processed for this survey.

B.5 Data Processing

B.5.1 Primary Data Processing Software

The following Feature Object Catalog was used: NOAA Profile Version 2022..

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 |
|---------------------------|-----------------------------|------------|-----------------------------|-------------------|------------------|
| F00828_MB_50cm_MLLW_Final | CARIS Raster Surface (CUBE) | 0.5 meters | 0.447 meters - 7.621 meters | NOAA_0.5m | Object Detection |
| F00828_MB_50cm_MLLW | CARIS Raster Surface (CUBE) | 0.5 meters | 0.447 meters - 7.621 meters | NOAA_0.5m | Object Detection |

Table 9: Submitted Surfaces

C. Vertical and Horizontal Control

Additional information discussing the vertical or horizontal control for this survey can be found in the accompanying HVCR.

C.1 Vertical Control

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

ERS Datum Transformation

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

| Method | Ellipsoid to Chart Datum Separation File |
|----------------|--|
| ERS via VDATUM | S-B905_Limits_100m_NAD83-MLLW_geoid12b |

Table 10: 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 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 |
|---------------------|------------------------|
| NHDOT CONCORD | NHCO |
| DUMMERSTON | VTD2 |
| U NEW HAMPSHIRE | NHUN |
| MASA SALISBURY | MASA |
| SHEFFIELD | MASH |
| TRURO | MATU |
| MACM CHATHAM | MACM |
| MANT NANTUCKET | MANT |
| CORTLAND | NYCL |
| DARIEN | CTDA |
| LAKE CARMEL | NYLC |

Table 11: 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

D.1.1 Electronic Navigational Charts

The following are the largest scale ENC's, which cover the survey area:

| ENC | Scale | Edition | Update Application Date | Issue Date |
|------------|--------------|----------------|--------------------------------|-------------------|
| US5PVDEC | 1:20000 | 4 | 01/26/2023 | 04/01/2023 |
| US5PVDED | 1:20000 | 4 | 01/26/2023 | 04/01/2023 |

Table 12: Largest Scale ENC's

D.1.2 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.3 Charted Features

This survey has 28 assigned features and 7 were investigated. Please see the FFF for further information. Charted soundings were also compared to F00828 soundings and were found to be similar.

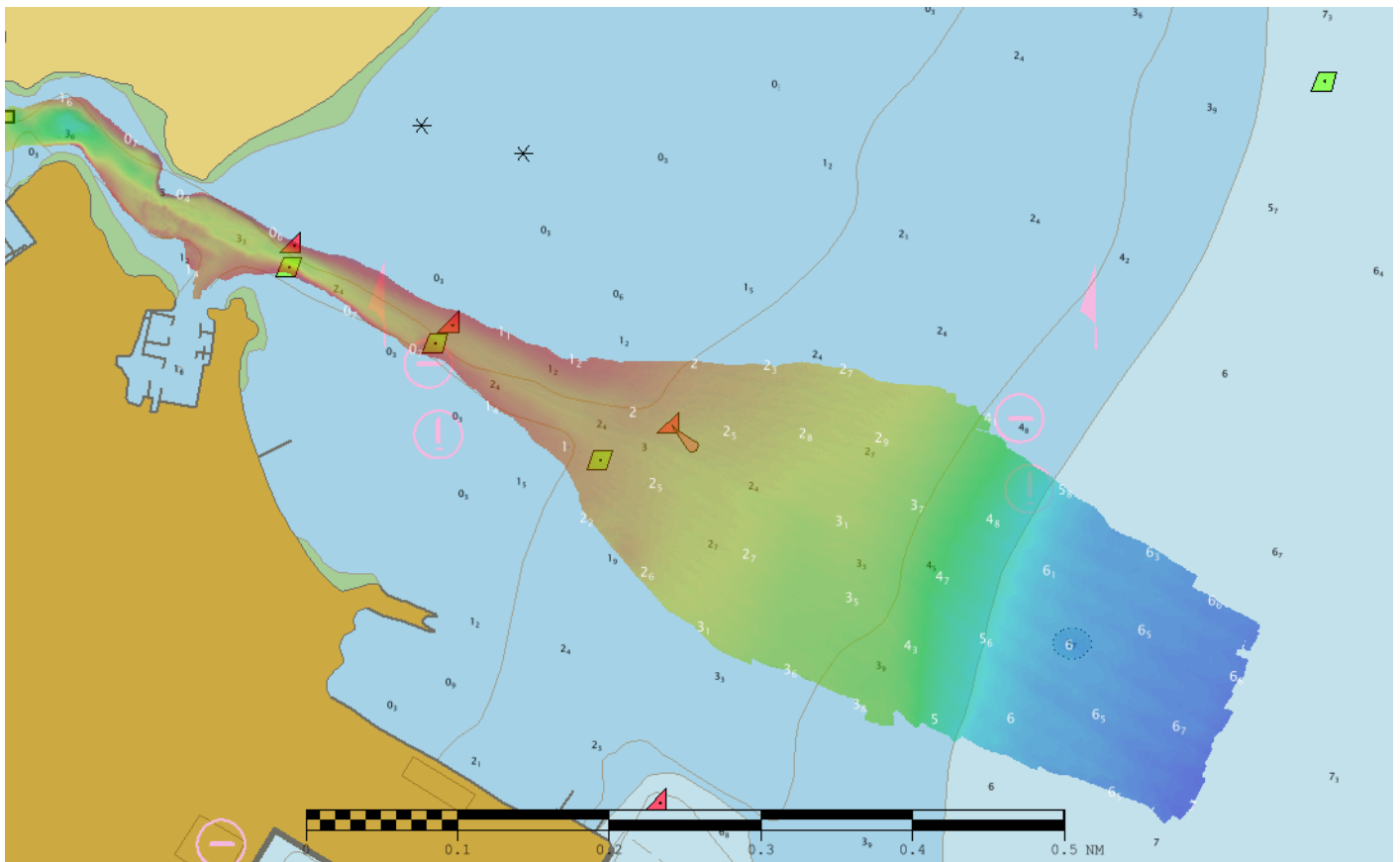


Figure 6: Charted soundings (black) are similar to F00828 soundings (white).

D.1.4 Uncharted Features

No uncharted features exist for this survey.

D.1.5 Channels

No channels exist within the survey limits.

D.2 Additional Results**D.2.1 Aids to Navigation**

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

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

No submarine features exist for this survey.

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 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 ENC scales 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 |
|-------------------|--------------------|---------------|---|
| Michael Bloom | Physical Scientist | 12/05/2022 | BLOOM.MICHAEL.GRAHAM.1029463049 <small>Digitally signed by BLOOM.MICHAEL.GRAHAM.1029463049 Date: 2023.01.23 10:56:59 -05'00'</small> |
| LTJG Mark Meadows | Chief of Party | 12/05/2022 | MEADOWS.MARKJUDE.1571877895 <small>Digitally signed by MEADOWS.MARKJUDE.1571877895 Date: 2023.01.23 11:16:00 -05'00'</small> |

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 |