

**H13848**

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

**DESCRIPTIVE REPORT**

Type of Survey: Navigable Area

Registry Number: H13848

**LOCALITY**

State(s): Washington

General Locality: Grays Harbor

Sub-locality: Grays Harbor

**2023**

CHIEF OF PARTY  
LTJG Patrick Faha

**LIBRARY & ARCHIVES**

Date:

**HYDROGRAPHIC TITLE SHEET**

**H13848**

**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): **Washington**

General Locality: **Grays Harbor**

Sub-Locality: **Grays Harbor**

Scale: **10000**

Dates of Survey: **08/22/2023 to 08/28/2023**

Instructions Dated: **10/31/2023**

Project Number: **S-N938-NRTSE-23**

Field Unit: **NOAA Navigation Response Team - Seattle**

Chief of Party: **LTJG Patrick Faha**

Soundings by: **Kongsberg Maritime EM 2040C (MBES)**

Imagery by: **EdgeTech 4125 (SSS)  
 Kongsberg Maritime EM 2040C (MBES Backscatter)**

Verification by: **Pacific Hydrographic Branch**

Soundings Acquired in: **meters at Mean Lower Low Water**

**Remarks:**

This survey is in conjunction with survey H13634 (S-N906-NRTSE-22) submitted under separate cover. They should be reviewed and considered as a package.

*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 10N, MLLW. All references to other horizontal or vertical datums in this report are applicable to the processed hydrographic data provided by the field unit.*

## DESCRIPTIVE REPORT SUMMARY

### A. Area Surveyed

The survey area is located at the entrance of Grays Harbor along the central west coast of Washington State in the ancestral waters of the Quinault and Queets tribes and descendants of five other coastal tribes: Quileute, Hoh, Chehalis, Chinook, and Cowlitz (<http://www.quinaultindiannation.com/>).

This hydrographic survey was acquired in accordance with the requirements defined in the Project Instruction S-N938-NRTSE-23. Survey work was initially assigned and conducted in 2022 under H13634, S-N906-NRTSE-22. Due to issues encountered in 2022 (detailed in the DR for H13634) the survey team returned in 2023 to collect additional side scan sonar data in the areas surveyed in 2022. Post data collection in 2023, it was decided in conversation with the Pacific Hydrographic Branch that the data should be assigned separate survey registry numbers: H13634, S-N906-NRTSE-22 and H13848, S-N938-NRTSE-23. While this report specifically covers H13848 it is recommended that the two surveys be reviewed and compiled as a unit. H13848 was conducted as side scan with concurrent multibeam in an effort to cover shoal areas and holidays from 2022's H13634 multibeam only survey. As with H13634, data collection did not occur west of Green Buoy #9 or south of the north jetty due to significant wave heights.

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
46° 57' 47.22" N 124° 9' 59.44" W	46° 54' 27.48" N 123° 58' 49.83" W

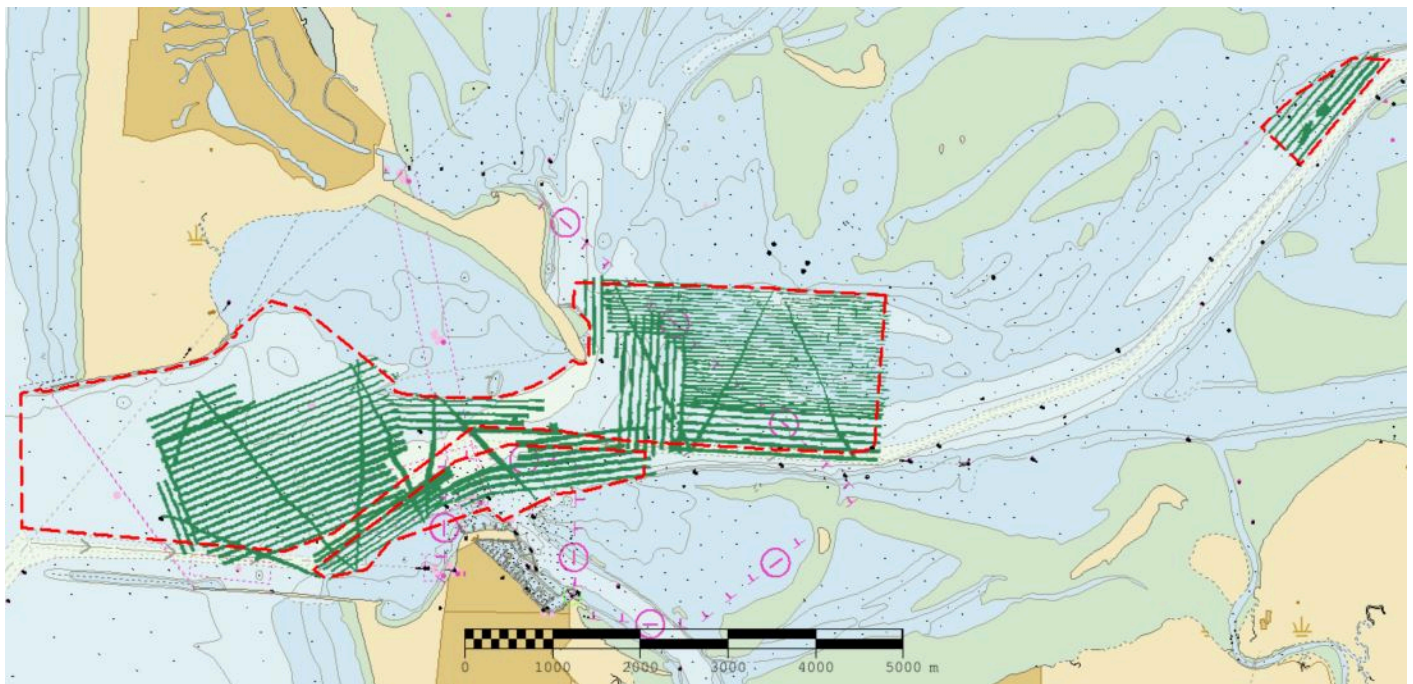


Figure 1: H13848 multibeam coverage (green) and sheet limits (red) overlaid onto ENC US5WA60M.

*The surveys H13643 and H13848 were submitted at separate dates, but intended to be reviewed in combination, as a single survey. This proves challenging for a number of reasons, one of which is that there are two registry numbers that are in the records. In coordination with the HTL, it was decided to re-define the boundaries of H13634 and H13848, and to use bathymetry from both surveys within those two areas. A geographic North-South axis was defined, where all bathymetry from both H13634 and H13848 (MBES, SSS, MBAB) and features were split - the eastern portion being the new extents of H13634, and the western portion H13848. Because VR surfaces are not able to be segmented with surface extraction, new surfaces were created for H13634, meeting object detection requirements (50cm and 1m resolutions). H13848 surfaces remained 50cm and 1m. Due to a long pause in H13634 survey dates (63 days between DN194 and 257) the H13634 bathymetry was also split into two separate surfaces, separated by dates. H13634 surfaces 1of6 and 4of6 cover survey dates DN173 to DN194, while surfaces 2of6 and 5of6 cover DN 257 to DN 259. This virtually eliminated grid tearing due to shifting sediment in the area, allowing the best possible bathymetry to be submitted to the NBS whose supersession rules can make meaningful differentiations based on acquisition dates. Finally, bathymetry from the same eastern extents of H13848 were also included. Grids from H13634, which are deliverable as part of H13848 products, have had their filenames changed to H13848 - specifically surfaces 1of6, 2of6, 4of6, and 5of6. New surfaces required a lot of cleaning, and once fliers were removed, erode edges was employed on all surfaces to further reduce edge noise issues and represent best available bathymetry, especially considering H13848 data is set line spacing with SSS. This is the final disposition of H13848 - all data in the western portion of the combined survey areas have been collected, and referred to as H13848, regardless of the survey of origin. All data from H13848 is adequate to supersede chart data. The remainder of the document should be read through the lens of this additional information.*

## **B. Survey Purpose**

The primary purpose of this project is to provide contemporary hydrographic data to update NOAA's nautical charting products to improve the safety of maritime traffic.

## **C. Intended Use of Survey**

The survey is partially adequate to supersede previous data.

Survey data from this project, in conjunction with H13634 (S-N906-NRTSE-22), is intended to supersede all prior survey data in the common area. H13848 data was collected as 200% Side Scan with concurrent multibeam and was initially collected to be part of H13634. However the survey area is highly changeable with shifting sand and strong currents. Merging the multibeam data sets would have created multi beam surfaces with jumps in bottom detection resulting in an irregular surface due to sand wave movement. As such data from 2022 and 2023 were assigned separate registry numbers and separate multibeam surfaces are submitted under each registry number. Compilation of data should honor the shoalest data from the two surveys and it is recommended that changeable sandwave areas are charted in accordance with H13634 and H13848 data.

## **D. Data Acquisition and Processing**

Please reference 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. S3006 vessel is equipped with POS MV v5 system for positioning and attitude, Kongsberg EM 2040C for MBES, EdgeTech 4125 for SSS, AML Oceanographic MicroX SVS surface sound speed sensor, and YSI CastAway-CTD casts.

H13848 was processed in conjunction with H13634 (S-N906-NRTSE-22) using CARIS Hips and Sips version 11.4.22. Separate multibeam surfaces were generated and submitted for H13634 and H13848. The NOAA CUBE parameters defined in the HSSD were used for the creation of all CUBE surfaces for H13848. The surfaces have been reviewed where noisy data, or "fliers," are incorporated into the gridded solutions causing the surface to be shoaled or deeper than the true sea floor. Where these spurious soundings cause the gridded surface to be shoaler or deeper than the reliably measured seabed by greater than the maximum allowable Total Vertical Uncertainty at that depth, the noisy data have been rejected by the hydrographer and the surface recomputed. As H13848 multibeam data was collected concurrent to SSS and not a complete multibeam survey, the resulting set line spacing surface was subject to extremely noisy edges. The new PYDRO Tool, Erode Raster Edges was utilized in an attempt to clean the edges of multibeam surfaces. To utilize this tool, a 1m single resolution surface was created and iteratively cleaned and run through both HydrOffice Flier Finder and the Erode Edges tool. The final surface retains no fliers with default settings in HydrOffice Flier Finder, and 350 with 'Noisy Edges'. These were viewed and all deemed to be false fliers, mainly of the edges of sand waves.

S-57 deliverables for H13848 include Side Scan Sonar contacts and Final Feature File (FFF). The submitted FFF for H13634 and H13848 are identical and contain new features from both surveys. Attempts were made to fully develop side scan sonar contacts prior to leaving the area however, additional side scan sonar contacts from H13848 were identified in post processing that were correlated to multibeam data from 2022's H13634. All features maintain the SORIND/SORDAT of the survey providing the reported multibeam depth.

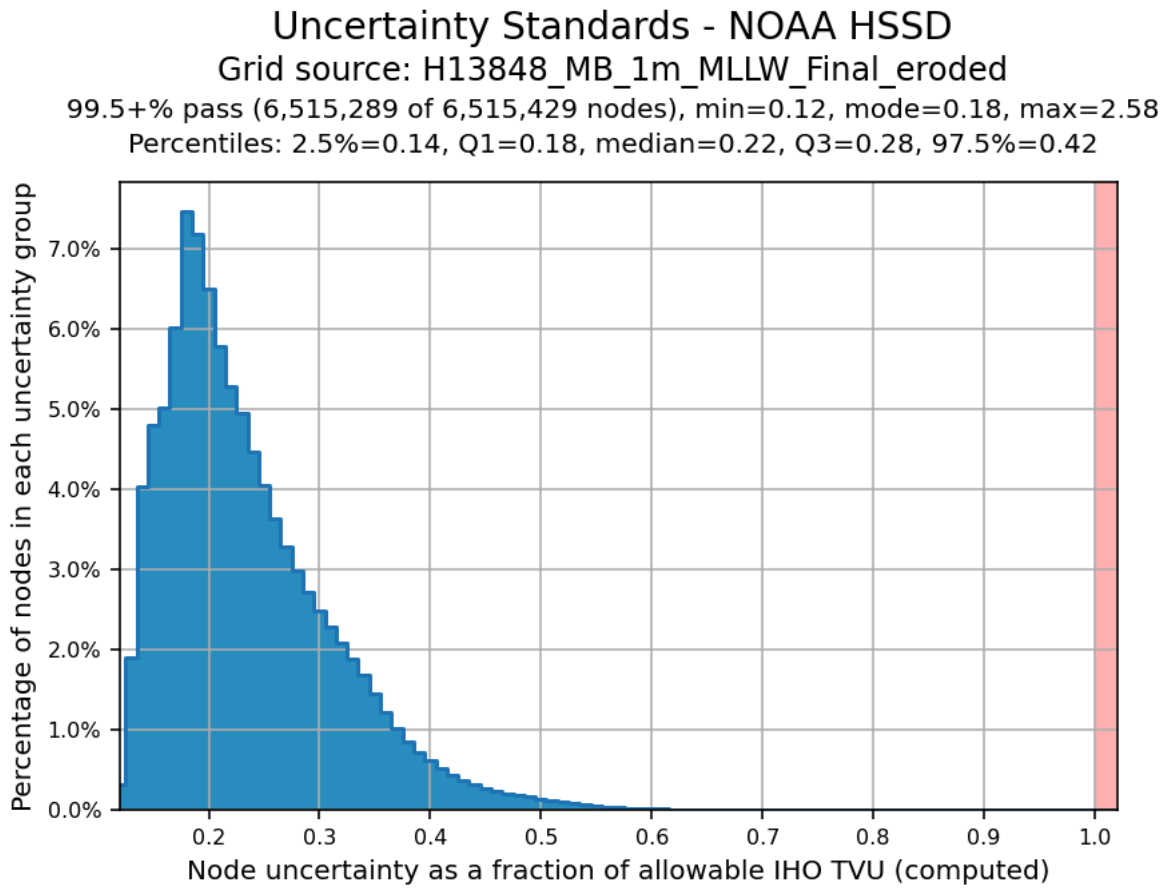
H13848 contains 16 designated soundings in accordance with HSSD Section 5.2.1.2.3. Designated soundings were selected to accurately represent the seafloor and correlate to submerged addressed features included in the FFF. As noted above, the submitted FFF contains additional submerged features identified and marked by designated soundings in survey H13634.

### **E. Uncertainty**

The following survey specific Tide TPU parameters were used for this survey: Method: ERS via VDATUM; Measured: 0.0 meters, Zoning: 0.226 meters

The following survey specific Sound Speed TPU Values were used for this survey: Measured- CTD: 4.0 meters/second; Surface- 0.5 meters/second

Total Propagated Uncertainty (TPU) values for H13848 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 unit. In addition to the usual a priori estimates of uncertainty provided via device models for vessel motion, ERS, real time and post processed uncertainty sources were also incorporated into the depth estimates of H13848. Real-time uncertainties from the Kongsberg 2040C MBES sonars were incorporated and applied during post processing. Uncertainties associated with vessel roll, gyro, and navigation were applied real-time. H13848 utilized kinematic (RTK) positioning service. The recorded delayed heave Applanix files included an estimate of the heave uncertainty and were applied during post processing. All of the aforementioned uncertainties were applied in CARIS. H13848 is an ellipsoidally referenced survey (ERS) and the tidal component was accomplished via separation model. The surface was analyzed using the HydrOffice QC Tools Grid QA feature to determine compliance with specifications. Overall, 99.5% of nodes within the surface meet NOAA Allowable Uncertainty specifications for H13848. (Figure 2)



*Figure 2: H13848 Node Uncertainty as a fraction of Allowable*

**F. Results and Recommendations**

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

ENC	Scale	Edition	Update Application Date	Issue Date
US5WA60M	1:40000	30	11/24/2021	08/02/2023

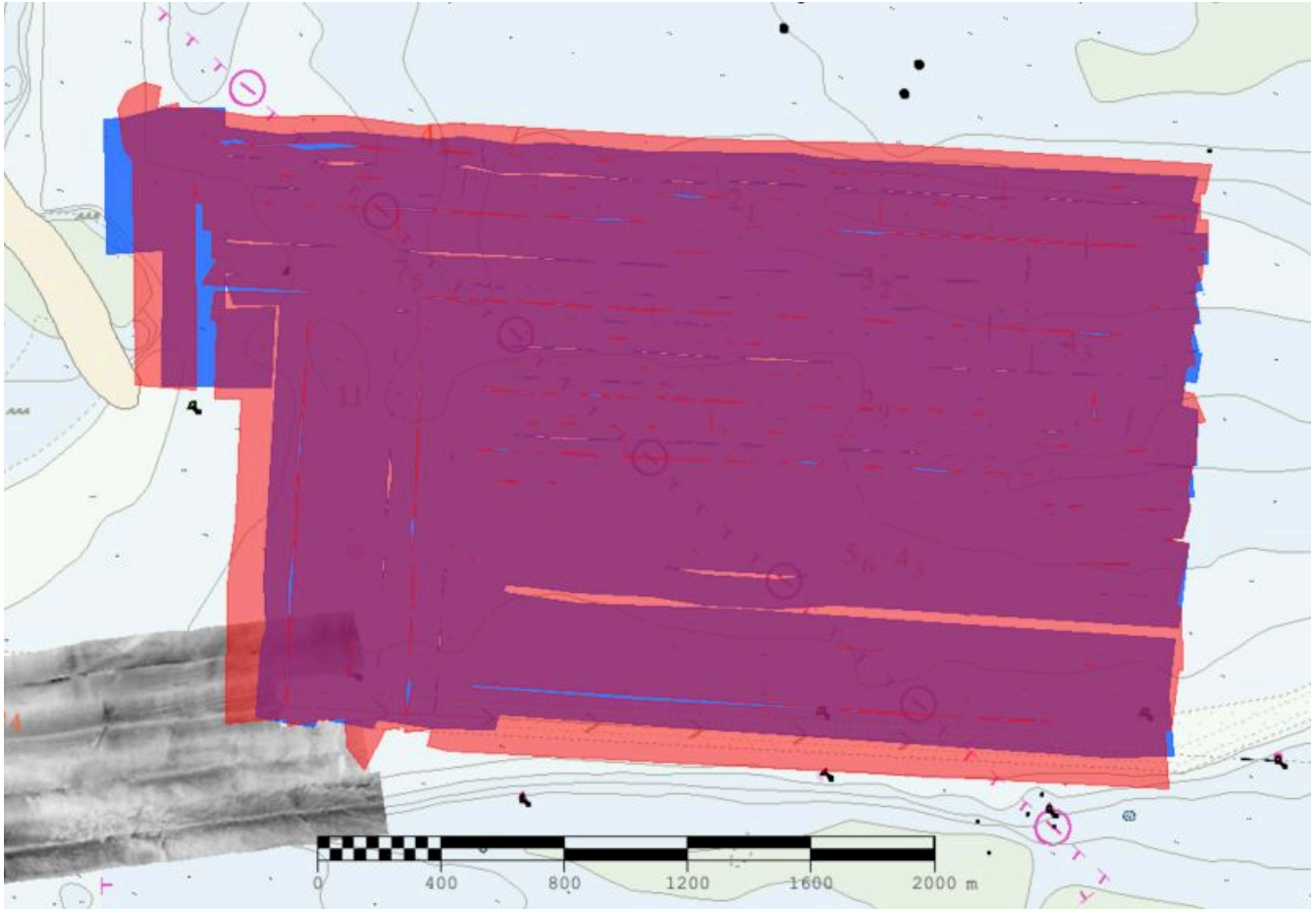
The following surfaces and/or BAGs were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H13848_MB_1m_MLLW	CARIS Raster Surface (CUBE)	1 m	1.0 m - 197.01 m	NOAA_1m	MBES Set Line Spacing
H13848_MB_1m_MLLW_Final	CARIS Raster Surface (CUBE)	1 m	1.0 m - 197.01 m	NOAA_1m	MBES Set Line Spacing
H13848_MB_1m_MLLW_Final_eroded	CARIS Raster Surface (CUBE)	1 m	1.0 m - 30.79 m	NOAA_1m	MBES Set Line Spacing
H13848_SSSAB_1m_400kHz_1of6	SSS Mosaic	1 m	N/A	N/A	100% SSS
H13848_SSSAB_1m_400kHz_2of6	SSS Mosaic	1 m	N/A	N/A	200% SSS
H13848_SSSAB_1m_400kHz_3of6	SSS Mosaic	1 m	N/A	N/A	100% SSS
H13848_SSSAB_1m_400kHz_4of6	SSS Mosaic	1 m	N/A	N/A	200% SSS
H13848_SSSAB_1m_400kHz_5of6	SSS Mosaic	1 m	N/A	N/A	100% SSS
H13848_SSSAB_1m_400kHz_6of6	SSS Mosaic	1 m	N/A	N/A	200% SSS

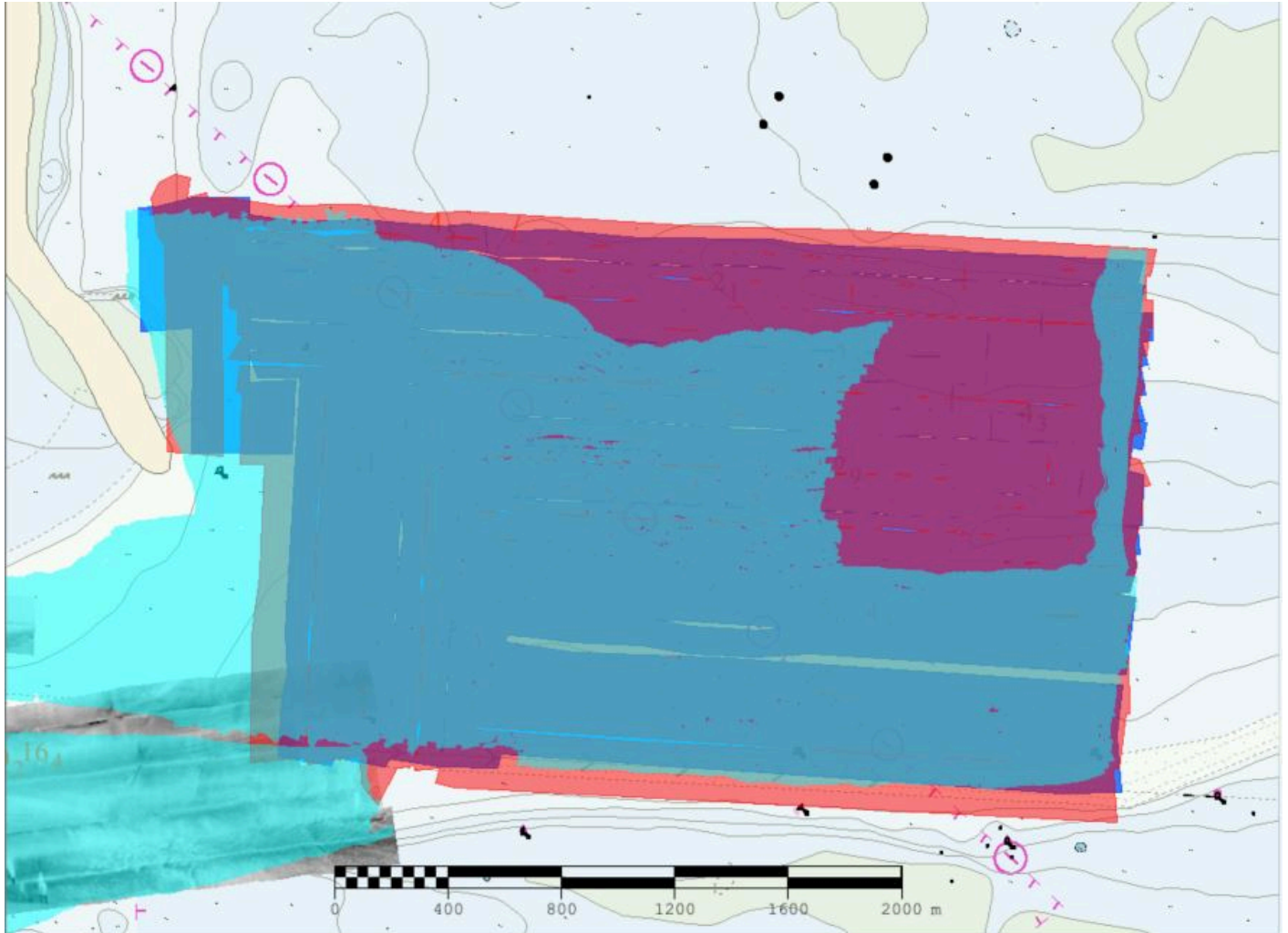
To assist with side scan mosaic creation and processing, the survey was broken up into 3 regions, each with two mosaics, representing 100% and 200% coverage. Portions of the area covered by mosaics 'H13848\_SSSAB\_1m\_400kHz\_3of6' and 'H13848\_SSSAB\_1m\_400kHz\_4of6' did not quite achieve full 200% coverage (Figure 3). Sliver holidays exist in this area where sufficient overlap was not quite achieved. One hundred percent coverage was achieved within the survey bounds and only a small portion is not also covered by H13634 (Figure 4). Thorough review of the data was made and hydrographer feel data is adequate to supersede charted.

Requirements for backscatter MBAB products were waived by the project manager, as noted in supplemental correspondence, as these products would be duplicative of the MBAB products delivered with H13634.

Data from H13634, in conjunction with H13848 should supersede charted data. Shifting sandwaves are present throughout the survey area. It is recommended that changeable sandwave areas are charted in accordance with H13634 and H13848 data. Refer to H13634\_DR for more detailed results and recommendations.



*Figure 3: Area showing sliver gaps in 100% (Blue) and 200% (Red) sidescan data.*



*Figure 4: Area with side scan sliver gaps overlaid with complete coverage multibeam survey outline (Light Blue) from H13634.*

## **G. Vertical and Horizontal Control**

The vertical datum for this project is Mean Lower Low Water. The vertical control method used was VDatum.

The following ellipsoid-to-chart vertical datum transformation was used: ERS via VDATUM: S-N906-NRTSE-22\_VDatum\_100m\_NAD83-MLLW\_geoid12b.csar

Sounding elevations relative to the ellipsoid were post-processed with the daily logged POSpac data to create a best statistical estimate of trajectory (SBET) file, as detailed in the DAPR. All of H13848 meets HSSD vertical accuracy requirements.

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 10.

Precise Positioning-SmartBase and RTX processing methods were used in Applanix POSpac MMS 8.9 software to produce SBETs for post-processing horizontal correction. All of H13848 meets HSSD horizontal accuracy requirements.

## **H. Additional Results**

There are no additional results for this survey.

## I. Approval

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 Survey Summary 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, Standing and 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 Survey Summary Report.

Approver Name	Title	Date	Signature
Patrick Faha	Chief of Party	02/29/2024	RAYMOND.ANNEMIEK E.SMITH.1365883048 <small>Digitally signed by RAYMOND.ANNEMIEKE.SMITH.1365883048 Date: 2024.06.11 15:09:38 -0700'</small>
Annemieke Raymond	Sheet Manager	02/29/2024	RAYMOND.ANNEMIEK E.SMITH.1365883048 <small>Digitally signed by RAYMOND.ANNEMIEKE.SMITH.136 5883048 Date: 2024.06.11 15:08:52 -0700'</small>