

F00831

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

DESCRIPTIVE REPORT

Type of Survey: Basic Hydrographic Survey

Registry Number: F00831

LOCALITY

State(s): Alaska

General Locality: Glacier Bay National Park

Sub-locality: McBride Glacier

2021

CHIEF OF PARTY
Olivia A. Hauser, CDR\NOAA

LIBRARY & ARCHIVES

Date:

HYDROGRAPHIC TITLE SHEET

F00831

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): **Alaska**

General Locality: **Glacier Bay National Park**

Sub-Locality: **McBride Glacier**

Scale: **10000**

Dates of Survey: **06/15/2021 to 06/20/2021**

Instructions Dated: **06/29/2021**

Project Number: **OPR-O351-RA-21**

Field Unit: **NOAA Ship *Rainier***

Chief of Party: **Olivia A. Hauser, CDR\NOAA**

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

Imagery by: **N/A**

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 8N, 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 referred to as F00831, "McBride Glacier" in the project instructions. The survey area is approximately 1.27 square nautical miles and is located Glacier Bay National Park, AK.

This hydrographic survey was acquired in accordance with the requirements defined in the modified Project Instruction OPR-O351-RA-21 dated 06/29/2021.

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
59° 4' 2.24" N 136° 9' 19.81" W	59° 1' 39.29" N 136° 3' 16.8" W

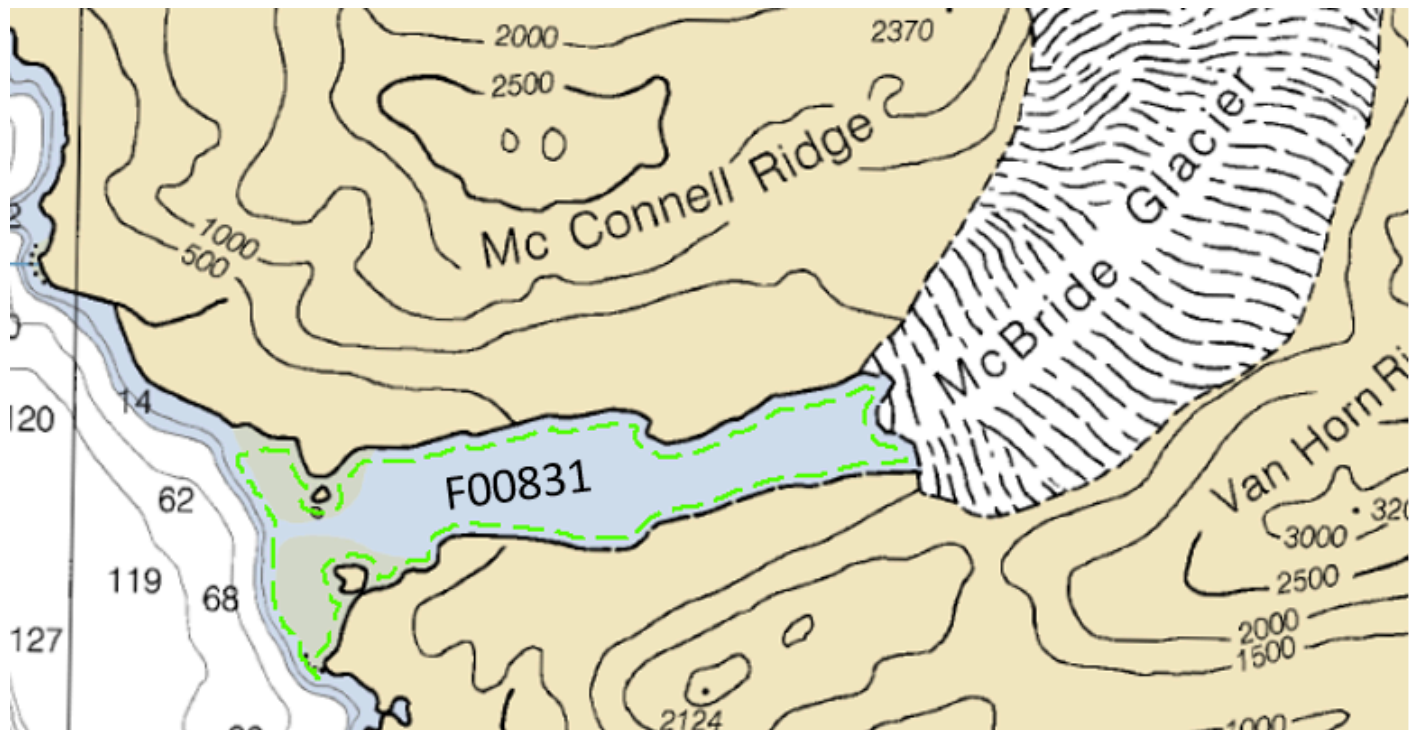


Figure 1: F00831 assigned survey area (Chart 17318).

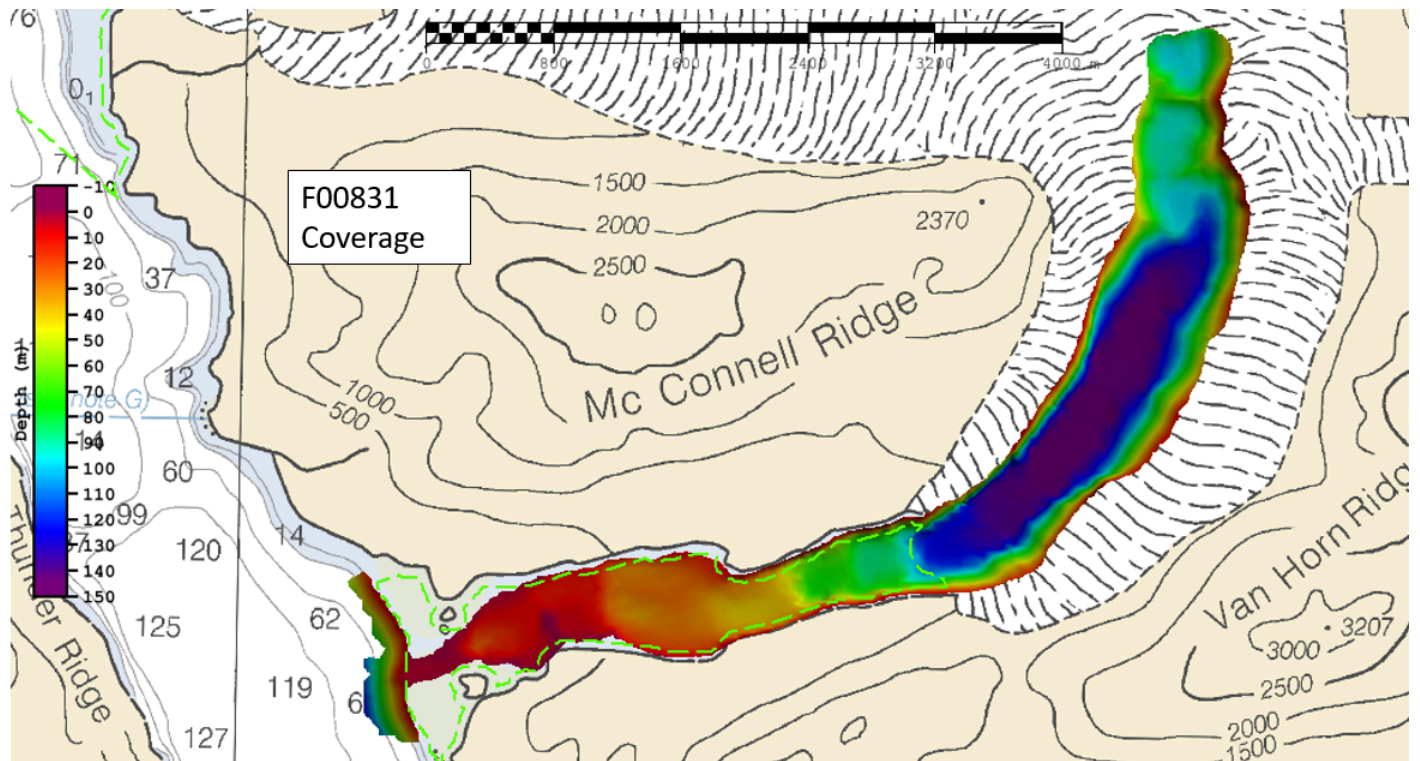


Figure 2: F00831 MBES coverage and assigned survey limits (Chart 17318).

B. Survey Purpose

Glacier Bay in Southeast Alaska was covered by a single ice sheet as recently as the late 1700s. The tidewater glaciers that visitors see today are remnants of the calving and retreat of this glacial ice. In 2019, Glacier Bay National Park received approximately 675,000 visitors traveling by cruise ships, tour boats, charter boats, and private vessels. Most of the glaciers within the bay are thinning and receding due to rapidly warming atmospheric temperatures and ocean water, exposing uncharted areas at the glacier faces. In addition, glacial till has altered the bathymetry in the fjords near the glaciers. While most of Glacier Bay was last surveyed in 2009, the southern portion was last surveyed prior to 2001. This project focuses on a number of glacier faces, as well as several coves within Glacier Bay. Conducting a modern bathymetric survey in this area will provide critical data for the updating of National Ocean Service (NOS) nautical charting products and services to increase maritime safety in Glacier Bay. Survey data from this project is intended to supersede all prior survey data in the common area.



Figure 3: McBride Glacier in survey area of F00831.

C. Intended Use of Survey

The entire survey is adequate to supersede previous data.

F00831 McBride Inlet started as part of survey H13400. After reviewing the data and boat traffic that frequent the area it was decided to ask NOAA Hydrographic Surveys Division (HSD) for the McBride portion of the survey H13400 to be split and become survey F00831 in order to expedite the application of this data to an unsurveyed section of the chart. . Documentation of this accompanies the DR summary.

D. Data Acquisition and Processing

Fourteen sound speed profiles were acquired for this survey at discrete locations within the survey area at least once every four hours, when significant changes in surface sound speed were observed, or when operating in a new area. Sound speed profiles were obtained using Sea-Bird 19plus SEACAT Profilers. All

casts were concatenated into a master file and applied to MBES data using the "Nearest distance within time" (4 hours) profile selection method.

Sound speed was an issue interior to the McBride Inlet. This SV issue was corrected by taking an existing cast from julian day 171 of survey operations and rename the julian day to 168. The new cast was also renamed from 19:40 to 19:00 and applied to select lines using the nearest in distance within 4 hours method by re-georeferencing. Select lines from julian day 171 were re-georeferenced with the originally applied cast (17:05) using nearest in distance method to correct sound speed issues. After review, these actions improved data quality in the area.

The junction with 2009 survey H12144, encompassed approximately 0.08 square nautical miles along the western boundary of F00831. A finalized 16m single-resolution surface from F00831 was compared with a 16m single-resolution surface from H12144. Pydro's Compare Grids results showed that 35% of nodes in the overlapping met NOAA allowable error standards. Analysis of the difference indicates that there is a -0.56 average difference between these two junctioned surveys. The pattern of the difference between the two surveys suggests sedimentation, scouring, and real world changes to the seafloor at the mouth of the bay. Refer to Figure 7 and plots below for additional information.

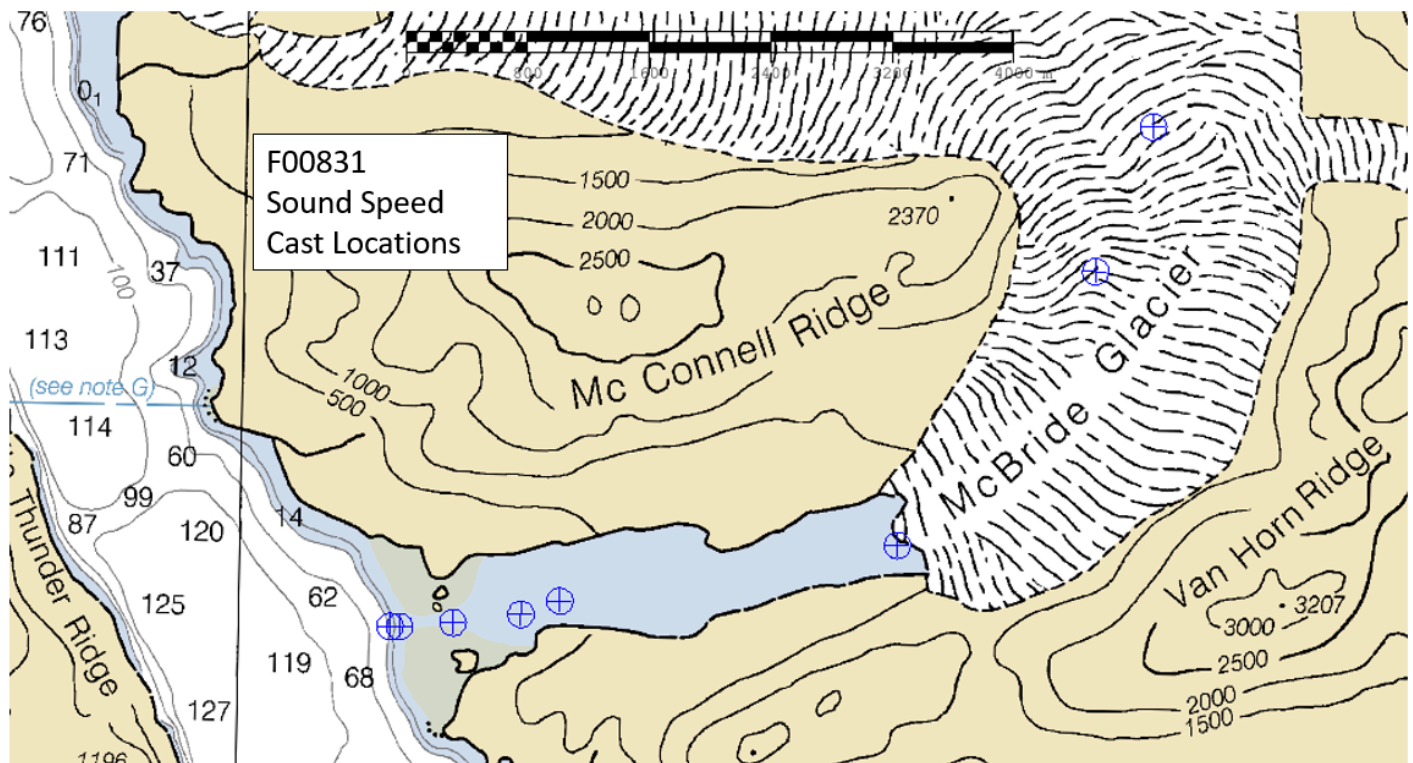


Figure 4: F00831 sound speed cast locations.

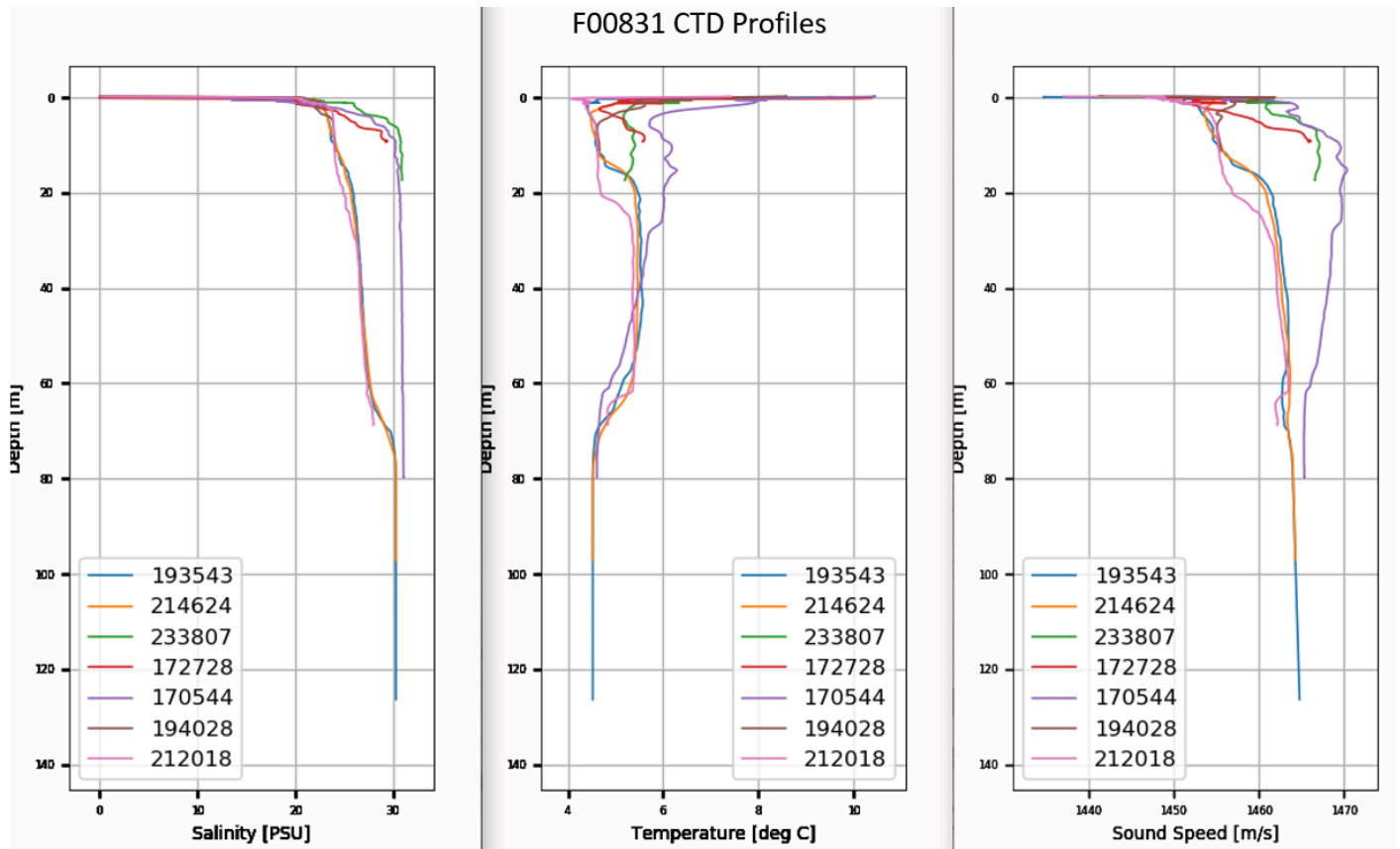


Figure 5: CTD casts taken during survey acquisition of F00831.

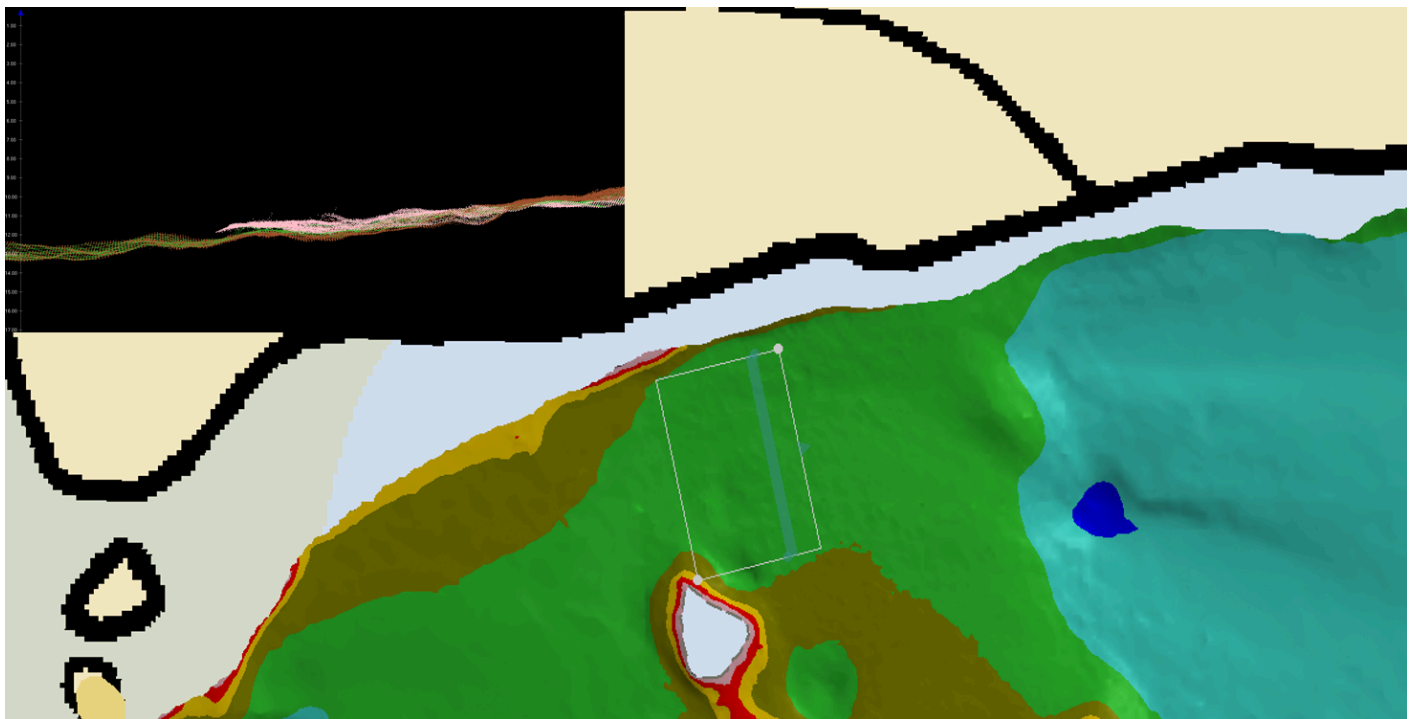


Figure 6: Example of sound speed issue in survey F00831.

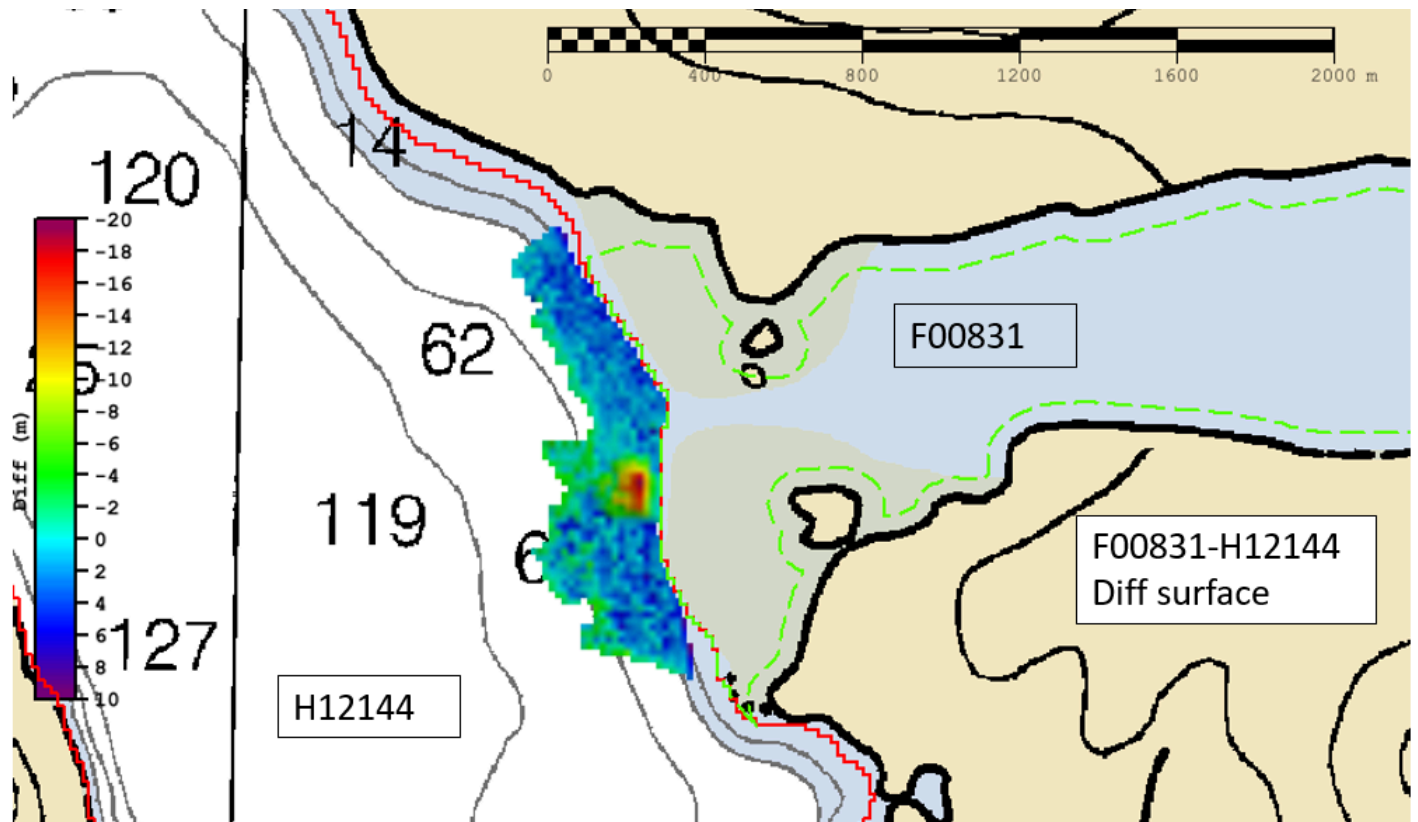


Figure 7: F00831/ H12144 Junction Comparison.

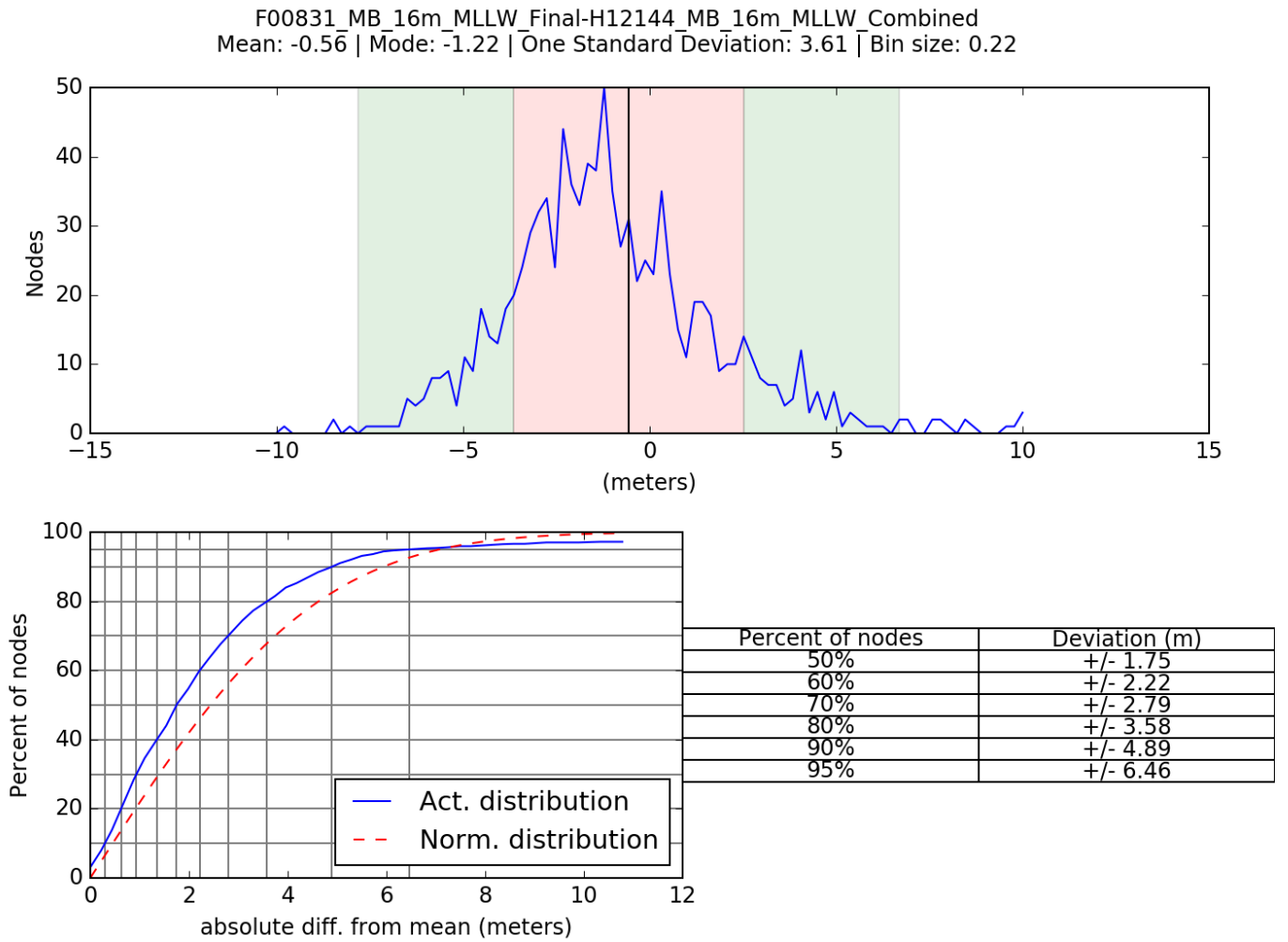


Figure 8: Pydro derived plot showing absolute difference statistics of F00831 to H12144.

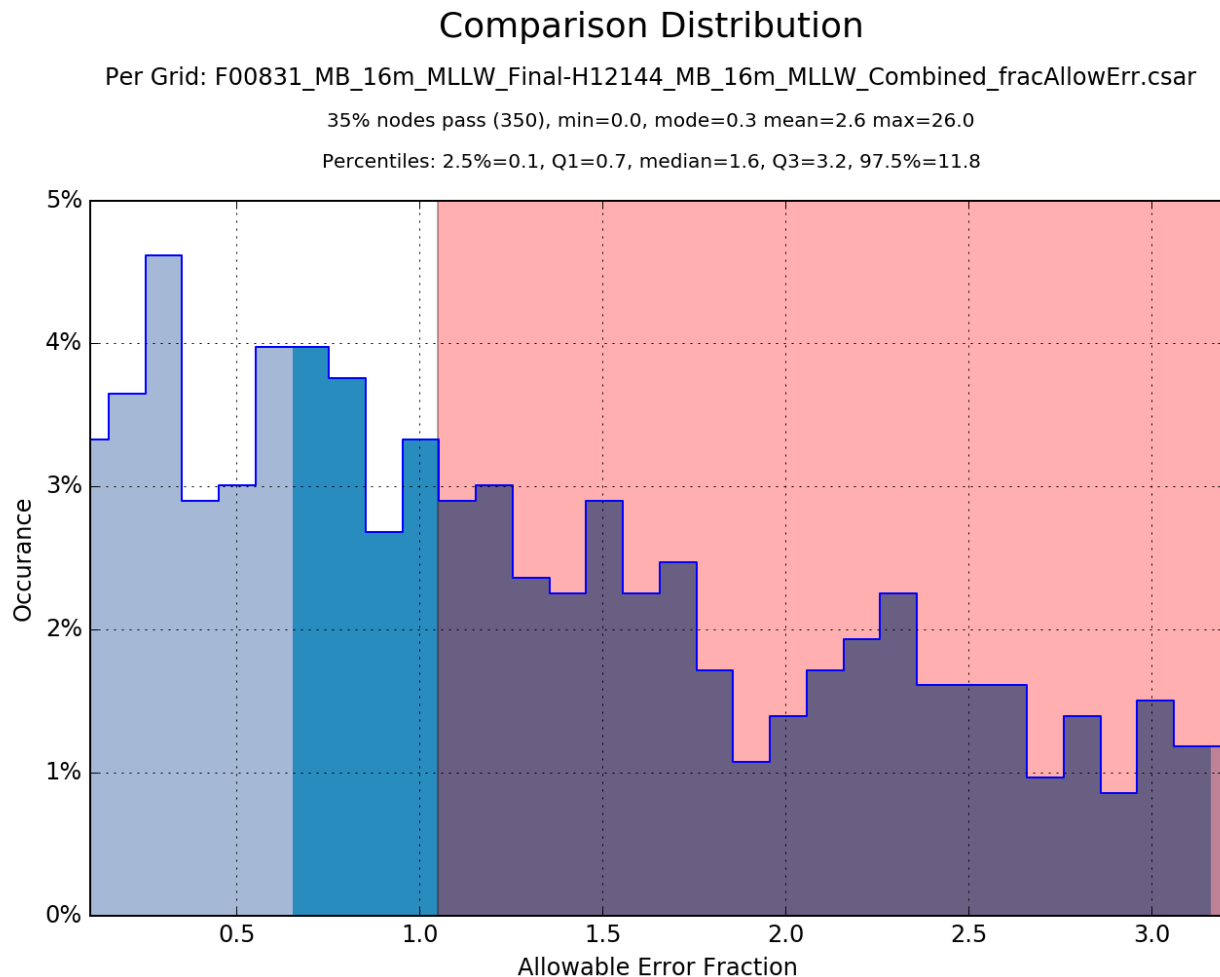


Figure 9: Pydro derived plot showing percentage-pass value of F00831 to H12144.

E. Uncertainty

Total Propagated Uncertainty (TPU) values for survey F00831 were derived from a combination of fixed values for equipment and vessel characteristics, as well as from field assigned values for sound speed uncertainties. Tidal uncertainty was provided in the project instructions for NOAA vertical datum transformation model used in this survey.

In addition to the usual a priori estimates of uncertainty, real-time and post-processed uncertainty sources were also incorporated into the depth estimates of this survey. Real-time uncertainties for position, navigation, attitude, and vessel motion data from Applanix POS MV were applied during acquisition and initially in post-processing. We later applied POSpac SBET and RMS files in CARIS HIPS to supersede POS MV uncertainties associated with GPS height and position.

Uncertainty values of the submitted finalized grids were calculated in Caris using "Greater of the Two" of uncertainty and standard deviation (scaled to 95%). Grid QA v5 within Hydro QC Tools was used to analyze F00831 TVU compliance. F00831 met HSSD requirements in over 99 percent of grid nodes, which is shown in the histogram plot below.

Pydro QC Tools 2 Grid QA was used to analyze F00831 multibeam echosounder (MBES) data density. The submitted F00831 variable-resolution (VR) surface met HSSD density requirements shown in the histograms below.

RAINIER launch 2804 acquired 1.62 lnm of crosslines across most depth ranges on one boat day. Pydro's Compare Grids results 97% of nodes met allowable uncertainties between finalized variable-resolution surfaces of F00831 mainscheme only and crossline only data. The average difference between the compared surfaces are likely steep relief in bathymetry. Refer to plots below for additional information.

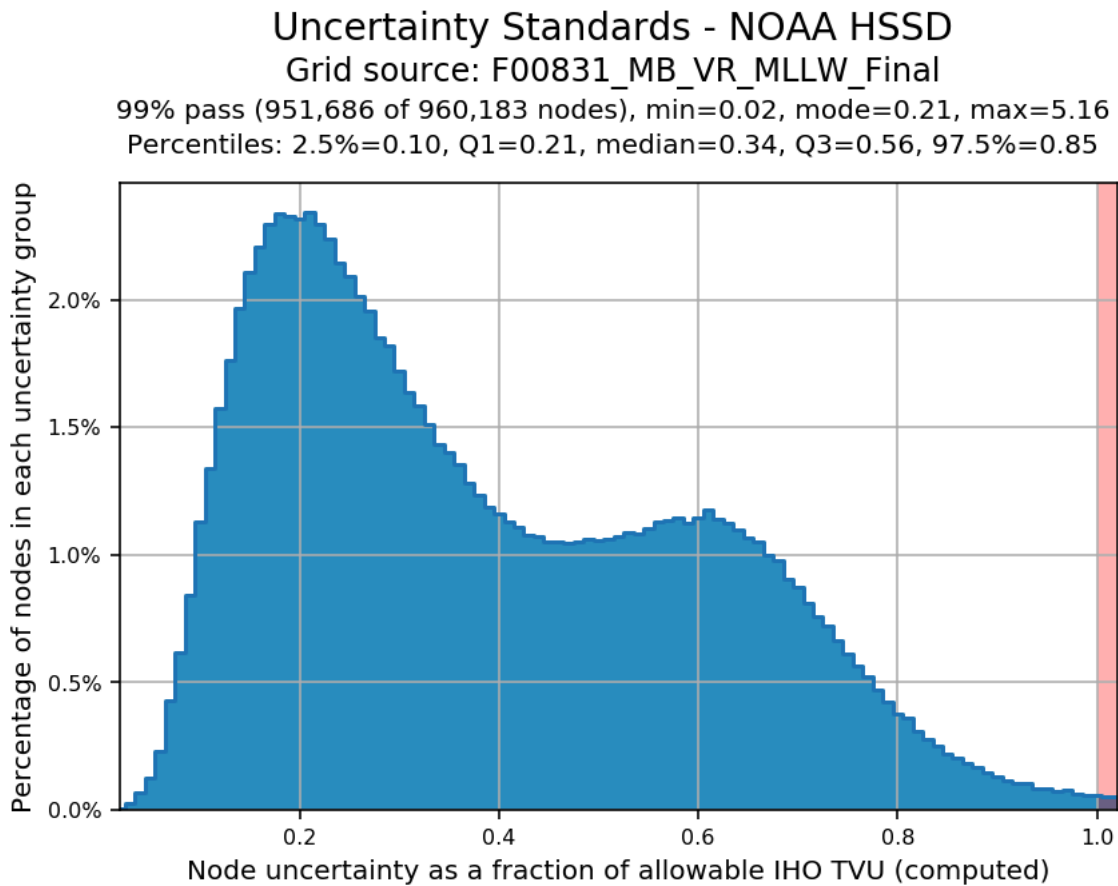


Figure 10: Pydro derived plot showing TVU compliance of F00831 finalized multi-resolution MBES data.

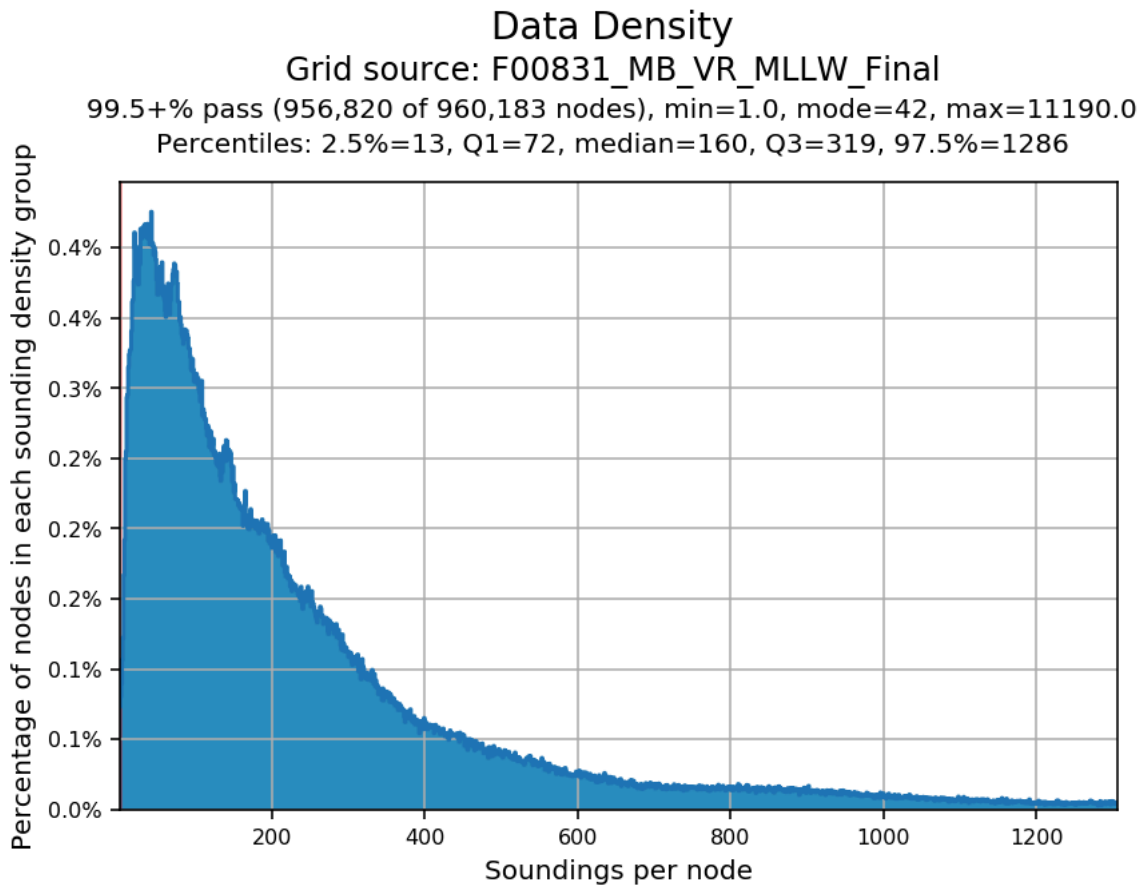


Figure 11: Pydro derived histogram plot showing HSSD density compliance of F00831 finalized variable-resolution MBES data.

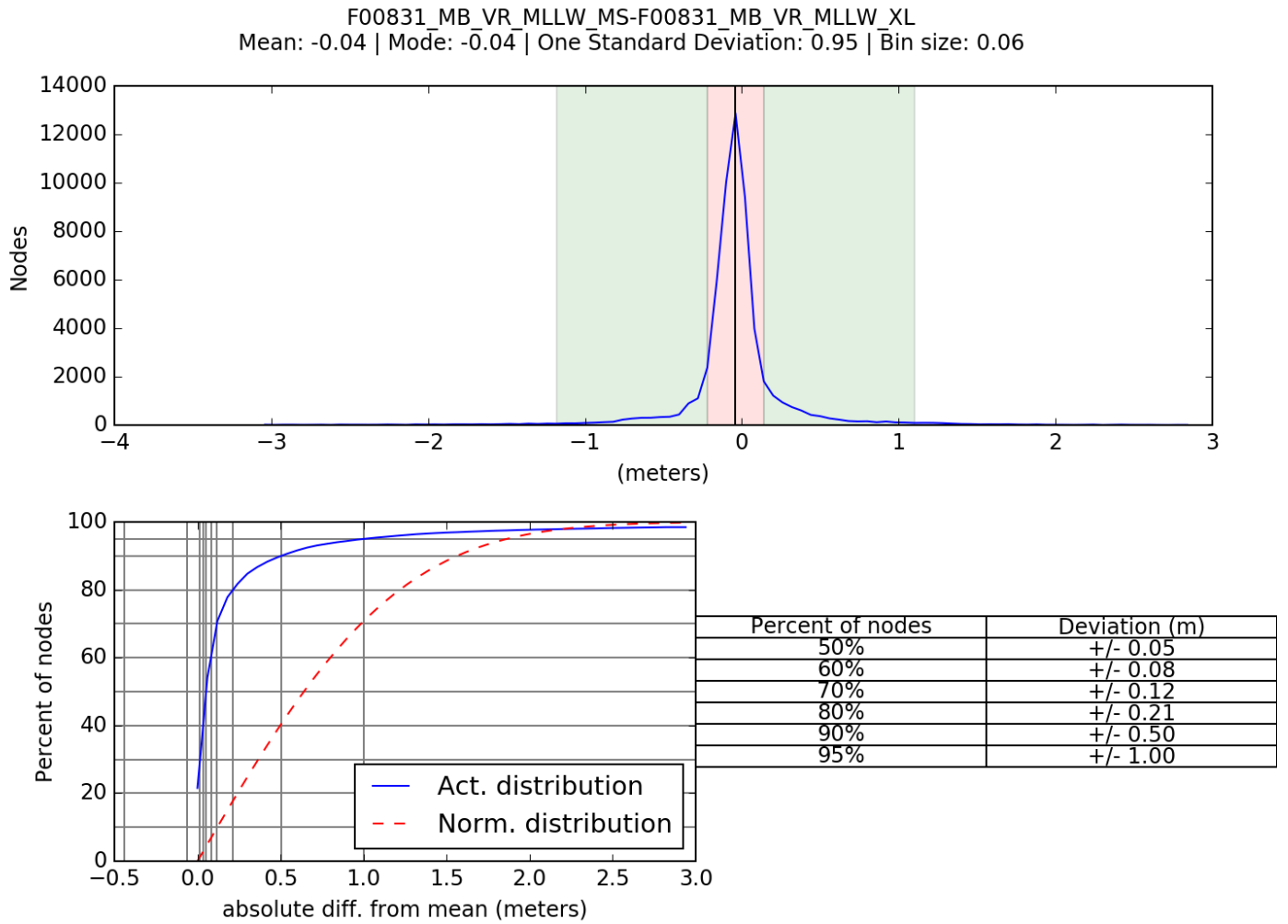


Figure 12: Pydro derived plot showing absolute difference statistics of F00831 mainscheme to crossline data.

Comparison Distribution

Per Grid: F00831_MB_VR_MLLW_MS-F00831_MB_VR_MLLW_XL_fracAllowErr.csar

97% nodes pass (57686), min=0.0, mode=0.1 mean=0.2 max=18.1

Percentiles: 2.5%=0.0, Q1=0.0, median=0.1, Q3=0.2, 97.5%=1.3

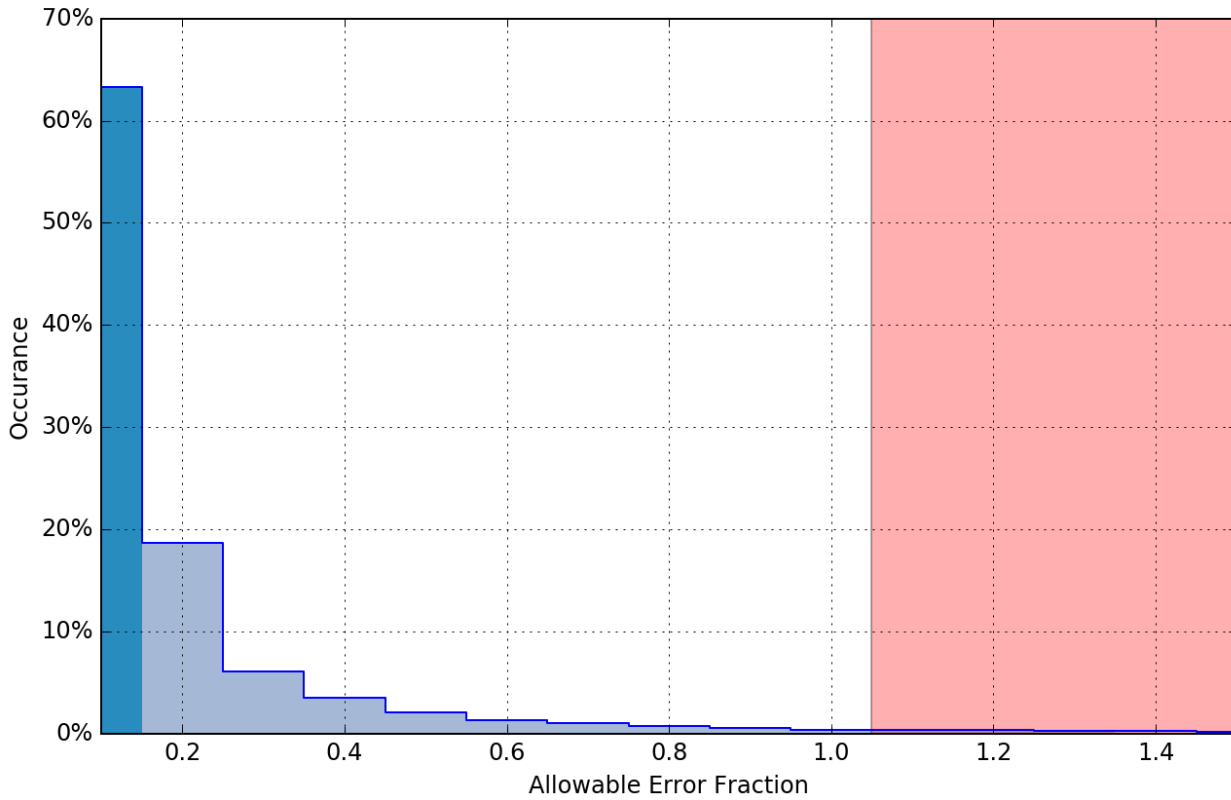


Figure 13: Pydro derived plot showing percentage-pass value of F00831 mainscheme to crossline data.

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
US4AK3DM	1:80000	7	09/20/2018	09/20/2018

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

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
F00831_MB_VR_MLLW_Final	CARIS VR Surface (CUBE)	Variable Resolution m	-1.27 m - 144.46 m	NOAA_VR	Complete MBES
F00831_MB_VR_MLLW	CARIS VR Surface (CUBE)	Variable Resolution m	-1.27 m - 144.46 m	NOAA_VR	Complete MBES

Submitted surfaces were generated using the recommended parameters for depth-based (Ranges) Caris variable resolution bathymetric grids specified in the 2021 HSSD.

Pydro QC Tools Detect Fliers was used with default settings to find fliers in a finalized VR surfaces. Obvious noise was rejected by the hydrographer in Caris Subset Editor. After data cleaning, Detect Fliers was run again and found 8 potential flier in the Complete Coverage surface. These were investigated and found to be false.

Pydro QC Tools Holiday Finder was used with default settings to find holidays in a finalized VR surfaces. Holiday Finder detected one holiday, created by the presence of multiple icebergs in the survey area. Please see image below.

The NALL was achieved in areas where it was navigationaly safe, including areas where the presence of icebergs prevented hydrographers from pushing inshore.

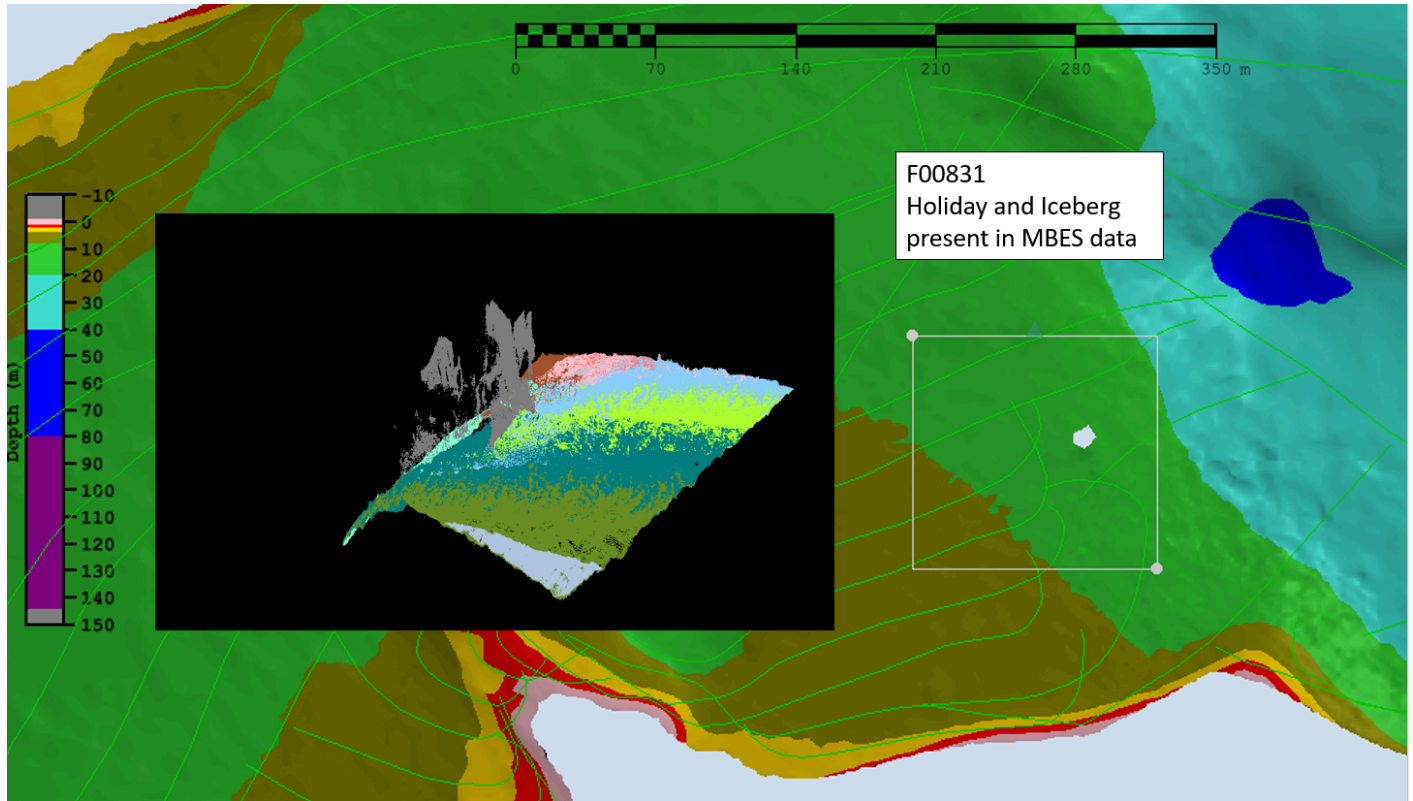


Figure 14: Example of holiday caused by iceberg present in F00831 MBES data.

G. Vertical and Horizontal Control

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

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

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

ERS via VDATUM

Mcbride2_VDatum_NAD83-MLLW.csar

An ERS file specific to McBride Inlet was requested due to the survey operations exceeding the limit of the ERS file provided for OPR-O351-RA-21.

Ellipsoidally referenced GNSS derived heights and applied a separation model to reduce soundings to chart datum. Documentation with Hydrographic Surveys Division (HSD) accompanies the DR summary.

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 8.

Post Processed-Real Time Extended (PP-RTX) processing methods were used in Applanix POSPac MMS 8.5 SP2 software to produce SBETs for post-processing horizontal correction.

H. Additional Results

Shoreline Investigation

Due to the shallow, narrow, dangerous and uncharted nature of the entrance to McBride Inlet, Rainier decided collaborate with the Alaska Hunter, a tour vessel familiar with the area. A RAINIER survey launch followed the Alaska Hunter into McBride Inlet, the logging data for a safe path though the entrance channel. In addition to safe navigation through the entrance, the Alaskan Hunter alerted surveyors of an uncharted reef in an area close to the entrance. Hydrographers returned to McBride Inlet to further develop the channel and reef, which is included in the final feature file.



Figure 15: Glacier Bay National Park boat tour contractor Alaskan Hunter.

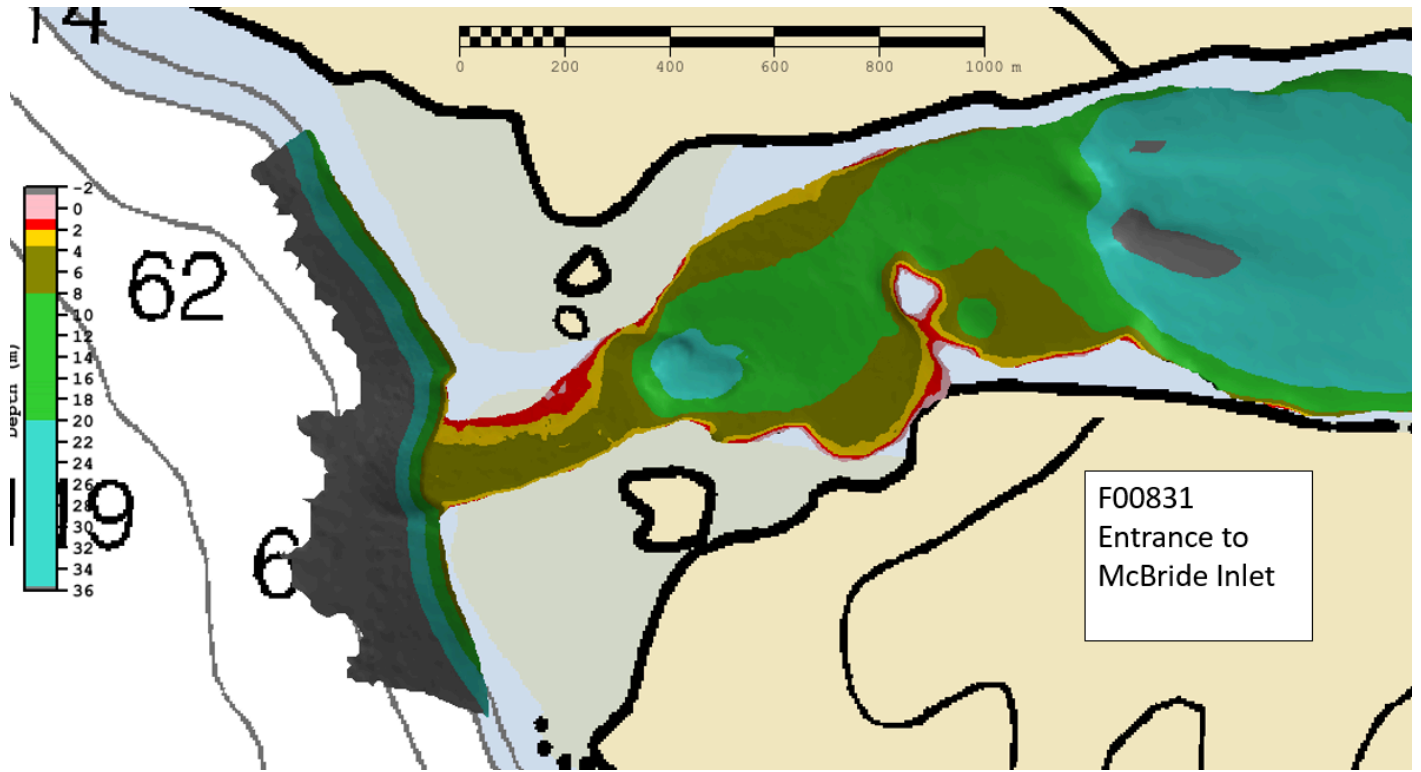


Figure 16: Entrance into McBride Inlet (Chart 17318).



Figure 17: Reef discovered during survey operations in F00831.

Chart Update

The eastern and western glaciers intersecting McBride are no longer connected and it is recommended that satellite imagery or other remote sensing methods be used to update shoreline in the new chart.

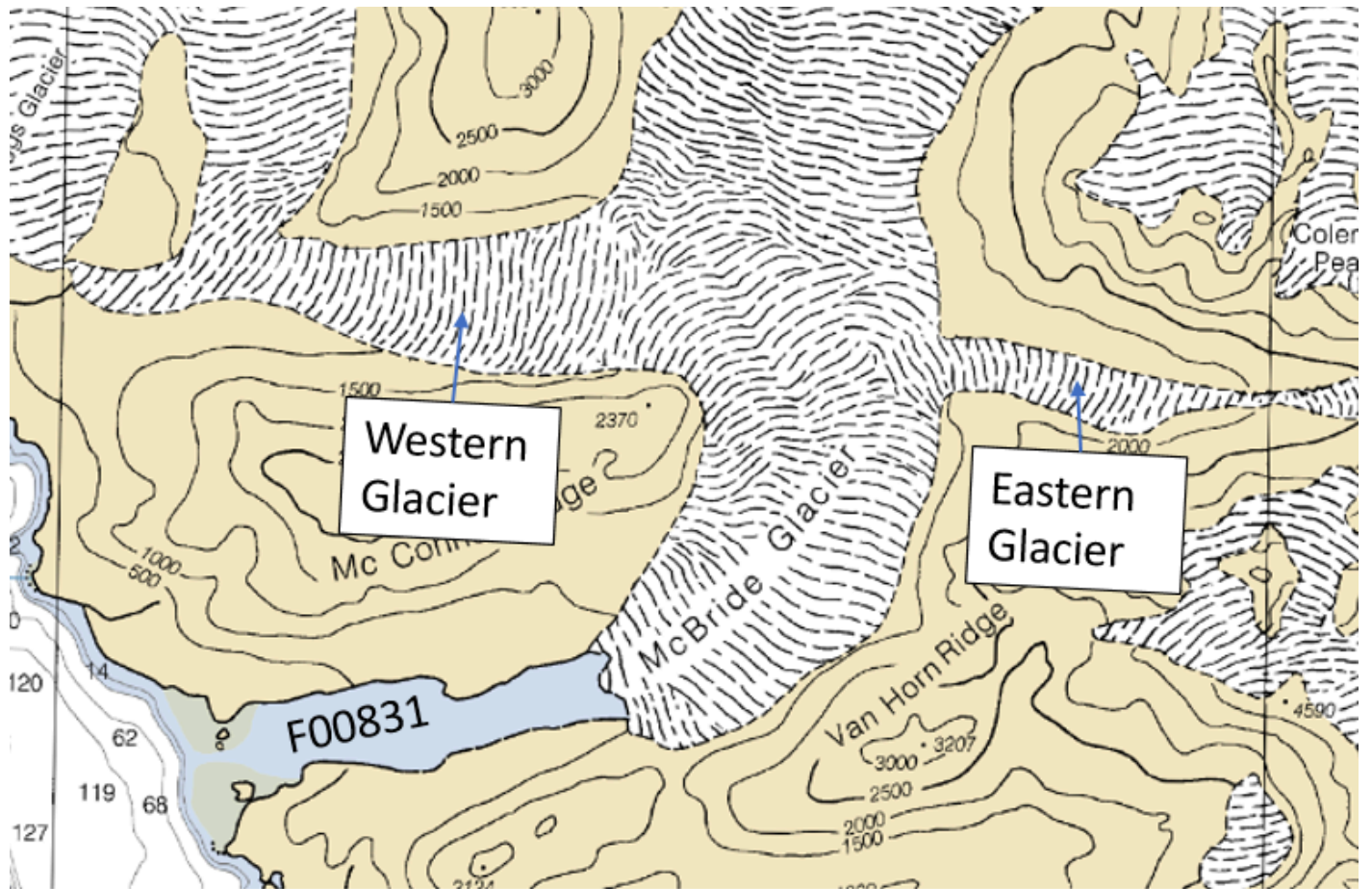


Figure 18: Chart 17318 of survey area F00831.



Figure 19: Eastern Glacier relative to McBride Glacier.



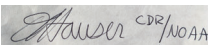



Figure 20: Western glacier relative to McBride glacier.

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
Olivia A. Hauser, CDR\NOAA	Chief of Party	07/02/2021	 HAUSER.OLIVIA.ANN.12756 36009 2021.07.02 11:57:37 -08'00'
Matthew B. Sharr, LT\NOAA	Field Operations Officer	07/02/2021	 SHARR.MATTHEW.BRANDON. 1503637126 2021.07.02 12:16:15 -08'00'
James B. Jacobson	Chief Survey Technician	07/02/2021	 JACOBSON.JAMES.BRYAN.1269 664017 I have reviewed this document 2021.07.02 11:47:14 -08'00'
Christina L. Brooks	Sheet Manager	07/02/2021	 Digitally signed by BROOKS.CHRISTINA.LORRAINE.1553513177 Date: 2021.07.02 11:44:46 -08'00'

APPROVAL PAGE

F00831

The survey data meet or exceed the current requirements of the Office of Coast Survey hydrographic data review process and may be used to update NOAA products. The following survey products will be archived at the National Centers for Environmental Information:

- Descriptive Report
- Collection of Bathymetric Attributed Grids (BAGs)
- Collection of acoustic backscatter mosaics
- Geospatial PDF of survey products

Approved: _____

James Miller

Acting Chief, Pacific Hydrographic Branch