H13401

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13401

LOCALITY

State(s):	Alaska
General Locality:	Glacier Bay
Sub-locality:	Bartlett Cove

2021

CHIEF OF PARTY
Olivia A. Hauser CDR/NOAA

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Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H13401**

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**
Sub-Locality:	**Bartlett Cove**
Scale:	**10000**
Dates of Survey:	**03/20/2021 to 06/14/2021**
Instructions Dated:	**03/04/2021**
Project Number:	**OPR-O351-RA-21**
Field Unit:	**NOAA Ship *Rainier***
Chief of Party:	**Olivia A. Hauser CDR/NOAA**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Multibeam Echo Sounder 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 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.

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Descriptive Report to Accompany Survey H13401

Project: OPR-O351-RA-21

Locality: Glacier Bay

Sublocality: Bartlett Cove

Scale: 1:10000

March 2021 - June 2021

NOAA Ship *Rainier*

Chief of Party: Olivia A. Hauser CDR/NOAA

A. Area Surveyed

This survey is referred to as H13401, "Bartlett Cove" (sheet 3) within the Project Instructions. The assigned survey area encompassed an estimated 35 square nautical miles among the Beardslee Islands near the southern entrance to Glacier Bay National Park.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
58° 38' 10.3" N 136° 2' 52.26" W	58° 26' 24.94" N 135° 50' 41.96" W

Table 1: Survey Limits

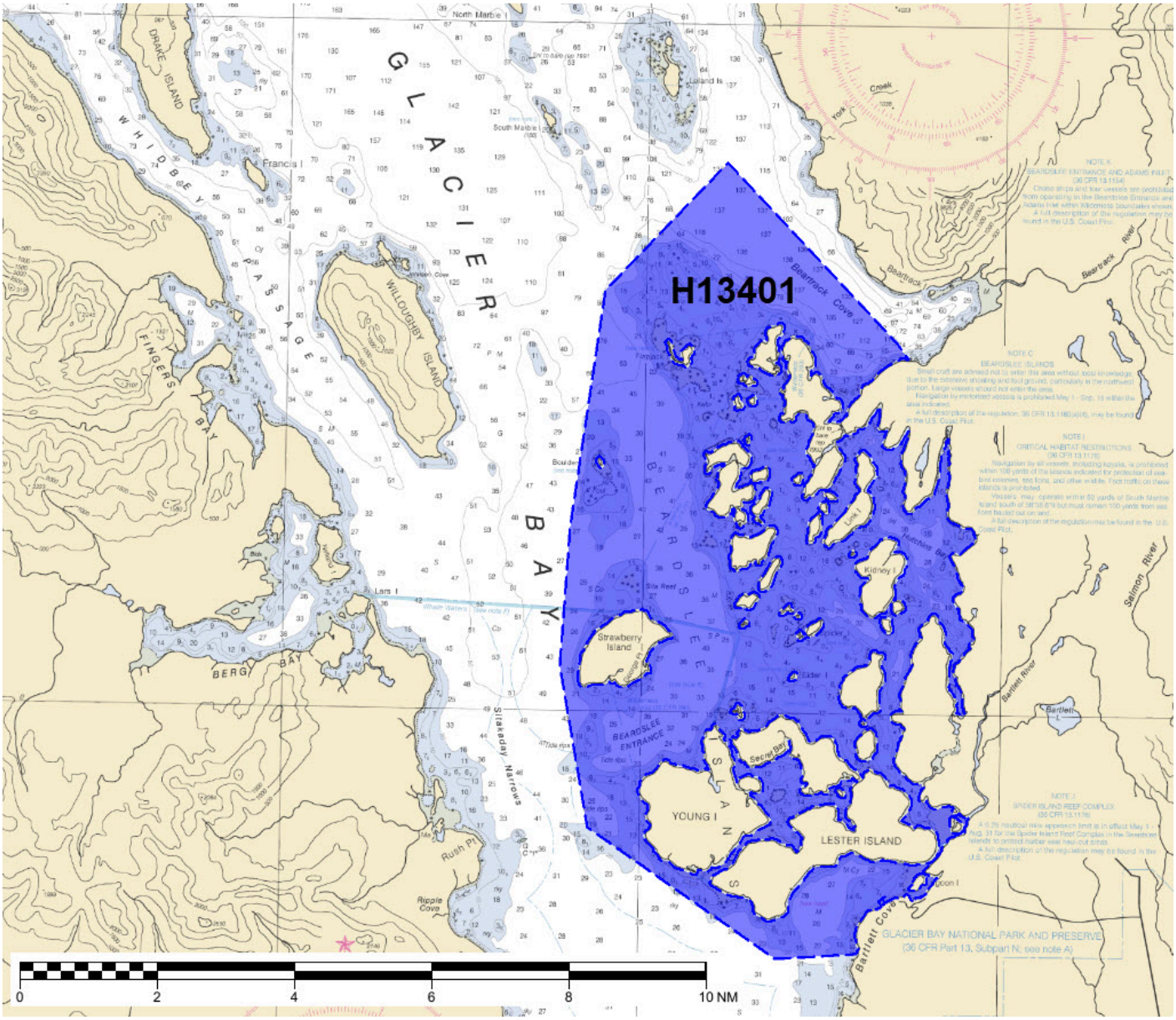


Figure 1: H13401 assigned survey area (Chart 17318).

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

A.2 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 survey focuses on 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. Data from this survey 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.

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	Complete Coverage (Refer to HSSD Section 5.2.2.3)

Table 2: Survey Coverage

A significant amount of multibeam echosounder coverage was acquired in H13401 to the inshore limit of hydrography, the Navigable Area Limit Line (NALL). The NALL is defined as the most seaward of the following: the surveyed 3.5 meter depth contour, the line defined by the distance seaward from the observed MHW line which is equivalent to 0.8 millimeters at chart scale (the assigned sheet limits closely reflect this) or the inshore limit of safe navigation. Areas where H13401 survey coverage reached neither 3.5 meters water depth, nor the assigned sheet limits, were due to the presence of hazardous rocks and/or thick kelp. The figures included below illustrate the areas in which the NALL was reached and not reached. The NALL was not reached continuously throughout the shore surrounding Flapjack Island, southern shores of Beartrack Cove, the western shores of an island directly south of Flapjack Island, and areas between Eider Island and Secret Bay. See figures below for more information. Additional MBES coverage was completed outside the southern-most edge of the assigned survey limits in an effort to locate a submerged park service instrument. No instrument was discovered but the additional coverage is included in the final surface.

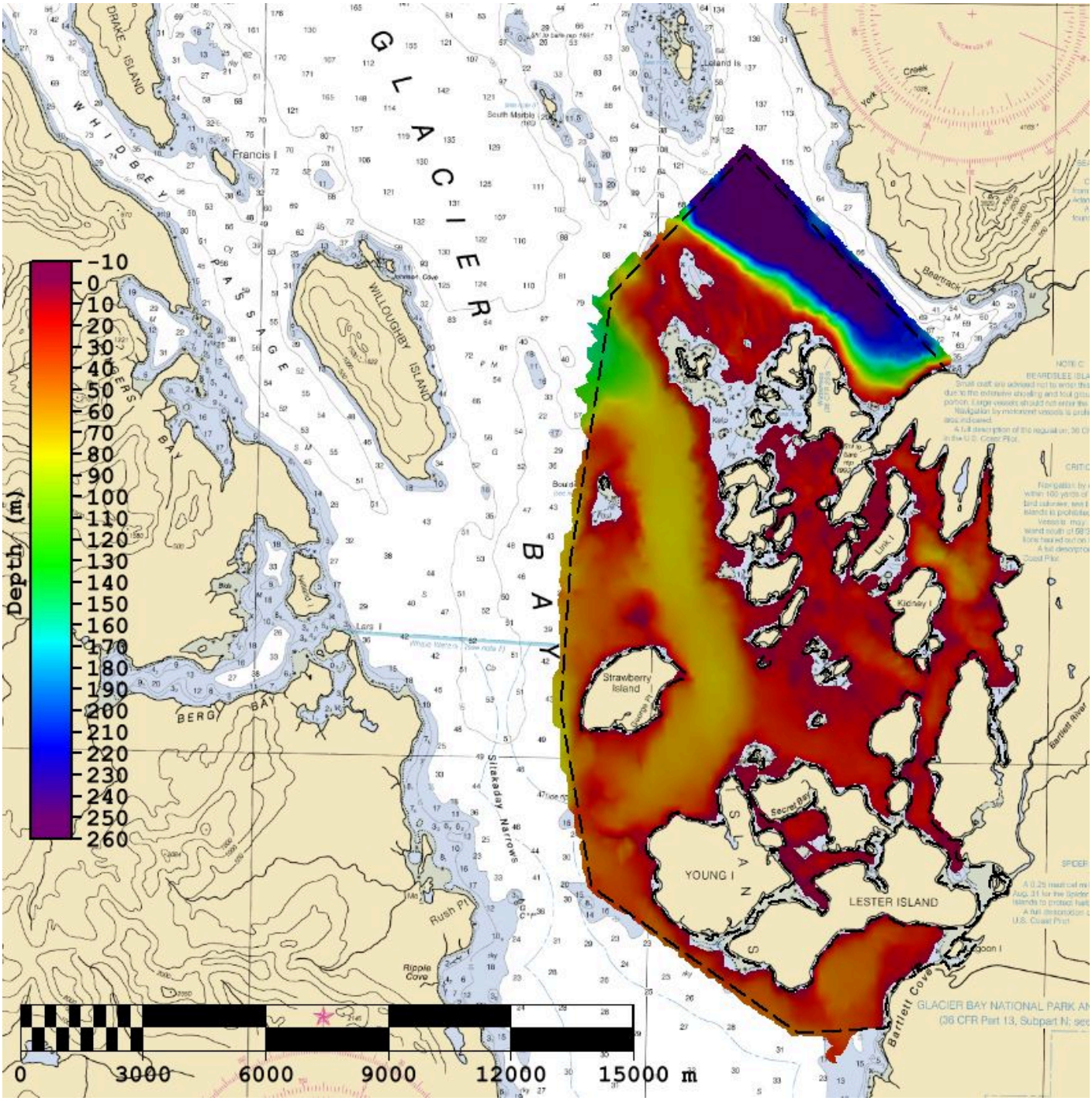


Figure 2: H13401 MBES coverage and assigned survey limits as black dashed lines (Chart 17318).

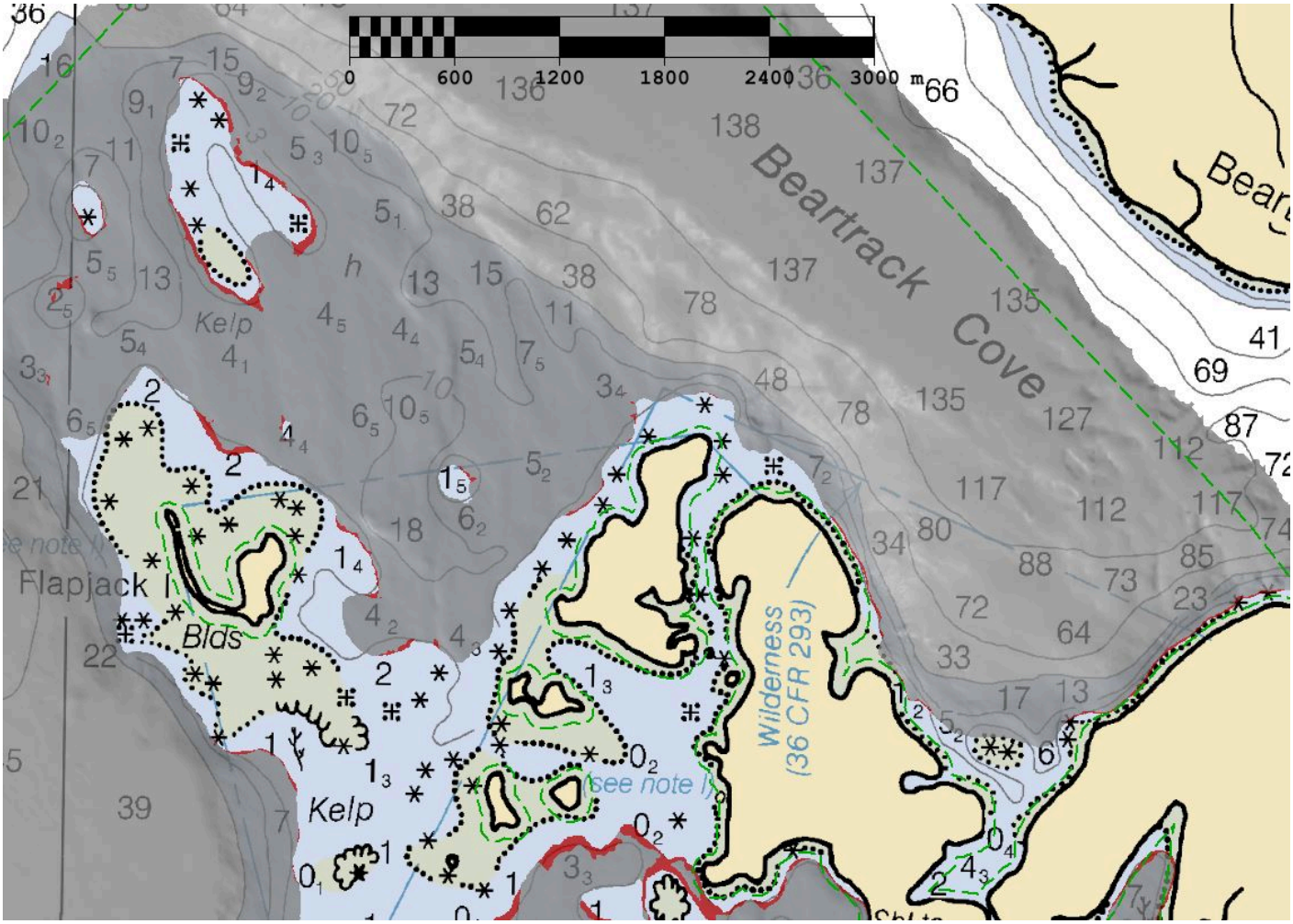


Figure 3: Example of areas surrounding Flapjack Island and southern shores of Beartrack Cove where the 3.5-meter NALL was not reached. Red indicates areas where the 3.5-meter NALL was reached and the green dashed line indicates the assigned sheet limits.

A.6 Survey Statistics

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

	HULL ID	*2801*	*2802*	*2803*	*2804*	*Total*
LNM	SBES Mainscheme	0	0	0	0	0
	MBES Mainscheme	177.67	212.82	265.15	250.81	906.46
	Lidar Mainscheme	0	0	0	0	0
	SSS Mainscheme	0	0	0	0	0
	SBES/SSS Mainscheme	0	0	0	0	0
	MBES/SSS Mainscheme	0	0	0	0	0
	SBES/MBES Crosslines	0	15.37	0	15.35	30.72
	Lidar Crosslines	0	0	0	0	0
Number of Bottom Samples						5
Number Maritime Boundary Points Investigated						0
Number of DPs						30
Number of Items Investigated by Dive Ops						0
Total SNM						32.37

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
03/20/2021	79
03/21/2021	80

Survey Dates	Day of the Year
03/22/2021	81
03/23/2021	82
03/24/2021	83
03/25/2021	84
03/26/2021	85
03/27/2021	86
03/28/2021	87
03/29/2021	88
03/30/2021	89
06/13/2021	164
06/14/2021	165

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	*2801*	*2802*	*2803*	*2804*	*1701*	*1905*
LOA	8.8 meters	8.8 meters	8.8 meters	8.8 meters	7.62 meters	5.7 meters
Draft	1.1 meters	1.1 meters	1.1 meters	1.1 meters	0.47 meters	0.35 meters

Table 5: Vessels Used

Figure 4: NOAA Ship RAINIER survey launch 2802.

All H13401 survey data were acquired by NOAA Ship RAINIER launches 2801, 2802, 2803 and 2804. These vessels acquired depth soundings, backscatter imagery and sound speed profiles. RAINIER Jetboat 2701 and RAINIER Skiff 1905 conducted limited shoreline feature verification.

B.1.2 Equipment

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

Manufacturer	Model	Type
Applanix	POS MV 320 v5	Positioning and Attitude System
Kongsberg Maritime	EM 2040	MBES
Sea-Bird Scientific	SBE 19plus	Conductivity, Temperature, and Depth Sensor
Teledyne RESON	SVP 70	Sound Speed System

Table 6: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

RAINIER launches 2802 and 2804 acquired 30.72 linear nautical miles (3.4%) of MBES crosslines across all depth ranges, water masses and boat days that were operationally practical in order to evaluate the internal consistency of H13401 sonar data. Crossline analysis was performed using the Compare Grids function within Pydro Explorer on Caris variable-resolution surfaces of H13401 mainscheme only and crossline only data. 99.5% of grid nodes met allowable uncertainties as shown in the Pydro generated histograms below.

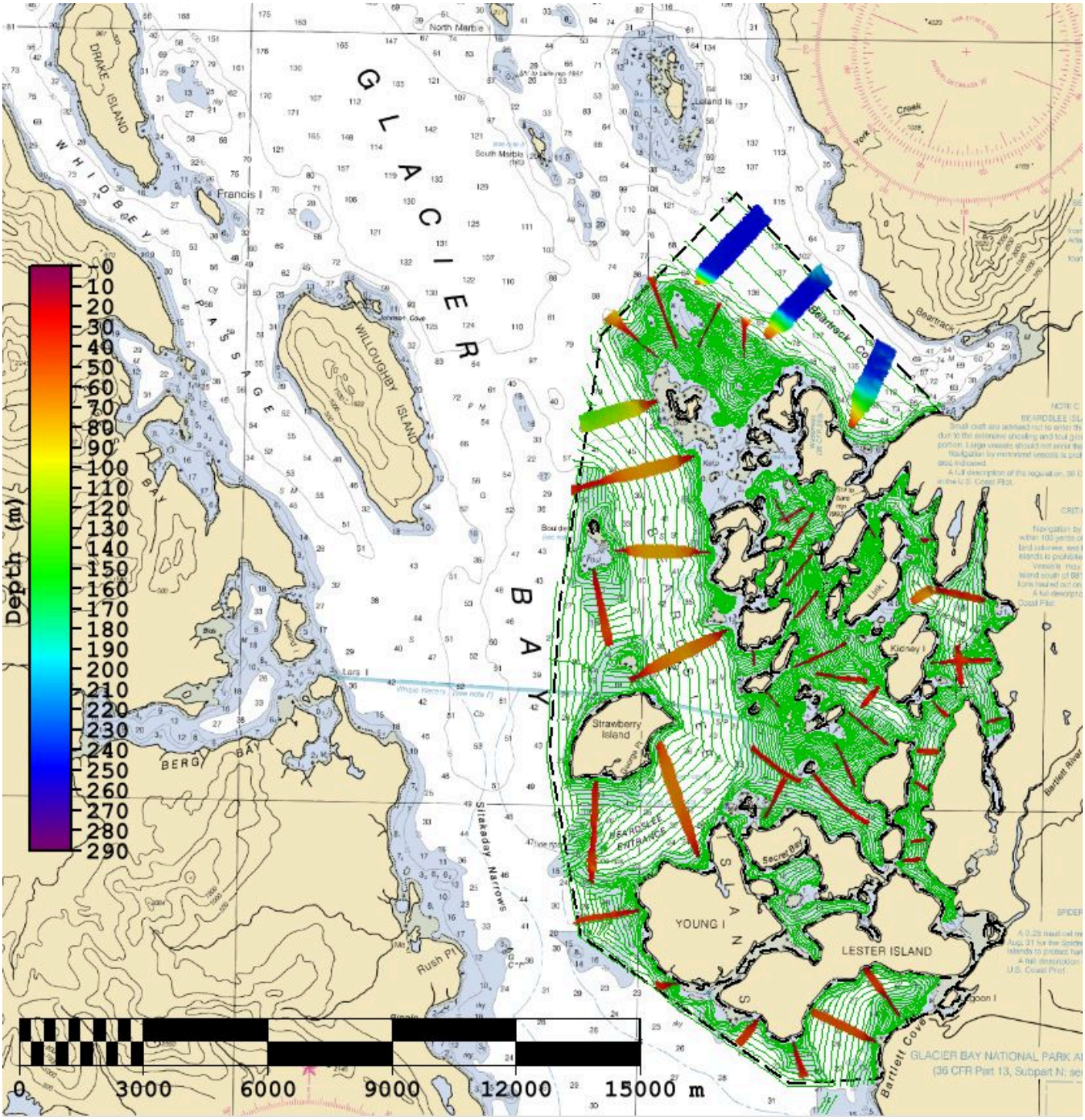
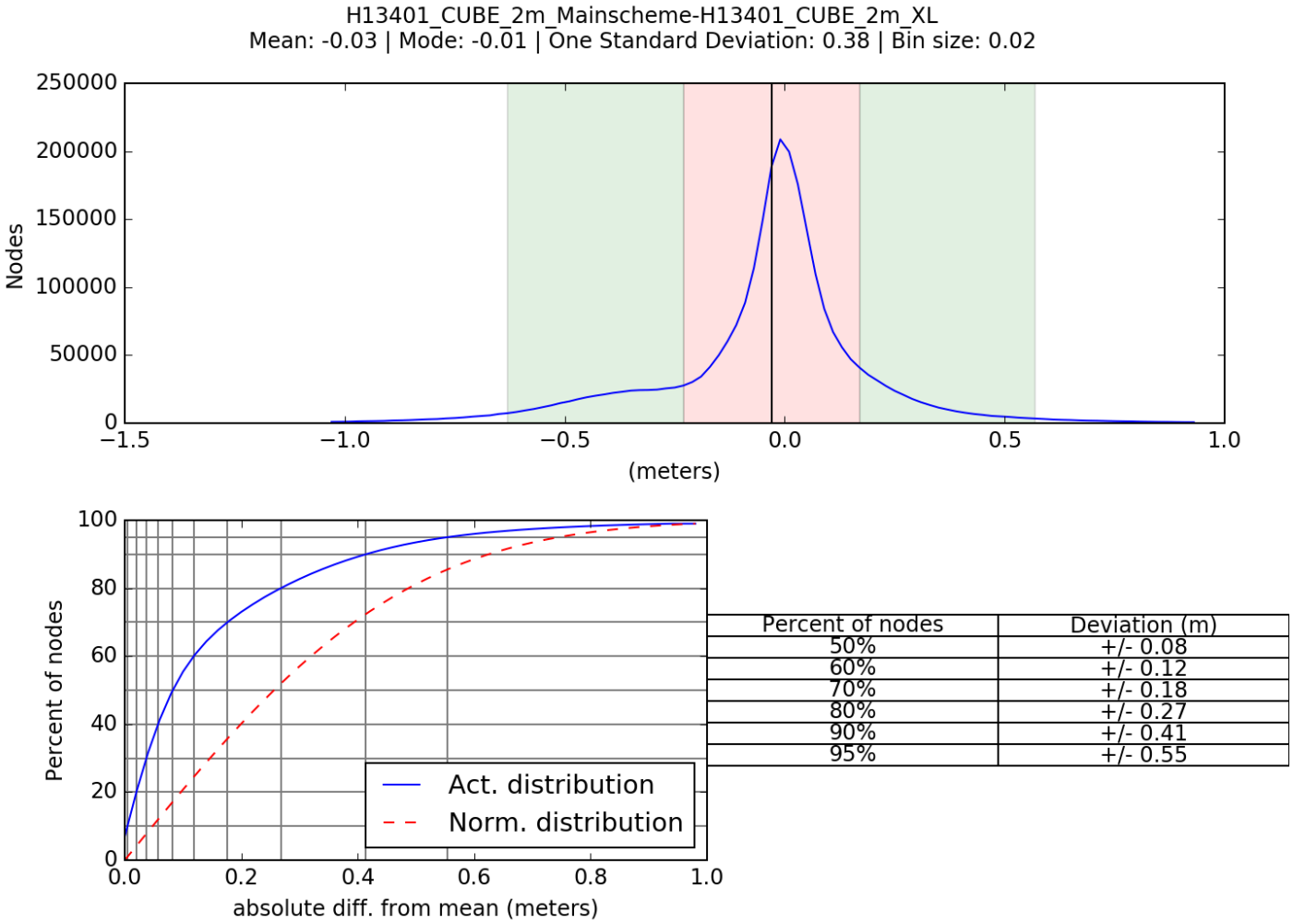


Figure 5: H13401 crossline surface overlaid on mainscheme tracklines.



Percent of nodes	Deviation (m)
50%	+/- 0.08
60%	+/- 0.12
70%	+/- 0.18
80%	+/- 0.27
90%	+/- 0.41
95%	+/- 0.55

Figure 6: Pydro derived plot showing percentage-pass value of H13401 mainscheme to crossline data.

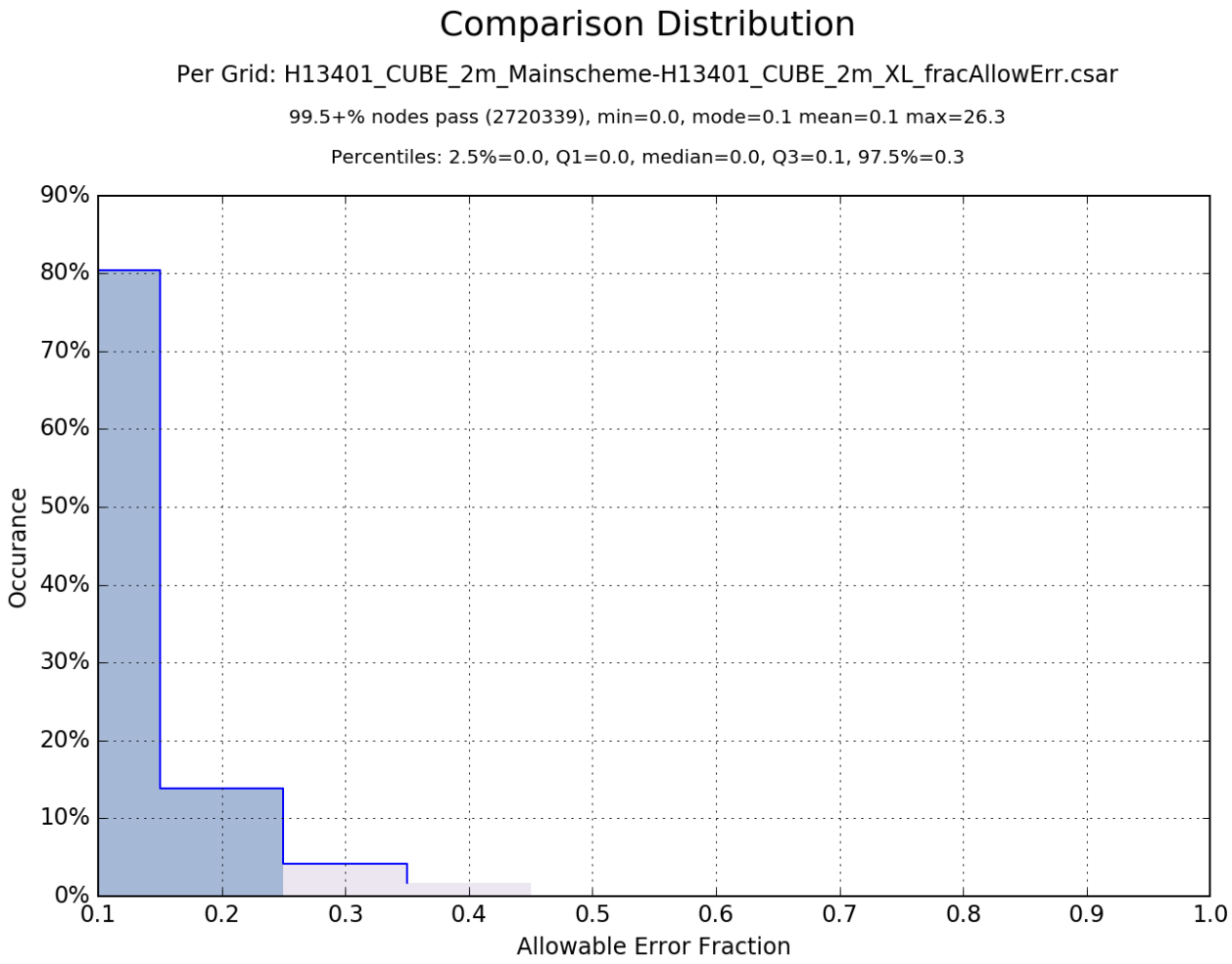


Figure 7: Pydro derived plot showing absolute difference statistics of H13401 mainscheme to crossline data.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0 meters	0.13 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
2801,2802,2803,2804	3 meters/second	N/A	N/A	0.05 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

Total Propagated Uncertainty (TPU) values for survey H13401 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 the NOAA vertical datum transformation model used for this 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 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. However, the SBET and RMS files, which were generated using POSPac MMS software and applied in Caris HIPS to supersede POS MV data, have post-processed uncertainties associated with the 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 within Pydro Tools (v.3.4.3) was used to analyze H13401 TVU compliance and multibeam (MBES) data density; histogram plots of the results are shown below. H13401 met HSSD requirements in over 99.5% of grid nodes and the submitted H13401 variable-resolution (VR) surface met HSSD density requirements.

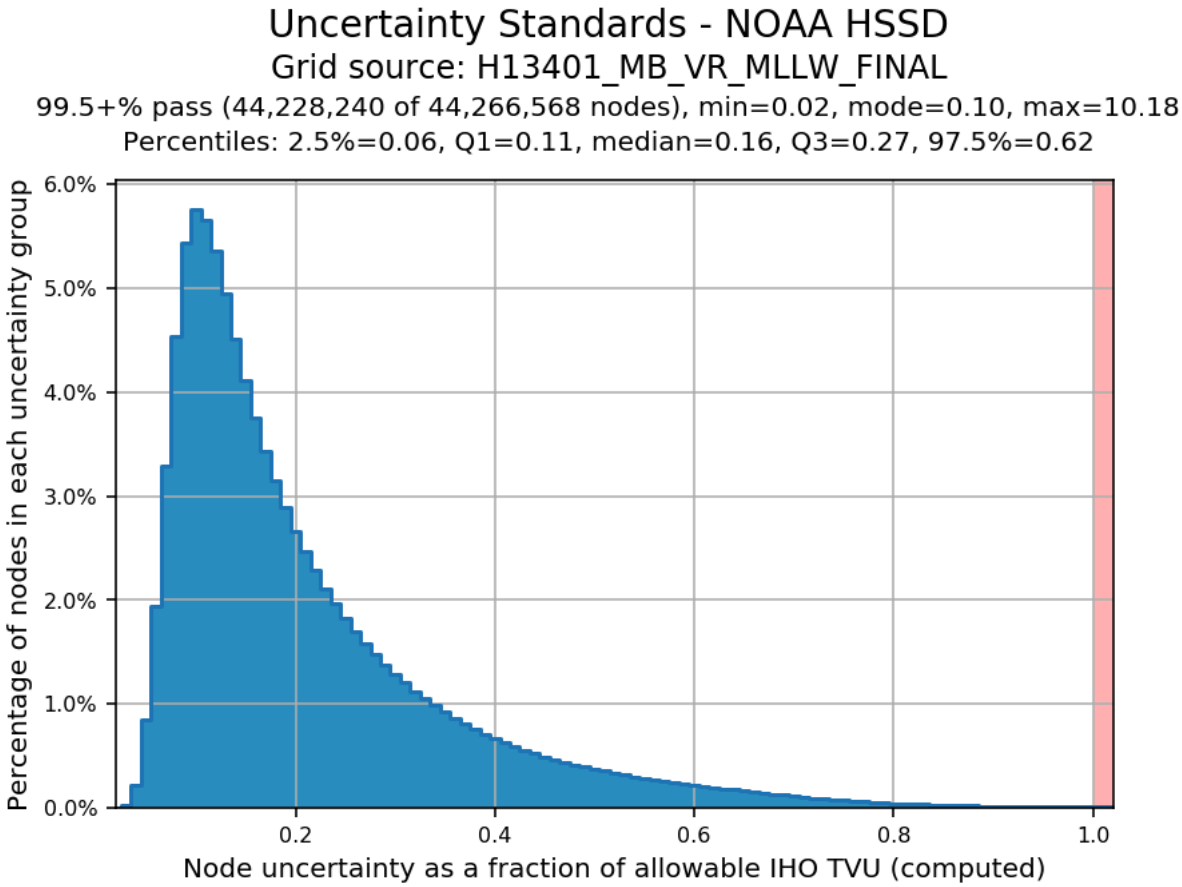


Figure 8: Pydro derived plot showing TVU compliance of H13401 finalized variable-resolution MBES data.

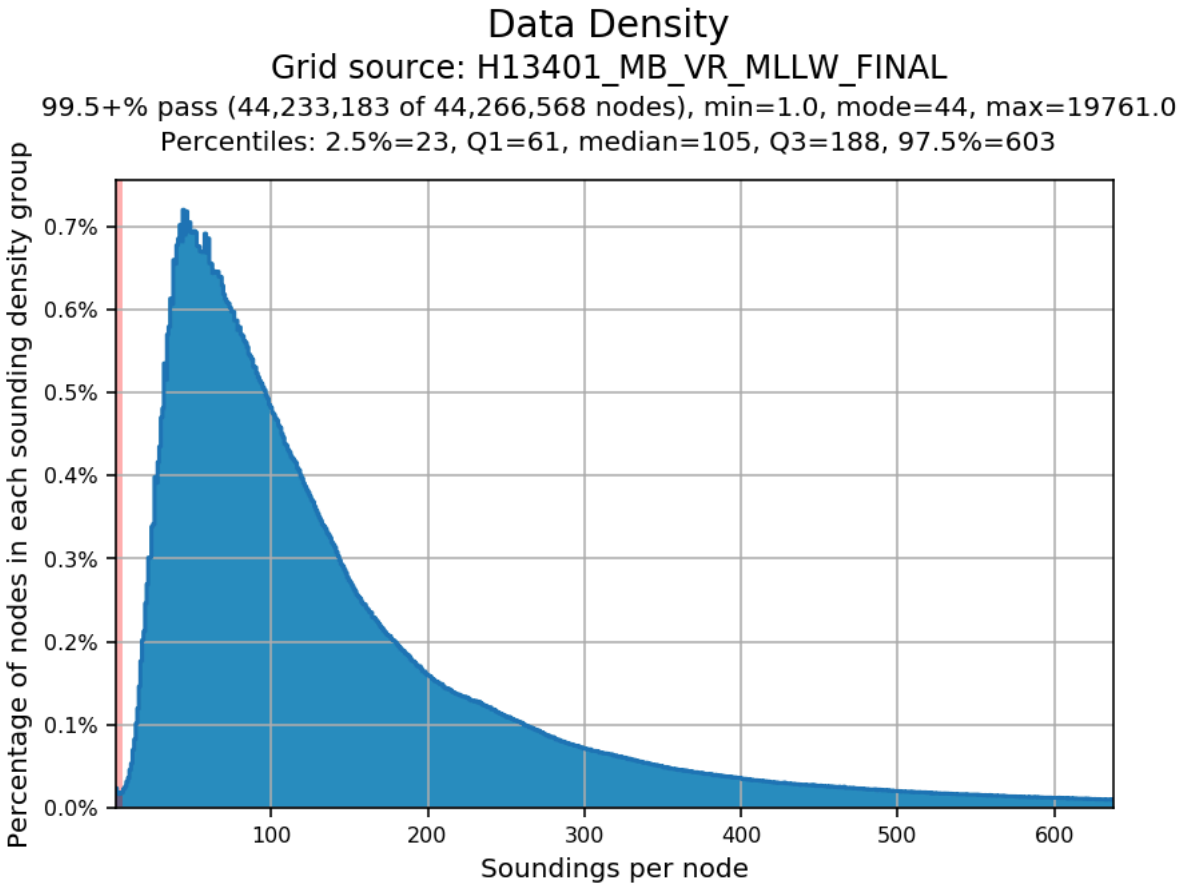


Figure 9: Pydro derived histogram plot showing HSSD density compliance of H13401 finalized variable-resolution MBES data.

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: 120 sound speed profiles were acquired for this survey at discrete locations within the survey area at least once every four hours, when significant changes to surface sound speed were observed, or when moving survey operations to a new area. Sound speed data were acquired using Sea-Bird Scientific SBEplus profilers. All casts were concatenated into a master file and applied to H13401 MBES data using the "Nearest distance within Time" (4 hours) profile selection method.

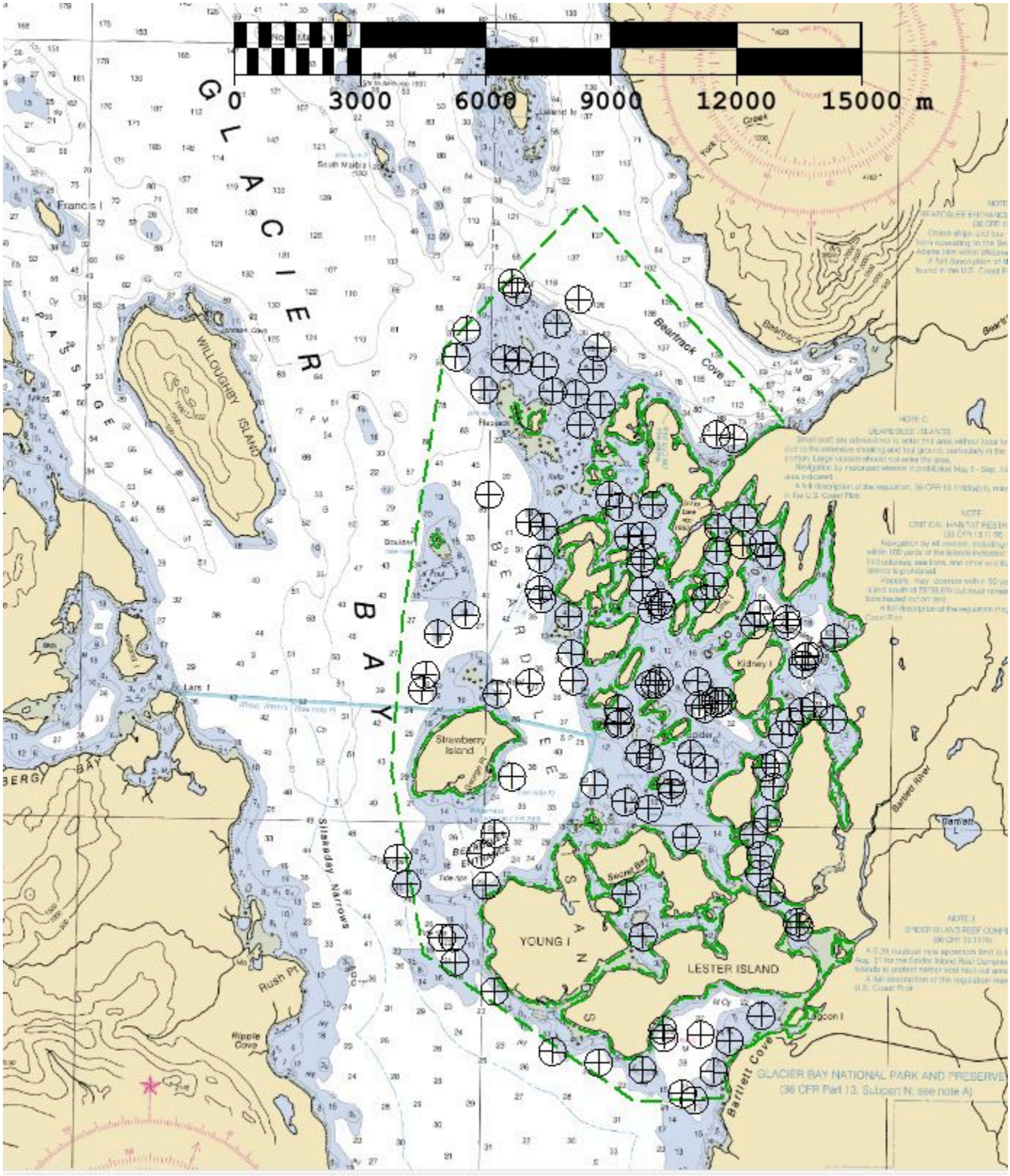


Figure 10: H13401 sound speed cast locations.

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 data were acquired as .ALL files logged during MBES operations and subsequently processed by RAINIER personnel. The .GSF files created during processing and backscatter mosaics per vessel and per frequency are delivered with this report. Backscatter processing procedures are described in the DAPR.

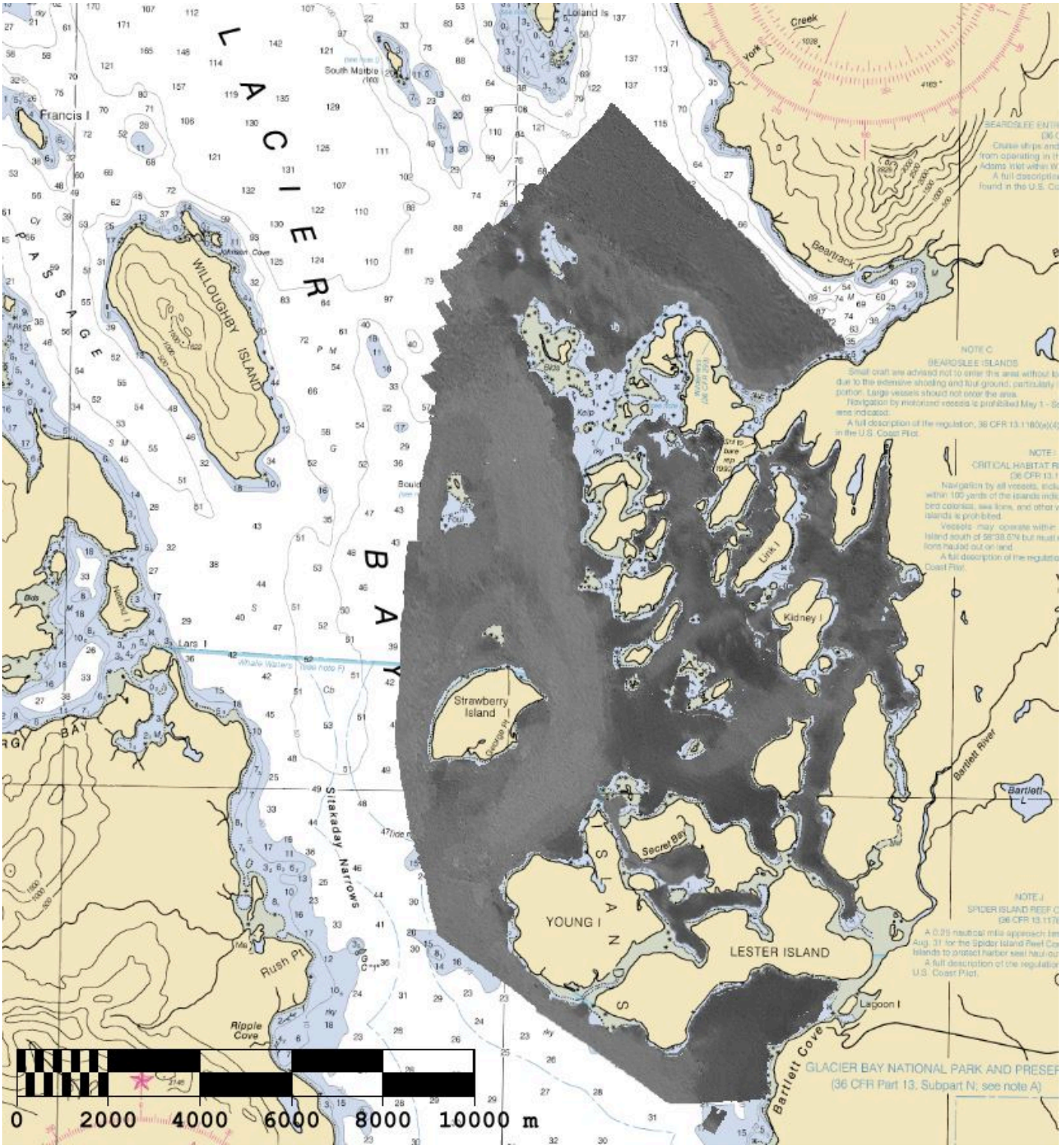


Figure 11: Overview of H13401 backscatter mosaics.

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	11.2.4

Table 9: Primary bathymetric data processing software

The following software program was the primary program used for imagery data processing:

Manufacturer	Name	Version
QPS	Fledermaus Geocoder Tool Box (FMGT)	7.9.4

Table 10: Primary imagery data processing software

The following Feature Object Catalog was used: **NOAA Profile (v2021).**

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
H13401_MB_VR_MLLW	CARIS VR Surface (CUBE)	Variable Resolution	-2.23 meters - 251.19 meters	NOAA_VR	Complete MBES
H13401_MB_VR_MLLW_Final	CARIS VR Surface (CUBE)	Variable Resolution	-2.23 meters - 251.19 meters	NOAA_VR	Complete MBES

Table 11: Submitted Surfaces

Submitted H13401 surfaces were generated using NOAA recommended parameters for density-based (Ranges) Caris variable-resolution bathymetric grids. Four soundings were designated and submitted as DTONs. See DTON report in project correspondence attachment.

Pydro QC Tools v.3.4.3 Flier Finder v8 program with default settings was used to identify sounding "fliers" in submitted H13401 surfaces. The program identified 12 fliers which, after examination, were determined to be false positives.

C. Vertical and Horizontal Control

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

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	OPR-O351-FA-20_VDatum_100m_NAD83(2011)-MLLW_XGEOID16B.csar OPR-O351-FA-20_VDatum_100m_NAD83(2011)-MHW_XGEOID16B.csar

Table 12: 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 8.

RTK

Precise Positioning-Real time Extended (PP-RTX) processing methods were used in Applanix POSPac MMS (v8.5) software during post-processing horizontal correction of submitted H13401 MBES data.

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

The majority of H13401's survey area is covered by ENC US4AK3DM with a small southern section covered by ENC US4AK36M. A cartographic discontinuity of up to 75 meters exists at the junction between the two ENCs, most noticeably near the western shore of Young Island.

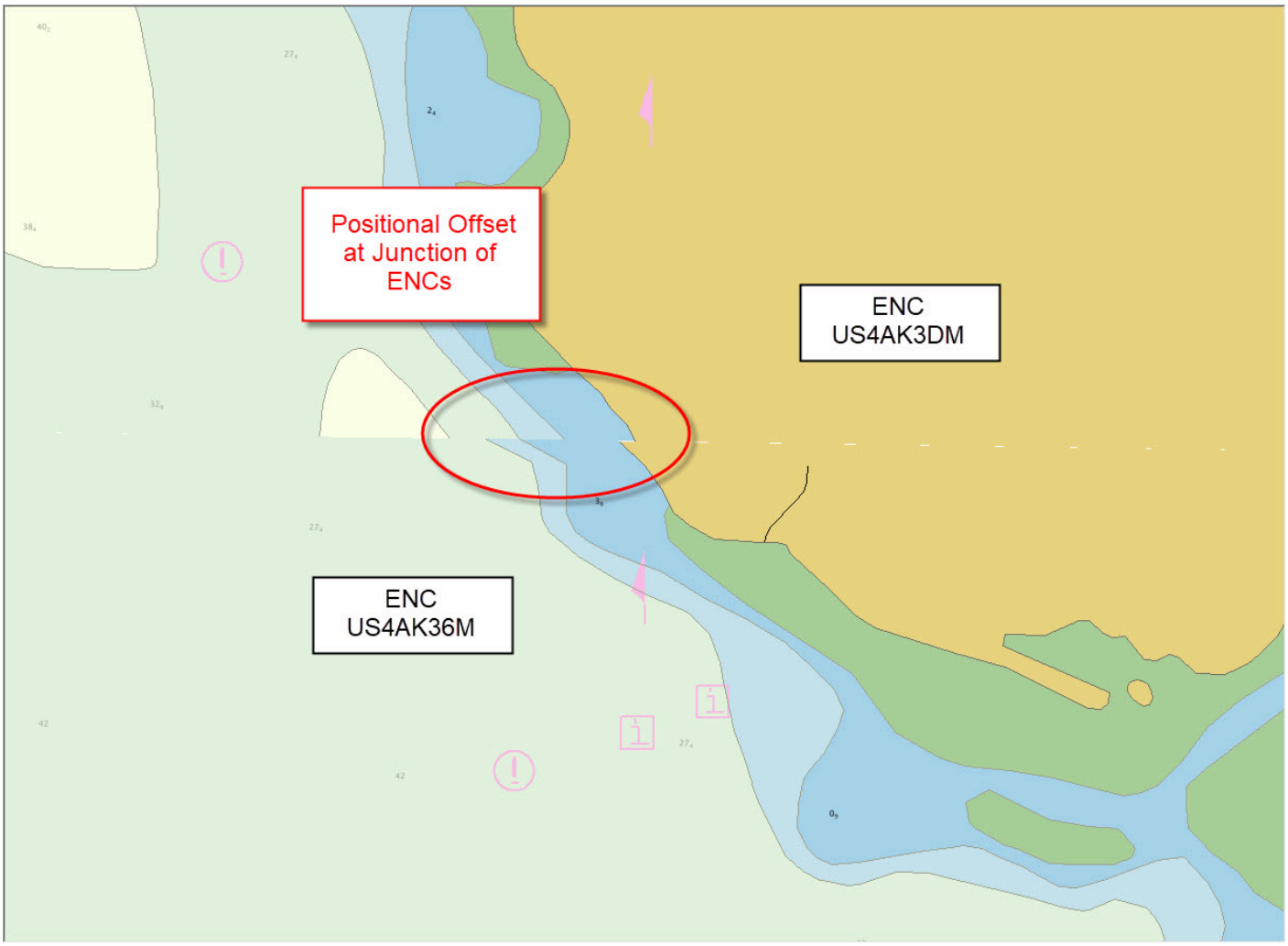


Figure 12: Positional offset between ENC US4AK3DM and US4AK36M.

Shoreline Feature Verification

Limited shoreline verification was conducted within the H13401 survey area using the Composite Source File (CSF) provided by NOAA HSD Operations Branch. Many features included in the CSF were inshore of the NALL. In the field, all assigned features that were deemed safe to approach, were addressed as required with S-57 attribution and recorded in the H13401 Final Feature File (FFF) to best represent features at chart scale. This file also includes any new features found in the field as well as recommendations to update, retain or delete assigned features. Features that were unsafe to approach or inshore of the NALL were attributed in the FFF as Not Addressed and the reason stated.

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
US4AK3DM	1:80000	7	09/20/2018	09/20/2018
US4AK36M	1:80000	7	10/22/2018	02/09/2021

Table 13: Largest Scale ENCs

D.1.2 Shoal and Hazardous Features

Four shoals were identified in this survey and submitted as DTONs for chart number 17318. See project correspondence for DTON report.

D.1.3 Charted Features

Note C for the Beardslee Islands on RNC 17318 indicates a small craft advisory and recommends navigation only through local knowledge . This survey acquired complete coverage throughout the area and provides information to update areas included in the small craft advisory note. The "Shl to bare rep 1992" notation on RNC 17318 and ENC US4AK3DM was investigated during shoreline and visually determined to be present.

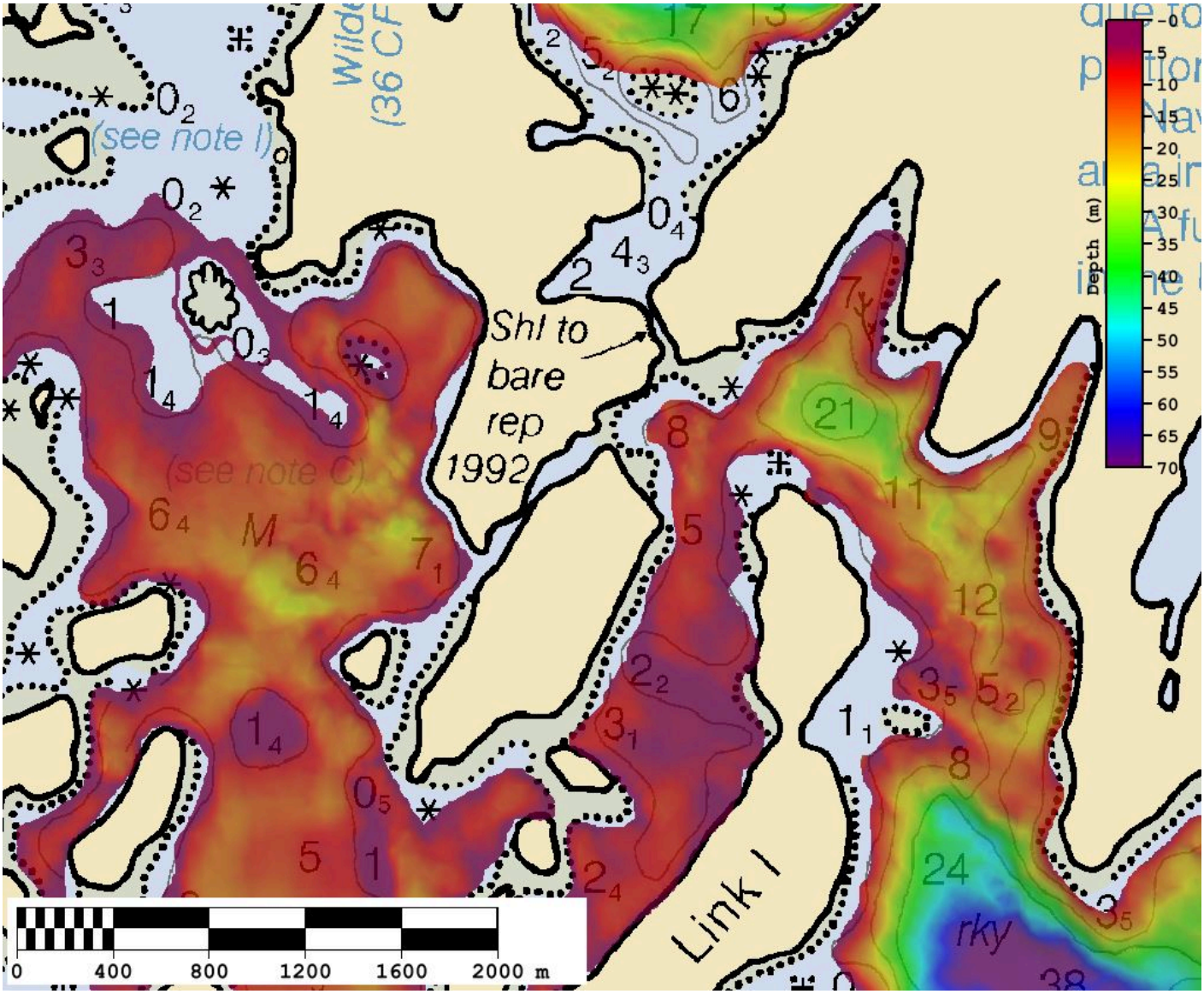


Figure 13: Charted notation "Shl to bare rep 1992" was visually investigated and confirmed to be present during shoreline.

D.1.4 Uncharted Features

At the direction of Glacier Bay National Park personnel, RAINIER was advised to keep an eye out for a sunken fishing vessel somewhere in the vicinity of northeast of Strawberry Island. A non-dangerous wreck was located, with a length of approximately 18m and a width of approximately 5m in roughly 67m of water. This wreck is believed to be the crabber "Westerly". From page 108 Navigating Troubled Waters: A History of Commercial Fishing in Glacier Bay, Alaska.

On February 15, 1994, the steel-hulled, 72-foot Petersburg-based Westerly, which was preparing to set Tanner crab gear, reported that it was in danger of sinking northeast of Strawberry Island. There were gale-

force winds from the north at the time. The three individuals aboard donned immersion suits and abandoned the vessel. They were almost immediately rescued by the vessel Northwyn, which was also fishing Tanner crab. The Westerly stayed afloat for approximately one hour, than sank east of Strawberry Island. Despite the severe weather, the cause of the sinking was not weather-related, but due to the sudden failure of a bulkhead in the main hold, which was filled with seawater to hold live crab. No attempt was made to salvage the Westerly.

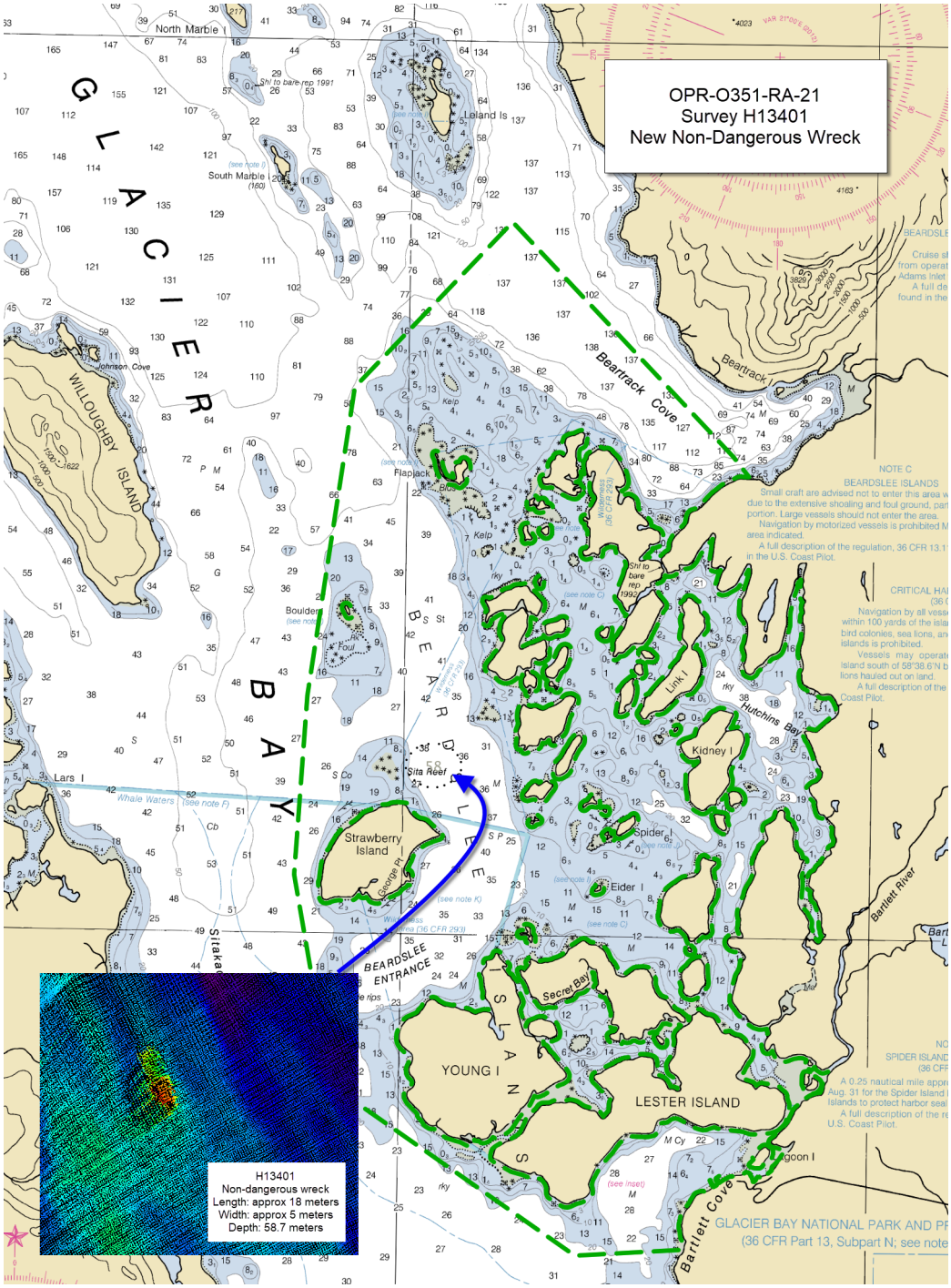


Figure 14: New non-dangerous wreck identified east of Sita Reef, north of Strawberry Island.

D.1.5 Channels

No maintained channels are located within the H13401 survey area. 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

No Aids to navigation (ATONs) are located within the H13401 survey area.

D.2.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.2.3 Bottom Samples

Five bottom samples were investigated for the survey; the results are included in the H13401 Final Feature File submitted with this report.

D.2.4 Overhead Features

No overhead features were observed within the H13401 survey area.

D.2.5 Submarine Features

No submarine features such as cables or pipelines were observed within the H13401 survey area.

D.2.6 Platforms

No drilling or production platforms are located within the H13401 survey area.

D.2.7 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey. The U.S. National Park Service maintains a pier in Bartlett Cove where government vessels have priority.

D.2.8 Abnormal Seafloor or Environmental Conditions

Tide rips are indicated for the Beardslee Islands entrance on chart 17318. Complete bottom coverage was acquired throughout this area and confirms steep changes in sea floor depth and numerous deep pools. Confused waves and tide rips were observed during the survey between Strawberry Island and Young Island, especially at maximum ebb and flood tidal currents.

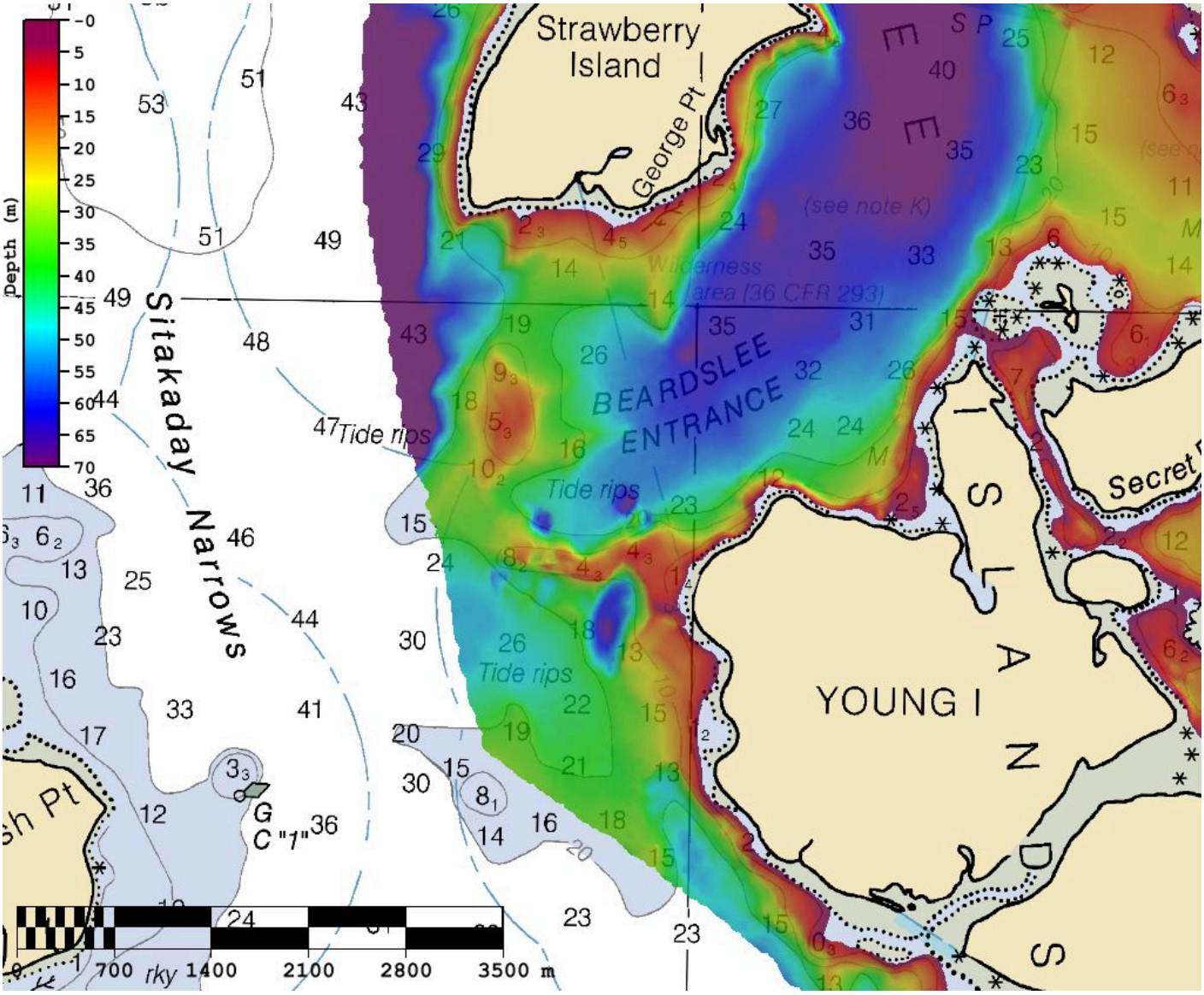


Figure 15: Multibeam sea floor coverage at the Beardslee Islands entrance where tide rips were observed during the survey.

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

A larger scale ENC would allow for safe navigation through the Beardslee Islands complex.

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
Olivia A. Hauser, CDR/NOAA	Chief of Party	07/23/2021	HAUSER.OLIVIA.ANN.1275636009 2021.07.23 14:40:49 -08'00'
Matthew B. Sharr, LT/NOAA	Field Operations Officer	07/23/2021	SHARR.MATTHEW.BRANDON.1503637126 2021.07.23 14:34:58 -08'00'
James B. Jacobson	Chief Survey Technician	07/23/2021	JACOBSON.JAMES.BRYAN.1269664017 I have reviewed this document 2021.07.23 14:53:27 -08'00'
Alice B. Beittel, ENS/NOAA	Sheet Manager	07/23/2021	Digitally signed by BEITTEL.ALICE.BROOK.1571634330 Date: 2021.07.23 14:25:22 -08'00'

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