H12968

NOAA Form 76-35A

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

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: H12968

LOCALITY

State: Alaska

General Locality: George and Carroll Inlet

Sub-locality: Approaches to George and Carroll Inlets

2016

CHIEF OF PARTY
CAPT E.J. Van Den Ameele

LIBRARY & ARCHIVES

Date:

NOAA FORM 77-28 (11-72)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET		**H12968**

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:	**Alaska**
General Locality:	**George and Carroll Inlet**
Sub-Locality:	**Approaches to George and Carroll Inlets**
Scale:	1: **20,000**
Dates of Survey:	**10/30/2016 to 11/07/2016**
Instructions Dated:	**10/12/2016**
Project Number:	**OPR-O303-RA-16**
Field Unit:	**NOAA Ship *Rainier***
Chief of Party:	**CAPT Edward J. Van Den Ameele**
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**
H-Cell Compilation Units:	***meters at Mean Lower Low Water***

Remarks:

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Any revisions to the Descriptive Report (DR) generated during office processing are shown in bold red italic text. The processing branch maintains the DR as a field unit product, therefore, all information and recommendations within the body of the DR are considered preliminary unless otherwise noted. The final disposition of surveyed features is represented in the OCS nautical chart update products. All pertinent records for this survey, including the DR, are archived at the National Centers for Envitronmental Information (NCEI) and can be retrieved via http://www.ncei.noaa.gov/.

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Descriptive Report to Accompany Survey H12968

Project: OPR-O303-RA-16

Locality: George and Carroll Inlet

Sublocality: Approaches to George and Carroll Inlets

Scale: 1:20000

October 2016 - November 2016

NOAA Ship *Rainier*

Chief of Party: Edward J. Van Den Ameele, CAPT/NOAA

A. Area Surveyed

The survey area is referred to as "Approaches to George and Carroll Inlets", referencing the body of water that splits North from Revillagigedo Channel as it nears Ketchikan from the south. The extents of H12968 were altered to include the surveyed area of H12970. These areas are outlined in Figure 1.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
55° 24' 41.17" N 131° 32' 57.71" W	55° 17' 47.89" N 131° 17' 33.18" W

Table 1: Survey Limits

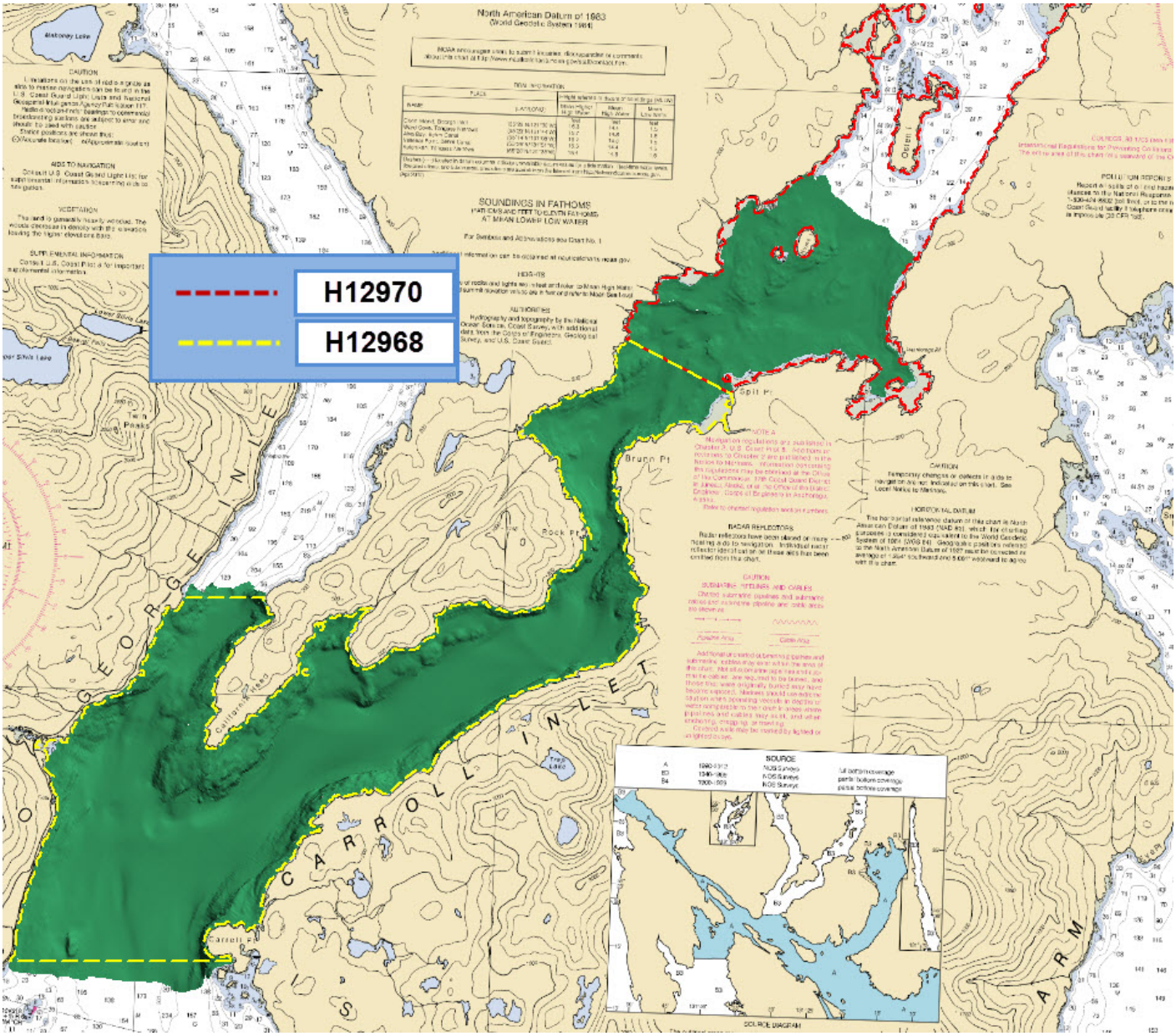


Figure 1: H12968 survey area with additional area from H12970

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

A.2 Survey Purpose

The purpose of this project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charting products in a high traffic area. This survey will cover approximately 11.12 square nautical miles (SNM), of which 30 SNM is Priority 3 area, as identified in the 2012 NOAA Hydrographic Survey Priorities.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data acquired on survey H12968 met complete multibeam coverage requirements outlined in section 5.2.2.2 of the HSSD including data density requirements. Overall the required data density was achieved in 99.5% of nodes. This was determined using the Pydro Finalized CSAR Surface Density Tool.

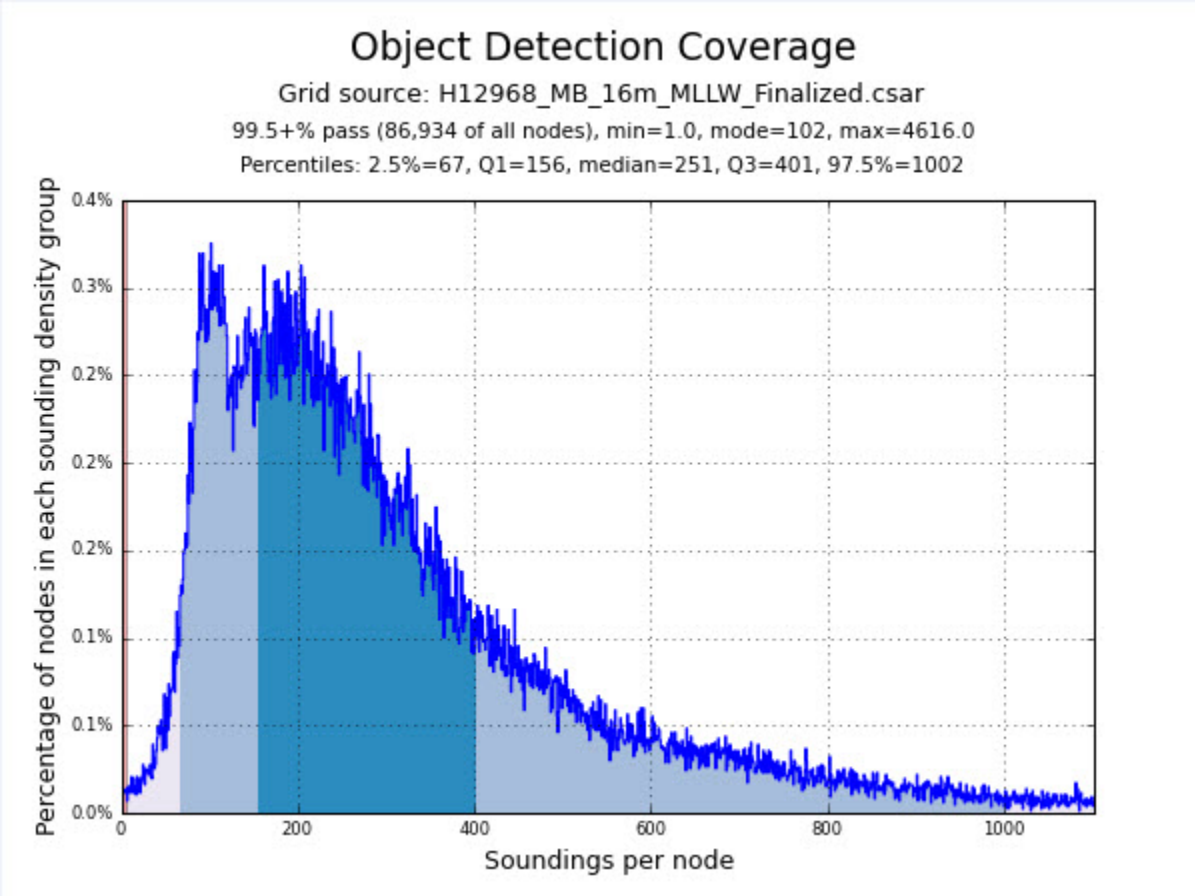


Figure 2: Pydro derived histogram plot showing HSSD compliance of H12968 MBES data within the 16-meter finalized CUBE surface

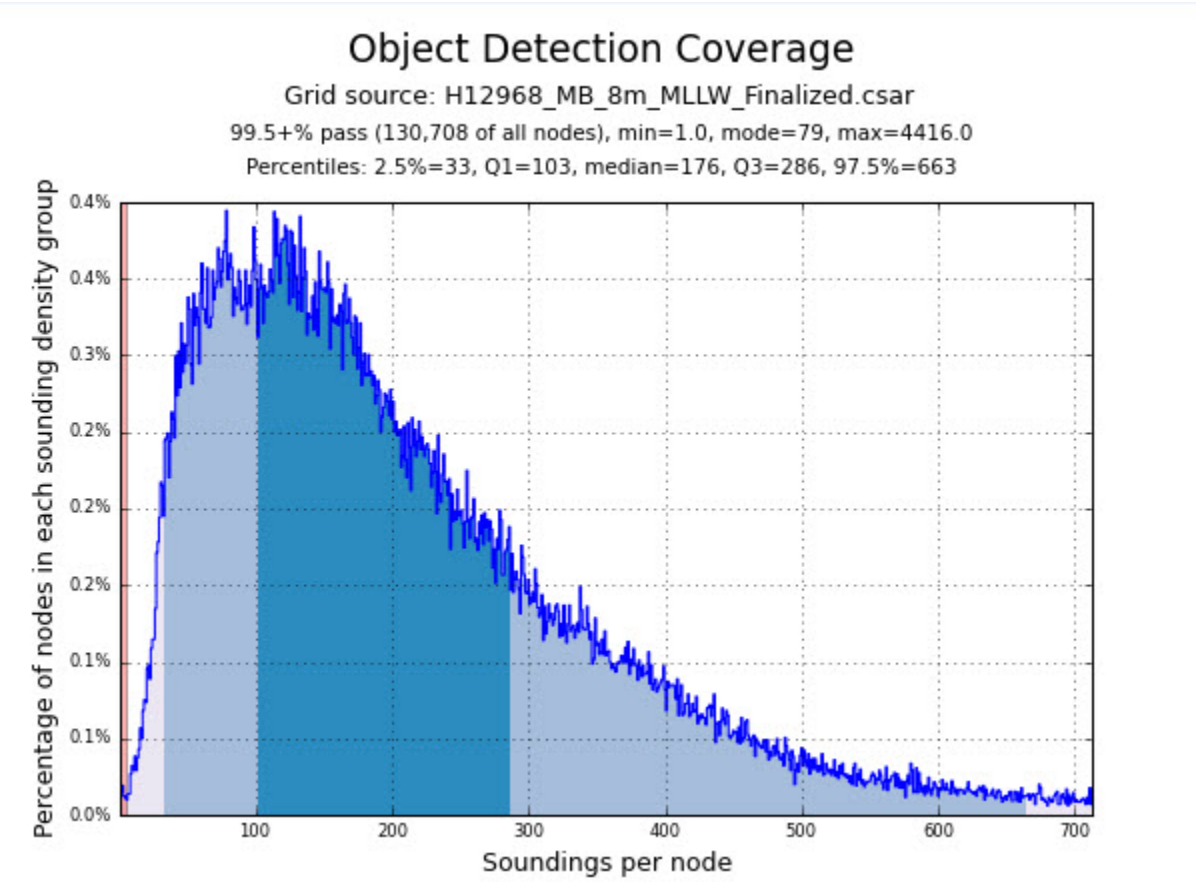


Figure 3: Pydro derived histogram plot showing HSSD compliance of H12968 MBES data within the 8-meter finalized CUBE surface

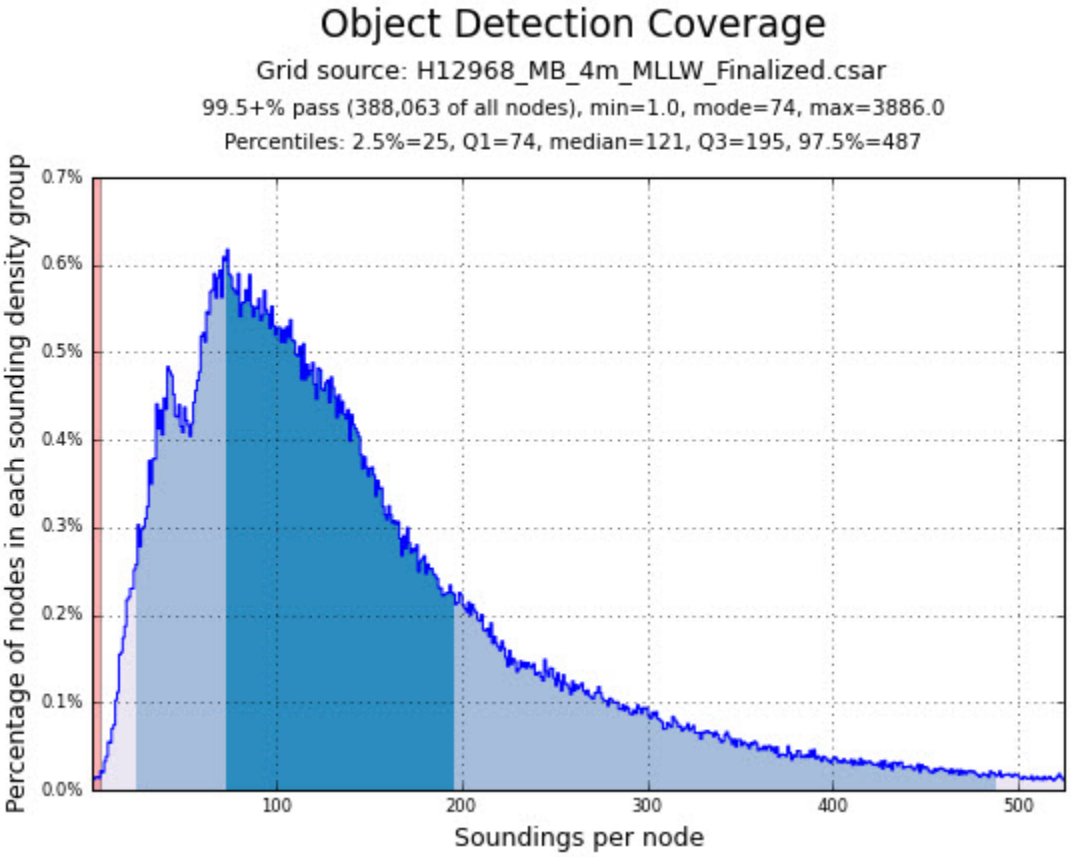


Figure 4: Pydro derived histogram plot showing HSSD compliance of H12968 MBES data within the 4-meter finalized CUBE surface

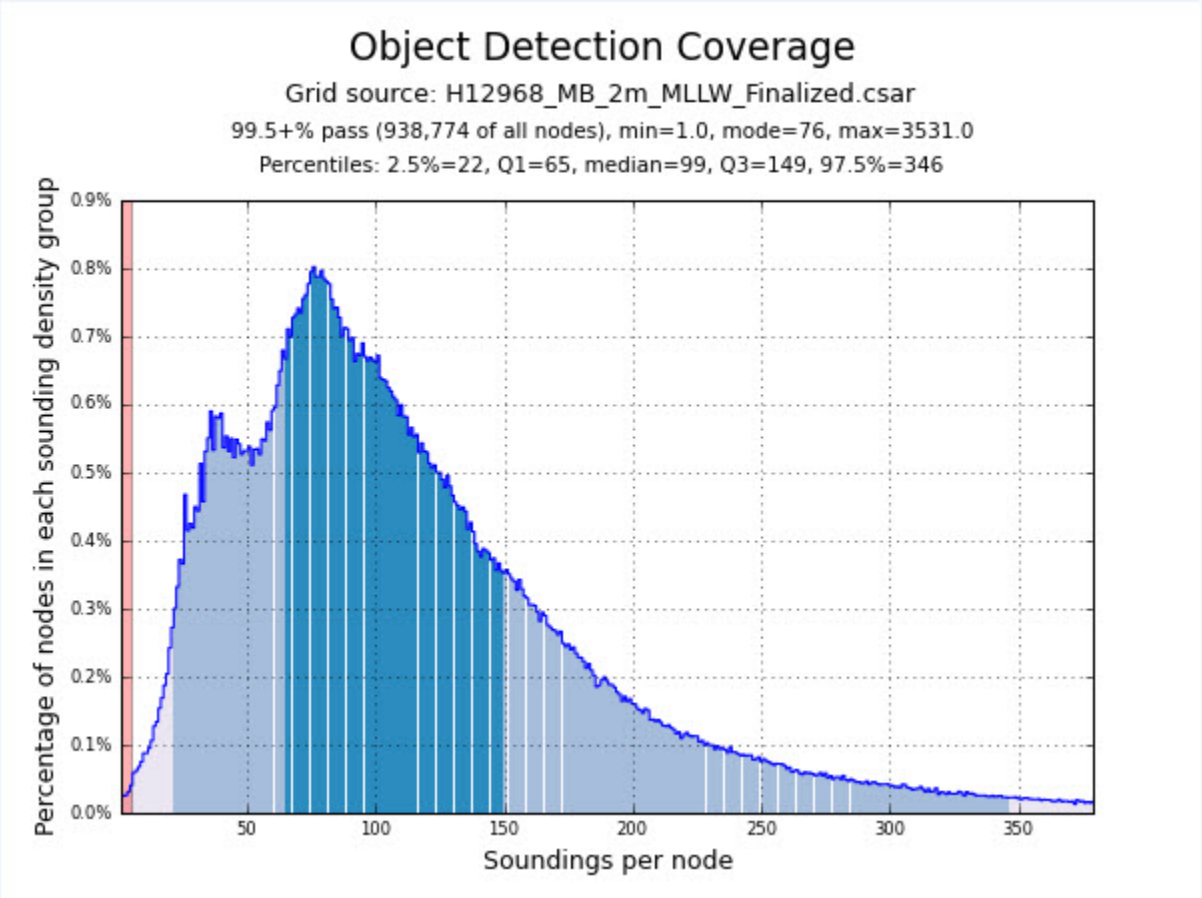


Figure 5: Pydro derived histogram plot showing HSSD compliance of H12968 MBES data within the 2-meter finalized CUBE surface

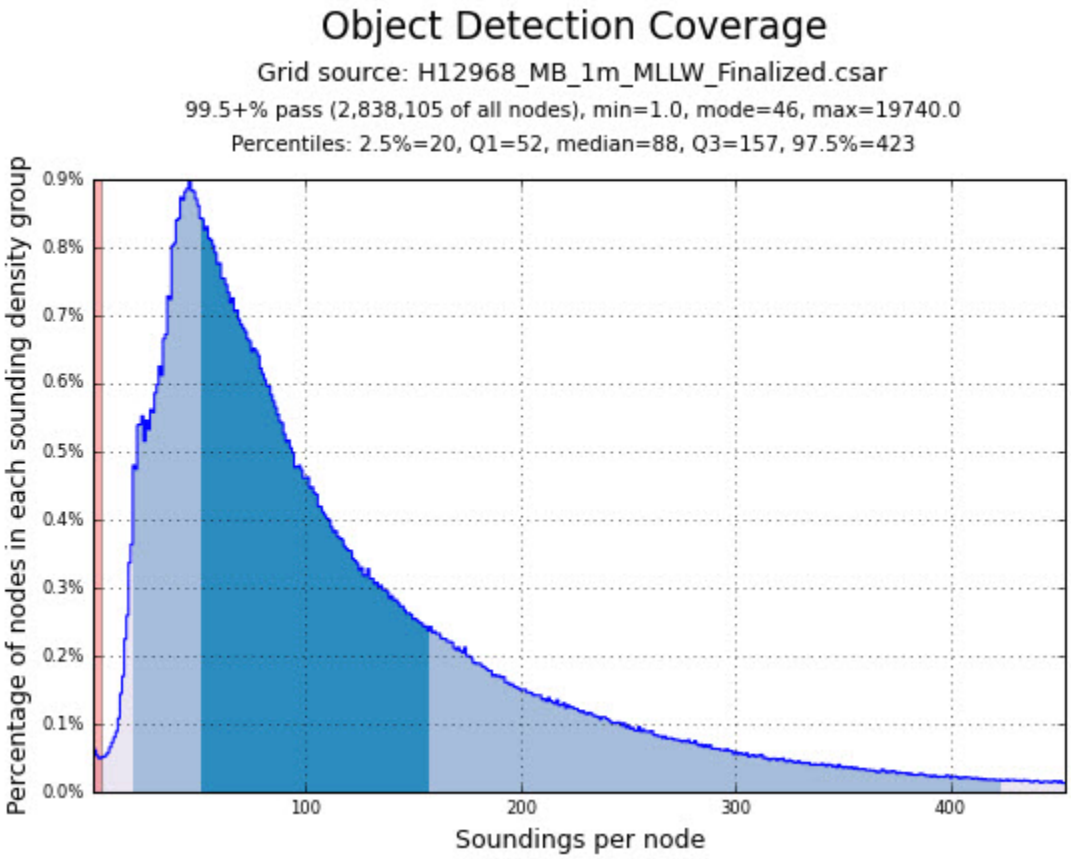


Figure 6: Pydro derived histogram plot showing HSSD compliance of H12968 MBES data within the 1-meter finalized CUBE surface

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	Complete Coverage. Refer to HSSD Section 5.2.2.3 (Option A)

Complete multibeam coverage was achieved within the limits of hydrography as defined in the project instructions except where noted below.

The nearshore slope of this survey area was extremely steep. As a result the recommended depths for the 16-meter surface grid were expanded from the normal depths (144-meter-320-meter) to (110-meter-400-meter) in an effort to achieve complete bottom coverage in accordance with HSSD 5.2.2.3 Option A: Complete Coverage Multibeam. The 16-meter surface resulted in complete coverage at depths deeper than the required grid-resolution thresholds and it was not seen as necessary to create a coarser resolution to cover these

depths, therefore a 32-meter surface was not generated. See attached supplemental correspondence for approval from HSD.

Due to the steep slopes present in nearshore areas, acoustic shadowing is present in many parts of the survey. One of these acoustic shadows is large enough to be considered a holiday and is highlighted in Figure 7.

Areas where acquired multibeam coverage did not meet the NALL or sheet limits are represented by the following images.

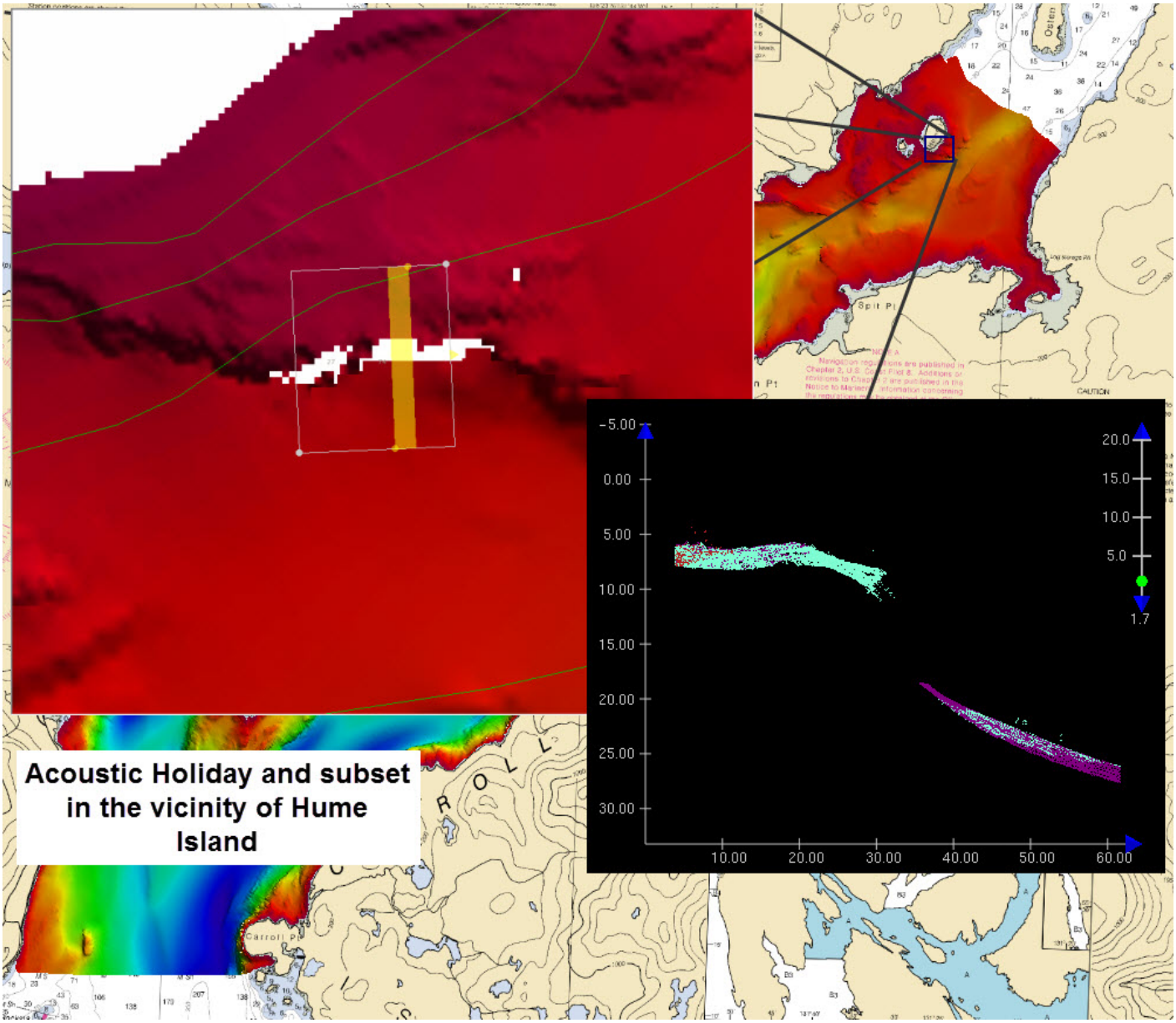


Figure 7: Acoustic holiday in the vicinity of Hume Island, Alaska.

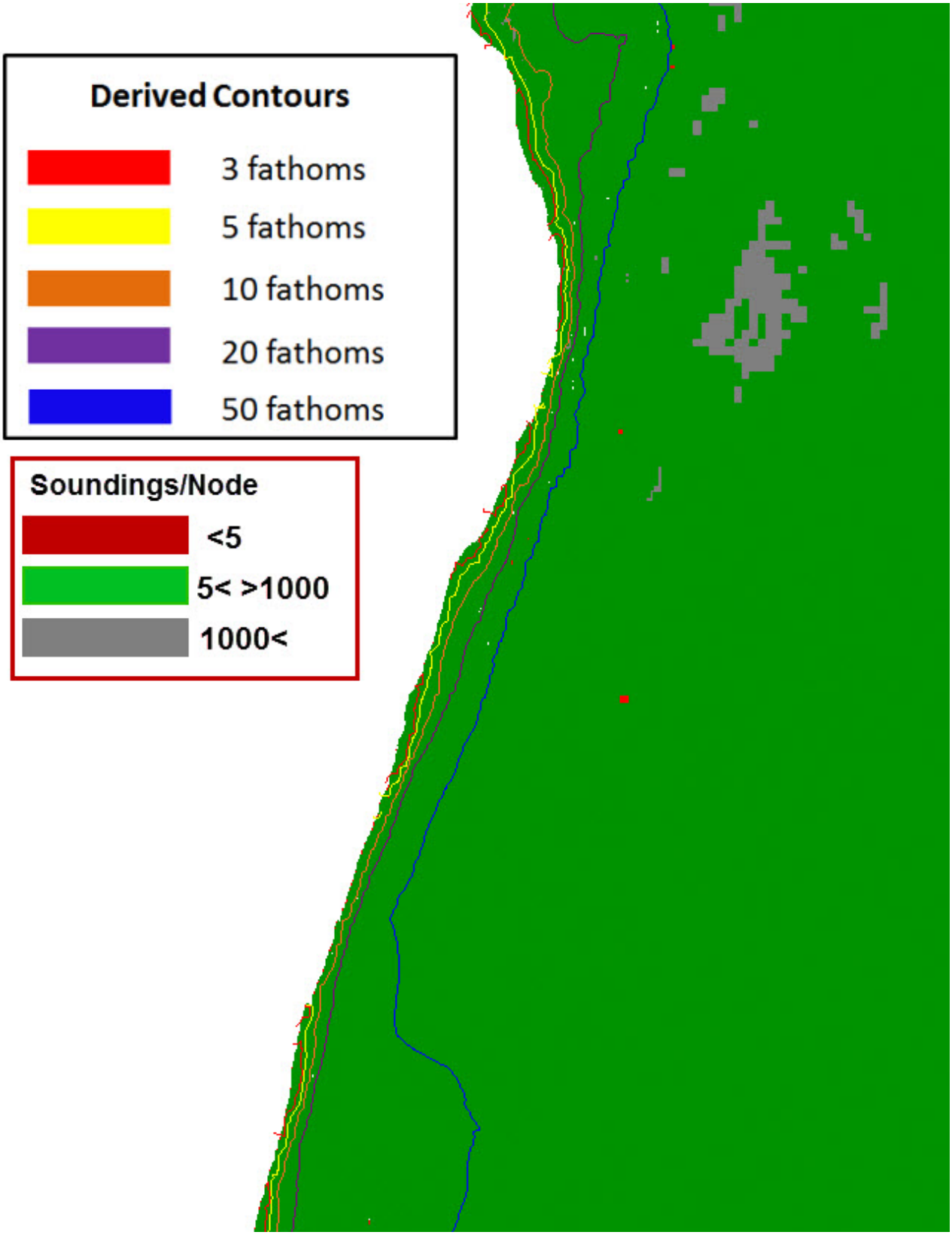


Figure 8: Image showing density coverage in steepest areas of survey are in compliance with HSSD.

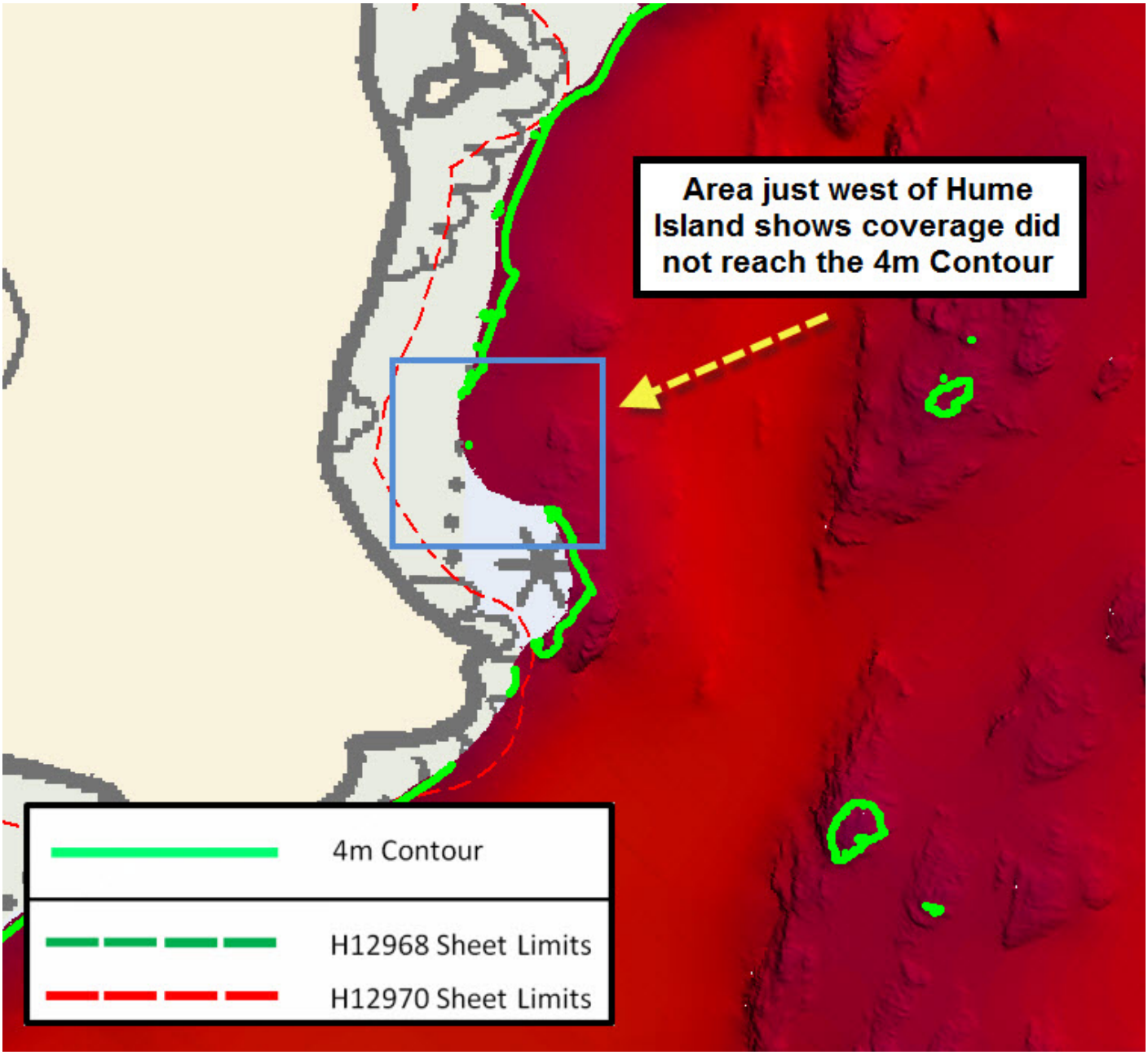


Figure 9: MBES coverage does not meet survey limits due to unsafe conditions on the shoreline west of Hume Island.

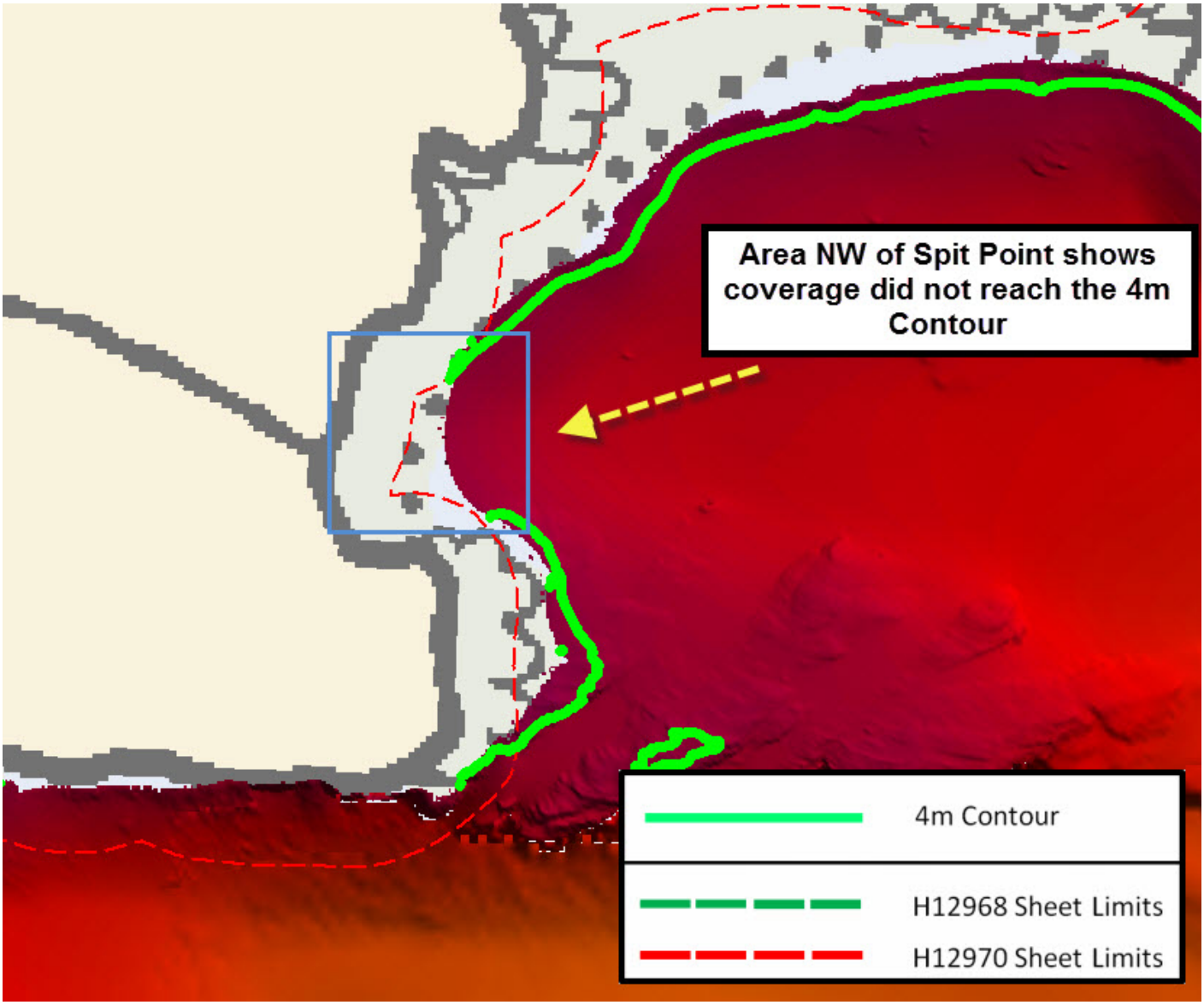


Figure 10: MBES coverage does not meet survey limits due to unsafe conditions on the shoreline NW of Spit Point.

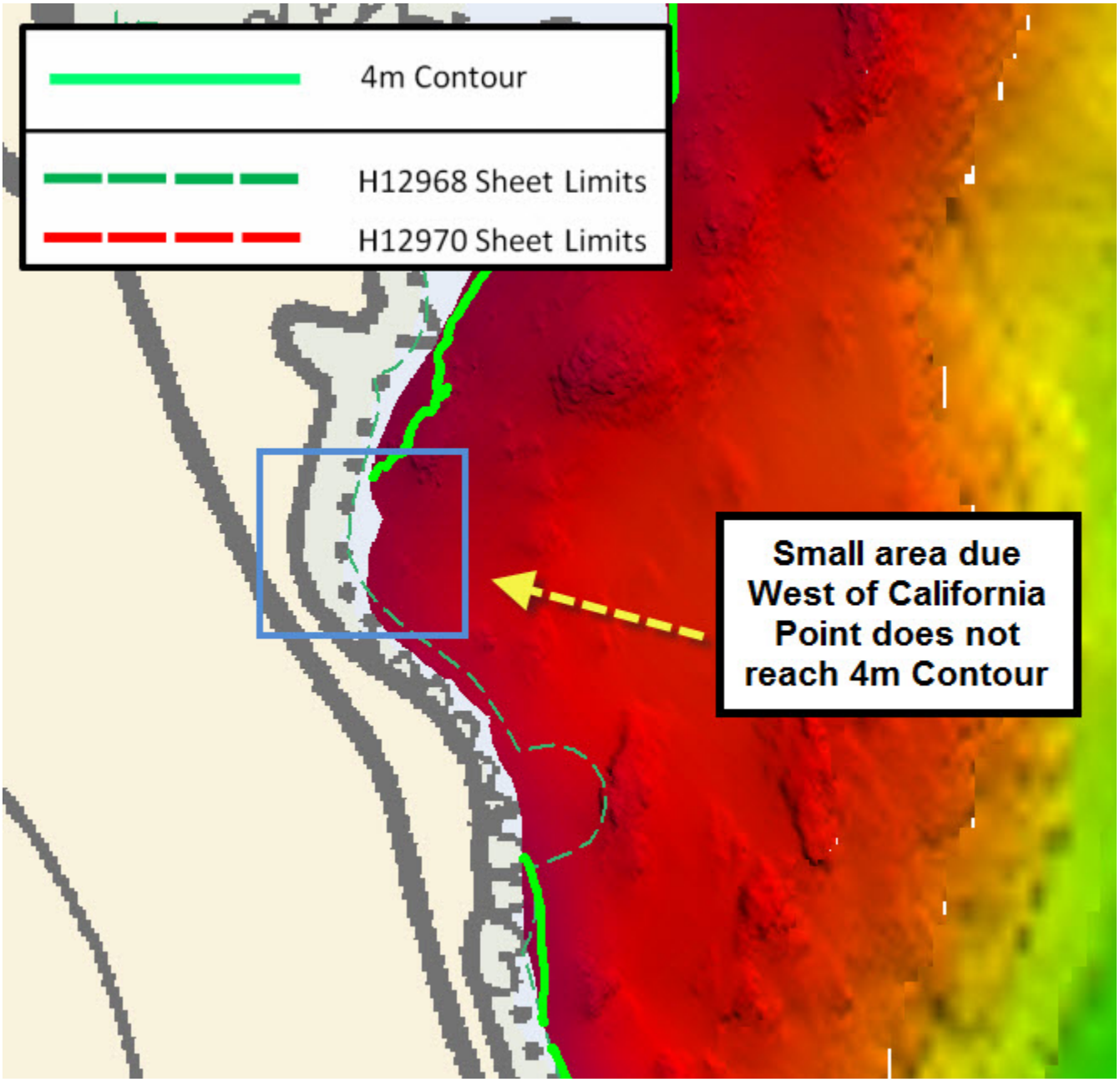


Figure 11: MBES coverage does not meet survey limits due to unsafe conditions on the shoreline west of California Point.

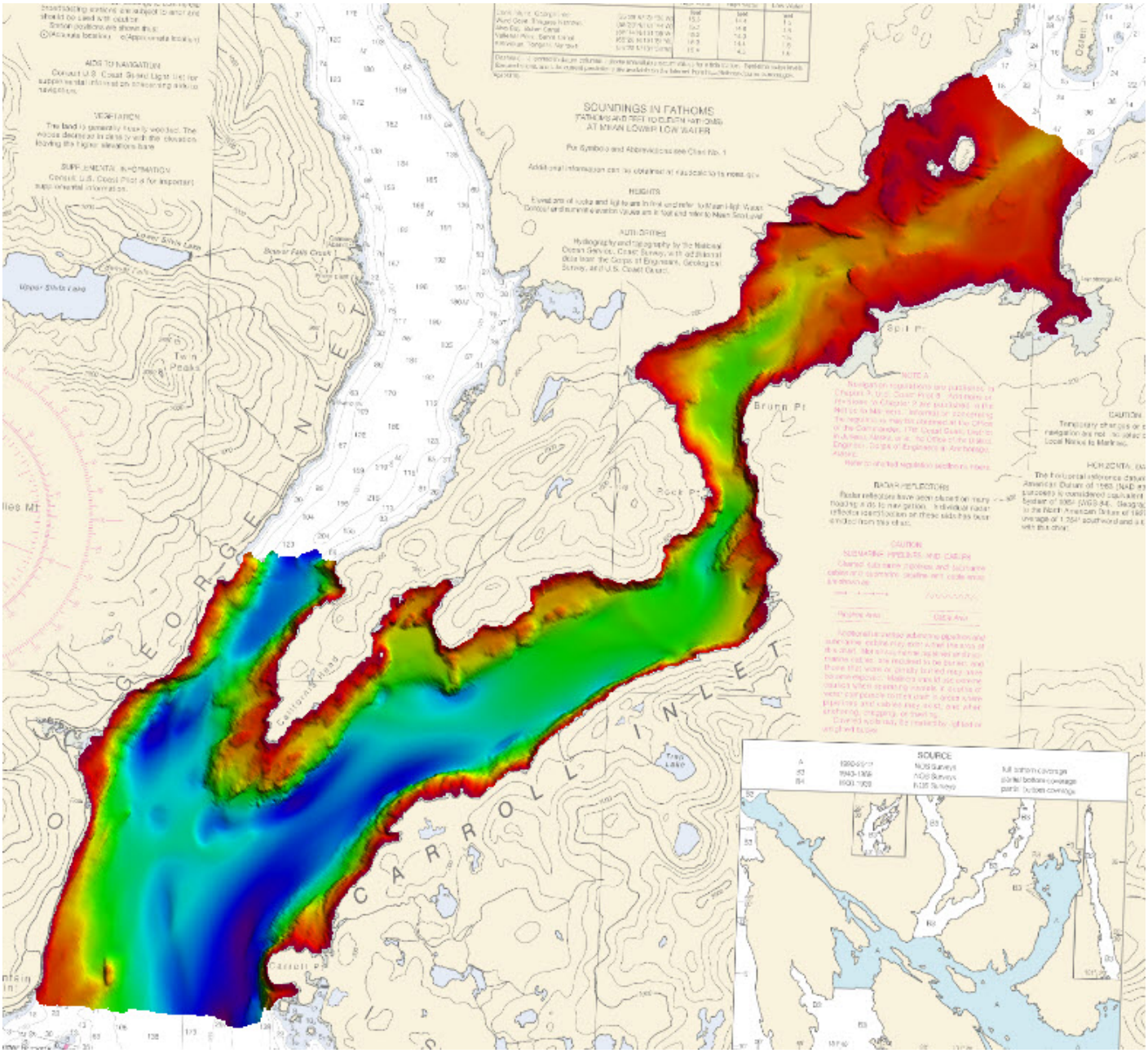


Figure 12: H12968 MBES coverage overlay on Chart 17428.

A.5 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	51.92	59.20	72.89	8.06	192.07
	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	20.45	0	3.77	0	24.22
	Lidar Crosslines	0	0	0	0	0
Number of Bottom Samples						3
Number Maritime Boundary Points Investigated						0
Number of DPs						63
Number of Items Investigated by Dive Ops						0
Total SNM						11.12

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
10/28/2016	302
10/29/2016	303

Survey Dates	Day of the Year
10/31/2016	305
11/01/2016	306
11/02/2016	307
11/05/2016	310
11/06/2016	311
11/07/2016	312

Table 3: Dates of Hydrography

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

The survey LNM statistics were incorrect for each vessel. The main scheme data and the cross line data were corrected with the correct values in the above table.

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*	*1905*	*1906*
LOA	8.8 meters	8.8 meters	8.8 meters	8.8 meters	5.7 meters	5.8 meters
Draft	1.1 meters	1.1 meters	1.1 meters	1.1 meters	0.35 meters	0.33 meters

Table 4: Vessels Used

All data for H12968 were acquired by survey launches (2801, 2802, 2803, and 2804) and skiffs (1905, and 1906). The launches acquired MBES depth soundings, sound speed profiles, backscatter, and bottom samples. The skiffs conducted shoreline verification.

B.1.2 Equipment

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

Manufacturer	Model	Type
Applanix	POS MV v5	Positioning and Attitude System
Sea-Bird Electronics	SBE 19plus SEACAT Profiler	Conductivity, Temperature, and Depth Sensor
Reson	SeaBat 7125-B	MBES
Reson	SeaBat 7125-SV2	MBES
Reson	SVP 71	Sound Speed System

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines acquired for this survey totaled 12.61% of mainscheme acquisition.

Multibeam crosslines were acquired using the Reson 7125 on Launch 2801 (RA-4). A 4m CUBE surface was created using only mainscheme lines, a second 4m CUBE surface was created using only crosslines, and a difference surface was generated in CARIS at a 4m resolution. This difference surface was compared to the IHO allowable total vertical uncertainty (TVU) standards. In total 97.2% of the depth differences between H12968 mainscheme and crossline data met HSSD TVU standards. This analysis was performed on H12968 data reduced to Mean Lower-Low Water (MLLW) using Ellipsoidally Referenced Zone Tides (ERZT) methods.

The southern portion of H12970 that was added to H12968 includes crosslines that were run in anticipation of being covered by future mainscheme lines. Due to time constraints at the end of the season, mainscheme covereage was not obtained over two of these crosslines. These lines, XL_2803_2016_3102228 and XL_2803_2016_3102237, are included in the submitted HDCS data but are not included in the delivered surfaces nor included when calculating XL comparison statistics.

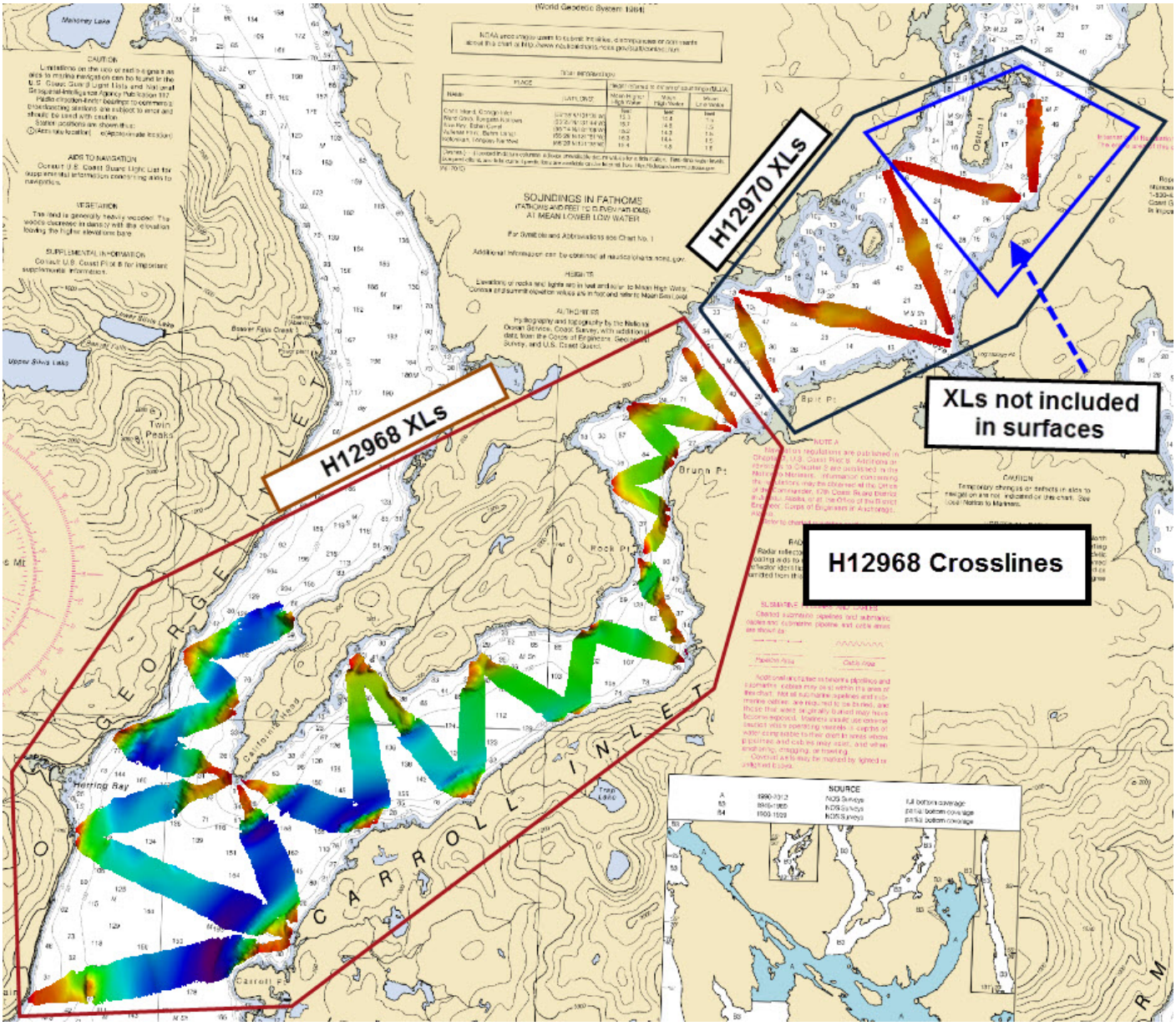


Figure 13: H12968 Crosslines. Note break in crossline coverage near Spit Point. This is where H12968 and H1270 were joined to create the current sheet.

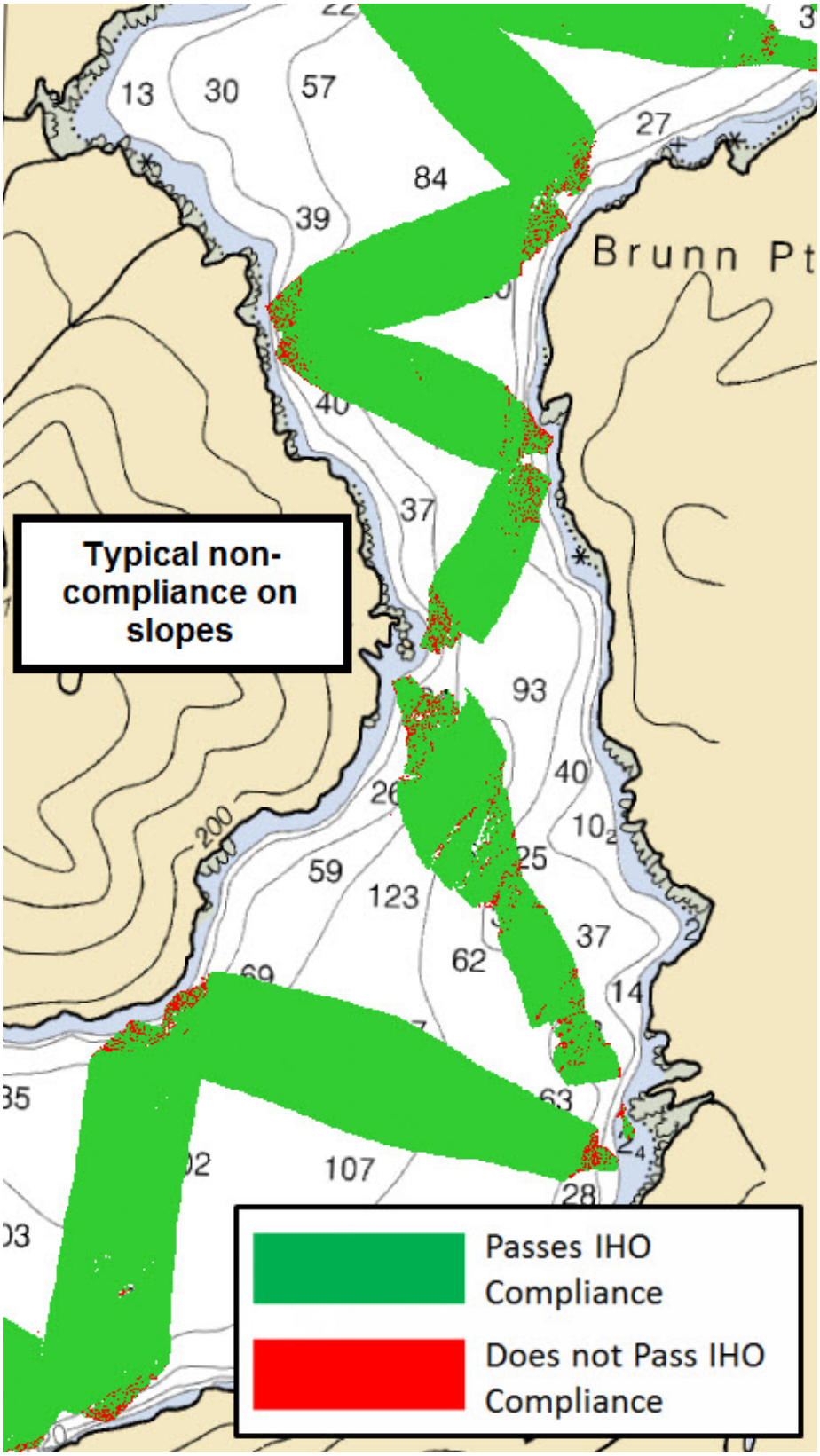


Figure 14: Non-Compliance in H12968 XL IHO Order 1 Compliance on the steepest slopes of the survey.

Crossline IHO-compliance Statistics (see previous tabs)				
Depth range	IHO Order	Number of nodes	Nodes satisfying HSSD accuracy	Percent nodes satisfying HSSD accuracy
Less than 100m	Order 1	141,388	132,059	93.40%
Greater than 100m	Order 2	671,190	665,240	99.11%
	TOTAL:	812,578	797,299	98.12%

Figure 15: Summary table indicating the percentage of difference surface nodes between H12968 mainscheme and crossline ERZT data that met HSSD allowable TVU standards.

Lines XL_2803_2016_3102228 and XL_2803_2016_3102237 were removed from the HDCS data.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning	Method
0 meters	0.02575 meters	ERS via ERZT

Table 6: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Surface
2801, 2802, 2803, 2804	3.0 meters/second		0.15 meters/second

Table 7: Survey Specific Sound Speed TPU Values.

Total Propagated Uncertainty (TPU) values for H12968 were derived from a combination of fixed values for equipment and vessel characteristics, as well as field assigned values for sound speed uncertainties. Tidal uncertainties were accounted for by examining the created 1000-meter separation model and statistically determining the measured uncertainty. The measured tide uncertainty of 0.02575 meters was entered into CARIS TPU tide zoning uncertainty to account for ERZT processing methods. See the OPR-O303-RA-16 ERZT memo included in Supplemental Correspondence for further information.

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 from Reson

MBES sonars were recorded and applied during post processing. Applanix TrueHeave (POS) files, which record estimates of heave uncertainty were also applied during post processing. Finally, the post processed uncertainties associated with vessel roll, pitch, yaw, and navigation were applied in CARIS HIPS using SBET/RMS files generated using POSPac software.

Uncertainty values of submitted final grids were calculated in CARIS using the "Greater of the Two" of uncertainty and standard deviation (scaled to 95%). The finalized CARIS IHO compliance tool within Pydro was used to analyze H12968 MBES. The results showed that more than 97% of H12968 nodes across all depth ranges met HSSD TVU uncertainty requirements: 1-meter, 2-meter, 4-meter, 8-meter, and 16-meter surfaces each obtained 95% or greater pass rates.

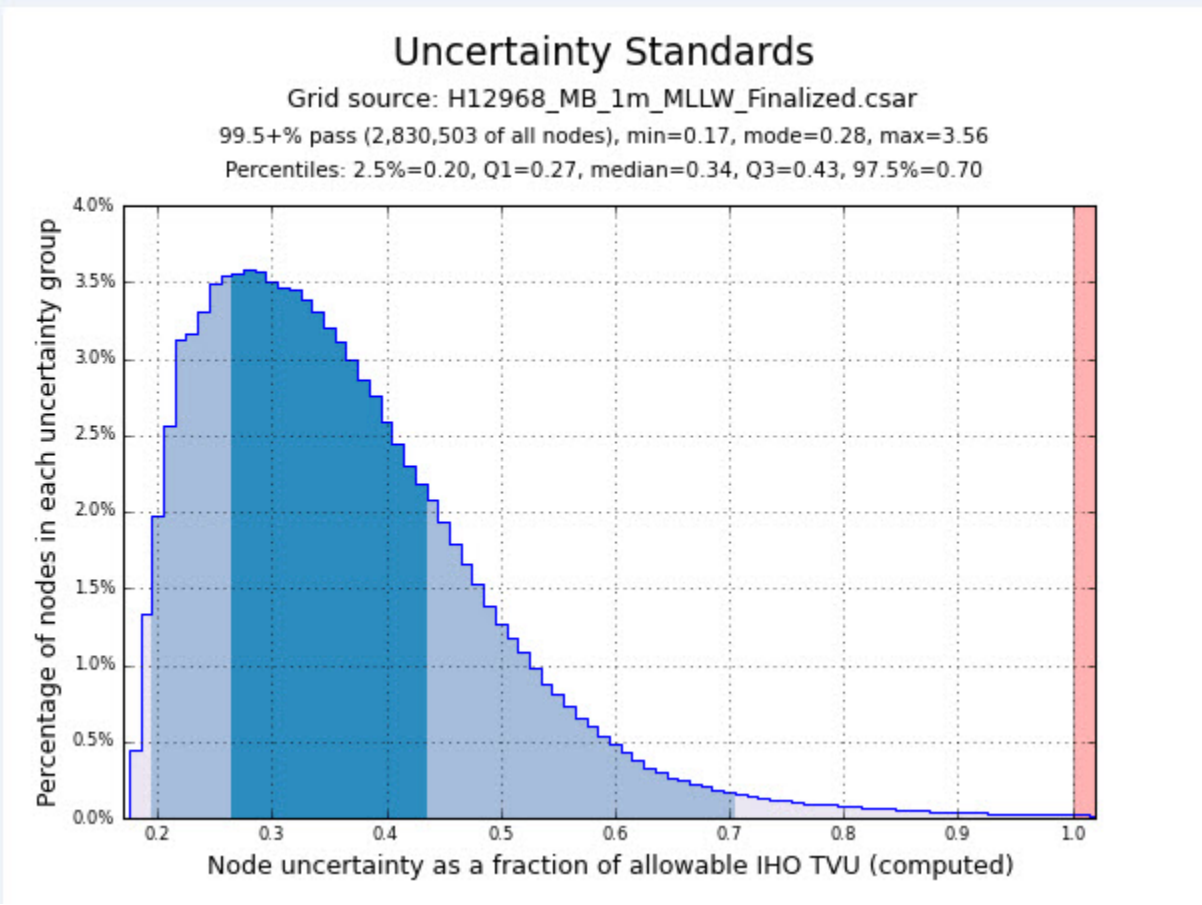


Figure 16: 1-meter finalized surface meets HSSD uncertainty standards.

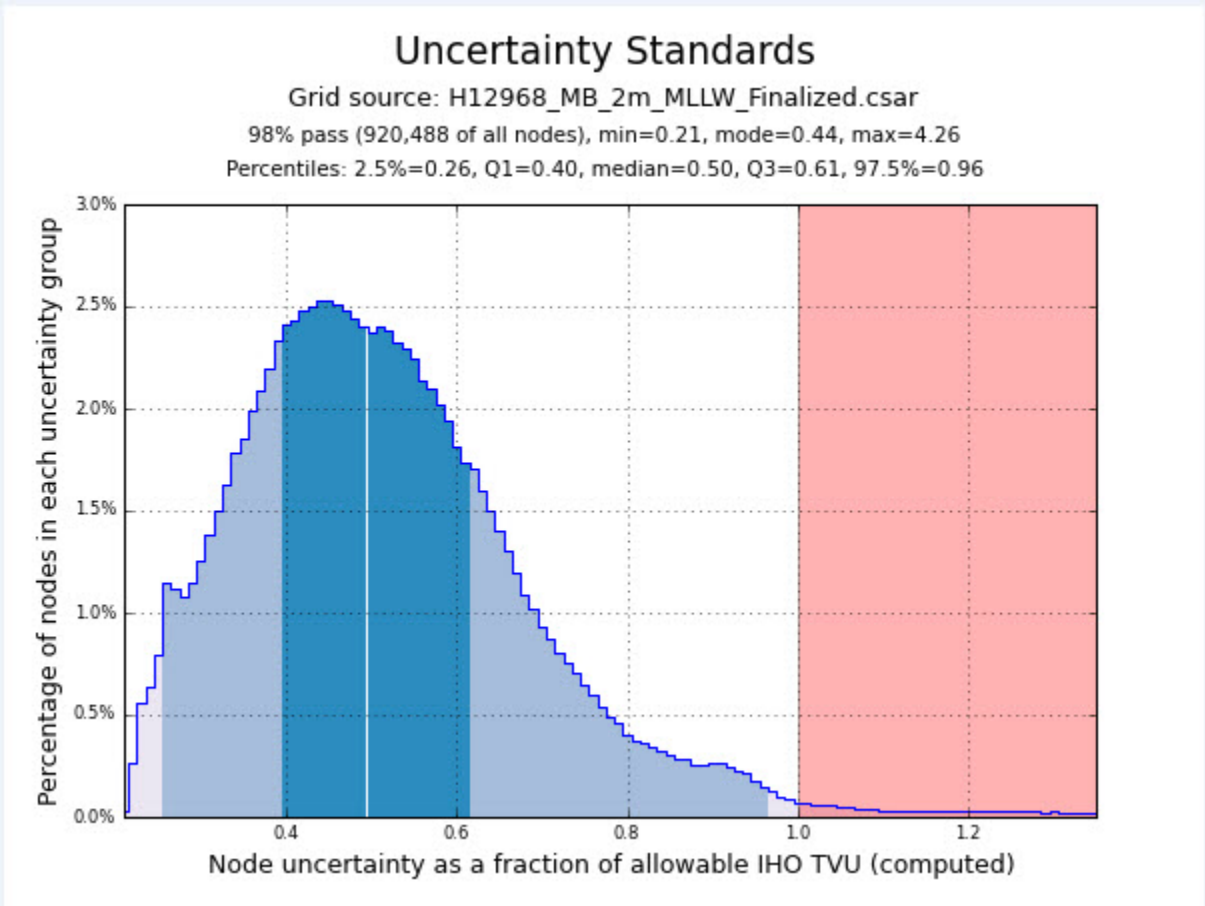


Figure 17: 2-meter finalized surface meets HSSD uncertainty standards.

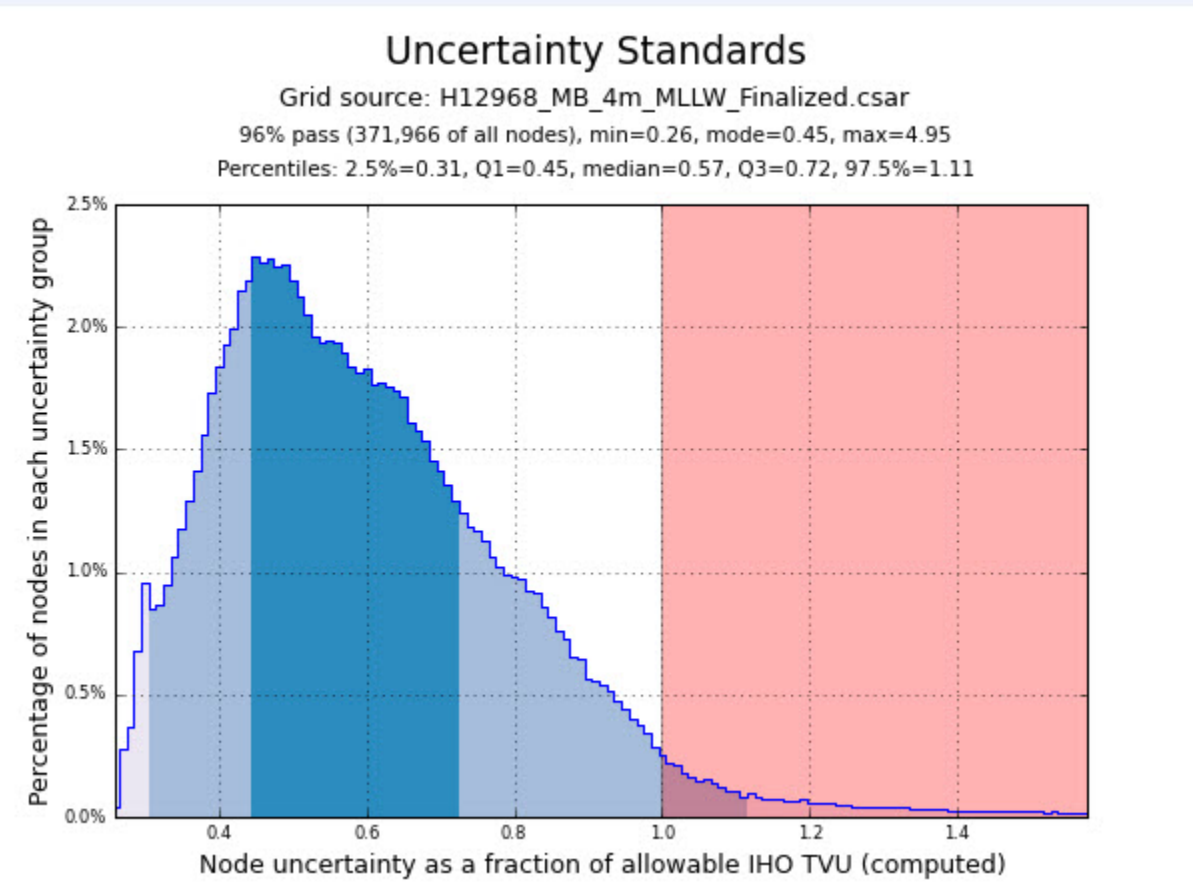


Figure 18: 4-meter finalized surface meets HSSD uncertainty standards.

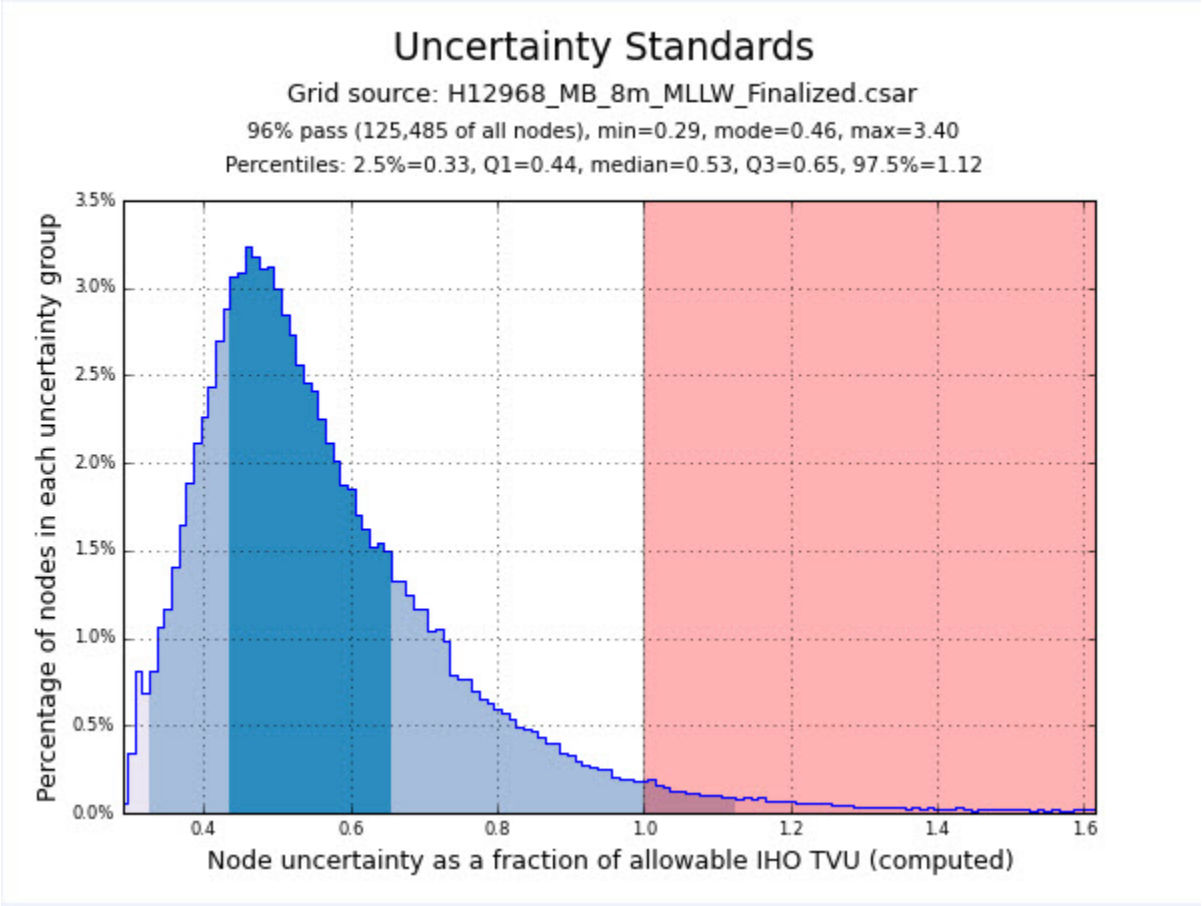


Figure 19: 8-meter finalized surface meets HSSD uncertainty standards.

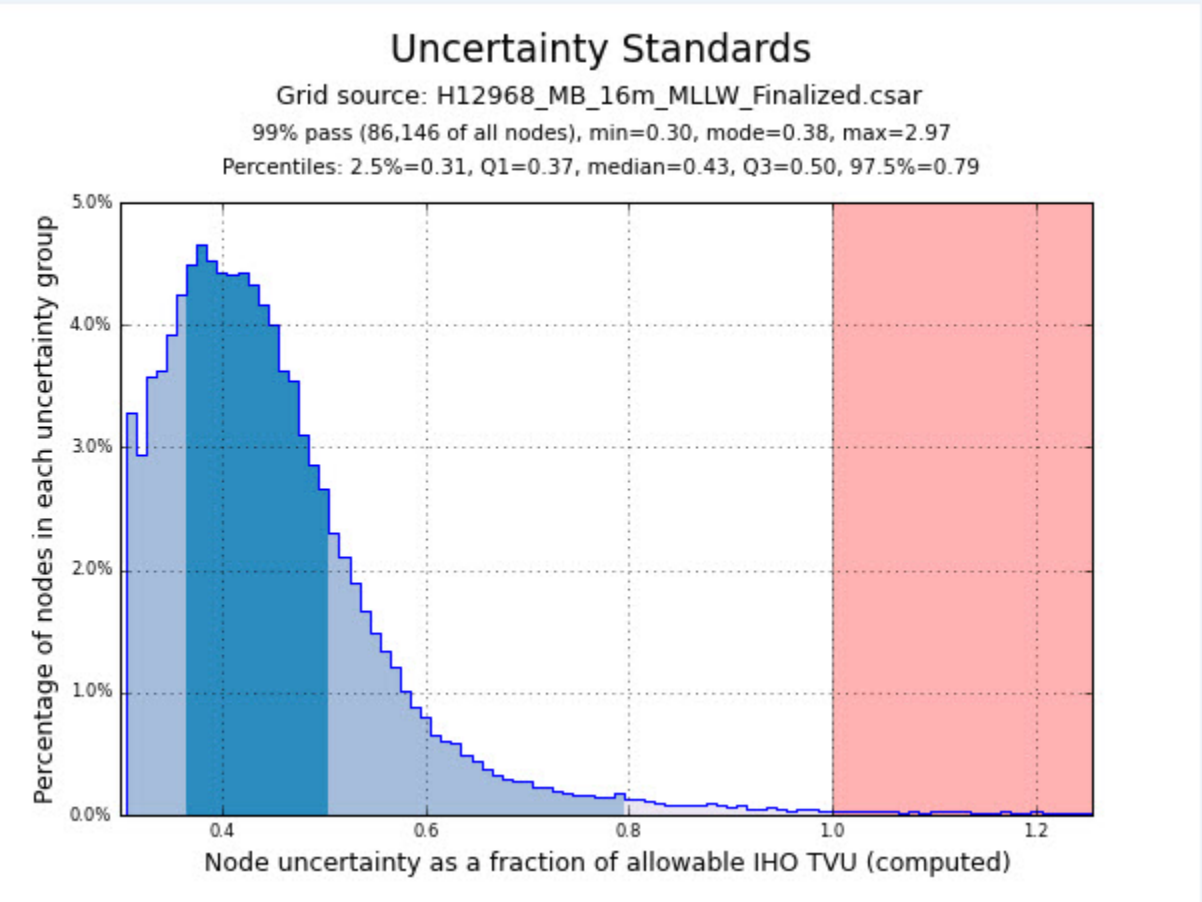


Figure 20: 16-meter finalized surface meets HSSD uncertainty standards.

B.2.3 Junctions

Three surveys junction with survey H12968, surveys H11009 and H12224 to the south are discussed in this DR, and the junction with H12968 to the north is discussed in its respective Descriptive Report.

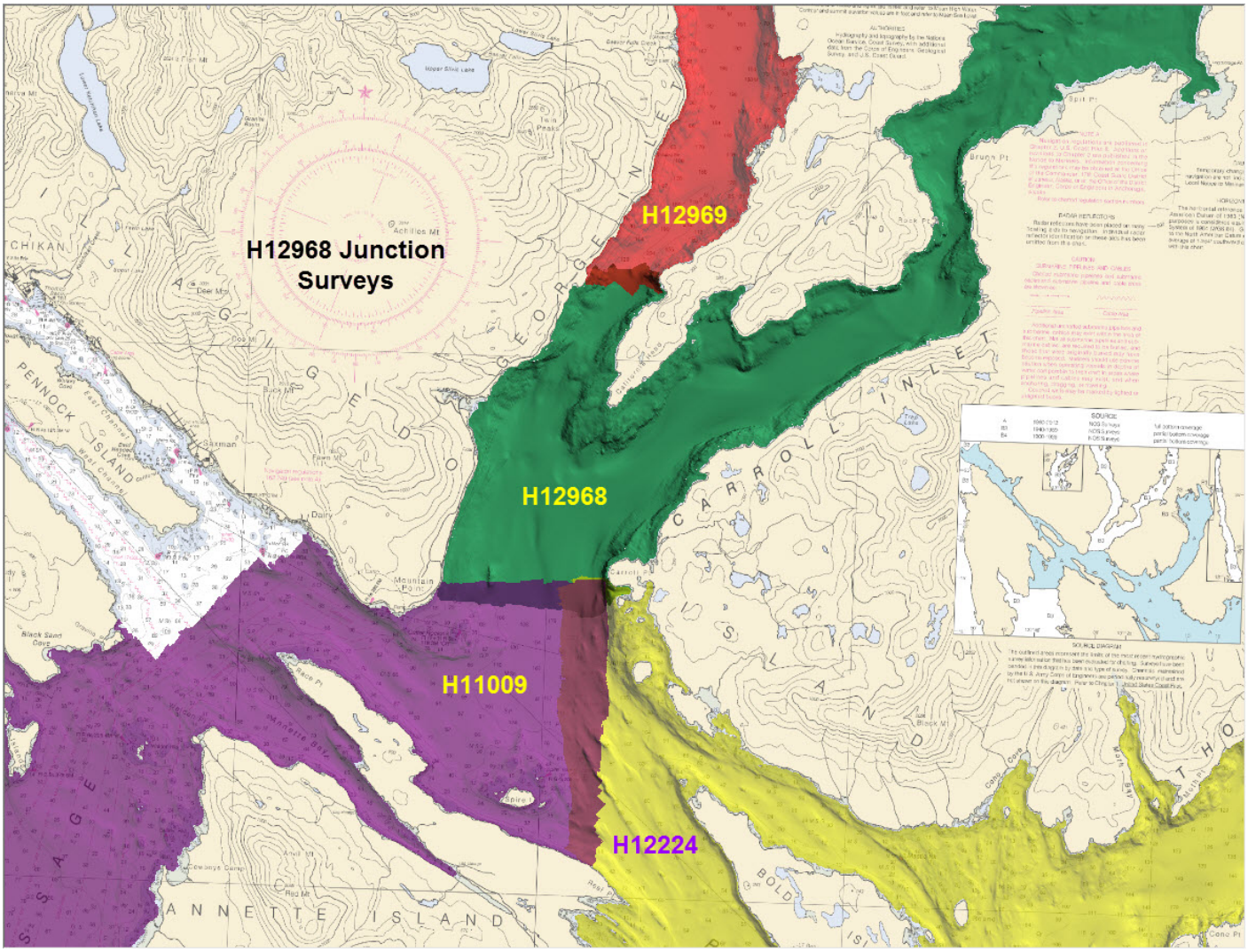


Figure 21: H12968 with corresponding Junction Surfaces

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H11009	1:10000	2000	Terrasond, Ltd.	S
H12224	1:20000	2010	NOAA Ship FAIRWEATHER	S

Table 8: Junctioning Surveys

H11009

Overlap with surveys H11009 is approximately 2900-meters wide along the Southern boundary of H12968 (Figure 23). Depths at the junction range from -3 to 380-meters. For the respective depths, the difference

surface was compared to the allowable TVU standards specified in the HSSD. 77.72% of the depth differences between H12968 and H12224 are within allowable uncertainties. It should be noted that much of the uncertainty in this junction is believed to be a result of only having a 16-meter resolution surface to compare H12968 data to.

Junction IHO-compliance Statistics (see previous tabs)

Depth range	IHO Order	Number of nodes	Nodes satisfying HSSD accuracy	Percent nodes satisfying HSSD accuracy
Less than 100m	Order 1	896	377	42.08%
Greater than 100m	Order 2	1,940	1,827	94.18%
	TOTAL:	2,836	2,204	77.72%

Figure 22: Summary table indicating the percentage of nodes from the junction overlap with H11009 that met HSSD allowable TVU standards.

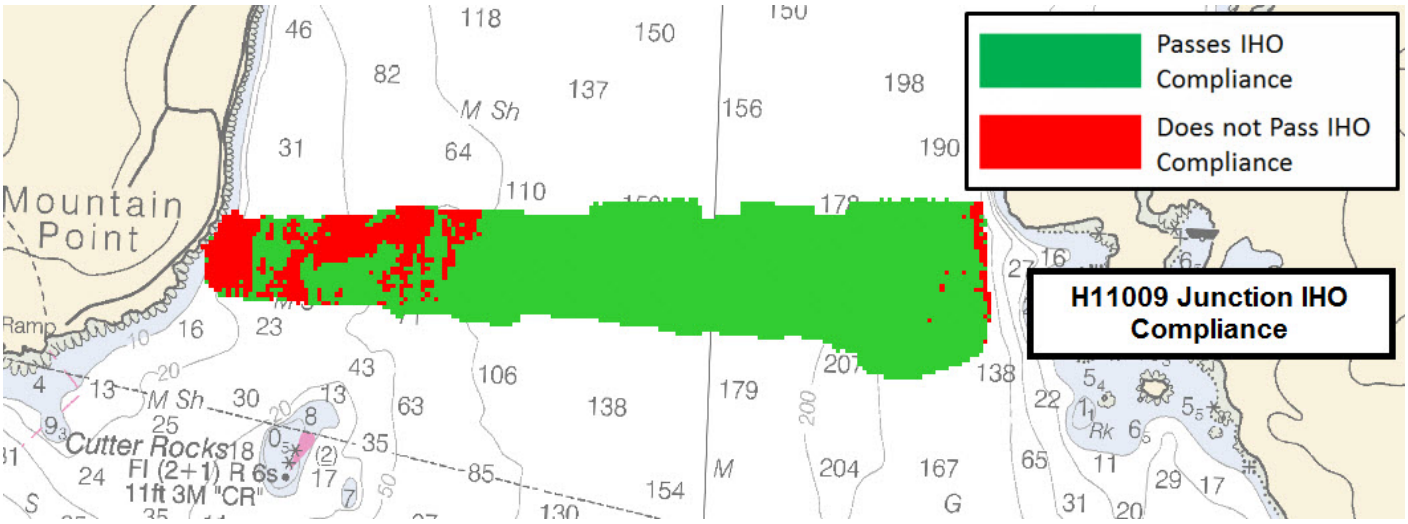


Figure 23: Area of HSSD non compliance with the junction survey H11009.

H12224

Overlap with surveys H12224 is approximately 1240-meters wide along the souther boundary of H12968 (Figure 25). Depths at the junction range from -3 to 380-meters. For the respective depths, the difference surface was compared to the allowable TVU standards specified in the HSSD. 84.25% of the depth difference between H12968 and H11009 are within allowable uncertainties.

Junction IHO-compliance Statistics (see previous tabs)				
Depth range	IHO Order	Number of nodes	Nodes satisfying HSSD accuracy	Percent nodes satisfying HSSD accuracy
Less than 100m	Order 1	295	56	18.98%
Greater than 100m	Order 2	1,940	1,827	94.18%
	TOTAL:	2,235	1,883	84.25%

Figure 24: Summary table indicating the percentage of nodes from the junction overlap with H12224 that met HSSD allowable TVU standards.

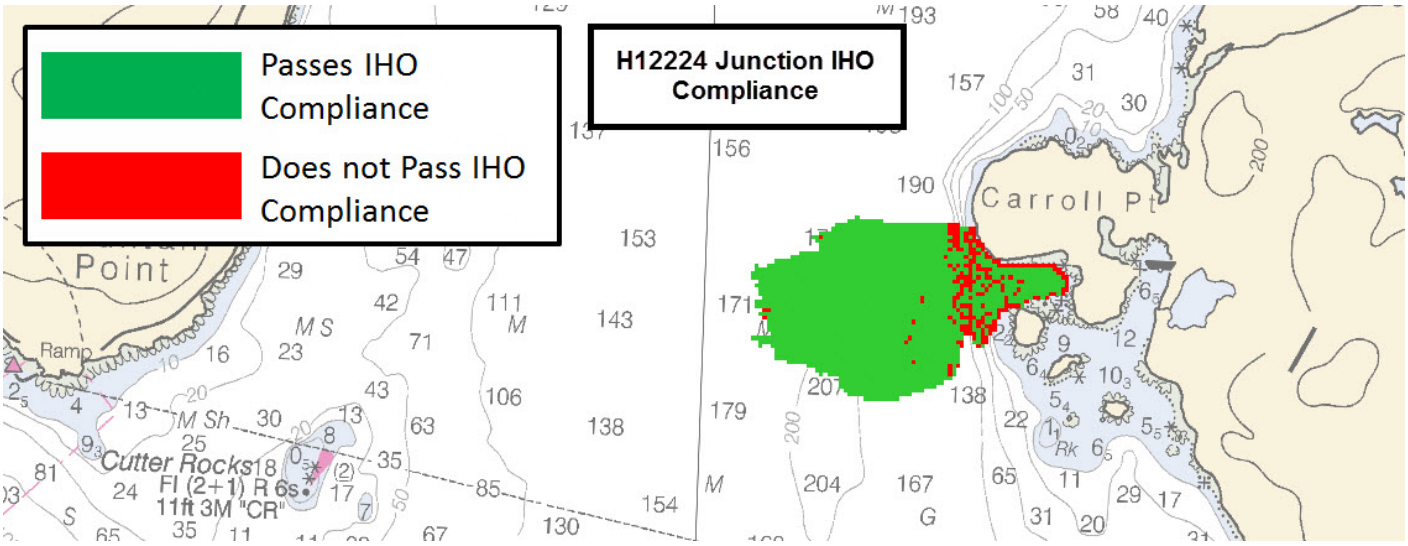


Figure 25: Area of HSSD non compliance with the junction survey H12224.

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: Sound speed profiles were acquired using the SBE 19plus probes at discrete locations within the survey area at least once every four hours, when significant changes in surface speed were observed, or when surveying a new area. A sheet-wide concatenated sound speed file was created using all 38 casts and applied to survey lines using the "Nearest in distance and time (4 hours)" profile selection 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 as a 7k file and has been sent to the Processing Branch. Backscatter was not processed by the field unit.

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/SIPS	9.1.7

Table 9: Primary bathymetric data processing software

The following Feature Object Catalog was used: NOAA Profile V_5_0

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
H12968_MB_16m_MLLW_Final	CUBE	16 meters	110 meters - 378.58 meters	NOAA_16m	Complete MBES
H12968_MB_16m_MLLW	CUBE	16 meters	-1.18 meters - 378.58 meters	NOAA_16m	Complete MBES
H12968_MB_8m_MLLW_Final	CUBE	8 meters	72 meters - 160 meters	NOAA_8m	Complete MBES
H12968_MB_8m_MLLW	CUBE	8 meters	-1.35 meters - 378.58 meters	NOAA_8m	Complete MBES
H12968_MB_4m_MLLW_Final	CUBE	4 meters	36 meters - 80 meters	NOAA_4m	Complete MBES
H12968_MB_4m_MLLW	CUBE	4 meters	-1.51 meters - 391.75 meters	NOAA_4m	Complete MBES
H12968_MB_2m_MLLW_Final	CUBE	2 meters	18 meters - 40 meters	NOAA_2m	Complete MBES
H12968_MB_2m_MLLW	CUBE	2 meters	-1.94 meters - 391.75 meters	NOAA_2m	Complete MBES
H12968_MB_1m_MLLW_Final	CUBE	1 meters	-1.97 meters - 20 meters	NOAA_1m	Complete MBES
H12968_MB_1m_MLLW	CUBE	1 meters	-1.97 meters - 440.63 meters	NOAA_1m	Complete MBES

Table 10: 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.

Traditional Methods Used:

Discrete Zoning

The following National Water Level Observation Network (NWLON) stations served as datum control for this survey:

Station Name	Station ID
Ketchikan	9450460

Table 11: NWLON Tide Stations

There was no Water Level file associated with this survey.

File Name	Status
O303RA2016CORP.zdf	Final
9450460.tid	Final

Table 12: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 11/17/2016. The final tide note was received on 01/14/2017.

A request for final tides was sent to CO-OPS on 11/17/2016. The final tide note was received on 12/14/2016. Features addressed during shoreline verification were tidally adjusted using the final water levels and tide zones.

ERS Methods Used:

ERS via ERZT

Ellipsoid to Chart Datum Separation File:

H12968_NAD83_MLLW_SEP_1000m

Ellipsoidally-Referenced Zoned Tides (ERZT) methods were used to transform between the ellipsoid and water level data. A 1000-meter resolution separation model between the ellipsoid and MLLW was computed using the real-time position measurements observed during the survey relative to the water line and the loaded TCARI tide file. "GPS tides" were then computed using the above separation model and the corrected GPS-height-to-water-level data (SBET). The 1000-meter resolution separation model was generated in NAD83 Hydrographic Technical Directives (HTD) guidance. For additional information see the OPR-O303-RA-16 ERS Compatibility Memo included with the supplemental correspondence.

C.2 Horizontal Control

The horizontal datum for this project is North American Datum of 1983 (NAD83).

The projection used for this project is Universal Transverse Mercator (UTM) Zone 9 North.

The following PPK methods were used for horizontal control:

Single Base

On DN 309 Rainier's Base Station "Martinview" experienced a power failure. Lines on DNs 310 through 212 used horizontal control data from Fairweather's Base Station "Elmo" to generate Smoothed Best Estimate Trajectories (SBETs). WAAS acted as the real-time horizontal control source for launches during survey operations. For more information see the project's HVCR.

The following user installed stations were used for horizontal control:

HVCR Site ID	Base Station ID
9715	Martinview
9375	Elmo_FA

Table 13: User Installed Base Stations

D. Results and Recommendations

D.1 Chart Comparison

Chart comparisons were made using a CARIS sounding and contour layer derived from a 4 meter combined CUBE surface. The contours and soundings were overlaid on the charts and compared for general agreement and to identify areas of significant change. Chart 17428 demonstrates general agreement except in the areas identified in the figures included.

D.1.1 Raster Charts

The following are the largest scale raster charts, which cover the survey area:

Chart	Scale	Edition	Edition Date	LNM Date	NM Date
17428	1:40000	12	06/2015	07/19/2016	07/23/2016

Table 14: Largest Scale Raster Charts

17428

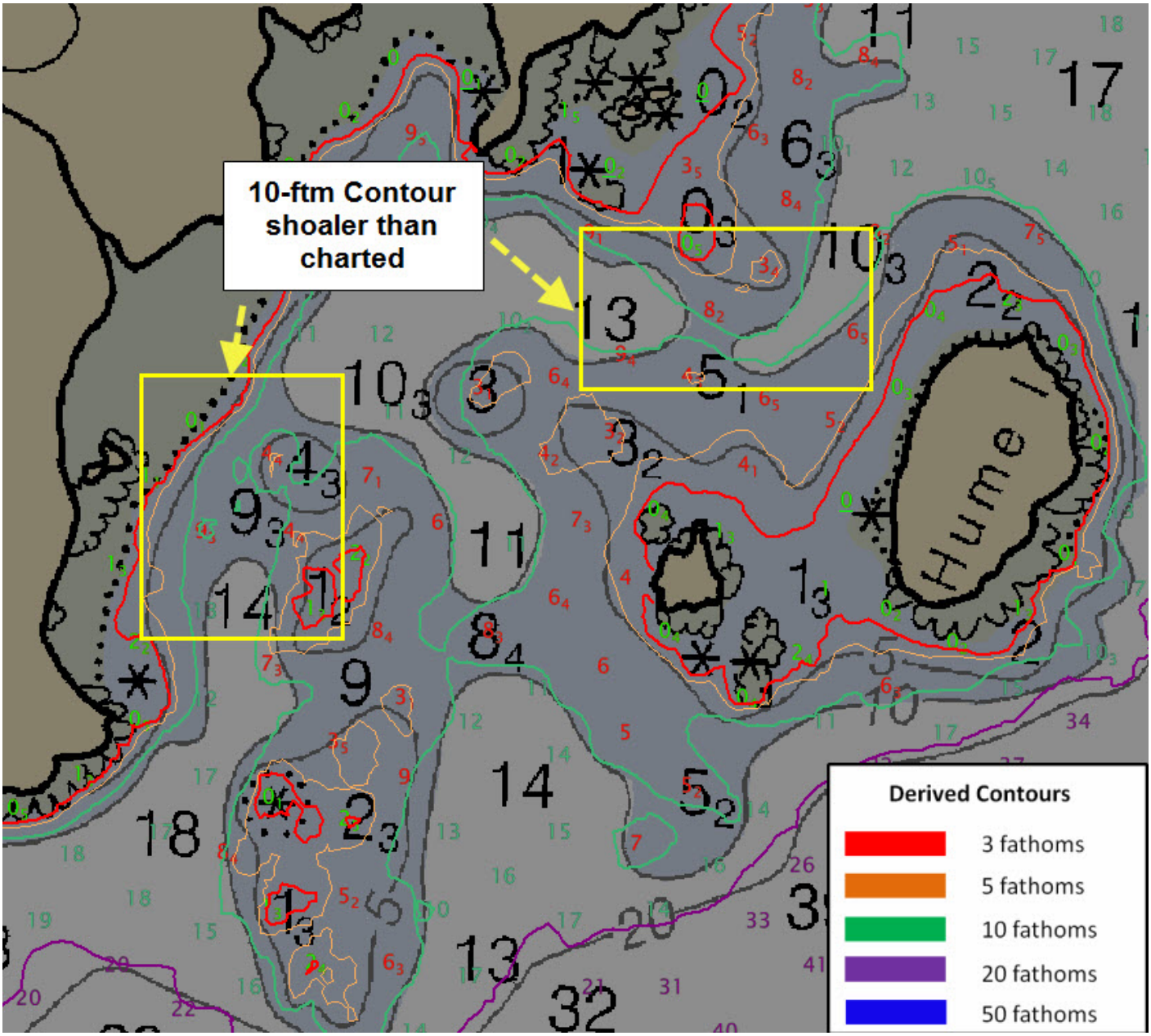


Figure 26: Variations in the 10 fathom contour in the vicinity of Hume Island show depths greater than 10 fathoms pass through the entire area.

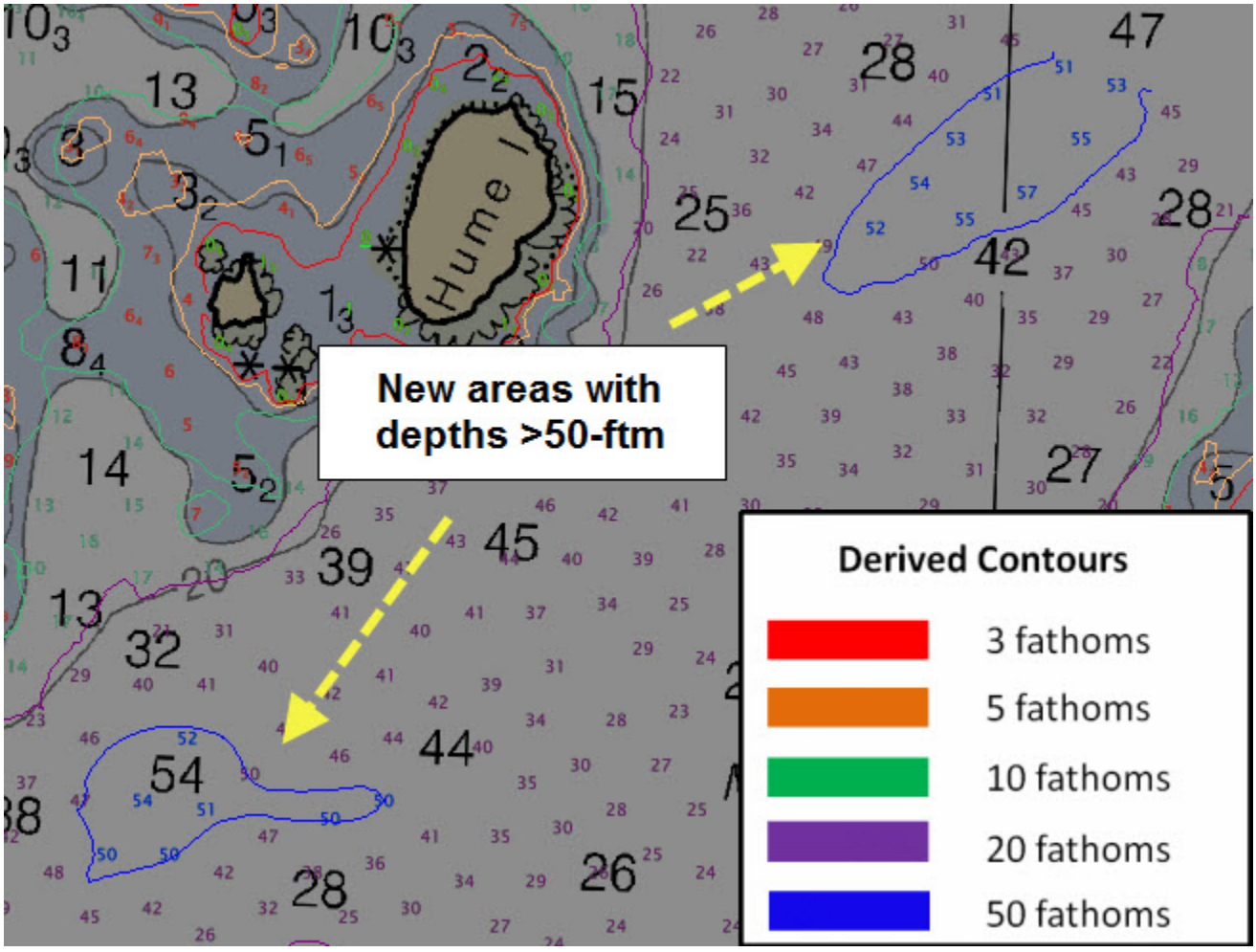


Figure 27: Depths greater than 50 fathoms shown in the vicinity of Hume Island.

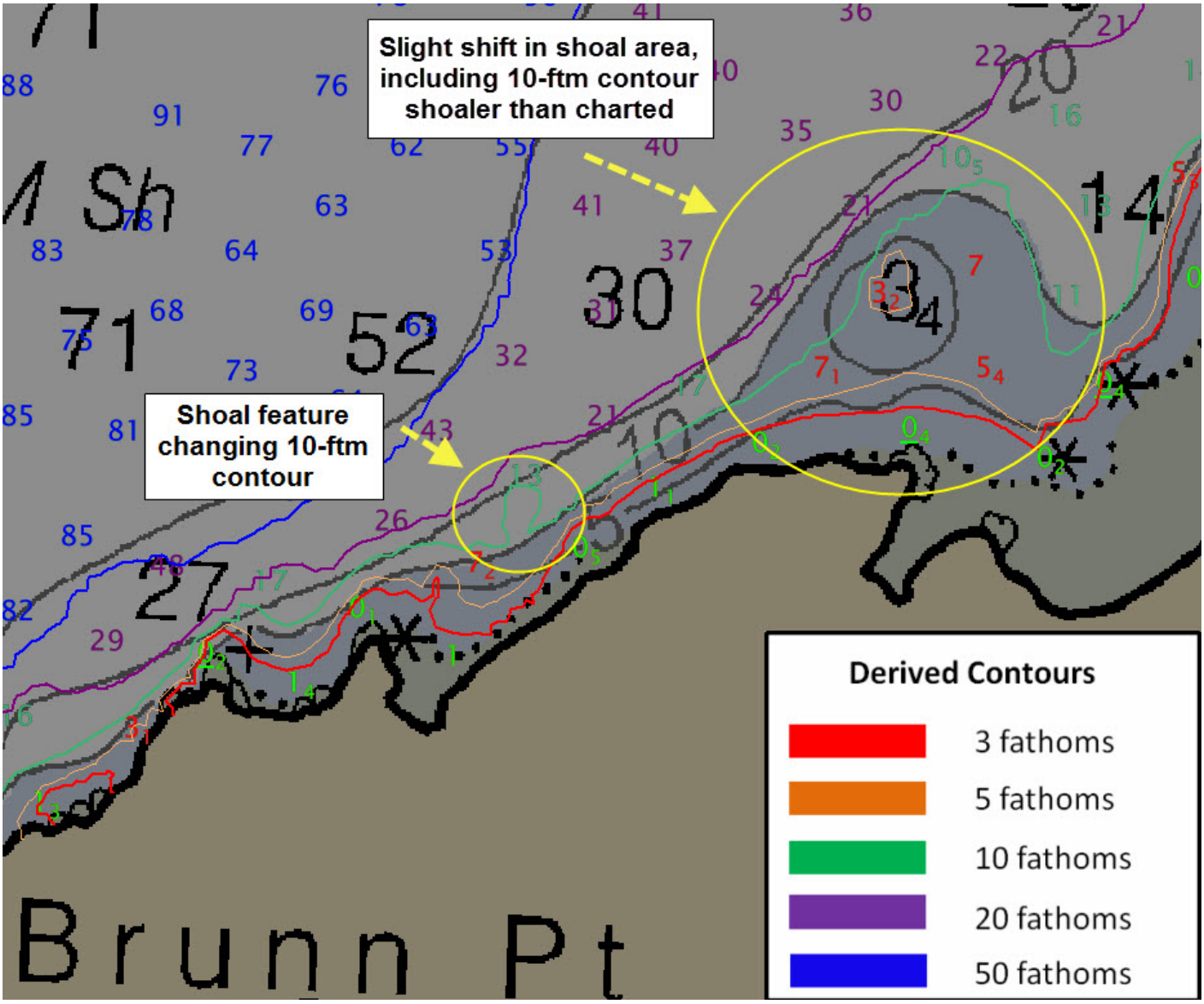


Figure 28: Variation in 10-fathom contour offshore of charted depths shown in vicinity of Brunn Point.

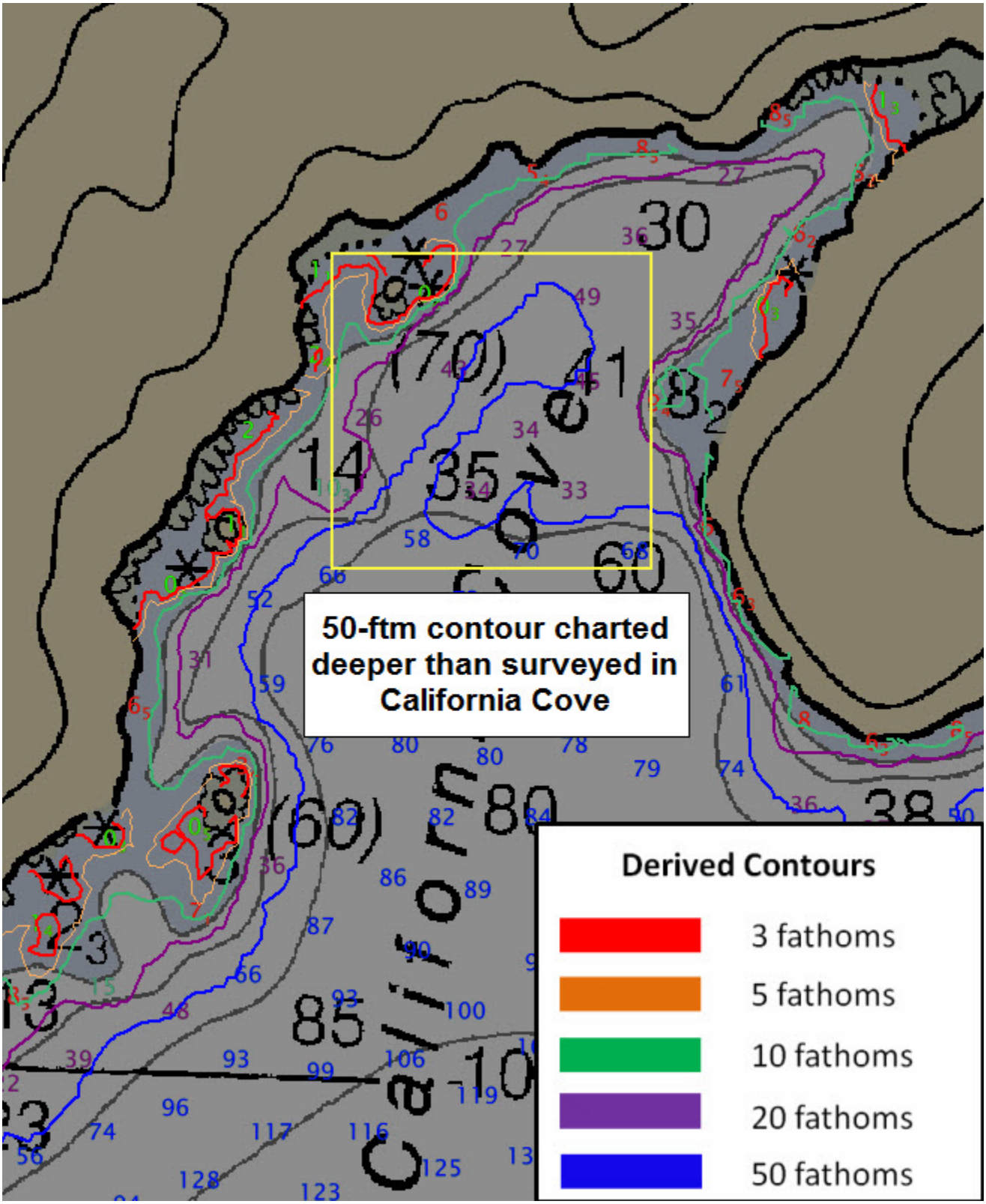


Figure 29: 50 fathom and 20 fathom contours surveyed to be nearshore of charted contours in California Cove.

D.1.2 Electronic Navigational Charts

The following are the largest scale ENCs, which cover the survey area:

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US5AK47M	1:40000	7	09/18/2015	09/18/2015	NO

Table 15: Largest Scale ENCs

US5AK47M

In the area of survey H12968, Electronic Navigation Chart (ENC) US5AK47M coincides with Chart 17428 therefore a comparison between H12916 is equivalent to the preceding comparison with Chart 17428.

D.1.3 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.4 Charted Features

No charted features exist for this survey.

D.1.5 Uncharted Features

No uncharted features exist for this survey.

D.1.6 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.7 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.8 Channels

No channels exist for this survey. 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.1.9 Bottom Samples

Three bottom sample locations were identified in the Project Reference File 9PRF). Three total bottom samples were collected and addressed with S-57 attribution in the Final Feature File. Acquired samples were collected in the vicinity of proposed sites.

D.2 Additional Results

D.2.1 Shoreline

Limited shoreline verification was conducted in accordance with applicable sections of NOAA HSSD and FPM using the Project Reference File (PRF) and Composite Source File (CSF) provided with the Project Instructions. There were 145 assigned features for this survey. 58 assigned features were addressed, and 87 assigned features could not be addressed due to time constraints or unsafe navigation. Higher than average tides allowed for multibeam collection over assigned features. Assigned features that were safe to approach were addressed as required with S-57 attribution and recorded in the H12968 Final Feature File (FFF) to best represent the features at chart scale. This file also includes new features found in the field as well as recommendations to update, retain, or delete assigned and some unassigned features.

See the Separates folder for the QC Tools pdf output for "scan features".

D.2.2 Prior Surveys

No prior survey comparisons exist for this survey.

D.2.3 Aids to Navigation

There was one charted ATON in the surveyed area, but was not found at time of the survey. ATON removal has been forwarded to USCG for update in the Light List.

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 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.7 Platforms

No platforms exist for this survey.

D.2.8 Significant Features

No Significant Features 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 Recommendation

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

D.2.11 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 and Specifications Deliverables Manual, 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
Edward J. Van Den Ameele, CAPT/NOAA	Chief of Party	03/08/2017	Digitally signed by LOMNICKY.JOHN.JOSEPH.1257920239 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=NOAA, cn=LOMNICKY.JOHN.JOSEPH.1257920239 Reason: I am signing for CAPT Van Den Ameele Date: 2017.05.11 13:32:49 -08'00'
Steven Loy, LT/NOAA	Field Operations Officer	03/08/2017	
James B. Jacobson	Chief Survey Technician	03/08/2017	JACOBSON.JAMES.BRYAN.1269664017 I have reviewed this document 2017.05.11 14:03:38 -08'00'
Dylan A. Kosten, ENS/NOAA	Sheet Manager	03/08/2017	Digitally signed by KOSTEN.DYLAN.ANDREW.1504527405 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=NOAA, cn=KOSTEN.DYLAN.ANDREW.1504527405 Date: 2017.05.12 08:15:31 -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	Continually Operating Reference Staiton
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
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
HSSD	Hydrographic Survey Specifications and Deliverables

Acronym	Definition
HSTP	Hydrographic Systems Technology Programs
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	Local Notice to Mariners
LNM	Linear Nautical Miles
MCD	Marine Chart Division
MHW	Mean High Water
MLLW	Mean Lower Low Water
NAD 83	North American Datum of 1983
NAIP	National Agriculture and Imagery Program
NALL	Navigable Area Limit Line
NM	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
PST	Physical Science Technician
RNC	Raster Navigational Chart
RTK	Real Time Kinematic
SBES	Singlebeam Echosounder
SBET	Smooth Best Estimate and Trajectory
SNM	Square Nautical Miles
SSS	Side Scan Sonar
ST	Survey Technician
SVP	Sound Velocity Profiler
TCARI	Tidal Constituent And Residual Interpolation
TPE	Total Propagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United Stated Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDA	Global Positiong System timing message
ZDF	Zone Definition File

UNITED STATES DEPARMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Silver Spring, Maryland 20910

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : December 07, 2016

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-O303-RA-16
HYDROGRAPHIC SHEET: H12968

LOCALITY: Approaches to George and Carroll Inlets, AK
TIME PERIOD: October 28 - November 07,2016

TIDE STATION USED: 9450460 Ketchikan, AK
Lat. 55° 19.9’N Long. 131° 37.6' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 4.433

ESTIMATED ZONING ERROR: 0.13

REMARKS: RECOMMENDED ZONING

Preliminary zoning for this project was provided under project OPR-O303-FA-16. Preliminary zoning is accepted as the final zoning for Registry No. H12968 for the time period of October 28 to November 07,2016.
Please use the zoning file O303FA2016CORP submitted with the project instructions for OPR-O303-FA-16. Zone SA89 is the applicable zone for H12968.

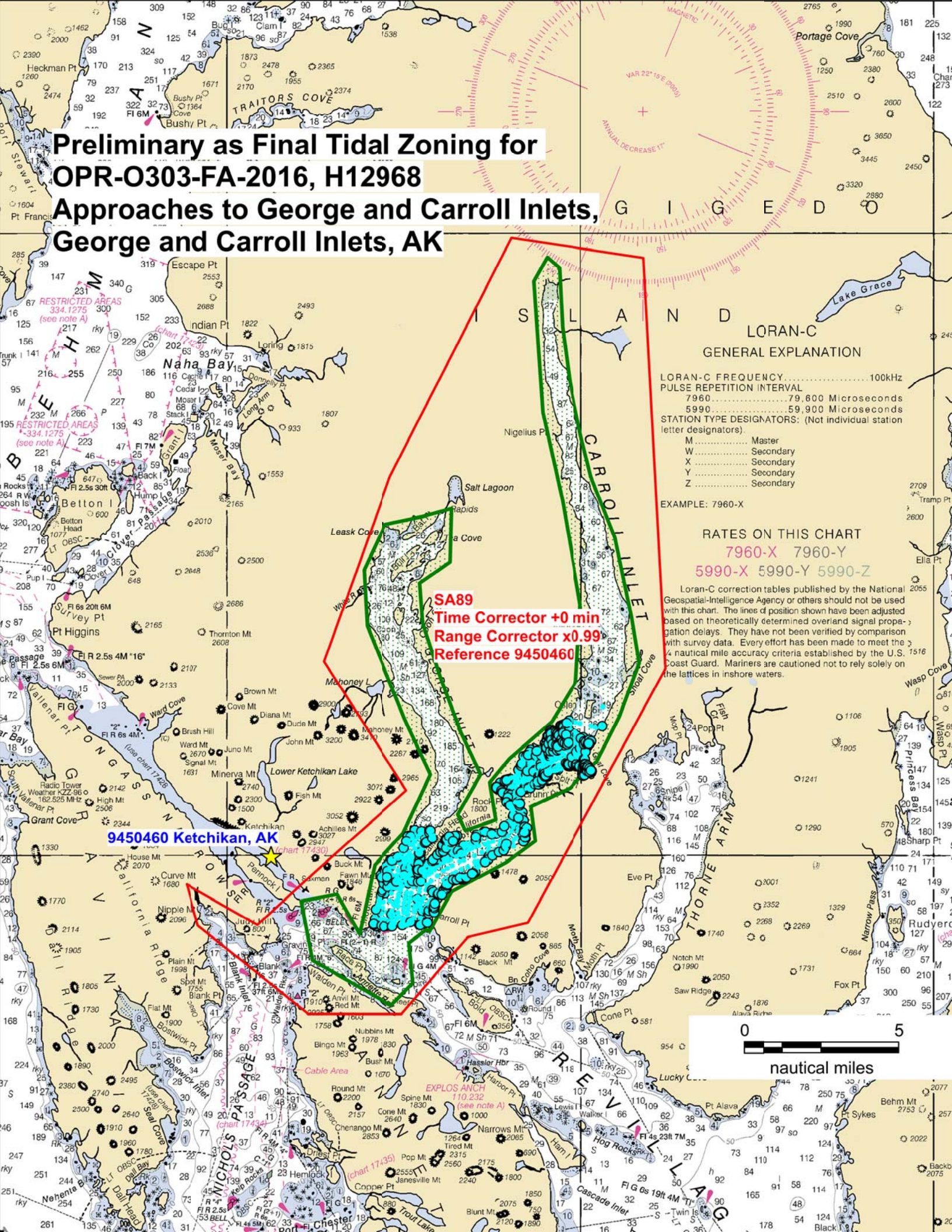
Refer to attachments for zoning information.

Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

HOVIS.GERALD.THOMAS.JR.1365860250

Digitally signed by HOVIS.GERALD.THOMAS.JR.1365860250
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=HOVIS.GERALD.THOMAS.JR.1365860250
Date: 2016.12.09 09:22:48 -05'00'

CHIEF, PRODUCTS AND SERVICES BRANCH


Preliminary as Final Tidal Zoning for
OPR-O303-FA-2016, H12968
Approaches to George and Carroll Inlets,
George and Carroll Inlets, AK
SA89
Time Corrector +0 min
Range Corrector x0.99
Reference 9450460
9450460 Ketchikan, AK
LORAN-C
GENERAL EXPLANATION
LORAN-C FREQUENCY.....100kHz
PULSE REPETITION INTERVAL
7960.....79,600 Microseconds
5990.....59,900 Microseconds
STATION TYPE DESIGNATORS: (Not individual station letter designators).
M..... Master
W..... Secondary
X..... Secondary
Y..... Secondary
Z..... Secondary
EXAMPLE: 7960-X
RATES ON THIS CHART
7960-X 7960-Y
5990-X 5990-Y 5990-Z
Loran-C correction tables published by the National Geospatial-Intelligence Agency or others should not be used with this chart. The lines of position shown have been adjusted based on theoretically determined overland signal propagation delays. They have not been verified by comparison with survey data. Every effort has been made to meet the ¼ nautical mile accuracy criteria established by the U.S. Coast Guard. Mariners are cautioned not to rely solely on the lattices in inshore waters.
0
5
nautical miles

Survey H12969

Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> Mon, Dec 11, 2017 at 10:11 AM
To: Janice Eisenberg - NOAA Federal <janice.eisenberg@noaa.gov>
Cc: Corey Allen <corey.allen@noaa.gov>, Olivia Hauser <olivia.hauser@noaa.gov>, Scott Broo - NOAA Federal <scott.e.broo@noaa.gov>, _OMAO MOP FOO RAINIER <ops.rainier@noaa.gov>, _OMAO MOP ChiefST RAINIER <chiefst.rainier@noaa.gov>, Grant Froelich <grant.froelich@noaa.gov>, Jacklyn James - NOAA Federal <Jacklyn.C.James@noaa.gov>, Fernando Ortiz <fernando.ortiz@noaa.gov>

Sounds good. As all the data has good internal consistency and the data does meet the standards per the HSSD. We will place a copy of this waiver in the survey correspondence and note in the SAR checklist that the ERS memo has been waived for this project. Thank you very much.

Tyanne

On Mon, Dec 11, 2017 at 6:42 AM, Janice Eisenberg - NOAA Federal <janice.eisenberg@noaa.gov> wrote:

> Hello Tyanne,
>
> I spoke with Corey on Friday about the ERS memo for OPR-O303-RA-16. If in PHB's opinion the field unit has performed ERS and the survey data meets quality standards outlined in the HSSD, OPS waives the requirement to review the ERS memo for this project.
>
> Thanks,
> Janice
>
> On Thu, Nov 30, 2017 at 11:19 AM, Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> wrote:
>
> > Hey Janice,
> >
> > Here is a very strange situation we are in for project OPR-O303-RA-16: from what I have gathered, the ERS memo was never submitted to OPS for review and subsequent approval. We have two surveys at PHB that are very close to being approved but we need this to be completed. Could you please look into what needs to be done?
> >
> > Thanks so much for your help,
> >
> > Tyanne
> >
> > On Tue, Nov 21, 2017 at 11:54 AM, Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> wrote:
> >
> > > Your memo was submitted with the survey information.
> > >
> > > Jackie, could you please see if anyone at OPS received or replied to the memo?
> > >
> > > Thanks,
> > >
> > > Tyanne
> > >
> > > On Mon, Nov 20, 2017 at 4:09 PM, Scott Broo - NOAA Federal <scott.e.broo@noaa.gov> wrote:
> > >
> > > > Tyanne,
> > > >
> > > > I imagine we sent this in last spring, but it seems not. Here is the ERS Capability Memo for the George & Carroll Inlets project.
> > > >
> > > > Scott
> > > >
> > > > On Mon, Nov 20, 2017 at 10:13 AM, Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> wrote:
> > > >
> > > > > That's good for the Coast Pilot. How about the ERS Memo?
> > > > >
> > > > > Hope you are feeling better.
> > > > >
> > > > > On Fri, Nov 17, 2017 at 3:17 PM, Scott Broo - NOAA Federal <scott.e.broo@noaa.gov> wrote:

Tyanne,

Please let me know if this will suffice. PDF of email chain attached.

Thanks,

Scott

On Thu, Nov 16, 2017 at 2:25 PM, Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> wrote:

> One more item, I am looking for correspondence that you have submitted Coast Pilot per the PIs.
>
> Thanks,
>
> Tyanne
>
> On Thu, Nov 16, 2017 at 8:27 AM, Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> wrote:
>
> > Good Morning Scott,
> >
> > I wanted to reach out to you today to see if you had any correspondence between the ship and OPS in regards to both the checklines and ERS memo. I see that the ERS memo was created but I wanted to see if you had the approval from OPS that they accepted your results to use ERZT for this survey.
> >
> > Thanks,
> >
> > Tyanne
> >
> > On Thu, Nov 9, 2017 at 12:31 PM, Scott Broo - NOAA Federal <scott.e.broo@noaa.gov> wrote:
> >
> > > Hi Tyanne,
> > >
> > > I'll be the point of contact for this survey.
> > >
> > > Thanks,
> > >
> > > Scott
> > >
> > > On Thu, Nov 9, 2017 at 12:11 PM, Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov> wrote:
> > >
> > > > Good afternoon,
> > > >
> > > > PHB has begun the Survey Acceptance Review for your survey H12969 from project OPR-O303-RA-16. The SAR will be conducted by, me, PS Tyanne Faulkes.
> > > >
> > > > Normally, any questions or clarifications will be directed to the sheet manager with a cc to the Operations Officer and the Chief Survey Tech. As the sheet manager (ENS Shelley Devereaux) has moved on to a new billet, kindly confirm the point of contact for this survey.
> > > >
> > > > Thanks,
> > > >
> > > > Tyanne Faulkes
> > > >
> > > > --
> > > > Tyanne Faulkes
> > > > Physical Scientist
> > > > NOAA's National Ocean Service
> > > > Office of Coast Survey, Hydrographic Surveys Division
> > > > Pacific Hydrographic Branch
> > >
> > > --

Date: ~~06~~ 20 JUN 2016	Location: NOAA Ship *Rainier*

Marine Mammal Observer Video

Printed Name	DEPT	Rank Grade	Signature
Jennifer Kraus	Wardroom	ENS	
Shelley Devereaux	Wardroom	ENS	
B. D. JACKSON	SURVEY	HSST	
Michael Bloom	SURVEY	HST	
Joseph Gleason	SURVEY	HAST	
GREGORY J. GAHLINGER	SURV	HAST	
DANIE PRINCE	SURV	HAST	
MATTHEW BISSELL	Ward	ENS	
PATRICIA PYDA	SURV	HAST	
MICHELLE LEVANO	WARD	ENS	
James Jacobson	Sur	HCST	
Eli Smith	SURVEY	HST	
Bethany McAcy	WARD	ENS	
Jay Lomicky	Wardroom	LCDR	
STEVEN LOY	Wardroom	LT	
EDWARD J. VAN DEN AMEELE	CO	CDR	
Samuel McKay	Wardroom	ENS	
Dylan Koster	WARD	ENS	
Timothy Brown	Wardroom	Ens	
JAMES CHAMBERS	DECK	AB	
JAMES KRUGER	DECK	AB	
Jeffrey M. MAYS	Deck	SS	

Printed Name	DEPT	Rank Grade	Signature
Mike Burton	Deck	AB	
CHANNING APGAR	DECK	AB	
JASON KINYON	DECK	BGL	
MICHAEL ALBERS	DECK	AB	
JIM BRZOSTEK	DECK	AB	
Angelica Patyten	Survey	HAST	
ROBERT J. STEELE	DECK	AB	
Carl Stedman	Deck	AB	

Dylan Kosten - NOAA Federal <dylan.kosten@noaa.gov>

H12968 Surface Parameter Change Request

Christina Fandel - NOAA Federal <christina.fandel@noaa.gov> Tue, Jan 31, 2017 at 10:04 AM
To: Dylan Kosten - NOAA Federal <dylan.kosten@noaa.gov>
Cc: Steven Loy - NOAA Federal <steven.loy@noaa.gov>, Scott Broo - NOAA Federal <scott.e.broo@noaa.gov>, _OMAO MOP CO Rainier <co.rainier@noaa.gov>, John Lomnicky - NOAA Federal <john.lomnicky@noaa.gov>, Corey Allen - NOAA Federal <corey.allen@noaa.gov>, Russell Quintero - NOAA Federal <russell.quintero@noaa.gov>, Jacklyn James - NOAA Federal <jacklyn.c.james@noaa.gov>

Dylan,

Thank you for your waiver request. OPS has reviewed your request and included our response below.

1) A change in the 16m surface from 144m-320m to 110m-320m. The reason being that the steepness of the bathy being so extreme the 8m surface could not capture it without dozens of holidays.

Per 2016 HSSD Section 5.2.2.3, the field unit may extend the shoaler extent of the coarser resolution grid to prevent gaps in junction between overlapping grids. Note, the shoal extension of the coarser resolution grid only applies if the steepness of slope is causing a gap in coverage at the junction between the finer and coarser grid. It does *not* apply if the gap in coverage is due low data density causing holidays at the finer resolution.

As such, if the gap in coverage occurs at the junction between the finer and coarser grid, you may extend the shoal extent of the 16 m surface and document the extended parameters within your descriptive report. If, however, the gap in coverage is due to inadequate data density at the 8 m resolution, the shoal extent of the 16 m grid may not be extended to alleviate holidays. Instead, document the gaps in coverage within the descriptive report.

2) I am also requesting to not submit a 32m surface even though there are depths >320m in the survey. The data from our 16m covers the deepest parts of the survey without a single break in the surface.

Given the 16 m grid provides continuous coverage of the survey area, RA does not need to submit a 32 m resolution surface for H12968. Please include this waiver in your correspondence folder.

Thank you and please let me know if you have any questions,

Christy
[Quoted text hidden]

APPROVAL PAGE

H12968

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

- H12968 _DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12968 _GeoImage.pdf

The survey evaluation and verification has been conducted according current OCS Specifications.

Approved: BROWN.KURT.E.1156712600 2018.06.05 11:01:17 -07'00'

Kurt Brown
Physical Scientist, Pacific Hydrographic Branch

The survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.

Approved: Digitally signed by HAUSER.OLIVIA.A.1275636009 Date: 2018.06.03 17:16:38 -07'00'

LCDR Olivia Hauser, NOAA
Chief, Pacific Hydrographic Branch