H12881

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H12881

LOCALITY

State(s):	Alaska
General Locality:	West of Prince of Wales Island
Sub-locality:	Vicinity of McFarland Islands

2016

CHIEF OF PARTY
CDR Mark Van Waes, NOAA

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H12881**

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:	**West of Prince of Wales Island**
Sub-Locality:	**Vicinity of McFarland Islands**
Scale:	**20000**
Dates of Survey:	**05/09/2016 to 06/15/2016**
Instructions Dated:	**03/28/2016**
Project Number:	**OPR-O190-FA-16**
Field Unit:	**NOAA Ship *Fairweather***
Chief of Party:	**CDR Mark Van Waes, 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:

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 Environmental Information (NCEI) and can be retrieved via http://www.ncei.noaa.gov/.

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Descriptive Report to Accompany Survey H12881

Project: OPR-O190-FA-16

Locality: West of Prince of Wales Island

Sublocality: Vicinity of McFarland Islands

Scale: 1:20000

May 2016 - June 2016

NOAA Ship *Fairweather*

Chief of Party: CDR Mark Van Waes, NOAA

A. Area Surveyed

The survey area is located along the West of Prince of Wales Island, within the sub-locality of the Vicinity of McFarland Islands.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
55° 5' 11.94" N 133° 0' 28.22" W	55° 1' 53.44" N 132° 53' 20.66" W

Table 1: Survey Limits

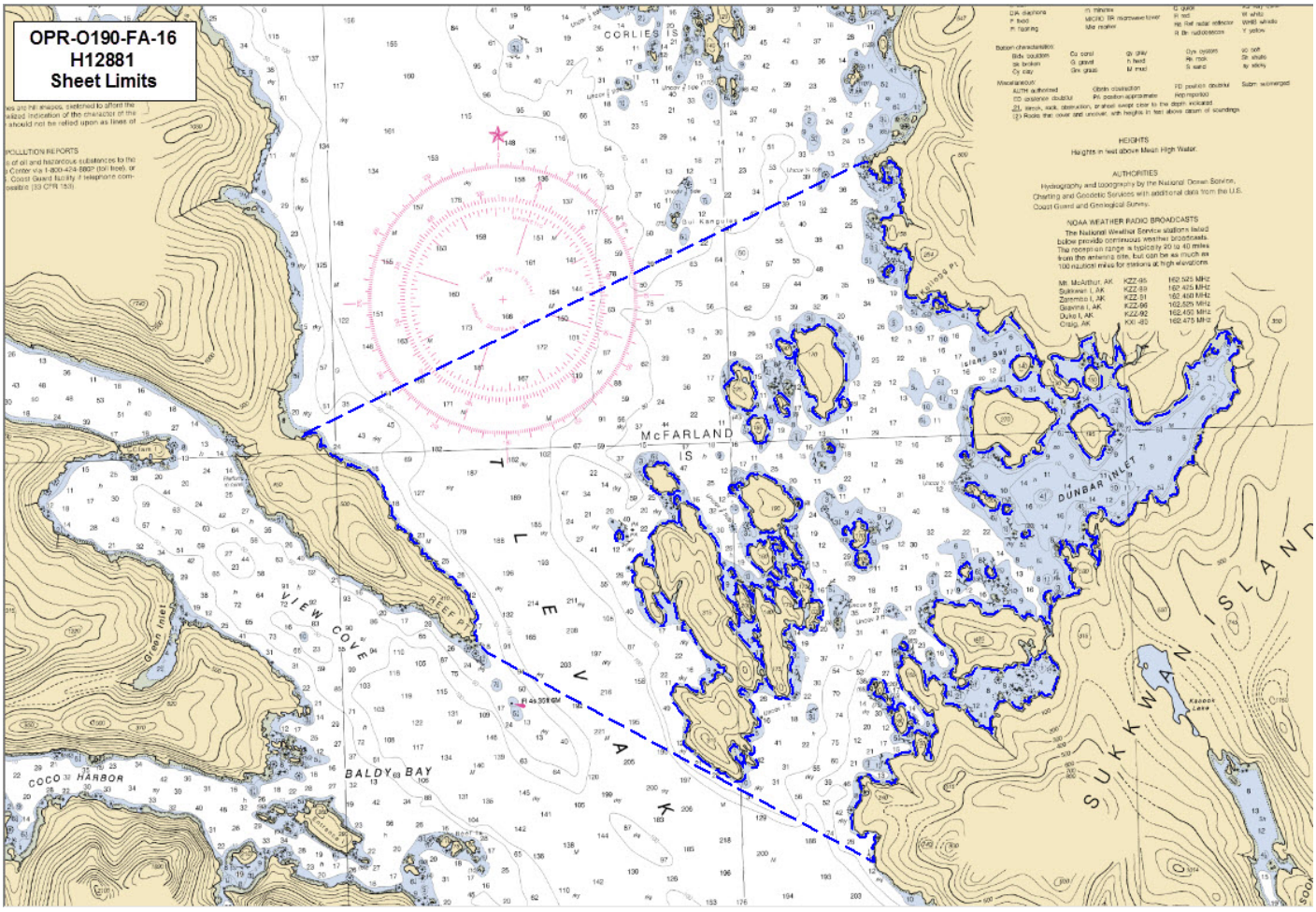


Figure 1: H12881 Sheet Limits (in blue) overlaid onto Chart 17408

Data for survey H12881 was acquired to the survey limits in accordance with the requirements in the Project Instructions and the NOS Hydrographic Surveys Specifications and Deliverables (HSSD) dated March 2016, as shown in Figure 1. In all areas where the 4-meter depth contour or the sheet limits were not met, the Navigable Area Limit Line (NALL) was defined as the inshore limit of bathymetry due to the risks of maneuvering the survey vessel in close proximity to the steep and rocky shoreline. For example, Figure 2 shows an area in the middle of the McFarland Islands and Figure 3 shows a cove on the SW corner of Sukkwan Island. The arrows in Figure 3 indicate where large and shallow rocks make it unsafe for boats to enter the area. The two areas have also been included as proposed new foul areas in the H12881_Final_Feature_File.

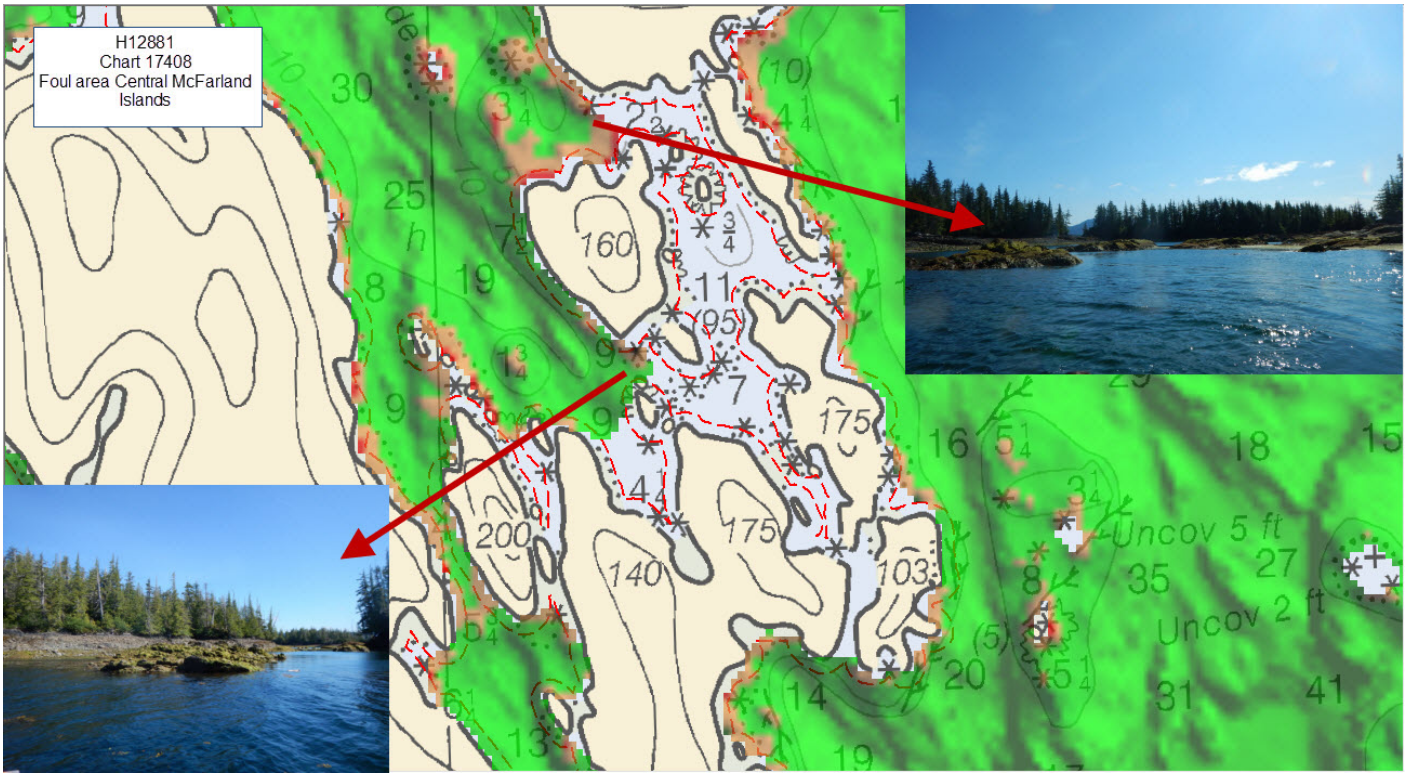


Figure 2: H12881 Foul area in central McFarland Islands

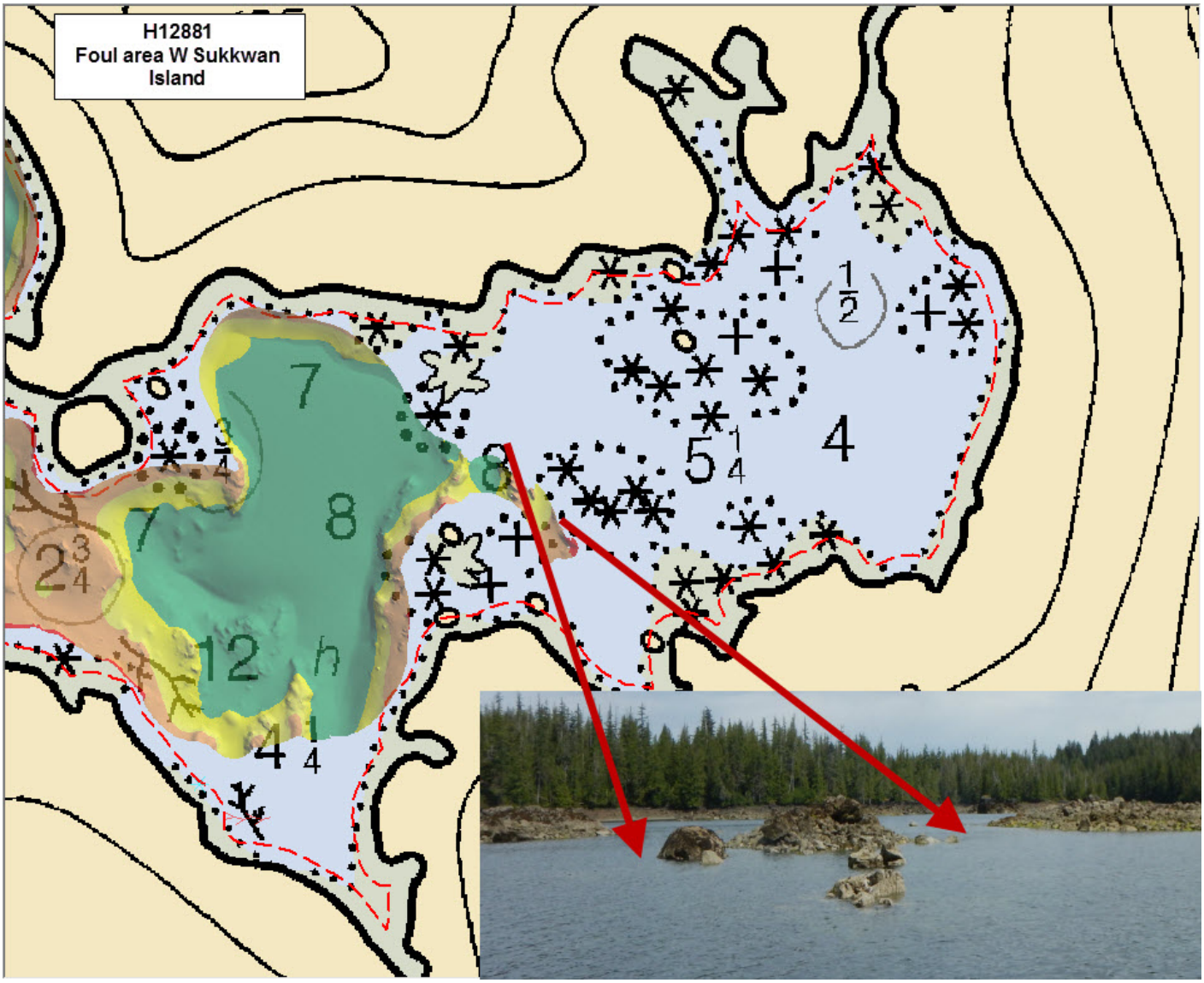


Figure 3: H12881 Foul area near SW Sukkwan Island

A.2 Survey Purpose

The purpose of this project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charting products. The survey area will address 14 SNM of navigationally significant waters in accordance with the National Hydrographic Survey Priorities Edition 2012.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data acquired in H12881 meet multibeam echo sounder (MBES) coverage requirements for complete coverage, as required by the HSSD. This includes crosslines (see Section B.2.1), NOAA allowable

uncertainty (see Section B.2.10), and density requirements (see Section B.2.11). Additional compliance statistics can be found in the Standards and Compliance Review located in Appendix II of this report.

The Standards and Compliance Review is archived at NCEI and is not appended to this report.

A.4 Survey Coverage

The following table lists the coverage requirements for this survey as assigned in the project instructions:

Water Depth	Coverage Required
Inshore limit to 8 meters water depth	Complete coverage MB with backscatter (Section 5.2.2.3) or Set Line Spacing at 100 meters (Section 5.2.2.4).
Greater than 8 meters water depth	Complete Coverage MBES with Backscatter. Refer to HSSD Section 5.2.2.3

The entirety of H12881 was acquired with complete coverage MBES with backscatter, meeting the requirements listed above and in the HSSD. See Figure 4 for an overview of coverage.

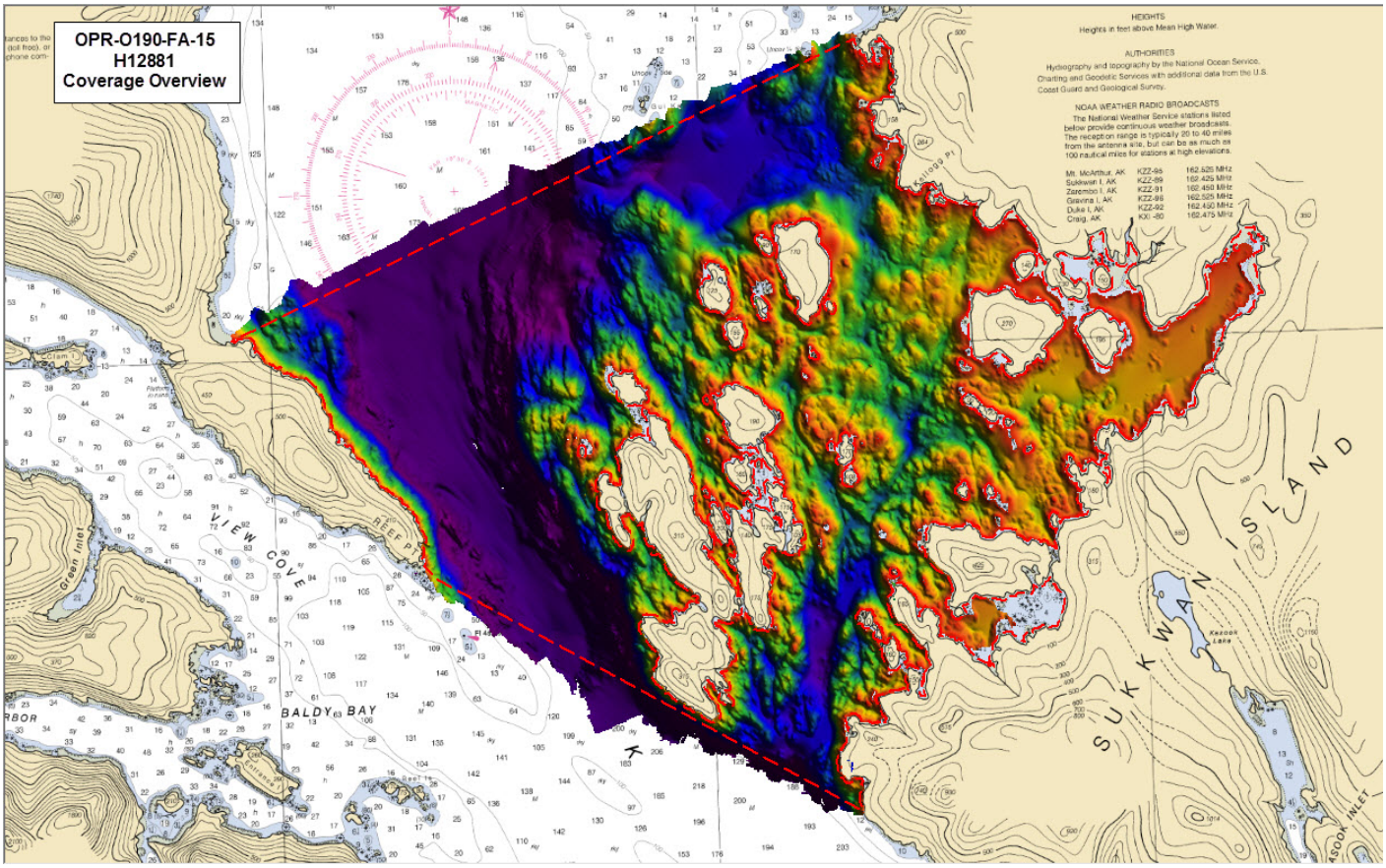


Figure 4: H12881 Survey Coverage (16m) overlaid onto Chart 17408

A.5 Survey Statistics

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

	HULL ID	*S220*	*FA-2805*	*FA-2806*	*FA-2807*	*FA-2808*	*Total*
LNM	**SBES Mainscheme**	0	0	0	0	0	0
	MBES Mainscheme	8.07	101.05	186.05	112.51	20.36	428.04
	Lidar Mainscheme	0	0	0	0	0	0
	SSS Mainscheme	0	0	0	0	0	0
	SBES/SSS Mainscheme	0	0	0	0	0	0
	MBES/SSS Mainscheme	0	0	0	0	0	0
	SBES/MBES Crosslines	0	8.07	11.88	0	2.67	22.62
	Lidar Crosslines	0	0	0	0	0	0
Number of Bottom Samples							6
Number Maritime Boundary Points Investigated							0
Number of DPs							140
Number of Items Investigated by Dive Ops							0
Total SNM							14.75

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
05/10/2016	131
05/13/2016	134

Survey Dates	Day of the Year
05/14/2016	135
05/25/2016	146
06/06/2016	158
06/07/2016	159
06/08/2016	160
06/09/2016	161
06/10/2016	162
06/11/2016	163
06/12/2016	164
06/13/2016	165
06/14/2016	166
06/15/2016	167

Table 3: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Refer to the OPR-O190-FA-16 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	***S220***	***2805***	***2806***	***2807***	***2808***
LOA	70.4 meters	8.64 meters	8.64 meters	8.64 meters	8.64 meters
Draft	8.64 meters	1.12 meters	1.12 meters	1.12 meters	1.12 meters

Table 4: Vessels Used

Draft of S220 is reported incorrectly and should be 5.03 meters.

B.1.2 Equipment

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

Manufacturer	Model	Type
Reson	7125 SV1	MBES
Kongsberg	EM710	MBES
Applanix	POS/MV V4	Positioning and Attitude System
Reson	SVP70	Sound Speed System
Reson	SVP71	Sound Speed System
Seabird	19Plus	Conductivity, Temperature, and Depth Sensor
Rolls Royce	MVP200	Conductivity, Temperature, and Depth Sensor
Velodyne	VLP-16	Lidar System

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines acquired for this survey totaled 5.28% of mainscheme acquisition.

Crosslines were collected, processed and compared in accordance with Section 5.2.4.3 of the HSSD. To evaluate crosslines, a 16-meter CUBE surface using strictly mainscheme lines, and a 16-meter CUBE surface using strictly crosslines were created. From these two surfaces, a difference surface (mainscheme - crosslines = difference surface) was generated at a 16-meter resolution (Figure 5), and is submitted in the Separates II Digital Data folder. Statistics show the mean difference between the depths derived from mainscheme and crosslines was 0.08 meters (with mainscheme being shoaler) with 95% of nodes falling within 4.80 meters (Figure 6). For the respective depths, the difference surface was compared to the allowable NOAA accuracy standards (Figure 7). In total, 94.3% of the depth differences between H12881 mainscheme and crossline data are within allowable NOAA accuracies (Figure 9). The largest differences exhibited are where the density of soundings were degraded in areas where the geologic structure of the seafloor is dynamic, as seen in Figures 5 and 8 and is discussed further in Section B.2.11.

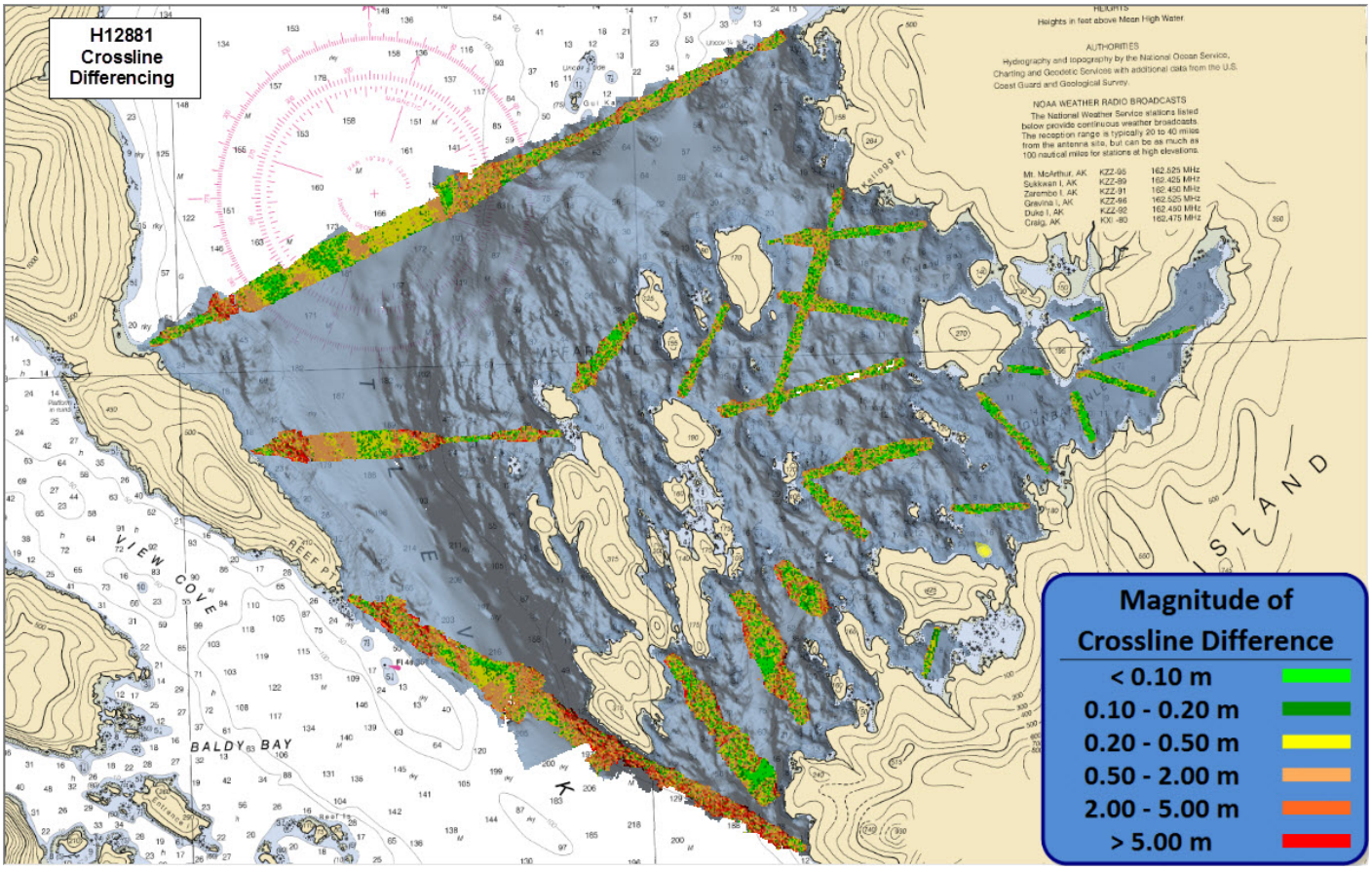
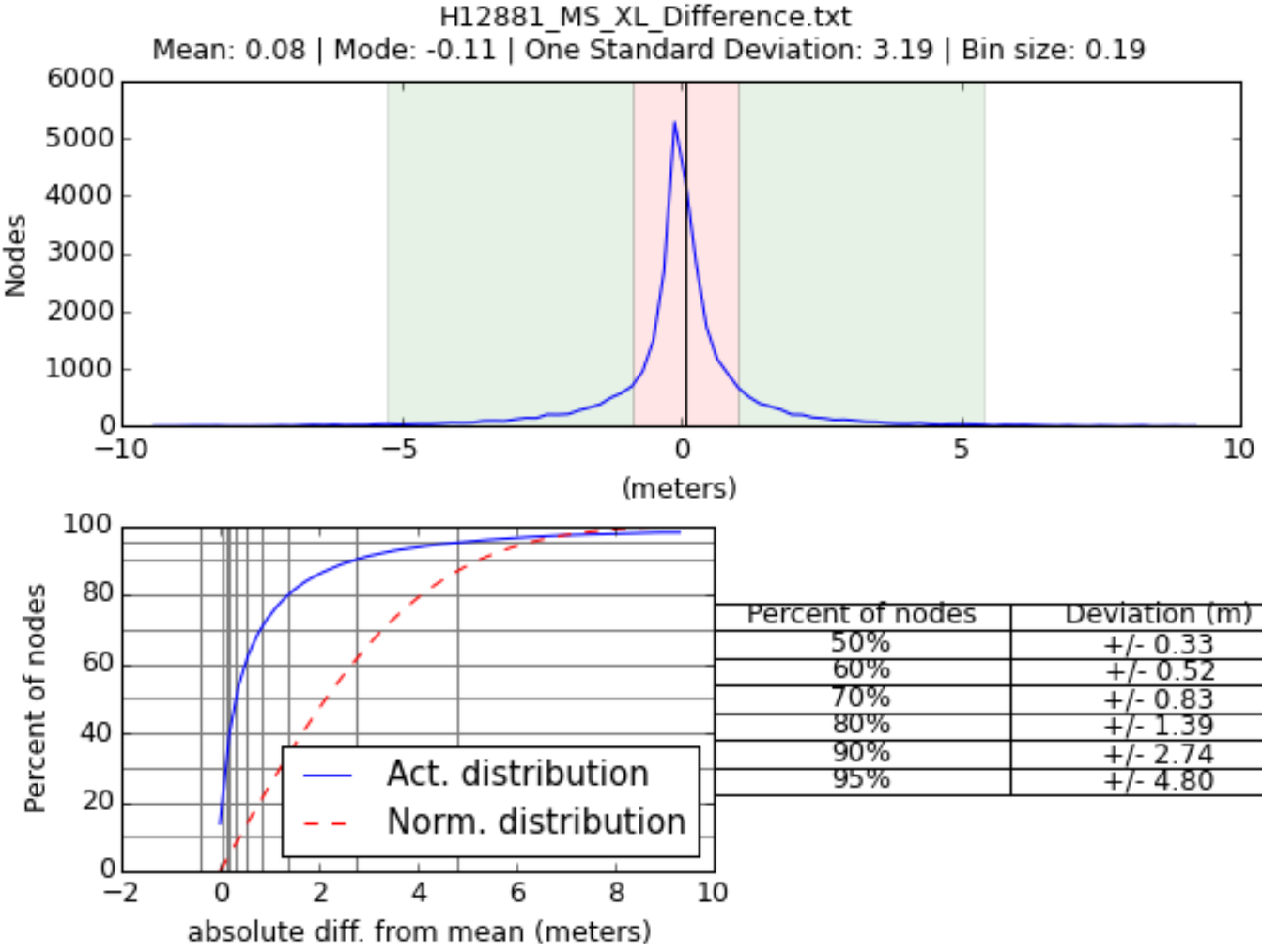


Figure 5: H12881 Crossline Difference Overview



Percent of nodes	Deviation (m)
50%	+/- 0.33
60%	+/- 0.52
70%	+/- 0.83
80%	+/- 1.39
90%	+/- 2.74
95%	+/- 4.80

Figure 6: H12881 Crossline Difference Statistics

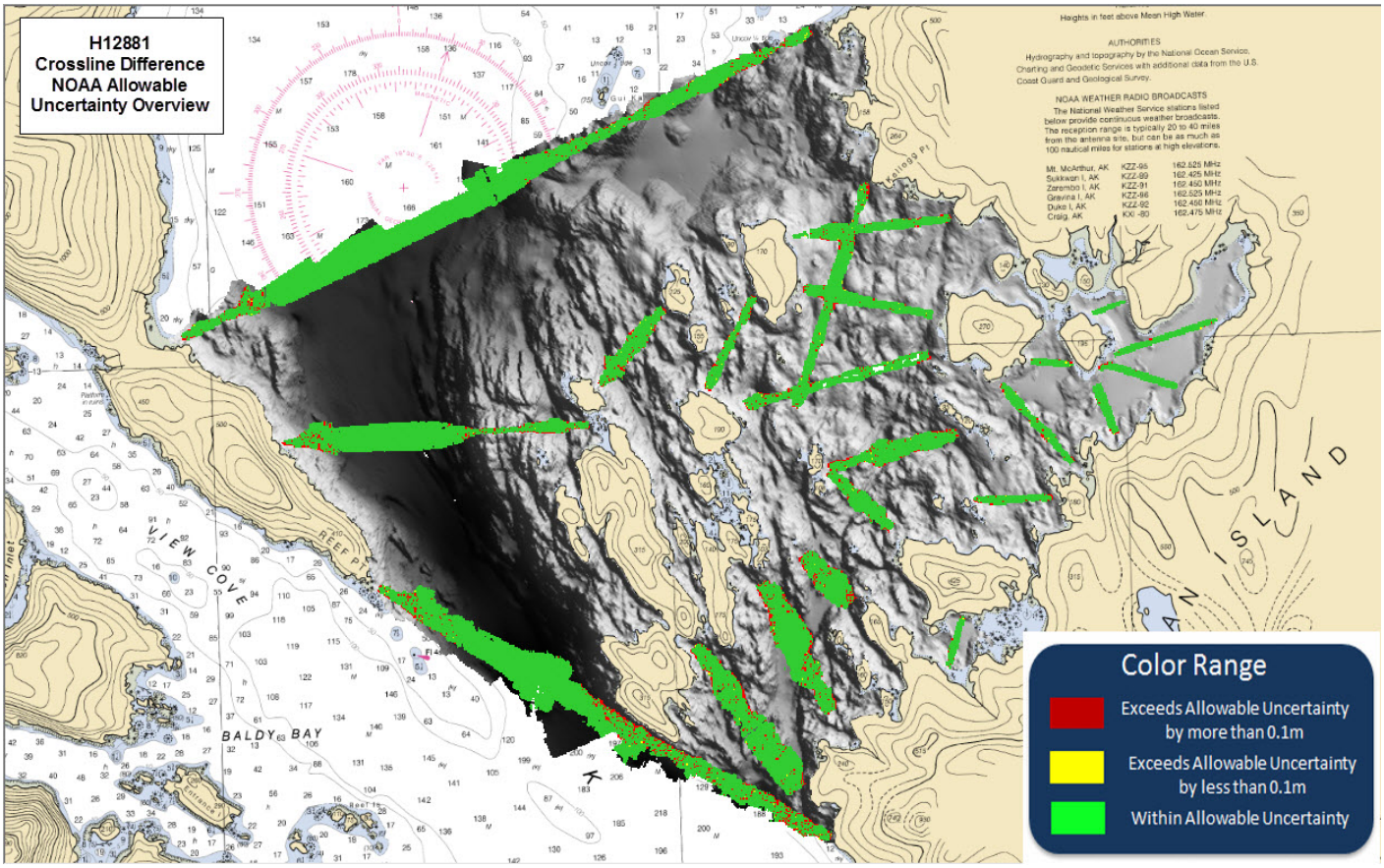


Figure 7: Depth differences between H12881 mainscheme and crossline data as compared to NOAA allowable uncertainty standards for the associated depths

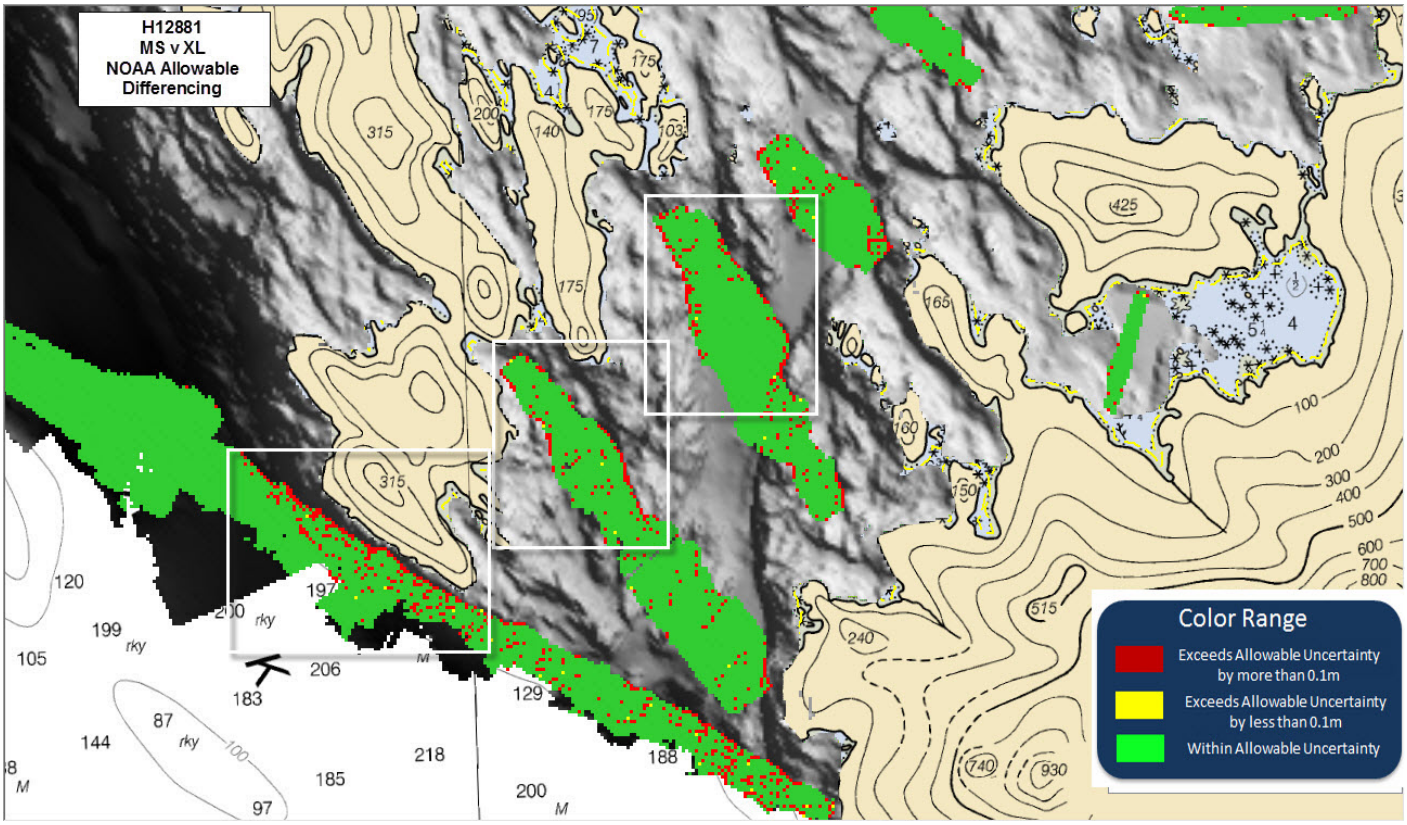


Figure 8: H12881 Crossline NOAA Allowable Uncertainty Example of Areas of High Difference

H12881 Crossline Differencing NOAA Allowable Uncertainty

Total Nodes	Passed Nodes	Failed Nodes
31,292	29,524	1,768
Percentage Nodes Passed		94.35%
Percentage Nodes Failed		5.65%

Figure 9: H12881 Crossline NOAA Allowable Uncertainty Statistics

The Separates are archived at NCEI and are not appended to this report.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning	Method
0 meters	0.02 meters	ERS via PMVD
0 meters	0.097 meters	Discrete Zoning
0 meters	0 meters	TCARI

Table 6: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Surface
S220	N/A meters/second	1 meters/second	0.5 meters/second
2805	2 meters/second	N/A meters/second	0.5 meters/second
2806	2 meters/second	N/A meters/second	0.5 meters/second
2807	2 meters/second	N/A meters/second	0.5 meters/second
2808	2 meters/second	N/A meters/second	0.5 meters/second

Table 7: Survey Specific Sound Speed TPU Values.

In addition to the usual a priori estimates of uncertainty provided via device models for vessel motion, discrete zoning tides, ERZT, and PMVD, real-time and post-processed uncertainty sources were also incorporated into the depth estimates of survey H12881. Real-time uncertainties were provided via EM710 and Reson 7125 MBES data, Applanix Delayed Heave RMS, and TCARI tides. Following post-processing of vessel motion, real time uncertainties of vessel roll, pitch, gyro and navigation were applied in CARIS HIPS and SIPS via a Smoothed Best Estimate of Trajectory (SBET) RMS file generated in Applanix POSPac.

B.2.3 Junctions

H12881 junctions with two adjacent surveys from this project: H12865 and H12880, as shown in Figure 10. Data overlap between all surveys was achieved. These areas of overlap between surveys were reviewed with CARIS HIPS and SIPS by surface differencing (at equal resolutions) to assess surface agreement. The multibeam data were also examined in CARIS Subset Editor for consistency and agreement. The junctions with H12881 are generally within the NOAA allowable uncertainty in their areas of overlap. For all junctions with H12881, a negative difference indicates H12881 was deeper, and a positive difference indicates H12881 was shoaler.

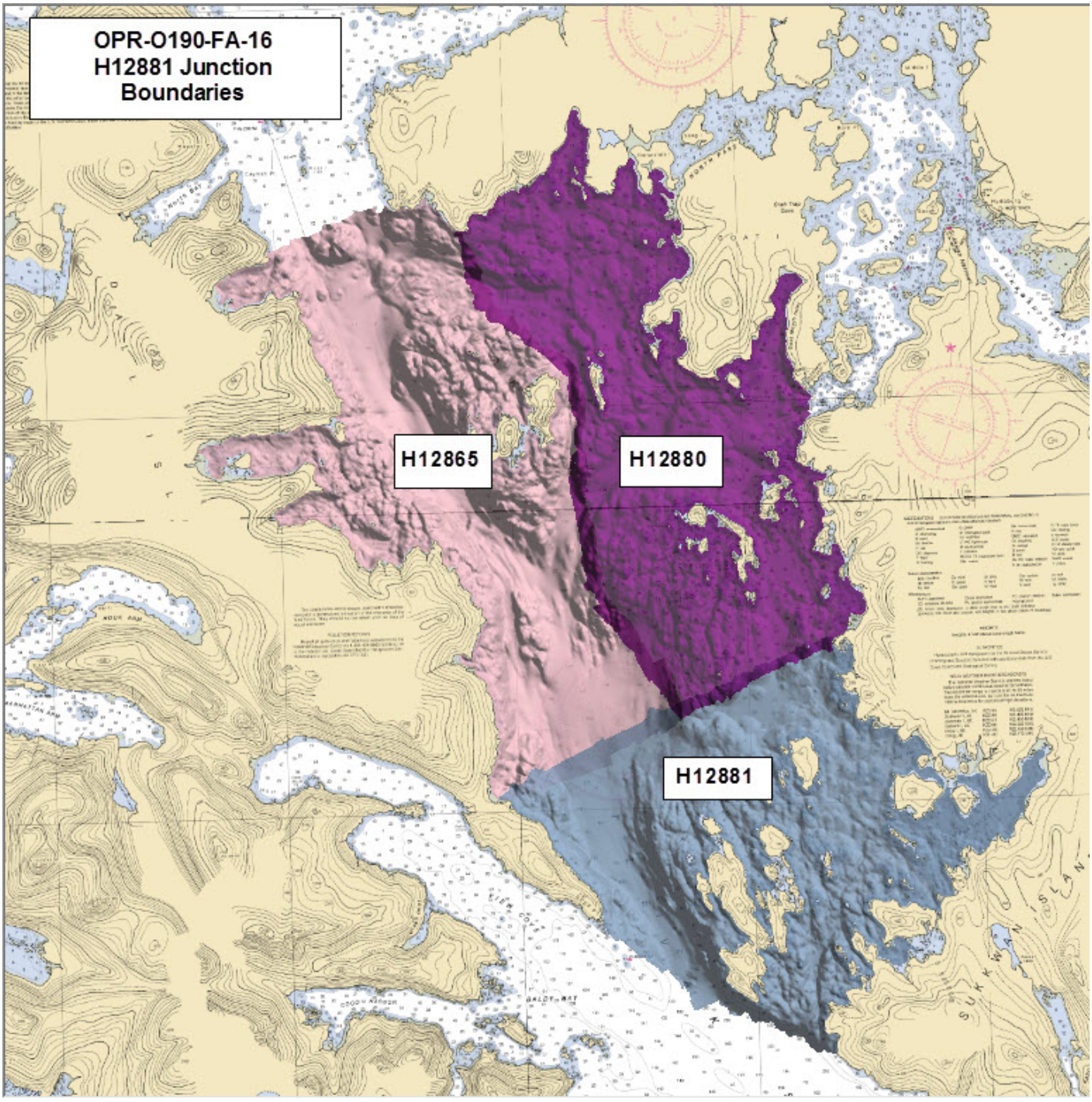


Figure 10: H12881 Junction Boundaries

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12865	1:20000	2016	NOAA Ship FAIRWEATHER	NW
H12880	1:20000	2016	NOAA Ship FAIRWEATHER	NE

Table 8: Junctioning Surveys

H12865

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between the 16 meter combined surface from H12881 and the 16 meter combined surface from H12865. The statistical analysis of the difference surface shows a mean of -0.26 meters with 95% of all nodes having a maximum deviation of +/- 1.76 meters, as seen in Figure 12. A detailed graphical overview can be seen in Figure 11. In addition, a comparison surface was created between the difference surface and the NOAA allowable uncertainty (See Figure 13). It was found that 99% of nodes are within allowable NOAA uncertainty (Figure 14). The largest differences are located at the edges of the junction where there were no overlapping lines for the individual surveys to provide greater density.

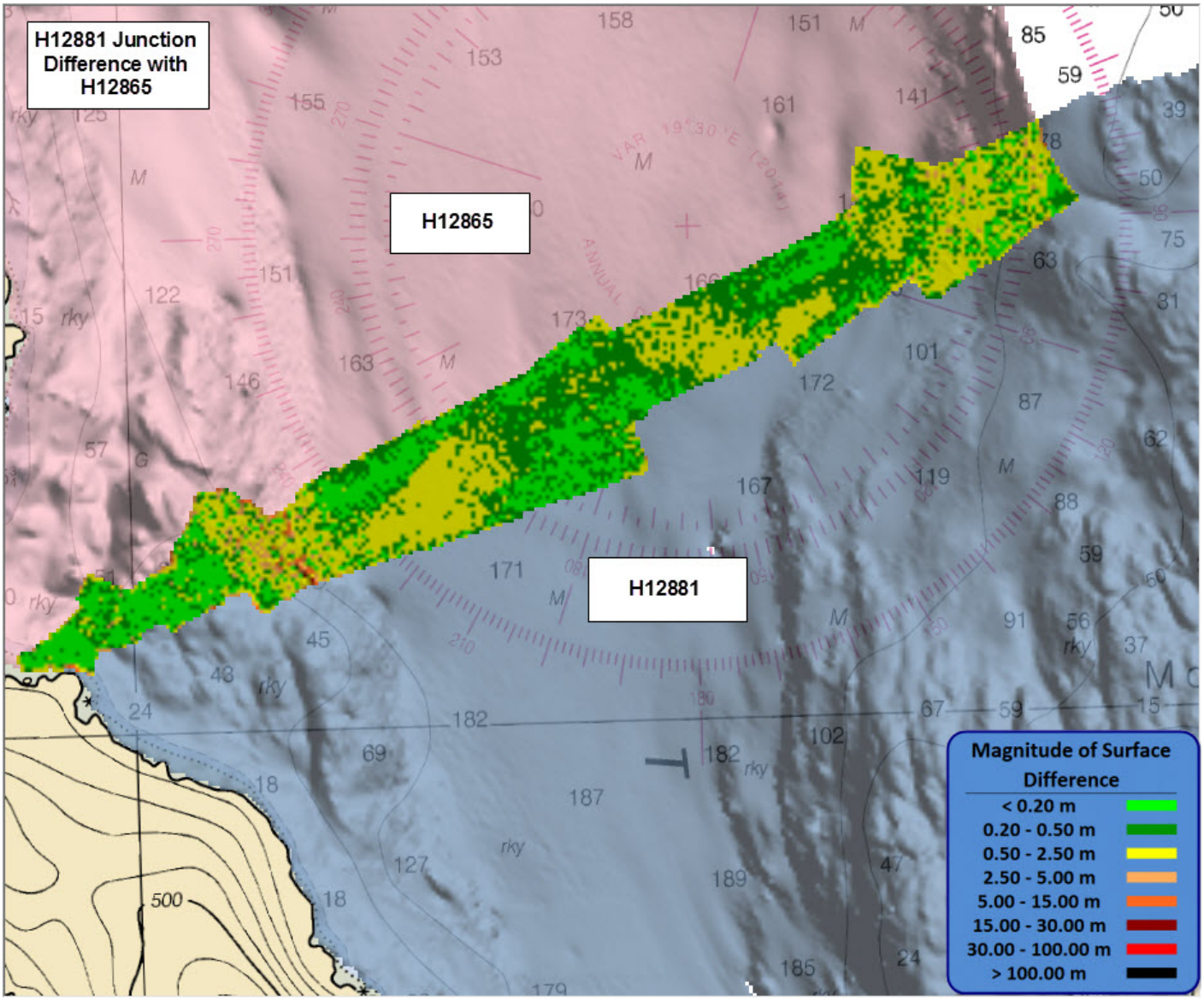
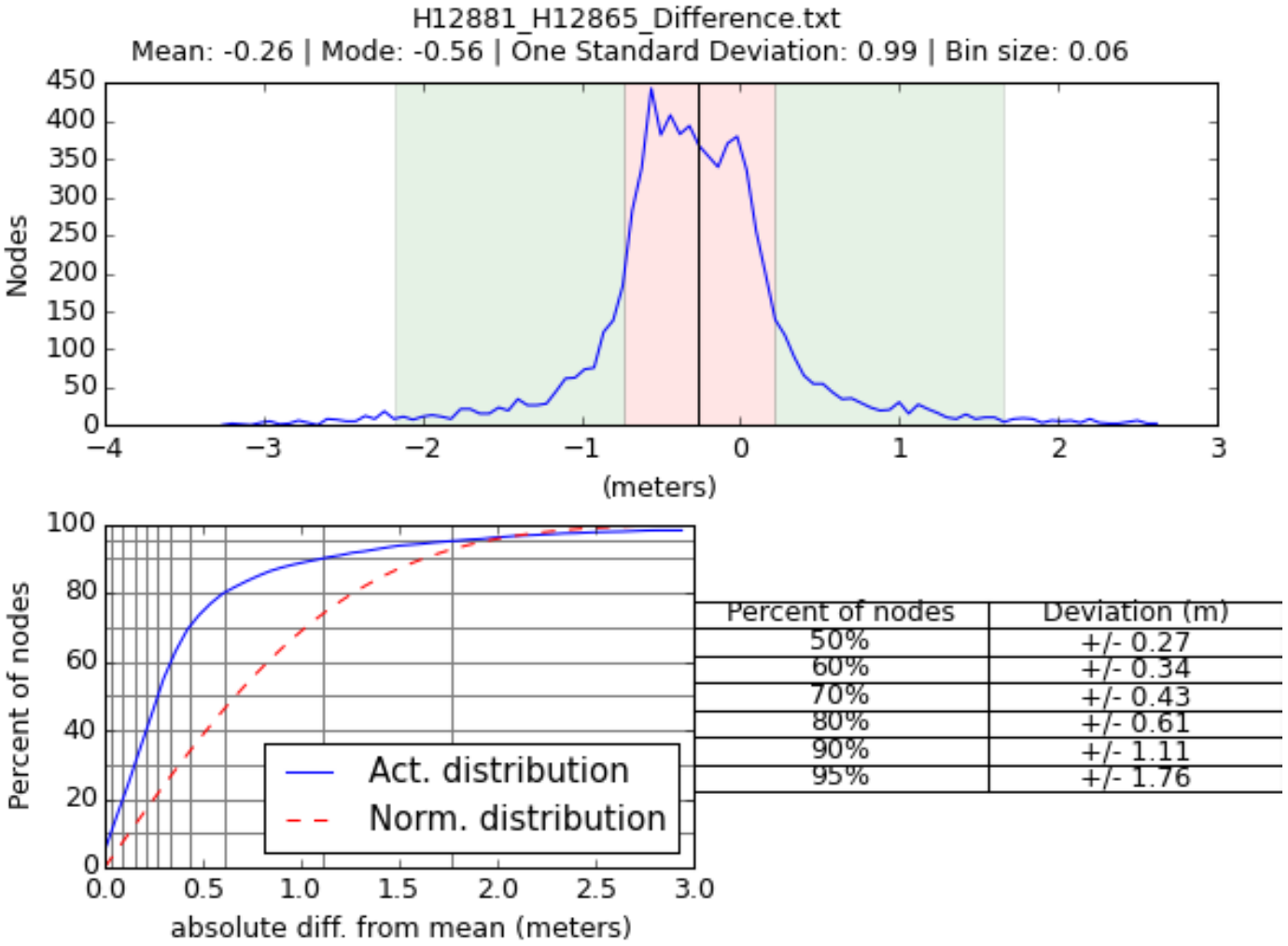


Figure 11: H12881 Junction with H12865



Percent of nodes	Deviation (m)
50%	+/- 0.27
60%	+/- 0.34
70%	+/- 0.43
80%	+/- 0.61
90%	+/- 1.11
95%	+/- 1.76

Figure 12: H12881 Junction with H12865 Statistics

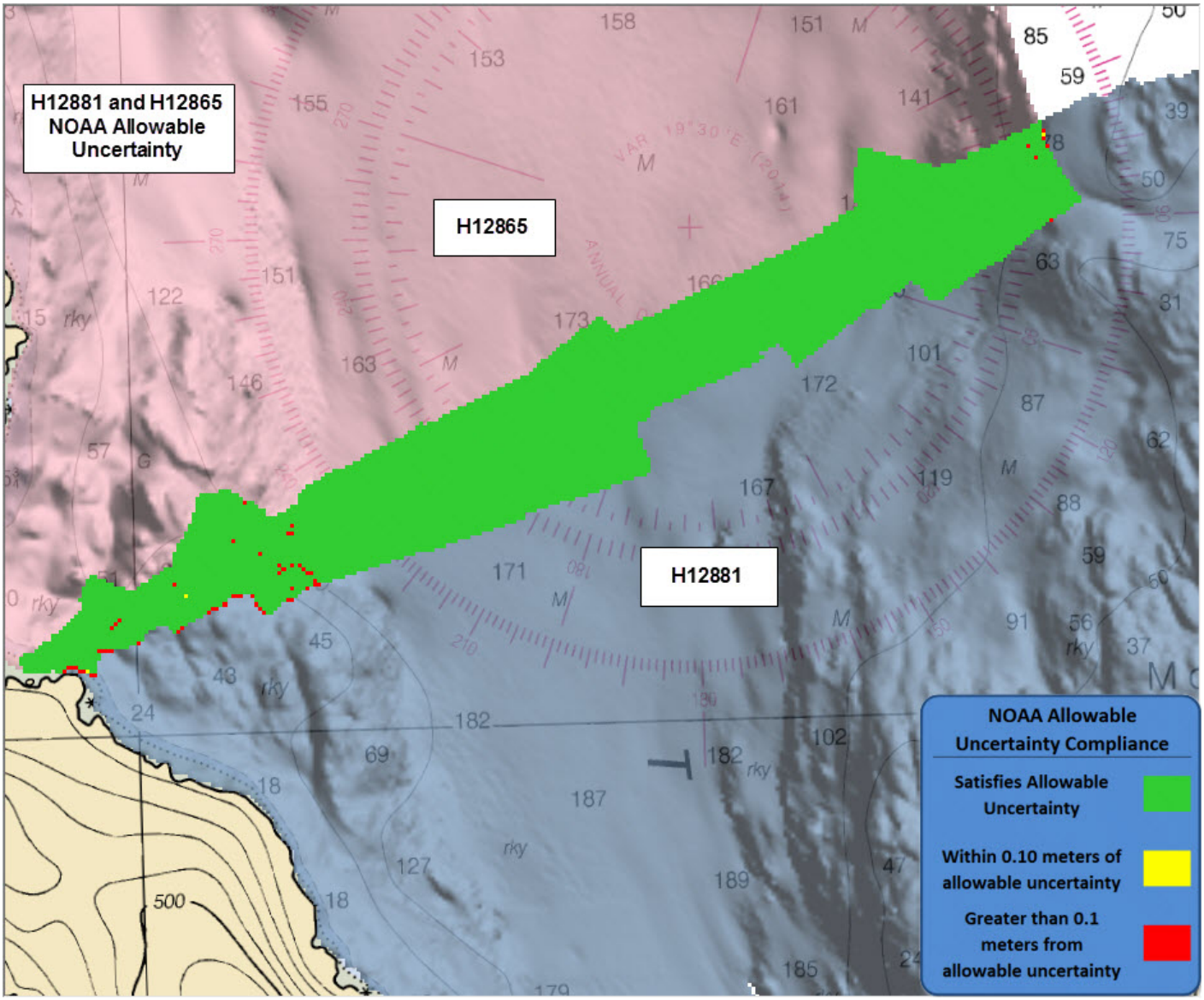


Figure 13: H12881 Junction with H12865 NOAA Allowable Uncertainty

H12881 Junction Differencing with H12865 NOAA Allowable Uncertainty

Total Nodes	Passed Nodes	Failed Nodes
7,547	7,497	50
Percentage Nodes Passed		99.34%
Percentage Nodes Failed		0.66%

Figure 14: H12881 Junction with H12865 NOAA Allowable Uncertainty Statistics

H12880

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between the 16 meter combined surfaces from H12881 and the 16 meter combined surface from H12880. A detailed graphical overview of the junction boundary can be seen in Figure 15. The statistical analysis of the difference surface shows a mean of 0.11 meters with 95% of all nodes having a maximum deviation of +/- 1.52 meters, as seen in Figure 16. In addition, a comparison surface was created between the difference surface and the allowable NOAA uncertainty (Figure 17). It was found that 99% of nodes are within allowable NOAA uncertainty (Figure 18). The largest differences are located at the edges of the junction where there were no overlapping lines for the individual surveys to provide greater density.

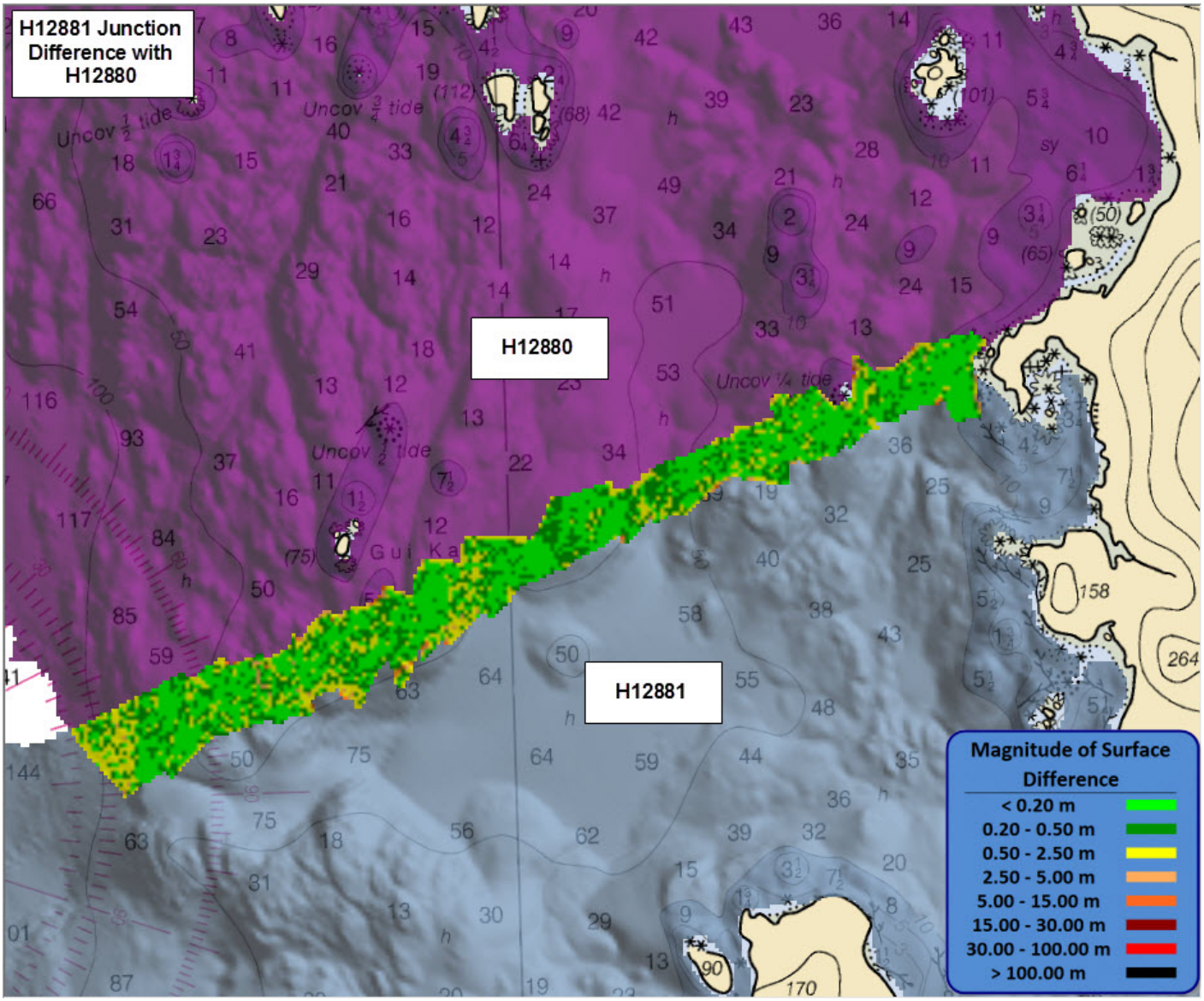
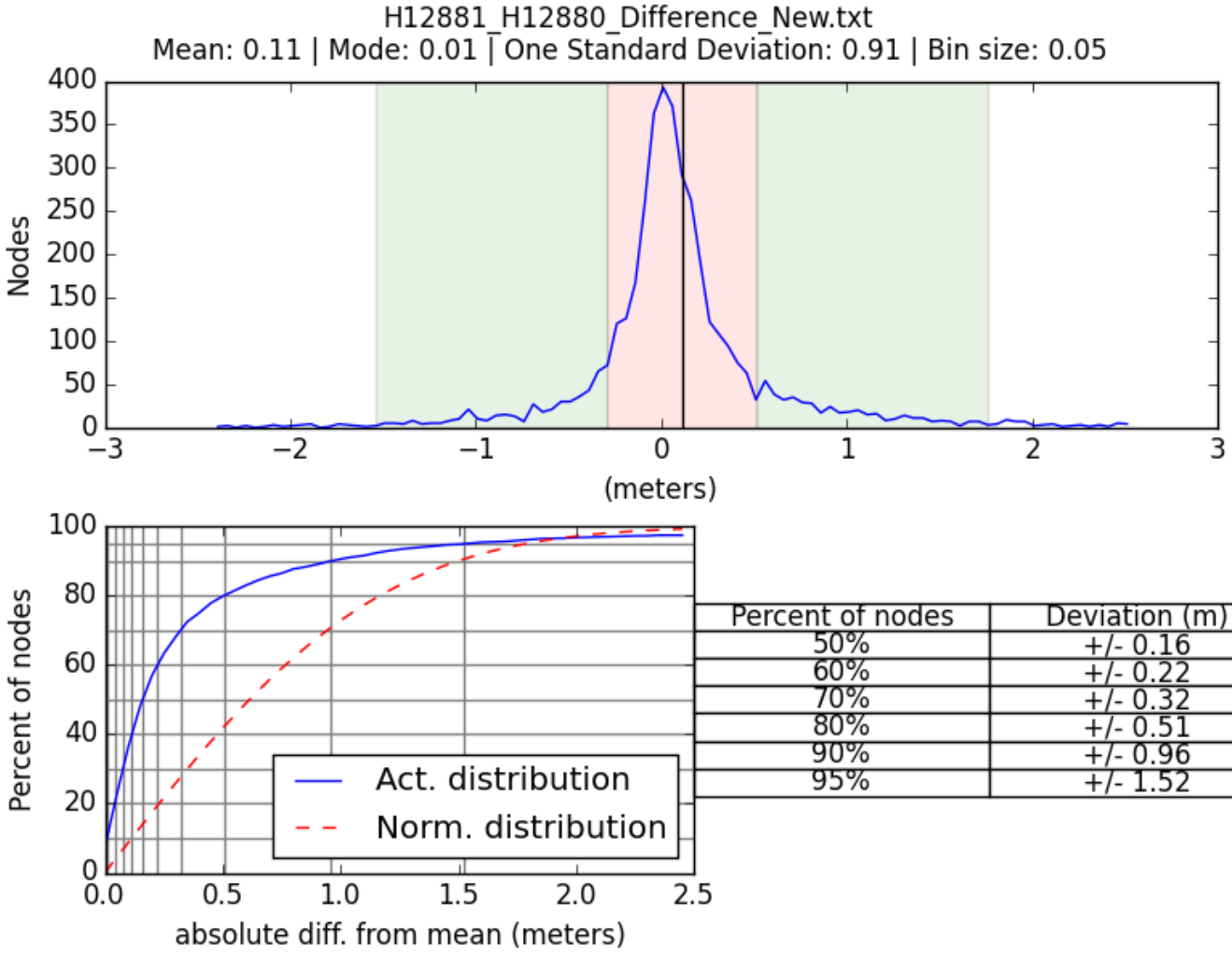


Figure 15: H12881 Junction with H12880



Percent of nodes	Deviation (m)
50%	+/- 0.16
60%	+/- 0.22
70%	+/- 0.32
80%	+/- 0.51
90%	+/- 0.96
95%	+/- 1.52

Figure 16: H12881 Junction with H12880 Statistics

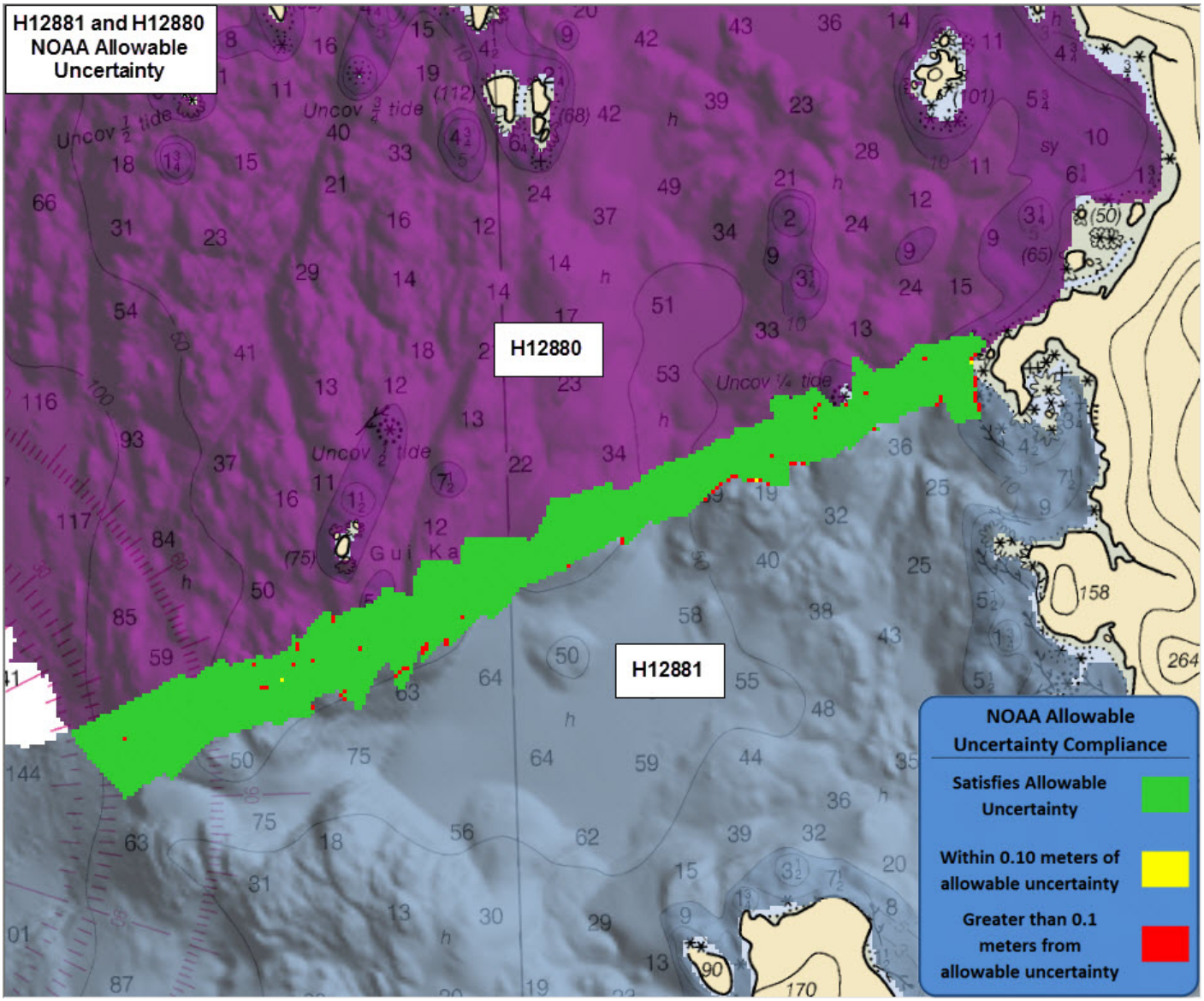


Figure 17: H12881 Junction with H12880 NOAA Allowable Uncertainty

H12881 Junction Differencing with H12880 NOAA Allowable Uncertainty

Total Nodes	Passed Nodes	Failed Nodes
4,094	4,040	54
Percentage Nodes Passed		98.68%
Percentage Nodes Failed		1.32%

Figure 18: H12881 Junction with H12880 NOAA Allowable Uncertainty Statistics

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

Sea Grass and Kelp

Kelp and sea grass were present throughout the survey area and at times, indistinguishable from the seafloor (Figure 19). In areas where they were distinguishable, the soundings on the vegetation were rejected to enable more accurate representation of the true seafloor. Where vegetation was indistinguishable, all soundings were retained. Furthermore, in some areas, patches of dense kelp prohibited safe navigation of the survey vessels. The limits of these areas were then used to define the NALL (Figure 20). Documentation can be found in the vessel boat sheets, which are located in the Separates II Digital Data folder.

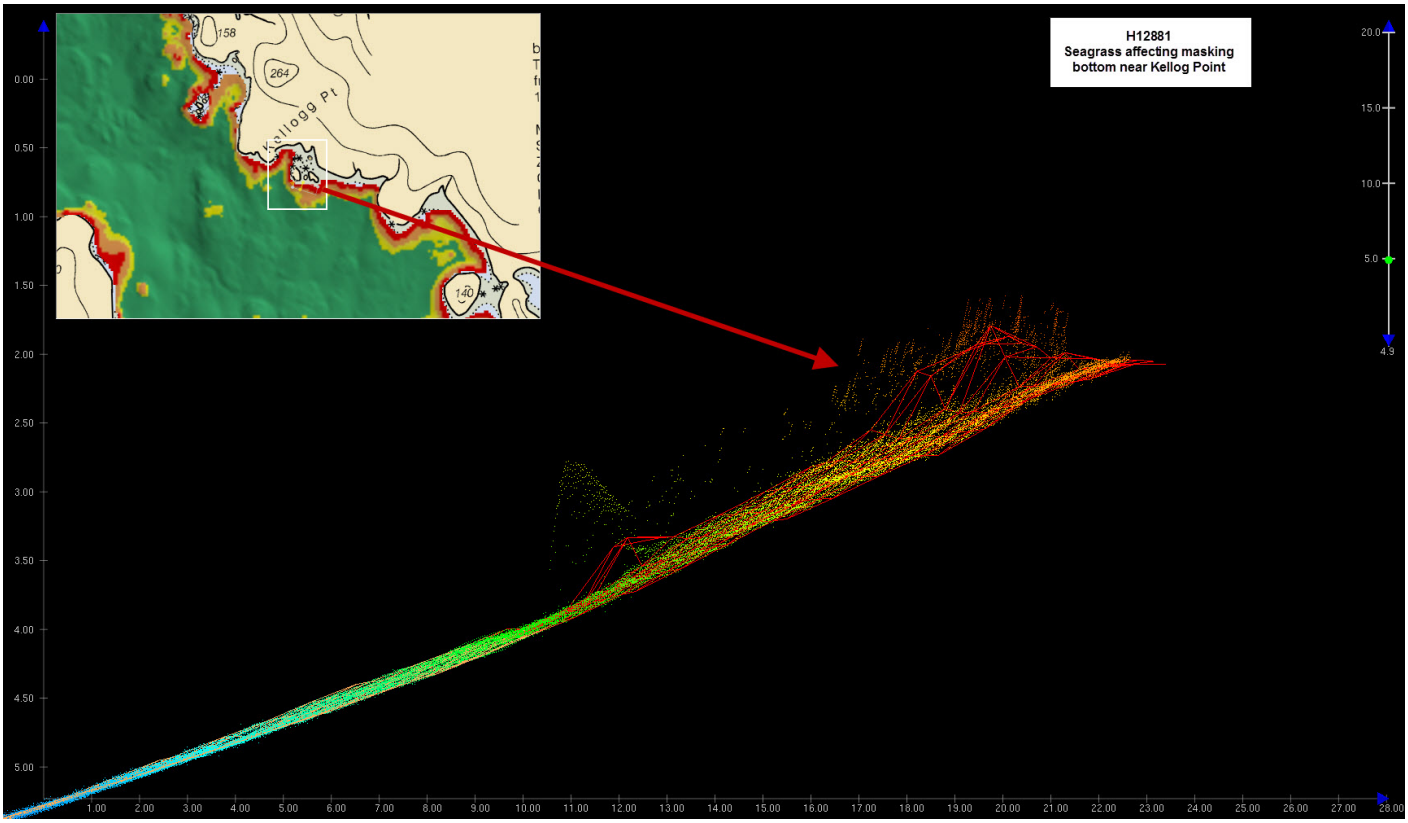


Figure 19: H12881 Representative area near Kellogg Point of kelp and sea grass masking the seafloor

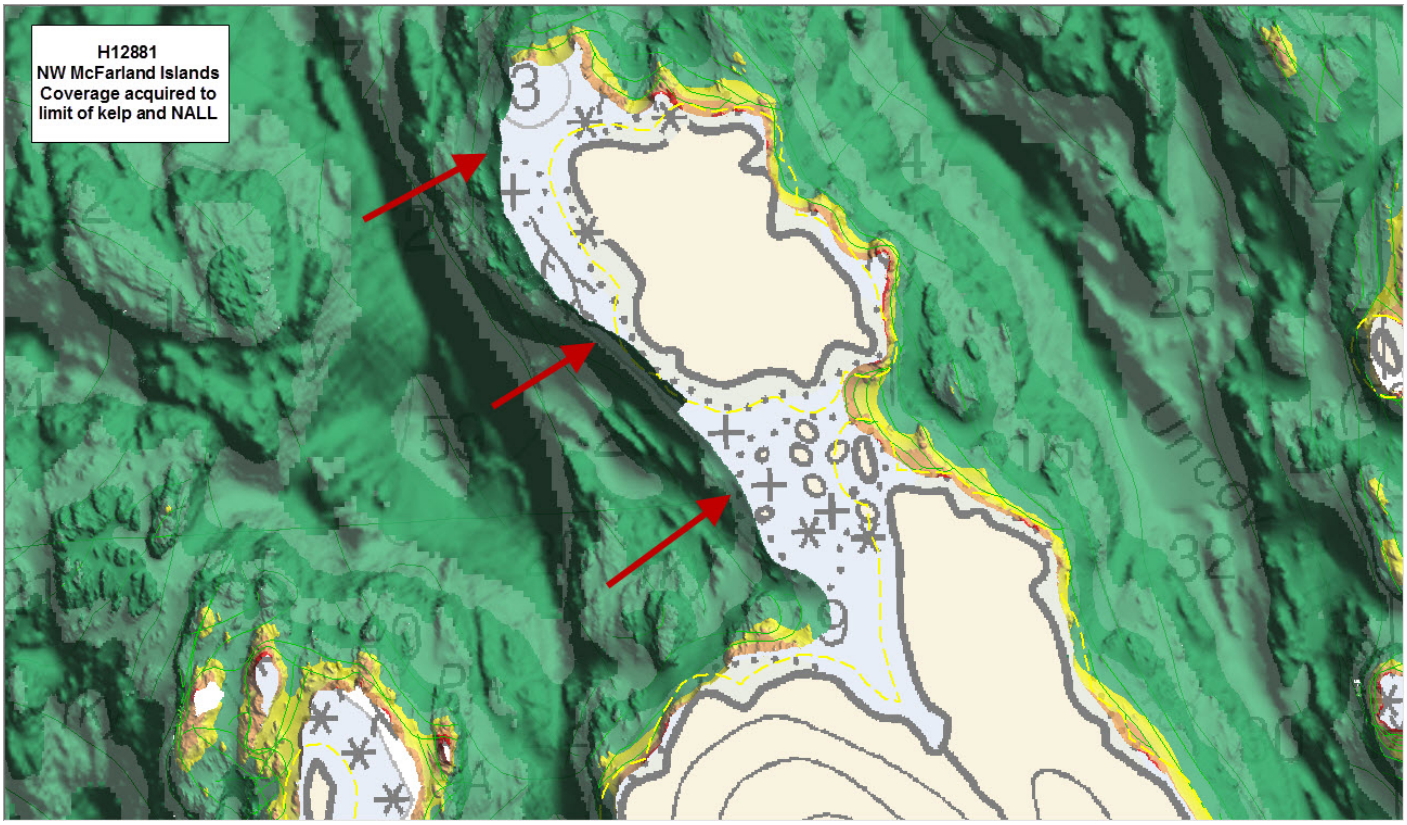


Figure 20: H12881 Kelp resulting in new NALL instead of 4m line or sheet limit

The Separates are archived at NCEI and are not appended to this report.

Sound Speed

Throughout the survey area of H12881, there are instances of soundings being affected by changes in sound speed. This resulted in the soundings generally being deeper (tracklines are bent down or "frowning") than the surrounding soundings. All casts were conducted as referenced below in Section B.2.7. In order to minimize the impact of the sound speed issues, affected lines were examined with various methods of sound speed profile association applied (Nearest in distance with time at multiple intervals, Nearest in distance and Nearest in time) and the best application of sound speed profiles was left as final. In general, soundings are within the HSSD specifications for sound speed uncertainty for their respective depths, and had a negligible impact on the Finalized CUBE surfaces. Figure 21 shows an example of affected soundings that were most likely caused by a large variation in sound speed through the water column. In this case, the general area is relatively shallow (<20m) and the sound speed changed by approximately 10 m/s within the water column. An over sampling of casts would most likely have been the only way to correct for this artifact.

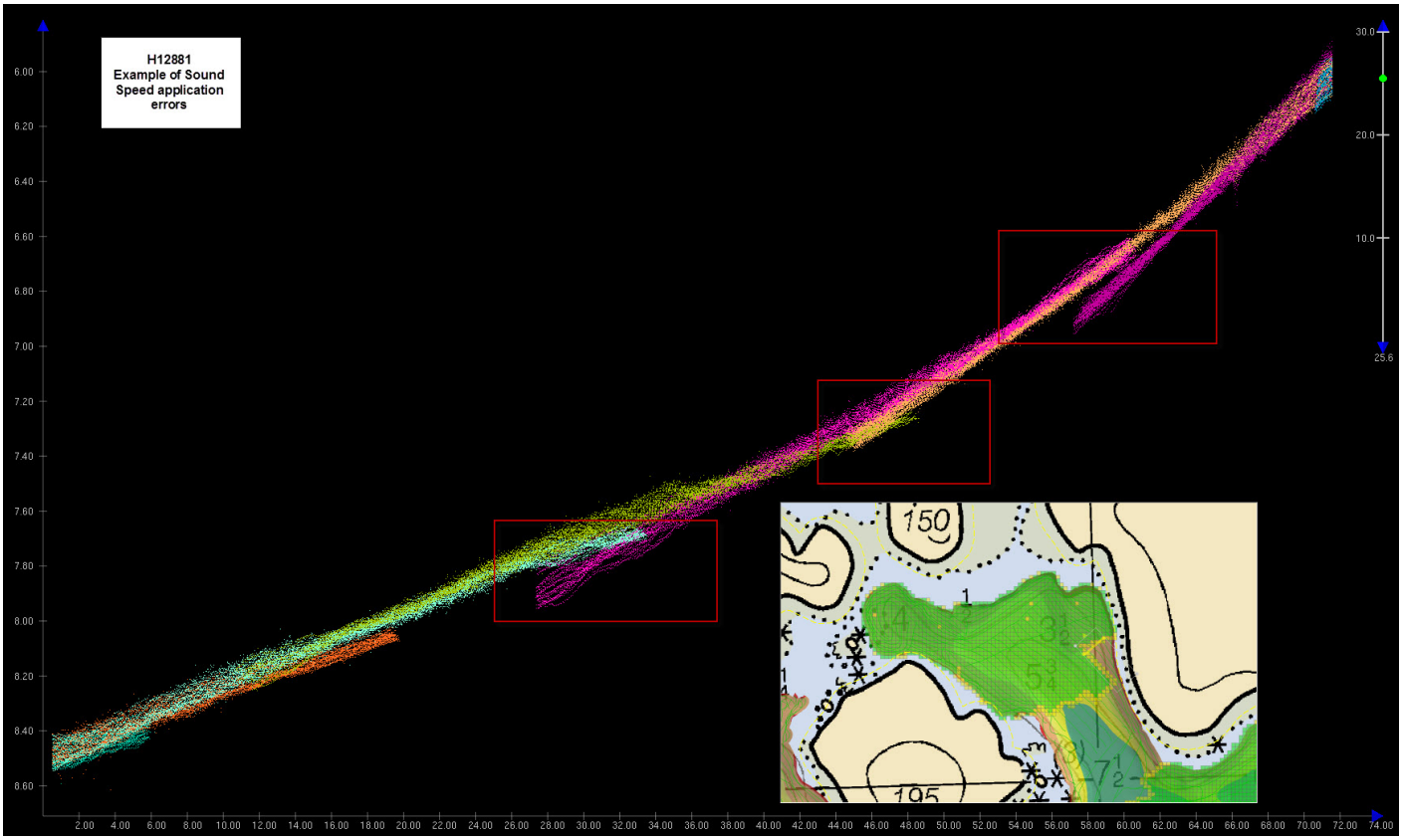


Figure 21: H12881 Sound Speed Issue 2807 Dn162

The data is adequate for charting despite the presence of sound speed errors.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Casts were conducted at a minimum of at least one per every 4 hours during launch acquisition. Casts were conducted more often in areas where the influx of freshwater had an effect on the speed of sound in the water column and when there was a change in surface sound velocity greater than two meters per second. MVP casts on S220 were conducted approximately every 15 minutes as recommend by Pydro CastTime, a software tool that determines optimum cast frequency based on observed sound speed variations. Detailed Sound Speed methods are described in the DAPR.

B.2.8 Coverage Equipment and Methods

All equipment and survey methods were used as detailed in the DAPR.

B.2.9 Holidays

H12881 data were reviewed in CARIS HIPS and SIPS for holidays in accordance with Section 5.2.2.3 of the 2016 HSSD. Seventy eight apparent holidays which meet the 3 by 3 node definition were identified via

Pydro QC Tools Holiday Finder function. This tool automatically scans finalized surfaces for holidays as defined in the HSSD. All flagged areas by Holiday Finder were examined and all apparent holidays were determined to be from areas where an adjoining surface covered the gap (e.g., a holiday in the 2m finalized surface was covered by the 1m finalized surface due to the area being shoaler than the depth range for the 2m surface), as seen in Figure 22. The numbers in red indicate the number of nodes identified as data gaps.

Figure 22: H12881 Apparent Holidays in Coverage

In many cases, the holidays are a result of not being able to ensonify the tops of rocks with multibeam. In these cases, the field unit added a rock with an unknown least depth to the final feature file. These approximate features will be forwarded for inclusion in the chart update product.

B.2.10 NOAA Allowable Uncertainty

To verify that all data meet the accuracy specifications as stated in the HSSD, a child layer titled "NOAA_Allowable_1" was created for each of the 1-meter, 2-meter, 4-meter, and 8-meter (72-100m) and "NOAA_Allowable_2" for the 8-meter (100-160m) and 16-m finalized surfaces using the equations stated in Section C. 2.1 of the DAPR. These surfaces were then analyzed using the Pydro Finalized CSAR QA tool. Figure 23 shows an overview of the NOAA Allowable Uncertainty layers in each of the surfaces. Figure 24 shows the statistics for each of the individual surfaces. It was found that at least 99% of nodes in the 1-meter, 2-meter, 4-meter, 8-meter, and 16-m grids meet or exceed NOAA Allowable Uncertainty specifications for all depths of survey H12881. For individual graphs per surface of uncertainty requirements, see the Standards Compliance Review in Appendix II.

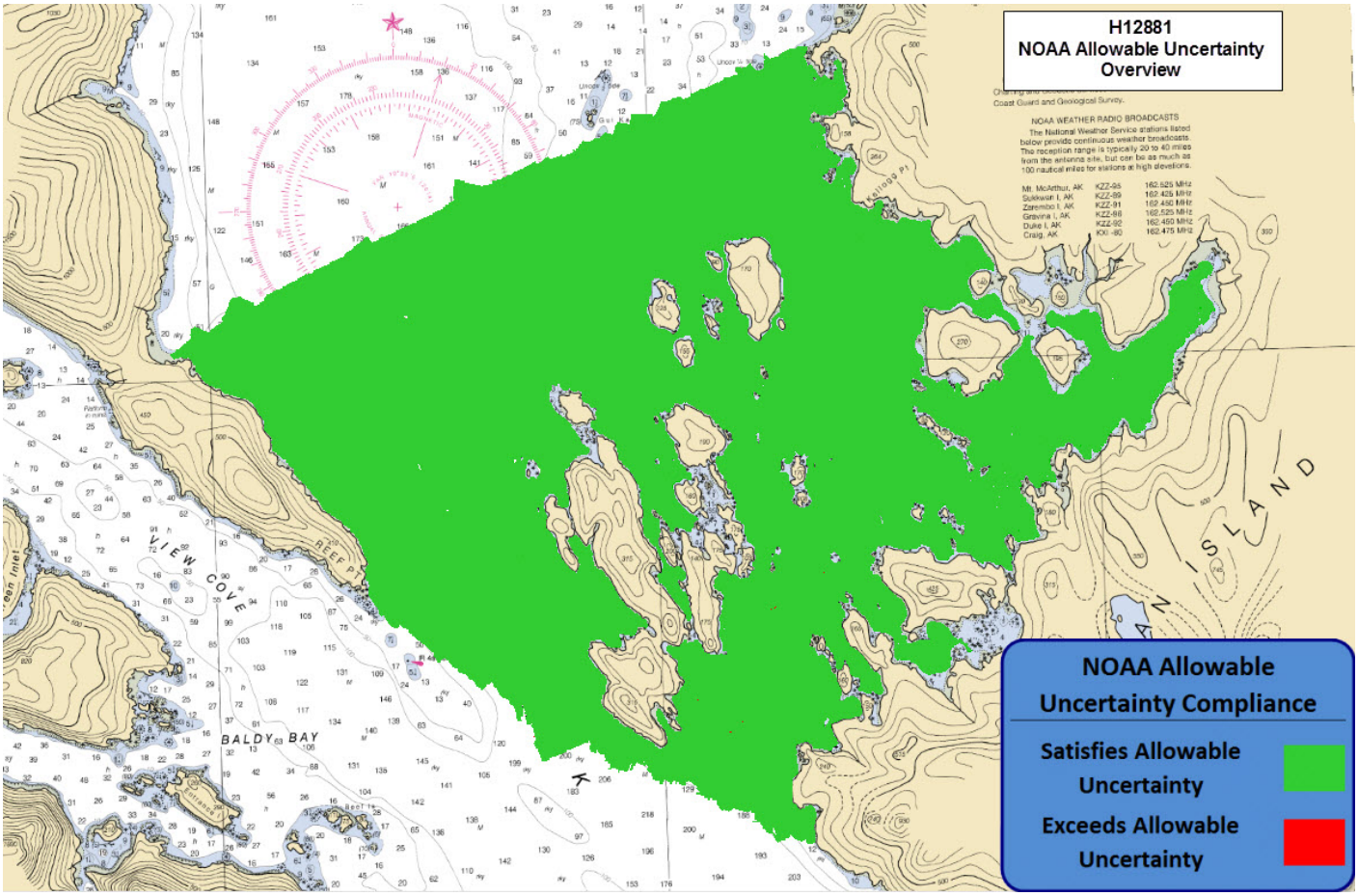


Figure 23: H12881 NOAA Allowable Uncertainty Overview

H12881 NOAA Allowable Uncertainty			
	Total Nodes	Passed Nodes	Percent Pass
1m	12,737,066	12,731,896	99.96%
2m	3,985,077	3,973,881	99.72%
4m	932,774	923,529	99.01%
8m	158,527	157,376	99.27%
16m	197,242	196,786	99.77%
	Total Nodes		18,010,686.00
	Total Nodes Pass		17,983,468.00
	Total Percent Pass		99.85%

Figure 24: H12881 NOAA Allowable Uncertainty Statistics

The Standards and Compliance Review is archived at NCEI and is not appended to this report.

B.2.11 Density

Finalized surfaces were analyzed using the Pydro Finalized CSAR QA tool and the results are shown in Figure 25 below. Density requirements for H12881 were achieved with at least 99.7% of finalized surface

nodes containing five or more soundings. For individual graphs per surface of density requirements, see the Standards Compliance Review in Appendix II.

The few nodes that did not meet density requirements are generally due to sparse data in the outer beams, especially near steep slopes and rocky areas where acoustic shadowing occurred, and at the edges of the survey limits. See Figure 26.

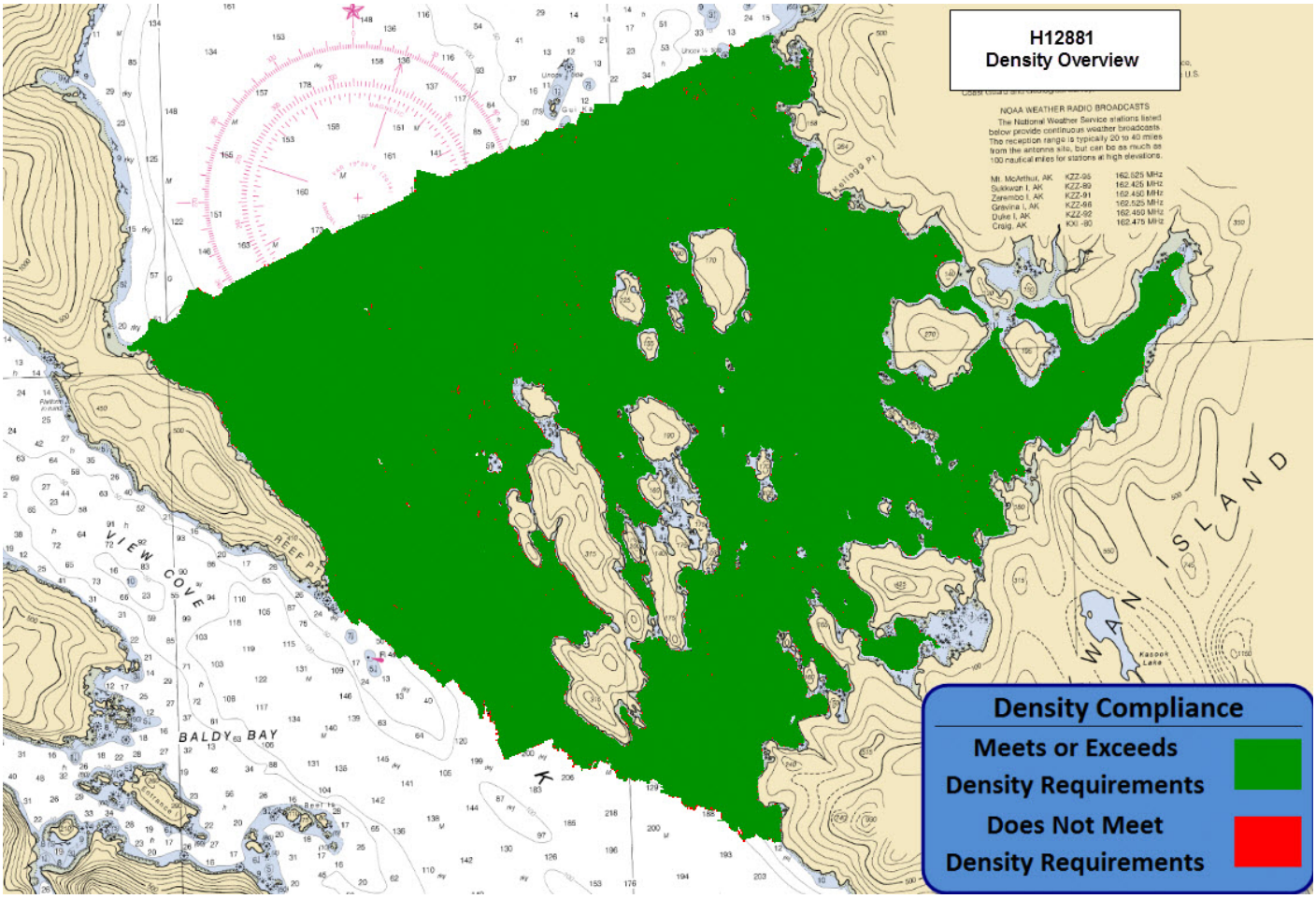


Figure 25: H12881 Density Overview

H12881 Density Statistics			
	Total Nodes	Passed Nodes	Percent Pass
1m	12,737,066	12,696,204	99.68%
2m	3,985,077	3,977,225	99.80%
4m	932,774	930,994	99.81%
8m	158,527	158,350	99.89%
16m	197,242	196,829	99.79%
	Total Nodes		18,010,686
	Total Nodes Pass		17,959,602
	Total Percent Pass		99.72%

Figure 26: H12881 Density Statistics

The Standards and Compliance Review is archived at NCEI and is not appended to this report. Reduced density in the outer beams and in steep and rocky areas is to be expected to a certain extent. The data is adequate for charting despite the reduced density in these instances.

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 was logged as .7k file for Reson 7125 data. Kongsberg EM710 stores the backscatter data in the .all file. The data have been sent to the Pacific Hydrographic Branch for processing. One line per vessel per day of acquisition was processed by the field unit for quality control.

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	9.1

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 FMGT	7.5.3

Table 10: Primary imagery data processing software

The following Feature Object Catalog was used: NOAA Extended Attribute Files V5_4

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
H12881_MB_1m_MLLW	CUBE	1 meters	-	NOAA_1m	Complete MBES
H12881_MB_2m_MLLW	CUBE	2 meters	-	NOAA_2m	Complete MBES
H12881_MB_4m_MLLW	CUBE	4 meters	-	NOAA_4m	Complete MBES
H12881_MB_8m_MLLW	CUBE	8 meters	-	NOAA_8m	Complete MBES
H12881_MB_16m_MLLW	CUBE	16 meters	-	NOAA_16m	Complete MBES
H12881_MB_1m_MLLW_Final	CUBE	1 meters	0 meters - 26 meters	NOAA_1m	Complete MBES
H12881_MB_2m_MLLW_Final	CUBE	2 meters	18 meters - 52 meters	NOAA_2m	Complete MBES
H12881_MB_4m_MLLW_Final	CUBE	4 meters	36 meters - 104 meters	NOAA_4m	Complete MBES

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12881_MB_8m_MLLW_Final	CUBE	8 meters	72 meters - 208 meters	NOAA_8m	Complete MBES
H12881_MB_16m_MLLW_Final	CUBE	16 meters	144 meters - 416 meters	NOAA_16m	Complete MBES

Table 11: Submitted Surfaces

The NOAA CUBE parameters mandated in the HSSD were used for the creation of all CUBE surfaces in Survey H12881. The surfaces have been reviewed where noisy data, or "fliers," are incorporated into the gridded solutions causing the surface to be shoaler or deeper than the true sea floor. Where these spurious soundings cause the gridded surface to be shoaler or deeper than the reliably measured seabed by greater than the maximum allowable Total Vertical Uncertainty at that depth, the noisy data have been rejected and the surface recomputed.

Flier Finder v3, part of the QC Tools package within Pydro, was used to assist the search for spurious soundings following gross cleaning. Flier Finder was run multiple times for each surface, reducing the flier height value for each consecutive run. This allowed Flier Finder to very accurately and quickly identify gross fliers, but as the flier height was reduced the effectiveness of the tool diminished. With smaller heights, Flier Finder began to incorrectly flag dynamic aspects of the seafloor such as steep drop offs and rocky areas as fliers resulting in hundreds of false positives. At this point, the hydrographer ceased using the tool and returned to manual cleaning for these dynamic regions of seafloor

In order to prevent visual data gaps between the finalized surfaces, the 1, 2, 4, 8, and 16 meter surface depths were extended for greater overlap between the surfaces. The surfaces and depth ranges are listed in Table 11. All finalized surface depth ranges were extended deeper by 6 times the surface resolution. To determine how much to expand the depth range by, the largest gap in coverage that could be found was measured in CARIS HIPS and SIPS subset editor. The distance of the gap was divided by the resolution of the surface that would cover the gap to determine how many multiples of that resolution it would take to cover that gap. This number was then multiplied by 2 to ensure that all gaps would be covered resulting in the extension of the surfaces by 6 times their resolution. All surfaces still meet the density and NOAA uncertainty requirements for their extended ranges.

As a minimal percentage by area of H12881 met the depth threshold for the 32 meter depth range, a waiver to extend the 16 meter surface depth range and not submit a 32 meter surface was granted from the Hydrographic Survey Division Operations Branch, and is located in Appendix II. All data within the extended 16 meter surface meets the coverage requirements as defined by the HSSD. This waiver also covers the extension of all grids per the methods described in the previous paragraph.

See attached correspondence regarding the surface resolution waiver.

B.5.3 Data Logs

Data acquisition and processing notes are included in the acquisition and processing logs, and additional processing such as final tide and sound velocity application are noted in the H12881 Data Log spreadsheet. All data logs are submitted digitally in the Separates I folder.

The Separates are archived at NCEI and are not appended to this report.

B.5.4 CARIS HIPS/SIPS Subset Editor Reference Surfaces

When viewing data in HIPS and SIPS Subset Editor, a video card incompatibility between the processing computer and CARIS caused visual artifacts to randomly appear as part of the displayed reference surface. Figures 27 and 28 show some of the more egregious errors observed. These issues were purely visual and did not actually correlate to the surfaces, however, they caused difficulties for the Hydrographer when identifying fliers and designating soundings.

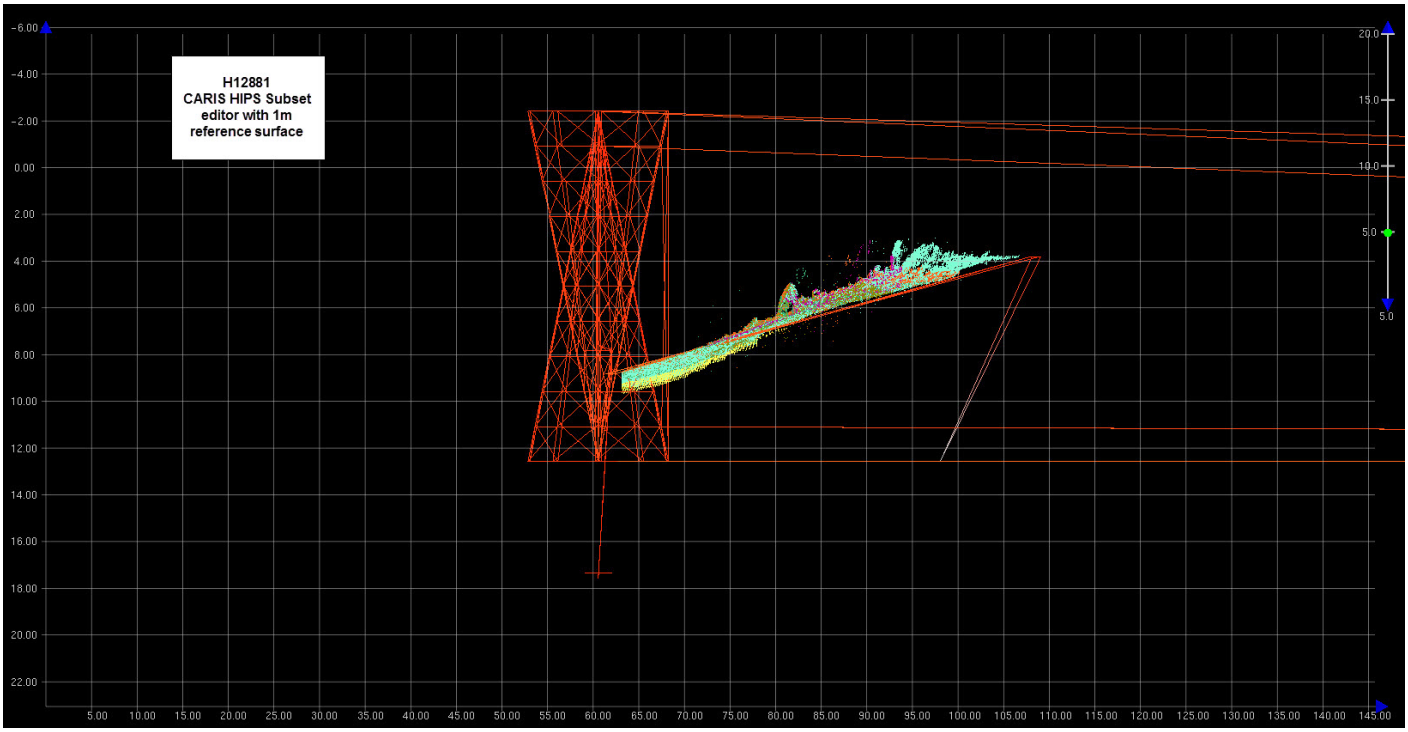


Figure 27: H12881 Caris Subset editor reference surface errors

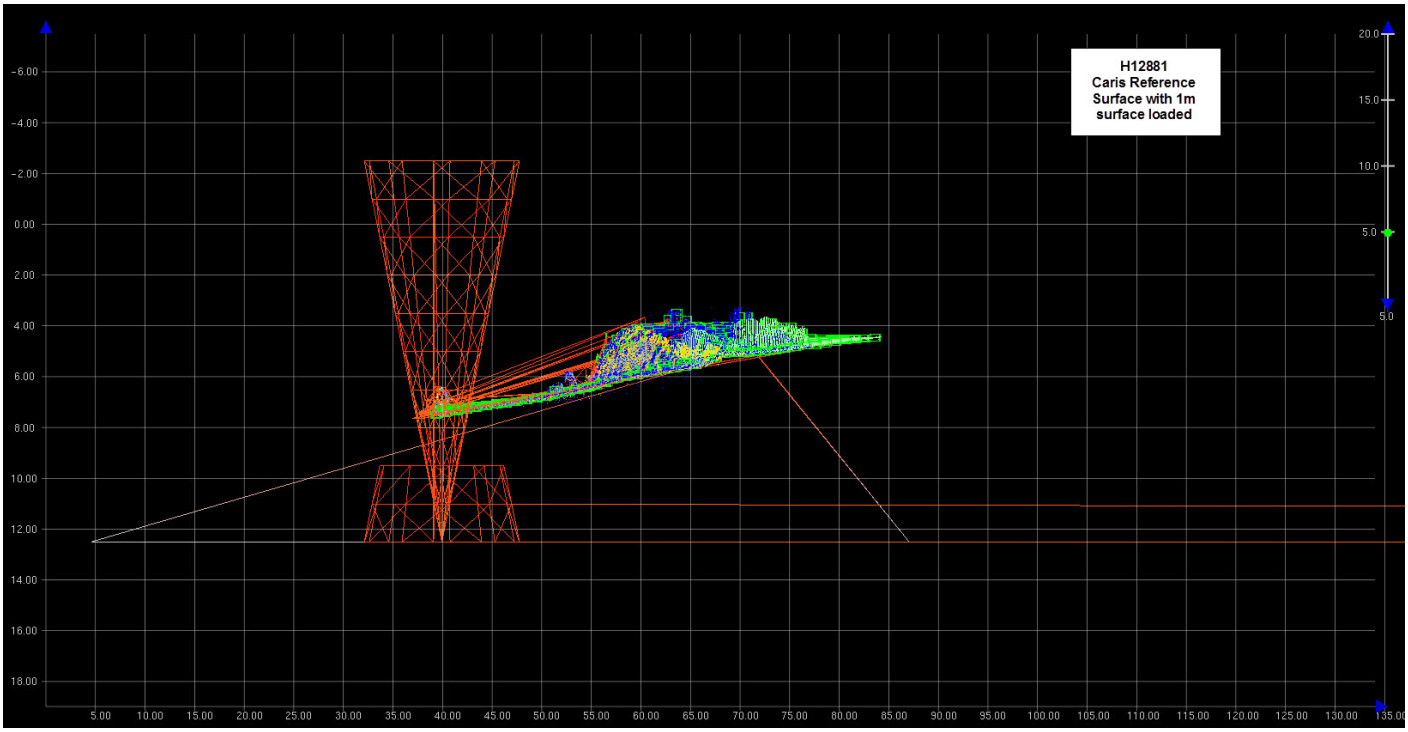


Figure 28: H12881 Caris Subset editor reference surface errors

B.5.5 Designated Soundings

Survey H12881 contains 26 designated soundings. Three designated soundings are used to represent DTONs, which are addressed in Section D.1.6 Dangers to Navigation, and the other 23 designated soundings are used to accurately represent the seafloor. Soundings were designated in accordance with the HSSD Section 5.2.1.2.3 Designated Soundings . The majority of designated soundings are located along the shoreline near Kellogg Point and Dunbar Inlet in areas where the CUBE surface did not accurately depict the true seafloor. Figure 29 shows an overview of the survey area and the location of designated soundings. Figure 30 shows an example of a designated sounding where the feature is >1m proud of the seafloor and exceeds the allowable TVU for the depth, thus satisfying the requirements stated in the HSSD.

Figure 29: H12881 Designated Soundings

Figure 30: H12881 Example of Designated Sounding Near Entrance to Dunbar Inlet

See attached DTON Report.

C. Vertical and Horizontal Control

Additional information discussing the vertical or horizontal control for this survey can be found in the accompanying Horizontal and Vertical Control Report (HVCR).

C.1 Vertical Control

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

Traditional Methods Used:

Discrete Zoning TCARI

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

Station Name	Station ID
Port Alexander, AK	9451054
Ketchikan, AK	9450460

Table 12: NWLON Tide Stations

The following subordinate water level stations were established for this survey:

Station Name	Station ID
Entrance to Windy Cove	9450251
Dunbar Inlet Tide Buoy	945BBBB

Table 13: Subordinate Tide Stations

File Name	Status
9451054.tid	Final Approved

Table 14: Water Level Files (.tid)

File Name	Status
OPRO190CORP.zdf	Preliminary
O190FA2016.tc	Final

Table 15: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 06/15/2016. The final tide note was received on 09/07/2016.

Initial reduction of acquired data to MLLW was accomplished via traditional tidal means using the discrete zoning / Tidal Constituent And Residual Interpolation (TCARI) grid provided by HSD-OPS. Following the successful application of SBETs and computation of an Ellipsoidally Referenced Zone Tide (ERZT) separation model, ERS methods were used for reducing data to MLLW. After final tides were received, the final TCARI grids / discrete zones were applied to the data and used for reducing features to MLLW.

See attached Tide Note dated September 6, 2016.

ERS Methods Used:

ERS via Poor Mans VDATUM

Ellipsoid to Chart Datum Separation File:

O190FA2016CORP_PMVDERZT_UTM-WGS84-8N_WGS84-MLLW_100m.csar

ERS methods were used as the final means of reducing H12881 to MLLW for submission. Data was initially reduced via traditional tidal means until an ERZT separation model could be calculated. This empirically derived model was then checked for consistency and compared to the Poor Man's VDatum (PMVD) separation model provided with the Project Instructions. The PMVD separation model was then vertically shifted such that the average difference between these two separation models is zero. This vertical shift de-biases the PMVD separation model, correcting for local offsets that cannot be effectively modeled by the PMVD. In areas where the PMVD model did not have sufficient coverage such as near shore areas, the ERZT separation model was appended to the PMVD model creating the composite ERZT/PMVD separation model listed above and used to reduce H12881 to MLLW. For further information see the ERS Capability Memo, submitted under a separate cover.

See attached ERS Approval Memo.

C.2 Horizontal Control

The horizontal datum for this project is Word Geodetic System 1984 (WGS84).

The projection used for this project is UTM Zone 8 North.

The following PPK methods were used for horizontal control:

Single Base

Vessel kinematic data were post-processed using Applanix POSPac processing software and Single Base Positioning methods described in the DAPR. Smoothed Best Estimate of Trajectory (SBET) and associated error (RMS) data were applied to all MBES data in CARIS HIPS.

For further details regarding the processing and quality control checks performed, see the H12881 POSPAC Processing Logs spreadsheet located in the Separates folder. See also the OPR-O190-FA-16 Horizontal and Vertical Control Report (HVCR), submitted under a separate cover.

Hydrographic Technical Directive (HTD) 2016-3, which revises the horizontal datum requirement to NAD83, was released after acquisition was completed for OPR-O190-FA-16. The field unit conferred with HSD-OPS and determined no waiver was required to maintain WGS84 as the datum for submission. This correspondence has been included in Appendix II.

The following user installed stations were used for horizontal control:

HVCR Site ID	Base Station ID
9677	Larson

Table 16: User Installed Base Stations

The Separates and HVCR are archived at NCEI and are not appended to this report. See attached correspondence regarding HTD 2016-3.

Differential correctors from the US Coast Guard beacon at Annette Island (323kHz) and Level Island (295kHz) were used during real time acquisition when not otherwise noted in the acquisition logs, and were the sole method of positioning of detached positions (DP) and bottom samples.

The following DGPS Stations were used for horizontal control:

DGPS Stations
Annette Island, AK (323kHz)
Level Island, AK (295kHz)

Table 17: USCG DGPS Stations

C.3 Additional Horizontal or Vertical Control Issues

3.3.1 Vertical Offsets

During post-acquisition analysis, vertical offsets were discovered in data acquired by launch 2806 on multiple days. These offsets varied depending on time and location, but were were generally 0.20 meters. This offset is only present in the data when reduced to MLLW via ellipsoidal methods (see Section C.1) and not when reduced via traditional tidal methods as shown in Figure 31. All SBETS on the affected days were re-processed and re-applied, however the offset remained in the data. As this offset also varies internally within 2806 data it was determined the offset was not caused by any static biases within the acquisition and processing work flow. Due to the offset being random in nature and within allowable uncertainty, the Hydrographer considers all impacted 2806 data to remain adequate to supersede previous data.

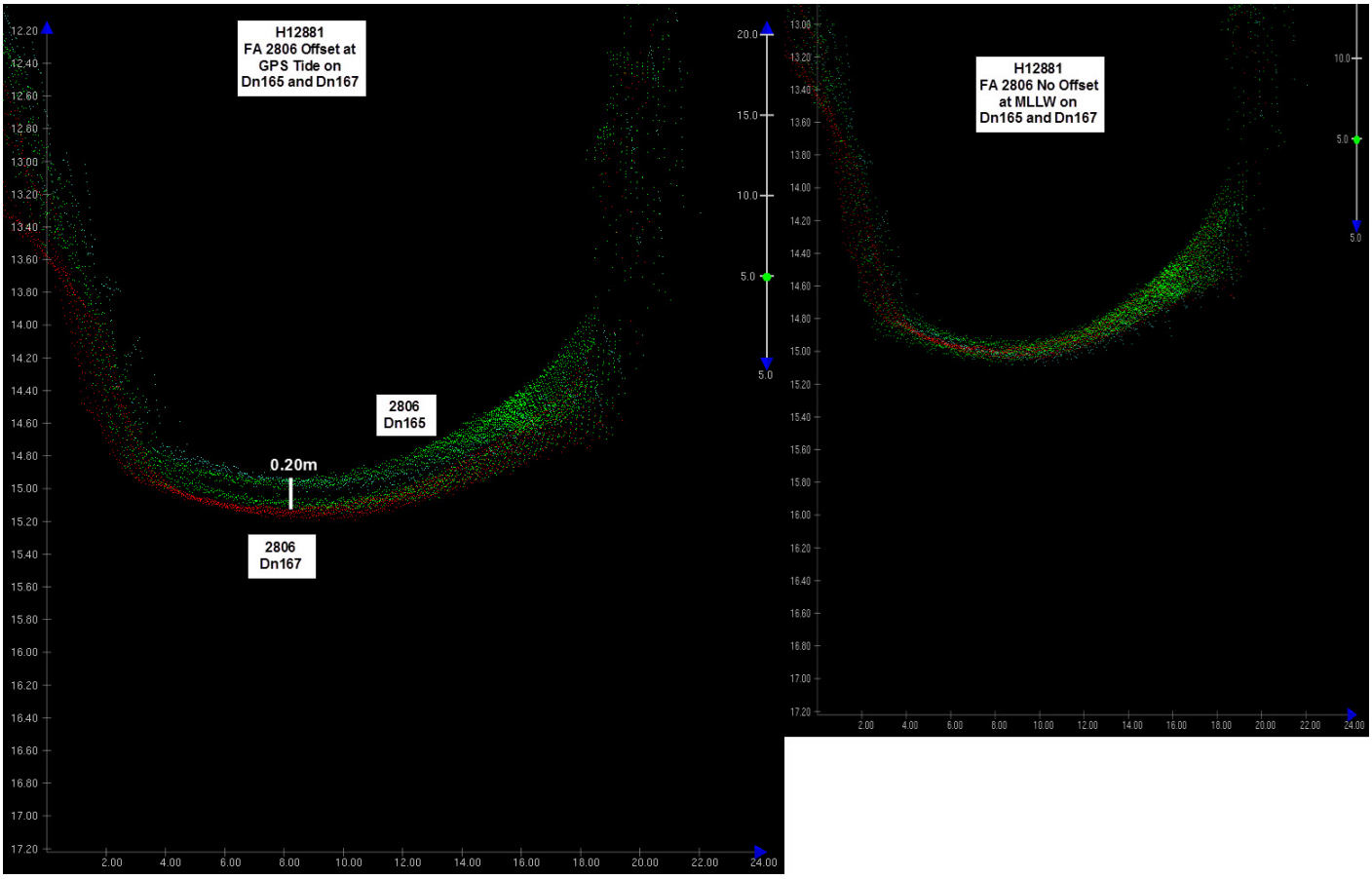


Figure 31: H12881 Vertical Offset of Data From FA 2806 DN165 and DN167

D. Results and Recommendations

D.1 Chart Comparison

A comparison was performed between survey H12881 and charts 17407 and 17408 as well as ENC US5AK4DM, and US5AK4EM using CARIS HIPS and SIPS sounding and contour layers derived from the 16m combined surface. The contours and soundings were overlaid on the charts to assess differences between the surveyed soundings and charted depths. ENCs were compared to a 16m combined grid by extracting all soundings from the chart and creating a TIN which was differenced to the combined surface.

All data from H12881 should supersede charted data. In general, surveyed soundings do not agree with the majority of charted depths. A full discussion of the disagreements follows below.

D.1.1 Raster Charts

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

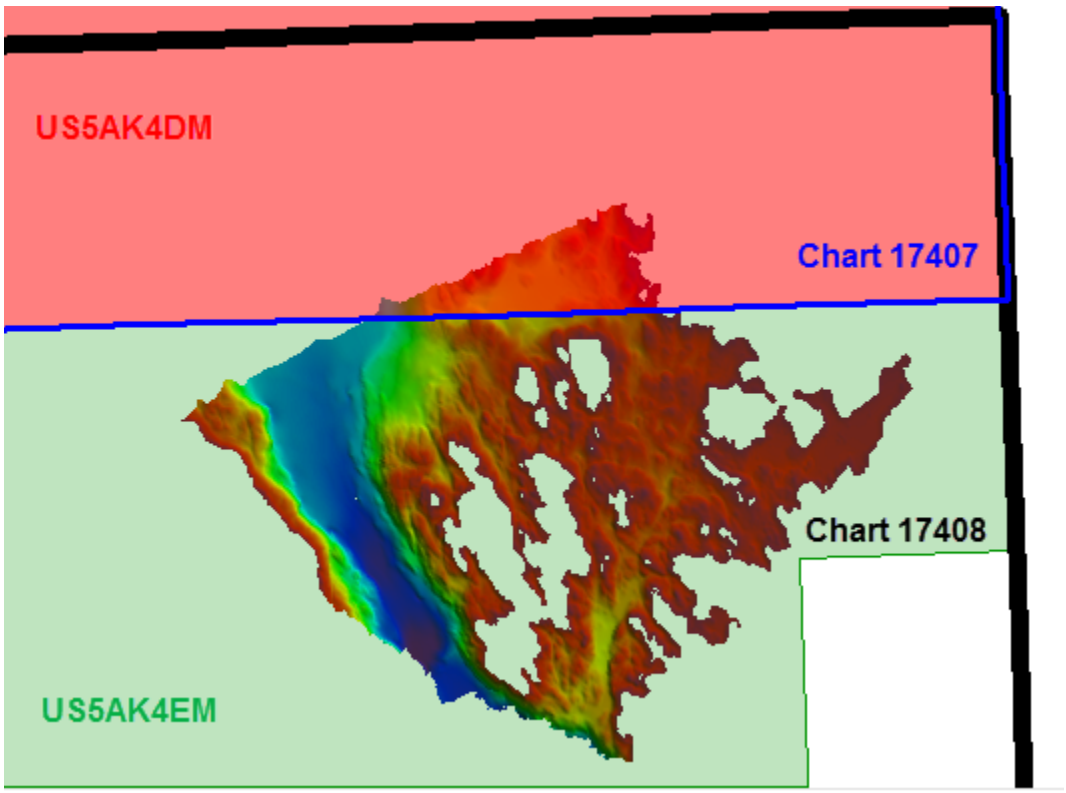
Chart	Scale	Edition	Edition Date	LNM Date	NM Date
17407	1:40000	16	12/2014	09/06/2016	08/20/2016

Table 18: Largest Scale Raster Charts

17407

The charted soundings and contours of Chart 17407 are identical to those found on ENC US5AK4DM. As such, all discussions regarding comparisons between surveyed soundings and charted depths are covered under the ENC US5AK4DM discussion below.

The field unit did not perform a chart comparison with chart 17408. Chart 17407 does not fully cover the entirety of the survey area. The following is the chart comparison performed by the reviewer. Chart 17408 and survey H12881 show very good agreement with majority of the soundings agreeing within 1-2 fathoms.



Boundaries of ENC and RNC Coverage

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?
US5AK4DM	1:40000	2	07/01/2016	05/12/2015	NO
US5AK4EM	1:40000	1	08/15/2016	05/14/2015	NO

Table 19: Largest Scale ENCs

US5AK4DM

While individual soundings generally agree within 1-2fm, the overall chart comparison between survey H12881 and ENC US5AK4DM showed large areas of disagreement. A difference surface was created from the H12881 16m combined surface and a 16m TIN created from the combined soundings on both ENC US5AK4DM and US5AK4EM. Figure 33 shows that the majority of the charted depths on the ENC are deeper than the surveyed soundings from H12881. Overall, 95% of nodes have a difference of +\- 40.49m with a mean difference of 2.38m when compared to the charted depths, as seen in Figure 34.

Contours from H12881 are in a general agreement with charted contours on ENC US5AK4DM with the exception of the missing 50 fathom and 100 fathom contours as shown in Figure 35. These contours are present in US5AK4EM and simply do not extend north into US5AK4DM. The Hydrographer recommends adding these contours to ENC US5AK4DM as to provide continuity to the mariner.

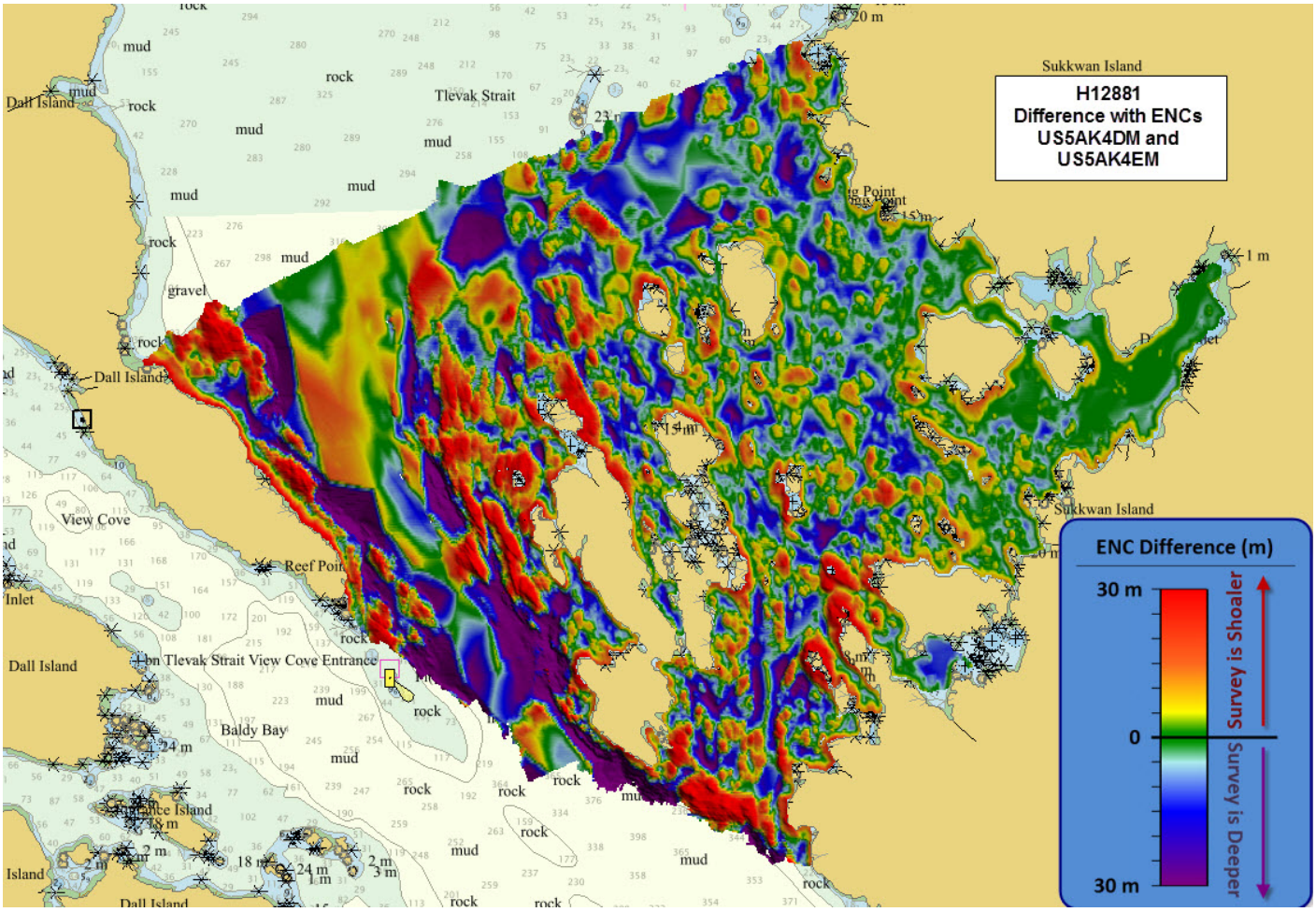
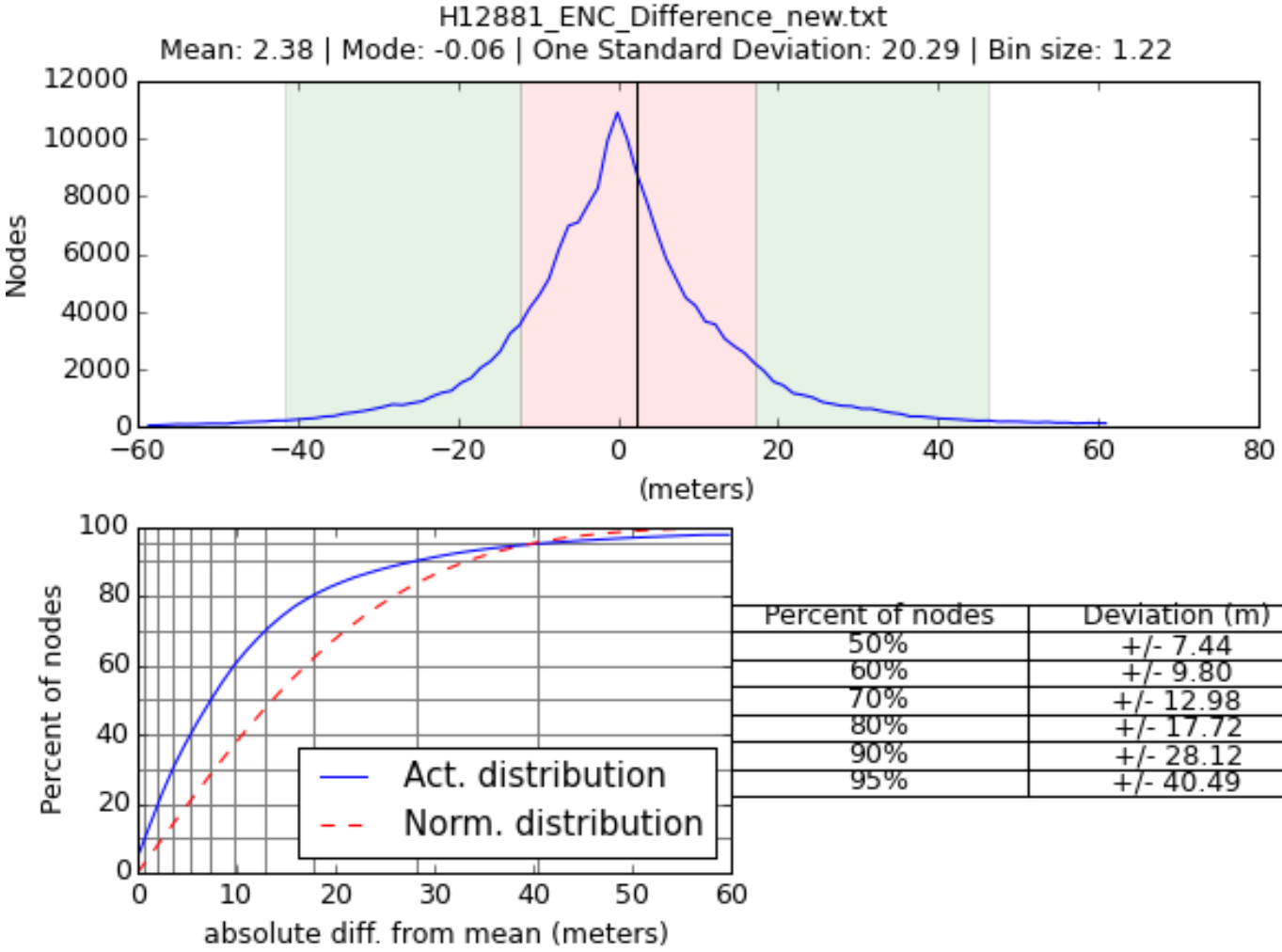


Figure 32: H12881 Surface difference to US5AK4DM and US5AK4EM



Percent of nodes	Deviation (m)
50%	+/- 7.44
60%	+/- 9.80
70%	+/- 12.98
80%	+/- 17.72
90%	+/- 28.12
95%	+/- 40.49

Figure 33: H12881 ENC Difference comparison statistics

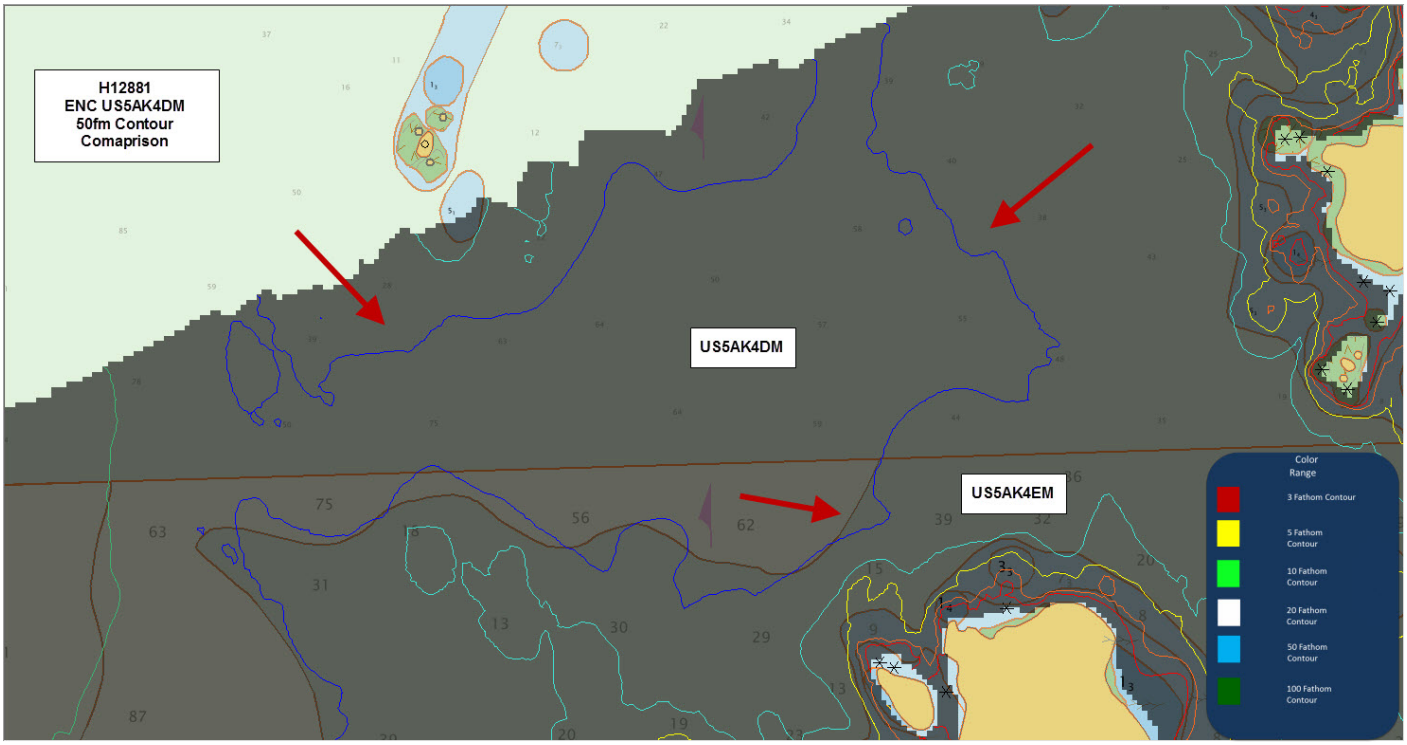


Figure 34: H12881 Recommended Addition of 50fm Contour

US5AK4EM

As discussed under ENC US5AK4DM and shown in Figure 33 above, while individual soundings match within 1-2fm, the overall chart comparison between survey H12881 and ENC US5AK4EM showed large and varying areas of disagreement. An example of these differences is shown in Figure 35 near Sukkwan Island where differences range from 8 fathoms deeper to 7 fathoms shoaler in the same relative geographic location. This is indicative of the trends throughout the survey area for H12881 and highlights the need for updated charts in the area.

Contours from H12881 are in a general agreement with charted contours on ENC US5AK4EM as shown in Figure 36. The largest differences are a lack the 20 fathom contour and lack of detail in the 10 fathom, 5 fathom, and 3 fathom contours as seen in Figures 36, 37, and 38, respectively. The Hydrographer recommends adding these contours to ENC US5AK4EM as to provide additional information to the mariner.

Figure 35: H12881 Sounding Discrepancies with ENC US5AK4EM

Figure 36: H12881 Contour Comparison and Recommend Addition of 20fm Contour

Figure 37: H12881 Proposed addition of 10fm contour to US5AK4EM in North East McFarland Islands

Figure 38: H12881 Proposed addition of 5fm and 3fm contour to US5AK4EM in Dunbar Inlet

D.1.3 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.4 Charted Features

All assigned features were addressed and are included in the H12881_Final_Feature_File.

D.1.5 Uncharted Features

Survey H12881 contains 101 new features that are addressed in the H12881_Final_Feature_File. Of these features, there are 7 new Obstructions; 16 new Seabed Areas; 65 new Underwater Rocks of which, 3 are submitted as DTONs; 8 new Kelp features; 1 new land area and 4 new land elevations.

D.1.6 Dangers to Navigation

The following DTON reports were submitted:

DTON Report Name	Date Submitted
H12881_DTON	2016-08-05

Table 20: DTON Reports

Three Dangers to Navigation (DTONs) were found within the limits of survey H12881, and were reported to the Marine Chart Division on August 05, 2016. Two rocks exist in the NE corner of Dunbar Inlet. Their respective depths are 1.5 and 1.25 fathoms. Two DTONs were created as the rocks are approximately 56m apart, which is greater than the NOS HSSD requirement of 2mm at survey scale. The shoaler of the two rocks is used as the least depth for a new rocky foul area submitted in the H12881_Final_Feature_File. See Figures 40 and 41 for visualizations. The third DTON is located on a 4 1/2 fathom charted depth at the Eastern edge of the entrance to Dunbar Inlet. The least depth is 1.5 fathoms. Figures 43 and 44 show chart location and a subset view respectively. Danger to Navigation Reports are included in Appendix II of this report.

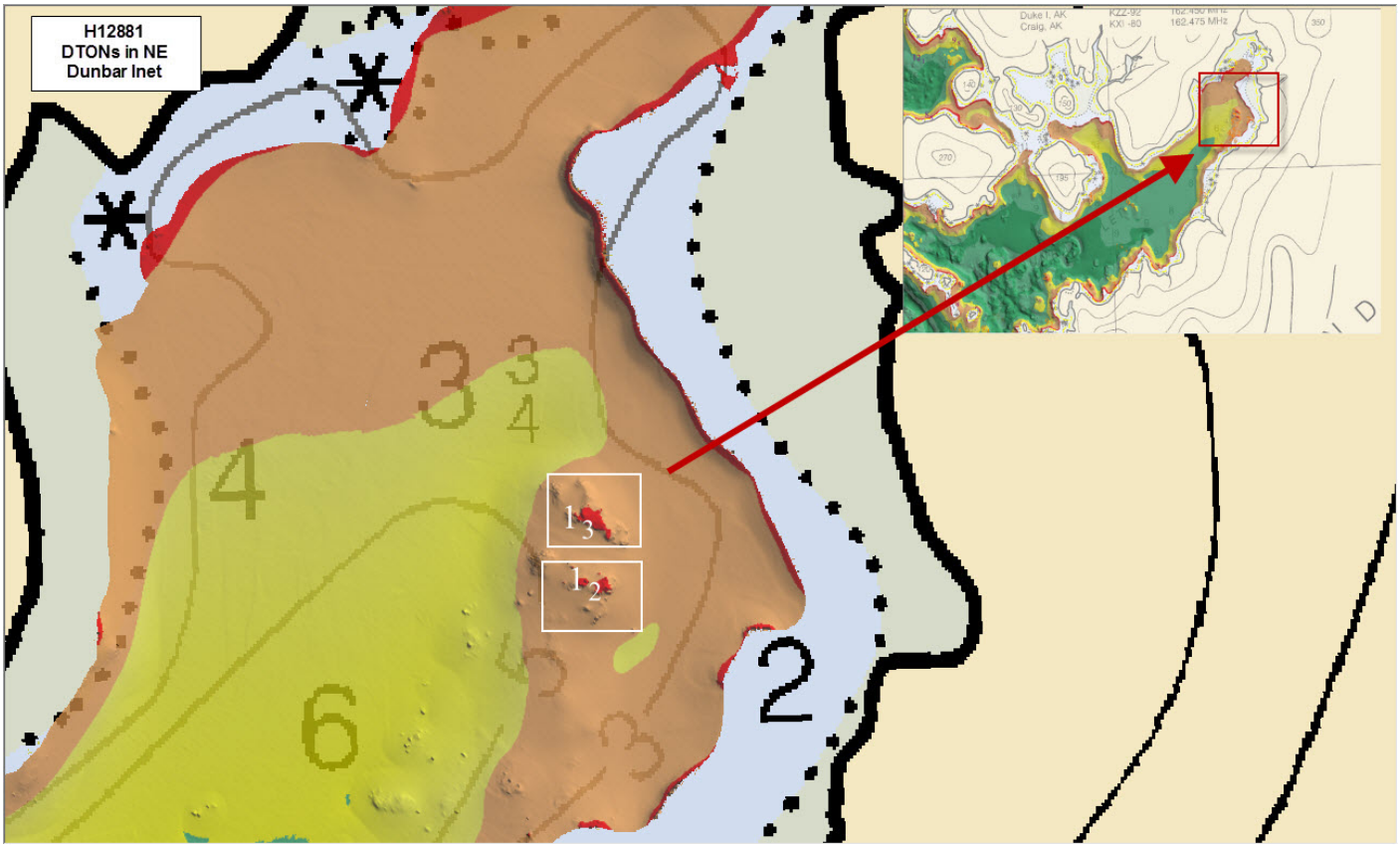


Figure 39: H12881 Chart 17408 location of DTONs in NE Dunbar Inlet

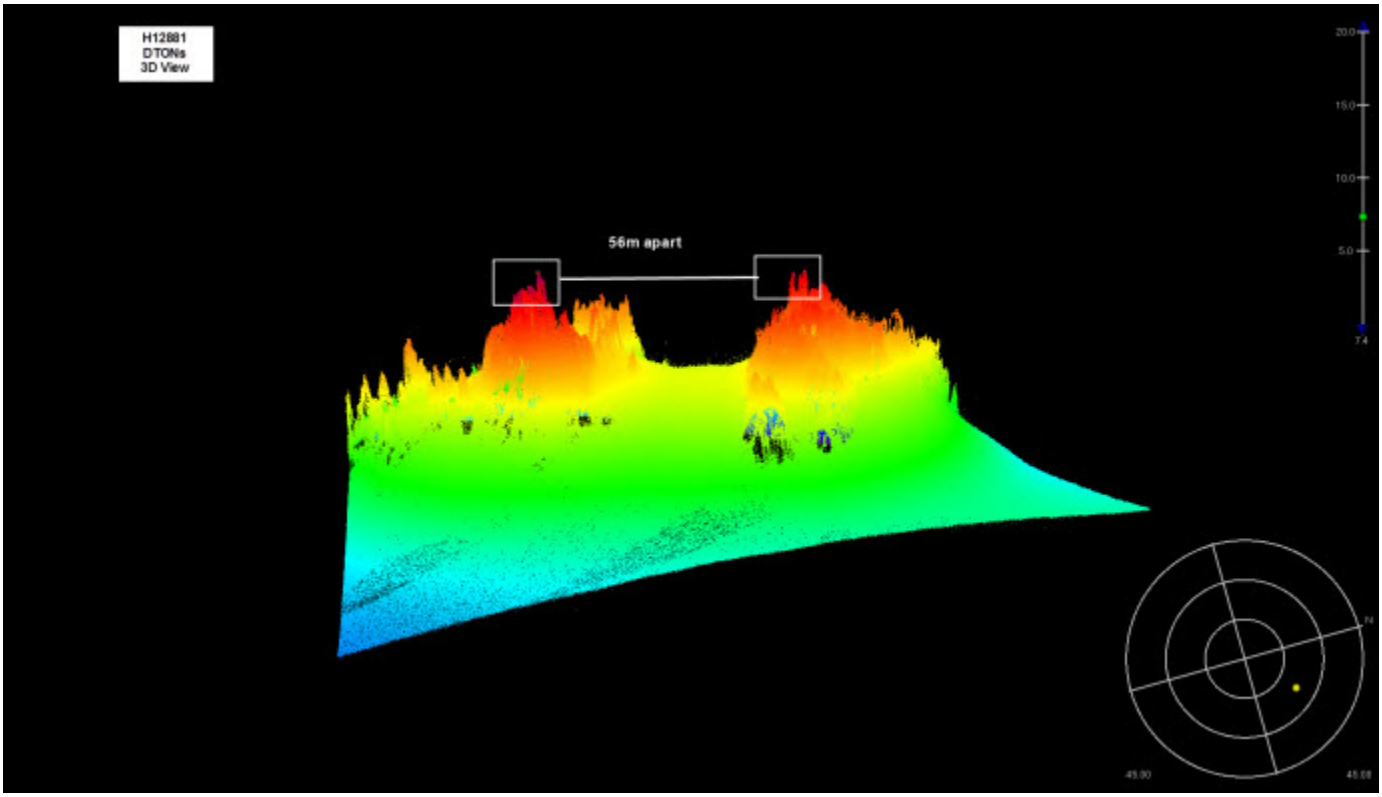


Figure 40: H12881 1.5fm and 1.25fm DTONs 3D subset view

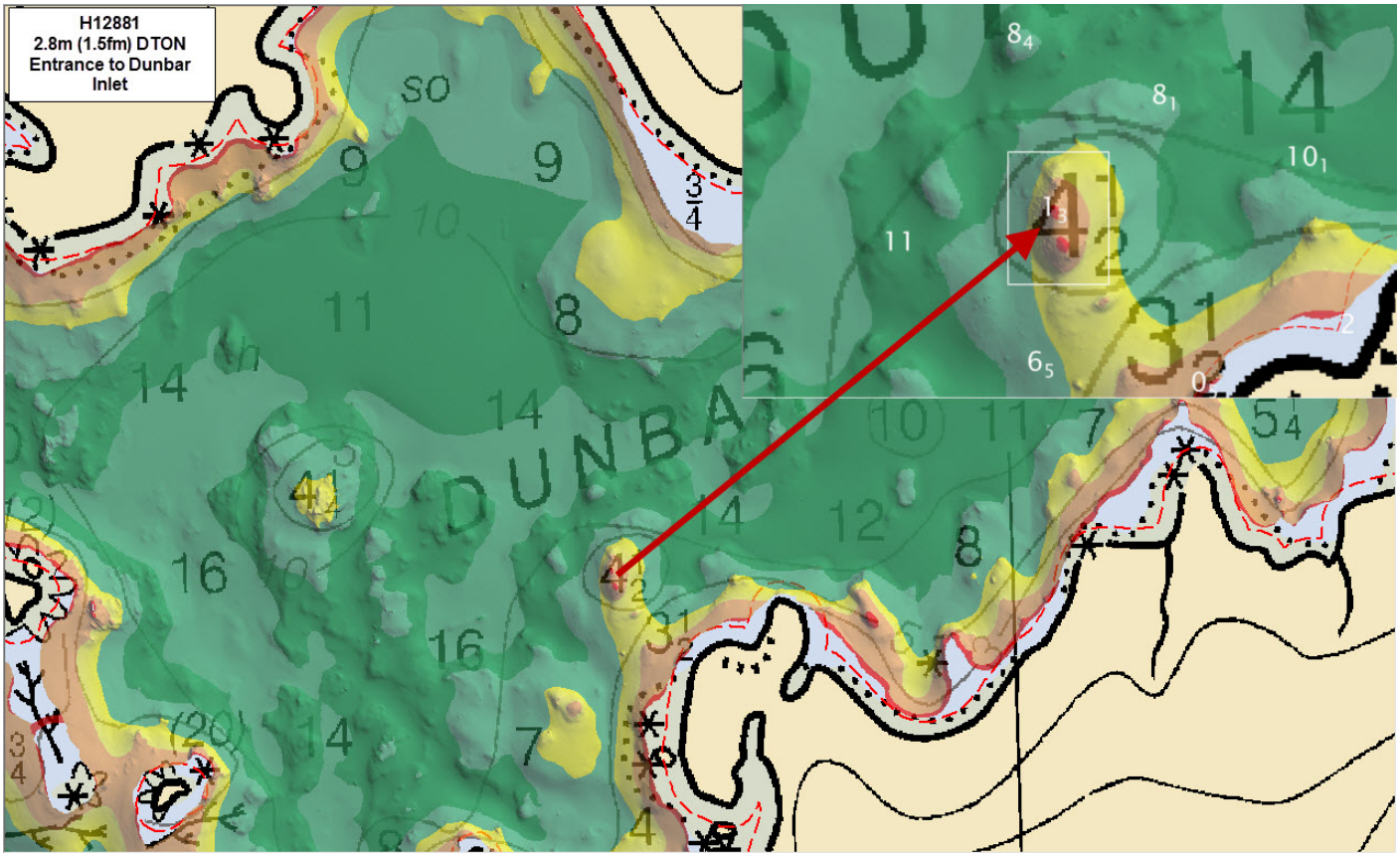


Figure 41: H12881 Chart 17408 location of DTONs at Eastern Entrance to Dunbar Inlet

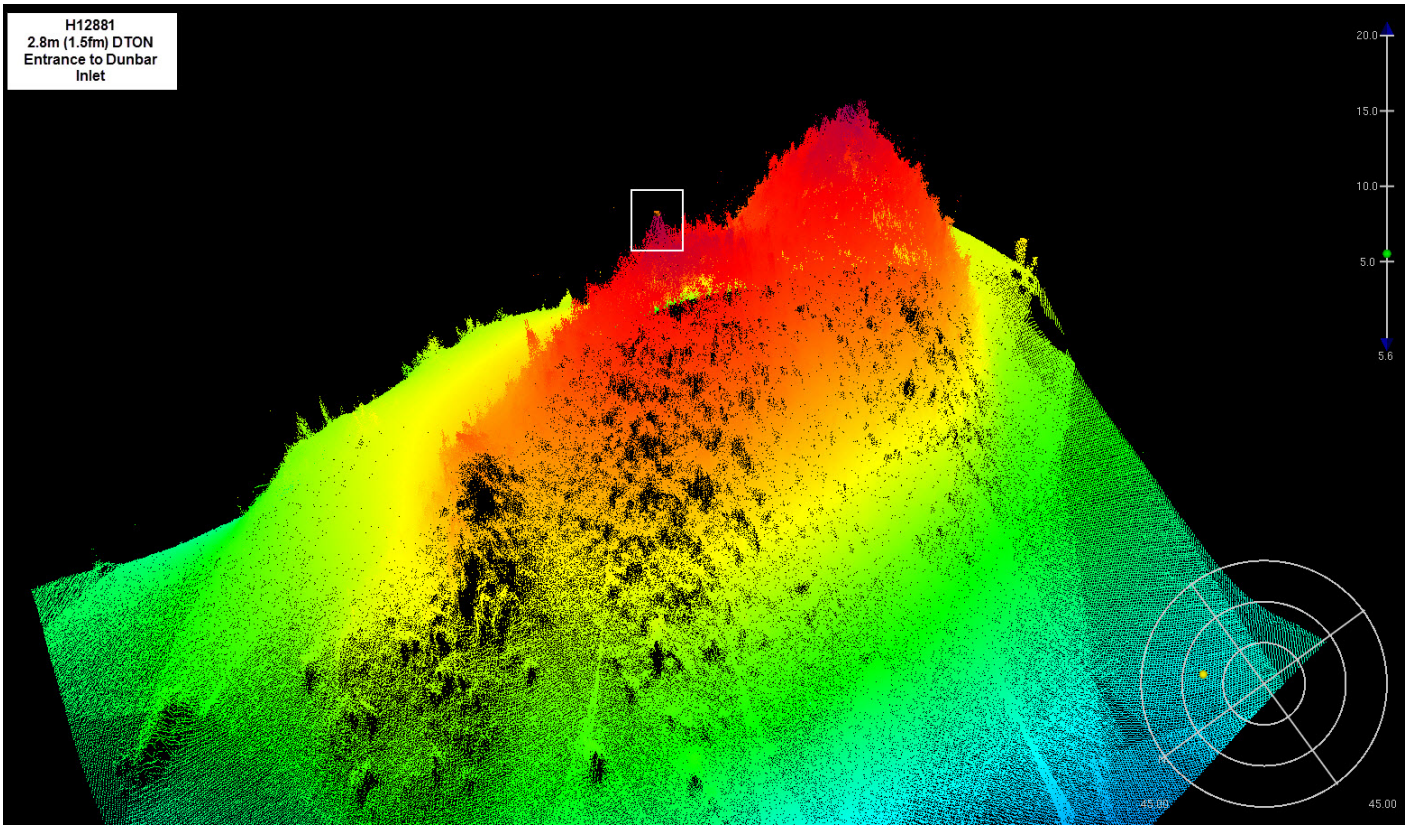


Figure 42: H12881 1.5fm DTON 3D subset view

See attached DTON Report.

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

Six bottom samples were acquired in accordance with the Project Instructions for survey H12881. One bottom sample, located in the middle of the survey area, returned no good sample after three attempts. All bottom samples were entered in the H12881_Final_Feature_File. See Figure 43 for a graphical overview of sample locations.

Figure 43: H12881 Bottom Sample Locations

D.2 Additional Results

D.2.1 Shoreline

Fairweather personnel conducted limited shoreline verification and reconnaissance, utilizing both traditional shoreline and Lidar methods, at times near predicted negative or low tides within the survey limits. Annotations, information, and diagrams collected on DP forms and boat sheets during field operations are scanned and included in the Separates I Detached Positions folder. Shoreline verification procedures for survey H12881 conform to those detailed in the DAPR.

For clarification, the Lidar data noted above were acquired from a surface vessel, not from an aircraft. The Separates are archived at NCEI and are not appended to this report.

D.2.2 Prior Surveys

No prior survey comparisons exist for this survey.

D.2.3 Aids to Navigation

No Aids to navigation (ATONs) exist for this survey.

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

No submarine features exist for this survey.

D.2.6 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 meet or exceed 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.

Report Name	Report Date Sent
Data Acquisition and Processing Report	2016-09-30
Horizontal and Vertical Control Report	2016-09-30
Tides and Water Levels Package	2016-07-15
Coast Pilot Report	2016-09-30

Approver Name	Approver Title	Approval Date	Signature
CDR Mark Van Waes, NOAA	Chief of Party	09/30/2016	
LT Bart O. Buessler, NOAA	Field Operations Officer	09/30/2016	Digitally signed by BUESSELER.BART.OWEN.1396600559 Date: 2016.09.30 09:16:16 -08'00'
HCST Douglas A. Bravo	Chief Survey Technician	09/30/2016	2016.09.30 09:14:34 -08'00'
HSST Clinton R. Marcus	Sheet Manager	09/30/2016	MARCUS.CLINTON.ROY.1187224876 2016.09.30 09:02:28 -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

PROVISIONAL TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : September 6th, 2016

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-O190-FA-2016
HYDROGRAPHIC SHEET: H12881

LOCALITY: West Prince of Wales, Vicinity of McFarland Islands
TIME PERIOD: May 10th, 2016 – June 15th, 2016

TIDE STATION USED: 945-0460 Ketchican, AK
Lat. 55° 20.0′ N Long. 131° 37.5' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 4.433 meters

TIDE STATION USED: 945-0251 Entrance to Windy Cove, AK
Lat. 55° 2.1′ N Long. 133° 1.4' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.704 meters
REMARKS: RECOMMENDED GRID

Please use the TCARI grid "O190FA2016.tc" as the final grid for project OPR-O190-FA-2016, Registry No. H12881, during the time period between May 10th and June 15th, 2016.
Refer to attachments for grid 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).

Note 2: Annual leveling for Ketchican, AK (945-0460) was not completed in the past year. A review of the verified leveling records from June 2006 – May 2015 shows the tide station benchmark network to be stable within an allowable 0.009 m tolerance. This Tide Note may be used as the final stability verification for survey OPR-O190-FA-2016, H12880. CO-OPS will immediately provide a revised Tide Note should subsequent leveling records indicate any benchmark network stability movement beyond the allowable 0.009 m tolerance.

Note 3: Survey tracklines fall outside of the TCARI boundaries in some areas due to inaccurate shoreline. TCARI will extrapolate the tide corrector to cover these soundings.

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: 2016.09.07 09:07:04 -04'00'

CHIEF, PRODUCTS AND SERVICES BRANCH

RI Boundry for OPR-O190-FA-2016, H12881
ce of Wales, Vicinity of McFarland Islands
9450460 KETCHIKAN
Entrance of Windy Cove
bing
Image courtesy of NASA Earthstar Geographics SIO © 2016 Microsoft Corporation

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Office of Coast Survey
Silver Spring, Maryland 20910-3282

August 1, 2016

MEMORANDUM FOR: Commander Mark Van Waes, NOAA
Commanding Officer, NOAA Ship *Fairweather*

FROM: Lieutenant Commander Michael Gonsalves, NOAA
HSD Operations Branch, Chief

SUBJECT: Vertical Datum Transformation Technique
OPR-O190-FA-16,
West Prince of Wales, AK

Hydrographic surveys H12865, H12880, H12881, H12882 for OPR-O190-FA-16 West Prince of Wales are approved for vertical reduction to chart datum, Mean Lower Low Water (MLLW), using the NOAA ellipsoidally-referenced zoned tides (ERZT) model.

Approval of ERZT, in lieu of the NOAA Center for Operational Oceanographic Products and Services (CO-OPS) discrete tidal zoning package as per the Project Instructions, is based on your recommendation and the review of comparison results you included in your attached email from June 3, 2016.

The results of the data analysis show that ellipsoidally referenced survey (ERS) techniques with ERZT used as the vertical datum reducer meet or exceed horizontal and vertical specifications for hydrographic surveys.

The comparison techniques used in the analysis are in line with the procedures outlined in the NOS Hydrographic Surveys Specifications and Deliverables document.

You shall include a description of your ERS processing procedures and the comparisons you conducted between ERS and traditional tides in the appropriate Descriptive Report (DR), Horizontal and Vertical Control Report and/or Data Acquisition and Processing Report. As appropriate in the DR, document specific vessel day(s) or line(s) that have not been processed using ERS techniques as the vertical reducer to MLLW where discrete zoning provides better results and/or where vertical uncertainties of your post processed vertical positional data are inaccurate.

Include this memo in the supplemental correspondence Appendix of the DR.

Clinton Marcus - NOAA Federal <clinton.r.marcus@noaa.gov>

OPR-O190-FA-16 Modified Finalized Depth Ranges

2 messages

FA OPS <ops.fairweather@noaa.gov> Mon, Jun 13, 2016 at 11:25 AM
To: Kathryn Pridgen - NOAA Federal <Kathryn.Pridgen@noaa.gov>
Cc: CO Fairweather <CO.Fairweather@noaa.gov>, CST Fairweather <ChiefST.Fairweather@noaa.gov>, Matthew Sharr <matthew.sharr@noaa.gov>, Tyler Fifield <tyler.p.fifield@noaa.gov>, Clint Marcus <Clinton.R.Marcus@noaa.gov>, Michael Gonsalves <Michael.Gonsalves@noaa.gov>

Good Morning Katy,

We've been seeing some gridding issues with our surfaces on O190 West Prince of Wales due to the steep and dynamic nature of the seafloor. What we're getting is when finalized, there are apparent coverage gaps where the surfaces meet (0-20 overlaps with 18-40, for example). This same issue was observed during last year's West Prince of Wales survey, and we resolved this issue by extending our shoaler surface deeper to cover these gaps. As per one of our DR's from last season:

In order to prevent visual data gaps between the finalized surfaces, the 1, 2, 4, and 8 meter surface depths were extended for greater overlap between the surfaces. The surfaces and depth ranges are listed in Table 10. … A waiver for the extension of depth ranges and no requirement to submit a 16 meter surface was granted from the Hydrographic Survey Division Operations Branch and is located in Appendix II. The 1, 2, and 4 meter finalized surface depth ranges were extended deeper by 6 times the surface resolution. To determine how much to expand the depth range by, the largest gap in coverage that could be found was measured in CARIS HIPS and SIPS subset editor. The distance of the gap was divided by the resolution of the surface that would cover the gap to determine how many multiples of that resolution it would take to cover that gap. This number was then multiplied by 2 to ensure that all gaps would be covered resulting in the extension of the surfaces by 6 times their resolution. All surfaces still meet the density and NOAA uncertainty requirements for their expanded ranges. -H12742 DR

With that in mind we would like to request permission to adjust the depth ranges of our finalized surfaces to cover these gaps between surfaces. The depth ranges we propose are:

1m: 0 - 26m
2m: 18-52m
4m: 36-104m
8m: 72-208m
16m: 144-416m
32m: (unchanged)

We would also like to request that provided data meets specs, that we absorb all 32m coverage areas (depths over 320 meters) into the 16 meter surface. The 32m coverage areas are minimal in this project, and eliminating the requirement to submit this surface would save time and processing effort for the us in the field.

These are in line with our 2015 modifications, and based on initial evaluations onboard we fully expect to meet NOAA density and uncertainty requirements, even at these extended ranges.

Please let me know if you have any questions. Thanks!

Very Respectfully,

LTJG Bart Buesseler, NOAA

--
Operations Officer
NOAA Ship Fairweather
1010 Stedman Street
Ketchikan, Alaska 99901

Cell: 907.254.2842

Iridium: 808.659.0054
OPS.Fairweather@noaa.gov

Kathryn Pridgen - NOAA Federal <kathryn.pridgen@noaa.gov> Wed, Jun 15, 2016 at 7:15 AM
To: FA OPS <ops.fairweather@noaa.gov>
Cc: CO Fairweather <CO.Fairweather@noaa.gov>, CST Fairweather <ChiefST.Fairweather@noaa.gov>, Matthew Sharr <matthew.sharr@noaa.gov>, Tyler Fifield <tyler.p.fifield@noaa.gov>, Clint Marcus <Clinton.R.Marcus@noaa.gov>, Michael Gonsalves <Michael.Gonsalves@noaa.gov>

Due to the dynamic nature of the seafloor, a waiver for the extension of depth ranges and no requirement to submit a 16 meter surface has been granted from the Hydrographic Survey Division Operations Branch on June 15, 2016 for the West Prince of Wales Project, OPR-O190-FA-16. As such an adjustment of depth ranges for the finalized surfaces is also necessary and that the 32m coverage area will be included in the 16m surface and is all approved via the waiver.

Katy

Kathryn Pridgen
Physical Scientist
NOAA-HSD OPS
301-713-2702 ext 178
kathryn.pridgen@noaa.gov
[Quoted text hidden]

Douglas Bravo - NOAA Federal <douglas.a.bravo@noaa.gov>

Re: Hydrographic Technical Directive 2016-3: Horizontal Datums for hydrographic surveys

Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov> Fri, Jul 22, 2016 at 8:13 AM
To: Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>
Cc: Eric Berkowitz - NOAA Federal <eric.w.berkowitz@noaa.gov>, Richard Brennan - NOAA Federal <Richard.T.Brennan@noaa.gov>, Lorraine Robidoux - NOAA Federal <lorraine.robidoux@noaa.gov>, John Nyberg - NOAA Federal <John.Nyberg@noaa.gov>, Mike Aslaksen - NOAA Federal <mike.aslaksen@noaa.gov>, Samuel Greenaway <Samuel.Greenaway@noaa.gov>, Russell Proctor - NOAA Federal <russell.proctor@noaa.gov>, _OMAO MOP CO Rainier <CO.Rainier@noaa.gov>, _OMAO MOP CO Fairweather <co.fairweather@noaa.gov>, "CO.Thomas Jefferson - NOAA Service Account" <co.thomas.jefferson@noaa.gov>, "CO.Ferdinand Hassler - NOAA Service Account" <co.ferdinand.hassler@noaa.gov>, "Evans, Rod E." <RHODRI.E.EVANS@leidos.com>, George Reynolds <ggr@oceansurveys.com>, Andrew Orthmann <aorthmann@terrasond.com>, Arthur Wright <artw@wassoc.com>, David Neff <david@etracinc.com>, "Millar, David FPI" <dmillar@fugro.com>, Deam Moyles <dmoyles@fugro.com>, Jon Dasler <jld@deainc.com>, Tara Levy <tlevy@oceaneering.com>, _NOS OCS HSD OPS <hsd.ops@noaa.gov>, _NOS OCS HSD AHB <nos.ahb.allpersonnel@noaa.gov>, _NOS OCS HSD PHB <nosphb@noaa.gov>, "ops.fairweather" <ops.fairweather@noaa.gov>, "OPS.Rainier" <ops.rainier@noaa.gov>, "OPS.Thomas Jefferson - NOAA Service Account" <OPS.Thomas.Jefferson@noaa.gov>, "OPS.Ferdinand Hassler - NOAA Service Account" <OPS.Ferdinand.Hassler@noaa.gov>, _OMAO MOP ChiefST Fairweather <chiefst.fairweather@noaa.gov>, Chief ST Rainier <ChiefST.Rainier@noaa.gov>, "ChiefST.Thomas Jefferson - NOAA Service Account" <chiefst.thomas.jefferson@noaa.gov>, "ChiefST.Ferdinand Hassler - NOAA Service Account" <chiefst.ferdinand.hassler@noaa.gov>, Chief NRB OCS - NOAA Service Account <chief.nrb.ocs@noaa.gov>, Christopher Hare - NOAA Federal <Christopher.Hare@noaa.gov>, Megan Greenaway - NOAA Federal <Megan.Greenaway@noaa.gov>

Greetings folks,

My apologies if I've induced a datum-related panic throughout the fleet - I should have provided a little more clarifying language.

First of all: relax! Don't cease acquisition, don't reconfigure your base stations, don't start transforming your data, don't reprocess all your SBETs.

The moral of the story is that HSD is fine with whichever horizontal datum you choose (NAD83 or WGS84), all we ask is that you document which datum was used. If you've already acquired half of a sheet in WGS84, then continue to do so, document the datum within your metadata and the Descriptive Report -- there isn't a need for HSD to issue any waiver to the HSSD because you're following the HSSD as written at the time of the issuance of your Project Instructions. All of AHB and PHB are CC'd on this email chain -- no field unit will get a demerit for submitting in one datum versus another. If you've completed one sheet of a project in WGS84 and would like to continue the rest of the project in WGS84 - go for it (in fact, for the purposes of DAPR documentation, I suspect the branches would prefer that).

Some of you may wonder why we made this change mid-season -- if you're one of those people, read the next three sentences (if you aren't, have a great weekend and remember to document your datums). The reason we made the change in language is strictly to satisfy an administrative requirement. As a civilian federal agency, we in the Office of Coast Survey could not publish an official technical specification that was in direct conflict with the Office of Management and Budget Circular A-16. The government is a little sensitive when it comes to having conflicting requirements out in the public space; as such, we were legally obliged to clean up the language.

We're only a few years away from the next realization of NAD83 which will be functionally indistinguishable from WGS84; so, eventually, these differences will truly be imperceptible.

Remember: relax, keep doing what you're doing, and document what you did.

Very respectfully,
~~ michael.gonsalves, LCDR/NOAA
HSD Operations Branch, Chief

On Thu, Jul 21, 2016 at 5:09 PM, Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov> wrote:

> Greetings,

The attached Hydrographic Technical Directive (HTD) provides a revision to the horizontal datum requirement, as stated in the 2016 Hydrographic Surveys Specifications and Deliverables. This HTD changes the requirement from WGS84 to NAD83, which brings us into compliance with other civilian federal agencies (see the document for further details).

If there are any questions or concerns about meeting this specification, please consult with your HSD Project Manager or Contracting Officer's Representative.

Very respectfully,
~~ michael.gonsalves, LCDR/NOAA
HSD Operations Branch, Chief

H12881 DTON Report

Registry Number: H12881
State: Alaska
Locality: West of Prince of Wales Island
Sub-locality: Vicinity of McFarland Islands
Project Number: OPR-O190-FA-16
Survey Dates: 05/09/2016 - 06/15/2016

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
17431	11th	03/01/2004	1:40,000 (17431_1)	[L]NTM: ?
17408	8th	06/01/2004	1:40,000 (17408_1)	[L]NTM: ?
17400	17th	03/01/2007	1:229,376 (17400_1)	[L]NTM: ?
16016	21st	10/01/2007	1:969,756 (16016_1)	[L]NTM: ?
531	24th	07/01/2007	1:2,100,000 (531_1)	[L]NTM: ?
500	8th	06/01/2003	1:3,500,000 (500_1)	[L]NTM: ?
501	12th	11/01/2002	1:3,500,000 (501_1)	[L]NTM: ?
530	32nd	06/01/2007	1:4,860,700 (530_1)	[L]NTM: ?
50	6th	06/01/2003	1:10,000,000 (50_1)	[L]NTM: ?

* Correction(s) - *source: last correction applied (last correction reviewed--"cleared date")*

Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude
1.1	Rock	2.85 m	55° 04' 27.8" N	132° 50' 37.0" W
1.2	Rock	2.77 m	55° 05' 18.1" N	132° 48' 49.5" W
1.3	Rock	2.53 m	55° 05' 16.5" N	132° 48' 49.2" W

1 - Dangers To Navigation

1.1) US 0000000338 00001 / H12881_DTONs.000

DANGER TO NAVIGATION

Survey Summary

Survey Position:	55° 04' 27.8" N, 132° 50' 37.0" W
Least Depth:	2.85 m (= 9.35 ft = 1.558 fm = 1 fm 3.35 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2016-167.00:00:00.000 (06/15/2016)
Dataset:	H12881_DTONs.000
FOID:	US 0000000338 00001(0226000001520001)
Charts Affected:	17408_1, 17400_1, 16016_1, 531_1, 500_1, 501_1, 530_1, 50_1

Remarks:

UWTROC/remrks: New uwtroc is DTON

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12881_DTONs.000	US 0000000338 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart new uwtroc

Arithmetically-Rounded Depth (Unit-wise Affected Charts):

1 ½fm (17408_1, 17400_1, 16016_1, 530_1)

1fm 3ft (531_1)

2.9m (500_1, 501_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	QUASOU - 6:least depth known
	SORDAT - 20160615
	SORIND - US,US,graph,H12881
	TECSOU - 3:found by multi-beam

VALSOU - 2.850 m

WATLEV - 3:always under water/submerged

Office Notes

Concur.

Feature Images

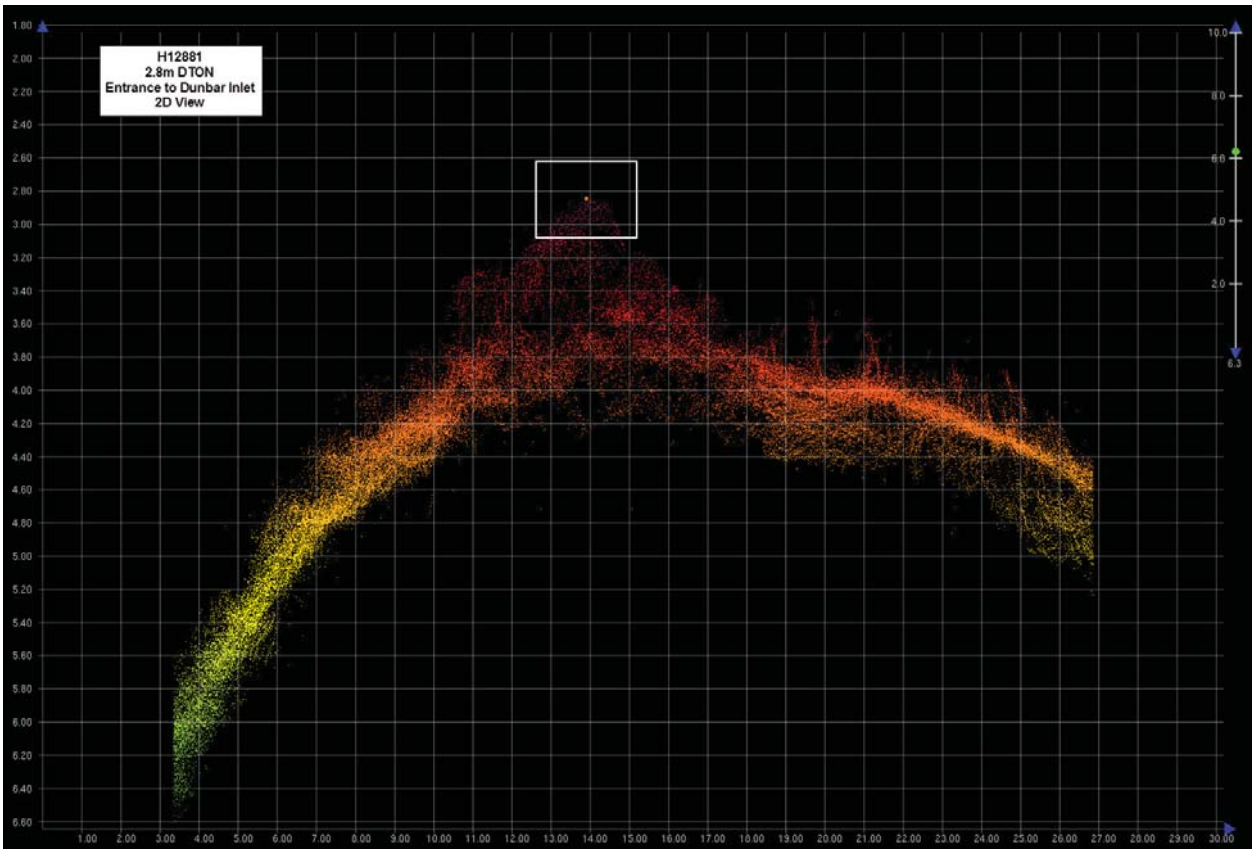


Figure 1.1.1

1.2) US 0000000192 00001 / H12881_DTONs.000

DANGER TO NAVIGATION

Survey Summary

Survey Position:	55° 05' 18.1" N, 132° 48' 49.5" W
Least Depth:	2.77 m (= 9.09 ft = 1.515 fm = 1 fm 3.09 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2016-167.00:00:00.000 (06/15/2016)
Dataset:	H12881_DTONs.000
FOID:	US 0000000192 00001(0226000000C00001)
Charts Affected:	17408_1, 17431_1, 17400_1, 16016_1, 531_1, 500_1, 501_1, 530_1, 50_1

Remarks:

UWTROC/remrks: New uwtroc is DTON

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12881_DTONs.000	US 0000000192 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart new uwtroc

Arithmetically-Rounded Depth (Unit-wise Affected Charts):

1 ½fm (17408_1, 17400_1, 16016_1, 530_1)

1fm 3ft (17431_1, 531_1)

2.8m (500_1, 501_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	QUASOU - 6:least depth known
	SORDAT - 20160615
	SORIND - US,US,graph,H12881
	TECSOU - 3:found by multi-beam

VALSOU - 2.770 m

WATLEV - 3:always under water/submerged

Office Notes

Do not concur. Chart shoaler, 2.53m submerged rock at 55º05'16.5120"N, 132º48'49.2444"W.

Feature Images

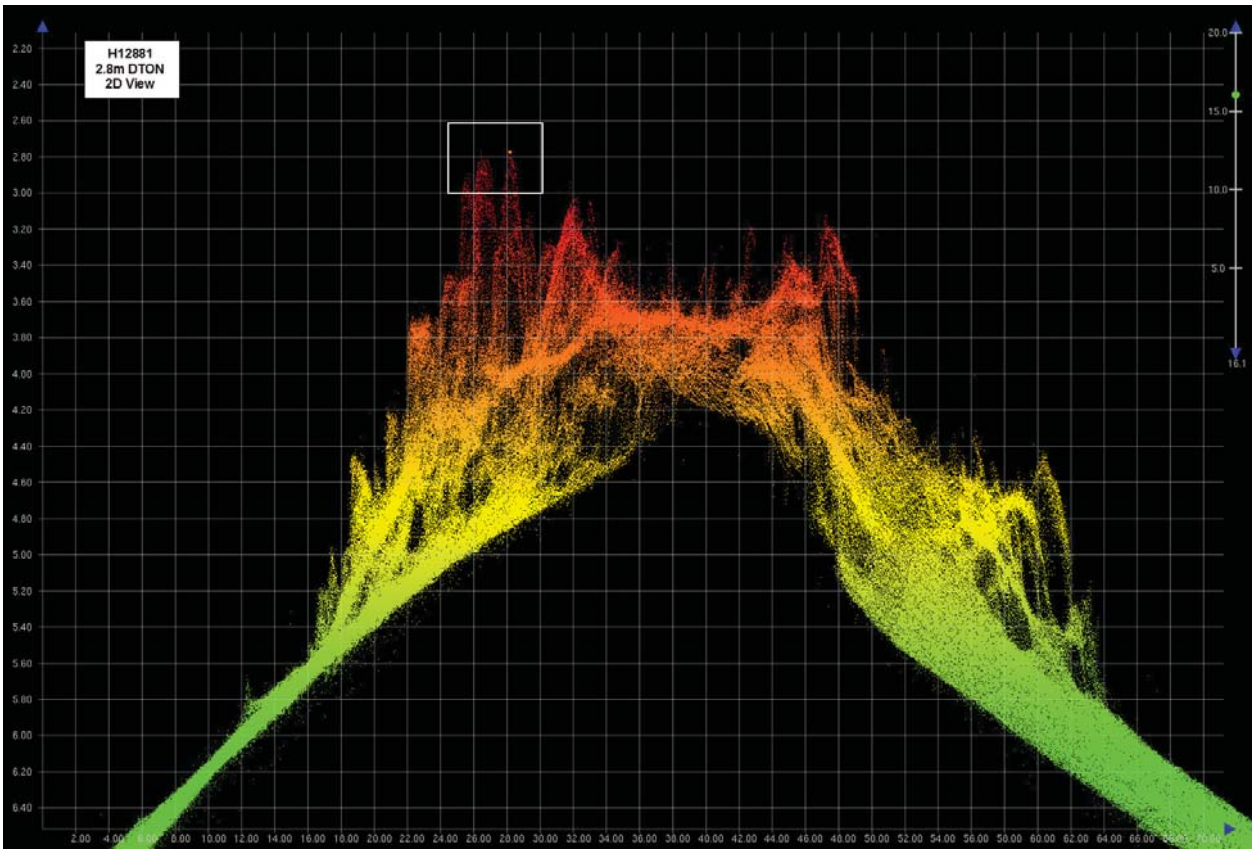


Figure 1.2.1

1.3) US 0000000182 00001 / H12881_DTONs.000

DANGER TO NAVIGATION

Survey Summary

Survey Position:	55° 05' 16.5" N, 132° 48' 49.2" W
Least Depth:	2.53 m (= 8.30 ft = 1.383 fm = 1 fm 2.30 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2016-167.00:00:00.000 (06/15/2016)
Dataset:	H12881_DTONs.000
FOID:	US 0000000182 00001(0226000000B60001)
Charts Affected:	17408_1, 17431_1, 17400_1, 16016_1, 531_1, 500_1, 501_1, 530_1, 50_1

Remarks:

UWTROC/remrks: New uwtroc is DTON, and least depth of new rocky foul area

Feature Correlation

Source	Feature	Range	Azimuth	Status
H12881_DTONs.000	US 0000000182 00001	0.00	000.0	Primary

Hydrographer Recommendations

Chart new uwtroc

Arithmetically-Rounded Depth (Unit-wise Affected Charts):

1 ½fm (17408_1, 17400_1, 16016_1, 530_1)

1fm 2ft (17431_1, 531_1)

2.5m (500_1, 501_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	QUASOU - 6:least depth known
	SORDAT - 20160615
	SORIND - US,US,graph,H12881
	TECSOU - 3:found by multi-beam

VALSOU - 2.530 m

WATLEV - 3:always under water/submerged

Office Notes

Concur.

Feature Images

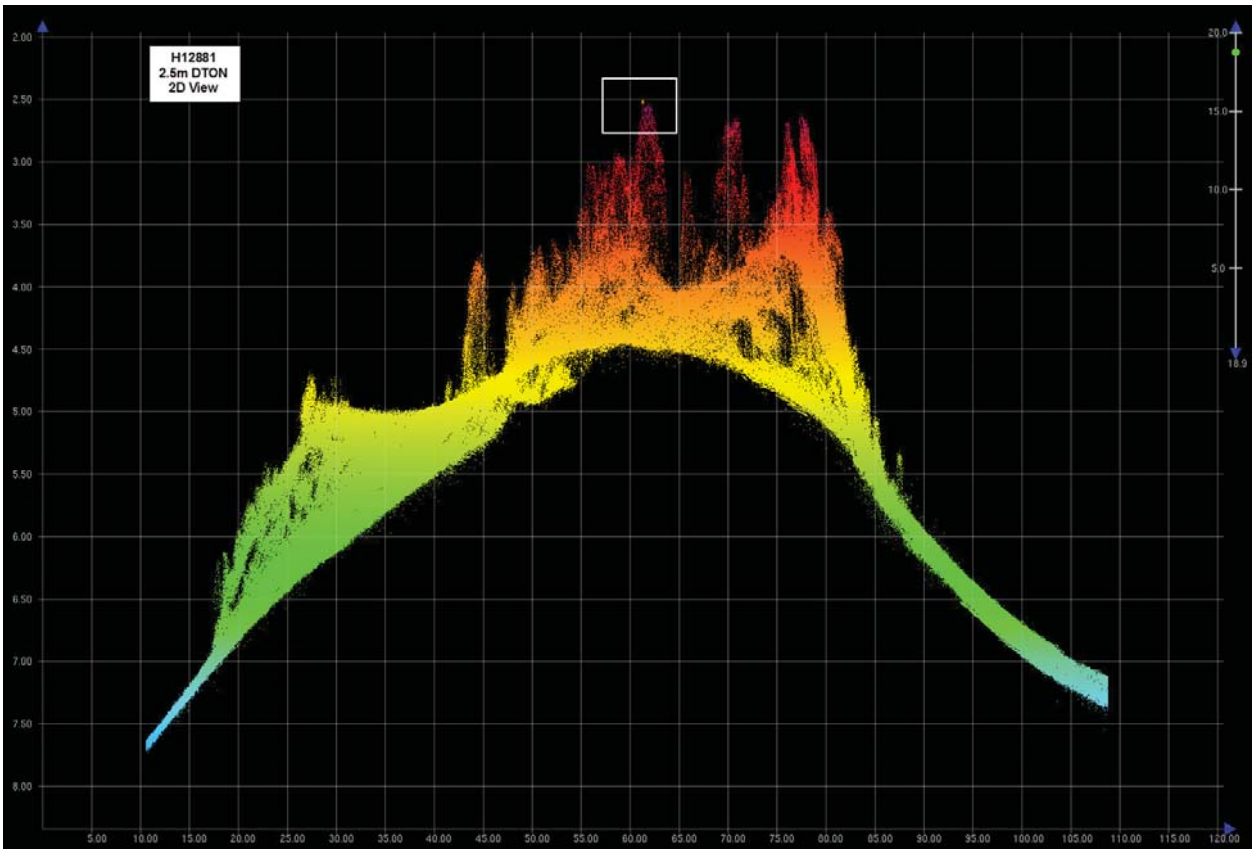


Figure 1.3.1

APPROVAL PAGE

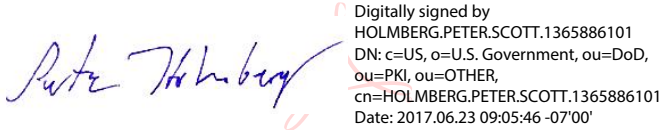
H12881

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

- H12881_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12881_GeoImage.pdf

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



Approved:_____

Peter Holmberg
Cartographic Team Lead, Pacific Hydrographic Branch

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

Approved:_____

CDR Benjamin K. Evans, NOAA
Chief, Pacific Hydrographic Branch