H12371

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:	H12371

LOCALITY

State:	Alaska
General Locality:	Chatham Strait
Sub-locality:	Port Herbert to Port Lucy

2011

CHIEF OF PARTY
CAPT David O. Neander, NOAA

LIBRARY & ARCHIVES

Date:

NOAA FORM 77-28 (11-72)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET		**H12371**

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:	**Chatham Strait**
Sub-Locality:	**Port Herbert to Port Lucy**
Scale:	**10000**
Dates of Survey:	**09/25/2011 to 10/07/2011**
Instructions Dated:	**08/19/2011**
Project Number:	**OPR-O322-FA-11**
Field Unit:	**NOAA Ship *Fairweather***
Chief of Party:	**CAPT David O. Neander, 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**
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. Revisions and Rednotes were generated during office processing. The processing branch concurs with all information and recommendations in the DR unless otherwise noted. Page numbering may be interrupted or non-sequential. All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via http://www.ngdc.noaa.gov/.

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Descriptive Report to Accompany Survey H12371

Project: OPR-O322-FA-11

Locality: Chatham Strait

Sublocality: Port Herbert to Port Lucy

Scale: 1:10000

September 2011 - October 2011

NOAA Ship *Fairweather*

Chief of Party: CAPT David O. Neander, NOAA

A. Area Surveyed

The survey area is located in Chatham Strait, AK within the sub-locality of Port Herbert to Port Lucy

A.1 Survey Limits

Data was acquired within the following survey limits:

Northeast Limit	Southwest Limit
56.47 N 134.62 W	56.29 N 134.76 W

Table 1: Survey Limits

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. The project covers areas of emerging critical and category one areas as identified in the 2010 NOAA Hydrographic Survey Priorities (NHSP).

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

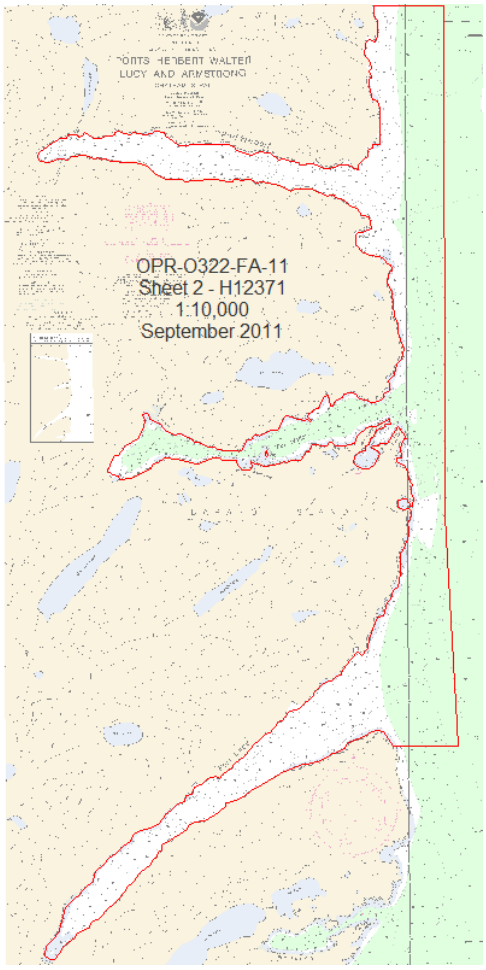


Figure 1: H12371 Survey Outline

Survey Coverage was in accordance with the requirements in the Project Instructions and the HSSD.

A.5 Survey Statistics

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

	HULL ID	*2808*	*2806*	*s220*	*2805*	*Total*
LNM	**SBES Mainscheme**	0.00	0.00	0.00	0.00	0.00
	MBES Mainscheme	24.84	79.58	16.69	72.01	193.12
	Lidar Mainscheme	0.00	0.00	0.00	0.00	0.00
	SSS Mainscheme	0.00	0.00	0.00	0.00	0.00
	SBES/MBES Combo Mainscheme	0.00	0.00	0.00	0.00	0.00
	SBES/SSS Combo Mainscheme	0.00	0.00	0.00	0.00	0.00
	MBES/SSS Combo Mainscheme	0.00	0.00	0.00	0.00	0.00
	SBES/MBES Combo Crosslines	4.08	0.00	0.00	6.46	10.54
	Lidar Crosslines	0.00	0.00	0.00	0.00	0.00
Number of Bottom Samples						5
Number of DPs						0
Number of Items Items Investigated by Dive Ops						0
Total Number of SNM						10.11

Table 2: Hydrographic Survey Statistics

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

Survey Dates
09/25/2011
09/29/2011
10/04/2011
10/05/2011
10/07/2011

Table 3: Dates of Hydrography

A.6 Shoreline

The assigned area was surveyed up to the NALL with the exception of those areas made impassable due to kelp.

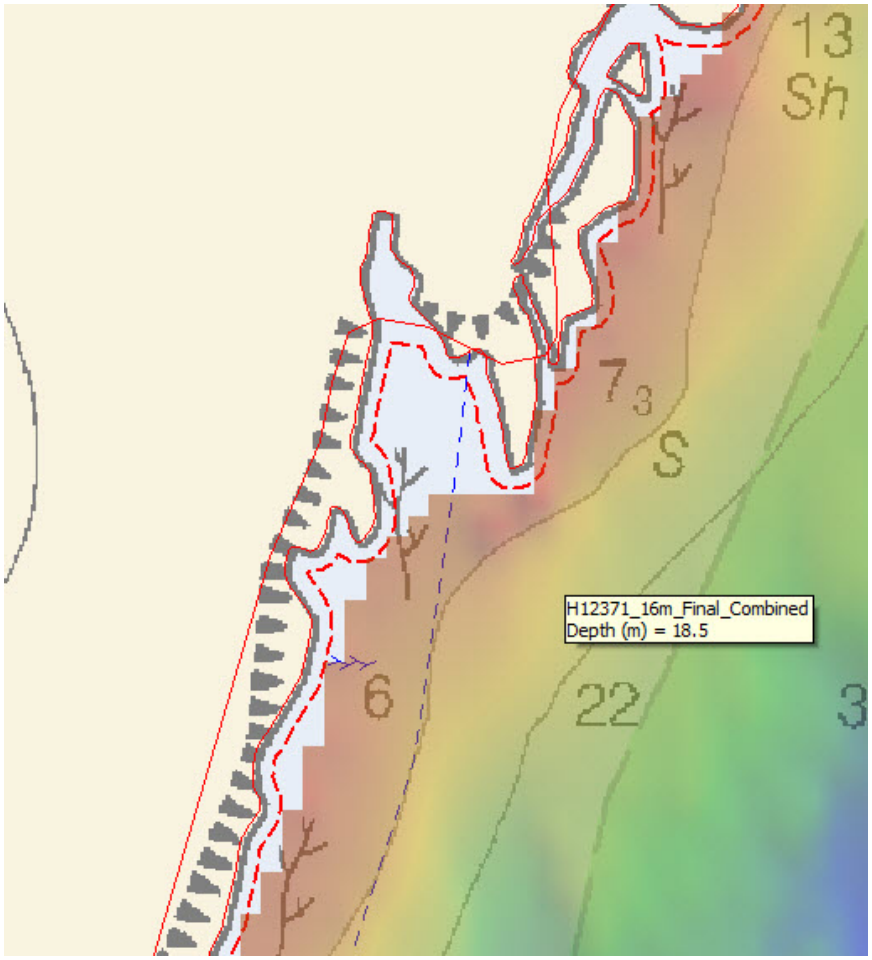


Figure 2: Kelp_NALL

A.7 Bottom Samples

Bottom Samples were acquired in accordance with the Project Instructions or the HSSD.

Four of the 5 bottom samples collected during H12371 were recommended for charting. The fifth bottom sample was not recommended because it is in conflict with a newly delineated rocky seabed area.

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	***S220***	***2808***	***2806***	***2805***
LOA	70.4 meters	8.64 meters	8.64 meters	8.64 meters
Draft	4.7 meters	1.12 meters	1.12 meters	1.12 meters

Table 4: Vessels Used

B.1.2 Equipment

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

Manufacturer	**Model**	**Type**
Seabird	SBE 19plus	Sound Speed System
Brooke Ocean	MVP 200	Sound Speed System
RESON	SVP 70/71	Sound Speed System
Applanix	POS/MV V4	Vessel Attitude/ Positioning System
RESON	7111	MBES
RESON	7125	MBES
RESON	8160	MBES

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines were obtained with LNM equal to 5.5% of all main-scheme lines surveyed, which is above the Specs and Deliverables required 4% for complete MBES surveys.

Surface differencing in CARIS Bathy DataBASE was used to assess crossline agreement with main-scheme lines. Figures 3 and 4 depict a difference surface between a surface made with main-scheme lines only and a surface made with crosslines only. This difference surface is submitted digitally in the Separates II folder. The two surfaces agree within plus or minus 0.5 meters, therefore crosslines agree with main-scheme lines within the total allowable vertical uncertainty in their common areas. Figure 5 contains additional statistical information regarding the crossline comparison.

One area of apparent disagreement exists when the surfaces encounter a high degree of elevation change over a short horizontal distance. The resulting surface has some difficulty determining an appropriate scale and resolution. Also in these areas of large elevation change, any small horizontal offset can produce a large vertical offset, thereby creating a large difference between the main-scheme and crossline surfaces. These areas show in the crossline differencing as black spots in the surface, seen closely in Figure 4.

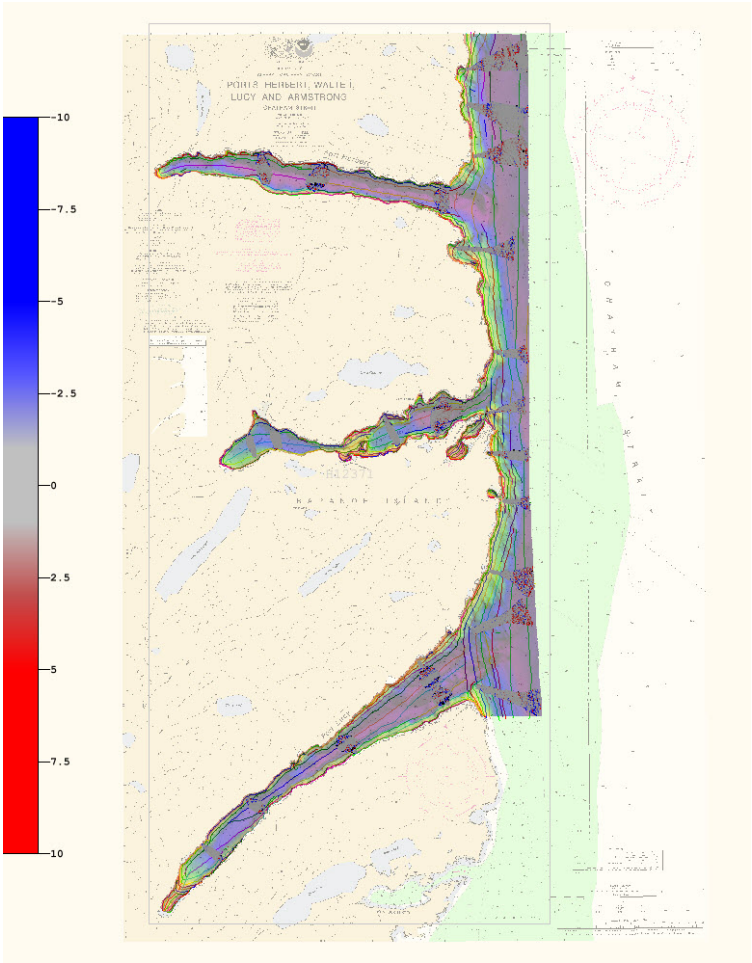


Figure 3: Results of surface differencing a surface made with main-scheme lines only and a surface made using crosslines only for sheet H12371. Cool colors indicate that the crosslines are shoaler while warm colors indicate the crosslines are deeper.

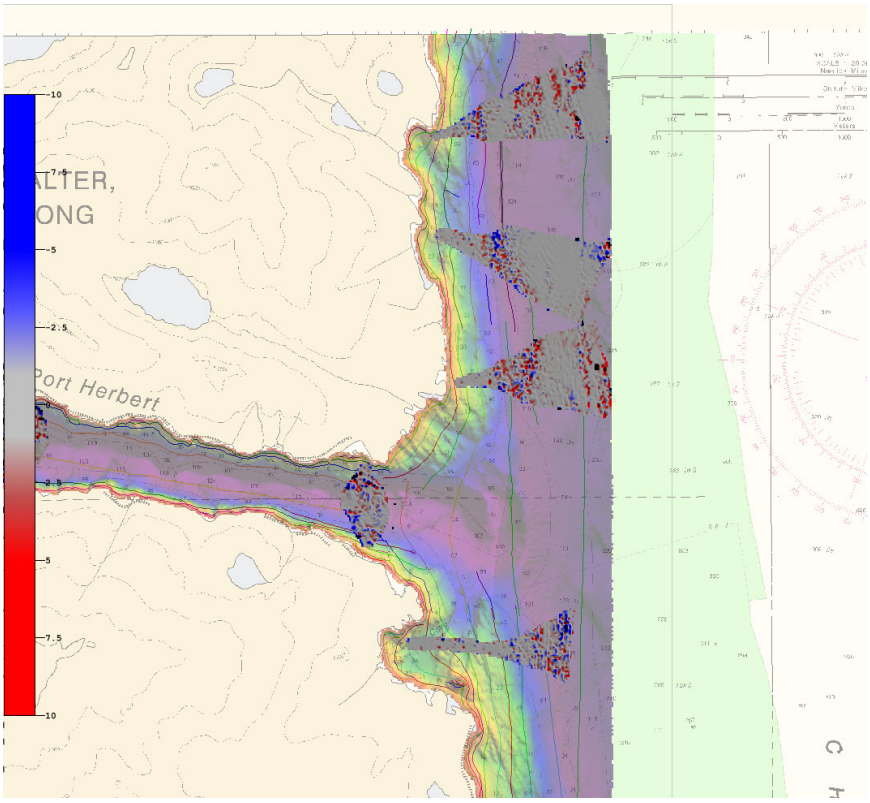


Figure 4: Close up of a small section at the northern end of H12371

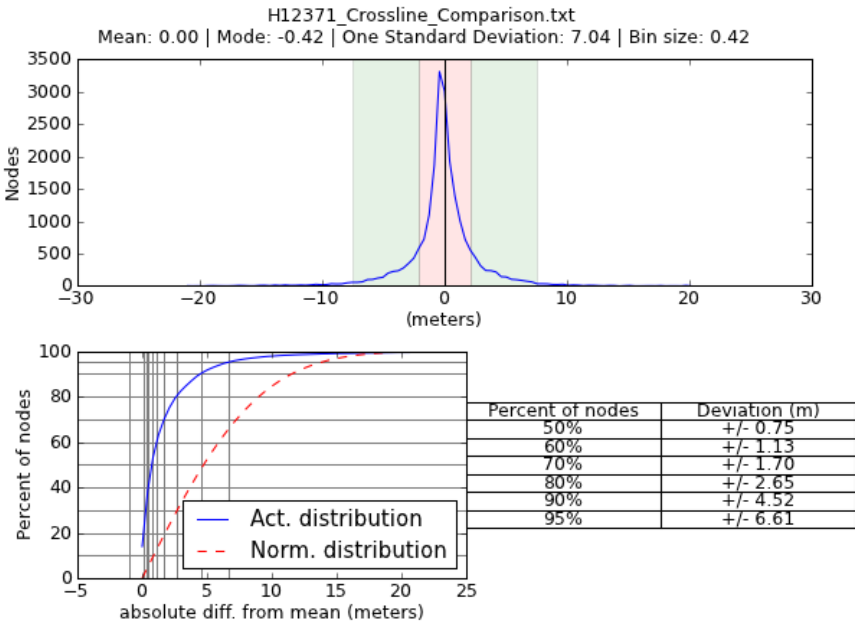


Figure 5: Statistical Analysis of the differencing between crosslines and mainscheme lines

The crossline comparison performed by the field is adequate and crosslines agree with mainscheme lines within the total allowable vertical uncertainty in their common areas. However, differences

between crossline and mainscheme data greater than 0.5 meters were found during office processing. Furthermore, the crossline analysis performed by the field, with results depicted in Figure 5, shows that 95% of nodes agree within +/- 6.61 meters, not 0.5 meters as stated in section B.2.1. The submitted difference surface was created in HIPS and SIPS 7.1, not BathyDataBASE as stated in section B.2.1. The difference surface can not self-determine resolution or scale as stated in section B.2.1. The resolution of two BASE surfaces that are differenced defaults to the coarsest resolution of the two.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
0.01	0.1

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
2805	2.0		0.5
2806	2.0		0.5
2808	2.0		0.5
S220		0.5	0.5

Table 7: Survey Specific Sound Speed TPU Values

Tide TPU values are in meters. Sound speed TPU values are in meters/second.

B.2.3 Junctions

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12370	1:10000	2011	NOAA Ship FAIRWEATHER	N
H12372	1:10000	2011	NOAA Ship FAIRWEATHER	S
H12373	1:10000	2011	NOAA Ship FAIRWEATHER	NE
H12374	1:10000	2011	NOAA Ship FAIRWEATHER	SE

Table 8: Junctioning Surveys

H12370

The areas of overlap between the sheets were reviewed in CARIS Subset Editor for sounding consistency and in CARIS HIPS and SIPS by surface differencing 16-meter combined surfaces to assess surface agreement. The soundings and surfaces are generally in agreement. Over areas where steep downsloping

occur, there are some large differences between the two surfaces. These areas show as black spots in the junction difference surface. The junction agreement is within the total allowable vertical uncertainty in its common areas and depths. See Figures 6 and 7 for area of overlap. Figure 8 provides additional statistical analysis regarding the survey junction.

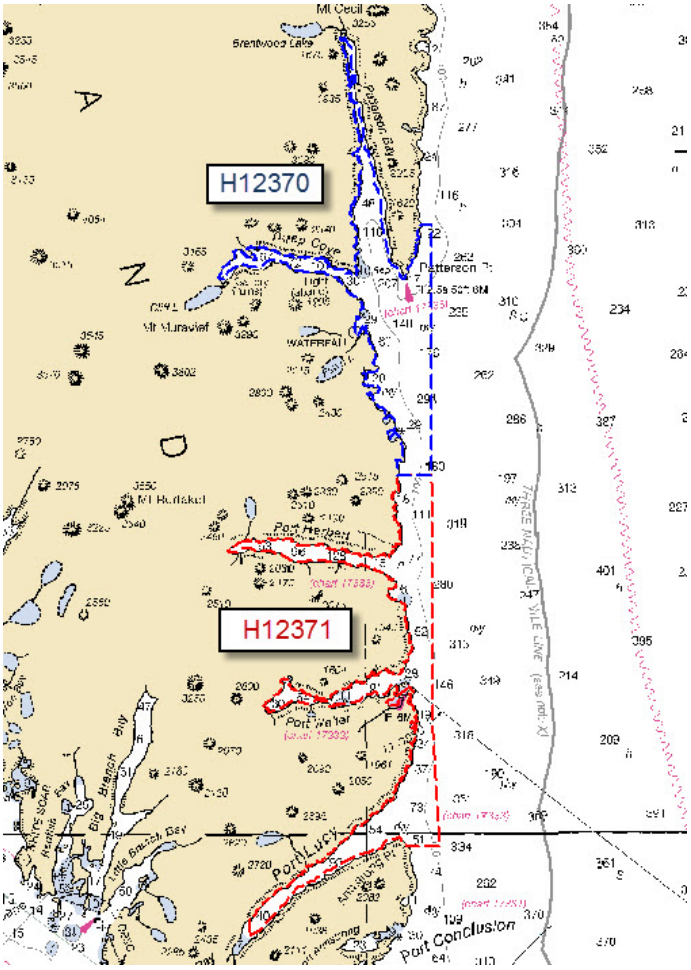


Figure 6: Junction between H12370

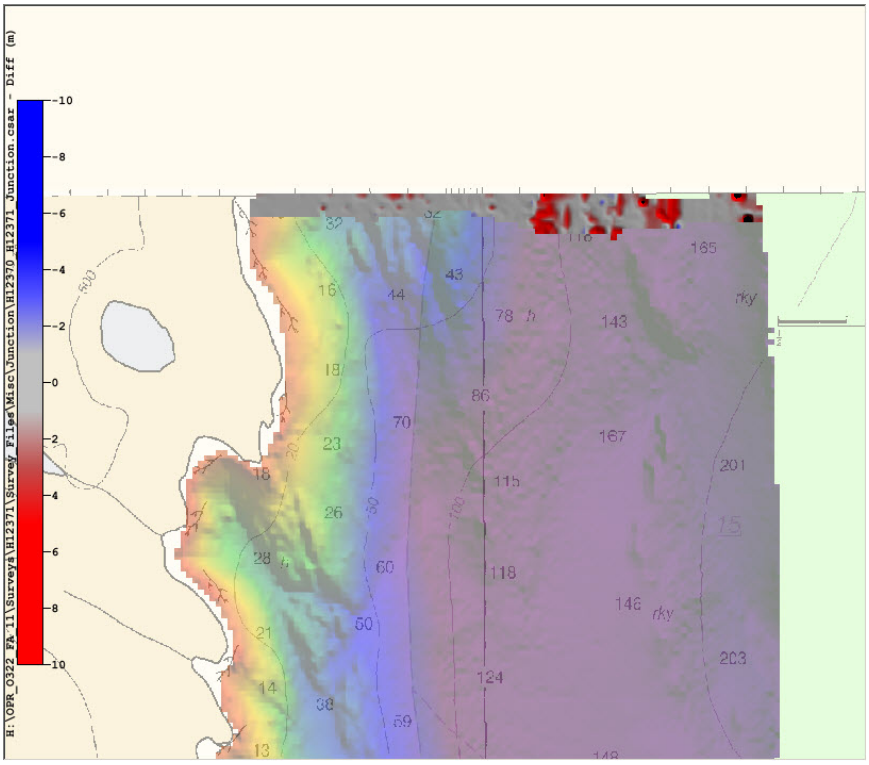
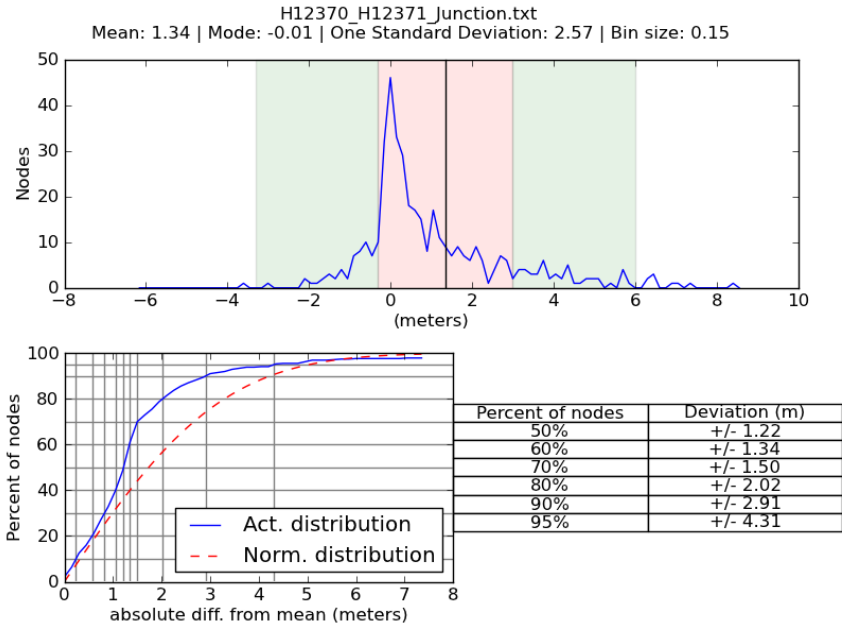


Figure 7: Results of surface differencing 16-meter surfaces in the area of overlap between H12371 and H12370



Percent of nodes	Deviation (m)
50%	+/- 1.22
60%	+/- 1.34
70%	+/- 1.50
80%	+/- 2.02
90%	+/- 2.91
95%	+/- 4.31

Figure 8: Statistical Analysis of the junction between H12370 and H12371

Due to the steep topography and possible sound speed refraction, differences in the junction area are to be expected. The data is adequate for charting.

H12372

The areas of overlap between the sheets were reviewed in CARIS Subset Editor for sounding consistency and in CARIS HIPS and SIPS by surface differencing 16-meter combined surfaces to assess surface agreement. The soundings and surfaces are generally in agreement. Over areas where steep downsloping occur, there are some large differences between the two surfaces. These areas show as black spots in the junction difference surface. The junction agreement is within the total allowable vertical uncertainty in its common areas and depths. See Figures 9 and 10 for area of overlap. Figure 11 provides additional statistical information regarding the survey junction.

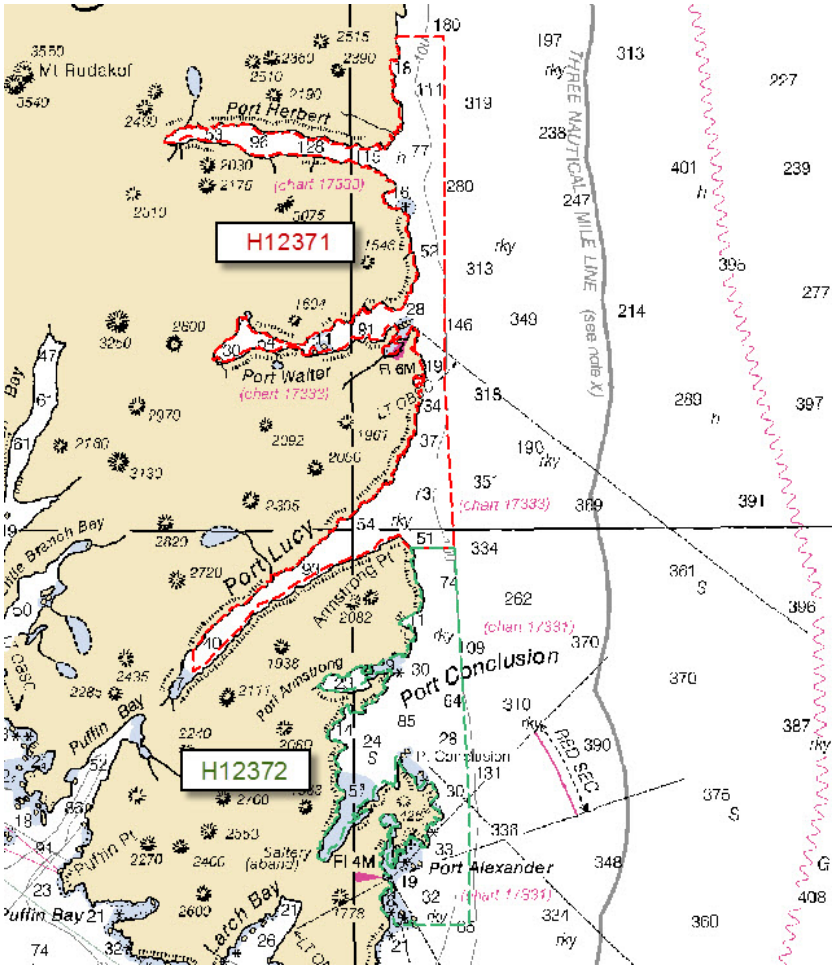


Figure 9: Junction between H12372

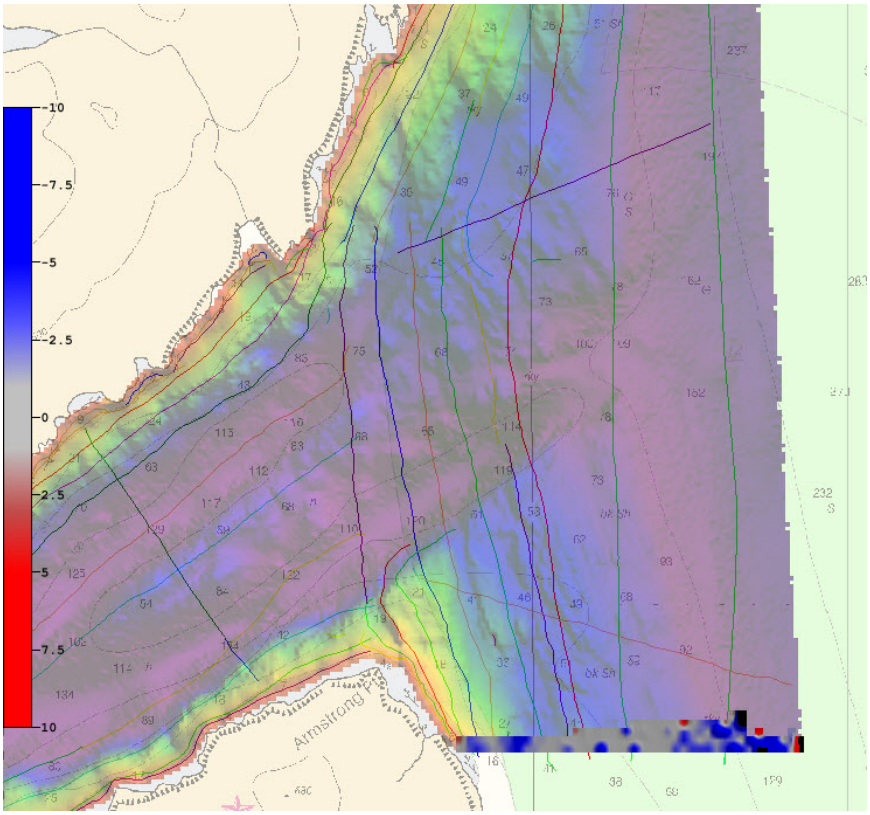


Figure 10: Results of surface differencing 16-meter surfaces in the area of overlap between H12371 and H12372

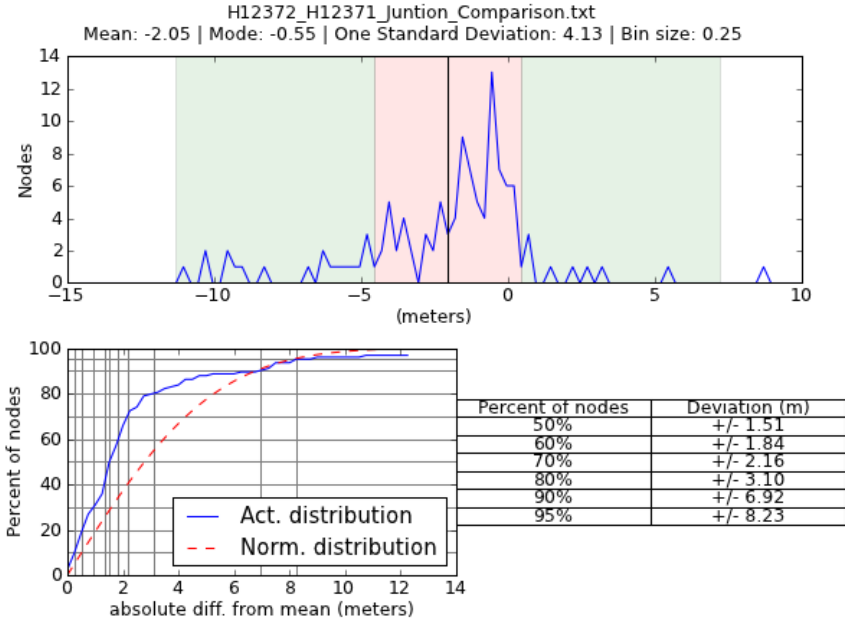


Figure 11: Statistical Analysis of the junction between H12372 and H12371

Due to the steep topography and possible sound speed refraction, differences in the junction area are to be expected. The data is adequate for charting.

H12373

The areas of overlap between the sheets were reviewed in CARIS Subset Editor for sounding consistency and in CARIS HIPS and SIPS by surface differencing 16-meter combined surfaces to assess surface agreement. The soundings and surfaces are generally in agreement. Over areas where steep downsloping occur, there are some large differences between the two surfaces. These areas show as black spots in the junction difference surface. The junction agreement is within the total allowable vertical uncertainty in its common areas and depths. See Figures 12 and 13 for area of overlap. Figure 14 provides additional statistical information regarding the survey junction.

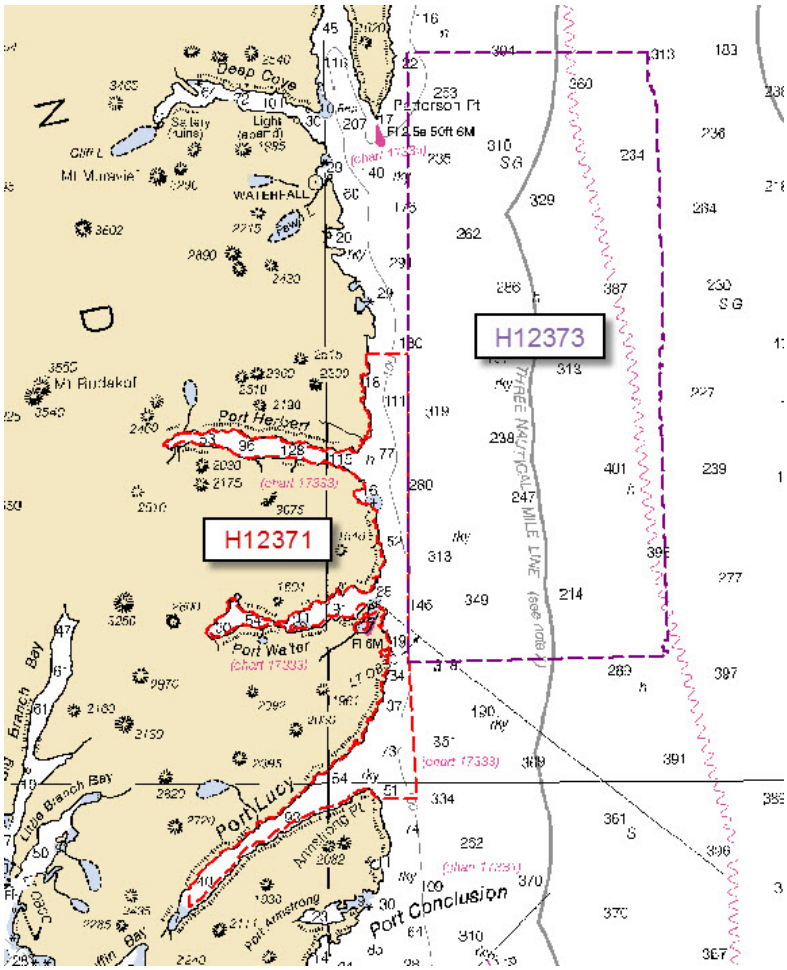


Figure 12: Junction between H12373

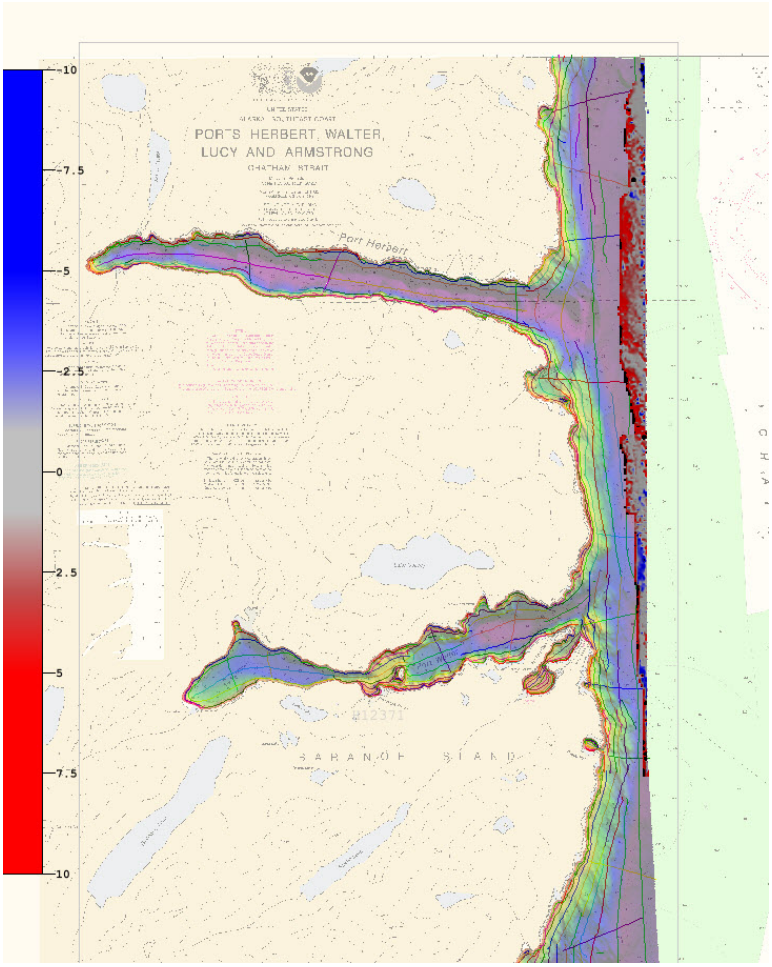


Figure 13: Results of surface differencing 16-meter surfaces in the area of overlap between H12371 and H12373

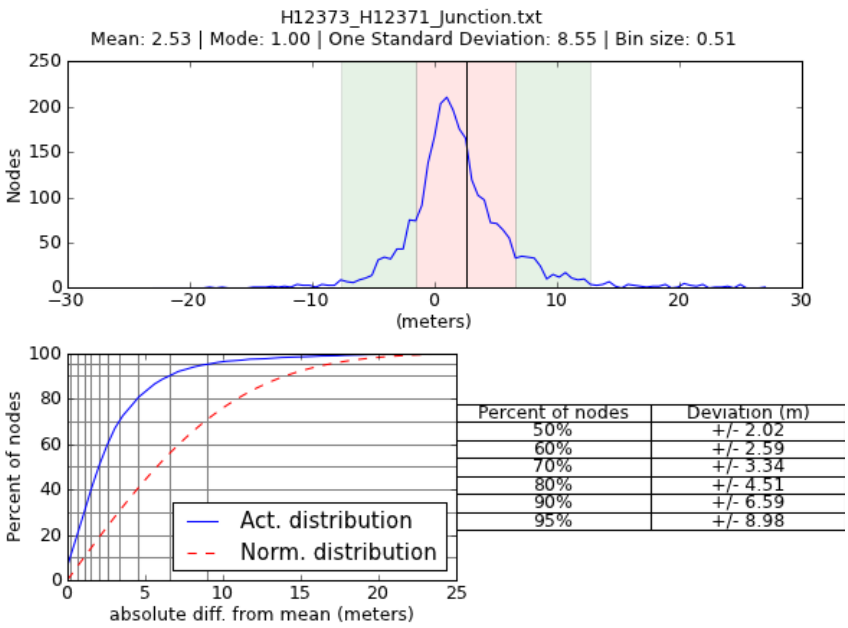


Figure 14: Statistical Analysis of the junction between H12373 and H12371

Due to the steep topography and possible sound speed refraction, differences in the junction area are to be expected. The data is adequate for charting.

H12374

The areas of overlap between the sheets were reviewed in CARIS Subset Editor for sounding consistency and in CARIS HIPS and SIPS by surface differencing 16-meter combined surfaces to assess surface agreement. The soundings and surfaces are generally in agreement. Over areas where steep downsloping occur, there are some large differences between the two surfaces. These areas show as black spots in the junction difference surface. The junction agreement is within the total allowable vertical uncertainty in its common areas and depths. See Figures 15 and 16 for area of overlap. Figure 17 provides additional statistical information regarding the survey junction.

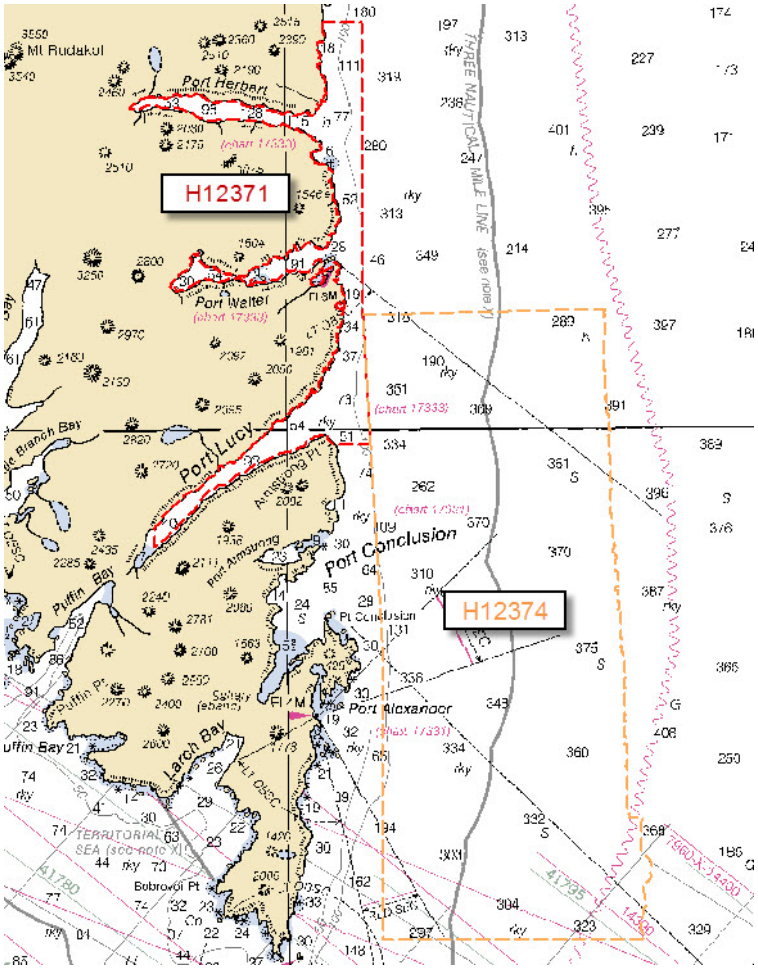


Figure 15: Junction between H12374

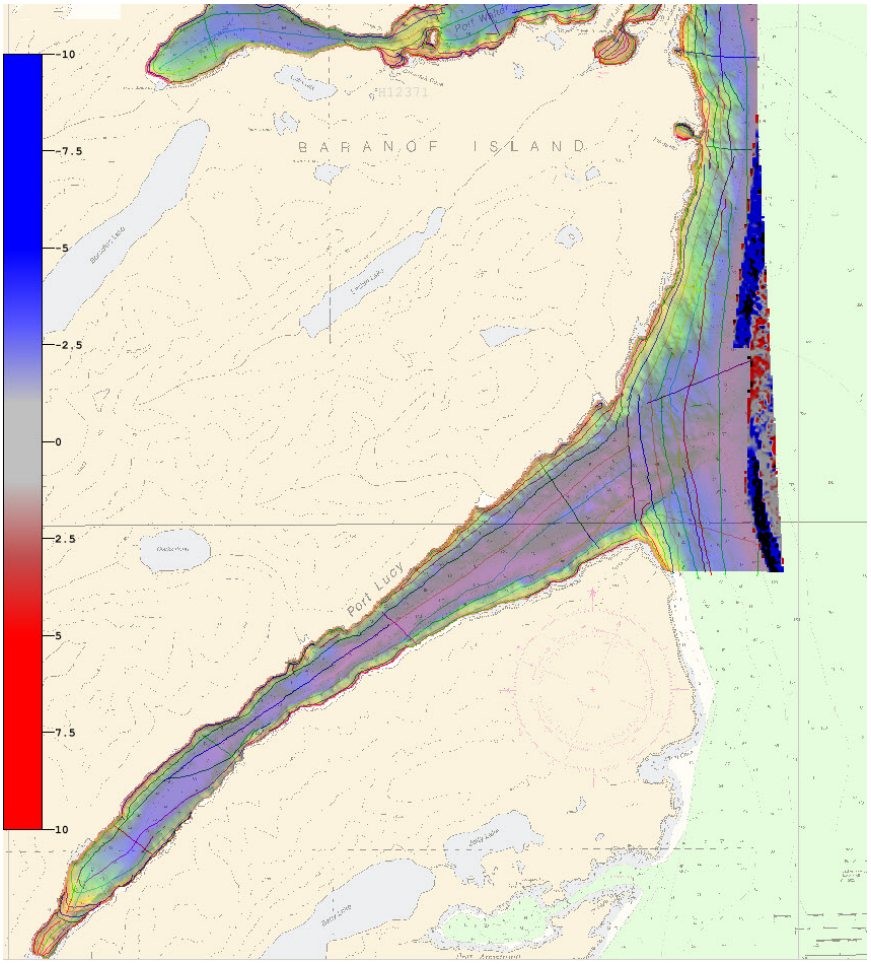


Figure 16: Results of surface differencing 16-meter surfaces in the area of overlap between H12371 and H12374

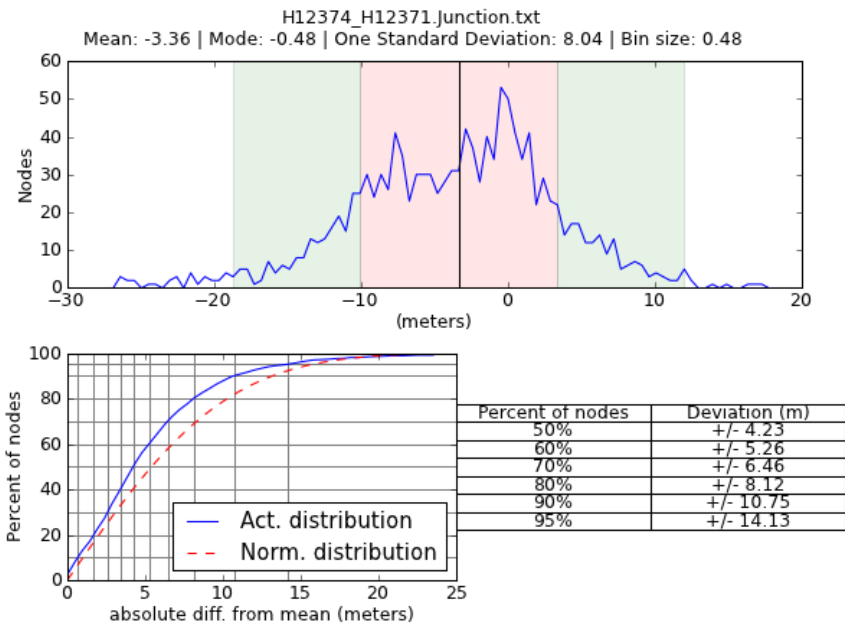


Figure 17: Statistical Analysis of the junction between H12374 and H12371

Due to the steep topography and possible sound speed refraction, differences in the junction area are to be expected. The data is adequate for charting.

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

B.2.5.1 RESON 8160

The RESON 8160 system has historically had issues with acquiring accurate data along its outer beams. As shown in Figures 18 and 19, the data gathered by the outer beams is erratic and has been manually removed when necessary. There was enough overlap with the 7111 and launch acquired data that no density or coverage holidays were created by doing this.

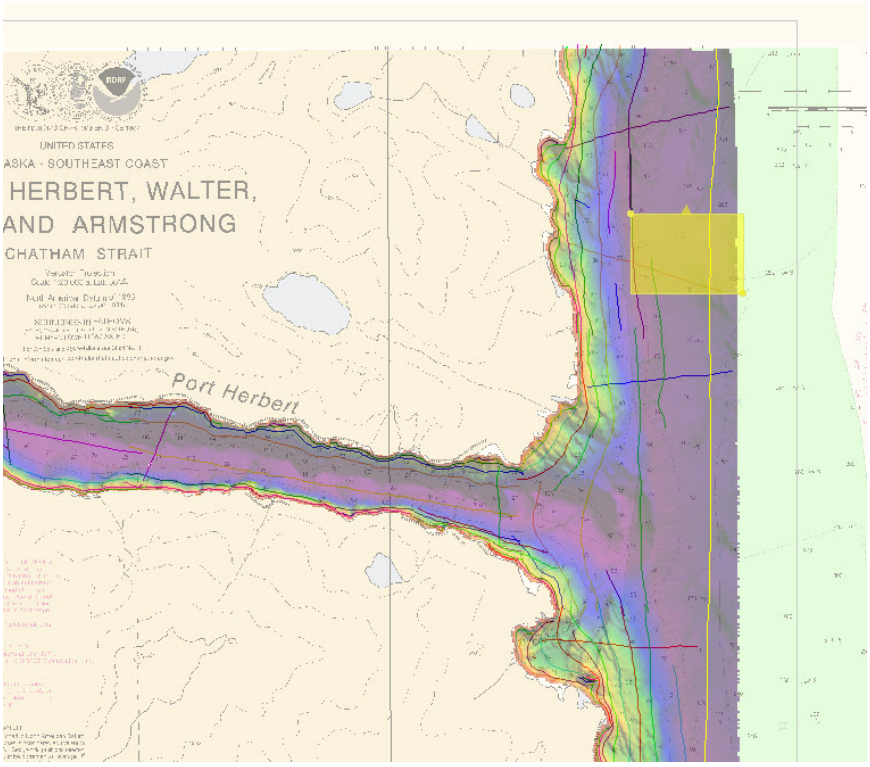


Figure 18: H12371 RESON 8160 Overview

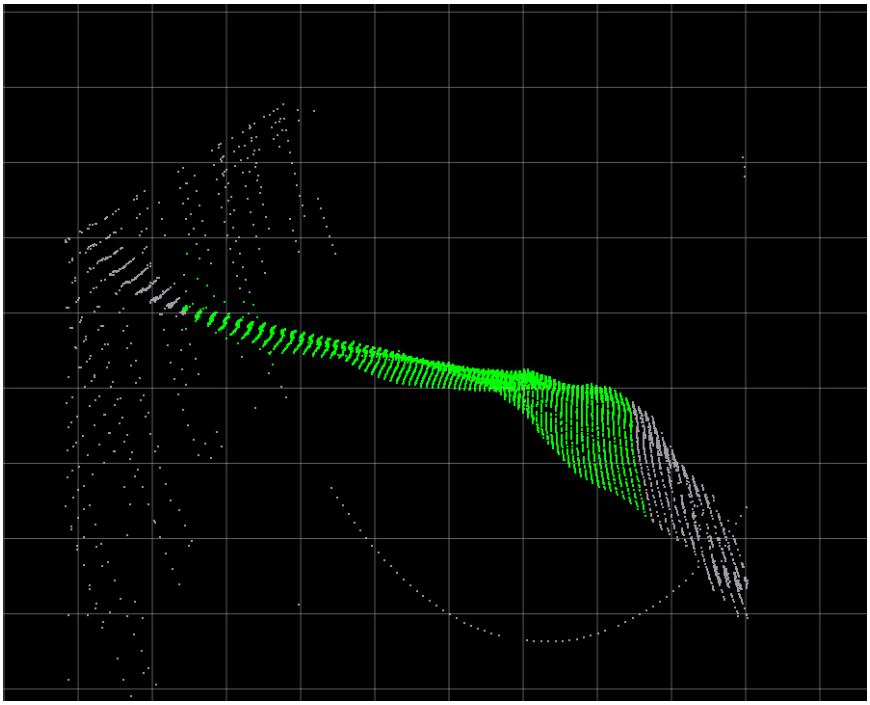


Figure 19: H12371 RESON 8160 Subset

B.2.5.2 Loss of GPS Satellites

While surveying in areas with steep cliffs to the south, the field teams experienced GPS satellite losses. This resulted in horizontal offsets due to errors in positioning. As these areas had very steep downslopes due to their proximity to the coast line, these horizontal offsets resulted in large vertical offsets outside the range of acceptable uncertainty.

Figures 20 and 21 illustrate one such area along the southern shore of Port Herbert. From approximately 17:54:59 to 18:10:02, data for line 2011M_2771750 was rejected as it was out of the specified vertical uncertainty range. In this particular area, we acquired a second line to see if the launch would experience the same satellite issues. The same issues occurred once again, but to a lesser degree. This line remained within specifications and was used in the survey.

Figures 22 and 23 show a coastal area just east of Toledo Harbor where the majority of lines acquired that day suffered from horizontal positioning inaccuracies. In examining the POS MV data, there are significant issues seen throughout that day. By removing SBETs from the lines and remerging that particular day, the lines are seen to be within specifications as shown in Figure 24.

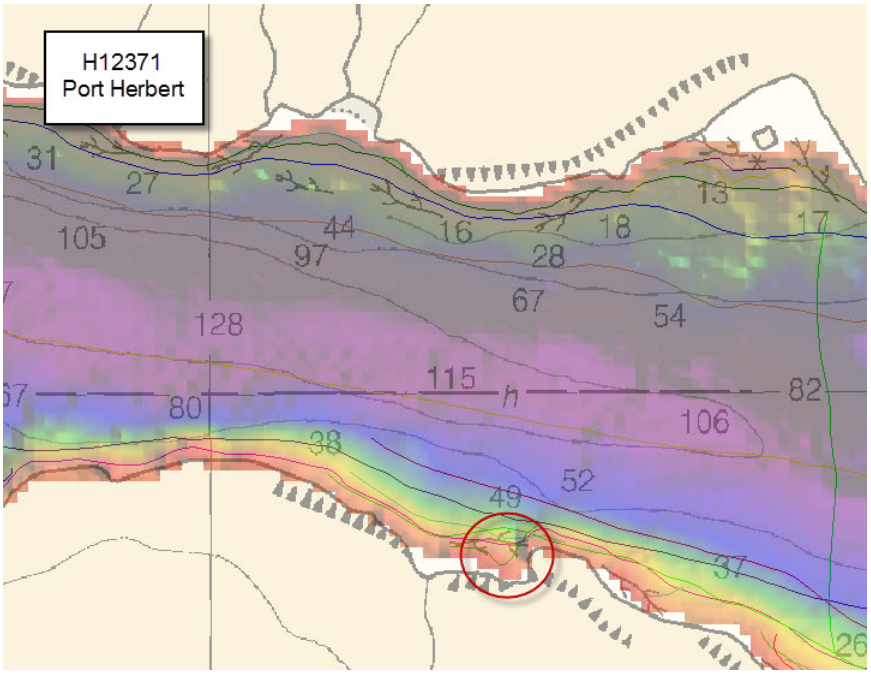


Figure 20: H12371 GPS Dropout Overview

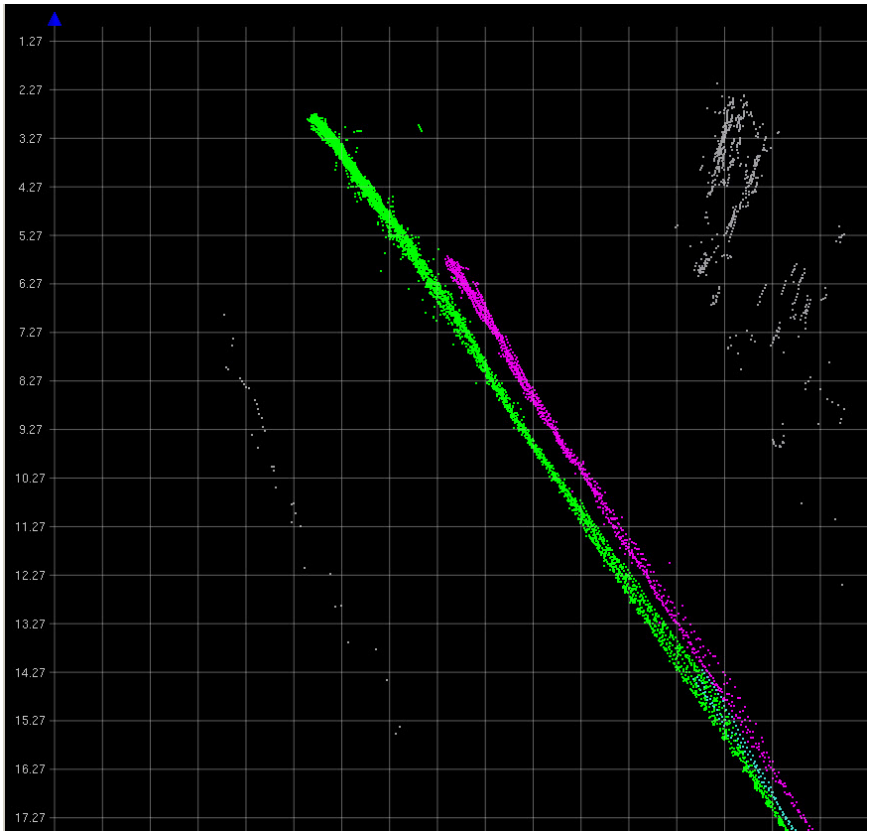


Figure 21: H12371 GPS Dropout Subset

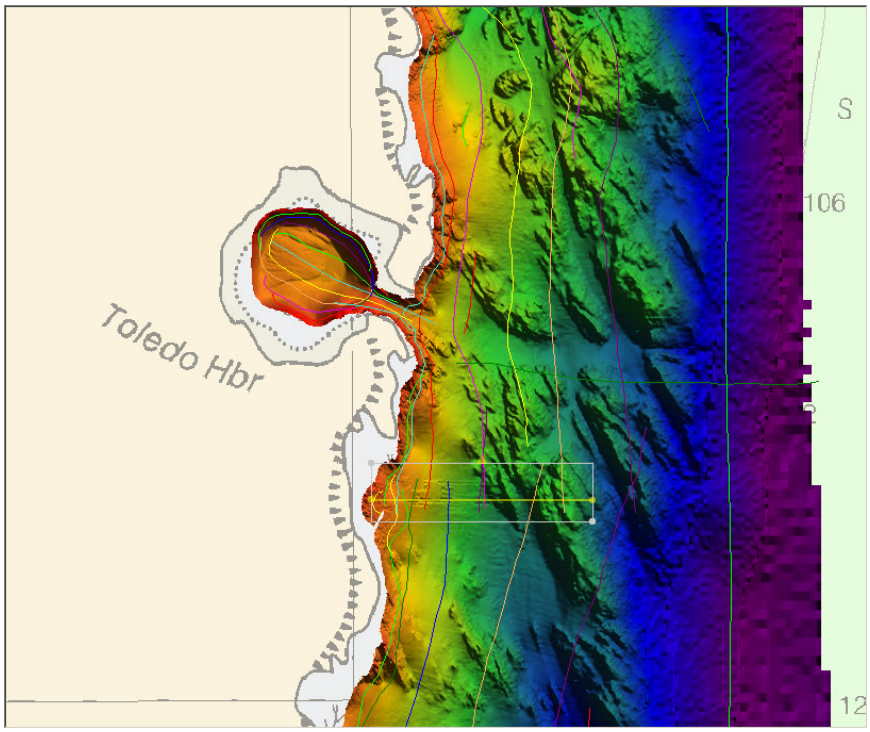


Figure 22: H12371 Toledo Harbor Positioning Loss Overview

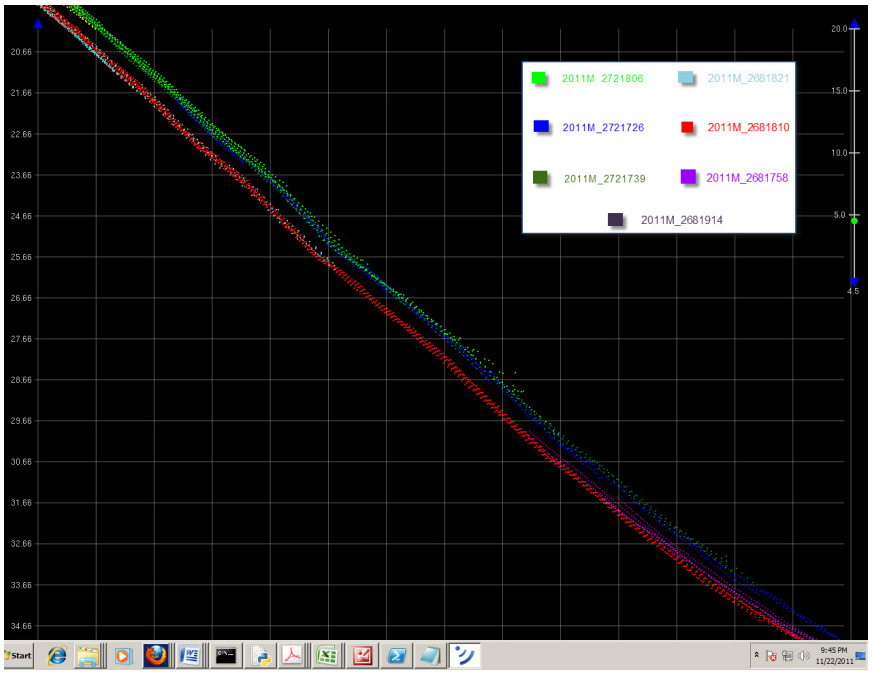


Figure 23: H12371 Toledo Harbor Positioning Loss Subset, SBET Applied

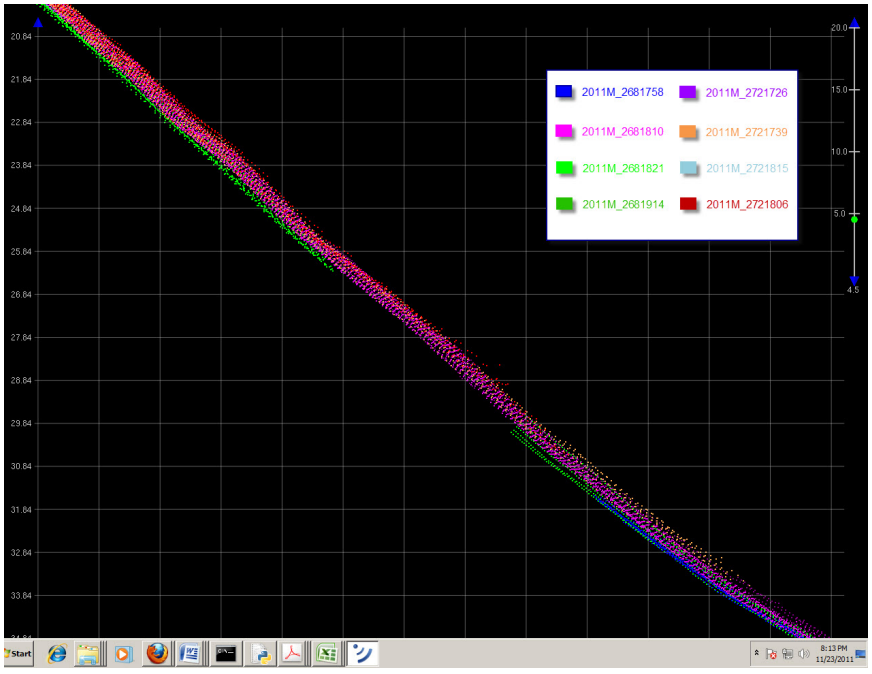


Figure 24: H12371 Toledo Harbor Positioning Loss, SBET Removed

The data is adequate for charting despite the horizontal offsets due to GPS dropouts.

B.2.6 Factors Affecting Soundings

B.2.6.1 Sound Speed

In Little Port Walter, some sound speed artifacts were encountered. The artifacts appear in an area where there is an out flow of fresh water from a stream leading from Sashin Lake. The MBES data were reviewed in CARIS Subset Mode with appropriate reference surfaces. The reference surface accurately depicts the seafloor. Figures 25 and 26 depict an overview of the area and data shown in CARIS Subset Mode.

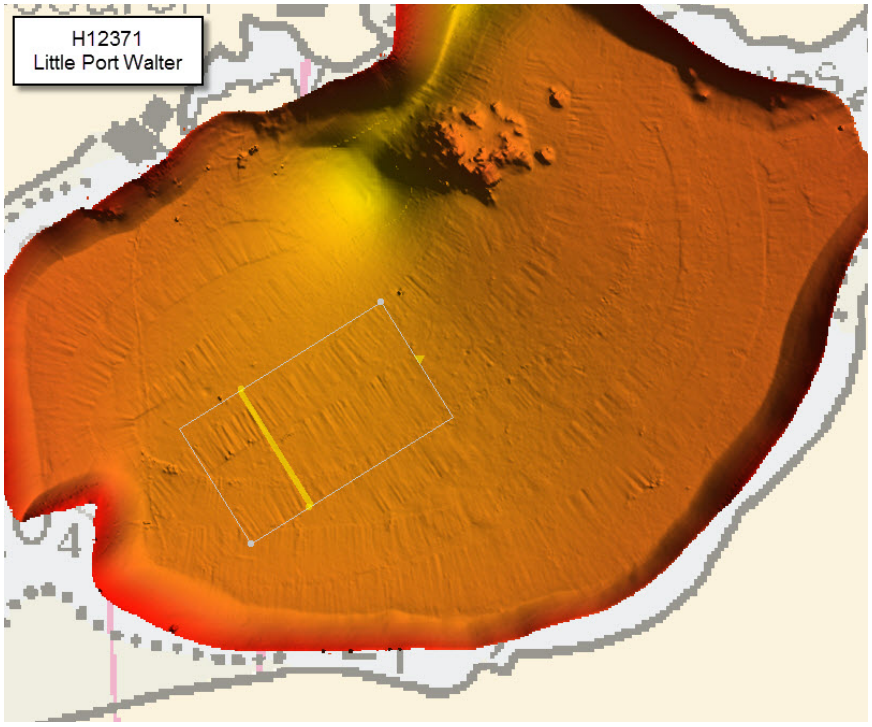


Figure 25: H12371 Area of Sound Velocity Issues in Little Port Walter

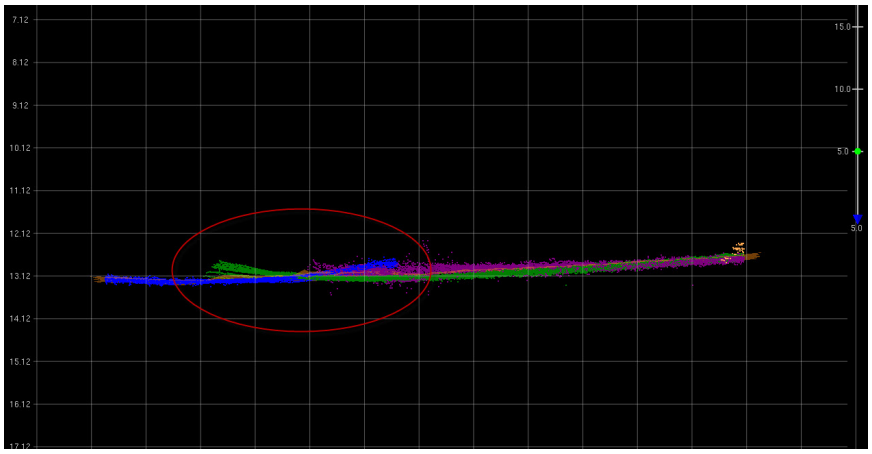


Figure 26: H12371 Subset of Sound Velocity Issues in Little Port Walter

The data is adequate for charting despite the sound speed artifacts.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Sound speed measurements were conducted and applied as discussed in the Corrections to Echo Soundings section of the DAPR.

B.2.8 Coverage Equipment and Methods

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

B.2.9 IHO Uncertainty

All data meet the data accuracy specifications as stated in the NOS Hydrographic Surveys Specifications and Deliverables (HSSD) dated April 2011.

It was found that at least 99% of nodes in all finalized surfaces meet or exceed their respective IHO Order specifications for all depths of survey H12371, see Standards Compliance Review in Appendix V. To assess vertical accuracy standards, a child layer titled “IHO1” was created for each of the 1-meter, 2-meter, 4-meter, and 8-meter finalized surfaces while a layer titled "IHO2" was created for the 8-meter and 16-meter finalized surfaces, using the equation as stated in section C. 2.1 of the DAPR.

B.2.10 Holiday Assessment

Complete multibeam coverage was obtained within the limits of H12371. For holidays larger than three surface grid nodes, the corresponding multibeam side scan was examined and no navigationally significant items were found. The least depths of all navigationally significant features are represented by H12371.

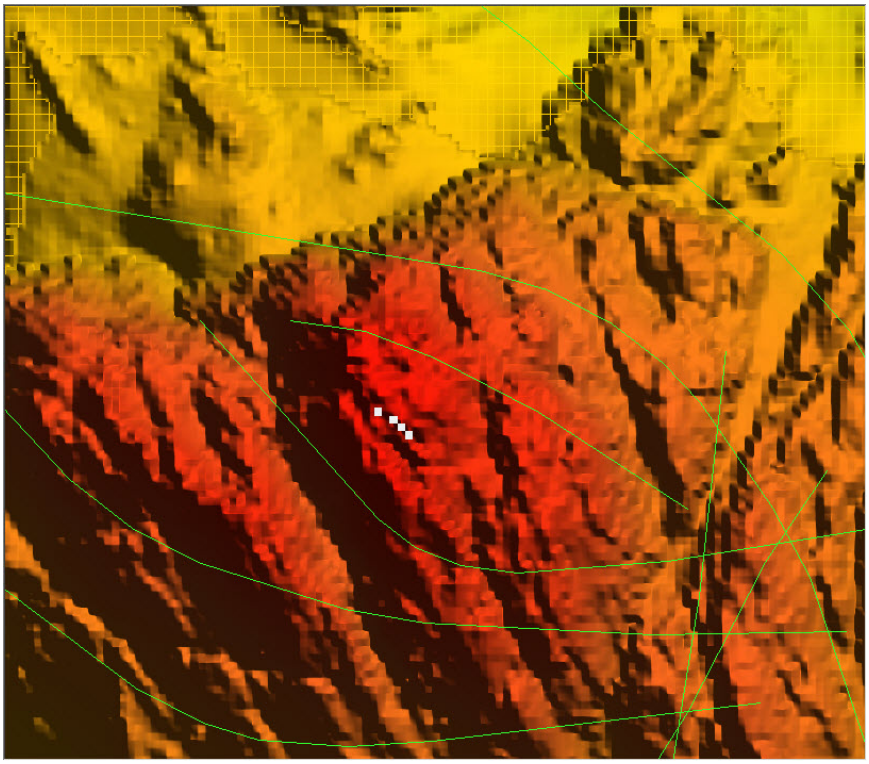


Figure 27: The holiday located in Codfish Cove at position 56° 25' 12.0"N, 134° 38' 23.9°W has the least depth represented. The holiday is depicted below in Figures 24 and 25

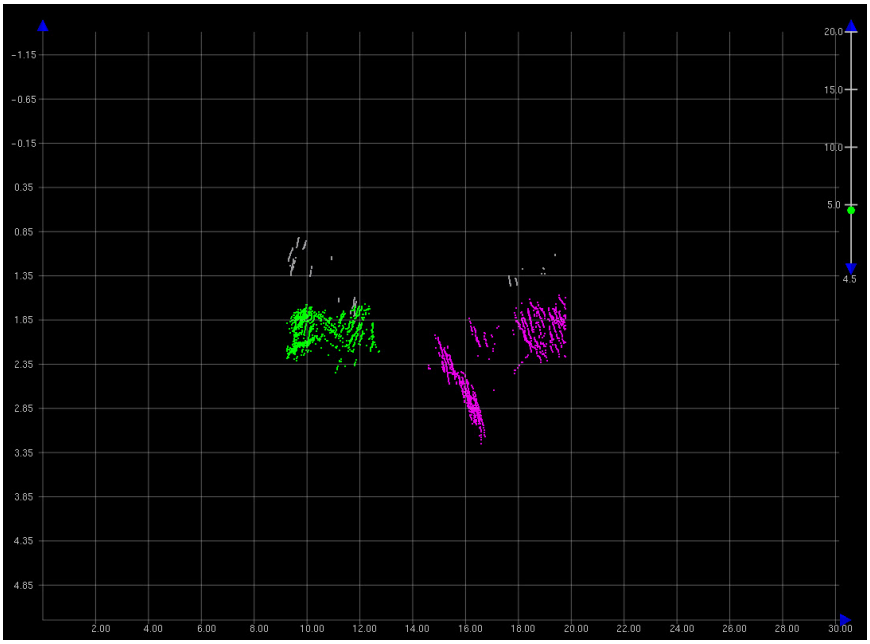


Figure 28: H12371 Codfish Cove Holiday Subset

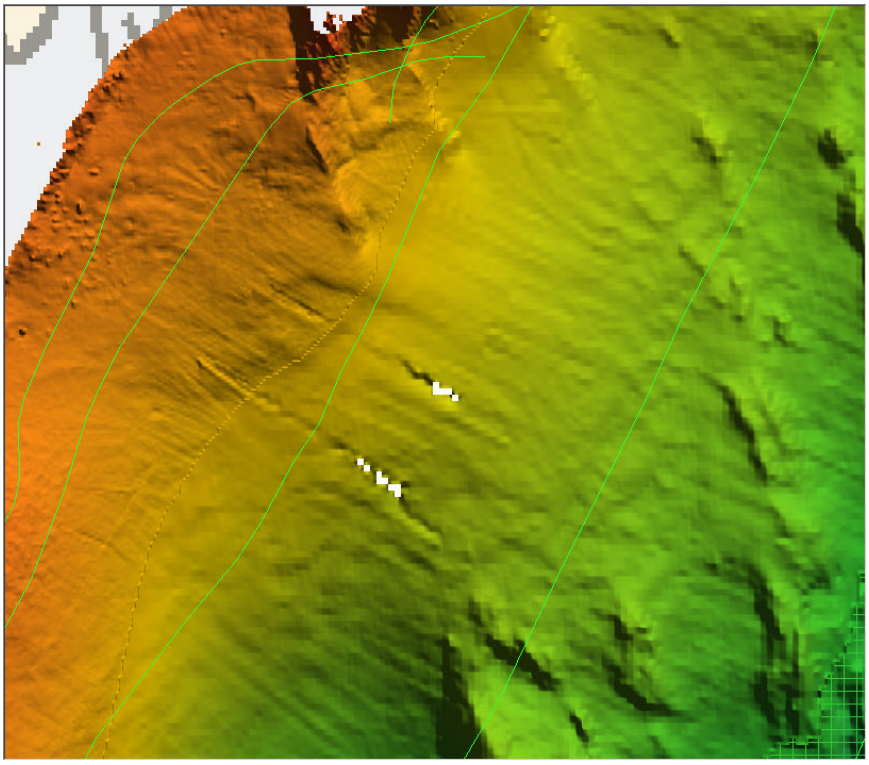


Figure 29: The holiday located north of Port Lucy entrance at position 56° 21' 00.0"N, 134° 38' 23.9"W has the least depth represented. The holiday is depicted below in Figures 26 and 27

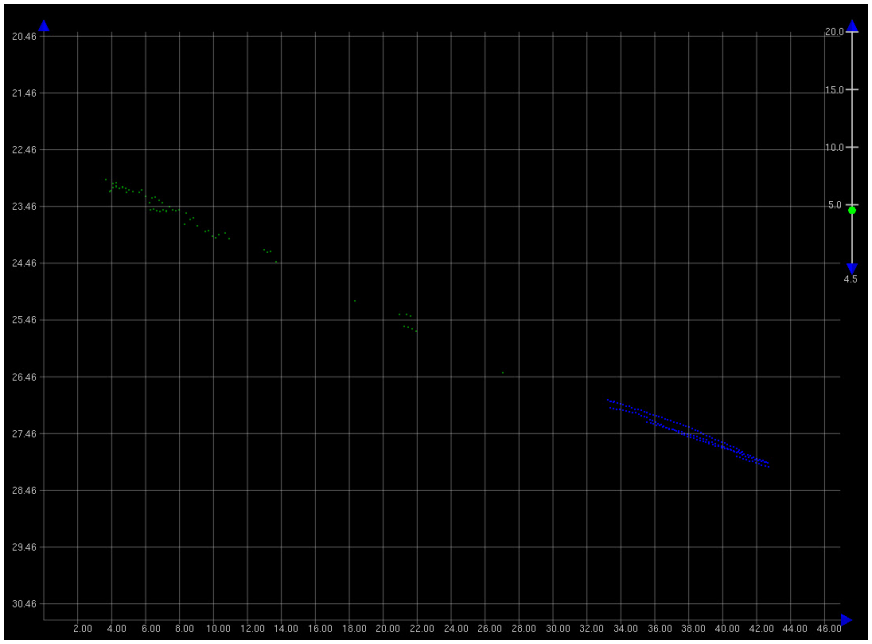


Figure 30: H12371 North of Port Lucy Holiday Subset

The holidays have been reviewed and the least depths are represented in these areas. The holidays are not represented in the survey coverage and the data is adequate for charting.The caption for Figure 27 should refer to Figure 28 below. The caption for Figure 29 should refer to Figure 30 below.

B.2.11 Density

Density requirements for H12371 were achieved with at least 98% of finalized surface nodes containing five or more soundings, see Standards Compliance Review in Appendix V.

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

All data reduction procedures conform to those detailed in the DAPR.

Do not concur. The field used a questionable method to make the data adhere exactly in the assigned sheet limits by manually rejecting large portions of data on the edges of the sheet that are within NOS specification.

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Backscatter was logged in 7k files and submitted directly to NGDC to be archived and to PHB where the data will be processed.

This data will be archived at NGDC, but branches are not currently processing the delivered backscatter.

B.5 Data Processing

B.5.1 Software Updates

The following software updates occurred after the submission of the DAPR:

Manufacturer	Name	Version	Service Pack	Hotfix	Installation Date	Use
Caris	HIPS/SIPS	7.1	0	3	10/24/2011	Processing
Caris	HIPS/SIPS	7.1	0	2	08/08/2011	Processing
Caris	Notebook	3.1	0	3	10/13/2011	Processing
NOAA	Pydro	v11.9-11 (r3603-r3670)	0	0	10/17/2011	Processing
Applanix	PosPAC	5.4	1	0	10/13/2011	Processing
Caris	Bathy DataBASE	3.2	1	0	10/13/2011	Processing

Table 9: Software Updates

The following Feature Object Catalog was used: Object Catalogue 5

B.5.2 Surfaces

The following CARIS surfaces were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H12371_16m_Combined	CUBE	16 meters	-	NOAA_16m	Complete MBES
H12371_16m_Final_128plus	CUBE	16 meters	128 meters - 999 meters	NOAA_16m	Complete MBES
H12371_8m_Final_100to160	CUBE	8 meters	100 meters - 160 meters	NOAA_8m	Complete MBES
H12371_8m_Final_64to100	CUBE	8 meters	64 meters - 100 meters	NOAA_8m	Complete MBES
H12371_4m_Final_32to80	CUBE	4 meters	32 meters - 80 meters	NOAA_4m	Complete MBES
H12371_2m_Final_16to40	CUBE	2 meters	16 meters - 40 meters	NOAA_2m	Complete MBES
H12371_1m_Final_0to20	CUBE	1 meters	0 meters - 20 meters	NOAA_1m	Complete MBES
H12371_16m	CUBE	16 meters	-	NOAA_16m	Complete MBES
H12371_8m	CUBE	8 meters	-	NOAA_8m	Complete MBES
H12371_4m	CUBE	4 meters	-	NOAA_4m	Complete MBES
H12371_2m	CUBE	2 meters	-	NOAA_2m	Complete MBES
H12371_1m	CUBE	1 meters	-	NOAA_1m	Complete MBES

Table 10: CARIS Surfaces

All field sheet extents were adjusted using the Base 16 calculator tool to ensure coincident nodes among all bathymetric surfaces regardless of the field sheet in which they are contained given the standard surface resolutions of one, two, four, eight and sixteen meters. The NOAA CUBE parameters mandated in HSSD were used for the creation of all CUBE BASE surfaces in Survey H12371.

The surfaces have been reviewed where noisy data, or 'fliers' are incorporated into the gridded solution causing the surface to be shoaler than the true seafloor. Where these spurious soundings cause the gridded surface to be shoaler than the reliably measured seabed by greater than the maximum allowable TVU at that depth, the noisy data have been rejected and the surface recomputed.

As there was significant downsloping encountered in the near shore areas, the use of conventional surface ranges was found to create holes in the boundaries between the surfaces. The solution decided upon was to double the depth overlap between the surfaces. For example, where originally the 1-meter surface would have a range of 0-20 meters and the 2-meter surface a range of 18-40 meters, the new surfaces would be 0-20 meters and 16-40 meters respectively. This solved the main display issues, but some gaps remained in those areas where sheer cliffs were encountered, as shown in figures 31 and 32.

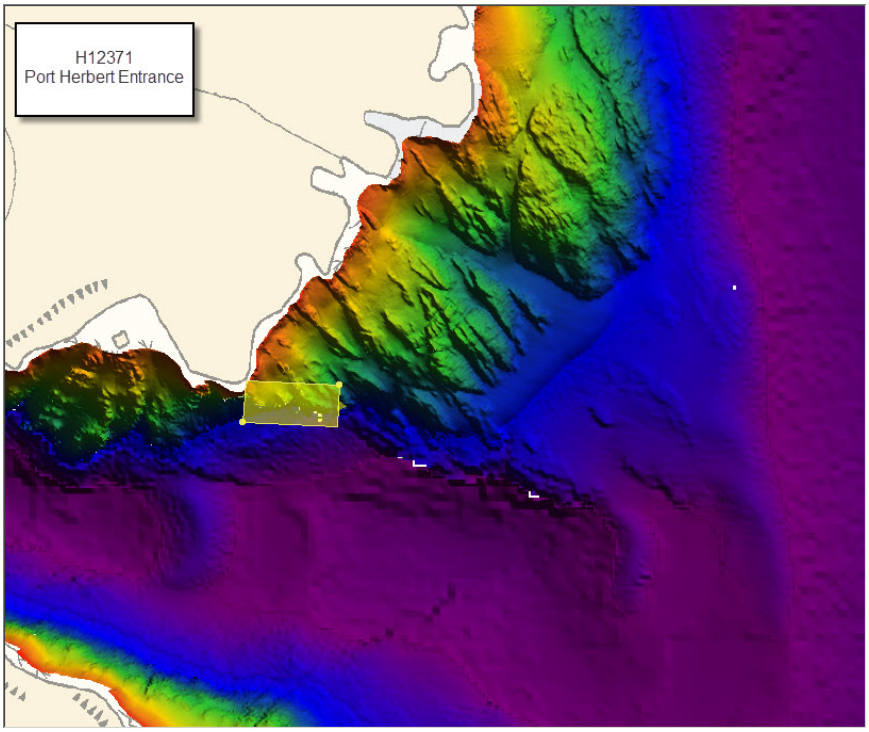


Figure 31: H12371 Entrance to Port Walter Surface Resolution Issue

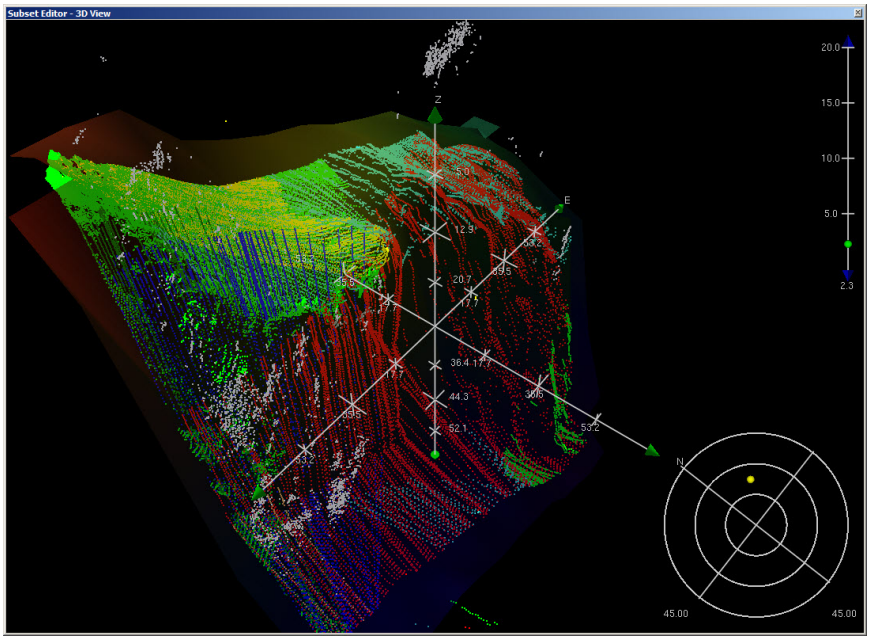


Figure 32: H12371 Entrance to Port Walter Surface Resolution Issue Subset

The two 8-meter finalized surfaces listed in section B.5.2 were created by the field to view the separate IHO layers for each depth range. The field intended to submit only the 8-meter finalized surface ranging from 64 to 160 meters to Pacific Hydrographic Branch. A new 8-meter finalized surface, ranging from 64 to 160 meters, was created during office processing and will be archived at NGDC.A 16-meter combined surface, H12371_16m_Combined_Office.csar, was created during office processing and was used as the basis of compilation.

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 is noted in the H12371 Data Log spreadsheet. All data logs are submitted digitally in the Separates I folder.

B.5.4 Critical Soundings

Designation of soundings followed procedures as outlined in section 5.2.1.2 of the HSSD. Survey H12371 had no designated or outstanding soundings, as a majority of the sheet area consisted of steep areas of significant depth, with soundings lying within the assigned horizontal and vertical uncertainty values.

B.5.5 TrueHeave

To enable the application of TrueHeave some POS/MV files were "fixed" using the fixTrueHeave.exe utility from CARIS. Fixed files were assigned an additional * .fixed suffix. This was performed for the following vessels and days: Launch 2805, Days 272, 277; Launch 2806, Days 277, 278.

The data that the fixTrueHeave utility was applied to is adequate for charting.

B.5.6 Data Processing Deviations

All Reson 8160 and 7111 data outside the sheet limits were manually removed using Subset Editor in Caris HIPS/SIPS.

Although the remaining data is adequate for charting, rejecting data that meets specifications to fit the assigned sheet limits is not an acceptable practice.

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.

Standard Vertical Control Methods Used:

Discrete Zoning

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

Station Name	Station ID
Port Alexander	945-1054

Table 11: NWLON Tide Stations

File Name	Status
9451054.tid	Verified Observed

Table 12: Water Level Files (.tid)

File Name	Status
O322FA2011CORP.zdf	Preliminary

Table 13: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 10/11/2011. The final tide note was received on 10/28/2011.

Preliminary zoning is accepted as the final zoning for project OPR-O322-FA-2011

C.2 Horizontal Control

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

The following PPK methods were used for horizontal control:

Single Base

Vessel kinematic data were post-processed using Applanix POSPac processing software and SingleBase Post Processed Kinematic methods described in the DAPR. Smooth Best Estimate of Trajectory (SBET)

and associated error (RMS) data were applied to all MBES data in CARIS HIPS with the exception of the following lines:

2806 - Dn268 2011M_2681748, 2011M_2681758, 2011M_2681804, 2011M_2681810, 2011M_2681821, 2011M_2681826, 2011M_2681828, 2011M_2681834, 2011M_2681836, 2011M_2681838, 2011M_2681840, 2011M_2681843, 2011M_2681846, 2011M_2681847, 2011M_2681849, 2011M_2681853, 2011M_2681855, 2011M_2681857, 2011M_2681858, 2011M_2681900, 2011M_2681902, 2011M_2681902A, 2011M_2681904, 2011M_2681906, 2011M_2681909, 2011M_2681911, 2011M_2681913, 2011M_2681914

For further details regarding the processing and quality control checks performed see the H12371 POSPAC Processing Logs spreadsheet located in the SBET folder with the GNSS data. See also the OPR-O322-FA-11 Horizontal and Vertical Control report, submitted under separate cover.

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
PORTALEX	AB48

Table 14: CORS Base Stations

The following user installed stations were used for horizontal control:

HVCR Site ID	Base Station ID
PAT	TT9786

Table 15: User Installed Base Stations

The following DGPS Stations were used for horizontal control:

DGPS Stations
Level Island, AK (295 kHz)

Table 16: USCG DGPS Stations

C.3 Additional Horizontal or Vertical Control Issues

3.3.1 WAAS Correctors

During the beginning of project O322 Launch 2805 was run with WAAS correctors enabled. This option was disabled post-acquisition but specific information was not documented for date and time.

D. Results and Recommendations

D.1 Chart Comparison

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
17333	1:20000	9	11/2007	10/23/2007	11/03/2007
17320	1:217828	18	03/2008	03/04/2008	03/01/2008

Table 17: Largest Scale Raster Charts

17333

Soundings from survey H12371 generally agreed within one to two fathoms with charted depths on chart 17333. Contours generated in CARIS HIPS closely approximated the charted 10, 20, 50 and 100 fathom contours. Notable exceptions to this general agreement are listed and shown in the figures below.

- Northeast of Armstrong Point: A series of shallow areas as shown in Figure 33 are not taken into account in the charted soundings.

- Northeast of Hutchinson Point: A 4.5-fathom charted depth was surveyed with MBES at 14-fathoms (Figure 34).

- East of Port Walter: A 14-fathom charted depth was surveyed with MBES at 8.4-fathoms (Figure 35).

- Southeast of Codfish Cove: A 7.5-fathom charted depth was surveyed with MBES at 2.5-fathoms (Figure 36).

- Codfish Cove: A 8.5-fathom charted depth was surveyed with MBES at 1.2-fathoms (Figure 37).

- North shore of Port Herbert: A 5-fathom sounding (Figure 38) found with MBES is not charted on chart 17333.

- North of Port Herbert Entrance: A charted 18-fathom depth (Figure 39) disagrees with the surrounding 3-fathom, 4-fathom, 6.3-fathom and 9.4-fathom surveyed soundings.

Chart 17333 noted areas previously surveyed by wire drag techniques as a green tint. The hydrographer recommends removing the green tint and notation of wire drag surveys for all the area covered by 100% MBES.

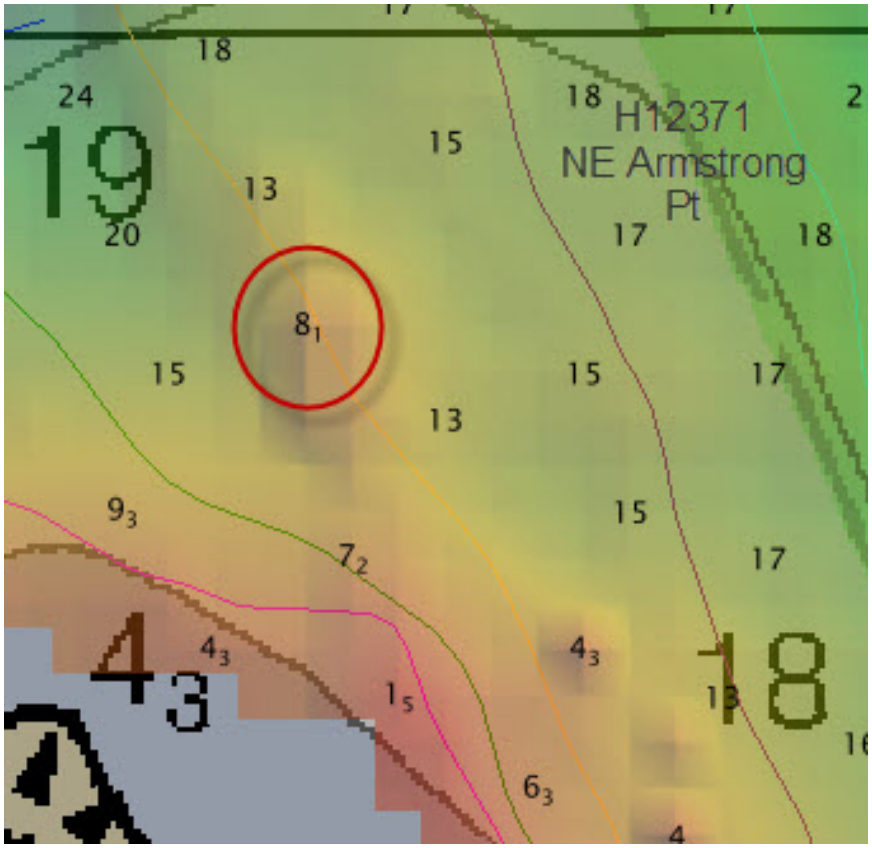


Figure 33: Disagreement between charted depths (17333) and surveyed soundings near Armstrong Point.

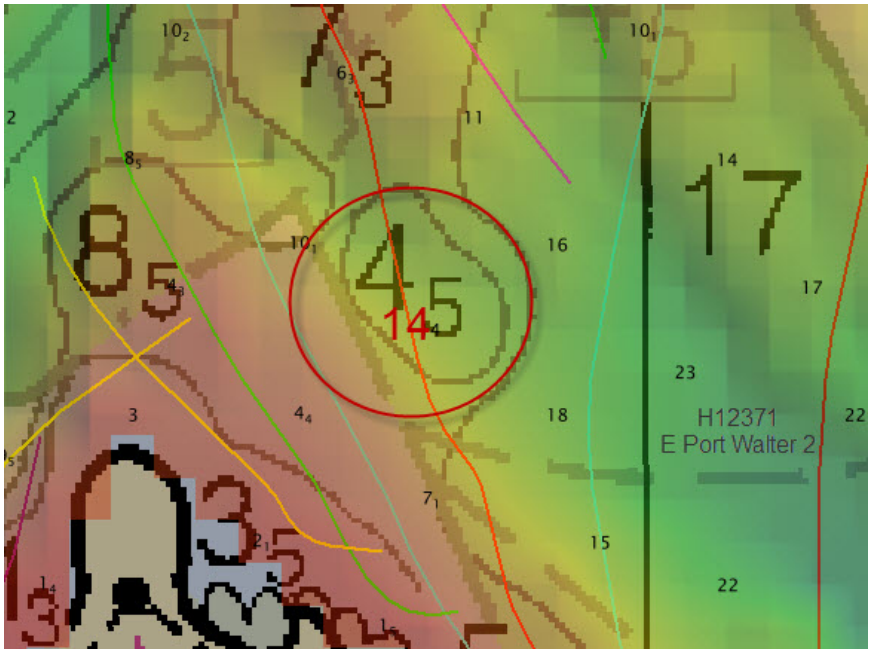


Figure 34: Disagreement between charted depths (17333) and surveyed soundings near Hutchinson Point.

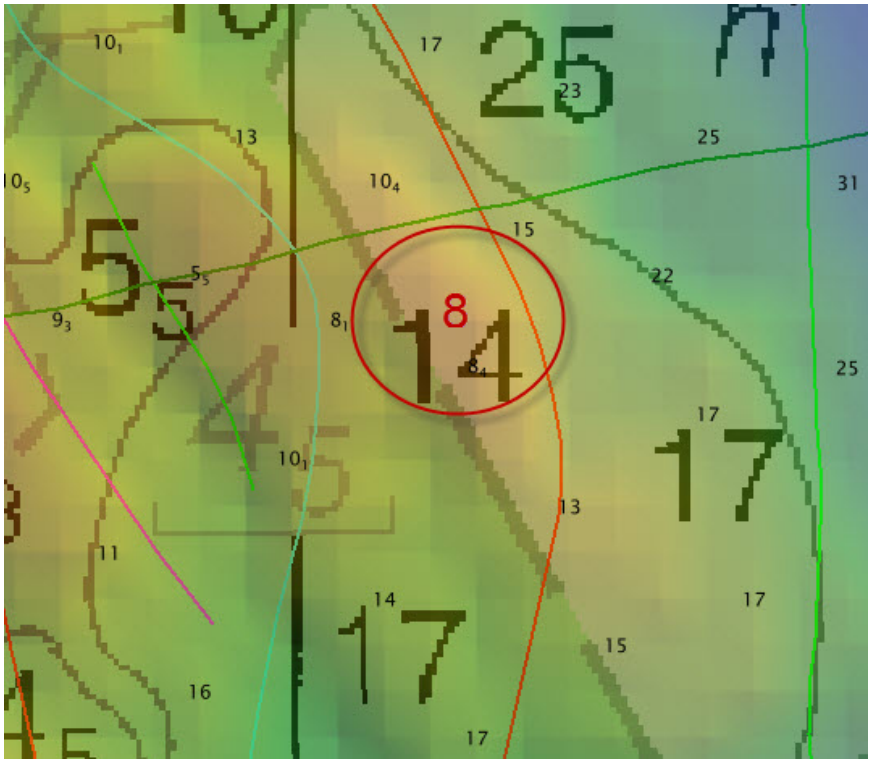


Figure 35: Disagreement between charted depths (17333) and surveyed soundings near Port Walter

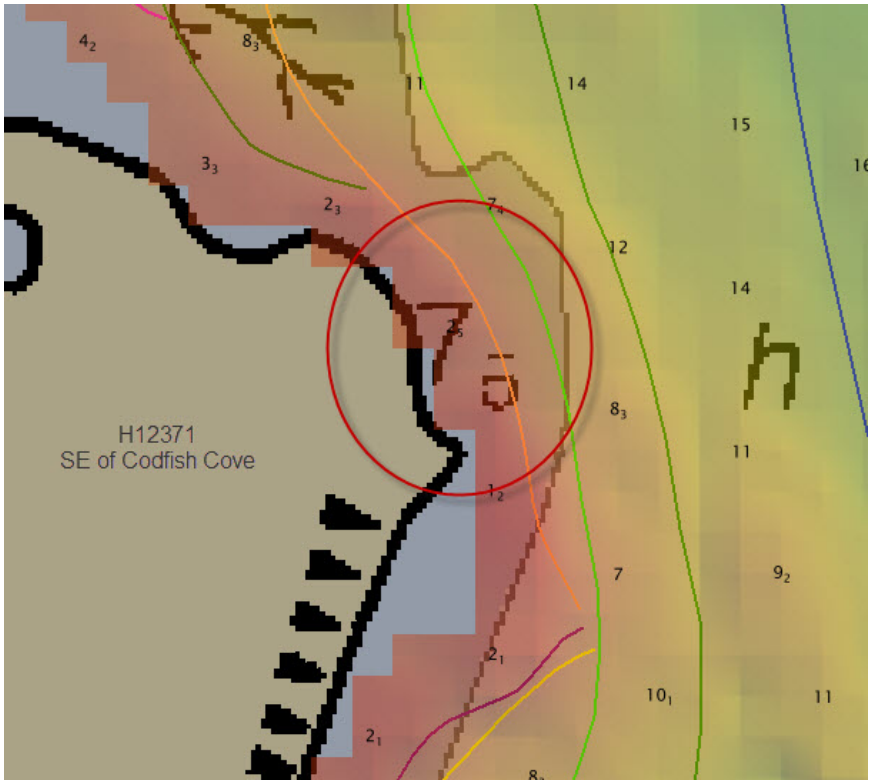


Figure 36: Disagreement between charted depths (17333) and surveyed soundings near Codfish Cove.

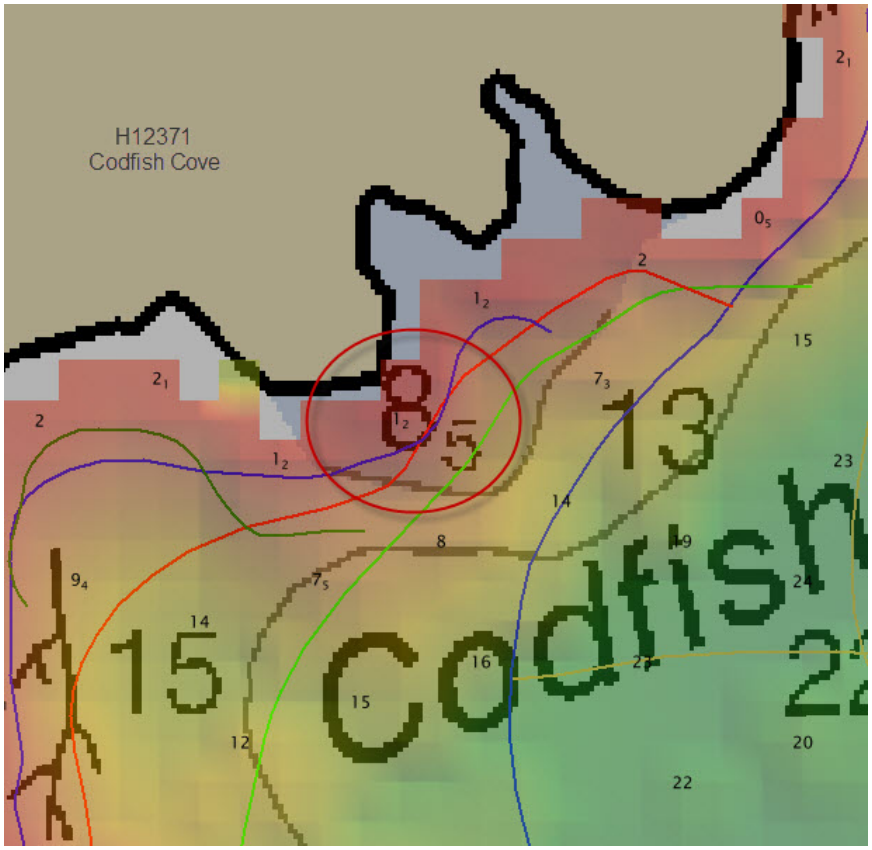


Figure 37: Disagreement between charted depths (17333) and surveyed soundings near Codfish Cove

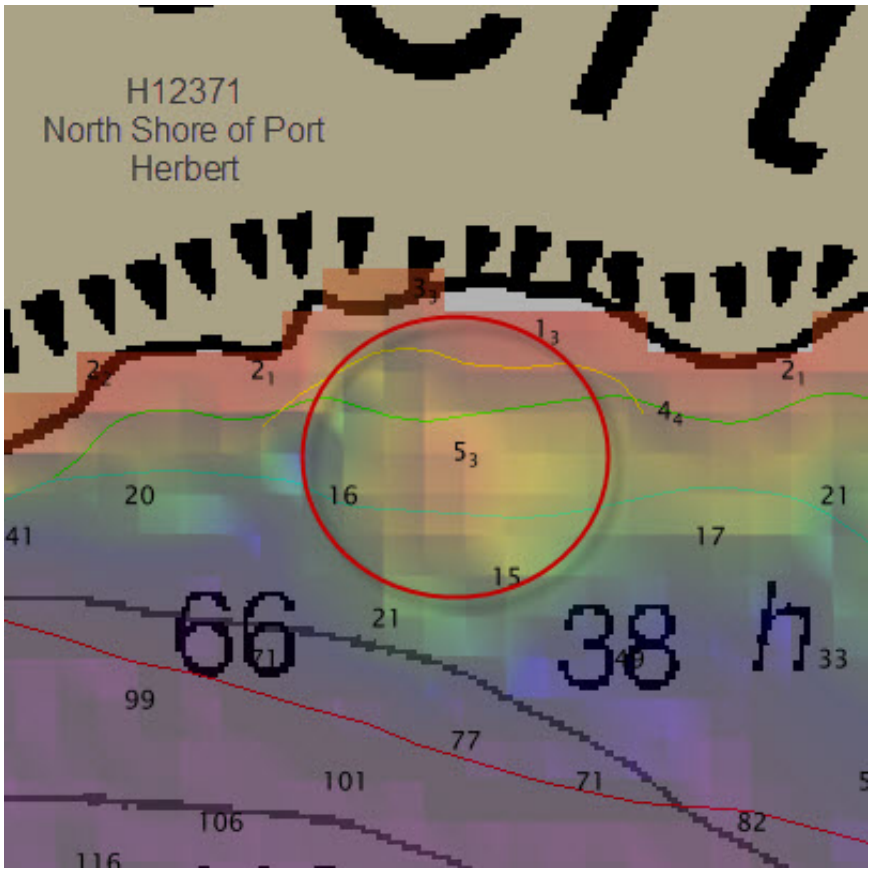


Figure 38: Shoal area found with MBES not seen on the chart (17333)

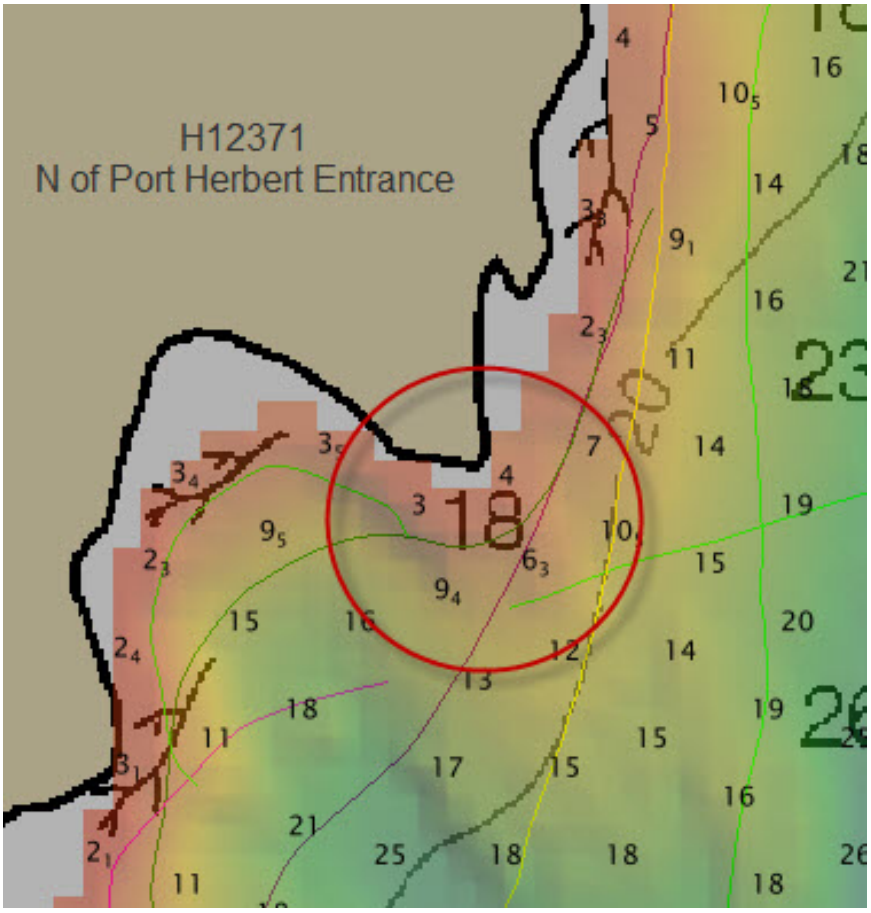


Figure 39: Disagreement between charted depths (17333) and surveyed soundings near Port Herbert.
Charted depths and contours were recommended to be updated based on new survey data.

17320

Soundings from survey H12371 generally agreed within one to two fathoms with charted depths on chart 17320. Contours generated in CARIS HIPS closely approximated the charted 100 fathom contour.

Charted depths and contours were recommended to be updated based on new survey data.

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?
US3AK4PM	1:217828	9	03/21/2011	03/21/2011	NO
US5AK09E	1:20000	1	08/02/2011	08/02/2011	YES

Table 18: Largest Scale ENCs

US3AK4PM

Soundings from survey H12371 generally agreed within one to two fathoms with charted depths on chart US3AK4PM. Contours generated in CARIS HIPS closely approximated the charted 100 fathom contour. Notable exceptions to this general agreement are listed and shown in the figures below.

- Northeast of Port Herbert: A charted 111-fathom depth (Figure 40) disagrees with the surrounding 144-fathom, 142-fathom and 139-fathom MBES derived soundings.

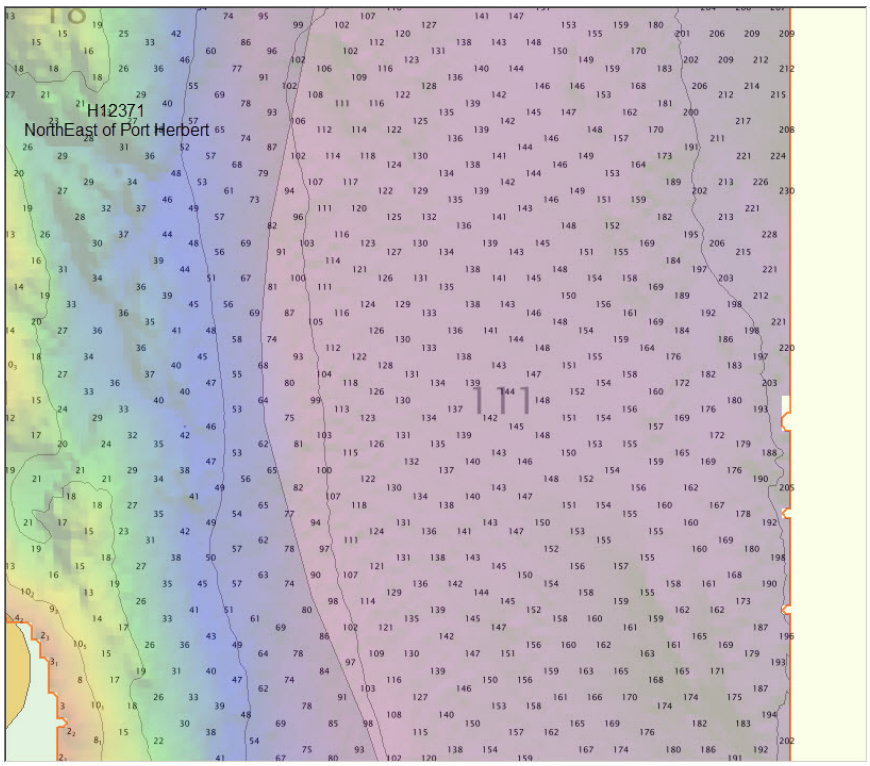


Figure 40: Disagreement between charted depths (US3AK4PM) and surveyed soundings near Port Herbert.

Charted depths and contours were recommended to be updated based on new survey data.
US5AK09E

Soundings from survey H12371 generally agreed within one to two fathoms with charted depths on chart US5AK09E. Contours generated in CARIS HIPS closely approximated the charted 100 fathom contour. Notable exceptions to this general agreement are listed and shown in the figures below.

- Northeast of Hutchinson Point: A charted 4.5-fathom depth (Figure 41) disagrees with the surrounding 10-fathom, 11-fathom, 16-fathom and 14-fathom MBES derived soundings.

- 1.5 NM north of Port Herbert Entrance: A charted 18-fathom depth (Figure 42) disagrees with the surrounding 3-fathom, 4-fathom, 6.3-fathom and 9.4-fathom MBES derived soundings.

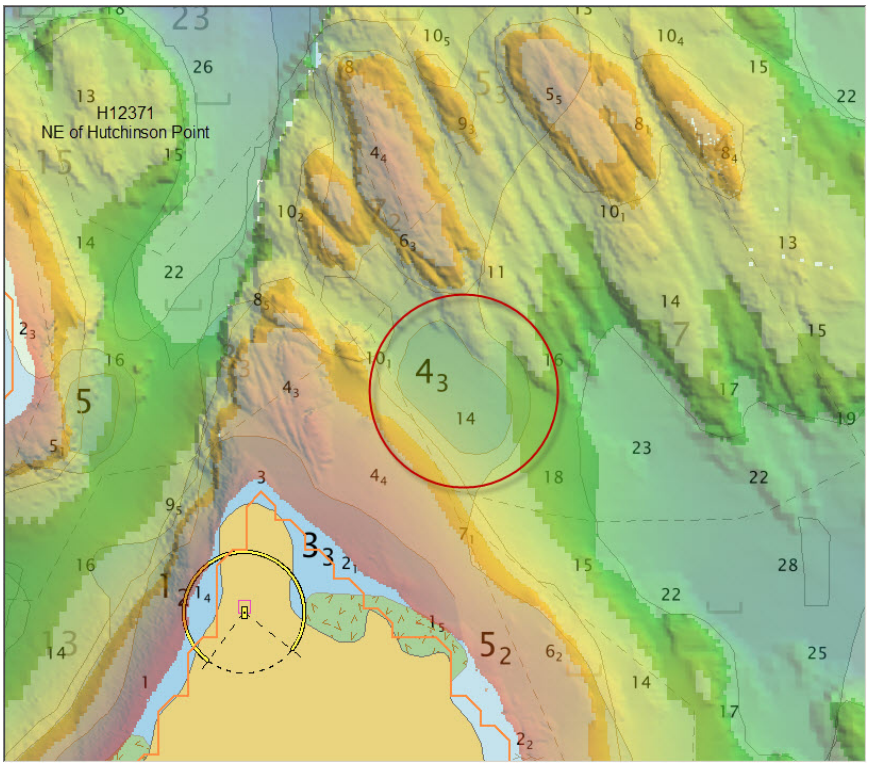


Figure 41: Disagreement between charted depths (US5AK09E) and surveyed soundings NorthEast of Hutchinson Point.

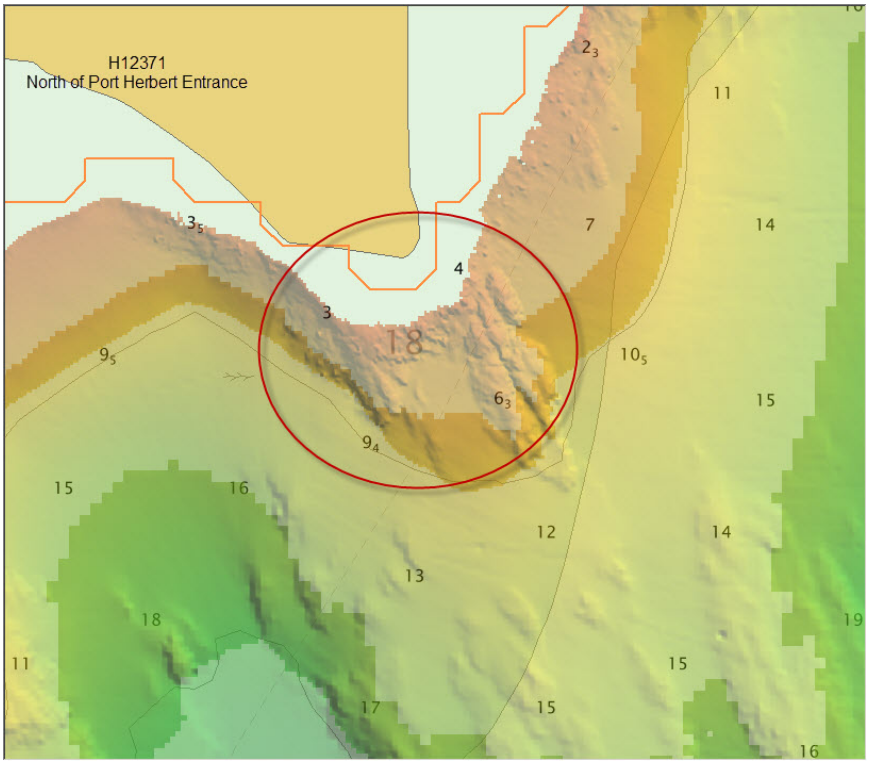


Figure 42: Disagreement between charted depths (US5AK09E) and surveyed soundings 1.5 NM north of Port Herbert.

Charted depths and contours were recommended to be updated based on new survey data.

D.1.3 AWOIS Items

There were no AWOIS items located within the limits of H12371.

D.1.4 Charted Features

All charted features which are investigated are included in the survey's Final Feature File.

D.1.5 Uncharted Features

A new fish pen was observed during field operations in Little Port Walter (Figure 43). Complete information for this feature is located in the survey's Final Feature file.

Figure 43: New fish pen located in Little Port Walter

The new fish pen has been recommended for charting.

D.1.6 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.7 Shoal and Hazardous Features

There were no shoals or hazardous features in this survey.

D.1.8 Channels

There were no channels in this survey.

D.2 Additional Results

D.2.1 Shoreline

Fairweather personnel investigated significant features while conducting survey operations for survey H12371. Annotations, information, and diagrams collected on boat sheets during field operations are scanned and included in the digital Separates I folder. Shoreline verification procedures for survey H12371 conform to those detailed in the DAPR.

Features from the current editions of charts 17320 and 17333 that were not depicted by the source shoreline data were digitized in CARIS Notebook with S-57 attribution into the H12371_Final_Feature_File.hob file, to be displayed for field verification

During composition of the original feature file, there was an error where small and large scale shoreline and feature data were not deconflicted. All chart 17320 shoreline and feature data were flagged in the final feature file as update with their original source date and source indication as well as a recommendation to disregard shoreline and feature data sourced from chart 17320.

The Hydrographer recommends that the shoreline depicted in the CARIS Notebook files and final sounding files supersede and complement shoreline information compiled on the CSF and charts.

Some shoreline features were revised or omitted to accommodate chart scale.

D.2.2 Prior Surveys

Prior survey comparisons were not conducted by the field.

D.2.3 Aids to Navigation

Survey H12371 included one aid to navigation (ATON). The ATON was found to serve its intended purpose.

D.2.4 Overhead Features

No overhead features in the survey area.

D.2.5 Submarine Features

No submarine features in the survey area.

Do not concur. There is a pipeline area at the head of Little Port Walter in the vicinity of the Fisheries Research Station. It is recommended that it be retained as charted.

D.2.6 Ferry Routes and Terminals

No ferry routes and terminals in the survey area.

D.2.7 Platforms

No platforms in the survey area.

D.2.8 Significant Features

No significant features in the survey area.

D.2.9 Construction and Dredging

No planned construction or dredging in the survey 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, Standing and Letter Instructions, and all HSD Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies noted in the Descriptive Report.

Report Name	Report Date Sent
Hydrographic Systems Readiness Review	2011-08-26
Data Acquisition and Processing Report for OPR-O322-FA-11	2011-12-16
Horizontal and Vertical Control Report for OPR-O322-FA-11	2011-12-16
Coast Pilot Report for OPR-O322-FA-11	2011-12-06

Approver Name	Approver Title	Approval Date	Signature
CAPT David O. Neander, NOAA	Chief of Party	12/16/2011	2011.12.19 10:24:44 -08'00'
ENS Eric G. Younkin, NOAA	Sheet Manager	12/16/2011	2011.12.16 23:35:42 Z
CST Weston J. Renoud	Chief Survey Technician	12/16/2011	David Moehl 2011.12.20 12:16:19 -08'00'
LT Caryn M. Zacharias, NOAA	Field Operations Officer	12/16/2011	Caryn M. Zacharias 2011.12.19 10:31:46 -08'00'

F. Table of Acronyms

Acronym	Definition
AFF	Assigned Features File
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	Discrete Position
DR	Descriptive Report
DTON	Danger to Navigation
ENC	Electronic Navigational Chart
ERS	Ellipsoidal Referenced Survey
ERZT	Ellipsoidally Referenced Zoned Tides
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
HSSDM	Hydrographic Survey Specifications and Deliverables Manual

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
TPU	Total Porpagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United Stated Coast Guard
UTM	Universal Transverse Mercator
XO	Exectutive 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 : October 24, 2011

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-O322-FA-2011
HYDROGRAPHIC SHEET: H12371

LOCALITY: Port Herbert to Port Lucy, Chatham Strait, AK
TIME PERIOD: September 25 - October 07, 2011

TIDE STATION USED: 945-1054 Port Alexander, AK
Lat. 56° 14.8'N Long. 134° 38.8' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.077 meters

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project OPR-O322-FA-2011, H12371, during the time period between September 25 and October 07, 2011.

Please use the zoning file "O322FA2011CORP" submitted with the project instructions for OPR-O322-FA-2011. Zones SA476, SA476A, SA477, SA477A, and SA478 are the applicable zones for H12371.

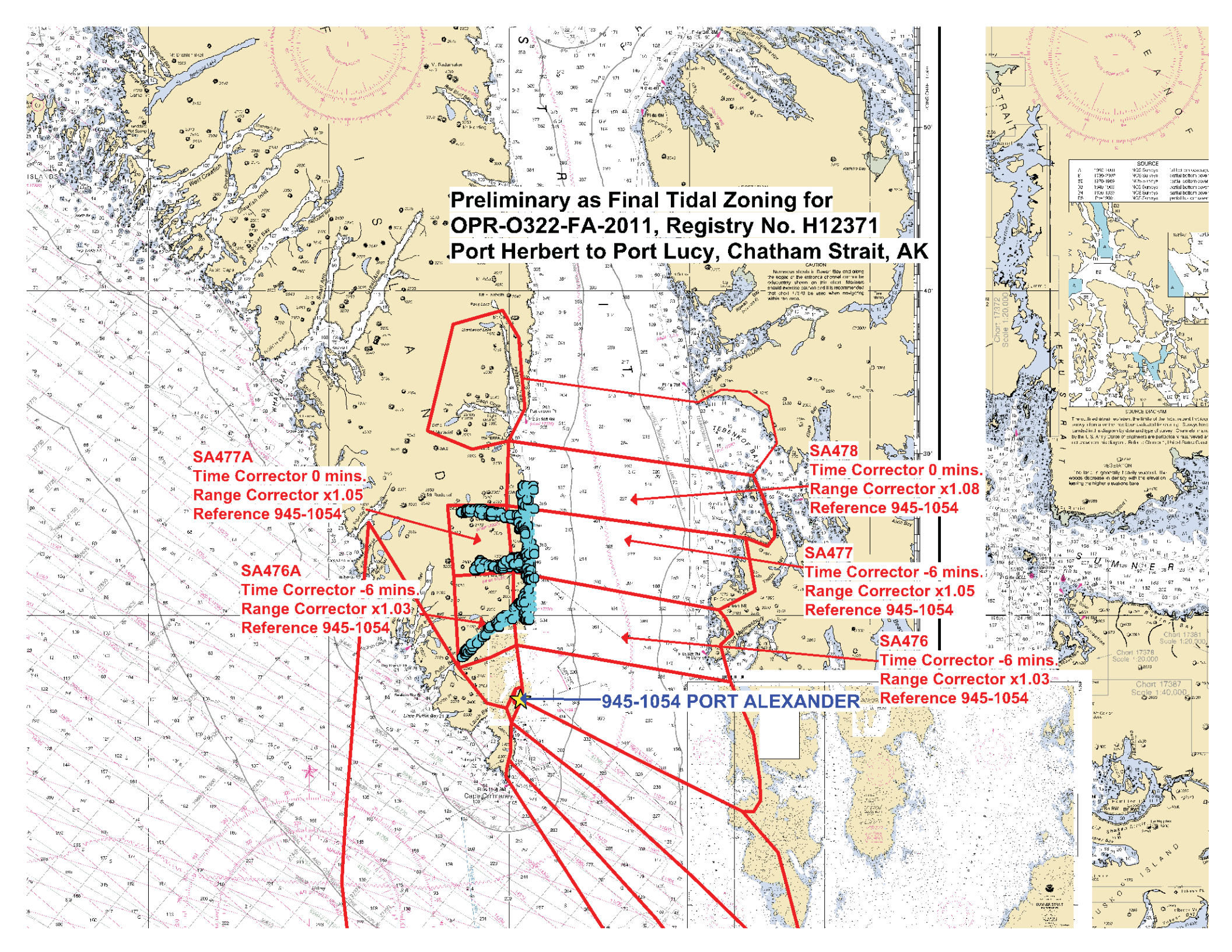
Refer to attachments for zoning information.

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).

Gerald Hovis

Digitally signed by Gerald Hovis
DN: cn=Gerald Hovis, o=Center for Operational Oceanographic Products and Services, ou=NOAA/NOS/CO-OPS/OD/PSB, email=gerald.hovis@noaa.gov, c=US
Date: 2011.10.26 12:53:53 -04'00'

CHIEF, PRODUCTS AND SERVICES BRANCH


Preliminary as Final Tidal Zoning for
OPR-O322-FA-2011, Registry No. H12371
Port Herbert to Port Lucy, Chatham Strait, AK
SA477A
Time Corrector 0 mins.
Range Corrector x1.05
Reference 945-1054
SA476A
Time Corrector -6 mins.
Range Corrector x1.03
Reference 945-1054
SA478
Time Corrector 0 mins.
Range Corrector x1.08
Reference 945-1054
SA477
Time Corrector -6 mins.
Range Corrector x1.05
Reference 945-1054
SA476
Time Corrector -6 mins.
Range Corrector x1.03
Reference 945-1054
945-1054 PORT ALEXANDER

APPROVAL PAGE

H12371

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 NGDC for archive

- H12371_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12371_GeoImage.pdf

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

Approved: Digitally signed by Peter S. Holmberg
DN: cn=Peter S. Holmberg, o, ou, email=peter.holmberg@noaa.gov, c=US
Date: 2012.09.20 14:51:14 -07'00'

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: Digitally signed by Russ Davies signed for Dave Zezula
DN: cn=Russ Davies signed for Dave Zezula, o=PHB, ou=NOAA, email=Russ.Davies@NOAA.Gov, c=US
Date: 2012.09.20 14:57:41 -07'00'

LCDR David J. Zezula, NOAA
Chief, Pacific Hydrographic Branch