

H12223

NOAA FORM 76-35A	
U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL OCEAN SERVICE	
DESCRIPTIVE REPORT	
Type of Survey	Hydrographic Survey
Field No.	N/A
Registry No.	H12223
LOCALITY	
State	Washington
General Locality	Olympic Coast National Marine Santuary
Sublocality	Southern Offshore Portion of Cape Flattery
<hr/> <hr/> 2010 <hr/>	
CHIEF OF PARTY	
CAPT David O. Neander, NOAA	
LIBRARY & ARCHIVES	
DATE	

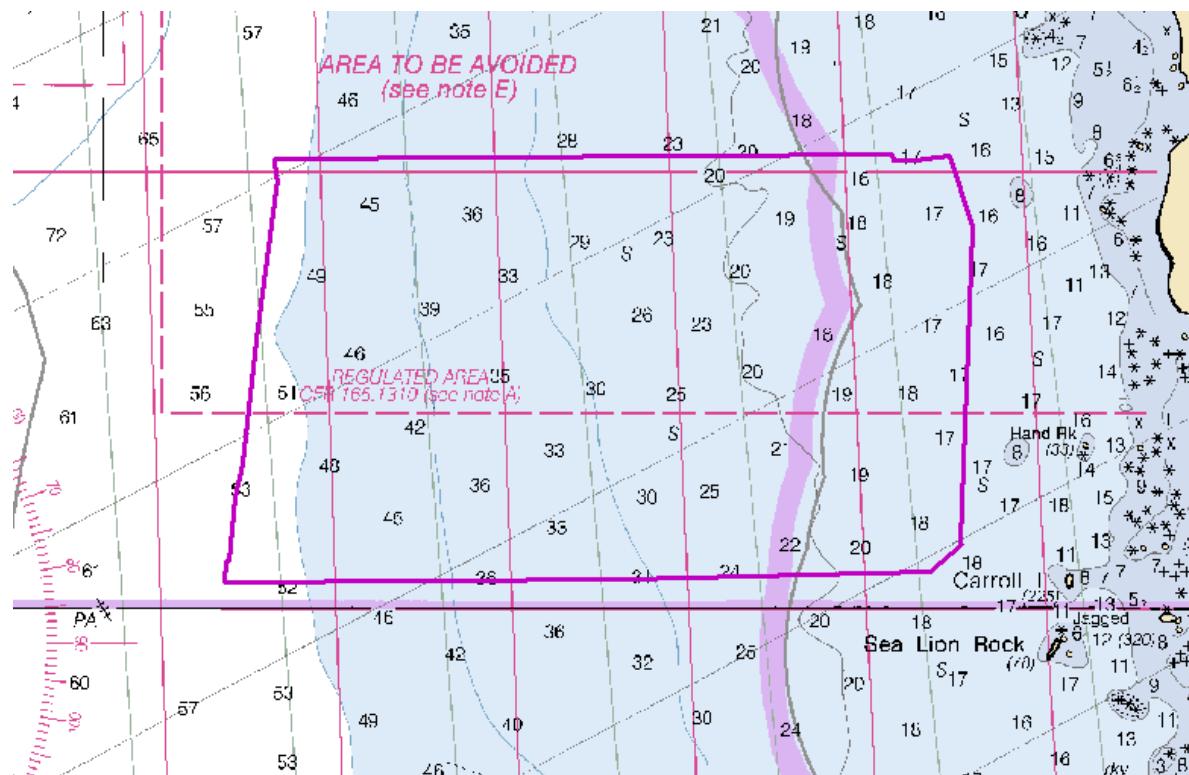
<p style="text-align: center;">U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION</p> <p style="text-align: center;">HYDROGRAPHIC TITLE SHEET</p>	REGISTRY No H12223
<p>INSTRUCTIONS — The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.</p>	
<p>State <u>Washington</u></p> <p>General Locality <u>Olympic Coast National Marine Sanctuary</u></p> <p>Sub-Locality <u>Southern Offshore Portion of Cape Flattery</u></p> <p>Scale <u>1:20,000</u> Date of Survey <u>June 22 - June 29, 2010</u></p> <p>Instructions dated <u>5/11/2010</u> Project No. <u>OPR-N324-FA-10</u></p> <p>Vessel <u>NOAA Ship Fairweather</u></p> <p>_____</p> <p>_____</p> <p>Chief of party <u>CAPT David O. Neander, NOAA</u></p> <p>Surveyed by <u>Fairweather Personnel</u></p> <p>Soundings by <u>Multibeam Echo Sounder</u></p> <p>SAR by <u>Adam Argento</u> Compilation by <u>Russ Davies</u></p> <p>Soundings compiled in <u>Fathoms</u></p> <p>_____</p> <p>REMARKS: <u>All times are UTC. UTM Zone 10</u></p> <p><u>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 end notes in red were generated during office processing. Page numbering may be interrupted or non sequential.</u></p> <p>_____</p> <p><u>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/.</u></p>	

Descriptive Report to Accompany Hydrographic Survey H12223

Project OPR-N324-FA-10
Olympic Coast National Marine Sanctuary, Washington
Scale 1:20,000
June 2010
NOAA Ship Fairweather
Chief of Party: Captain David O. Neander, NOAA

A. AREA SURVEYED

The survey area is located in the Olympic Coast National Marine Sanctuary (OCNMS), within the sub-locality of Southern Offshore Portion of Cape Flattery. During the course of OPR-N324-FA-10 the sheet layouts were modified several times in order to efficiently and safely operate S220 in the highly dynamic sea conditions on the Olympic Coast. The predominant weather during the course of OPR-N324-FA-10 came from wind and seas from the west, forcing S220 to occasionally run lines with a general east-west azimuth to minimize roll despite being perpendicular to depth contours. When seas and swell were down, S220 ran lines with a north-south azimuth parallel to the depth contours. Modifications to the sheet layout were made in cooperation and with approval from Hydrographic Surveys Division Operations Branch (see Project Correspondence). The final sheet layout for H12223 is depicted in Figure 1. Data acquisition was conducted from June 22 to June 29, 2010 (DN 173 to DN 180).



No assigned feature or AWOIS items were assigned within the survey limits of H12223, therefore no feature verification was conducted.

For vessel S220, dual acquisition of both Reson 7111 and Reson 8160 data was conducted throughout the entire survey area of H12223. For linear nautical milage (LNM) reporting purposes, only the Reson 7111 data were used for the following figures and tables. Mainscheme and crossline mileage for MBES and shoreline acquisition were calculated and are displayed in Table 1 below.

MAIN SCHEME - Mileage	
0 Single Beam MS	
475.99 Multibeam MS mileage	
394.35 FAIRWEATHER S-220	
13.15 Launch 2805	
0.00 Launch 2806	
35.27 Launch 2807	
33.22 Launch 2808	
0 SideScan MS	
475.99 Total MS	
CROSSLINE - Mileage	
0 Single Beam XL	
22.66 Multibeam XL	
22.66 FAIRWEATHER S-220	
0.00 Launch 2805	
0.00 Launch 2806	
0.00 Launch 2807	
0.00 Launch 2808	
22.66 Total XL	
OTHER	
n/a	Developments/AWOIS - Mileage
n/a	Shoreline/Nearshore Investigation - Mileage
n/a	Total # of Investigated Items
n/a	Total Bottom Samples
39.66	Total SNM
6/22/10, 6/23/10, 6/25/10, 6/27/10- 6/29/10 173, 174, 176, 178, 179, 180	Specific Dates of Acquisition Specific Dn#s of Acquisition

Table 1: H12223 Survey Statistics

B. DATA ACQUISTION AND PROCESSING

A complete description of data acquisition, processing systems and survey vessels along with quality control procedures and data processing methods are included and described in *Fairweather's 2010 Data Acquisition and Processing Report* (DAPR), submitted under separate cover. Items specific to this survey and any deviations from the aforementioned report are discussed in the following sections. This

hydrographic survey was completed as specified by Hydrographic Survey Project Instructions OPR-N324-FA-10, dated May 11, 2010.

B.1 Equipment and Vessels

Equipment and vessels used for data acquisition and survey operations during this survey are listed below in Table 1.

	FAIRWEATHER	Launch 2805	Launch 2807	Launch 2808
Hull Registration Number	S220	2805	2807	2808
Builder	Aerojet-General Shipyard	All American	All American	All American
Length Overall	231 feet	28' 10"	28' 10"	28' 10"
Beam	42 feet	10' 8"	10' 8"	10' 8"
Draft, Maximum	15' 6"	4' 0" DWL	4' 0" DWL	4' 0" DWL
Cruising Speed	12.5 knots	28 knots	28 knots	28 knots
Max Survey Speed	7 knots	8 knots	8 knots	8 knots
Primary Echo- sounder(s)	RESON 7111 & RESON 8160	RESON 7125	RESON 7125	RESON 7125
Sound Velocity Equipment	SBE 19plus, MVP 200, SVP70	SBE 19plus	SBE19plus	SBE19plus
Attitude & Positioning Equipment	POS/MV V4	POS/MV V4	POS/MV V4	POS/MV V4
Type of operation	MBES	MBES	MBES	MBES

Table 2: Vessel Inventory

No vessel configurations used during data acquisition deviated from the DAPR.

B.2 Quality Control

B.2.1.1 Crosslines

Multibeam crosslines for this survey totaled 22.66 LNM, comprising 4.54% of the 475.99 LNM of mainscheme MBES hydrography. All crosslines were filtered to 45 degrees, both port and starboard, off of nadir except when data were reaccepted to fill low density areas. Crosslines were adequately distributed throughout the entire survey area and all data was crossed with the exception of day number 176 for launch 2807. Both main scheme and crossline mileage are summarized in Table 1 above.

Surface differencing in CARIS BathyDataBASE was used to assess crossline agreement with main scheme lines. Figure 2 depicts a difference surface between an 8-meter surface made with main scheme lines only and an 8-meter surface made with crosslines only. This difference surface is submitted digitally in the Separates IV folder. Ninty-five percent of nodes common between the two surfaces agree within plus or minus 0.33 meters, therefore crosslines agree with main scheme lines within the total allowable vertical and horizontal uncertainty in their common areas.²

The only areas of apparent disagreement occur bewteen lines where the “frowning” Reson 8160 data is affecting the surface due to slightly wider line spacing where the ship was coming out of a turn. Those two areas most affected by the Reson 8160 data are highlighted below in Figure 2.³

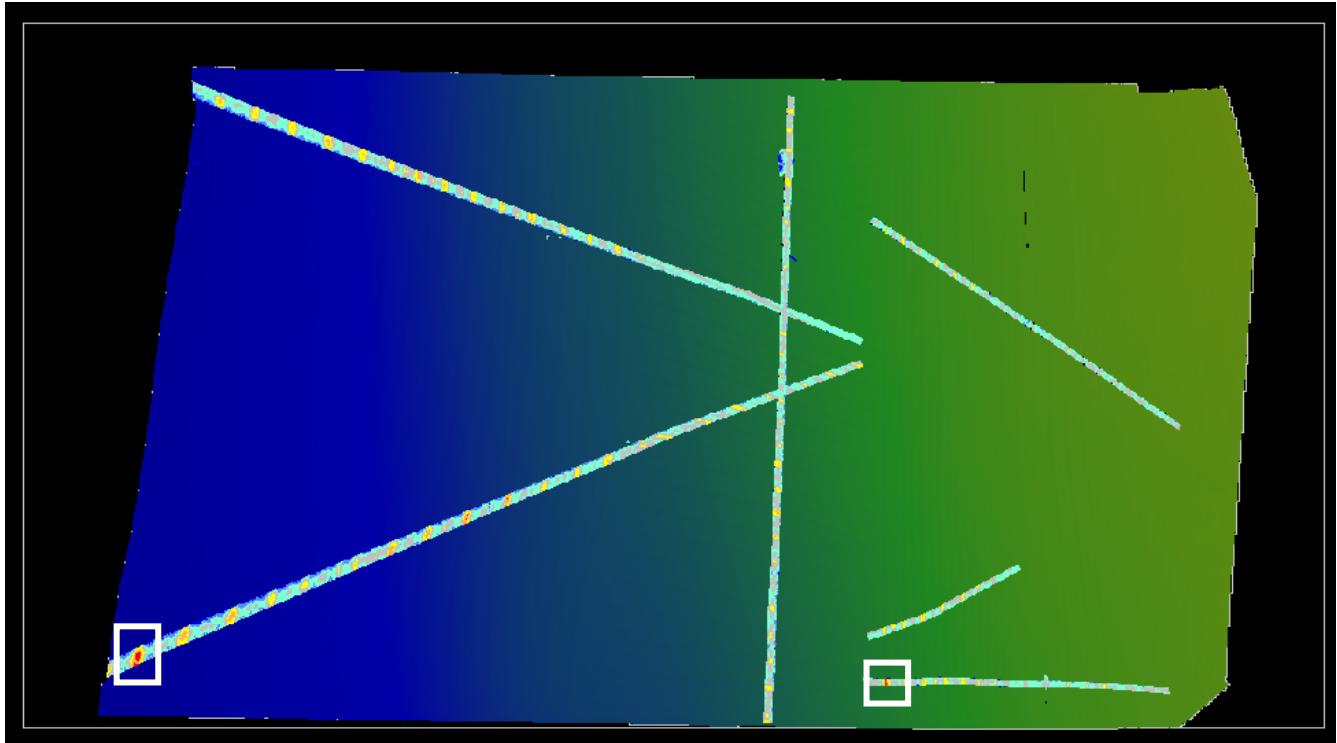


Figure 2: Crossline and main scheme differences (white indicates agreement, warm colors indicate a XLs shoaler than mainscheme and cool colors indicate XLs are deeper).

B.2.1.2 Junctions

Survey H12223 junctions with H12221 and H12222, which are sheets three and four of the same project.⁴ The survey scale of all surveys is 1: 20,000, and all surveys were completed during June 2010. The areas of overlap between the sheets were reviewed in CARIS Subset Editor for consistency and data were found to be in agreement within half a meter.⁵ Surveys H12222 and H12223 junction at depths from 35 to 95 meters, while survey H12221 junctions with H12223 in 31 meters of water. The sheet limits and area of overlap for sheets 3, 4, and 5 are shown in Figure 3.

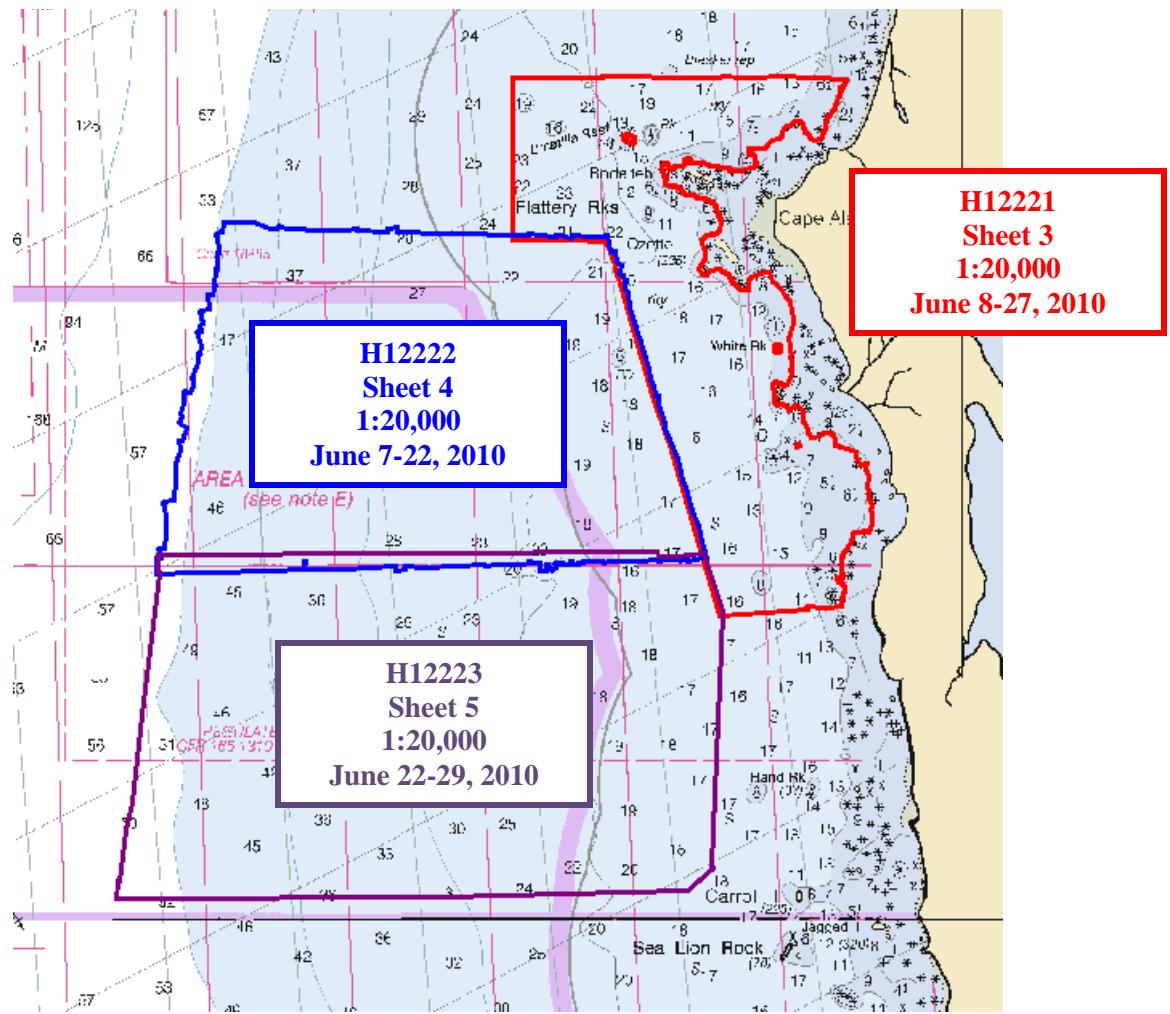


Figure 3: Junctions between H12221, H12222, and H12223

B.2.1.3 Quality Control Checks

The MBES quality control checks were conducted as discussed in the quality control section B of the DAPR.

B.2.1.4 Data Quality Factors

Project OPR-N324-FA-10 was the first project during the 2010 field season in which the Reson 7111 was used for MBES acquisition. During the Hydrographic Survey Readiness Review (HSRR) of S220 in the months prior to the start of OPR-N324-FA-10, the Reson 7111 stopped receiving acoustic returns and the transceiver was diagnosed by Reson engineers to have a number of failed cards in the transceiver box. Ultimately a senior engineer from Reson sailed with *Fairweather* to repair the Reson 7111 and troubleshoot data quality issues observed during the 2009 field season (see Project Correspondence). Despite replacement of several components of the transceiver and a software update containing the first release of the IFREMER (French Research Institute for Exploration of the Sea) bottom detection algorithm, *Fairweather* personnel continued to observe nadir gaps and errant outer beam artifacts difficult

to attribute to oceanographic conditions or systematic biases. Due to the suspect performance of the Reson 7111, Reson 7111 and Reson 8160 data were acquired simultaneously with tighter line spacing during H12223.⁶

COVERAGE ASSESSMENT

Complete multibeam coverage was obtained within the limits of H12223 with the exception of several small holidays. For holidays larger than three surface grid nodes, the corresponding multibeam backscatter side scan was examined and no navigationally significant items were found.⁷ The least depths of all navigationally significant features are represented by H12223.⁸

Five holidays were created by the Hydrographer cleaning out data related to Reson 7111 bottom detection errors discussed above and in the DAPR. An example of questionable Reson 7111 data from lines 2010M_1791203 and 2010M_1791250, before rejection, can be seen below in Figure 4. Figure 5 displays the approximate location of the holidays after cleaning.⁹

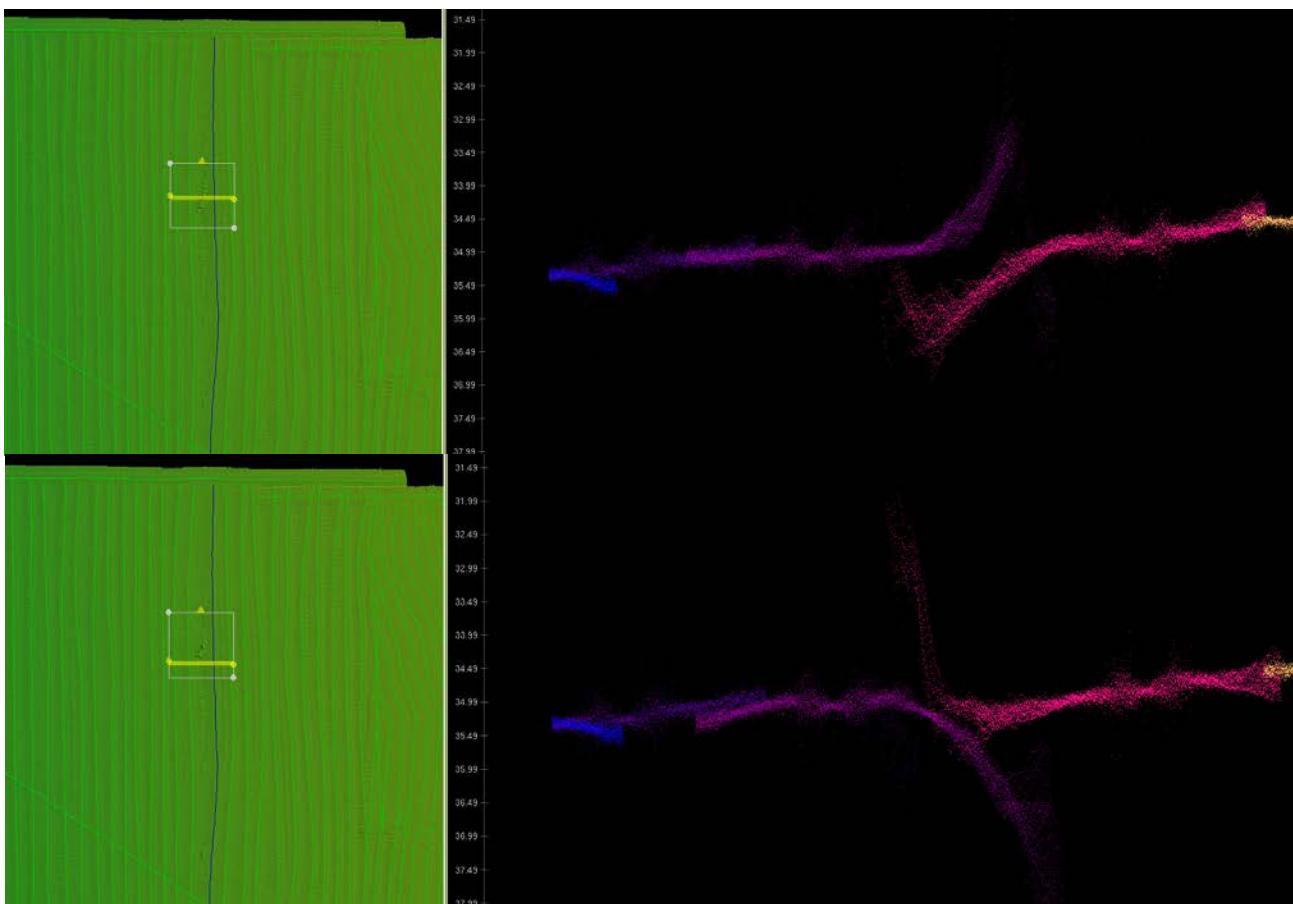


Figure 5: Reson 7111 bottom detection errors before cleaning. All lines displayed are Reson 7111 data.

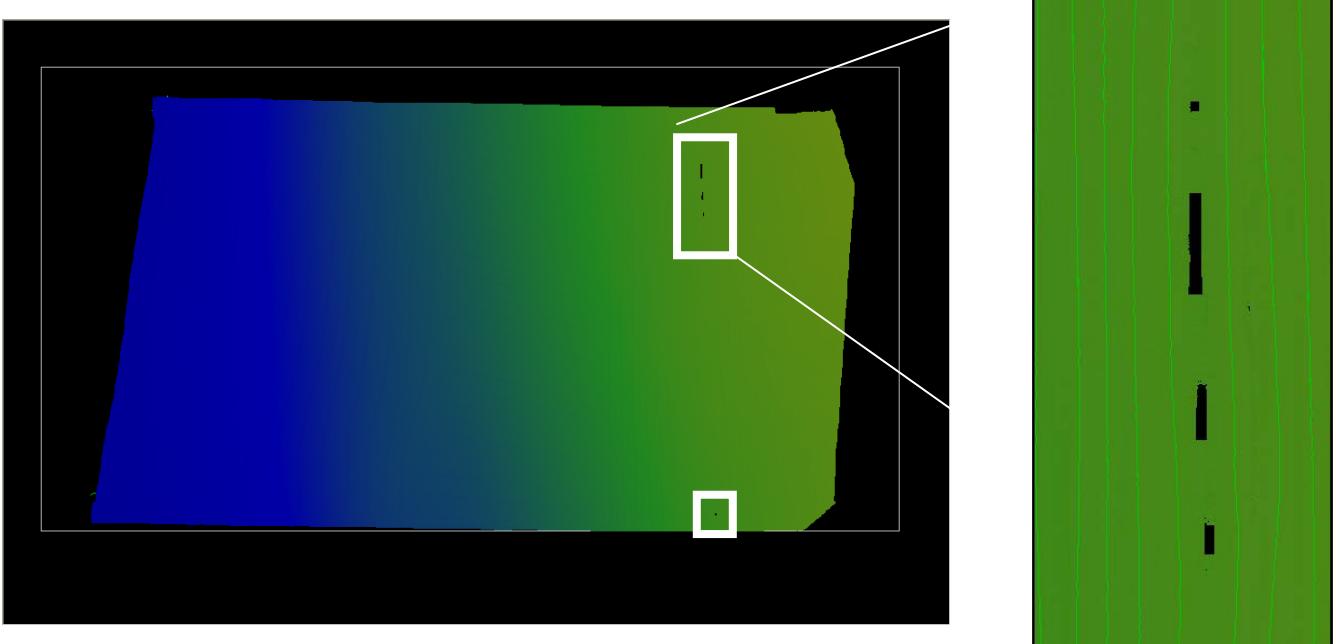


Figure 4: Holidays created by cleaning boxed above in white

DENSITY

Density requirements for H12223 were achieved with at least 95% of finalized surface nodes containing five or more soundings (see Appendix V). ¹⁰

TRUEHEAVE

TrueHeave data could not be applied to MBES data for four S220 lines from June 29, 2009 (DN 180), due to the file not being logged. The MBES data were investigated in CARIS Subset Editor and data quality from those lines was not affected by the lack of TrueHeave. ¹¹ 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 launch 2808, DN 178.

SOUND VELOCITY

Due to the rough sea surface conditions in the project area, *Fairweather* experienced “pounding” or hard pitching when surveying into seas and swell. As a result, “spidery beams” occurred throughout H12223 when air or bubbles flowed down the hull across the Surface Sound Velocimeter. An example of the spidery beams and spike in Surface Sound Speed (SSP) found at 48/00/51.74N 124/46/57.97W can be seen below in Figures 6 & 7. The spike in SSP caused by pounding was removed and the gap was interpolated across. ¹²

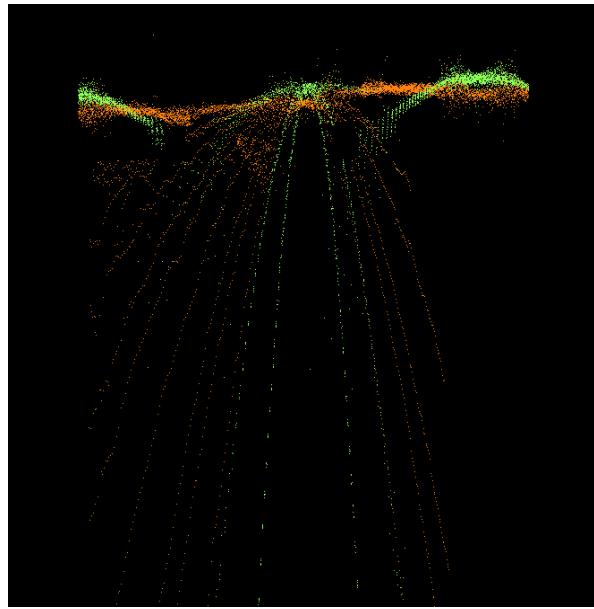


Figure 6: Spidery beams due to bad weather “pounding” the ship

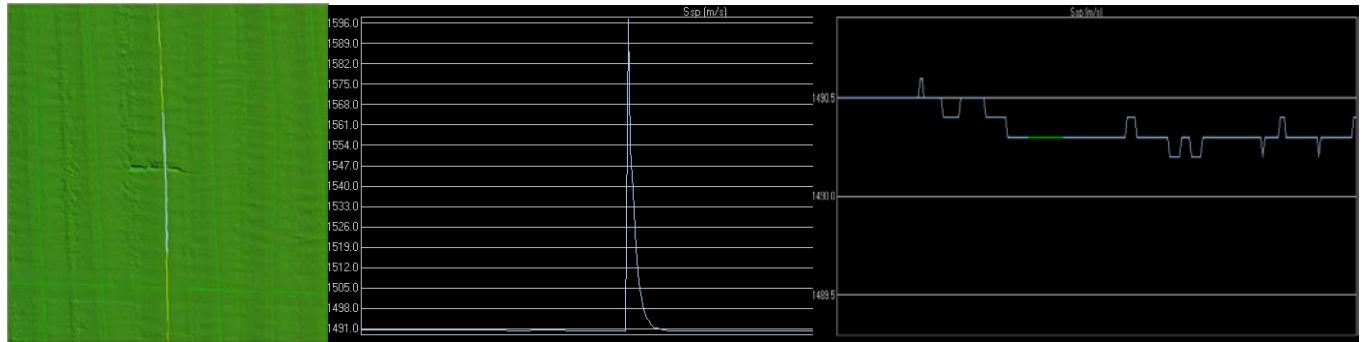


Figure 7: Example of spidery beams in cube surface, SSP spike and interpolated SSP when spike removed.

ROLL

Possible roll artifacts were investigated in the Reson 7111 data throughout H12223 (see Figure 6 below). However, the apparent roll artifacts fall within allowable total vertical uncertainty (TVU) set by the HSSDM dated April 2010 for the depth ranges in which they occur. ¹³

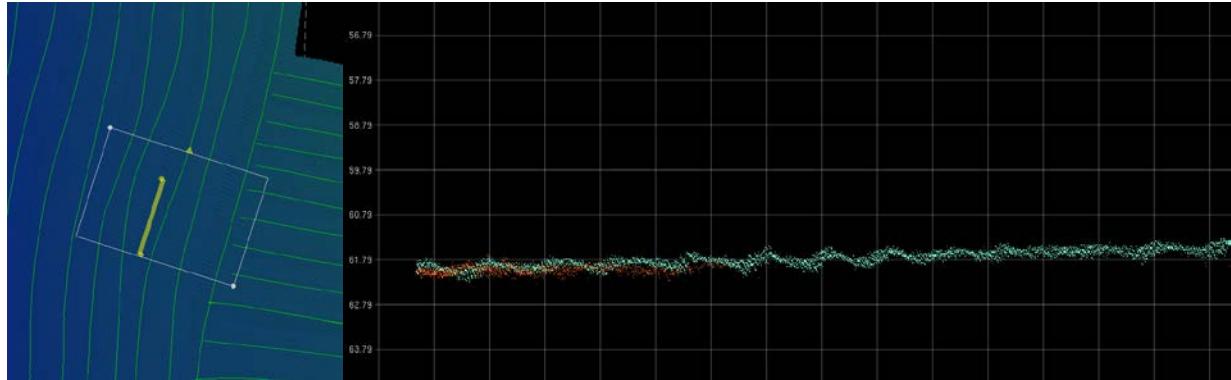


Figure 8: Possible roll errors within allowable TVU (48/01/40.94N 124/52/11.08W).

DESIGNATED SOUNDINGS

There were no designated soundings for survey H12223. The surfaces accurately reflect the depths in the area.¹⁴

UNUSUAL CONDITIONS

All MBES data for H12223 were collected in three to seven-foot sea surface swells.

B.2.1.5 Accuracy Standards

Fledermaus statistics indicate that 99.9% of nodes in the combined 8-meter grid meet or exceed IHO Order 1 specifications for all depths of survey H12223.¹⁵ To assess vertical accuracy standards, a child layer titled “IHOness1” was created for each of the 2-meter, 4-meter, and 8-meter finalized surfaces using the equation as stated in the DAPR.

B.3 Corrections to Echo Soundings

Data reduction procedures for survey H12223 conform to those detailed in the DAPR.

B.4 Data Processing

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 H12223_Data_Log spreadsheet. All datalogs are submitted digitally in the Separates I folder.

Data processing procedures for survey H12223 conform to those detailed in the DAPR with the exceptions noted in this report. Data were processed initially using CARIS HIPS & SIPS v7.0, Service Pack 1, and Hotfix 5. During the course of survey H12223, processing computer systems were updated to CARIS HIPS & SIPS v7.0, Service Pack 2 Hotfix 2. Additional processing details regarding Total Propagated Uncertainty (TPU) and CUBE Surfaces and Parameters utilized, along with any the deviations from the processing procedures outlined in the DAPR are discussed below.

B.4.1.1 Data Quality Factors Affecting Data Processing Procedures

Data collection methods were altered to account for inconsistencies in the bottom detection algorithm for the Reson 7111, as discussed above in section B.2.1.4. As a result, the processing methods for dealing with the suspect data were also adapted and the details for processing deviations from the DAPR were noted below. Suspected noise within allowable error specifications for survey H12223 were not rejected in CARIS HIPS. The following cases use alternative data processing techniques that deviate from those described in the DAPR in order to address data quality issues:

- All Reson 8160 data were filtered to 60 degrees off nadir on both port and starboard because it was mainly logged to fill gaps at nadir created by the Reson 7111 bottom detection algorithm.
- All Reson 7111 data were filtered to 65 degrees off nadir on both port and starboard to remove poor quality data due to inconsistencies suspected to be related to either the bottom detection algorithm or bad receiver cards in the sonar transceiver.
- Data were reaccepted in several locations to fill gaps created by filtering discussed above. See figure 9 below.

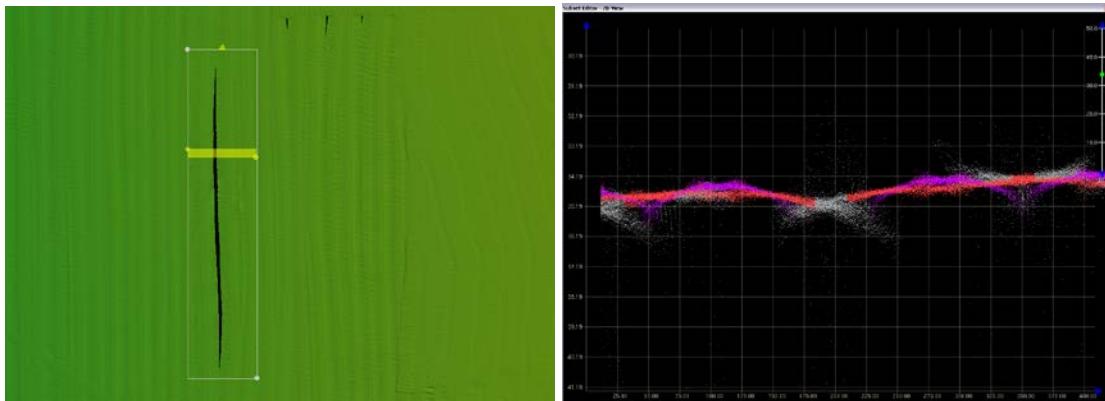


Figure 9: 7111 data (red) reaccepted to fill gaps

- The inconsistent performance of the Reson 7111 is thought to be the cause of an area of Reson 7111 data that is approximately 2.6 meters deeper than the actual bottom in one location within survey H12223. An example of the data affecting the surface from line 2010M_1740326 is shown in Figure 10.

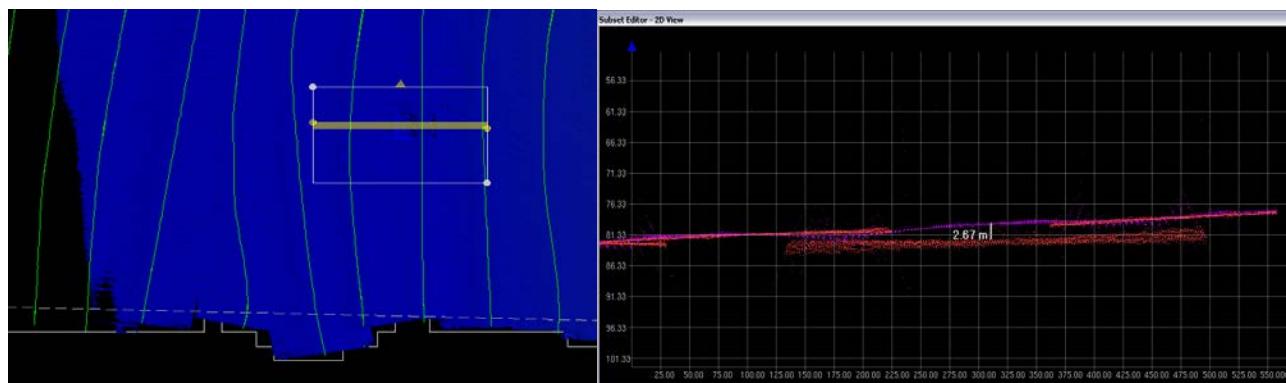


Figure 10: Reson 7111 data (red) drops 2.6 meters, pulling the surface out of IHO specifications (48/00/55.37 N, 124/54/46.24 W).

- Large schools of fish were occasionally ensonified near the seafloor. Though these fish masses or “bait balls,” as commonly referenced by the field, were noted in acquisition logs, they were difficult to differentiate between real features. Adjacent lines overlapping possible features near the seafloor were further evaluated in side scan editor to separate out noise from bait balls and actual features. If a possible bait ball could not be unequivocally attributed to fish in the water column then data were not rejected in CARIS HIPS (Figure 11).

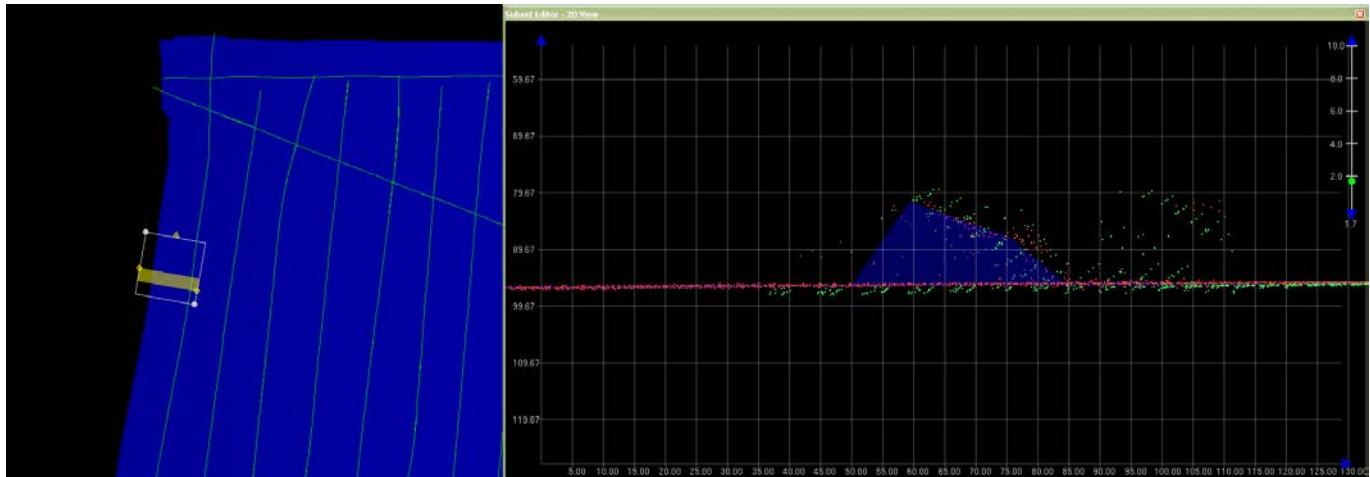


Figure 11: Suspected “Bait ball” retained, area is NW corner of survey.

B.4.1.2 TPU Values

The survey specific parameters used to compute TPU in CARIS for H12223 are listed in Table 4.

Tide values:	Measured	0.01 m	Zoning	0.10 m
7125 Sound Speed Values:	Measured	1.00 m/s	Surface	0.50 m/s
7111/ 8160 Sound Speed Values:	Measured	0.50 m/s	Surface	0.50 m/s

Table 4: Survey Specific CARIS TPU Parameters

B.4.1.3 CUBE Surfaces

The CARIS HIPS BASE (Bathymetry Associated with Statistical Error) surfaces delivered with H12223 and their associated resolutions are listed in Table 5. All fieldsheet 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 2, 4, and 8 meters. Additionally, an 8 meter ellipsoidally referenced surface was also created as discussed in section B.4.1.4 of this report.

The NOAA CUBE parameters prescribed by the 2010 HSDDM were used for the creation of all CUBE BASE surfaces in survey H12223.¹⁶

Field Sheet Name	Surface Name	Depth Ranges (m)	Resolution (m)
H12223	H12223_2m	All	2
	H12223_4m	All	4
	H12223_8m	All	8
	H12223_2m_20to44	20-44	2
	H12223_4m_40to88	40-88	4
	H12223_8m_80to176	80-176	8
	H12223_Combined_8m	All	8
	H12223_8m_ERS	All	8

Table 5: Depth Ranges, Resolutions, and CUBE Parameters

B.4.1.4 Post-Processed Kinematic Data and Ellipsoidally-Referenced Surfaces

Vessel kinematic data were post-processed using Applanix POSPac Precise Point Positioning (PPP) processing software methods as described in the DAPR and in Applanix's POSPac manual. Single Best Estimate of Trajectory (SBET) files and post processed solution accuracy files named SMRMSG files are applied to all data with the following exceptions because POSMV files were not logged during MBES data acquisition:

2010M_1800414,2010X_1800427 lines for both the S220 7111 and 8160

For more information about the processing of horizontal control data, see section C1. Additionally, the SBET and SMRMSG file application logs differ from procedure detailed in the DAPR. The new query fields "SBET Nav/Att File" and "SBET RMS File" implemented in CARIS HIPS and SIPS service pack 2 were tested during SBET application in CARIS for survey H12223. Therefore, see additional query fields included in H12223_Data_Log.xls located in Separates I for documentation regarding the application of SBET and SMRMSG files to H12223 survey data. Figure 12 below demonstrates how the SBET and SMRMSG files were applied to the data.

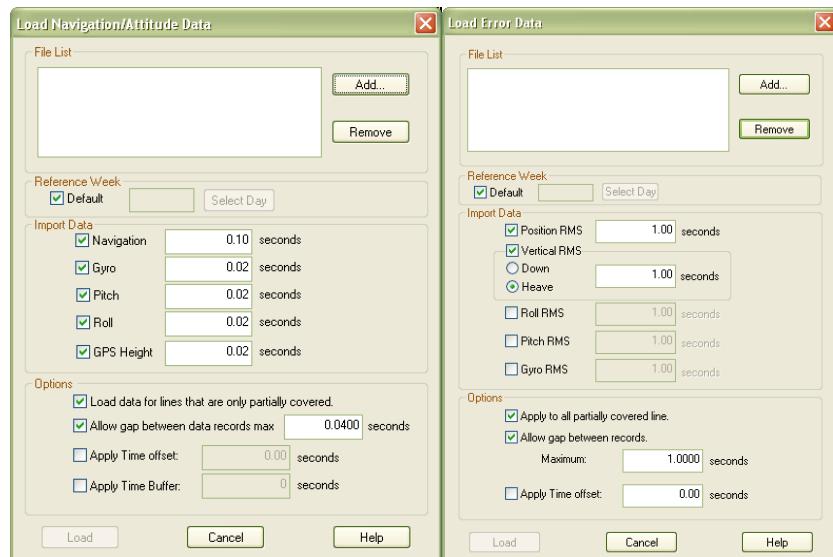


Figure 12: Application parameters for SBET (left) and SMRMSG (right) files used in CARIS

A single 8-meter ellipsoidally-referenced surface is submitted with H12223 for experimental and evaluation purposes as part of the Office of Coast Survey's initiative to survey to the ellipsoid. This surface was created while the soundings were reduced to the ellipsoid after merging with "GPS Tides" applied in CARIS HIPS & SIPS and excludes the above lines which have no SBET or SMRMSG files applied. GPS Tides were computed by the parameters selected below in Figure 13. After the ellipsoidal surface was created, the soundings were referenced back to Mean Lower Low Water (MLLW) during the CARIS merge process by unselecting the "Apply GPS tide" option. The traditional MLLW-vertically referenced finalized surfaces were then created as described in the DAPR according the HSSD and FPM. The ellipsoidal surface will appear out of date because the soundings used to create them have been moved back to MLLW.

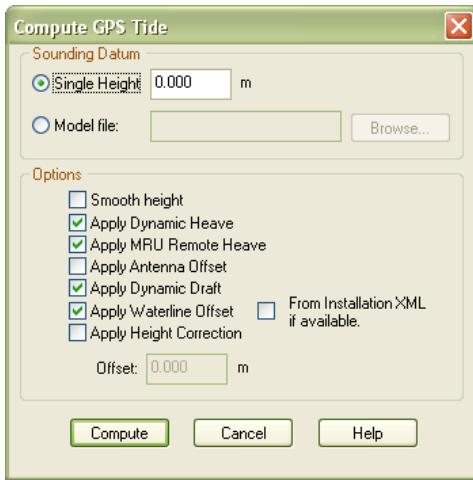


Figure 13: GPS Tide computation parameters

C. HORIZONTAL AND VERTICAL CONTROL

A complete description of horizontal and vertical control for survey H12223 can be found in the *OPR-N324-FA-10 Horizontal and Vertical Control Report*, submitted under separate cover. A summary of horizontal and vertical control for this survey follows.

C.1 Horizontal Control

The horizontal datum for this project is the North American Datum of 1983 (NAD83). Differential correctors from the U.S. Coast Guard beacon at Fort Stevens (287 kHz) served as the sole method of real-time positioning during MBES data acquisition. The Precise Point Positioning (PPP) method is used for positioning of all MBES soundings for H12223 except for the lines during which POSMV files were not logged as listed in section B.4.1.5.

Smoothed Best Estimate of Trajectory (SBET) files were created using the PPP method. The SBET files and their associated error files (SMRMSG) files were applied to the CARIS HDCS data in HIPS & SIPS for improved vessel kinematic accuracy. Refer to the *H12223_Data_Log.xls* located in Separates I for a record of application of these files in CARIS HIPS & SIPS. For further detail regarding the processing

method used and quality control checks performed see the *H12223_POSPAC_Processing_Log.xls* spreadsheet located in the SBET folder of GNSS_Data.

C.2 Vertical Control

The vertical datum for this project is MLLW as specified in the Project Instructions. The operating National Water Level Observation Network (NWLON) primary tide station at La Push, WA (944-2396) served as control for datum determination and as the primary source for water level correctors for survey H12223.

A request for delivery of final approved tides for survey H12223 was forwarded to N/OPS1 on June 29, 2010, in accordance with the FPM. A copy of the request is included in Appendix IV.

As per the Project Instructions, all data were reduced to MLLW using final, approved water levels from the La Push, WA station (944-2396) by applying tide file 9442369.tid and time and height correctors through the zone corrector file N324FA2010CORP.zdf. It will not be necessary for the Hydrographic Branch to reapply the final approved water levels (smooth tides) to the survey data during final processing.¹⁷

D. RESULTS AND RECOMMENDATIONS

D.1 Chart Comparison

Chart comparison procedures were followed as outlined in section 4.5 of the FPM and section 8.1.3-D.1 of the HSSD, utilizing CARIS HIPS & SIPS software program.

Survey H12223 was compared with the following chart listed in Table 6.¹⁸ Depths from survey H12223 generally agree within one to two fathoms with depths on chart 18480.¹⁹ There were no new changes within the survey area. Additionally, H12223 is within a charted regulated navigation area. See notes A, E, and H on chart 18480.

NOAA Chart Number	Chart Scale	Edition Number	Edition Date	Updated with Notice to Mariners through
18480	1:176,253	31 th Ed.	October 2006	October 10 th , 2006

Table 6: NOAA Charts compared with Survey H12223

D.1.1.1 Chart Comparison Recommendations

The Hydrographer has determined that bottom coverage requirements have been met and data accuracy meets requirements specified by the HSSD. All soundings from H12223 are adequate to supersede prior surveys in their common areas.²⁰

D.2 Automated Wreck and Obstruction Information System (AWOIS) Investigations

There were no AWOIS items located within the limits of H12223.²¹

D.3 Dangers to Navigation

There were no dangers to navigation found within the limits of H12223.²²

D.4 Additional Results

D.4.1.1 Shoreline/Feature Verification

There was no feature verification conducted by *Fairweather* personnel within the limits of survey H12223.²³

D.4.1.2 Aids to Navigation

There were no aids to navigation within the limits of survey H12223.²⁴

D.4.1.3 Overhead Features

There are no overhead features within the limits of survey H12223.²⁵

D.4.1.4 Submarine Cables and Pipelines

There are no submarine cables or pipelines charted within the limits of H12223, and none were detected by the survey.²⁶

D.4.1.5 Ferry Routes

There are no ferry routes charted within the limits of survey H12223, and none were observed to be operating in the area.²⁷

D.4.1.6 Bottom Samples

Bottom samples were not collected for survey H12223. There are future plans for Olympic Coast National Marine Sanctuary personnel to conduct extensive bottom sampling for use in ground truthing backscatter mosaics derived from multibeam echosounder data.²⁸

D.5 Supplemental Reports

Listed below are supplemental reports submitted separately that contain additional information relevant to this survey:

<u>Title</u>	<u>Date Sent</u>	<u>Office</u>
Hydrographic Systems Readiness Review 2010	April 9, 2010	N/CS34
Data Acquisition and Processing Report 2010	August 15, 2010	N/CS34
Horizontal and Vertical Control Report for OPR-N324-FA-10	August 15, 2010	N/CS34



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NOAA Marine and Aviation Operations
NOAA Ship FAIRWEATHER S-220
1010 Stedman Street
Ketchikan, AK 99901

August 10, 2010

MEMORANDUM FOR:

Gary Nelson
Chief, Pacific Hydrographic Branch

FROM:

CAPT David O. Neander, NOAA
Commanding Officer

David O. Neander
2010.08.12
19:25:14 -08'00'

TITLE:

Approval of Hydrographic Survey H12223,
OPR-N324-FA-10

As Chief of Party, I have ensured that standard field surveying and processing procedures were adhered to during acquisition and processing of hydrographic survey H12223 in accordance with the Hydrographic Manual, Fourth Edition; Field Procedures Manual, April 2010; and the NOS Hydrographic Surveys Specifications and Deliverables, as updated for April 2010. Additional guidance was provided by applicable Hydrographic Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required. All data and reports are respectfully submitted to N/CS34, Pacific Hydrographic Branch.

I acknowledge that all of the information contained in this report is complete and accurate to the best of my knowledge.

In addition, the following individuals were responsible for oversight of acquisition and processing of this survey:

Digitally signed by Tami Beduhn
DN: cn=Tami Beduhn, o=NOAA Ship
Fairweather, ou=OMAO,
email=Tami.Beduhn@noaa.gov, c=US
Date: 2010.08.10 20:52:26 Z

SST Tami Beduhn
Survey Manager

Briana Welton
I attest to the accuracy and
integrity of this document
2010.08.12 23:59:54 Z

LT Briana Welton
Field Operations Officer

Digitally signed by
Lynnette Morgan
Date: 2010.08.13 02:17:39 Z

CST Lynnette V. Morgan
Chief Survey Technician

Attachment



Revisions Compiled During Office Processing and Certification:

¹ Attached to this report

² Concur

³ This data was within specifications and was used for compilation

⁴ A common junction was made with H12222 during compilation. A common junction will be made with survey H12221 when that survey is compiled.

⁵ Concur

⁶ The data submitted is adequate for charting.

⁷ Concur

⁸ Concur

⁹ There was no indication of a significant feature in the holiday. The data is adequate for charting

¹⁰ Concur

¹¹ Concur

¹² The data is adequate for charting after the surface sound speed spikes were removed.

¹³ Concur

¹⁴ Concur

¹⁵ Cocnur

¹⁶ The office generated 8 m resolution combined surface, H12223_8M_Combined, was used for cartographic compilation.

¹⁷ See attached Tide Note, dated July 7, 2010

¹⁸ H12223 was also compiled to chart 18460, 13th Edition, scale 1:100,000.

¹⁹ Cocnur

²⁰ Concur

²¹ Concur

²² Concur

²³ Concur

²⁴ Concur

²⁵ Concur

²⁶ Concur

²⁷ Concur

²⁸ Concur; retain all bottom samples as charted.

Subject:

From:

Date:

To:

CC:

I don't have any concerns with the new layout. If this is the most efficient for the ship, considering the conditions, then go forward.

Megan.Greenaway@noaa.gov wrote:

Jim,

As a result of a constant westerly swell the FA has requested to modify the OCNMS sheet layout to a more conducive East-West direction to run ship hydro. Please see attached current coverage and updated layout.

The priorities will remain the same. The FA will start in the northern section of H12221 and work south. They will survey down to the division between H12222 and H12223 (magenta line on chart) and then move to H12222 and then H12223. Once finished with all other sheets they will finish the southern section of H12221 and square it off.

The OCNMS office has agreed to the new layout. Please let us know if we can move forward with these updates.

Thanks,
Megan



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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : July 7, 2010

HYDROGRAPHIC BRANCH: Pacific

HYDROGRAPHIC PROJECT: OPR-N324-FA-2010

HYDROGRAPHIC SHEET: H12223

LOCALITY: Southern Offshore Portion of Cape Flattery, OCNMS

TIME PERIOD: June 22 - June 29, 2010

TIDE STATION USED: 944-2396 La Push, WA

Lat. 47° 54.8'N Long. 124° 38.1' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.357 meters

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project OPR-N324-FA-2010, H12223, during the time period between June 22 to June 29, 2010.

Please use the zoning file "N324FA2010COPR" submitted with the project instructions for OCNMS. Zones PAC219 and PAC220 are the applicable zones for H12223.

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).

Digitally signed by Peter J. Stone
DN: cn=Peter J. Stone, o=CO-OPS, ou=NOAA/NOS, email=peter.stone@noaa.gov, c=US
Date: 2010.07.08 12:41:14 -04'00'

Peter J. Stone

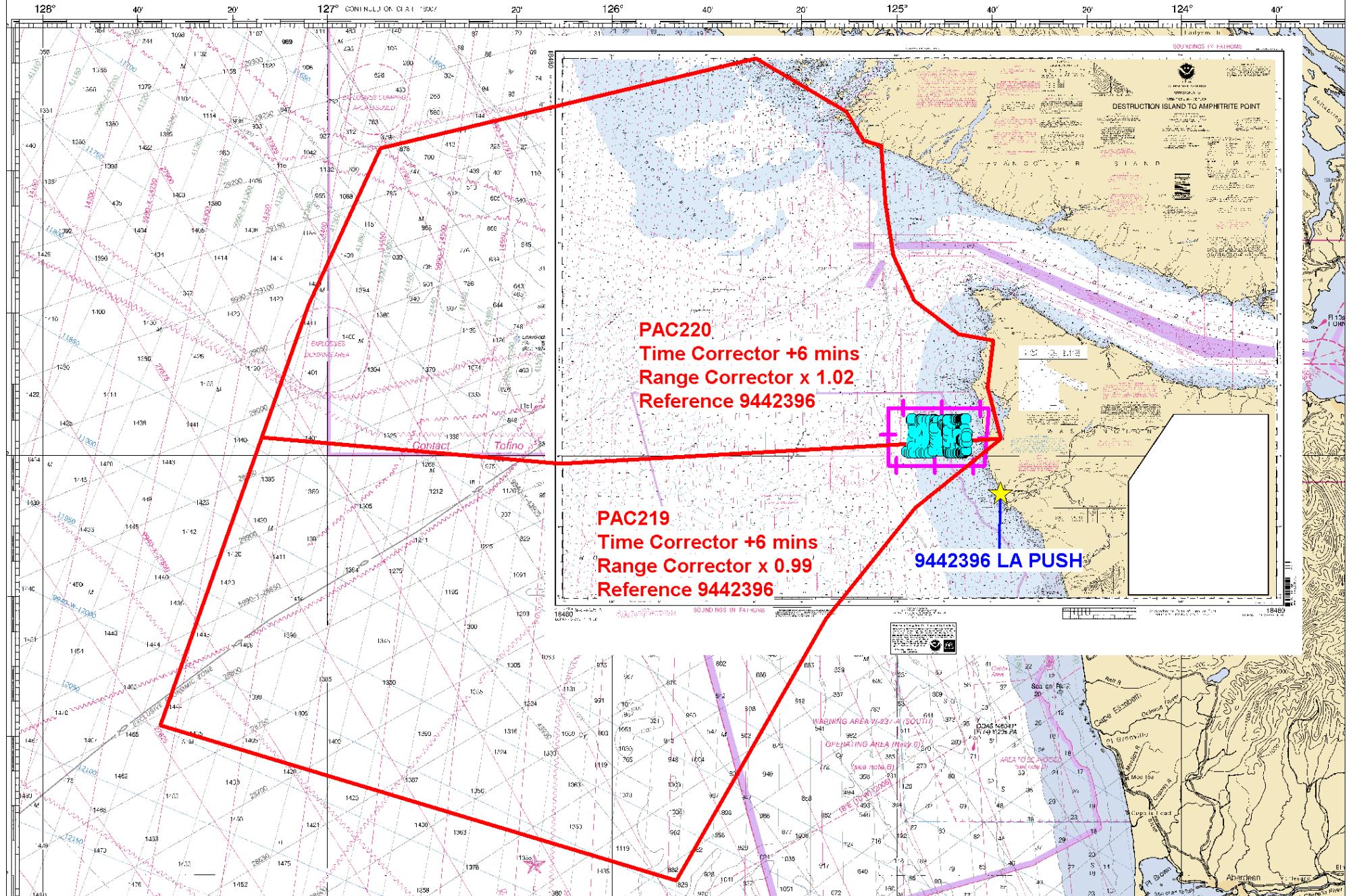
CHIEF, OCEANOGRAPHIC DIVISION



This chart has been designed to promote safe navigation. To National
Marine Service, please send comments and suggestions for
improving this chart to the Chief, Marine Chart Division (NMCD), National Oceanic
and Atmospheric Administration, Seattle, Washington 98103-2356.

Preliminary As Final Tidal Zoning for OPR-N324-FA-2010, H12223 Southern Offshore Portion of Cape Flattery, OCNMS, WA

Formerly O429 J22, 1st Ed., Mar 1949 G-19-8720 K429-651



H12223 HCell Report
Russ Davies, Cartographer
Pacific Hydrographic Branch

1. Specifications, Standards and Guidance Used in HCell Compilation

HCell compilation of survey H12223 used:

Office of Coast Survey HCell Specifications: Draft, Version: 4.0, 17 March, 2010.
HCell Reference Guide: Version 2.0, 22 February, 2010.

2. Compilation Scale

Depths and features for HCell H12223 were compiled to the largest scale raster charts shown below:

Chart	Scale	Edition	Edition Date	NM Date
18460	1:100,000	13th	10/2006	10/02/2010
18480	1:176,253	31st	10/2006	04/02/2010

The following ENC was not used during compilation:

Chart	Scale
US3WA01M	1:176,253
US4WA36M	1:100,000

3. Soundings

A survey-scale sounding (SOUNDG) feature object layer was built from the 8-meter Combined Surface in CARIS BASE Editor. A shoal-biased selection was made at 1:20,000 survey scale using a Radius Table file with values shown in the table, below.

Shoal Limit (m)	Deep Limit (m)	Radius (mm)
0.0	10	3
10	20	4
20	50	4.5
50	200	5

In CARIS BASE Editor soundings were manually selected from the high density sounding layers (SS) and imported into a new layer (CS) created to accommodate chart density depths. Manual selection was used to accomplish a density and distribution that closely represents the seafloor morphology.

4. Depth Contours

Depth contours at the intervals on the largest scale chart are included in the *_SS HCell for MCD raster charting division to use for guidance in creating chart contours. The metric and fathom equivalent contour values are shown in the table below.

Chart Contour Intervals in Fathoms from Chart 18460	Metric Equivalent to Chart Fathoms, Arithmetically Rounded	Metric Equivalent of Chart Fathoms, with NOAA Rounding Applied	Fathoms with NOAA Rounding Applied	Fathoms with NOAA Rounding Removed for Display on H12223_SS.000
20	36.576	37.9476	20.750	20
30	54.864	56.2356	30.750	30
40	73.152	74.5236	40.750	40
50	91.44	92.8116	50.750	50

5. Meta Areas

The following Meta objects are included in HCell H12223

M_QUAL
M_CSCL

These Meta area objects were constructed on the basis of the limits of the hydrography.

6. Features

Features addressed by the field units are delivered to PHB where they are deconflicted against the hydrography and the largest scale chart. These features, as well as features to be retained from the chart and features digitized from the Base Surface, are included in the HCell. The geometry of these features may be modified to emulate chart scale per the HCell Reference Guide on compiling features to the chart scale HCell.

7. S-57 Objects and Attributes

The *_CS HCell contains the following Objects:

M_QUAL	Data quality Meta object
SBDARE	Bottom samples
M_CSCL	Compilation Scale of Data
SOUNDG	Soundings at the chart scale density
\$CSYMB	Blue Notes-Notes to the MCD chart Compiler

The *_SS HCell contains the following Objects:

DEPCNT	Generalized contours at chart scale intervals
SOUNDG	Soundings at the survey scale density

8. Spatial Framework

8.1 Coordinate System

All spatial map and base cell file deliverables are in an LLDG geographic coordinate system, with WGS84 horizontal, MHW vertical, and MLLW (1983-2001 NTDE) sounding datums.

8.2 Horizontal and Vertical Units

DUNI, HUNI and PUNI are used to define units for depth, height and horizontal position in the chart units HCell, as shown below.

Chart Unit Base Cell Units:

Depth Units (DUNI):	Fathoms and Feet
Height Units (HUNI):	Feet
Positional Units (PUNI):	Meters

During creation of the HCell in CARIS BASE Editor and CARIS S-57 Composer, all soundings and features are maintained in metric units with as high precision as possible. Depth units for soundings measured with sonar maintain millimeter precision. Depths on rocks above MLLW and heights on islets above MHW are typically measured with range finder, so precision is less. Units and precision are shown below.

BASE Editor and S-57 Composer Units:

Sounding Units:	Meters rounded to the nearest millimeter
Spot Height Units:	Meters rounded to the nearest decimeter

See the HCell Reference Guide for details of conversion from metric to charting units, and application of NOAA rounding.

9. Data Processing Notes

There were no significant deviations from the standards and protocols given in the HCell Specification and HCell Reference Guide.

10. QA/QC and ENC Validation Checks

H12223 was subjected to QA checks in S-57 Composer prior to exporting to the metric HCell base cell (000) file. The millimeter precision metric S-57 HCell was converted to chart units and NOAA rounding applied. dKart Inspector was then used to further check the data set for conformity with the S-58 ver. 2 standard (formerly Appendix B.1 Annex C of the S-57 standard). All tests were run and warnings and errors investigated and corrected unless they are MCD approved as inherent to and acceptable for HCells.

11. Products

11.1 HSD, MCD and CGTP Deliverables

H12223_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:100,000 and 1:176,253
H12223_SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:20,000
H12223_DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H12223_outline.gml	Survey outline
H12223_outline.xsd	Survey outline

11.2 Software

CARIS HIPS Ver. 7.0	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 3.1	Creation of soundings and bathy-derived features, meta area object, and Blue Notes; Survey evaluation and verification; Initial HCell assembly.
CARIS S-57 Composer Ver. 2.2	Final compilation of the HCell, correct geometry and build topology, apply final attributes, export the HCell, and QA.
CARIS GIS 4.4a	Setting the sounding rounding variable for conversion of the metric HCell to NOAA charting units with NOAA rounding.
CARIS HOM Ver. 3.3	Perform conversion of the metric HCell to NOAA charting units with NOAA rounding.
HydroService AS, dKart Inspector Ver. 5.1, SP 1	Validation of the base cell file.
Northport Systems, Inc., Fugawi View ENC Ver.1.0.0.3	Independent inspection of final HCells using a COTS viewer.

12. Contacts

Inquiries regarding this HCell content or construction should be directed to:

Russ Davies
Cartographer
Pacific Hydrographic Branch
Seattle, WA
206-526-6854
Russ.Davies@NOAA.GOV

APPROVAL SHEET
H12223

Initial Approvals:

The survey evaluation and verification has been conducted according to branch processing procedures and the HCell compiled per the latest OCS HCell Specifications.

The survey and associated records have been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, S-57 classification and attribution of soundings and features, cartographic characterization, and verification or disproval of charted data within the survey limits. The survey records and digital data comply with OCS requirements except where noted in the Descriptive Report and are adequate to supersede prior surveys and nautical charts in the common area.

I have reviewed the HCell, accompanying data, and reports. This survey and accompanying digital data meet or exceed OCS requirements and standards for products in support of nautical charting except where noted in the Descriptive Report.