H11752

NOAA FORM 76-35A

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE

DESCRIPTIVE REPORT

Type of Survey HYDROGRAPHIC

Field No. n/a

Registry No. H11752

LOCALITY

State Alaska

General Locality Northeastern Prince William Sound

Sublocality Offshore Northwest Cape

2008

CHIEF OF PARTY

Commander Douglas Baird, Jr., NOAA

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DATE

NOAA FORM 77-28 (11-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTER NO.

H11752

HYDROGRAPHIC TITLE SHEET

INSTRUCTIONS - The hydrographic sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the office.

FIELD NO. N/A

State: Alaska

General Locality: Northeastern Prince of William Sound

Sublocality: Offshore Northwest Bear Cape

Scale: 1:80,000

Date of Survey: 9/16/2008-10/3/2008

Instructions Dated: 7/30/2008

Project No.: OPR-P132-FA-08

Vessel: FAIRWEATHER (S-220), Launch 1018

Chief of Party: Commander Douglas Baird, Jr., NOAA

Surveyed by: FAIRWEATHER Personnel

Soundings taken by echo sounder: RESON 8111, RESON 8160, RESON 8101

Graphic record scaled by: N/A

Graphic record checked by: N/A

Evaluation by: Tyanne Faulkes

Automated plot by: N/A

Verification by: Tyanne Faulkes

Soundings in: Fathoms and Feet at MLLW

REMARKS: Time in UTC. UTM Projection Zone 6

Revisions and annotations appearing as endnotes were generated during office processing.

As a result, page numbering may be interrupted or non-sequential

All separates are filed with the hydrographic data.

Descriptive Report to Accompany Hydrographic Survey H11752

Project OPR-P132-FA-08
Prince William Sound, Alaska
Scale 1:20,000
September 2008
NOAA Ship *Fairweather*
Chief of Party: Commander Douglas D. Baird, NOAA

A. AREA SURVEYED

The survey area was located in southern Prince William Sound, within the sub-locality of Offshore NW Bear Cape. This survey corresponds to Sheet D in the sheet layout provided with the Project Instructions, as shown in Figure 1 below.

Data acquisition was conducted from September 16 to October 3, 2008 (DN 260 to DN 277).

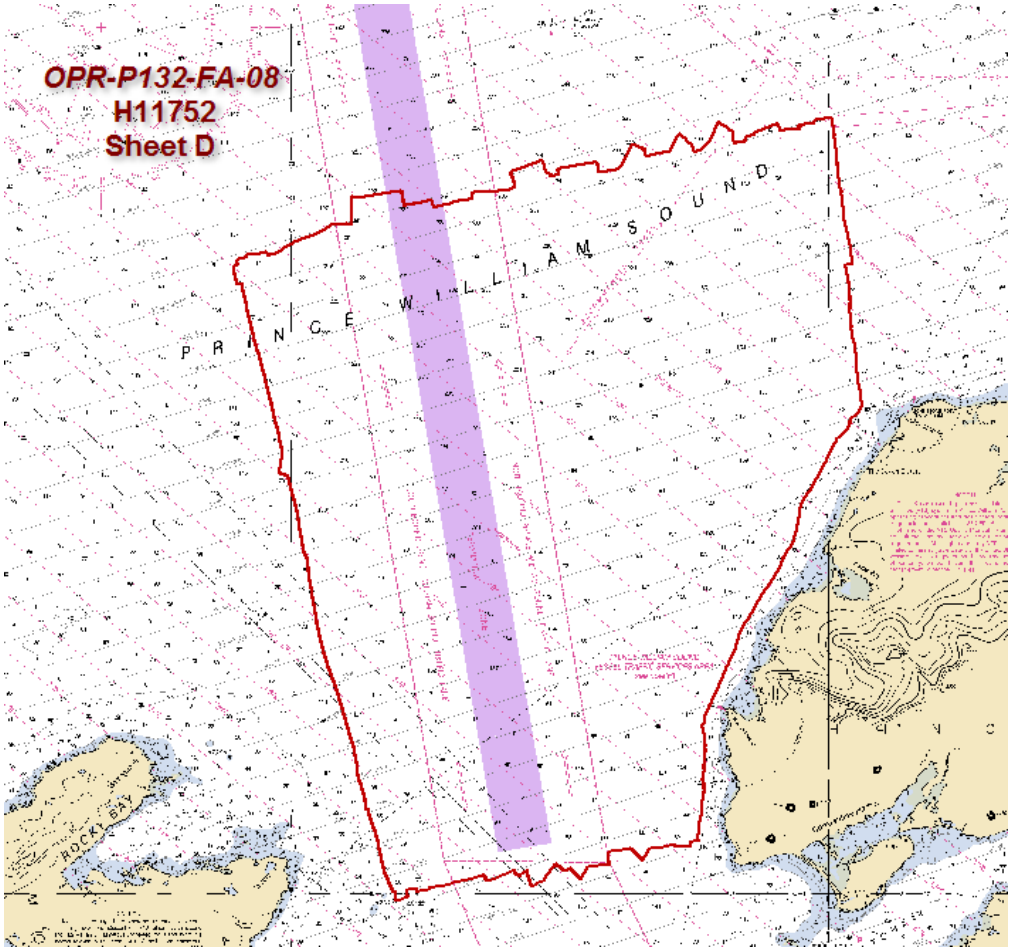

Figure 1: H11752 Survey Outline

One-hundred percent multibeam echosounder (MBES) coverage was obtained in the survey area to the limit safely reached with *Fairweather*.[1] Data were acquired as close to shore as safely possible, roughly a half-mile offshore. Equipment failures on both Launch 1010 and Launch 1018 during operational dates prevented acquisition of near shore MBES data.

Shoreline verification was not conducted for H11752. A single shoreline window was missed due to equipment failures on all shoreline platforms.

Mainscheme and crossline mileage for MBES and shoreline acquisition were calculated and are displayed in Table 1 below.[2]

MAIN SCHEME - Mileage	
0	**Single Beam MS**
376.74	**Multibeam MS mileage**
373.84	FAIRWEATHER S-220
0.00	Launch 1010
2.90	Launch 1018
0	**SideScan MS**
376.74	**Total MS**
CROSSLINE - Mileage	
0	**Single Beam XL**
52.93	**Multibeam XL**
52.93	FAIRWEATHER S-220
0.00	Launch 1010
0.00	Launch 1018
52.93	**Total XL**
OTHER	
0	**Developments/AWOIS - Mileage**
	Shoreline/Nearshore Investigation - Mileage
0	**Total # of Investigated Items**
0	**Total Bottom Samples**
113.432	**Total SNM**
September 16, 18, 20, 21, 22, 23, October 2, 3	**Specific Dates of Acquisition**
260, 262, 264, 265, 266, 267, 276, 277	**Specific Dn#s of Acquisition**

Table 1: H11752 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 the NOAA Ship *Fairweather* 2008 *Data Acquisition and Processing Report* (DAPR)[3], 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-P132-FA-08[4], dated July 30th, 2008, with the exception of surveying only to areas safely surveyed with S220, not any further inshore than that, and not accomplishing any shoreline or AWOIS verification.

B1. Equipment and Vessels

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

	Fairweather	**Launch 1010**	**Launch 1018**
Hull Registration Number	S220	1010	1018
Builder	Aerojet-General Shipyard	The Boat Yard, Inc.	The Boat Yard, Inc.
Length Overall	231 feet	28’ 10”	28’ 10”
Beam	42 feet	10’ 8”	10’ 8”
Draft, Maximum	15’ 6”	4’ 0” DWL	4’ 0” DWL
Cruising Speed	12.5 knots	24 knots	24 knots
Max Survey Speed	10 knots	10 knots	10 knots
Primary Echosounder	RESON 8111 & RESON 8160	RESON 8101	RESON 8101
Sound Velocity Equipment	SBE 19plus & 45, MVP 200	SBE 19plus	SBE19plus
Attitude & Positioning Equipment	POS/MV V4	POS/MV V4	POS/MV V4
Type of operations	MBES	MBES	MBES, Tide

Table 2: Vessel Inventory

On Dn 275, RESON Transceiver Processing Units (TPUs) were swapped between Launches 1010 and 1018 as a diagnostic for intermittent outages that corrupted data for short durations, about two seconds or so on average. No changes occurred as a result of this swap, and the problem was traced to a bad signal and control cable. Once the cable was replaced and the problem cleared, the TPUs were left in place: 1018 has TPU Serial 34497 and 1010 has TPU Serial 35737. This is a change from the *Fairweather* 2008 Data Acquisition and Processing Report, submitted under separate cover.

B2. Quality Control

Crosslines

Multibeam crosslines for this survey totaled 52.9 linear nautical miles (lnm), comprising 14.05% of the 376.74 lnm of total MBES hydrography. Both main scheme and crossline mileage are summarized in Table 1 above. Crossline discrepancies are mainly attributable to sound velocity issues discussed in Data Quality Factors section on Sound Velocity. Figure 2 below is a histogram of the vertical difference between the crossline and mainscheme surfaces as measured in meters. Ninety five percent of the nodes exhibit an absolute difference of less than 2.6 meters.[5] The surfaces range in depth from 50 to 450 meters.

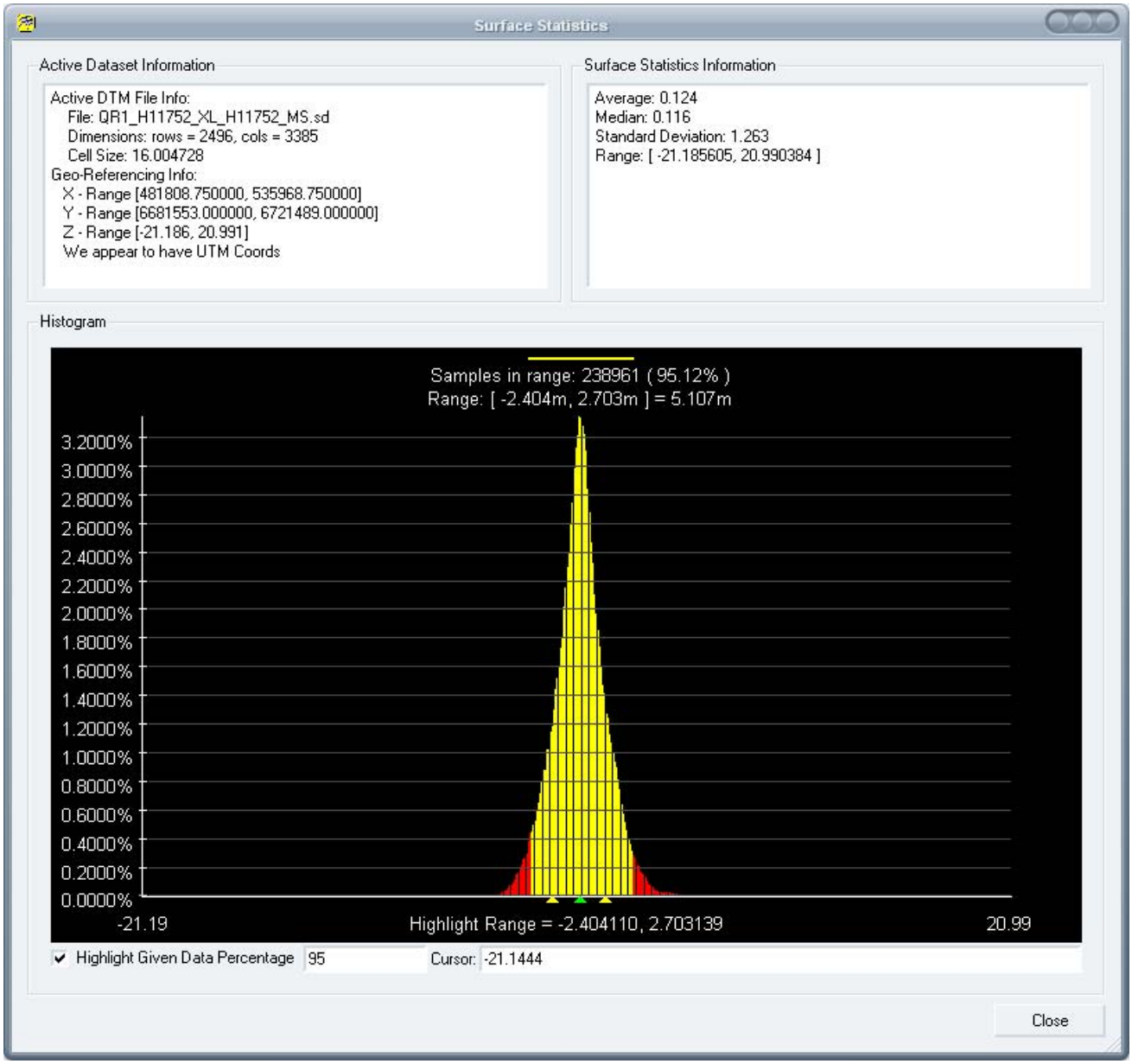

Figure 2 – Crossline Comparison Statistics and Histogram

Junctions

Table 3 below lists all survey junctions for H11752. The sheet limits and areas of overlap for all junction surveys are shown in Figure 3.[6] Each junction is discussed separately following Figure 3.

Junction Survey	Survey Scale	Date of Survey	Survey Location
H10849	1:40,000	1998	E Naked Island
H10925	1:40,000	1999	N Montague Point
H10921	1:10,000	1999	E Rocky Bay
H11637	1:20,000	2007	W Orca Bay
H11743	1:20,000	2008	SW Knowles Head

Table 3: Junction Surveys

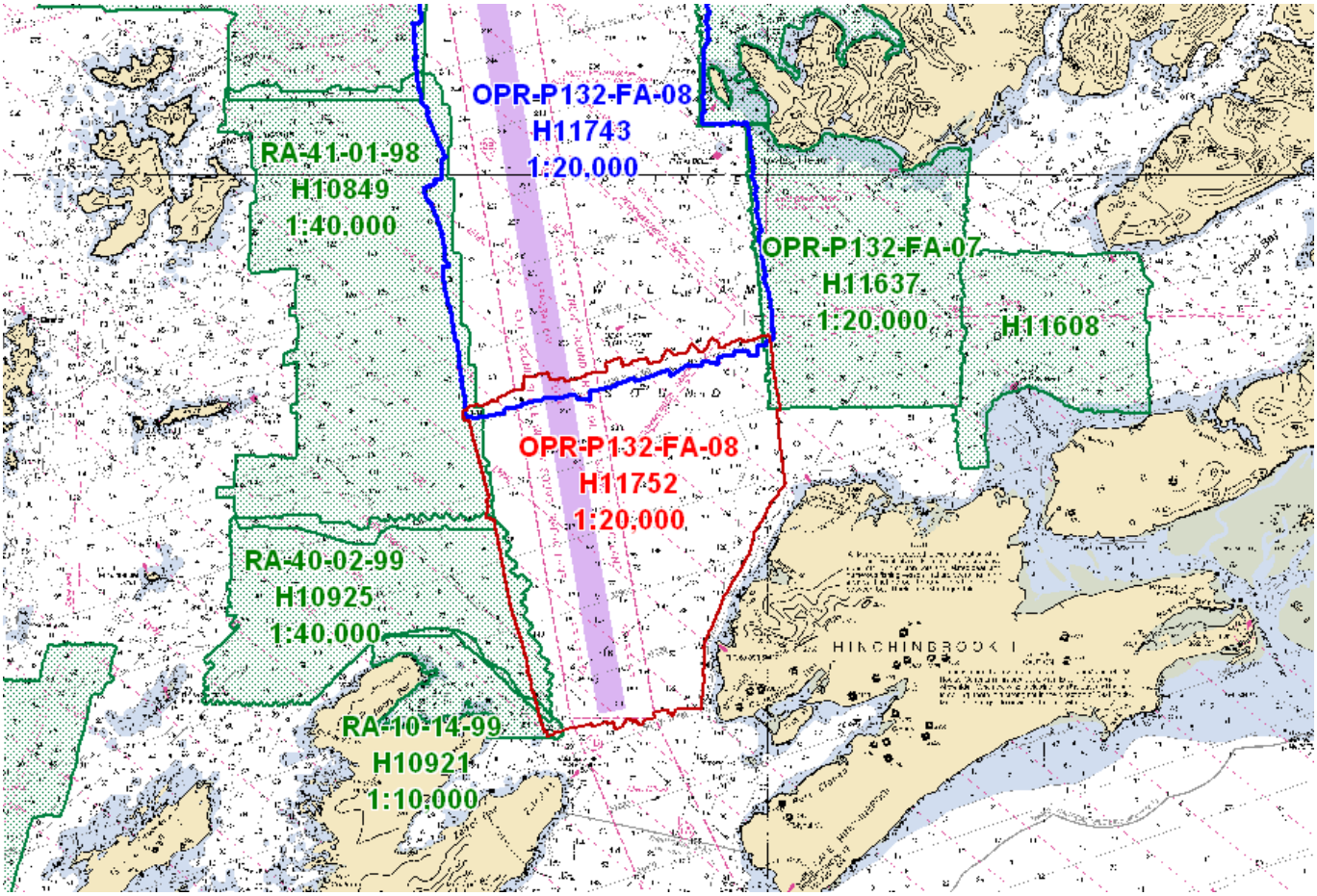

Figure 3: Junction Between H11752 and H11743, H11637, H10921, H10925, H10849.

All data from H11752 used for junction comparisons was collected from the NOAA ship *Fairweather*'s RESON 8160 multibeam echo sounder system (MBES) in conjunction with Triton ISIS software v7.1.5.

JUNCTION H10921

Data from survey H10921 was collected by the NOAA Ship *Rainier* using a Knudsen 320M vertical beam echo sounder (VBES), a Raytheon DSF-6000N VBES, while using Coastal Oceanographic's HYPACK v8.9. Sounding data between H10921 and H11752 agree well, within one or two meters at depths between 40 and 100 meters[7].

JUNCTION H10925

Data from survey H10925 was collected by the NOAA Ship *Rainier* using the SeaBeam 1050D MKII MBES with Triton-Elics ISIS software v4.32 in conjunction with Elac-Nautik's HydroStar Online v2.8.9. Sounding data between H10925 and H11752 agree well, within a meter or two at depths between 90 and 370 meters[8].

JUNCTION H10849

Data from survey H10849 was collected by the NOAA Ship *Rainier* using the IDSS data acquisition system that consisted of Digital Equipment Corporations' VAX Station 4000-90 computer system interfaced with a SeaBeam Hydrochart II MBES. Soundings agree well for the most part between H11752 and H10849. Occasionally, disagreements reach as high as twelve meters at depths between 310 and 360 meters. Overall, there is agreement between one and two meters. The soundings acquired from hydrographic instruments on NOAA Ship *Fairweather* are sufficient to supersede soundings from H10849[9].

JUNCTION H11637

Data from survey H11673 was collected by the NOAA Ship *Fairweather* using hull-mounted Reson 8160 MBES and 8111 MBES systems with Triton ISIS software. Soundings between H11637 and H11752 agree well, within one or two meters at depths beyond 200 meters[10].

JUNCTION H11743

Data from survey H11743 was collected by the NOAA Ship *Fairweather* using hull-mounted Reson 8160 MBES and 8111 MBES systems with Triton ISIS software. Soundings between H11743 and H11752 agree well, within one or two meters at depths as much as 400 meters.[11]

Quality Control Checks

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

Data Quality Factors

TRUEHEAVE:

TrueHeave started logging after acquisition on line 265-0241 from September 21 (DN265) and line 276-0305 from October 2, 2008 (DN 276), so TrueHeave data could not be applied. Due to the negligible swell in the protected waters of Prince William Sound and the depth in the survey area, MBES data quality from those lines does not appear to have been adversely affected by the lack of TrueHeave.[12]

SOUND VELOCITY:

Figures 4 and 5 below characterize sound velocity (SV) problems that have been seen in MBES data from survey H11752. Similar SV issues have been identified even in areas directly surrounding SV casts. The predominant method of SV profiling was Nearest in Time within Distance (2hrs), though Nearest in Time has been used as well, as documented in the acquisition logs. SV casts made at depths greater than 220 meters with the Brooke Ocean Moving Vessel Profiler (MVP) are not of sufficient depth to produce a full water column SV profile, a likely cause of SV error.

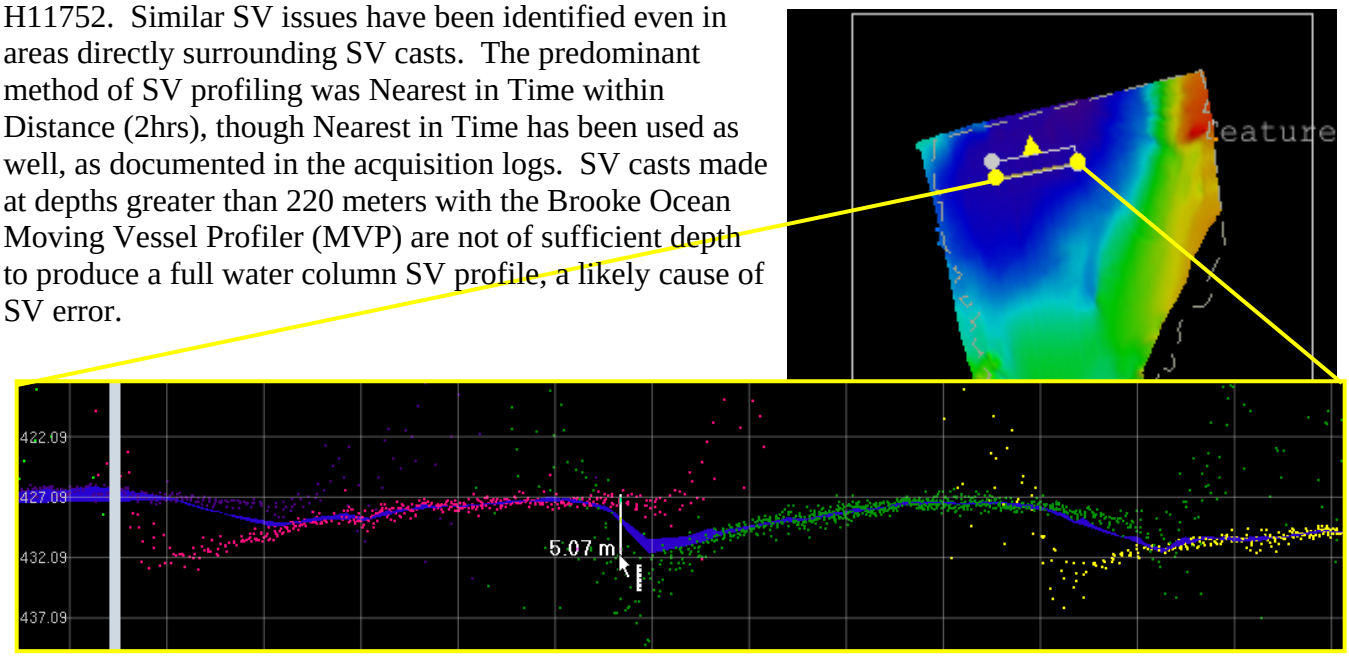

Figure 4 – Sound Velocity Error in deepest section of survey H11752

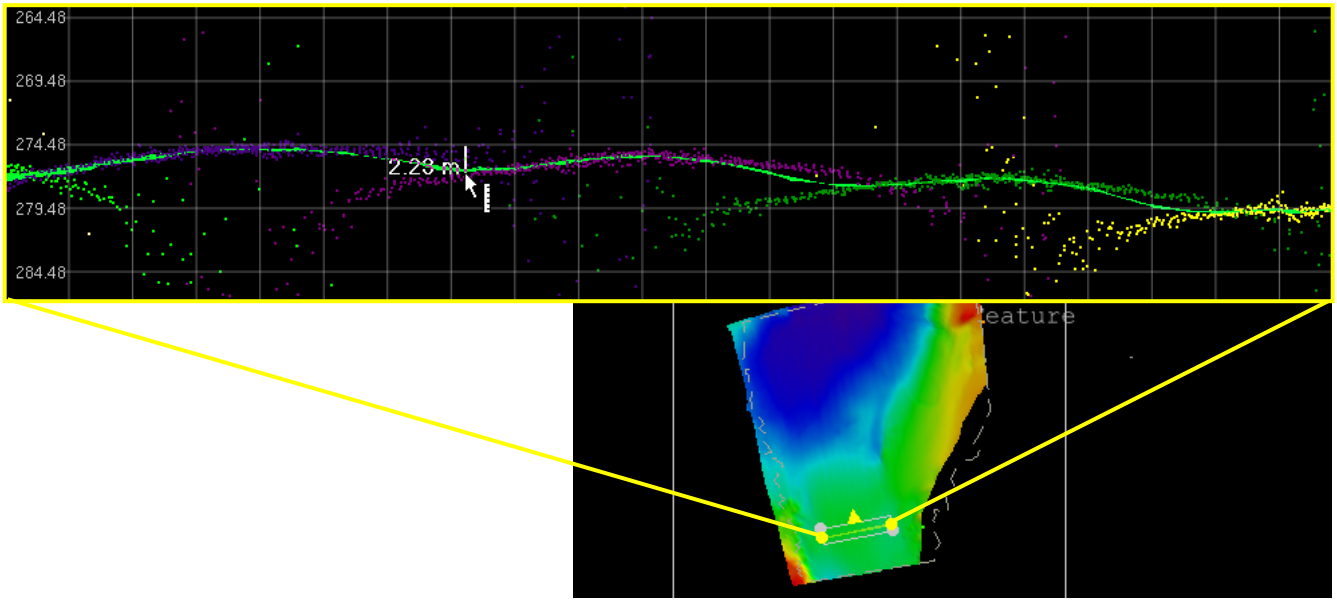

Figure 5 – Sound Velocity Error in moderate depth of survey H11752

The Hydrographic Survey Specifications and Deliverables (HSSD) Manual Section 5.1.1.1 assigns an IHO error tolerance of 9.97 meters at a depth of 432 meters, a specification our data meets. Section 5.1.3.5 assigns a total sound speed error budget of 0.3meters + 0.5% of total depth. Figure 4 depicts a deep area with SV error of 5.07 meters at a depth of 432 meters. For this depth, the SV Error budget = (0.3+ 2.16) = 2.46 meters, a specification the data do not meet.

Figure 5 illustrates another deep area with SV error of 2.23m at a depth of 276 meters. For this depth, the SV Error budget is (0.3+ 1.38) = 1.68 meters, a specification the data do not meet.

The HSSD Manual Section 5.1.3.3 assigns, for depths greater than 100 meters, a sound velocity profile of at least 85% of the anticipated water depth. Routinely, soundings in H11752 measure 350 meters and greater, up to a max depth of about 430 meters. Average cast depth with the MVP at survey speed (8 kts) is about 200 meters, creating an extended depth profile from 4.5 meters (transducer head depth) down to a maximum depth of 260 meters, far short of the actual sounding depth, and unable to support the 85% specification for soundings of depth 260 meters or greater.[13]

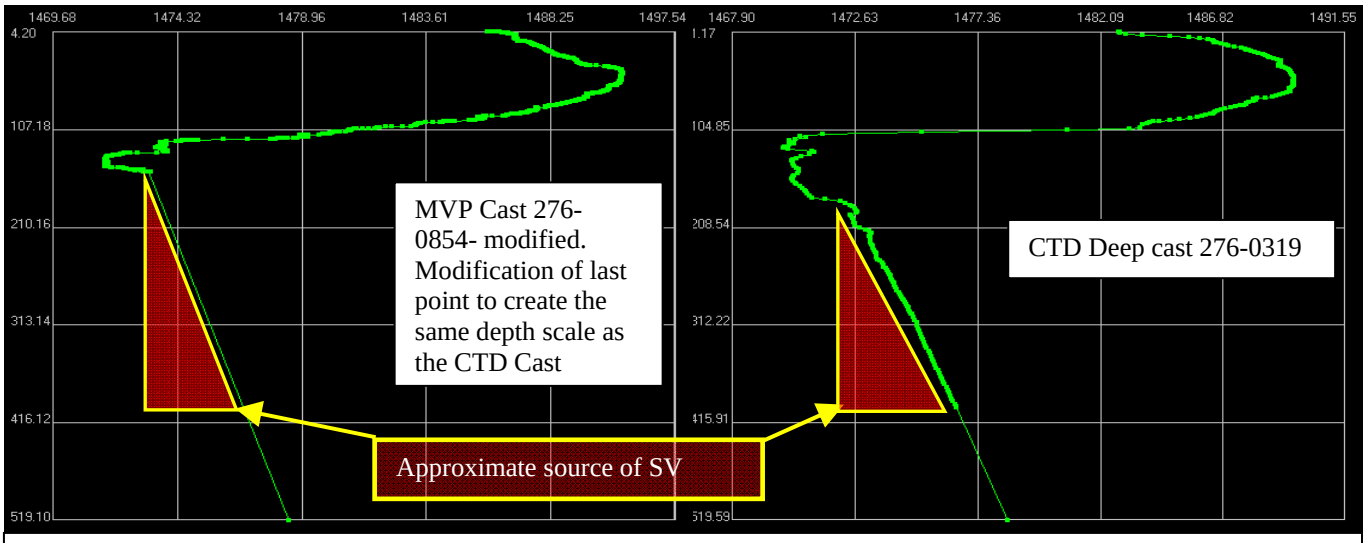

Figure 6a – Sound velocity profile divergence between a deep CTD cast in H11752 and an MVP cast in the same survey area where duration between casts is about 5.5 hours.

An attempt to slow the vessel before MVP casts were conducted managed to extend the cast profile, but resulted in casts initiating at depths of 10 meters and greater. This portion of unrecorded water column, between the transducer head (at a depth of 4.5 meters) and the depth of cast initialization, creates sources of SV error.

Figure 6a shows the data collection difference between a deep cast SV profile from a stationary CTD cast conducted with the vessel's winch and a typical survey speed cast from the MVP. There are significant amounts of SV data acquired from the CTD that do not appear in the MVP cast. As captured by the CTD, past 200 meters in depth the water sound velocity increases at a fairly linear rate of 5m/s for every 200 meters. When CARIS creates its SV corrections, it uses the last profile point. Past the last recorded SV value of the MVP ~1472m/s @ 180m, the actual water SV value diverges from the value CARIS uses to correct for SV, creating error.

Figure 6b reveals the spatial extent of SV error that exceeds the SV error budget. One assumption was made to make this image: that all error between the crossline surface and mainscheme surface was due solely to SV errors. This represents an exaggerated estimate, as there may be other sources of error. The purpose was to determine the extent of SV error in H11752.

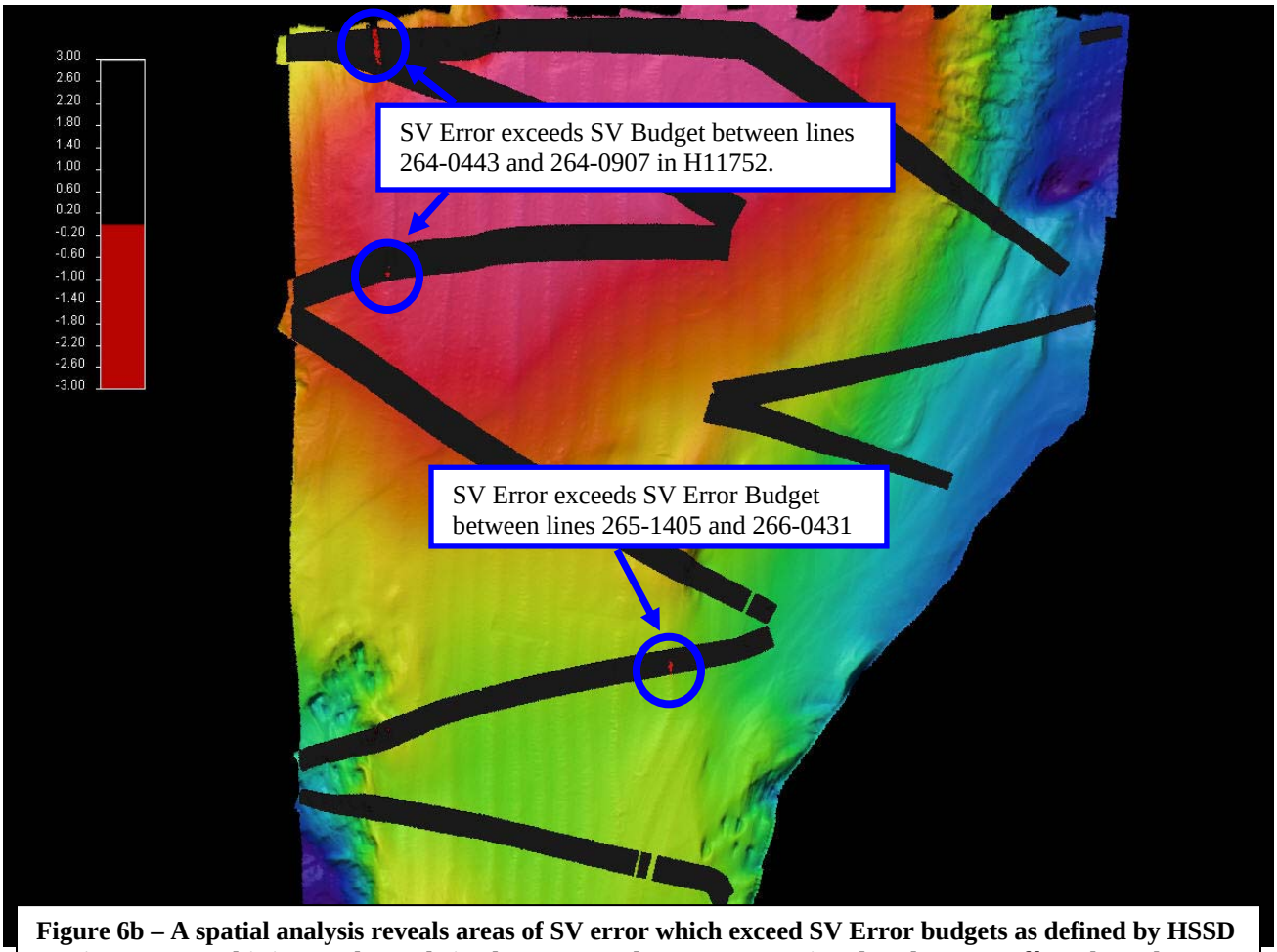

Figure 6b – A spatial analysis reveals areas of SV error which exceed SV Error budgets as defined by HSSD Section 5.1.3.3. This image shows their placement and extent, suggesting that the areas affected are due to inadequate overlap between survey lines for H11752. The image also reveals that the area affected is minimal.

The method used was as follows – a Bathymetry with Associated Statistical Error (BASE) surface was created for the whole Quality Control (QC) 16 meter surface whose nodes follow the SV budget formula of adding .5% of total depth to 3 meters. This surface is called SV_Budget, and covers the entire survey.

$$SV_{Budget} = ((Depth * 0.005) + 3.0)m$$

The Crossline Surface Difference BASE surface measures the difference in height between mainscheme and crossline surfaces. If we assume all error is due to SV error, then this surface difference will calculate SV error as a height. When we convert these positive and negative heights to absolute values (error being a non-directional magnitude), the resulting surface contains SV error values for areas with crossline coverage. Because crosslines are well distributed throughout the survey area, we are confident that there is similar sound velocity error in areas not covered by crosslines.

I conducted a second surface difference between the SV Budget surface and the SV Error surface. By subtracting the measured error from the budget, any positive outcome of the surface difference reveals nodes within the SV error budget and any negative outcome reveals nodes that do not fall within their error budget. Figure 6 above displays areas – in red – from the final surface difference where the SV

budget was exceeded. Where survey lines were spaced too far apart, overlap of data was insufficient to keep outer beams, and their resulting surfaces, from bending out of spec. Specifically, line spacing was too great between lines 264-0443 and 264-0907 as well as between 265-1405 and 266-0431. The areas that exceed their SV budgets seem to be contained to within these paired lines.

SV CAST
On Day Number (Dn) 260, the ninth cast - BOT_0009.raw – was recorded with no .calc file. As a result, that cast was unable to be processed in Velocwin. Because of this, the number of SV casts on Dn 260 exceeds the number of processed SV files.

DESIGNATED SOUNDINGS:
Designation of soundings followed procedures as outlined in section 5.1.1.3 of the NOS Hydrographic Surveys Specifications and Deliverables (HSSDM) dated April 2008.

There is a single designated sounding in H11752. The difference between the surface and the shoalest sounding exceeded the designation threshold, and the sounding was designated to preserve the least depth on the feature.[14]

There are no outstanding flags within the critical soundings layer.[15]

Accuracy Standards

By exporting IHO Order 1 and Order 2 values to Fledermaus and assembling a surface based on them, surface statistics can verify the number of surface nodes both above and below IHO Order 1 and IHO Order 2 specification as per Section 5.1.1.1, Accuracy Standards, in the Hydrographic Survey Specifications and Deliverables (HSSD), April 2008. When the calculations for a node results in a value less than one, IHO budgets are exceeded. The histogram created in Fledermaus reveals the range that comprise a user-defined percentage of calculated values in the surface. As long as the range on the lower end exceeds zero, then all values in the set exceed IHO Order 1 or 2 error budgets. Using Fledermaus Surface Statistics, it was found that over 99% of the soundings meet their IHO uncertainty budgets for their depth as seen in Figures 6 and 7 below.[16]

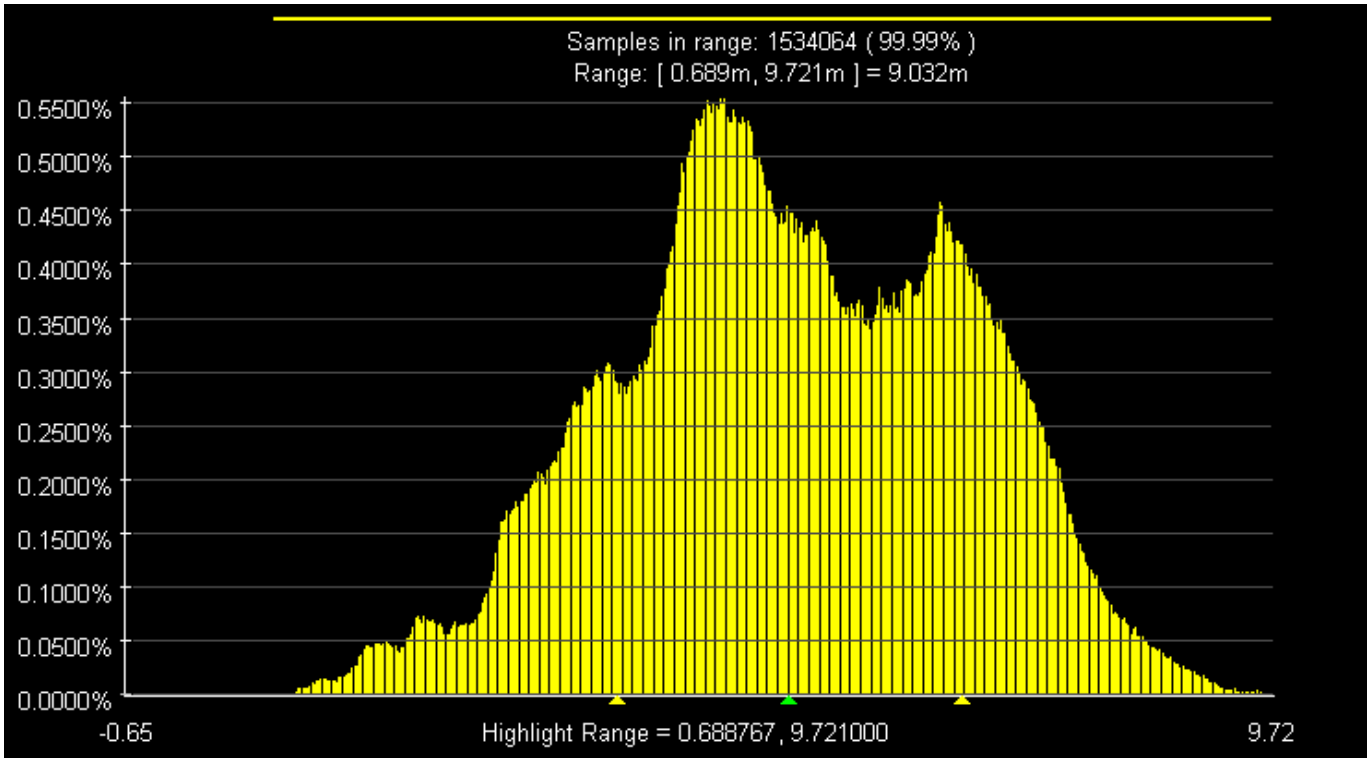

Figure 7: Surface statistics for IHO Order 2 in H11752

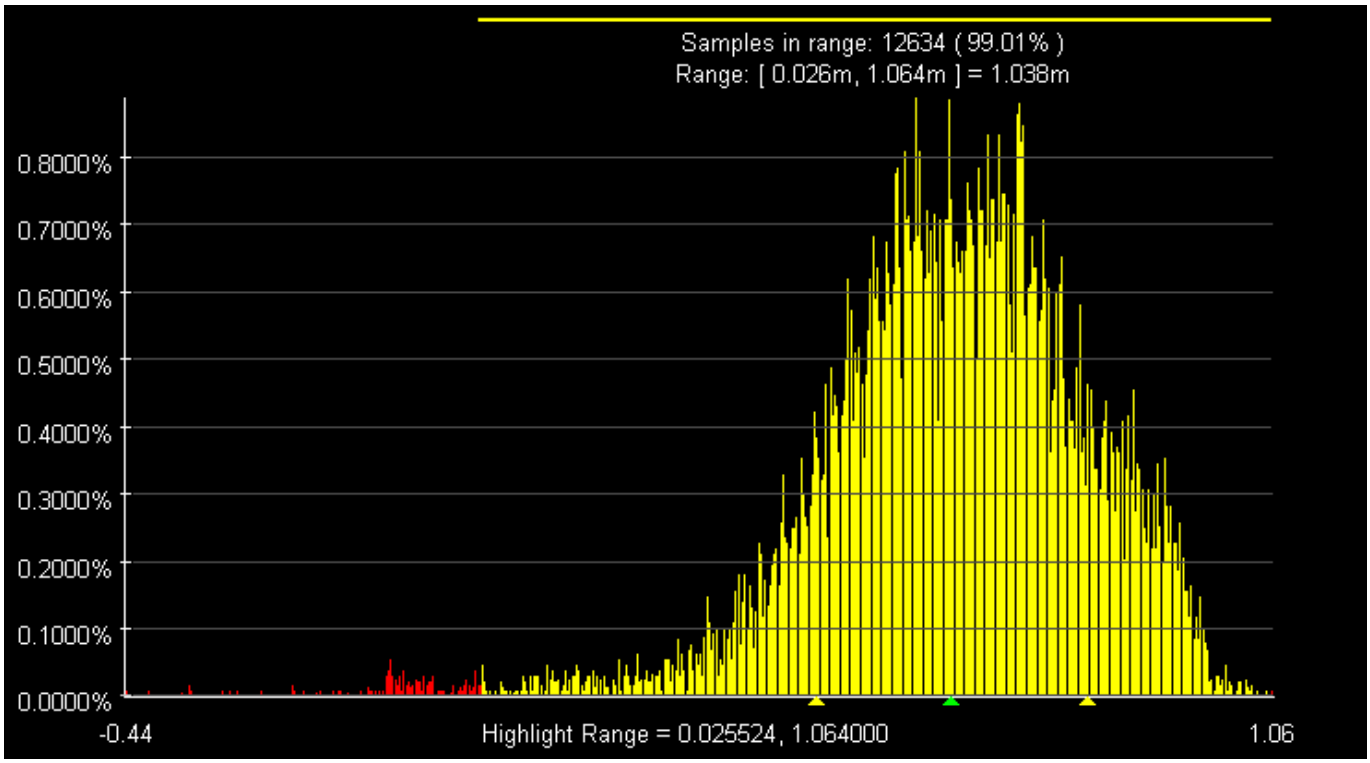

Figure 8: Surface statistics for IHO Order 1 in H11752

Sources of SV error are discussed above, in the Sound Velocity section of Data Quality Factors.

B3. Corrections to Echo Soundings

Data reduction procedures for survey H11752 conform to those detailed in the DAPR.

B4. Data Processing

Initial data acquisition and processing notes are included the acquisition and processing logs. Additional processing such as *final tides* and *sound velocity applied* is tracked in the survey wide query in the MBES_MS, MBES_XL, and Reviewer_Qry tabs of the H11752_Data_Log. All of the logs are included with the digital Separates I.

Data processing procedures for survey H11752 conform to those detailed in the DAPR. Further processing details regarding Total Propagated Uncertainty (TPU), Total Propagated Error(TPE), and Combined Uncertainty and Bathymetry Estimator (CUBE) Surfaces and Parameters utilized, along with any the deviations from the processing procedures outlined in the DAPR are discussed below.

TPE VALUES:
The survey specific parameters used to compute TPE in CARIS for H11752 are listed in Table 4.

Tide values:	Measured	0.02 m	Zoning	0.155
Sound Speed Values:	Measured	0.50 m/s	Surface	0.50 m/s

Table 4: Survey Specific CARIS TPE Parameters

CUBE SURFACES:
CUBE base surface resolutions utilized are listed below in Table 5. Three fieldsheets were used, a single survey-wide fieldsheet contains all soundings within a 16m BASE Surface, two other fieldsheets were created around shallower waters in the NE and SW corners of the survey.

Fieldsheet Name	Surface Name	Depth Ranges (m)	Resolution (m)
H11752	H11752_16m	0-900	16
H11752	H11752_16m_Final_60to900	60-900	16
H11752	H11752_16m_Combined	0-900	16
H11752_SW	H11752_8m	0-900	8
H11752_SW	H11752_8m_Final_35to80	35-80	8
H11752_NE	H11752_8m	0-900	8
H11752_NE	H11752_8m_Final_35to80	35-80	8

Table 5: Depth Ranges and Resolutions

CUBE PARAMETERS:
The CUBE parameters utilized for creating CUBE surfaces are included in Table 6. The CUBE parameters .xml file is included with digital data in the vessel configuration folder.

Cube Parameter	Estimate Offset	Capture Distance Scale (%)	Capture Distance Minimum (m)	Horizontal Error Scalar
8MeterGrid	4.00	1.00	5.65	2.95
16MeterGrid	4.00	10.00	11.31	2.95

Table 6: CUBE Parameters from H11752

C. HORIZONTAL AND VERTICAL CONTROL

A report of horizontal and vertical control was not required or submitted for *OPR-P132-FA-08*. A summary of horizontal and vertical control for this survey follows.

Horizontal Control

The horizontal datum for this project is the North American Datum of 1983 (NAD83). A Differential Global Positioning System (DGPS) was the sole method of positioning. Differential corrections from the U.S. Coast Guard beacon at Cape Hinchinbrook (292 kHz) were used exclusively.

Vertical Control

The vertical datum for this project is Mean Lower Low Water (MLLW) as specified in the Project Instructions. The operating National Water Level Observation Network (NWLON) primary tide station at Valdez, Prince William Sound, AK station (945-4240) served as control for datum determination and as the primary source for water level correctors for survey H11752.

A request for delivery of final approved (smooth) tides for survey H11752 was forwarded to N/OPS1 on October 06, 2008 in accordance with the Field Procedures Manual (FPM), dated May, 2008. A copy of the request is included in Appendix V[17].

As per the Project Instructions, all data were reduced to MLLW using the final approved water levels (smooth tides) from the Valdez, Prince William Sound, AK station (945-4240) by applying tide file 9454240.tid and time and height correctors through the zone corrector file P132FA2008CORP.zdf. **It will not be necessary for the Pacific Hydrographic Branch to reapply the final approved water levels (smooth tides) to the survey data during final processing.**

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 HSSDM, utilizing MapInfo 9.5 software program.

Survey H11752 was compared with the following charts listed in Table 7. There were no new changes within the survey area.

NOAA Chart Number	Chart Scale	Edition Number	Edition Date	Updated with Notice to Mariners through
16700	1:200,000	30th Ed.	December, 2007	November, 2008
16709	1:80,000	24th Ed.	August, 2008	November, 2008

Table 7: NOAA Charts compared with Survey H11752

Chart 16700

Depths from survey H11752 generally agreed within one to two fathoms with depths on chart 16700. There are two soundings that exceed general agreement.

Figure 9 shows, at 60.5105N and 147.0231W, a reference surfaces without any breaks that established complete coverage at this sounding. Figure 10 shows the charted sounding of 177fm where the MBES sounding layer indicates a shoalest depth of 182fm.

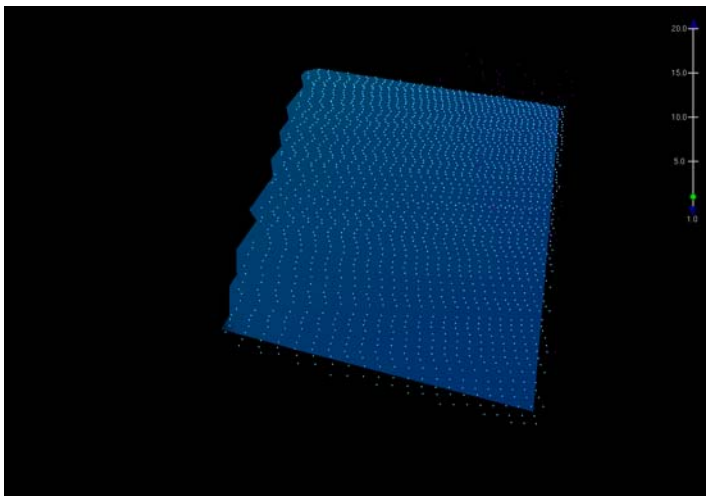

Figure 9 – Complete coverage for Charted (16700) 177 fathom sounding

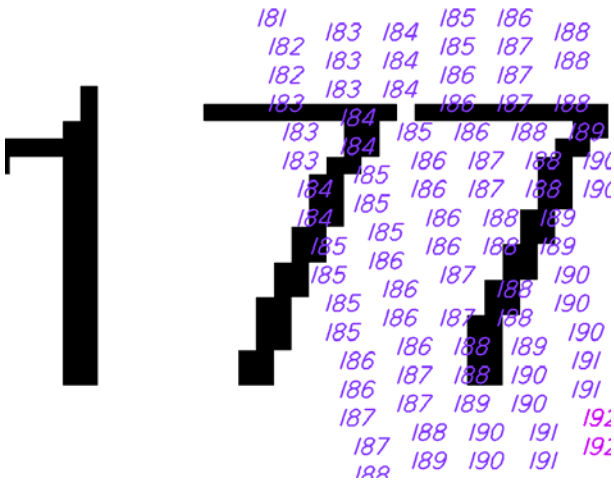

Figure 10 – Surveyed least depth of 182 fathoms on Charted (16700) 177 fathom sounding

Figure 11 shows, at 60.4503N and 146.9767W, a charted sounding of 188fm where the MBES sounding layer indicates a shoalest depth of 198fm. Figure 12 shows the charted sounding of 188fm where the MBES sounding layer indicates a shoalest depth of 197fm.

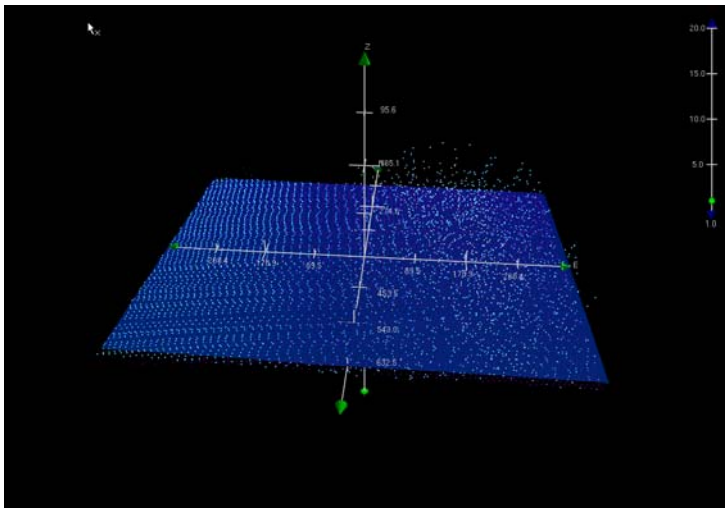

Figure 11 – Complete coverage for Charted (16700) 188 fathom sounding

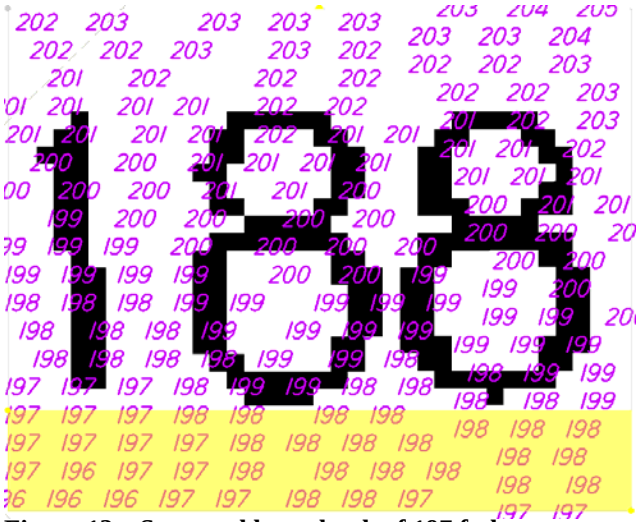

Figure 12 – Surveyed least depth of 197 fathoms on Charted (16700) 188 fathom sounding

Chart 16709

Depths from survey H11752 generally agreed within one to two fathoms with depths on chart 16709. There are two soundings that exceed general agreement.

Figure 13 shows, at 60.4510N and 146.9802W, a charted sounding of 188 fm where the MBES sounding layer indicates a shoalest depth of 199fm. Figure 14 shows the charted sounding of 188fm where the MBES sounding layer indicates a shoalest depth of 199fm.

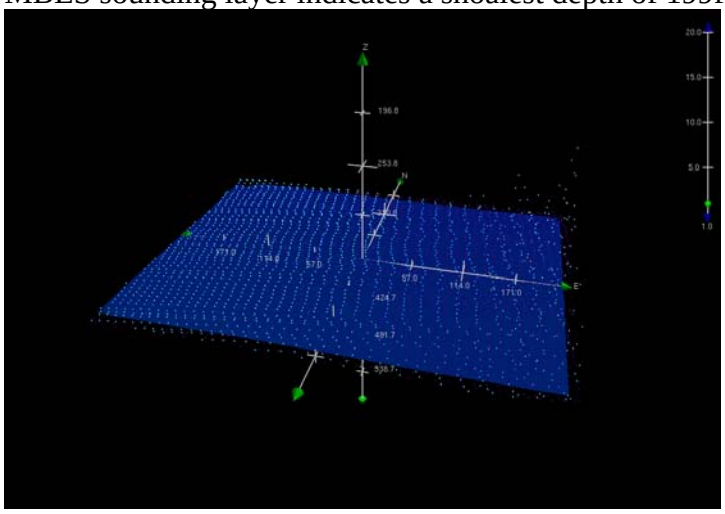

Figure 13 - Complete coverage for Charted (16709) 188 fathom sounding

Figure 14 - Surveyed least depth of 199 fathoms on Charted (16709) 188 fathom sounding

Figure 15 shows, at 60.4926N and 146.7631W, a charted sounding of 163 fm where the MBES sounding layer indicates a shoalest depth of 180 fm. Figure 16 shows the charted sounding of 163 fathoms where the MBES sounding layer indicates a shoalest depth of 180 fathoms.

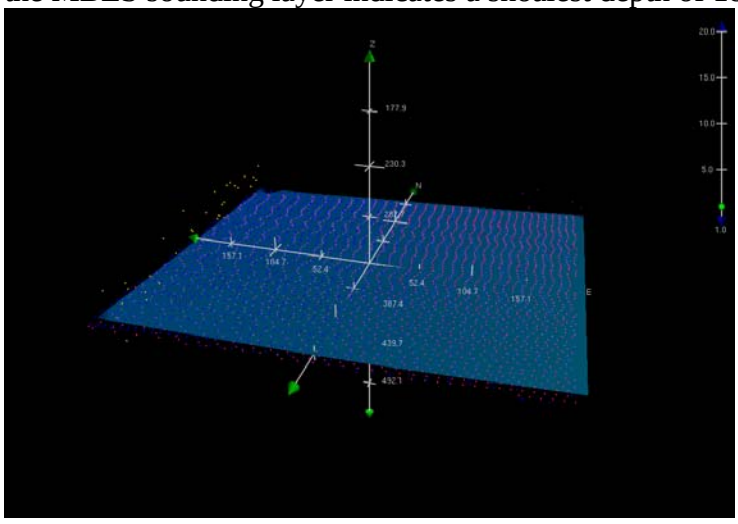

Figure 15 – Complete coverage for Charted (16709) 163 fathom sounding

Figure16 – Surveyed least depth of 180 fathoms on Charted (16709) 163 fathom sounding.

Chart Comparison Recommendations

The Hydrographer has determined that bottom coverage requirements have been met and data accuracy meets requirements specified by the *HSSDM*. **The surveyed soundings are adequate to supersede prior surveys in their common areas.**

Automated Wreck and Obstruction Information System (AWOIS) Investigations

The initial survey limits of H11752 encompassed an AWOIS item, but both shallow water MBES platforms were inoperable during the survey dates. As a result, surveyed areas include only offshore areas. No AWOIS items were included within the final limits of the survey. AWOIS items shoreward of the current survey should be assigned to future surveys conducted in the area.[18]

Dangers to Navigation

There were no dangers to navigation found within the survey limits.[19]

D.2 Additional Results

Shoreline Verification

Fairweather personnel conducted no shoreline verification on this survey. No nearshore hydrography was conducted[20] due to equipment and time restrictions, therefore the shoreline was outside of the limits of the survey.

Bottom Samples

Bottom samples were not collected because there were no suitable anchorage sites within the surveyed area.

Additional Recommendations

- The request in the 2008 Project Instructions to survey to the 4-meter curve was not accomplished due to mechanical breakdowns. Future projects in this area should include a 4-meter curve survey inshore of H11752.
- Shoreline verification, as requested in the 2008 Project Instructions, was not accomplished due to mechanical breakdowns. Future projects in this area should include shoreline verification of the coastline inshore of H11752.
- The one AWOIS item for this survey was not adequately assessed so should be fully developed during future projects.

E. Supplemental Reports

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

Title	Date Sent	Office
Hydrographic Systems Certification Report 2008	May 14, 2008	N/CS34
Data Acquisition and Processing Report 2008	November 14, 2008	N/CS34
Coast Pilot Report for OPR-P132-FA-08	TBD	N/CS26

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[1] **Concur**
[2] **Concur**
[3] **Filed with project records**
[4] **Filed with project records**
[5] **Concur**
[6] **Concur**
[7] **Concur**
[8] **Concur**
[9] **Concur**
[10] **Concur**
[11] **Concur**
[12] **Concur**
[13] **Concur**
[14] **Concur**
[15] **Concur**
[16] **Concur**
[17] **Tide note is appended to this report**
[18] **Concur**
[19] **Concur**
[20] **Concur**

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : October 27, 2008

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-P132-FA-2008
HYDROGRAPHIC SHEET: H11752

LOCALITY: Offshore-NW Bear Cape, Prince William Sound, AK
TIME PERIOD: September 16 - October 3, 2008

TIDE STATION USED: 945-4240 Valdez, AK
Lat. 61° 07.4'N Long. 146° 21.8' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.417 meters

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project OPR-P132-FA-2008, H11752, during the time period between September 16 - October 3, 2008.

Please use the zoning file "P132FA2008CORP" submitted with the project instructions for H11752. Zones PWS51, PWS53, PWS54 & PWS64 are the applicable zones for H11752.

Refer to attachments for zoning information.

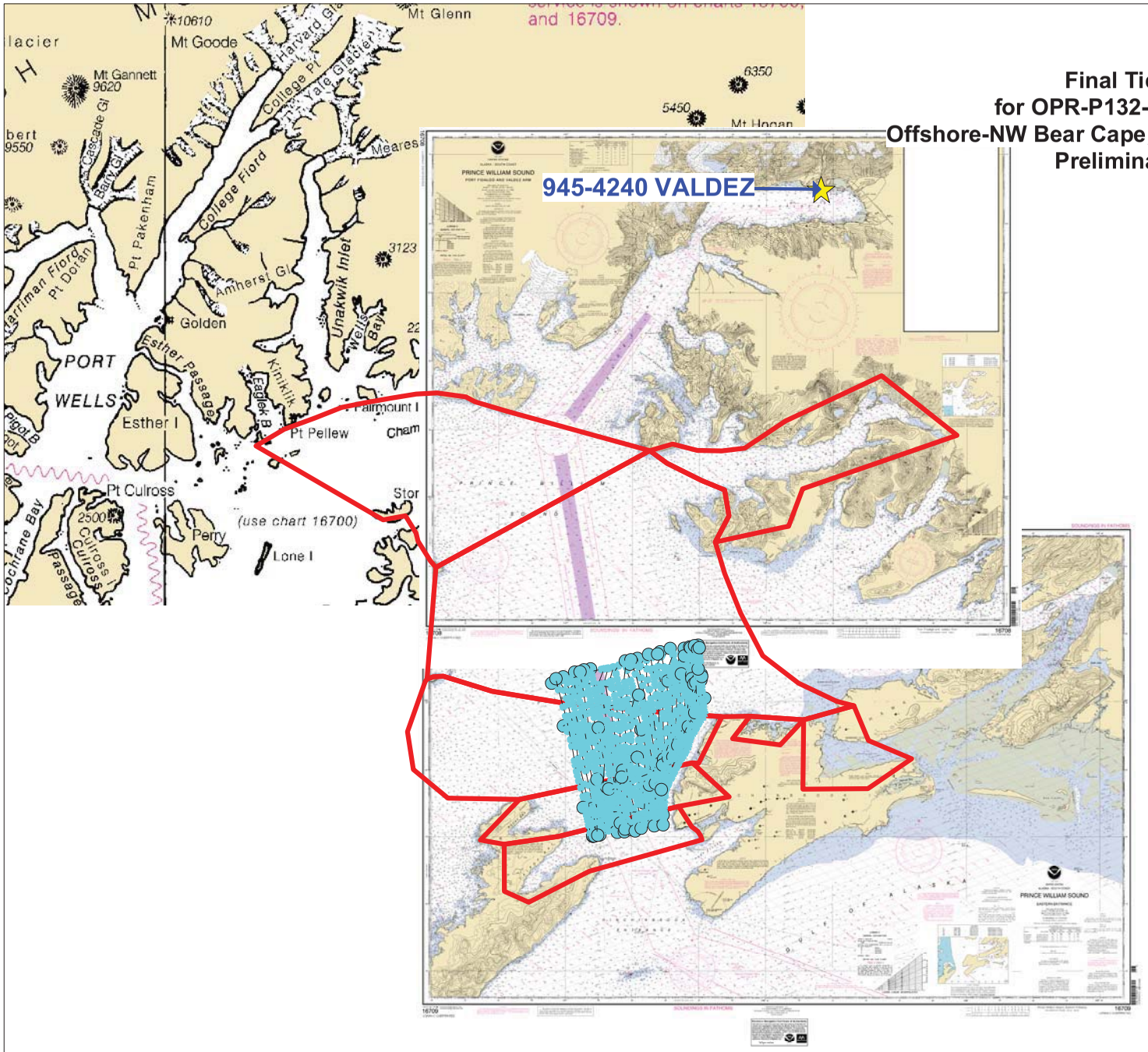
Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

Peter J. Stone

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: 2008.10.28 07:09:15 -04'00'

CHIEF, OCEANOGRAPHIC DIVISION

Final Tidal Zoning
for OPR-P132-FA-2008, H11752
Offshore-NW Bear Cape, Prince William Sound, AK
Preliminary as Final



H11752 HCell Report

Tyanne Faulkes, ERT Associate
Pacific Hydrographic Branch

Introduction

The primary purpose of the HCell is to provide new survey information in International Hydrographic Organization (IHO) format S-57 to update the largest ENC and RNC in the region: NOAA ENC: US4AK25M; and NOAA RNCs: 16709.

HCell compilation of survey H11752 utilized Office of Coast Survey HCell Specifications Version 3.1, with approved modifications to better align with PHB's HCell process and to meet MCD needs.

1. Compilation Scale

The density of soundings in the HCell are compiled as appropriate to emulate those soundings of Charts 16709 1:80,000. Position and density of non-bathymetric features included in the HCell have not been generalized from the scale of the hydrographic survey H11752.

2. Soundings

A survey-scale sounding (SOUNDG) feature object source layer was built from the **H11752_Office_Combined_10m** surface in CARIS BASE Editor. A shoal-biased selection was made at 1:10,000 survey scale for the area of the survey covered by chart 16709 (1:80,000). These shoal-based selections were made using a Radius Table file with values shown in the table, below. The resultant sounding layer contains 119,332 depths ranging from 21-244 fathoms.

Upper limit (m)	Lower limit (m)	Radius (mm)
0	10	3
10	20	4
20	50	4.5
50	150	5

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

3. Depth Areas and Depth Contours

3.1 Depth Areas

The extents of the highest resolution BASE Surface together with the extents of the soundings layer were used to digitize the hydrographic extents, which were then used to create the single, all encompassing depth area (DEPARE). One depth range, from 38.5 to 462.5 meters, was used for depth area objects. Upon conversion to NOAA charting units, the depth range is 21 to 253 fathoms.

3.2 Depth Contours

Depth contours at the intervals on the largest scale chart are included in the H11752_SS HCell for MCD raster charting division to use for guidance in creating chart contours. The generalized metric and fathom equivalent contour values are shown in the table below.

Chart Contours in Fathoms	Metric Equivalent of Chart Contours	Metric Equivalent of Chart Contours NOAA Rounded	Actual Value of Chart Contours
3	5.4864	5.715	n/a
10	18.288	18.5166	n/a
50	91.44	92.8116	50.75

Contours delivered in the H11752_SS file have not been deconflicted against soundings and hydrography as all other features in the H11752_CS file and soundings in the H11752_SS have been. This results in conflicts between the H11752_SS file contours and HCell features at or near the survey limits. Conflicts with M_COVR, M_QUAL, M_CSCL and DEPARE objects should be expected. HCell features should be honored over H11752_SS.000 file contours in all cases where conflicts are found.

4. Meta Areas

The following Meta object areas are included in HCell H11752:

M_QUAL
M_COVR

Meta area objects were constructed on the basis of the limits of the hydrography. (See 3.1 *Depth Areas*.)

5. Features

A features files **H11752_Original_Composite_Source.hob, H11752_Disprovals.hob,** and **H11752_Original_Composite_Source.hob** were delivered. Shoreline was not performed on the survey and no new features were created. There no DTONs reported by the field unit.

11 bottom sample features were imported from chart 16709. The source of all features included in the H11752 HCell can be determined by the SORIND field.

6. S-57 Objects and Attributes

The H11752_CS HCell contains the following Objects:

SOUNDG	Chart scale soundings
DEPARE	All-encompassing depth area and intertidal areas
SBDARE	Bottom samples
M_COVR	Data coverage Meta object
M_QUAL	Data quality Meta object
$CSYMB	Blue notes

The H11983_SS HCell contains the following Objects:

SOUNDG	Soundings at the survey scale density
DEPCNT	NOAA rounded contours at chart scale intervals

All S-57 Feature Objects in the H11752_CS HCell have been attributed as fully as possible based on information provided by the Hydrographer and in accordance with current guidance and the OCS HCell Specifications.

7. Blue Notes

Notes to the RNC and ENC chart compilers are included in the HCell as CSYMB features with the Blue Note information located in the INFORM field.

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

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, and therefore have lower precision. 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

Conversion to charting units and application of NOAA rounding is completed in the same step, at the end of the HCell compilation process.

Conversion to charting units with NOAA rounding ensures that:

- All depths will display as whole feet.
- All depth units above MLLW (0 feet) to 2.0 feet above MHW display in whole feet.
- All height units (HUNI) which have been converted to charting units, and that are 2.0 feet above MHW and greater, are shown in feet.

In an ENC viewer, depths (DUNI) and heights (HUNI) display as whole feet.

9. Data Processing Notes

9.1 Junctions

Refer to section B.2 of the Descriptive Report for information on junction surveys.

10. QA/QC and ENC Validation Checks

H11752 was subjected to QA checks in S-57 Composer prior to exporting to the HCell base cell (000) file. The millimeter precision metric S-57 HCell was converted to a 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 have been approved by MCD as inherent to and acceptable for HCells.

11. Products

11.1 HSD, MCD and CGTP Deliverables

- H11752_CS, Chart Units, Soundings compiled to 1:80,000
- H11752_SS, Chart Units, Soundings compiled to 1:10,000
- H11752_DR including end notes compiled during office processing and certification, the HCell Report, and supplemental items
- H11752 Survey Outline to populate to SURDEX

11.2File Naming Conventions

- Chart units base cell file, chart scale soundings H11752_CS.000
- Chart units base cell file, survey scale soundings H11752_SS.000
- Descriptive Report H11752_DR.pdf
- Survey outline H11752.gml & *.xsd

11.3 Software

CARIS HIPS Ver. 6.1	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 2.1	Creation of soundings and bathy-derived features, creation of the depth area, meta area objects, and Blue Notes; Survey evaluation and verification; Initial HCell assembly.
CARIS S-57 Composer Ver. 2.0	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	Validation of the base cell file.
Newport 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:

Tyanne Faulkes, ERT Associate, PHB, Seattle, WA; 206-526-6883;
Tyanne.Faulkes@noaa.gov

APPROVAL SHEET
H11752

Initial Approvals:

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

Digitally signed by Tyanne Faulkes
DN: cn=Tyanne Faulkes, o=USDOC/NOAA/NOS, ou=Pacific Hydrographic Branch, email=tyanne.faulkes@noaa.gov, c=US
Date: 2009.08.31 13:27:33 -07'00'

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.

Digitally signed by Charles R. Davies
DN: cn=Charles R. Davies, o=Pacific Hydrographic Branch, ou=NOAA,NOS,OCS, email=Russ.Davies@NOAA.GOV, c=US
Date: 2009.08.31 13:42:30 -07'00'

I have reviewed the H-Cell, 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.

Gary C. Nelson
for Capt. Neander
2009.08.31 13:57:46
-07'00'

J. Corey Allen
AWOIS and SURF Check Complete
2009.09.01 09:43:21 -04'00'