H12128

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. David Evans and Associates, Inc.

Registry No. H12128

LOCALITY

State Oregon

General Locality Pacific Ocean - Northern Oregon

Sublocality Cascade Head to Siletz Bay

2006

CHIEF OF PARTY
Jonathan L. Dasler, PE (OR) , PLS (OR,CA)

LIBRARY & ARCHIVES

DATE

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION **HYDROGRAPHIC TITLE SHEET**	REGISTRY No **H12128**
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 Oregon

General Locality Pacific Ocean - Northern Oregon

Sub-Locality Cascade Head to Siletz Bay

Scale 1:20,000 **Date of Survey** August 14, 2009 to September 22, 2010

Instructions dated June 2009 **Project No.** M-N928-KR-09

Vessel R/V Pacific Storm, R/V JAB

Chief of party Jonathan L. Dasler, PE (OR) , PLS (OR,CA)

Surveyed by David Evans and Associates, Inc.

Soundings by RESON 8101-ER, RESON 7101-ER

SAR by Pete Holmberg Compilation by **Martha Herzog**

Soundings compiled in Fathoms

REMARKS: **All times are UTC. UTM Zone 10**

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.

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/.

Descriptive Report to Accompany Hydrographic Survey H12128
Project M-N928-KR-09
Oregon Coastal Mapping Project
Cascade Head to Siletz Bay
Scale 1:20,000
August 2009 - October 2009
August 2010 – September 2010
David Evans and Associates, Inc.
Lead Hydrographer: Jonathan L. Dasler

A. AREA SURVEYED

David Evans and Associates, Inc. (DEA) conducted hydrographic survey operations in the Pacific Ocean along the Northern Oregon Coast. The survey area (Figure 1) is located between Neskowin and Siletz Bay, Oregon. This project is in support of the Oregon Coastal Mapping Project established under the West Coast Governor's Agreement.

Survey H12128 was conducted in accordance with the *Statement of Work* for M-N928-KR-09 with Modification 1; dated June, 2009 and *Project Instructions* received on August 20, 2009 with the exception of multibeam resolution and density requirements and tides and water levels requirements. Required multibeam resolution and density was reduced by waiver from the Chief of the Data Acquisition and Control Branch on September 1, 2009. DEA received permission from the Hydrographic Surveys Division (HSD) on January 5, 2010 to use Global Positioning System (GPS) water levels acquired directly at the survey vessel in lieu of the tide zoning scheme included with the water levels requirements.[1] A copy of the waiver and HSD correspondence is included in Appendix V *Supplemental Survey Records and Correspondence.*

The project instructions required complete multibeam coverage within the survey limits in areas with water depth greater than 8 meters. Preliminary multibeam data and associated imagery was delivered to Oregon State University (OSU), College of Oceanic and Atmospheric Sciences (COAS) to support multiple uses of the data including: habitat mapping of proposed Marine Protected Areas (MPA), inundation modeling, and other applications in support of the West Coast Governor's Agreement. Automated Wreck and Obstruction Information System (AWOIS) items and significant features were required to meet object detection coverage requirements. The inshore limit of hydrography was defined as the most seaward of either the survey polygon depicted by the M-M928-N928-KR-09.shp file provided by Office of Coast Survey (OCS) staff or the surveyed eight-meter contour.

No AWOIS item was assigned within the H12128 survey limits. The project instructions referenced three assigned items; two items for full investigation (AWOIS #s 53808 and 53809) are within H12124 survey limits and one item, for background information only, (AWOIS # 50114) straddles H12125 and H12126 survey limits.

Fifty-five (55) bottom samples were acquired for H12128.[2] For this survey, bottom samples were acquired by OSU COAS aboard a second vessel used for the Oregon Coastal Mapping Project.

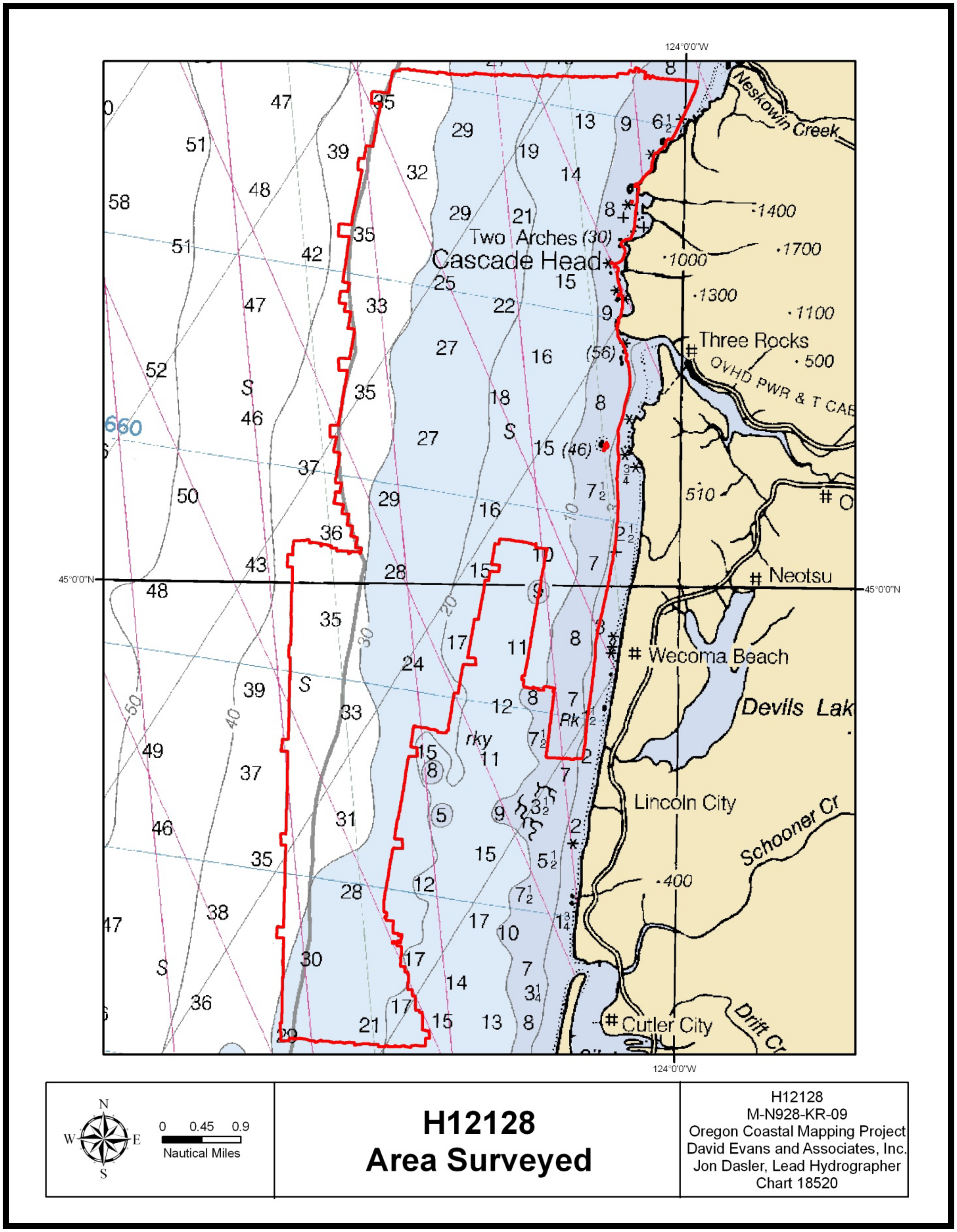

Figure 1. H12128 Area Surveyed

Data acquisition was conducted from August 14, 2009 (DN 226) to October 12, 2009 (DN 285) and from August 13, 2010 (DN 225) to September 22, 2010 (DN 265). Table 1 lists specific dates of acquisition.

Table 1. H12128 Days of Acquisition

Dates of Acquisition	
Month	**Dates**
August 2009	14-22
October 2009	12
August 2010	13-19
September 2010	22

Detailed survey statistics of H12128 are provided in Table 2.

Table 2. H12128 Survey Statistics

Survey Statistics	Total
MBES (mainscheme nm)	697.1
Crosslines (MBES nm)	46.5
Fill (MBES nm)	21.4
Developments (MBES nm)	2.4
Number of Bottom Samples	55
Number of Item Investigations that required additional survey effort	0
Total number of square nautical miles	28.6

B. DATA ACQUISITION AND PROCESSING

B1. Equipment

Equipment and vessels used for data acquisition and survey operations during this survey are listed below in Table 3 and Table 4.

Table 3. R/V *Pacific Storm* Equipment and Vessel Specifications

R/V *Pacific Storm*

Official Number (O/N)	604146
Builder	Spence Bros Boat Works
Design	Steel Displacement Hull
Year Built	1979
Length Overall	84’
Beam	24’
Cruising Speed	8.5 knots
Max Survey Speed	8.2 knots
Primary Echosounder	RESON 8101-ER
Sound Velocity Equipment	• Brooke Ocean MVP-30 with AML Micro SV&P and Dissolved Oxygen Sensor • Sea-Bird SEACAT SBE 19 CTD Profiler
Positioning & Attitude	• Navcom StarFire GPS • Applanix POS/MV 320 v4

Table 4. R/V *JAB* Equipment and Vessel Specifications

R/V *JAB*	
	
Hull Registration Number	IAR38CATK910
Official Number (O/N)	1229272
Builder	Armstrong Marine
Design	Catamaran
Year Built	2010
Length Overall	42’
Beam	15’
Cruising Speed	30 knots
Max Survey Speed	8 knots
Primary Echosounder	RESON 7101-ER
Sound Velocity Equipment	• Brooke Ocean MVP-30 with AML Micro SV&P • Sea-Bird SEACAT SBE 19 CTD Profiler • RESON SVP-71
Positioning & Attitude	• Navcom StarFire GPS • Applanix POS/MV 320 v4

There were no vessel or equipment configurations used during data acquisition that deviated from those described in the *M-N928-KR-09 Data Acquisition and Processing Report* (DAPR).

B2. Quality Control

Quality control is discussed in detail in Section B of the DAPR. The results from the positioning system comparison and lead line to multibeam comparison are included in Separate I *Acquisition and Processing Logs*. The sound velocity profile sensor weekly evaluation table can be found in Separate II *Sound Speed Data* of this report. Data were reviewed at multiple levels of data processing, including: CARIS Hydrographic Information Processing System (HIPS) conversion, subset editing, and analysis of anomalies revealed in combined uncertainty and bathymetry estimator (CUBE) surfaces. Submerged significant features identified during survey were noted in the acquisition logs which were used to aid in the interpretation of data and act as a check during feature compilation.

B2.a Crosslines

A total of 46.5 nautical miles of crosslines, or 6.5% of the 720.9 nautical miles of survey lines, were run for analysis of survey accuracy. Crosslines were run in a direction perpendicular to mainscheme lines across the entire surveyed area providing a good representation for analysis of consistency. All crosslines were used for crossline comparisons.

Crossline analysis was performed using the CARIS HIPS QC Report tool, which compares crossline data to a gridded surface and reports results by beam number. Crosslines from both vessels were compared to a 1 meter CUBE surface that encompassed the entire survey area. In addition, crosslines from each vessel were compared to a 1 meter CUBE surface encompassing the mainscheme data collected by that vessel. The QC Report tabular output and plot are included in Separate IV *Crossline Comparisons* for all of the comparisons. The result of the analysis meets the requirements as stated in the National Ocean Service (NOS) *Hydrographic Surveys Specifications and Deliverables* (April 2009). There are some outliers reported in the crossline QC Report's minimum and maximum fields which result from comparing raw crossline soundings to the gridded CUBE surface along steep slopes (high standard deviation). The multibeam data has been thoroughly reviewed to ensure that there are no fliers present in either the crosslines or underlying CUBE surface.

Additional crossline analysis was performed by computing a 1 meter CUBE surface from the crossline data. This surface was then differenced from the 1 meter CUBE surface that encompassed the survey area, and statistics compiled on the resulting nodes. This yielded over 6.8 million node comparisons and an average difference between the crossline surface and the mainscheme surface of 0.02 meters across all depths, with a 0 .26 meters uncertainty at 95% confidence.[3]

B2.b Uncertainty

During HIPS processing, the "greater of the two" option was selected, where the calculated uncertainty from total propagated uncertainty (TPU) is compared to the standard deviation of the soundings influencing the node and where the greater value is assigned as the final uncertainty of the node. As a result, the uncertainty of the finalized surface and associated Bathymetric Attributed Grids (BAGs) increased for nodes where the standard deviation of the node was greater than the calculated uncertainty. The calculated uncertainty values of all nodes within the finalized CUBE surfaces range from 0.38 to 1.48 meters. The high uncertainty error is an artifact of the application of GPS water levels as is discussed in detail below, and of steep relief in rocky seabed which generates high standard deviation values per grid node. All uncertainty statistics were derived from finalized surfaces that were created with depth threshold bounds appropriate for the resolution of the survey.

Given the large range of depths encountered in the survey area, the allowable International Hydrographic Organization (IHO) uncertainty varied considerably. To determine if surface grid nodes met specification, a ratio of the node uncertainty to the allowable uncertainty at that depth was determined. As a percentage, this value represents the amount of the error budget utilized by the uncertainty value at each node. Values over 100% exceed specification.
As shown in Table 5 below, both uncertainty and the allowable error utilized have low average values and a tight standard deviation (StdDev). The maximum values, however, are significant outliers that fail to meet specification. For the 8-meter CUBE surface, all 136,407 nodes meet specification. For the 4-meter CUBE surface, 317 nodes out of 4,396,596 fail to meet specification. For the 2-meter CUBE surface, 21,069 nodes out of 6,884,494 fail to meet specification. For the 1-meter CUBE surface, 51,480 nodes out of 9,323,608 fail to meet specification.

Table 5. CUBE Uncertainty

CUBE Uncertainty Statistics						
	Uncertainty (m)			Allowable error utilized		
	Average	StdDev	Maximum	Average	StdDev	Maximum
1m CUBE	0.39	0.02	1.48	72%	4%	286%
2m CUBE	0.39	0.03	1.24	64%	7%	217%
4m CUBE	0.40	0.02	1.16	47%	5%	165%
8m CUBE	0.41	0.02	0.77	41%	2%	74%

The nodes failing to meet specification were carefully reviewed in CARIS HIPS and found to fall within three categories: failure due to high standard deviation resulting from steep or rocky terrain, failure due to high standard deviation at the junction between the 2009 and 2010 datasets, and failure due to high uncertainty from the inclusion of high GPS vertical RMS error.

The majority of nodes that were reported out of specification were coincident with areas of steep or rocky terrain. Reviewing the underlying data in these regions in subset shows good agreement between survey lines and few anomalies. The high standard deviation, which results in the node being reported as out of specification, is considered an artifact of gridding data over a steep and variable seafloor.

The 2009 and 2010 datasets exhibit some differences of over 1 meter at their junction due to physical changes in the seafloor that occurred in the time frame between the two datasets. The datasets show good agreement over rocky areas, which is evidence of no systematic errors between the 2009 and 2010 collection efforts, but do not agree in the sandy areas surrounding the rocks, as shown in Figures 2 and 3 below. These differences are attributable to sediment transport between the 2009 and 2010 collection efforts, and are representative of a true physical difference in the seafloor.[4] As a result, nodes which fail due to high standard deviation at the junction between the datasets are considered within specification.

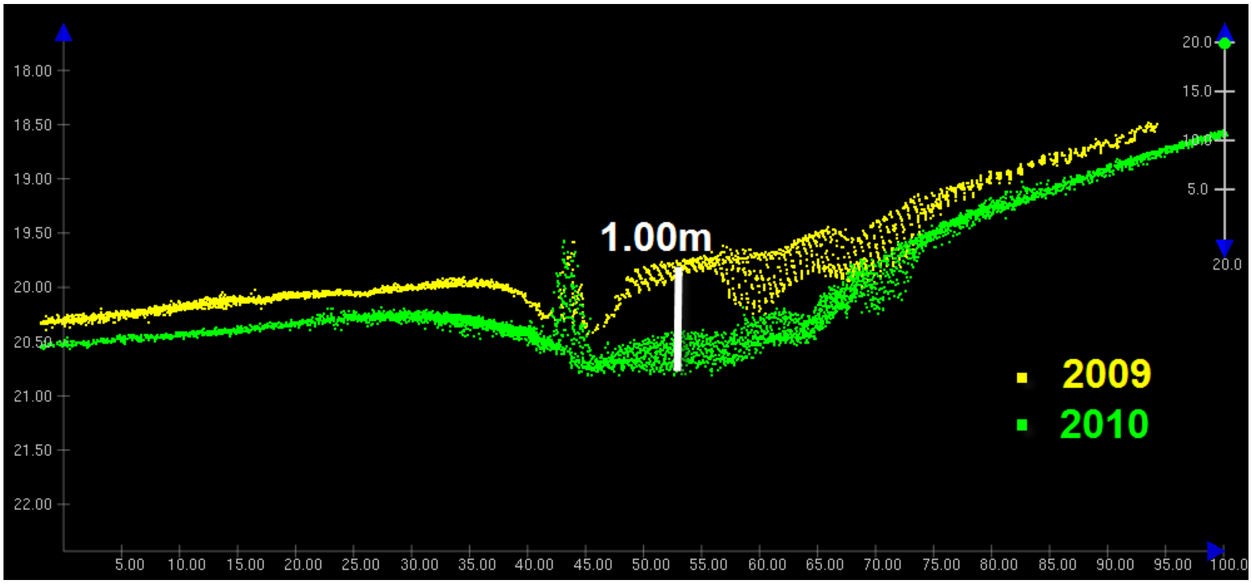

Figure 2. Difference Between 2009 and 2010 Seafloor

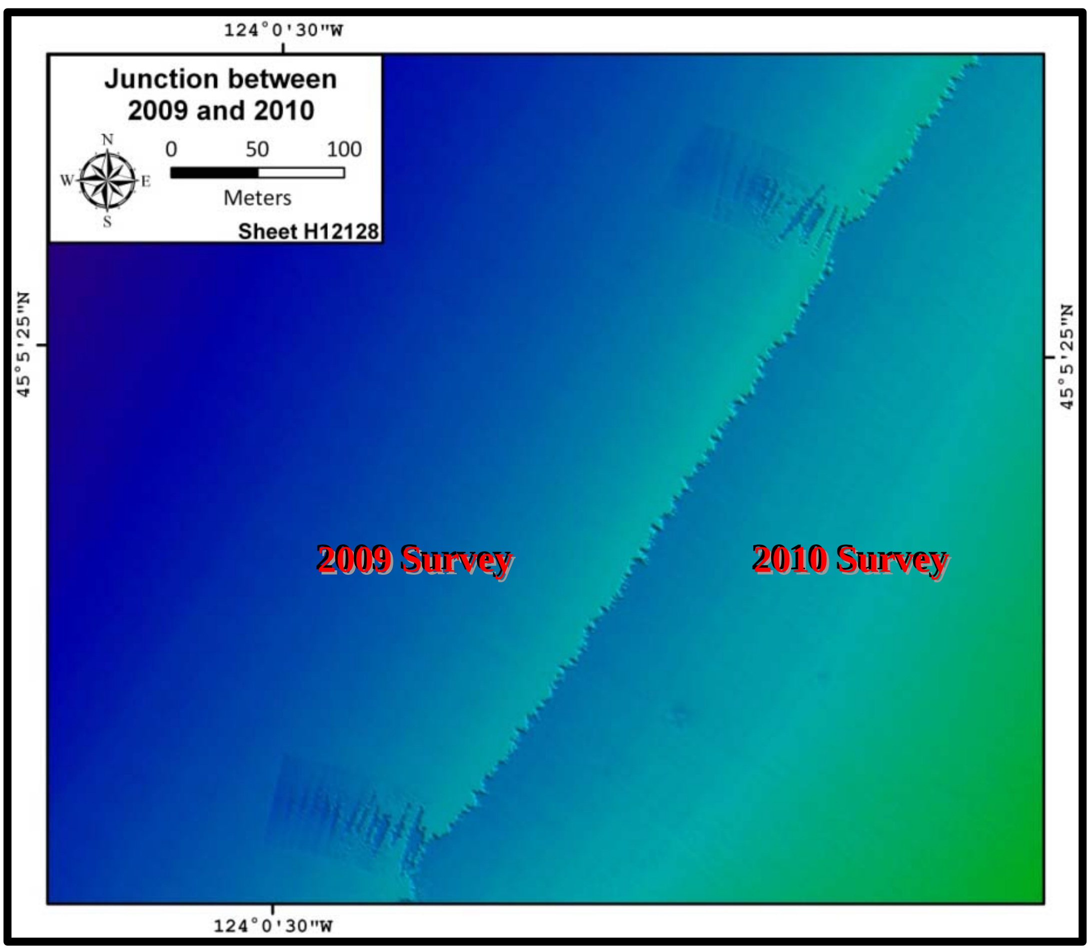

Figure 3. Plan View of the 2009 and 2010 Survey Junction

High GPS vertical root mean square (RMS) error, as determined by POSPac post-processing software, resulted in some nodes being reported as out of specification. In each instance of high RMS, the GPS height signal was reviewed for abnormal fluctuations and the corresponding CUBE standard deviation was consulted to determine if the soundings were abnormal. If the height signal was found to be abnormal, the fluctuations in the corresponding GPS tide values were removed by a hydrographer through interpolation as discussed in section B2.d below. The resulting corrected data did not exhibit any unusual degradation and agreed well with neighboring lines and crosslines. Though the high error GPS height signal was removed from the processed depths for those nodes, the corresponding RMS error could not be removed from the uncertainty layer produced by the CARIS CUBE. The high uncertainty of these specific nodes, which contain erroneous RMS values approaching 0.59 meters (95% confidence level), are considered a processing artifact and not representative of the actual uncertainty. As a result, all nodes are considered within specification.[5]

B2.c Junctions

H12128 survey limits junctions with H12127 (Sheet F) to the north. Survey junction analysis was performed between H12128 and H12127 to the north by visually reviewing survey data in CARIS HIPS subset mode and by performing surface to surface comparisons in CARIS Bathy DataBASE. The surface-to-surface difference yielded over 1.6 million node comparison points, with an average difference of 0.00 meters and an uncertainty of 0.22 meters at 95% confidence level.[6]

B2.d Unusual Conditions or Data Degradation

As discussed in Section B.2b, several survey lines were affected by very high GPS vertical RMS error as determined by POSPac post-processing. These areas are evident as sections of unusually high uncertainty in the CUBE uncertainty layer. In each instance, the GPS height signal was reviewed for abnormal fluctuations or anomalies. If there were no abnormal fluctuations present in the tide signal and the sounding data showed good agreement with neighboring survey lines, the data was deemed reliable and the high RMS ignored. If, however, anomalies were present, the GPS signal was removed by the hydrographer and a linear interpolation was performed between the stable GPS tide values on either side of the high RMS data. The underlying sounding data was then inspected by a hydrographer to ensure good agreement with neighboring survey lines.[7]

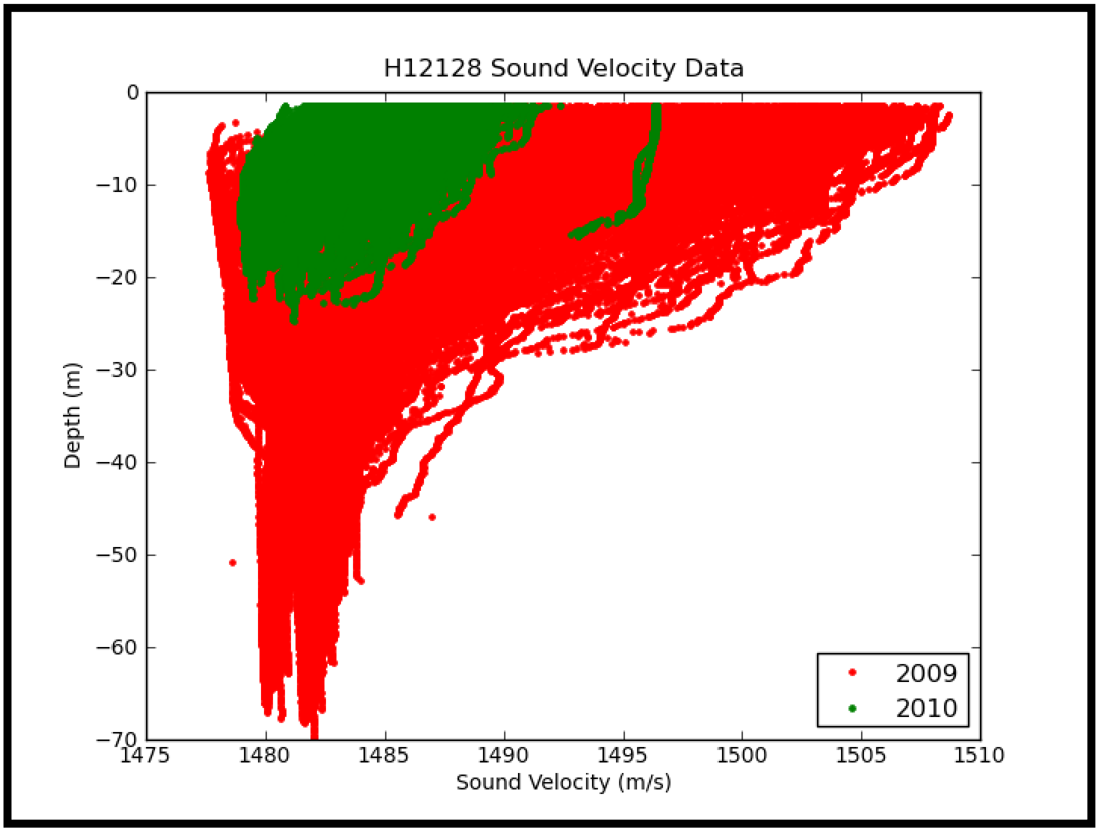

Figure 4. H12128 Sound Velocity Profiles

Survey data were adversely affected by very steep sound velocity gradients and high variability in the sound velocity profile. Although an MVP30 moving vessel profiler was used to measure sound velocity profiles every 10 to 15 minutes, the variability in between casts resulted in errors of 20 to 30 centimeters in outer beam soundings, with some instances in deeper water reaching 50 centimeters. Figure 4 depicts all 1,028 sound velocity profiles collected during survey operations. While sound speed at depth is relatively constant over the course of the survey, the sound speed near the surface varies by over 25 meters per second. In addition, the depth of the sound speed gradient maximum varies by over 25 meters. Significant spatial variability in sound speed was also observed, with changes in sound speed of over 10 meters per second occurring over spatial scales of as little as several hundred meters. Some of this spatial variability is depicted in Figure 5, which shows the interpolated sound velocity at 5-meter water depth for specific days from the 2009 collection effort.

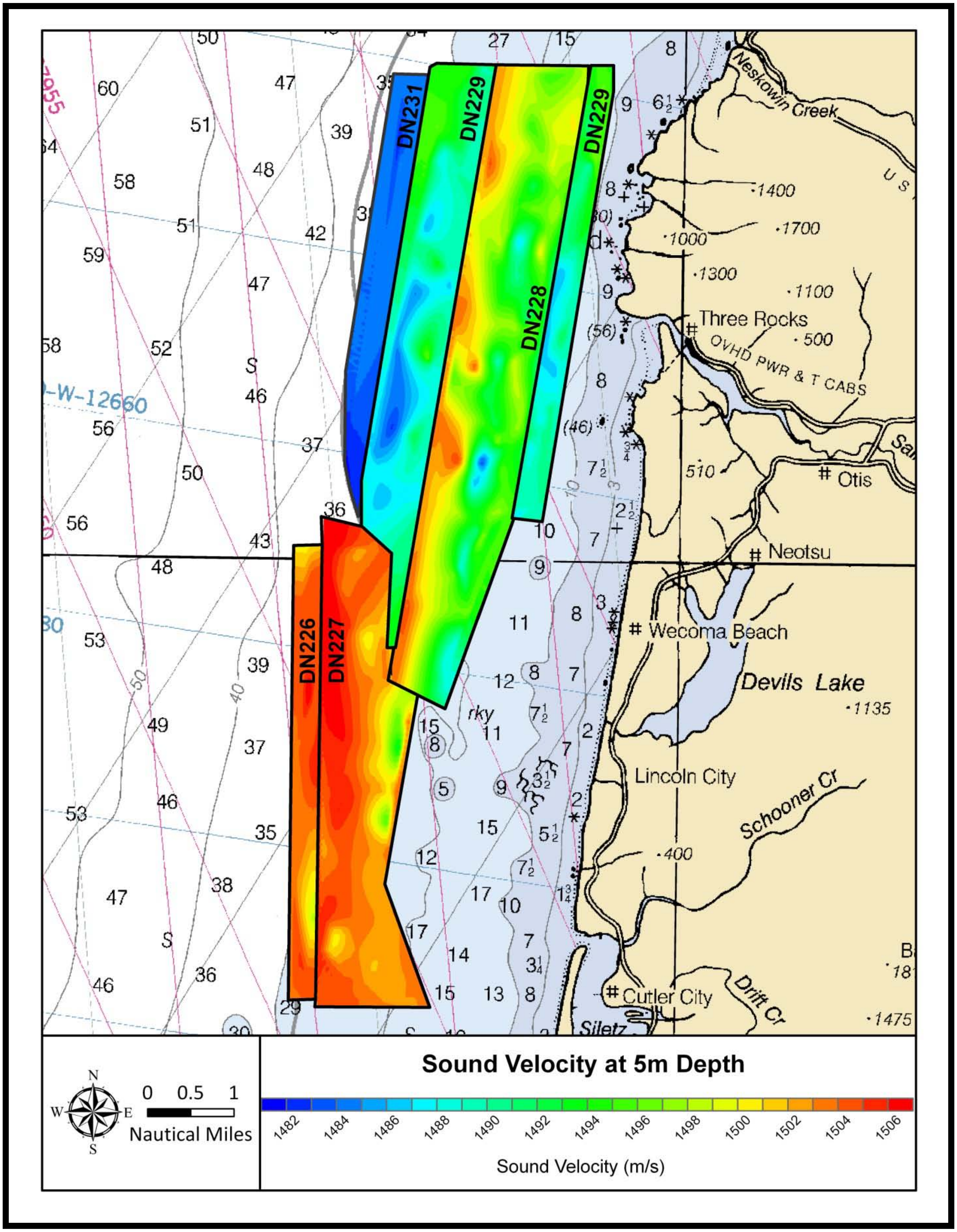

Figure 5. Sound Velocity at 5-Meter Depth by Survey Day

As a result of this high degree of variability in sound velocity, refraction artifacts are still present within the dataset despite frequent sound velocity casts from the MVP, in accordance with procedures described in the DAPR.[8] As depicted in the DAPR, a weekly comparison of sound velocity casts was made between the MVP30 and a Seabird SBE-19 CTD to verify the performance of the sound velocity and depth sensor in the MVP30 towfish. Results from these comparisons are included in Separate II *Sound Speed Data* along with a copy of the annual calibration reports for all sound speed sensors.

The dataset includes beam pattern artifacts on the port side of the Reson 8101 data collected by the R/V *Pacific Storm.* The origin of the error is unknown, though it resembles a refraction artifact in structure. The magnitude of the error is depth and beam dependent, with the error increasing with increasing depth and port beam angle, reaching approximately 45 centimeters of error in deep water at the outermost port-side beams. The direction of the error is consistent, with depths at the outer beams on the port side reporting deeper, and the port-side swath resembling a slight frown in shape. The port-side error is frequently masked by sound velocity induced refraction errors as discussed above; however, its effect in aggregate is evident in the crossline analysis. In the crossline analysis the error is shown to be within specification, and the overall effect of the error on the final gridded surface is mitigated by a high amount of swath-to-swath overlap.[9]

B2.e Object Detection and Coverage Requirements

As discussed in the *M-N928-KR-09* DAPR, a waiver from NOAA's Data Acquisition and Control Branch was granted to reduce the CUBE surface density, resolution, and depth threshold requirements for the survey.[10] A copy of this waiver and related email correspondence is included in Appendix V *Supplemental Survey Records and Correspondence.*

The sounding density requirement of 95% on all nodes populated with at least three soundings was verified by exporting the density child layer of each CUBE surface (finalized using depth thresholds) to an ASCII text file and compiling statistics on the density values. More than 98.8% of all final CUBE surface nodes contained three or more soundings.

Complete coverage requirements were verified by a comprehensive review of the CUBE surface to ensure no holidays spanning more than three nodes were present in the surface. Object detection coverage requirements were verified by review of temporary CUBE surfaces of the appropriate object detection resolution created over significant features.

Multibeam data were acquired in conjunction with individual sonar beam backscatter time series (SNIPPETS) data. A fill plan was created for all holidays that did not meet the density or coverage requirement.[11]

B3. Corrections to Echo Soundings

Data reduction procedures for survey H12128 are detailed in the *M-N928-KR-09 DAPR*, submitted under a separate cover.

B3.a Deviations from DAPR

A RESON SVP71 sound velocimeter, S/N 2008029, was used to measure sound velocity at the Reson 7101 multibeam head onboard the R/V *JAB* during the 2010 field season. These measurements were input into the Reson 7-P processor to provide accurate velocities during acquisition. Due to logistical and time constraints it was not possible to recalibrate the SVP71 within six months of the start of survey. A waiver was granted from the Chief of the Data Acquisition and Control Branch on June 18, 2010 to allow for the use of this sensor with the requirement to make periodic comparisons to other calibrated sound speed sensors onboard the R/V *JAB*.[12] Daily comparisons were conducted between the SVP71 and the primary SV sensor, the AML Micro-SV. Results from these comparisons are included in Separate II *Sound Speed Data* along with a copy of the most recent calibration report (July 2009) for the SVP71. A copy of the waiver from the Chief of the Data Acquisition and Control Branch is included in Appendix V *Supplemental Survey Records and Correspondence.*

B3.b Additional Calibration Tests

The initial system calibration tests for the R/V *Pacific Storm* were performed on July 26, 2009 day number (DN207). Additional tests were performed periodically to verify the adequacy of the known system biases and document changes in alignment of the Reson 8101. The initial system calibration tests for the R/V *JAB* were performed on July 01, 2010 (DN182). Additional tests were performed periodically to verify the adequacy of the known system biases and document changes in alignment of the Reson 7101. Additional discussion on calibration tests can be found in the *M-N928-KR-09 DAPR*.

B4. Data Processing (Data Representation)

B4.a Multibeam

A BAG was created for each finalized CUBE surface and both the CUBE and BAG surfaces have been included with the digital data. Table 6 lists the CUBE surfaces and BAGs submitted with this survey. Both CUBE and BAG surfaces utilize depth thresholds corresponding to their resolution as described in the *M-N928-KR-09* DAPR.

Table 6. H12128 Surfaces

Surface Name	Resolution
H12128_1m	1.0m
H12128_2m	2.0m
H12128_4m	4.0m
H12128_8m	8.0m

C. HORIZONTAL AND VERTICAL CONTROL

A complete description of horizontal and vertical control for survey H12128 can be found in the *M-N928-KR-09 Horizontal and Vertical Control Report*, submitted under separate cover. A summary of horizontal and vertical control for this survey follows.

Real-time navigation logged during acquisition was overwritten with a post-processed navigation solution created from Applanix POSPac MMS using the SmartBase option. GPS reference stations from the National Geodetic Survey (NGS) National and Cooperative Continuously Operating Reference Stations (CORS) or the UNAVCO (University NAVSTAR Consortium) Plate Boundary Observatory (PBO) were used during each post-processing session. Table 7 lists the reference stations used in the network subdivided by data provider. North American Datum of 1983 (NAD83) coordinates of the base stations are included in the *M-N928-KR-09 Horizontal and Vertical Control Report*.

Table 7. GPS Base Stations Used During SmartBase Processing

NGS	UNAVCO	UNAVCO
CABL	P365	P405
CHZZ	P374	P407
CORV	P375	P408
FTS5	P395	P411
FTS6	P396	
LFLO	P397	
P367	P398	
P415	P402	
PABH	P404	

Post-processed uncertainty estimates for position, attitude, and heading were applied using the HIPS Load Error Tool and used during the calculation of TPU.

C1. Vertical Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). To improve vertical accuracy of this survey, soundings were reduced to MLLW using post-processed GPS water levels.[13] The VDatum derived separation model, *COrgGRS.bin*, was used to reduce soundings from NAD83 ellipsoid heights to MLLW as described in the *M-N928-KR-09* DAPR. The separation model has been included with the digital deliverables.

Traditional zoning from water level stations was not used for this project, though zoning provided by Center for Operational Oceanographic Products and Services (CO-OPS) and verified water level files for the survey have been included with the digital deliverables.

C2. Discussion of GPS Tides

The decision to use GPS Tides in lieu of discrete zoning was made for the entire project rather than on a sheet by sheet basis. As shown in the example for H12124 (Figure 6), the use of GPS Tides considerably improved swath to swath agreement of adjacent survey lines. In many cases, the use of GPS tides removed 50- to 60-centimeter offsets between adjacent survey lines reduced with discrete zoning.

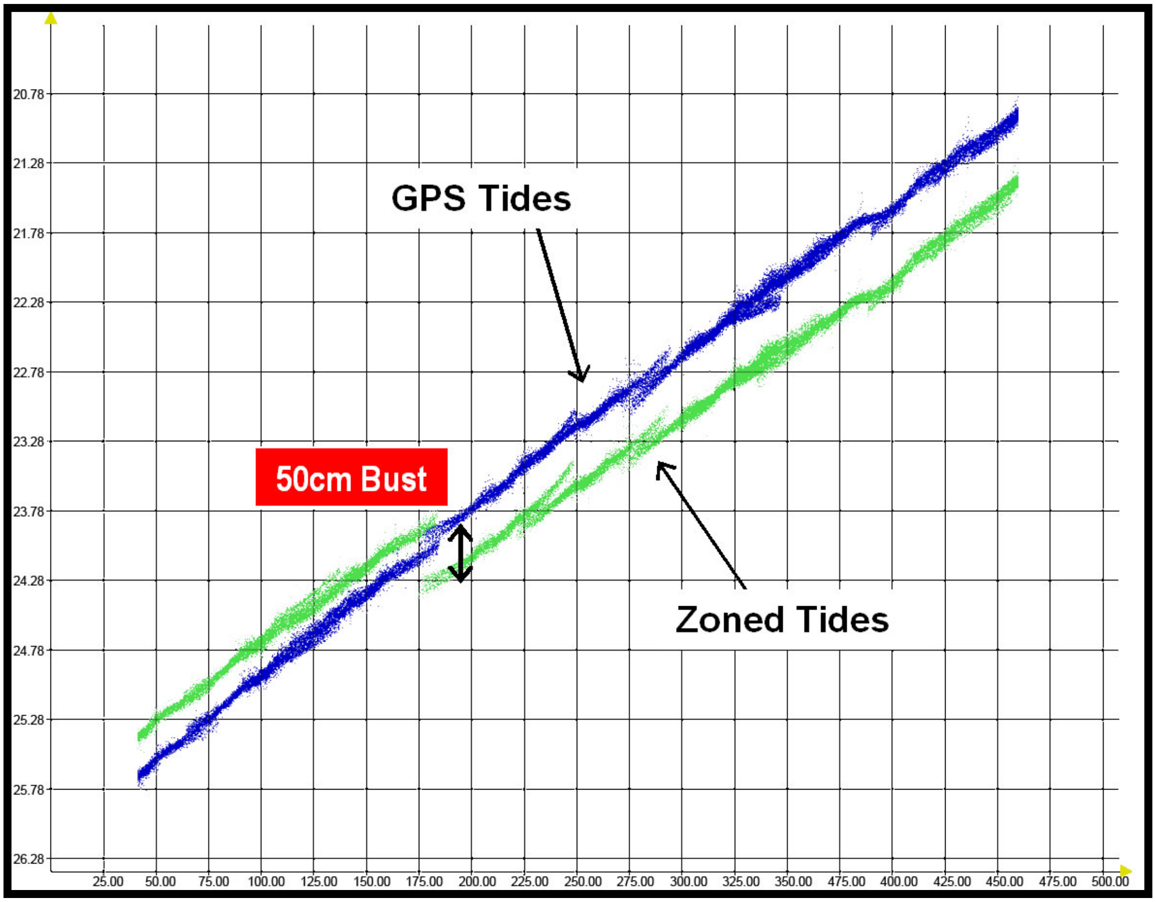

Figure 6. Depth Discrepancies in Tidal Zoning Relative to Tides Derived from GPS

C3. Horizontal Control

The horizontal datum for this project is NAD83. Differential GPS (DGPS) and Starfire Global Navigation Satellite System (GNSS) positioning were used simultaneously throughout acquisition with DGPS positions only used for a real-time confidence check. DGPS corrections were received from the U.S. Coast Guard (USCG) beacon at Ft. Stevens, OR (287 kHz) or from the secondary beacon at Appleton, WA (300 kHz). All of the primary real-time navigation data were collected using the Starfire Real Time GIPSY (RTG) corrections and are referenced to the International Terrestrial Reference Frame (ITRF) 2005. Real-time navigation data were overwritten by post-processed Smoothed Best Estimate Trajectory (SBET) data referenced to NAD83.

D. RESULTS AND RECOMMENDATIONS

D1. Chart Comparison

D1.a Survey Agreement with Chart

During the course of data acquisition and processing H12128 was compared to the largest scale raster and electronic navigation charts (ENC). Table 8 lists the charts and edition dates used for the chart comparison. The results of these comparisons are described below, as well as in Sections D1.b through D1.f of this report.

The latest electronic and raster versions of the relevant charts were reviewed to ensure that all U.S. Coast Guard Local Notice to Mariners (LNM) issued during survey acquisition, impacting the survey area, were applied and addressed by this survey. A surface was generated from the ENC using both the ENC sounding and contours layers. A difference surface was produced using the ENC and a four-meter product surface to conduct the chart comparison.

Table 8. Charts Compared to H12128

Chart	Scale	Edition	Edition Date	Issue Date	Latest LNM	Cleared Through Date
18520	1:185,238	27	5/1/2009	---	11/2/2010	11/13/2010
US3OR01M	---	17	11/15/2010	11/15/2010	11/9/2010	11/20/2010

In general, survey H12128 depths are 1 to 2 fathoms deeper than those from the chart as shown in Figure 7, on the following page. The difference surface also shows areas of significant difference, from as much as 4 fathoms deeper to 1 fathom shoaler. These more significant differences are mostly a byproduct of comparing a dense dataset to a surface produced from a triangulated irregular network (TIN) of a small scale ENC composed of sparse soundings and contours. Most of the significant variations occur in the vicinity of charted rocks where the surveyed seafloor is being compared to the interpolated surface. Given the scale of the underlying chart, most of these discrepancies are not considered navigationally significant.[14]

The most significant discrepancies between the chart and H12128 are discussed below.

1. Over the entire survey area there is a general deepening and shoreward movement of the 10, 20 and 30 fathom contours several hundred meters.[15]

D1.b Comparison to Significant Shoals

The H12128 survey area contains no significant shoals.[16]

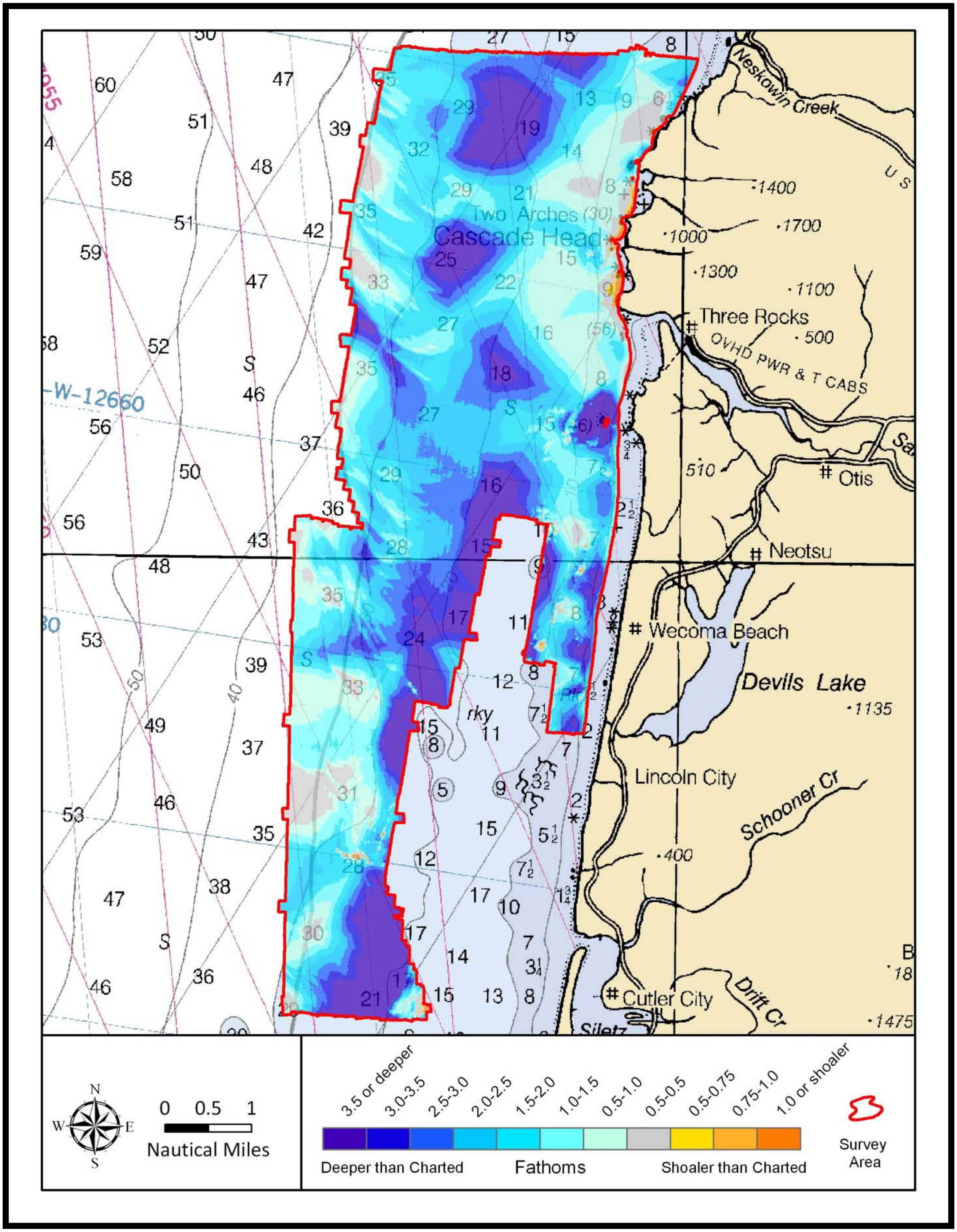

Figure 7. Depth Difference Between H12128 and US3OR01M; Chart 18520 Displayed

D1.c Comparison to Charted Features

No AWOIS items were located within the limits of survey H12128.[17] Five charted features and several land areas are located within the limits of H12128 and are discussed below.

The charted rock which covers and uncovers to the north end of the survey area does not correlate to an awash or exposed rock within the dataset and is considered disproved within the surveyed area. An exposed rock is visible in National Agriculture Imagery Program (NAIP) overhead imagery approximately 130 meters, or 0.7 millimeters at chart scale, east of the charted rock. Several submerged rocks are present in the data in the vicinity of this disproved rock. The most significant of these submerged rocks is included in the feature file and lies 42 meters to the north-east of the disproved position.[18]

In addition, the charted position of the islet to the north-east of this rock is approximately 85 meters, or 0.5 millimeters at chart scale, west of the position estimated from the bathymetry data and from NAIP imagery.

The feature file includes an underwater rock marking the most shoal depth obtained on this islet. The hydrographer recommends charting both the rock which covers and uncovers and the islet using positions estimated from NAIP overhead imagery (Figure 8).[19]

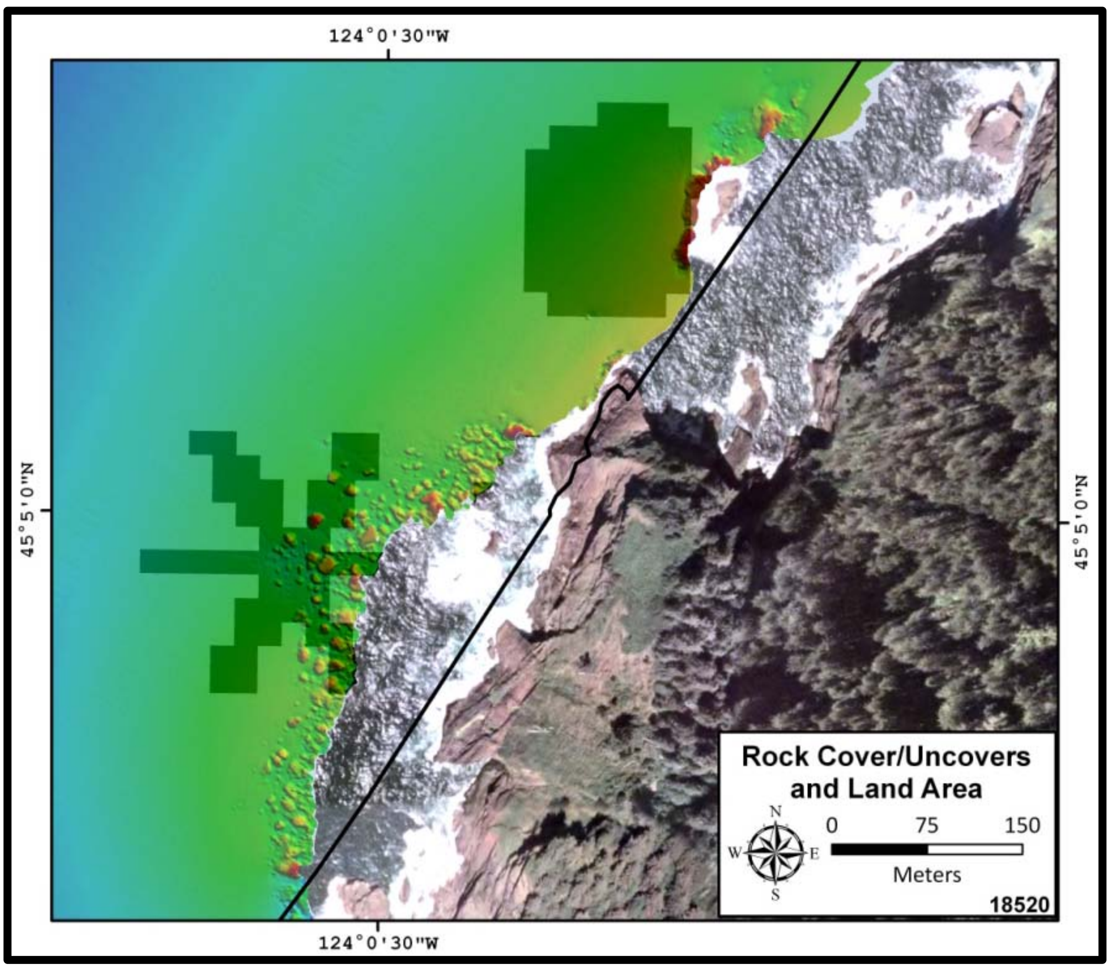

Figure 8. Comparison of Data to Charted Rock and Islet

The charted and surveyed positions of the rock which covers and uncovers near the 8-fathom sounding, north of Two Arches rock, agree well. The center of the surveyed area lies approximately 110 meters, or 0.6 millimeters at chart scale, to the east-north-east of the charted position. Due to the shift in position of the rock, the ENC feature was disproved. The feature file includes an underwater rock feature which identifies the most shoal depth obtained around the base of this rock. The hydrographer recommends charting this rock as covers and uncovers and using the one meter BAG to estimate the geographic position of the rock.[20] The charted and surveyed positions of the islet north of this rock agree well. The center of the surveyed area lies approximately 140 meters, or 0.8 millimeters at chart scale, to the north-east of the charted position. The feature file includes an underwater rock feature which identifies the most shoal depth obtained around the base of this islet. The hydrographer recommends charting this islet using a position estimated from the one meter BAG and NAIP overhead imagery (Figure 9).[21]

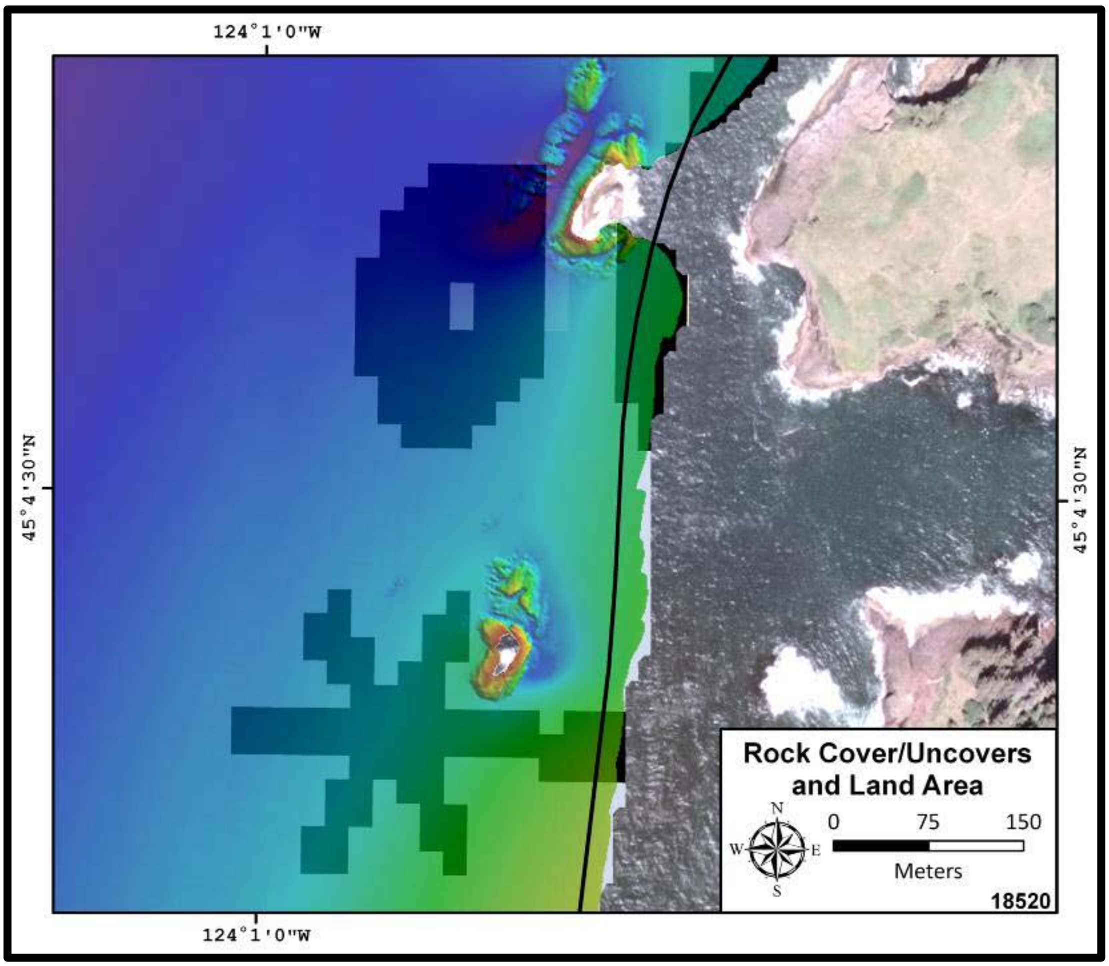

Figure 9. Comparison of Data to Charted Rock and Islet

The charted position of the submerged rock of unknown depth near the 8-fathom sounding, north of Two Arches rocks, does not correlate to a feature within the dataset and is considered disproved (Figure 10).[22]

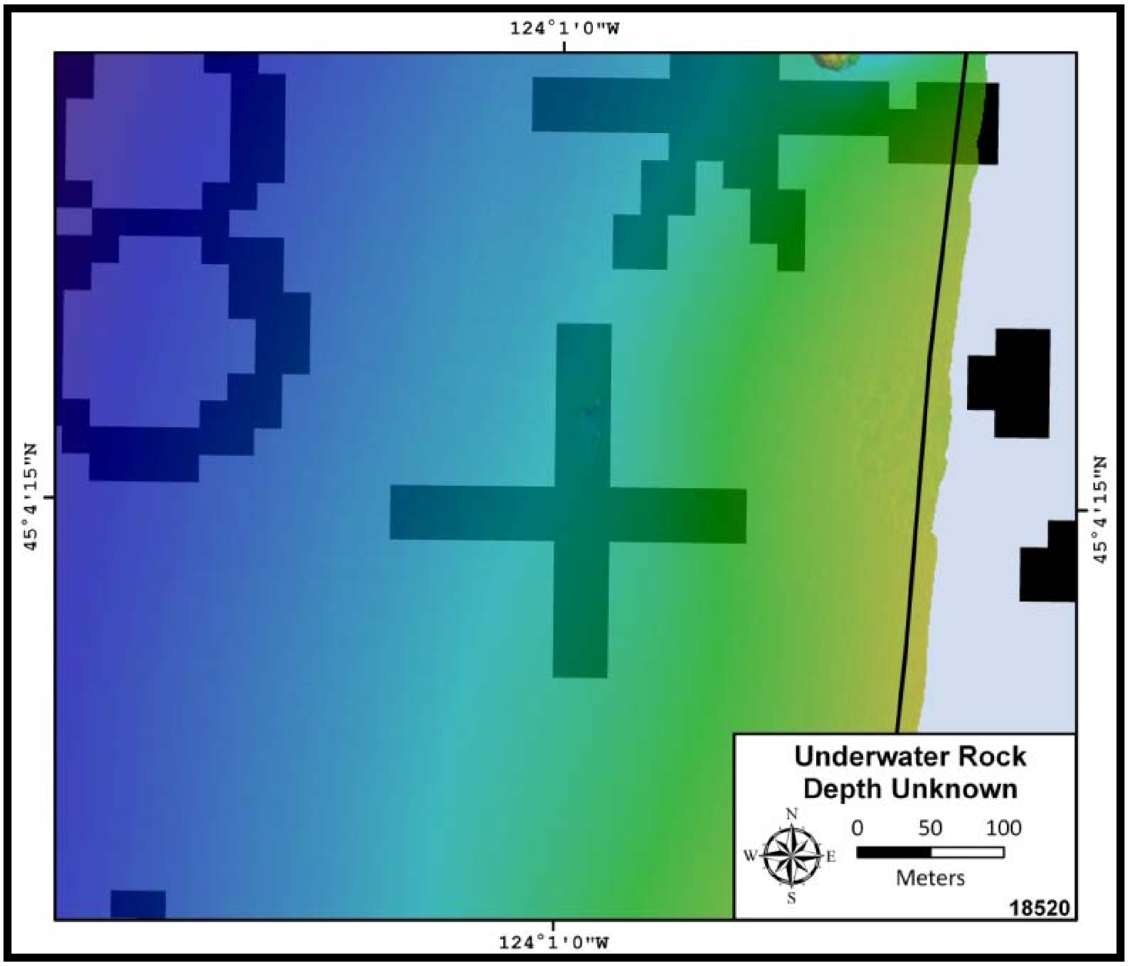

Figure 10. Comparison of Data to Charted Rock

The position of northernmost of Two Arches Rocks as determined from NAIP imagery lies approximately 120 meters, or 0.6 millimeters at chart scale, east of the charted position. The position of southernmost of Two Arches Rocks as determined from NAIP imagery lies approximately 80 meters, or 0.4 millimeters at chart scale, north-east of the charted position. The feature file includes an underwater rock marking the most shoal depth obtained on each islet. The hydrographer recommends charting these islets using positions estimated from the NAIP imagery (Figure 11).[23]

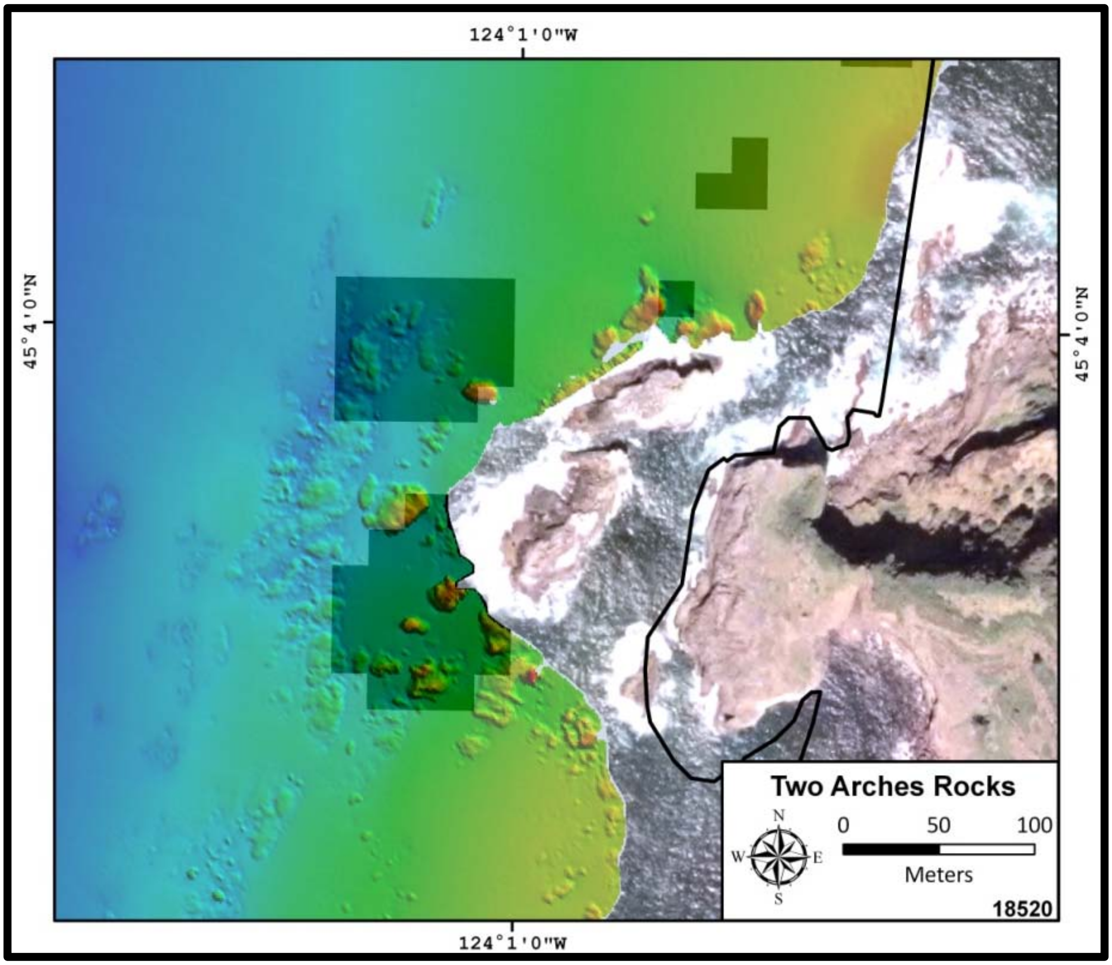

Figure 11. Comparison of Data to Charted Islets

The charted and surveyed positions of the rock which covers and uncovers directly off Cascade Head agree well (Figure 12). The center of the surveyed area lies approximately 70 meters, or 0.4 millimeters at chart scale, to the east of the charted position. Due to the shift in position of the rock, the ENC feature was disproved. The feature file includes an underwater rock feature which identifies the most shoal depth obtained around the base of this rock. The hydrographer recommends charting this rock as covers and uncovers and using the one meter BAG to estimate the geographic position of the rock. The feature file also includes an underwater rock feature identifying the most shoal depth obtained on the islet to the east-south-east of the charted rock. The position of this islet as estimated from the multibeam bathymetry and NAIP imagery lies approximately 50 meters, or 0.3 millimeters at chart scale, north-east of its charted position. The charted position of the islet to the south-south-east of the charted rock coincides with a submerged underwater rock feature in the dataset. The actual position of this islet as estimated from NAIP imagery lies approximately 160 meters, or 0.9 millimeters at chart scale, east of its charted position. The base of this islet was captured in the multibeam bathymetry and the feature file includes an underwater rock feature marking the most shoal depth obtained.[24]

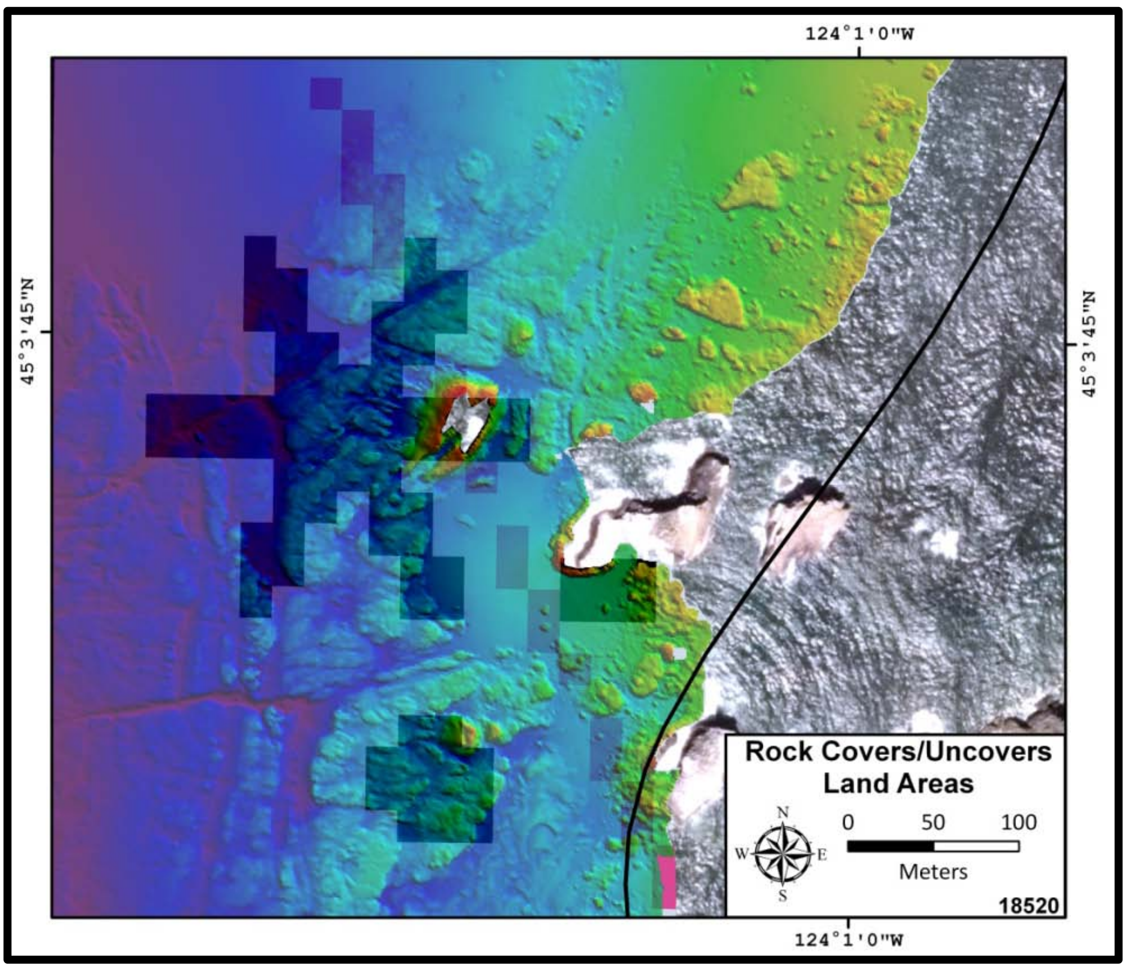

Figure 12. Comparison of Data to Charted Islets

The charted position of the rock which covers and uncovers near the nine fathom sounding south of Cascade Head does not correlate to a feature within the dataset and is considered disproved within the surveyed area.[25] Two submerged rocks were found in the vicinity of this charted rock: one approximately 50 meters to the north-west of the disproved position, the other, of unknown least depth, approximately 100 meters to the south-east. Both rocks are included in the feature file. In addition, an awash rock was noted in the log and is visible in NAIP imagery approximately 120 meters, or 0.6 millimeters at chart scale, east-north-east of the disproved position. The hydrographer recommends charting this rock using the position estimated from NAIP imagery. The charted position of the islet to the south of this rock is approximately 160 meters, or 0.9 millimeters at chart scale, west of the position estimated from NAIP imagery. The hydrographer recommends charting this islet using the position estimated from NAIP imagery (Figure 13).[26]

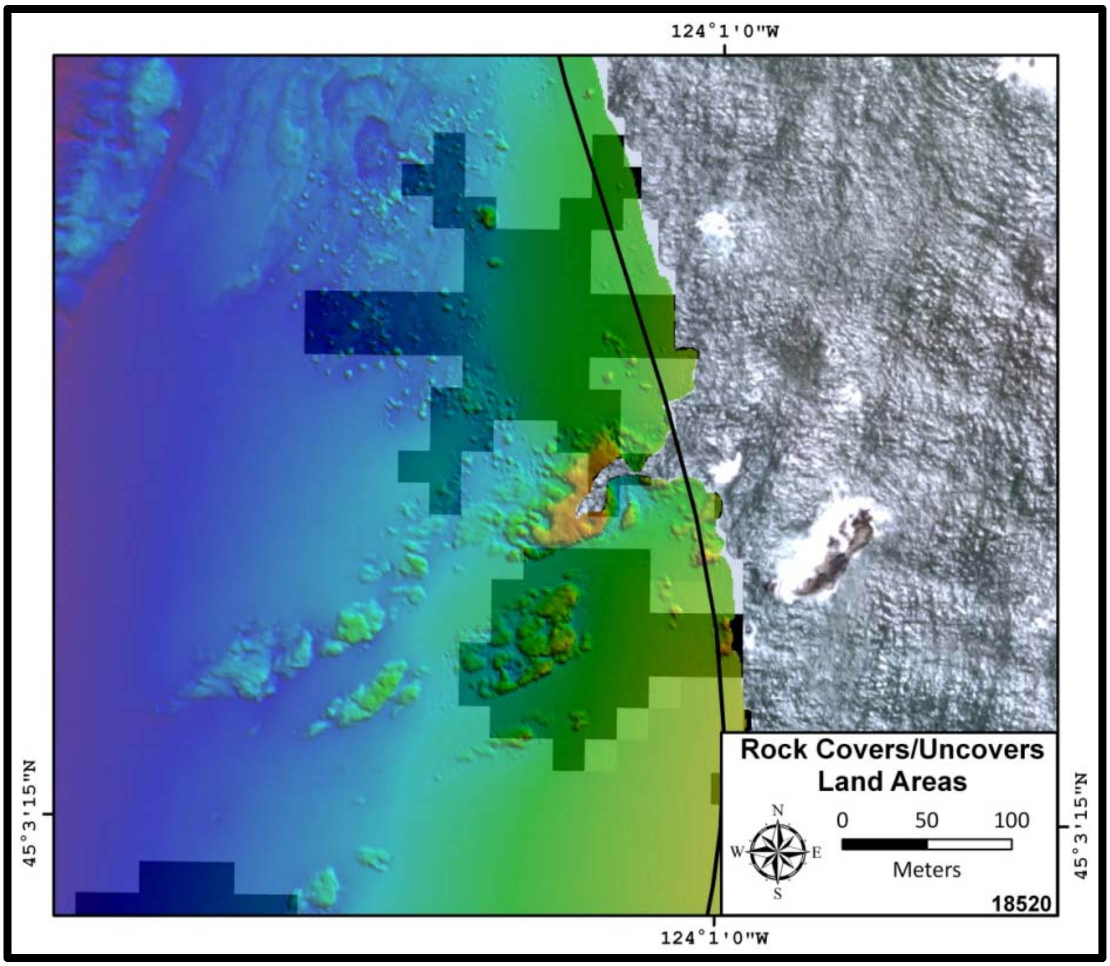

Figure 13. Comparison of Data to Charted Rock and Islet

The charted and surveyed positions of the islets south of Cascade Head, with a charted elevation of 56 feet, agree well. The center of the surveyed area lies approximately 150 meters, or 0.75 millimeters at chart scale, to the east-north-east of the charted islets. The feature file includes an underwater rock feature idenitfying the most shoal depth obtained on each islet (Figure 14).[27]

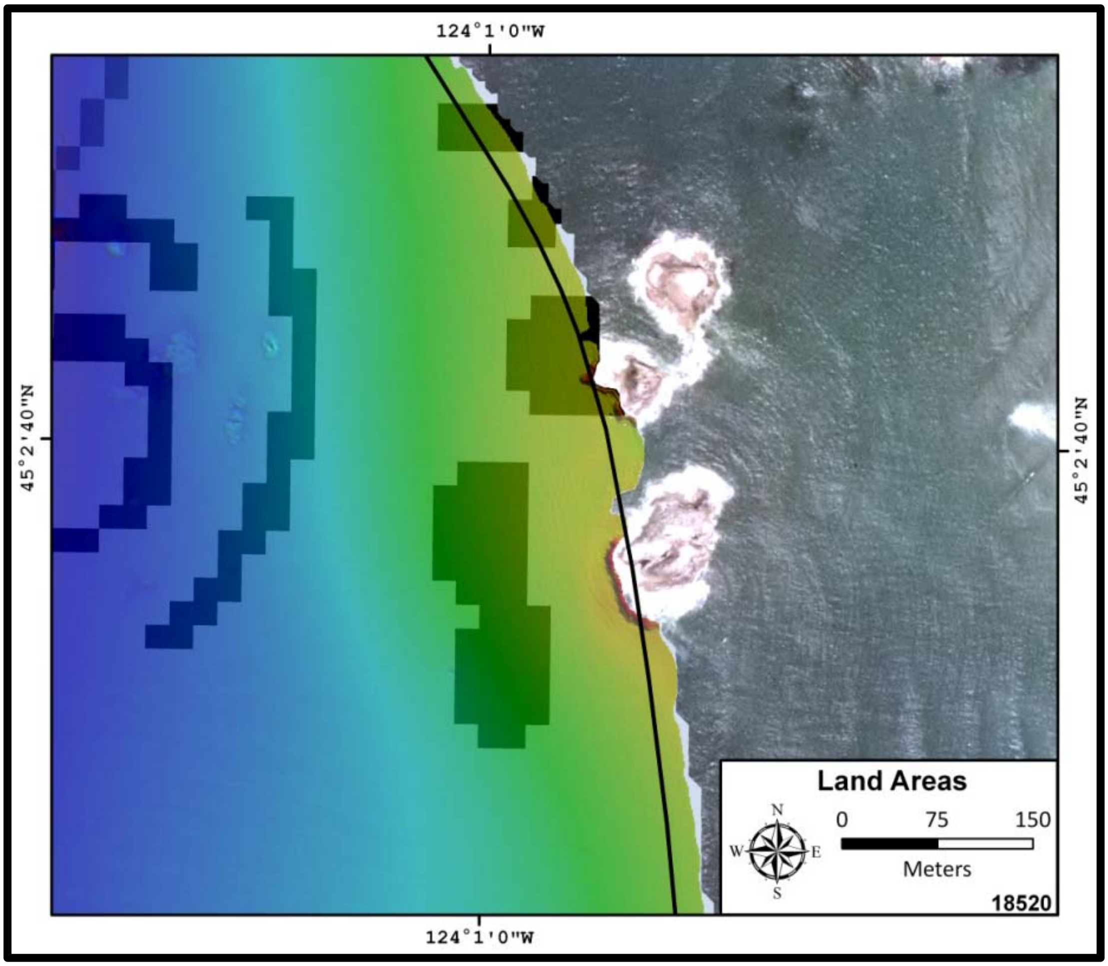

Figure 14. Comparison of Data to Charted Islets

The charted and surveyed positions of the islet south of Cascade Head, with a charted elevation of 46 feet, agree well. The center of the surveyed area lies approximately 100 meters, or 0.5 millimeters at chart scale, to the east-south-east of the charted islet. The feature file includes an underwater rock feature identifying the most shoal depth obtained on this islet (Figure 15). The feature file also includes an underwater rock feature that marks the most shoal depth obtained on a rock to the immediate south-south-west of this islet. Field personnel noted that this rock was awash, and amplifying information to that effect is included in the information field of the underwater rock in the feature file.[28]

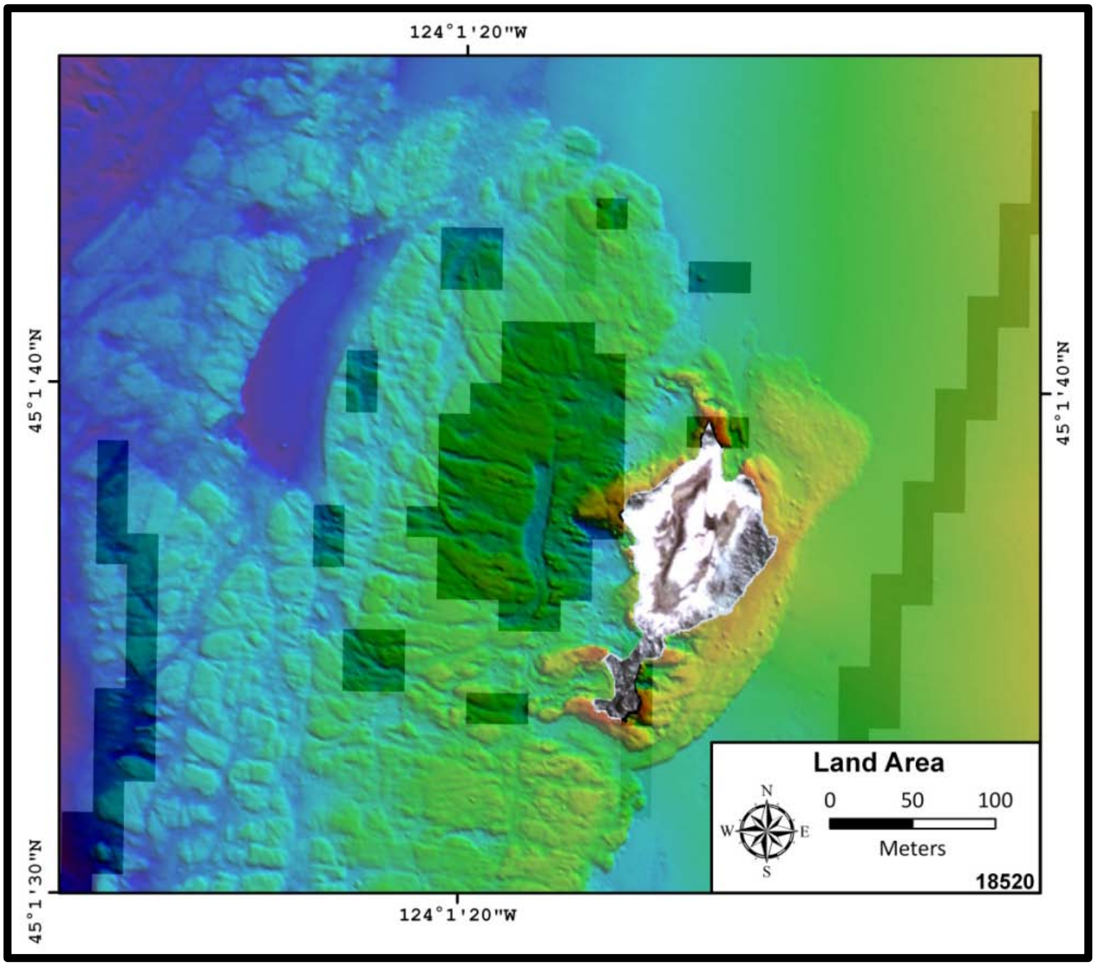

Figure 15. Comparison of Data to Charted Islet

D1.d Comparison of Soundings in Designated Anchorages and Along Channels
The H12128 survey area does not contain any anchorage areas or channels.[29]

D1.e New Submerged Features
Several new areas of rocky seabed were identified by the survey.[30] The most prominent submerged rocks within each of these areas were designated as point features. Several awash rocks and land areas were observed by field personnel or from NAIP imagery just shoreward of the surveyed extents. In some cases, portions of these rocks were captured in the multibeam bathymetry, for which a feature was assigned to the rock with a position and value of sounding corresponding to the most shoal depth in the dataset. For each of these features, amplifying information was included in the information field indicating that an awash rock or land area was observed in the immediate vicinity just shoreward of the survey coverage. All of these features are listed in Appendix II *Survey Feature Report.*

D1.f Dangers to Navigation
Two (2) Dangers to Navigation (DtoN) were located during survey H12128 and have been submitted to PHB. Both DtoNs were reviewed by PHB with only DtoN #2 being forwarded on to the Marine Chart Division (MCD).[31] DtoNs were submitted with preliminary sounding values. Upon final processing, it was found that DtoN #2 did not reflect the true least depth of the linear rock feature at that position. The true least depth of 3.19 meters lies approximately 65 meters, or 0.4 millimeters at chart scale, to the south-south-west of the original reported position, and is depicted in the feature file.[32]

All DtoNs are listed in Table 9 below and are included in the S-57 feature file and should be charted as depicted in the file.

Table 9. H12128 DtoN Charting Status

DtoN	Feature	Applied to Raster Chart	Applied to ENC	PHB Submitted to MCD
1	UWTROC	No	No	No
2	UWTROC	Yes	Yes	Yes

D.2 Additional Results

D2.a Shoreline Investigations
Shoreline investigation was not required for M-N928-KR-09.[33]

D2.b Comparison with Prior Surveys
Comparison with prior surveys was not required under this task order.[34]

D2.c Aids to Navigation (AtoN)
There were no U.S. Coast Guard aids to navigation (AtoNs) found within the survey limits.[35]

D2.d Overhead Clearance
There are no overhead bridges, cables, or other structures which would impact overhead clearance in the survey area.[36]

D2.e Cables, Pipelines and Offshore Structures

There were no charted or observed pipelines, undersea cables, drilling structures, production platforms, or well heads within the survey area.[37]

D2.f Environmental Conditions Impacting the Quality of the Survey

The coastline in vicinity of the survey area offers no protection from incoming swell and sea. As a result, ocean swell was a continuous presence and presented a hazard when working near to shore and adjacent to awash rocks. This prevented the survey vessel from collecting data as close to shore and awash rocks as would otherwise be possible. This resulted in areas where the survey data did not extend to either the sheet boundary or continuously map the 8-meter contour. The most significant departure from the 8-meter contour is shown in Figure 16, where depths shallower than 8 meters are depicted in red, survey vessel track lines in yellow, and the survey boundary provided with the *Project Instructions* in black. Despite revisiting this area during relatively calm conditions, safety of navigation precluded surveying further than depicted due to the effect of swell on the vessel.

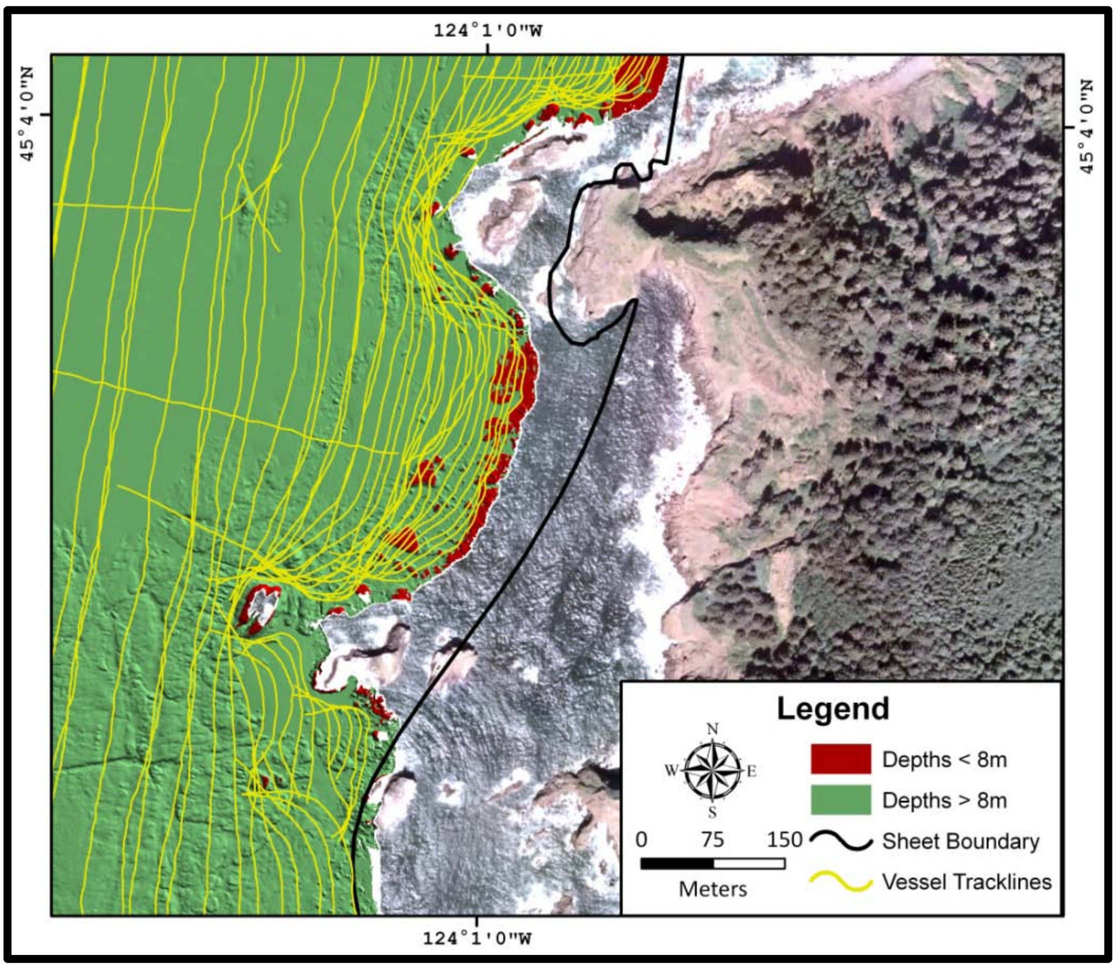

Figure 16. Data Gaps near Hazardous Areas

Every effort was made to survey as close as possible to awash or baring features. Working close to dangerous features in the presence of ocean swell required the close and constant coordination of both members of the survey crew and the vessel captain. This close coordination and the use of a purpose built vessel enabled data to be collected much closer to shore and to dangerous rocks than would normally be possible. At times, baring rocks were visible close aboard the survey vessel. However, the environmental conditions did not allow time for the survey crew to safely estimate the height and position of these features. Annotations were entered into the log once the risk to the vessel had passed.

D2.g Construction Projects
No active construction projects were observed in H12128 survey area.

D2.h Bottom Characteristics
Fifty-five (55) bottom samples were obtained on September 2-3, 2009 (DN 245 and DN 246) and are included in the S-57 attributed feature file in the *Supporting Data* folder. A table listing the position and description of each bottom sample is included in Appendix V *Supplemental Survey Records and Correspondence*, along with photographs of each sample. Bottom samples were obtained on a 2,000-meter grid to meet survey requirements.[38]

E. LETTER OF APPROVAL

The letter of approval for this report and accompanying data follows on the next page.

F. SUPPLEMENTAL REPORTS

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

Title	Submittal Date
M-N928-KR-09 Data Acquisition and Processing Report	November 10, 2010
M-N928-KR-09 Horizontal and Vertical Control Report	December 23, 2010

DAVID EVANS
AND ASSOCIATES INC.

LETTER OF APPROVAL

M-N928-KR-09
REGISTRY NO. H12128

This report and the accompanying data are respectfully submitted.

Field operations contributing to the accomplishment of survey H12128 were conducted under my direct supervision with frequent personal checks of progress and adequacy. This report and associated data have been closely reviewed and are considered complete and adequate as per the *M-N928-KR-09 Statement of Work* dated June 2009, and *Project Instructions* received on August 20, 2009.

Digitally signed by Jon Dasler
DN: cn=Jon Dasler,
email=jld@deainc.com, o=David
Evans and Associates, Inc., c=US
Date: 2010.12.22 18:20:40 -08'00'

Jonathan L. Dasler, PE (OR), PLS (OR, CA)
ACSM/THSOA Certified Hydrographer
Chief of Party

Digitally signed by Jason Creech
DN: cn=Jason Creech,
email=jasc@deainc.com,
o=David Evans and Associates,
Inc., c=US
Date: 2010.12.22 18:21:19 -08'00'

Jason Creech
Lead Hydrographer

David Evans and Associates, Inc.
September 2010

2801 SE Columbia Way, Ste. 130, Vancouver, Washington 98661 Telephone: 360.314.3200 Facsimile: 360.314.3250

Revisions Compiled During Office Processing and Certification

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[1] Concur.
[2] Concur. Because of the density of the bottom samples, 39 of the collected bottom samples were imported into H12128_CS.000.
[3] Concur.
[4] Concur.
[5] Concur.
[6] Concur. No cartographic junction was made with H12127 as it has not been compiled at this time.
[7] Concur.
[8] Concur. The data is adequate to supersede charted data.
[9] Concur.
[10] Concur.
[11] Concur. Nor significant holidays in the data.
[12] Concur.
[13] Concur.
[14] Concur with hydrographer's comments.
[15] Concur.
[16] Concur with clarification. Islets and rocks are present in the survey data toward the inshore areas.
[17] Concur.
[18] Concur. Chart per H12128_CS.000.
[19] Do not concur. Islet cannot be depited properly at chart scale. Chart per H12128_CS.000.
[20] Concur with clarification. Islet and rock are created in based on hydrography; chart per H12128_CS.000.
[21] Concur with clarification. Islet and rock are created in based on hydrography; chart per H12128_CS.000.
[22] Concur. Chart per H12128_CS.000.
[23] Concur with clarification. Update islets' positions per H12128_CS.000.
[24] Concur with clarification. Islet and rock are created based on hydrography; chart per H12128_CS.000.
[25] Concur. Chart per H12128_CS.000.
[26] Concur with clarification. Rock is created based on hydrography; chart per H12128_CS.000.
[27] Concur with clarification. Islet is created based on hydrography; chart per H12128_CS.000.
[28] Concur with clarification. Islet is created based on hydrography; chart per H12128_CS.000.
[29] Concur.
[30] Concur. Chart per H12128_CS.000.
[31] Concur. Only DTON#2 was significant enough to put through to the chart.
[32] A new sounding with proper position and depth was selected for charting in the H12128_CS.000. The original submitted DTON submission is appended to this report.
[33] Concur.
[34] Concur.
[35] Concur.
[36] Concur.
[37] Concur
[38] Concur. Bottom sampling was much denser than required, 39 of the collected bottom samples were imported into H12128_CS.000.

Dangers to Navigation for H12128

Registry Number: H12128

State: Oregon

Locality: Pacific Ocean-- Northern Oregon

Sub-locality: Cascade Head to Siletz Bay

Project Number: M-N928-KR-09

Survey Date: 08/17/2010

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
18520	26th	10/01/2005	1:185,238 (18520_1)	[L]NTM: ?
18003	20th	11/01/2006	1:736,560 (18003_1)	[L]NTM: ?
18007	33rd	02/01/2009	1:1,200,000 (18007_1)	[L]NTM: ?
501	12th	11/01/2002	1:3,500,000 (501_1)	[L]NTM: ?
530	32nd	06/01/2007	1:4,860,700 (530_1)	[L]NTM: ?
50	6th	06/01/2003	1:10,000,000 (50_1)	[L]NTM: ?

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

Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	Rock	3.08 m	44° 58' 30.1" N	124° 01' 31.2" W	---

1 - Danger To Navigation

1.1) GP No. - 1 from H12128_DtoN_2.xls

DANGER TO NAVIGATION

Survey Summary

Survey Position:	44° 58' 30.1" N, 124° 01' 31.2" W
Least Depth:	3.08 m (= 10.11 ft = 1.685 fm = 1 fm 4.11 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2010-229.17:16:02.000 (08/17/2010)
GP Dataset:	H12128_DtoN_2.xls
GP No.:	1
Charts Affected:	18520_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

Dangerous rock found during hydrographic survey.

Feature Correlation

Address	Feature	Range	Azimuth	Status
H12128_DtoN_2.xls	1	0.00	000.0	Primary

Hydrographer Recommendations

Chart dangerous rock.

Cartographically-Rounded Depth (Affected Charts):

1 ½fm (18520_1, 18003_1, 18007_1, 530_1)

3.1m (501_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	SORDAT - 20100817
	SORIND - US,US,graph,H12128
	TECSOU - 3:found by multi-beam
	VALSOU - 3.081 m
	WATLEV - 3:always under water/submerged

Feature Images

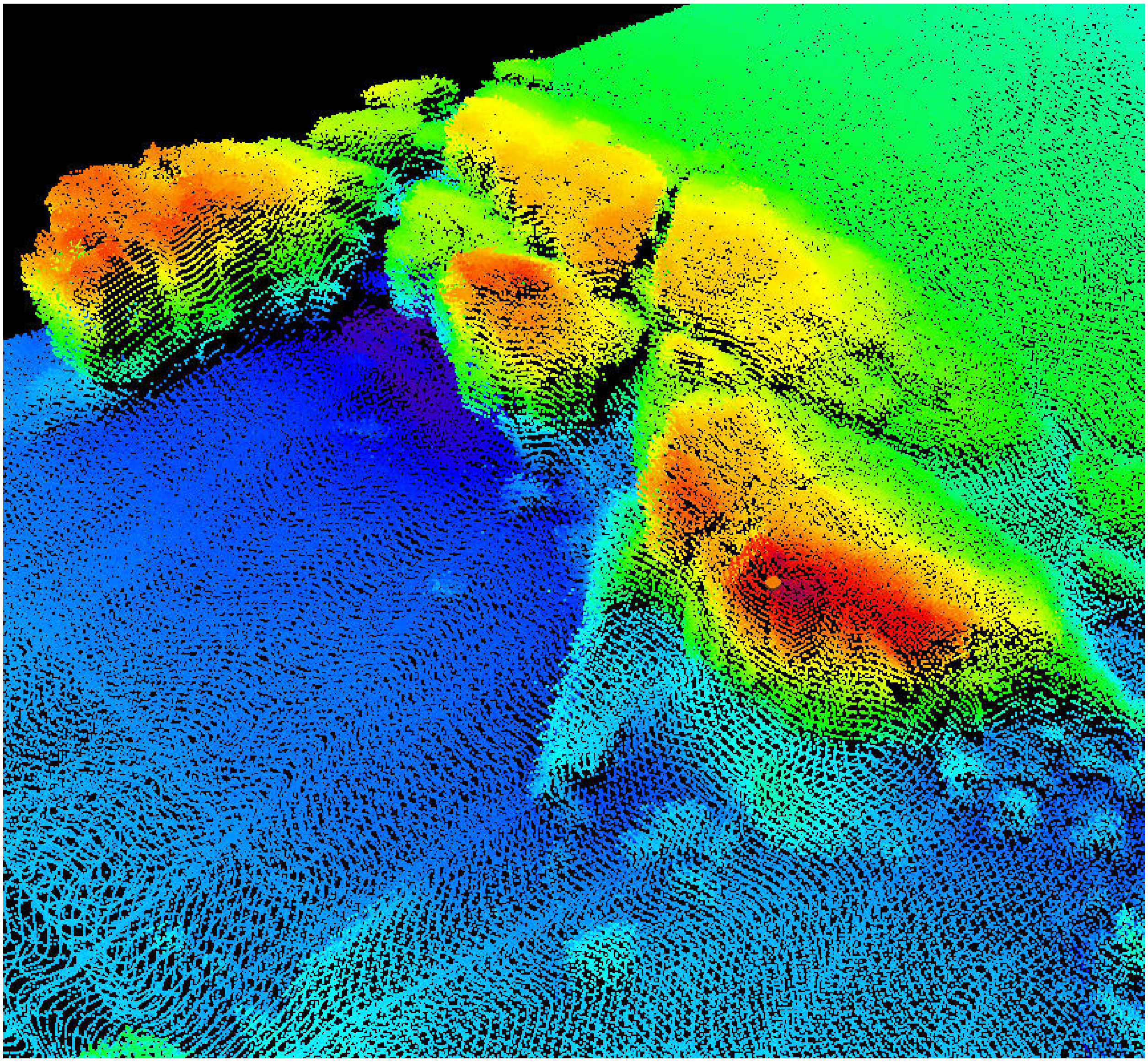

Figure 1.1.1

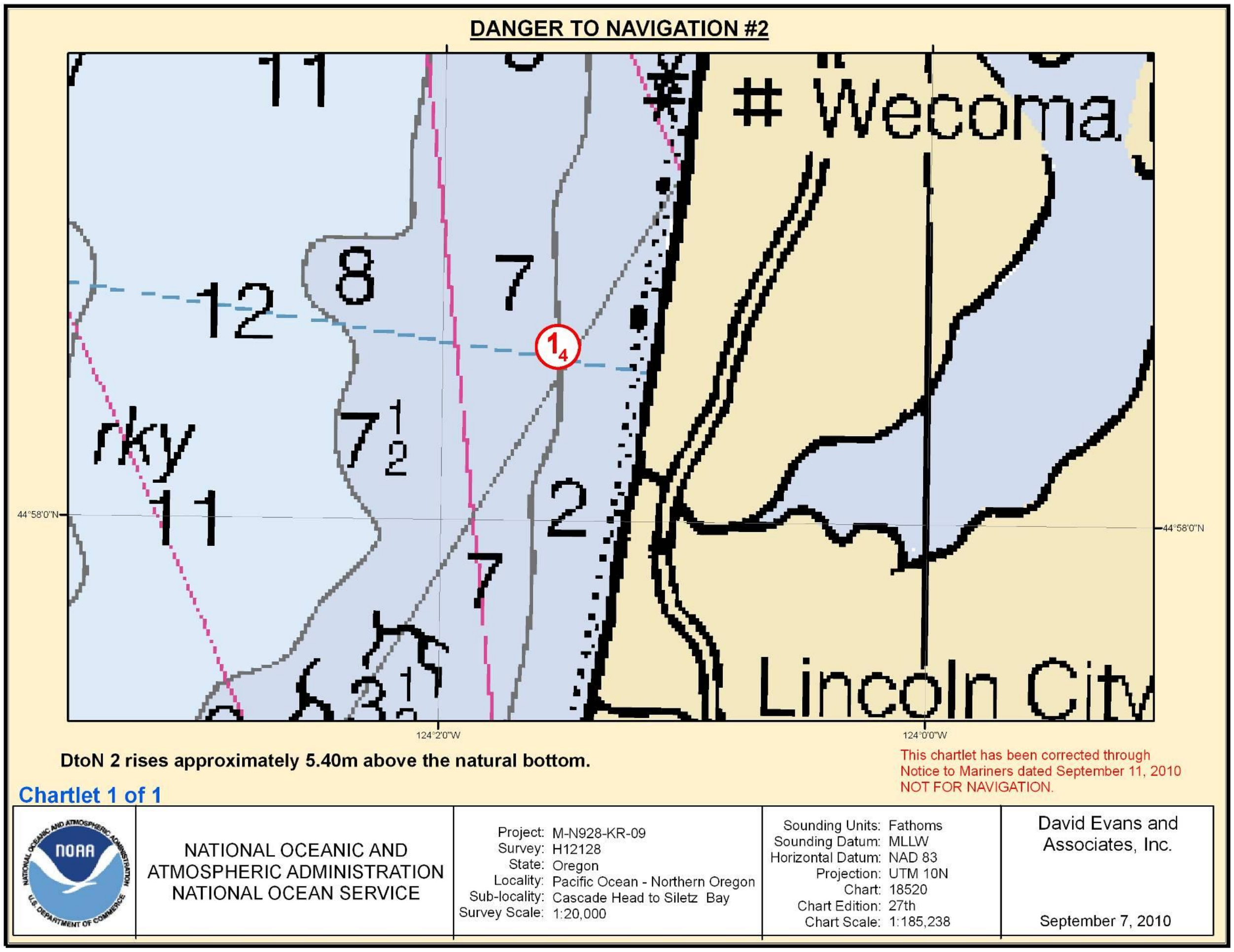

Figure 1.1.2

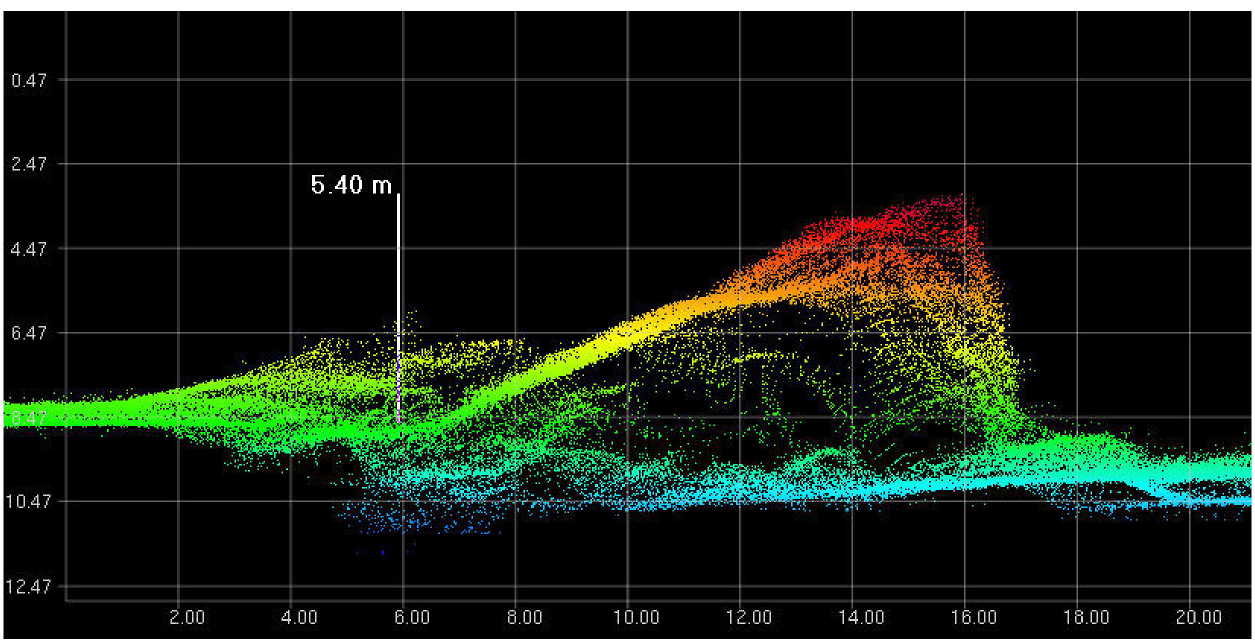

Figure 1.1.3

Jason Creech

From: Ben Evans [Benjamin.K.Evans@noaa.gov]
Sent: Tuesday, September 01, 2009 9:24 AM
To: Jason Creech
Cc: Lori.Knell; Jeffrey Ferguson; Jon Dasler
Subject: Re: DEA Sounding Density

Jason,

Your compromise proposal sounds very reasonable. NOAA agrees to relax the resolution and sounding density requirements to the values you have proposed for the surveys assigned to David Evans and Associates as part of OPR-N928-KR-09. Please include these non-standard values and reference this correspondence in the Descriptive Report for all affected surveys, with additional detail included as appropriate in the Data Acquisition and Processing Report. We will also notify the Atlantic Hydrographic Branch of this change.

For the record, we note the following:

- The reduced resolution allowed by this waiver may require DEA to increase use of designated soundings to ensure that any shoal features are adequately represented in the final gridded surface (as per Section 5.1.1.3 of the 2009 NOS Hydrographic Surveys Specifications and Deliverables).
- This waiver permits deviation from the 2009 edition of the NOS Hydrographic Surveys Specifications and Deliverables, issued in April 2009. DEA's price proposal and final work plan for this project were dated July 2 and July 16, 2009, respectively.
- This waiver applies only to the work awarded under Task Order 3 of contract DG133C-08-CQ-0006 (survey projects OPR-M928-KR-09 and OPR-N928-KR-09).

Lori - please file a copy of this email with the records for this task order, and let AHB know to expect this.

Regarding planning tools - We have used some spreadsheets in the past to estimate beam footprint size for different sonar/depth/swath angle regimes, but don't have anything tailored for these new sounding density requirements that I'm aware of.

Thanks,

Ben

Jason Creech wrote:

> Ben
>
> For the Oregon Coast we have looked at some data that we have already acquired using the 8101 with a 55 to 60 degree swath filter to see what grid resolutions support a minimum of 3 sounding per node. We propose the following depth range / resolution combinations while using the new maximum propagation distance.
>
> Depth Range (m)   Resolution (m)

0-18	1
15-40	2
35-70	4
65 to project max	8

It appears that these combinations will allow us to populate 95% of all nodes with 3 of more soundings without needing to acquire additional data. We are concerned about the possible need to acquire additional data considering our project cost estimates did not account for this new specification. We have already completed several areas for the project that would require long ship transit times and additional survey days in order to return to these sites to increase sounding density.

We are in the process of building some planning tools to help estimate sonar dependent maximum swath widths for specific depths in order to estimate survey plans in the future. I'm just wondering, but has NOAA already prepared anything similar to this?

Thanks again for your willingness to work with us on this issue.

Jason

From: Ben Evans [mailto:Benjamin.K.Evans@noaa.gov]
Sent: Thursday, August 20, 2009 8:39 AM
To: Jason Creech
Cc: Lori.Knell; Jeffrey Ferguson
Subject: Re: DEA Sounding Density

Jason,

Good to talk to you. Just to summarize where we left things:

Sounding Density:
- If compromise is required on the sounding density requirements in the 2009 Specs, NOAA's general preference would be to relax grid resolution requirements before sounding density requirements.
- DEA will analyze an existing dataset characteristic of the expected OR Coast survey area, to determine what grid resolution could be met while still maintaining a minimum of 3 soundings per node for 95% of the grid cells.
- Based on the results of this analysis, we'll work together to come to a final decision on a waiver from the 2009 Specs. We'll also resolve the ambiguity in resolution and density requirements for "skunk stripe" MBES run concurrently with SSS.

Chesapeake Water Levels:
- I will raise this with Jeff Ferguson and EJ Van den Ameele on their return to the office next week.
- DEA will provide a summary of its GPS-based water levels methods for this survey, TPU estimation for these methods, and comparison of survey results using traditional gauge/zone water levels and the GPS methods for a subset of data.
- Based on this, we'll work together to come to a decision on if/how to submit the Chesapeake surveys with GPS water levels, possibly prior to closeout of the 90 day gauge.

Thanks, and I hope everything goes well with your new arrival.

Ben

Jason Creech wrote:
Hey Ben

Yesterday Lori mentioned that you wanted to discuss some of the 2009 HSSD density issues with me. Can you give me a call when you have a chance? I'm sure you are busy preparing for tomorrow's press event.

Thanks and I look forward to speaking with you.

Jason

Jason Creech
Lead Hydrographer

David Evans and Associates, Inc. | Marine Services Division
2801 SE Columbia Way, Ste. 130 | Vancouver, WA 98661
jasc@deainc.com | Phone: 804.516.7829 | Fax: 360.314.3250

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LCDR Ben Evans, NOAA
Chief, Data Acquisition and Control Branch (N/CS35)
NOAA Office of Coast Survey
SSMC3, Station 6815
1315 East West Highway
Silver Spring, MD 20910
voice: (301) 713-2700 x111
fax: (301) 713-4533
cell: (240) 687-4602

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fax: (301) 713-4533
cell: (240) 687-4602

Jason Creech

From: Lori.Knell [Lori.Knell@noaa.gov]
Sent: Wednesday, November 04, 2009 10:27 AM
To: Jon Dasler; Jason Creech
Cc: Benjamin.K.Evans@noaa.gov
Subject: Official Delivery Address Change

Jon and Jason,

We have officially changed the delivery address from the Atlantic Hydrographic Branch to the Pacific Hydrographic Branch. You will ship all data, reports and survey records for each completed project for the Oregon Coast Mapping Project (M-M928-KR-09 and M-N928-KR-09) to:

Chief, Pacific Hydrographic Branch, N/CS34 National Ocean Service, NOAA 7600 Sand Point Way, NE Building 3, BIN C15700 Seattle, Washington 98115-0070

Thank you,

Lori Knell

--
Lori Knell
Physical Scientist, Data Acquisition Control Branch Hydrographic Surveys Division NOAA
Lori.Knell@noaa.gov 301.713.2700 x114

Jon Dasler

From: Lori.Knell [Lori.Knell@noaa.gov]
Sent: Tuesday, January 05, 2010 6:59 AM
To: Jon Dasler
Subject: Updated information

Jon,

I had a meeting with Jeff and Ben before the holidays and I realize there were a few things I meant to pass along before I left. Here are a few of the topics we discussed. (Some of them we already went over)

* ERS data for the Chesapeake Bay will be submitted to C Request as soon as we have access to the budget, it will be the first task order
* The continuation of Vdatum in the Chesapeake Bay is highly likely but we need more time to make the final decision, we may even be able to accept the ERS data alone but separate cost estimates is helpful at this point, which I already received
* ERS data will be accepted for the Oregon Coast surveys if the tidal zoning is that bad. If this how the data is submitted make sure to explain everything in the DR

Please let me know if you have any questions.

Thank you,
Lori

--
Lori Knell
Physical Scientist, Data Acquisition Control Branch Hydrographic Surveys Division NOAA
Lori.Knell@noaa.gov 301.713.2700 x114

Jon Dasler

From: Ben Evans [Benjamin.K.Evans@noaa.gov]
Sent: Friday, June 18, 2010 10:01 AM
To: Jon Dasler
Cc: Lori.Knell; Jason Creech
Subject: Re: Annual SV Calibration

Jon,

Your proposed approach to cross compare the SV71 with recently calibrated AML SV sensors and CTDs is acceptable. Please document your processes in the DR and DAPR as appropriate, and include a copy of this correspondence. Note that all standard requirements for maximum TPU of soundings and resulting gridded data will still apply.

Lori - please archive a copy of this email with the records for this task order. This waiver applies to the 2010 Oregon Coast work only.

Thanks,

Ben

Jon Dasler wrote:
> Ben,
>
> This season we will be using a Reson 7101 on the Oregon Coast. It
> turns out the SVP71 provided with that system was last calibrated in
> July, 2009. There will not be time to ship this probe to Denmark for
> calibration prior to deployment. Can we compare the sensor against one
> or more of our AML SV sensors as proof of performance within
> specifications in lieu of a more recent calibration? We will be using
> an MVP30 in addition to the SV71 at the head and can make real-time
> comparisons when the MVP sensor is towed near the vessel. We also
> conduct weekly comparisons between our MVP sensor and a SeaBird which
> could both be compared to the SV71. All of our other sensors have been
> calibrated this spring as required. Let me know if this will be
> acceptable.
>
> Regards,
>
> Jon
>
> *Jon Dasler, P.E., P.L.S.
> Vice President, Director of Marine Services*
>
> *David Evans and Associates, Inc.** | Marine Services Division**
> *2801 SE Columbia Way, Ste. 130 | Vancouver, WA 98661 jld@deainc.com |
> Office: 360.314.3202 | Cell: 503.799.0168 | Fax:
> 360.314.3250
>
> www.deainc.com <http://www.deainc.com/>
>

>
>
>

H12128 HCell Report

Martha Herzog, Physical Scientist
Pacific Hydrographic Branch

1. Specifications, Standards and Guidance Used in HCell Compilation

HCell compilation of survey H12128 used:

Office of Coast Survey HCell Specifications: Version: 4.0, 2 June, 2010.
HCell Reference Guide: Version 2.0, 2 June, 2010.

2. Compilation Scale

Depths and features for HCell H12128 were compiled to the largest scale raster charts shown below:

Chart	Scale	Edition	Edition Date	NTM Date
18520	1:185,238	27th	05/01/2009	01/29/2011

The following ENCs were also used during compilation:

Chart	Scale
US3OR401M	1:185,238

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	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 H12128_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 18520	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 H12128_SS.000
3	5.4864	5.715	3.125	3
10	18.288	18.517	10.125	10
20	36.576	37.9476	20.75	20
30	54.864	56.236	30.750	30

Contours have not been deconflicted against shoreline features, soundings and hydrography, as all other features in the H12128_CS file. This may result in conflicts between the H12128_SS file contours and HCell features at or near the survey limits. HCell features should be honored over H12128_SS.000 file contours in all cases where conflicts are found.

5. Meta Areas

The following Meta object areas are included in HCell H12128:

M_QUAL

The 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. Spatial Framework

7.1 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.

7.2 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.

8. Data Processing Notes

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

9. QA/QC and ENC Validation Checks

H12128 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.

10. Products

10.1 HSD, MCD and CGTP Deliverables

H12128_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 185,238
H12128 _SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:20,000
H12128 _DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H12128 _outline.gml	Survey outline
H12128 _outline.xsd	Survey outline

10.2 Software

CARIS HIPS Ver. 6.1	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 2.3	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. 2.1	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.

11. Contacts

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

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Pacific Hydrographic Branch
Seattle, WA
206-526-6730
martha.herzog@noaa.gov

APPROVAL SHEET
H12128

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.

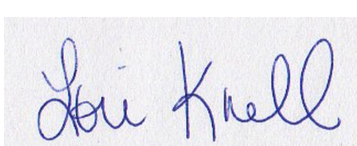
Digitally signed by Martha Herzog
Date: 2011.03.15 10:45:11 -07'00'

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 Kurt Brown
Date: 2011.03.15 15:08:36 -07'00'

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.

Digitally signed by Gary C. Nelson
DN: cn=Gary C. Nelson, o=NOAA, ou=Pacific Hydrographic Branch, email=gary.nelson@noaa.gov, c=US
Date: 2011.03.16 13:38:51 -07'00'



Digitally signed by Lori Knell
DN: cn=Lori Knell, o=NOAA, ou=NOAA HSD, email=lori.knell@noaa.gov, c=US
Reason: AWOIS/Surf Check
Date: 2011.03.28 14:12:56 -04'00'