H12129

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. H12129

LOCALITY

State Oregon

General Locality Pacific Ocean - Northern Oregon

Sublocality Cape Perpetua

2009

CHIEF OF PARTY

Jonathan L. Dasler

LIBRARY & ARCHIVES

DATE

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

HYDROGRAPHIC TITLE SHEET

REGISTRY No

H12129

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:

State Oregon

General Locality Pacific Ocean - Northern Oregon

Sub-Locality Cape Perpetua

Scale 1:20,000 **Date of Survey** August 7, 2009 to September 1, 2009

Instructions dated June 2009 **Project No.** M-M928-KR-09

Vessel R/V *Pacific Storm*

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

Surveyed by David Evans and Associates, Inc.

Soundings by RESON 8101-ER

SAR by Grant Froelich Compilation by Joe Tegeder

Soundings compiled in Meters at MLLW

REMARKS: All times are UTC.

The purpose of this contract is to provide NOAA with modern, accurate hydrographic survey data with which to update the nautical charts of the assigned area. Data is to be multi-use for Oregon Seafloor Mapping.

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 H12129
Project M-M928-KR-09
Oregon Coastal Mapping Project
Cape Perpetua
Scale 1:20,000
August 2009 – September 2009
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 off of Cape Perpetua, Oregon. This project is in support of the Oregon Coastal Mapping Project established under the West Coast Governor's Agreement.

Survey H12129 was conducted in accordance with the *Statement of Work* for M-M928-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. 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-KR-09.shp file provided by Office of Coast Survey (OCS) staff or the surveyed eight-meter contour.

No AWOIS items were located within the H12129 survey limits. The project instructions referenced six assigned items, but the six items included in the AWOIS database export were located over 130 nautical miles to the south in the vicinity of Cape Ferrelo along the Oregon - California border.[1]

Fifty-one (51) bottom samples were acquired for H12129[2]. For this survey, bottom samples were acquired by OSU COAS aboard a second vessel used for the Oregon Coastal Mapping Project.

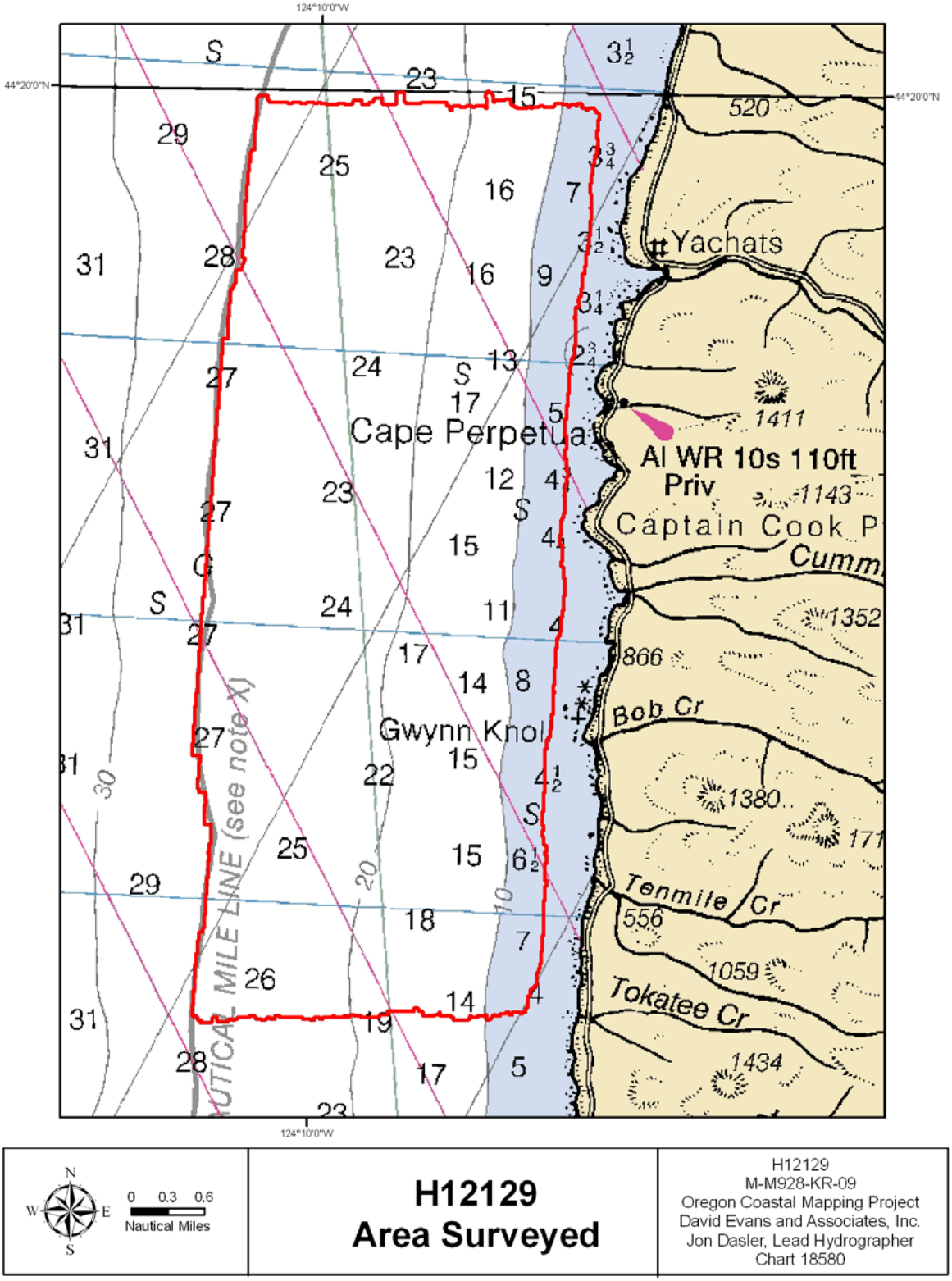

Figure 1. H12129 Survey Area

Data acquisition was conducted from August 7, 2009 (Day Number 219) to September 1, 2009 (Day Number 244). Table 1 lists specific dates of acquisition.

Table 1. H12129 Days of Acquisition

Dates of Acquisition	
Month	**Dates**
August	7-13, 31
September	1

Detailed survey statistics of H12129 are provided in Table 2.

Table 2. H12129 Survey Statistics

Survey Statistics	***Total***
MBES (mainscheme nm)	630.1
Crosslines (MBES nm)	25.4
Fill (MBES nm)	57.0
Developments (MBES nm)	0
Number of Bottom Samples	51
Number of Item Investigations that required additional survey effort	0
Total number of square nautical miles	21

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.

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

R/V Pacific Storm	
	
Hull Registration Number	1
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

There were no vessel or equipment configurations used during data acquisition that deviated from those described in the *M-M928-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 bar-to-multibeam comparison are included in Separate I *Acquisition and Processing Logs* and the sound velocity profile sensor weekly evaluation table can be found in Separate II *Sound Speed Data* section 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.[3]

B2.a Crosslines

A total of 25.43 nautical miles of crosslines, or 4.0% of the 630.1 nautical miles of mainscheme lines, were run for analysis of survey accuracy[4]. Due primarily to the unexpectedly large number of crab pot buoys present in the survey area, the survey required an substantial amount of fill, totaling 107 nautical miles, which was excluded from the crossline percentage calculation. 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 were compared to 1, 2, and 4 meter CUBE surfaces that encompassed the entire survey area. The QC Report tabular output and plots are included in Separate IV *Crossline Comparisons*. The results of the analysis meet the requirements as stated in the National Ocean Service (NOS) *Hydrographic Surveys Specifications and Deliverables* (April 2009).

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 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 0.94 meters. The high uncertainty error is an artifact of the application of GPS water levels and is discussed in detail below. 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 4 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 and approach or fail to meet specification. For the 4m CUBE surfaces, 5 nodes out of 2,976,511 exceed specification. For the 2m CUBE surface, 20,558 nodes out of 6,385,605 exceed specification. For the 1m CUBE surface, 4,886 out of 8,353,967 exceed specification.

Table 4. CUBE Uncertainty

CUBE Uncertainty Statistics						
	Uncertainty (m)			Allowable error utilized		
	Average	StdDev	Maximum	Average	StdDev	Maximum
1m CUBE	0.38	0.01	0.92	72%	2%	174%
2m CUBE	0.39	0.02	0.94	66%	6%	123%
4m CUBE	0.4	0.02	0.89	51%	4%	110%

Each of the nodes which fail to meet specification coincides with areas of very high GPS vertical root mean square (RMS) error as determined by POSPac post-processing software. 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 that exceed 0.2m (0.4m 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

Survey H12129 does not adjoin any contemporary surveys.[6]

B2.d Unusual Conditions or Data Degradation

As discussed in Section B.2 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 disregarded. 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.

In one instance, survey line *2009PS3301333*, the high vertical RMS error extended beyond the end of the survey line. In order to provide a stable GPS tide point for interpolation, the GPS height data from the turn and following line was included with that survey line by using a 300-

second time buffer when applying smoothed best estimate trajectory (SBET) navigation data. In the absence of the corresponding True Heave data, the GPS tide for this line was computed without applying dynamic heave. The GPS tide was then filtered using an 8 second moving average, the offending high RMS data removed by interpolation, and the resulting smoothed GPS tide with interpolation was applied to the survey line.

B2.e Object Detection and Coverage Requirements

As discussed in the *M-M928-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. A copy of this waiver and related email correspondence is included in Appendix V *Supplemental Survey Records and Correspondence.* [7]

Survey speeds were maintained to meet object detection requirements throughout the survey. 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 txt file and compiling statistics on the density values. More than 99.9% of all final CUBE surface nodes contained three or more soundings.[8]

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

B3. Corrections to Echo Soundings

Data reduction procedures for survey H12129 are detailed in the M-M928-KR-09 DAPR, submitted under a separate cover.

B3.a Deviations from DAPR

There are no deviations from the *M-M928-KR-09 DAPR*, with the exception of the processing of survey line *2009PS3301333* as discussed in section B2.d above.[9]

B3.b Additional Calibration Tests

The initial system calibration tests for the *Research Vessel (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. Additional discussion on calibration tests can be found in the *M-M928-KR-09 DAPR*.

B4. Data Processing (Data Representation)

B4.b Multibeam

In order to keep CUBE surfaces at a manageable size, the survey area was subdivided into four areas. A BAG was created for each finalized CUBE surface and both the CUBE and BAG surfaces have been included with the digital data. Table 5 lists the CUBE surfaces and BAGs submitted with this survey.[10]

Table 5. H12129 Surfaces

Surface Name	Resolution
H12129_1of4_1m	1.0m
H12129_2of4_1m	1.0m
H12129_3of4_1m	1.0m
H12129_4of4_1m	1.0m
H12129_1of4_2m	2.0m
H12129_2of4_2m	2.0m
H12129_3of4_2m	2.0m
H12129_4of4_2m	2.0m
H12129_1of4_4m	4.0m
H12129_2of4_4m	4.0m
H12129_3of4_4m	4.0m
H12129_4of4_4m	4.0m

C. HORIZONTAL AND VERTICAL CONTROL

A complete description of horizontal and vertical control for survey H12129 can be found in the *M-M928-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 6 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-M928-KR-09 Horizontal and Vertical Control Report*.

Table 6. GPS Base Stations Used During SmartBase Processing

NGS	UNAVCO
CABL	P365
CHZZ	P367
CORV	P373
LFLO	P374
P367	P375
OBEC	P378
	P395
	P404
	P407

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

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. The VDatum derived separation model, *SOrgGRS.bin*, was used to reduce soundings from NAD83 ellipsoid heights to MLLW as described in the *M-M928-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

To ensure the use of sounding reduction using GPS water levels was as accurate was accurate as or better than sounding reduction using tidal zoning, a crossline comparison was conducted using one dataset reduced through conventional tidal zoning, and another comparison using a dataset reduced through the use of GPS Tides. The use of GPS tides improved the percentage of soundings which met IHO Special Order specifications by 0.4% from 99.5% to 99.9%.[11]

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. While the use of GPS Tides only provided a slight statistical improvement in soundings that met IHO requirements for H12129, findings were more dramatic for other survey sheets which were part of the Oregon Coastal Mapping Project. As shown in the example for H12124 (Figure 2), 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.

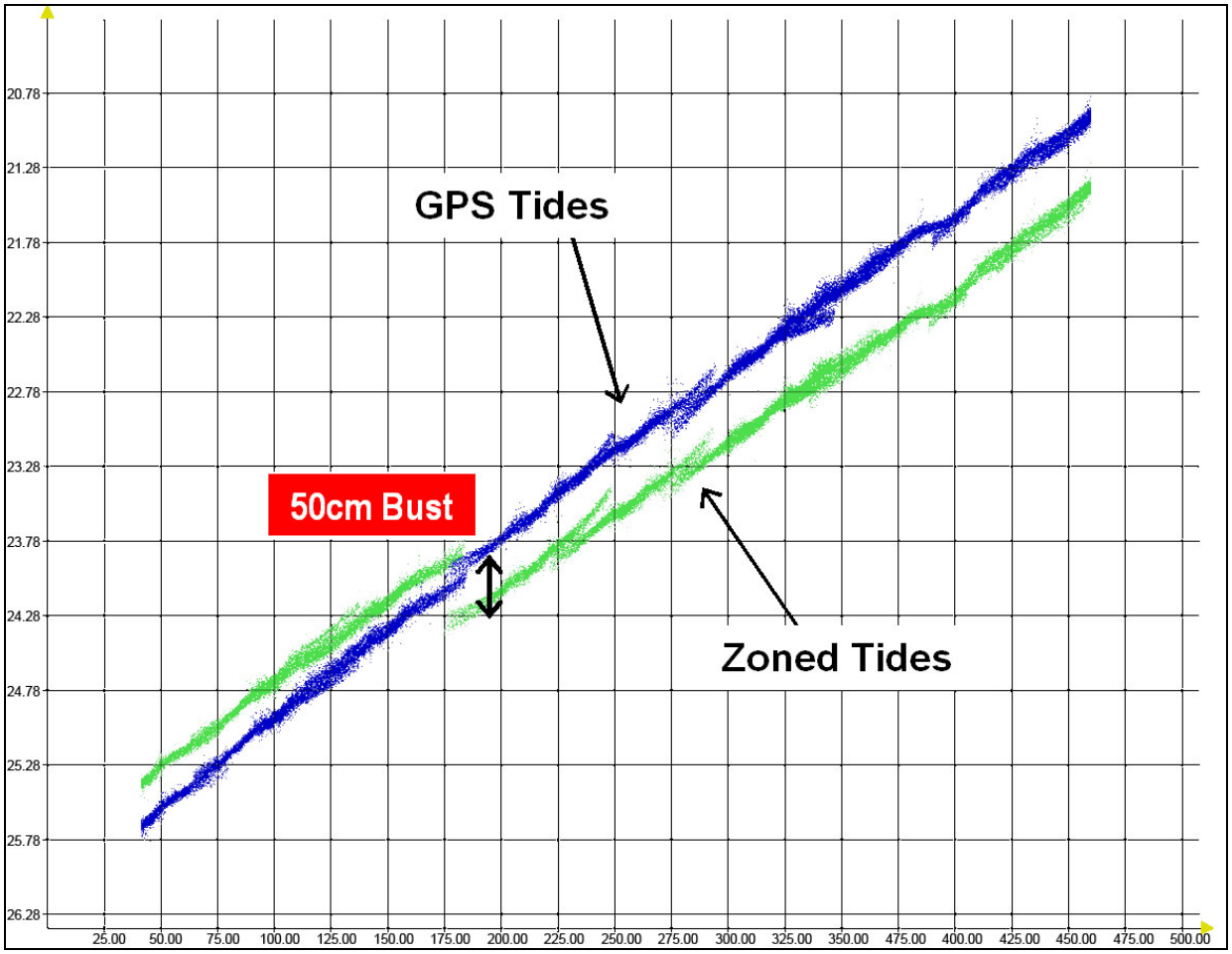

Figure 2. Overview of depth discrepancies

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 navigation data were collected using the Starfire Real Time gipsy corrections to GPS (RTG) correction, and are referenced to International Terrestrial Reference Frame (ITRF) 2005.

D. RESULTS AND RECOMMENDATIONS

D1. Chart Comparison

D1.a Survey Agreement with Chart

During the course of data acquisition and processing H12129 was compared to the largest scale raster and electronic navigation charts (ENC). The results of these comparisons are described below, as well as in Sections D1.b through D1.f of this report.

Contours and soundings used during the chart comparison were generated from combined HIPS product surfaces. Soundings and contours were generated from a 10-meter HIPS product surface (1:10,000) of the entire survey area, which was compiled from all finalized CUBE surfaces for the survey. The product surfaces, contours, and soundings were created solely for the chart comparison and have not been submitted as a final deliverable.

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.

H12129 contours and soundings were compared in CARIS HIPS to the depths and contours on the charts listed in Table 7. In addition, a surface was generated from the ENC from both the ENC sounding and contours layers. A difference surface was produced using the ENC and a five-meter combined surface to aid in the chart comparison.

Table 7. Charts compared to H12129

Chart	Scale	Edition	Edition Date	Issue Date	Latest LNM	Cleared Through Date
18580	1:191,730	22	12/1/2005	---	9/29/2009	10/10/2009
US3OR02M	---	11	---	6/9/2009	9/15/2009	10/10/2009

In general, survey H12129 depths are one to two fathoms deeper than the chart (Figure 3). The difference surface also shows areas of significant difference, from as much as 4 fathoms deeper to one fathom shoaler.[12] Many of these more significant differences are 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 variation occurs between charted soundings, where the surveyed seafloor is being compared to the interpolated surface.

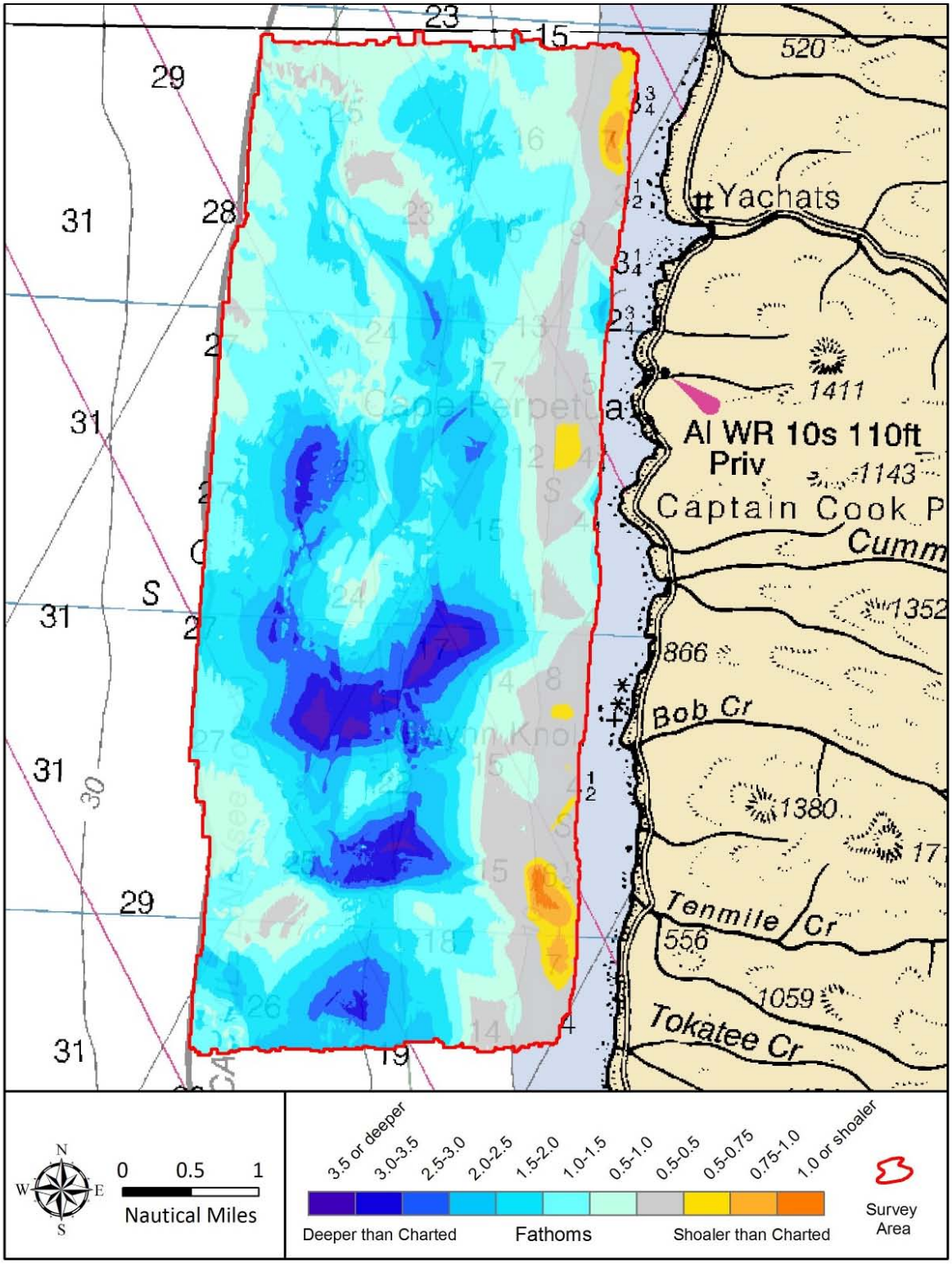

Figure 3. Overview of depth discrepancies between H12129 and US3OR02M. Chart 18580 displayed.

The most significant discrepancies between the chart and H12129 are discussed below.

1. There is shoaling of up to one fathom centered on the charted seven fathom sounding in the northeast corner of the survey area.[13]
2. There is shoaling of over one fathom in the southeast corner of the survey area near a six to seven fathom charted area.[14]

D1.b Comparison to Significant Shoals
H12129 survey area contains no significant shoals.[15]

D1.c Comparison to Charted Features
No AWOIS items were located within the limits of survey H12129. Because of the apparent error in the Project Instructions discussed in Section A, the hydrographer reviewed the published AWOIS database to ensure that there were no items within the survey area.[16]

D1.d Comparison of Soundings in Designated Anchorages and Along Channels
H12129 survey area does not contain any anchorage areas or channels.[17]

D1.e Dangers to Navigation
No danger to navigation (DtoNs) were located during survey H12129.[18]

D.2 Additional Results

D2.a Shoreline Investigations
Shoreline investigation was not required for M-M928-KR-09.

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

D2.c Aids to Navigation (AtoN)
There were no U.S. Coast Guard aids to navigation (AtoNs) found within the survey limits.[19]

D2.d Overhead Clearance
There are no overhead bridges, cables or other structures, which would impact overhead clearance in the survey area.[20]

D2.e Cables, Pipelines and Offshore Structures
There were no charted or observed submarine cables or pipelines, drilling structures, production platforms, or well heads within the survey area.[21]

D2.f Environmental Conditions Impacting the Quality of the Survey
No environmental conditions impacted the quality of the survey.

D2.g Construction Projects
No active construction projects were observed in H12129 survey area.

D2.h Bottom Characteristics

Fifty-one (51) bottom samples were obtained on August 31 and September 1, 2009 (Day Numbers 243 and 244) and are included in the S-57 attributed feature file in the *Supporting Data* folder.[22] 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 2000 meter grid to meet survey requirements.

E. LETTER OF APPROVAL

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

DAVID EVANS
AND ASSOCIATES INC

LETTER OF APPROVAL

M-M928-KR-09
REGISTRY NO. H12129

This report and the accompanying data are respectfully submitted.

Field operations contributing to the accomplishment of survey H12129 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-M928-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: 2010.06.11 10:21:54 -07'00'

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: 2010.06.11 10:28:11 -07'00'

Jason Creech
Lead Hydrographer

David Evans and Associates, Inc.
September 2009

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

F. SUPPLEMENTAL REPORTS

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

Title	**Submittal Date**
M-M928-KR-09 Data Acquisition and Processing Report	June 11, 2010
M-M928-KR-09 Horizontal and Vertical Control Report	June 11, 2010

Revisions and Corrections Compiled During Office Processing and Certification

[1] Concur, correspondence is attached.
[2] Concur with clarification. 10 samples were selected for compilation, 41 of the samples were not included due to the chart scale.
[3] Concur
[4] Despite the 5% requirement, the crosslines show good agreement with the mainscheme lines and are adequate for QC purposes.
[5] Concur
[6] Concur
[7] Concur with Hydrographers comments. See end note 1.
[8] Concur
[9] Concur
[10] DEA used a waiver from DACB to adjust surface resolutions and the 4-meter combined surface, H12129_Combined_4m was used as the basis for compilation.
[11] Concur, data are adequate for charting.
[12] Concur
[13] Concur, new shoal represented in HCell
[14] Concur, new shoal represented in HCell
[15] Concur
[16] Concur
[17] Concur
[18] Concur
[19] Concur
[20] Concur
[21] Concur
[22] Concur with clarification. 10 samples were selected for compilation, 41 of the samples were not included due to the chart scale.

APPENDIX I
DANGER TO NAVIGATION RECORDS

No Dangers to Navigation Reported.

APPENDIX II
SURVEY FEATURE REPORT

NO AWOIS ITEMS WERE LOCATED
WITHIN THE LIMITS OF SURVEY H12129

M-M928-KR-09
H12129
Survey Features
OBSTRN

New:

ENC Latitude (N)	ENC Longitude (W)	Surveyed Latitude (N)	Surveyed Longitude (W)	Remarks
--	--	44-13-57.263	124-09-32.656	
--	--	44-16-37.366	124-10-15.906	

H12129

FINAL TIDE NOTE and FINAL TIDE ZONING CHART

DATE: September 1, 2009

HYDROGRAPHIC BRANCH: Pacific

HYDROGRAPHIC PROJECT: M-M928-KR-09

HYDROGRAPHIC SHEET: H12129

LOCALITY/SUB-LOCALITY: Pacific Ocean, Northern Oregon/Cape Perpetua

TIME PERIOD: 2009: August 7-13, 31; September 1

TIDE STATIONS USED: 9435380, South Beach, OR
Lat. 44° 37.5' N Lon. 124° 2.5' W

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

HEIGHT OF MEAN HIGH WATER (943-5380) ABOVE PLANE OF REFERENCE: 2.33 meters

REMARKS: RECOMMENDED ZONING
Use zone(s) identified as:

Tide Zone	Time Correction (min)	Range Ratio	Reference Station
PAC204	-12	0.97	9435380
PAC202	-6	1	9432780
PAC205	-6	1	9435380
PAC309	12	0.91	9432780
PAC28	-6	0.96	9435380
PAC198	6	1.02	9419750
PAC211	-6	0.96	9442396
PAC203	-12	0.94	9435380
PAC200	12	1.02	9431647
PAC211A	0	0.97	9442396
PAC199	0	1.01	9431647
PAC308	0	0.95	9432780
PAC29	0	1	9435380
CR1	6	0.96	9442396
PAC211B	0	0.96	9442396
PAC201	-6	0.97	9432780

APPENDIX V
SUPPLEMENTAL RECORDS AND CORRESPONDENCE

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

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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

H12129 HCell Report

Joe Tegeder, Physical Scientist
Pacific Hydrographic Branch

1. Specifications, Standards and Guidance Used in HCell Compilation

HCell compilation of survey H12129 used:

Office of Coast Survey HCell Specifications: Draft, Version: 4.0, 17 March, 2010.
HCell Reference Guide: Version 2.0, 29July, 2010.

2. Compilation Scale

Depths and features for HCell H12129 were compiled to the largest scale raster charts shown below:

Chart	Scale	Edition	Edition Date	NTM Date
18580	1:191,730	22nd	12/01/2005	09/11/2010

The following ENCs were also used during compilation:

Chart	Scale
US3OR02M	1: 191,730

3. Soundings

A survey-scale sounding (SOUNDG) feature object layer was built from the 4-meter Combined Surface in CARIS BASE Editor. A shoal-biased selection was made at 1:191,730 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	500	5

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

4. Depth Contours

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

Chart Contour Intervals in Fathoms from Chart 16708	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 H12129_SS.000
10	18.288	18.517	10.125	10
20	36.576	37.947	20.750	20

5. Meta Areas

The following Meta object areas are included in HCell H12129:

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. S-57 Objects and Attributes

The *_CS HCell contains the following Objects:

$CSYMB	Blue Notes-Notes to the MCD chart Compiler
M_QUAL	Data quality Meta object
OBSTRN	Obstruction objects
SBDARE	bottom samples
SOUNDG	Soundings at the chart scale density

The *_SS HCell contains the following Objects:

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

8. Spatial Framework

8.1 Coordinate System

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

8.2 Horizontal and Vertical Units

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

Chart Unit Base Cell Units:

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

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

BASE Editor and S-57 Composer Units:

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

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

9. Data Processing Notes

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

10. QA/QC and ENC Validation Checks

H12129 was subjected to QA checks in S-57 Composer prior to exporting to the metric HCell base cell (000) file. The millimeter precision metric S-57 HCell was converted to chart units and NOAA rounding applied. dKart Inspector was then used to further check the data set for conformity with the S-58 ver. 2 standard (formerly Appendix B.1 Annex C of the S-57 standard). All tests were run and warnings and errors investigated and corrected unless they are MCD approved as inherent to and acceptable for HCells.

11. Products

11.1 HSD, MCD and CGTP Deliverables

H12129_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:191,730
H12129 _SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:20,000
H12129 _DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H12129 _outline.gml	Survey outline
H12129 _outline.xsd	Survey outline

11.2 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 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.

12. Contacts

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

Joe Tegeder
Physical Scientist
Pacific Hydrographic Branch
Seattle, WA
206-526-6434
joe.tegeder@noaa.gov.

APPROVAL SHEET
H12129

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

2010.12.20
09:54:33 -08'00'

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 Pete Holmberg
DN: cn=Pete Holmberg, o=NOAA, ou=PHB, email=peter.holmberg@noaa.gov, c=US
Date: 2010.12.20 09:43:51 -08'00'

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: 2010.12.20 14:15:44 -08'00'

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: 2010.12.21 14:38:01 -05'00'