H12122

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic Survey

Field No. N/A

Registry No. H12122

LOCALITY

State Oregon

General Locality Pacific Ocean - Northern Oregon

Sublocality Tillamook Head

2010

CHIEF OF PARTY

Jonathan L. Dasler, PE (OR) , PLS (OR,CA)

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DATE

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

HYDROGRAPHIC TITLE SHEET

REGISTRY No

H12122

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 Tillamook Head

Scale 1:20,000 **Date of Survey** July 23, 2010 to September 22, 2010

Instructions dated 6/1/2009 **Project No.** M-N928-KR-09

Vessel R/V JAB

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

Surveyed by David Evans and Associates, Inc.

Soundings by RESON 7101-ER

SAR by Adam Argento 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 H12122
Project M-N928-KR-09
Oregon Coastal Mapping Project
Tillamook Head
Scale 1:20,000
July 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 Seaside and Cannon Beach, Oregon and seaward to roughly the charted 30-fathom contour. This project is in support of the Oregon Coastal Mapping Project established under the West Coast Governor's Agreement.

Survey H12122 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 eight meters. 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 items were assigned within the H12122 survey limits.[2] The project instructions referenced three assigned items; two items for full investigation (AWOIS #53808 and #53809) are within H12124 survey limits and one item, for background information only, (AWOIS #50114) straddles H12125 and H12126 survey limits

Eight (8) bottom samples were acquired for H12122. For this survey, bottom samples were acquired by OSU COAS aboard a second vessel used for the Oregon Coastal Mapping Project.

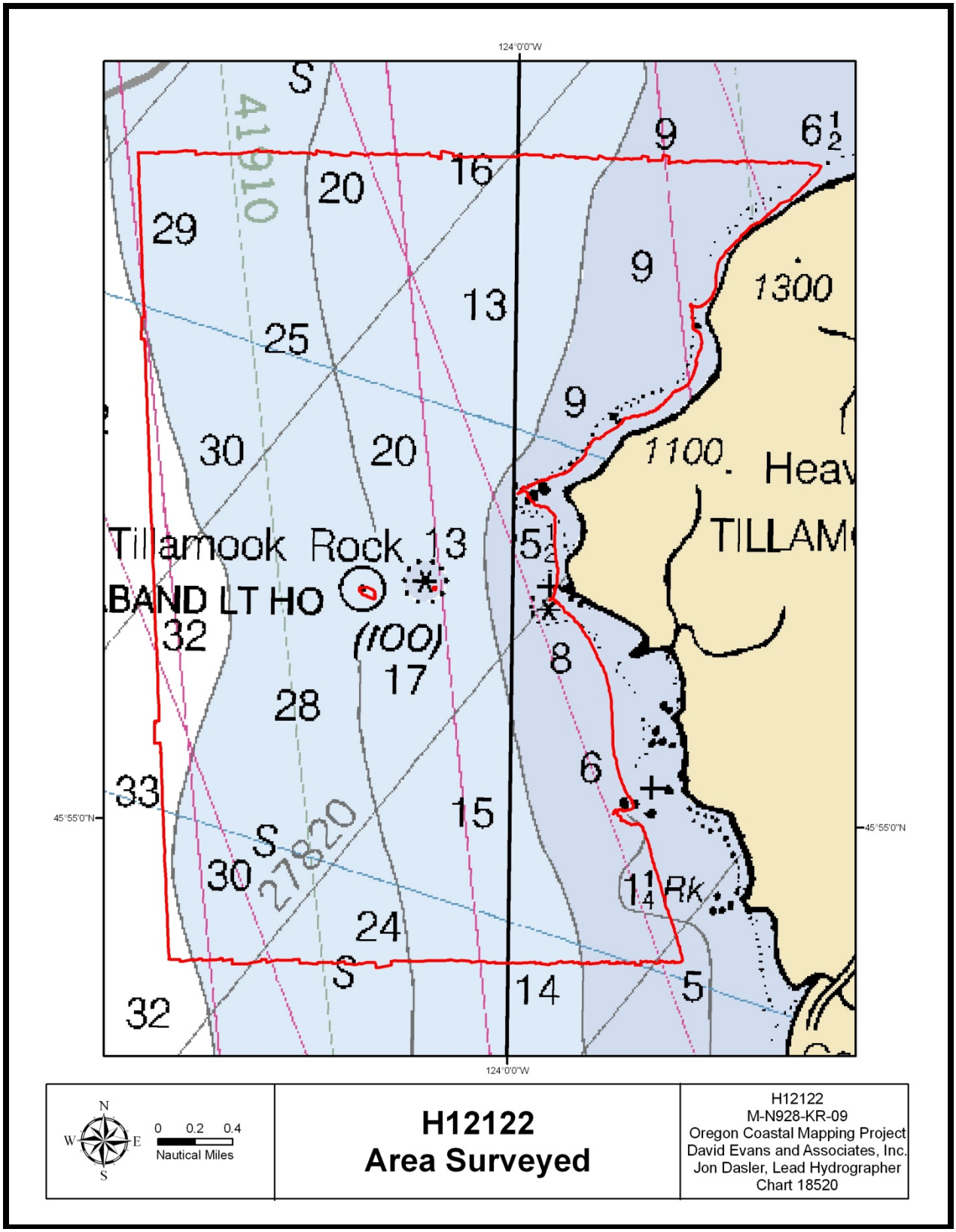

Figure 1. H12122 Area Surveyed

Data acquisition was conducted from July 23, 2010 (DN 204) to September 22, 2010 (DN 265). Table 1 lists specific dates of acquisition.

Table 1. H12122 Days of Acquisition

Dates of Acquisition	
Month	**Dates**
July	23, 26, 27, 30, 31
August	1-5, 7
September	22

Detailed survey statistics of H12122 are provided in Table 2.

Table 2. H12122 Survey Statistics

Survey Statistics	Total
MBES (mainscheme nm)	377.2
Cross lines (MBES nm)	29.1
Fill (MBES nm)	17.4
Developments (MBES nm)	2.4
Number of bottom samples	8
Number of item investigations that required additional survey effort	0
Total number of square nautical miles	11.4

B. DATA ACQUISITION AND PROCESSING

B1. Equipment

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

Table 3. 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
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 29.1 nautical miles of crosslines, or 7.3% of the 397.0 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 were compared to a 1 meter CUBE surface that encompassed the entire survey area. The QC Report tabular output and plot are included in Separate IV *Crossline 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 nearly five million node comparisons and an average difference between the crossline surface and the mainscheme surface of only .01 meters across all depths, with a 0.19-meter 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 1.94 meters. The high uncertainty error is an artifact 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 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 that fail to meet specification. For the 4-meter CUBE surfaces, 168 nodes out of 1,307,784 fail to meet specification. For the 2-meter CUBE surface, 17,651 nodes out of 4,257,232 fail to meet specification. For the 1 meter CUBE surface, 130,711 nodes out of 7,311,044 fail to meet specification.

Table 4. CUBE Uncertainty

CUBE Uncertainty Statistics						
	Uncertainty (m)			Allowable error utilized		
	Average	StdDev	Maximum	Average	StdDev	Maximum
1m CUBE	0.39	0.03	1.94	73%	7%	358%
2m CUBE	0.41	0.03	1.50	66%	6%	278%
4m CUBE	0.45	0.05	1.24	56%	7%	169%

The nodes which fail to meet specification were carefully reviewed in CARIS HIPS. Each node which fails to meet specification coincides with areas of steep relief. Reviewing 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. As a result, all data are considered within specification.[4]

B2.c Junctions

H12122 survey limits junctions with H12123 (Sheet B) to the south. At the time of writing: survey H12123 had not been completely processed. Junction analysis between these surveys will be discussed in the H12123 descriptive report.[5]

B2.d Unusual Conditions or Data Degradation

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 2 depicts all 636 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 20 meters per second. In addition, the depth of the sound speed gradient maximum varies by over 10 meters. Significant spatial variability in sound speed was also observed, with changes in sound speed of up to 8 meters per second occurring over spatial scales of as little as several hundred meters. Some of this spatial variability is depicted in Figure

3 which shows the interpolated sound velocity at 5-meter water depth for specific survey days. 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.[6]

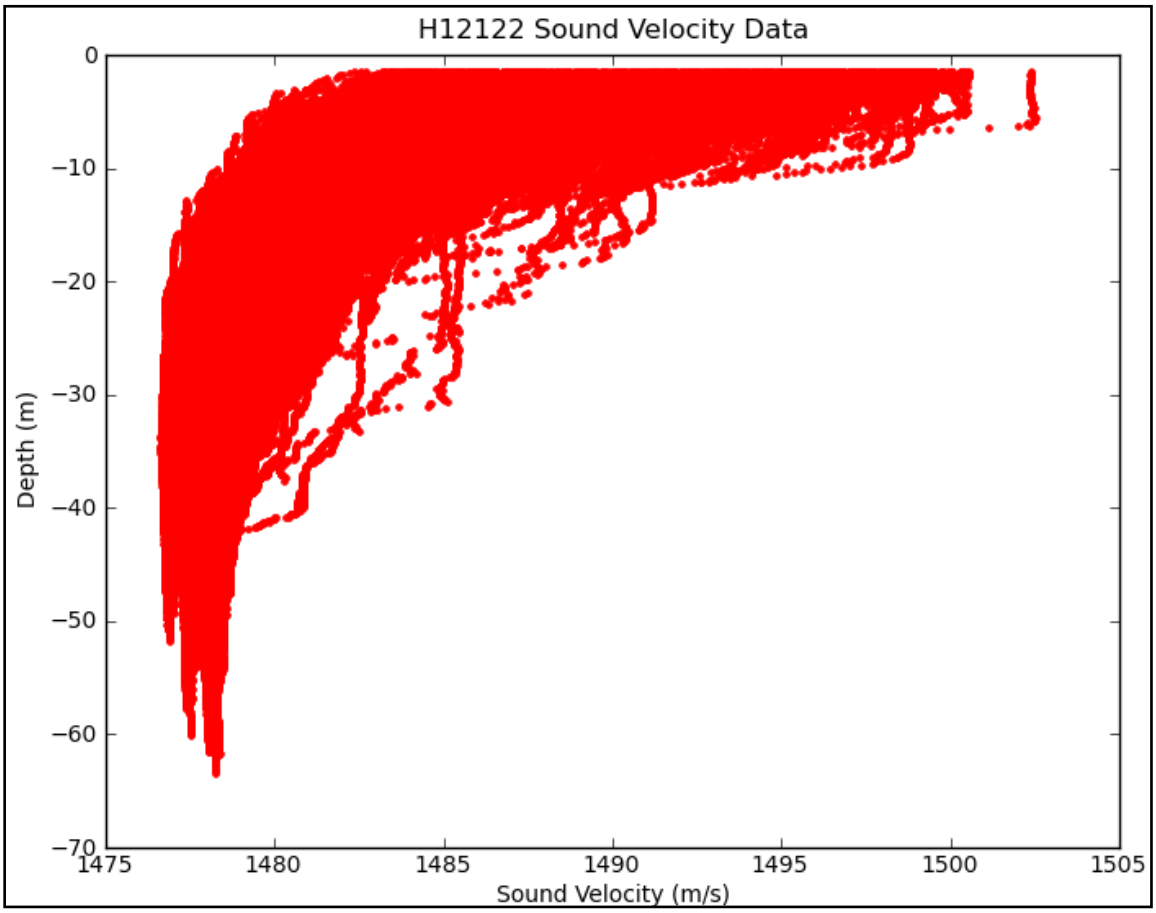

Figure 2. H12122 Sound Velocity Profiles

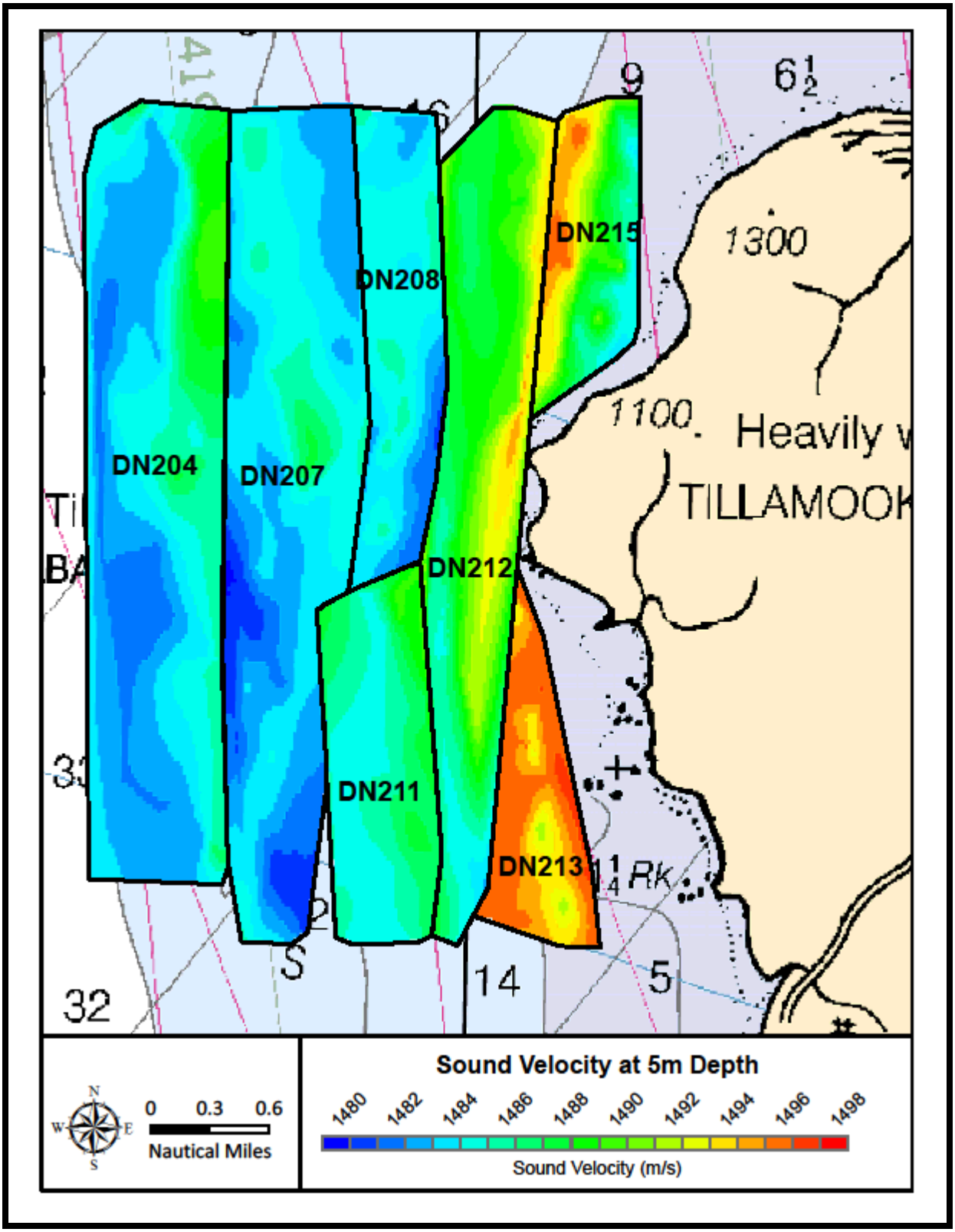

Figure 3. Sound velocity at 5-meter depth by survey day

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.[7] 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 txt file and compiling statistics on the density values. More than 99.5% 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.[8]

B3. Corrections to Echo Soundings

Data reduction procedures for survey H12122 are detailed in the *M-N928-KR-09* DAPR, submitted under a separate cover.

B3.a Deviations from DAPR

There are no deviations from the *M-N928-KR-09* DAPR.[9]

B3.b Additional Calibration Tests

The initial system calibration tests for the Research Vessel (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 5 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.[10]

Table 5. H12122 Surfaces

Surface Name	Resolution
H12122_1m	1.0 m
H12122_2m	2.0 m
H12122_4m	4.0 m

C. HORIZONTAL AND VERTICAL CONTROL

A complete description of horizontal and vertical control for survey H12122 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 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-N928-KR-09 Horizontal and Vertical Control Report*.

Table 6. GPS Base Stations Used During SmartBase Processing

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

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.[11] The VDatum derived separation model, *NOrgGRS.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 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-centimer offsets between adjacent survey lines reduced with discrete zoning.

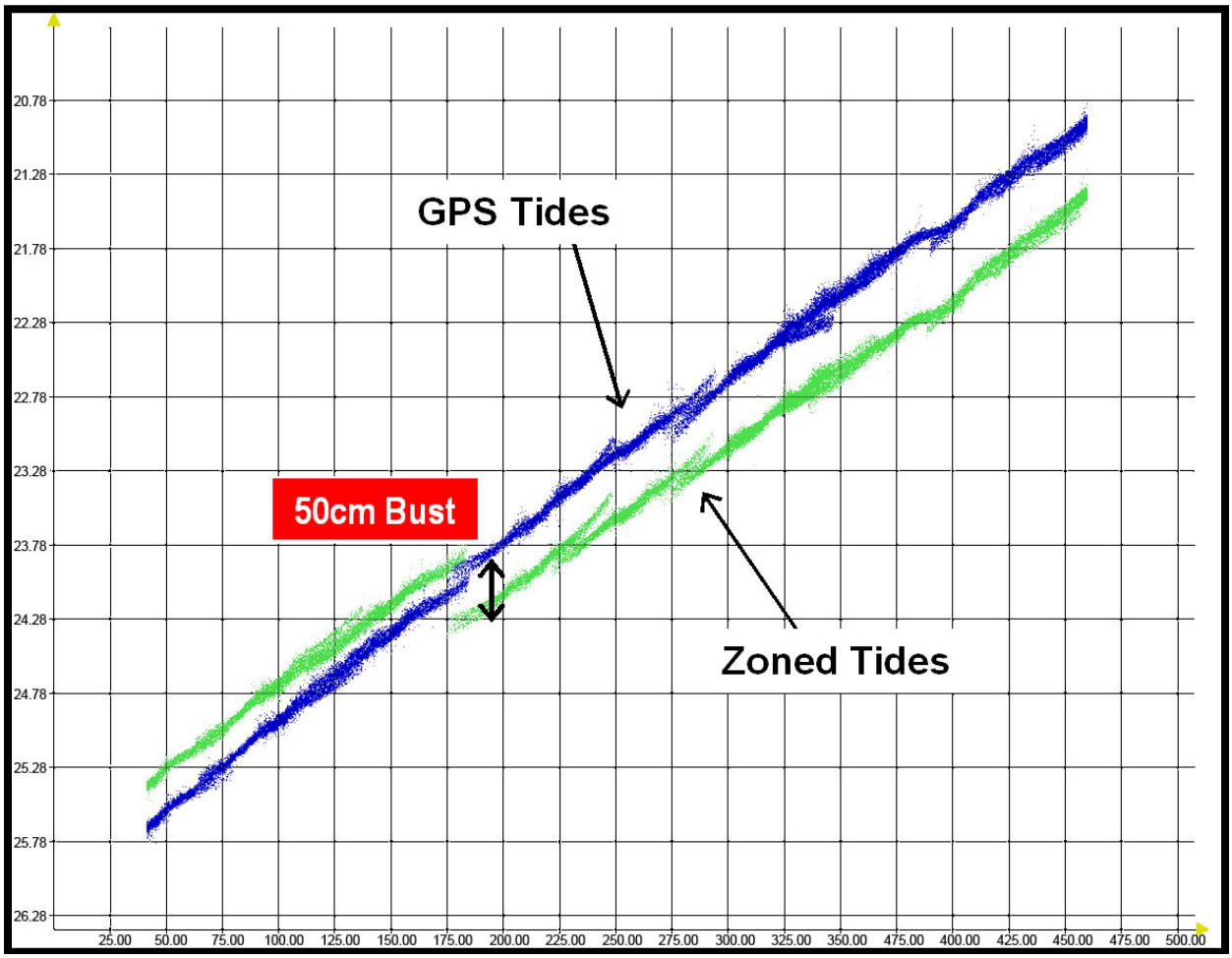

Figure 4. Depth discrepancies between tides derived from GPS and tidal zoning

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 H12122 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.

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 combined surface to conduct the chart comparison.

Table 7. Charts compared to H12122

Chart	Scale	Edition	Edition Date	Issue Date	Latest LNM	Cleared Through Date
18520	1:185,238	27	5/1/2009	---	8/31/2010	9/11/2010
US3OR01M	---	16	8/25/2010	---	---	8/25/2010

In general, survey H12122 depths are 1 to 2 fathoms deeper than those from the chart (Figure 5). 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 between charted soundings and inshore of the charted 10-fathom contour, 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.[12]

The most significant discrepancy between the chart and H12122 is discussed below.

- There is shoaling of up to 1 fathom between the charted 8-fathom and 6-fathom soundings in the south-east portion of the survey area.[13]

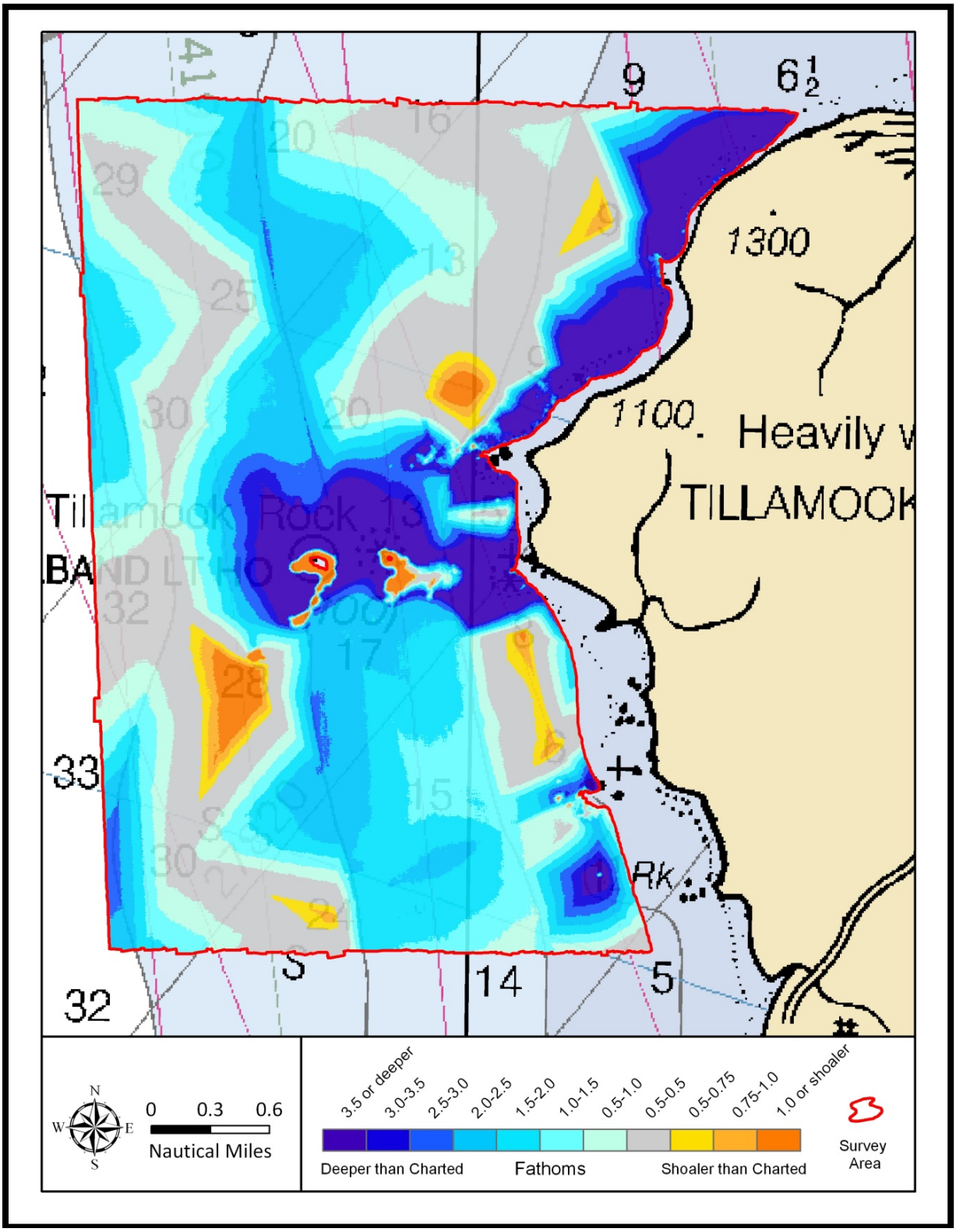

Figure 5. Depth discrepancies between H12122 and US3OR01M; Chart 18520 displayed

D1.b Comparison to Significant Shoals

H12122 survey area contains no significant shoals.[14]

D1.c Comparison to Charted Features

No AWOIS items were located within the limits of survey H12122.[15] Four charted features were located within the limits of H12122 and are discussed below.

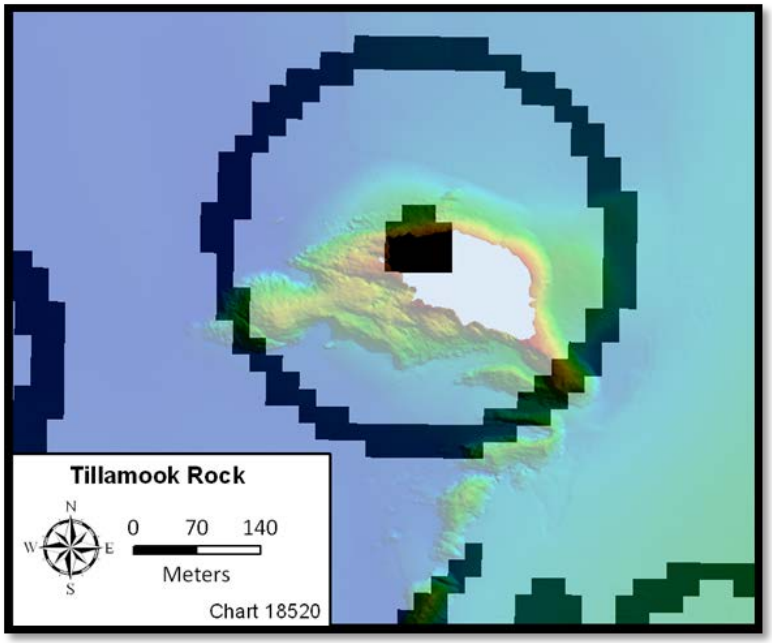

Figure 6. Comparison of data to chart at Tillamook Rock

The charted and surveyed locations of Tillamook Rock agree well. The center of the surveyed area lies approximately 67 meters, or 0.3 millimeters at chart scale, to the south-east of the charted position as shown in Figure 6.[16]

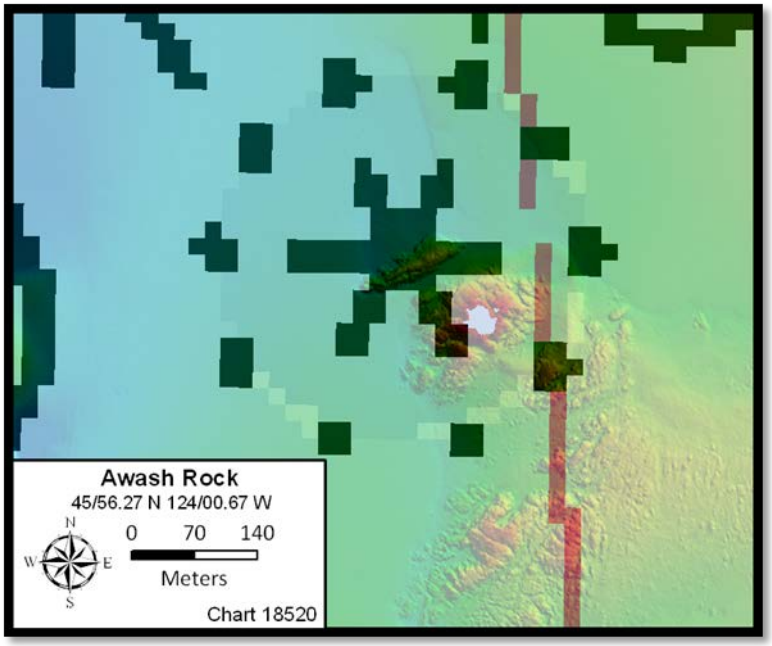

Figure 7. Comparison of data to charted rock

The charted and surveyed locations of the rock, which covers and uncovers between Tillamook Head and Tillamook Rock, agree well. The center of the surveyed area lies approximately 122 meters, or 0.6 millimeters at chart scale, to the south-east of the charted position as shown in Figure 7. Due to the shift in position of the rock, the ENC feature position was disproved, and a new S-57 feature with the same attribution was created in the location as determined from the survey data. ENC US3OR01M incorrectly assigns the name "Tillamook Rock" to this feature.[17]

There are two charted rocks in the vicinity of Tillamook Head, one which covers and uncovers and the other which is awash, that were disproved by the survey.[18] These features were included in the disproved feature file. However, awash rocks are visible in imagery published by the National Agriculture Imagery Program (NAIP) and were noted in the survey log as lying just outside of the surveyed area. The nearest awash rock visible in the imagery and noted in the data is approximately 90 meters east-north-east of the charted position, or 0.5 millimeters at chart scale. The feature file includes three under water rocks in the area that depict the base of these rocks by identifying the shoalest depth obtained. The hydrographer recommends charting these rocks as awash and using the one meter BAG to estimate the geographic position of their high points.[19]

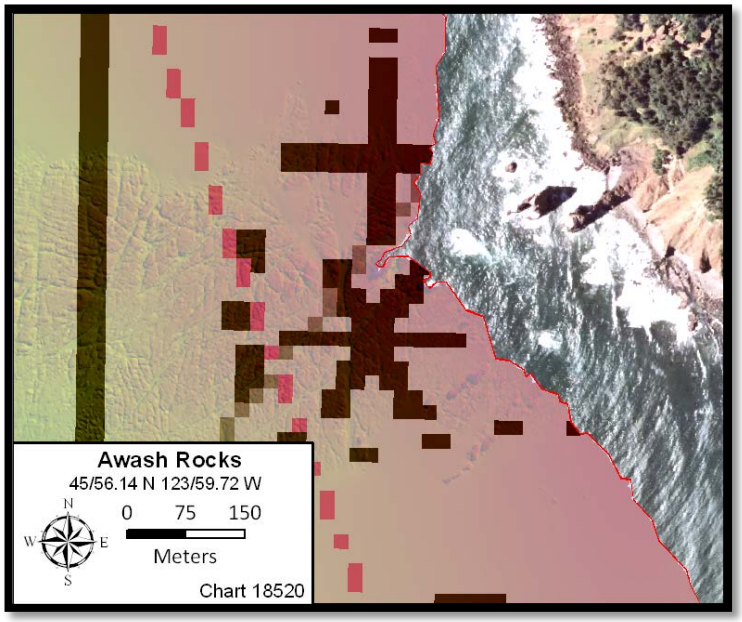

Figure 8. Comparison of data to charted rocks

D1.d Comparison of Soundings in Designated Anchorages and Along Channels

H12122 survey area does not contain any anchorage areas or channels.[20]

D1.e New Submerged Features

Several new areas of rocky seabed were identified by the survey.[21] The most prominent submerged rocks within each of these areas were designated as point features. Several awash rocks were observed just shoreward of the surveyed extents. In some cases, portions of these rocks were captured in the multibeam bathymetry. In these cases, a feature was assigned to the rock with a position and value of sounding corresponding to the most shoal depth in the dataset. The feature was attributed as depth known, and amplifying information was included in the remarks field indicated that field personnel observed an awash rock 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

One (1) Danger to Navigation (DtoN) was located during survey of H12122 and has been submitted to PHB. This DtoN, which has been reviewed by PHB and forwarded on to the Marine Chart Division (MCD), was submitted after application of preliminary sounding corrections.[22]
It is also included in the S-57 feature file with a final position and depth and should be charted as depicted in the file.

The charting status of the H12122 DtoN is included in Table 8.

Table 8. H12122 DtoN Charting Status

DtoN	Feature	Applied to Raster Chart	Applied to ENC	PHB Submitted to MCD
1	Obstruction	Yes	Yes	Yes

D2. Additional Results

D2.a Shoreline Investigations

Shoreline investigation was not required for M-N928-KR-09.[23]

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.[24]

D2.d Overhead Clearance

There are no overhead bridges, cables, or other structures which would impact overhead clearance in the survey area.[25]

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.[26]

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 9, where depths shoaler 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.

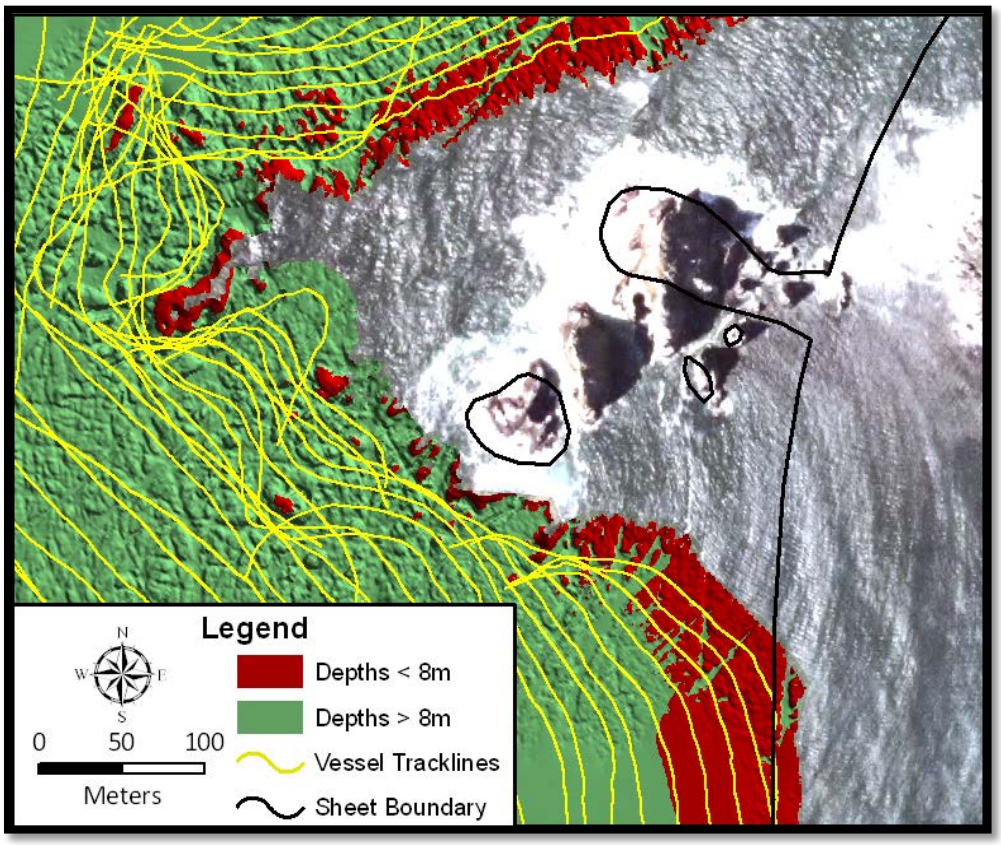

Figure 9. Surveyed area that does not meet the sheet boundary

Every effort was made to survey as close as possible to shore and 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 awash rocks and baring rocks were visibly 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 H12122 survey area.[27]

D2.h Bottom Characteristics

Eight (8) bottom samples were obtained on September 10, 2009 (DN 253) 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.[28]

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

DAVID EVANS
AND ASSOCIATES INC.

LETTER OF APPROVAL

M-N928-KR-09
REGISTRY NO. H12122

This report and the accompanying data are respectfully submitted.

Field operations contributing to the accomplishment of survey H12122 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: 2010.11.10 14:27:33 -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: 2010.11.10 14:34:30 -08'00'

Jason Creech
Lead Hydrographer

David Evans and Associates, Inc.
September 2010

Revisions Compiled During Office Processing and Certification

[1] Concur. The correspondence concerning the waiver and GPS tides is appended to this report.
[2] Concur.
[3] Concur.
[4] Concur. The data is adequate to supersede the charted data
[5] Concur. H12123 Descriptive Report states that H12122 and H12123 compare well with an average difference of 0.13 meters. No cartographic junction was made with H12123 as it has not been compiled at this time.
[6] Concur. The data is adequate to supersede charted data.
[7] Concur. The waiver is appended to this report.
[8] Concur. No significant holidays exist in the data.
[9] Concur.
[10] A 4 meter finalized combined surface was created during the SAR was used as the basis for compilation.
[11] Concur.
[12] Concur.
[13] Concur. These are reflected in the appended DTON reports.
[14] Concur.
[15] Concur with clarification. No AWOIS items were assigned for investigation.
[16] Concur. Chart per H12122_CS.000.
[17] Concur. OBJNAM for the feature in the ENC is incorrect. Chart per H12122_CS.000.
[18] Concur with clarification. Rocks cannot be depicted properly at chart scale and have been noted to be retained.
[19] Do not concur. Rocks cannot be depicted properly at chart scale and should be retained. Chart per H12122_CS.000.
[20] Concur.
[21] Chart per H12122_CS.000.
[22] Concur. The submitted DTON has been applied to the chart. An additional DTON was found at PHB and was forwarded to MCD. Both DTON submissions are appended to this report and are included in the HCell.
[23] Concur.
[24] Concur.
[25] Concur.
[26] Concur.
[27] Concur.
[28] Concur. In addition to the eight surveyed bottom samples, one bottom sample was imported in the HCell from the ENC to be retained. Chart per H12122_CS.000.

Jason Creech

From: Jason Creech
Sent: Friday, August 20, 2010 10:08 AM
To: Crescent Moegling
Cc: 'Gary Nelson'; 'Lori.Knell'; Jon Dasler
Subject: H12122_DTON_1 Submission
Attachments: H12122_DtoN_1.doc; H12122_DtoN_1.txt

Crescent,

Attached is the Danger to Navigation report for H12122_DTON_1. The attached files include the danger report, ASCII text file, chartlet, and supporting images. Please let me know if you have any questions or require any additional information on this danger to navigation.

Thanks,
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

www.deainc.com

Jason Creech

From: Crescent Moegling [Crescent.Moegling@noaa.gov]
Sent: Friday, August 20, 2010 3:06 PM
To: OCS.NDB@noaa.gov
Cc: Gary Nelson; Brooke McMahon; Russ Davies; Jason Creech
Subject: H12122 DTON #1

Attachments: H12122_DtoN_1.zip

H12122_DtoN_1.zip
(4 MB)

The attached DTON was found by the contractor during field operations. It has been reviewed by PHB personnel and is approved for dissemination.

--
Crescent Moegling
Hydrographic Team Lead
Pacific Hydrographic Branch
206.526.6840

Dangers to Navigation Report

Registry Number: M-N928-KR-09

State: Oregon

Locality: Pacific Ocean-- Northern Oregon

Sub-locality: Tillamook Head

Project Number: H12122

Survey Date: 8/2/2010

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
18520	27th	05/01/2009	1:185,238 (18520_1)	USCG LNM: 6/1/2010 (7/27/2010) CHS NTM: None (10/30/2009) NGA NTM: 6/26/2010 (8/7/2010)
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	2.39 m	45° 54' 39.4" N	123° 59' 02.8" W	---

1 - Danger To Navigation

1.1) GP No. - 1 from H12122_DtoN_1.xls

DANGER TO NAVIGATION

Survey Summary

Survey Position: 45° 54' 39.4" N, 123° 59' 02.8" W

Least Depth: 2.39 m (= 7.85 ft = 1.309 fm = 1 fm 1.85 ft)

TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]

Timestamp: 2010-214.22:01:46.000 (08/02/2010)

GP Dataset: H12122_DtoN_1.xls

GP No.: 1

Charts Affected: 18520_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

Depths were acquired with Multibeam Sonar relative to the NAD83(CORS96) ellipsoid. Depths are corrected to chart datum using VDatum and should be considered preliminary.

Feature Correlation

Address	Feature	Range	Azimuth	Status
H12122_DtoN_1.xls	1	0.00	000.0	Primary

Hydrographer Recommendations

Chart new DtoN as surveyed.

Cartographically-Rounded Depth (Affected Charts):

1 ¼fm (18520_1, 18003_1, 18007_1, 530_1)

2.4m (501_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)

Attributes: SORDAT - 20100802

SORIND - US,US,graph,H12122

TECSOU - 3:found by multi-beam

VALSOU - 2.393 m

WATLEV - 3:always under water/submerged

Feature Images

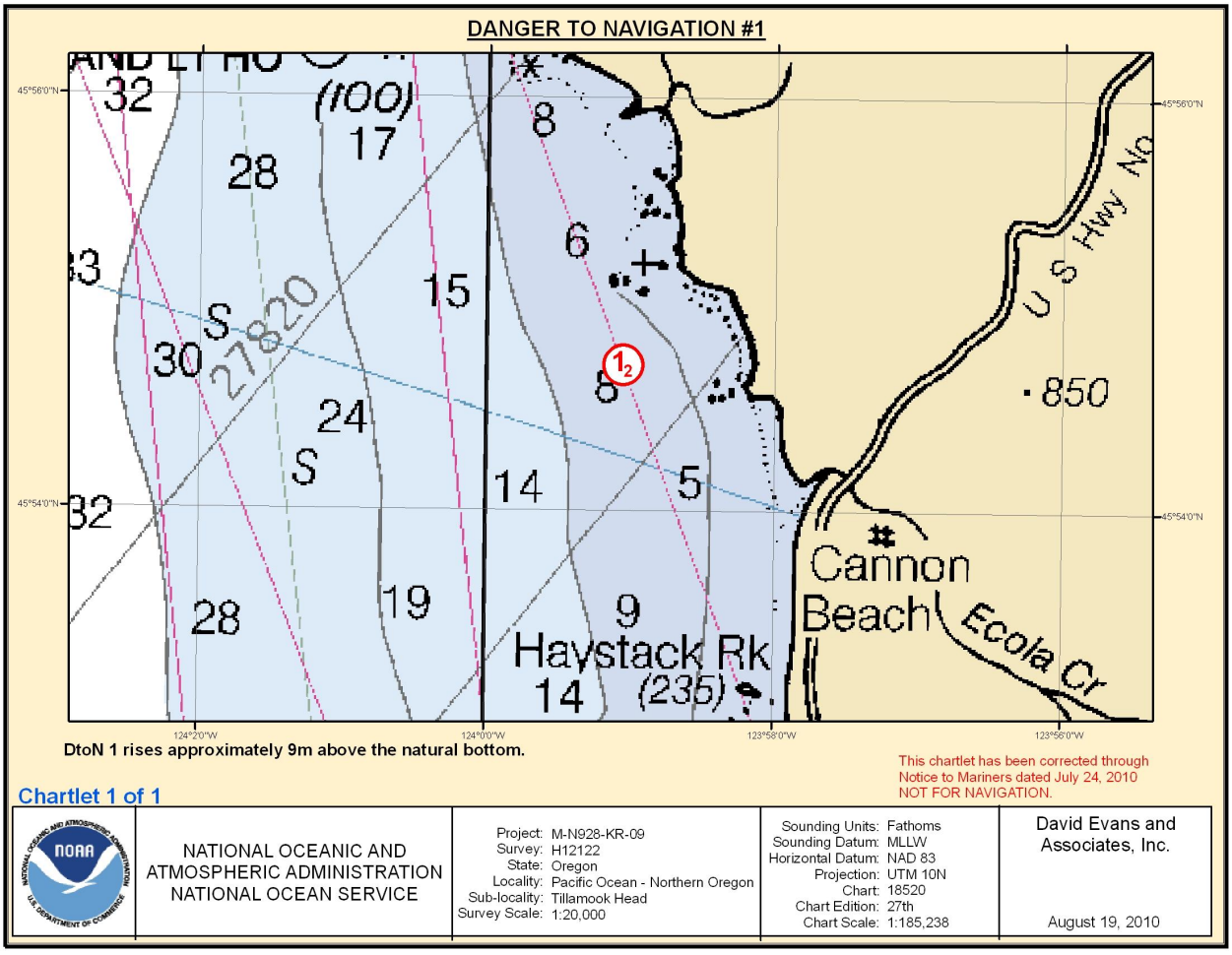

Figure 1.1.1

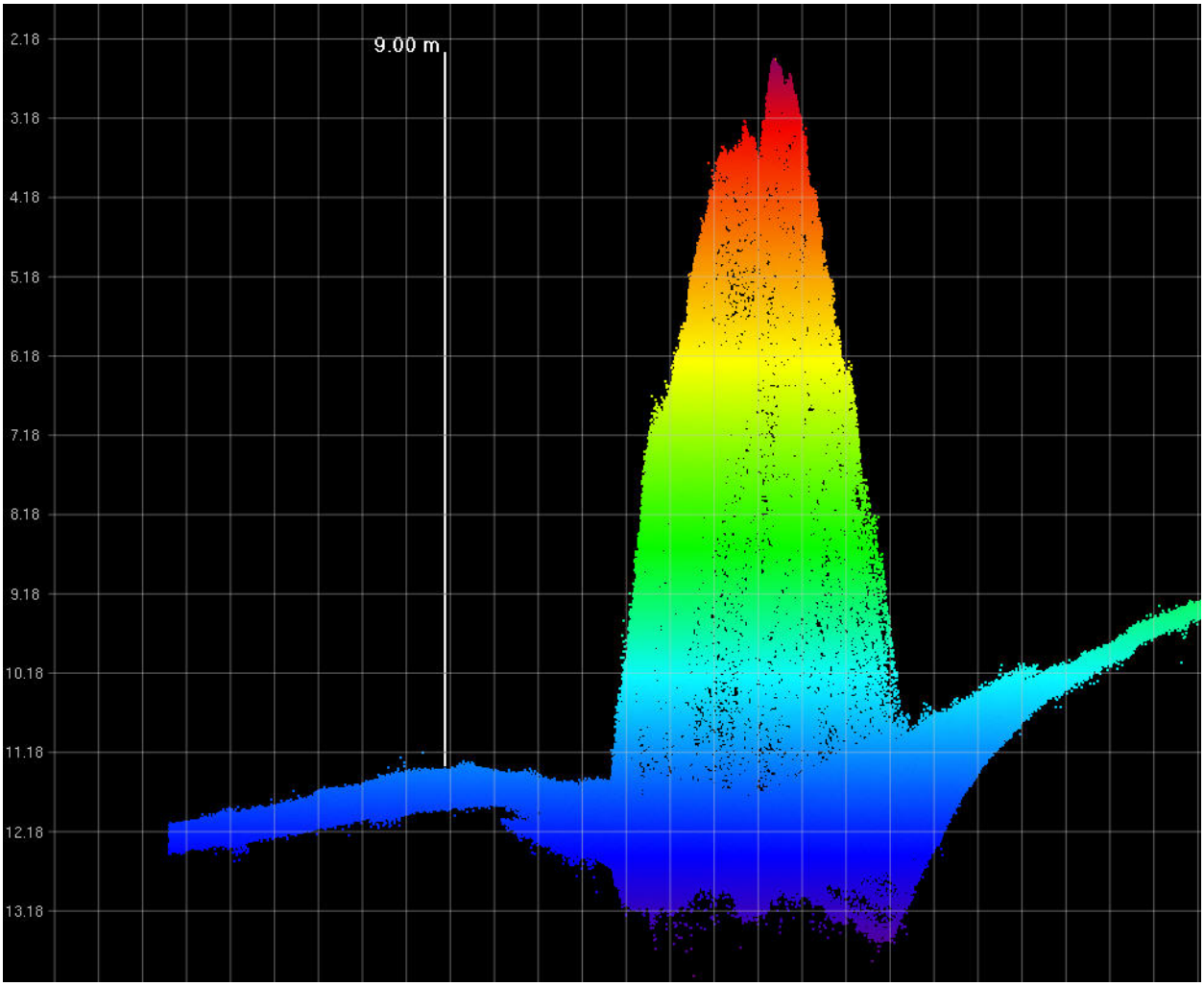

Figure 1.1.2

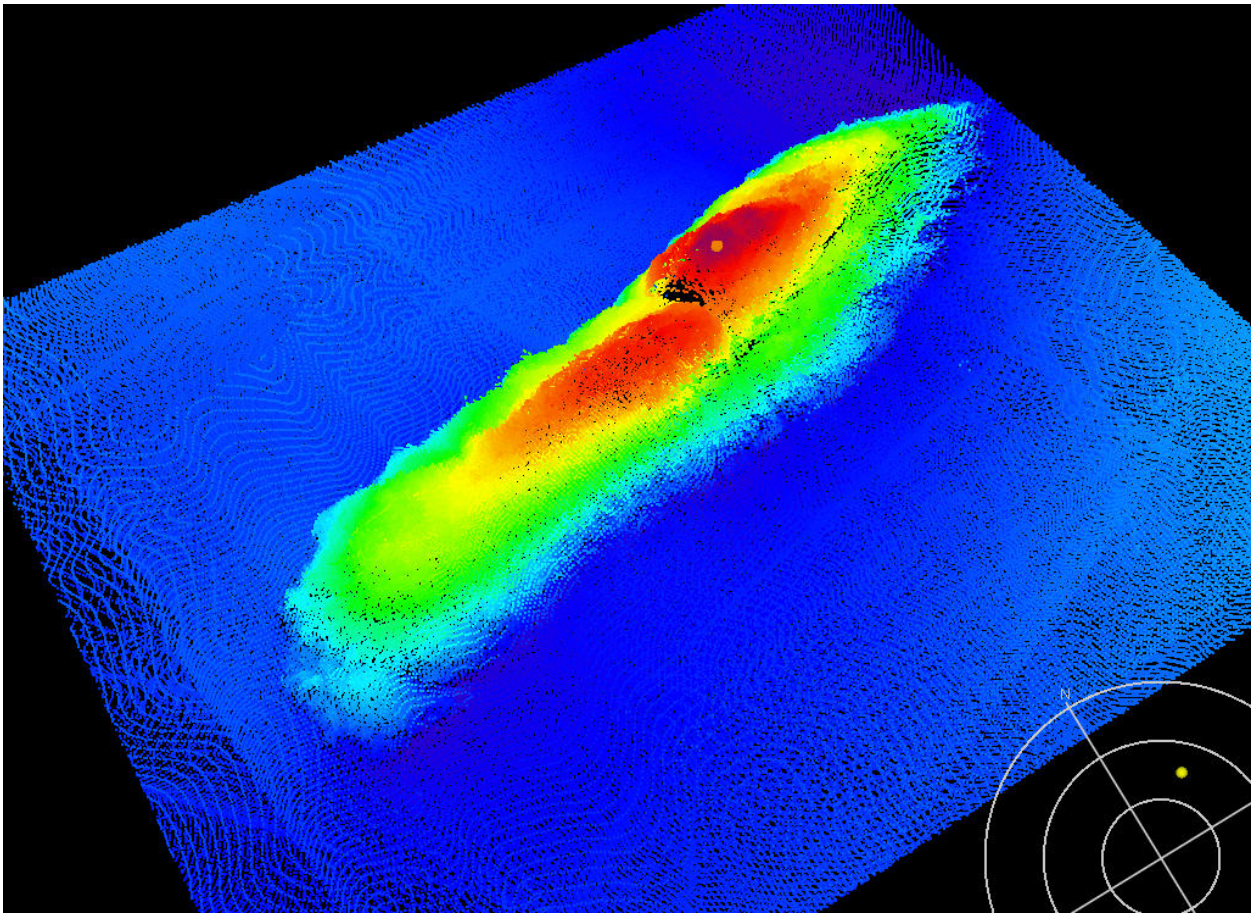

Figure 1.1.3

H12122 Danger to Navigation Report

Registry Number: H12122

State: Oregon

Locality: Pacific Ocean - Northern Oregon

Sub-locality: Tillamook Head

Project Number: M-N928-KR-09

Survey Dates: July 23, 2010 - September 22, 2010

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
18520	27th	05/01/2009	1:185,238 (18520_1)	USCG LNM: 11/9/2010 (3/1/2011) CHS NTM: None (2/25/2011) NGA NTM: 6/26/2010 (3/12/2011)
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	3.38 m	45° 55' 02.7" N	123° 59' 21.1" W	---

1 - Danger To Navigation

1.1) 502/3

DANGER TO NAVIGATION

Survey Summary

Survey Position: 45° 55' 02.7" N, 123° 59' 21.1" W

Least Depth: 3.38 m (= 11.08 ft = 1.846 fm = 1 fm 5.08 ft)

TPU (±1.96σ): **THU (TPEh)** ±0.145 m ; **TVU (TPEv)** ±0.381 m

Timestamp: 2010-213.22:10:47.416 (08/01/2010)

Survey Line: h12122 / n928-kr-09_ja / 2010-213 / 2010ja2132210

Profile/Beam: 502/3

Charts Affected: 18520_1, 18003_1, 18007_1, 501_1, 530_1, 50_1

Remarks:

[None]

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12122/n928-kr-09_ja/2010-213/2010ja2132210	502/3	0.00	000.0	Primary

Hydrographer Recommendations

Chart shoal sounding.

Cartographically-Rounded Depth (Affected Charts):

1 ¾fm (18520_1, 18003_1, 18007_1, 530_1)

3.4m (501_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)

Attributes:

SORDAT - 20100922

SORIND - US,US,graph,H12122

TECSOU - 1:found by echo-sounder

VALSOU - 3.376 m

WATLEV - 3:always under water/submerged

Feature Images

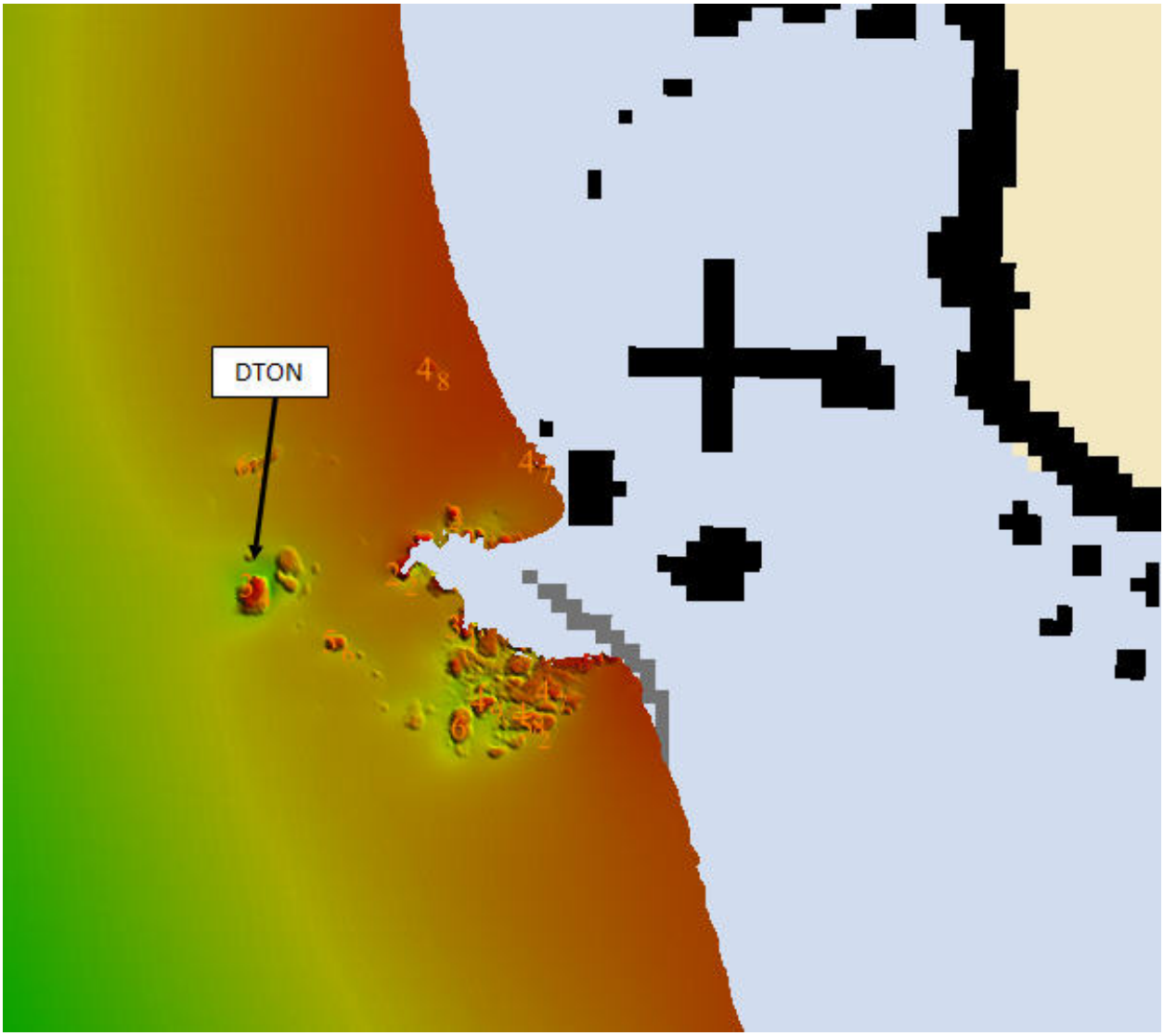

Figure 1.1.1

H12122 HCell Report

Martha Herzog, Physical Scientist
Pacific Hydrographic Branch

1. Specifications, Standards and Guidance Used in HCell Compilation

HCell compilation of survey H12122 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 H12122 were compiled to the largest scale raster charts shown below:

Chart	Scale	Edition	Edition Date	NTM Date
18520	1:185,238	27th	5/01/2009	3/12/2011

The following ENCs were also used during compilation:

Chart	Scale
US3OR01M	1:185,238

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 1:20,000 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 H12122_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 H12122_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	30.75	30

Contours have not been deconflicted against shoreline features, soundings and hydrography, as all other features in the H12122_CS file and soundings in the H12122_SS have been. This may result in conflicts between the H12122_SS file contours and HCell features at or near the survey limits. Conflicts with M_QUAL, COALNE and SBDARE objects, should be expected. HCell features should be honored over H12122_SS.000 file contours in all cases where conflicts are found.

5. Meta Areas

The following Meta object areas are included in HCell H12122:

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

H12122 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

H12122_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:185,238
H12122 _SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:20,000
H12122 _DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H12122 _outline.gml	Survey outline
H12122 _outline.xsd	Survey outline

10.2 Software

CARIS HIPS Ver. 7.0	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 3.0	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.

11. Contacts

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

Martha Herzog
Physical Scientist
Pacific Hydrographic Branch
Seattle, WA
206-526-6730
Martha.herzog@noaa.gov

APPROVAL SHEET
H12122

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
DN: cn=Martha Herzog, o=NOAA, ou=Pacific Hydrographic Branch, email=martha.herzog@noaa.gov, c=US
Date: 2011.05.13 13:49:31 -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.

Katie Reser
2011.05.13
13:54:45 -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 NELSON.GARY.C.1365885318
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=NELSON.GARY.C.1365885318
Date: 2011.05.13 13:55:45 -07'00'