H11976

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic

Field No.

Registry No. H11976

LOCALITY

State California

General Locality Pacific Ocean - Northern California

Sublocality Eel River to Mussel Rock

2010

CHIEF OF PARTY

Dean Moyles, Fugro Pelagos, Inc.

LIBRARY & ARCHIVES

DATE

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

HYDROGRAPHIC TITLE SHEET

REGISTRY No

H11976

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: California

General Locality: Pacific Ocean - Northern California

Sub-Locality: Eel River to Mussel Rock

Scale:

Date of Survey: 11/25/08-12/21/08 and 09/04/09- 10/08/09

Instructions dated: 7/7/2008

Project No.: M-L906-KR-08

Vessel: F/V Pacific Star (556510), R/V R2 (623241) and R/V D2 (647782)

Chief of party: Dean Moyles, Fugro Pelagos, Inc.

Surveyed by: MOYLES, BRIGGS, FARLEY, REYNOLDS, CAIN, LYDON, ROKYTA, GOODALL, LOPEZ, TIXIER, et al

Soundings by: Reson Seabat 7125, 8125 and 8111 echosouders hull mounted

SAR by: Andrew Clos

Compilation by: Fernando Ortiz

Soundings compiled in: Fathoms

REMARKS: All times are UTC. UTM Projection 10

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. 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/.

A. AREA SURVEYED

H11976 (Sheet BF) is located from Eel River to Mussel Rock. It is bound by the coordinates listed in Table 1. [1]

This data was collected by Fugro Pelagos, Inc. for NOAA and the State of California's Coastal Conservancy. While the State of California's interest in this data is primarily for fisheries habitat mapping, the necessary steps to meet NOAA specifications and make the data suitable to OCS for nautical charting purposes have been taken, as detailed in the 2008 Specifications and Deliverables and described in this and accompanying reports.

Hydrographic data collection was conducted on November 25, 2008 to December 21, 2008 and again on September 4, 2009 to October 8, 2009.

Table 1 – Sheet Bounds

Point	Latitude (North)	Longitude (West)
1	40-39-54	124-28-30
2	40-39-54	124-18-24
3	40-28-54	124-18-24
4	40-28-54	124-28-30

Note: The northern bounds were modified slightly (shifted further north) from originally planned to include additional survey area. The southern bounds were modified slightly (shifted further south) from originally planned to include additional survey area.[2]

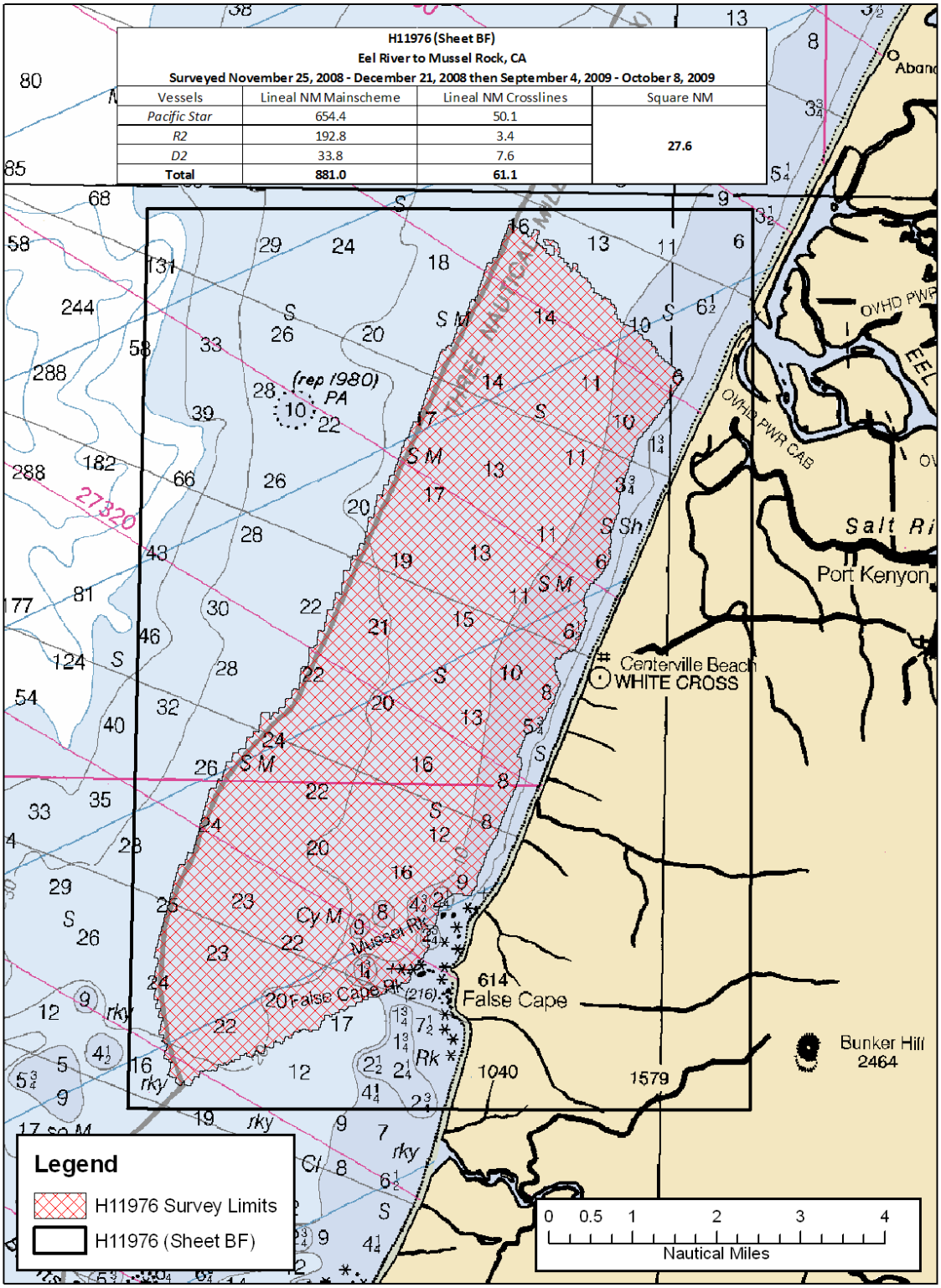

Figure 1 H11976 Area Surveyed

B. DATA ACQUISITION AND PROCESSING

Refer to the M-L906-KR-08 Data Acquisition and Processing Report for a detailed description of all equipment, survey vessels, processing procedures and quality control features. Items specific to this survey and any deviations from the Data Acquisition and Processing Report are discussed in the following sections.

B.1 Equipment & Vessels

The R/Vs R2 and D2 and F/Vs Pacific Star acquired all sounding data for H11976.

The Pacific Star, 162 feet in length with a draft of 16 feet, was equipped with both a Reson Seabat 7125 (400/200 kHz dual frequency) sonar, and a Reson Seabat 8111 sonar for multibeam data acquisition. The 7125 multibeam data files were logged in the S7K format, and the Reson 8111 files logged in the XTF format. All multibeam data files were logged using WinFrog Multibeam v 3.08.44.04. The vessel was also equipped with two AML sound velocity and pressure sensors (SV&P), and a Brooks Ocean Moving Vessel Profiler (MVP), for sound velocity profiles. Vessel attitude and position were measured using an Applanix Position and Orientation System for Marine Vessels (POS MV) 320 V4.

Vessel D2, a Pacific Star launch, is 29 feet in length with a draft of 3 feet. It was equipped with a Reson Seabat 8125 (455 kHz frequency) multibeam sonar system, two AML SV&P probes, and an Applanix (POS MV) 320 V4. Multibeam data files were logged in the XTF format using WinFrog Multibeam v 3.08.44.04.

Vessel R2, with the same specifications as D2, was similarly equipped, except that it was outfitted with a Reson 7125 system (400/200 kHz dual frequency).

Refer to M-L906-KR-08 Data Acquisition and Processing Report for a complete listing of equipment and vessel descriptions.

B.2 Quality Control

Crosslines

Crosslines were planned and well distributed throughout the survey to ensure adequate quality control. Total crossline length surveyed was 61.1 nautical miles or 6.9 percent of the total main scheme line length. Each crossline was compared to the entire main scheme line plan and CUBE surface it intersected, using the CARIS HIPS QC report routine.

The majority of QC Reports fall well within the required accuracy specifications. However, beams that fall below the 95 percent confidence level in the QC report are associated with areas and conditions illustrated below. It should be noted that these locations are in agreement with the surrounding adjacent lines and are considered well within the required specifications.[3] Results are located in Separate IV. Note: QC reports were conducted line by line with GPS derived tides, and by vessel with verified tides applied. A 2m resolution BASE surface was used in the crossline comparisons.

The majority of beams that fall below the 95 percent confidence level are located in areas extremely steep slopes and/or rock.[4] **A figure 2** below provides an example. Note: Main scheme lines are shown in yellow and crosslines in purple.

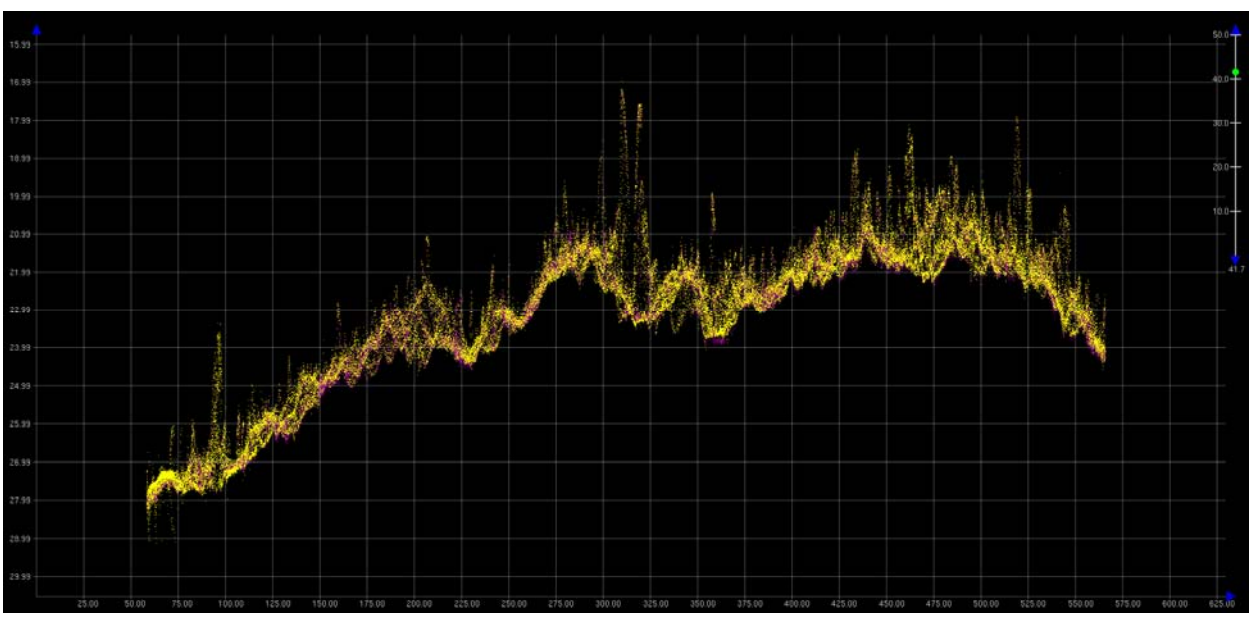

Figure 2 Profile of 5BF01-TIE51

Note: The QC reports were generated based on the given accuracy specification of:

$+/- \sqrt{(a^2 + (b * d)^2)}$ where a = 0.2, b = 0.01, and d = depth.

Uncertainty Values

The majority of H11976 had uncertainty values of 0.20 m to 0.40 m, which met project specifications.[5]

As seen in the uncertainty surface, uncertainty is generally lowest near the sonar nadir beams and increases toward the outside of each swath. This is primarily a result of sound velocity error uncertainty.

Other areas of higher uncertainty include rock outcrops and irregular bottom topography.

Oscillations along track and port to starboard in the uncertainty surface are due to higher uncertainty computed due to vessel roll, again prevalent mostly in the outer beams.

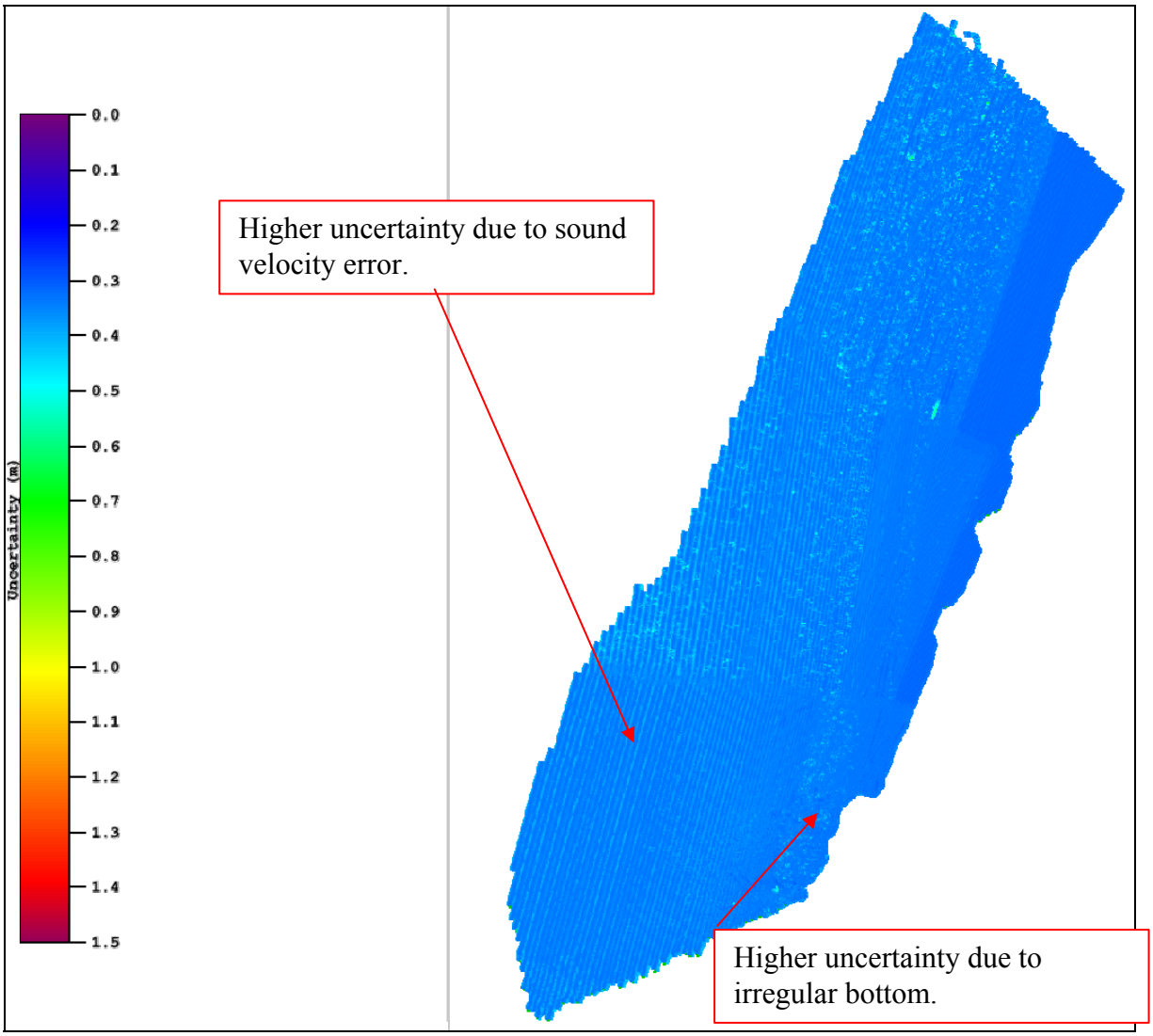

Figure 3 Uncertainty DTM

Survey Junctions[6]

H11976 (Sheet BF) junctions with:

Registry #	Date	Junction Side
H11977	2009	Southwest
H11978	2009	Northeast

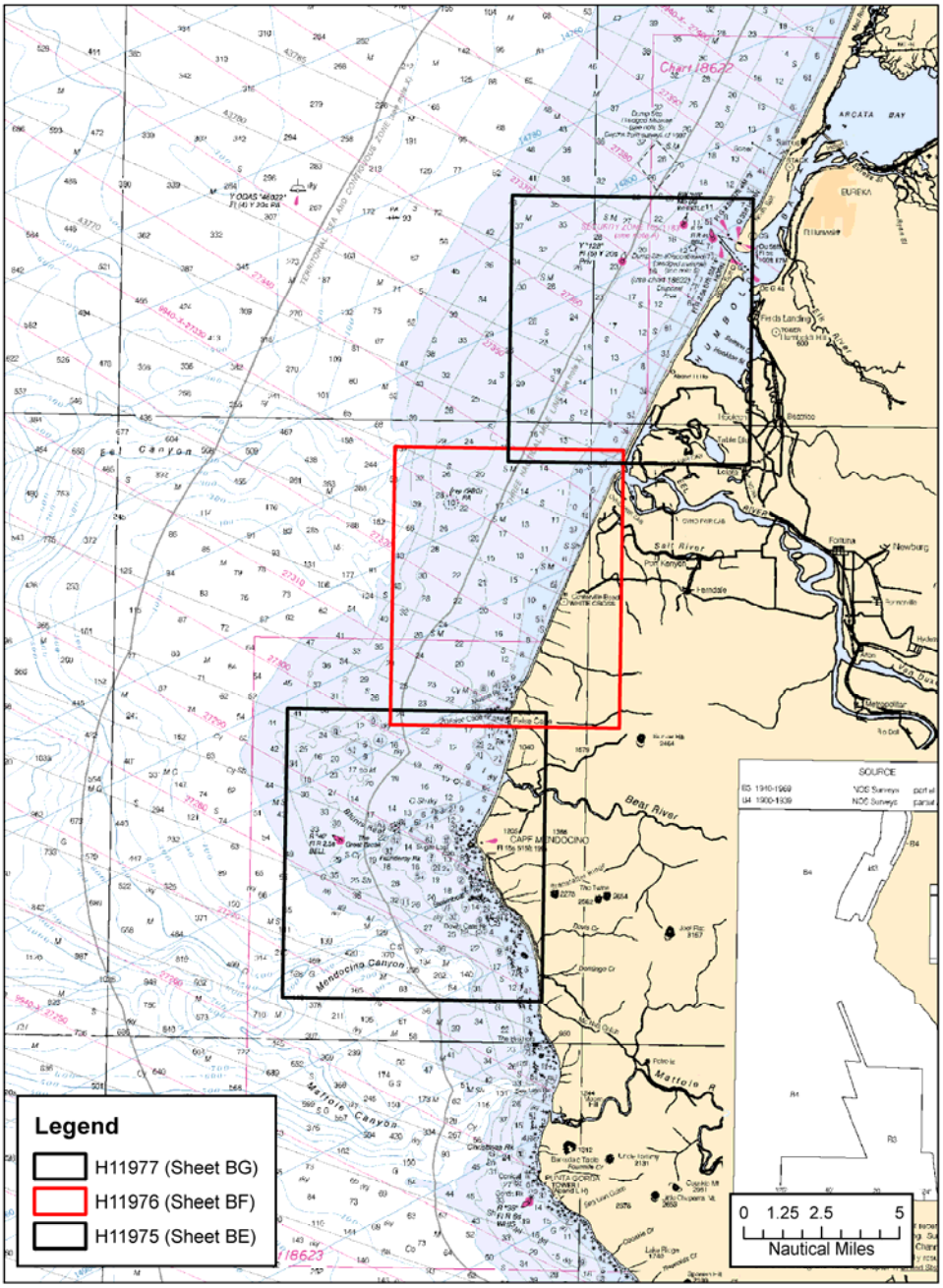

Figure 4 H11976 Survey Junctions

The surveys are in agreement along their common borders. The agreement was noted in the field using the CUBE surfaces during subset cleaning. The conformity is also apparent in the Final Combined BASE Surfaces.

Quality Control Checks

Positioning system confidence checks were conducted on a daily basis using the (POS MV) controller software. The controller software had numerous real-time displays that were monitored throughout the survey to ensure the positional accuracies specified in the NOS Hydrographic Surveys Specifications and Deliverables were achieved. These include, but are not limited to the following: GPS Status, Position Accuracy, Receiver Status (which included HDOP), and Satellite Status. During periods of high HDOP and/or low number of available satellites, survey operations were suspended.

Sonar system confidence checks were performed weekly by comparing post processed depth information collected by multiple vessels surveying over a common area. In addition, bar checks were performed to maintain a high confidence level. Sound Velocity Probe confidence checks were conducted weekly by producing comparative sound velocity data between all vessels. This was conducted by having all sound velocity profiling equipment (MVP and SVPs) perform a cast in close proximity to each other in a near simultaneous time period.

Comparison of PPK-GPSTide and Zoned Verified Tides

Tidal corrections for this survey were done using PPK-GPS derived altitudes which were reduced to MLLW using VDatum grids and the CARIS HIPS GPSTide function. Since conventional tidal data and zones were available, gross error and reality check comparisons were done between data corrected using both methods. The following tests were performed:

1. For a snapshot of general agreement throughout the survey area, a copy of the crossline data was corrected using zoned, verified smoothed tides. QC reports were then generated in HIPS for these "tidal" crosslines versus the BASE surfaces (GPSTide method) in the same manner described in the crossline comparison section above.

   Results:
   Most "tidal" beams for R2 passed at 95% confidence interval or better as compared to the BASE surfaces. Results are available in Separate IV.

   Most "tidal" beams for D2 and the Pacific Star did not pass at a 95% confidence interval in using the project defined S-44 values of a=.2 and b=.01. Failure is due to a vertical offset consistently seen in all sheets (See **Table 2** below). Several factors can be attributed to the offset including a NOAA published uncertainty of 13.1cm for the v-datum region (http://vdatum.noaa.gov/docs/est_uncertainties.html), inability to measure the waterline (static draft) value on the Pacific Star in less than ideal sea states, and D2

lines located in areas having extremely steep slopes and/or rocks as discussed in the Crossline section of the report. Even though this vertical offset was consistent through all sheets, the shallow nature of H11976 caused the crossline comparison for "tidal" beams to fall below the 95% confidence interval whereas other sheets with deeper overall depths easily passed. When crossline comparisons were performed using the IHO S-44 Order 1 criteria, a=.5 and b=.013, all "tidal" beams for D2 and the Pacific Star passed at a 95% confidence interval or better.

Table 2 – Crossline Verified Tide vs GPS Tide Surface Difference

Dataset	Median	Mean	Standard Deviation
SHT_AU_Diff_Surface	-0.26	-0.252	0.052
SHT_AV_Diff_Surface	-0.23	-0.222	0.134
SHT_AW_Diff_Surface	-0.30	-0.297	0.115
SHT_AX_Diff_Surface	-0.29	-0.267	0.097
SHT_AY_Diff_Surface	-0.21	-0.213	0.077
SHT_AZ_Diff_Surface	-0.19	-0.196	0.077
SHT_BA_Diff_Surface	-0.23	-0.230	0.073
SHT_BB_Diff_Surface	-0.22	-0.213	0.130
SHT_BC_Diff_Surface	-0.18	-0.180	0.110
SHT_BD_Diff_Surface	-0.18	-0.180	0.116
SHT_BE_Diff_Surface	-0.23	-0.228	0.128
SHT_BF_Diff_Surface	-0.19	-0.191	0.051
SHT_BG_Diff_Surface	-0.24	-0.224	0.064

2. In order to identify and quantify any static offsets between the two processing methods, a difference surface was created in Caris Bathy DataBASE 2.3 using a CUBE surface created from the crosslines and a CUBE surface created from the same crosslines corrected using zoned, verified smooth tides. Difference surface = (tidal surface minus GPSTide surface). Both surfaces were created at a 2m resolution.

   Results: Average difference was -0.191 m; median difference was -0.19 m, with a standard deviation of 0.051 m. Therefore, the GPSTide surface was about 19 cm shoaler on average. No significant trends were apparent, but a portion of the difference can be attributed to the high uncertainty or inability to measure the waterline (static draft) value on the Pacific Star in less than ideal sea states. See **Figure 6** below.

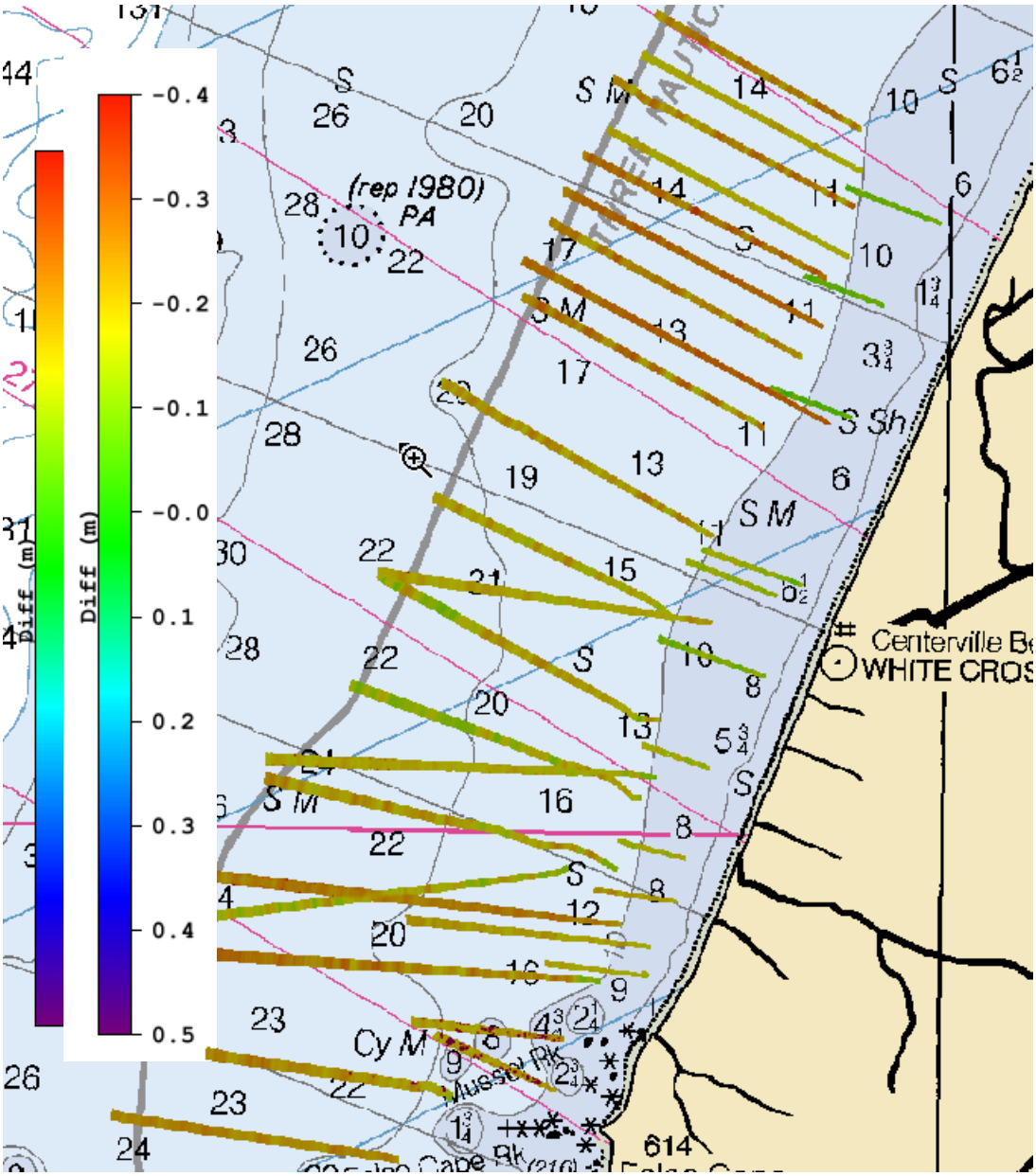

Figure 5 H11976 Difference Surface (Tidal minus GPSTide)

In conclusion, absolute correctness of one source of tidal correction over the other cannot be determined by direct comparisons between the two data sets. However, data corrected using both methods statistically compares very well to each other, and qualitatively the matchup between adjacent lines is good using both methods. Therefore, for this survey, the GPSTide method of tidal correction meets specification and is an acceptable alternative to the standard tidal method.[7]

Data Quality

In general, the multibeam data quality for H11976 was good. Three notable problems follow:

1. A general downward and/or upward cupping is noticeable in the across track sounding profiles for certain areas. This is possibly due to a high volume of thermal layering and strong undercurrents in the water column. This problem was addressed by conducting SVP casts more frequently and reducing the line spacing interval. Even though this SVP error is noticeable in the data, it is within required specifications.[8]

R2 and D2 collected sound velocity profiles every two hours (or less) to compensate for velocity changes over time. Profiles were collected on alternate ends of lines, or often in the middle of lines, to minimize the spatial aspect of sound velocity changes.

The MVP system on the Pacific Star was also used at an interval of every two hours, except that the system was used to collect as many as five profiles along the course of a single line. Two hours later, another set of profiles would be collected, with the net result being the creation of a grid of sound velocity profiles that kept differences in time and distance to a minimum between the survey data and the in-use sound velocity profile.

2. Some small holidays exist in the data. These are due to insufficient along or across track data density due to the irregular bottom topography. The holidays are small, in relatively deep water, and no shoaling is evident along their edges.[9]

3. Some tide busts occur sporadically between adjacent lines. This was due to lower post-processed GPS accuracy than normal on certain lines. Although the busts are apparent in subset edit mode, they are relatively small (less than 0.10 m) and within specifications.[10]

4. Dynamic bottom issues were also present in H11976. Data acquisition for survey H11976 occurred from November 25, 2008 through December 21, 2008, and again from September 4, 2009 through October 8, 2009. This 10 month time span resulted in vertical busts appearing between data collected in opposing years. These vertical busts can be attributed to dynamic bottom conditions occurring due to natural sediment transportation. When dynamic bottom was suspected, permanent features (i.e. rocks) were located to verify that the data from opposing years was in agreement. A sample of the dynamic bottom can be seen in **Figure 6**. Where appropriate, the shoaler data was retained.[11]

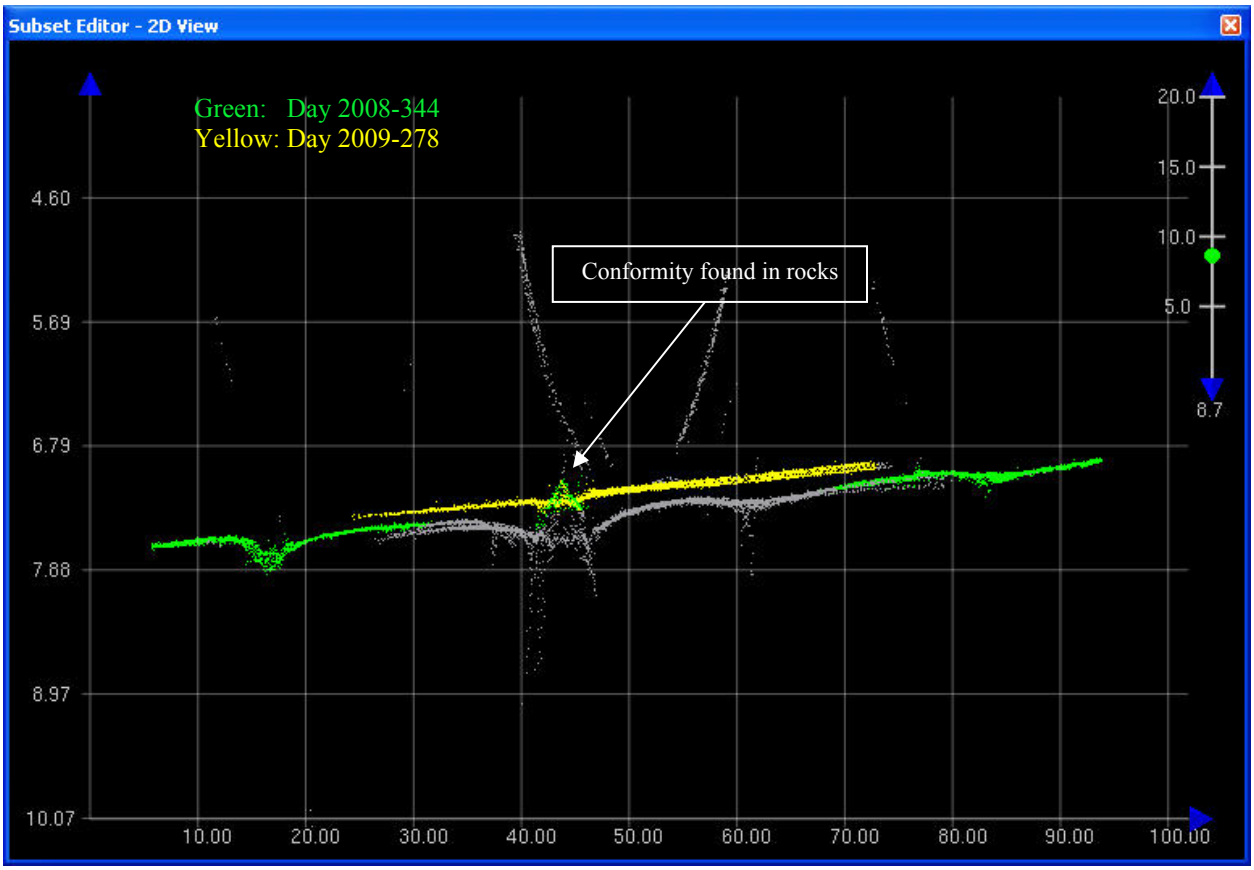

Figure 6 H11976 Dynamic Bottom

Object detection requirements were met by minimizing vessel speed when necessary, using sonar range scales appropriate to the water depth to maximize ping rates, and by maximizing swath overlap. These variables were adjusted in real-time by the online acquisition crew, based on the WinFrog QC and coverage displays. The office-based processing crew provided feedback after preliminary processing and coverage creation in CARIS HIPS, and reported re-runs or in-fills as necessary to the acquisition crew.

Refer to the M-L906-KR-08 Data Acquisition and Processing Report for a detailed description of the survey equipment and methodology used over the course of this survey.

B.3 Corrections to Echo Soundings

Refer to the M-L906-KR-08 Data Acquisition and Processing Report for a detailed description of all corrections to echo soundings. No deviations from the report occurred.

B.4 Data Processing

Refer to the M-L906-KR-08 Data Acquisition and Processing Report for a detailed description of

the processing flow.

The final fieldsheet for H11976, named "H11976_(Sheet_BF)", contains 3 BASE surfaces. The following parameters were used:[12]

0-33 meters: 1 m resolution, name "H11976_1m_Final"
30-45 meters: 1.5 m resolution, name "H11976_1_5m_Final"
40-84 meters: 2 m resolution, name "H11976_2m_Final"

Notes:

- Maximum depth was approximately 48 m; therefore resolutions coarser than 2m were not computed.
- Due to the quantity of data, final CUBE BASE surfaces were created with CARIS v 7.0 in the CARIS Spatial Archive (CSAR) format. These surfaces are located under the "H11976_(Sheet_BF)\CARIS\Fieldsheets\" directory.

The final S57 file for this project is called "H11976_S57_Features.000". This file contains the object and metadata S57 objects as required in the Specifications and Deliverables. [13]

C. VERTICAL AND HORIZONTAL CONTROL

Refer to the M-L906-KR-08 Horizontal and Vertical Control Report for a detailed description of the horizontal and vertical control used on this survey. No deviations from the report occurred. A summary of the project's horizontal and vertical control follows.

Horizontal Control

The horizontal control datum for this survey was the North American Datum of 1983 (NAD83).

For real-time DGPS corrections, a CSI MBX-3 unit was tuned to the Cape Mendocino, CA. USCG DGPS site. The unit output differentially corrected positions at 1 Hz to the (POS MV) 320 V4 where it was integrated with inertial data; and a position for the top-center of the IMU was generated. This position was logged concurrently with the bathymetry from WinFrog and the POS file by WinFrog PosMvLogger. It was later corrected for offsets to the multibeam echosounder (MBES) by CARIS HIPS in processing.

Final positioning, however, was done using post-processed kinematic (PPK) methods. Applanix POSPac software was used in conjunction with the POS files and local base station data to generate a higher accuracy position which was applied in processing, replacing the real-time position records.

See M-L906-KR-08 Horizontal and Vertical Control Report for a more detailed description of PPK positioning methods used.

Vertical Control

All sounding data were initially reduced to mean lower low water (MLLW) using preliminary tidal data. It should be noted that preliminary tides were used in the field for the initial stage of processing only.

Table 2 – Tide Gauge

Gauge	Location	Latitude	Longitude
9418767	North Spit, CA	40° 46.0' N	124° 13.0' W
9416841	Arena Cove, CA	38° 54.8' N	123° 42.4' W
9415020	Point Reyes, CA	37° 59.7' N	122° 58.6' W

Final tidal corrections were generated using PPK processing methods in conjunction with NOAA's VDATUM model and the CARIS GPSTide routine. Applanix POSPac software

produced a smoothed best estimate of trajectory (SBET) file that, among other data, contained GPS altitudes based on the NAD83 ellipsoid (GRS 80). The SBET altitudes were loaded into every line in CARIS HIPS, and HIPS' GPSTide routine was run to compute a GPS-based tide. The GPSTide routine used a VDatum NAD83 to MLLW offset grid to produce MLLW tide correctors. This grid is an XYZ text file and is included with the CARIS data under the tide directory.

See M-L906-KR-08 Horizontal and Vertical Control Report for a more detailed description of the GPSTide methods.

D. RESULTS AND RECOMMENDATIONS

D.1 Chart Comparison

H11976 survey was compared with charts shown in Table 3. [14]

Table 3 – Chart Comparisons

Chart Number	Type	Cell Name	Scale	Edition	Edition Date
18010	Raster	n/a	1:811,980	21	Jan-07
18620	Raster	n/a	1:196,948	23	Jun-02
18640	Raster	n/a	1:207,840	25	Aug-05
18645	Raster	n/a	1:40,000	26	Sep-08
18622	Raster	n/a	1:25,000	54	Apr-10
18623	Raster	n/a	1:40,000	11	Aug-01
18626	Raster	n/a	1:40,000	15	Sep-00
18628	Raster	n/a	1:10,000	8	Nov-99
18640	ENC	US3CA14M	n/a	9	Jul-09
18620	ENC	US3CA15M	n/a	9	May-09
18007	ENC	US2WC12M	n/a	6	Jun-09
501	ENC	US1WC01M	n/a	23	Oct-09

Comparison of Soundings

A comparison of soundings was accomplished by overlaying the latest edition of NOAA charts and ENCs on the final BASE surfaces in CARIS HIPS & SIPS. The general agreement between charted soundings and H11976 soundings was noted. A more detailed comparison was undertaken for any charted shoals or other dangerous features.

Agreement between soundings on this survey and all charts is good (Raster and ENC), with BASE surface depths comparing to charted soundings generally within +/- 1 fathom. Exceptions follow:

1. Conformity to the charts was found to be in some areas poor. Deviations from the charts were found in the Mussel Rock (40˚31’21”N 124˚23’26”W) and False Cape Rock (40˚30’36”N 124˚23’48”W) area and extended just offshore of the 20 fathom contour. Some shoal and rock areas were found be more extensive that previously charted and need to be revised. This includes areas of sporadic subsurface rocks found in between currently charted shoals as well as subsurface rock outcroppings which were found to be more extensive than previously charted. Recommend revising existing contours and shoal areas to conform to sounds collected in survey H11976. [15]

2. Several charted islets and rocks found in the Mussel Rock (40˚31'21"N 124˚23'26"W) and False Cape Rock (40˚30'36"N 124˚23'48"W) area on ENC US2WC12M are not revealed on hydrographic survey H11976 and should be removed from the chart.[16]

Automated Wreck and Observation Information System

There were no AWOIS items assigned to H11976.[17]

Charted Features

There were no charted features labeled ED, PD, or PA within the limits of H11976.[18]

Dangers to Navigation

Five dangers to navigation were found and reported for this survey. See Appendix I for DtoN's reports. [19]

D.2 Additional Results

None to note.

Bottom Samples

None were assigned for this sheet. [20]

Aids to Navigation

No charted aids to navigation existed in the survey area. [21]

No uncharted aids to navigation were found in the survey area. [22]

E. APPROVAL SHEET

Approval Sheet

For

H11976

Standard field surveying and processing procedures were followed in producing this survey in accordance with the following documents:

M-L906-KR-08 Statement of Work
NOS Hydrographic Surveys Specifications and Deliverables, April 2008 Edition
Fugro Pelagos, Inc. Acquisition Procedures (2009-MBES_Acquisition_Procedures_R0);
Fugro Pelagos, Inc. Processing Procedures (2009-MBES_Processing_Procedures_R0)

The data were reviewed daily during acquisition and processing, and the survey is complete and adequate for its intended purpose.

This report has been reviewed and approved. All records are forwarded for final review and processing to the Chief, Pacific Hydrographic Branch.

Approved and forwarded,

David D Briggs,
Lead Hydrographer
Fugro Pelagos, Inc.
May 3, 2010

5/3/2010

X

David D Briggs
Lead Hydrographer

Revisions compiled during office processing and certification

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[1] Concur.
[2] Concur.
[3] Concur.
[4] The data is adequate to supersede charted data in the common area despite falling below the 95% confidence level on the crossline comparison.
[5] Concur. Areas of higher uncertainties are common in these situations. Data is adequate to supersede charted data in the common area.
[6] H11976 junctions with H11975 to the South. A common junction was made with an adjoining portion of this survey. A common junction will be made with H11977 to the North. during compilation process.
[7] Concur.
[8] Concur. The data is adequate to supersede charted data in the common area.
[9] Holiday was examined in Caris HIPS and SIPS and there were no navigationally significant features were found. Chart as depicted in the HCell.
[10] Concur. Data is adequate and within specs to supersede charted data in the common area despite the offset problem.
[11] Concur. Chart depths as depicted in the HCell.
[12] A 2 meter combined surface was created during the Survey Acceptance Review and was used for cartographic compilation for this survey
[13] Concur with clarification. The submitted hob files were used in the compilation of HCell H11976. During compilation, some modifications were made to accommodate chart scale. Chart features as depicted in the HCell.
[14] Concur with clarification. H11976 only falls on charts 18623 and 18620. During Office processing the following charts were used for the compilation of H11976: charts 18623 scale 1:40.000 and 18620 scale 1:200,000 using the latest editions.
[15] Concur. Chart depths as depicted in the HCell.
[16] Concur. A blue note was added to the HCell to remove charted islets from the ENC US2WC12M
[17] Concur.
[18] Concur.
[19] DTONs report is attached to this document. None of the reported DTONs were applied to the charts, but all are included in the HCell.
[20] Nine bottom samples were imported from the ENC to be retained and six blue notes were added to the HCell to retain bottom samples on chart 18623.
[21] Concur.
[22] Concur.

H11976 Danger to Navigation Report

Registry Number: M-L906_KR-08

State: California

Locality: Pacific Ocean-- Northern California

Sub-locality: Eel River to Mussel Rock

Project Number: H11976

Survey Dates: 11/25/2008 - 10/10/2009

5 Dangers to Navigation

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
18623	11th	08/04/2001	1:40,000 (18623_1)	USCG LNM: 3/24/2009 (1/4/2011) NGA NTM: None (1/15/2011)
18620	23rd	06/01/2002	1:200,000 (18620_1)	USCG LNM: 10/12/2010 (1/4/2011) NGA NTM: 8/5/2006 (1/15/2011)
18010	21st	03/01/2007	1:811,980 (18010_1)	USCG LNM: 12/7/2010 (1/4/2011) CHS NTM: None (12/31/2010) NGA NTM: 11/25/2006 (1/1/2011)
18007	33rd	02/01/2009	1:1,200,000 (18007_1)	USCG LNM: 12/7/2010 (1/4/2011) CHS NTM: 12/31/2010 (12/31/2010) NGA NTM: 10/31/2009 (1/1/2011)
18020	38th	10/01/2007	1:1,444,000 (18020_1)	USCG LNM: 12/21/2010 (1/4/2011) NGA NTM: 11/20/2010 (1/1/2011)
501	13th	06/01/2009	1:3,500,000 (501_1)	USCG LNM: 12/7/2010 (1/4/2011) CHS NTM: 1/30/2009 (12/31/2010) NGA NTM: 11/20/2010 (1/15/2011)
530	33rd	10/01/2010	1:4,860,700 (530_1)	USCG LNM: 12/7/2010 (1/4/2011) CHS NTM: 12/26/2008 (12/31/2010) NGA NTM: 11/20/2010 (1/15/2011)
50	7th	11/01/2010	1:10,000,000 (50_1)	USCG LNM: 11/23/2010 (1/4/2011) CHS NTM: 2/23/2007 (12/31/2010) NGA NTM: 2/13/2010 (1/15/2011)

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

Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item

Generated by Pydro v9.10 (r2824) on Thu Jan 13 22:14:28 2011 [UTC]

1.1	Rock	11.52 m	40° 30' 26.3" N	124° 25' 01.5" W	---
1.2	Rock	11.16 m	40° 31' 03.1" N	124° 24' 12.3" W	---
1.3	Rock	10.42 m	40° 31' 18.2" N	124° 23' 60.0" W	---
1.4	Rock	15.73 m	40° 31' 29.0" N	124° 24' 15.9" W	---
1.5	Rock	11.89 m	40° 31' 36.2" N	124° 23' 50.7" W	---

1 - Danger To Navigation

1.1) GP No. - 1 from DtoN_1.xls

DANGER TO NAVIGATION

Survey Summary

Survey Position:	40° 30' 26.3" N, 124° 25' 01.5" W
Least Depth:	11.52 m (= 37.80 ft = 6.300 fm = 6 fm 1.80 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2009-253.23:14:23.000 (09/10/2009)
GP Dataset:	DtoN_1.xls
GP No.:	1
Charts Affected:	18623_1, 18620_1, 18010_1, 18007_1, 18020_1, 501_1, 530_1, 50_1

Remarks:

This feature was found by contractor, Fugro Pelagos, during hydrographic survey operation. Depth was reduced to Mean Lower Low Water using GPS tides and VDATUM. Feature was found with 100% multibeam coverage.

Hydrographer Recommendations

Chart as surveyed.

Cartographically-Rounded Depth (Affected Charts):

6 ¼fm (18623_1, 18620_1, 18010_1, 18007_1, 18020_1, 530_1)

11.5m (501_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	SORDAT - 20091010
	SORIND - US,US,graph,H11976
	TECSOU - 3:found by multi-beam
	VALSOU - 11.52144 m
	WATLEV - 3:always under water/submerged

Feature Images

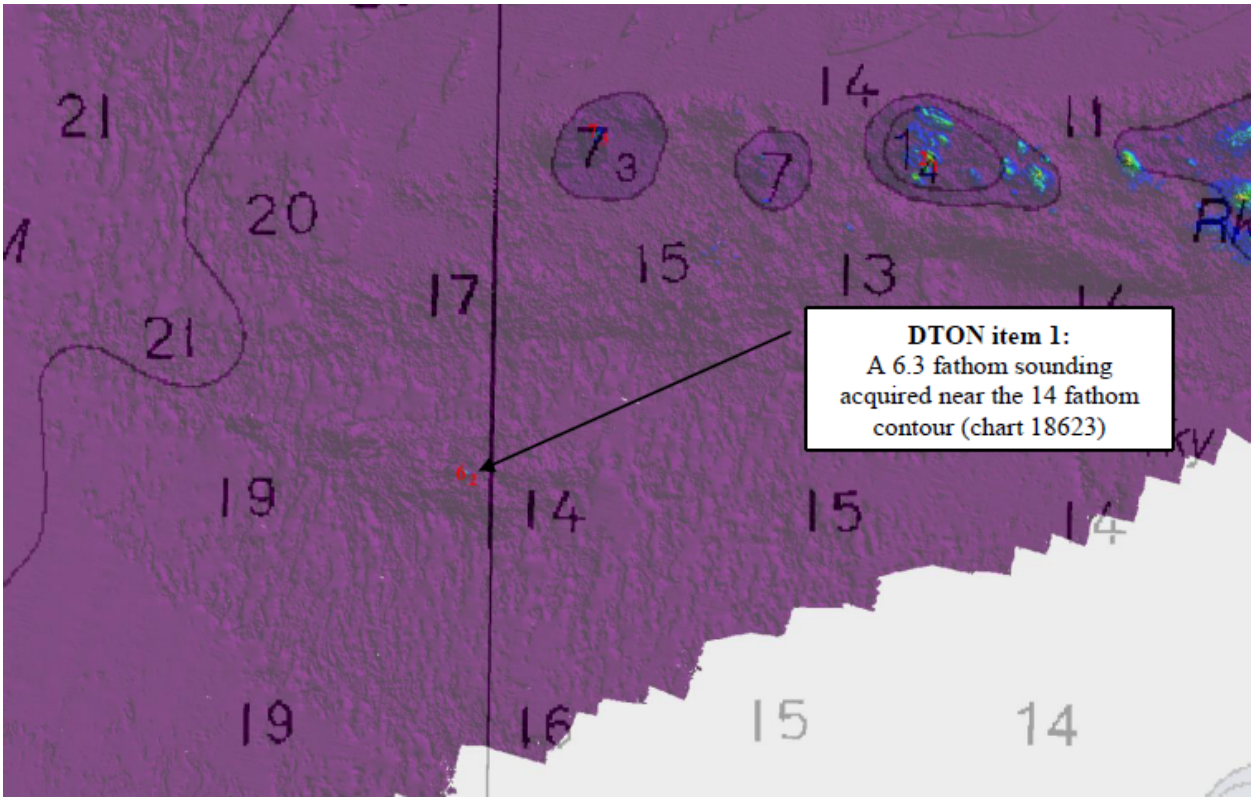

Figure 1.1.1

1.2) GP No. - 2 from DtoN_1.xls

DANGER TO NAVIGATION

Survey Summary

Survey Position:	40° 31' 03.1" N, 124° 24' 12.3" W
Least Depth:	11.16 m (= 36.60 ft = 6.100 fm = 6 fm 0.60 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2008-330.17:01:37.000 (11/25/2008)
GP Dataset:	DtoN_1.xls
GP No.:	2
Charts Affected:	18623_1, 18620_1, 18010_1, 18007_1, 18020_1, 501_1, 530_1, 50_1

Remarks:

This feature was found by contractor, Fugro Pelagos, during hydrographic survey operation. Depth was reduced to Mean Lower Low Water using GPS tides and VDATUM. Feature was found with 100% multibeam coverage.

Hydrographer Recommendations

Chart as surveyed.

Cartographically-Rounded Depth (Affected Charts):

6fm (18623_1, 18620_1, 18010_1, 18007_1, 18020_1, 530_1)

11.2m (501_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	SORDAT - 20091010
	SORIND - US,US,graph,H11976
	TECSOU - 3:found by multi-beam
	VALSOU - 11.15568 m
	WATLEV - 3:always under water/submerged

Feature Images

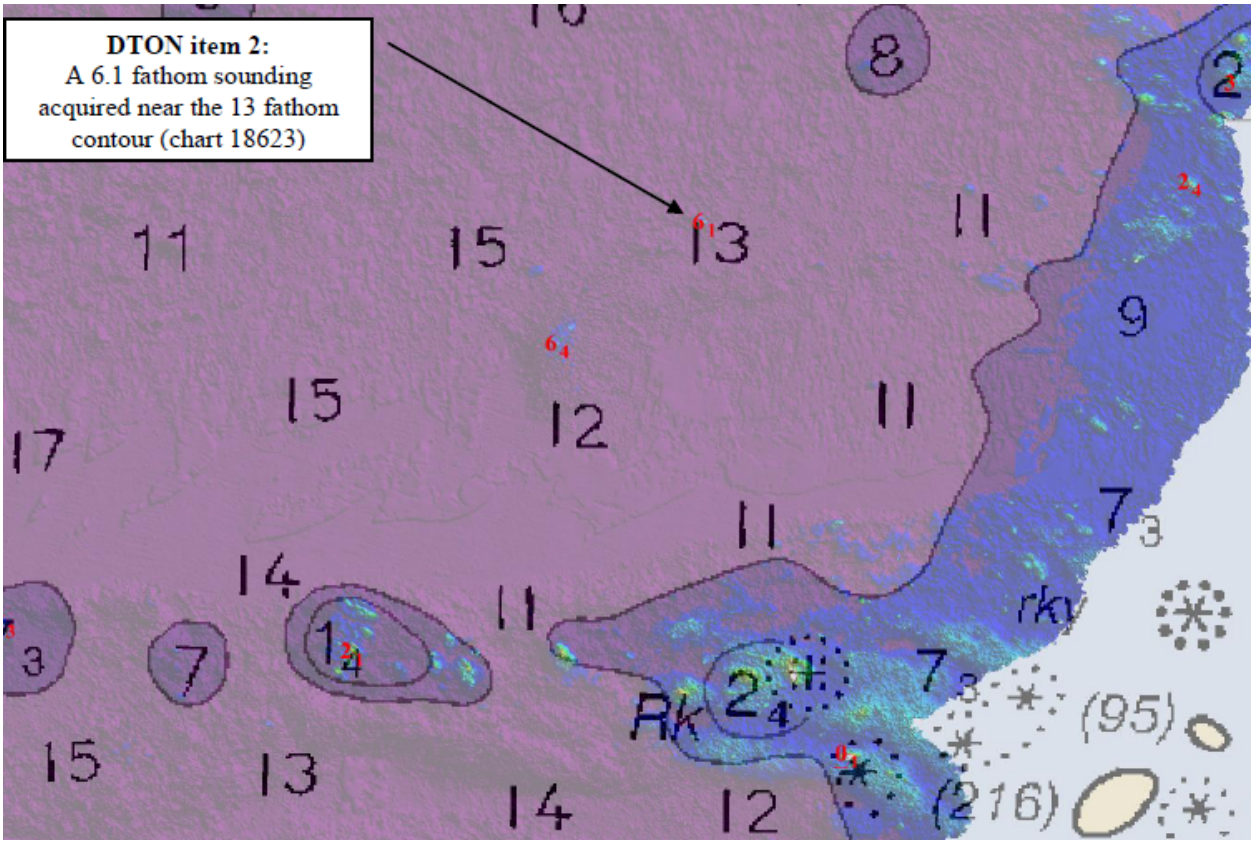

Figure 1.2.1

1.3) GP No. - 3 from DtoN_1.xls

DANGER TO NAVIGATION

Survey Summary

Survey Position:	40° 31' 18.2" N, 124° 23' 60.0" W
Least Depth:	10.42 m (= 34.20 ft = 5.700 fm = 5 fm 4.20 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2008-330.18:15:49.000 (11/25/2008)
GP Dataset:	DtoN_1.xls
GP No.:	3
Charts Affected:	18623_1, 18620_1, 18010_1, 18007_1, 18020_1, 501_1, 530_1, 50_1

Remarks:

This feature was found by contractor, Fugro Pelagos, during hydrographic survey operation. Depth was reduced to Mean Lower Low Water using GPS tides and VDATUM. Feature was found with 100% multibeam coverage.

Hydrographer Recommendations

Chart as surveyed.

Cartographically-Rounded Depth (Affected Charts):

5 ¾fm (18623_1, 18620_1, 18010_1, 18007_1, 18020_1, 530_1)

10.4m (501_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	SORDAT - 20091010
	SORIND - US,US,graph,H11976
	TECSOU - 3:found by multi-beam
	VALSOU - 10.42416 m
	WATLEV - 3:always under water/submerged

Feature Images

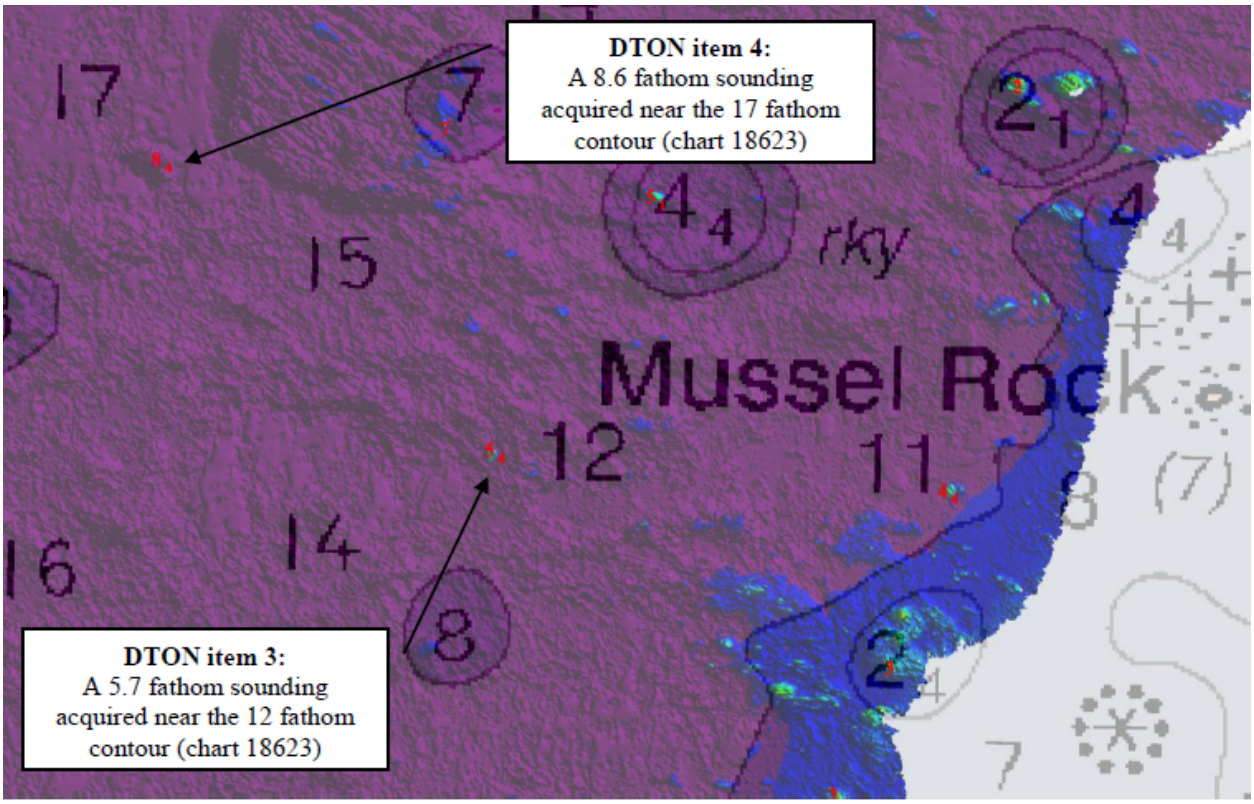

Figure 1.3.1

1.4) GP No. - 4 from DtoN_1.xls

DANGER TO NAVIGATION

Survey Summary

Survey Position:	40° 31' 29.0" N, 124° 24' 15.9" W
Least Depth:	15.73 m (= 51.60 ft = 8.600 fm = 8 fm 3.60 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2008-344.22:47:38.000 (12/09/2008)
GP Dataset:	DtoN_1.xls
GP No.:	4
Charts Affected:	18623_1, 18620_1, 18010_1, 18007_1, 18020_1, 501_1, 530_1, 50_1

Remarks:

This feature was found by contractor, Fugro Pelagos, during hydrographic survey operation. Depth was reduced to Mean Lower Low Water using GPS tides and VDATUM. Feature was found with 100% multibeam coverage.

Hydrographer Recommendations

Chart as surveyed.

Cartographically-Rounded Depth (Affected Charts):

8 ½fm (18623_1, 18620_1, 18010_1, 18007_1, 18020_1, 530_1)

15.7m (501_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	SORDAT - 20091010
	SORIND - US,US,graph,H11976
	TECSOU - 3:found by multi-beam
	VALSOU - 15.72768 m
	WATLEV - 3:always under water/submerged

Feature Images

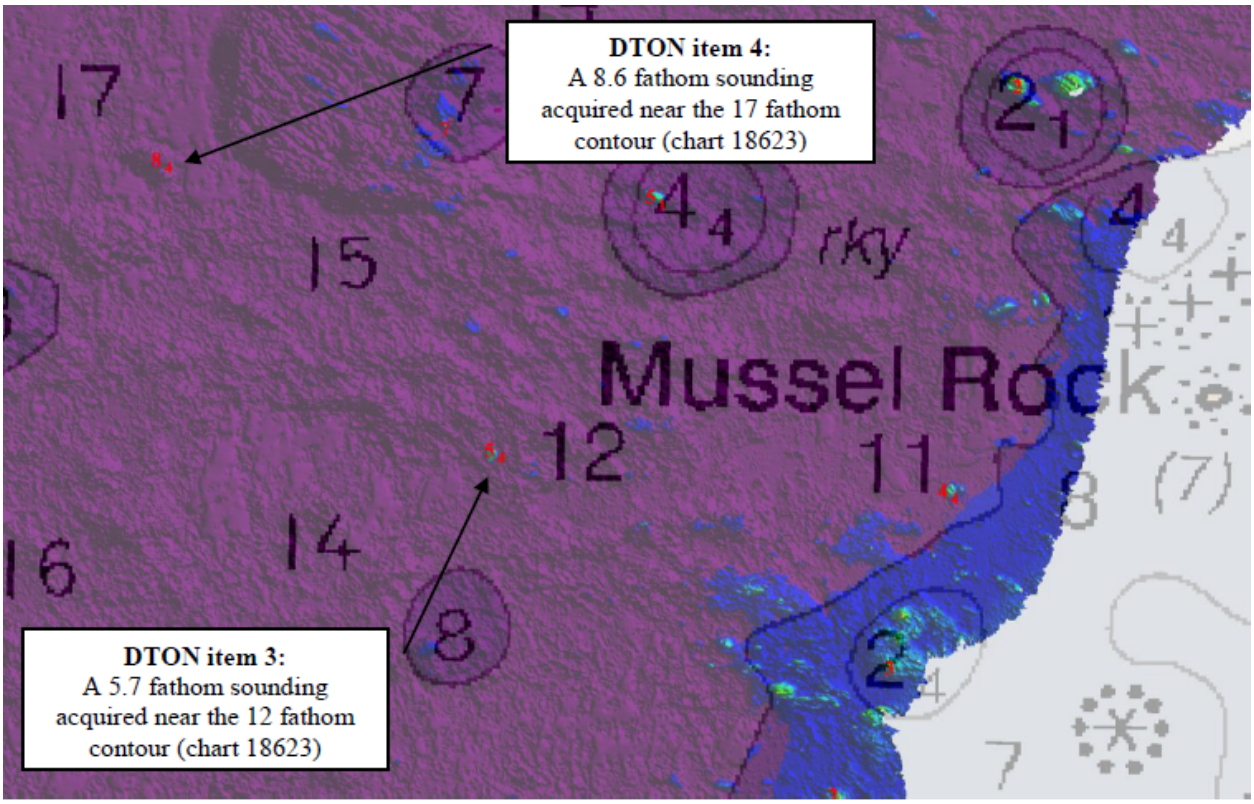

Figure 1.4.1

1.5) GP No. - 5 from DtoN_1.xls

DANGER TO NAVIGATION

Survey Summary

Survey Position:	40° 31' 36.2" N, 124° 23' 50.7" W
Least Depth:	11.89 m (= 39.00 ft = 6.500 fm = 6 fm 3.00 ft)
TPU (±1.96σ):	**THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp:	2009-253.22:54:41.000 (09/10/2009)
GP Dataset:	DtoN_1.xls
GP No.:	5
Charts Affected:	18623_1, 18620_1, 18010_1, 18007_1, 18020_1, 501_1, 530_1, 50_1

Remarks:

This feature was found by contractor, Fugro Pelagos, during hydrographic survey operation. Depth was reduced to Mean Lower Low Water using GPS tides and VDATUM. Feature was found with 100% multibeam coverage.

Hydrographer Recommendations

Chart as surveyed.

Cartographically-Rounded Depth (Affected Charts):

6 ½fm (18623_1, 18620_1, 18010_1, 18007_1, 18020_1, 530_1)

11.9m (501_1, 50_1)

S-57 Data

Geo object 1:	Underwater rock / awash rock (UWTROC)
Attributes:	SORDAT - 20091010
	SORIND - US,US,graph,H11976
	TECSOU - 3:found by multi-beam
	VALSOU - 11.8872 m
	WATLEV - 3:always under water/submerged

Feature Images

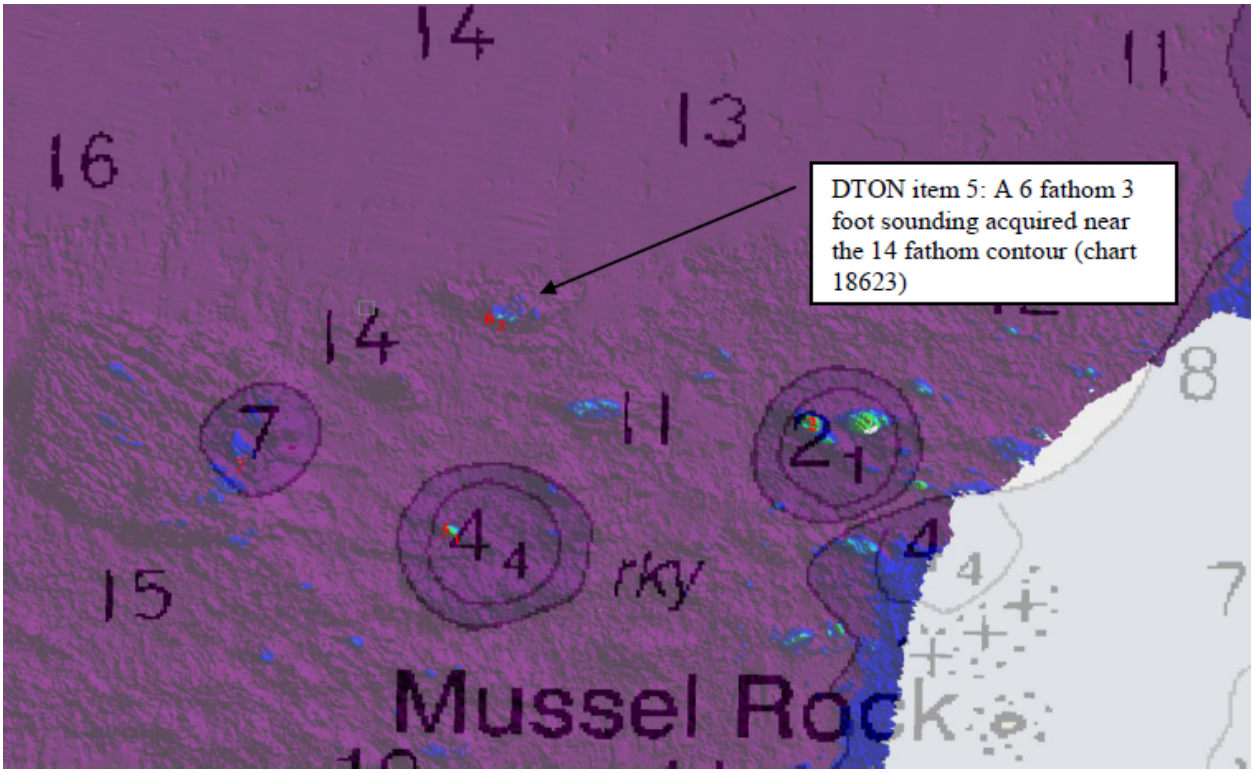

Figure 1.5.1

H11976 HCell Report

Fernando Ortiz, Physical Scientist
Pacific Hydrographic Branch

1. Specifications, Standards and Guidance Used in HCell Compilation

HCell compilation of survey H11976 used:

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

2. Compilation Scale

Depths and features for HCell H11976 were compiled to the largest scale raster charts shown below:

Chart	Scale	Edition	Edition Date	NTM Date
18623	1:40,000	11th	08/2001	03/12/2011
18620	1:200,000	23rd	06/2002	07/17/2010

The following ENCs were also used during compilation:

Chart	Scale
US2WC12M	1:200,000
US3CA15M	1:200,000

3. Soundings

A survey-scale sounding (SOUNDG) feature object layer was built from the 2-meter Combined Surface in CARIS BASE Editor. A shoal-biased selection was made at 1:30,000 for the 18623 chart at survey scale using a Radius Table file with values shown in the table, below.

Shoal Limit (m)	Deep Limit (m)	Radius (mm)
-5	10	2
10	20	3
20	50	3.5
50	500	4

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 18623	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 H11976_SS.000
3	5.4864	5.715	3.125	3
5	9.144	9.3726	5.125	5
10	18.288	18.5166	10.125	10
20	36.576	37.9476	20.75	20

5. Meta Areas

The following Meta object areas are included in HCell H11976:

M_CSCL
M_QUAL

The Meta area object was 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_CSCL	Compilation Scale of Data
M_QUAL	Data quality Meta object
SBDARE	Bottom samples, rocky seabed areas
SOUNDG	Soundings at the chart scale density
UWTROC	Rocks

The *_SS HCell contains the following Objects:

DEPCNT	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

H11976 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

H11976_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:40,000 and 1:200,000
H11976 _SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:30,000
H11976 _DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H11976 _outline.gml H11976 _outline.xsd	Survey outline

11.2 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.
Northport Systems, Inc., Fugawi View ENC Ver.1.0.0.3	Independent inspection of final HCells using a COTS viewer.

12. Contacts

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

Fernando Ortiz
Physical Scientist
Pacific Hydrographic Branch
Seattle, WA
206.526.6859
Fernando.ortiz@noaa.gov.

APPROVAL SHEET
H11976

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

Fernando Ortiz
2011.04.15 11:30:40 -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
2011.04.15
11:32:28 -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: 2011.04.15 11:52:20 -07'00'

David Scharff
2011.04.21 20:04:11 -04'00'