

H11733

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. OPR-M-M924-KR-07
Registry No. H11733

LOCALITY

State CALIFORNIA
General Locality Northern California Coast
Sublocality Fort Ross Cove to Duncans Landing

2007

CHIEF OF PARTY

..... Andrew Orthmann, Fugro-Pelagos, Inc.

LIBRARY & ARCHIVES

DATE

HYDROGRAPHIC TITLE SHEET

H11733

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.
Sheet D

State CALIFORNIA

General Locality Northern California Coast

Sublocality Fort Ross Cove to Duncans Landing

Scale N/A Dates of Survey 03/04/2007 - 04/01/2007

Instructions Date 6/26/2007 Project No. OPR-M-M924-KR-07

Vessel F/V PACIFIC STAR (556510)

Chief of Party Andrew Orthmann

Surveyed by Orthmann, Moyles, Reynolds, Briggs, Gill, Mount, Farley, Lapointe, et al.

Soundings taken by echo sounders: Reson Seabat 8101 (Hull Mounted) echosounder

Graphic record scaled by Fugro Pelagos, Inc. personnel

Graphic record checked by Fugro Pelagos, Inc. personnel

Evaluation by G. Froelich Automated plot by N/A

Verification by G. Froelich, K. Reser

Soundings in Fathoms and Feet at MLLW

REMARKS: Time in UTC. UTM Projection Zone 10

Revisions and annotations appearing as endnotes were

generated during office processing.

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

All separates are filed with the hydrographic data.



A. AREA SURVEYED

H11733 (Sheet D) encompasses the area from Fort Ross Cove to Duncans Landing, California. It is bound by the coordinates listed in Table 1.

This data was originally collected by Fugro Pelagos, Inc. for the Seafloor Mapping Lab at California State University Monterey Bay (CSUMB) for the purpose of fisheries habitat mapping. CSUMB refers to this data set as “Northern Central California Coast State Waters Mapping Project Phase II”. After submission to CSUMB in June 2007, an agreement with NOAA was reached to reprocess and QC the data to produce deliverables that meet NOAA specifications and are suitable to OCS for nautical charting purposes¹. This report and accompanying data represent those deliverables.

Hydrographic data collection began on March 4, 2007 and ended on April 1, 2007.

Table 1 – Sheet Bounds

Point	Latitude (North)	Longitude (West)
1	38-31-55	123-19-40
2	38-31-55	123-07-38
3	38-23-01	123-07-38
4	38-23-01	123-19-40
5	38-31-55	123-19-40

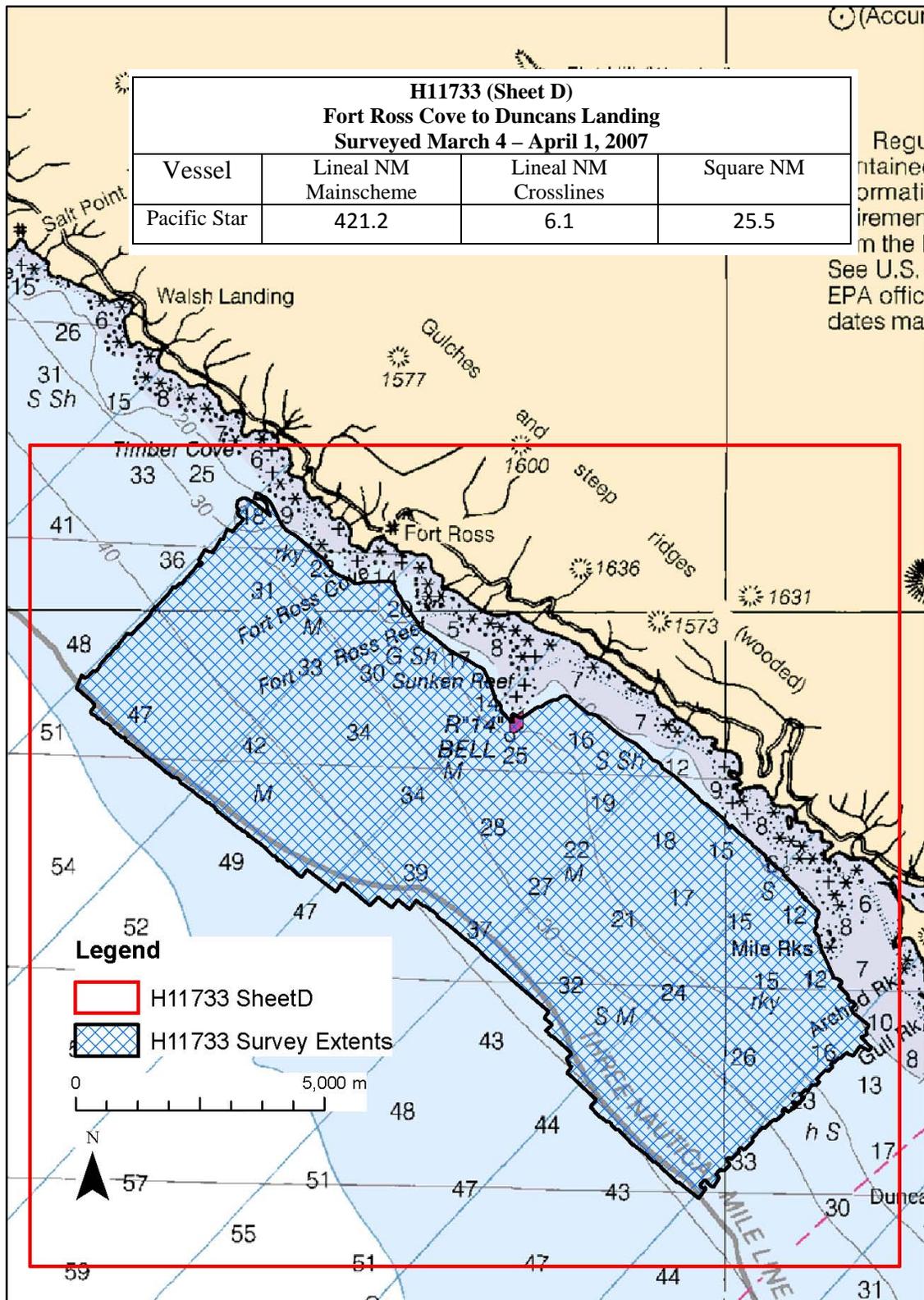


Figure 1 H11733 Area Surveyed

B. DATA ACQUISITION AND PROCESSING

Refer to the OPR-M-M924-KR-07 Data Acquisition and Processing Report² 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 F/V Pacific Star acquired all sounding data for H11733. The Pacific Star, which is 162 feet in length with a draft of 14 feet, was equipped with a Reson 8101 with option 033 (pseudo Side Scan) for multibeam data acquisition. The vessel was also equipped with two AML sound velocity and pressure sensors (SV&P) for sound velocity profiles. Vessel attitude and position were measured using an Applanix Position and Orientation System for Marine Vessel (POSMV 320 V4) with XTF files logged in Triton ISIS v7.1.428.53.

Refer to OPR-M-M924-KR-07 Data Acquisition and Processing Report for a complete listing of equipment and vessel descriptions.

B.2 Quality Control

Crosslines

Quality control crosslines were planned so that all main scheme lines would intersect with at least one crossline. This resulted in at least one crossline for each block of mainlines. Total crossline length surveyed was 6.1 nautical miles or 1.4 percent of the total main scheme nautical miles (5 % was not required). Conducted crosslines were distributed throughout the sheet to ensure adequate crossline distribution. All crosslines were compared to the mainline CUBE surface, using the CARIS HIPS QC report routine and all beams passed at 95 percent confidence level or better. Results are located in Separate IV³.

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

$$\pm \sqrt{a^2 + (b * d)^2}$$

where, a = 0.5, b = 0.013 and d = depth.

However, since a variance of a difference, rather than a variance from a mean is being used, the a and b values were defined in the user defined option within the CARIS HIPS QC Report routine:

$$a = 0.5 * \sqrt{2} = 0.707$$

$$b = 0.013 * \sqrt{2} = 0.018$$

Uncertainty Values

The majority of H11733 had uncertainty values of 0.30 to 0.60 m, with extremes of 0.23 m and 1.15 m. The effects of speed sound uncertainty are very apparent in the graphic below. No uncertainty values exceeded IHO Order 1.⁴

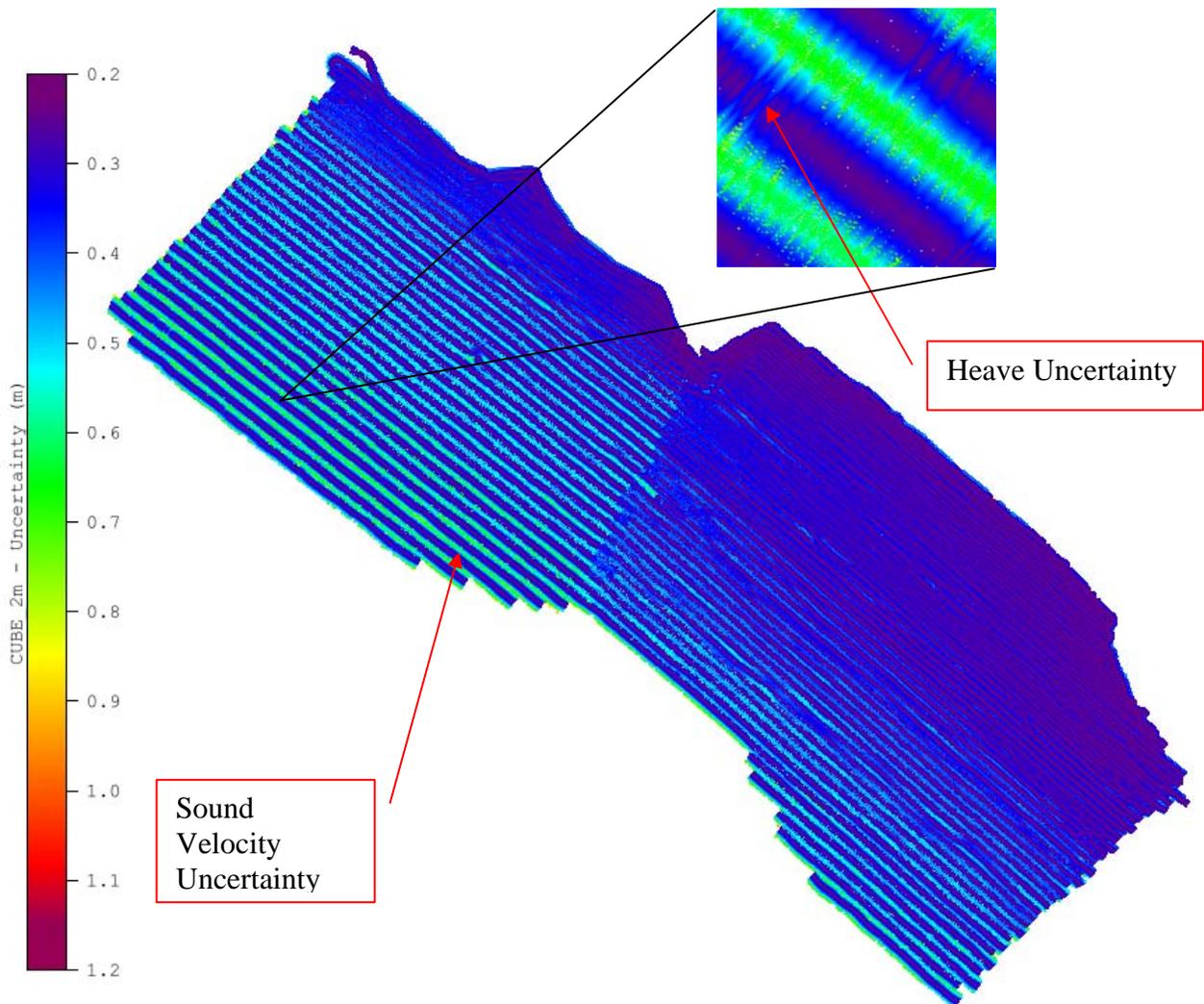


Figure 2 Uncertainty DTM

Survey Junctions

H11733 (Sheet D) junctions with:

Registry #	Date	Junction Side
H11732	2007	North
H11734	2007	South

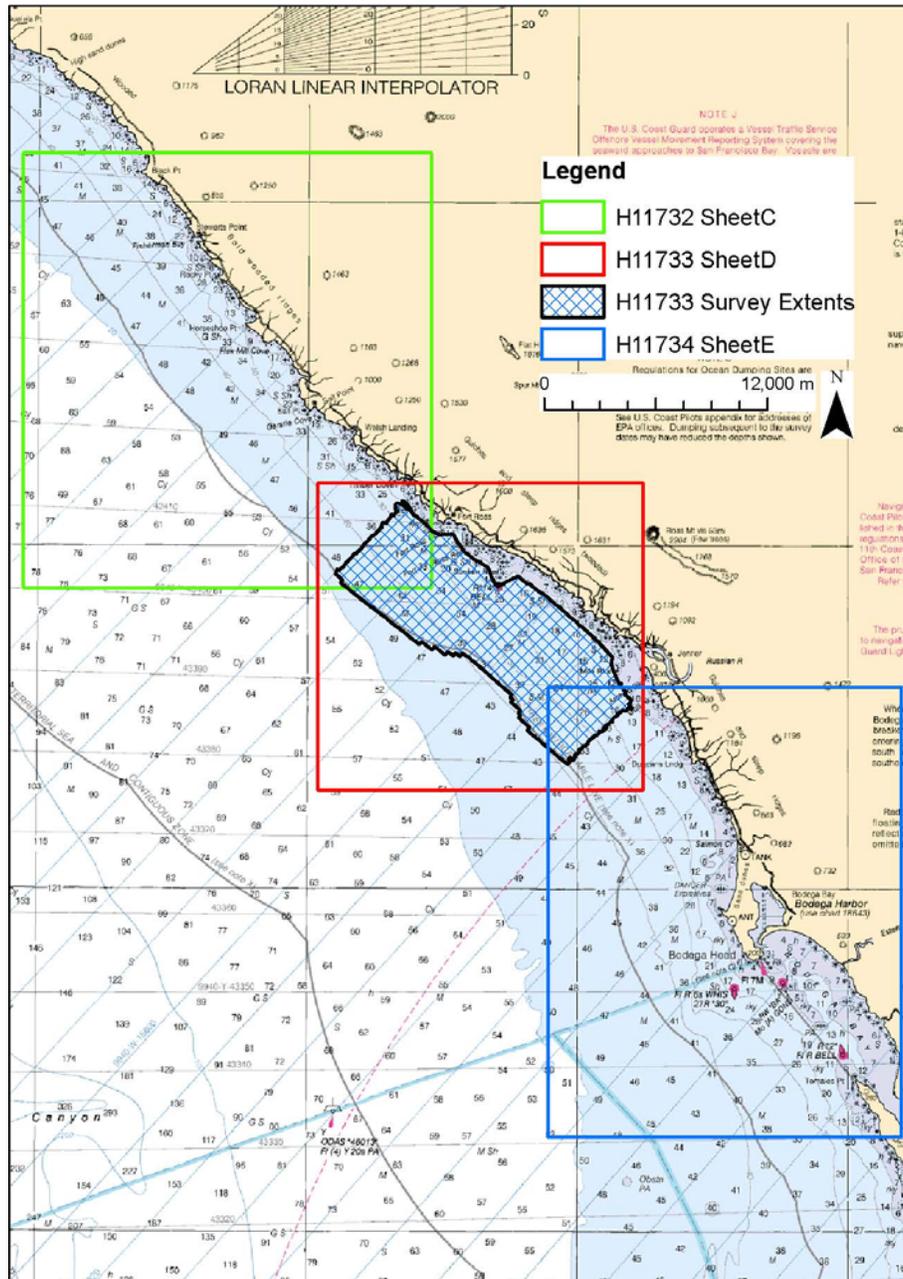


Figure 3 H11733 Survey Junctions

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.⁵

Quality Control Checks

Positioning system confidence checks were conducted on a daily basis using the POSMV 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 stopped.

Data Quality

In general, the multibeam data quality for H11733 was good. Three notable problems follow:

- During data acquisition and routine processing, a general downward and/or upward cupping was noticed in the across track sounding profiles for certain areas. This is possibly due to a high volume of thermal layering and strong under currents 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 on the uncertainty surface, the data is within required specifications.⁶
- During data acquisition and routine processing an across-track oscillation in the survey data was noted and attributed to heave error. Error was directly proportional to swell / wave height and varied from 0.05m to 0.10m. Though not apparent in the 1x depth DTMs the effect can be seen if greater vertical exaggerations are used. The problem could not be compensated for but was considered the best that could be expected from the heave compensation system in the long-period swell experienced on this survey (POSMV manufacture specs are heave at +/- 5 % of heave amplitude). Though the effect can be seen on the uncertainty surface, the data is within required specifications.⁷
- Dungeness crab fishery was ongoing while this survey was underway; many crab pots buoys were encountered while surveying in 15m to 30m water depths. This made navigation difficult as the survey vessel attempted to avoid them, sometimes leading to small holidays that could not be filled. Shoaling was not observed on the edges of these holidays.⁸

Sound velocity profiles were collected every two to three hours to compensate for velocity changes over time. Profiles were collected on alternate ends of lines to minimize the spatial aspect of sound velocity changes.

Object detection requirements were met by minimizing vessel speed, using sonar range scales appropriate to the water depth to maximize ping rates, and maximizing swath overlap. These variables were adjusted in real-time by the online acquisition crew based on the ISIS and DelphMap QC and coverage displays. Ship-board processing crew provided feedback in near real-time after preliminary processing and coverage creation in CARIS HIPS.

Refer to the OPR-M-M924-KR-07 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 OPR-M-M924-KR-07 Data Acquisition and Processing Report for a detailed description of all corrections to echo soundings and lead line measurements. No deviations from the report occurred.

B.4 Data Processing

Refer to the OPR-M-M924-KR-07 Data Acquisition and Processing Report for a detailed description of the processing flow.

The final fieldsheet for H11733 is called “H11733-Final” and it contains three BASE surfaces. The following parameters were used:

- 0-25 meters: 1.5 m resolution, name “H11733_1_5m”.
- 22-50 meters: 2 m resolution, name “H11733_2m”.
- 45-150 meters: 4 m resolution, name “H11733_4m”.

Most of the surveyed area is deeper than 20m, therefore it does not support gridding at resolutions finer than 1.5m. 1.5 was chosen for this depth range as too many holidays open at 1m resolution.⁹

The final S57 file for this project is called “H11733_S57_Features.000”. This file contains the object and metadata S57 objects as required in the Specifications and Deliverables.

C. VERTICAL AND HORIZONTAL CONTROL

Refer to the OPR-M-M924-KR-07 Horizontal and Vertical Control Report¹⁰ 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). All raw positions were originally collected in WGS84 (ITRF00) and transformed to NAD83 by CARIS HIPS.

A STARFIX XP unit was used for the primary source of DGPS corrections. The Starfix XP service has a rated accuracy of +/- 0.15m. The unit output differentially corrected positions at 1-Hz to the POSMV 320 V4 where it was integrated with inertial data and a position for the top-center of the IMU was generated. This position was then logged concurrently with the bathymetry by ISIS and logged to the POS file by the POS Controller software. It was later corrected for offsets to the MBES sonar by CARIS HIPS in processing.

Vertical Control

All sounding data were initially reduced to MLLW using predicted tidal data from Ft. Ross and Pt. Reyes. Predicted tides were used only for preliminary data cleaning.

On October 12, 2007, John Oswald and Associates (JOA) issued a final tidal zoning scheme covering the project area. Verified tidal data was downloaded from the NOAA COOPS website (http://tidesandcurrents.noaa.gov/station_retrieve.shtml?type=Historic+Tide+Data). The data was then smoothed using a 5th order polynomial curve, and applied to the CARIS data on November 7, 2007. Verified tidal data were used for all final base surfaces. Refer to the Horizontal and Vertical Control Report for additional tidal information and station descriptions.

Table 2 - Tide Gauges

Gauge	Location	Latitude	Longitude
9415020	Point Reyes, CA	37° 59.8' N	122° 58.5' W
9416841	Arena Cove, CA	38° 54.8' N	123° 42.5' W

Table 3 - Final Tide Zones

Zone	Primary			
	Site	Number	Time Offset	Range Ratio
BB01	Point Reyes, CA	9415020	0	1.00
BB02	Point Reyes, CA	9415020	+6	1.01
BB03	Arena Cove, CA	9416841	0	1.00

D. RESULTS AND RECOMMENDATIONS

D.1 Chart Comparison

H11733 survey was compared with charts:

Table 4 – Chart Comparisons

Chart Number	Type	Cell Name	Scale	Edition	Edition Date as of Nov. 2007
	OPR-M-M924-KR-07				
18640	Raster	N / A	1:207,840	25 th	Aug. 2005
18640	ENC	US3CA14M	N / A	6 th	Sept. 6, 2007

Comparison of Soundings

A comparison of soundings was accomplished by generating shoal-biased soundings and contours in the CARIS Fieldsheet Editor and overlaying them on the latest edition NOAA charts. The general agreement between charted soundings and H11733 soundings was noted. A more detailed comparison was undertaken for any charted shoals or other dangerous features.

General agreement between this survey and chart 18640 (Raster and ENC) is good. Any significant differences are itemized below:

1. This survey found a depth of 13.2 fathoms at 38° 31' 03.20" N, 123° 16' 32.49" W where chart 18640 has an 18 fathom sounding.¹¹

correspondence in Appendix I.¹⁵

D.2 Additional Results

None to note.

Bottom Samples

None were assigned for this sheet.¹⁶

Aids to Navigation

A charted aid to navigation existed within the survey extents but investigation was not required.¹⁷

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

E. APPROVAL SHEET

Approval Sheet

For

H11733

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

OPR-M-M924-KR-07 Statement of Work
NOS Hydrographic Surveys Specifications and Deliverables, April 2007 Edition
Fugro Pelagos, Inc. Acquisition Procedures (2006- NOAAAcquisitionProcedures);
Fugro Pelagos, Inc. Processing Procedures (2006-NOAAProcessingProcedures);
Bodega Bay, CA QC and Zoning Report

The data were reviewed daily during acquisition and processing, and the survey is complete and adequate for its intended purpose.¹⁸

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,



Andrew Orthmann, Fugro Pelagos, Inc.
Lead Hydrographer
Fugro Pelagos, Inc. Survey Party

¹ Concur with clarification. Data meets specifications, verified during Survey Acceptance Review (SAR) performed at the Pacific Hydrographic Branch, PHB.

² Filed with project records.

³ Separate IV filed with hydrographic records.

⁴ Concur.

⁵ Concur.

⁶ Concur.

⁷ Concur.

⁸ Concur.

⁹ Concur.

¹⁰ Filed with project records.

¹¹ Concur.

¹² Concur with clarification. No AWOIS exist within the survey area.

¹³ Concur. See endnote 14.

¹⁴ Concur with clarification. Full coverage was not obtained on the rock and the least depth is unknown. The "4 fms rep 2007" note on raster chart 18640 should be removed and the rock charted as a dangerous underwater rock of unknown depth. The UWTROC feature from ENC US3CA14M was modified with the following attributes: EXPSOU = within range of depth of surrounding depth area, QUASOU = depth unknown, VALSOU = UNKNOWN, INFORM = rep 2007 – Surveyed to 4.045 usfm – Least depth unknown, SORDAT = 20070401, SORIND = US,US,nsurf,H11733.

¹⁵ Concur with clarification. See endnote 14. Appendix I filed with hydrographic records.

¹⁶ Concur with clarification. Charted bottom samples were retained with the exception of two. The two bottom samples with a NATSUR of rock were used in the ENC to denote rocky (rky) areas from the raster chart. The areas were determined not to be rocky based on the gridded surface.

¹⁷ Concur with clarification. Chart using latest ATONIS information.

¹⁸ Concur.

H11733 HCell Report
Katie Reser, Physical Scientist
Pacific Hydrographic Branch

Introduction

The primary purpose of the HCell is to directly update NOAA ENC's with new survey information in International Hydrographic Organization (IHO) format S-57. HCell compilation of survey H11733 utilized Office of Coast Survey HCell Specifications Version 2.0, April 2, 2007. HCell H11733 will be used to update charts 18640,1:207,840 (25nd Ed.; August 05, NM 3/1/2008), and US3CA14M.

1. Compilation Scale

The densities of soundings in the HCell are compiled as appropriate to emulate those soundings of Chart 18640, 1:207,840.

2. Soundings

2.1 Source Data

A 4 meter resolution Combined BASE surface, **H11733_Combined_4m** was used as the basis for HCell production following Branch certification.

A survey-scale sounding (SOUNDG) feature object source layer was built from the **H11733_Combined_4m** surface in CARIS BASE Editor. A shoal-biased selection was made at 1:20,000 scale using a radius table with values shown in **Table 1**.

Upper limit (m)	Lower limit (m)	Radius (mm)
0	10	3
10	20	4
20	40	4.5
40	100	5

Table 1

2.2 Sounding Feature Objects

In CARIS BASE Editor soundings were manually selected from the high density sounding layer from H11733, and imported into a new layer created to accommodate chart density depths. Manual selection was used to accomplish a density and distribution that more closely represents the seafloor morphology and that emulates density and distribution of soundings on chart 18640 than is possible using automated methods. See section 10.1, Data Processing Notes, for details about the use of manual sounding selection for H11733. The sounding feature object source layer was exported as **H11733_CS**, and imported into HOM.

3. Depth Areas

3.1 Source Data

Using the BASE surface **H11733_Combined_4m** a single depth area was generated. No depth contours were delivered per OCS HCell Specifications ver.2.0.

3.2 Depth Area Feature Objects

One all-encompassing depth range, 7 meters to 90 meters, was used for all depth area objects below MLLW.

4. Meta Areas

The following Meta object areas are included in HCell 11733:

M_QUAL M_NSYS
M_COVR

Meta area objects were constructed on the basis of a perimeter line delineating the surveyed limits. This perimeter was first used to create the Skin of The Earth (SOTE) layer, then was duplicated to the Meta object layers and attributed per the HCell Specifications, ver. 2.0.

5. Survey Features

H11733 contains one rock with a surveyed depth of 7.398 meters (4.045 fathoms) at 38-27-47.300N, 123-09-59.400W. The rock was reported as a DTON by the field and the least depth of the rock is unknown.

No bottom samples were collected with H11733. All but two charted bottom samples within the surveyed area were imported in to the H11733 HCell. The two bottom samples with a NATSUR of rock were used in the ENC to denote rocky (rky) areas from the raster chart. The areas were determined not to be rocky based on the gridded surface.

6. Shoreline / Tide Delineation

One depth area (DEPARE) was created for the SOTE.

7. Attribution

All S-57 Feature Objects have been attributed as fully as possible based on information provided by the Hydrographer and in accordance with OCS H-Cell Specifications, ver. 2.0.

8. Layout

8.1 CARIS HOM Layering Scheme

100	Chart scale soundings
101	Survey scale soundings
200	Group 1 object (Skin of the Earth)
300	Point objects
600-602	Meta layers
800	Items used for creation of Blue Notes

8.2 Blue Notes

Notes regarding data sources are in CARIS HOM as layer 800 as a Shapefile set, **H11733_bluenotes_p**.

9. Spatial Framework

9.1 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.

9.2 Horizontal and Vertical Units

During creation of sounding sets in CARIS BASE Editor, and creation of the HCell in CARIS HOM, units are maintained as metric with millimeter resolution. NOAA rounding is applied at the same time that conversion to chart units is made to the metric HCell base cell file, at the end of the HCell compilation process.

A CARIS environment variable, `uslXsounding_round`, controls the depth at which rounding occurs. Setting this variable to NOAA fathoms and feet displays all soundings from 0 to equal to or greater than 11 fathoms as whole units.

In an ENC viewer fathoms and feet display in the format X.YZZZ, where X is fathoms, Y is feet, and ZZZ is decimals of the foot. For fathoms and feet between 0 and 10 fathoms 4.5 feet (10.75 fms), soundings round to the deeper foot if the decimals of the foot are X.Y75000 or greater. For fathoms and feet deeper or equal to 11 fathoms, soundings round to the deeper fathom if feet and decimals of the foot are X.45000 (X.Y75000) or greater. Drying heights are in feet and are rounded using arithmetic methods. In an ENC viewer, heights greater than 6 feet will register in fathoms and feet using the above stated rules.

HOM Units

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

Chart Unit Base Cell Units

Depth Units (DUNI):	Fathoms and feet
Height Units (HUNI):	Feet (or fathoms and feet above 6 feet)
Positional Units (PUNI):	Meters

10. QA/QC

10.1 Data Processing Notes

Manual chart scale sounding selections were made for this survey. Experience has shown that in areas where bathymetry varied, automated sounding selection is impractical. None of the default sounding suppression options offered in CARIS BASE Editor or HOM yields an acceptable density and distribution of depths, generally bunching soundings nearshore with too sparse coverage seaward. While the customized options are more practical for this type of terrain, an inordinate amount of time must be spent in experimentation with variations on the algebraic terms in order to devise the most suitable formula, and manual adjustments are still required to the resulting sounding set.

10.2 ENC Validation Checks

H11733 was subjected to QA and Validation checks in HOM prior to exporting to the HCell base cell (000) file. Full millimeter precision was retained in the export of the metric S-57 base cell data set. This data set was converted to a chart unit 000 file. dKart Inspector 5.0 (Service Pack 1) was then used to further check the data set for conformity using the S-58 ver. 2 standard (formerly Appendix B.1 Annex C of the S-57 standard). All tests were run and errors investigated and corrected where necessary.

11. Products

11.1 HSD, MCD and CGTP Deliverables

- H11733 Base Cell File, Chart Units, Soundings compiled to 1:207,840
- H11733 Base Cell File, Chart Units, Soundings compiled to 1:20,000
- H11733 Descriptive Report including end notes compiled during office processing and certification
- H11733 HCell Report
- Blue Notes shape files
- 000 Features File

11.2 File Naming Conventions

HOM file set prefix: *H11733_hc*

MCD Chart units base cell file: *US511733_CU.000*

MCD Chart units base cell file, survey scale soundings: *US511733_SS.000*

Features File (for CGTP): *H11733_Features.000*

11.3 Software

BASE Editor 2.1:	Combination of Product Surfaces and initial creation of the S-57 bathymetry-derived features
HOM 3.3:	Assembly of the H-Cell, S-57 products, QA
GIS 4.4a:	Setting the sounding rounding variable
dKart Inspector 5.0:	Validation of the base cell file

12. Contacts

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

Katie Reser, Physical Scientist, PHB, Seattle, WA; 206-526-6864;

Katie.Reser@noaa.gov.



APPENDIX I -- DANGER TO NAVIGATION REPORTS

DTON report submitted to PHB on 03/15/07:



Hydrographic Survey Registry Number: N/A

Survey Title: State: **CALIFORNIA**
 Locality:
 Sub-locality:

Project Number: N/A

Survey Dates: **FEBRUARY – MARCH 2007**

Depths are reduced to Mean Lower Low Water using predicted tides.

Positions are based on the NAD83 horizontal datum.

CHARTS AFFECTED:

Chart	Scale	Edition	Date
18640	1:207,840	25 th	Aug. 23, 2005

DANGER:

Feature	Depth(ft or fms)	Latitude	Longitude
Rock	4 fms	38-27-47.279 N	123-09-59.434 W
Rock	4 fms	38-31-21.389 N	123-16-27.254 W
Rock	4 fms or shoaler*	38-32-37.129 N	123-18-36.913 W
Rock	2 fms or shoaler*	38-34-18.769 N	123-20-38.023 W

* Possibly shoaler – this is the shoalest observed depth but full coverage was not achieved over feature.

COMMENTS:

Soundings collected by Fugro Pelagos, Inc., aboard the F/V Pacific star, with a Reson 8101 multibeam echosounder. Performed under contract with California State University – Monterey Bay (CSUMB), for the purpose of fisheries habitat mapping.

Survey designed to meet or exceed IHO Order 1 specifications.

Questions concerning this report should be directed to the Chief, Pacific Hydrographic Branch (N/CS34), at (206) 526-6836.



Correspondence with Gary Nelson (PHB) concerning DTON error in LNtoM:

From: Gary Nelson [Gary.Nelson@noaa.gov]
Sent: Tuesday, November 20, 2007 09:33
To: Andy Orthmann
Subject: Re: dton questions...

Andy ,

We would not have changed it to ft if it was submitted as fm - unless it was by mistake. Could you pass on the information to me. The error should be noted in the Descriptive Report. I need to know what you originally sent and what it ended up being reported as.

Thanks,

Gary

>

> I am working on the descriptive reports for the northern California
> work we are submitting to NOAA, and was looking back at the DTONS.

>

> I noticed that the DTONS I sent in had the units "fms" for fathoms,
> but in the LNtoM (District11_16-07) the units were reported as "ft"
> (for example, the 2 fms rock got reported as a rock submerged 2 ft). I
> suppose the "ft" report is safer but it is in error.

>

> Is this something that will get addressed now, or should I simply
> address it in the DR for the appropriate sheet?

>

> Thank you,

>

> Andy

From: Gary Nelson [Gary.Nelson@noaa.gov]
Sent: Tuesday, November 20, 2007 11:48
To: Andy Orthmann
Subject: Re: FW: dton questions...

Andy,

Thanks for the info. Looks like the wrong info got to the chart and the Coast Guard but at least it is shoaler. Your report and PHB's were in fathoms.

Regards,

Gary

>

> Hey Gary.

>

>

>

> Attached is the original DTON. The units are fms but the LNtoM report



> is in ft (see snippet below, from LNTom_District11_16-07).

APPROVAL SHEET
H-11733

Initial Approvals:

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

The survey and associated records have been inspected with regard to survey coverage, development of critical depths, S-57 classification and attribution of soundings and features, cartographic characterization, and verification or disproof 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.

I have reviewed the H-Cell, accompanying data, and reports. This survey and accompanying digital data meet or exceed OCS requirements and standards for products in support of nautical charting except where noted in the Descriptive Report.