

H11982

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.* H11982

### LOCALITY

*State* California

*General Locality* Pacific Ocean - Northern California

*Sublocality* Midway Point to Split Rock

2008-2009

### CHIEF OF PARTY

Dean Moyles

### LIBRARY & ARCHIVES

DATE

**HYDROGRAPHIC TITLE SHEET**

**H11982**

**INSTRUCTIONS** – The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

FIELD No

State California

General Locality Pacific Ocean - Northern California

Sub-Locality Midway Point to Split Rock

Scale N/A Date of Survey Sept 09 to Nov 24, 2008, Apr 28 to Jun 05, 2009

Instructions dated 7/7/2008 Project No. M-L906-KR-08

Vessel F/V PACIFIC STAR (556510), R/V R2 (623241), R/V D2 (647782), R/V QUICKSILVER (947419)

Chief of party Dean Moyles

Surveyed by Moyles, Farley, Reynolds, Barrow, Zurita, Todd, Tidey, Cameron, Mount, et. Al.

Soundings by echo sounder, hand lead, pole Reson Seabat 7125 and 8125 echosounders hull mounted

Graphic record scaled by N/A

Graphic record checked by N/A Automated Plot N/A

SAR by Grant Froelich Compilation by Grant Froelich

Soundings in Feet at MLLW

**REMARKS:** All times are UTC. UTM Projection 10 N

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.



## A. AREA SURVEYED

H11982 (Sheet BL) is in the vicinity of Midway Point, California. It is bound by the coordinates listed in Table 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 September 9, 2008 to November 24, 2008 and then April 28, 2009 to June 5, 2009.

**Table 1 – Sheet Bounds**

| <b>Point</b> | <b>Latitude North)</b> | <b>Longitude West)</b> |
|--------------|------------------------|------------------------|
| 1            | 41-40-28               | 124-13-20              |
| 2            | 41-40-28               | 124-03-57              |
| 3            | 41-28-26               | 124-03-57              |
| 4            | 41-28-26               | 124-13-20              |
| 5            | 41-40-28               | 124-13-20              |

Note: The north and south bounds were modified slightly (shifted further north and south) from originally planned to include additional survey area.

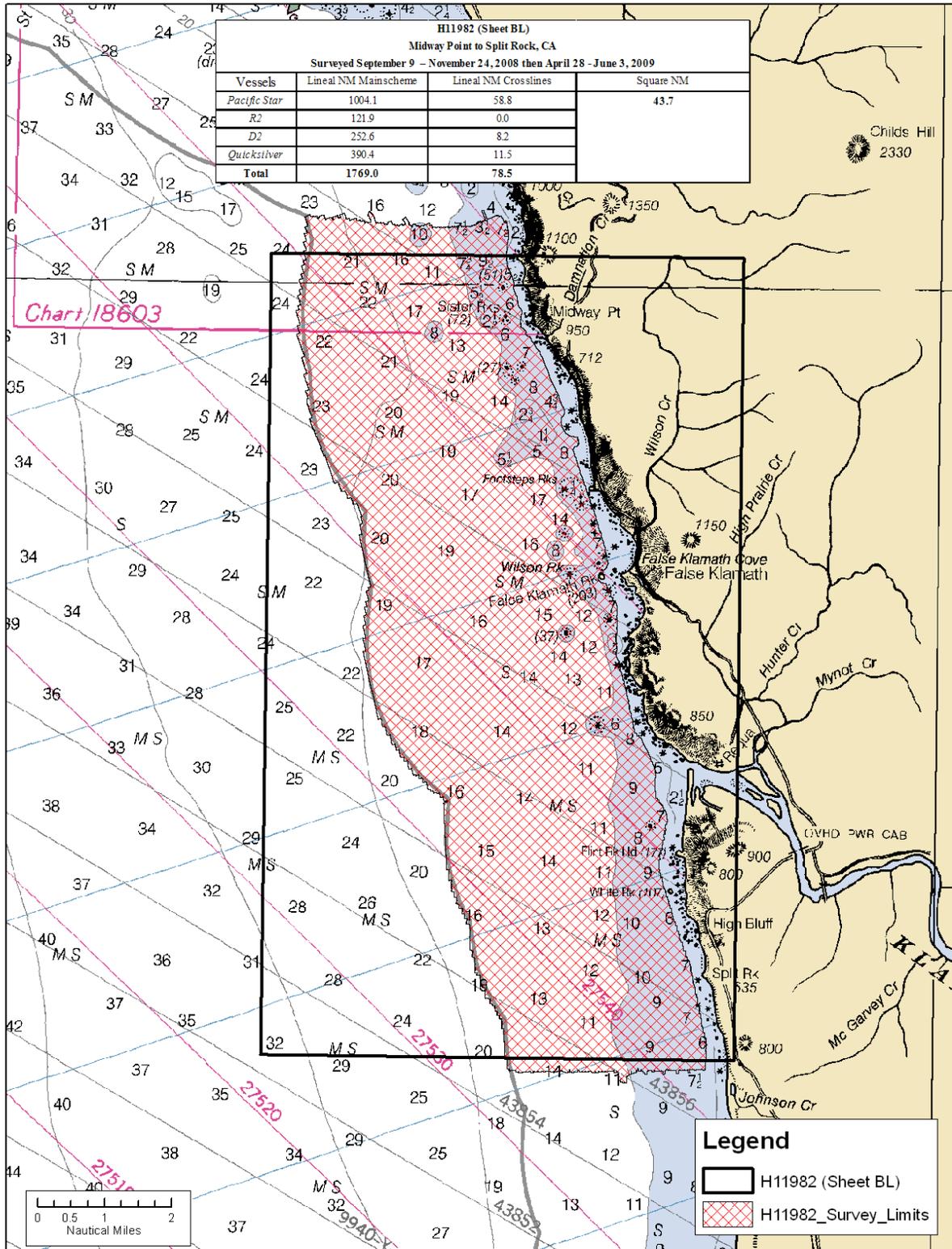


Figure 1 H11982 Area Surveyed

## **B. DATA ACQUISITION AND PROCESSING**

Refer to the M-L906-KR-08 Data Acquisition and Processing Report<sup>1</sup> 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 and Quicksilver acquired all sounding data for H11982.

The Pacific Star, which is 162 feet in length with a draft of 16 feet, was equipped with both a Reson Seabat 7125 (400/200 kHz dual frequency) and a Reson Seabat 8111 for multibeam data acquisition. 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 Vessel (POS MV) with S7K files logged in WinFrog Multibeam v 3.08.23.

Vessel D2, a Pacific Star launch, is 29 feet in length with a draft of 3 feet. It was equipped with a Reson Seabat 7125 (400/200 kHz dual frequency) multibeam system, two AML SV&P probes, and an Applanix POS MV 320 V4. S7K Files were logged in WinFrog Multibeam v 3.08.23. Note: the 7125 was replaced with an 8125 on September 9, 2008 after the vessel hit a submerged rock near Crescent City.

Vessel R2, with the same specifications as D2, was similarly equipped, except the 7125 system was single frequency (400 kHz only).

The Quicksilver, which is 32 feet in length with a draft of 3 feet, was equipped with a Reson Seabat 7125 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 a POS MV with S7K files logged in WinFrog Multibeam v 3.08.44.

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

## B.2 Quality Control

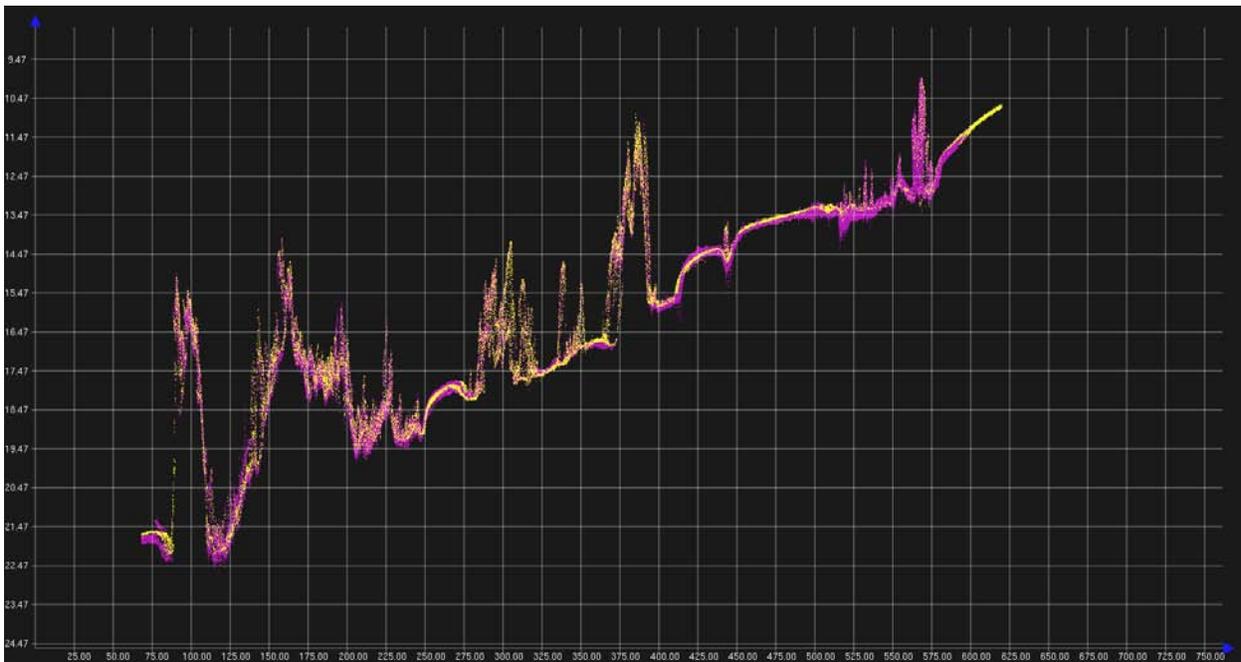
### Crosslines

Crosslines were planned and well distributed throughout the survey to ensure adequate quality control. Total crossline length surveyed was 78.5 nautical miles or 4.5 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. <sup>2</sup>

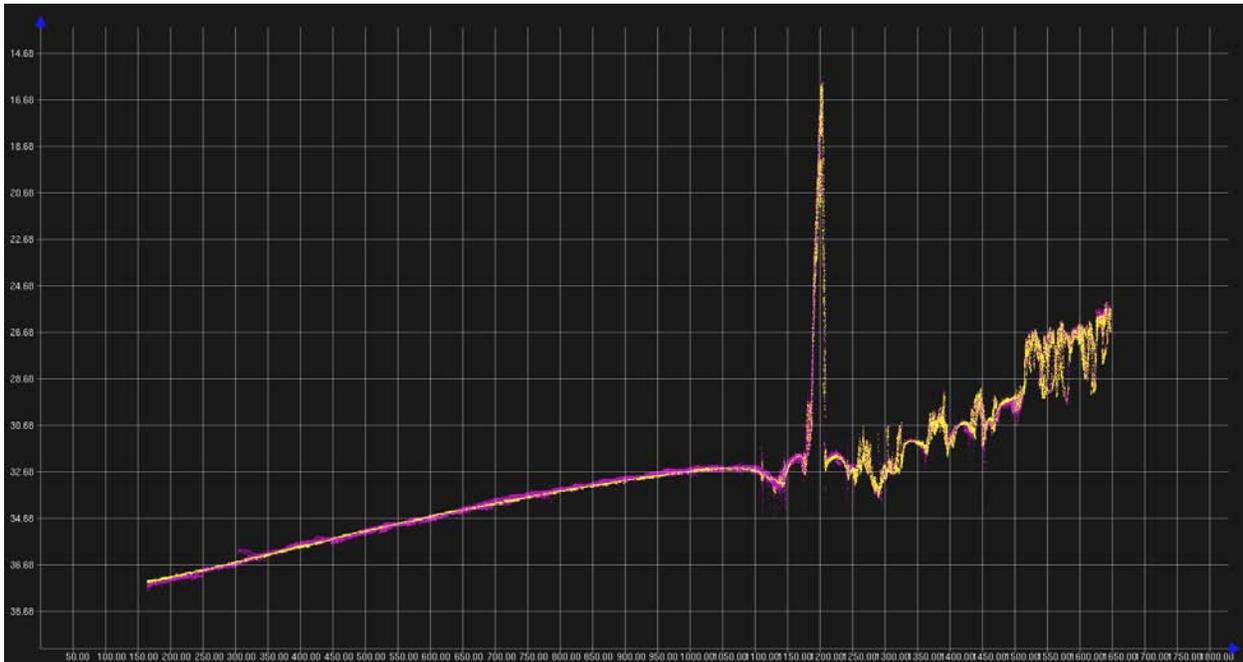
Note: The main reasons for achieving only 4.5 percent of the total main scheme line length is directly related to surveying beyond the require survey limits.

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. 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.

The majority of beams that fall below the 95 percent confidence level are located in areas having a dynamic bottom. Figures 2 and 3 below provide examples. Note: Main scheme lines are shown in purple and crosslines in yellow.



**Figure 2 Profile of 2BL02-TIE03**



**Figure 3 Profile of 3BL03-TIE04**

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

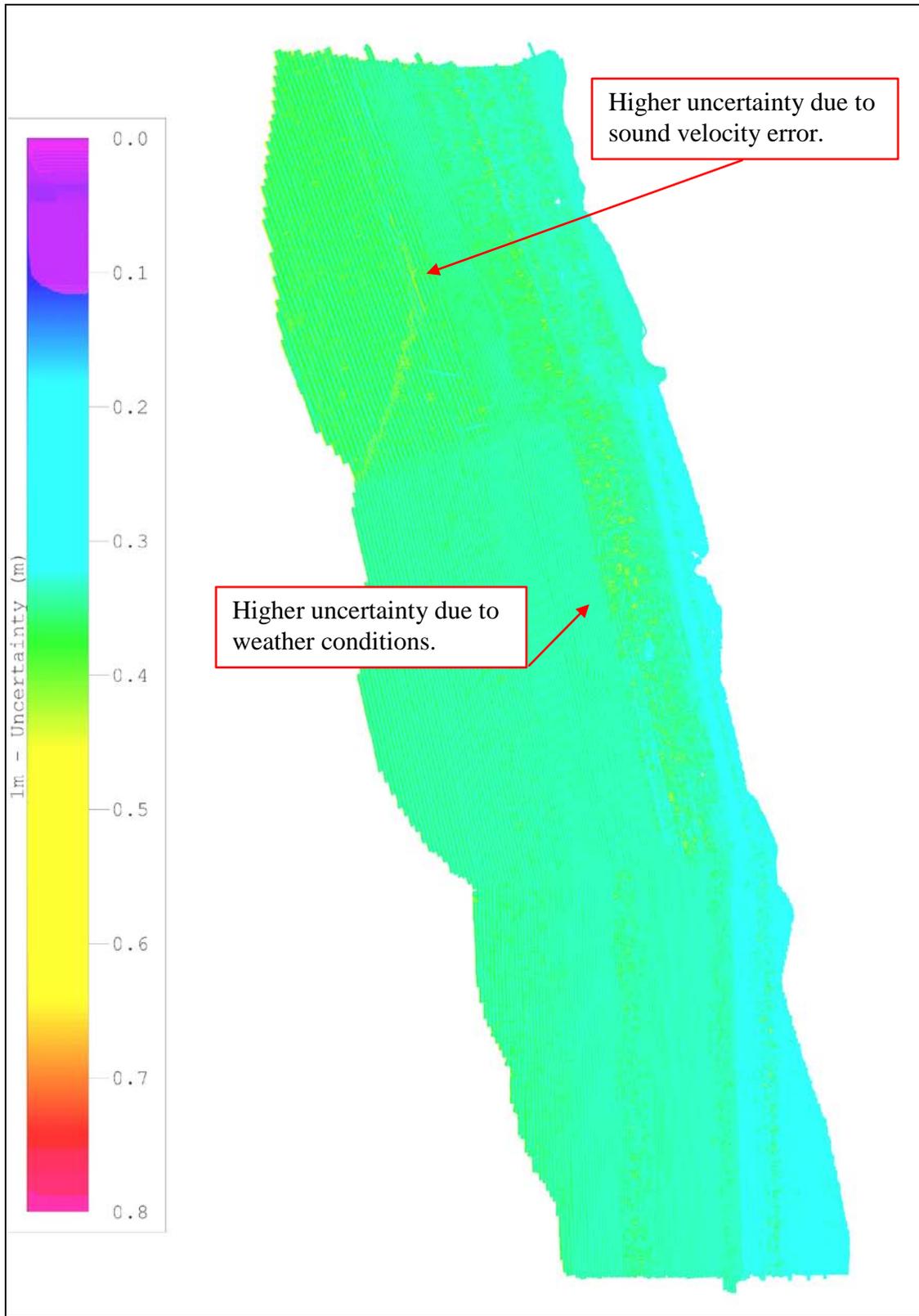
$$\pm \sqrt{(a^2 + (b * d)^2)} \text{ where } a = 0.2, b = 0.01, \text{ and } d = \text{depth.}$$

### Uncertainty Values

The majority of H11982 had uncertainty values of 0.32 m to 0.55 m, which met project specifications. <sup>3</sup>

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 expected and primarily a result of sound velocity error uncertainty.

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 4 Uncertainty DTM**

### Survey Junctions

H11982 (Sheet BL) junctions with:

| Registry # | Date      | Junction Side      |
|------------|-----------|--------------------|
| H11983     | 2008      | North <sup>4</sup> |
| H11981     | 2008/2009 | South <sup>5</sup> |

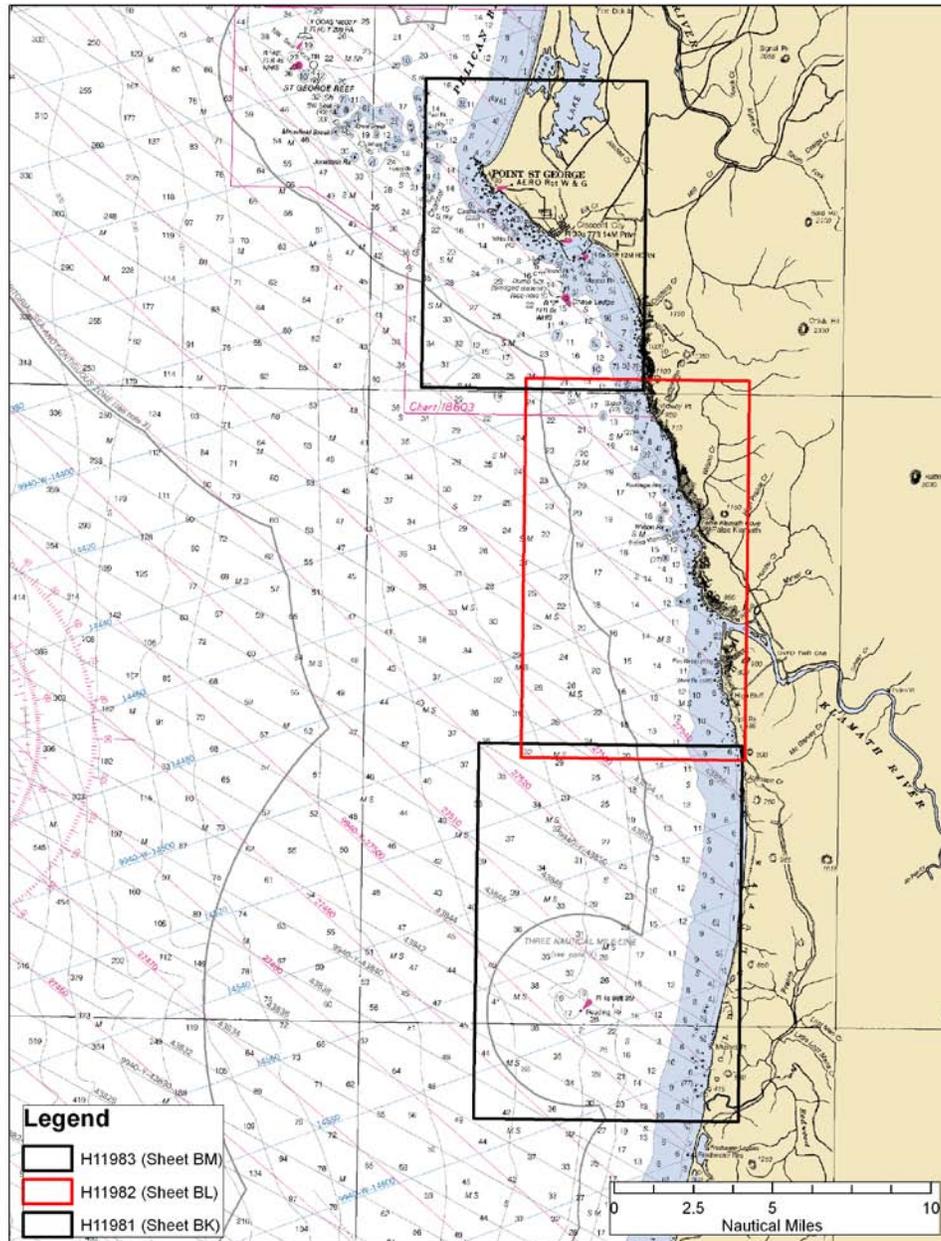


Figure 5 H11982 Survey Junctions

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. <sup>6</sup>

### 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 stopped.

### Comparison of PPK-GPSTide and Zoned Verified Tides

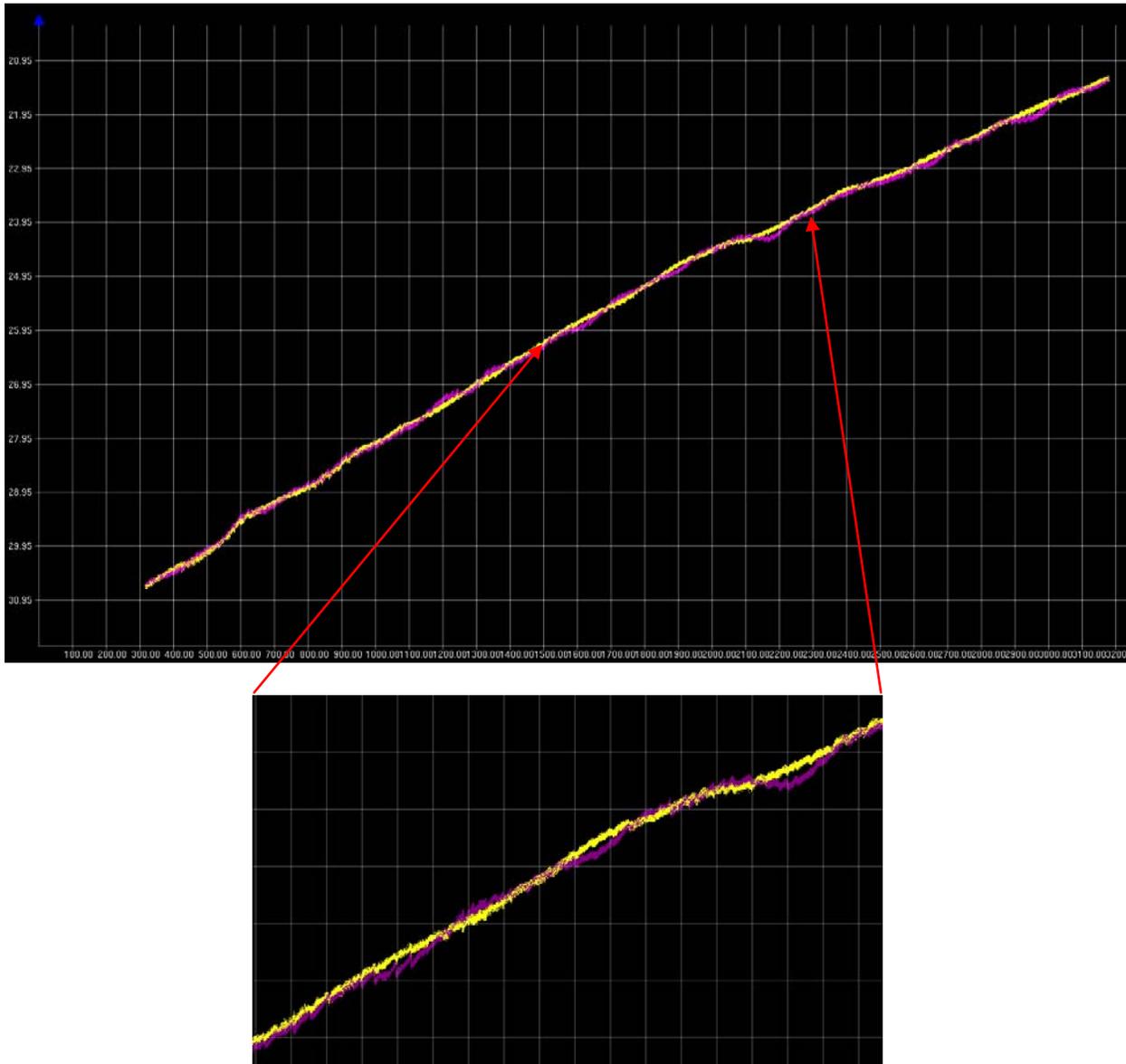
Tidal corrections for this survey were done using PPK-GPS derived altitudes which were reduced to MLLW using VDatum grids and the CARIS HIPS GPSTide function. Since conventional tidal data and zones were available, gross error and reality check comparisons were done between data corrected using both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

- For a snapshot of general agreement throughout the survey area, a copy of the crossline data was corrected using zoned, verified smoothed tides, and dynamic draft correctors applied. 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.

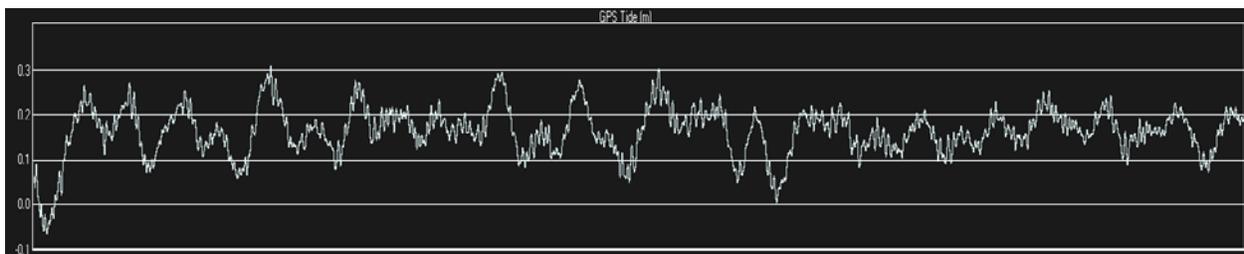
Results: All “tidal” beams passed at 95 % or better as compared to the BASE surfaces. Results are available in Separate IV.

- In order to identify and quantify any static offsets between the two processing methods, a difference surface was created in IVS Fledermaus 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 4m resolution)

Results (see figure 8): Average difference was -0.015 m; median difference was -0.005 m, with a standard deviation of 0.107 m. Therefore, the GPSTide surface was deeper on average. One significant trend was apparent, additional artifacts (in Heave +/- 0.10 m) are more obtrusive in data corrected using verified tides and are deemed to be weather related. In figure 6, data represented by the magenta color was reduced using verified tides and zones; data in yellow was reduced using GPS derived tides (crossline 3BL01-TIE04). These artifacts are not present in the GPS Tide data because that residual error is calculated by using the POSpac SBET solution, refer to figure 7 for a linear representation of the GPS Tide for 3BL01-TIE04.



**Figure 6 H11982 Gross Error Check – Tidal vs. GPSTide**



**Figure 7 GPSTide for Crossline 3BL01-TIE04**



## Data Quality

In general, the multibeam data quality for H11982 was good. Five 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<sup>8</sup>. This error was very apparent in blocks 01 and 02 near the Klamath River. Most lines near the Klamath River, the surface speed sound changed by as much as 20m/s.

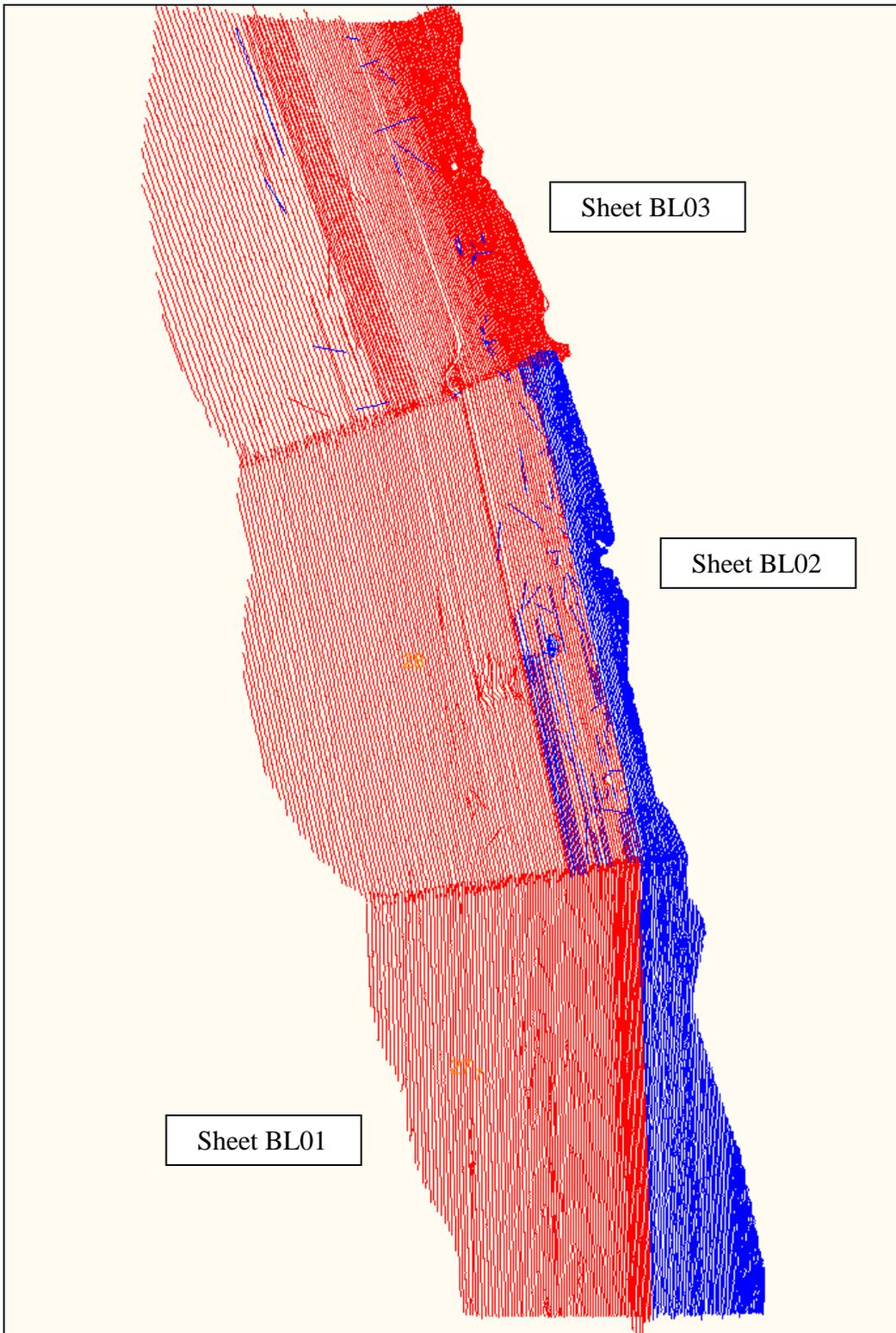
R2, D2, and Quicksilver vessels collected sound velocity profiles every two hours (or less) to compensate for velocity changes over time. Profiles were collected on alternate ends of lines, or often in the middle of lines, to minimize the spatial aspect of sound velocity changes. Since the completion of this project, several new features have been added to WinFrog Multibeam and PosMvLogger to alert the user when measurements exceed a user defined specification, one of these include the real-time surface speed sound value.

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 minimal between the survey data and the in-use sound velocity profile.

2. During subset cleaning it became apparent in areas of H11982 that the bottom was offset vertically. It should be noted that this survey was conducted in two phases; it was started on September 9, 2008 and ran until November 24, 2008 and then April 28, 2009 to June 5, 2009 (data collection was not exclusive to H11982 during these times). Due to weather conditions and logistical considerations, survey operations were not confined to a particular sheet or area.

Areas within Sheet BL were problematic, in that they contained vertically shifted data. Data were collected by the Pacific Star, R2 and D2 (displayed as red in Figure 9) and by the Quicksilver (displayed as blue in Figure 9).

Figures 10 and 11 are cross sections of two separate areas in block BL02. Data displayed in purple were collected during the first phase (September 9, 2008 to November 24, 2008) by R2 on Julian Day 2008-328. Data displayed in yellow were collected during the second phase (April 28, 2009 to June 5, 2009) by the Quicksilver on Julian Day 2009-133. The vertical shift is very apparent between the two data sets, but it is only a sediment shift and not a systematic error since the peaks of the rocky outcrops compare very closely to one another.



**Figure 9 Sheet BL Blocks**

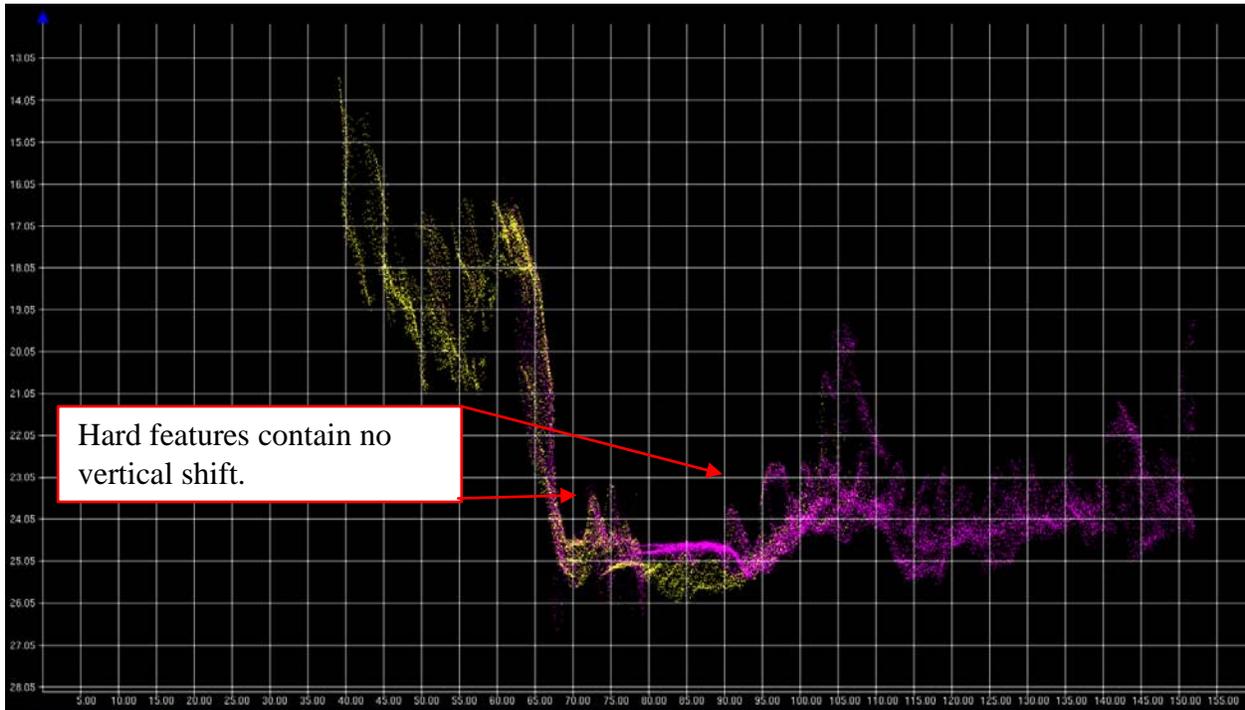


Figure 10 Cross section in Sheet BL block 02 (color coded by vessel)

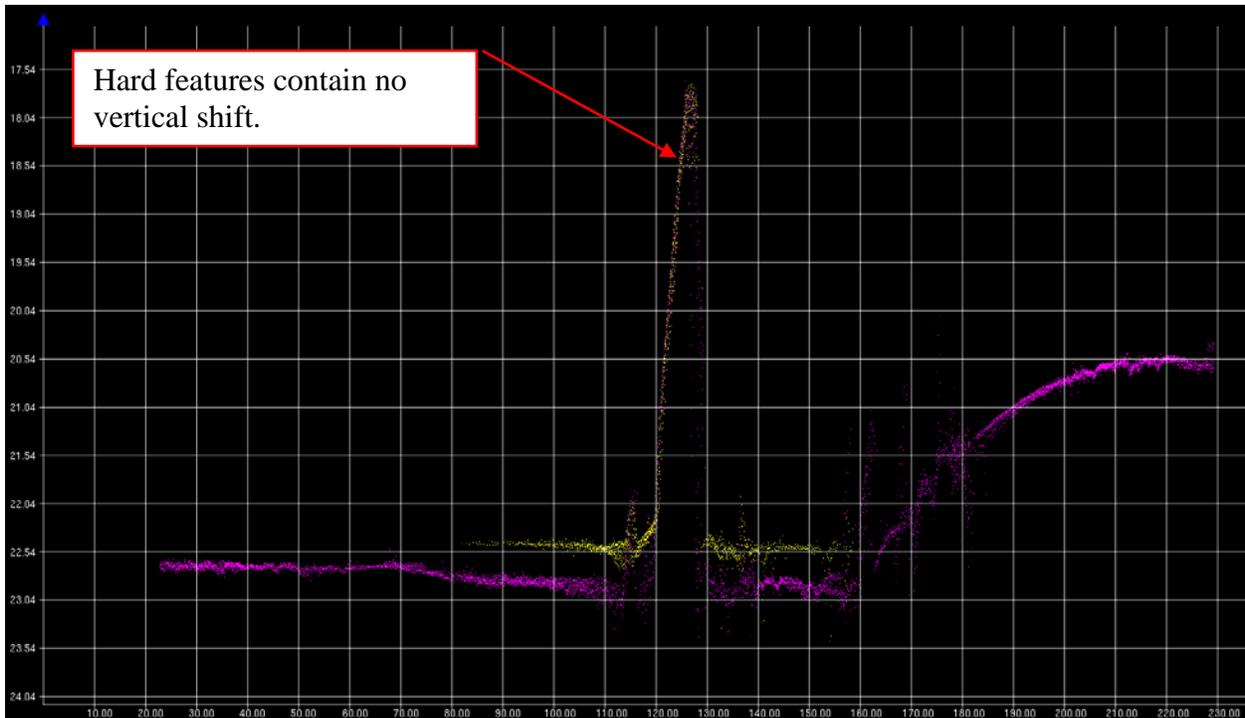


Figure 11 Cross section in Sheet BL block 02 (color coded by vessel)

Since there is no way to rectify this issue (because this is a dynamic bottom), the data was edited to reflect the shoalest depth and all other data points were marked as rejected in subset editor.

3. Some small holidays exist in the data. These are due to insufficient along or across track data density caused by weather or environmental conditions. The holidays are small, in relatively deep water, and no shoaling is evident along their edges. Other areas that contain holidays were around charted rocks. These areas were visited a number of times in an attempt to obtain a least depth, but for safety reasons, due to weather and environmental conditions it was not obtained.
4. Some tide busts occur sporadically between adjacent lines. This was due to lower post-processed GPS accuracy than normal on certain lines. Though the busts are apparent in subset edit mode, they are relatively small (on the order of 0.10m to 0.15m) and within specifications.<sup>9</sup>
5. Zoned, verified tides had to be used on a single survey line due to poor GPS data resulting in an excessive tidal bust. 3BL01-4530 (Julian Day 2008-268, Pacific Star) was loaded and merged with zoned, verified tides. The result matched up well with the adjacent GPSTide-corrected survey lines, the residual error is a heave artifact due to weather conditions.<sup>10</sup>

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 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 H11982 is called “H11982” and it contains three BASE surfaces. The following parameters were used:

0-33 meters: 1 m resolution, name “H11982\_1m\_Final”

30-45 meters: 1.5 m resolution, name “H11982\_1\_5m\_Final”

Notes:

- Maximum depth was approximately 45 m; therefore resolutions coarser than 1.5 m 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 “H11982 (Sheet\_BL)\CARIS\Fieldsheets\Final BASE Surface” directory.
- In addition to the final Fieldsheet, component CUBE BASE surfaces (created in CARIS v 6.1) are included, these are located under the “H11982 (Sheet\_BL)\CARIS\Fieldsheets\ Component\_Fieldsheets” directory.

The final S57 file for this project is called “H11982\_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 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 logged to the POS file by WinFrog PosMvLogger. It was later corrected for offsets to the MBES sonar 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<sup>11</sup> 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 preliminary processing only.

**Table 2 – Tide Gauges**

| Gauge   | Location          | Latitude    | Longitude    |
|---------|-------------------|-------------|--------------|
| 9419750 | Crescent City, CA | 41° 44.7' N | 124° 10.9' W |
| 9418767 | North Spit, CA    | 40° 46.0' N | 124° 13.0' 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 then 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<sup>12</sup>

H11982 survey was compared with the charts shown on Table 3.<sup>13</sup>

**Table 3 – Chart Comparisons**

| Chart Number | Type   | Cell Name | Scale     | Edition | Edition Date |
|--------------|--------|-----------|-----------|---------|--------------|
| 18010        | Raster | n/a       | 1:811,980 | 21      | Jan-07       |
| 18600        | Raster | n/a       | 1:196,948 | 14      | Jan-02       |
| 18600        | ENC    | US3OR03M  | n/a       | 9       | Oct-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 H11982 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.<sup>14</sup> Exceptions follow:

1. Some discrepancy exists at the exact position of charted soundings on steep slopes, likely due to the charted soundings being slightly out of position, making a large difference in depths apparent. Recommend soundings as charted be superseded by this survey.<sup>15</sup>
2. Charted rock on ENC US3OR03M (and 18600) @ 41-34-19N 124-06-21W falls in the multibeam coverage and should be modified to agree with the H11982 survey.<sup>16</sup>
3. Charted rock on ENC US3OR03M (and 18600) @ 41-33-25N 124-06-44W falls in the multibeam coverage and should be modified to agree with the H11982 survey.<sup>17</sup>



### Automated Wreck and Observation Information System

There were no AWOIS items assigned to H11982<sup>18</sup>.

### Charted Features

There were no charted features labeled ED, PD, or PA within the limits of H11982<sup>19</sup>.

### Dangers to Navigation

Two dangers to navigation were found and reported for this survey<sup>20</sup>.

### D.2 Additional Results

None to note.

### Bottom Samples

None were assigned for this sheet<sup>21</sup>.

### Aids to Navigation

No charted aids to navigation existed in the survey area<sup>22</sup>.

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

## E. APPROVAL SHEET

### Approval Sheet

For

**H11982**

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)

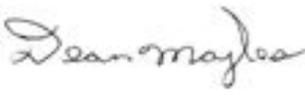
The data were reviewed daily during acquisition and processing, and the survey is complete and adequate for its intended purpose.

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,

Dean Moyles (ACSM Certificate No. 226),  
Lead Hydrographer  
Fugro Pelagos, Inc. Survey Party  
November 16, 2009

 Invalid signature

X 

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Dean Moyles  
ACSM Certified

## Revisions Compiled During Office Processing and Certification

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<sup>1</sup> Filed with the project records

<sup>2</sup> Crosslines do not meet the 5% requirement but were adequate for the confidence tests.

<sup>3</sup> Concur with clarification. Resubmitted, unfinalized surfaces from the contractor had uncertainty values ranging from 0.31 to 0.73m. These values meet IHO Order 1 Total Vertical Uncertainty limits, but do not meet the TVU limits for the project listed in the M-L906-KR-08 Statement of Work page 33. Finalized surfaces, which take the greater of either the uncertainty or the standard deviation values for a grid node range up to 1.43m which exceeds IHO order 1 TVU limits for the depths surveyed. The majority of the unfinalized surface, however, does fall into acceptable limits. The majority of the finalized surface also falls within the acceptable limits. The data are adequate to supersede charted data within the common area

<sup>4</sup> HCell submitted. Soundings in H11982\_CS.000 in the overlapping area that conflicted were removed.

<sup>5</sup> HCell submitted for QC. No selected soundings overlap.

<sup>6</sup> Concur

<sup>7</sup> Concur

<sup>8</sup> Concur

<sup>9</sup> Concur

<sup>10</sup> Concur

<sup>11</sup> Filed with the project records

<sup>12</sup> Data are adequate to supersede charted data within the common area

<sup>13</sup> Survey H11982 was compared to charts 18600 and 18603.

<sup>14</sup> Concur

<sup>15</sup> Concur

<sup>16</sup> Hydrographer's statement is unclear. The charted rock is mostly covered by multibeam but several rocks are present within the charted location. The present location of the rock symbol is the best representation of the cluster of rocks. Recommend retain as charted

<sup>17</sup> Concur

<sup>18</sup> Concur

<sup>19</sup> Concur

<sup>20</sup> Concur with clarification. The contractor submitted two DTONs. When PHB transmitted the report, a typo misplaced one of the DTONs. During the SAR process the typo was caught and a new DTON report along with a Anti-DTON report were generated to fix the problem.

<sup>21</sup> Concur, retain all charted bottom samples within the common area.

<sup>22</sup> Concur

# H11982 Danger to Navigation Report

**Registry Number:** H11982  
**State:** California  
**Locality:** Northern California  
**Sub-locality:** Midway Point to Split Rock  
**Project Number:** M-L906-KR-08  
**Survey Dates:** 09/09/08 - 06/05/09

## Charts Affected

| Number | Edition | Date       | Scale (RNC)           | RNC Correction(s)* |
|--------|---------|------------|-----------------------|--------------------|
| 18603  | 16th    | 12/01/2002 | 1:40,000 (18603_1)    | [L]NTM: ?          |
| 18600  | 14th    | 01/26/2002 | 1:196,948 (18600_1)   | [L]NTM: ?          |
| 18010  | 21st    | 03/01/2007 | 1:811,980 (18010_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         | 6.21 m       | 41° 39' 27.6" N | 124° 09' 02.8" W | ---        |
| 1.2 | Rock         | 15.07 m      | 41° 24' 20.7" N | 124° 08' 17.4" W | ---        |

# **1 - Danger To Navigation**

**1.1) GP No. - 1 from dtons.xls****DANGER TO NAVIGATION****Survey Summary**

**Survey Position:** 41° 39' 27.6" N, 124° 09' 02.8" W  
**Least Depth:** 6.21 m (= 20.38 ft = 3.396 fm = 3 fm 2.38 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh) [None] ; TVU (TPEv) [None]  
**Timestamp:** 2008-328.32:20:25.000 (11/23/2008)  
**GP Dataset:** dtons.xls  
**GP No.:** 1  
**Charts Affected:** 18603\_1, 18600\_1, 18010\_1, 18007\_1, 501\_1, 530\_1, 50\_1

**Remarks:**

Feature found during bathymetric survey. Features are reduced to Mean Lower Low Water using GPS derived tides.

**Feature Correlation**

| Address   | Feature | Range | Azimuth | Status  |
|-----------|---------|-------|---------|---------|
| dtons.xls | 1       | 0.00  | 000.0   | Primary |

**Hydrographer Recommendations**

Recommend charting charting rock.

**Cartographically-Rounded Depth (Affected Charts):**

20ft (18603\_1)

3 ¼fm (18600\_1, 18010\_1, 18007\_1, 530\_1)

6.2m (501\_1, 50\_1)

**S-57 Data**

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** QUASOU - 1:depth known  
 SORDAT - 20090605  
 SORIND - us,us,survy,H11982  
 TECSOU - 3:found by multi-beam

VALSOU - 6.211 m

VERDAT - 12:Mean lower low water

WATLEV - 3:always under water/submerged

### Feature Images

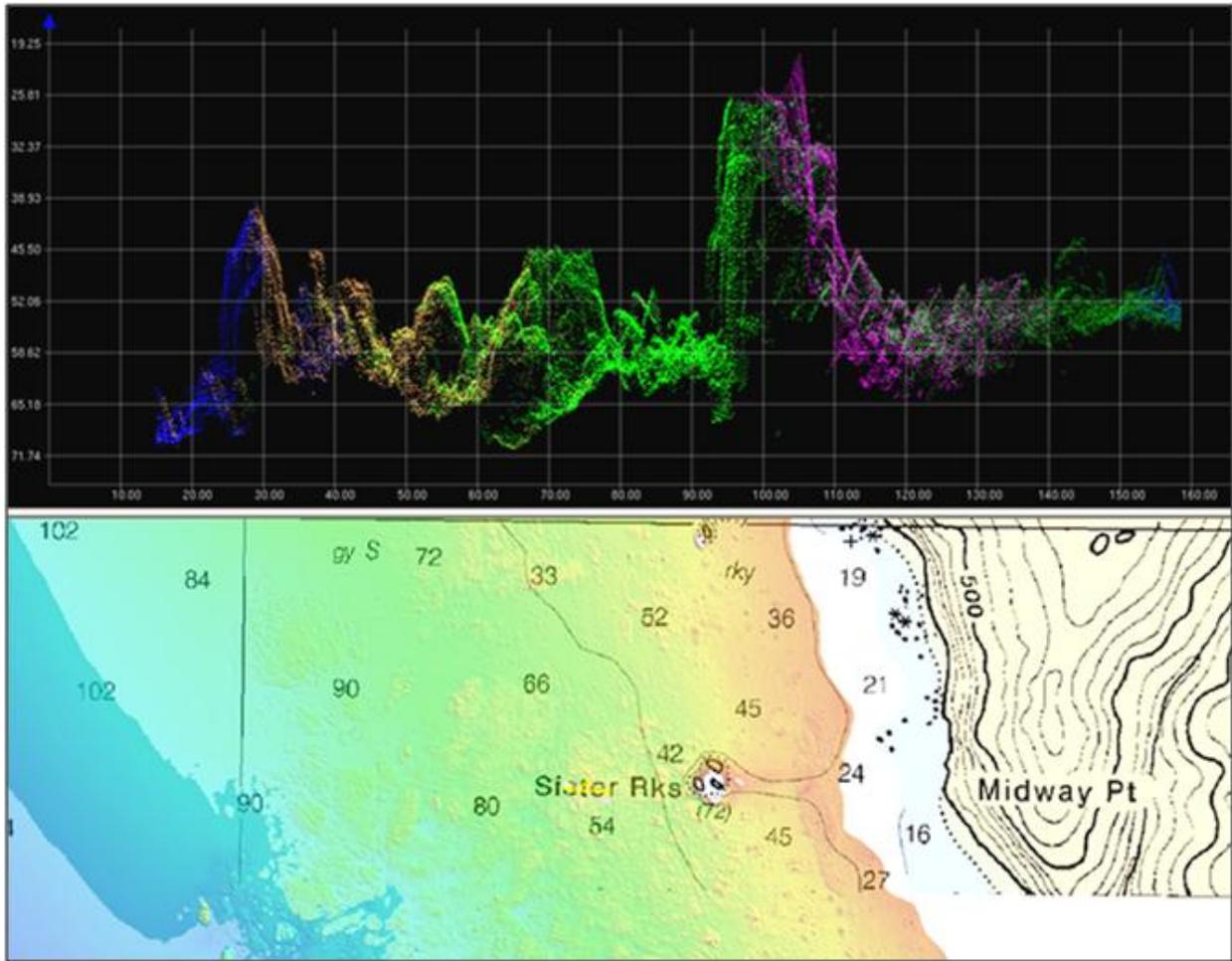


Figure 1.1.1

**1.2) GP No. - 2 from dtons.xls****DANGER TO NAVIGATION****Survey Summary**

**Survey Position:** 41° 24' 20.7" N, 124° 08' 17.4" W  
**Least Depth:** 15.07 m (= 49.46 ft = 8.243 fm = 8 fm 1.46 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh) [None] ; TVU (TPEv) [None]  
**Timestamp:** 2008-266.05:14:17.000 (09/22/2008)  
**GP Dataset:** dtons.xls  
**GP No.:** 2  
**Charts Affected:** 18600\_1, 18010\_1, 18007\_1, 501\_1, 530\_1, 50\_1

**Remarks:**

Feature found during bathymetric survey. Features are reduced to Mean Lower Low Water using GPS derived tides.

**Feature Correlation**

| Address   | Feature | Range | Azimuth | Status  |
|-----------|---------|-------|---------|---------|
| dtons.xls | 2       | 0.00  | 000.0   | Primary |

**Hydrographer Recommendations**

Recommend charting charting rock.

**Cartographically-Rounded Depth (Affected Charts):**

8 ¼fm (18600\_1, 18010\_1, 18007\_1, 530\_1)

15.1m (501\_1, 50\_1)

**S-57 Data**

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090605  
 SORIND - us,us,survey,H11982  
 TECSOU - 3:found by multi-beam  
 VALSOU - 15.075 m  
 VERDAT - 12:Mean lower low water

WATLEV - 3:always under water/submerged

### Feature Images

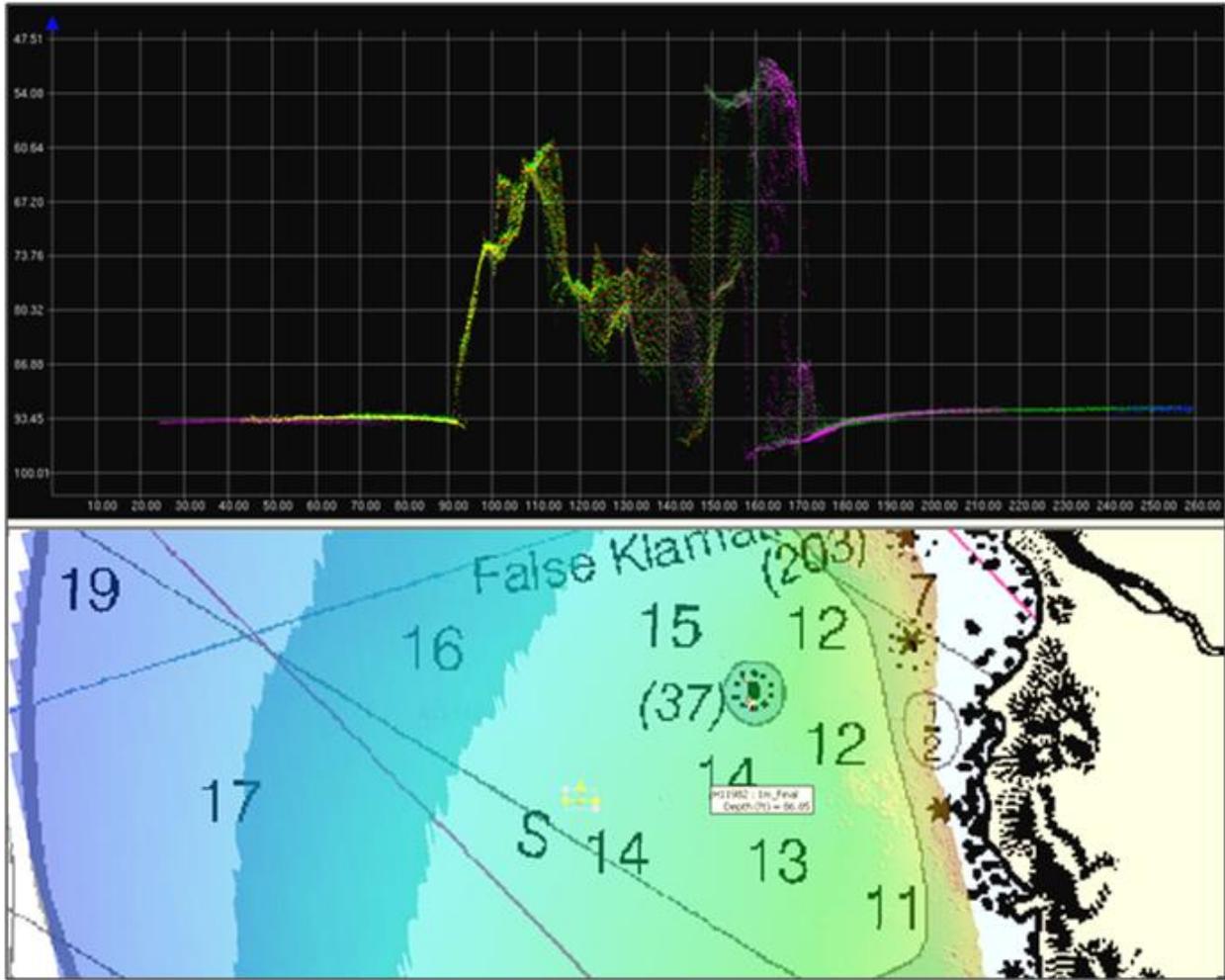


Figure 1.2.1

# H11982 Danger to Navigation Report

**Registry Number:** H11982  
**State:** California  
**Locality:** Northern California  
**Sub-locality:** Midway Point to Split Rock  
**Project Number:** M-L906-KR-08  
**Survey Dates:** 09/09/08 - 06/05/09

## Charts Affected

| Number | Edition | Date       | Scale (RNC)           | RNC Correction(s)*  |
|--------|---------|------------|-----------------------|---|
| 18600  | 14th    | 01/26/2002 | 1:196,948 (18600_1)   | USCG LNM: 12/15/2009 (01/26/2010)<br>NGA NTM: 03/18/2006 (02/06/2010) |
| 18010  | 21st    | 03/01/2007 | 1:811,980 (18010_1)   | USCG LNM: 12/15/2009 (01/26/2010)<br>NGA NTM: 11/25/2006 (02/06/2010) |
| 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 |
|-----|--------------|--------------|-----------------|------------------|
| 1.1 | Rock         | 14.60 m      | 41° 24' 20.7" N | 124° 08' 17.4" W |
| 1.2 | Rock         | 14.81 m      | 41° 34' 20.7" N | 124° 08' 17.4" W |

## **1 - Danger To Navigation**

## 1.1) GP No. - Danger 381 from ChartGPs - ENC US3OR03M

### ANTI-DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 41° 24' 20.7" N, 124° 08' 17.4" W  
**Least Depth:** 14.60 m (= 47.90 ft = 7.983 fm = 7 fm 5.90 ft)  
**TPU ( $\pm 1.96\sigma$ ):** **THU (TPEh)** [None] ; **TVU (TPEv)** [None]  
**Timestamp:** [None]  
**GP Dataset:** ChartGPs - ENC US3OR03M  
**GP No.:** Danger 381  
**Charts Affected:** 18600\_1, 18010\_1, 18007\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

Feature incorrectly reported as a DTON. Remove from chart.

#### Feature Correlation

| Address                 | Feature    | Range | Azimuth | Status  |
|-------------------------|------------|-------|---------|---------|
| ChartGPs - ENC US3OR03M | Danger 381 | 0.00  | 000.0   | Primary |

#### Hydrographer Recommendations

Recommend removing rock from chart.

#### Cartographically-Rounded Depth (Affected Charts):

8fm (18600\_1, 18010\_1, 18007\_1, 530\_1)

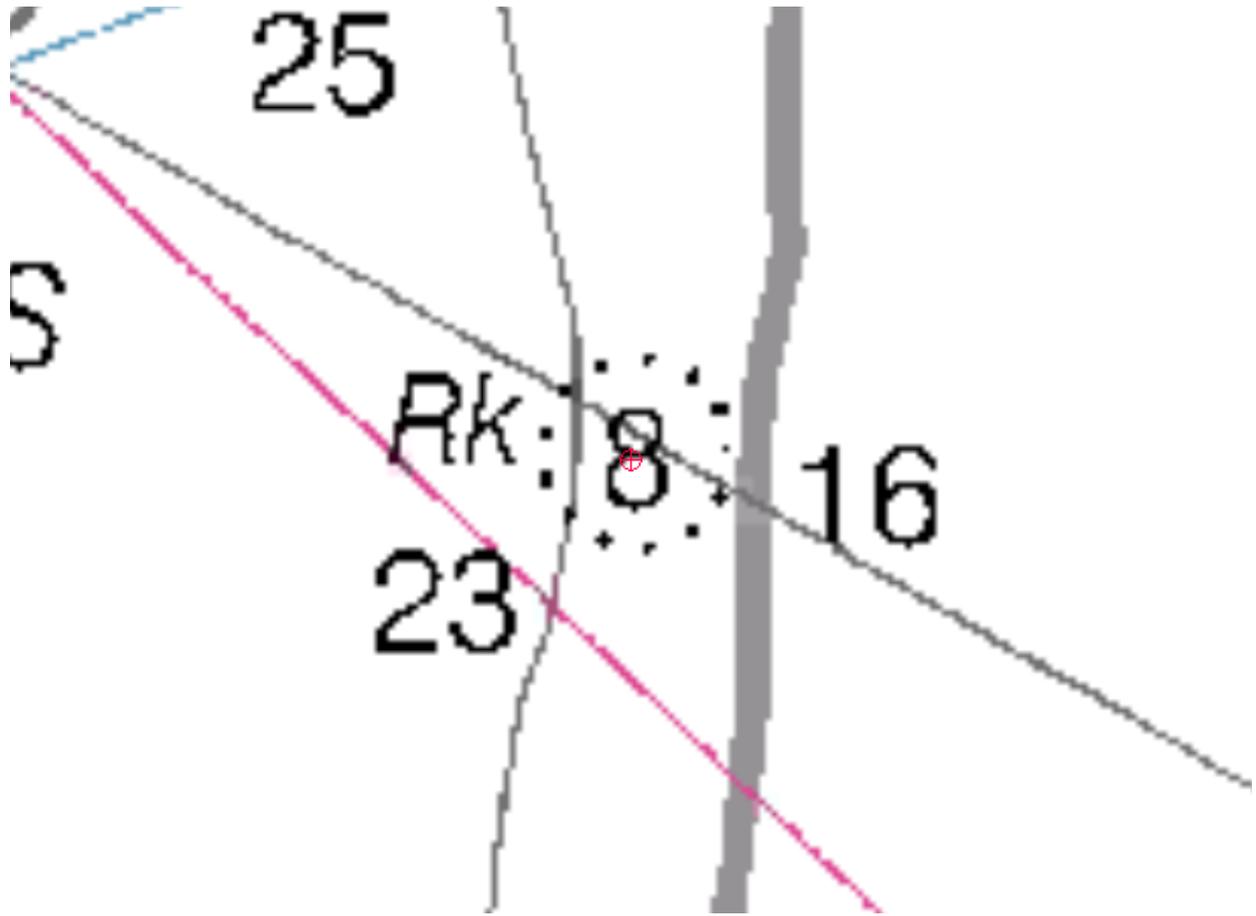
14.6m (501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** QUASOU - 6:least depth known  
 SORDAT - 20081123  
 SORIND - US,US,reprt,L-57/10  
 VALSOU - 14.600 m  
 WATLEV - 3:always under water/submerged



**Feature Images**



*Figure 1.1.1*

**1.2) GP No. - 4 from dtons2.xls****DANGER TO NAVIGATION****Survey Summary**

**Survey Position:** 41° 34' 20.7" N, 124° 08' 17.4" W  
**Least Depth:** 14.81 m (= 48.60 ft = 8.100 fm = 8 fm 0.60 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh) [None] ; TVU (TPEv) [None]  
**Timestamp:** 2008-266.05:14:17.000 (09/22/2008)  
**GP Dataset:** dtons2.xls  
**GP No.:** 4  
**Charts Affected:** 18600\_1, 18010\_1, 18007\_1, 501\_1, 530\_1, 50\_1

**Remarks:**

Feature found during bathymetric survey. Features are reduced to Mean Lower Low Water using GPS derived tides.

**Feature Correlation**

| Address    | Feature | Range | Azimuth | Status  |
|------------|---------|-------|---------|---------|
| dtons2.xls | 4       | 0.00  | 000.0   | Primary |

**Hydrographer Recommendations**

Recommend charting rock

**Cartographically-Rounded Depth (Affected Charts):**

8fm (18600\_1, 18010\_1, 18007\_1, 530\_1)

14.8m (501\_1, 50\_1)

**S-57 Data**

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

**Attributes:** SORDAT - 20080922  
 SORIND - US,US,nsurf,H11982  
 TECSOU - 3:found by multi-beam  
 VALSOU - 14.81328 m  
 VERDAT - 12:Mean lower low water

WATLEV - 3:always under water/submerged

Incorrect survey position. The correct GP is latitude  
41-34.345N, longitude 124-08.291W

### Feature Images

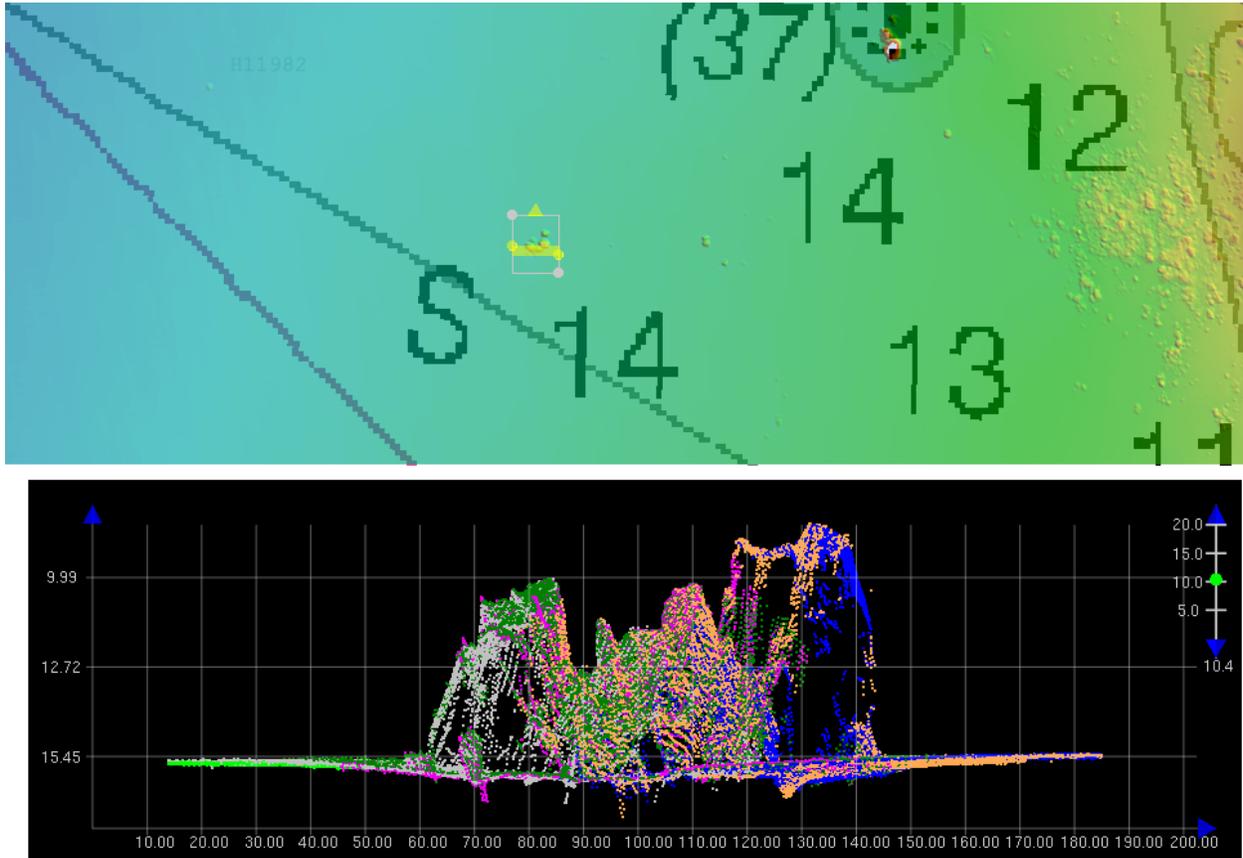


Figure 1.2.1

**H11982 HCell Report**  
Grant Froelich, Physical Scientist  
Pacific Hydrographic Branch

**Introduction**

The primary purpose of the HCell is to provide new survey information in International Hydrographic Organization (IHO) format S-57 to update the largest scale ENC's and RNC's in the region: NOAA RNC's, 18603 (1:40000) and 18600 (1:196948) and corresponding NOAA ENC's, US3OR03M and US2WC12M. (See section 4. Meta Areas.)

HCell compilation of survey H11982 utilized Office of Coast Survey DRAFT HCell Specifications Version 4.0. For additional information on the standards and protocols used for HCell Compilation, see the DRAFT A/PHB HCell Reference Guide, version 2.0, 22 February, 2010.

**1. Compilation Scale**

Depths and features for HCell H11982 were compiled to the largest scale chart in the region, 18603 (1:40000), with additional scales compiled using the M\_CSCL meta area object. (See section 4. Meta Areas.)

**2. Soundings**

A survey-scale sounding (SOUNDG) feature object layer was built from the 1.5-meter Combined Surface in CARIS BASE Editor. A shoal-biased selection was made at 1:20,000 survey scale for areas covered by RNC 18603 (1:40000) and at 1:40000 for areas covered by RNC 18600 (1:196948) using a Radius Table file with values shown in the table, below. The resultant sounding layer contains 6,200 depths ranging from 1.5 to 43.6 meters.

| Shoal Limit (m) | Deep Limit (m) | Radius (mm) |
|-----------------|----------------|-------------|
| -4.7            | 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 and imported into a new layer created to accommodate chart density depths. Manual selection was used to accomplish a density and distribution that closely represents the seafloor morphology.

**3. Depth Contours**

Depth contours at the intervals on the largest scale chart are included in the H11982\_SS HCell for MCD raster charting division to use for guidance in creating chart contours. The metric, foot and fathom equivalent contour values are shown in the tables below.

| Chart Contour Intervals in Feet from Chart 18603 | Metric Equivalent to Chart Feet, Arithmetically Rounded | Metric Equivalent of Chart Feet, with NOAA Rounding Applied | Feet with NOAA Rounding Applied | Feet with NOAA Rounding Removed for Display on H11409_SS.000 |
|--|---|---|---------------------------------|--|
| 30   | 9.144   | 9.3726  | 30.75                           | 30   |
| 60   | 18.288  | 18.5166   | 60.75                           | 60   |

| Chart Contour Intervals in Fathoms from Chart 18600 | 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 H11409_SS.000 |
|---|--|--|------------------------------------|---|
| 3   | 5.4864   | 5.715  | 3.125                              | 3   |
| 10  | 18.288   | 18.5166  | 10.125                             | 10  |
| 20  | 36.576   | 37.9476  | 20.75                              | 20  |

Contours have not been deconflicted against shoreline features, soundings and hydrography, as all other features in the H11982\_CS file and soundings in the H11982\_SS have been. This may result in conflicts between the H11982\_SS file contours and HCell features at or near the survey limits. Conflicts with M\_QUAL and SBDARE objects should be expected. HCell features should be honored over H11982\_SS.000 file contours in all cases where conflicts are found.

#### 4. Meta Areas

The following Meta object areas are included in HCell H11982:

M\_QUAL  
M\_CSCL

Meta area objects were constructed on the basis of the limits of the hydrography. (See 3.1 *Depth Areas*.)

#### 5. Features

##### 5.1 Generalization of Features to Chart Scale

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 is modified to emulate chart scale.

Feature generalization to emulate chart scale is accomplished primarily through reduction in the number of features included in the HCell, and in some cases generalizing area features to point objects. Some instances of reduction of area features to point objects is entrusted to the RNC division, for example rocky seabed areas that will display as point features on the RNC. Where line and area objects are included in the HCell, complexity of the lines and edges comprising the features have been smoothed to commensurate with chart scale.

## 5.2 Compilation of Features to the HCell

Shoreline features for H11982 were delivered from the field in one hob file defining new rocky seabed area features. These were deconflicted against the chart and hydrography during office processing.

During office processing, several submerged rocks were digitized from the high resolution BASE Surfaces.

The source of all features included in the H11982 HCell can be determined by the SORIND field.

Six bottom samples in the common area should be retained as charted. Two charted bottom samples should be removed because they fall within the rocky sea bed area.

## 5.2 Mean High Water Used for HCells

For the purposes of determining the height at which a rock becomes an islet, the CO-OPS “*Tide Note for Hydrographic Survey*”, “*Height of High Water Above the Plane of Reference*” is used.

## 6. S-57 Objects and Attributes

The H11982\_CS HCell contains the following Objects:

|         |                                      |
|---------|--------------------------------------|
| \$CSYMB | Blue Notes                           |
| LNDARE  | Islet                                |
| M_CSCL  | Compilation scale meta area          |
| M_QUAL  | Data quality Meta object             |
| SBDARE  | Rocky seabed areas                   |
| SOUNDG  | Soundings at the chart scale density |
| UWTROC  | Rock features                        |

The H11982\_SS HCell contains the following Objects:

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

All S-57 Feature Objects in the H11982\_CS HCell have been attributed as fully as possible based on information provided by the Hydrographer and in accordance with current guidance and the OCS HCell Specifications.

## 7. Blue Notes

Notes to the RNC and ENC chart compilers are included in the HCell as \$CSYMB features. By agreement with MCD, the NINFOM field is populated with an abbreviated version of the Blue Note (30 characters or less), describing the chart disposition, to be used by MCD in generating their Chart History spreadsheet.

## **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):      | 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  |

Conversion to charting units and application of NOAA rounding is completed in the same step, at the end of the HCell compilation process.

Conversion to feet charting units with NOAA rounding ensures that:

- All depths display as whole feet.
- All height units (HUNI) which have been converted to charting units, and that are 2.00 feet above MHW and greater, are shown in feet.

## **9. Data Processing Notes**

### **9.1 Junctions with H11981 and H11983**

H11982 junctions with H11983, submitted in May 2009. A common junction was not made between the two surveys during the earlier compilation, so the northern extent of H11982 should supersede H11983 in the common area.

H11982 junctions with H11981, submitted in January 2010. A common junction was not made between the two surveys during the earlier compilation, so the southern extent of H11982 should supersede H11981 in the common area.

## 10. QA/QC and ENC Validation Checks

H11982 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

|                    |  |
|--------------------|--|
| H11982_CS.000      | Base Cell File, Chart Units, Soundings and features compiled to 1:40,000   |
| H11982_SS.000      | Base Cell File, Chart Units, Soundings and Contours compiled to 1:20000 and 1:40000  |
| H11982_DR.pdf      | Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items |
| H11982_outline.gml | Survey outline to populate SURDEX  |
| H11982_outline.zsd |  |

### 11.3 Software

|  |  |
|--|--|
| CARIS HIPS Ver. 7.0                                | Inspection of Combined BASE Surfaces   |
| CARIS BASE Editor Ver. 2.3                         | Creation of soundings and bathy-derived features, creation of the depth area, meta area objects, and Blue Notes; Survey evaluation and verification; Initial HCell assembly. |
| CARIS S-57 Composer Ver. 2.1                       | Final compilation of the HCell, correct geometry and build topology, apply final attributes, export the HCell, and QA.   |
| CARIS GIS 4.4a                                     | Setting the sounding rounding variable for conversion of the metric HCell to NOAA charting units with NOAA rounding.   |
| CARIS HOM Ver. 3.3                                 | Perform conversion of the metric HCell to NOAA charting units with NOAA rounding.  |
| HydroService AS, dKart Inspector Ver. 5.1          | Validation of the base cell file.  |
| Newport 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:

Grant Froelich  
Physical Scientist  
Pacific Hydrographic Branch  
Seattle, WA  
206-526-4374  
[grant.froelich@noaa.gov](mailto:grant.froelich@noaa.gov).

APPROVAL SHEET  
H11982

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.

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 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 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.