

H12112

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. H12112

LOCALITY

State CALIFORNIA

General Locality Gulf of the Farallones

Sublocality Vicinity of Golden Gate

.....
2010
.....

CHIEF OF PARTY

.....
DAVID D BRIGGS, Fugro Pelagos, Inc.
.....

LIBRARY & ARCHIVES

DATE

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION HYDROGRAPHIC TITLE SHEET		REGISTRY No H12112
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 <u>California</u>		
General Locality <u>Gulf of the Farallones</u>		
Sub-Locality <u>Vicinity of Golden Gate</u>		
Scale <u>1:10,000</u>		Date of Survey <u>June 14 - August 07, 2009</u>
Instructions dated <u>11/25/2008</u>		Project No. <u>OPR-L430-KR-09</u>
Vessel <u>F/V PACIFIC STAR (556510), R/V R2 (623241), R/V D2 (647782)</u>		
<hr/>		
Chief of party <u>DAVID D BRIGGS</u>		
Surveyed by <u>REYNOLDS, MOYLES, FARLEY, ROKYTA, LYDON, LOPEZ, et al</u>		
Soundings by <u>RESON SEABAT 7125 , RESON SEABAT 8125</u>		
SAR by <u>Joe Tegeder</u>		Compilation by <u>Annie Raymond</u>
Soundings compiled in <u>Feet</u>		
<hr/>		
REMARKS: <u>All times are UTC. UTM Zone 10</u>		
<u>The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS)</u>		
<u>naautical charts. All separates are filed with the hydrographic data. Revisions and end notes in red were</u>		
<u>generated during office processing. Page numbering may be interrupted or non sequential.</u>		
<hr/>		
<u>All pertinent records for this survey, including the Descriptive Report, are archived at the</u>		
<u>National Geophysical Data Center (NGDC) and can be retrieved via http://www.ngdc.noaa.gov/.</u>		



A. AREA SURVEYED

H12112 (Sheet D) is located in the vicinity of Golden Gate. It is bound by the coordinates listed in **Table 1** and shown in **Figure 1**.

Hydrographic data collection began on June 14, 2009 and ended on August 7, 2009.

Table 1 – Sheet Bounds

Point	Latitude (North)	Longitude (West)
1	37-46-49	122-38-46
2	37-42-54	122-36-02
3	37-47-00	122-27-05
4	37-50-41	122-29-44

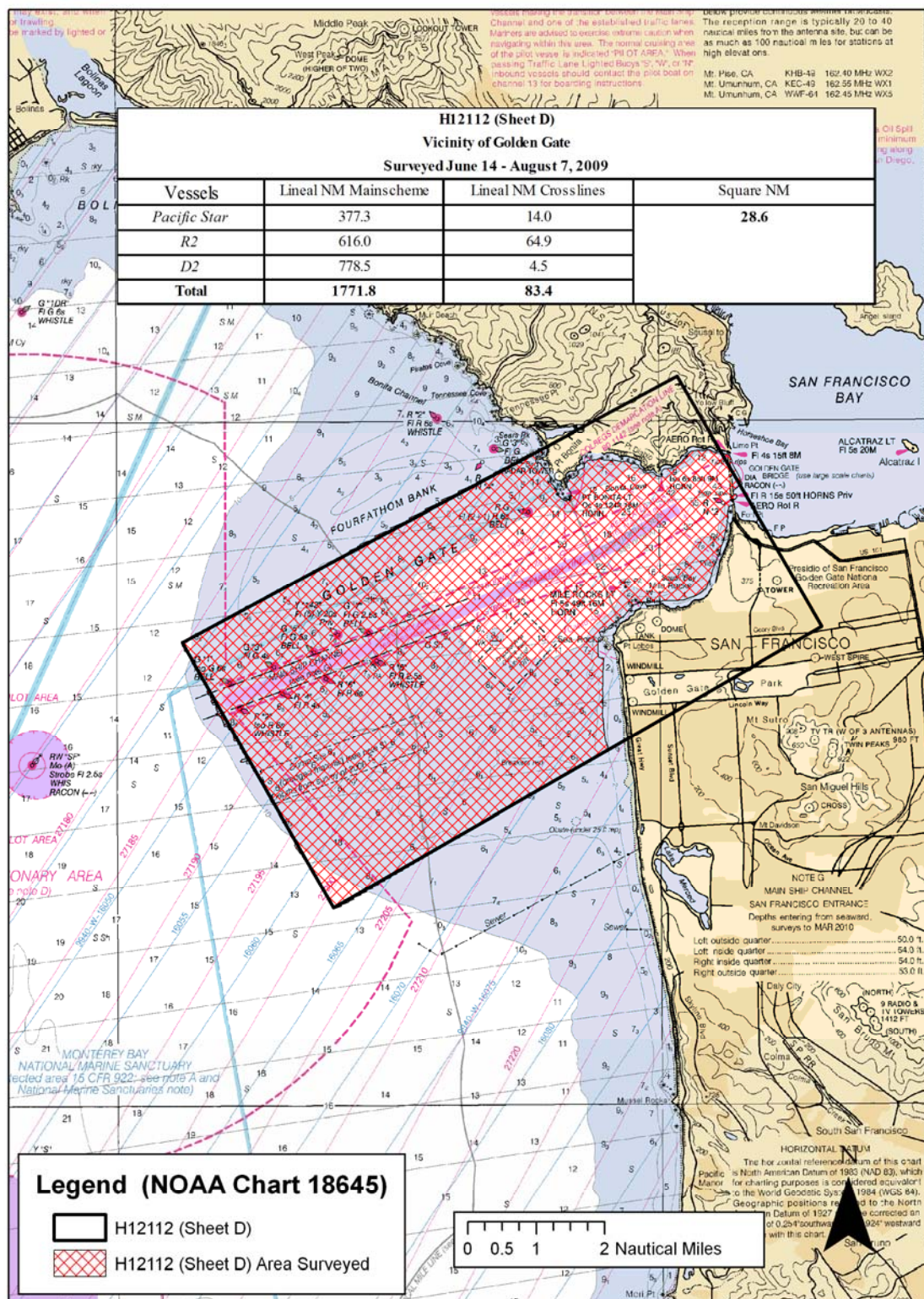


Figure 1 H12112 Area Surveyed

B. DATA ACQUISITION AND PROCESSING

Refer to the OPR-L430-KR-09 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 F/V Pacific Star (with launches R2 and D2) acquired all sounding data for H12112.

F/V Pacific Star, 162 feet in length with a draft of 16 feet, was equipped with a hull mounted Reson SeaBat 7125 dual-frequency multibeam echosounder system for the OPR-L430-KR-09 survey. All 7125 multibeam data files were logged in the S7K format using WinFrog Multibeam v 3.08.44.04. The vessel was 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.

R/V R2, a Pacific Star launch, is 29 feet in length with a draft of 3 feet. For this survey, R2 was equipped with a hull mounted Reson SeaBat 7125 dual-frequency multibeam echosounder system. All 7125 multibeam data files were logged in the S7K format using WinFrog Multibeam v 3.08.44.04. R2 was equipped with two AML sound velocity and pressure sensors (SV&P) for sound velocity profiles, and vessel attitude and position were measured using an Applanix Position and Orientation System for Marine Vessels (POS MV) 320 V4.

R/V D2, a Pacific Star launch, is 29 feet in length with a draft of 3 feet. D2 is outfitted and configured in a manner similar to R/V R2. For this survey, D2 was equipped with a Reson Seabat 8125 (455 kHz frequency) multibeam echosounder system. Multibeam data files were logged in the XTF format using WinFrog Multibeam v 3.08.44.04. D2 was equipped with two AML sound velocity and pressure sensors (SV&P) for sound velocity profiles, and vessel attitude and position were measured using an Applanix Position and Orientation System for Marine Vessels (POS MV) 320 V4.

Refer to OPR-L430-KR-09 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 83.4 nautical miles or 4.7 percent of the total main scheme line length. Each crossline was compared to the 2m CUBE BASE surface, using the CARIS HIPS QC report routine with most beams passing at the 95 percent confidence level or better ¹. Results are located in Separate IV. Exceptions follow:

- Line 4D03-TIE006, 4D06-TIE05, & 4D06-TIE10 were acquired in areas of significant sedimentation movement. While most of the beams for lines 4D03-TIE006 and 4D06-TIE05 fell within the 95% confidence level, several did not due to a horizontal migration of sand waves. 4D06-TIE10 was acquired in an area which exhibited migration of sand waves along with significant near shore erosion² (**Figure 2**).

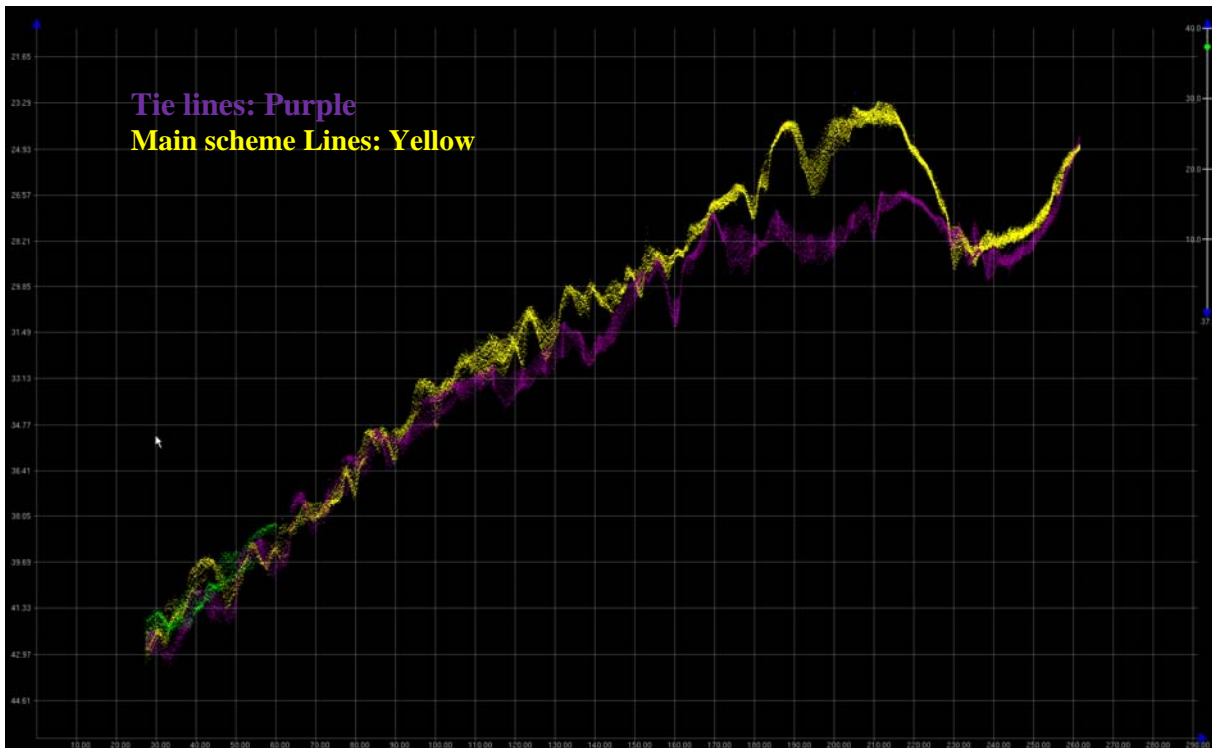


Figure 2 4D06-TIE10

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

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

Where, a=0.5 and b=0.013, d=depth

Uncertainty Values

The majority of H12112 had uncertainty values of 0.31 m to 0.56 m, which met project specifications³ (**Figure 3**).

As seen in the uncertainty surface graphic, uncertainty values are generally lowest near the sonar nadir beams and increase toward the outside of each swath. This is expected and primarily a result of sound velocity error and higher bottom detection uncertainty.⁴

Areas of higher uncertainty include sound velocity error and static draft busts. Other areas of higher uncertainty include irregular bottom topography and rock outcrops.⁵

Oscillations found in the along-track and across-track uncertainty values are a result of vessel pitch and roll and are more pronounced during times of heavy weather.⁶

A slight difference in uncertainty values between survey platforms is also apparent in the uncertainty surface.⁷

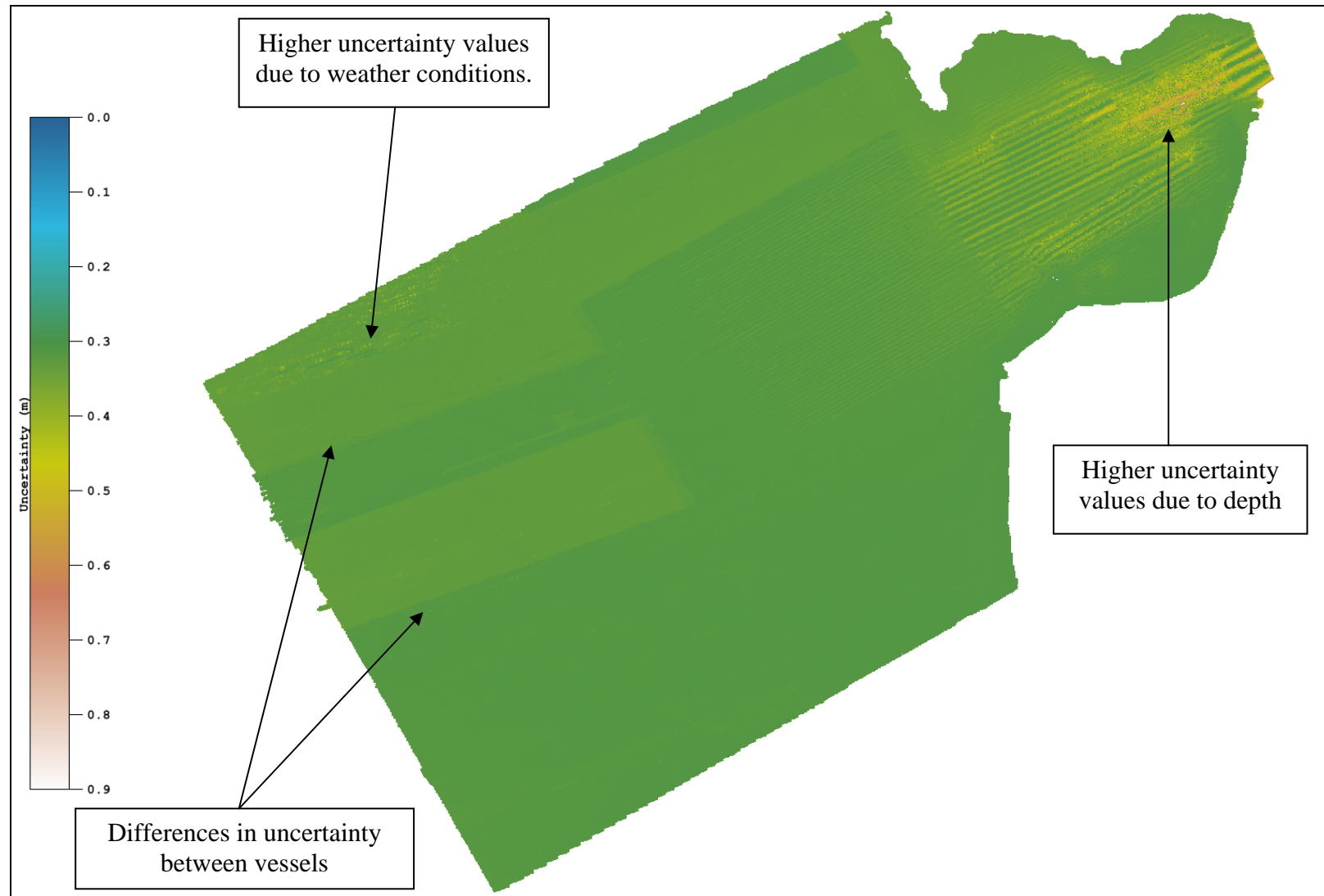


Figure 3 Uncertainty DTM



Survey Junctions

H12112 (Sheet D) junctions with:
See (**Figure 4**).

<u>Registry #</u>	<u>Date</u>	<u>Junction Side</u>
H12109	2009	West
H12110	2009	Southwest
H12111	2009	North
H12113	2009	South

The surveys agree along their common borders. The agreement was noted in the field by comparing the CUBE surfaces during subset cleaning. This conformity is also apparent in the final combined BASE surfaces. ⁸

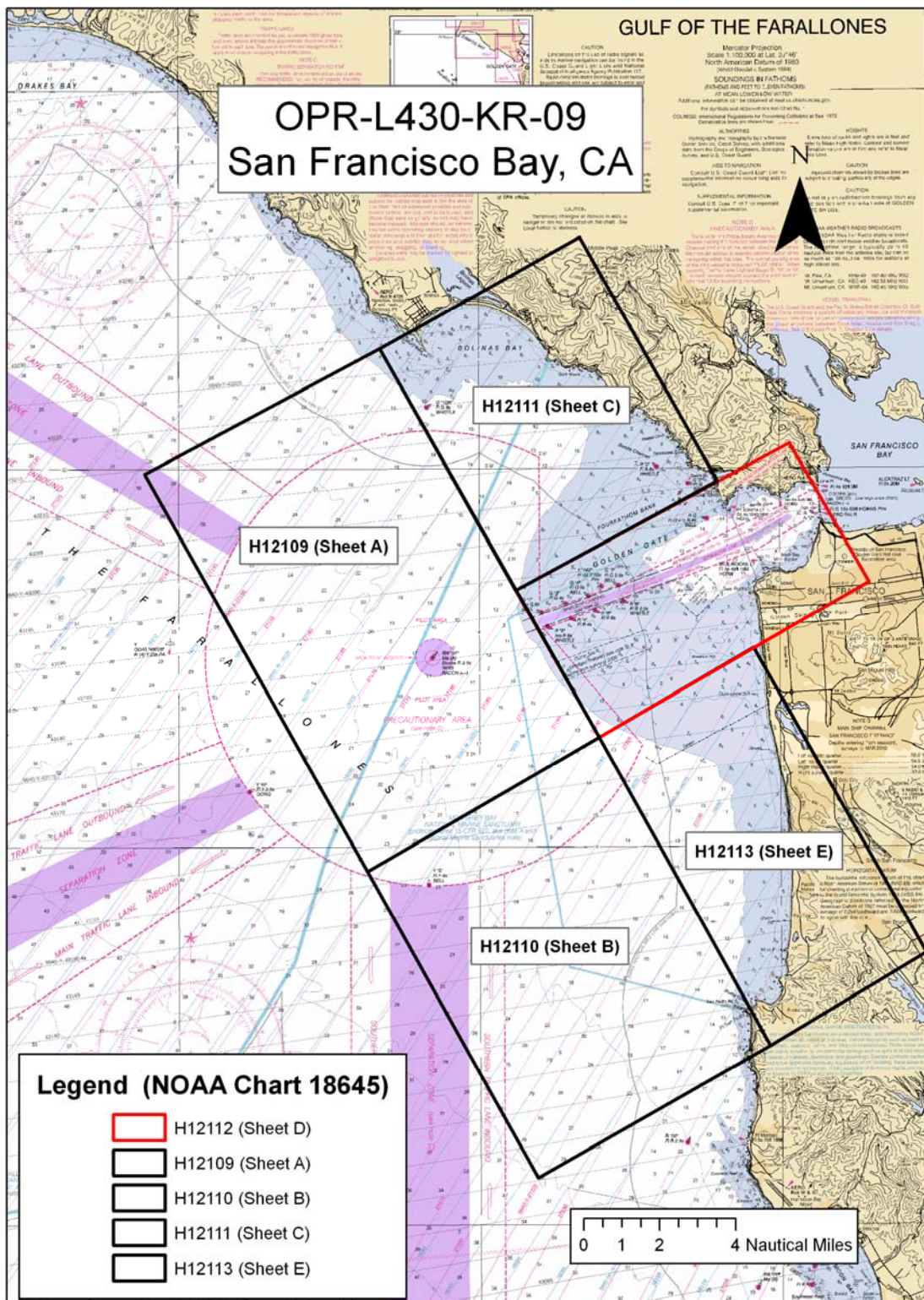


Figure 4 H12112 Survey Junctions

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 which were monitored throughout the survey to ensure that 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 comparable sound velocity data for all vessels. This was accomplished by having all sound velocity profiling equipment (MVP and SVPs) perform an SVP cast concurrently, with all vessels in close proximity to each other.

Data Quality

In general, the multibeam data quality for H12112 was good. Four notable problems follow:

1. A general downward and/or upward cupping is noticeable in the across-track sounding profiles for certain areas. This is most likely due to a high volume of thermal layering and to strong undercurrents in the water column. To address this problem, full water column sound speed measurements were conducted more frequently. Even though this SVP error is noticeable in the data, it is within required specifications.⁹

The MVP system on the Pacific Star was deployed at an interval of once every two hours, where 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 was collected, with the result being the creation of a grid of sound velocity profiles. This method kept differences in time and distance to a minimum between the survey data and the applied sound velocity profile.

2. During routine processing in subset editor, areas were found which contained significant noise due to poor bottom tracking in soft sediments. The noise manifests itself as a parabolic near nadir bottom return in the water column commonly described as a set of horns. As a result of rejecting this noise in subset data cleaning, data density requirements of 5 pings per cell dropped below density requirements. Though localized areas did not meet the 5 pings per cell requirement, the overall sheet did meet the 95% requirement for data density.¹⁰ Below is a graphics illustrating the effect (**Figure 5**).

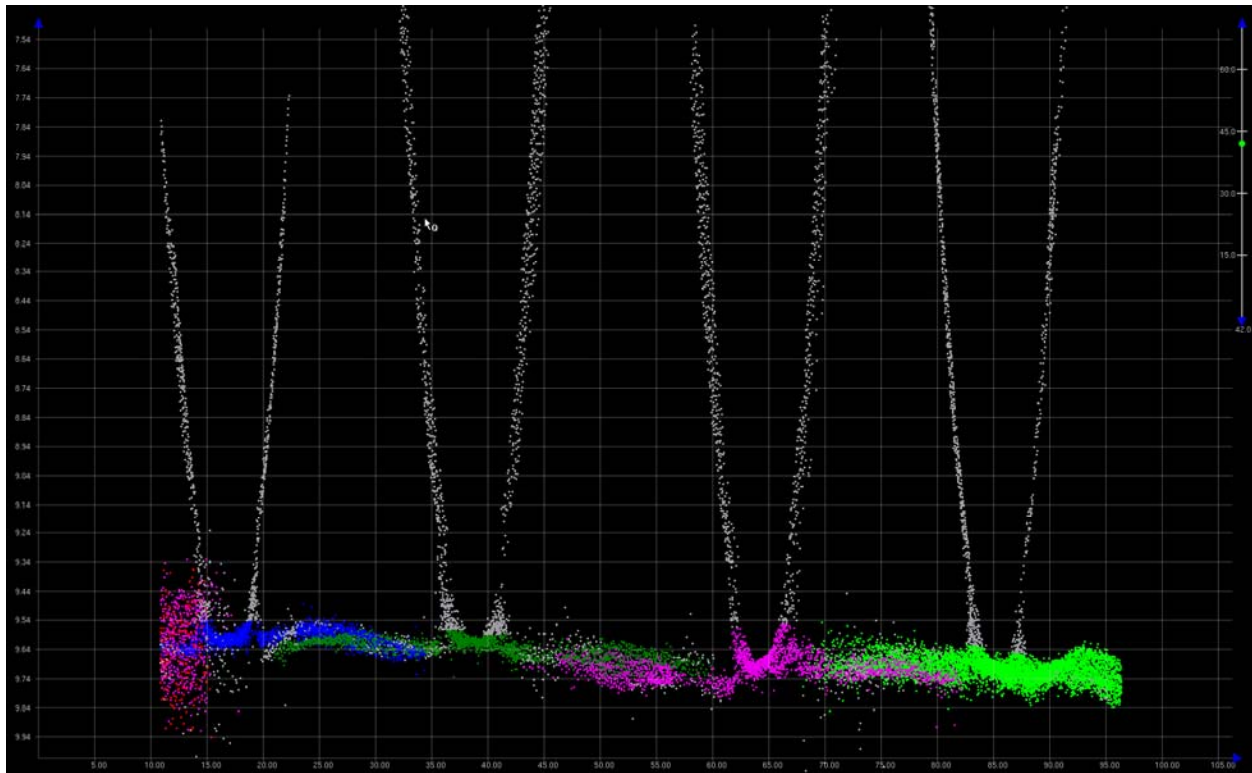


Figure 5 Bottom Tracking Noise

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.

3. Several inaccurate waterline measurements were logged on the Pacific Star as a result of significant wave action combined with considerable vessel roll. An effort was made to record waterline values at 12-hour intervals and vessel ballasting was avoided, but significant variance was still found in these values. Waterline values were evaluated using Post Processed Kinematic GPS Altitude and erroneous values were removed from the CARIS Vessel Configuration File. Some lines still exhibit vertical busts of up to 15cm as a result of higher than normal uncertainty in waterline measurements.¹¹
4. Several late project infill lines logged in H12112 exhibited vertical busts as a result of sedimentation transport. This dynamic bottom effect was confirmed by verifying conformity of hard objects such as rocks and ridges. With the exception of a very few instances such as the tie lines referenced in Section B.2, the dynamic bottom still conformed to IHO order 1 Uncertainty requirements¹² (Figure 6).

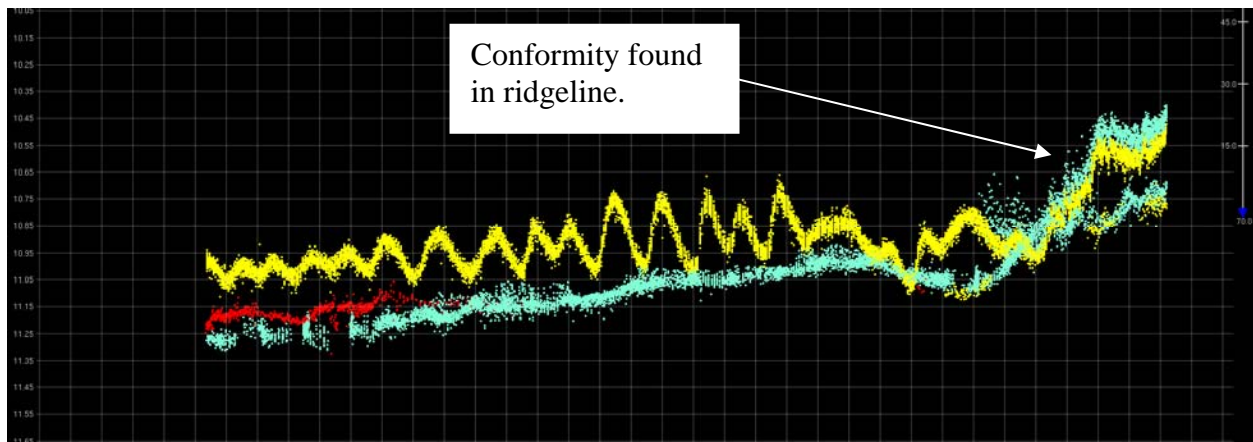


Figure 6 Dynamic Bottom

Refer to the OPR-L430-KR-09 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 Soundings

Refer to the OPR-L430-KR-09 Data Acquisition and Processing Report for a detailed description of all corrections to soundings. No deviations from the report occurred.

B.4 Data Processing

Refer to the OPR-L430-KR-09 Data Acquisition and Processing Report for a detailed description of the processing flow.

In order to provide more accurate project wide TPU values, all full water column sound speed cast measurements were statistically analyzed in MBTools, via the SVP Statistics utility. This utility calculated a mean, variance, and standard deviation at a user specified depth interval. The standard deviation was then used to produce a TPU value of higher accuracy that was vessel and sheet specific.

The calculated Sound Velocity TPU values are as follows for H12112:

Vessel	Measured	Surface
3-Pacific Star	0.500	4.017
4-R2	0.500	1.874
5-D2	0.500	2.380

The final fieldsheet for H12112 is called “H12112_(Sheet_D)” and it contains three BASE surfaces.¹³ The following parameters were used:

0-23 meters: 1m resolution, name “H12112_1m_Final”
20-52 meters: 2m resolution, name “H12112_2m_Final”
46-115 meters: 4m resolution, name “H12112_4m_Final”

Note:

- Maximum depth was approximately 115 m; therefore, resolutions coarser than 4m were not computed.

The final S57 file for this project is called “H12112_S57_Features.000”.¹⁴ 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-L430-KR-09 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.

C.1 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 Pigeon Point, 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 OPR-L430-KR-09 Horizontal and Vertical Control Report for a more detailed description of PPK positioning methods used.

C.2 Vertical Control

All sounding data were initially reduced to mean lower low water (MLLW) using preliminary tidal data for gauges 9414290 & 9415020, from the National Water Level Observation Program accessed through the NOAA tides and currents website (<http://tidesandcurrents.noaa.gov/>). A cumulative file for the gauges was updated daily by appending the new data. Preliminary tidal zoning provided by NOAA was used in conjunction with the preliminary tide data for initial data processing.

On September 14, 2009, JOA issued verified tidal data and final zoning for H12109, H12110, H12111, H12112, and H12113 of OPR-L430-KR-09. The tidal zoning was modified by JOA, providing a more elaborate zoning scheme from those zones issued in the Statement of Work. Verified tidal data had a light smoothing applied to alleviate high frequency noise.

All sounding data were then re-merged using CARIS HIPS and SIPS tide routine. Verified tidal data from the San Francisco, CA (9414290) and Point Reyes, CA (9415020) tidal stations were used for the final Navigation Base Surfaces and S-57 Feature files.¹⁵ Tidal Stations were owned and operated by NOAA's National Ocean Service through the National Water Level Observation Program.



Table 2 – Tide Gauge

Gauge	Location	Latitude	Longitude
9414290	San Francisco, CA	37° 48.4' N	122° 27.9' W
9415020	Point Reyes, CA	37° 59.7 N	122° 58.6 W

See OPR-L430-KR-09 Horizontal and Vertical Control Report for a more detailed description of final tidal zoning.

D. RESULTS AND RECOMMENDATIONS

D.1 Chart Comparison

H12112 survey was compared with the charts shown in **Table 3.**¹⁶

Table 3 – Chart Comparisons

Chart Number	Type	Scale	Edition	Edition Date
18645	Raster	1:100,000	26	September, 2008
18649	Raster	1:40,000	67	December, 2009
18652	Raster	1:80,000	35	August, 2009
US5CA12M	ENC	n/a	13	November, 2010
US5CA13M	ENC	n/a	52	December 2010

Comparison of Soundings

A comparison of soundings was accomplished by overlaying the latest edition of NOAA charts and ENCs onto the final BASE surfaces in CARIS HIPS & SIPS. The general agreement between the charted soundings and H12112 soundings is noted. A more detailed comparison was undertaken for any charted shoals or other dangerous features.

Agreement between the H12112 BASE surface depths and the charted soundings for all applicable ENCs and Raster charts was within +/- 1 to 2 fathoms. Since the survey area was ensonified with 100% multibeam coverage, shoaler depths were discovered between the charted soundings. In these areas, when necessary, the sounding was designated to ensure its inclusion in the finalized BASE surface.¹⁷

- Numerous rocks, least depths ranging from 10ft to 35ft, were found just seaward of the 36ft contour on chart 18649 and 18652 extending from the vicinity of Pt Bonita (37-49-00N 122-31-45W) to North of Bird Island (37-49-32N 122-32-21W). Due to the extensive nature of the rocks, the Hydrographer recommends revising contours to include shoaler rocks.¹⁸
- A small cove North of Bird Island (37-49-32N 122-32-14W) was found to be deeper than charted on 18649 and 18652. Hydrographer recommends revising contours to include bay behind island.¹⁹
- Numerous rocks, least depths ranging from 20ft to 30ft, were found just seaward of the 30ft contour on chart 18649 and 18652 extending from 400m North to 150m South of a 24ft Rock (37-48-12N 122-29-03W). Due to the extensive nature of the rocks, the Hydrographer recommends revising contours to include shoaler rocks.²⁰

- A charted rocky shoal in the vicinity of the Mile Rocks (37-47-34N, 122-30-37W) was found to be more extensive than contours depict. The 36ft contour was found to extend an additional 110m to the Northwest from its current bound. Hydrographer recommends revising contours to conform to H12112.²¹
- A charted shoal of 14ft (37-47-27N 122-30-34W) was found to exist as a submerged rock 100m to the South of its charted position at 37-47-24.43N 122-30-34.04W. The rock was found to have a least depth of 15ft. Hydrographer recommends the charted 14ft depth area be removed and submerged rock be charted as depicted in the S-57 feature file.²²

The Hydrographer recommends that soundings within the survey limits of H12112 supersede all prior survey and charted depths.²³

USACE Maintained San Francisco Ship Channel

Depths within the navigation channel either agree or are deeper than those listed in the USACE table displayed on the chart with the following exceptions.²⁴ Note: Chart 18649 Table shows a channel survey in March of 2010 which may supersede H12112.

- An uncharted non-dangerous feature was found at 37-47-04.04N 122-34-10.75W and has a least depth of 17.28m (56.71ft). The vessel has a length of 5m and a width of 2m and is located in the center of the USACE controlled dredged channel of 54ft (**Figure 7 & 8**).
- A small area of shoaling was found at 37-46-41.31N 122-35-36.64W with a least depth of 15.84m (51.96ft). The control depth of the channel quadrant is listed as 54ft (**Figure 8**).
- A small area of shoaling was found at 37-46-35.48N 122-35-52.84W with a least depth of 16.21m (53.18ft). The control depth of the channel quadrant is listed as 54ft (**Figure 8**).
- A small area of shoaling was found at 37-46-26.63N 122-35-51.05W with a least depth of 15.82m (51.91ft). The control depth of the channel quadrant is listed as 53ft (**Figure 8**).

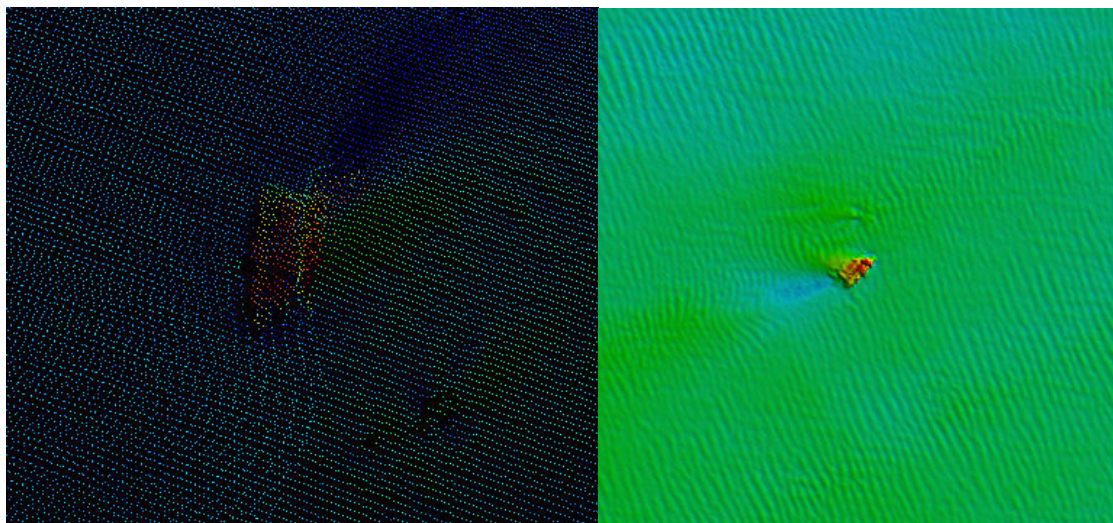


Figure 7 Uncharted feature

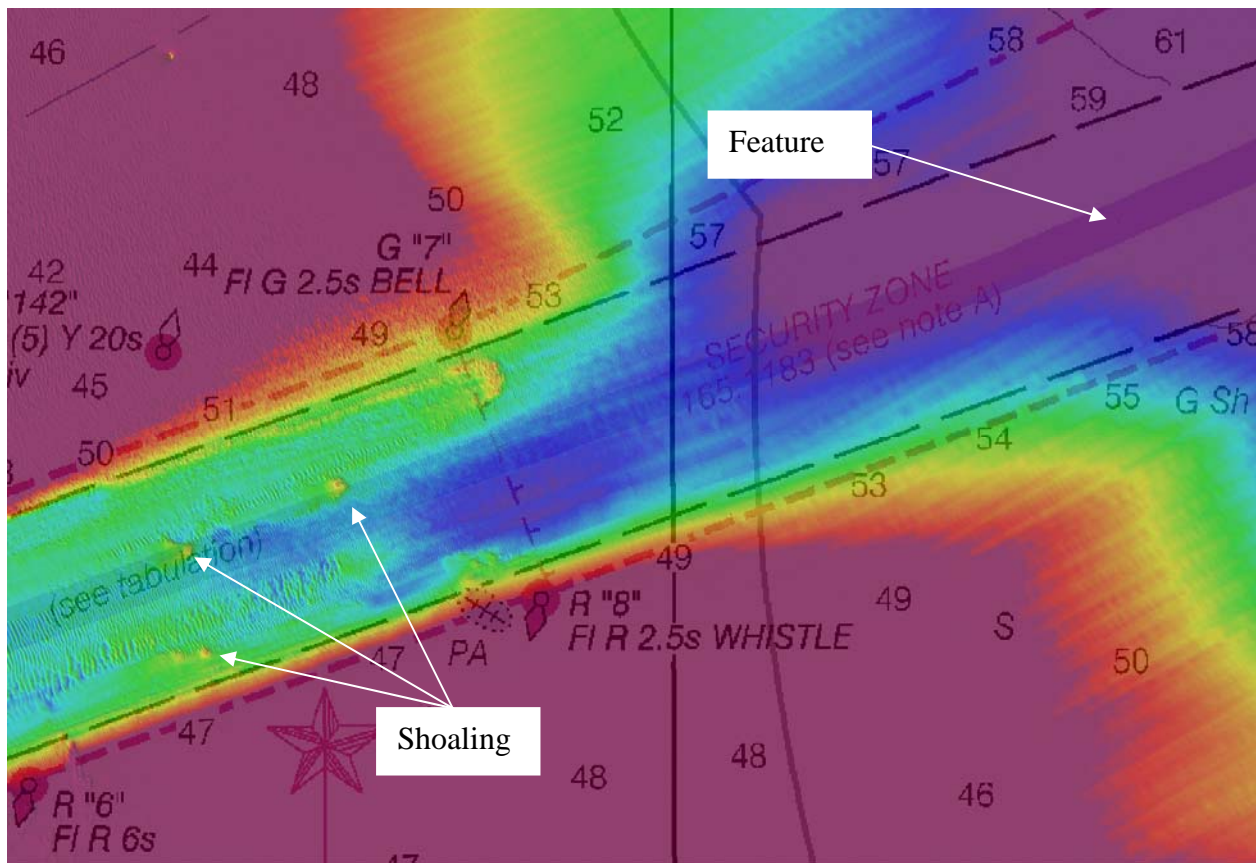


Figure 8 San Francisco Channel Discrepancies

Automated Wreck and Observation Information System (AWOIS)

There were eleven AWOIS items assigned to H12112. Items 53723, 53724, 50390, 50038, & 53722, were ensonified using object detection criteria. 50063, 50066, 50073, 50186, 50141, & 50286 areas were ensonified using 100% multibeam criteria. A search was done for each AWOIS item using the required search radius, the results of which can be seen in Appendix II. ²⁵

Charted Features labeled PA/ED/PD/Rep.

There were three charted features labeled PA within the limits of H12112.

1. Dangerous wreck PA charted at 37-47-26N 122-35-21W is AWOIS item 53722. The wreck was not found in object detection coverage. Hydrographer recommends removal of wreck. ²⁶
2. Dangerous wreck PA charted at 37-46-31N 122-35-21W is AWOIS item 50038. The wreck was not found in object detection coverage. Hydrographer recommends removal of wreck. ²⁷

3. Dangerous wreck PA charted at 37-47-38N 122-30-38W is AWOIS items 53723 & 53724. The wreck was not found in object detection coverage. Hydrographer recommends removal of wreck.²⁸

Refer to Appendix II for AWOIS information and further details regarding these PA items.²⁹

Charted Features

1. Dangerous wreck, known depth 50ft charted at 37-46-53N 122-33-03W is AWOIS item 50390. The wreck was found to exist 50m to the west of its current charted position with a least depth of 18.864m (61.89ft). Refer to Appendix II for AWOIS information and further details. Hydrographer recommends repositioning of the wreck and revising least depth as depicted in the S-57 feature file.³⁰
2. A charted Pile, located at 37-47-55N 122-29-00W was not found to exist in the MBES data. No visual verification was performed on this feature. Hydrographer recommends removal of the pile.³¹
3. Submerged rock, known depth 24ft charted at 37-48-11.5N 122-29-03W was found to be correctly positioned but to have an incorrect depth. The rock has a least depth of 5.498m (18.04ft). Hydrographer recommends revising least depth as depicted in the S-57 feature file.³²
4. Several exposed rocks in the vicinity of Pt Bonita (37-49-07N 122-32-02W) were found to be incorrectly positioned based on MBES coverage. No visual verification or leveling was performed on the features. Hydrographer recommends adjusting positions based on the MBES coverage.³³
5. Several exposed or submerged rocks in the vicinity of Lands End (37-47-21N 122-30-27W) were found to be incorrectly positioned based on MBES coverage. The least depth was not obtained and no visual verification or leveling was performed on the features. Hydrographer recommends adjusting positions based on the MBES coverage.³⁴
6. Several exposed rocks in between Bakers Beach and Fort Pt. (37-48-06N 122-28-55W) were found to be incorrectly positioned based on MBES coverage. No visual verification or leveling was performed on the features. Hydrographer recommends adjusting positions based on the MBES coverage.³⁵
7. A charted private buoy labeled Y"142" Fl (5) Y 20s Priv at position 37-46-53N 122-35-56W was found to exist but to be incorrectly positioned. The surveyed position of the buoy is 200m to the Southeast at 37-46-48.62N 122-35.49.52W. Hydrographer recommends repositioning the buoy as depicted in the S-57 feature file.³⁶
8. Dangerous wreck charted at 37-47-07N 122-30-44W was only partially surveyed with 100% multibeam coverage. No indication of a wreck was found in the coverage. Hydrographer recommends no action be taken on the wreck due to a lack of coverage.³⁷

Uncharted Features

1. An uncharted nondangerous wreck was found at 37-48-17.75N 122-32-27.23W with a least depth of 28.077m (92.116ft). The vessel has a length of 14.5m and a breadth of 5m. Hydrographer recommends charting wreck as depicted in the S-57 feature file³⁸ (**Figure 9**).

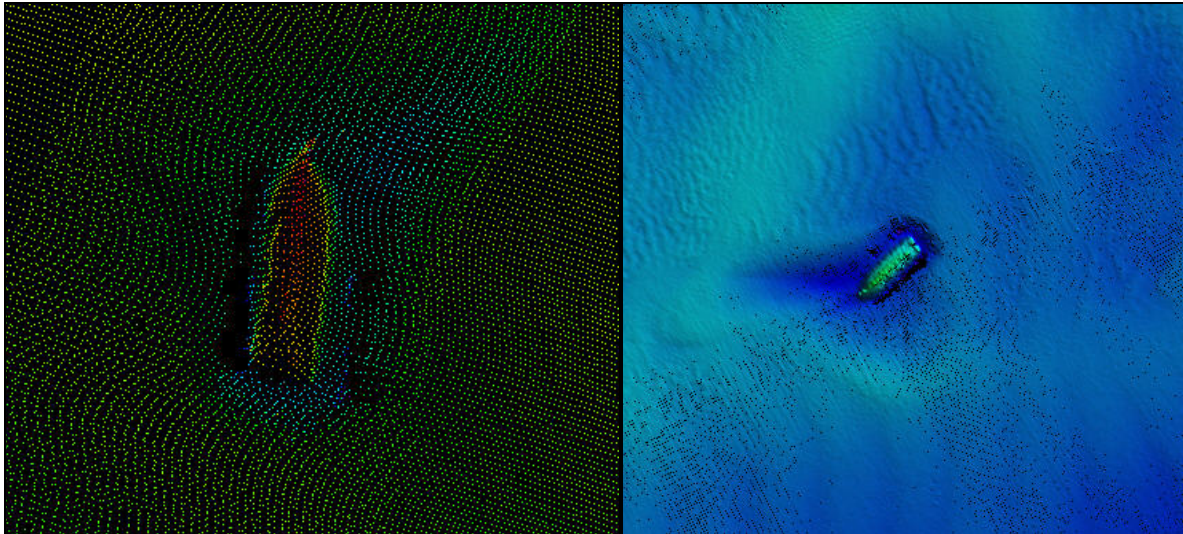


Figure 9 Uncharted Wreck

2. An uncharted nondangerous wreck was found at 37-47-23.31N 122-33-15.90W and has a least depth of 18.875m (61.93ft). The vessel has a length of 19m and a breadth of 9 m. This wreck does lie in the center of the main ship channel. Hydrographer recommends charting wreck as depicted in the S-57 feature file³⁹ (**Figure 10**).

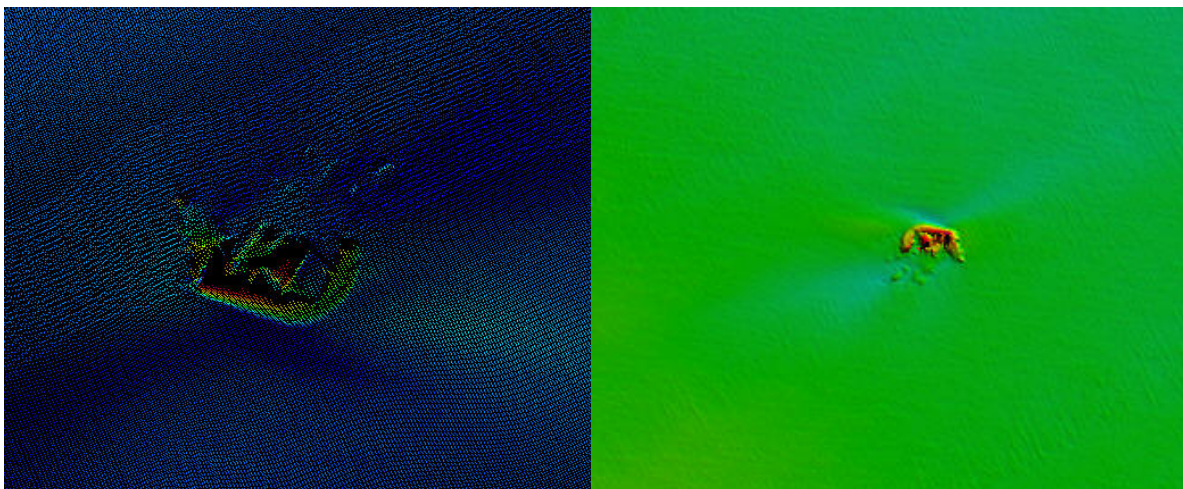


Figure 10 Uncharted Wreck

Dangers to Navigation

There were no Dangers to Navigation found for H12112.⁴⁰

D.2 Additional Results

Shoreline verification was not a requirement for OPR-L430-KR-09.⁴¹ In addition to providing NOAA with high density multibeam data for charting purposes, an in-depth VDatum analysis was conducted as a joint effort between Fugro Pelagos, Inc. and John Oswald & Associates. The results and findings can be found in the Horizontal & Vertical Control Report for the project.

Additional Features

1. An uncharted non-dangerous wreck was found at 37-47-19.49N 122-35-54.49W and has a least depth of 14.032m (46.04ft). The vessel has a length of 22m and a breadth of 8 m. Since the features height off of bottom is less than zero, the Hydrographer does not recommend charting this feature⁴² (**Figure 11**).

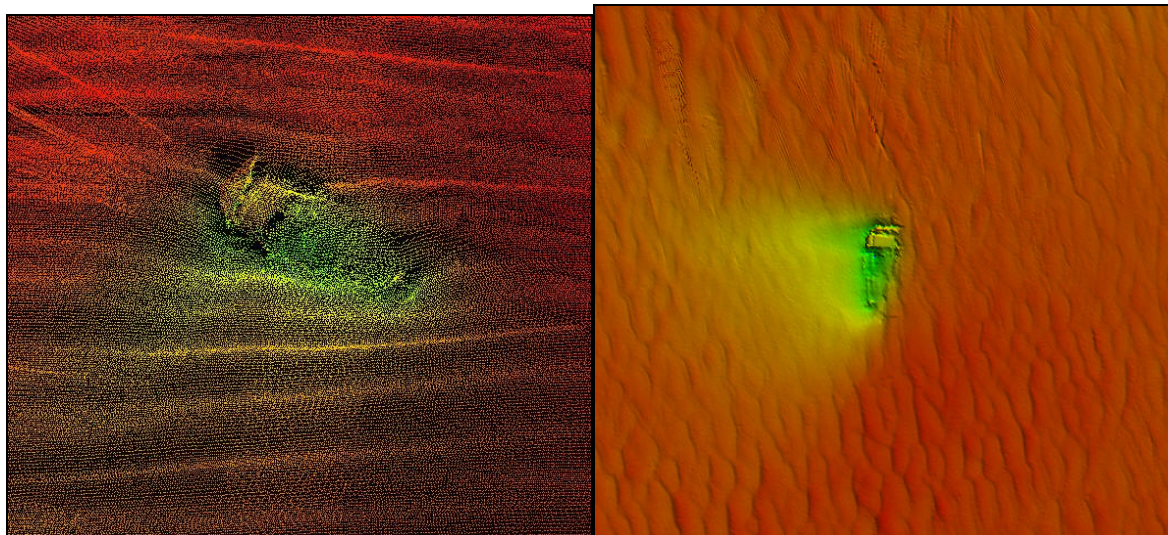


Figure 11 Uncharted Wreck

2. An uncharted nondangerous feature was found at 37-48-15.30N 122-32-46.27W and has a least depth of 25.120m (82.42ft). The vessel has a length of 8m and a width of 6m. A sand wave has been charted 10m to the east of the feature was found to be shoaler. Due to the features close proximity to the shoaler sand wave, the Hydrographer does not recommend charting this feature⁴³ (**Figure 12**).

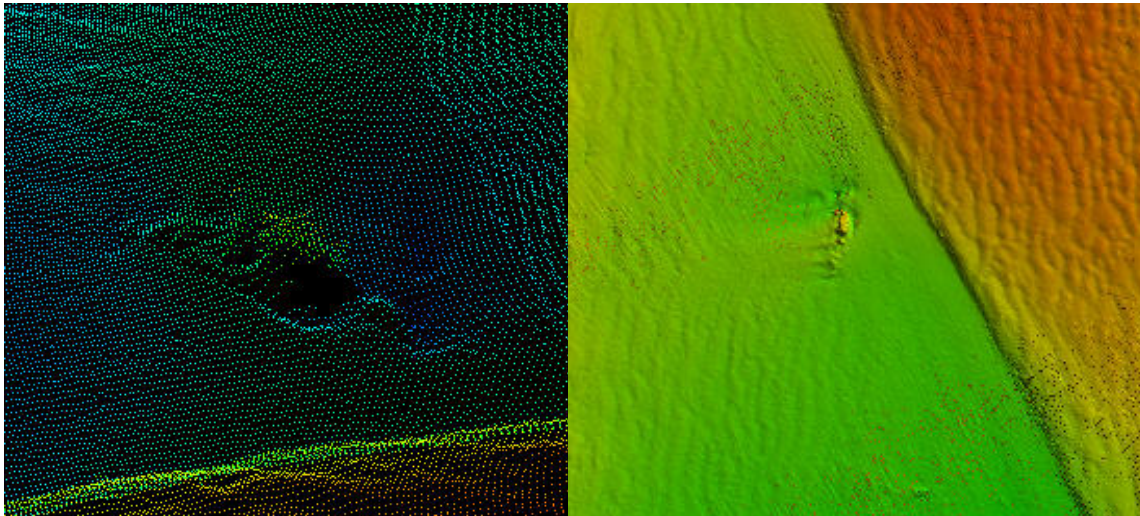


Figure 12 Uncharted Feature

3. An uncharted non-dangerous feature was found at 37-49-30.21N 122-28-46.26W and has a least depth of 8.537m (28.01ft). The feature has the shape of a cuboid measuring 8m x 3m x 2.5m and is located on a steep rocky coastline near the Golden Gate Bridge. Due to the features close proximity to the shoaler coastline, less than 5m, the Hydrographer does not recommend charting this feature⁴⁴ (Figure 13 & 14).

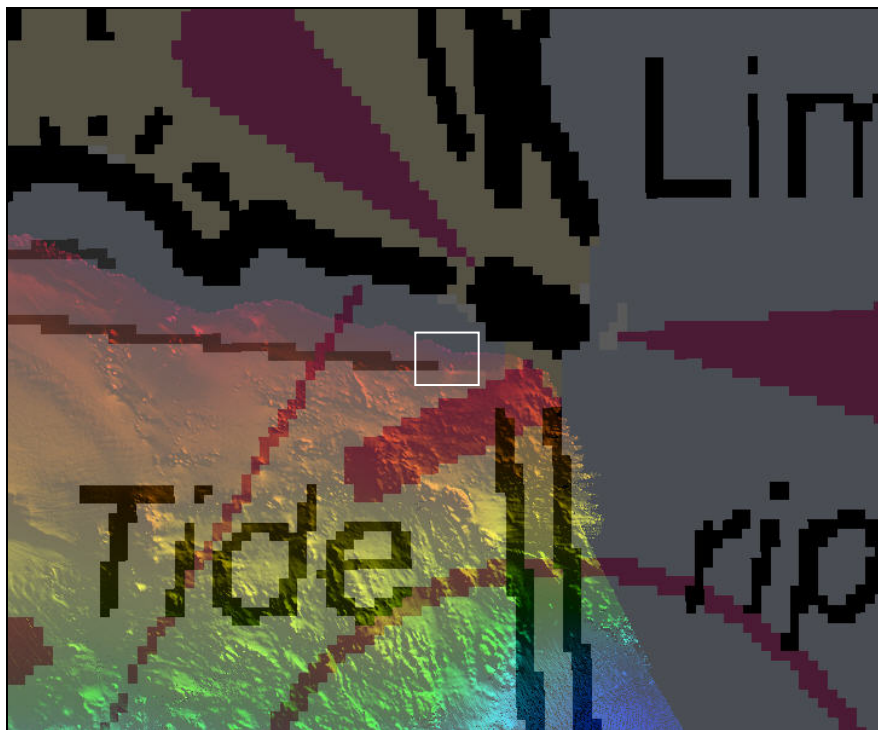


Figure 13 Location of Feature

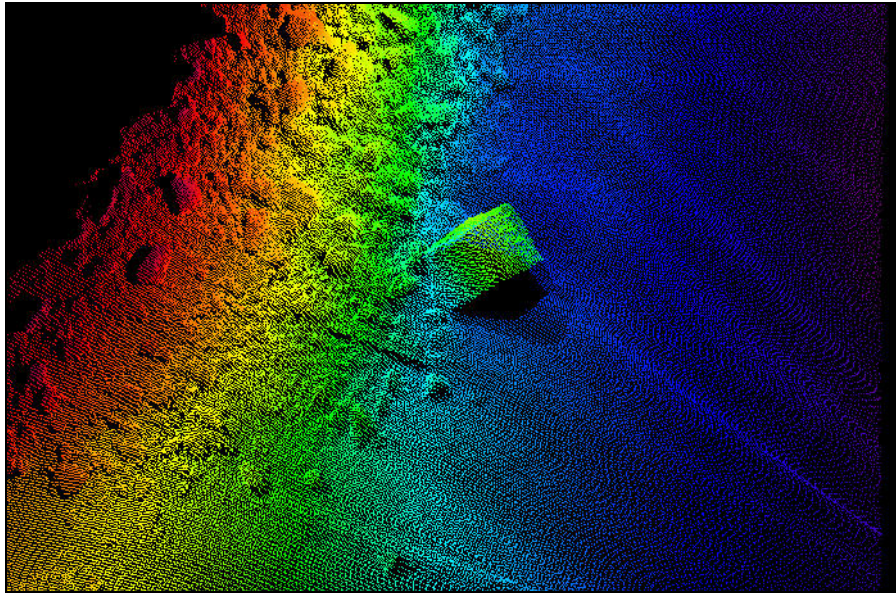


Figure 14 3D image of Feature

4. Large sand waves, up to 9.5m (31ft) in height were found in the main channel between Pt. Bonita and Golden Gate. The sand waves are of no navigational significance, but are singled out for potential scientific interest. (**Figure 15**)

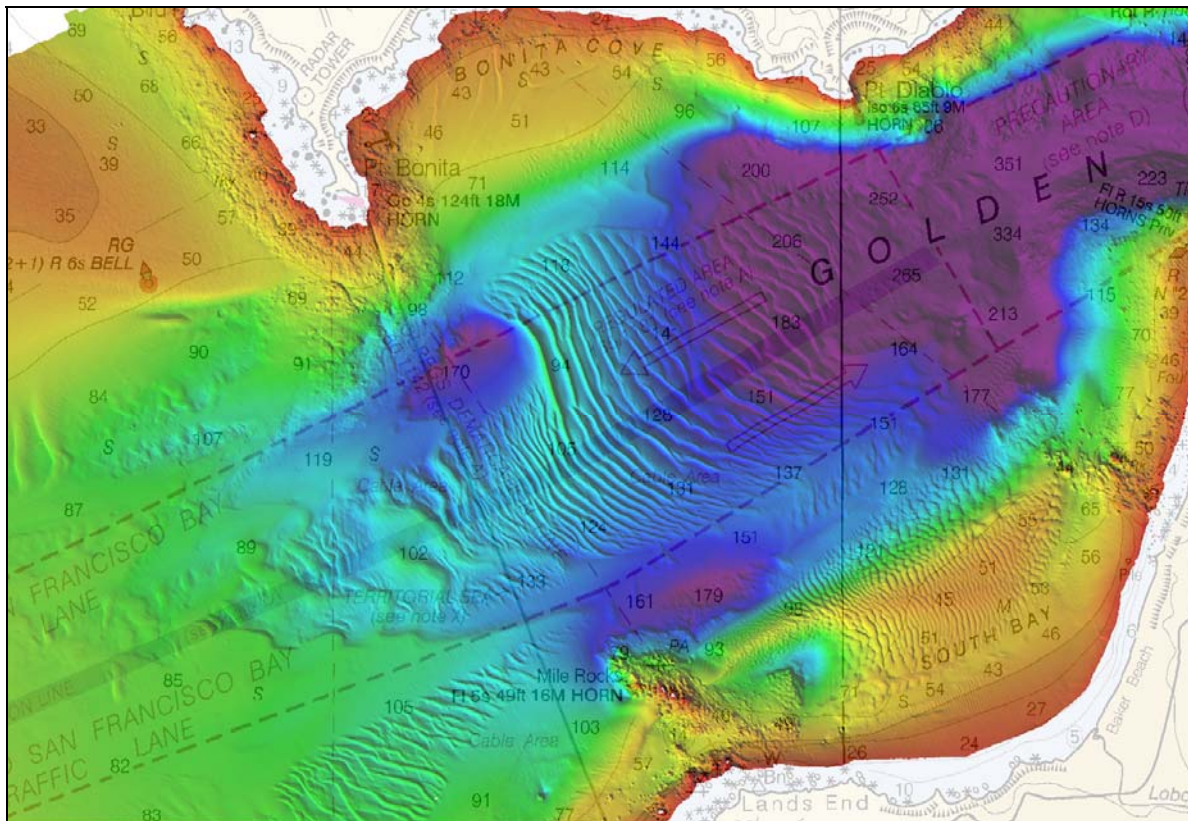


Figure 15 Sand Waves

Bottom Samples

The F/V Pacific Star and launches (R2 and D2) were fitted to obtain bottom samples as specified in the Statement of Work.

Samples were taken with a Van Veen grab sampler and positions were recorded with WinFrog Multibeam v 3.08.44.04. Samples retrieved were analyzed and then encoded with the appropriate S57 attributes. Positions and descriptions of all samples are found in the H12112_S57_Features file.⁴⁵

Aids to Navigation

The following aids to navigation were examined during this survey⁴⁶:

1. Point Bonita Light – Oc W 4s - (Chart 18649) found in correct position and serving its intended purpose
2. Mile Rocks Light – Fl W 5s - (Chart 18649) found in correct position and serving its intended purpose
3. Point Diablo Light – Iso W 6s - (Chart 18649) found in correct position and serving its intended purpose
4. Four Fathoms Bank Lighted Bell Buoy – Fl (2 + 1)R 6s - (Chart 18649) found in correct position and serving its intended purpose
5. Lighted Bell Buoy 1 – Iso G 6s- (Chart 18649) found in correct position and serving its intended purpose
6. Lighted Whistle Buoy 2 – Iso R.6s- (Chart 18649) found in correct position and serving its intended purpose
7. Lighted Buoy 3 – Fl G 4s- (Chart 18649) found in correct position and serving its intended purpose
8. Lighted Buoy 4 – Fl R 4s - (Chart 18649) found in correct position and serving its intended purpose
9. Lighted Bell Buoy 5 – Fl G 6s - (Chart 18649) found in correct position and serving its intended purpose
10. Lighted Buoy 6 – Fl R 6s - (Chart 18649) found in correct position and serving its intended purpose

11. Lighted Bell Buoy 7 – Fl G 2.5s - (Chart 18649) found in correct position and serving its intended purpose

12. Lighted Whistle Buoy 8 - (Chart 18649) found in correct position and serving its intended purpose

No uncharted aids to navigation were found in the survey area.⁴⁷

E. APPROVAL SHEET

Approval Sheet

For

H12112

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

OPR-L430-KR-09 Statement of Work
NOS Hydrographic Surveys Specifications and Deliverables, April 2009 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.
September 2, 2010

9/2/2010

X



David D Briggs
Lead Hydrographer



-
- ¹ Concur.
 - ² Concur.
 - ³ Concur.
 - ⁴ Concur.
 - ⁵ Concur.
 - ⁶ Concur.
 - ⁷ Concur. Data are adequate to supersede charted data within the common area.
 - ⁸ Concur. A common junction has been formed with previously compiled surveys H12109, H12111, and H12113.
 - ⁹ Concur.
 - ¹⁰ Concur.
 - ¹¹ Concur. The data is adequate for charting.
 - ¹² Concur. The data is adequate for charting.
 - ¹³ A 4 meter combined surface created during the Survey Review processes was used for compilation.
 - ¹⁴ H12112_S57_Features.000 was used in the compilation of H12112_CS.000
 - ¹⁵ Concur.
 - ¹⁶ H12112 also falls on a small portion of chart 18650 (1:20,000).
 - ¹⁷ Concur.
 - ¹⁸ Concur.
 - ¹⁹ Concur.
 - ²⁰ Concur.
 - ²¹ Concur.
 - ²² Concur. Chart per HCell.
 - ²³ Concur. Chart per HCell.
 - ²⁴ Concur with items and depths listed but recommended that the tabulated depths for the channel be updated with the latest survey information which may be from the US Army Corps of Engineers. All of the final NOAA rounded depths are in agreement with the latest tabulated quadrant depth from July 2010.
 - ²⁵ Not all AWOIS items were covered with their assigned full search radii. The following AWOIS items with corresponding charted features are bluenoted in the HCell; 53723, 53724, 53722, 50038, and 50390. Concur with all other AWOIS findings, see attached AWOIS report.
 - ²⁶ Concur. Item has been bluenoted in the HCell for removal.
 - ²⁷ Concur. Item has been bluenoted in the HCell for removal.
 - ²⁸ Concur. Item has been bluenoted in the HCell for removal.
 - ²⁹ See attached AWOIS report.
 - ³⁰ Concur, Chart per HCell. See attached AWOIS report.
 - ³¹ Concur.
 - ³² Concur. Chart per HCell.
 - ³³ Concur. Chart per HCell.
 - ³⁴ Concur. Chart per HCell.
 - ³⁵ Concur. Chart per HCell.
 - ³⁶ Concur. Chart per HCell.
 - ³⁷ Concur. Wreck has been imported in the HCell to be retained.
 - ³⁸ Concur. Chart per HCell. Recommend adding to AWOIS database.
 - ³⁹ Concur. Chart per HCell. Recommend adding to AWOIS database.
 - ⁴⁰ Concur.
 - ⁴¹ Concur.
 - ⁴² Do not concur with recommendation, chart per HCell. Recommend adding to AWOIS database.

⁴³ Do not concur with recommendation, chart per HCell. Recommend adding to AWOIS database.

⁴⁴ Concur.

⁴⁵ Twenty-three new bottom samples and 10 new rocky seabed areas were compiled . Eleven bottom samples were recommended for removal, all others retained as charted. Chart bottom samples in accordance with HCell.

⁴⁶ Concur with listing. Chart according to latest ATONIS information

⁴⁷ Concur.

APPENDIX II – SURVEY FEATURE REPORT

There were eleven AWOIS items assigned to H12112.

AWOIS Items:

AWOIS Item 50063: City of New York

The item is located at 37-49-00N 122-31-49W. No data was collected within the 100m search radius of AWOIS item 50063. The area surrounding AWOIS 50063 contained significant shoals, rocks, and swift tidal currents, which did not allow for safe MBES survey operations (**Figure 1**). Hydrographer recommends no action be taken on the AWOIS item due to lack of coverage.

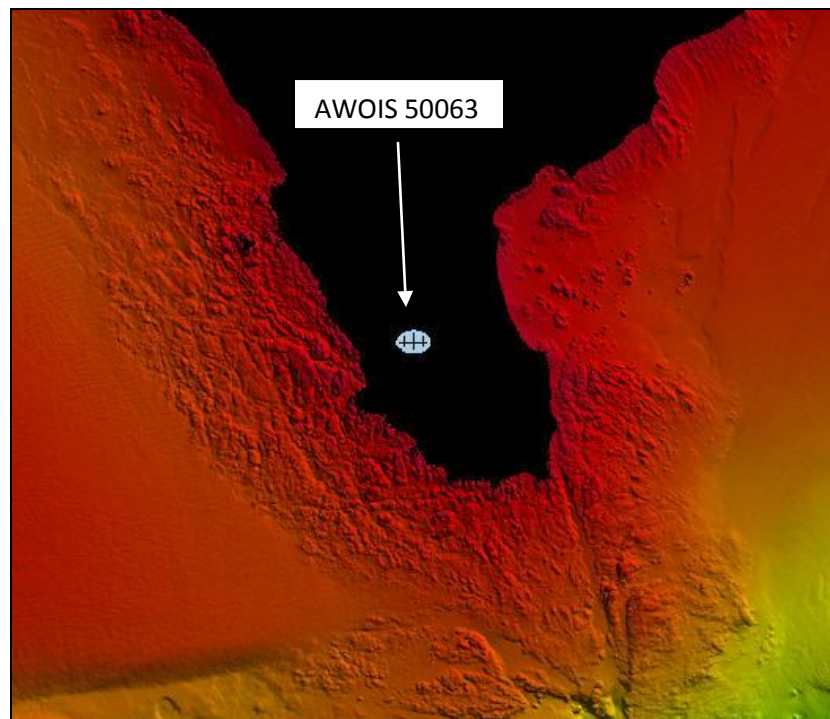


Figure 1 AWOIS item 50063

AWOIS Item 50066: City of Roede

The item is located at 37-49-00N 122-30-04W (**Figure 2**). The area was ensonified with 100% multibeam requirements and no evidence of a shipwreck type feature was found within the 2km search radius. Hydrographer recommends removal of the AWOIS item from the database.

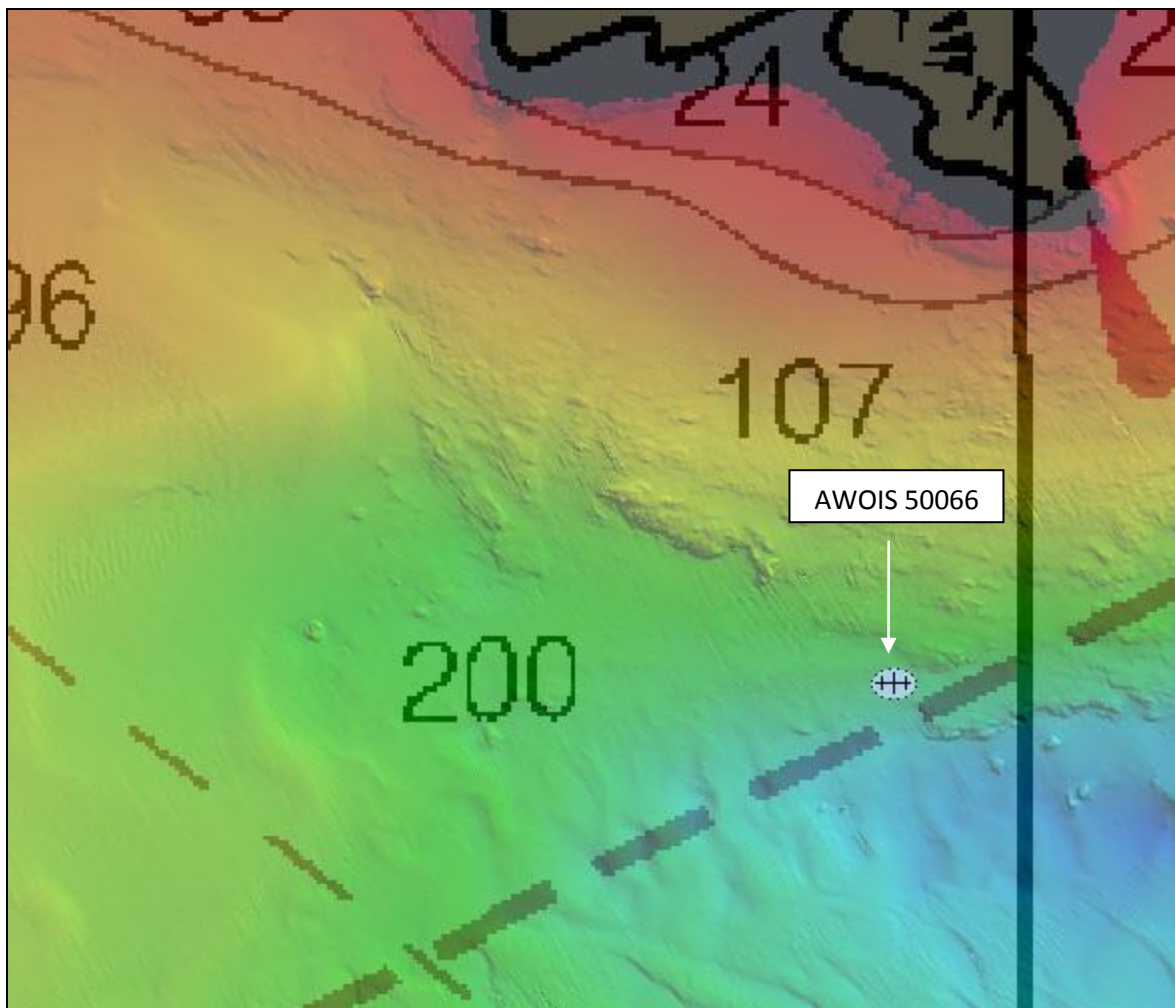


Figure 2 AWOIS 50066

AWOIS Item 50073: Coos Bay

The item is located at 37-48-00N 122-31-04W (**Figure 3**). The area was ensonified with 100% multibeam requirements and no evidence of a shipwreck type feature was found within the 2km search radius. Hydrographer recommends removal of the AWOIS item from the database.

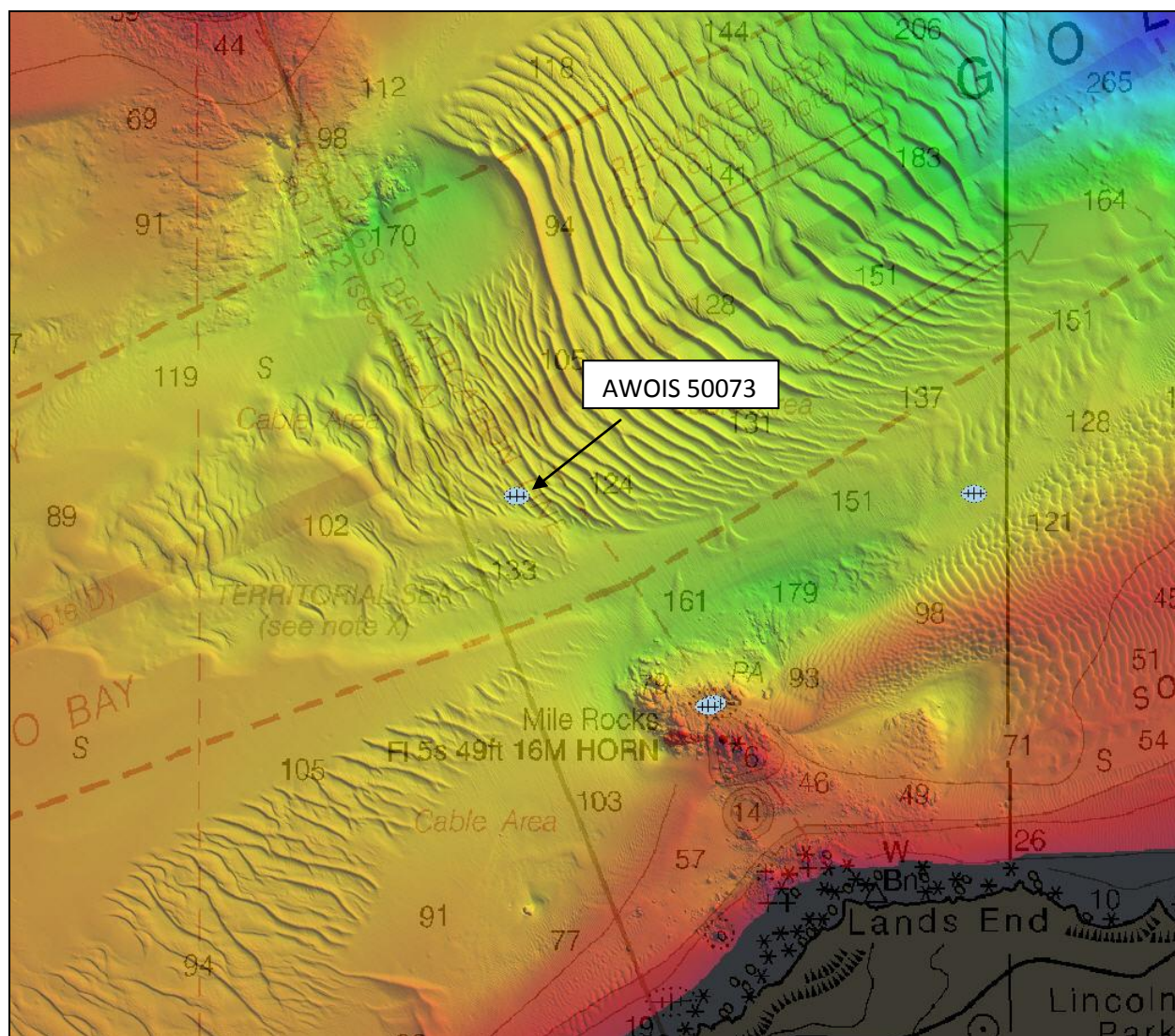


Figure 3 AWOIS Item 50073

AWOIS Items 53723 & 53724: The F/V Seaworthy and Unknown

The two items are located 20m apart at 37-47-38N 122-30-39W & 37-47-38N 122-30-38W (**Figure 4**). The area was ensonified with object detection multibeam requirements and no evidence of a shipwreck type feature was found within the 200m search radius. Hydrographer recommends removal of the AWOIS items from the database.

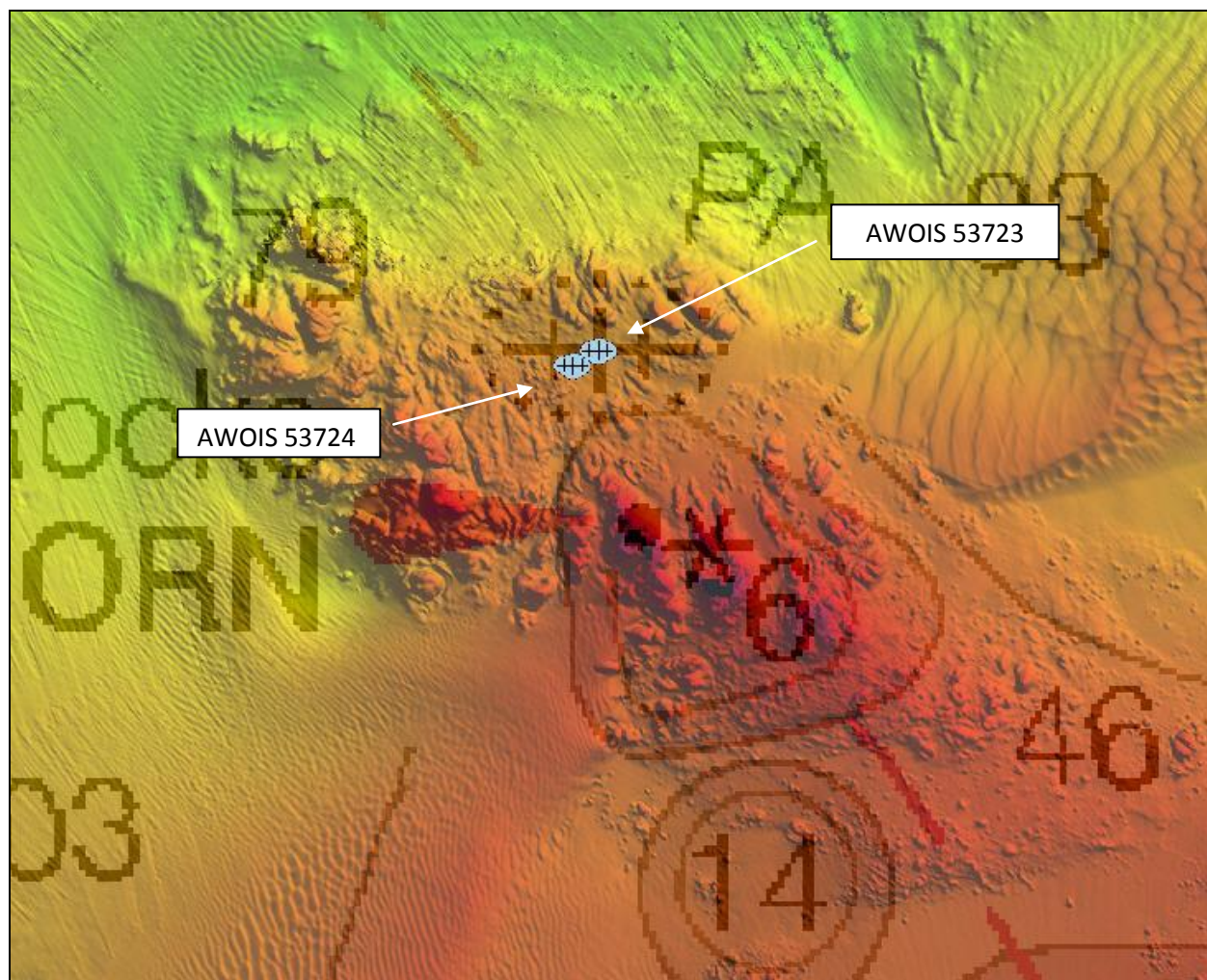


Figure 4 AWOIS Items 53723 & 53724

AWOIS Item 50390: USS Benevolence

The item is located at 37-46-53N 122-33-02W (**Figure 5**). The area was ensonified with object detection multibeam requirements and a debris field measuring 155m long by 53m wide was found centered 50m to the west of the AWOIS position at 37-46-52.19N 122-33-04.09W. The wreck has a least depth of 61.89ft. Hydrographer recommends repositioning and revising wreck information as depicted in the S-57 feature file.

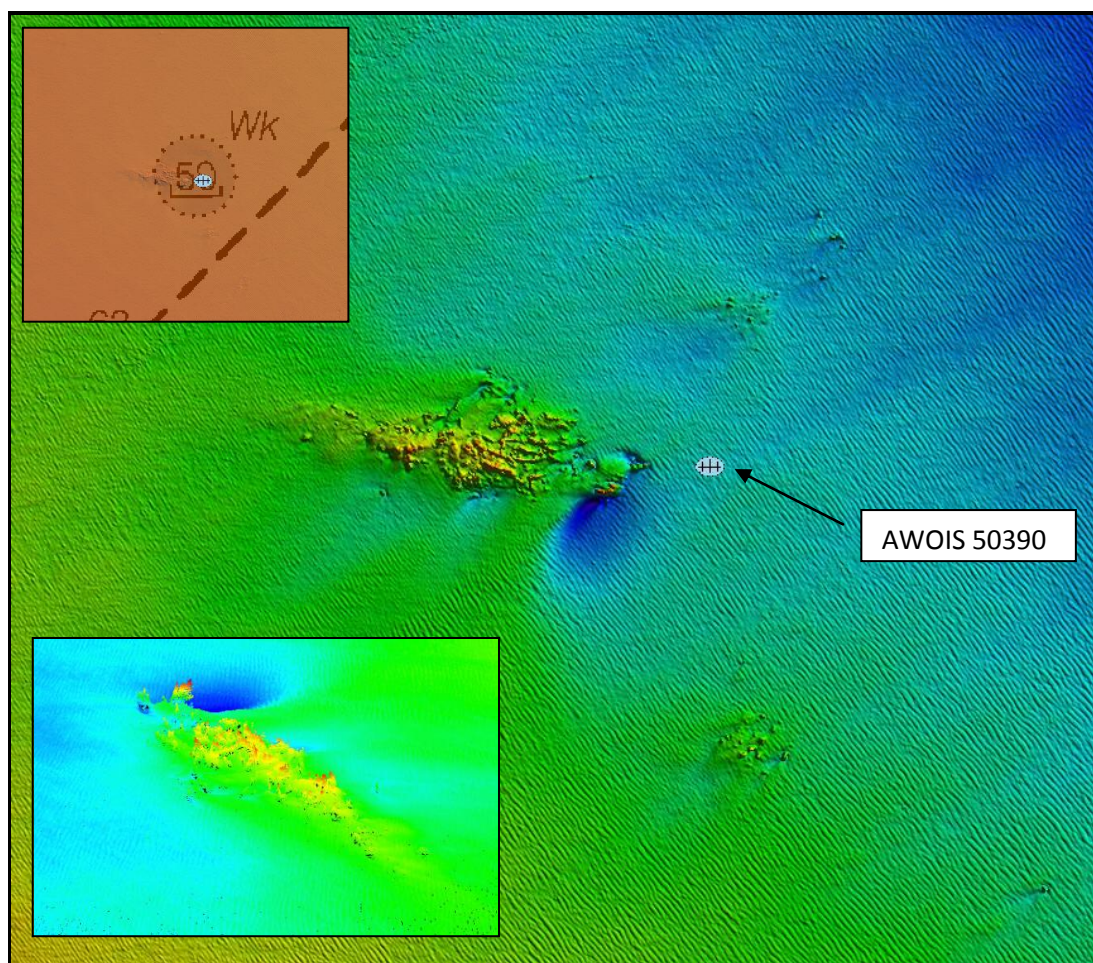


Figure 5 AWOIS Item 50390

AWOIS Item 50038: Unknown

The item is located at 37-46-31N 122-35-21W and is denoted as a 40ft fishing vessel(**Figure 6**). The area was ensonified with object detection multibeam requirements and no ship wreck shaped feature was discovered. Approximately 150m to the east of the AWOIS item and directly under a charted R “8” nun buoy, a small rock or debris field was found in the MBES data along with the buoy’s anchor chain. This debris field is most likely past or current anchors for the nun buoy and does not exhibit any ship wreck features. Hydrographer recommends removal of the AWOIS item from the database.

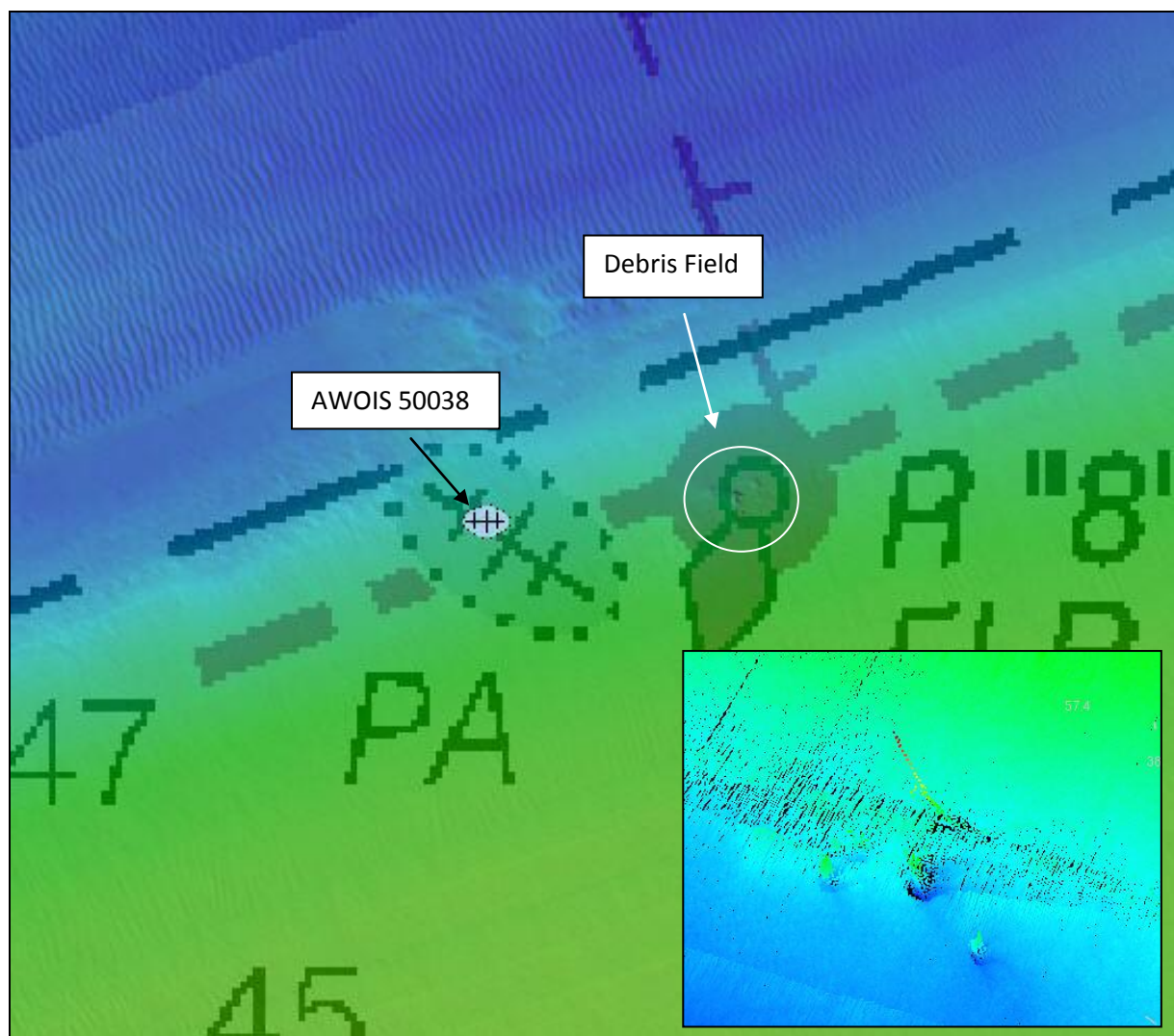


Figure 6 AWOIS Item 50038 and small debris field

AWOIS Item 53722: Unknown

The item is located at 37-47-26N 122-35-20W (**Figure 7**). The area was ensonified with object detection multibeam requirements and no evidence of a shipwreck type feature was found within the 200m search radius. Hydrographer recommends removal of AWOIS items from the database.



Figure 7 AWOIS Item 53722

AWOIS Items 50186: Ohian

The item is located at 37-46-54N 122-30-58W. (**Figure 8**). A very small area of MBES data was collected within the 200m search radius of AWOIS item 50186. The area surrounding AWOIS 50186 contained significant shoals, rocks, and swift tidal currents, which did not allow for safe MBES survey operations. Hydrographer recommends no action be taken on the AWOIS item due to lack of coverage.

AWOIS 50141: M. Espinos

The item is located at 37-47-00N 122-31-04W (**Figure 8**). The area was ensonified with 100% multibeam requirements. MBES coverage was only obtained a distance of 100m to the Southeast of the AWOIS item. No evidence of a shipwreck type feature was found within the ensonified area. Hydrographer recommends no action be taken on the AWOIS item due to lack of coverage.

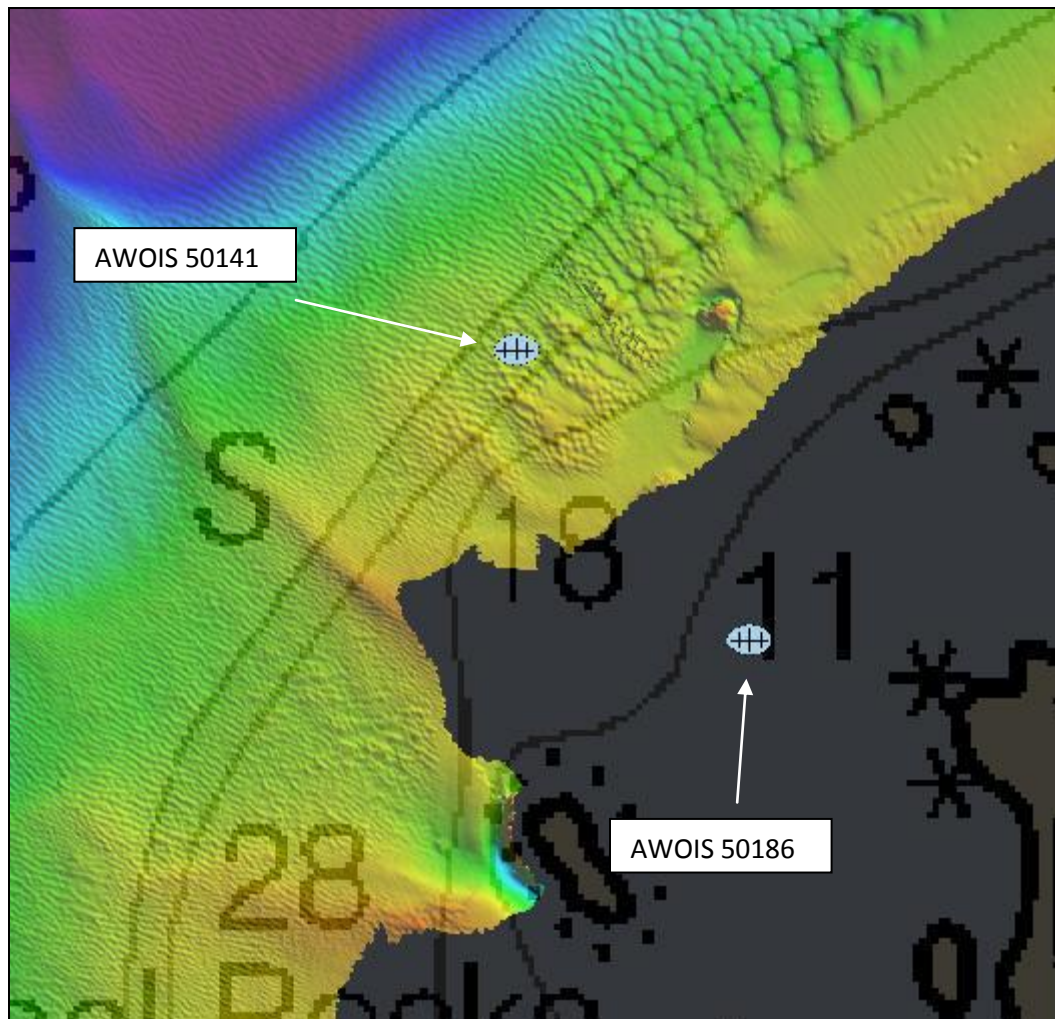


Figure 8 AWOIS Items 50186 & 50141

AWOIS 50286: SS City of Chester

The item is located at 37-48-00N 122-30-04W (**Figure 9**). The area was ensonified with 100% multibeam requirements and no evidence of a shipwreck type feature was found within the 2km search radius. Hydrographer recommends removal of the AWOIS item from the database.

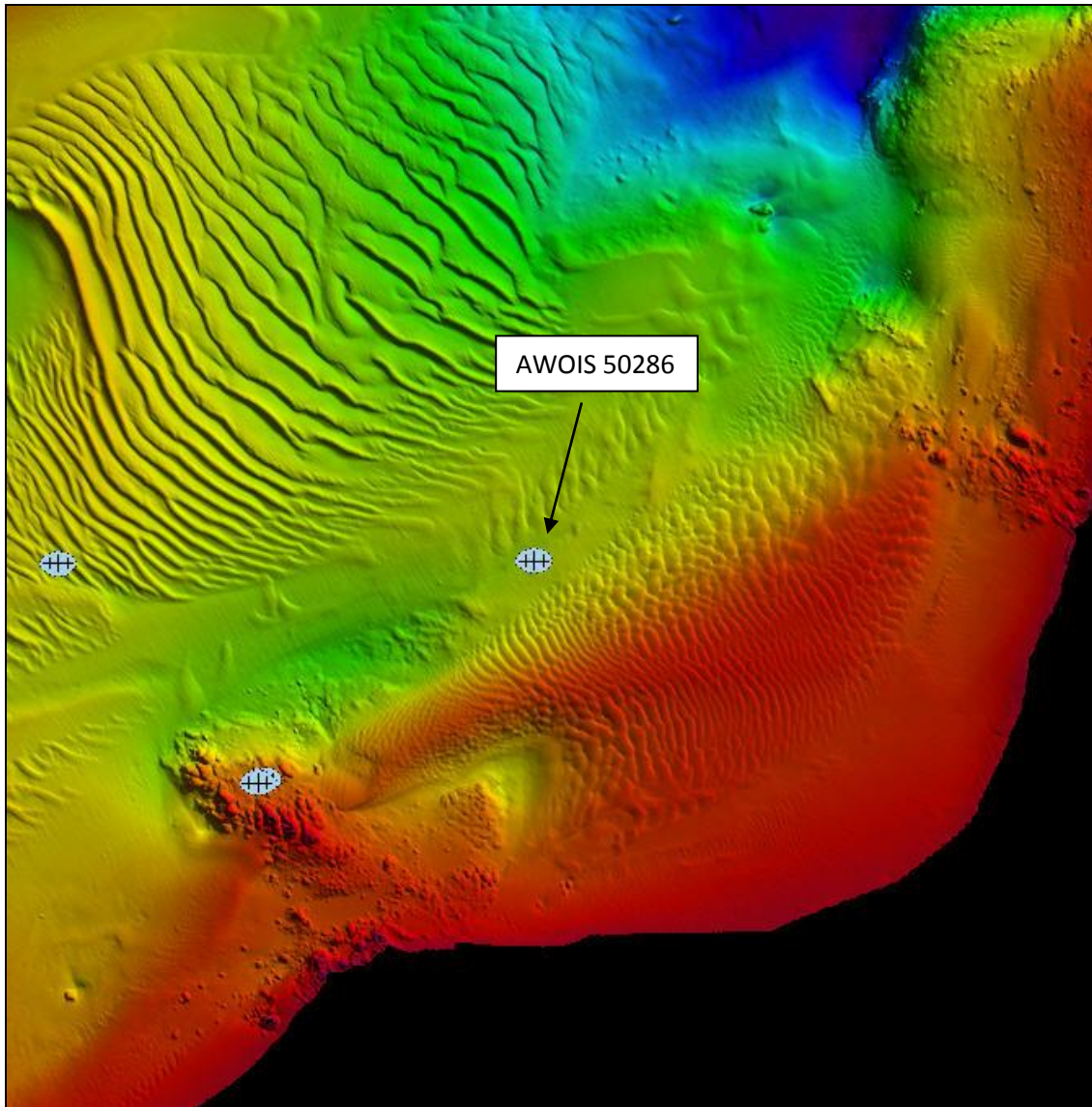


Figure 9 AWOIS item 50286



Dean Moyles

From: David.Scharff [David.Scharff@noaa.gov]
Sent: Monday, August 03, 2009 10:20 AM
To: David Briggs
Cc: Dean Moyles
Subject: Re: AWOIS
Attachments: David_Scharff.vcf

David,

That is a correct statement. Thanks.

Dave

David D Briggs wrote:

>
> Dave,
>
> Currently we have 6 AWOIS items listed as SEARCHTYPE "Full" and 11
> listed as "Information". We will perform object detection coverage
> over the AWOIS listed as Full" and standard 100% coverage over AWOIS
> listed as "Information".
>
> Is this statement correct? I just want to make certain before we leave
> the area.
>
> Thanks,
>
> David
>
> David D. Briggs
>
> Lead Hydrographer
>
> Fugro Pelagos, Inc
>
> 3738 Ruffin Rd
>
> San Diego, CA 92123-1812
>
> Phone: 858-292-8922
>
> Fax: 858-292-5308
>
> Cell: 858-598-7317
>
> dbriggs@fugro.com <<mailto:esaade@fugro.com>>
>
> www.fugro-pelagos.com <<http://www.fugro-pelagos.com/>>
>



Dean Moyles

From: David.Scharff [David.Scharff@noaa.gov]
Sent: Tuesday, August 04, 2009 12:26 PM
To: Dean Moyles
Subject: AWOIS Item 14336
Attachments: AWOIS_L430_revised.zip; David_Scharff.vcf

Dean,

14336 is where you thought it was (see attachment). Sorry for the confusion.

Dave

H12112 HCell Report
Annie Raymond, Physical Scientist
Pacific Hydrographic Branch

1. Specifications, Standards and Guidance Used in HCell Compilation

HCell compilation of survey H12112 used:

Office of Coast Survey HCell Specifications: Version: 4.0, 2 June, 2010.
HCell Reference Guide: Version 2.0, 2 June, 2010.

2. Compilation Scale

Depths and features for HCell H12112 were compiled to the largest scale raster charts shown below:

Chart	Scale	Edition	Edition Date	NTM Date
18650	1:20,000	56th	09/01/2009	03/26/2011
18649	1:40,000	67th	12/01/2009	03/12/2011

The following ENC's were also used during compilation:

Chart	Scale
US5CA13M	1:40,000
US5CA12M	1:20,000

3. Soundings

A survey-scale sounding (SOUNDG) feature object layer was built from the 4-meter Combined Surface in CARIS BASE Editor. A shoal-biased selection was made at 1:5,000 and 1:10,000 survey scale using a Radius Table file with values shown in the table, below.

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 (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 combined intervals on the largest scale chart 18650 and smaller scale chart 18649 are included in the H12112_SS HCell for MCD raster charting division to use for guidance in creating chart contours. The metric and feet equivalent contour values are shown in the table below.

Chart Contour Intervals in Feet	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 H12112_SS.000
6	1.8288	2.0574	6.75	6
12	3.6576	3.8862	12.75	12
18	5.4864	5.715	18.75	18
30	9.144	9.3726	30.750	30
36	10.9728	11.2014	36.750	36
60	18.288	18.5166	60.750	60
90	27.432	27.6606	90.750	90
120	36.576	36.8046	120.750	120

Contours have not been deconflicted against shoreline features, soundings and hydrography, as all other features in the H12112_CS file and soundings in the H12112_SS have been. This may result in conflicts between the H12112_SS file contours and HCell features at or near the survey limits. Conflicts with M_QUAL, COALNE and SBDARE objects should be expected. HCell features should be honored over H12112_SS.000 file contours in all cases where conflicts are found.

5. Meta Areas

The following Meta object areas are included in HCell H12112:

M_QUAL
M_CSCL

The Meta area objects were constructed on the basis of the limits of the hydrography.

6. Features

Features addressed by the field units are delivered to PHB where they are deconflicted against the hydrography and the largest scale chart. These features, as well as features to be retained from the chart and features digitized from the Base Surface, are included in the HCell. The geometry of these features may be modified to emulate chart scale per the HCell Reference Guide on compiling features to the chart scale HCell.

7. Spatial Framework

7.1 Coordinate System

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

7.2 Horizontal and Vertical Units

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

Chart Unit Base Cell Units:

Depth Units (DUNI):	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.

7.3 S-57 Object Classes

The CS HCell contains the following Object Classes:

* \$CSYMB	Blue Notes (points) —Notes to the MCD chart Compiler
COALNE	Retained islet coastline
BOYSPP	Private Bouy
LIGHTS	Private Light
LNDARE	Retained islet land area
M_QUAL	Data quality Meta object
M_CSCL	Compilation Scale
OBSTRN	Obstruction area objects
SBDARE	Bottom samples and rocky seabed areas
SOUNDG	Soundings at chart scale density
*UWTROC	Rock features
WRECKS	Wrecks

* The M_QUAL is adequate for NDB product searches except for features in these object classes which reside outside the M_QUAL limits.

The SS HCell contains the following Object Classes:

DEPCNT	Generalized contours at chart scale intervals (See table under section 4.)
SOUNDG	Soundings at the survey scale density (See table under section 3.)

8. Data Processing Notes

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

9. QA/QC and ENC Validation Checks

H12112 was subjected to QA checks in S-57 Composer prior to exporting to the metric HCell base cell (000) file. The millimeter precision metric S-57 HCell was converted to chart units and NOAA rounding applied. dKart Inspector was then used to further check the data set for conformity with the S-58 ver. 2 standard (formerly Appendix B.1 Annex C of the S-57 standard). All tests were run and warnings and errors investigated and corrected unless they are MCD approved as inherent to and acceptable for HCells.

10. Products

10.1 HSD, MCD and CGTP Deliverables

H12112_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:20,000 and 1:40,000
H12112_SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:5,000 and 1:10,000
H12112_DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H12112_outline.gml	Survey outline
H12112_outline.xsd	Survey outline

10.2 Software

CARIS HIPS Ver. 7.0	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 3.0 HF10	Creation of soundings and bathy-derived features, meta area objects, and Blue Notes; Survey evaluation and verification; Initial HCell assembly.
CARIS S-57 Composer Ver. 2.2 HF4	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.

11. Contacts

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

Annie Raymond
Physical Scientist
Pacific Hydrographic Branch
Seattle, WA
206-526-6849
Annemieke.raymond@noaa.gov

APPROVAL SHEET
H12112

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.