

H11640

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. H11640

LOCALITY

State California

General Locality San Francisco Bay

Sublocality Entrance to San Francisco Bay

2010

CHIEF OF PARTY

Eric M. Moore

LIBRARY & ARCHIVES

DATE

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| U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION | | REGISTRY No H11640 |
| HYDROGRAPHIC TITLE SHEET | | |
| 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>San Francisco Bay</u> | | |
| Sub-Locality <u>Entrance to San Francisco Bay</u> | | |
| Scale <u>1:10,000</u> | | Date of Survey <u>03/15/2010 - 05/14/2010</u> |
| Instructions dated <u>8/12/2009</u> | | Project No. <u>OPR-L430-NRT6-09</u> |
| Vessel <u>NOAA Survey Launch S3003</u> | | |
| <hr/> | | |
| Chief of party <u>Eric M. Moore</u> | | |
| Surveyed by <u>Navigation Response Team Six Personnel</u> | | |
| Soundings by <u>Simrad EM3000 Multibeam Echosounder</u> | | |
| SAR by <u>Joe Tegeder</u> | | Compilation by <u>Annie Raymond</u> |
| Soundings compiled in <u>Feet</u> | | |
| <hr/> | | |
| REMARKS: All times are UTC. UTM Zone 10 | | |
| The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Revisions and end notes in red were generated during office processing. The processing branch concurs with all information and recommendations in the DR unless otherwise noted. Page numbering may be interrupted or non sequential. | | |
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| All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via http://www.ngdc.noaa.gov/. | | |

Descriptive Report
to accompany
HYDROGRAPHIC SURVEY H11640
PROJECT: OPR-L430-NRT6-09
Scale of Survey: 1:10,000
Year of Survey: 2010
NOAA Navigation Response Team 6
Eric Moore, Laura Pagano and Ed Wernicke

A. AREA SURVEYED

This survey was conducted in accordance with Hydrographic Survey Letter Instructions for Survey H11640, San Francisco Bay, CA. The original instructions are dated August 12, 2009. Data acquisition was conducted from March 15th, 2010 through May 14th, 2010.

Project Instructions specify complete coverage, which was achieved in most areas using 200% side scan sonar with concurrent multibeam. Coverage requirements for areas too shallow or close to shore for towing side scan sonar were not specified in the project instructions, so object detection multibeam was acquired in these areas not covered by side scan but seaward of the NALL line. Object detection coverage was acquired over all developments and AWOIS items. Please see figures 4 and 6 for an image depicting object detection multibeam coverage.

The survey area designated by the fieldsheet name H11640_inset is located near the entrance to San Francisco Bay on the north end of the San Francisco peninsula. This area was too shallow for side scan operations, so 100% object detection coverage multibeam was acquired in this area. See Figure 5 for a DTM of the survey area.

See Table 1 and figures 1-6 below for acquisition totals, images of survey limits and data coverage.

Table 1: NOAA Survey Launch S3003 Acquisition Totals

| | |
|-----------------------------------|----------|
| Multibeam (mainscheme) | 54.5 LNM |
| Side Scan Sonar 100% (mainscheme) | 18 LNM |
| Side Scan Sonar 200% (mainscheme) | 18 LNM |
| Crosslines | 4.65 LNM |
| Development/Holidays/CSF/AWOIS | 9.1 LNM |
| Square Nautical Miles | 1.3 SNM |

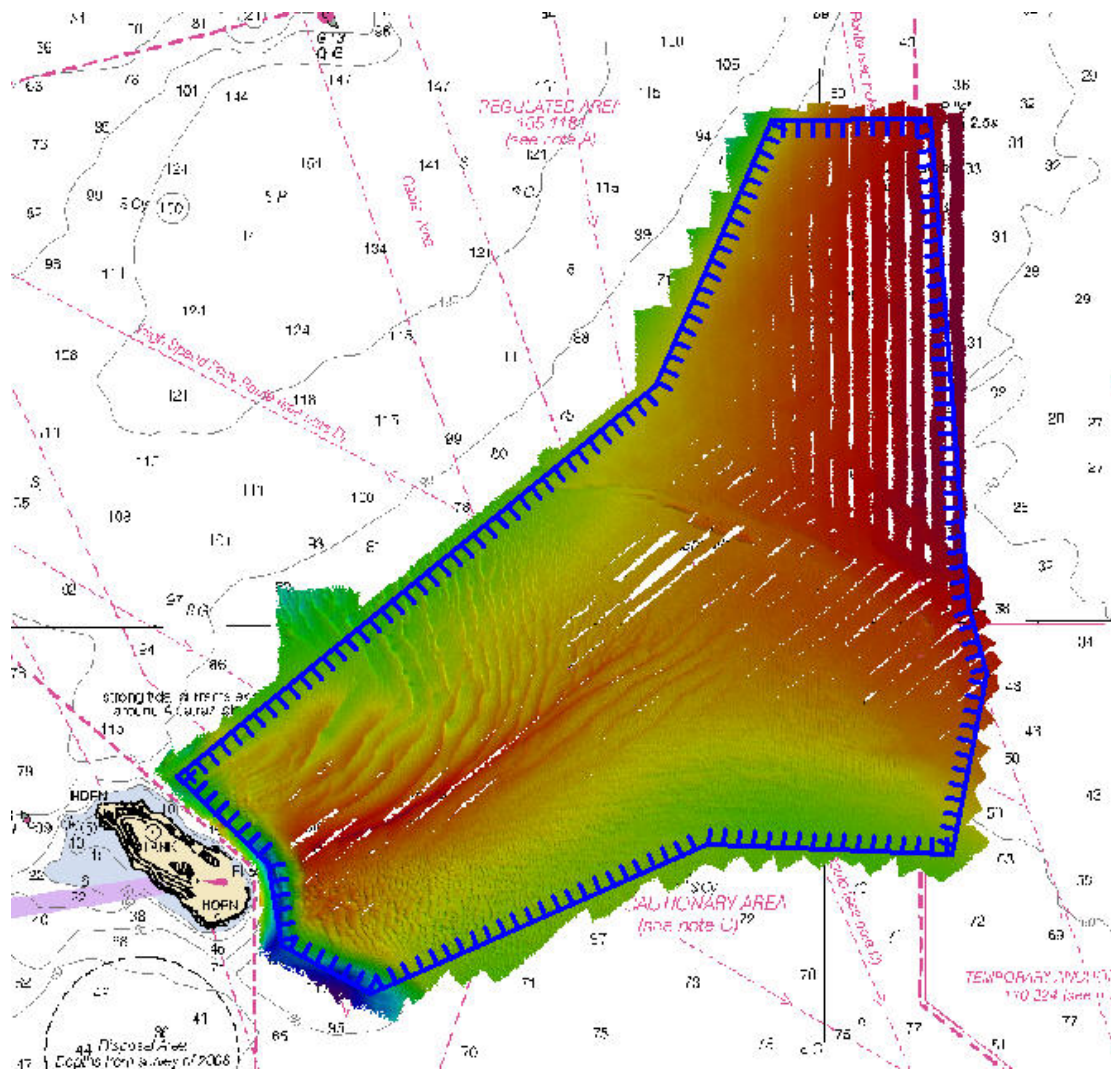


Figure 1: San Francisco Bay, Sheet C, multibeam sonar data coverage.

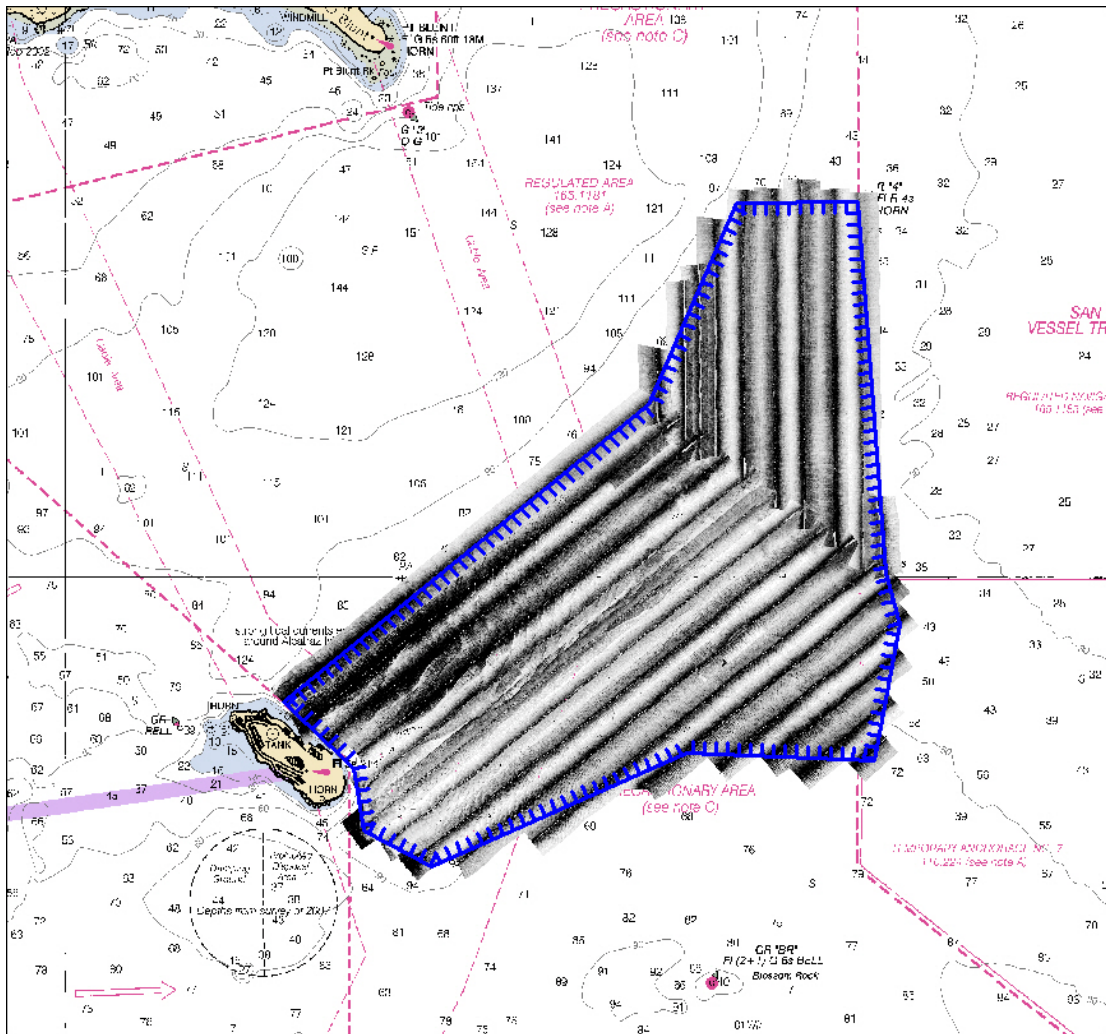


Figure 2: San Francisco Bay, Sheet C, 100% side scan sonar data coverage.

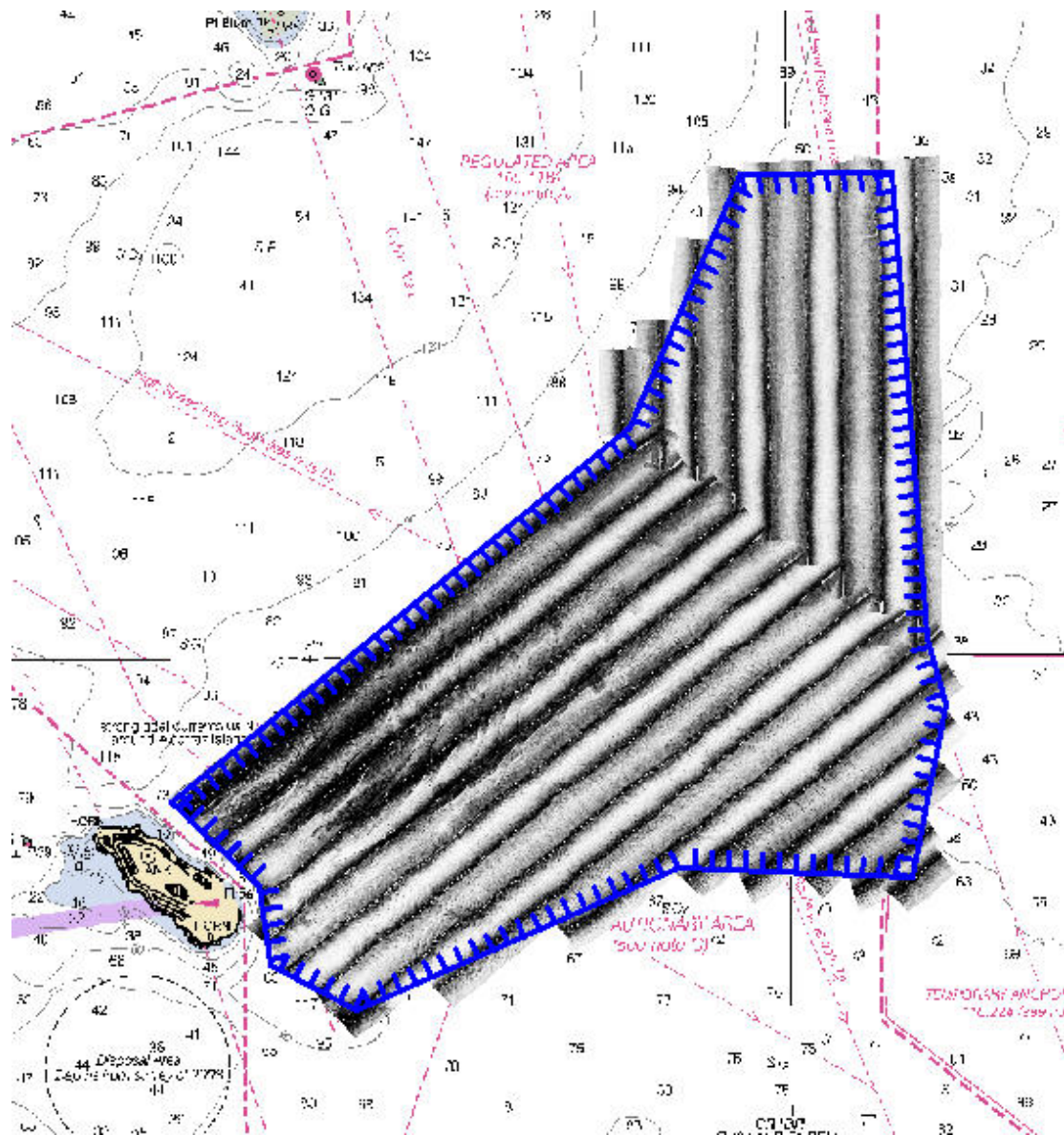


Figure 3: San Francisco Bay, Sheet C, 200% side scan sonar data coverage.

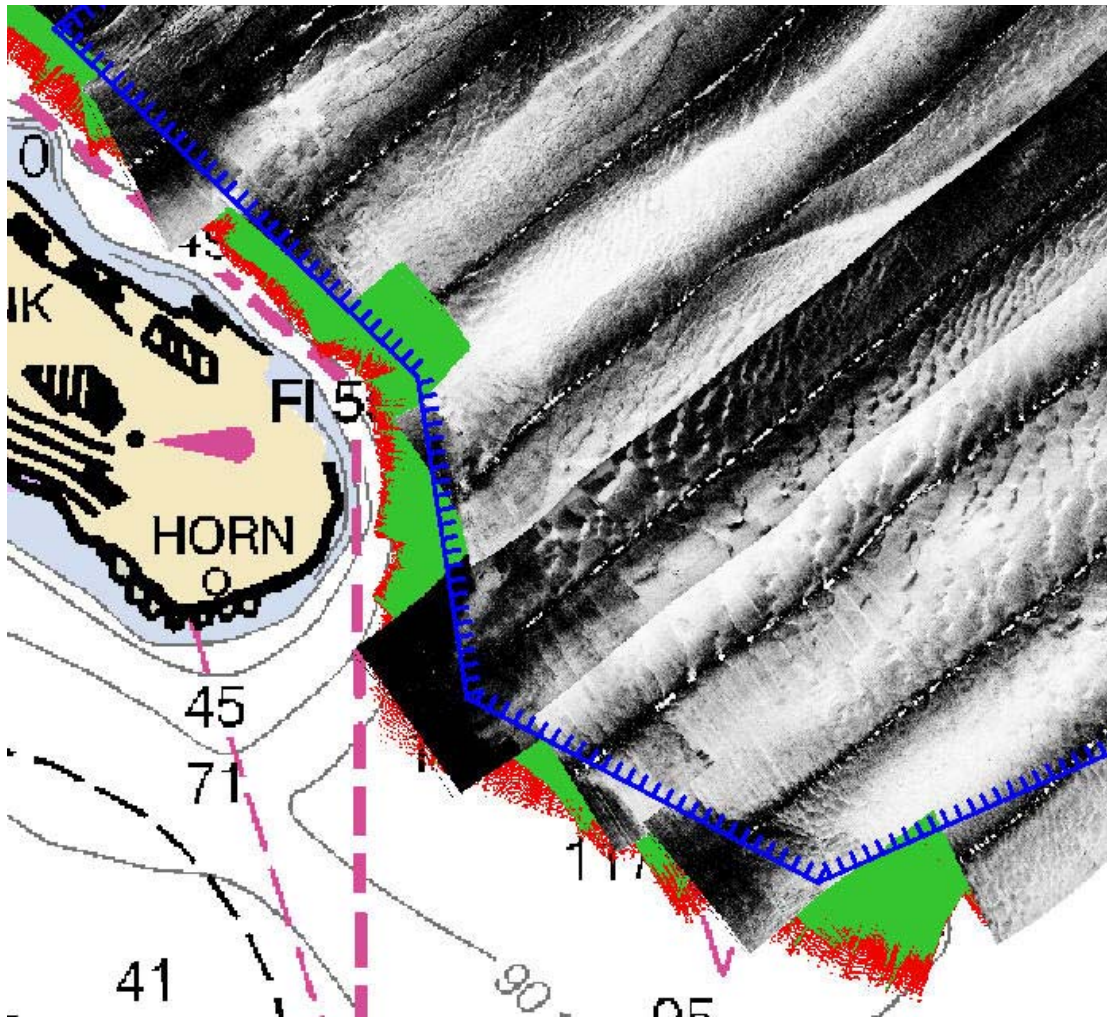


Figure 4: Object detection coverage of 5 soundings per node was acquired where towfish operations were not possible or where the depths exceeded the SSS range specs and towfish capability. Areas with a density of five soundings per node or greater are shown in green, less than five are in red.

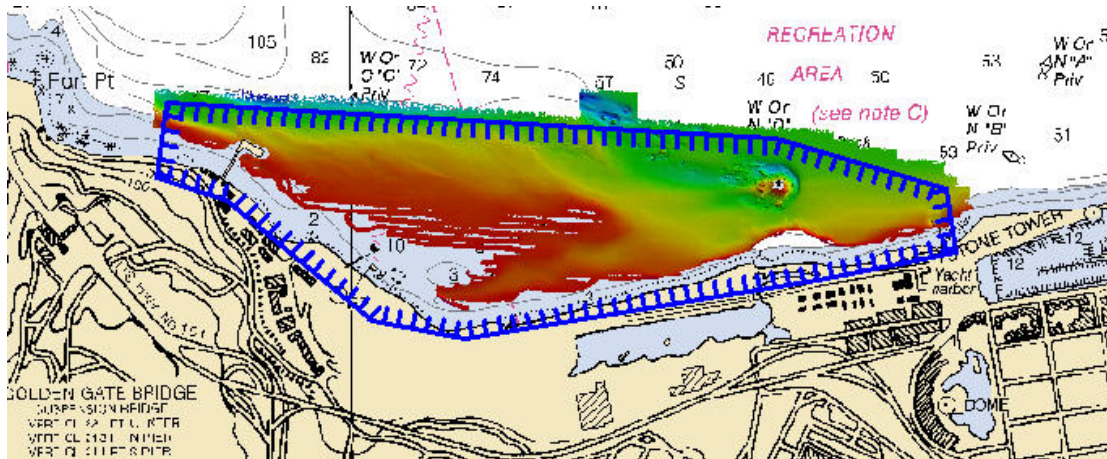


Figure 5: San Francisco Bay Inset survey area, Sheet C, multibeam sonar data coverage.

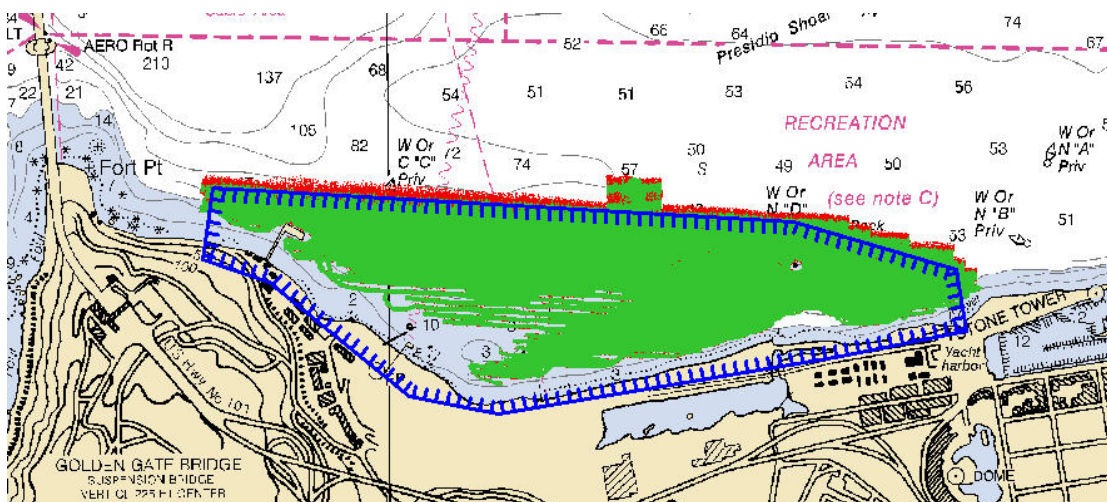


Figure 6: Object detection coverage of 5 soundings per node was acquired where towfish operations were not possible, to the NALL. Areas with a density of five soundings per node or greater are shown in green, less than five are in red.

B. DATA ACQUISITION AND PROCESSING

B.1 EQUIPMENT

Data were acquired by NOAA Survey boat S3003, which is a 10-meter hydrographic survey vessel with a transducer draft of 0.507 meters (-.024m from reference to waterline, .483m from reference to multibeam transducer).

NOAA Survey boat S3003 acquired soundings, imagery, and sound velocity profiles. Soundings and imagery were acquired by SIMRAD EM3000 multibeam echosounder. Imagery was acquired with a Klein 3000 side scan sonar. Water column sound velocity data was acquired with a Sea-Bird SBE 19+ CTD.

NOAA Survey boat S3003 positioning and attitude data were determined with an Applanix POS/MV 320 Version 4 GPS-aided inertial navigation system.

Refer to the Data Acquisition and Processing Report (DAPR) for detailed equipment and vessel configuration information.

B.2 QUALITY CONTROL

B.2.1 Side Scan Sonar Quality Control

Daily confidence checks were made by observing the outer ranges of the side scan sonar images. A good check consisted of distinguishing contacts corresponding to charted features such navigational Fixed Aids and other cultural features across the entire range of the side scan trace.

B.2.2 Shallow Water Multibeam Quality Control

One area of multibeam data shows a 1.5 m horizontal offset between days. This error is not systematic throughout the survey, and it is suspected this offset may have been caused by DGPS positional error, multipathing (vessel was located very close to shore, in an urban area), or other source of random positional error. This offset falls within the $5\text{m} + 5\%$ of water depth uncertainty for IHO Order 1 surveys.¹ See images below for details.

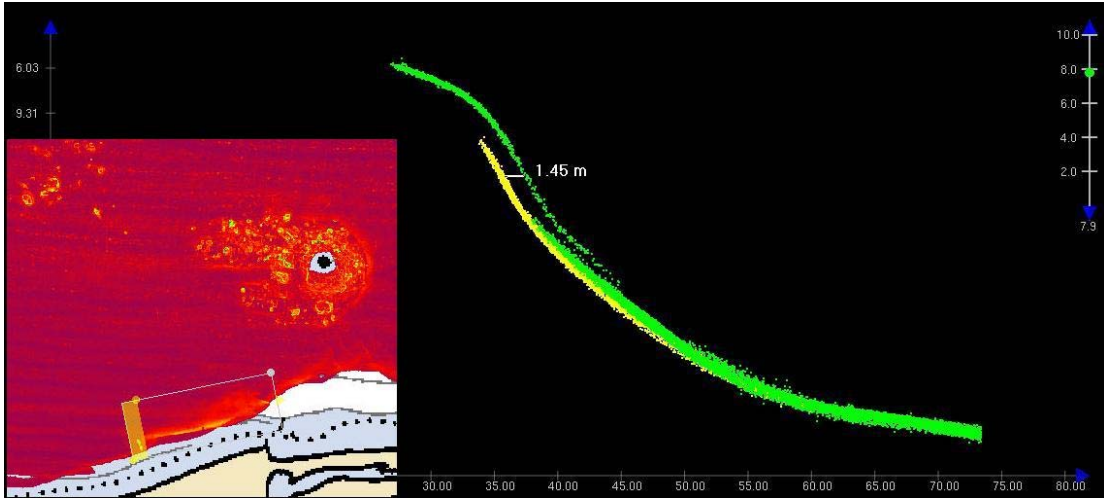


Figure 7: Offset seen in CARIS subset 2D editor. Inset is the STD Dev layer, for surface H11640_Inset_0p5m. This area is located next to the beach, south of Anita Rock.

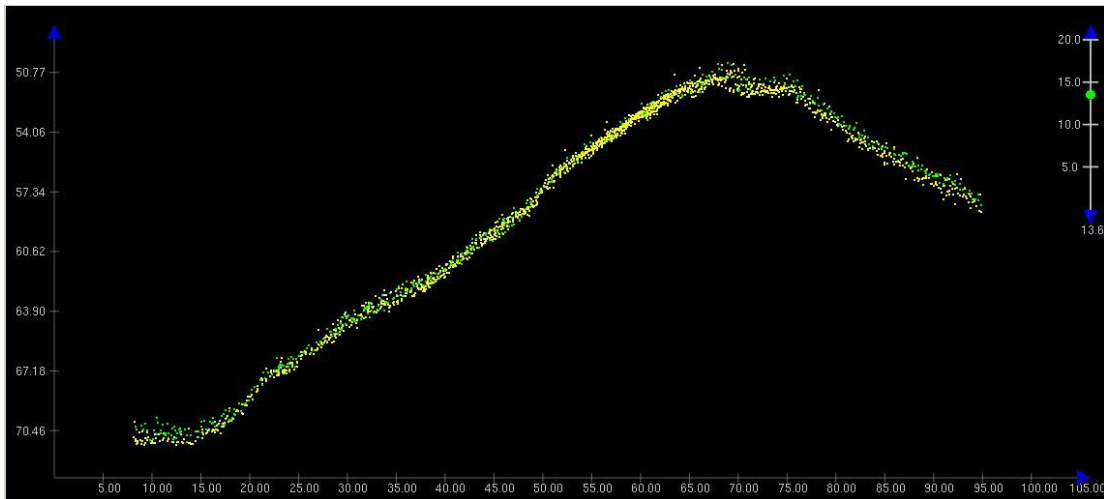


Figure 8: CARIS 2D subset editor view of horizontal positioning agreeing well between different survey days.

Refer to this project's DAPR and HSRR for detailed discussion of SWMB system calibrations, data acquisition, and data processing.

B.2.3 BASE Surfaces

Three CARIS HIPS BASE (*Bathymetry Associated with Statistical Error*) surfaces, which incorporate each sounding's total propagated uncertainty (TPU), were created. The finalized BASE surface contains eight layers: depth, uncertainty, density, mean, standard deviation, hypothesis strength, hypothesis count and user nominated. Refer

to this project’s DAPR for detailed discussion of BASE surface generation and processing. Three Bathymetric Attributed Grids (BAG) were created from the finalized BASE surface.

The following Field sheet was generated as part of this survey²:

Table 2: Fieldsheets, BASE Surfaces and BAG (Bathymetric Attributed Grid) surfaces created.

| <u>Fieldsheet</u> | <u>#BASE Surfaces</u> | <u>Resolution</u> | <u>Purpose</u> |
|---------------------|-----------------------|-------------------|----------------------|
| H11640 | 2 | 1m | Coverage & Finalized |
| H11640_inset | 2 | 0.5m | Coverage & Finalized |
| H11640_Awois_Csf | 2 | 1m | Coverage & Finalized |
| H11640_1m | 1 | 1m | BAG Generation |
| H11640_inset_0_5m | 1 | 0.5m | BAG Generation |
| H11640_Awois_Csf_1m | 1 | 1m | BAG Generation |

B.2.4 Crosslines

A total of 55 lnm of mainscheme lines were planned and approximately 4.65 lnm of crosslines were conducted, totaling more than 5% of the planned survey lines. BASE surfaces were examined and no systematic errors in the SWMB system were found.

B.3 CORRECTIONS TO ECHO SOUNDING

All methods or instruments used are detailed in the project DAPR. A table of all sound velocity casts is located in Separate II. Sound velocity casts are taken in local Pacific Time.

B.4 COMPOSITE SOURCE FILE

NRT6 received a Composite Source File with the survey package in 2009. The intention is to verify the items listed in the CSF, in the field. CSF items were verified in the field either visually, using SSS, or SWMB. All CSF items are addressed in the Pydro PSS. A Composite Source File Feature Report, exported from the PSS, is

located in Appendix 5 of the DR. Also located in Appendix 5 are the original CSF file, and the acquisition sheets. Please see the DAPR for detailed CSF procedures and notes.

C. VERTICAL AND HORIZONTAL CONTROL

C.1 VERTICAL CONTROL

The tidal datum for this project is Mean Lower Low Water (MLLW). The operating National Water Level Observation Network (NWLON) station at San Francisco, CA (941-4290) was the sole water level station for this project. See Figure 2 for station location and tide zone boundaries. The tide zoning file “L430NRT62009CORP” was applied during processing. The uncertainty value of .13m was used for the TPE computation in CARIS.

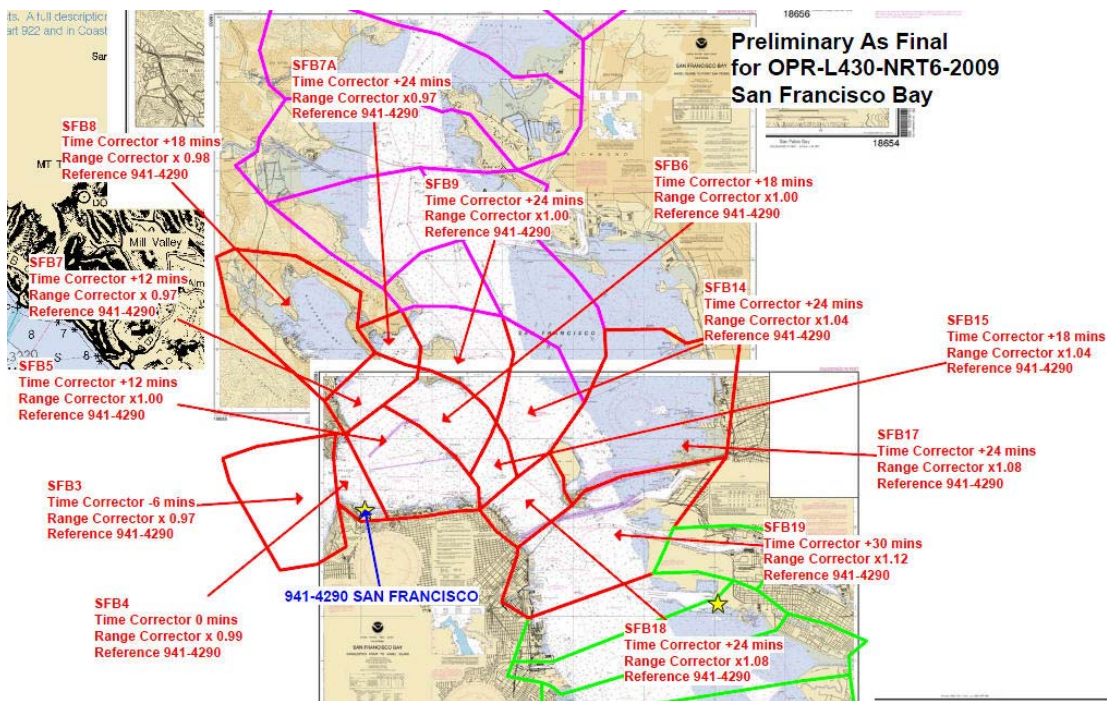


Figure 9: Preliminary Tide Zoning

The preliminary/final zones and correctors used for this survey are as follows:

Table 1: Preliminary Tide Zones & Correctors

| <u>Zone Name</u> | <u>Time Correctors (mins)</u> | <u>Range Ratio</u> | <u>Predicted Reference</u> |
|------------------|-------------------------------|--------------------|----------------------------|
| SFB3 | -6 | X0.97 | 941-4290 |
| SFB4 | 0 | X0.99 | 941-4290 |
| SFB5 | +12 | X1.00 | 941-4290 |
| SFB6 | +18 | X1.00 | 941-4290 |
| SFB7 | +12 | X0.97 | 941-4290 |
| SFB7A | +24 | X0.97 | 941-4290 |
| SFB8 | +18 | X0.98 | 941-4290 |
| SFB9 | +24 | X1.00 | 941-4290 |
| SFB14 | +24 | X1.04 | 941-4290 |
| SFB15 | +18 | X1.04 | 941-4290 |
| SFB17 | +24 | X1.08 | 941-4290 |
| SFB18 | +24 | X1.08 | 941-4290 |
| SFB19 | +30 | X1.12 | 941-4290 |

A Request for Smooth Tides was sent to N/OPS1 on May 17th, 2010 and is included in Appendix IV Tides & Water Levels.³ Observed water levels from the N/OPS1 CO-OPS website were downloaded and applied to all sounding data with preliminary tide zoning. Refer to the 2009 DAPR for a summary of the methods used to determine, evaluate, and apply tide corrections to sounding data.

C.2 HORIZONTAL CONTROL

The horizontal datum used for this survey is the North American Datum of 1983 (NAD 83), projected using UTM zone 10.

Horizontal position was determined using the Global Positioning System (GPS) corrected by U.S. Coast Guard differential GPS (DGPS) beacon station at Pigeon Pt, CA (287 kHz). No horizontal control stations were established for this survey.

Horizontal dilution of precision (HDOP) was monitored daily. The observed HDOP values did not exceed 4.00.

D. RESULTS AND RECOMMENDATIONS

D.1 CHART COMPARISON

Data accuracy standards and bottom coverage requirements have been met and survey data for survey H11640 are adequate to supersede charted data in their common areas.

There are four raster charts affected by this survey and two ENC cells covering the survey area.

Table 3: Affected Charts

| <u>Chart Number</u> | <u>Edition</u> | <u>Edition Date</u> |
|----------------------------|-----------------------|----------------------------|
| 18649 | 67 th | 12/01/2009 |
| 18650 | 56 th | 09/01/2009 |
| 18652 SC | 35 th | 08/01/2009 |
| 18653 | 11 th | 10/01/2009 |

| <u>ENC Cell</u> | <u>Last Updated</u> | <u>Issue Date</u> |
|------------------------|----------------------------|--------------------------|
| US5CA13M | 5/25/2010 | 5/25/2010 |

D.1.1 General Agreement with Charted Soundings

Depths from survey H11640 generally agree with depths on chart 18650, with the exception of the contour lines that need to be slightly shifted and repositioned to reflect new survey data. The most apparent and dramatic sounding shifts that have taken place are shown in the figures below. Sounding recommendations and images are included in the Pydro PSS and the survey feature report located in Appendix II.⁴

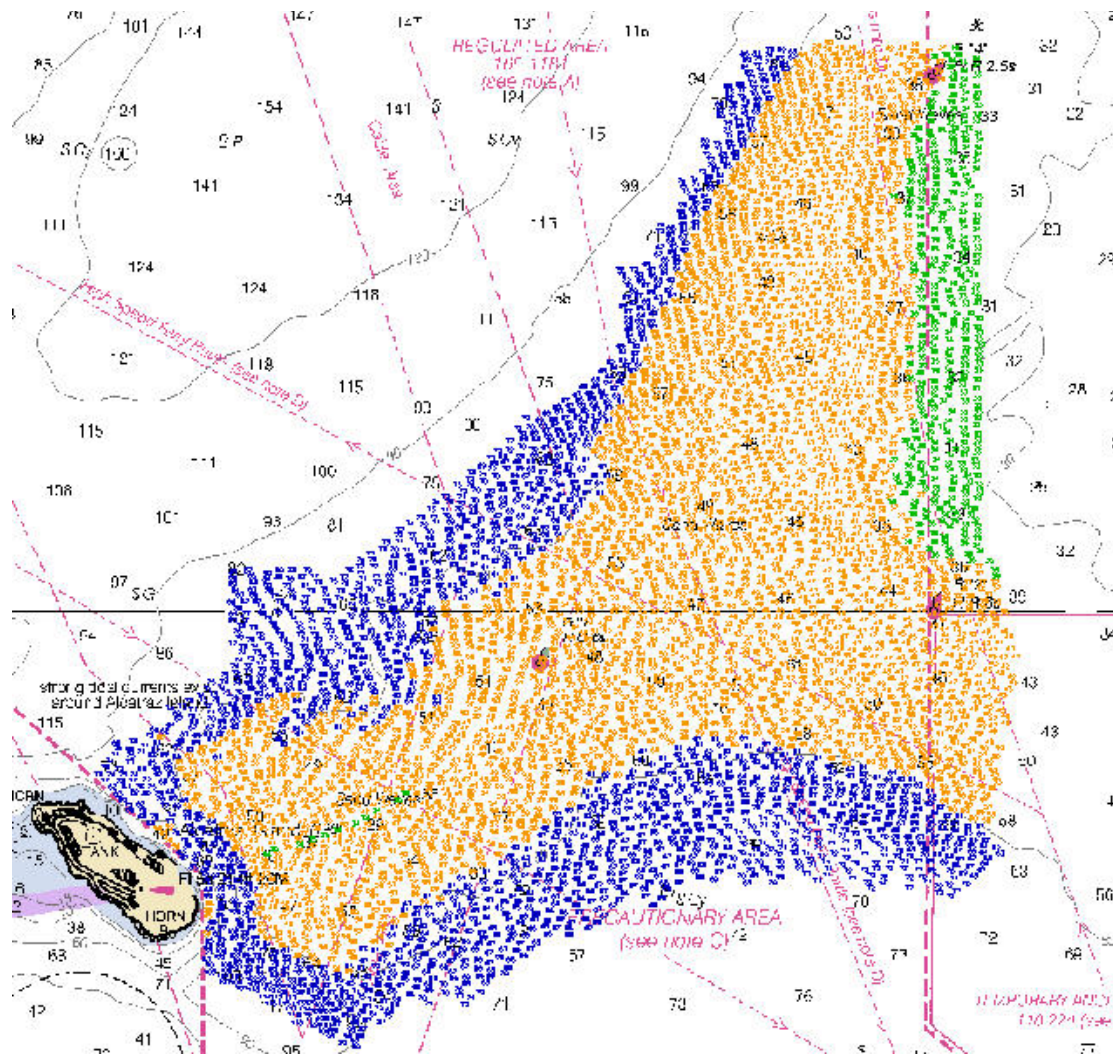


Figure 10: In general, the updated soundings and contours agree with the current chart within a few feet. Below are two areas to note of minor discrepancy. The contours need to be updated to reflect the new survey data⁵.

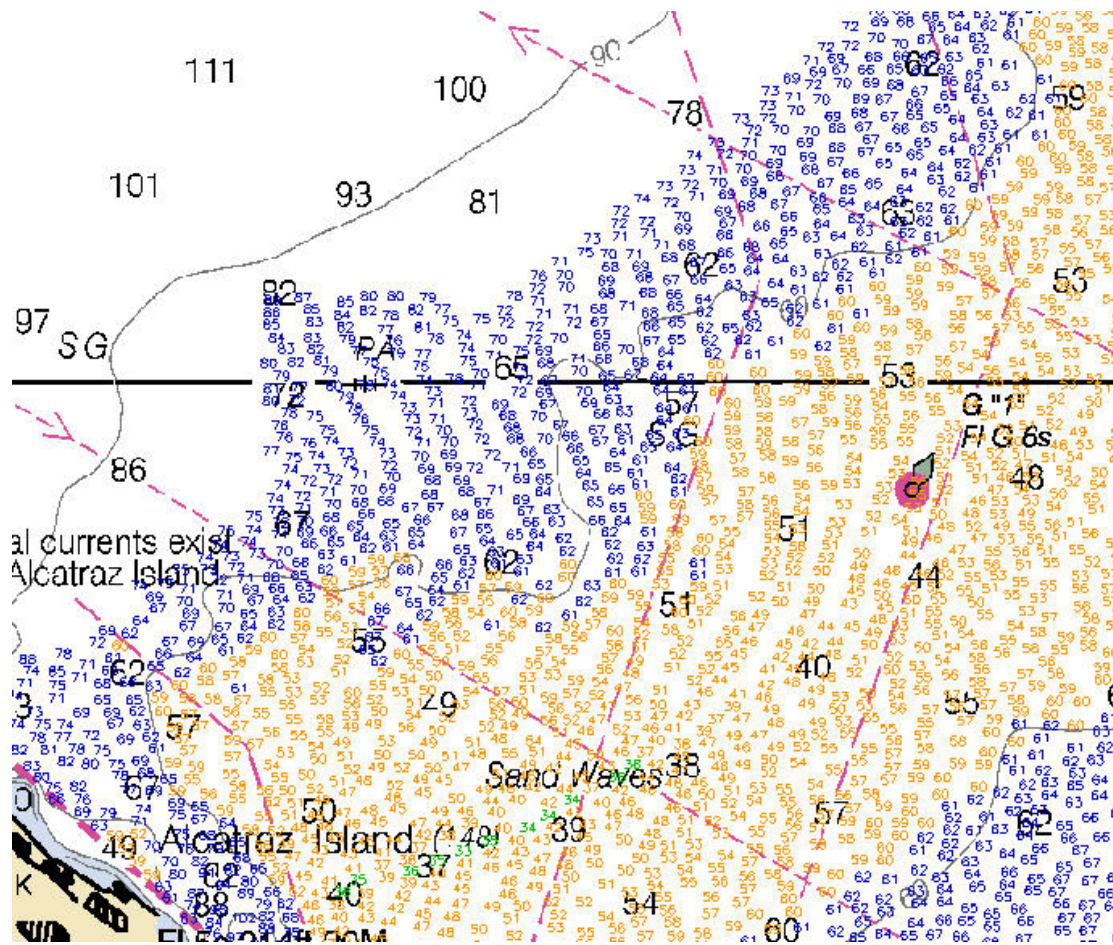


Figure 11: The 60ft contour, NE of Alcatraz, can be updated to reflect the new survey data. ⁶

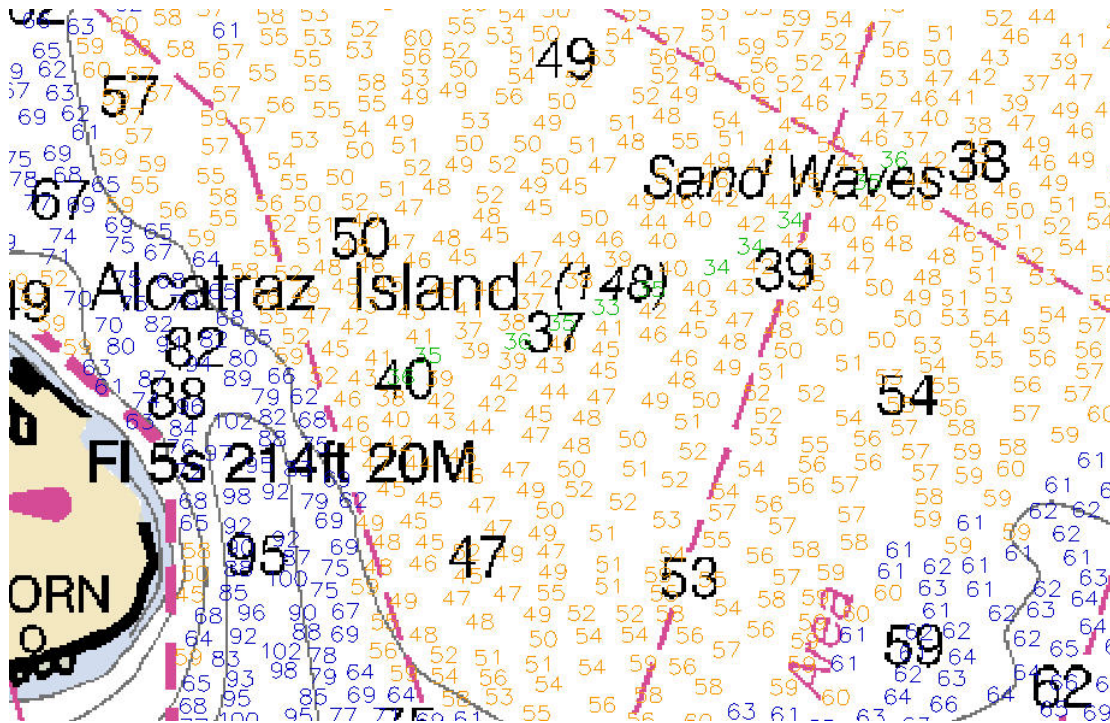


Figure 12: A few soundings, shown in green, should be updated in this shoal sand wave area east of Alcatraz Island. Most notably the 35ft sounding next to the 40ft charted sounding and the 34 ft sounding next to the 39ft charted sounding.

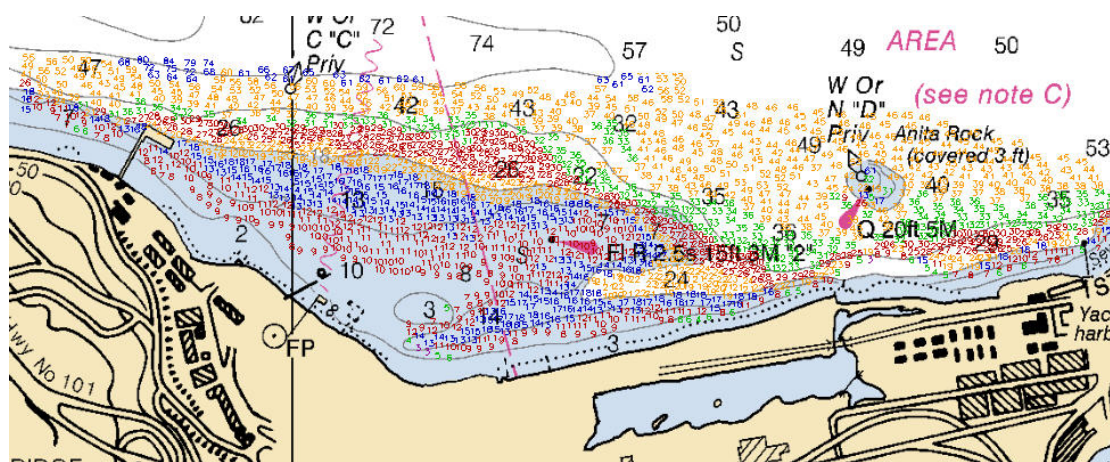


Figure 13: Soundings and contours in the San Francisco Bay inset need only minor updating to reflect new survey data. See image below.

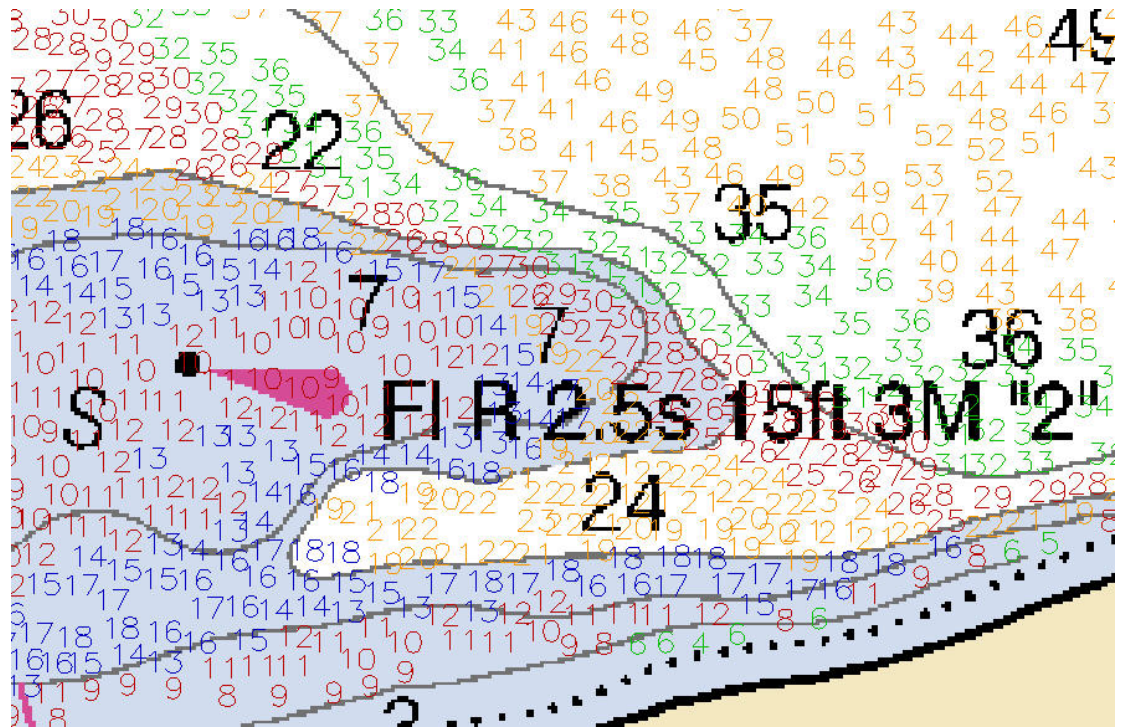


Figure 14: The most notable chart discrepancy in the inset area is the contour shift east of light “2”. A 25ft sounding sits over the charted 7 ft sounding. Contours in this area need to be updated to reflect new survey data.⁷

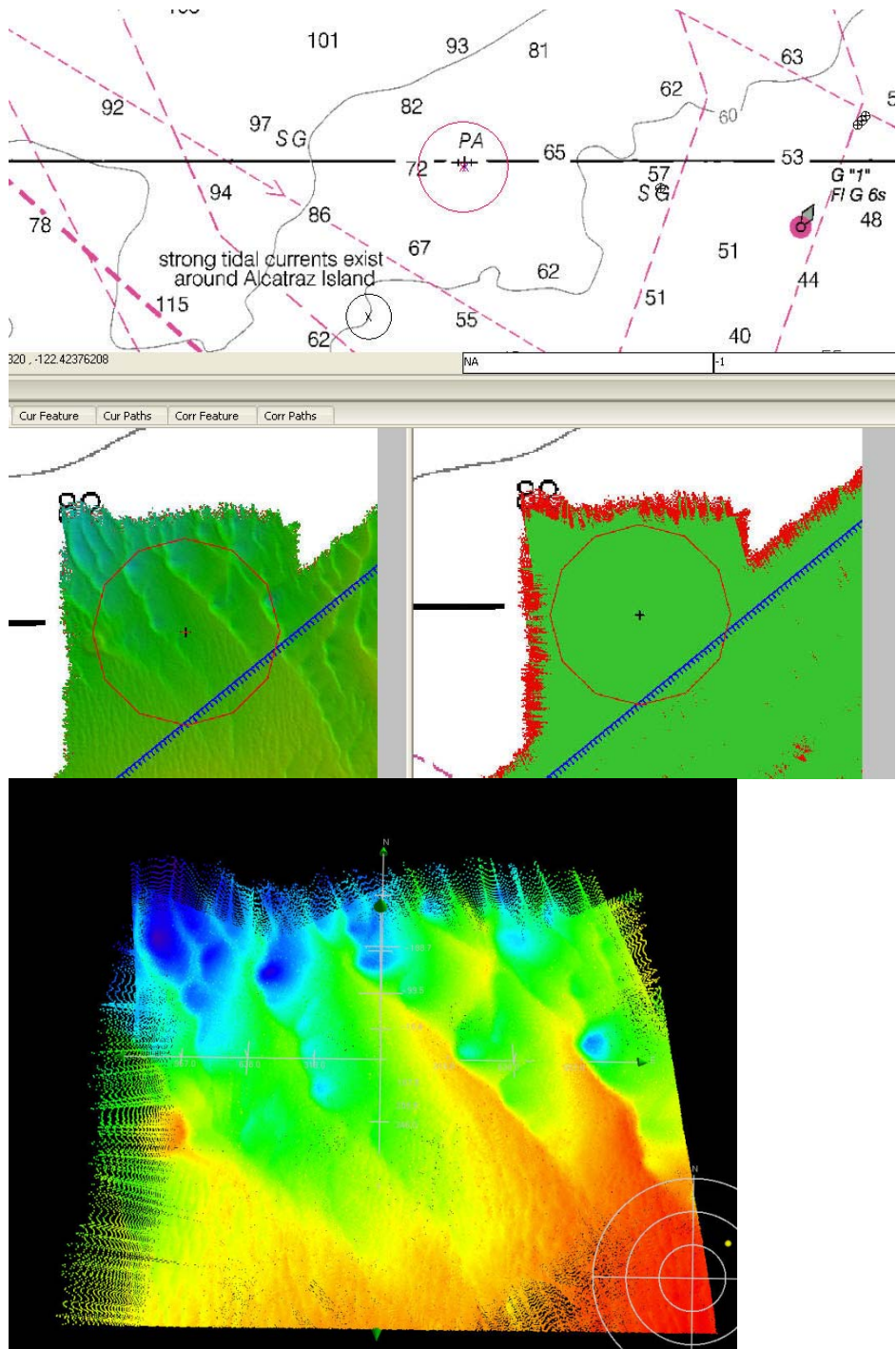


Figure 15: Disprove AWOIS 51985. The AWOIS database states that a 21ft sailing vessel sank in 70ft of water in the area shown above. NRT6 completed the coverage requirements for the search radius and found no evidence of a wreck. The hydrographer in charge recommends removing the PA wreck symbol from the chart. Investigation methods, results and charting recommendations have been entered into the Pydro PSS “H11640.pss”.⁸

D.1.2 Dangers to Navigation (Dtons)

No DTON's were identified by the field party within the limits of H11640.

D.1.3 AWOIS Items

Six AWOIS items were assigned and investigated during this survey. Investigation methods, results and charting recommendations have been entered into the Pydro PSS "H11640.pss". Information pertaining to the AWOIS items is contained in Appendix II of this report.⁹

D.2 ADDITIONAL RESULTS

D.2.1 Prior Surveys

No prior surveys were listed for comparison in the project instructions.

D.2.2 Aids to Navigation and Other Detached Positions

No aids to navigation or other detached positions were acquired for this survey.

D.2.3 Bridges and Overhead Cables

No bridges or overhead cables were located within the survey limits of H11640.

D.2.4 Ferry Routes

High speed ferry routes run through the survey area and are addressed with Note "D" on the chart. There no ferry terminals within the survey area of Sheet H11640.

D.2.5 Submarine Cables and Pipelines

A large cable area that is already denoted on the chart is located within the survey limits of Sheet H11640.¹⁰

One charted sewer line was verified in the survey area and is shown in the figure below.

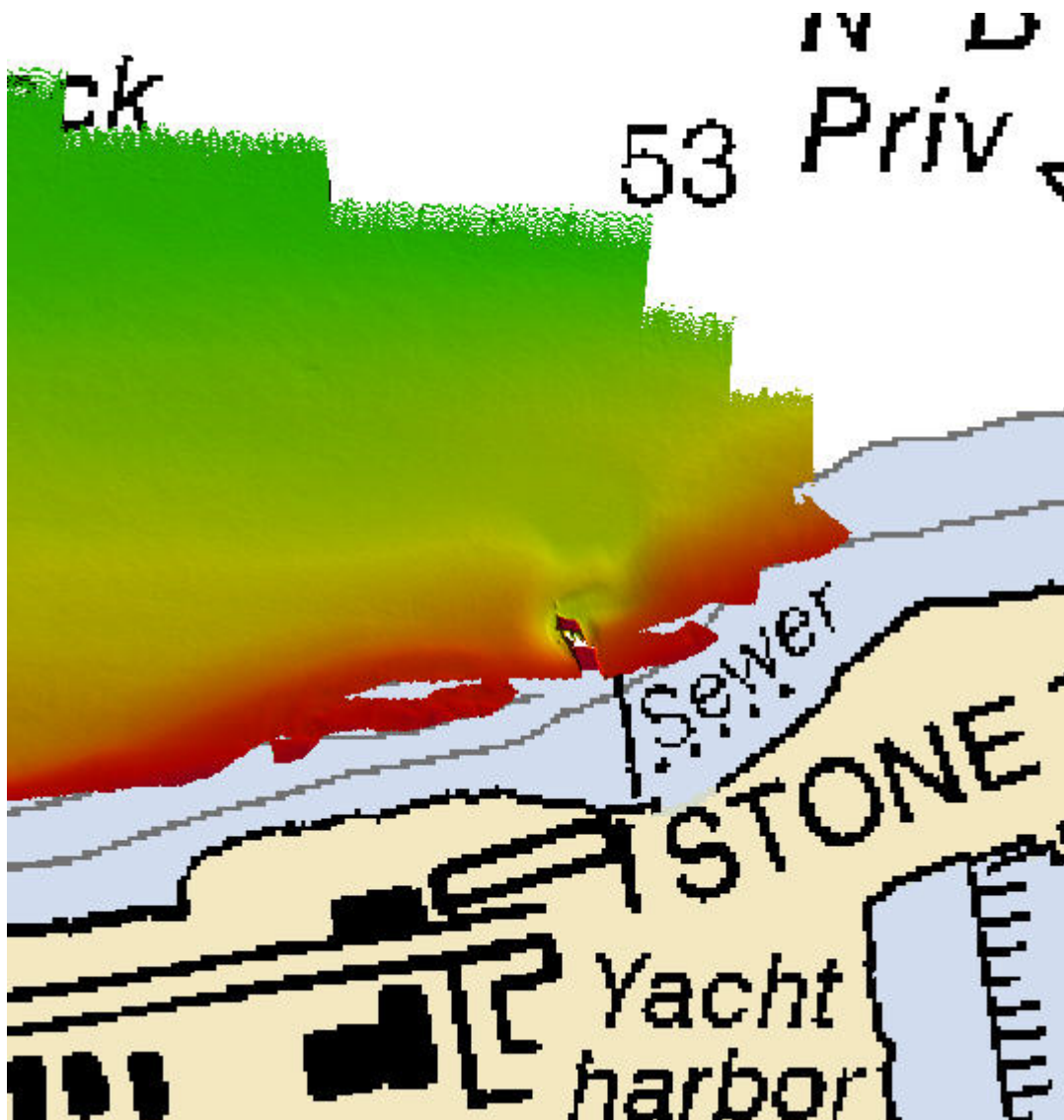


Figure 16: Sewer line verified on the eastern edge of the San Francisco Inset survey area. The location on the chart could be slightly modified. Due to the extreme shallow water in this area, we were not able to get complete coverage.

D.2.6 Bottom Samples

Bottom samples were acquired in the survey area. A detailed table can be found in Appendix 5 of the descriptive report. In addition they have been included in the Pydro PSS “H11640.pss” submitted for this survey.¹¹

Revisions Compiled During Office Processing and Certification

- ¹ Survey Data is adequate to supersede charted data within the common area.
- ² The following office finalized surfaces were used for Compilation:
H11640_1m_Final_Combined, awois_csf_1m_Final and H11640_0_5m_Final (inset)
- ³ Tide note received 5/25/2010: Preliminary zoning is accepted as the final zoning for project. The final tide note is appended to this report.
- ⁴ Concur with clarification. Chart soundings and features in accordance with HCell.
- ⁵ Updated Contours are included in the H11640_SS.000 file.
- ⁶ Updated Contours are included in the H11640_SS.000 file.
- ⁷ Updated Contours are included in the H11640_SS.000 file.
- ⁸ See attached features report. Recommendations to remove have been bluenoted in the HCell.
- ⁹ AWOIS report is appended to this report. Chart per HCell.
- ¹⁰ Retain cable are as charted
- ¹¹ Chart four new bottom samples in accordance with HCell. Charted bottom samples have been bluenoted retain or remove in the HCell.

E. APPROVAL SHEET

OPR-L430-NRT6-09
San Francisco Bay, California
Survey Registry No. H11640

Field operations for this basic hydrographic survey were conducted under my daily supervision with frequent checks of progress and adequacy. All bathymetry models, this Descriptive Report, and all accompanying records and data are approved.

This survey is adequate to supersede all prior surveys in common areas and for application to the relevant NOS nautical charts.


Also submitted in association with this descriptive report has been a series of reports and data:

- SEPARATES TO ACCOMPANY PROJECT OPR-L430-NRT6-09
- OPR-L430-NRT6-09 HORIZONTAL AND VERTICAL CONTROL REPORT
- SEPTEMBER 2009 DATA ACQUISITION AND PROCESSING REPORT

Respectfully Submitted:

Approved and Forwarded:

**eric m
moore**



Digitally signed by eric m moore
DN: cn=eric m moore, email=eric.
m.moore@noaa.gov, o=NOAA S/V
BAY HYDROGRAPHER, ou=NOAA/
NOS/OCS/HSD/OPS, c=US
Date: 2010.06.21 15:32:34 -07'00'

Eric Moore, NOAA
Physical Science Technician

3 - AWOIS Features

3.1) AWOIS #52175 - AWOIS 52175 - SOUNDING

No Primary Survey Feature for this AWOIS Item

Search Position: 37° 49' 49.0" N, 122° 25' 12.5" W
Historical Depth: [None]
Search Radius: 50
Search Technique: S2,MB,ES
Technique Notes: [None]

History Notes:

HISTORY ■ BP142034(CL141/91)--COE; 55FT(16.8M) DEPTH FROM A 1:4800 SCALE CONDITION
 i ■ SURVEY. ■ H10456/93--CHARTED 55FT COE DEPTH NOT DISPROVED WITH SPLIT LINE/SPACING,
 i ■ PRESENT DEPTHS OF 22M EXIST IN THE VICINITY. THE i ■ CHARTED 55FT DEPTH WAS SCALED IN
 LAT 37-49-49.0N, LONG i ■ 122-25-12.5W(NAD83). (ENTERED 1/95 RWD)

Survey Summary

Charts Affected: 18650_1, 18649_1, 18652_5, 18652_1, 18645_1, 18640_1, 18680_1, 18010_1, 18022_1,
 18007_1, 18020_1, 501_1, 530_1, 50_1

Remarks:

AWOIS 52175 - Sounding verification

Feature Correlation

| Address | Feature | Range | Azimuth | Status |
|-----------------------|---------------|-------|---------|---------|
| OPR-L430-NRT6-09awois | AWOIS # 52175 | 0.00 | 000.0 | Primary |

Hydrographer Recommendations

Filled AWOIS search radius with coverage requirements. New MB survey data will verify soundings for this AWOIS area. Hydrographer recommends updating chart and contour lines accordingly to reflect new survey data. No significant change or dramatic shifts were found.

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: SORDAT - 20100514
 SORIND - US,US,nsurf,H11640
 TECSOU - 3:found by multi-beam

VERDAT - 12:Mean lower low water

3.2) AWOIS #51985 - AWOIS 51985

No Primary Survey Feature for this AWOIS Item

Search Position: 37° 49' 59.7" N, 122° 25' 03.9" W
Historical Depth: [None]
Search Radius: 100
Search Technique: S2,MB,ES
Technique Notes: [None]

History Notes:

HISTORY ■ H9794/78--65-80FT DEPTHS EXIST IN VICINITY. ■ LNM30/81(7/24/81)--12TH CGD; CF 1621 EA, 21FT SAILING VESSEL i ■ SANK IN THE WATERS BETWEEN ANGEL ISLAND AND ALCATRAZ ISLAND IN i ■ APPROX LAT 37-50N, LONG 122-25W(NAD27) IN 70FT OF WATER. VESSEL i ■ DOES NOT POSE A HAZARD TO NAVIGATION. (ENTERED 11/92 RWD) ■ H10456/93--MAINScheme ES HYDROGRAPHY INADEQUATE TO DISPROVE i ■ WRECK. (UPDATED 1/95 RWD)

Survey Summary

Charts Affected: 18650_1, 18649_1, 18652_5, 18652_1, 18640_1, 18680_1, 18010_1, 18022_1, 18007_1, 18020_1, 501_1, 530_1, 50_1

Remarks:

AWOIS 51985, 21FT SAILING VESSEL SANK IN THE WATERS BETWEEN ANGEL ISLAND AND ALCATRAZ ISLAND IN APPROX LAT 37-50N, LONG 122-25W(NAD27) IN 70FT OF WATER. VESSEL DOES NOT POSE A HAZARD TO NAVIGATION. (ENTERED 11/92 RWD) H10456/93--MAINScheme ES HYDROGRAPHY INADEQUATE TO DISPROVE WRECK. (UPDATED 1/95 RWD)

Feature Correlation

| Address | Feature | Range | Azimuth | Status |
|-------------------------|---------------|-------|---------|---------------------|
| OPR-L430-NRT6-09awois | AWOIS # 51985 | 0.00 | 000.0 | Primary |
| ChartGPs - ENC 0_1CSF01 | Danger 59 | 6.14 | 269.5 | Secondary (grouped) |

Hydrographer Recommendations

Filled search radius with SWMB and fulfilled the coverage requirements to disprove wreck. Highly turbulent and deep area, did not find 21ft wreck nor is it a hazard to navigation. Hydrographer recommends deleting off the chart.

S-57 Data

[None]

3.3) Profile/Beam - 290/70 from hdcs_data / nrt6_s3003_em3000 / 2010-091 / 616_1938

Primary Feature for AWOIS Item #51155

Search Position: 37° 49' 00.7" N, 122° 24' 07.3" W
Historical Depth: 24.69 m
Search Radius: 50
Search Technique: S2,MB,ES
Technique Notes: [None]

History Notes:

HISTORY ■ H9794/78--94-99FT DEPTHS EXIST IN VICINITY. ■ LNM45/86(11/5/86)--12TH CGD; DANG SUBM WK, PA, FLAT BARGE 100FT X 30FT SUNK i ■ IN APPROX LAT 37-49-01.8N, LONG 122-24-06.0W. IN APPROX 50FT WATER, NEAR i ■ BLOSSOM ROCK LIGHTED BELL BUOY. (ENTERED 12/86 RWD) ■ H10456/93-- BARGE (SUBM 23.7M AT MLLW), 5M ES INVESTIGATION ON i ■ AN APPROX 41X98FT BARGE, POSITION GIVEN IN LAT 37-49-00.55N, LONG i ■ 122-24-07.92W. (UPDATED 1/95 RWD) ■ H10960/00--OPR-L304-KR-00: THIS WRECK WAS FOUND AT POSITION 37 49 00.738 N, 122 24 07.313 W WITH A LEAST DEPTH OF 81.0 FEET. THIS POSITION IS 16 METERS NORTHEAST OF THE REPORTED LOCATION IN THE AWOIS DATABASE. A DEPTH OF 77 FEET WAS INDICATED ON THE AWOIS LISTING, OBTAINED FROM A 1993 SURVEY WITH AN ECHOSOUNDER. IT IS RECOMMENDED THAT THE DEPTH BE REVISED TO 81 FEET. UPDATED 11/04 MCR

Survey Summary

Survey Position: 37° 49' 00.8" N, 122° 24' 07.6" W
Least Depth: 25.12 m (= 82.41 ft = 13.735 fm = 13 fm 4.41 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) ± 1.968 m ; TVU (TPEv) ± 0.314 m
Timestamp: 2010-091.19:47:28.204 (04/01/2010)
Survey Line: hdcs_data / nrt6_s3003_em3000 / 2010-091 / 616_1938
Profile/Beam: 290/70
Charts Affected: 18650_1, 18649_1, 18652_5, 18652_1, 18640_1, 18680_1, 18010_1, 18022_1, 18007_1, 18020_1, 501_1, 530_1, 50_1

Remarks:

AWOIS 51155 - 81ft Wreck

Feature Correlation

| Address | Feature | Range | Azimuth | Status |
|---|---------|-------|---------|---------|
| hdcs_data/nrt6_s3003_em3000/2010-091/616_1938 | 290/70 | 0.00 | 000.0 | Primary |

| | | | | |
|-------------------------|---------------|-------|-------|---------------------|
| ChartGPs - ENC 0_1CSF01 | Danger 58 | 5.54 | 226.3 | Secondary (grouped) |
| OPR-L430-NRT6-09awois | AWOIS # 51155 | 7.35 | 300.2 | Secondary |
| ChartGPs - ENC 0_1CSF01 | Danger 60 | 11.53 | 061.6 | Secondary (grouped) |

Hydrographer Recommendations

Verified with SWMB. Recommend updating least depth on chart to 82ft sounding.

Cartographically-Rounded Depth (Affected Charts):

82ft (18650_1, 18649_1, 18652_5, 18652_1)

13fm (18640_1, 18680_1, 18010_1, 18022_1, 18007_1, 18020_1, 530_1)

25m (501_1, 50_1)

S-57 Data

Geo object 1: Wreck (WRECKS)

Attributes: CATWRK - 1:non-dangerous wreck
 QUASOU - 6:least depth known
 SORDAT - 20100514
 SORIND - US,US,nsurf,H11640
 TECSOU - 3:found by multi-beam
 VALSOU - 25.119 m
 VERDAT - 12:Mean lower low water
 WATLEV - 3:always under water/submerged

3.4) Profile/Beam - 342/87 from hdcs_data / nrt6_s3003_em3000 / 2010-124 / 658_1827

Primary Feature for AWOIS Item #50112

Search Position: 37° 49' 12.2" N, 122° 27' 34.9" W
Historical Depth: [None]
Search Radius: 50
Search Technique: S2,MB,ES
Technique Notes: [None]

History Notes:

HISTORY ■ NM4/53--FERNSTREAM (WK), HAS BEEN SWEEPED CLEAR TO A DEPTH OF 60FT IN
 LAT ■ 37-49-12N LONG 122-27-31W (PA), REPORTED BY THE COE. ■ CL44/53--SAME AS NM4/53. ■
 H9793/78--OPR-L123-RA-78; WK LOCATED IN LAT 37-49-12.5N, LONG 122-27-31.0W, ■ 99FT
 ECHOSOUNDER DEPTH ACQUIRED IS NOT NECESSARILY LEAST DEPTH, RECOMMENDS ■ RETAIN
 CHARTED SWEEPED DEPTH IN LOCATION OF PRESENT SURVEY, DELETE (PA). ■ (UPDATED 8/87
 RWD) ■ H10456/93--WK NOT INVESTIGATED, CARRIED FORWARD AS 30.2M. i ■ (UPDATED 1/95
 RWD) ■ ■ DESCRIPTION ■ 24 NO.1368; 4980 GT, SUNK 12/25/52, WD CLEARED TO 60 FT, POS
 ACCURACY 1 MILE ■ AT LAT.37-49-12N, LONG.122-29-29W.

Survey Summary

Survey Position: 37° 49' 12.0" N, 122° 27' 32.7" W
Least Depth: 33.36 m (= 109.45 ft = 18.241 fm = 18 fm 1.45 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) ± 1.974 m ; TVU (TPEv) ± 0.337 m
Timestamp: 2010-124.18:36:19.276 (05/04/2010)
Survey Line: hdcs_data / nrt6_s3003_em3000 / 2010-124 / 658_1827
Profile/Beam: 342/87
Charts Affected: 18650_1, 18649_1, 18652_5, 18652_1, 18645_1, 18640_1, 18680_1, 18010_1, 18022_1,
 18007_1, 18020_1, 501_1, 530_1, 50_1

Remarks:

AWOIS 50112 - Fernstream

Feature Correlation

| Address | Feature | Range | Azimuth | Status |
|---|---------------|-------|---------|---------------------|
| hdcs_data/nrt6_s3003_em3000/2010-124/658_1827 | 342/87 | 0.00 | 000.0 | Primary |
| OPR-L430-NRT6-09awois | AWOIS # 50112 | 53.16 | 099.1 | Secondary (grouped) |

Hydrographer Recommendations

Investigated and verified with MB. Hydrographer would recommend modifying least depth to 109ft and re-centering wreck. It appears to have shifted and have spread out. Please see attached image.

Cartographically-Rounded Depth (Affected Charts):

109ft (18650_1, 18649_1, 18652_5, 18652_1)

18fm (18645_1, 18640_1, 18680_1, 18010_1, 18022_1, 18007_1, 18020_1, 530_1)

33m (501_1, 50_1)

S-57 Data

Geo object 1: Wreck (WRECKS)

Attributes: CATWRK - 1:non-dangerous wreck
QUASOU - 6:least depth known
SORDAT - 20100514
SORIND - US,US,nsurf,H11640
TECSOU - 3:found by multi-beam
VALSOU - 33.359 m
VERDAT - 12:Mean lower low water
WATLEV - 3:always under water/submerged

3.5) Profile/Beam - 92/103 from hdcs_data / nrt6_s3003_em3000 / 2010-091 / 610_1934

Primary Feature for AWOIS Item #53764

Search Position: 37° 48' 49.9" N, 122° 24' 09.3" W
Historical Depth: 13.11 m
Search Radius: 50
Search Technique: S2,MB,ES
Technique Notes: [None]

History Notes:

L17(09) - 43FT SOUNDING KNOWN BY LOCAL MARINERS TO BE A ROCK, SIDE SCAN DATA(2005) SHOW TO BE A LARGE ROCK STANDING OVER 5M HIGH. 37-48-49.891N 122-24-09.279W (ENTERED 4/09 KAK)

Survey Summary

Survey Position: 37° 48' 49.5" N, 122° 24' 09.5" W
Least Depth: 13.08 m (= 42.91 ft = 7.151 fm = 7 fm 0.91 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) ± 1.965 m ; TVU (TPEv) ± 0.295 m
Timestamp: 2010-091.19:42:19.007 (04/01/2010)
Survey Line: hdcs_data / nrt6_s3003_em3000 / 2010-091 / 610_1934
Profile/Beam: 92/103
Charts Affected: 18650_1, 18649_1, 18652_5, 18652_1, 18640_1, 18680_1, 18010_1, 18022_1, 18007_1, 18020_1, 501_1, 530_1, 50_1

Remarks:

AWOIS 53764 - Rock Obstruction

Feature Correlation

| Address | Feature | Range | Azimuth | Status |
|---|---------------|-------|---------|---------------------|
| hdcs_data/nrt6_s3003_em3000/2010-091/610_1934 | 92/103 | 0.00 | 000.0 | Primary |
| OPR-L430-NRT6-09awois | AWOIS # 53764 | 12.74 | 204.9 | Secondary (grouped) |

Hydrographer Recommendations

Rock verified with SWMB. Hydrographer recommends Modifying chart sounding to reflect new survey data; least depth is now 42 ft.

Cartographically-Rounded Depth (Affected Charts):

43ft (18650_1, 18649_1, 18652_5, 18652_1)

7fm (18640_1, 18680_1, 18010_1, 18022_1, 18007_1, 18020_1, 530_1)

13.1m (501_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: QUASOU - 6:least depth known
SORDAT - 20100514
SORIND - US,US,nsurf,H11640
STATUS - 1:permanent
TECSOU - 3:found by multi-beam
VALSOU - 13.078 m
VERDAT - 12:Mean lower low water
WATLEV - 3:always under water/submerged

3.6) Profile/Beam - 111/97 from hdcs_data / nrt6_s3003_em3000 / 2010-096 / 672_1926

Primary Feature for AWOIS Item #50562

Search Position: 37° 48' 33.6" N, 122° 27' 33.0" W
Historical Depth: 9.90 m
Search Radius: 50
Search Technique: S2,MB,ES
Technique Notes: [None]

History Notes:

HISTORY ■ H7621/47--CS256; 31 FT AT LW, ECHO SOUNDER, SEXTANT, POS. SCALED (1:10,000) ■ IN
 LAT.37-48-33.7N, LONG.122-27-29.5W. ■ H9793/78--OPR-L123-RA-78; NOT DISPROVED, ECHO
 SOUNDER, ELECTRONIC CONTROL, i ■ NOT INVESTIGATED. A 35 FT DEPTH FOUND APPROX. 25
 METERS SE. ■ FE242/83--OPR-L123-RA-83; 33FT DEPTH LOCATED IN LAT 37-48-33.5N, LONG
 ■ 22-27-29.0W. THE 31FT DEPTH WAS NOT ADEQUATLY DEVELOPED FOR DISPROVAL, THE
 i ■ VERIFIER RECOMMENDS THAT IT BE RETAINED AS CHARTED. BOTTOM CHARACTERISTIC IS
 i ■ SOFT MUD. (UPDATED 11/85 RWD) ■ H10456/93--9.9M(32.5FT) LEAST DEPTH LOCATED BY 5M ES
 DEVELOPMENT, i ■ POSITION GIVEN IN LAT 37-48-33.65N, LONG 122-27-33.01W. CHART PRESENT
 ■ SURVEY DATA. (UPDATED 1/95 RWD)

Survey Summary

Survey Position: 37° 48' 33.8" N, 122° 27' 34.0" W
Least Depth: 9.95 m (= 32.63 ft = 5.439 fm = 5 fm 2.63 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) ± 1.962 m ; TVU (TPEv) ± 0.288 m
Timestamp: 2010-096.19:34:32.604 (04/06/2010)
Survey Line: hdcs_data / nrt6_s3003_em3000 / 2010-096 / 672_1926
Profile/Beam: 111/97
Charts Affected: 18650_1, 18649_1, 18652_5, 18652_1, 18645_1, 18640_1, 18680_1, 18010_1, 18022_1,
 18007_1, 18020_1, 501_1, 530_1, 50_1

Remarks:

AWOIS 50562 - 32ft SOUNDING

Feature Correlation

| Address | Feature | Range | Azimuth | Status |
|---|---------------|-------|---------|---------------------|
| hdcs_data/nrt6_s3003_em3000/2010-096/672_1926 | 111/97 | 0.00 | 000.0 | Primary |
| OPR-L430-NRT6-09awois | AWOIS # 50562 | 23.74 | 281.3 | Secondary (grouped) |

Hydrographer Recommendations

32ft sounding was verified with SWMB. Hydrographer recommends modifying the sounding location on the chart to reflect new sounding position.

Cartographically-Rounded Depth (Affected Charts):

32ft (18650_1, 18649_1, 18652_5, 18652_1)

5 ½fm (18645_1, 18640_1, 18680_1, 18010_1, 18022_1, 18007_1, 18020_1, 530_1)

9.9m (501_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: QUASOU - 6:least depth known
SORDAT - 20100514
SORIND - US,US,nsurf,H11640
TECSOU - 3:found by multi-beam
VERDAT - 12:Mean lower low water



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Silver Spring, Maryland 20910

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : May 25, 2010

HYDROGRAPHIC BRANCH: Atlantic
HYDROGRAPHIC PROJECT: OPR-L430-NRT6-2010
HYDROGRAPHIC SHEET: H11640

LOCALITY: Entrance to San Francisco Bay, CA
TIME PERIOD: March 15 - May 14, 2010

TIDE STATION USED: 941-4290 San Francisco, CA
Lat. 37° 48.4'N Long. 122° 27.9' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.594 meters

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project OPR-L430-NRT6-2010, H11640, during the time period between March 15 to May 14, 2010.

Please use the zoning file "L430NRT62010CORP" submitted with the project instructions for Entrance to San Francisco Bay. Zones SFB4, SFB5, SFB6, SFB9, SFB14 and SFB15 are the applicable zones for H11640.

Refer to attachments for zoning information.

Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

Peter J. Stone

Digitally signed by Peter J. Stone
DN: cn=Peter J. Stone, o=CO-OPS, ou=NOAA/
NOS, email=peter.stone@noaa.gov, c=US
Date: 2010.05.25 13:28:35 -04'00'

CHIEF, OCEANOGRAPHIC DIVISION



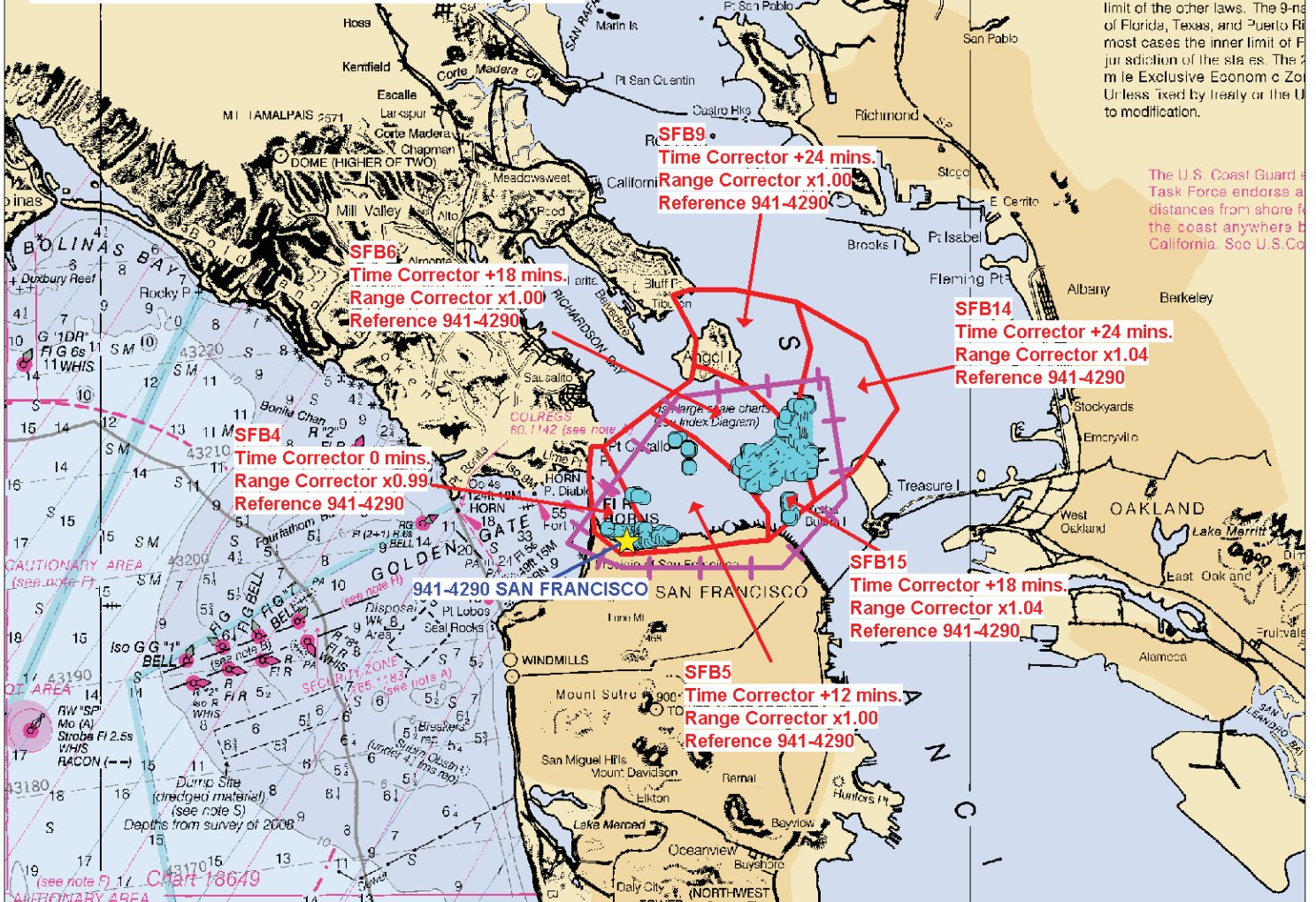
NATIONAL MARINE SANCTUARY NOTE

Marine sanctuaries are protected areas, administered by NOAA, that contain diverse natural resources such as marine species and deep-sea hydrothermal vents. These areas are protected from environmental damage such as spills of oil and other pollutants.

Preliminary as Final Zoning for OPR-L430-NRT6-2010, H11640 Entrance to San Francisco Bay, CA

Within the 12-nautical mile limit of the territorial sea, the outer limit of the territorial sea, the limit of the other laws. The 9-nautical mile limit of Florida, Texas, and Puerto Rico in most cases the inner limit of the territorial sea. The 200-nautical mile Exclusive Economic Zone unless fixed by treaty or the United States is not subject to modification.

The U.S. Coast Guard and Task Force endorse a 12-mile distance from shore for the coast anywhere in California. See U.S. Coast Guard Notice to Mariners 10-010.



PHB Compilation Log

General Survey Info

| | | | | | | | |
|----------------|------------------|-------------------------|-------------------------------|-------------------|----------|----------|-----|
| Survey Number | H11640 | Field Unit | NRT6 | State | CA | UTM Zone | 10N |
| Project Number | OPR-L430-NRT6-09 | Project Name (Locality) | San Francisco Bay | | | | |
| Start Date | 03/15/2010 | Sublocality | Entrance to San Francisco Bay | | | | |
| End Date | 05/14/2010 | Survey Scale | 1:10,000 | Compilation Scale | 1:20,000 | | |

Affected Raster Charts

| Chart | KAPP | Scale | Edition | Date | NTM Date |
|-------|------|----------|---------|------------|------------|
| 18650 | 1824 | 1:20,000 | 56th | 09/01/2009 | 07/02/2011 |
| 18653 | 1939 | 1:20,000 | 11th | 10/01/2009 | 07/02/2011 |
| 18649 | 1823 | 1:40,000 | 67th | 12/01/2009 | 07/09/2011 |
| 18652 | 1832 | 1:40,000 | 36th | 02/01/2011 | 07/09/2011 |
| | | | | | |
| | | | | | |
| | | | | | |

Add Chart

Remove Chart

Affected Electronic Charts

| ENC | Scale |
|----------|----------|
| US5CA13M | 1:20,000 |

Add ENC

Remove ENC

Spatial Reference

| | |
|-------------------|-------|
| Horizontal Datum | WGS84 |
| Coordinate System | LLDG |
| Sounding Datum | MLLW |
| Vertical Datum | MHW |

Junction Surveys

| Survey Number | Survey Date | Location Relative to Current Survey |
|---------------|-------------|-------------------------------------|
| N/A | | (NE, SW, NNW, ect.) |

Add Survey

Remove Survey

PHB Compilation Log

Processing Info

HCell Compiler

Annie Raymond

QC Reviewer

Martha Herzog

SAR Reviewer

Joe Tegeder

Source Surfaces

| Resolution | File Name |
|--|-------------------------------|
| 0.5m | H11640_0_5m_Final.csar |
| 1m | awois_csf_1m_Final.csar |
| 1m | H11640_1m_Final_Combined.csar |
| <input type="button" value="Add Surface"/> <input type="button" value="Remove Surface"/> | |

Supporting Documents

| Name | Version |
|--|------------|
| Specs and Deliverables | April 2011 |
| HCell Specs | 6.1 |
| <input type="button" value="Add Doc"/> <input type="button" value="Remove Doc"/> | |

Software Used

| Software | Version, HF | Used For |
|-------------------------------|-------------|---|
| CARIS HIPS | 7.0 SP2 HF3 | SAR Review. Inspection of Combined BASE Surfaces. |
| Pydro | 11.8 | SAR Review. Generation of Features Reports. |
| CARIS BASE Editor | 3.2 HF2 | Creation of soundings and bathy-derived features, meta area object, and Blue Notes; Survey evaluation and verification; Initial HCell assembly. |
| CARIS S-57 Composer | 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. (For Fathoms and Feet chart units only.) |
| CARIS HOM | 3.3 SP3 HF8 | Perform conversion of the metric HCell to NOAA charting units with NOAA rounding. (For Fathom and Feet chart units only) |
| CARIS Plot Composer | 5.1 SP 2 | Generate plots of CARIS Session files used for QC. |
| HydroService, dKart Inspector | | Validation check of the base cell file. |
| Fugawi View ENC | 1.0.0.3 | Independent inspection of final HCells using COTS viewer. |

Product Info

Deliverables

Chart Scale HCell

H11640_CS.000

Survey Scale HCell

H11640_SS.000

HCell Report for MCD

H11640_HCell_Report.pdf

Feature Listing

H11640_FL.txt

Descriptive Report

H11640_DR.pdf

Survey Outline

H11640_Outline.gml and .xsd

Horizontal and Vertical Units

During creation of the HCell 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.

Depth Units (DUNI)

Feet

Height Units (HUNI)

Feet

Positional Units (PUNI)

Meters

PHB Compilation Log

| Radius Setting | | |
|--|----------------|---------------|
| A survey-scale sounding (SOUNDG) feature object layer was built from the Combined Surface in CARIS BASE Editor. A shoal-biased selection was made at survey scale using a Radius Table file with values shown below. | | |
| Radius (mm) | Min. Depth (m) | Max Depth (m) |
| 3 | -4.7 | 10 |
| 4 | 10 | 20 |
| 4.5 | 20 | 50 |
| 5 | 50 | 500 |

| Contours | | | |
|--|-------------------|----------------------|-------------------------------|
| Depth contours at the intervals on the largest scale chart are included in the SS HCell for MCD raster charting division to use for guidance in creating chart contours. With the exception of the zero contours included in the *_CS file, contours have not been deconflicted against shoreline features, soundings and hydrography. | | | |
| Charted Contours | Metric Equivalent | Metric- NOAA Rounded | Chart Contours - NOAA Rounded |
| 6ft | 1.8288m | 2.0574m | 6.75ft |
| 12 | 3.6576 | 3.8862 | 12.75 |
| 18 | 5.4864 | 5.715 | 18.75 |
| 30 | 9.144 | 9.3726 | 30.75 |
| 60 | 18.288 | 18.5166 | 60.75 |
| 90 | 27.432 | 27.6606 | 90.75 |
| Add Contour | Remove Contour | | |

Additional Info

| Contact Information | |
|---|----------------------------|
| Inquiries regarding this HCell content or construction should be directed to: | |
| HCell Compiler | Annie Raymond |
| Phone Number | 206-526-6849 |
| Email | annemieke.raymond@noaa.gov |

| Compilation Comments |
|--|
| Some shoreline verification took place outside areas where multibeam data was collected. Features verified during survey were bluenoted as "Retain". |

APPROVAL SHEET
H11640

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.