

H11691

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey HYDROGRAPHIC

Field No.

Registry No. H11691

LOCALITY

State ALASKA

General Locality West of Prince of Wales Island

Sublocality Vicinity of Maurelle Islands

2007

CHIEF OF PARTY

..... Commander Guy T. Noll, NOAA

LIBRARY & ARCHIVES

DATE

HYDROGRAPHIC TITLE SHEET

H11691

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 AlaskaGeneral Locality West of Prince of Wales IslandSublocality Vicinity of Maurelle IslandsScale 1:10,000Dates of Survey 5/8/2007 to 7/28/2007Instructions Date 4/30/2007Project No. OPR-O190-RA-07Vessel Launches 1101, 1103, 1021, 1016, 1015, and 1006Chief of Party CDR Guy T. Noll, NOAASurveyed by Jacobson, Jackson, YoosSoundings taken by echo sounders: Reson 8101, Reson 8125Graphic record scaled by N/AGraphic record checked by N/AEvaluation by A. RaymondAutomated plot by N/AVerification by K. BrownSoundings in Fathoms

at

MLLWREMARKS: Time in UTC. UTM Projection Zone 8

Revisions and annotations appearing as endnotes were

generated during office processing.

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

All separates are filed with the hydrographic data.

Descriptive Report to Accompany Hydrographic Survey H11691

Project OPR-O190-RA-07
West of Prince of Whales Island
Vicinity of Maurelle Islands, Alaska
Scale 1:10,000
May-July 2007
NOAA Ship RAINIER (s221)
Chief of Party: Commander Guy T. Noll, NOAA

A. AREA SURVEYED¹

This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions OPR-O190-RA-07 dated April 30th, 2007 and all other applicable direction¹, with the exception of deviations noted in this report. The survey area is the vicinity of the Maurelle Islands west of Prince of Whales Island and in the Gulf of Esquibel. This survey corresponds to sheet "C" in the sheet layout provided with the Letter Instructions (See Figure 1). OPR-O190-RA-07 responds to a request to provide contemporary surveys to update National Ocean Service (NOS) nautical charts and reduce the Critical Areas backlog.

Complete multibeam echosounder (MBES) coverage was obtained in the survey area. The inshore limit of hydrography was the farthest offshore of the following: (1) the assigned lidar limit line, (2) the 4-meter depth contour, or (3) 32-meters from shore. In areas inshore of the MBES limit, vertical beam echo sounder (VBES) data were acquired to aid in the planning of SWMB data acquisition and to obtain least-depths over specific items. In most inshore areas, Phase Differencing Bathymetric Sonar (PDBS) was used to run a buffer and acquire experimental bathymetry and imagery to aid in the planning of SWMB data acquisition. Limited Shoreline Verification was performed for the survey area in addition to shoreline items selected by NOAA Ship FAIRWEATHER for further investigation. Junction of Lidar surveys was completed where possible (See Figure 2).

¹ Standing Instructions for Hydrographic Surveys (May 2006), NOS Hydrographic Surveys Specifications and Deliverables (April 2007), OCS Field Procedures Manual for Hydrographic Surveying (March 2007), and all Hydrographic Surveys Technical Directives issued through November 2006.

Survey statistics were calculated for each vessel (see *Table 1*).

Data Acquisition Type	Hull Number with Mileage (nm)						Total
	1101	1103	1015	1016	1006	1021	
VBES (mainscheme)	-	13.8	-	-	-	-	13.8
MBES (mainscheme)	-	-	41.4	433.6	123.5	31.8	630.3
SSS (mainscheme)	-	-	92.2	-	-	-	92.2
Crosslines	-	-	40.7	-	-	-	40.7
Developments	18	19	-	-	-	-	37
Shoreline	-	8.4	-	-	-	-	8.4
Bottom Samples	-	20	-	-	-	5	25
Total Number of Items Investigated	-	3	-	-	-	-	3
Total Area Surveyed (sq. nm)	-	-	-	-	-	-	30.02

Table 1: Statistics for survey H11691

Data acquisition was conducted from May 8 to July 28, 2007 (DN 128 to 209).

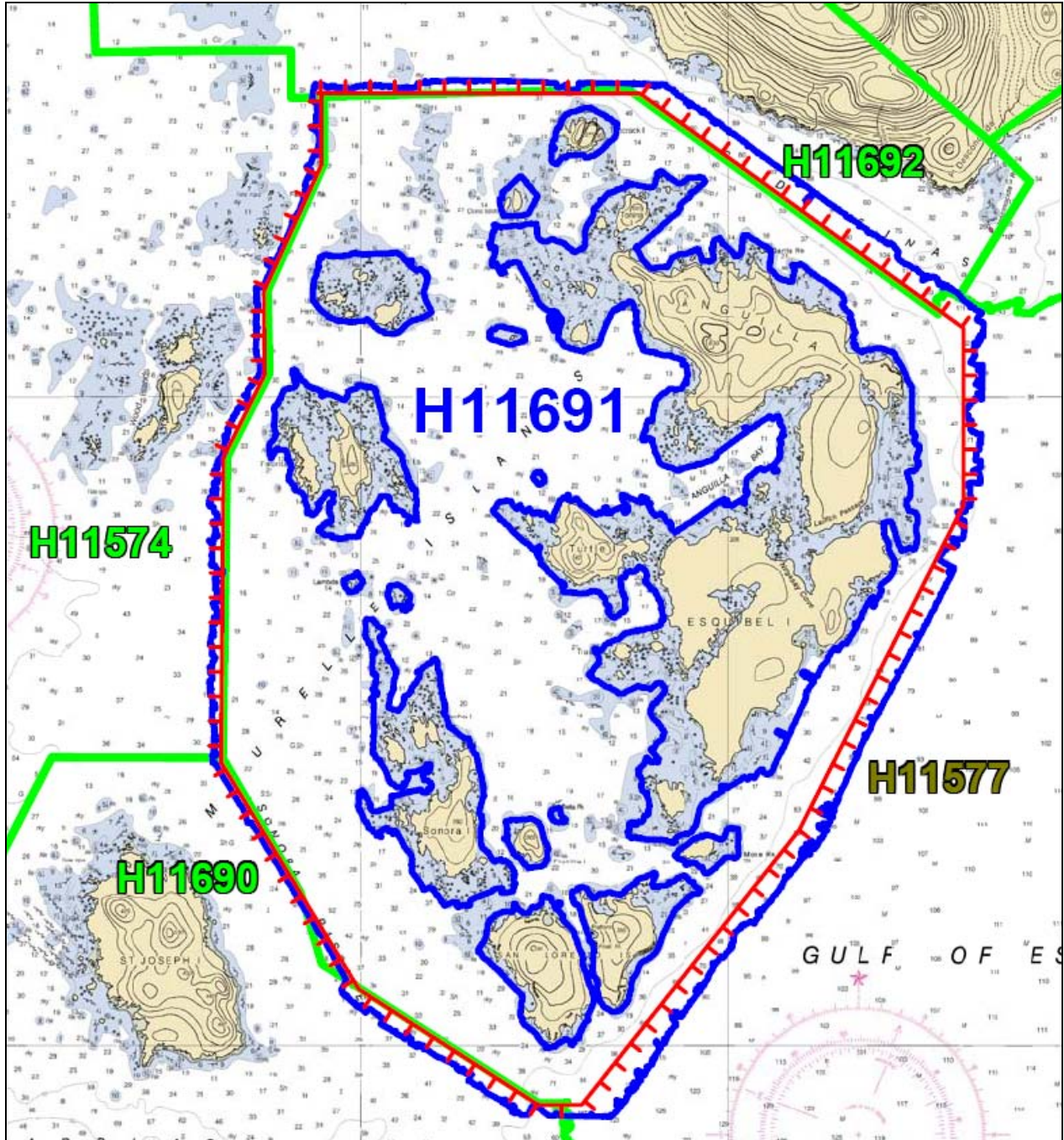


Figure 1. H11691 Survey outline in blue, survey limit in red, junction surveys in green (Chart 17404). H11577 is prior survey.

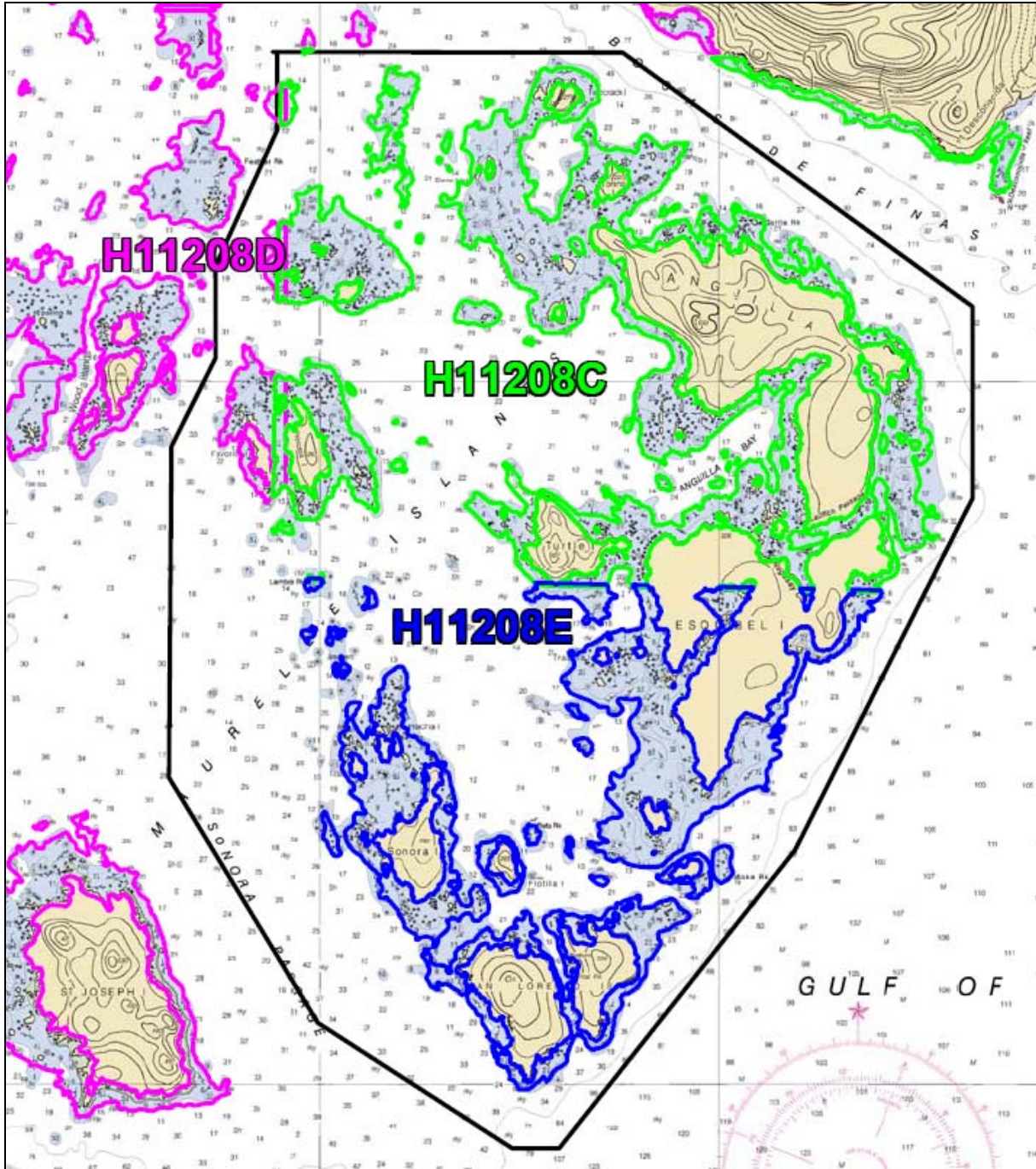


Figure 2. Lidar survey junctions for H11691 (Chart 17404).

B. DATA ACQUISITION AND PROCESSING

A complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods can be found in the *OPR-O190-RA-07 Data Acquisition and Processing Report (DAPR)*², submitted under separate cover. Items specific to this survey, and any deviations from the DAPR are discussed in the following sections.

Final Approved Water Levels have been applied to this survey³. See Section C. for additional information.

B1. Equipment and Vessels

Data for this survey were acquired by the following vessels:

Hull Number	Name	Acquisition Type
1101	RA-1	Vertical Beam Echosounder
1103	RA-2	Vertical Beam Echosounder Detached Positions Bottom Samples
1021	RA-3	Multibeam Echosounder Bottom Samples
1016	RA-4	Multibeam Echosounder
1006	RA-5	Multibeam Echosounder
1015	RA-6	Multibeam Echosounder Phase Differencing Bathymetric Sonar

Table 2. Data Acquisition Vessels for H11691.

Sound speed profiles were measured with SEACAT SBE-19+ profiler in accordance with the Specifications and Deliverables.

No unusual vessel configurations were used for data acquisition.

B2. Quality Control

Crosslines

Multi-Beam Echosounder (MBES) crosslines totaled 40.1 nautical miles, comprising 7.0% of main scheme MBES hydrography. The mainscheme bathymetry was manually compared to the XL nadir beams in CARIS subset mode and agreed well with differences averaging less than 0.3 meter.⁴

A statistical Quality Control Report has been conducted on representative data acquired with each system used on this survey. Results of these tests are included in the updated 2007 RAINIER Hydrographic System Readiness Review package submitted with this survey.

Junctions

The following contemporary surveys junctions with H11691 (See Figure 1):

Registry #	Scale	Date	Junction side
H11208C	1:10,000	2004	within Northeast
H11208D	1:10,000	2004	within Northwest
H11208E	1:10,000	2004	within South
H11577	1:10,000	2006	East/Southeast
H11574	1:10,000	2007	West
H11690	1:10,000	2007	Southwest
H11692	1:10,000	2007	North

Table 3. Survey junctions for H11691.

Junction with the H11577 BASE Surface provided by Pacific Hydrographic Branch was less than 0.3 meters in less than 50 meters of water, less than 0.7 meters in 50-80 meters of water, and less than 1.0 meter for 80-150 meters of water in all comparisons made by the hydrographer. The junction differences were without any variation trends.⁵

Junction with the H11574 BASE Surface in CARIS Subset editor was less than 0.3 meters in 40 meters of water in all comparisons made by the hydrographer, with variations due to flyers in the H11574 surfaces that have not yet been resolved.⁶

Junction with the H11690 of BASE Surface in CARIS Subset editor was less than 0.5 meters in 50-70 meters of water without variation trends in all comparisons made by the hydrographer.⁷

Junction with the H11692 of BASE Surface in CARIS Subset editor was less then 0.3 in 20-30 meters of water, less than 0.4 in 30-40 meters, and less than 0.5 meters in 50-130 meters in all comparisons made by the hydrographer. The junction differences were without variations trends.⁸

Junction data for Lidar surveys H11208C, H11208D, and H11208E were not available.⁹

PDBS data were not used for junction comparisons.

Data Quality Factors

Data Gaps:

Nearshore holidays for this survey were extensive and throughout¹⁰. While some traditional data acquired did overlap with the lidar limit, much of it did not. Holidays tended to be in excess of 50 meters in width and at times exceeded 200 meters in width (see example in Figure 3). These holidays were due to extensive kelp and foul areas throughout the nearshore survey area (See field_verified hob file for recommendations on charting kelp areas)¹¹. There was one exception where a large holiday was due to breakers near an area charted with breakers. This is shown below in Figure 4 and the hydrographer recommends charting another breakers symbol at the marked location in Notebook (H11691_Notebook.wrk).¹² Where possible, the C3D was used to

buffer nearshore areas to ‘see’ farther across track than was reachable by other means¹³. This resulted in copious amounts of C3D bathymetry and sidescan imagery strewn with kelp. While much of this C3D buffering is not suitable for charting, it is included with this survey for reference and possible future application.

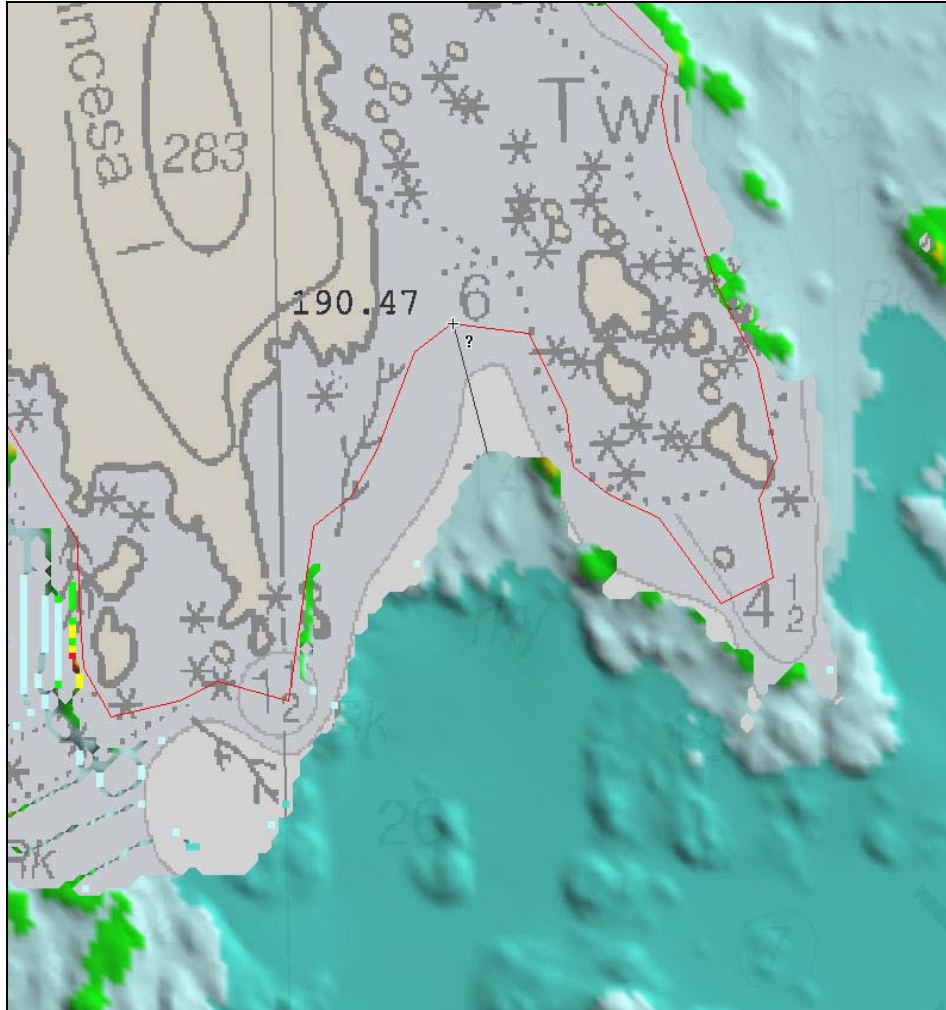


Figure 3: One example of holidays found throughout the survey overlaid on Chart 17404 (red line is Lidar limit).

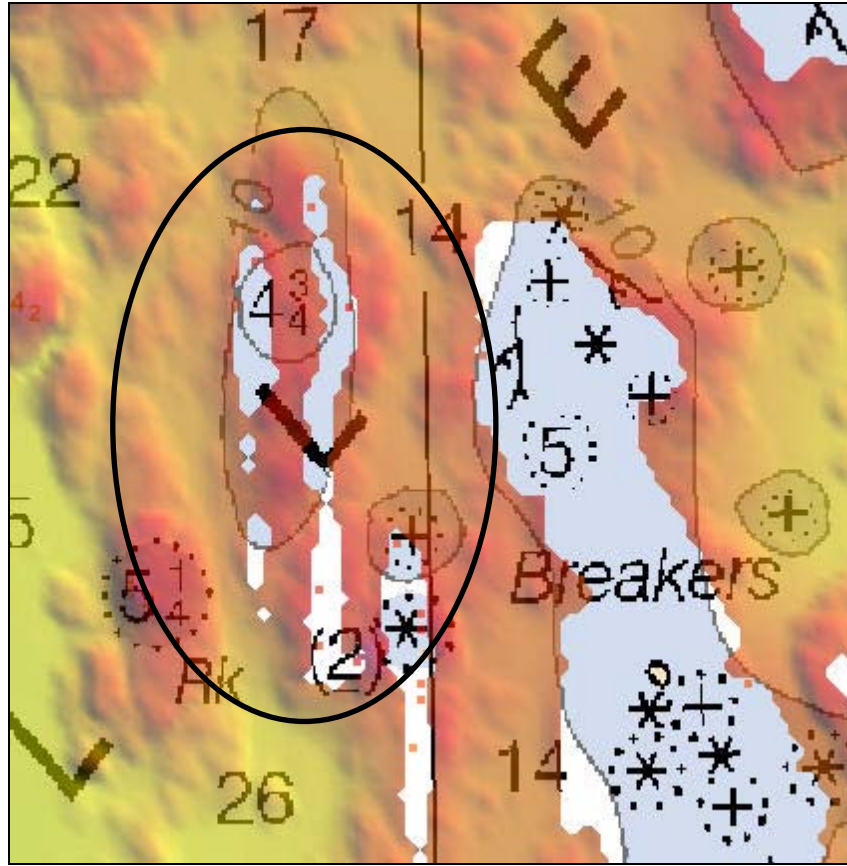


Figure 4: Showing the one exception where a holiday was due to breakers and not kelp/foul area.

C3D Data Coverage, Quality, and Processing:

The coverage of C3D is shown below (yellow) in Figure 5 along with the submitted fieldsheet in Figure 6. The fieldsheet encompasses the entire area of C3D coverage and the BASE surface was computed at five (5) meter resolution.

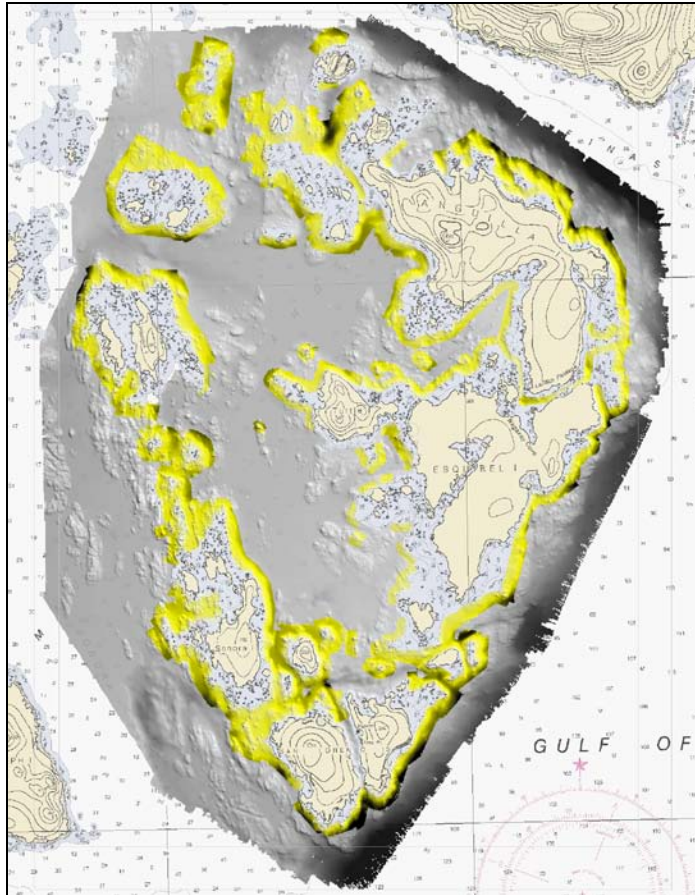


Figure 5: shows C3D 5-meter surface (yellow) overlaid on traditional survey coverage (gray) over chart 17404.

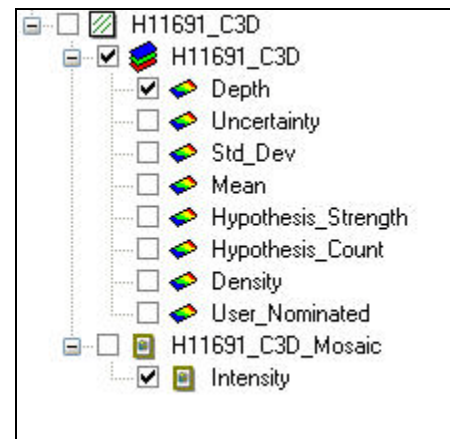


Figure 6: shows field sheet structure for C3D

There are two locations where the hydrographer recommends that C3D bathymetry be used to supersede charted depths¹⁴. In the two places shown below where bathymetry is from only singlebeam and C3D, the C3D data was substantially cleaned to leave a strip of data that remained wider than the singlebeam data. In these areas, the hydrographer recommends superseding previous charted depths with C3D bathymetry in addition to the singlebeam data.

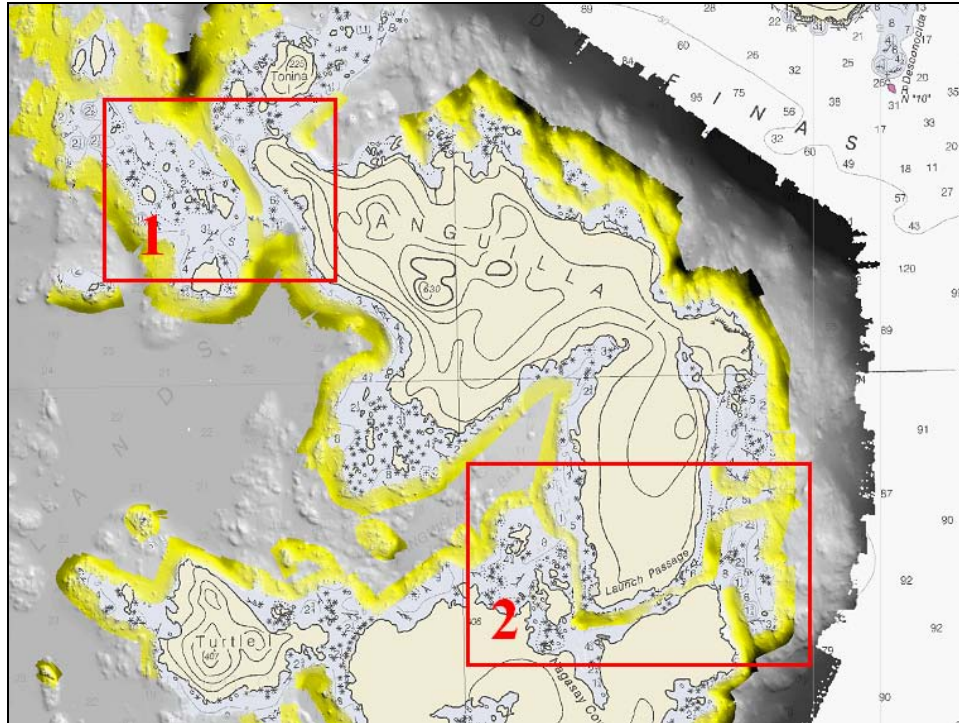


Figure 7: Showing two areas that the hydrographer recommends be superseded by a combination of singlebeam and C3D bathymetry (Chart 17404).

In Figure 7 above, the red box labeled '1' features a narrow passage west of Anguilla Island that has only singlebeam and C3D data. The red box labeled '2' features an area known as 'Launch Passage,' a narrow channel leading from the Gulf of Esquibel to the center of the Maurelle Islands. This was also only covered with singlebeam and C3D. The hydrographer recommends that these areas be superseded by a combination of singlebeam and C3D bathymetry. A closer examination of each of these areas is shown below in Figures 8 and 9.

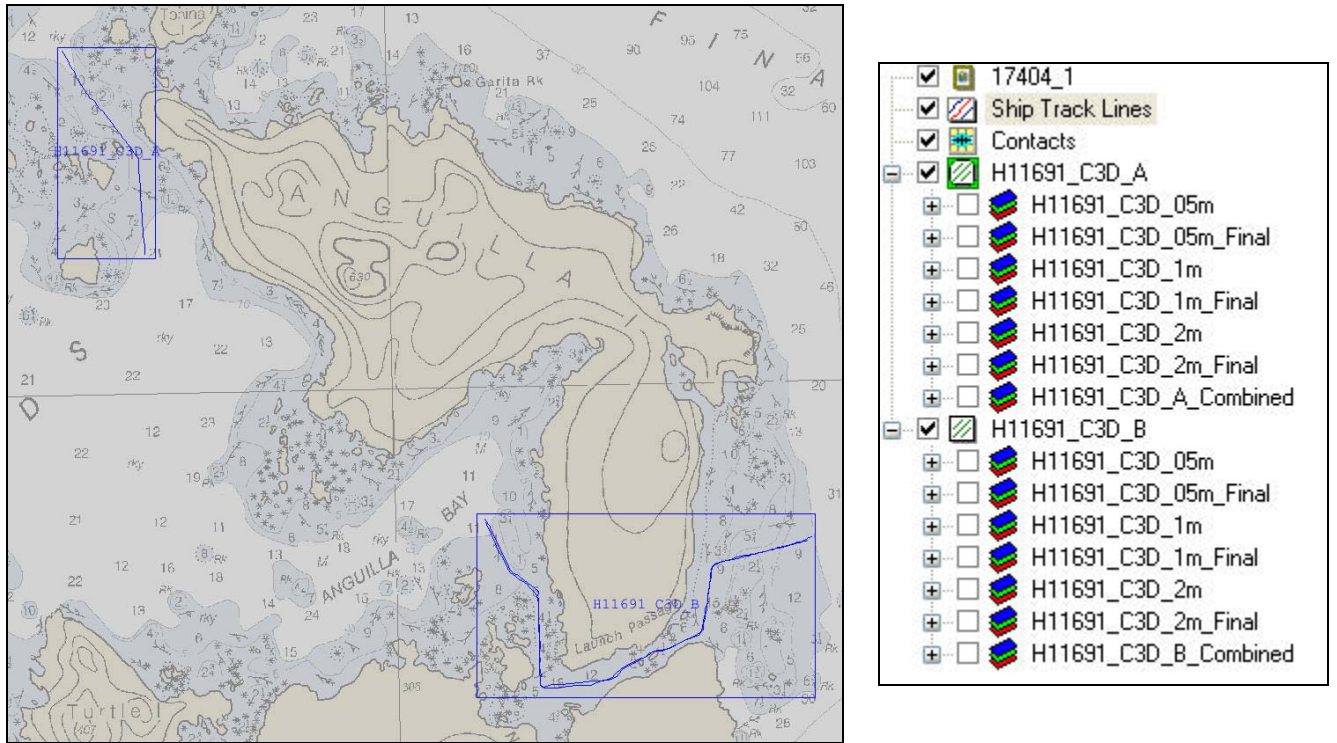


Figure 8: Showing fieldsheet layout and trackline of the two passages previously mentioned.

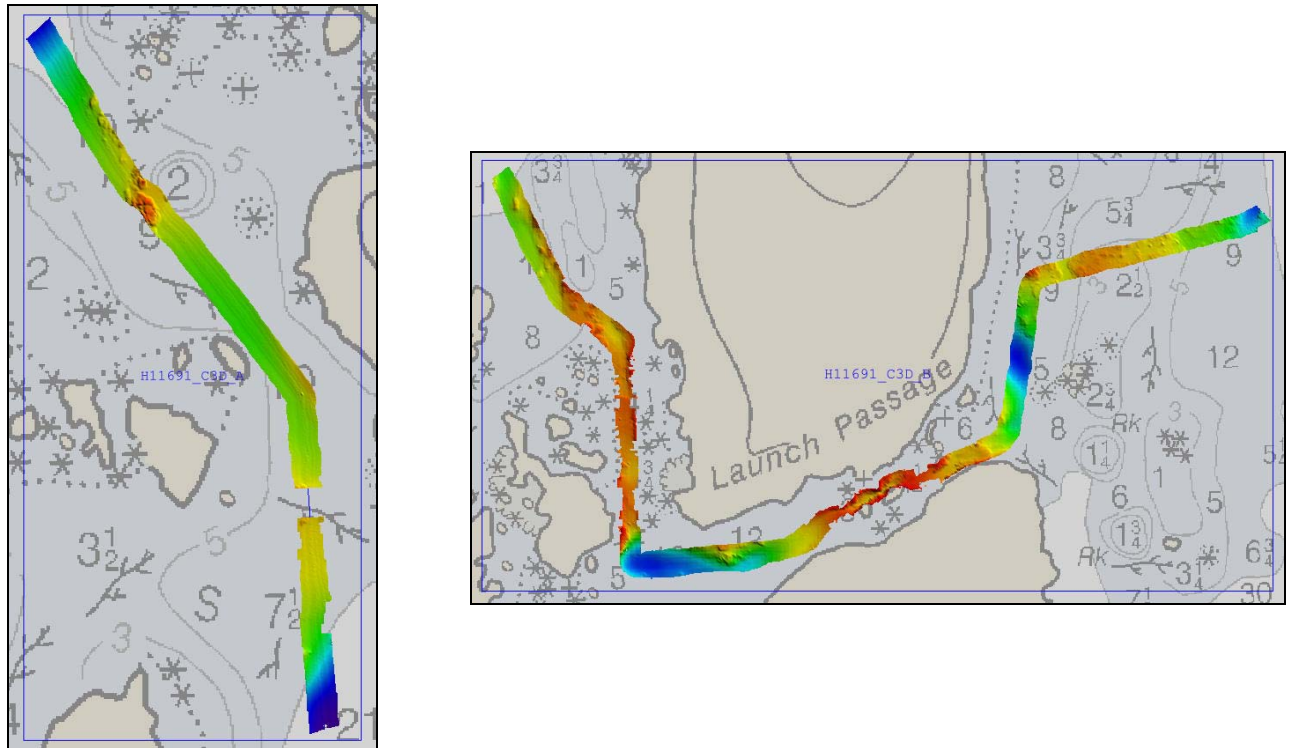


Figure 9: Showing BASE surface of the two passages previously mentioned.

In these two passages, the C3D data was filtered to reject data that was greater than 30 meters across track. This filter was applied after it became apparent that the majority of the data significantly (in excess of 1-meter thickness) degraded at the 30 meter across track point. At the point of degradation, there was obvious data blowout resulting in a 'bowtie' effect (see Figure 10).

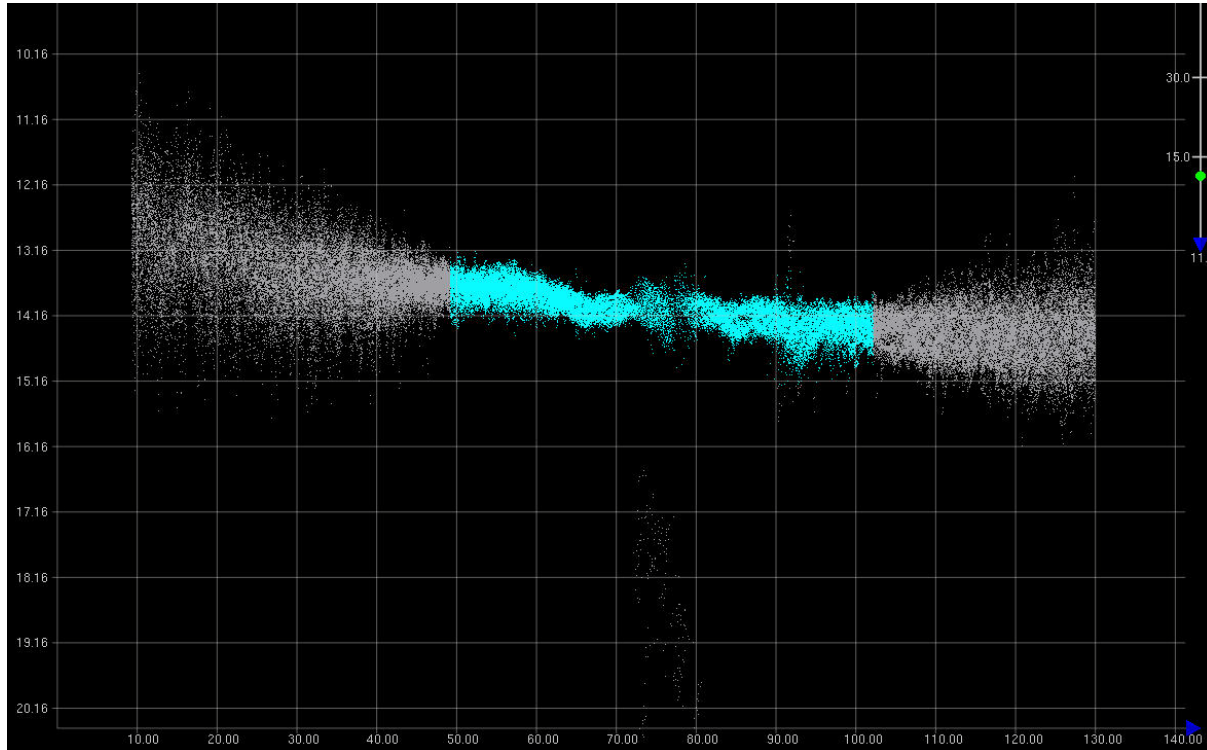


Figure 10: 'Bowtie' effect of C3D data at approximately 30 meters across track.

In addition to this filter, the data was examined again and cleaned as carefully as possible. Cleaning was limited due to the 'thickness' of the data at many points as well as the limited number of 'hits' on features due to the design of the sonar (each trackline has only one set of 'hits'). Regardless of these factors, the hydrographer believes this data to be more helpful than what is currently charted (on chart 17404) in these areas and that they be applied to the chart (17404).¹⁵

C3D DN190

Declination of the sonar head during acquisition in the C3D controller was set to 20 degrees when it should have been set to 30 degrees during data acquisition on DN190. This created a 10 degree offset in the data. This problem was addressed by creating a new vessel file (HVF) to include dual transducers with 10 degree roll offset for each transducer head. A negative 10 degree roll offset was applied to the starboard head and positive 10 degrees for the port transducer head. The new HVF is listed in H11691 as C3D_DN190_H11691_HVF.hvf. Images of the initial problem and the applied fix are shown below in Figures 11 and 12.

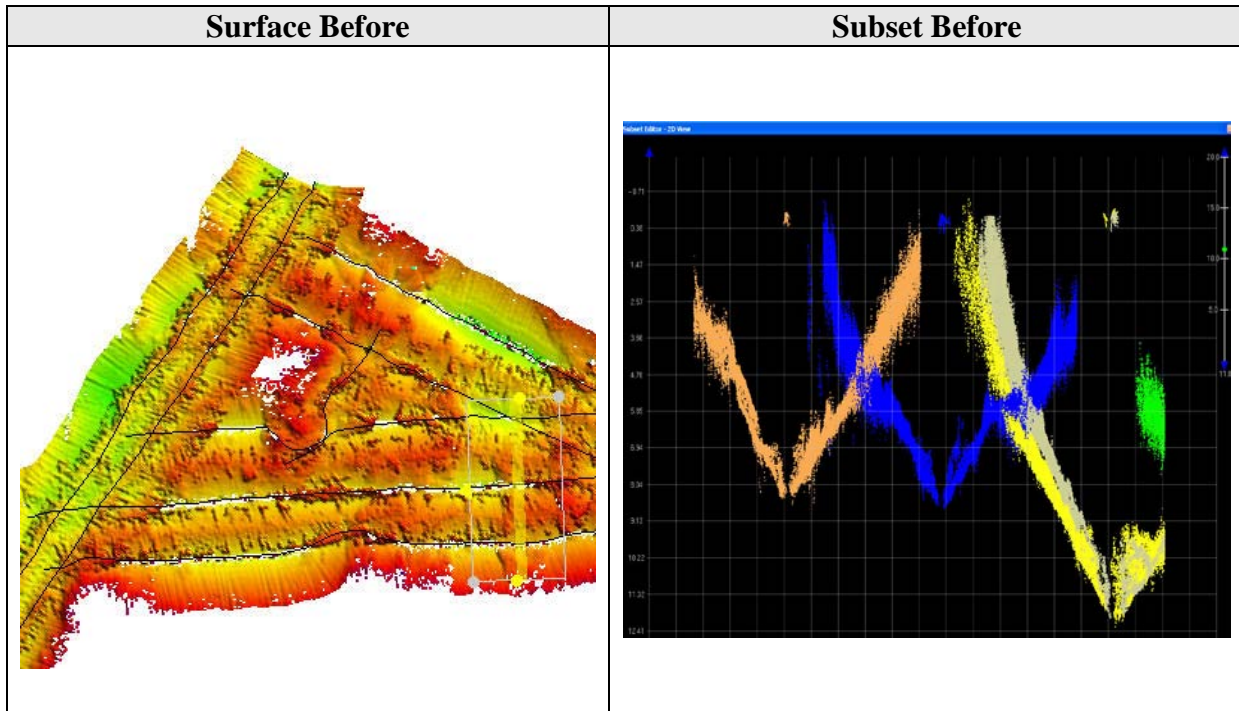


Figure 11. Surface and subset selection of C3D DN190 data showing incorrect sonar head declination of 20 degrees.

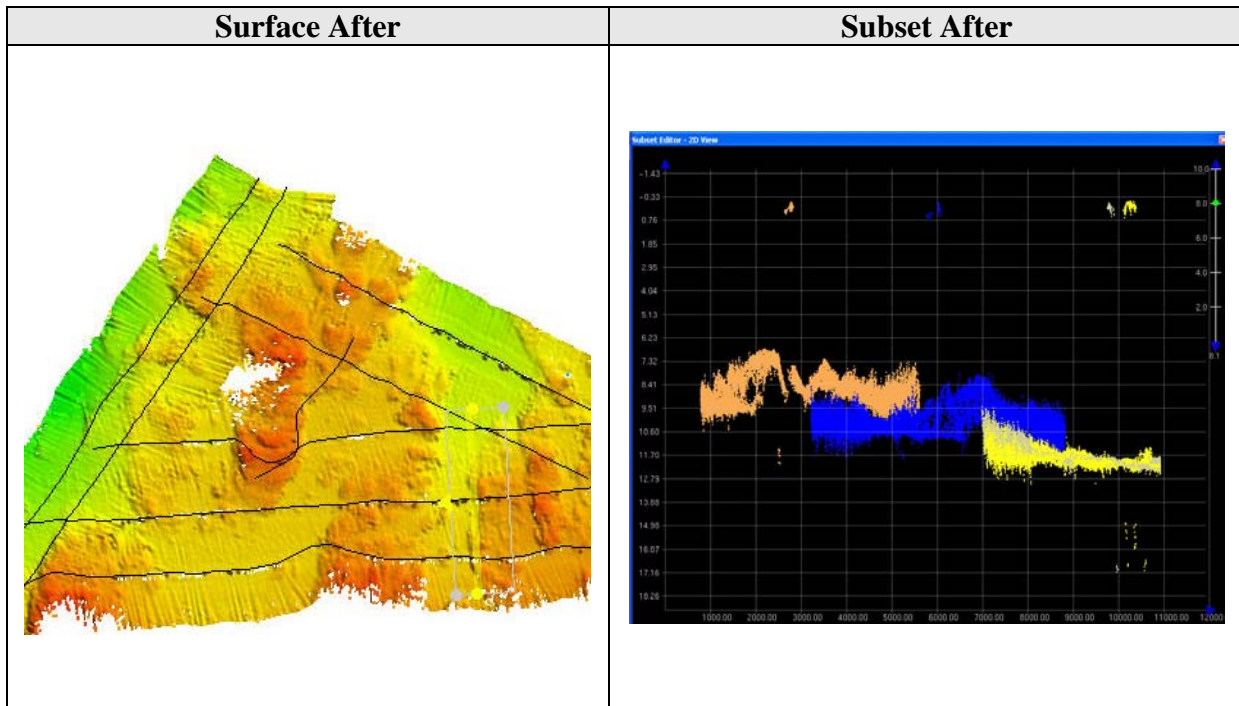
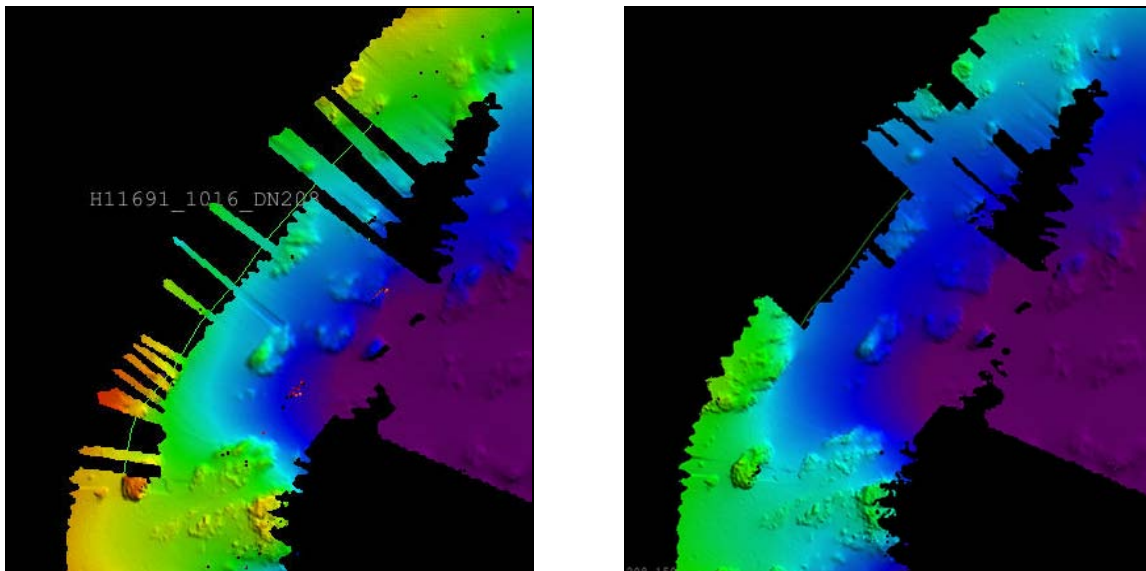


Figure 12. Surface and subset selection of C3D DN190 data showing applied correction of negative 10 degree roll offset to the starboard transducer head and positive 10 degrees for the port transducer head.

Launch 1016 Reson 8125 Digibar Blowouts

During data acquisition for H11691 launch 1016 (RA-4) experienced Digibar blowouts that could generally be attributed to kelp on the Digibar¹⁶. While this problem was usually noticed during acquisition and immediately addressed by re-running the survey line, several lines were not addressed and not re-run. This resulted in the sound speed being outside of the range that CARIS will convert, leaving gaps in the surface. To address this, a Pydro macro was used (SetXTFReson8125ss.py) to insert a convertible sound speed value into the raw data file. This allowed CARIS to convert the data using the Digibar's last known good sound speed value. This allowed acquired data to be recovered. If the initial blowout was exceptionally bad, there were still holidays where data were never acquired. See Figure 13 below:



Digibar blowout before fix

With 1500 inserted for SV

Figure 13. The screen capture on the left shows gaps or 'blowouts' produced when CARIS does not accept the bad sound speed value collected by the Digibar. The screen capture on the right shows data after a sound speed value of 1500m/s is applied during conversion.

This macro creates a new XTF file with the value '1500' listed at the end of the line. These lines are listed below in Table 4.

Lines redone with 1500 m/s are as follows:

Launch 1016 (RA-4) Day Number	Line File
DN 158	437_2100_1500
DN 185	418_1907_1500
DN 191	398_2213_1500
DN 192	463A1956_1500
DN 192	464A1957_1500
DN 192	464A1958_1500
DN 192	464A1959_1500
DN 208	344_2243_1500
DN 209	740_1731_1500

Table 4: Survey lines re-processed with sound velocity of 1500 m/s

B3. Data Reduction

Data reduction procedures for survey H11691 conform to those detailed in the *OPR-O190-RA-07 DAPR*.

B4. Data Representation

Many BASE surfaces were used in processing H11691¹⁷. The submission Field Sheet and BASE Surface structure are shown in Figures 14-17.

Soundings and contours were generated in CARIS HIPS from the final combined BASE surface for field unit review purposes. They are included for reference only and are not intended as a deliverable.

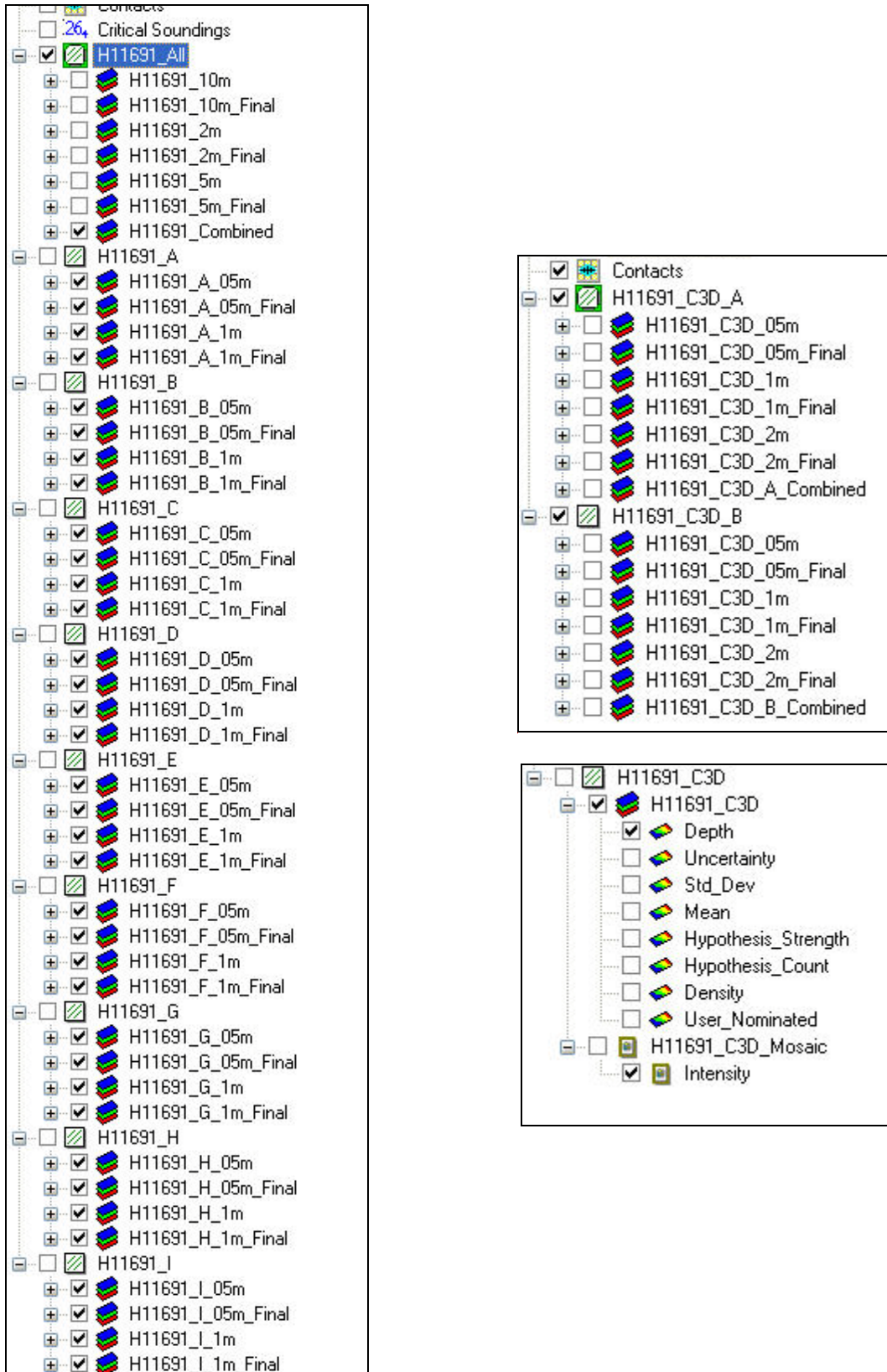


Figure 14: Field sheets and BASE surfaces submitted with H11691.

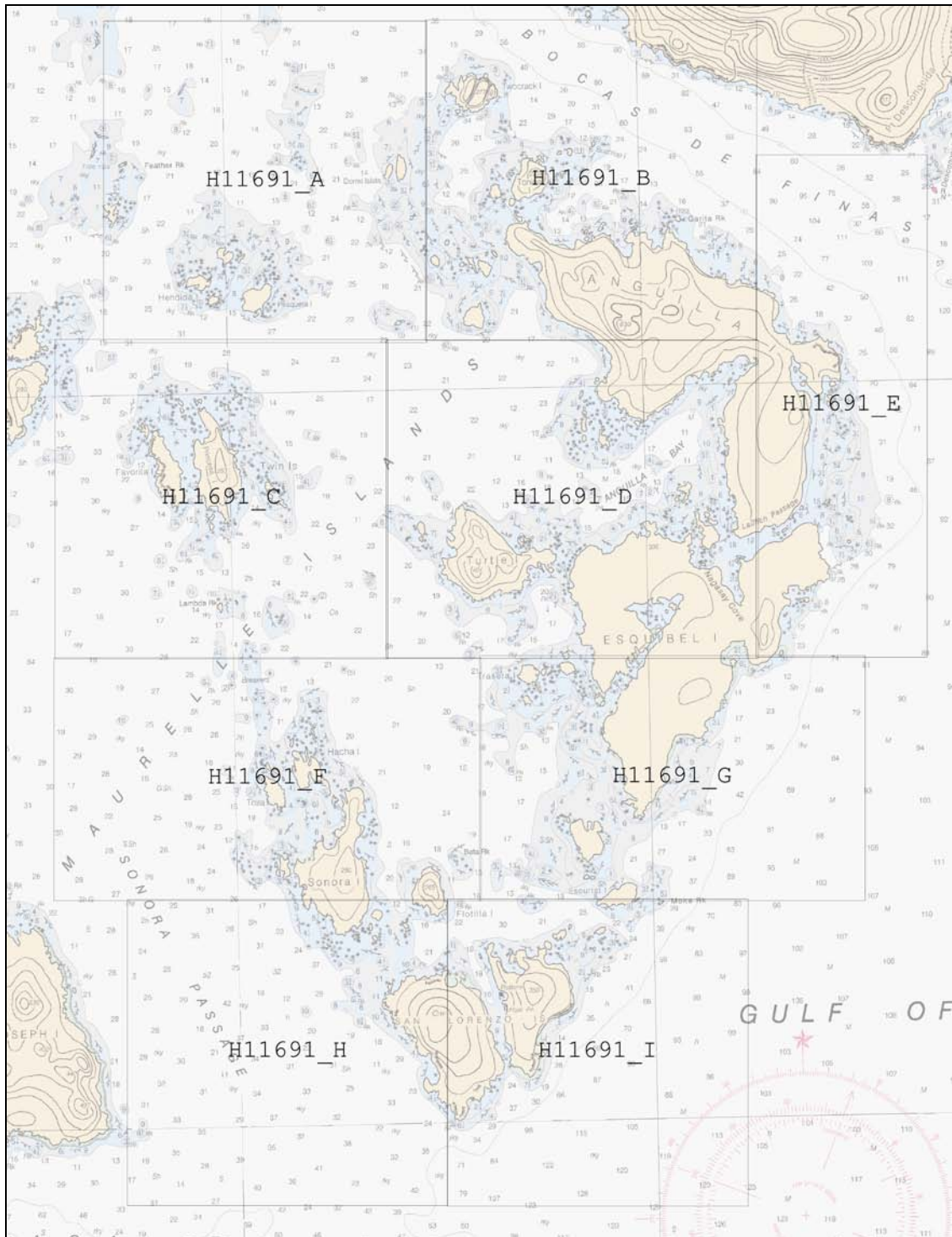


Figure 15: Traditional fieldsheet layout for H11691 overlaid on Chart 17404. Not shown is Fieldsheet 'H11691_All' encompassing the entire survey area with and including the 10m, 5m, and 2m BASE surfaces.

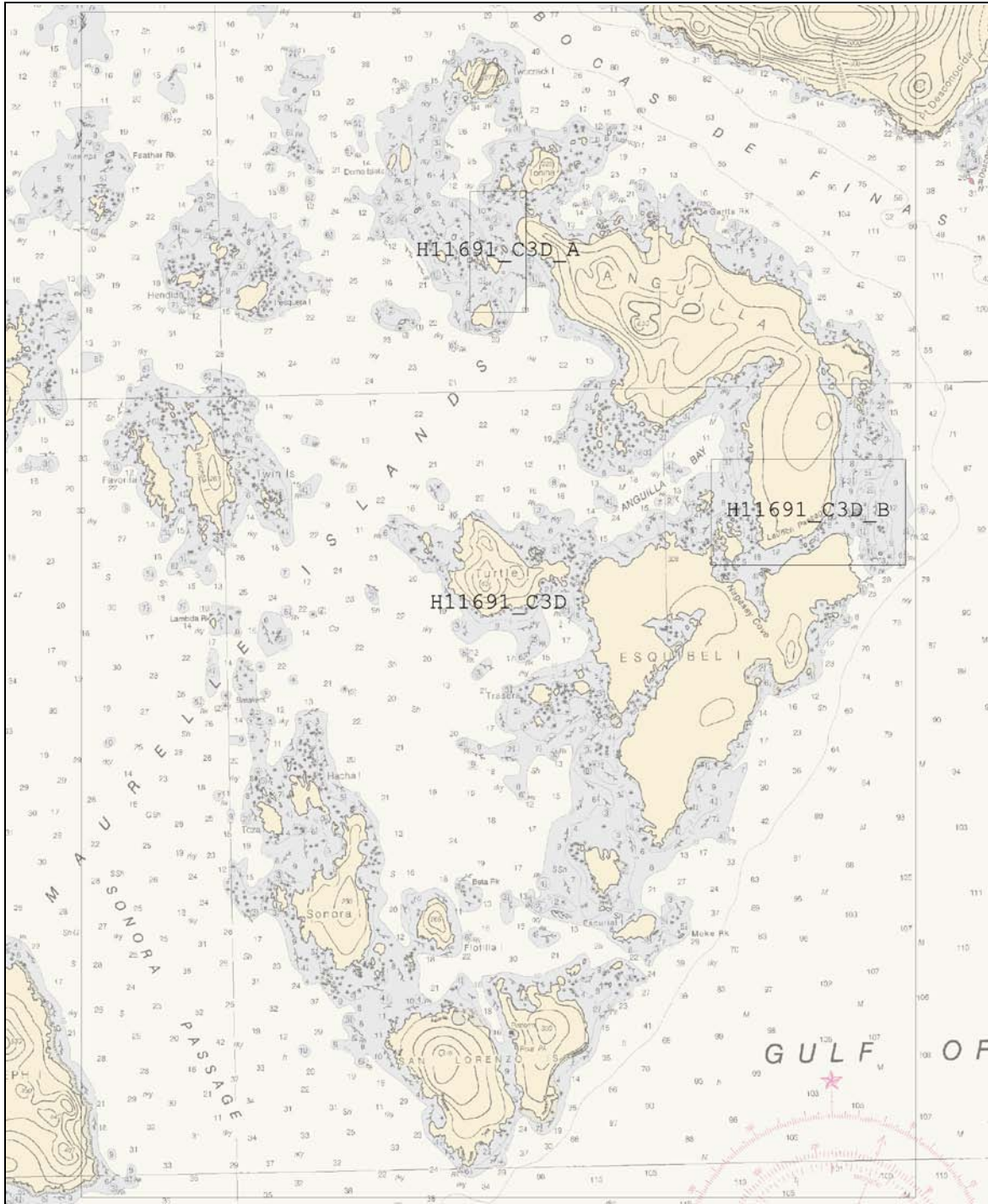


Figure 16: C3D Fieldsheet layout for H11691 overlaid on Chart 17404.

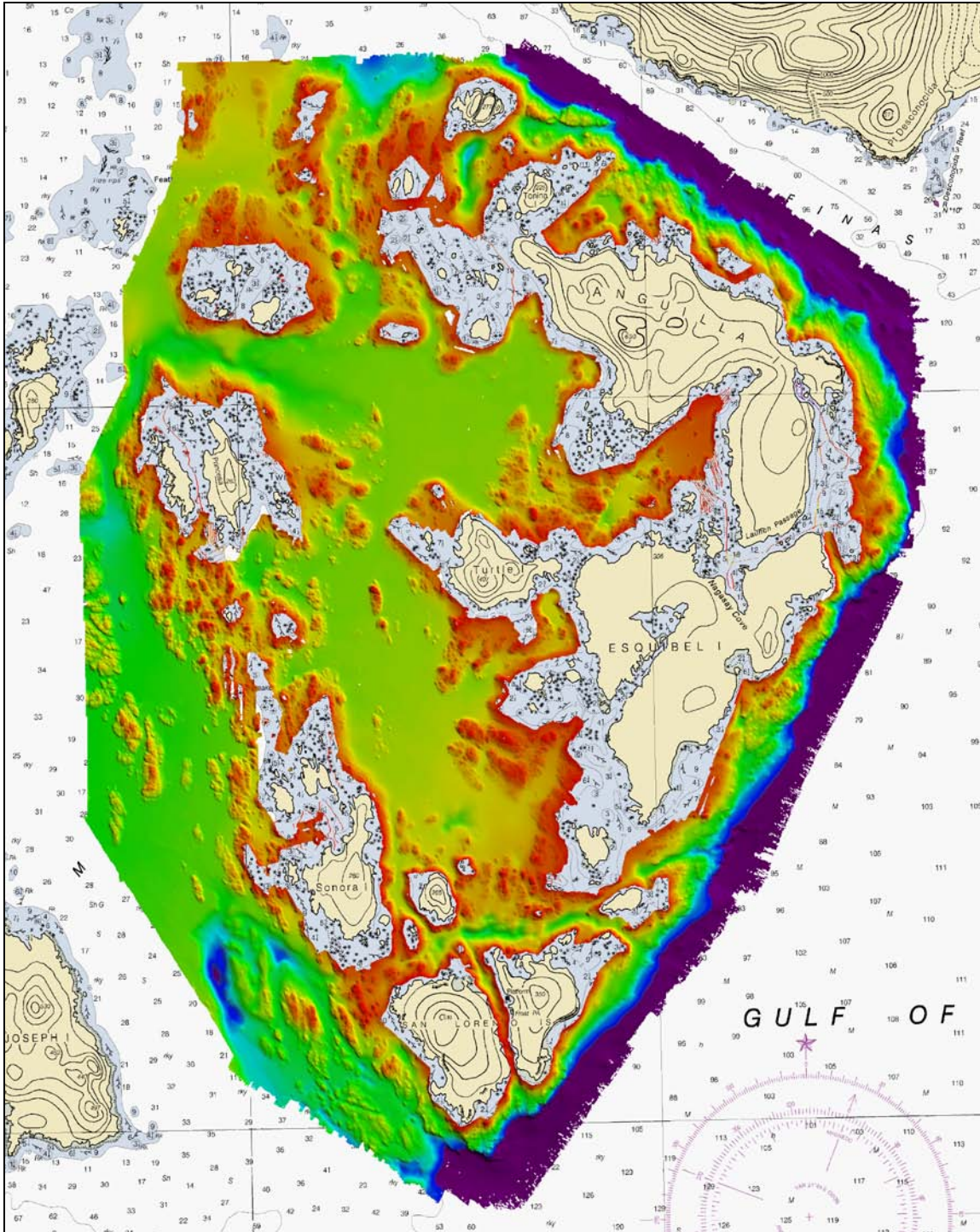


Figure 17: Final combined BASE surface for traditional survey data of H11691 overlaid on Chart 17404 (vertical exaggeration is 1). C3D coverage not shown.

C. VERTICAL AND HORIZONTAL CONTROL

A complete description of vertical and horizontal control for survey H11691 can be found in the *OPR-O190-RA-07 Horizontal and Vertical Control Report*,¹⁸ submitted under separate cover. A summary of horizontal and vertical control for this survey follows.

Horizontal Control

The horizontal datum for this project is the North American Datum of 1983 (NAD83). Differential GPS (DGPS) was the sole method of positioning. The differential corrector beacons utilized for this survey are given in Table 5.

Location	Frequency	Operator	Distance	Priority
Level Island	295 kHz	USCG	52 nm	Primary
Biorka Island	305 kHz	USCG	95 nm	Backup

Table 5: Differential Corrector Sources for H11691.

Vertical Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) primary tide station at Sitka, AK (945-1600) served as control for datum determination and as the primary source for water level reducers for survey H11691.

RAINIER personnel installed Sutron 8210 “bubbler” tide gauge at the following subordinate station in accordance with the Letter Instructions. This station is described in detail in the *OPR-O190-RA-07 Horizontal and Vertical Control Report*.

Station Name	Station Number	Type of Gauge	Date of Installation	Date of Removal
Nossuk Bay	945-0711	30-day	5/5/2007	7/28/2007

Table 6: Tide Station installed by RAINIER personnel for H11691

All data were reduced to MLLW using **final approved water levels** from station Sitka, AK (945-1600) and Nossuk Bay (945-0711) using the tide file 9450711.tid and **final** time and height correctors using the zone corrector file H11691CORF.zdf.

The request for Final Approved Water Levels for H11691 was submitted to CO-OPS on September 6, 2007 and the Final Tide Note was received on October 4, 2007. This documentation is included in Appendix IV.¹⁹

D. RESULTS AND RECOMMENDATIONS

D.1. Chart Comparison

D.1.a. Survey Agreement with Chart

Survey H11691 was compared with the following chart²⁰:

Chart	Scale	Edition and Date	Local Notice to Mariners Applied Through
17404	1:40,000	13 th Ed; May 2006	1/18/2007

Table 7: Chart compared with H11691

Depths from survey H11691 were generally within 1 fathom of charted depths on chart 17404. In some instances, this survey found shoaler soundings between and near charted soundings even though agreement at the position of the charted depths was generally good. This can be attributed to increased bottom coverage using SWMB methods.²¹

Four locations were found to be significantly deeper than charted and are shown in Figures 18 and 19 below. These areas were covered with complete MBES and the hydrographer recommends removing charted depths and charting as per survey data.²²

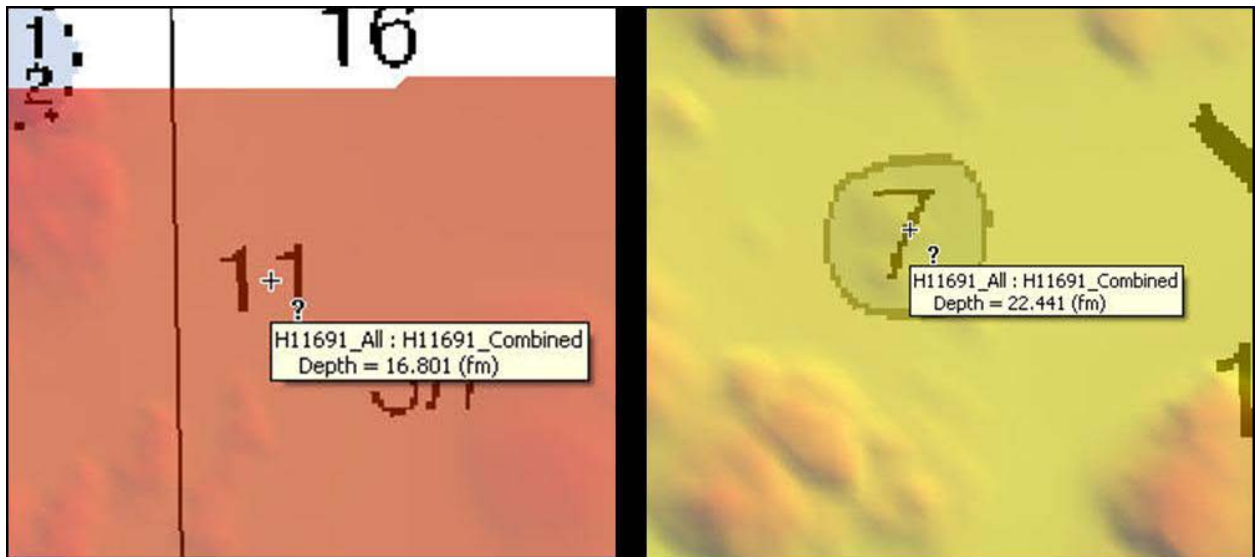


Figure 18 showing two significantly deeper than charted (17404) depths. 11-fm charted sounding is located in position 55° 42' 16.41" N 133° 39' 54.73" W and 7-fm charted sounding is located in position 55° 38' 51.81" N 133° 39' 19.36" W.

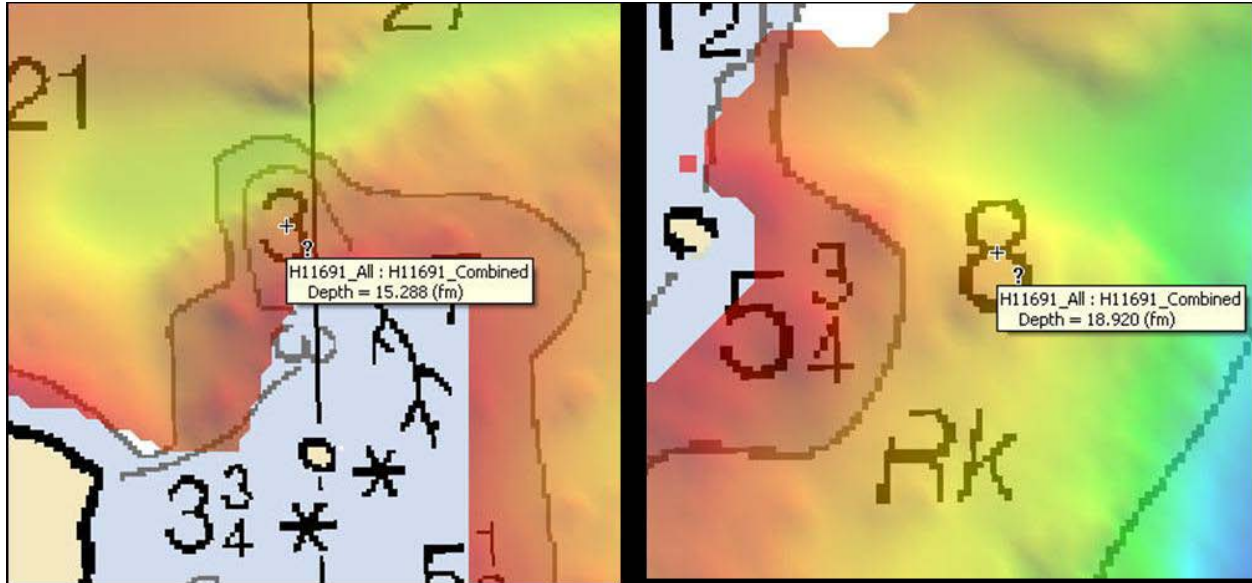


Figure 19 showing two significantly deeper than charted (17404) depths. 3-fm charted sounding is located in position 55° 36' 42.67" N 133° 35' 01.16" W and 8-fm charted sounding is located in position 55° 38' 30.22" N 133° 32' 50.25" W. The 8-fm sounding is also noted seaward of the 10-fm contour.

Two minor charting errors were noted while examining survey agreement with the chart and are shown below in Figure 20²³.

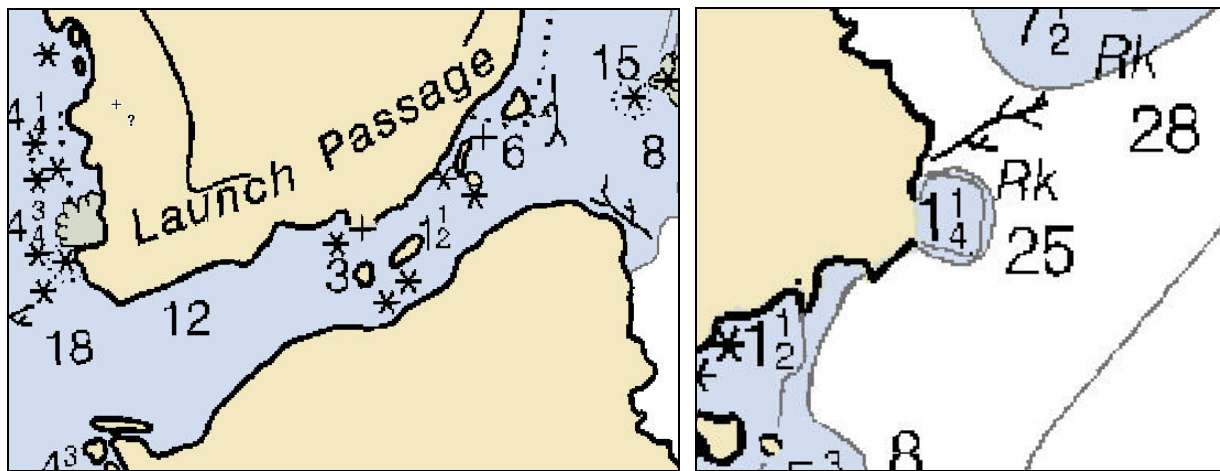


Figure 20 shows two locations (Launch Passage and 800 meters southeast of Launch Passage, respectively) where apparent charting (17404) errors were observed. On the left are several deeper-than-10-fm soundings inside the 10-fm contour and contained in tinted blue. On the right is a tinting overlap at the MHW line.

The Hydrographer recommends that survey soundings supersede all prior survey and charted depths in the common area.²⁴

D.1.b. Dangers to Navigation

A dangerous and poorly charted area to be avoided was initially submitted to the Coast Pilot and is shown below in Figures 21 and 22. Since this was a general area with many dangers, a Coast Pilot submission was deemed to be the most effective means of communicating the information to the mariner. Later in the processing pipeline, it was decided by the Chief of Party to select several DTONs in this same area in addition to the Coast Pilot. This area lies in the East/West passage south of Princesa Island and north of Lambda Rock.

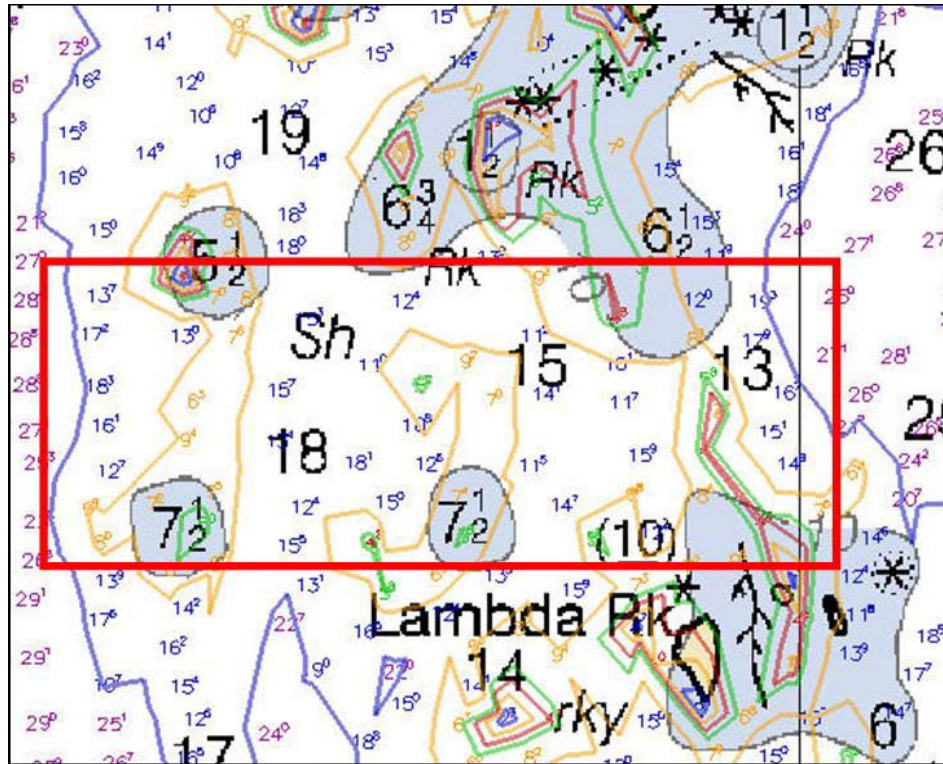


Figure 21: Sounding (in fathoms) and contour plot of area to be avoided overlaid on Chart 17404.

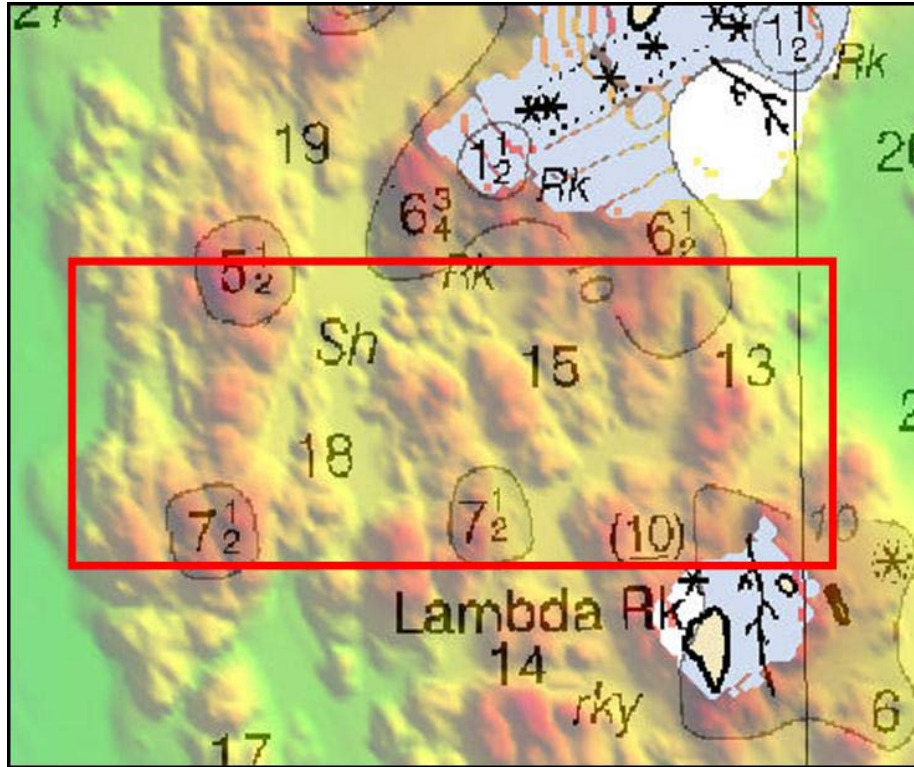


Figure 22: BASE surface of area to be avoided overlaid on Chart 17404 (vertical exaggerations is 3).

There were seventeen (17) Dangers to Navigation (DTON) found during data acquisition of H11691. These were submitted to the Marine Charting Division via email on April 4, 2008. The original DTON submission packages are included in Appendix IV.²⁵

D.1.c. Other Features

Automated Wreck and Obstruction Information System (AWOIS) Investigations

There were no AWOIS items within the survey limits of H11691.²⁶

Additional Items

Additional features investigated within the limits of H11691 are described in the Survey Feature Report in Appendix II.²⁷

D.2. Additional Results

D.2.a. Prior Survey Comparison

Prior survey comparison was not performed.

D.2.b. Shoreline Verification

Shoreline Source

The Pacific Hydrographic Branch provided RAINIER with a list of features from NOAA Ship FAIRWEATHER that were selected for further investigation. This source shoreline was used for orientation purposes in Hypack and on printed boat sheets and utilized for investigation of the items discussed above.²⁸

Shoreline Verification²⁹

Traditional “limited shoreline verification” was not required for this survey, since much of the nearshore area was covered by NOAA Ship FAIRWEATHER, and thus outside the limits of H11691. The following field procedures were followed:

- H11691 FAIRWEATHER items selected for further investigation were addressed by visual, Detached Position (DP), VBES, or MBES techniques as appropriate and feasible, near predicted low water. Note that some of these features were located in areas unsafe to approach and/or were considered insignificant to navigation, and were not further investigated.
- Charted features noted to be both egregiously misrepresented in source data and significant to navigation were investigated. In some cases these items were inshore of the limits of H11691.
- All new and charted items within the limits of H11691 (i.e., offshore of the limits prescribed in the Letter Instructions and discussed in Section A.) were addressed.

Detached positions (DPs) were recorded in HYPACK and logged on DP forms, processed in Pydro, and then translated into CARIS Notebook. These DPs indicate revisions to features and features not found on the verified shoreline. In addition, annotations describing shoreline were recorded on hard copy plots of digital shoreline, and transferred to the “remrks” attribute on the corresponding features in Notebook. DP forms are included in the Detached Position directory of the *Separates to be Included with Survey Data*.

Investigation methods and recommendations are described in the Pydro “Remarks” and “Recommendations” tabs. Details of investigations of H11691 FAIRWEATHER features and all new items are included in the Survey Feature Report in Appendix II. DP forms are included in the *Separates to be Included with Survey Data*.

All shoreline data is submitted in Caris Notebook .hob files. The session H11691_Notebook.hsf contains the following:

HOB File	Purpose and Contents
H11691_Reference	Contains the survey outline limit.
H11691_Lidar_extents	Contains the Lidar limit line.
H11691_Composite_Source_Unedited	Contains the original unedited composite source.
H11691_Updates.hob	New or revised features identified by this survey (including bottom samples), (Pydro carto actions “add” or “modify”.)
H11691_Disprovals.hob	Features disproved by this survey. (Pydro carto action “delete”.)
H11691_None	Investigation items that were either not modified or not investigated (Pydro carto action “none”).
H11691_DTON	Items selected as DTONs. (Pydro carto action “add” and selected as DTONs)

Table 8. List and Description of Notebook HOB files.

Source Shoreline Changes and New Features

Items for survey H11691 that require further discussion and are associated with a detached position, have been flagged “Report” in Pydro in H11691.pss. Investigation methods and recommendations are listed in the Remarks and Recommendation tabs. These features are included in the Survey Feature Report in Appendix I.

Recommendations

The Hydrographer recommends that the shoreline as depicted in the Notebook .HOB files supersede and complement shoreline information compiled on the CFF and charts as described above.³⁰

D.2.c. Aids to Navigation

There are no Aids to Navigation within the limits of H11691.³¹

D.2.d. Overhead Features

There are no overhead features within the limits of survey H11691.³²

D.2.e. Submarine Cables and Pipelines

There are no submarine cables or pipelines charted within the limits of H11691, and none were detected by the survey.³³

D.2.f. Ferry Routes

There are no ferry routes charted within the limits of survey H11691, and none were observed to be operating in the area.³⁴

D.2.g. Bottom Samples

A total of twenty-five (25) bottom samples were collected within the limits of survey H11691 in accordance with the Field Procedures Manual. Four (4) samples were taken in potential anchorage areas not previously sampled, and the rest were taken in previously sampled locations. Five (5) samples were significantly different than charted bottom types, Sixteen (16) samples were close to or the same as charted bottom types.³⁵

D.2.h. Other Findings



There were no other findings within this survey.

E. APPROVAL

As Chief of Party, Field operations for hydrographic survey H11691 were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports. The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual (April 2007 edition), Field Procedures Manual (March 2007 edition), Standing and Letter Instructions, and all HSD Technical Directives issued through July 2007. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required. All data and reports are respectfully submitted to N/CS34, Pacific Hydrographic Branch.



Listed below are supplemental reports submitted separately that contain additional information relevant to this survey:

<u>Title</u>	<u>Date Sent</u>	<u>Office</u>
Data Acquisition and Processing Report for OPR-O190-RA-07	April 4, 2008	N/CS34
Coast Pilot Report for OPR-O190-RA-07	TBD	N/CS26


Approved and Forwarded:   Digitally signed by Donald W. Haines, CDR/NOAA
 DN: cn=Donald W. Haines, CDR/NOAA, c=US, o=NOAA/NMAD/MOC-P, ou=NOAA Ship RAINIER, email=cc.nhaines@noaa.gov
 Reason: I am approving this document for CDR Noll
 Date: 2008.04.11 19:04:15 -07'00'

Guy T. Noll
 Commander, NOAA
 Commanding Officer



In addition, the following individuals were also responsible for overseeing data acquisition and processing of this survey:

Survey Sheet Manager:   Digitally signed by Meghan McGovern
 DN: cn=Meghan McGovern, c=US, o=NOAA, ou=NOAA Ship RAINIER, email=meghan.mcgowern@noaa.gov
 Reason: I am the author of this document
 Date: 2008.04.11 16:53:14 Z

Meghan E. McGovern
 Lieutenant Junior Grade, NOAA

Chief Survey Technician:  James B Jacobson
 I have reviewed this document
 2008.04.11 16:55:48 Z

James B. Jacobson
 Chief Survey Technician, NOAA Ship RAINIER

Field Operations Officer:   Digitally signed by Charles Yoos
 I have reviewed this document
 2008.04.11 10:50:44 -07'00'

Charles Yoos
 Lieutenant, NOAA

Revisions Compiled During Office Processing and Certification

¹ This survey was compiled with shoreline from Fairweather survey H11576. Survey H11576 was canceled and compilation of data from the survey is included in Rainier HCell H11691. All data from H11576 is attributed with the original SORDAT. The SORIND was changed to reflect survey H11691.

² Filed with project records

³ Concur

⁴ Concur

⁵ Concur

⁶ Concur

⁷ Concur

⁸ Concur

⁹ In areas with both lidar and SWMB coverage the compiler generally used SWMB data for sounding selection. Lidar data was used to update heights on rocks and islets and to add significant features as scale allowed. The lidar data was not used to disprove charted features. Charted features in the lidar area were retained.

¹⁰ The reviewer modified finalized resolutions for BASE surfaces in an effort to minimize holidays. In areas where holidays were still present, the compiler retained all charted features and soundings.

¹¹ Retain all charted kelp symbols and areas.

¹² Concur

¹³ C3D data was not included in the office generation BASE surfaces.

¹⁴ Do not concur. As the system is still in an experimental status and its bathymetry has not been shown to meet NOAA standards, C3D depth data included with the survey records is for evaluation purposes only and was not used to create office generated BASE surfaces.

¹⁵ See note 14.

¹⁶ See note 9.

¹⁷ Reviewer modified the finalized resolutions in an effort to minimize holidays due to line spacing. This included extending the range of the 1m surface to include depths of 0-16m submitted as a 0.5m surface as the 1m surface adequately represents all features. See list of finalized surfaces on page 6 below.

¹⁸ Filed with Project Records.

¹⁹ See attached tide note dated October 4, 2007.

²⁰ H11692 was compared to chart 17404, 14th edition, October 2008.

²¹ Concur

²² Concur

²³ Concur

²⁴ Concur

²⁵ See attached Danger to Navigation report.

²⁶ Concur

²⁷ The Survey Feature Report is filed with the hydrographic records. Note: the survey feature report does not include all features from H11691. Additional features were added, some removed, and some modified in CARIS Notebook after the feature report was generated from Pydro. All features included in the compilation of H11692 have come directly from CARIS Notebook, which is the official features deliverable for this survey.

²⁸ In 2006 Fairweather conducted shoreline verification in the area encompassed by survey H11691 and submitted results under survey H11576. During survey H11691, Rainier investigated features submitted by the Fairweather for further investigation, as well as charted and LIDAR features. As survey H11576 is not being compiled separately, features from survey H11576 are compiled into HCell H11691. The SORIND for all features, including those from H11576, is attributed with survey H11691 while the SORDAT is retained for features from survey H11576 allowing these features to be filtered by date. Also see note 9.

²⁹ Retain all rocks and islets unless otherwise noted in HCell.

³⁰ Concur

³¹ Concur

³² Concur

³³ Concur

³⁴ Concur

³⁵ 49 charted bottom samples were retained in HCell H11691 and 18 bottom samples were imported from the survey.

Descriptive Report to Accompany Hydrographic Survey H11576¹

Project OPR-O190-FA
West of Prince of Wales Island, Alaska

Scale 1:10,000

April 2006

NOAA Ship FAIRWEATHER

Chief of Party: Captain John E. Lowell, Jr., NOAA

A. AREA SURVEYED

The survey area was located in West of Prince of Wales Island, within the sub-locality of Vicinity of Maurelle Islands. This survey corresponds to Sheet C in the sheet layout provided with the Letter Instructions, as shown in Figure 1 below. The survey area is bounded on the Southwest corner at 55°33'00"N, 133°47'00"W and the Northeast corner at 55°45'00"N, 133°28'00"W. Due to equipment difficulties MBES data was not acquired on Sheet C. Shoreline data acquisition was conducted from April 30 to May 16, 2006 (DN120 to DN136).

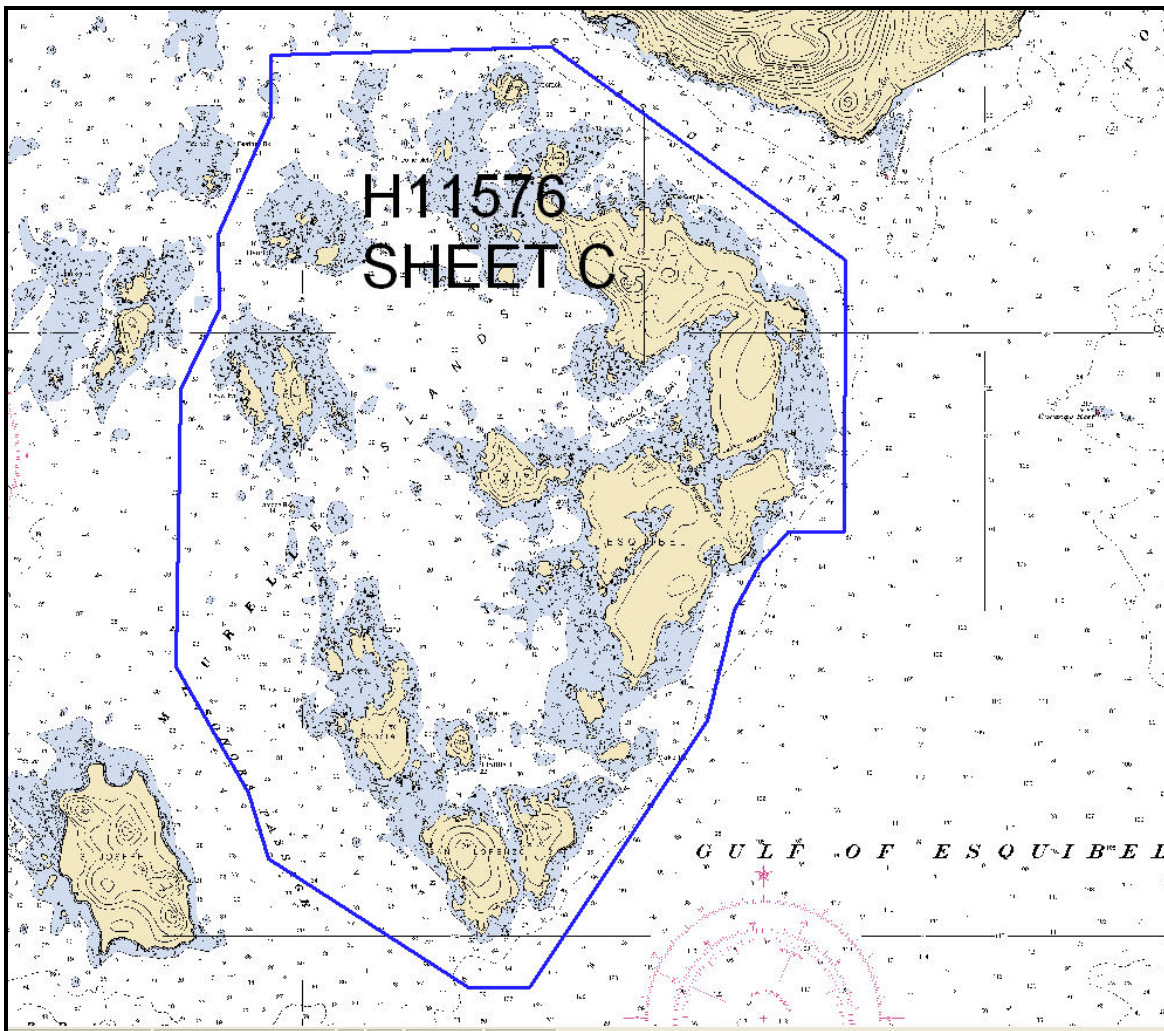


Figure 1: H11576 Survey Limits

Shoreline data were acquired for H11576. These data were attributed as S-57 objects for submittal.

B. DATA ACQUISITION AND PROCESSING

A complete description of data acquisition/processing systems and survey vessels can be found in the *NOAA Ship FAIRWEATHER Hydrographic Systems Readiness Report 2006*², submitted under a separate cover. Quality control procedures and data processing methods are listed and described in the *OPR-O190-FA-06 Data Acquisition and Processing Report (DAPR)*³, submitted under separate cover. Items specific to this survey and any deviations from the aforementioned report are discussed in the following sections.

B1. Equipment and Vessels

Equipment and vessels used for data acquisition and survey operations during this survey are listed below in Table 1.

	MonArk	Ambar 700
Hull Registration Number	1706	2302
Builder	MonArk	Marine Silverships, Inc
Length Overall	17'	23'
Beam	7'	9' 4"
Draft, Maximum	1' 3"	1' 4"
Cruising Speed	20 knots	22 knots
Max Survey Speed		
Primary Echosounder		
Sound Velocity Equipment		
Attitude & Positioning Equipment		
Type of operations	Shoreline	Shoreline

Table 1: Vessel Inventory

B2. Quality Control

Junctions

Survey H11576 was conducted as a shoreline survey and a bathymetric junction comparison with other surveys was not possible.

Quality Control Checks

Data Quality Factors

UNUSUAL CONDITIONS

Due to equipment difficulty MBES was not acquired on Sheet C.

The raw data files for the shore line acquisition on May 1 (DN 121) Trimble 2 and May 13 (DN 133) Trimble 2 were lost. The exported files for both day are incorporated into the Pydro PSS session. On May 1 (DN 121) Trimble 2 DP number 21213 (a charted rock disproval) did not show up in Pydro and without the raw data files can not be reproduced. The location DP number 21213 is 55°35.04' N latitude, 133°36.99' W longitude. The Hydrographer recommends MBES be used to disprove this charted rock. The figure below depicts its proximity to other features in the area.⁴

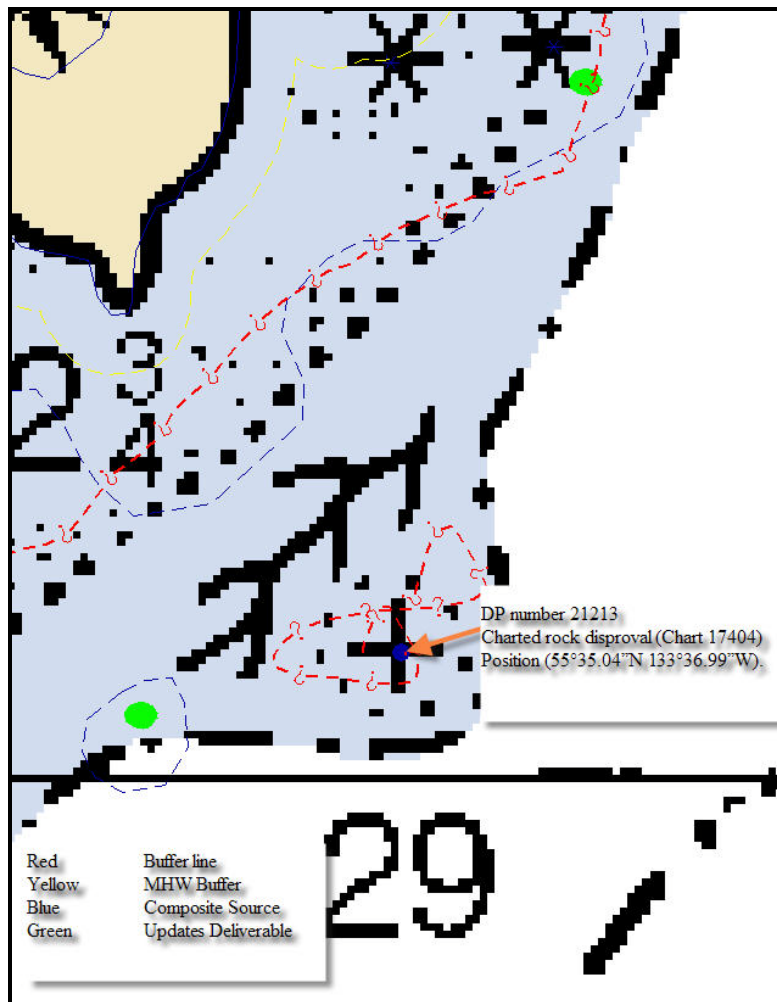


Figure 2: H11576 proposed charted rock MBES disproval

Accuracy Standards

All data meet the data accuracy specifications as stated in the *NOS Hydrographic Surveys Specifications and Deliverables(HSSD)*, dated March 2003.⁵

C. HORIZONTAL AND VERTICAL CONTROL

A complete description of horizontal and vertical control for survey H11576 can be found in the *OPR-O190-FA-06 Horizontal and Vertical Control Report*,⁶ submitted under separate cover. A summary of horizontal and vertical control for this survey follows.

Horizontal Control

The horizontal datum for this project is the North American Datum of 1983 (NAD83). Differential GPS (DGPS) was the sole method of positioning. Differential corrections came from the U.S. Coast Guard beacons at Annette Island (323kHz) and Level Island (295 kHz).

Distances from the U.S. Coast Guard beacons combined with fjord-like topography created weak signal to noise ratios for the DGPS corrections within the project area. Occasionally the corrector signal from a beacon would be lost. When that occurred a launch would move away from the shoreline to re-acquire the signal or switch to another corrector station. Data affected by this issue has been reviewed and it meets the horizontal accuracy required by the *HSSD*.

Vertical Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) primary tide station at Sitka, AK (945-1600) served as control for datum determination and as the primary source for water level reducers for survey H11576.

FAIRWEATHER personnel installed one Sutron 8210 “bubbler” tide gauge at the tertiary station listed below. Gauge #15 (S/N 97038) was the gauge installed. The gauge was installed in order to provide information to Center for Operational Oceanographic Products and Services (CO-OPS N/OPS1) for the determination of time and height correctors, in accordance with the Project Instructions.

Station Name	Station Number	Type of Gauge	Date of Installation	Date of Removal
Steamboat Bay, AK	945-0578	Tertiary 30 Day	April 28, 2006	May 25, 2006

A request for delivery of approved water level data (smooth tides) for survey H11576 was forwarded to N/OPS1 on May 28, 2006 in accordance with the *Preliminary Field Procedures Manual v1.1(FPM)*, dated March 2005. A copy of the request is included in Appendix III⁷.

All data were reduced to MLLW using predicted water levels with preliminary zoning downloaded from the CO-OPS website for station Sitka, AK by applying tide file 9451600.tid and time and height

correctors through the preliminary zone corrector file O190FA2006CORP.zdf.

The Pacific Hydrographic Branch will apply final approved water levels (smooth tides) to the survey data during final processing. A request for delivery of final approved water level data (smooth tides) for survey H11576 was forwarded to N/OPS1 on May 28, 2006 in accordance with the *Preliminary Field Procedures Manual v1.1(FPM)*, dated December, 2005. A copy of the request is included in Appendix V⁸.

D. RESULTS AND RECOMMENDATIONS

D.1 Chart Comparison

Survey H11576 was conducted as a shoreline survey and did not require a bathymetric chart comparison. The shoreline comparison of the chart 17404 was completed by digitized the chart in Caris Notebook into the hob file named H11576_Composite_Source.hob. All recommendations by the hydrographer for features on chart 17404 are noted in the Caris Notebook section. The features that the hydrographer recommends to be deleted are in the hob file named H11576_Updates_Deliverable.hob.

Automated Wreck and Obstruction Information System (AWOIS) Investigations

There were no AWOIS items located within the limits of H11576.⁹

Dangers to Navigation

There were no dangers to navigation found within the survey limits.¹⁰

D.2 Additional Results

Shoreline Source

Source shoreline for this sheet was taken from photogrammetric survey AK0201 (NAD 83) GC-10558 at the scale of 1:20,000. The CFF shoreline was imported into CARIS Notebook 2.2 as an editable layer named H11576_Composite_Source.hob, with all objects having S57 attribution. In addition, features from the current editions of charts 17400 and 17404 that were not depicted by the source shoreline data were also digitized into CARIS Notebook attributed with S57 into the H11576_Composite_Source.hob file.

Lidar features that were defined as source shoreline were imported into CARIS Notebook and added to the H11576_Composite_Source.hob. Chart Evaluation File (CEF) investigation items were imported into CARIS Notebook as a .HOB file to be used for reference, not for verification.

Shoreline Verification

FAIRWEATHER personnel conducted limited shoreline verification at times near predicted low water, in accordance with the Standing Project Instructions. Detached positions (DPs) and generic positions (GPs) acquired during shoreline verification were recorded in TerraSync and on paper DP forms. Scanned

copies of the DP forms are included in the digital Separates folder and hard copies can be found with the *Separates to be Included with Survey Data*. In addition, annotations describing shoreline were recorded on hard copy plots of the digital shoreline.¹¹

Shoreline Data Processing

Positions acquired during shoreline verification operations were processed in GPS Pathfinder Office and inserted into Pydro using the Generic GPs/DPs Import tool. Features were entered as Detached Positions (DPs) when tide correctors were required, while Generic Positions (GPs) were used if no tide correction was needed. The DPs and GPs indicate new features, revisions to features, or features not found during shoreline verification. A Carto Action of Add, Modify, Delete, or None was assigned to each item in Pydro, and all features were S57 attributed.

All accepted and primary detached and generic positions were imported from the Pydro .xml to two .hob files in CARIS Notebook 2.2. These were named H11576_Updates_Deliverable.hob, and H11576_Disprovals_Deliverable.hob.

Source Shoreline Changes, New Features and Charted Features

Items for survey H11576 associated with a detached or generic position that needed further discussion were flagged Report in Pydro. Investigation or survey methods were listed under the Remarks tab and, when appropriate, recommendations to the cartographer were included in the Recommendations tab. A survey feature report for shoreline items was generated and included as H11576_Features.pdf in Appendix II.¹²

Two additional .hob layers, named H11576_Updates_Deliverable.hob, and H11576_Disprovals_Deliverable.hob, were created in CARIS Notebook for features with and without associated DPs. New items were digitized to the Update layer, while existing features from the CFF and chart were transferred to the Disprovals layers, depending on the cartographic action deemed appropriate by the Hydrographer. Features to be retained as depicted by the source shoreline file were left in the H11576_Composite_Source.hob file. Field notes made by the Hydrographer on the boat sheets and DP forms were transferred to the remarks field for each feature.¹³

Shoreline Recommendations

The Hydrographer recommends that the shoreline depicted in the CARIS Notebook files supersede and complement shoreline information compiled on the CFF, charts and Lidar.¹⁴

Aids to Navigation

There were no aids to navigation within the survey limits.¹⁵

Bottom Samples

There were no bottom samples taken within the survey limits.¹⁶

Additional Recommendations

Due to equipment difficulty MBES was not acquired on Sheet C. In Caris Notebook a hob file was created named H11576_Investigation_Items.hob that indicates areas where MBES will be required to disprove of Lidar, CFF, and charted features.

In addition MBES should also be acquired over DP number 21213 charted rock disapproval position (55°35.04'N latitude, 133°36.99' W longitude) to satisfy data acquisition requirements for a charted rock disapproval.¹⁷

E. Supplemental Reports

Listed below are supplemental reports submitted separately that contain additional information relevant to this survey:

<u>Title</u>	<u>Date Sent</u>	<u>Office</u>
Hydrographic Systems Readiness Report 2006	April 18, 2006	N/CS34
OPR-O190-FA-06 Data Acquisition and Processing Report	July 23, 2006	N/CS34
OPR-O190-FA-06 Horizontal & Vertical Control Report	June 5, 2006	N/CS34, N/OPS1

Revisions Compiled During Office Processing and Certification

¹ Survey H11576 was canceled and compilation of data from the survey is included in Rainier HCell H11691. All data from H11576 is attributed with the original SORDAT. The SORIND was changed to reflect survey H11691. The Descriptive report is being included and endnoted for reference.

² Filed with Project Records

³ Filed with Project Records

⁴ Rock disproved using SWMB during survey H11691.

⁵ Concur

⁶ Filed with Project Records.

⁷ Filed with Hydrographic Records in Appendix IV.

⁸ Filed with Hydrographic Records in Appendix IV.

⁹ Concur

¹⁰ Concur

¹¹ Filed with Hydrographic Records.

¹² Filed with Hydrographic Records.

¹³ Filed with Hydrographic Records.

¹⁴ Concur

¹⁵ Concur

¹⁶ Concur. See note 33 in the H11691 DR for bottom sample information.

¹⁷ See note 4.

H11691 DTON Report

Registry Number: H11691
State: Alaska
Locality: West of Prince Wales Island
Sub-locality: Vicinity of Maurelle Islands
Project Number: OPR-O190-RA-07
Survey Dates: 05/15/2007 - 07/28/2007

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
17404	13th	05/01/2006	1:40,000 (17404_1)	[L]NTM: ?
17400	16th	06/02/2001	1:229,376 (17400_1)	[L]NTM: ?
16016	20th	11/01/2003	1:969,756 (16016_1)	[L]NTM: ?
531	23rd	01/01/2006	1:2,100,000 (531_1)	[L]NTM: ?
500	8th	06/01/2003	1:3,500,000 (500_1)	[L]NTM: ?
530	31st	06/01/2005	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	Shoal	6.91 m	55° 38' 45.3" N	133° 40' 05.8" W	---
1.2	Shoal	9.61 m	55° 38' 09.2" N	133° 37' 33.6" W	---
1.3	Shoal	2.77 m	55° 38' 51.7" N	133° 40' 54.0" W	---
1.4	Shoal	4.14 m	55° 38' 30.0" N	133° 40' 26.1" W	---
1.5	Rock	2.55 m	55° 38' 02.7" N	133° 40' 20.9" W	---
1.6	Shoal	8.07 m	55° 38' 14.6" N	133° 40' 28.9" W	---
1.7	Shoal	10.88 m	55° 39' 20.6" N	133° 36' 46.7" W	---
1.8	Shoal	12.03 m	55° 39' 09.1" N	133° 38' 29.2" W	---
1.9	Shoal	9.77 m	55° 38' 27.6" N	133° 38' 15.6" W	---
1.10	Shoal	5.32 m	55° 37' 02.8" N	133° 39' 36.5" W	---
1.11	Shoal	11.59 m	55° 35' 45.3" N	133° 39' 12.2" W	---

1.12	Shoal	4.04 m	55° 39' 55.2" N	133° 41' 10.9" W	---
1.13	Shoal	3.07 m	55° 39' 04.2" N	133° 40' 43.3" W	---
1.14	Shoal	15.02 m	55° 37' 50.8" N	133° 33' 38.4" W	---
1.15	Rock	1.27 m	55° 35' 44.4" N	133° 38' 33.7" W	---
1.16	Rock	1.63 m	55° 35' 33.5" N	133° 36' 53.5" W	---
1.17	Rock	2.43 m	55° 35' 58.3" N	133° 38' 41.5" W	---

1 - Danger To Navigation

1.1) Profile/Beam - 142/7 from h11691 / 1006_reson8101_hvf / 2007-143 / 2483**DANGER TO NAVIGATION****Survey Summary**

Survey Position: 55° 38' 45.3" N, 133° 40' 05.8" W
Least Depth: 6.91 m (= 22.68 ft = 3.780 fm = 3 fm 4.68 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp: 2007-143.17:37:13.494 (05/23/2007)
Survey Line: h11691 / 1006_reson8101_hvf / 2007-143 / 2483
Profile/Beam: 142/7
Charts Affected: 17404_1, 17400_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

DTON MBES LD 3.9 ftm sndg in CHD (17404) 13 ftm sndg.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11691/1006_reson8101_hvf/2007-143/2483	142/7	0.00	000.0	Primary

Hydrographer Recommendations

Chart (17404) new sndg.

Cartographically-Rounded Depth (Affected Charts):

3 ¾fm (17404_1, 17400_1, 16016_1, 530_1)

3fm 4ft (531_1)

6.9m (500_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: QUASOU - 6:least depth known
 TECSOU - 3:found by multi-beam

Office Notes

DTON sounding was changed to a submerged rock in HCell with a VALSOU of 3.8 fathoms.

Feature Images

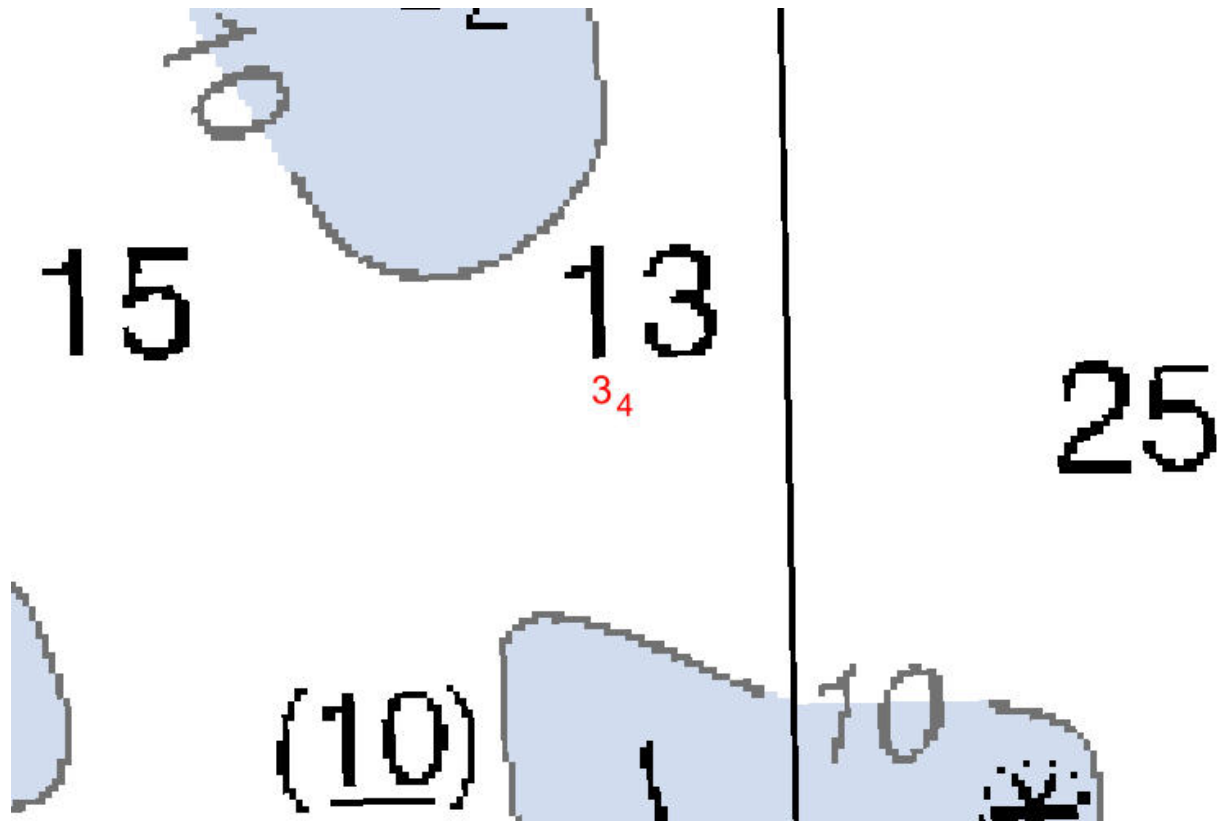


Figure 1.1.1

1.2) Profile/Beam - 1031/98 from h11691 / 1006_reson8101_hvf / 2007-155 / 464_2301

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 38' 09.2" N, 133° 37' 33.6" W
Least Depth: 9.61 m (= 31.53 ft = 5.255 fm = 5 fm 1.53 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** [None]; **TVU (TPEv)** [None]
Timestamp: 2007-155.23:04:55.789 (06/04/2007)
Survey Line: h11691 / 1006_reson8101_hvf / 2007-155 / 464_2301
Profile/Beam: 1031/98
Charts Affected: 17404_1, 17400_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

DTON MBES LD 5.4 ftm sndg in CHD (17404) 13 ftm.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11691/1006_reson8101_hvf/2007-155/464_2301	1031/98	0.00	000.0	Primary

Hydrographer Recommendations

Chart (17404) new sounding

Cartographically-Rounded Depth (Affected Charts):

5 ¼fm (17404_1, 17400_1, 16016_1, 530_1)

5fm 1ft (531_1)

9.6m (500_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: QUASOU - 6:least depth known
 TECSOU - 3:found by multi-beam

Office Notes

DTON sounding was changed to a submerged rock in HCell with a VALSOU of 5.3 fathoms.

Feature Images

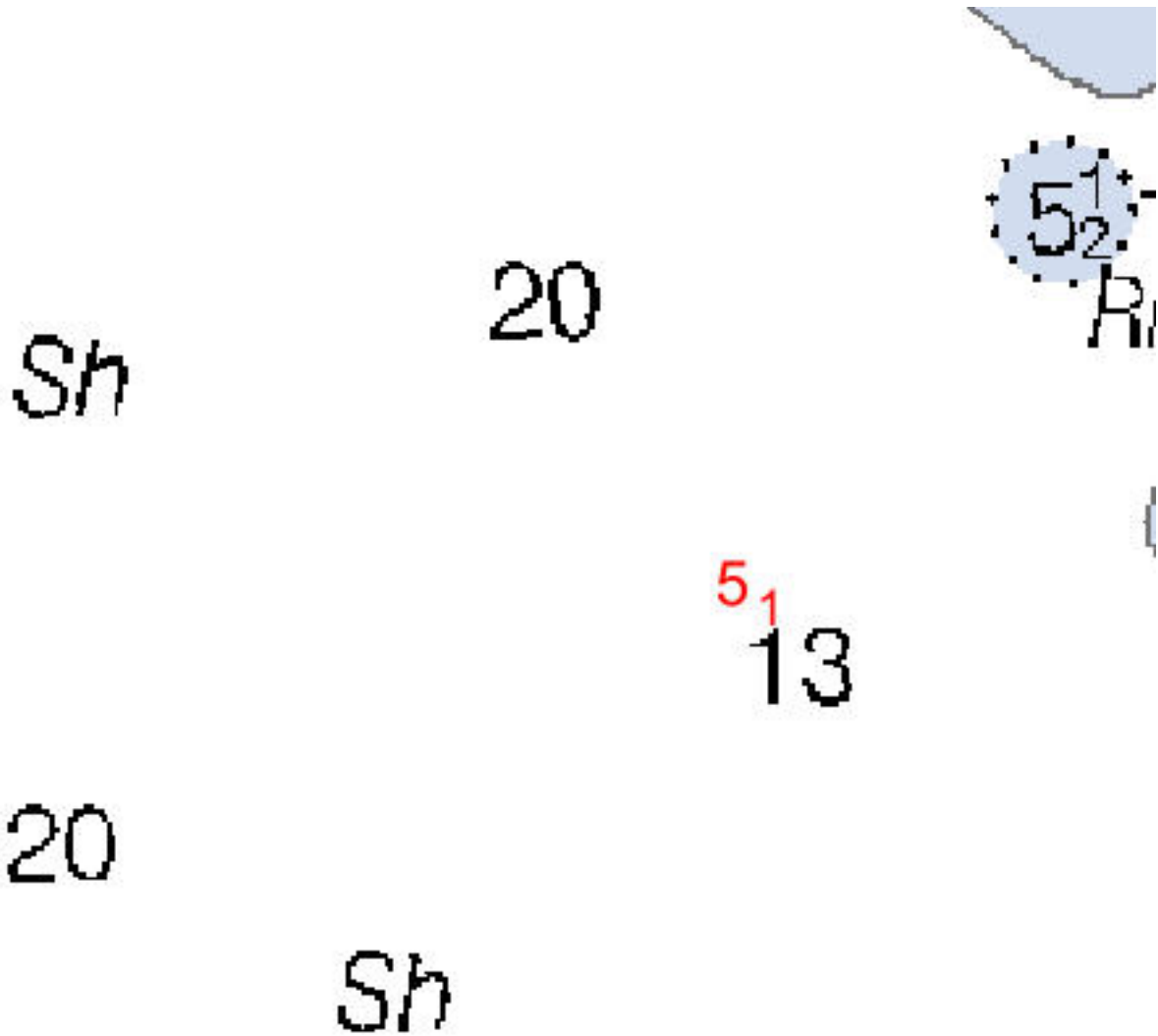


Figure 1.2.1

1.3) Profile/Beam - 3019/1 from h11691 / 1016_reson8125_hvf / 2007-135 / 416_2058

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 38' 51.7" N, 133° 40' 54.0" W
Least Depth: 2.77 m (= 9.08 ft = 1.514 fm = 1 fm 3.08 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** [None]; **TVU (TPEv)** [None]
Timestamp: 2007-135.21:12:11.741 (05/15/2007)
Survey Line: h11691 / 1016_reson8125_hvf / 2007-135 / 416_2058
Profile/Beam: 3019/1
Charts Affected: 17404_1, 17400_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

DTON MBES LD 1.5 ftm sndg in CHD (17404) 5.5 ftm.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11691/1016_reson8125_hvf/2007-135/416_2058	3019/1	0.00	000.0	Primary

Hydrographer Recommendations

Chart (17404) new sndg

Cartographically-Rounded Depth (Affected Charts):

1 ½fm (17404_1, 17400_1, 16016_1, 530_1)

1fm 3ft (531_1)

2.8m (500_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)

Attributes: TECSOU - 3:found by multi-beam

Office Notes

DTON sounding was changed to a submerged rock in HCell with a VALSOU of 1.5 fathoms.

Feature Images



Figure 1.3.1

1.4) Profile/Beam - 2353/139 from h11691 / 1016_reson8125_hvf / 2007-135 / 418_2148

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 38' 30.0" N, 133° 40' 26.1" W
Least Depth: 4.14 m (= 13.59 ft = 2.264 fm = 2 fm 1.59 ft)
TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp: 2007-135.21:59:38.719 (05/15/2007)
Survey Line: h11691 / 1016_reson8125_hvf / 2007-135 / 418_2148
Profile/Beam: 2353/139
Charts Affected: 17404_1, 17400_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

DTON MBES LD 2.3 ftm sndg in CHD (17404) 14 ftm.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11691/1016_reson8125_hvf/2007-135/418_2148	2353/139	0.00	000.0	Primary

Hydrographer Recommendations

Chart (17404) new sndg

Cartographically-Rounded Depth (Affected Charts):

2 ¼fm (17404_1, 17400_1, 16016_1, 530_1)
 2fm 1ft (531_1)
 4.1m (500_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: TECSOU - 3:found by multi-beam

Office Notes

DTON sounding was changed to a submerged rock in HCell with a VALSOU of 2.3 fathoms.

Feature Images

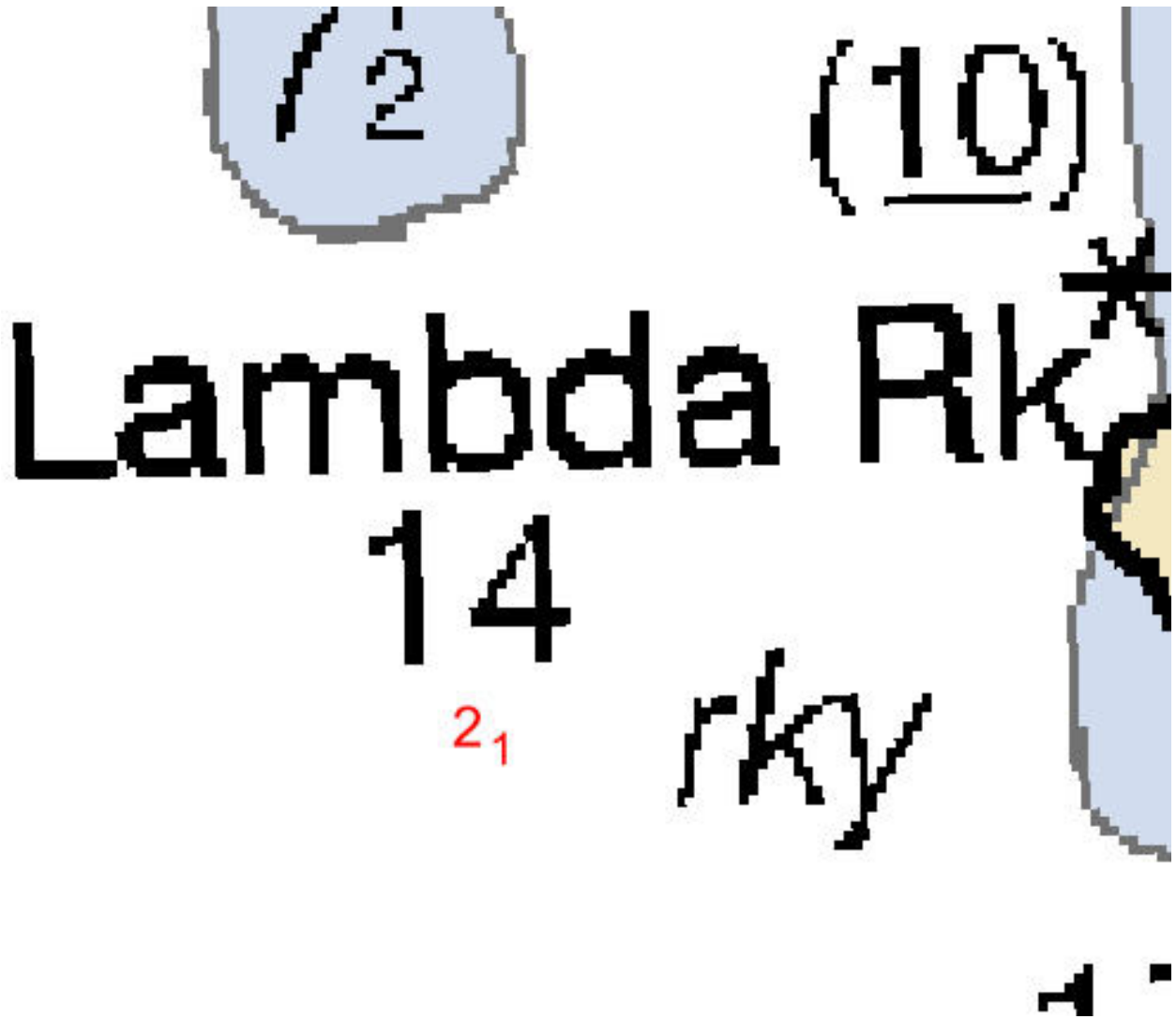


Figure 1.4.1

1.5) Profile/Beam - 2073/74 from h11691 / 1016_reson8125_hvf / 2007-135 / 419_2203

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 38' 02.7" N, 133° 40' 20.9" W
Least Depth: 2.55 m (= 8.37 ft = 1.394 fm = 1 fm 2.37 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** [None]; **TVU (TPEv)** [None]
Timestamp: 2007-135.22:10:32.192 (05/15/2007)
Survey Line: h11691 / 1016_reson8125_hvf / 2007-135 / 419_2203
Profile/Beam: 2073/74
Charts Affected: 17404_1, 17400_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

DTON MBES LD 1.4 ftm RK over CHD (17404) 5.25 ftm RK.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11691/1016_reson8125_hvf/2007-135/419_2203	2073/74	0.00	000.0	Primary

Hydrographer Recommendations

Chart (17404) new LD RK.

Cartographically-Rounded Depth (Affected Charts):

1 ¼fm (17404_1, 17400_1, 16016_1, 530_1)
 1fm 2ft (531_1)
 2.6m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: VALSOU - 2.550 m

Office Notes

DTON sounding was changed to a submerged rock in HCell with a VALSOU of 1.4 fathoms.

Feature Images

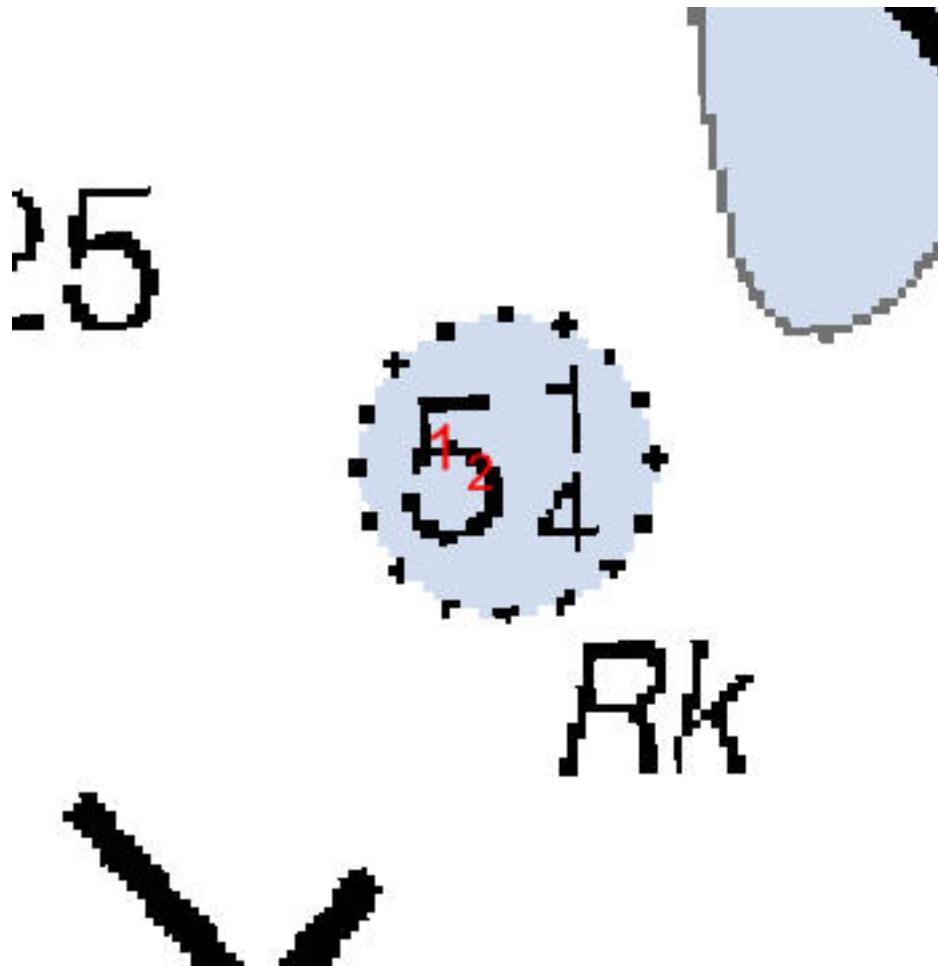


Figure 1.5.1

1.6) Profile/Beam - 130/2 from h11691 / 1016_reson8125_hvf / 2007-156 / 2235**DANGER TO NAVIGATION****Survey Summary**

Survey Position: 55° 38' 14.6" N, 133° 40' 28.9" W
Least Depth: 8.07 m (= 26.48 ft = 4.413 fm = 4 fm 2.48 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp: 2007-156.17:50:31.699 (06/05/2007)
Survey Line: h11691 / 1016_reson8125_hvf / 2007-156 / 2235
Profile/Beam: 130/2
Charts Affected: 17404_1, 17400_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

DTON MBES LD 4.4 ftm sndg in CHD (17404) 20+ ftm.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11691/1016_reson8125_hvf/2007-156/2235	130/2	0.00	000.0	Primary

Hydrographer Recommendations

Chart (17404) new sndg

Cartographically-Rounded Depth (Affected Charts):

4 ¼fm (17404_1, 17400_1, 16016_1, 530_1)

4fm 2ft (531_1)

8.1m (500_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)

Attributes: TECSOU - 3:found by multi-beam

Office Notes

Concur with clarification. MB least depth is 1.4 fms. DTON sounding was changed to a submerged rock in HCell with a VALSOU of 4.4 fathoms.

Feature Images

22

4₂



Figure 1.6.1

1.7) Profile/Beam - 852/43 from h11691 / 1016_reson8125_hvf / 2007-158 / 431_2135

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 39' 20.6" N, 133° 36' 46.7" W
Least Depth: 10.88 m (= 35.68 ft = 5.947 fm = 5 fm 5.68 ft)
TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp: 2007-158.21:37:47.999 (06/07/2007)
Survey Line: h11691 / 1016_reson8125_hvf / 2007-158 / 431_2135
Profile/Beam: 852/43
Charts Affected: 17404_1, 17400_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

DTON MBES LD 5.9 fm sndg in CHD (17404) 12 fm.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11691/1016_reson8125_hvf/2007-158/431_2135	852/43	0.00	000.0	Primary

Hydrographer Recommendations

Chart (17404) new sndg.

Cartographically-Rounded Depth (Affected Charts):

6fm (17404_1, 17400_1, 16016_1, 530_1)
 5fm 5ft (531_1)
 10.9m (500_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: TECSOU - 3:found by multi-beam

Office Notes

DTON sounding was changed to a submerged rock in HCell with a VALSOU of 5.9 fathoms.

Feature Images



Figure 1.7.1

1.8) Profile/Beam - 404/228 from h11691 / 1016_reson8125_hvf / 2007-186 / 620_1726

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 39' 09.1" N, 133° 38' 29.2" W
Least Depth: 12.03 m (= 39.46 ft = 6.577 fm = 6 fm 3.46 ft)
TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp: 2007-186.17:27:35.591 (07/05/2007)
Survey Line: h11691 / 1016_reson8125_hvf / 2007-186 / 620_1726
Profile/Beam: 404/228
Charts Affected: 17404_1, 17400_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

DTON MBES LD 6.6 ftm sndg in CHD (17404) 11 ftm.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11691/1016_reson8125_hvf/2007-186/620_1726	404/228	0.00	000.0	Primary

Hydrographer Recommendations

Chart (17404) new sndg

Cartographically-Rounded Depth (Affected Charts):

6 ½fm (17404_1, 17400_1, 16016_1, 530_1)
 6fm 3ft (531_1)
 12.0m (500_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: TECSOU - 3:found by multi-beam

Office Notes

DTON sounding was changed to a submerged rock in HCell with a VALSOU of 6.6 fathoms.

Feature Images

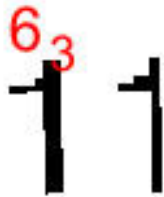


Figure 1.8.1

1.9) Profile/Beam - 176/32 from h11691 / 1016_reson8125_hvf / 2007-186 / 622_1649

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 38' 27.6" N, 133° 38' 15.6" W
Least Depth: 9.77 m (= 32.05 ft = 5.342 fm = 5 fm 2.05 ft)
TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp: 2007-186.16:49:52.964 (07/05/2007)
Survey Line: h11691 / 1016_reson8125_hvf / 2007-186 / 622_1649
Profile/Beam: 176/32
Charts Affected: 17404_1, 17400_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

DTON MBES LD 5.5 ftm sndg in CHD (17404) 20+ ftm.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11691/1016_reson8125_hvf/2007-186/622_1649	176/32	0.00	000.0	Primary

Hydrographer Recommendations

Chart (17404) new sndg

Cartographically-Rounded Depth (Affected Charts):

5 ¼fm (17404_1, 17400_1, 16016_1, 530_1)
 5fm 2ft (531_1)
 9.8m (500_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)

Office Notes

Concur with clarification. MB least depth is 5.3 fathoms. DTON sounding was changed to a submerged rock in HCell with a VALSOU of 5.3 fathoms.

Feature Images

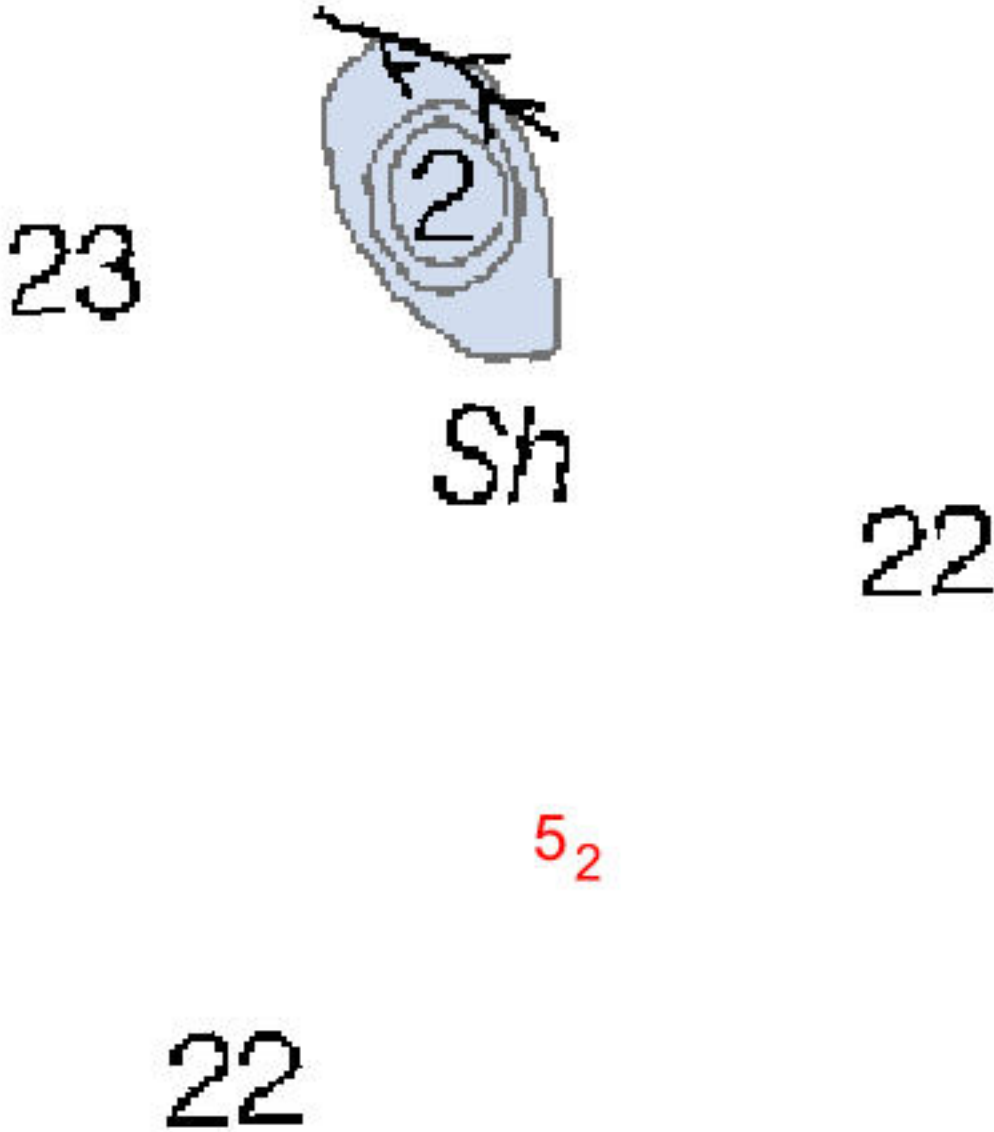


Figure 1.9.1

1.10) Profile/Beam - 840/5 from h11691 / 1016_reson8125_hvf / 2007-191 / 304_2156

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 37' 02.8" N, 133° 39' 36.5" W
Least Depth: 5.32 m (= 17.44 ft = 2.906 fm = 2 fm 5.44 ft)
TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp: 2007-191.21:59:30.397 (07/10/2007)
Survey Line: h11691 / 1016_reson8125_hvf / 2007-191 / 304_2156
Profile/Beam: 840/5
Charts Affected: 17404_1, 17400_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

DTON C3D LD 2.9 fm sndg in CHD (17404) 10 ftm.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11691/1016_reson8125_hvf/2007-191/304_2156	840/5	0.00	000.0	Primary

Hydrographer Recommendations

Chart (17404) new sndg

Cartographically-Rounded Depth (Affected Charts):

2 ¾fm (17404_1, 17400_1, 16016_1, 530_1)
 2fm 5ft (531_1)
 5.3m (500_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: QUASOU - 4:unreliable sounding
 TECSOU - 1:found by echo-sounder

Office Notes

Concur. Charted and bluenoted in HCell.

Feature Images

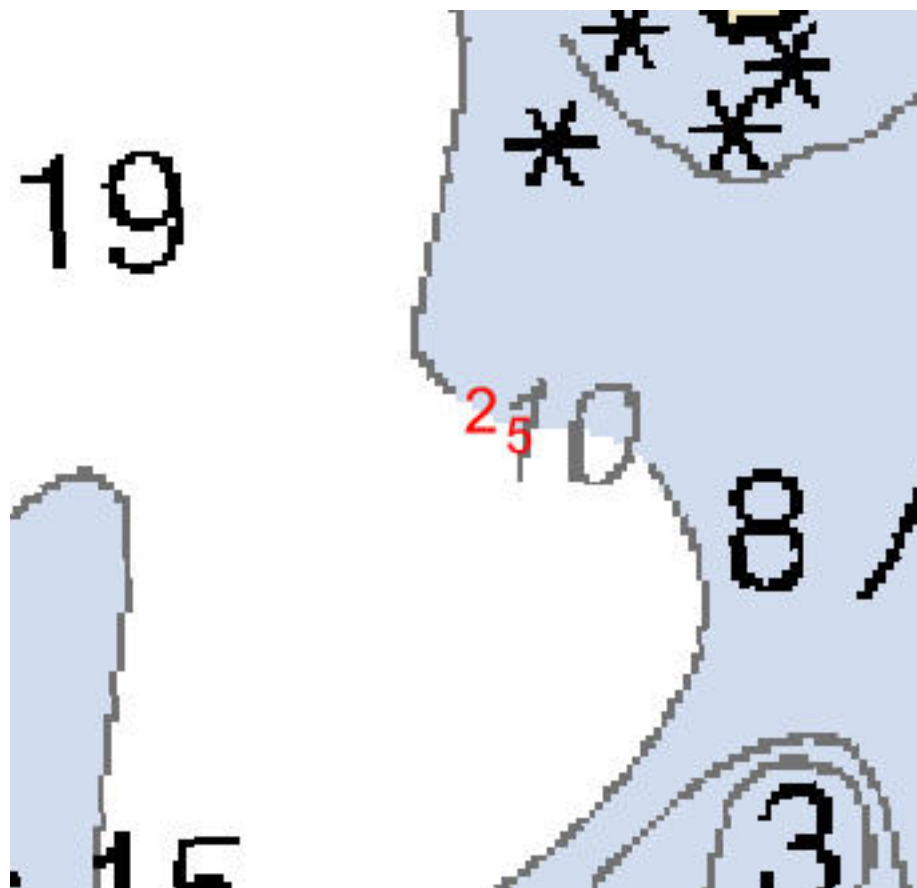


Figure 1.10.1

1.11) Profile/Beam - 411/194 from h11691 / 1016_reson8125_hvf / 2007-191 / 412_2110

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 35' 45.3" N, 133° 39' 12.2" W
Least Depth: 11.59 m (= 38.03 ft = 6.339 fm = 6 fm 2.03 ft)
TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp: 2007-191.21:11:40.883 (07/10/2007)
Survey Line: h11691 / 1016_reson8125_hvf / 2007-191 / 412_2110
Profile/Beam: 411/194
Charts Affected: 17404_1, 17400_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

DTON MBES LD 6.3 fm sndg in CHD (17404) 10 fm.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11691/1016_reson8125_hvf/2007-191/412_2110	411/194	0.00	000.0	Primary

Hydrographer Recommendations

Chart (17404) new sndg.

Cartographically-Rounded Depth (Affected Charts):

6 ¼fm (17404_1, 17400_1, 16016_1, 530_1)
 6fm 2ft (531_1)
 11.6m (500_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: TECSOU - 3:found by multi-beam

Office Notes

Concur. Charted and included in HCell.

Feature Images

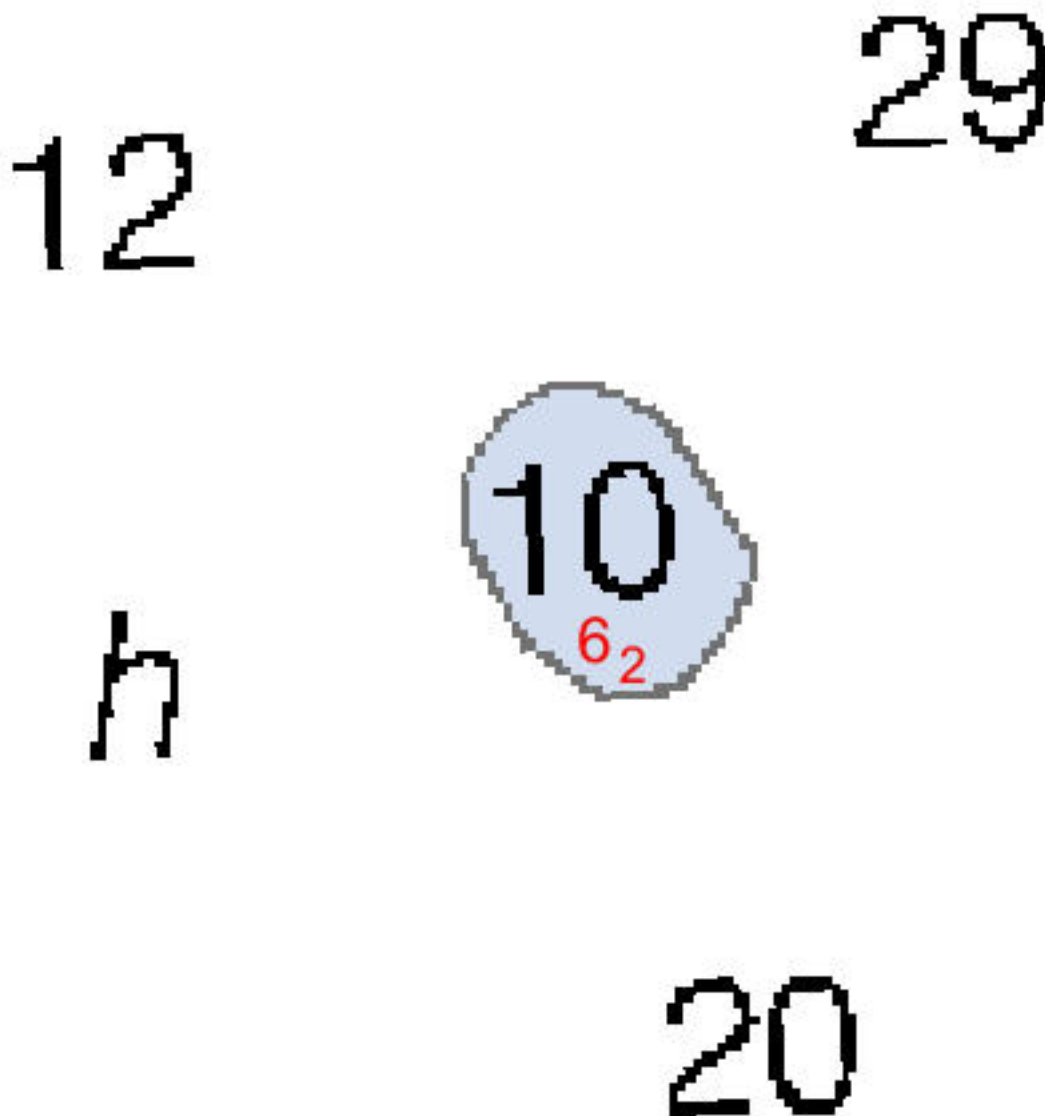


Figure 1.11.1

1.12) Profile/Beam - 1784/240 from h11691 / 1016_reson8125_hvf / 2007-205 / 809_1913

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 39' 55.2" N, 133° 41' 10.9" W
Least Depth: 4.04 m (= 13.26 ft = 2.210 fm = 2 fm 1.26 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** [None]; **TVU (TPEv)** [None]
Timestamp: 2007-205.19:17:28.545 (07/24/2007)
Survey Line: h11691 / 1016_reson8125_hvf / 2007-205 / 809_1913
Profile/Beam: 1784/240
Charts Affected: 17404_1, 17400_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

DTON MBES partial coverage LD 2.3 fm sndg seaward of CHD (17404) 10 fm contour.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11691/1016_reson8125_hvf/2007-205/809_1913	1784/240	0.00	000.0	Primary

Hydrographer Recommendations

Chart (17404) new sndg.

Cartographically-Rounded Depth (Affected Charts):

2 ¼fm (17404_1, 17400_1, 16016_1, 530_1)

2fm 1ft (531_1)

4.0m (500_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: QUASOU - 4:unreliable sounding
 TECSOU - 3:found by multi-beam

Office Notes

Concur. Charted and bluenoted in HCell

Feature Images

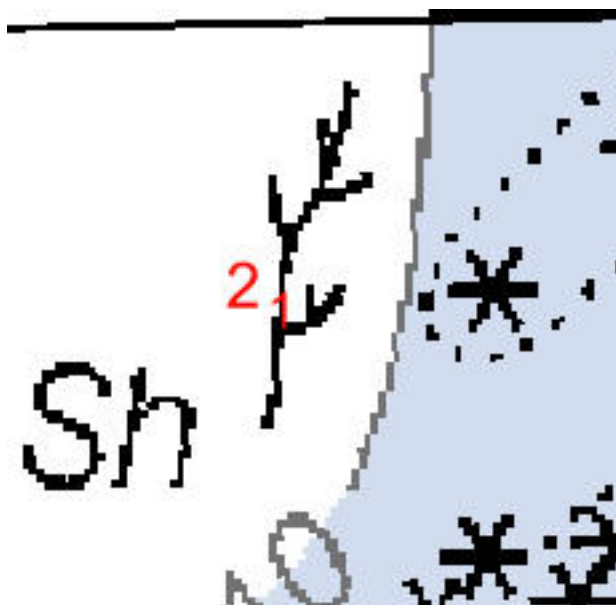


Figure 1.12.1

1.13) Profile/Beam - 1573/204 from h11691 / 1016_reson8125_hvf / 2007-205 / 834_1857

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 39' 04.2" N, 133° 40' 43.3" W
Least Depth: 3.07 m (= 10.06 ft = 1.677 fm = 1 fm 4.06 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** [None]; **TVU (TPEv)** [None]
Timestamp: 2007-205.19:00:09.736 (07/24/2007)
Survey Line: h11691 / 1016_reson8125_hvf / 2007-205 / 834_1857
Profile/Beam: 1573/204
Charts Affected: 17404_1, 17400_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

DTON MBES partial coverage LD 1.7 fm sndg seaward of CHD (17404) 10 fm contour.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11691/1016_reson8125_hvf/2007-205/834_1857	1573/204	0.00	000.0	Primary

Hydrographer Recommendations

Chart (17404) new sndg

Cartographically-Rounded Depth (Affected Charts):

1 ½fm (17404_1, 17400_1, 16016_1, 530_1)
 1fm 4ft (531_1)
 3.1m (500_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: TECSOU - 3:found by multi-beam

Office Notes

DTON sounding was changed to a submerged rock in HCell with a VALSOU of 1.7 fathoms.

Feature Images

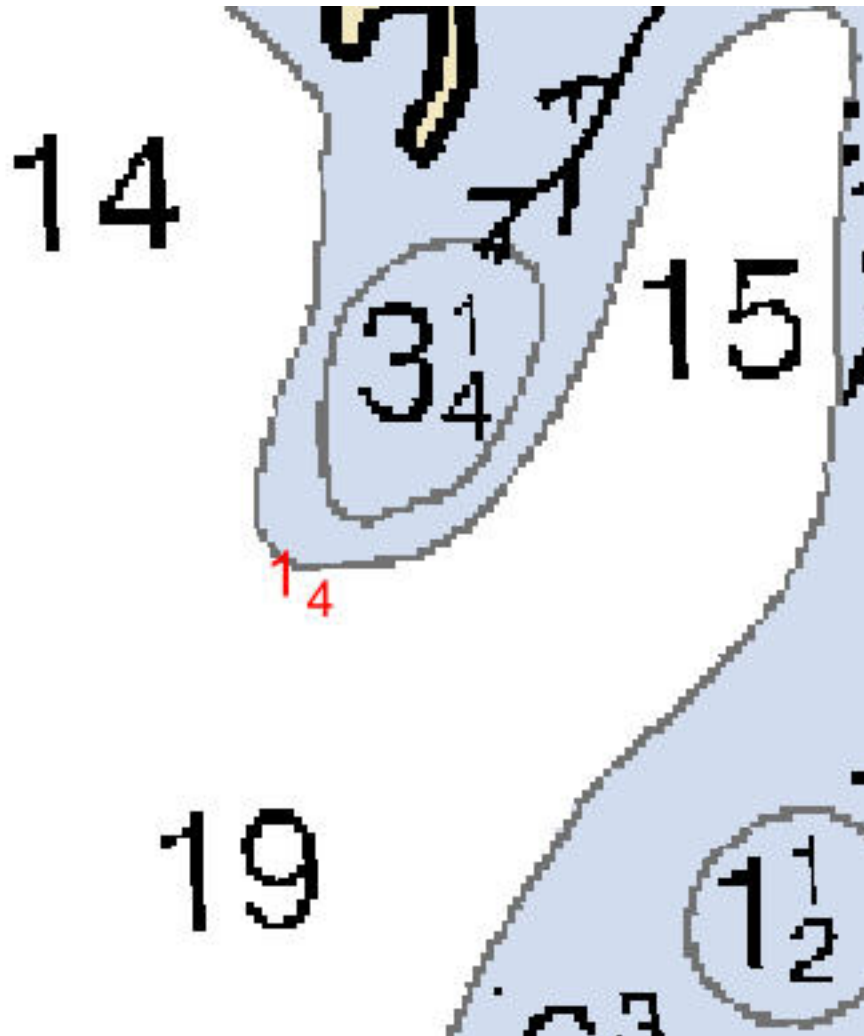


Figure 1.13.1

1.14) Profile/Beam - 210/211 from h11691 / 1016_reson8125_hvf / 2007-208 / 317_2253

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 37' 50.8" N, 133° 33' 38.4" W
Least Depth: 15.02 m (= 49.29 ft = 8.215 fm = 8 fm 1.29 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** [None]; **TVU (TPEv)** [None]
Timestamp: 2007-208.22:54:34.961 (07/27/2007)
Survey Line: h11691 / 1016_reson8125_hvf / 2007-208 / 317_2253
Profile/Beam: 210/211
Charts Affected: 17404_1, 17400_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

DTON MBES LD 8.3 fm sndg seaward of CHD (17404) 10 fm contour.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11691/1016_reson8125_hvf/2007-208/317_2253	210/211	0.00	000.0	Primary

Hydrographer Recommendations

Chart (17404) new sndg

Cartographically-Rounded Depth (Affected Charts):

8 ¼fm (17404_1, 17400_1, 16016_1, 530_1)

8fm 1ft (531_1)

15.0m (500_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)

Attributes: TECSOU - 3:found by multi-beam

Office Notes

Concur with clarification. MB least depth is 8.1 fathoms. DTON sounding was changed to a submerged rock in HCell with a VALSOU of 8.1 fathoms.

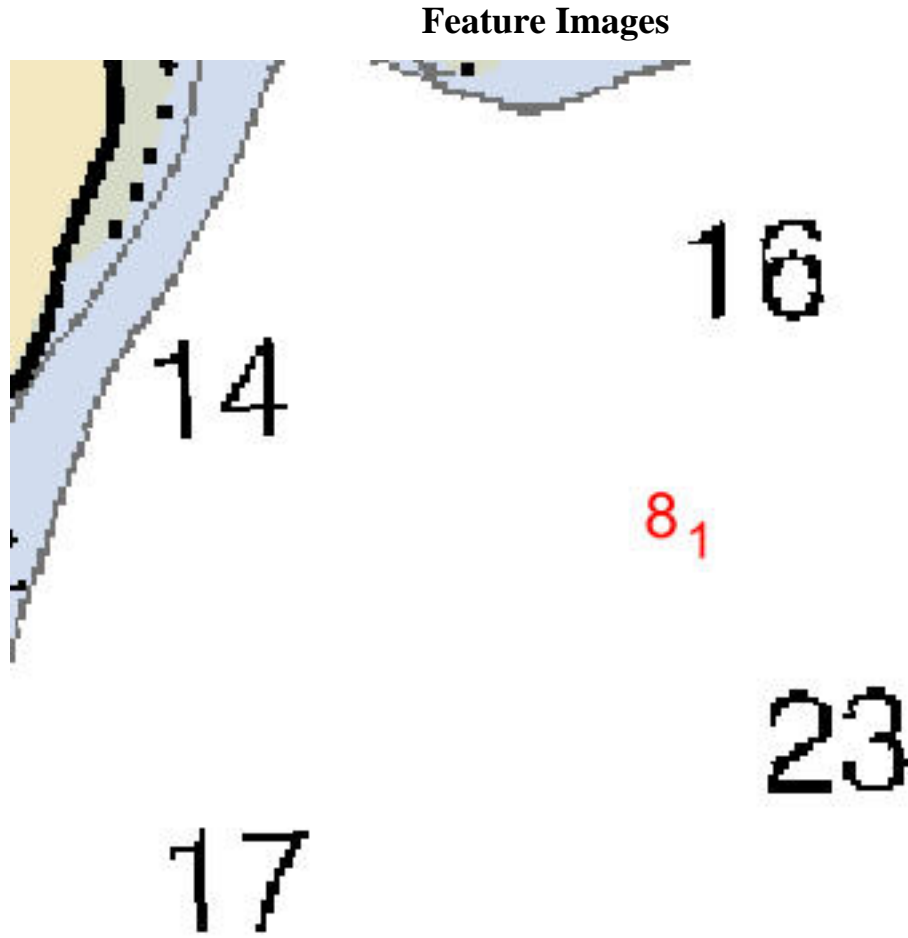


Figure 1.14.1

1.15) Profile/Beam - 347/101 from h11691 / 1021_reson8101_hvf / 2007-209 / 369_1721

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 35' 44.4" N, 133° 38' 33.7" W
Least Depth: 1.27 m (= 4.17 ft = 0.696 fm = 0 fm 4.17 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** [None]; **TVU (TPEv)** [None]
Timestamp: 2007-209.17:22:03.419 (07/28/2007)
Survey Line: h11691 / 1021_reson8101_hvf / 2007-209 / 369_1721
Profile/Beam: 347/101
Charts Affected: 17404_1, 17400_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

DTON MBES LD 0.69 ftm RK near CHD (17404) 6.5 ftm RK.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11691/1021_reson8101_hvf/2007-209/369_1721	347/101	0.00	000.0	Primary
h11691/1021_reson8101_hvf/2007-209/369_1721	355/8	7.84	188.4	Secondary

Hydrographer Recommendations

Chart (17404) new RK

Cartographically-Rounded Depth (Affected Charts):

0 $\frac{3}{4}$ fm (17404_1, 17400_1, 16016_1, 530_1)

0fm 4ft (531_1)

1.3m (500_1, 50_1)

S-57 Data

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

Attributes: VALSOU - 1.272 m

Office Notes

Concur. DTON sounding was changed to a submerged rock in HCell with a VALSOU of 0.618 fathoms.

Feature Images

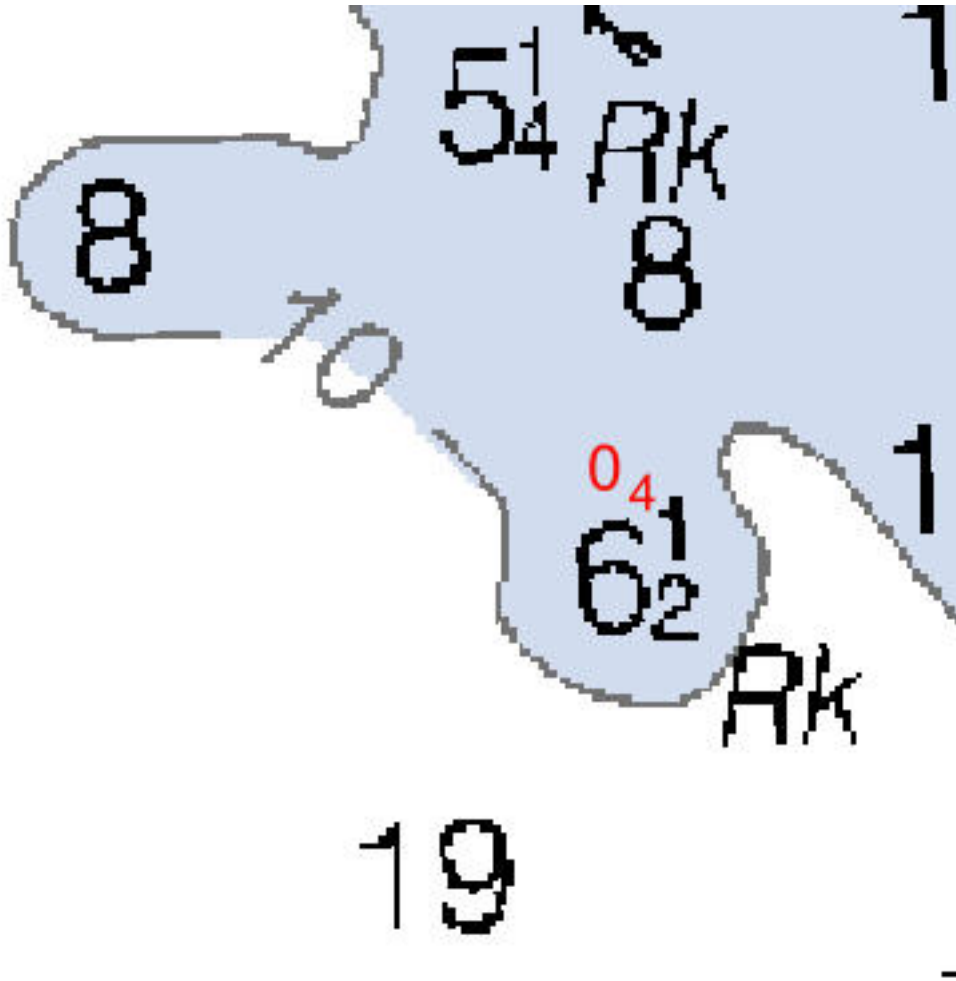


Figure 1.15.1

1.16) Profile/Beam - 1/1 from h11691 / dive / 2007-158 / dive#1**DANGER TO NAVIGATION****Survey Summary**

Survey Position: 55° 35' 33.5" N, 133° 36' 53.5" W
Least Depth: 1.63 m (= 5.34 ft = 0.891 fm = 0 fm 5.34 ft)
TPU ($\pm 1.96\sigma$): **THU (TPEh)** [None]; **TVU (TPEv)** [None]
Timestamp: 2007-158.20:05:00.000 (06/07/2007)
Survey Line: h11691 / dive / 2007-158 / dive#1
Profile/Beam: 1/1
Charts Affected: 17404_1, 17400_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

DTON new position of CHD (17404) RK 33 meters SW of this position.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11691/dive/2007-158/dive#1	1/1	0.00	000.0	Primary
Dive#1.TGT	1	0.00	000.0	Secondary

Hydrographer Recommendations

Chart (17404) RK. Remove CHD (17404) RK 33m southwest of this position.

Cartographically-Rounded Depth (Affected Charts):

0 $\frac{3}{4}$ fm (17404_1, 17400_1, 16016_1, 530_1)
 0fm 5ft (531_1)
 1.6m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: VALSOU - 1.629 m

Office Notes

Concur. F VQP "uqwpf kpi 'y cu'ej cpi gf "q'c'uwdo gti gf 'tqemlp"J Egm'y kj "c'XCNUQW'qh'20 97'lxj qo u0

Feature Images

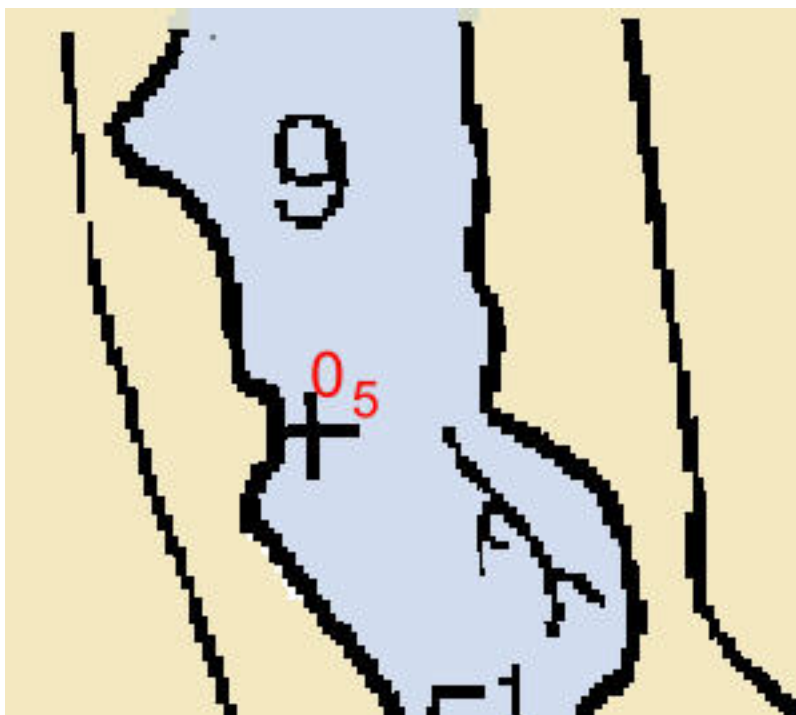


Figure 1.16.1

1.17) Profile/Beam - 672/1 from h11691 / 1103_singlebeam_hvf / 2007-208 / 003_1659

DANGER TO NAVIGATION

Survey Summary

Survey Position: 55° 35' 58.3" N, 133° 38' 41.5" W
Least Depth: 2.43 m (= 7.99 ft = 1.331 fm = 1 fm 1.99 ft)
TPU (±1.96σ): **THU (TPEh)** [None] ; **TVU (TPEv)** [None]
Timestamp: 2007-208.17:00:32.616 (07/27/2007)
Survey Line: h11691 / 1103_singlebeam_hvf / 2007-208 / 003_1659
Profile/Beam: 672/1
Charts Affected: 17404_1, 17400_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

DTON SB LD of dangerous rk of unkown depth. Position approximate. LD not found.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11691/1103_singlebeam_hvf/2007-208/003_1659	672/1	0.00	000.0	Primary

Hydrographer Recommendations

Chart (17404) dangerous rk of unkown depth.

Cartographically-Rounded Depth (Affected Charts):

1 ¼fm (17404_1, 17400_1, 16016_1, 530_1)
 1fm 2ft (531_1)
 2.4m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: VALSOU - 2.434 m

Office Notes

Concur.

Feature Images

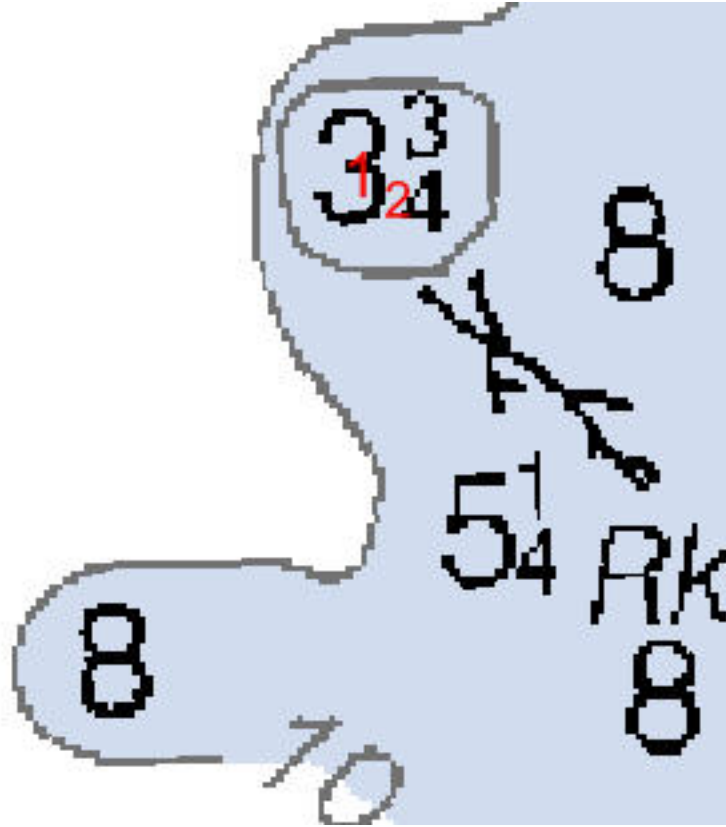
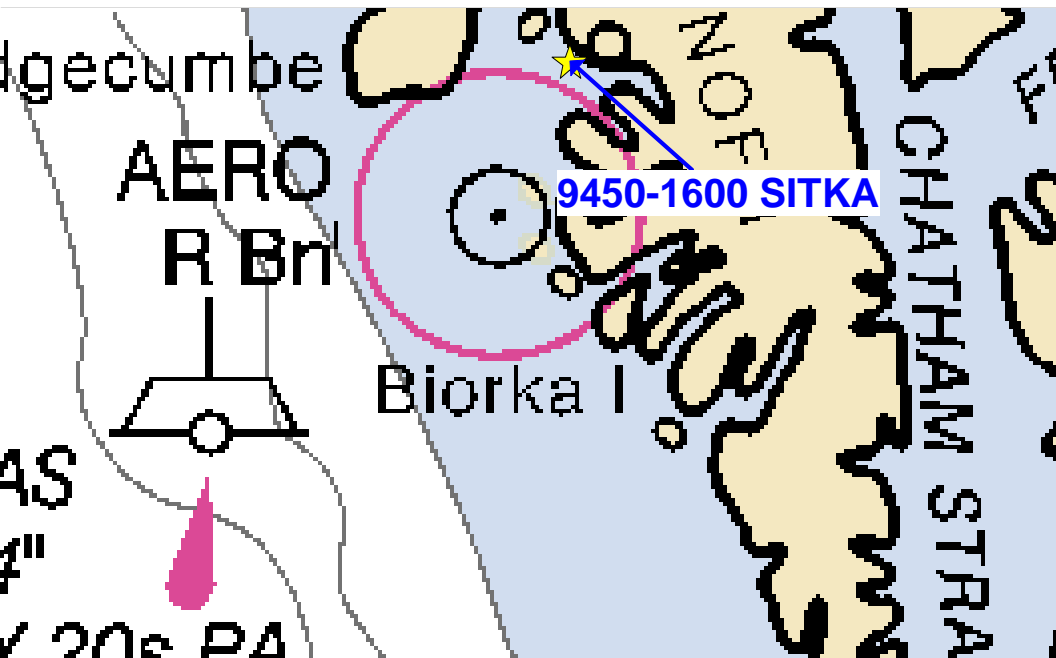


Figure 1.17.1



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

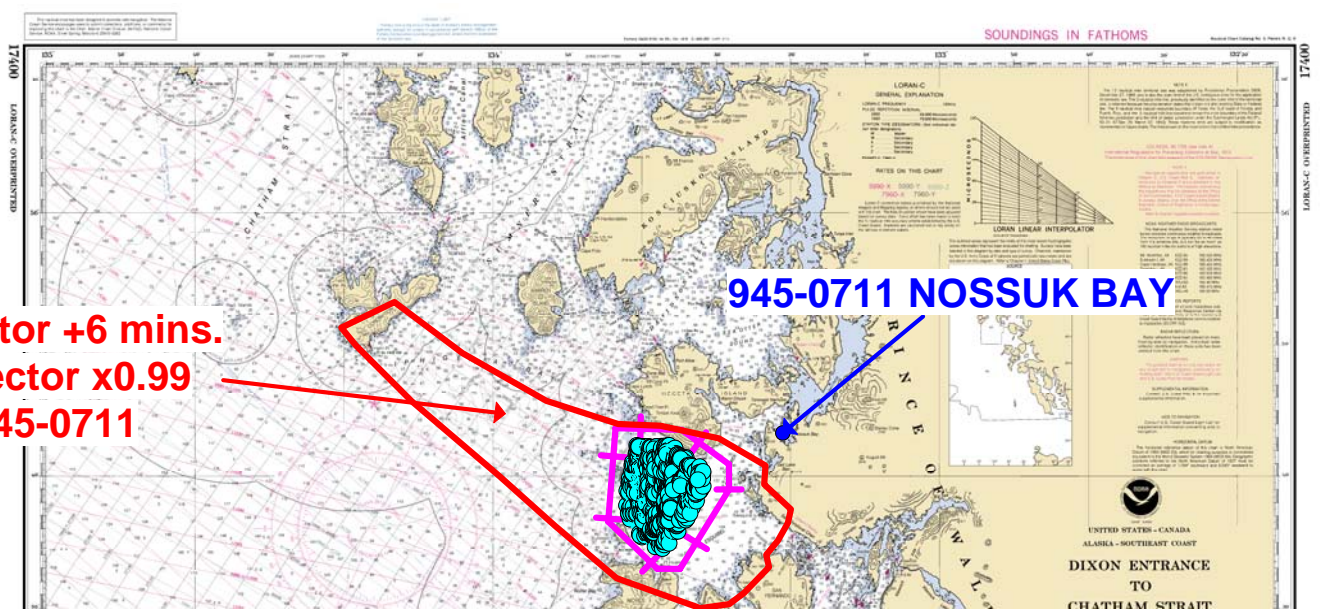




**Final Tidal Zoning
for OPR-O190-RA-2007
H11691**

West of Prince of Whales Island, AK

**SA227
Time Corrector +6 mins.
Range Corrector x0.99
Reference 945-0711**



H11691 HCell Report
Kurt Brown, 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:

ENC US5AK4AM and
RNC17404 (1:40,000)
RNC 17400 (1:229,376)

HCell compilation of survey H11691 used HCell Reference Guide Version 1.1 and Office of Coast Survey HCell Specifications Version 3.1 with approved modifications to better align with PHB's HCell process and to meet MCD needs.

1. Compilation Scale

Depths for HCell H11691 were compiled to the largest scale chart in the region, 17404, 1:40,000. Density and distribution of soundings emulate charts 17404. Non-bathymetric features have been generalized to chart scale.

2. Soundings

A survey-scale sounding feature layer, H11691_SS, was built in CARIS BASE Editor using the following BASE surface from survey H11691:

H11691_Office_Combined_10m

A shoal-biased selection was made at 1:7,500. The resultant sounding layer contains depths ranging from 0 to 227 meters.

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.

Soundings were also digitized from smooth sheet soundings (displayed as .dgn files in CARIS BASE Editor) from Lidar surveys H11208C, H11208D and H11208E.

3. Depth Areas and Depth Contours

3.1 Depth Areas

The extents of the highest resolution BASE Surface together with the extents of the soundings layer and lidar data were used to digitize the hydrographic extents, which were then used to create the single, all encompassing depth area (DEPARE). A depth range of

0 to 230 meters was used for the depth area object. Upon conversion to NOAA charting units, the depth range is 0 to 126 fathoms.

3.2 Depth Contours

Depth contours at the intervals on the largest scale chart are included in the H11691_SS HCell for MCD raster charting division to use for guidance in creating chart contours. The generalized metric and feet equivalent contour values are shown in the table below.

Chart Contours in Fathoms	Metric Equivalent of Chart Contours	Metric Equivalent of Chart Contours NOAA Rounded	Actual Value of Chart Contours
3	5.4864	5.715	3.75
5	9.144	9.3726	5.75
10	18.288	18.5166	10.75
50	91.44	92.8116	50.75

Contours delivered in the H11691_SS file have not been deconflicted against shoreline features, soundings and hydrography as all other features in the H11691_CS file and soundings in the H11691_SS have been. This results in conflicts between the H11691_SS file contours and HCell features at or near the survey limits. Conflicts with M_QUAL, DEPARE, COALNE and SBDARE objects, and with DEPCNT objects representing MLLW, should be expected. HCell features should be honored over H11691_SS.000 file contours in all cases where conflicts are found.

4. Meta Areas

The following Meta objects areas are included in HCell 11691:

M_QUAL

Meta area objects were constructed on the basis of the limits of the hydrography and lidar data. A separate M_QUAL was created for SWMB and lidar data.

5. Features

Shoreline features for H11691 were delivered from the field in several .hob files described in the DR. The files contained new features, modification to GC or charted features, and disapprovals. These were deconflicted against GC shoreline, the chart and hydrography during office processing.

In 2006 Fairweather conducted shoreline verification in the area encompassed by survey H11691 and submitted results under survey H11576. During survey H11691, Rainier investigated features submitted by the Fairweather for further investigation, as well as charted and LIDAR features. As survey H11576 is not being compiled separately, features from survey H11576 are compiled into HCell H11691. The SORIND for all features, including those from H11576, is attributed with survey H11691 while the

SORDAT is retained for features from survey H11576 allowing these features to be filtered by date.

In nearshore areas not covered by survey H11691, features from Lidar survey H11208 are also included in the HCell as scale allowed. Lidar data was also used to update heights on rocks and islets. The lidar data was not used to disprove charted features. Charte features in the lidar area were retained.

New rocky seabed areas were delineated using the high resolution BASE surfaces and are included in the H11691 HCell. 49 charted bottom samples were retained in HCell H11691 and 17 bottom samples were imported from the survey.

There were 17 DTONs reported from survey H11691. The DTONs are charted and reflected in the HCell.

There were no AWOIS items in survey H11691.

The source of all features included in the H11691 HCell can be determined by the SORDAT and SORIND fields.

6. S-57 Objects and Attributes

The H11691_CS HCell contains the following Objects:

SOUNDG	Chart scale soundings
DEPARE	All-encompassing depth area and intertidal areas
UWTROC	Rock features
SBDARE	Bottom samples, rocky seabed areas and ledges
M_QUAL	Data quality Meta object
\$CSYMB	Blue notes
DEPCNT	Zero depth curves.
LNDARE	Islets
OBSTRN	Foul areas
COALNE	Coastline imported from ENC
LNDELV	Updated heights for islets
WEDKLP	Kelp areas
PONTON	Float PA

The H11691_SS HCell contains the following Objects:

DEPCNT	NOAA rounded contours at chart scale intervals
SOUNDG	Soundings at the survey scale density

All S-57 Feature Objects in the H11691_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 with the Blue Note information located in the INFORM field. 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):	Fathoms and feet
Height Units (HUNI):	Feet
Positional Units (PUNI):	Meters

During creation of the HCell in CARIS BASE Editor and CARIS S-57 Composer, all soundings and features are maintained in metric units with as high precision as possible. Depth units for soundings measured with sonar maintain millimeter precision. Depths on rocks above MLLW and heights on islets above MHW are typically measured with range finder, so precision is less. Units and precision are shown below.

BASE Editor and S-57 Composer Units:

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

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 fathoms and feet charting units with NOAA rounding ensures that:

- All depths deeper or equal to 11 fathoms display as whole fathoms.
- All depth units between 0 fathoms (MLLW) and 11 fathoms display as fathoms and whole feet.

- All depth units skyward of 0 fathoms (MLLW) to 2.0 feet above MHW display in feet for values that round to 5 feet or less, and in fathoms and feet skyward of that.
- 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.

In an ENC viewer fathoms and feet depth units (DUNI) display in the format X.YZZZ, where X is fathoms, Y is feet, and ZZZ is decimals of the foot. In an ENC viewer, heights (HUNI) display as whole feet.

9. Data Processing Notes

9.1 Junctions

H11691 junctions to the north with survey H11692, to the northeast with survey H11688, and to the southeast with survey H11577. These surveys have been compiled and the junctions made. H11691 also junctions to the south and west with surveys H11690 and H11574, respectively. Junctions with these surveys will be made as they are compiled.

10. QA/QC and ENC Validation Checks

H11691 was subjected to QA checks in S-57 Composer prior to exporting to the HCell base cell (000) file. The millimeter precision metric S-57 HCell was converted to a 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 have been approved by MCD as inherent to and acceptable for HCells.

11. Products

11.1 HSD, MCD and CGTP Deliverables

- H11691 Base Cell File, Chart Units, Soundings compiled to 1:40,000
- H11691 Base Cell File, Chart Units, Soundings compiled to 1:7,500
- H11691 Base Cell File, Features compiled to 1:10,000
- H11691 Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
- H11691 Survey Outline to populate SURDEX

11.2 File Naming Conventions

- | | |
|--|----------------------------|
| • Chart units base cell file, chart scale soundings | H11691_CS.000 |
| • Chart units base cell file, survey scale soundings | H11691_SS.000 |
| • Descriptive Report package | H11691_DR.pdf |
| • Survey outline | H11691_Outline.gml & *.xsd |

11.3 Software

CARIS HIPS Ver. 6.1	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:

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APPROVAL SHEET
H11691

Initial Approvals:

The survey evaluation and verification has been conducted according to branch processing procedures and the HCell compiled per the latest OCS H-Cell 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 disproval of charted data within the survey limits. The survey records and digital data comply with OCS requirements except where noted in the Descriptive Report and are adequate to supersede prior surveys and nautical charts in the common area.

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.