

H11690

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.* . . . . . H11690

### LOCALITY

*State* . . . . . ALASKA

*General Locality* . . . . . West of Prince of Wales Island

*Sublocality* . . . . . Arriaga Passage

**2007**

### CHIEF OF PARTY

Commander Guy T. Noll, NOAA

### LIBRARY & ARCHIVES

DATE . . . . .

## HYDROGRAPHIC TITLE SHEET

H11690

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 Arriaga PassageScale 1:10,000Dates of Survey 5/29/2007 to 7/24/2007Instructions 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, Smith, 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 H11690

Project OPR-O190-RA-07  
West of Prince of Wales Island, AK  
Arriaga Passage  
Scale 1:10,000  
May – July, 2007  
**NOAA Ship RAINIER (s221)**  
Chief of Party: Commander Guy T. Noll, NOAA

## A. AREA SURVEYED<sup>1</sup>

This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions OPR-O190-RA-07 dated April 30, 2007 and all other applicable direction<sup>1</sup>, with the exception of deviations noted in this report. The survey area is West of Prince of Wales Island, Alaska, Arriaga Passage in the Gulf of Esquibel. Survey H11690 (Figure 1) corresponds to sheet “B” in the sheet layout provided with the Letter Instructions. The purpose of project OPR-O190-RA-07 is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. This project lies in the critical survey area of the NOAA Hydrographic Survey Priorities (NHSP).

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. 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 (Figure 4) was completed where possible.

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<sup>1</sup> Standing Instructions for Hydrographic Surveys (January 2006), NOS Hydrographic Surveys Specifications and Deliverables (April 2007), OCS Field Procedures Manual for Hydrographic Surveying v 2.1 (March 2007), and all Hydrographic Surveys Technical Directives issued through HSD 2007-5 dated June 2007.

Data Acquisition Type	Hull Number with Mileage (nm)						Total
	1101	1103	1015	1016	1006	1021	
VBES (mainscheme)	-	-	-	-	-	-	-
MBES (mainscheme)	-	-	44.3	212.4	138.7	63.1	458.5
C3D (mainscheme)	-	-	6.3	-	-	-	6.3
SSS (mainscheme)	-	-	-	-	-	-	-
Crosslines	-	-	26.7	0.8	5.9	1.1	34.5
Developments	-	-	-	-	-	-	-
Shoreline	-	8.5	-	-	-	-	8.5
Bottom Samples	-	-	-	-	-	-	0
Total Number of Items Investigated	-	14	-	-	-	-	14
Total Area Surveyed (sq. nm)	-	-	-	-	-	-	20.46

Table 1: Statistics for survey H11690

Data acquisition was conducted from May 29 – July 24, 2007 (DN149-205).

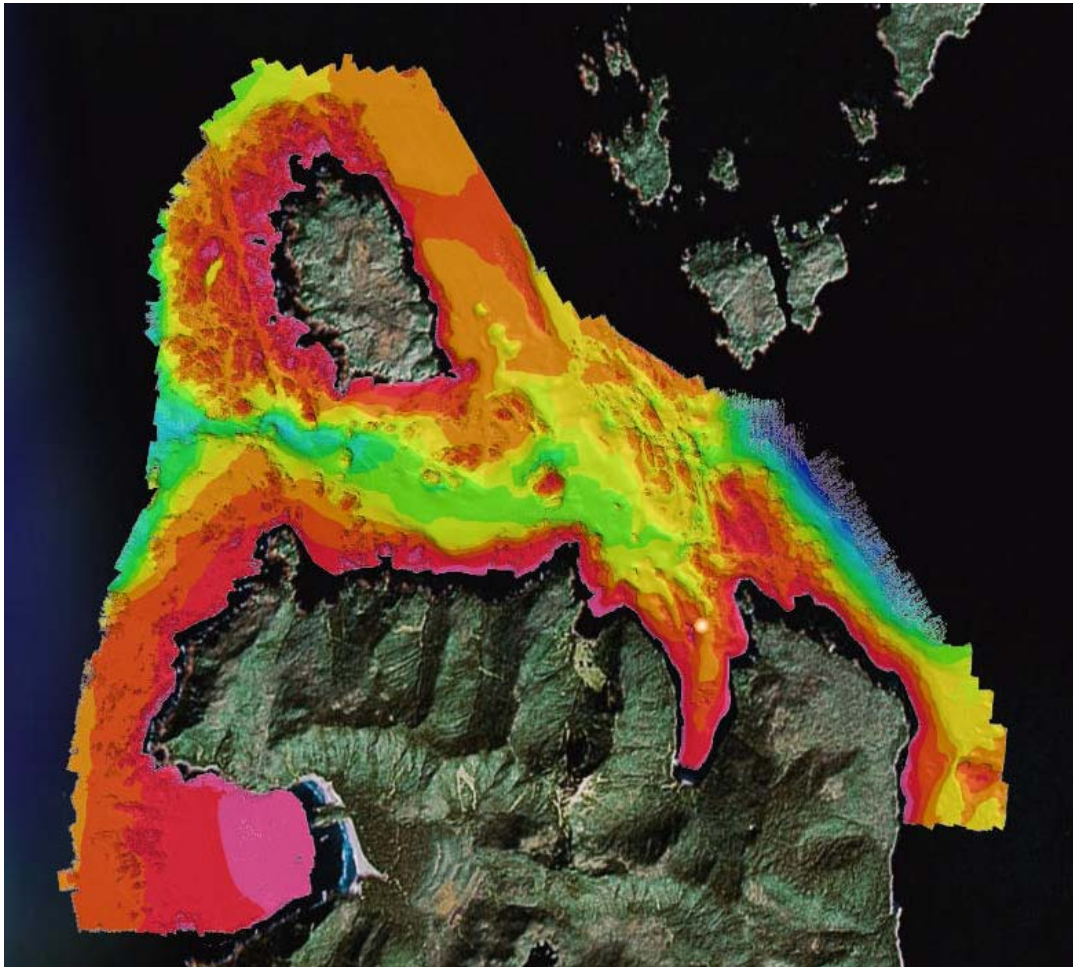


Figure 1: 10m BASE Surface of Survey H11690 overlaid on satellite imagery.

**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-0190-RA-07 Data Acquisition and Processing Report (DAPR)*<sup>2</sup>, 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 survey. 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
1103	RA-2	Vertical Beam Echosounder Detached Positions Bottom Samples
1021	RA-3	Multibeam Echosounder
1016	RA-4	Multibeam Echosounder
1006	RA-5	Multibeam Echosounder
1015	RA-6	Multibeam Echosounder C3D

*Table 2: Data Acquisition Vessels for H11690.*

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**

No Vertical Beam Echo Sounder (VBES) crosslines were run on survey H11690.

Multi-Beam Echosounder (MBES) crosslines totaled 34.5 nautical miles, comprising 7.52% of main scheme MBES hydrography. The mainscheme BASE surface was statistically compared to the XL BASE surface using Fledermaus surface differencing tool and agreed well with differences averaging 0.660 meter with a median of 0.285 and a standard deviation of 1.303 meters.<sup>3</sup> High standard deviation is likely due to steep and variable shoals while general discrepancies can be attributed to the poor sounding quality of ELAC data compared to Reson multibeam data (Figure 2).

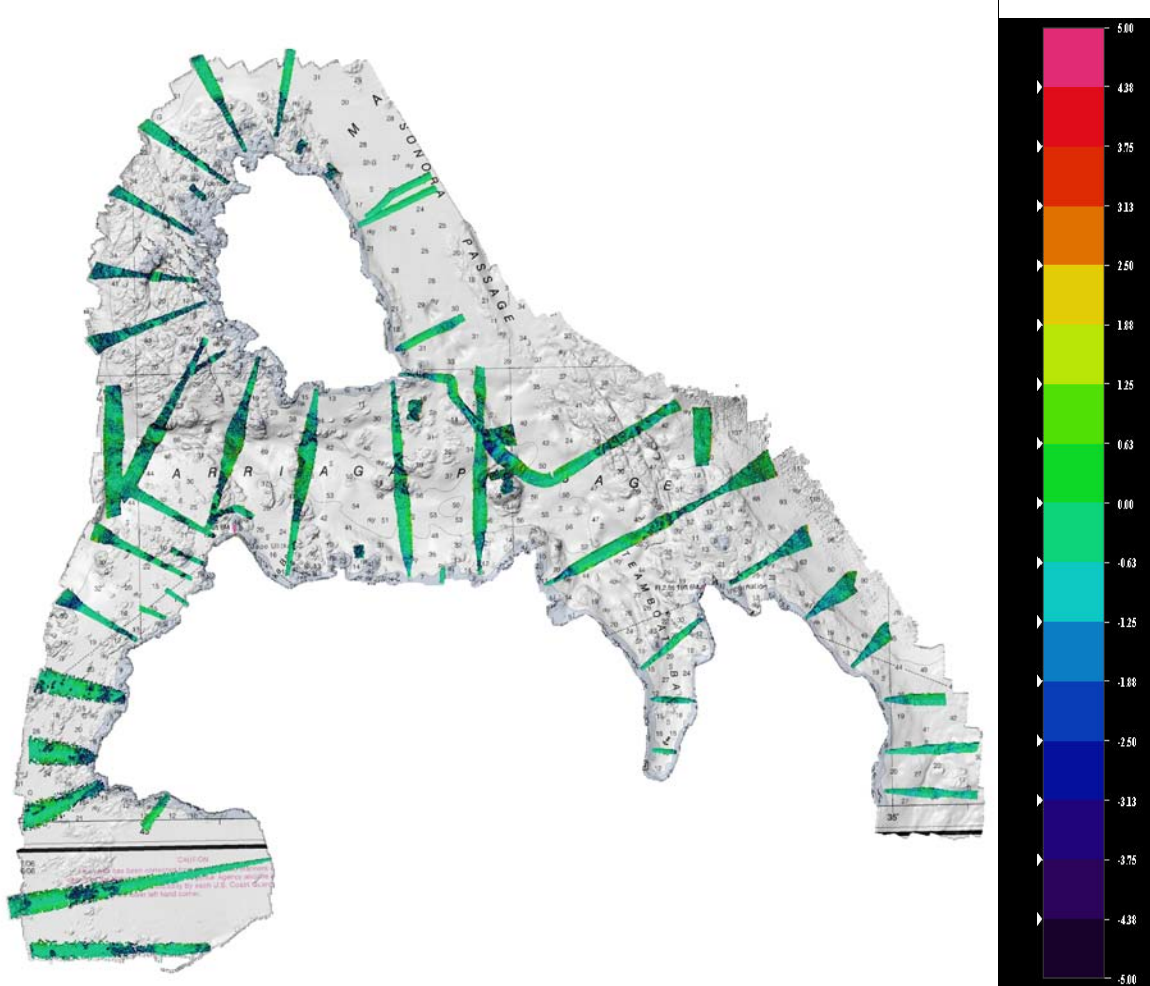


Figure 2: XL-Surface difference surface overlaid on shaded Chart 17404 with difference scalebar.

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 junction with H11690 (Figure 3):

<b>Registry #</b>	<b>Scale</b>	<b>Date</b>	<b>Junction side</b>
H11574	1:10,000	2007	Northwest
H11691	1:10,000	2007	Northeast
H11577	1:10,000	2006	East

The following LIDAR surveys junction with H11690 (Figure 4)

<b>Registry #</b>	<b>Scale</b>	<b>Date</b>	<b>Junction side</b>
H11208H	1:10,000	2004	North, West
H11208I	1:10,000	2004	Southeast

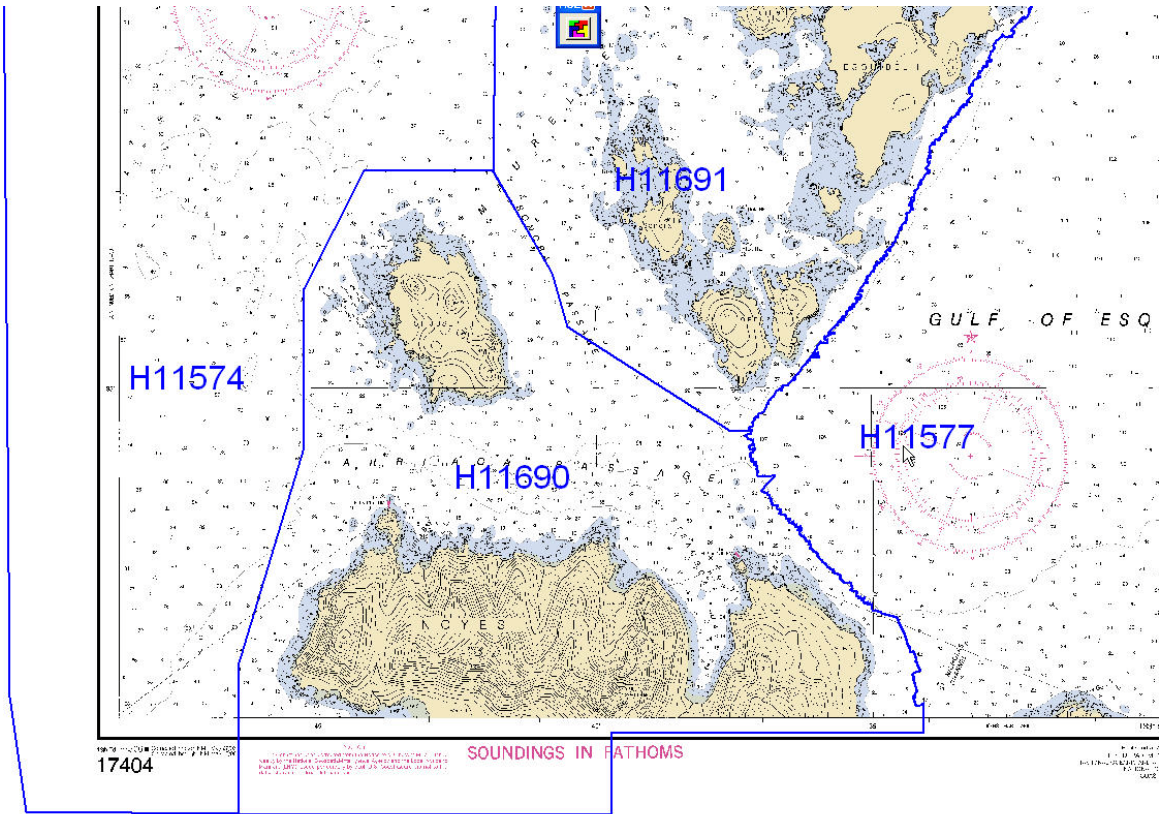


Figure 3: H11690 Contemporary Junction Surveys overlaid on Chart 17404.

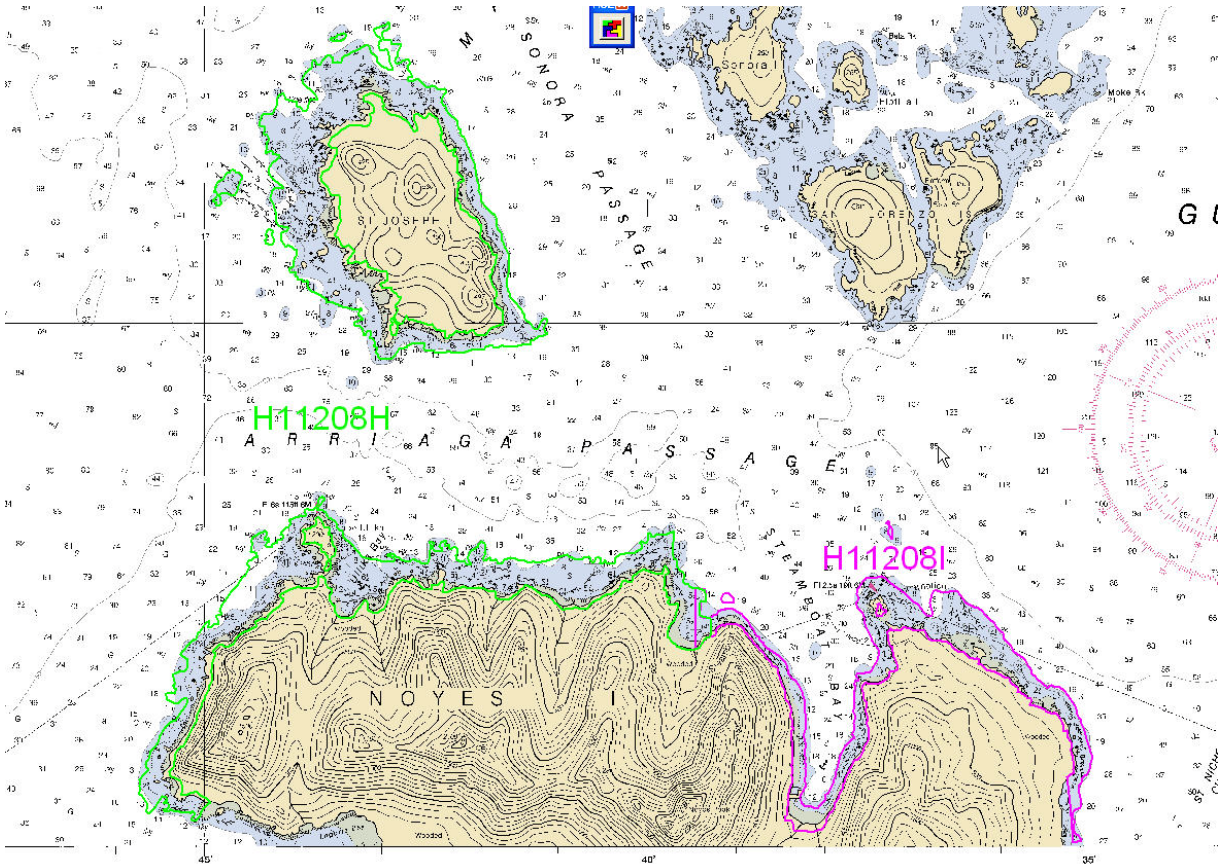


Figure 4: H11690 LIDAR Junction Surveys overlaid on Chart 17404

Survey junctions were compared using the Fledermaus surface differencing tool. In all cases the H11690 10m Combined Finalized BASE surface was subtracted from the junction BASE surface to give surface difference statistics.

The middle third of the H11574 junction differed by an average of 0.85 meters on steep slopes in greater than 75 meters of water. The upper and lower thirds of the H11574 junction differed by an average of -0.25 meters in waters less than 75 meters.<sup>4</sup> Higher differences in deep water can generally be attributed the use of ELAC which had already shown a 0.30 meter vertical offset in the *2007 Hydrographic System Readiness Review*.

The northern half of the H11691 junction differed by an average of -0.28 meters in waters less than 50 meters while the southern half differed by an average of -0.40 meters over rocky bottom in 60 meters and -1.50 meters on steep slopes in over 200 meters of water.<sup>5</sup> Higher differences in southern half can be attributed to noisy ELAC data and compared BASE surface nodes not being located in same position.

Junction with the H11577 BASE Surfaces provided by Pacific Hydrographic Branch differed by an average of -0.40 meters in 30 to 70 meters of water, -0.90 meters in 50 to 120 meters of water, and -1.60 meters in 100 to 350 meters of water.<sup>6</sup> These differences can largely be attributed to noise at edge of survey data into deep sloping waters within the Gulf of Esquibel.



Data along edges of the survey H11690 were cleaned less aggressively since there was only one line to cross compare against. Also, some data was also left untouched because sparse ELAC data could not be discerned between actual flyers and possible bottom detection.

Junction with the H11208H BASE Surface differed by an average of -0.88 meters, with a median of -0.97 meters and standard deviation of 1.53 meters in waters less than 30 meters.<sup>7</sup>

Junction with the H11208I BASE Surface differed by an average of -1.05 meters, with a median of -0.89 meters and standard deviation of 1.45 meters in waters less than 30 meters.<sup>8</sup>

Within the LIDAR junction, rocks detected with MBES often detected shoaler soundings than corresponding LIDAR data due to the increased density of MBES soundings.<sup>9</sup> These shoaler soundings are reflected in final submitted BASE surfaces.

Above differences can also be attributed to the fact that surfaces were not all compared with matching resolutions. While H11690 Finalized Combined BASE surface was a 10m surface, H11577 surfaces provided by PHB were of different resolutions than the H11690 combined Final BASE surface (30-70m was 5m resolution and 100-350m was 20m resolution), and LIDAR surfaces, along with having much sparser data spacing than multibeam, were all 4 meter BASE surfaces.

Fledermaus difference surfaces have been compiled and submitted with this survey in “Field Products\H11690\_Junction” within the project folder.

PDBS data were not used for junction comparisons.

## **Data Quality Factors**

### Non Junction with LIDAR

Large ocean swell prevented full junctions with the LIDAR boundary along West coast of Noyes Island. The dangerous conditions within the area made survey impractical and coverage was not obtained. Heavy kelp prevented surveying NW of Steamboat Bay and junctioning with the LIDAR was not possible in these areas (Figure 5). See Field Verified hob layer for charting recommendations on kelp, breakers and swell.<sup>10</sup>

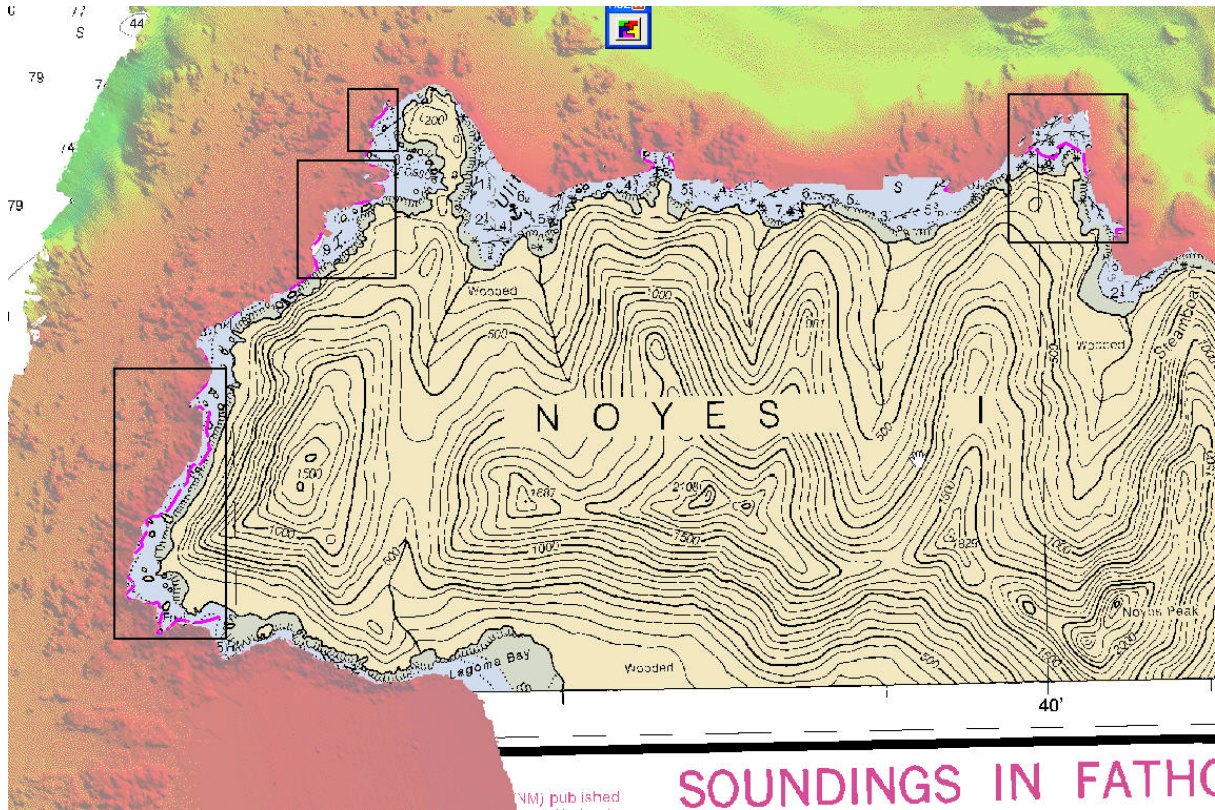


Figure 5: Non LIDAR junctions within Survey H11690 overlaid on Chart 17404 (pink line is Lidar limit).

Launch 1016 Reson 8125 Digibar Blowouts

During data acquisition for H11690 launch 1016 (RA-4) experienced Digibar blowouts that could generally be attributed to kelp on the Digibar. While this problem was usually noticed during acquisition and immediately addressed by re-running the survey line, several lines were not re-run. This resulted in the sound speed being outside of the range that CARIS will convert thus leaving along-track 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 allowing the majority of acquired data to be recovered. The macro creates a new XTF file with the value ‘1500’ listed at the end of the line. Lines redone with 1500 m/s are as follows:

Launch 1016 (RA-4) Day Number	Line File
DN 183	258_2215_1500
DN 183	262_2213_1500
DN 183	263_2217_1500

Table 3: Survey lines re-processed with sound velocity of 1500 m/s

Roll offset in RA 3 data

Survey Launch 1021(RA-3) experienced a static roll error on DN 190. The probable cause was transducer turnbuckle not being tightened properly and thus not bringing the swing arm to its proper fully deployed position. An entry was made in the vessel config file to correct for the loose swing arm on DN 190.

### ELAC squat

ELAC data acquired within Sonora Passage with Launch 1015 (RA-6) showed a vertical displacement or squat of approximately 0.3 meters. The cause of the discrepancy is undetermined and is documented in the *2007 Hydrographic System Readiness Review*. No features were found with affected survey data. ELAC data were only acquired in greater than 45 meters and at these depths the 0.3 m offset is within IHO tolerance

No other unusual conditions were encountered during the survey that affected the expected accuracy and quality of survey data.

### **B3. Data Reduction**

Data reduction procedures for survey H11690 conform to those detailed in the *OPR-0190-RA-07 DAPR*.

### **B4. Data Representation**

Many BASE surfaces were used in processing H11690. The submission Field Sheet and BASE Surface structure are shown in Figures 6-10.<sup>11</sup>

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.

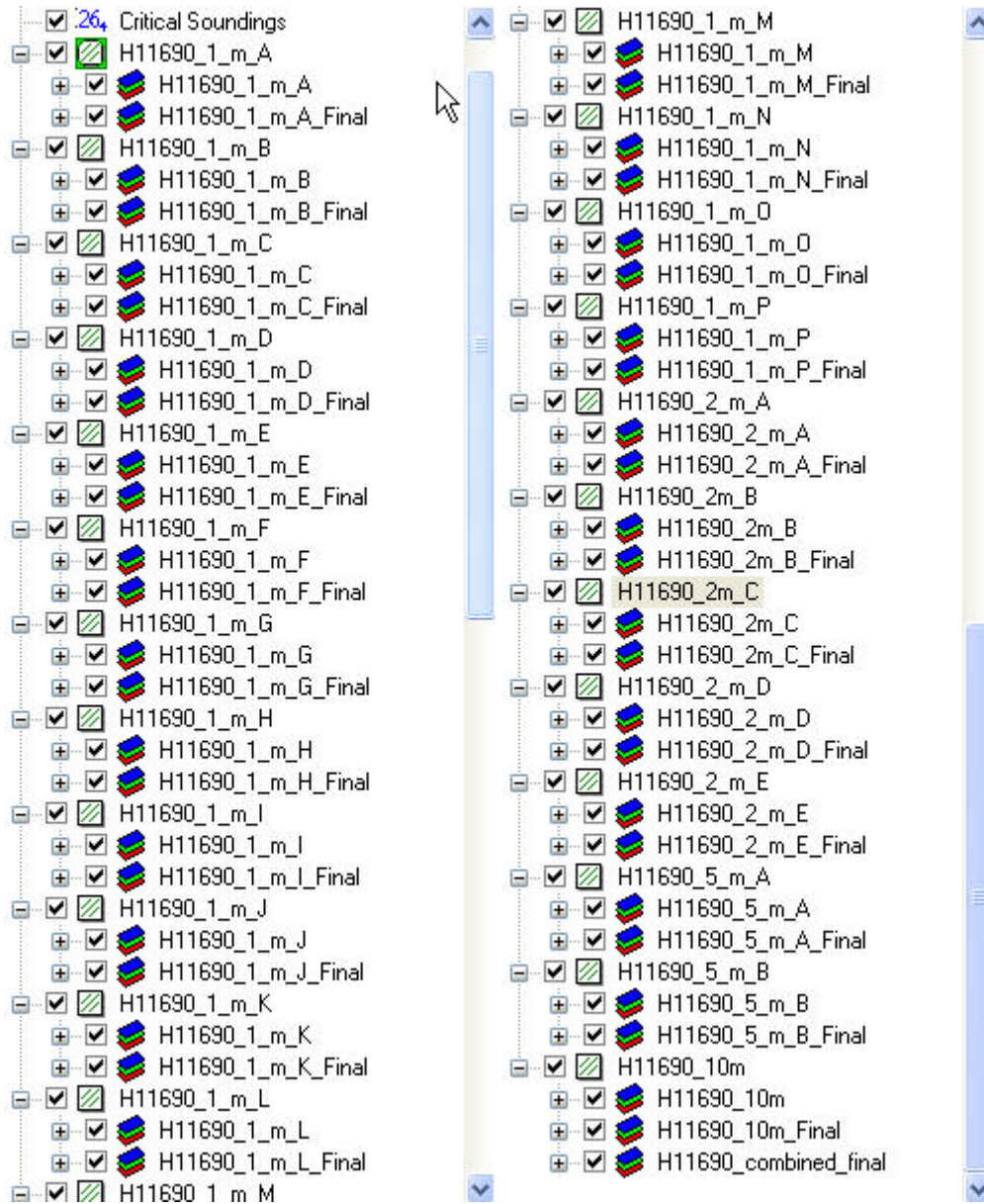


Figure 6: Field sheets and BASE surfaces submitted with H11690.

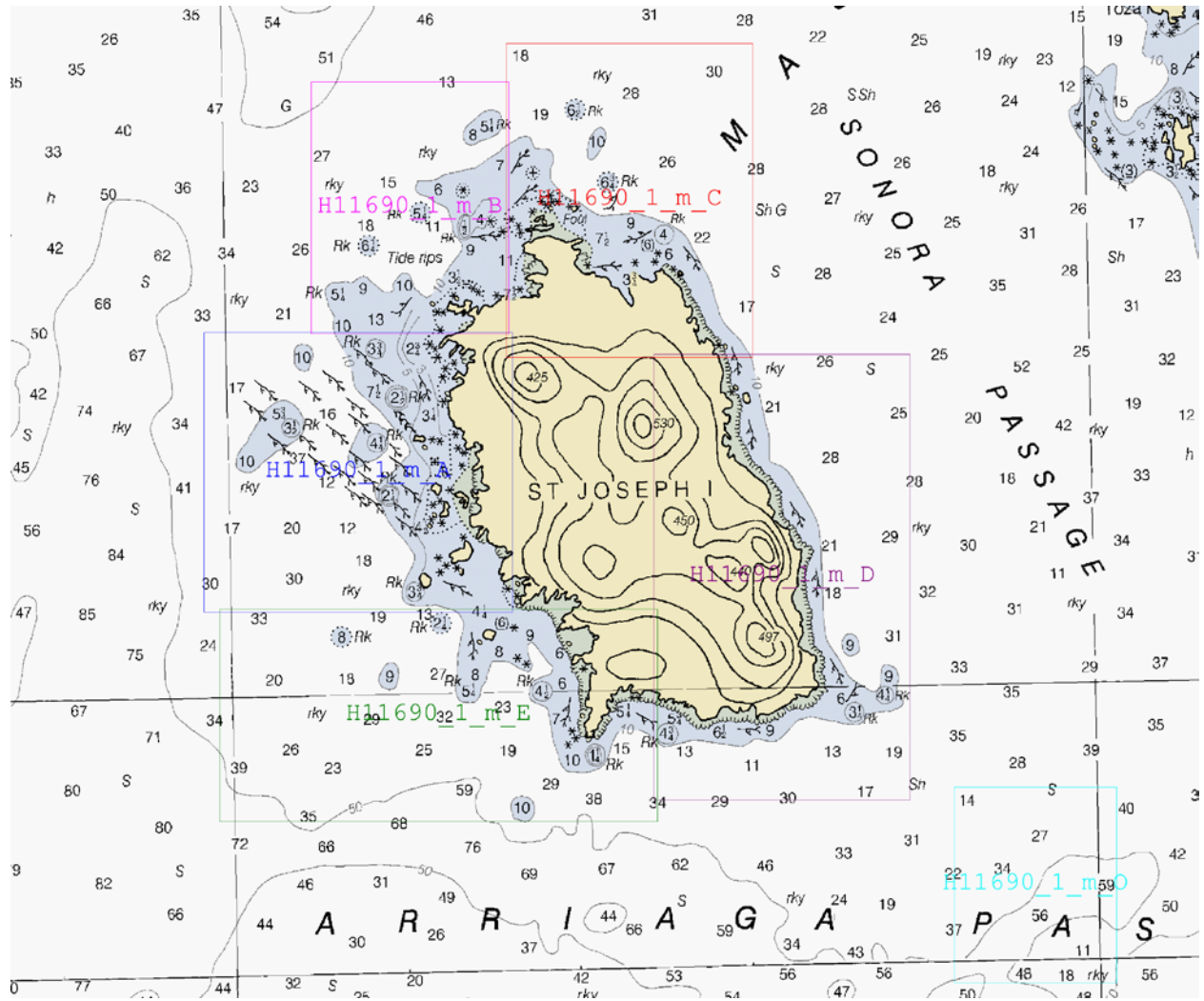


Figure 7: Layout of 1 meter field sheets and BASE surfaces for H11690, overlaid on Chart 17404.

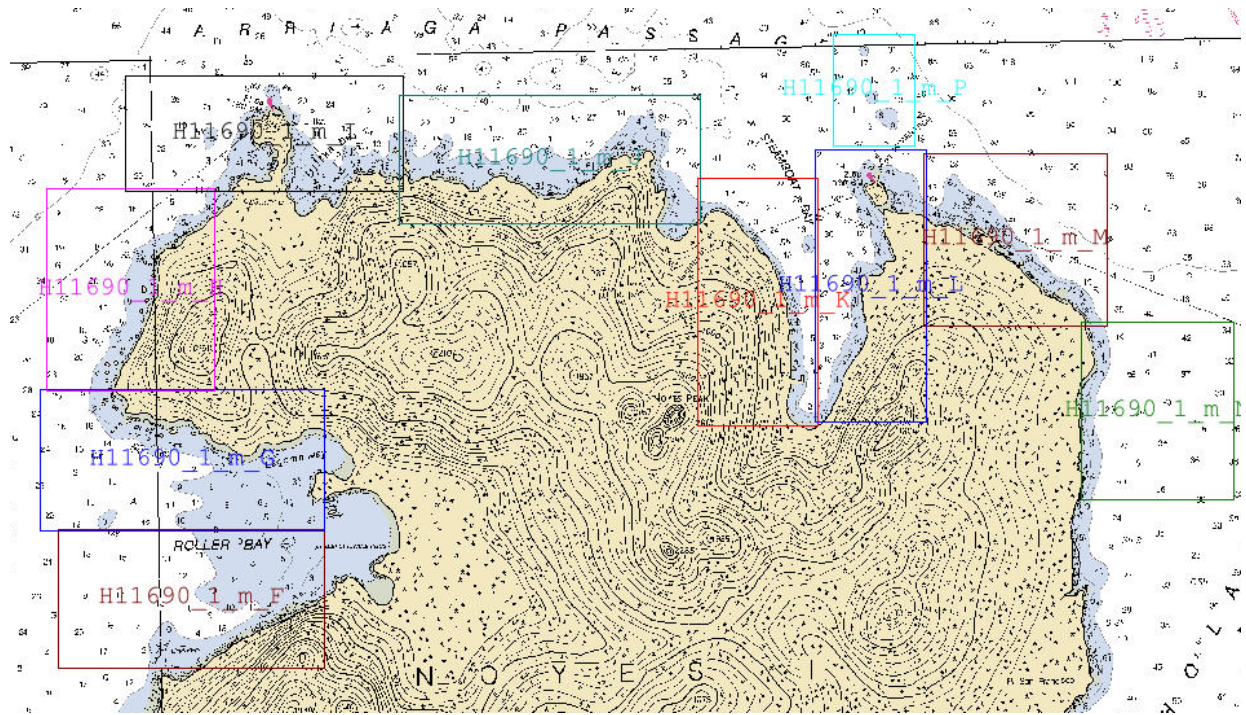


Figure 8: Layout of 1 meter field sheets and BASE surfaces for H11690, overlaid on NOAA Charts 17404 and 17406.

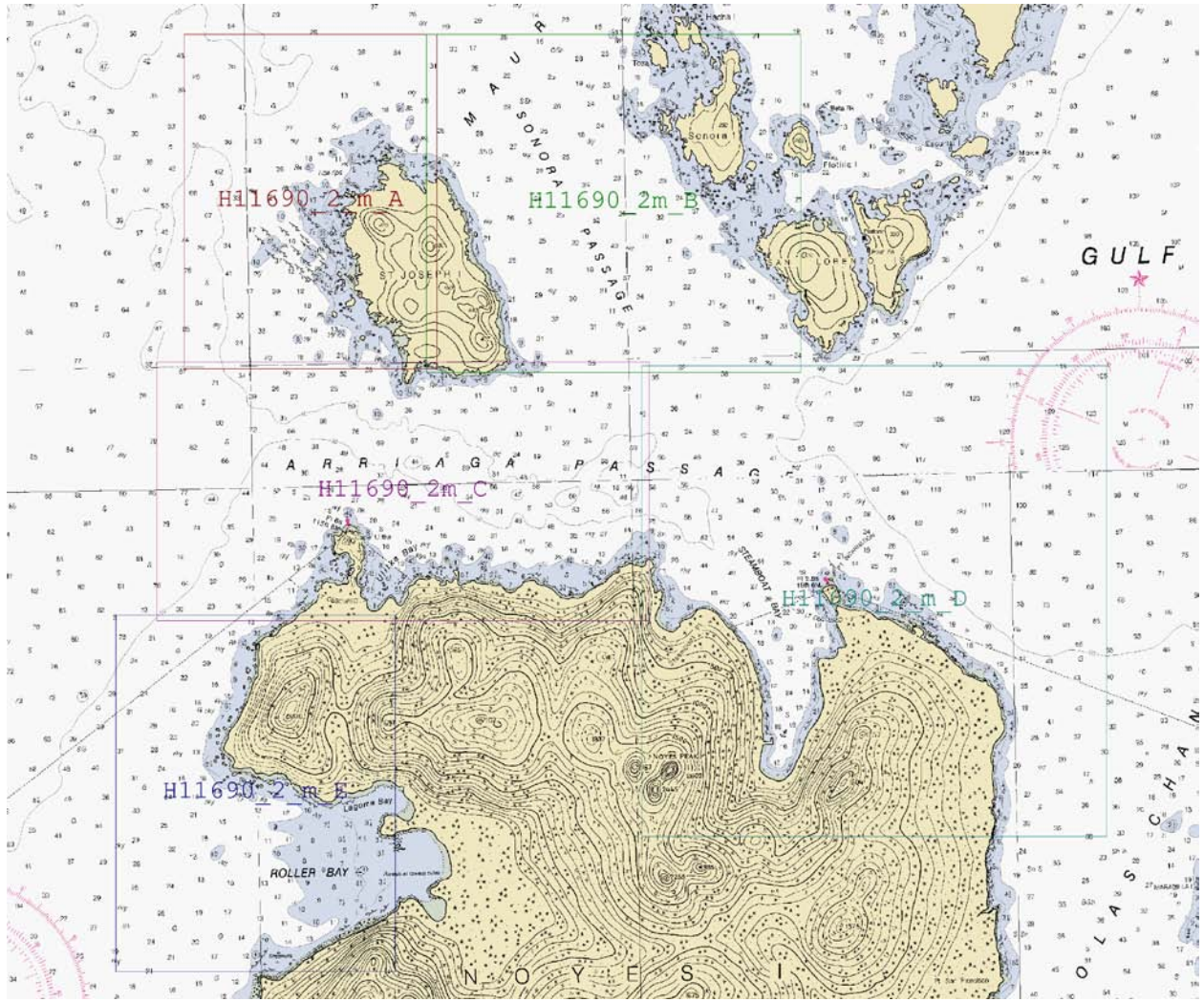


Figure 9: Layout of 2 meter field sheets and BASE surfaces for H11690, overlaid on NOAA Charts 17404 and 17406.

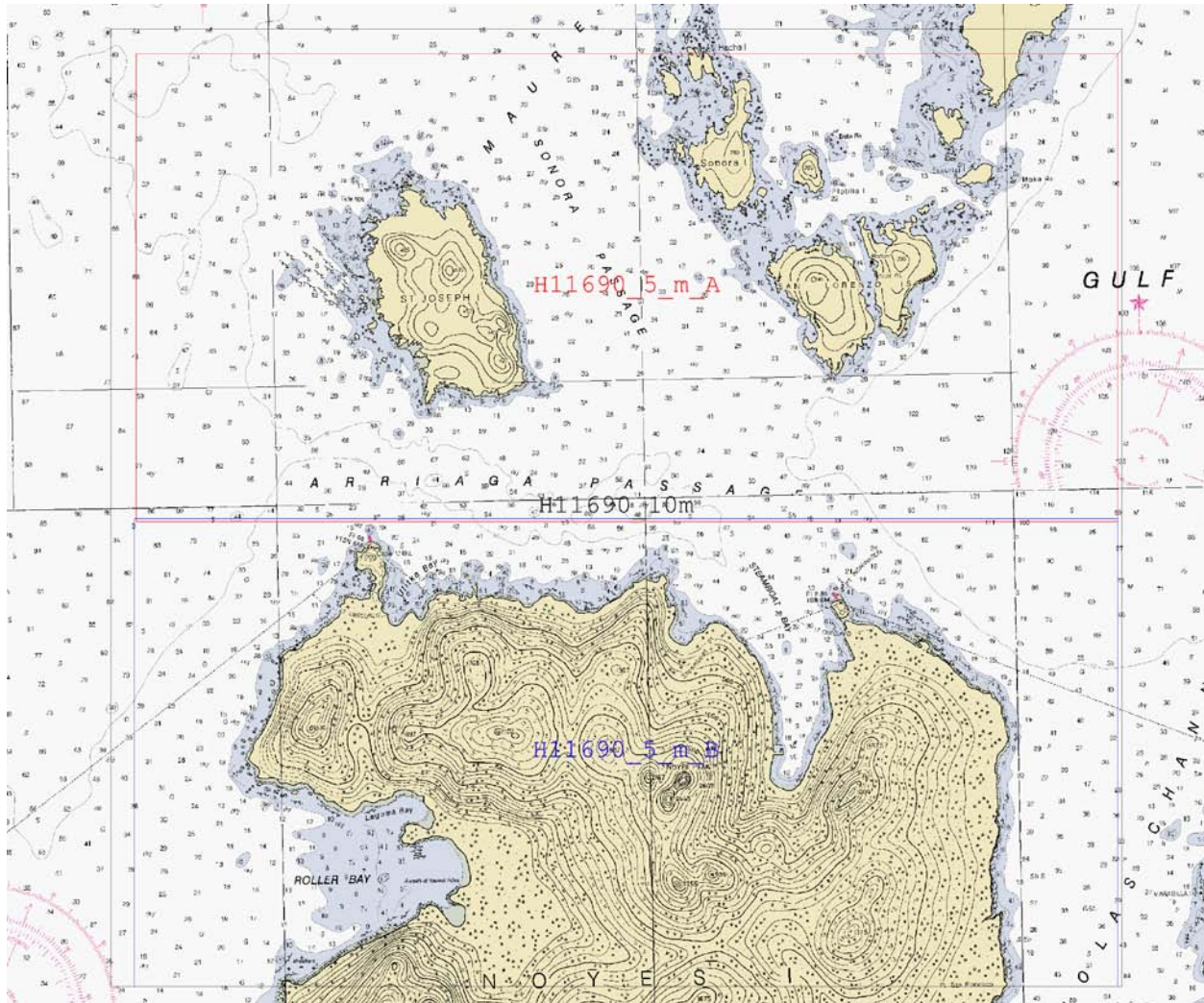


Figure 10: Layout of 5 and 10 meter field sheets and BASE surfaces for H11690, overlaid on NOAA Charts 17404 and 17406.

### C. VERTICAL AND HORIZONTAL CONTROL

A complete description of vertical and horizontal control for survey H11690 can be found in the *OPR-0190-RA-07 Horizontal and Vertical Control Report*,<sup>12</sup> 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 4.



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

Table 4: Differential Corrector Sources for H11690.

## 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 H11690.

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 5: Tide Station installed by RAINIER personnel for H11690

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 H11690CORF.zdf.

The request for Final Approved Water Levels for H11690 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.<sup>13</sup>

## D. RESULTS AND RECOMMENDATIONS

### D.1. Chart Comparison

#### D.1.a. Survey Agreement with Chart

Survey H11690 was compared with the following charts:<sup>14</sup>

Chart	Scale	Edition and Date	Local Notice to Mariners Applied Through
17404	1:40,000	13 <sup>th</sup> Ed; May 2006	5/16/2006
17406	1:40,000	7 <sup>th</sup> Ed; March 2004	5/16/2006
17400	1:229,376	17 <sup>th</sup> Ed; March 2007	3/13/2007

Table 6: Charts compared with H11690

Generally, charted depths East of Noyes Island and St. Joseph Island agree well, with most discrepancies less than two fathoms. Shoaler soundings are present West of Noyes Island, in the

vicinity of Cape Ulitka (Figure 11), at mouth of Roller Bay (Figure 12), South and West of St. Joseph Island (Figure 13), and North of Pt (Figure 14). In many instances this survey found shoaler soundings between charted depths, even though agreement at the position of charted depths was good. This is attributed to increased bottom coverage using MBES methods.<sup>15</sup>

ELAC data were only acquired in depths of 50 fm or greater (with the exception of Sonora Passage where ELAC was used to fill holidays) and at these depths the 0.3 m offset is well within IHO tolerance.

No areas were found deeper than 2 fathoms of the charted depths with the one exception; the 9 fathom shoal on the SW end of St Joseph Island (Figure 16). Soundings are closer to 19 fathoms in the area and coverage is adequate such that the Hydrographer recommends removing the charted shoal and charting as per digital data.<sup>16</sup>

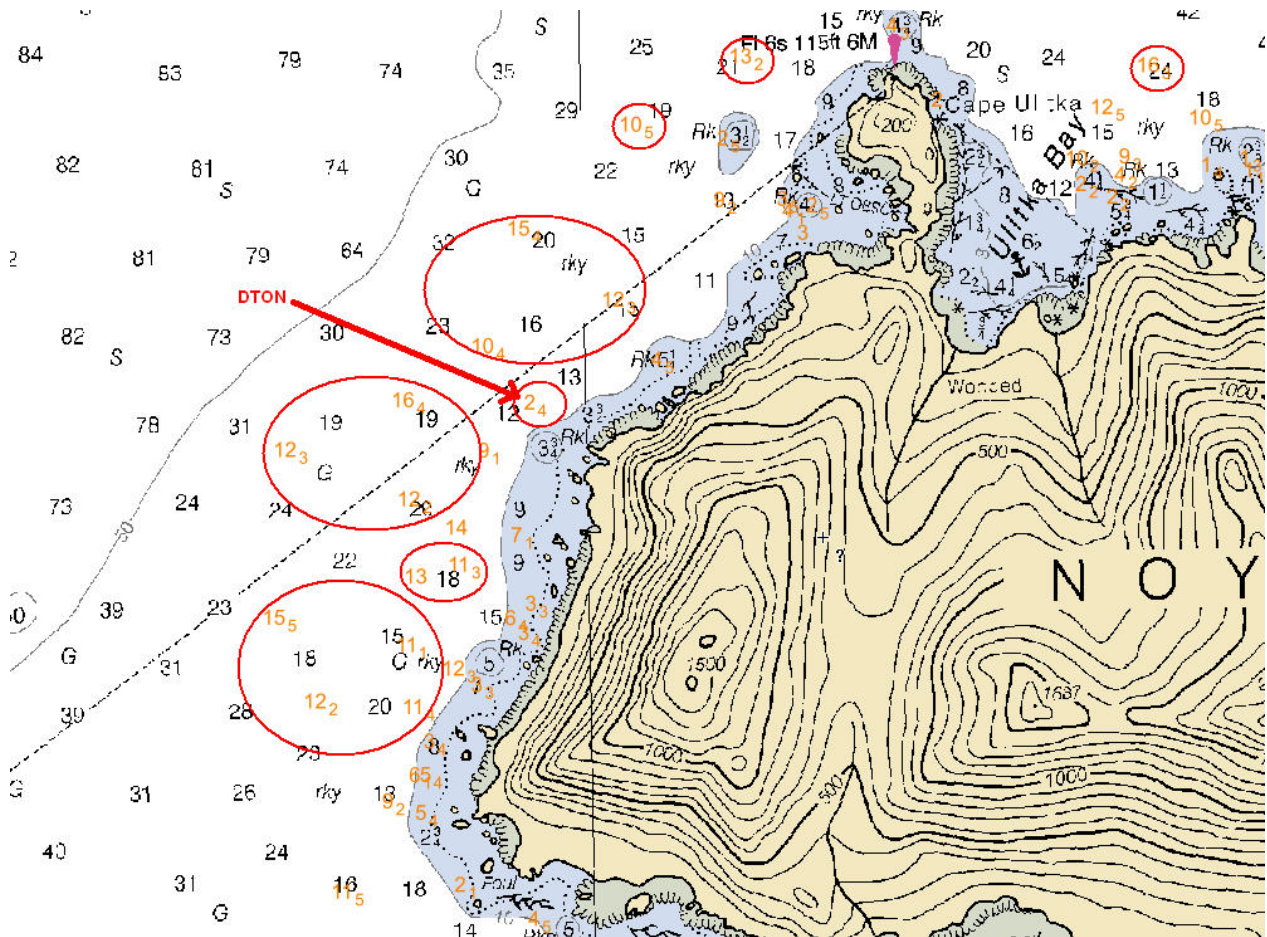


Figure 11: Shoals West of Noyes Island, overlaid on Chart 17404.

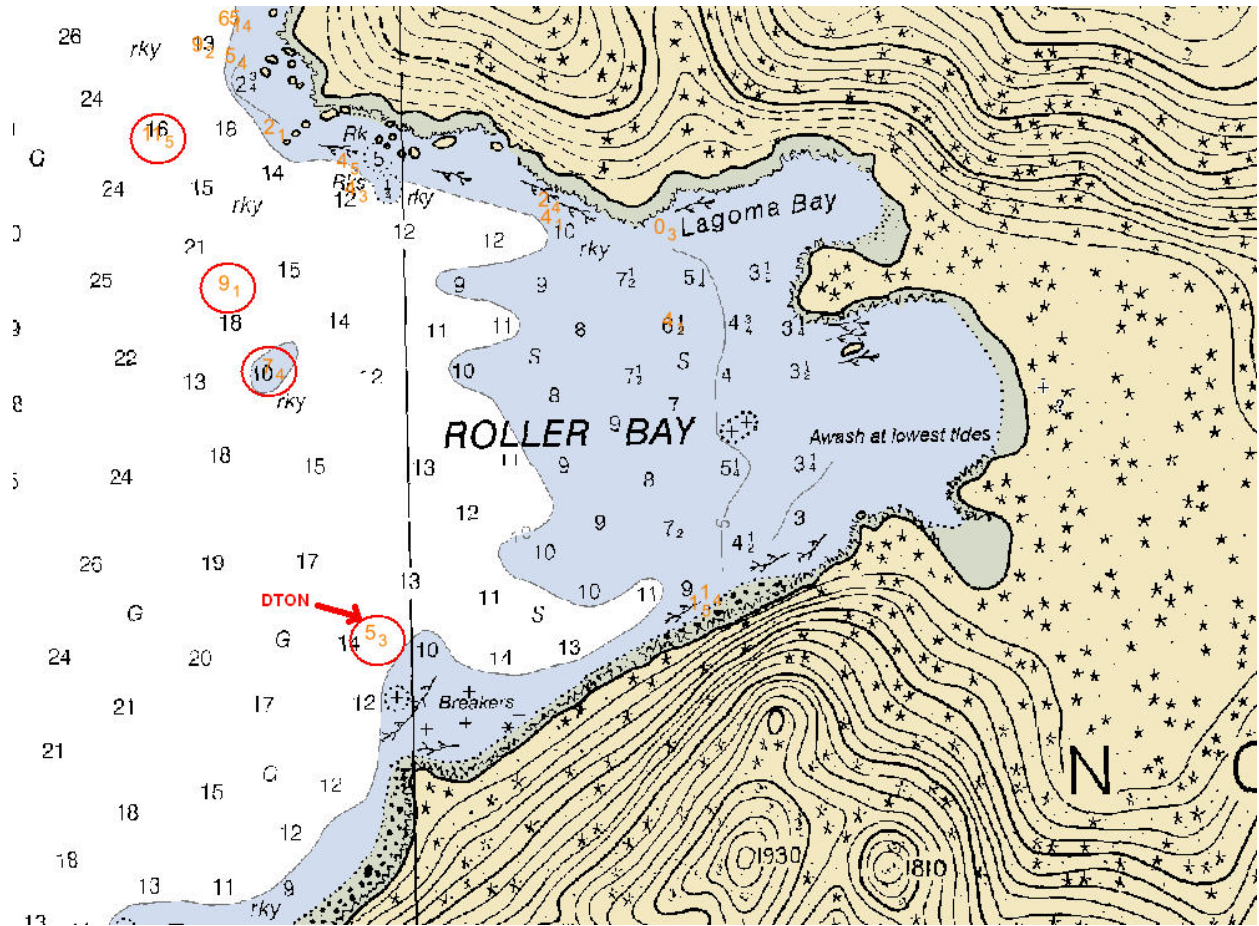


Figure 12: Shoals at Mouth of Roller Bay, overlaid on Chart 17406.

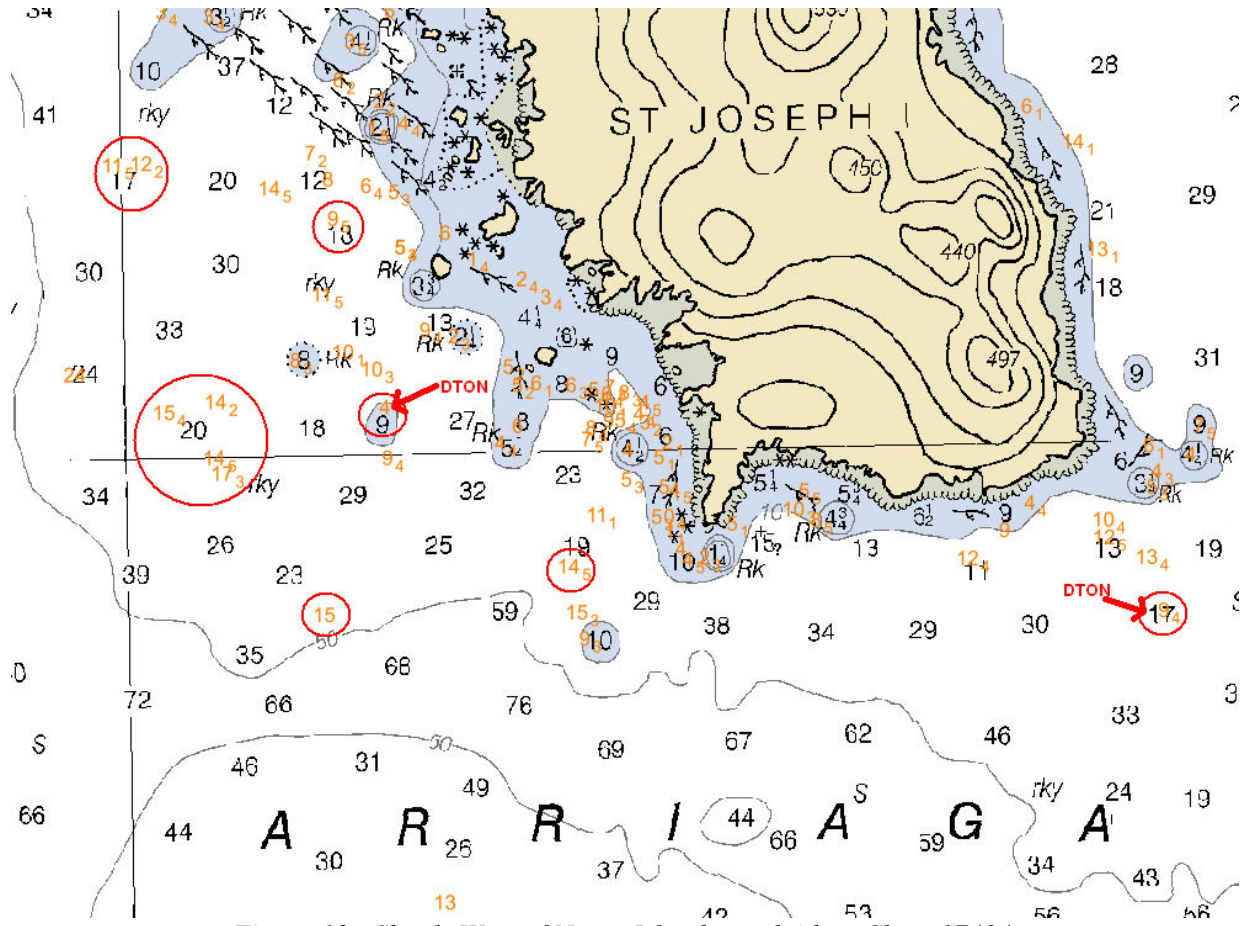


Figure 13: Shoals West of Noyes Island, overlaid on Chart 17404.

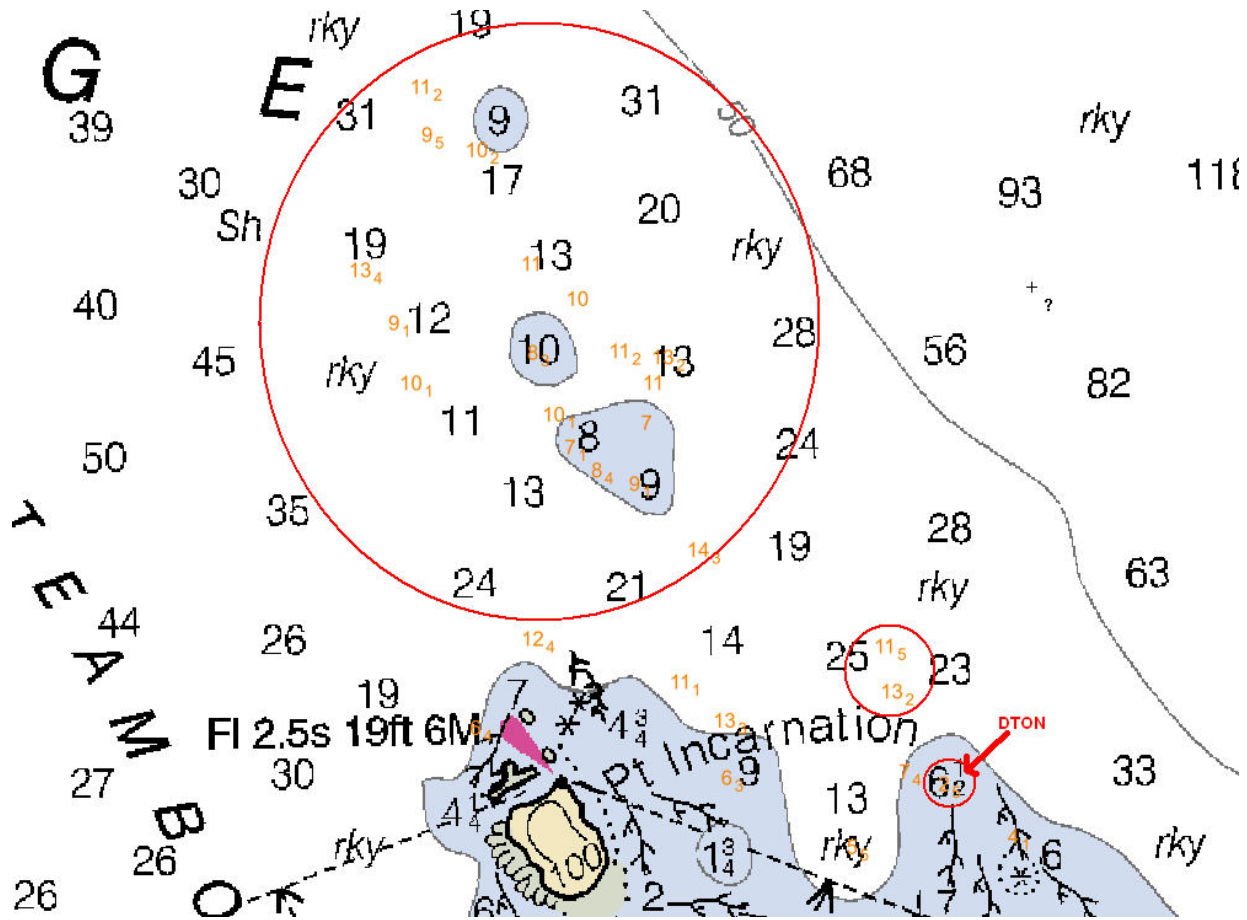


Figure 14: Shoals North of Pt Incarnation, overlaid on Chart 17404.

The hydrographer recommends that survey soundings supersede all prior survey and charted depths in the common area, with the following exceptions:

1. Due to extensive kelp, a holiday exists over the charted one and a quarter (1 ¼) fathom depth 350 meters East of Ulitka Bay (Figure 15). The shoalest MBES sounding of 2.18 meters may not represent the least depth on feature and the hydrographer, therefore, recommends charting shoalest available digital data.<sup>17</sup>
2. The three and a quarter (3 ¼) fathom charted depth 230 meters SE of St. Joseph Island is within LIDAR junction and was not investigated with SWMB (Figure 16). The hydrographer recommends charting shoalest of LIDAR sounding or charted depth.<sup>18</sup>
3. Due to extensive kelp and heavy surf, a holiday exists over the two and a half (2 ½) fathom charted rock 300 meters West of St. Joseph Island (Figure 17). The shoalest MBES sounding of 4.53 meters may not represent the least depth on feature and the hydrographer, therefore, recommends charting shoalest available digital data.<sup>19</sup>

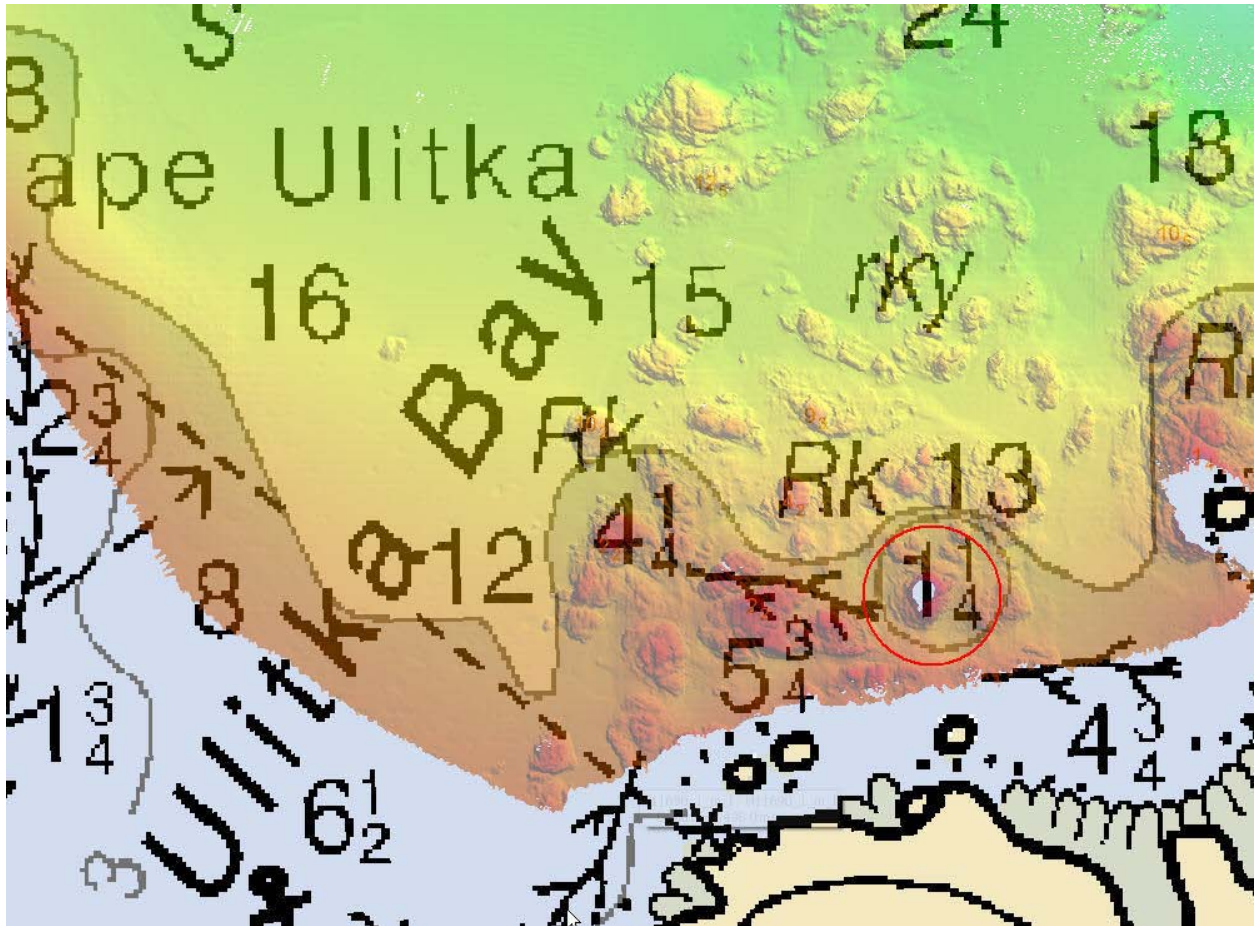


Figure 15: H11690 survey data overlaid on Chart 17404 showing holiday over 1 ¼ fathom rock.

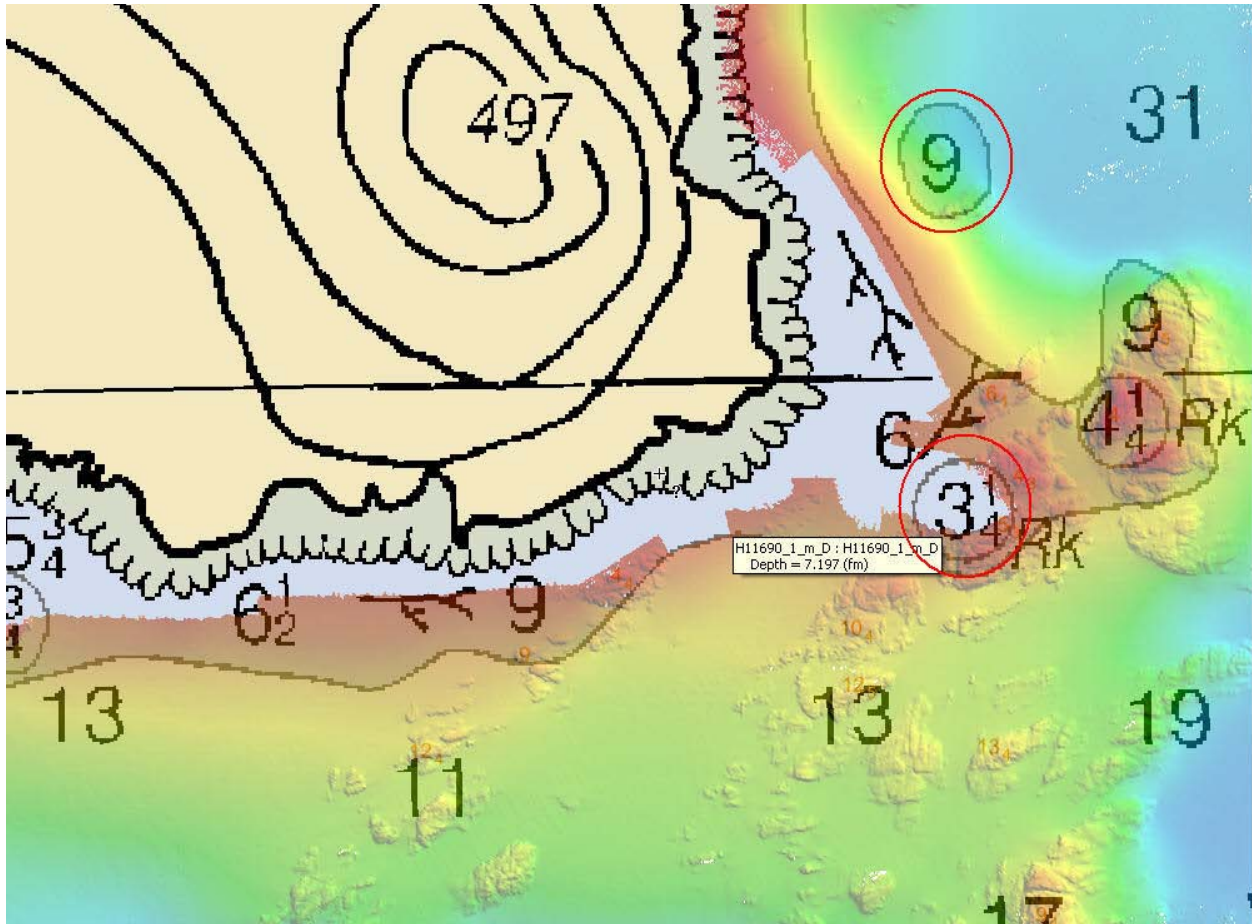


Figure 16: H11690 survey data overlaid on Chart 17404 showing holiday around 3 ¼ ftm rock and mischarted 9 ftm shoal.

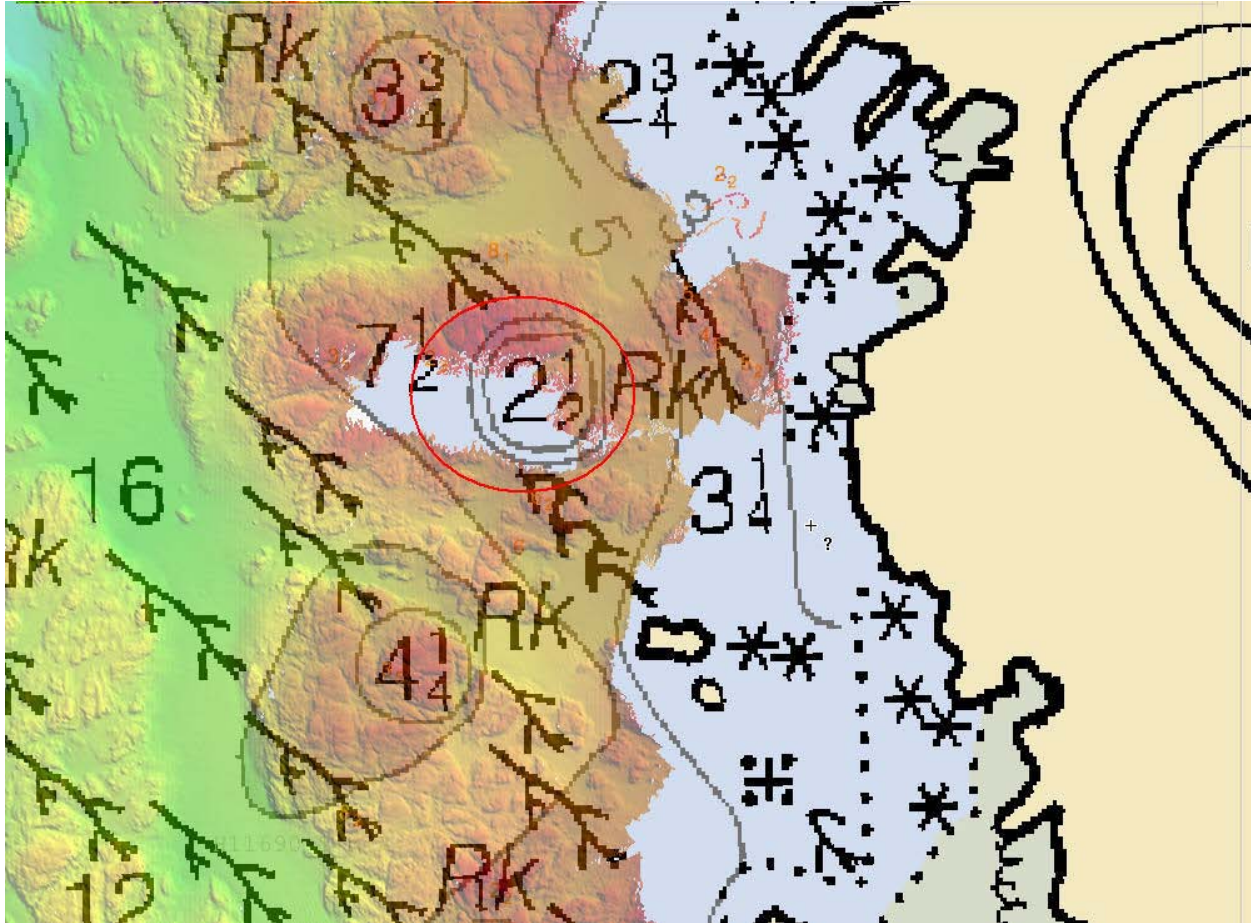


Figure 17: H11690 survey data overlaid on Chart 17404 showing holiday over 2 ½ fathom rock.

Although Utika Bay is an adequate area for small vessels to anchor, large vessels would not find the shelter needed in that bay. The hydrographer recommends removing the designated large vessel anchorage, in Ulitka Bay (Chart 17404), and replacing it with a small vessel anchorage symbol.<sup>20</sup>

Also, the “PA” designated pier on Chart 17406 in Steamboat Bay is mischarted. Pier should be relocated 250 meters to South to correspond with charted pier on Chart 17404.<sup>21</sup>

#### **D.1.b. Dangers to Navigation**

Five (5) Dangers to Navigation (DTONs) were found on survey H11690 (Figures 11-14 above), and reported to the Marine Chart Division via email on (4/14/08). The original DTON submission package is included in Appendix IV. Descriptions of each DTON are included in the Survey Feature Report in Appendix I.<sup>22</sup>

#### **D.1.c. Other Features**

##### Automated Wreck and Obstruction Information System (AWOIS) Investigations

One (1) AWOIS items fall the within the survey limits of H11690. Descriptions of AWOIS item investigation is included in the Survey Feature Report in Appendix II.<sup>23</sup>



### Additional Items

Additional features investigated within the limits of H11690 are described in the Survey Feature Report in Appendix II.<sup>24</sup>

## **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.<sup>25</sup>

#### Shoreline Verification

Traditional “limited shoreline verification” was not required for this survey, since much of the nearshore area was covered by NOAA Ship FAIREATHER in 2006, and thus outside the limits of H11690. The following field procedures were followed:

- H11690 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 H11690.
- All new and charted items within the limits of H11690 (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 or investigations to features and features 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. Investigation details of H11690 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*.<sup>26</sup>

All shoreline data is submitted in Caris Notebook .hob files. The session H11690\_Notebook contains the following:

<b>HOB File</b>	<b>Purpose and Contents</b>
H11690_Reference	Contains the survey outline limit.
H11690_Lidar_extents	Contains the Lidar limit line.
H11690_Composite_Source_Unedited	Contains the original unedited composite source.
H11690_Updates	New or revised features identified by this survey (including bottom samples), (Pydro carto actions “add” or “modify”.)
H11690_FieldVarified_Source	Copy of the original composite source HOB file that has been edited to represent the shoreline as seen in the field during shoreline verification.
H11690_Delete	Features disproved by this survey. (Pydro carto action “delete”.)
H11690_None	Investigation items that were either not modified or not investigated (Pydro carto action “none”).

*Table 7: List and Description of Notebook HOB files.*

Source Shoreline Changes and New Features

Items for survey H11690 that require further discussion and are associated with a detached position, have been flagged “Report” in Pydro in H11690.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.<sup>27</sup>

**D.2.c. Aids to Navigation**

Two (2) aids to navigation (ATONs) were found within the survey limits; all of them were found to be correctly charted and serve their intended purpose.<sup>28</sup>

No GPS static surveys were conducted for Survey H11690.

**D.2.d. Overhead Features**

There are no overhead features within the limits of survey H11690.<sup>29</sup>

**D.2.e. Submarine Cables and Pipelines**

There are no submarine cables or pipelines charted within the limits of H11690, and none were detected by the survey.<sup>30</sup>

**D.2.f. Ferry Routes**

There are no ferry routes charted within the limits of survey H11690, and none were observed to be operating in the area.<sup>31</sup>

**D.2.g. Bottom Samples**

A total of eighteen (18) bottom samples were collected within the limits of survey H11690 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. Nine (9) samples were close to or the same as charted bottom types.<sup>32</sup>

**D.2.h. Other Findings**

There were no other findings within this survey.

**E. APPROVAL**

As Chief of Party, Field operations for hydrographic survey H11690 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 with the exception of deficiencies noted in the Descriptive Report. This survey is complete and no additional work is required with the exception of deficiencies noted in the Descriptive Report. 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, CN=NOAA  
DN: cn=Donald W. Haines, c=US, o=NOAA/  
NMAO/MOC-7, ou=NOAA Ship RAINIER, email=do-  
haines@noaa.gov  
Reason: I am approving this document for CDR Noll  
Date: 2008.04.17 21:26:11 -0700

**Commander Guy T. Noll, 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 Timothy M. Smith  
DN: cn=Timothy M. Smith, c=US, o=NOAA,  
ou=NOAA Ship RAINIER, email=timothy.m-  
smith@noaa.gov  
Date: 2008.04.16 03:59:27 Z

**Ensign Timothy Smith, NOAA**  
Sheet Manager

Chief Survey Technician:



James B. Jacobson  
I have reviewed this document  
2008.04.16 21:13:11 Z

**James B. Jacobson**  
Chief Survey Technician, NOAA Ship RAINIER

Field Operations Officer:



Charles Yoos  
I have reviewed this document  
2008.04.17 21:01:00 -0700

**Lieutenant Charles Yoos, NOAA**  
Field Operations Officer

## Revisions Compiled During Office Processing and Certification

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<sup>1</sup> This survey was compiled with shoreline from Fairweather survey H11575. Survey H11575 was canceled and compilation of data from the survey is included in Rainier HCell H11690. All data from H11575 is attributed with the original SORDAT. The SORIND was changed to reflect survey H11690.

<sup>2</sup> Filed with project records

<sup>3</sup> Concur

<sup>4</sup> Concur

<sup>5</sup> Concur

<sup>6</sup> Concur

<sup>7</sup> Concur

<sup>8</sup> Concur

<sup>9</sup> 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.

<sup>10</sup> In areas where holidays are present, the compiler retained all charted features and soundings.

<sup>11</sup> Reviewer chose to extend the depth range of the 5m final surface to include the depths covered by the submitted 10m final surface as the majority of the data supported the higher resolution surface. Only small areas on the western edge and eastern central edge of the survey contain depths greater than 158m covered by the submitted 10m finalized surface. These areas appear more sparsely covered at 5m surface resolution but more accurately reflect the sparse Elac 1180 coverage. The area on the western edge of the survey was also covered fully by data from junction survey H11577.

<sup>12</sup> Filed with Project records.

<sup>13</sup> See attached Tide Note dated October 3, 2007.

<sup>14</sup> H11690 was compared to charts 17404, 14<sup>th</sup> edition, October 2008 and 17406, 7<sup>th</sup> edition February, 2004.

<sup>15</sup> Concur

<sup>16</sup> Concur

<sup>17</sup> Charted rock retained as SWMB data does not provide complete coverage.

<sup>18</sup> Retain charted sounding.

<sup>19</sup> Charted rock retained as SWMB data does not provide complete coverage.

<sup>20</sup> Concur. See blue note.

<sup>21</sup> Concur with clarification. The pier at location shown on chart 17404 has changed in shape. Chart according to HCell H11690.

<sup>22</sup> See attached DTON report.

<sup>23</sup> AWOIS item 53343 was investigated visually and positioned using a DP in both surveys H11575 and H11690. SWMB from survey H11690 did not show a rock at the position of the DP from survey H11575 whereas lidar data from survey H11208 indicated a rock near the position of the DP from survey H11690. As the DP from survey H11690 was a positioned using a visual estimate of distance and bearing, the compiler chose to use the lidar rock position (55-36-38.04N, 133-43-37.1W, approximately 20meters to the west of the H11690 DP) to update the charted rock position and AWOIS item 53343.

<sup>24</sup> The Survey Feature Report is filed with the hydrographic records. Note: the survey feature report does not include all features from H11690. Additional features were added, some

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removed, and some modified in CARIS Notebook after the feature report was generated from Pydro. All features included in the compilation of H11690 have come directly from CARIS Notebook, which is the official features deliverable for this survey.

<sup>25</sup> In 2006 Fairweather conducted only shoreline verification in the area encompassed by survey H11690 and submitted results under survey H11575. During survey H11690, Rainier investigated features submitted by the Fairweather for further investigation, as well as charted and LIDAR features. As survey H11575 is not being compiled separately, features from survey H11575 are compiled into HCell H11690. The SORIND for all features, including those from H11575, is attributed with survey H11690 while the SORDAT is retained for features from survey H11575 allowing these features to be filtered by date.

<sup>26</sup> Filed with hydrographic records.

<sup>27</sup> Concur

<sup>28</sup> Chart ATONs according to latest ATONIS information.

<sup>29</sup> Concur

<sup>30</sup> Concur

<sup>31</sup> Concur

<sup>32</sup> 73 bottom samples were retained in HCell H11690 and 18 bottom samples were imported from surveys H11575 and H11690.

# Descriptive Report to Accompany Hydrographic Survey H11575<sup>1</sup>

Project OPR-O190-FA  
West of Prince of Wales Island, Alaska  
1:10,000  
April - May 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 Arriaga Passage. This survey corresponds to Sheet B 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°30'40"N, 133°46'28"W and the Northeast corner at 55°34'34"N, 133°36'41"W.

Shoreline data acquisition was conducted from April 29, to May 17, 2006 (DN 119 to DN 137).

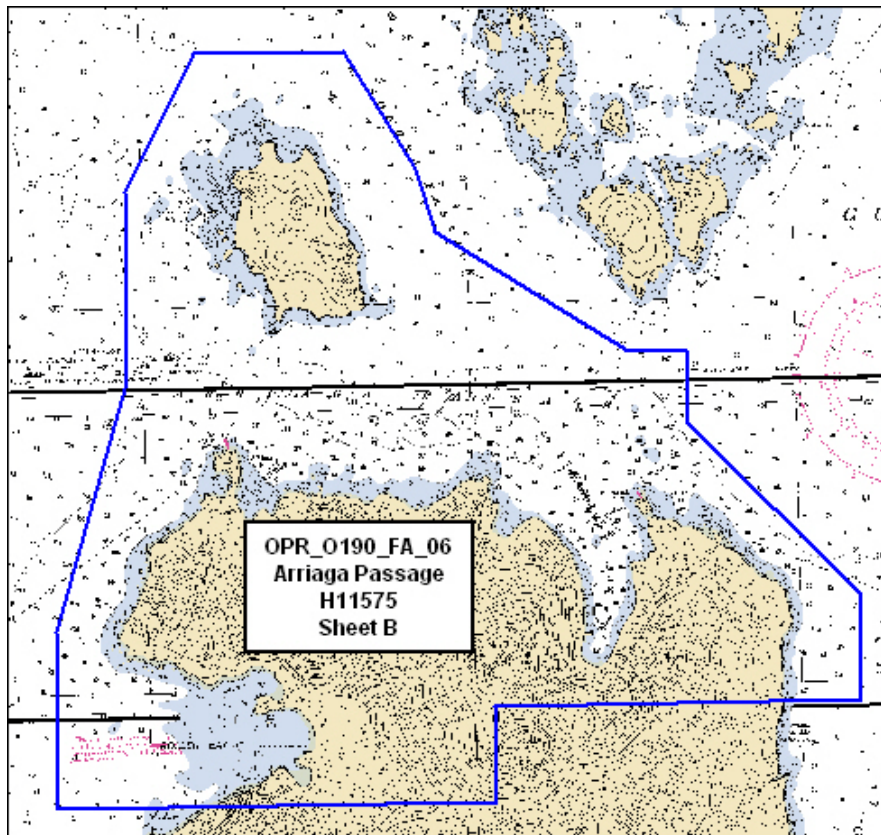


Figure 1. H11575

Shoreline data were acquired for H11575. These data were attributed as S-57 objects for submittal.

<b>SHORELINE</b>		
<b>Developments/AWOIS - Mileage</b>	0	
<b>Shoreline/Nearshore Investigation – Mileage (LNM)</b>	27.18	
<b>Total # of Investigated Items</b>	34	
<b>Total Bottom Samples</b>	11	
<b>Total SNM</b>	0	
<b>Specific Dates of Acquisition</b>		04/29/2006 - 05/17/2006
<b>Specific Dn#s of Acquisition</b>		119 - 137

*Table 1. H11575 Survey Statistics obtained from H11575\_Data\_Log.xls*

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

This hydrographic survey was not completed as specified by Hydrographic Survey Letter Instructions OPR-O190-FA, dated March 29<sup>th</sup>, 2006 and Change No. 1, dated April 27<sup>th</sup>, 2006. Due to the inoperability of the FAIRWEATHER survey launches during the time of acquisition, it was not possible to collect shallow water multi-beam echosounder data. Therefore, the survey does not comply with the Letter Instruction’s call for 100 percent multibeam coverage up to the 8-meter depth contour. No shallow water multibeam data are submitted for survey H11575.

Shoreline verification was completed in compliance with the Letter Instructions and Change No. 1. Following correspondence with the Pacific Hydrographic Branch and HSD Operations Branch, it was decided that the verified shoreline files would be submitted independent of bathymetric data. Due to the lack of a singlebeam echosounder or the availability of a multibeam echosounder equipped launch, it was not possible to conduct complete investigations of several lidar items or disprovals of a number of charted (17404, 17406) features. The lidar and charted features requiring further investigation from survey H11575 were sent to the NOAA Ship RAINIER to be addressed during their 2007 field season. RAINIER’s findings regarding these further investigation features will be submitted with a new survey number under project OPR-O190-RA-07.

A complete description of data acquisition/processing systems and survey vessels along with quality control procedures and data processing methods are included and described in the *OPR-O190-FA-06 Data Acquisition and Processing Report (DAPR)*<sup>2</sup>, submitted under separate cover.

### **B1. Equipment and Vessels**

Equipment and vessels used for data acquisition and survey operations during this survey are listed below in Table 2.



	MonArk	Ambar 700
<b>Hull Registration Number</b>	1706	2302
<b>Builder</b>	MonArk	Marine Silverships, Inc
<b>Length Overall</b>	17'	23'
<b>Beam</b>	7'2"	9' 4"
<b>Draft, Maximum</b>	1' 3"	1' 4"
<b>Cruising Speed</b>	20 knots	22 knots
<b>Max Survey Speed</b>		
<b>Primary Echosounder</b>		
<b>Sound Velocity Equipment</b>		
<b>Attitude &amp; Positioning Equipment</b>		
<b>Type of operations</b>	Shoreline	Shoreline, Bottom Samples

*Table 2: Vessel Inventory*

No vessel configurations used during data acquisition deviated from the DAPR.

## **B2. Quality Control**

### **Data Quality Factors**

#### **UNUSUAL CONDITIONS**

Rough sea conditions off the Northwest corner of St. Joseph Island prevented the verification or disproval of a number of lidar investigation items and source shoreline features.

## **C. HORIZONTAL AND VERTICAL CONTROL**

A complete description of horizontal and vertical control for survey H11575 can be found in the *OPR-0190-FA-06 Horizontal and Vertical Control Report (HVCR)*,<sup>3</sup> 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 (323 kHz), Biorka Island (305 kHz), Level Island (295 kHz), and Gustavus (288 kHz).

Distances from the U.S. Coast Guard beacons created weak signal to noise ratios for the DGPS corrections within the project area. Occasionally the corrector signal from a beacon would be lost. The loss of signal did not appear to influence the collection of detached and generic positions during shoreline acquisition.

### 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 H11575 during acquisition.

FAIRWEATHER personnel installed one Sutron 8210 “bubbler” tide gauge (Gauge #15 S/N 023512) at the tertiary station listed below. The gauge was installed in order to provide information to the 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

*Table 3. Tide Gauge Information*

A request for delivery of final approved water level data (smooth tides) for survey H11575 was forwarded to N/OPS1 on May 31, 2006 in accordance with the *Field Procedures Manual v2.1 Beta*, dated December, 2005 (FPM). A copy of the request is included in Appendix V.<sup>4</sup>

The Pacific Hydrographic Branch received the Tide Note for Hydrographic Survey H11575 on November 7, 2006. Final approved water level data were received by the FAIRWEATHER on April 24, 2007 for the tertiary tide station Steamboat Bay, AK (945-0578). The Tide Note for Hydrographic Survey H11575 and ancillary correspondence are included in Appendix V.

As per the Letter Instructions, all data were reduced to MLLW using the final approved water levels (smooth tides) from station Steamboat Bay, AK by applying tide file 945-0578 and time and height correctors through the zone corrector file H11575CORF.zdf. It will not be necessary for the Pacific Hydrographic Branch to reapply the final approved water levels (smooth tides) to the survey data during final processing.

## **D. RESULTS AND RECOMMENDATIONS**

### **D.1 Chart Comparison**

#### **Automated Wreck and Obstruction Information System (AWOIS) Investigations**

There were 3 AWOIS items assigned for investigation to survey H11575<sup>5</sup>. One item was fully investigated and updated in Pydro; a description of the AWOIS investigation methods is included in H11575\_Survey\_Features.pdf located in Appendix II.

#### **Dangers to Navigation**

One danger to navigation (DTON), a new submerged rock with a depth of 0.58 meters, was found during shoreline acquisition. The DTON is located off the north shore of Roller Bay at the following coordinates: 55-31-46.455N, -133-45-03.526W. It was reported to the Mapping and Charting Division for final submission to the Seventeenth Coast Guard District on May 1, 2007. A copy of the preliminary Danger to Navigation Report is included in Appendix I.<sup>6</sup>

### **D.2 Additional Results**

#### **Shoreline Source**

Source shoreline for this sheet was taken from photogrammetric survey AK0201 (NAD 83) GC-10545 and AK0503 (NAD 83) GC-10583 at the scale of 1:20,000. The CFF shoreline was imported into CARIS Notebook 2.2 as an editable layer named H11575\_Composite\_Source.hob that was cropped from a project wide source shoreline HOB file.

Lidar features from junction survey H11208 that were defined as source shoreline were imported into CARIS Notebook 2.2 and added to the H11575\_Composite\_Source.hob.<sup>7</sup> Lidar features defined as requiring further investigation were inserted into Notebook as a temporary Lidar\_Investigation.hob file to distinguish these features from Lidar Source features on the shoreline acquisition boat sheets.

Features from the current editions of charts 17404 and 17406 that were not depicted by the source shoreline data were also digitized in CARIS Notebook into the H11575\_Composite\_Source.hob file.

Chart Evaluation File (CEF) investigation items were imported into Notebook as a .HOB file to be used for reference, not for verification.

All source features were imported and attributed in Notebook according to IHO Standard 57 (S57). The SORIND and SORDAT fields for the source features were propagated with the information specific to the source type: 1) GC number and flight date for CFF items, 2) Lidar Survey number and final date of survey for Lidar items and 3) Chart number and Edition date for charted items.

## 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 Trimble TerraSync 2.4.1 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*.<sup>8</sup> In addition, annotations describing shoreline were recorded on hard copy plots of the digital shoreline.

## Shoreline Data Processing

Positions acquired during shoreline verification operations were processed in GPS Pathfinder Office 3.0 and inserted into Pydro using the Generic GPs/DPs Import tool and database import function. Features were entered as Detached Positions (DPs) when tide correction was required and as Generic Positions (GPs) if no tide correction was needed. The DPs and GPs indicate new features, revisions to features, or features not found during shoreline verification (disprovals). All features in Pydro were S57 attributed and resolved according to Pydro flagging logic.

An original composite source file (H11575\_Original\_Composite\_Source.hob) was saved prior to being edited and will be submitted with the survey. All edits to existing source shoreline features following shoreline acquisition were made in the H11575\_Composite\_Source.hob, with CFF and charted features modified or deleted as necessary.

All accepted and primary detached and generic positions, including AWOIS investigation items, were exported from Pydro as .xml files. The XML files were imported into CARIS Notebook 2.2 as two separate stand alone .hob files based on their status as shoreline updates or disprovals. These were named H11575\_Updates.hob and H11575\_Disprovals.hob.

Following shoreline acquisition, the Lidar investigation features were copied from the temporary Lidar\_Investigation.hob into the H11575\_Composite\_Source.hob file and were processed in the same manner as Lidar source features.

An original composite source file (H11575\_Original\_Composite\_Source.hob) was saved prior to being edited and will be submitted with the survey. All edits to existing source shoreline features following shoreline acquisition were made in the H11575\_Composite\_Source.hob, with CFF and charted features modified or deleted as necessary.<sup>9</sup>

Field notes made by the Hydrographer on the boat sheets and DP forms were transferred to the remarks field for each feature. A marker note layer was created under the H11575\_Composite\_Source.hob layer to include any non-feature specific notes or photos for the cartographer.

If a source feature was edited, the SORIND and SORDAT attribute fields were modified to reflect the survey number (US,US,graph,H11575) and final survey date. Unmodified source shoreline features were left with their original SORIND and SORDAT values. The SORIND/SORDAT information for shoreline features included in the final Notebook .HOB files is included in Table 4.

Shoreline Source	SORIND	SORDAT
RSD	US,US,graph,GC10583	20030501
RSD	US,US,graph,GC10545	20030806
RNC	US,US,graph,Chart17404	20000624
RNC	US,US,graph,Chart17406	20040207
Lidar	US,US,graph,H11208_KRL	20040824
Survey	US,US,graph,H11575	20060517

Table 4. SORIND/SORDAT Attribution for Shoreline Features

For a more detailed description of shoreline data processing refer to the DAPR.

### Source Shoreline Changes, New Features and Charted Features

Significant changes to the coastline of St. Joseph Island were noted during shoreline verification. Large discrepancies were present between the RSD CFF Mean High Water (MHW) and the Charted (17404) MHW line. The CFF MHW indicated that on the Northwest coast, the MHW line had advanced up to 300 meters seaward of what was currently charted (Figure 2). On the Southeast coast of the island, in the vicinity of 55°35'13" N, 133°43'04" W, the CFF MHW line has advanced inland approximately 150 meters than charted (Figure 3). The Hydrographer recommends the CFF MHW line supersede the charted Coastline.<sup>10</sup>

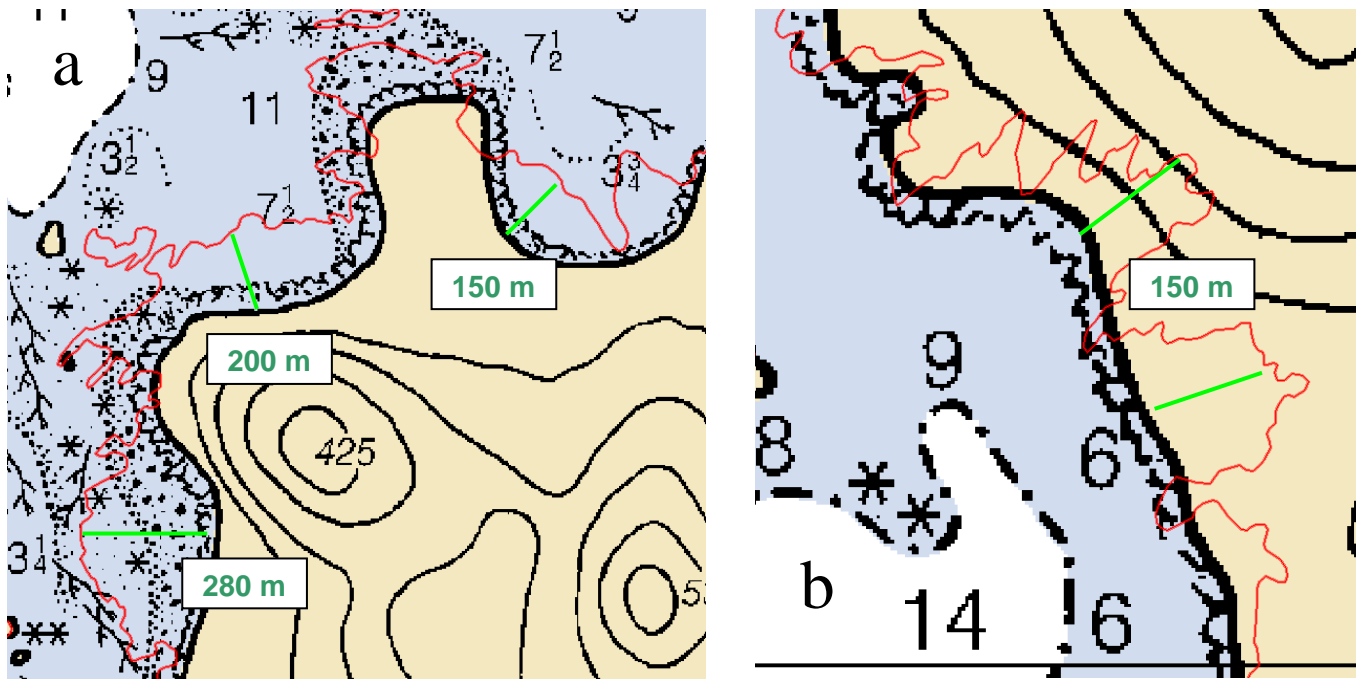


Figure 2(a). NOAA Chart 17404 serves as the background, zoomed into the Northwest corner of St. Joseph Island. 2(b). NOAA Chart 17404, zoomed into the Southeast coast of St. Joseph Island. The red line represents the CFF Mean High Water (MHW) line digitized by RSD from aerial photos. The green lines and measurements represent the approximate discrepancy in meters between the charted MHW and CFF MHW.

An error in tide correction occurred in Pydro for DP 21221, a new submerged rock located at 55°34'51.5" N, 133°42'27.62" W on the south coast of St. Joseph Island. The observed depth was measured visually at 1.50 meters. Following application of approved tides in Caris HIPS to all DP lines, a tide correction value of -0.29 meters was calculated. The corrected depth should have appeared as 1.21 meters next to the "Depth" button in Pydro's Editor Window, however, the depth value that appeared was 0.70 meters. Despite multiple re-applications of tide correctors in Caris HIPS, there was no change in this error. None of the other DP items in the Pydro .PSS file experienced problems with tide correcting the observed depths.

Although, it was not possible to correct the depth value in Pydro, the VALSOU field of the corresponding feature in Caris Notebook was manually corrected by the Hydrographer. The new submerged rock feature at the above coordinates in the Notebook HOB file titled H11575\_Updates, has the correct depth of 1.21 meters. Since approved tides have already been applied in the field, it is not necessary for the processing branch to overwrite the survey updates layer, which was imported from a Pydro XML.<sup>11</sup>

The charted (17406) wharf and pier located at the base of Steamboat Bay are no longer operational and are scheduled for demolition in the near future. The Hydrographer recommends charting the wharf and pier as ruins.<sup>12</sup>

### **Shoreline Recommendations**

The Hydrographer recommends that the shoreline depicted in the CARIS Notebook files and final sounding files supersede and complement shoreline information compiled on the CFF and charts.<sup>13</sup>

A survey feature report was generated in Pydro which includes additional remarks and recommendations for significant new or modified source features. The file is titled H11575\_Survey\_Features.pdf and is located in Appendix II.<sup>14</sup>

A number of charted (17404, 17406) features and lidar items within the survey area are in need of full disapproval investigations. Source features requiring further investigation were identified with comments in the "Remarks" field in Caris Notebook and have been sent to the NOAA Ship RAINIER to be addressed during their 2007 field season.<sup>15</sup>

## Aids to Navigation

Survey H11575 included two (2) aids to navigation (ATONs). Both ATONs were noted during shoreline acquisition and were found to serve their intended purpose.

The following fixed ATONs were positioned using static GPS survey methods, see the HVCR for further information.<sup>16</sup>

Light List Name	Light List Number	NAD83 (CORS 96) (EPOCH:2003.0000)		Ellipsoid Ht. (m) (Pk to Pk Err. (m))	Geoid03 Approx. MSL Ht. (m) (Pk to Pk Err. (m))	Satellite Ephemeris File
		N. Latitude (Pk to Pk Err. (m))	W. Longitude (Pk to Pk Err. (m))			
POINT INCARNATION	24645	55° 33' 15.26353" (0.081)	133° 37' 22.23820" (0.150)	6.118 (0.111)	7.713 (0.114)	Rapid
CAPE ULITKA	24650	55° 33' 45.19689" (0.127)	133° 43' 43.34529" (0.135)	31.429 (0.288)	32.891 (0.289)	Rapid

*Table 5. Horizontal and Vertical Control Data for H11575 ATONs*

## Bottom Samples

Eleven (11) bottom samples were collected on April 30, 2006 (DN 120) and are included as seabed classifications along with the other S57 features in the Pydro Preliminary Smooth Sheet. The bottom sample positions were also imported to the Notebook H11575\_Updates.hob file.<sup>17</sup>

It was not possible to complete all planned bottom samples due to water depth, rough sea conditions and malfunctioning of the bottom sampler.

## 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 Review 2006	May 5, 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 3, 2006	N/CS34, N/OPS1

## Revisions Compiled During Office Processing and Certification

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- <sup>1</sup> Survey H11575 was canceled and compilation of data from the survey is included in Rainier HCell H11690. All data from H11575 is attributed with the original SORDAT. The SORIND was changed to reflect survey H11690. The Descriptive report is being included and endnoted for reference.
- <sup>2</sup> Filed with project records.
- <sup>3</sup> Filed with project records.
- <sup>4</sup> Attached to this report.
- <sup>5</sup> The DR states that three AWOIS items were assigned but only one item, AWOIS 53343, falls within the sheet limits and was investigated. See endnote 23 in Descriptive Report for H11690 for results of the investigation of AWOIS item 53343.
- <sup>6</sup> See attached Danger to Navigation Report.
- <sup>7</sup> 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.
- <sup>8</sup> Filed with hydrographic records.
- <sup>9</sup> H11575\_Update\_Office .hob file was created during the SAR to update several features and was also used during compilation.
- <sup>10</sup> CFF shoreline has been applied to chart.
- <sup>11</sup> The error in tide correction for Pydro DP21221, a new submerged rock located at 55°34'51.5" N, 133°42'27.62" W, was also corrected in office processing when approved water levels were re-applied. The correct depth should now read 1.41 meters. Pydro and notebook files were updated and the correct depth is reflected in the HCell.
- <sup>12</sup> See endnote 21 to the Descriptive Report for survey H11690.
- <sup>13</sup> Concur
- <sup>14</sup> The Survey Feature Report is filed with the hydrographic records. Note: the survey feature report does not include all features from H11575. 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 H11575 have come directly from CARIS Notebook, which is the official features deliverable for this survey.
- <sup>15</sup> See endnote 25 in Descriptive Report for H11690.
- <sup>16</sup> Chart ATONs according to latest ATONIS information.
- <sup>17</sup> See endnote 32 in Descriptive Report for H11690.



# H11690 DTONS

**Registry Number:** H11690  
**State:** Alaska  
**Locality:** Gulf of Esquibel  
**Sub-locality:** Arriaga Passage  
**Project Number:** OPR-O190-RA-07  
**Survey Dates:** 05/22/2007 - 07/03/2007

## Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
17404	14th	10/01/2008	1:40,000 (17404_1)	USCG LNM: 10/23/2007 (01/05/2010) NGA NTM: None (01/16/2010)
17406	7th	02/01/2004	1:40,000 (17406_1)	USCG LNM: 05/24/2005 (01/05/2010) NGA NTM: None (01/16/2010)
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	10.28 m	55° 30' 44.8" N	133° 45' 08.2" W	---
1.2	Shoal	17.71 m	55° 34' 39.7" N	133° 41' 18.6" W	---
1.3	Shoal	7.47 m	55° 35' 06.2" N	133° 44' 04.5" W	---
1.4	Shoal	5.31 m	55° 33' 15.0" N	133° 36' 33.1" W	---
1.5	Shoal	4.87 m	55° 33' 01.8" N	133° 45' 11.8" W	---

## **1 - Danger To Navigation**

## 1.1) Profile/Beam - 643/2 from h11690 / 1006\_reson8101\_hvf / 2007-142 / 526\_2206

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 30' 44.8" N, 133° 45' 08.2" W  
**Least Depth:** 10.28 m (= 33.71 ft = 5.618 fm = 5 fm 3.71 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh) [None] ; TVU (TPEv) [None]  
**Timestamp:** 2007-142.22:07:58.570 (05/22/2007)  
**Survey Line:** h11690 / 1006\_reson8101\_hvf / 2007-142 / 526\_2206  
**Profile/Beam:** 643/2  
**Charts Affected:** 17406\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 530\_1, 50\_1

#### Remarks:

Designated Sounding represents DTON

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h11690/1006_reson8101_hvf/2007-142/526_2206	643/2	0.00	000.0	Primary

#### Hydrographer Recommendations

Chart shoal sounding as dangerous rock

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

5 ½fm (17406\_1, 17400\_1, 16016\_1, 530\_1)

5fm 3ft (531\_1)

10.3m (500\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Sounding (SOUNDG)  
**Attributes:** QUASOU - 6:least depth known  
 SORDAT - 20070724  
 SORIND - us,us,graph,H11690

TECSOU - 3:found by multi-beam

VERDAT - 12:Mean lower low water

## Office Notes

Concur. Charted and included in HCell as UWTROC with depth of 10.241 meters (5 fms 3 ft.).

### Feature Images

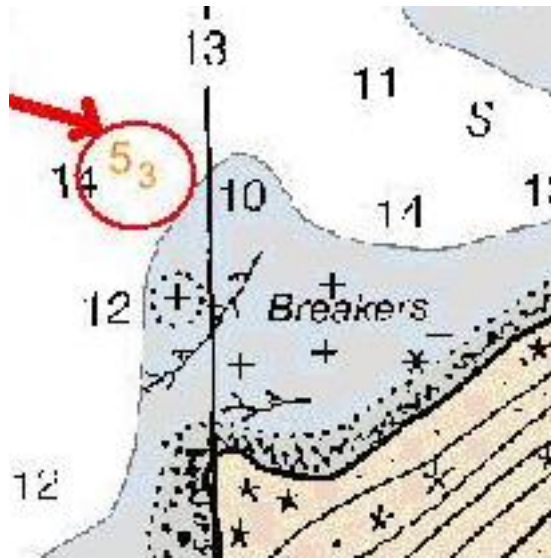


Figure 1.1.1

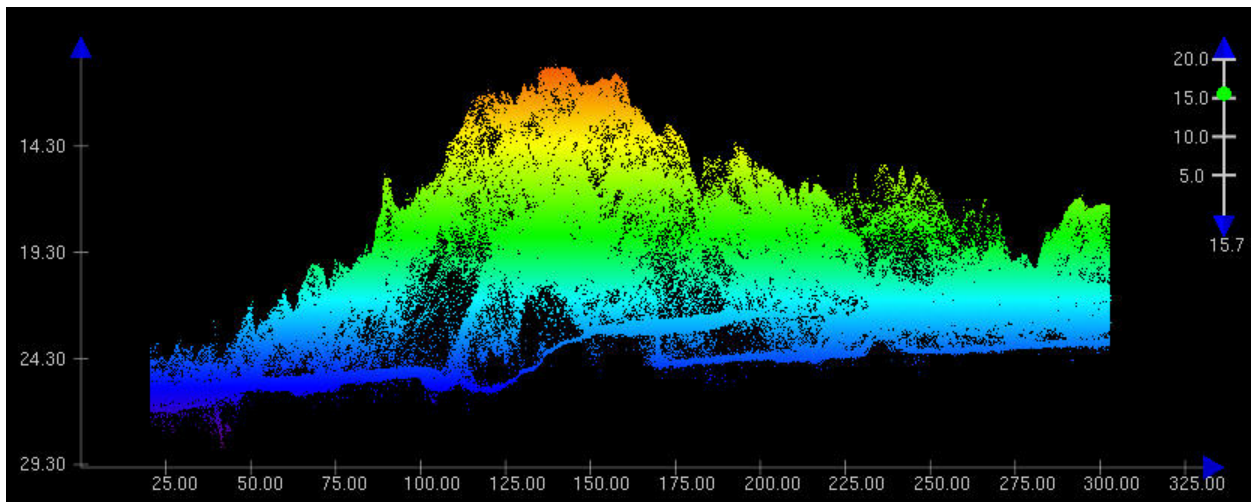


Figure 1.1.2

## 1.2) Profile/Beam - 1613/100 from h11690 / 1006\_reson8101\_hvf / 2007-156 / 325\_1909

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 34' 39.7" N, 133° 41' 18.6" W  
**Least Depth:** 17.71 m (= 58.09 ft = 9.682 fm = 9 fm 4.09 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh) [None] ; TVU (TPEv) [None]  
**Timestamp:** 2007-156.19:18:19.916 (06/05/2007)  
**Survey Line:** h11690 / 1006\_reson8101\_hvf / 2007-156 / 325\_1909  
**Profile/Beam:** 1613/100  
**Charts Affected:** 17404\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 530\_1, 50\_1

#### Remarks:

Designated Sounding represents DTON

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h11690/1006_reson8101_hvf/2007-156/325_1909	1613/100	0.00	000.0	Primary

#### Hydrographer Recommendations

Chart shoal sounding as dangerous rock

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

9 ½fm (17404\_1, 17400\_1, 16016\_1, 530\_1)

9fm 4ft (531\_1)

17.7m (500\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Sounding (SOUNDG)  
**Attributes:** QUASOU - 6:least depth known  
 SORDAT - 20070724  
 SORIND - us,us,graph,H11690

TECSOU - 3:found by multi-beam

VERDAT - 12:Mean lower low water

## **Office Notes**

Concur. Charted and included in HCell as UWTROC with depth of 17.739 meters (9fms 4 ft.).

### Feature Images

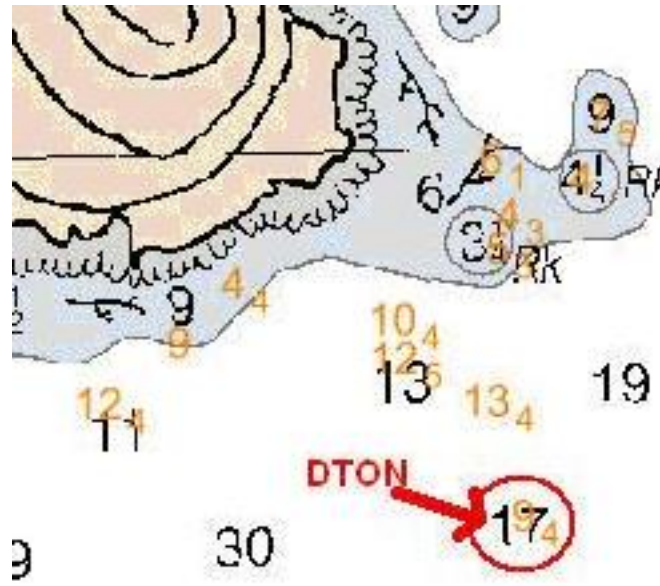


Figure 1.2.1

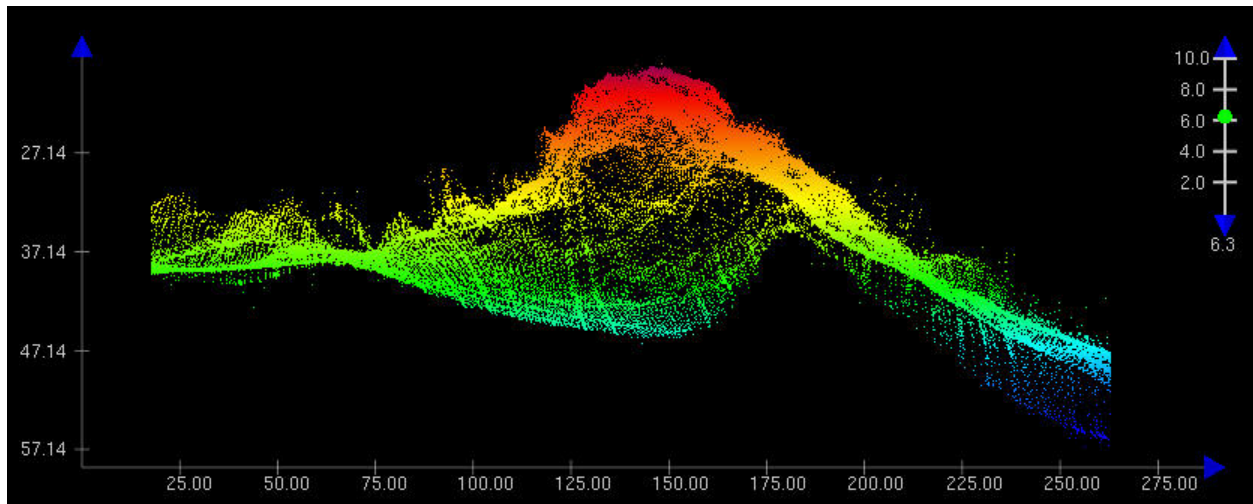


Figure 1.2.2



### 1.3) Profile/Beam - 1363/27 from h11690 / 1016\_reson8125\_hvf / 2007-163 / 430\_1740

## DANGER TO NAVIGATION

### Survey Summary

**Survey Position:** 55° 35' 06.2" N, 133° 44' 04.5" W  
**Least Depth:** 7.47 m (= 24.50 ft = 4.084 fm = 4 fm 0.50 ft)  
**TPU ( $\pm 1.96\sigma$ ):** **THU (TPEh)** [None] ; **TVU (TPEv)** [None]  
**Timestamp:** 2007-163.17:46:31.048 (06/12/2007)  
**Survey Line:** h11690 / 1016\_reson8125\_hvf / 2007-163 / 430\_1740  
**Profile/Beam:** 1363/27  
**Charts Affected:** 17404\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 530\_1, 50\_1

#### Remarks:

Designated Sounding represents DTON

### Feature Correlation

Address	Feature	Range	Azimuth	Status
h11690/1016_reson8125_hvf/2007-163/430_1740	1363/27	0.00	000.0	Primary

### Hydrographer Recommendations

Chart shoal sounding as dangerous rock

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

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

4fm 0ft (531\_1)

7.5m (500\_1, 50\_1)

### S-57 Data

**Geo object 1:** Sounding (SOUNDG)  
**Attributes:** QUASOU - 6:least depth known  
 SORDAT - 20070724  
 SORIND - us,us,graph,H11690

TECSOU - 3:found by multi-beam

VERDAT - 12:Mean lower low water

## Office Notes

Concur. Charted and included in HCell as UWTROC with depth of 7.498 meters (4 fms).

### Feature Images

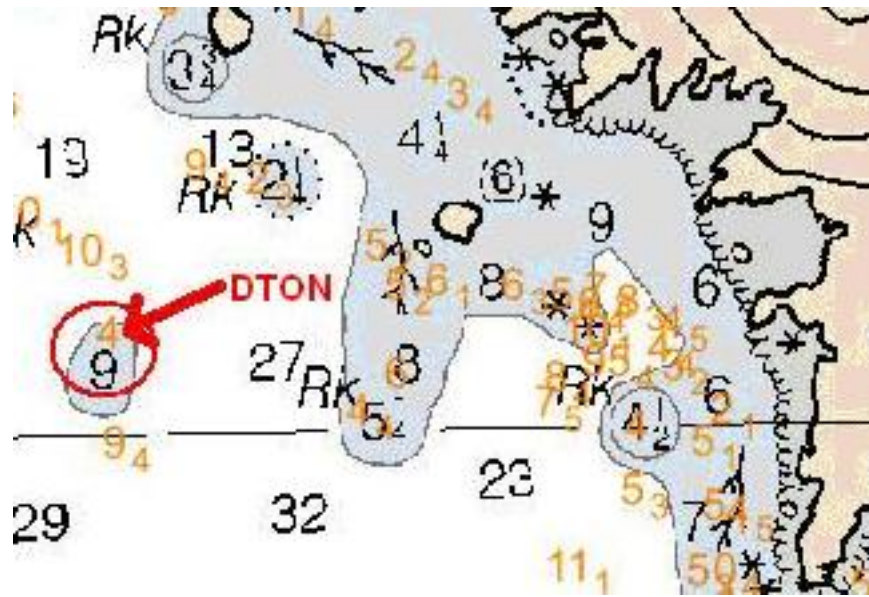


Figure 1.3.1

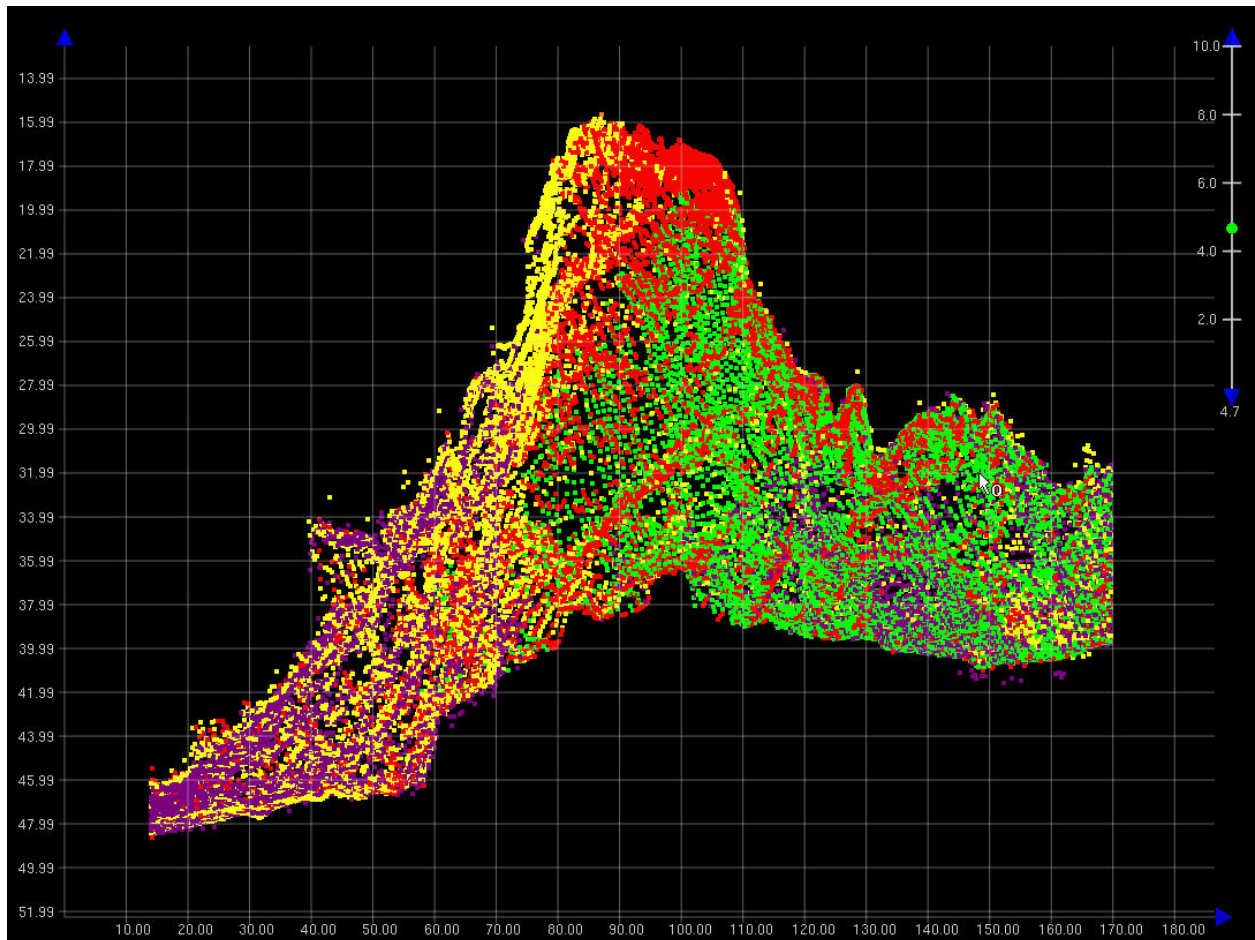


Figure 1.3.2

## 1.4) Profile/Beam - 516/102 from h11690 / 1016\_reson8125\_hvf / 2007-183 / 424\_1952

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 33' 15.0" N, 133° 36' 33.1" W  
**Least Depth:** 5.31 m (= 17.41 ft = 2.902 fm = 2 fm 5.41 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh) [None] ; TVU (TPEv) [None]  
**Timestamp:** 2007-183.19:53:20.656 (07/02/2007)  
**Survey Line:** h11690 / 1016\_reson8125\_hvf / 2007-183 / 424\_1952  
**Profile/Beam:** 516/102  
**Charts Affected:** 17404\_1, 17406\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 530\_1, 50\_1

#### Remarks:

Designated Sounding represents DTON

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h11690/1016_reson8125_hvf/2007-183/424_1952	516/102	0.00	000.0	Primary

#### Hydrographer Recommendations

Chart shoal sounding as dangerous rock

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

2  $\frac{3}{4}$ fm (17404\_1, 17406\_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 - 6:least depth known  
 SORDAT - 20070724  
 SORIND - us,us,graph,H11690

TECSOU - 3:found by multi-beam

VERDAT - 12:Mean lower low water

## Office Notes

Concur. Charted and included in HCell as UWTROC with depth of 5.304 meters (2 fms 5 ft.).

### Feature Images

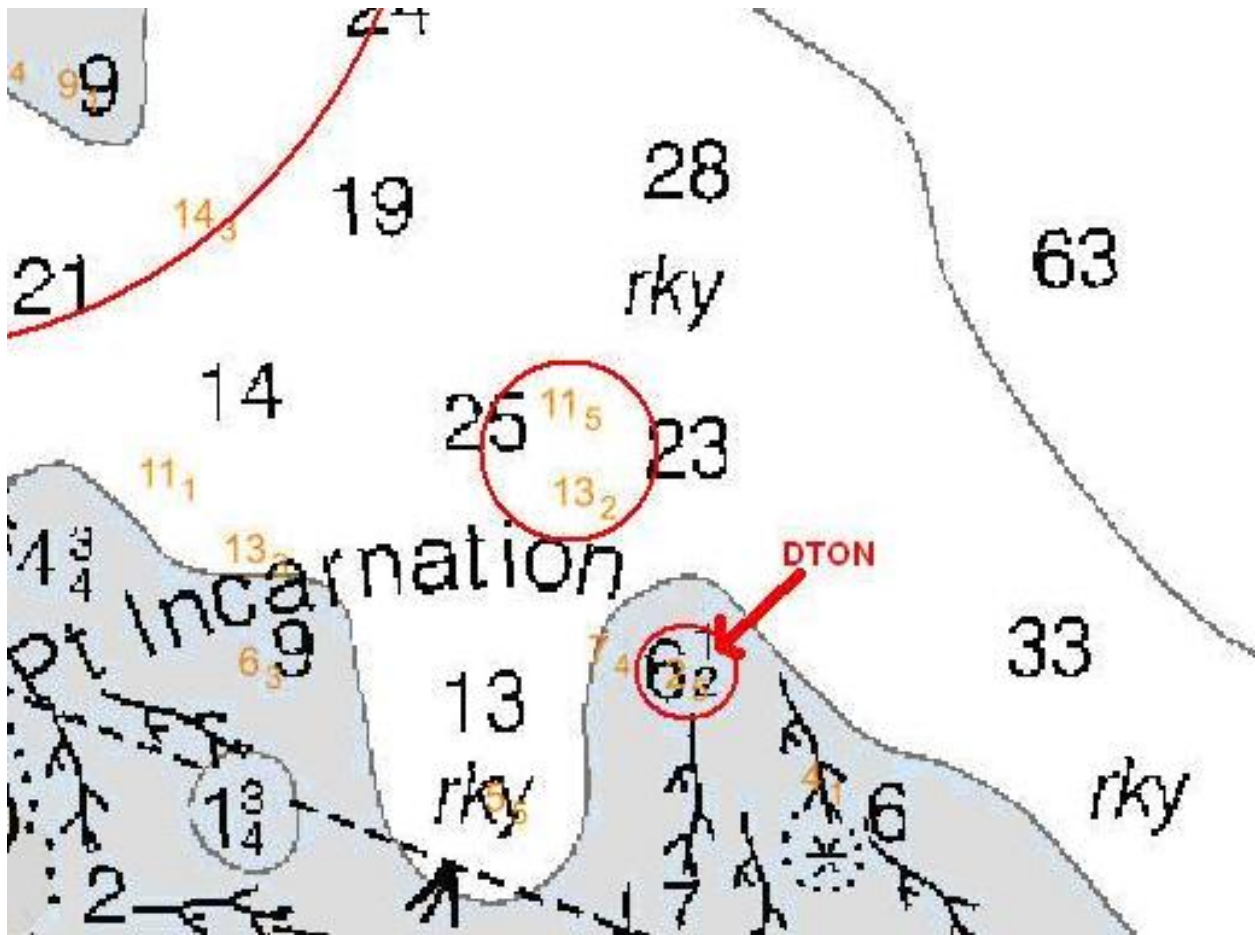


Figure 1.4.1

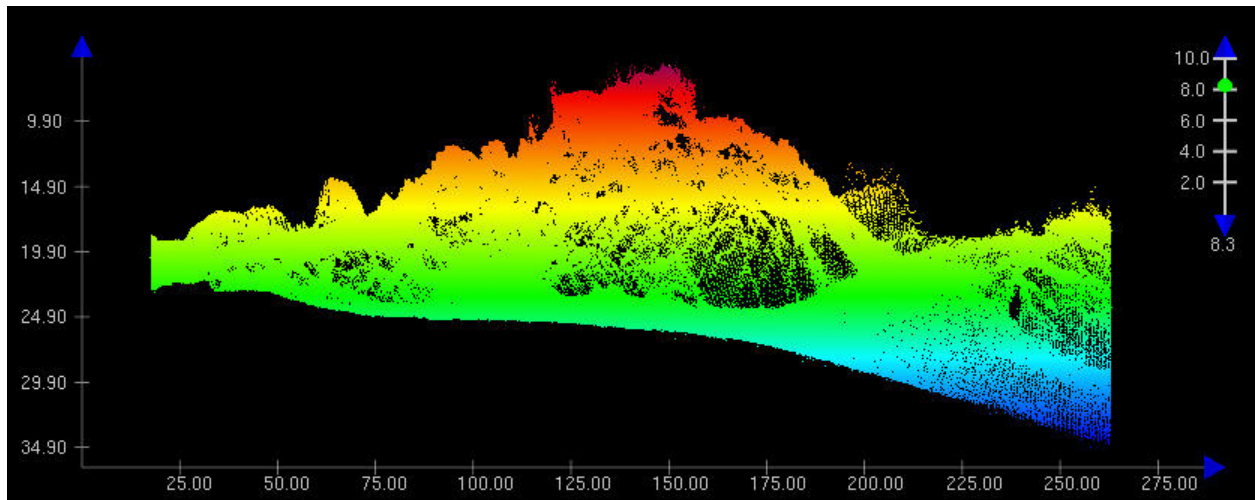


Figure 1.4.2

**1.5) Profile/Beam - 293/240 from h11690 / 1016\_reson8125\_hvf / 2007-184 / 001\_2148**

**DANGER TO NAVIGATION**

**Survey Summary**

**Survey Position:** 55° 33' 01.8" N, 133° 45' 11.8" W  
**Least Depth:** 4.87 m (= 15.96 ft = 2.661 fm = 2 fm 3.96 ft)  
**TPU (±1.96σ):** **THU (TPEh)** [None] ; **TVU (TPEv)** [None]  
**Timestamp:** 2007-184.21:49:14.375 (07/03/2007)  
**Survey Line:** h11690 / 1016\_reson8125\_hvf / 2007-184 / 001\_2148  
**Profile/Beam:** 293/240  
**Charts Affected:** 17404\_1, 17406\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 530\_1, 50\_1

**Remarks:**

[None]

**Feature Correlation**

Address	Feature	Range	Azimuth	Status
h11690/1016_reson8125_hvf/2007-184/001_2148	293/240	0.00	000.0	Primary

**Hydrographer Recommendations**

Chart shoal sounding as dangerous rock

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

2 ½fm (17404\_1, 17406\_1, 17400\_1, 16016\_1, 530\_1)  
 2fm 4ft (531\_1)  
 4.9m (500\_1, 50\_1)

**S-57 Data**

**Geo object 1:** Sounding (SOUNDG)  
**Attributes:** QUASOU - 6:least depth known  
 SORDAT - 20070724  
 SORIND - us,us,graph,H11690

TECSOU - 3:found by multi-beam

VERDAT - 12:Mean lower low water

## **Office Notes**

Concur. Charted and included in HCell as UWTROC with a depth of 4.938 meters (2 fms 4 ft.)



### Feature Images

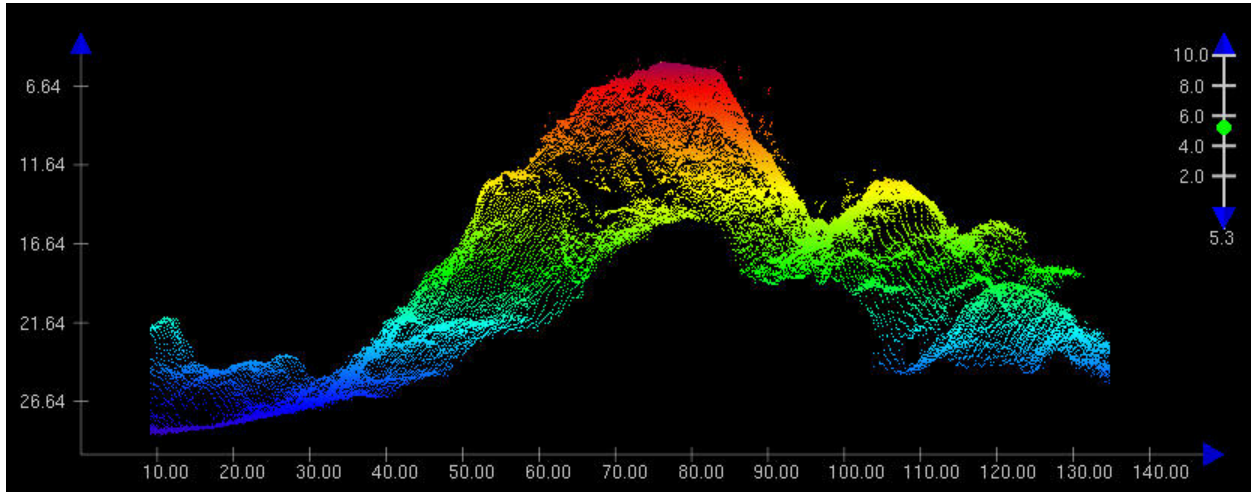


Figure 1.5.1

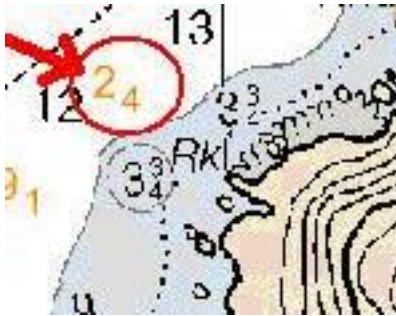


Figure 1.5.2

# H11575 Danger to Navigation Report

**Registry Number:** H11575  
**State:** Alaska  
**Locality:** West of Prince of Wales Island  
**Sub-locality:** Arriaga Passage  
**Project Number:** OPR-O190-FA  
**Survey Dates:** April 29, 2006 - May 17, 2006

## Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
17404	12th	06/24/2000	1:40,000 (17404_1)	[L]NTM: ?
17406	7th	02/01/2004	1:40,000 (17406_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	Rock	0.65 m	55° 31' 46.5" N	133° 45' 03.5" W	---

## **1 - Danger To Navigation**

**1.1) 11356****DANGER TO NAVIGATION****Survey Summary**

**Survey Position:** 55° 31' 46.5" N, 133° 45' 03.5" W  
**Least Depth:** 0.65 m (= 2.13 ft = 0.355 fm = 0 fm 2.13 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh) [None] ; TVU (TPEv) [None]  
**Timestamp:** 2006-135.16:33:16.000 (05/15/2006)  
**DP Dataset:** h11575 / fa\_trimble\_dpne\_1 / 2006-135 / tr1135\_uwtroc.mdb  
**Profile/Beam:** 6/1  
**Charts Affected:** 17404\_1, 17406\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 530\_1, 50\_1

**Remarks:**

New subm Rk, seaward ext CFF foul.

**Feature Correlation**

Address	Feature	Range	Azimuth	Status
h11575/fa_trimble_dpne_1/2006-135/tr1135_uwtroc.mdb	6/1	0.00	000.0	Primary

**Hydrographer Recommendations**

Chart new submerged rock.

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

0 ¼fm (17404\_1, 17406\_1, 17400\_1, 16016\_1, 530\_1)

0fm 2ft (531\_1)

.7m (500\_1, 50\_1)

**S-57 Data**

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** RECDAT - 20060515  
 VALSOU - 0.650 m  
 WATLEV - 3:always under water/submerged

## Office Notes

Concur. Charted and included in HCell as a UWTRC with a depth of 0.65 meters (0 fms 2 ft.).



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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

I  
DATE : October 3, 2007

HYDROGRAPHIC BRANCH: Pacific  
HYDROGRAPHIC PROJECT: OPR-0190-RA-2007  
HYDROGRAPHIC SHEET: H11690

LOCALITY: Arriaga Passage, AK  
TIME PERIOD: May 20 - July 24, 2007

TIDE STATION USED: 945-0711 Nossuk Bay, AK  
Lat. 55° 43.3'N Long. 133° 21.0' W  
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters  
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.922 meters

REMARKS: RECOMMENDED ZONING  
Use zone(s) identified as: SA227 & PAC296

Refer to attachments for zoning information.

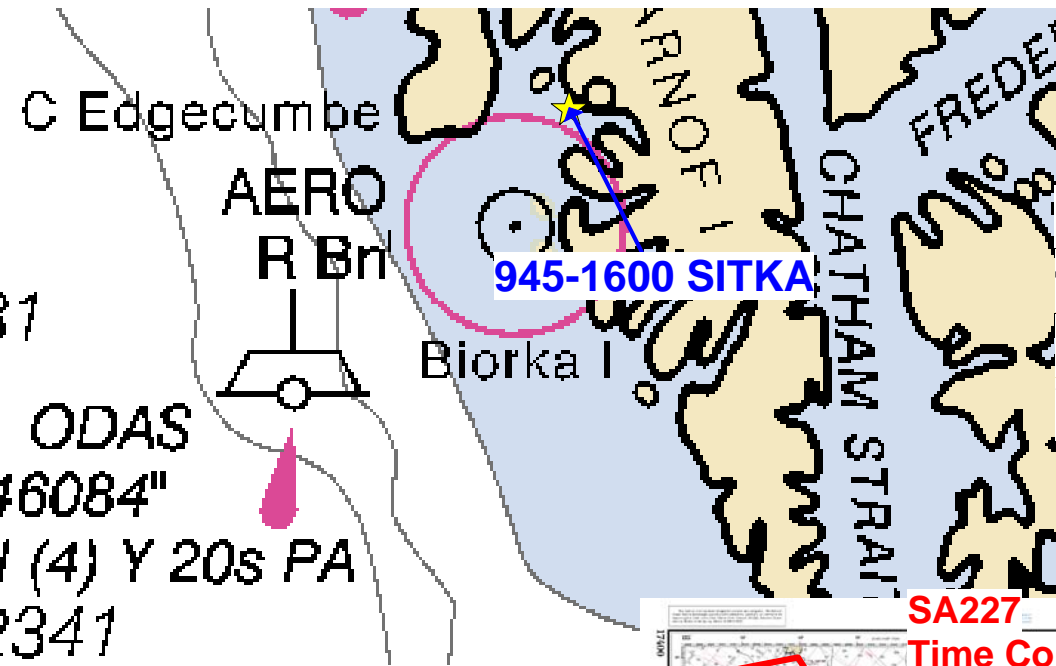
Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

Peter J. Stone

Digitally signed by Peter J. Stone  
DN: cn=Peter J. Stone, c=US, o=CO-OPS,  
ou=NOAA/NOS, email=peter.stone@noaa.gov  
Reason: I am approving this document  
Date: 2007.10.09 11:11:23 -0400

CHIEF, PRODUCTS AND SERVICES DIVISION





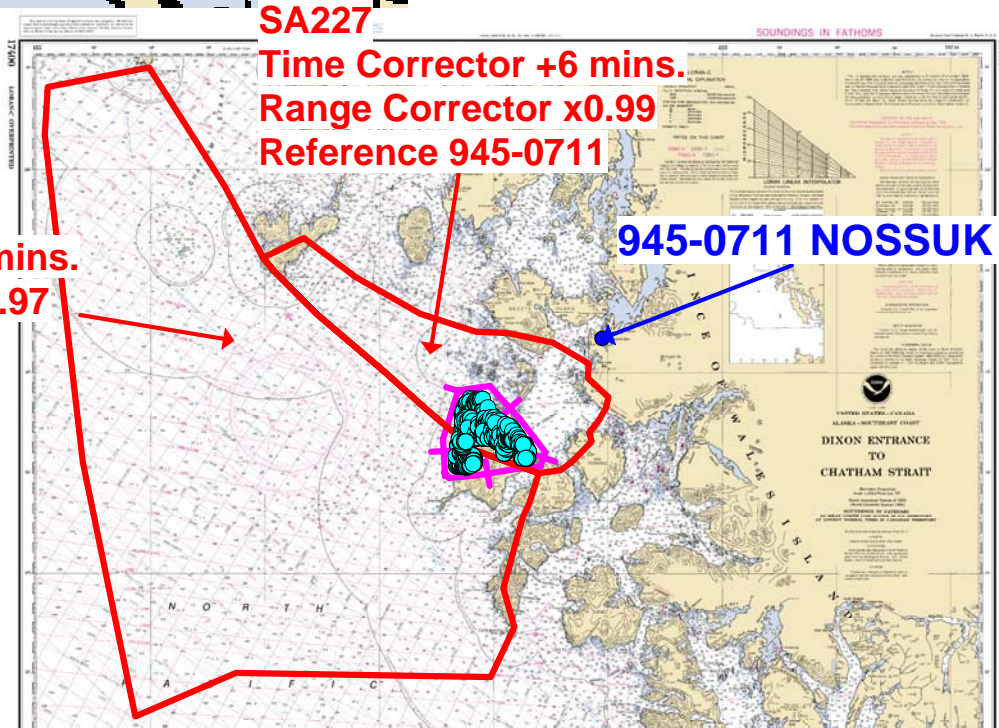
**Final Tidal Zoning  
for OPR-O190-RA-2007  
H11690  
West of Prince of Wales Island, AK**

ODAS  
16084"  
(4) Y 20s PA  
2341

**PAC296  
Time Corrector +6 mins.  
Range Corrector x0.97  
Reference 945-0711**

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

**945-0711 NOSSUK BAY**





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



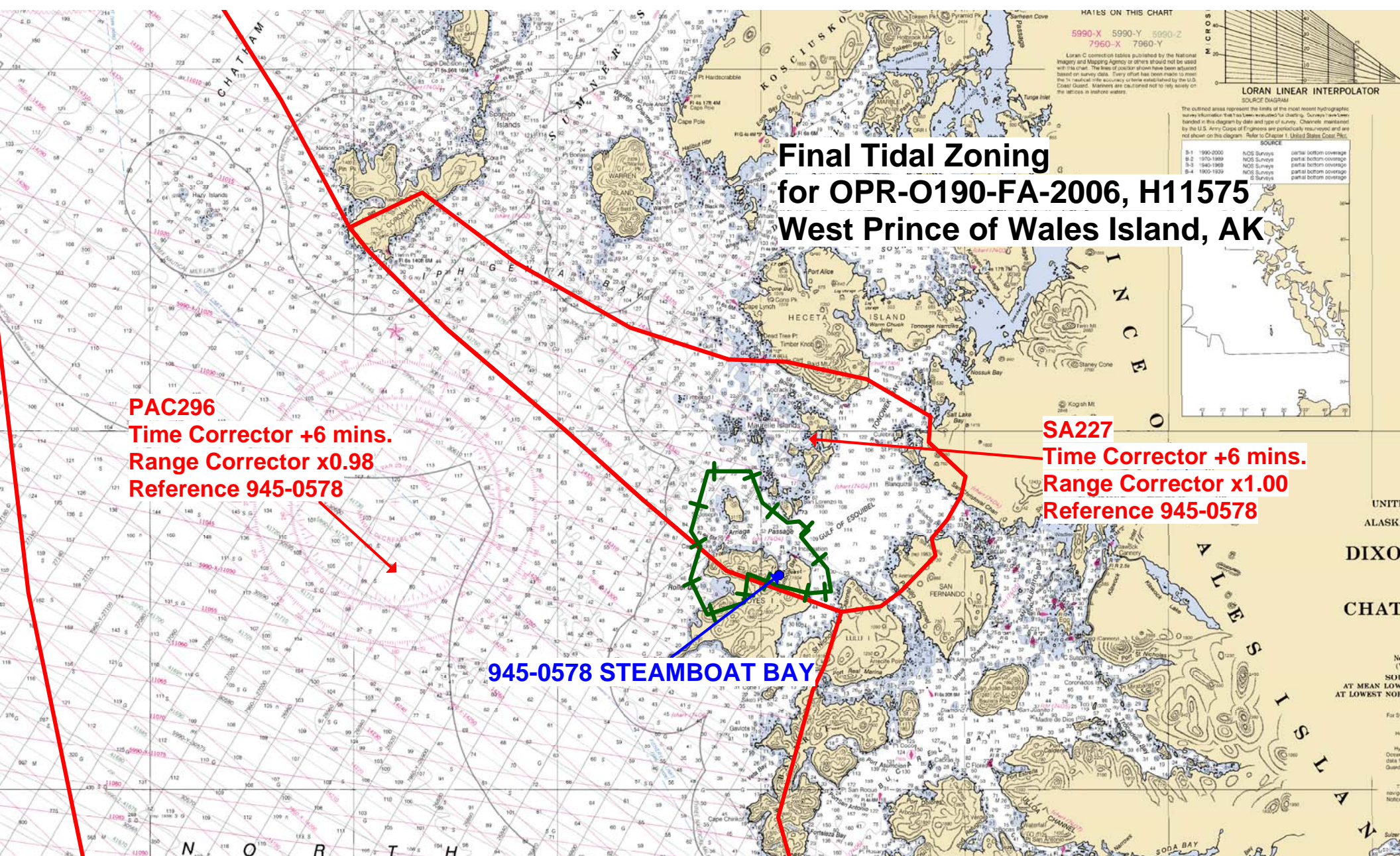


**Final tide zone node point locations for OPR-O190-FA-2006, H11575**

Format: Tide Station (in recommended order of use)  
 Average Time Correction (in minutes)  
 Range Correction  
 Longitude in decimal degrees (negative value denotes Longitude West),  
 Latitude in decimal degrees

	Tide Station Order	AVG Time Correction	Range Correction
PAC296	945-0578	+6	x0.98
-133.605919 55.243308			
-133.67527 55.159713			
-134.419361 55.166565			
-134.712992 55.093733			
-134.866171 55.517283			
-134.977374 56.055934			
-134.968794 56.134025			
-134.673184 56.166002			
-134.452424 55.972205			
-134.340174 55.854792			
-134.308032 55.832542			
-134.182589 55.761874			
-133.986584 55.667449			
-133.861141 55.603878			
-133.722631 55.53724			
-133.53479 55.499123			
-133.562653 55.448813			
-133.581915 55.425645			
-133.638205 55.307774			
-133.605919 55.243308			
SA227	945-0578	+6	x1.00
-134.221058 55.886934			
-134.340174 55.854792			
-134.308032 55.832542			
-134.182589 55.761874			
-133.986584 55.667449			
-133.861141 55.603878			
-133.722631 55.53724			
-133.53479 55.499123			
-133.47009 55.50424			
-133.436746 55.518515			
-133.380726 55.55132			
-133.386897 55.567216			
-133.361067 55.584786			

-133.338467 55.607369  
-133.331531 55.624864  
-133.391526 55.656501  
-133.388738 55.680334  
-133.493275 55.714751  
-133.624251 55.7308  
-133.719365 55.733084  
-133.880478 55.762336  
-134.068642 55.822675  
-134.221058 55.886934



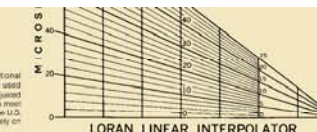
# Final Tidal Zoning for OPR-O190-FA-2006, H11575 West Prince of Wales Island, AK

**PAC296**  
**Time Corrector +6 mins.**  
**Range Corrector x0.98**  
**Reference 945-0578**

**SA227**  
**Time Corrector +6 mins.**  
**Range Corrector x1.00**  
**Reference 945-0578**

**945-0578 STEAMBOAT BAY**

**HATES ON THIS CHART**  
 5990-X 5990-Y 5990-Z  
 7960-X 7960-Y



The outlined areas represent the limits of the most recent hydrographic survey information that has been evaluated for charting. Surveys have been conducted in this diagram by date and type of survey. Channels maintained by the U.S. Army Corps of Engineers are periodically resurveyed and are not shown on this diagram. Refer to Chapter 1, United States Coast Pilot.

SOURCE	NOES Surveys	partial bottom coverage
8-1 1990-2000	NOES Surveys	partial bottom coverage
8-2 1970-1989	NOES Surveys	partial bottom coverage
8-3 1960-1969	NOES Surveys	partial bottom coverage
8-4 1900-1959	NOES Surveys	partial bottom coverage

UNITED STATES COAST AND GEODETIC SURVEY  
 ALASKA  
 DIXON  
 CHATHAM  
 SAN FERNANDO  
 STEAMBOAT BAY

**H11690 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  
ENC US5AK4CM  
RNC17404 (1:40,000)  
RNC17406 (1:40,000)  
RNC 17400 (1:229,376)

HCell compilation of survey H11690 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 H11690 were compiled to the largest scale charts in the region, 17404 and 17406, both 1:40,000. Density and distribution of soundings emulate charts 17404 and 17406. Non-bathymetric features have been generalized to chart scale.

**2. Soundings**

A survey-scale sounding feature layer, H11690\_SS, was built in CARIS BASE Editor using the following BASE surface from survey H11690:

H11690\_Office\_Combined\_5m

A shoal-biased selection was made at 1:7,500. The resultant sounding layer contains depths ranging from 0 to 147 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 H11208H and H11208I.

### 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 147 meters was used for the depth area object. Upon conversion to NOAA charting units, the depth range is 0 to 80 fathoms.

#### 3.2 Depth Contours

Depth contours at the intervals on the largest scale chart are included in the H11690\_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 H11690\_SS file have not been deconflicted against shoreline features, soundings and hydrography as all other features in the H11690\_CS file and soundings in the H11690\_SS have been. This results in conflicts between the H11690\_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 H11690\_SS.000 file contours in all cases where conflicts are found.

### 4. Meta Areas

The following Meta objects areas are included in HCell 11690:

M\_QUAL

Meta area objects were constructed on the basis of the limits of the hydrography and lidar data. Separate M\_QUAL objects were created for SWMB and lidar data.

### 5. Features

Shoreline features for H11690 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 disprovals. 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 H11690 and submitted results under survey H11575. During survey H11690, Rainier investigated features submitted by the Fairweather for further investigation, as well as charted and LIDAR features. As survey H11575 was cancelled and is not being compiled separately, features from survey H11575 are compiled into HCell H11690. The SORIND for all features, including those from H11575, is attributed with survey H11690 while the SORDAT is retained for features from survey H11575 allowing these features to be filtered by date.

In nearshore areas not covered by survey H11690, features from Lidar survey H11208 are also included in the HCell.

New rocky seabed areas were delineated using the high resolution BASE surfaces and are included in the H11690 HCell. 49 charted bottom samples were retained in HCell H11690 and 17 bottom samples were imported from the survey.

There were 5 DTONs reported from survey H11690 and 1 from survey H11575. The DTONs are charted and reflected in the HCell.

One AWOIS item, 53343, was included in both surveys H11690 and H11575.

The source of all features included in the H11690 HCell can be determined by the SORDAT and SORIND fields.

## **6. S-57 Objects and Attributes**

The H11690\_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
PILPNT	Pile
SLCONS	Piers

The H11690\_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 H11690\_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 a description of 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**

H11690 junctions to the north with survey H11691 and to the east with survey H11577. These surveys have been compiled and the junctions made. H11690 also junctions to the west with surveys H11574, respectively. The junctions with this surveys will be made when it is compiled.

## **10. QA/QC and ENC Validation Checks**

H11690 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**

- H11690 Base Cell File, Chart Units, Soundings compiled to 1:40,000
- H11690 Base Cell File, Chart Units, Soundings compiled to 1:7,500
- H11690 Base Cell File, Features compiled to 1:10,000
- H11690 Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
- H11690 Survey Outline to populate SURDEX



## 11.2 File Naming Conventions

- Chart units base cell file, chart scale soundings H11690\_CS.000
- Chart units base cell file, survey scale soundings H11690\_SS.000
- Descriptive Report package H11690\_DR.pdf
- Survey outline H11690\_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  
H11690

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.