

H12028

NOAA FORM 76-35A

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

## DESCRIPTIVE REPORT

*Type of Survey* Hydrographic Survey

*Field No.* N/A

*Registry No.* H12028

### LOCALITY

*State* Alaska

*General Locality* West of Prince of Wales Island

*Sublocality* Trocadero Bay

**2009**

### CHIEF OF PARTY

Captain Donald W. Haines, NOAA

### LIBRARY & ARCHIVES

DATE

<p style="text-align: center;">U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION</p> <p style="text-align: center;"><b>HYDROGRAPHIC TITLE SHEET</b></p>	<p>REGISTRY No</p> <p style="text-align: center;"><b>H12028</b></p>
<p><b>INSTRUCTIONS</b> – The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.</p>	<p>FIELD No: N/A</p>
<p>State <u>Alaska</u></p> <p>General Locality <u>West Prince of Wales Island</u></p> <p>Sub-Locality <u>Trocadero Bay</u></p> <p>Scale <u>1:20,000</u> Date of Survey <u>April 29 to June 9, 2009</u></p> <p>Instructions dated <u>4/8/2009</u> Project No. <u>OPR-O190-RA-09</u></p> <p>Vessel <u>Rainier (s221), RA-1 (1101), RA-2 (1103), RA3 (2803), RA-4 (2801), RA-5 (2802), RA-6 (2804),</u></p> <hr/> <p>Chief of party <u>Captain Donald W. Haines, NOAA</u></p> <p>Surveyed by <u>RAINIER Personnel</u></p> <p>Soundings by <u>Reson 8125, Reson 7125, Knudsen 320</u></p> <p>SAR by <u>Matt Andring</u> Compilation by <u>Annie Raymond</u></p> <p>Soundings compiled in <u>Fathoms</u></p>	
<p>REMARKS: <u>All times are UTC. UTM Projection (zone #8)</u></p> <p><u>The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Revisions and end notes in red were generated during office processing. Page numbering may be interrupted or non sequential.</u></p> <hr/> <p><u>All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via <a href="http://www.ngdc.noaa.gov/">http://www.ngdc.noaa.gov/</a>.</u></p>	

# Descriptive Report to Accompany Hydrographic Survey H12028

Project OPR-O190-RA-09  
West Prince of Wales Island, Alaska  
Trocadero Bay  
Scale 1:20,000  
April – June 2009  
**NOAA Ship *Rainier* (s221)**  
Chief of Party: Captain Donald W. Haines, NOAA

## A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Project Instructions OPR-O190-RA-09 dated April 8, 2009 and all other applicable direction<sup>1</sup>, with the exception of deviations noted in this report. The survey area is Trocadero Bay, Alaska and corresponds to sheet “C” in the sheet layout provided with the Project Instructions. The purpose of OPR-O190-RA-09 is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts.

Complete multibeam echosounder (MBES) coverage was achieved in the survey area in waters 8 meters and deeper. In depths less than 8 meters additional MBES coverage was acquired to identify least depths over significant features or shoals, as appropriate for this survey. Additional multibeam coverage was achieved in water depths between 8 m and 4 m that meet or exceed the project instruction requirements. Total mileage acquired by each vessel and system is reference in Table 1.

Data Acquisition Type	Hull Number with Mileage (nm)							Total
	1101	1103	2801	2802	2803	2804	S221	
VBES (main scheme)	-	-	-	-	-	-	-	-
MBES (main scheme)	42.99	-	31.71	71.01	13.89	68.30	-	227.9
Crosslines	-	-	-	-	3.1	7.31	-	10.41
Developments	-	0.85	-	-	-	-	-	0.85
Shoreline	-	-	-	-	-	-	-	-
Bottom Samples	-	-	-	-	-	-	4	4
Total Number of Items Investigated	-	-	-	-	-	-	-	-
Total Area Surveyed (sq. nm)	-	-	-	-	-	-	-	7.522

Table 1: Statistics for survey H12028

Limited Shoreline Verification was performed for the survey area seaward of the Navigable Area Limit Line (NALL) for H12028, as per section 3.5.5 of the Field Procedures Manual April 2009 (FPM). Shoreline features were given S-57 attribution and included for submission in Notebook HOB files.

<sup>1</sup> NOS Hydrographic Surveys Specifications and Deliverables (April 2009), OCS Field Procedures Manual for Hydrographic Surveying (April 2009), and all Hydrographic Surveys Technical Directives issued through the dates of data acquisition.

Data acquisition was conducted from April 29 to June 9, 2009 (DN113 to DN160).

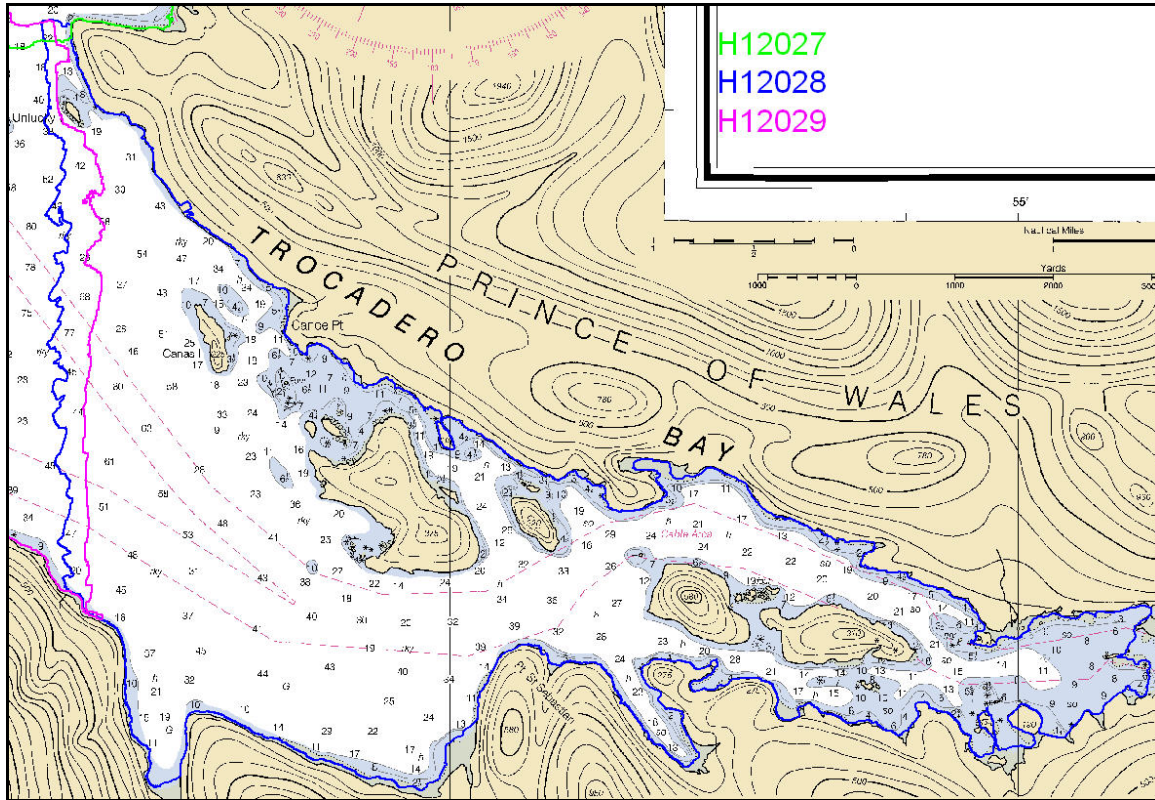


Figure 1: H12028 Survey Outline and Junctions

## 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-09 Data Acquisition and Processing Report (DAPR)*, 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.

### B.1. Equipment and Vessels

Data for this survey were acquired by the following vessels:

Hull Number	Name	Length (ft)	Draft (ft)	Acquisition Type
s221	<i>Rainier</i>	231	15.5	Bottom Samples
1101	RA-1	29	2	Reson 8125 Multibeam Echosounder
1103	RA-2	29	2	Knudsen 320M Vertical Beam Echosounder Detached Positions Bottom Samples
2803	RA-3	29	3.5	Reson 7125 Multibeam Echosounder
2801	RA-4	29	3.5	Reson 7125 Multibeam Echosounder
2802	RA-5	29	3.5	Reson 7125 Multibeam Echosounder
2804	RA-6	29	3.5	Reson 7125 Multibeam Echosounder

Table 2: Data acquisition vessels and systems for H12028

Sound speed profiles were measured in accordance with the Specifications and Deliverables using SEACAT 19+ profilers.

Multibeam vessel navigation and attitude data were measured and recorded using Applanix POS/MV 320 systems, versions 4. Vertical Beam echosounder navigation and attitude data were measured using a Trimble DSM212L GPS receiver and a TSS MAHRS system.

A complete description of survey vessels, hardware, and software systems is included in the *OPR-O190-RA-09 DAPR*.

No unusual vessel configurations were used for data acquisition.

## B.2. Quality Control

### B.2.a. Crosslines

Multibeam Echosounder (MBES) crosslines totaled 10.41 nautical miles, comprising 4.57% of main scheme MBES hydrography. The main scheme bathymetry was manually compared to the XL nadir beams in CARIS subset mode and generally agreed within 0.5 meters<sup>1</sup>.

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 2009 *Rainier Hydrographic System Readiness Review* package submitted with this survey.

### B.2.b. Final Uncertainty

Uncertainty values of submitted, finalized grids are calculated in CARIS using the “Greater of the Two” of total propagated uncertainty and standard deviation (scaled to 95%). An IHO\_1 “child” attribute layer was created for the H12028\_Final\_Combined surface in CARIS HIPS for analysis. Throughout the vast majority of the survey, uncertainty values for H12028 fall below the IHO levels as described in the NOS Specifications and Deliverables. The exception to these results occurred along very near-shore areas when using the tilted Reson 8125 sonar

configuration, refer to OPR-O190-RA-09 Data Acquisition and Processing Report for specifics<sup>2</sup>. There were also areas outside of IHO Order 1 in areas where the local geometry created a return below the seafloor, as discussed in the Data Quality section of this report under “Bottom Penetration by Outer Beams.”

**B.2.c. Junctions**

Survey H12028 junctions with H12027 and H12029, which are Sheets B and D of the same project, respectively. The sheet limits and area of overlap for multibeam surveys are shown in Figure 1.

<b>Junction Survey</b>	<b>Survey Scale</b>	<b>Date of Survey</b>	<b>Survey Location</b>
H12027	1:20,000	June 2009	Northwest
H12029	1:20,000	June 2009	West

*Table 3: Junction Surveys*

Survey H12029 was completed concurrently with survey H12028 during project OPR-O190-RA-09. Soundings from H12028 were compared with sounding data from survey H12029 in CARIS HIPS using the cursor information function. The examined area of overlap between H12028 and H12029 showed agreement within 0.5m across most depth ranges; on steep slopes and in depths exceeding 80ftms soundings generally agreed within 1m. On steep slopes where the surfaces differed by more than a meter, the cause was found to be a steep drop, with one surface reflecting the depth at the top of the ledge and the other the depth at the bottom. Adjacent nodes agreed within a meter<sup>3</sup>.

Survey H12027 was completed concurrently with survey H12028 during project OPR-O190-RA-09. Soundings from H12028 were compared with sounding data from survey H12027 in CARIS HIPS using the cursor information function. The area of overlap between H12028 and H12027 showed agreement within 0.2m throughout their common areas, across all depths<sup>4</sup>.

**B.2.d. Quality Control Checks**

MBES quality control checks were conducted as discussed in the quality control section B of the DAPR.

**B.2.e. Data Quality Factors**

Sound Speed Artifacts

Despite best efforts to conduct sufficient sound velocity casts distributed both spatially and temporally, isolated instances of inadequate sound velocity correction were observed in some areas of the survey. Figure 2 illustrates SV issues at the east end of Trocadero Bay that was consistent with the effects of surface layer warming, tidal currents, freshwater runoff and related environmental causes. All vertical offsets were observed to be less than 0.5m<sup>5</sup>. To address these sound velocity issues, the Hydrographer rejected outer beam soundings obviously in error where they were found to effect the CUBE surfaces accurate portrayal of the bottom.

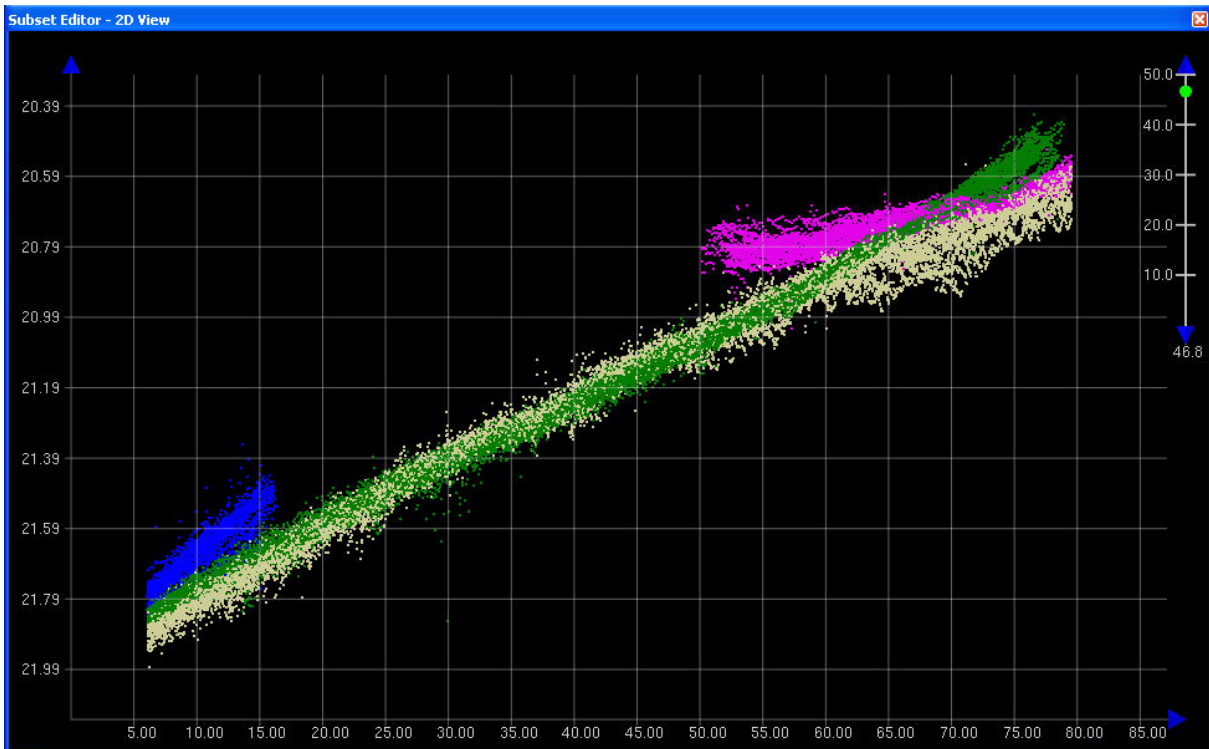
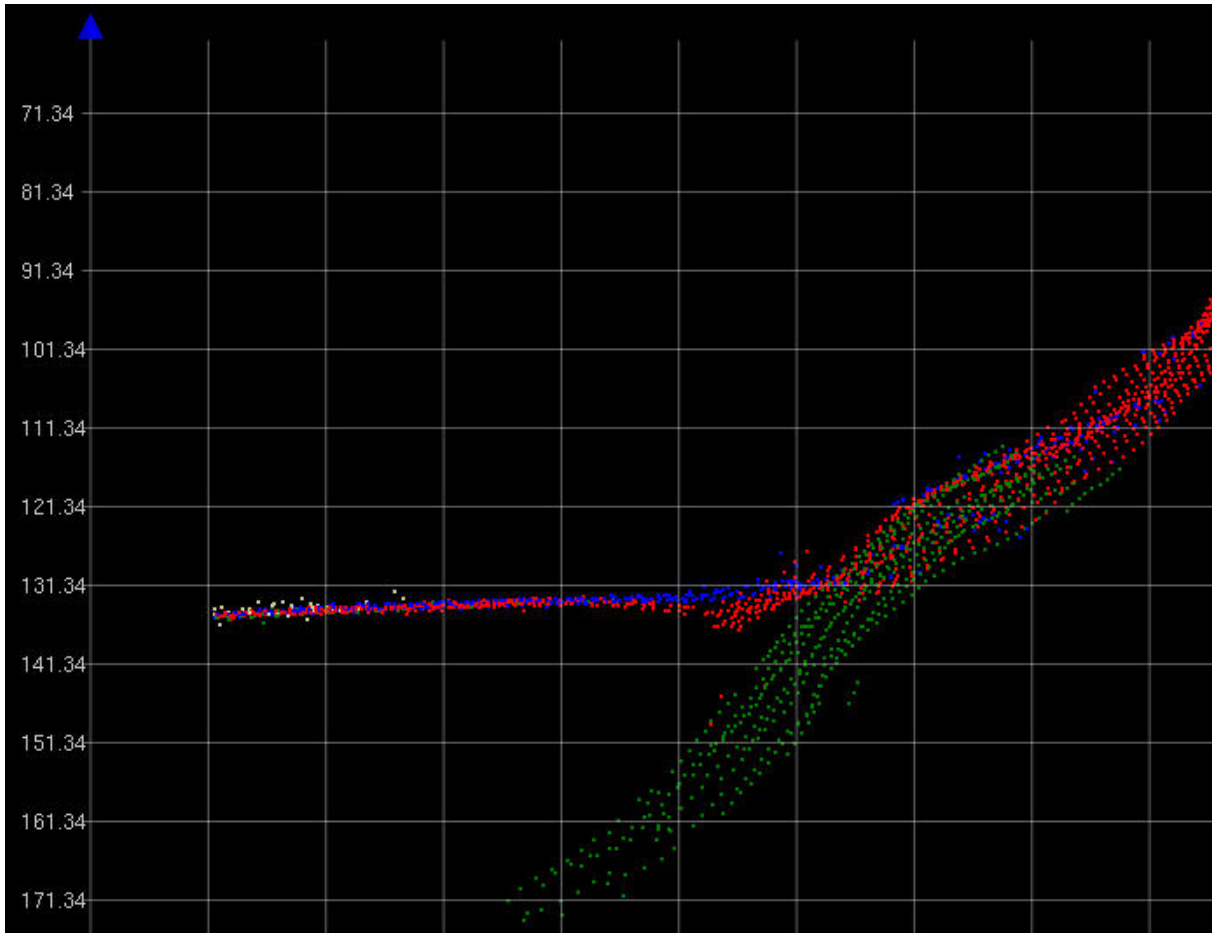


Figure 2: SV error in Subset mode

#### Bottom Penetration by Outer Beams

The bottom type found in the vicinity of San Juan Bautista contained areas of drastically-varying bottom type. In relatively deep waters at the interface of steep and apparently rocky slopes intersecting with a flat and presumably muddy flats soundings digitized below the apparent sea floor. Soundings continued to follow the trend of the steep slope and penetrate 10-20 meters beyond the real bottom. An example is shown in Figure 3 of beams that appear to penetrate the likely seafloor. This was initially theorized to be caused by differences in bottom type found in places where soft and hard (mud/rock) materials meet. The hydrographer rejected those soundings that were inconsistent with the most probable seafloor profile. Holidays produced by deleting this data are not considered navigationally significant, nor do these areas pose a threat to the mariner<sup>6</sup>. An example of this behavior was later shown to Mike Mutschler, a Reson representative. Although Mr. Mutschler could not offer the exact cause of this behavior, he stated definitively that due to the high frequencies used by the 7125 system, these errant soundings could not be caused by actual ground penetration. It was speculated that this could have been caused by a specular return from the flat seafloor striking the rock wall and then returning back to the sonar, similar to a racquetball striking the corner of the court, to give a reading with a much longer path length than the actual depth.



*Figure 3: Soundings continuing below the apparent seafloor*

#### Shallow Water Noise Bursts

At the east end of Trocadero Bay, there are numerous occurrences of a burst of noise, usually near nadir. These bursts occurred exclusively on RA5 (2802), on DN134. Due to the shallowness of the water, these nadir bursts rarely had overlapping data from another line to verify the formation, and no objects were observed in the backscatter, keeping in mind that backscatter is least useful at nadir. While the formations do not, in the opinion of the Hydrographer, look like rocks, there is no data available to disprove them in most cases and so the data was retained. Where additional lines were available, the bursts invariably proved to not be supported by the second line and were deleted. In the opinion of the Hydrographer, these bursts were caused by improper use of the “Nadir Search Gate” function of the Adaptive Gates on the Reson 7125. When the seafloor is allowed to pass outside of the Nadir Search Gate, the Reson 7125 tends to maintain the proper seafloor for the outer beams, but develops noise around nadir as it searches for the bottom because it has been told to reject the true seafloor. An alternate cause could be having the power and gain settings set incorrectly, leading to a blowout at nadir, with the outer beams appearing fine due to having sufficient attenuation, or a really low spreading coefficient set in the TVG.<sup>7</sup> See Figures 4-6.



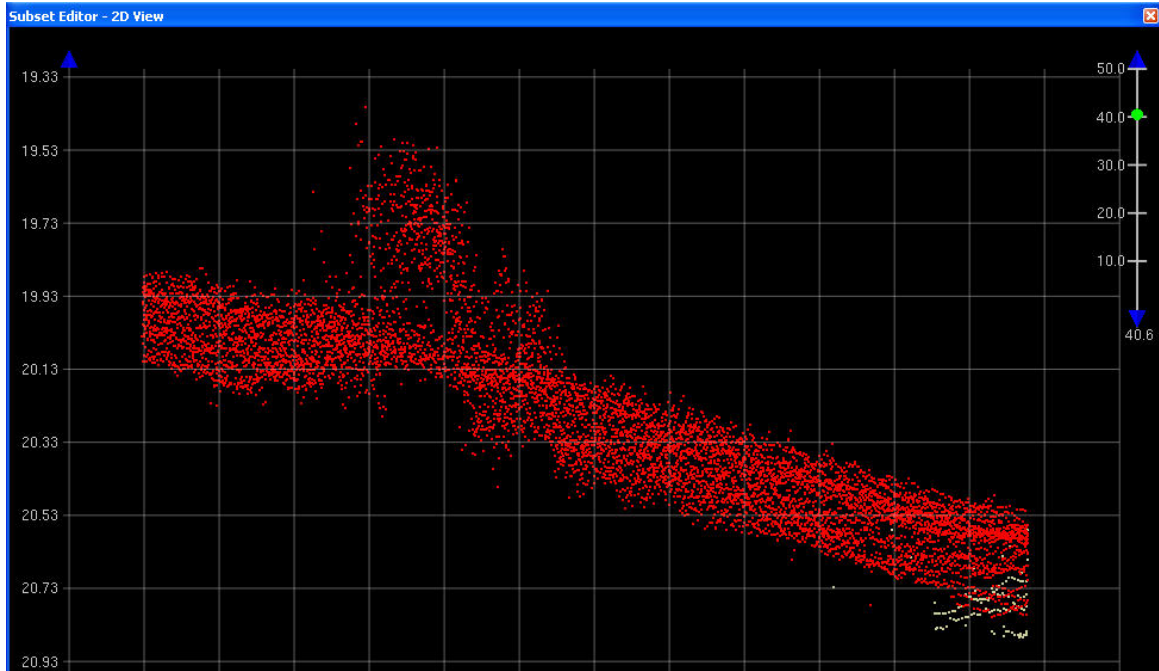


Figure 4: Nadir burst with no data overlap

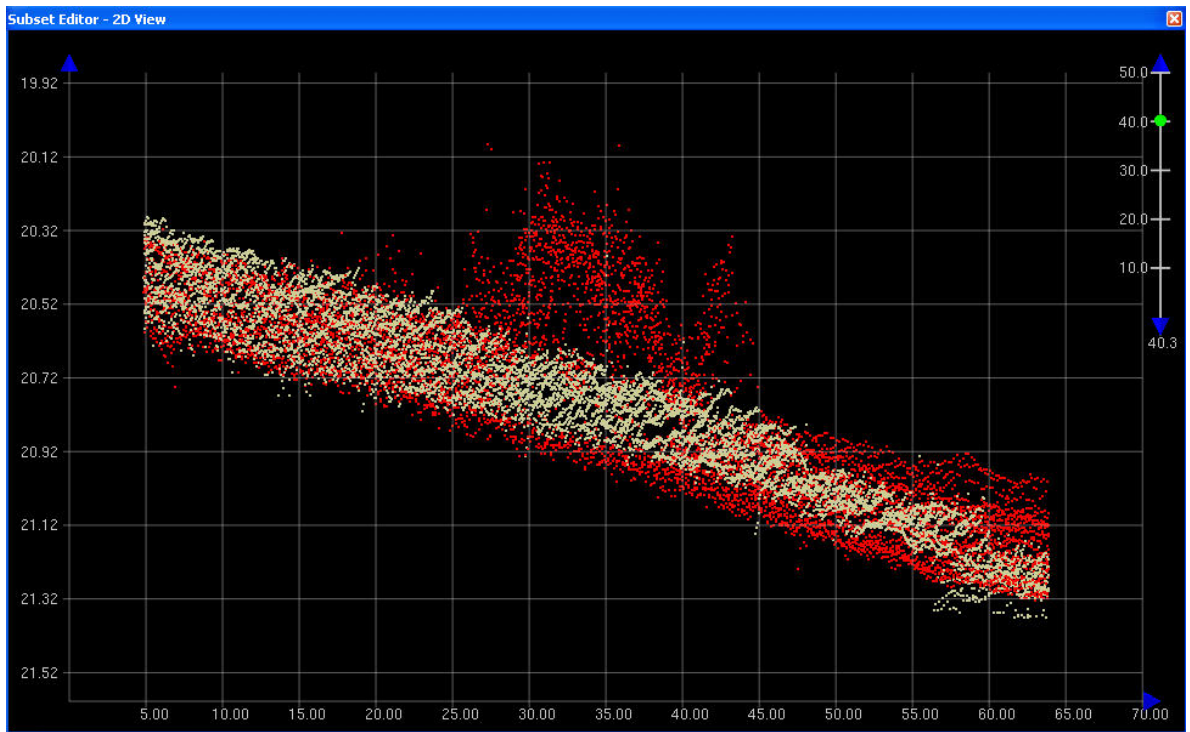


Figure 5: Nadir burst on the same line as Figure 6, with overlapping data from a cross-line

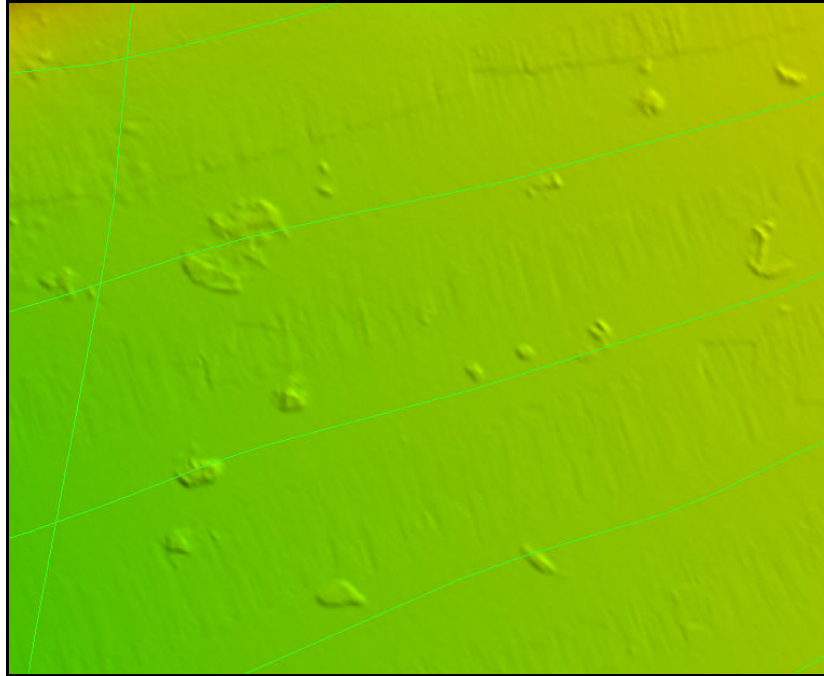


Figure 6: Effect of nadir bursts on the surface. Also note the minor SV artifacts

### B.2.f. Object Detection and Coverage Assessment

#### Holidays

Complete multibeam coverage was obtained in the survey area. Few gaps in coverage were found near steep slopes in non-navigationally significant areas due to acoustic shadowing (Figure 7), or where the penetration of the seafloor was rejected as discussed above (Figures 4 and 8). Least depths in these areas are represented by surrounding data.<sup>8</sup>

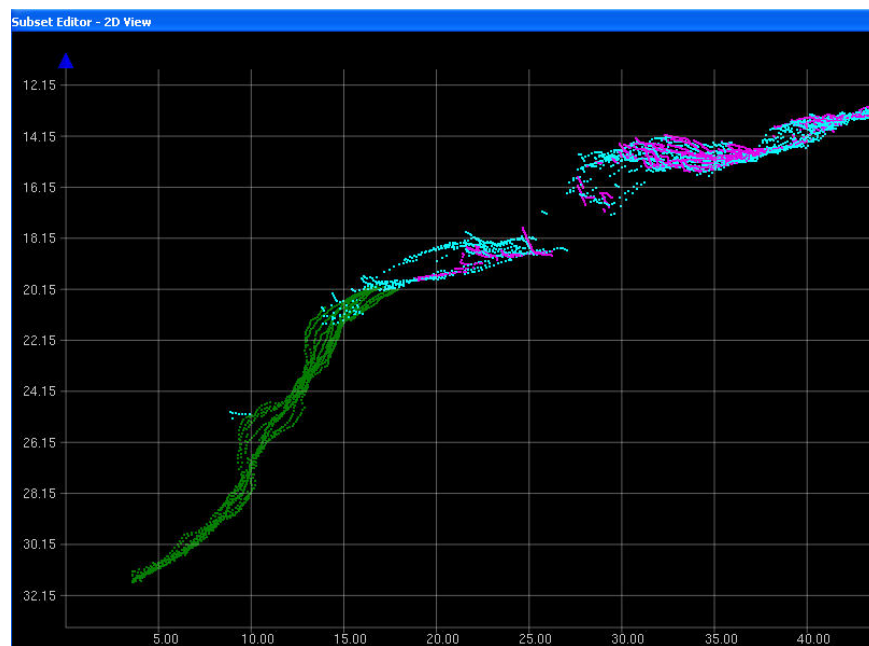
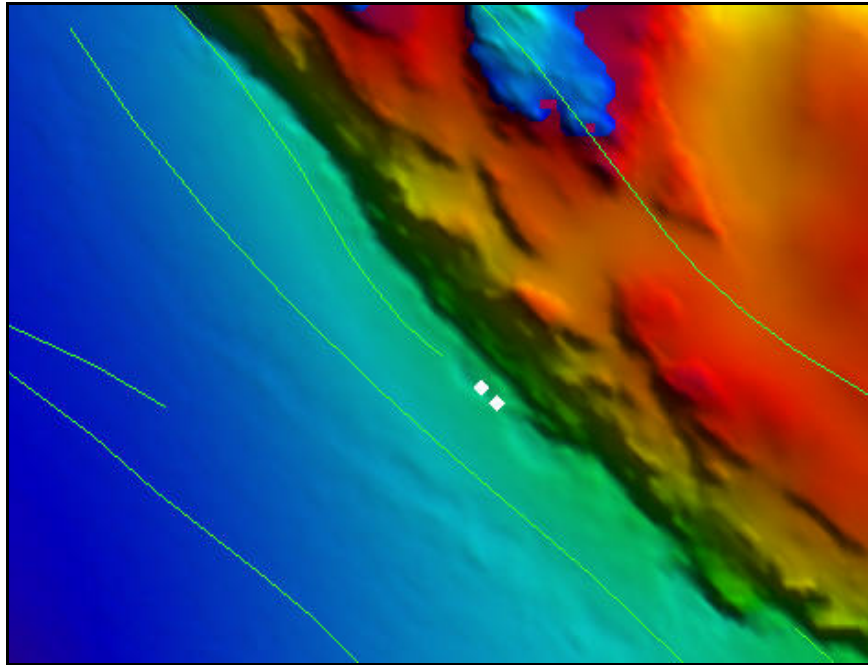
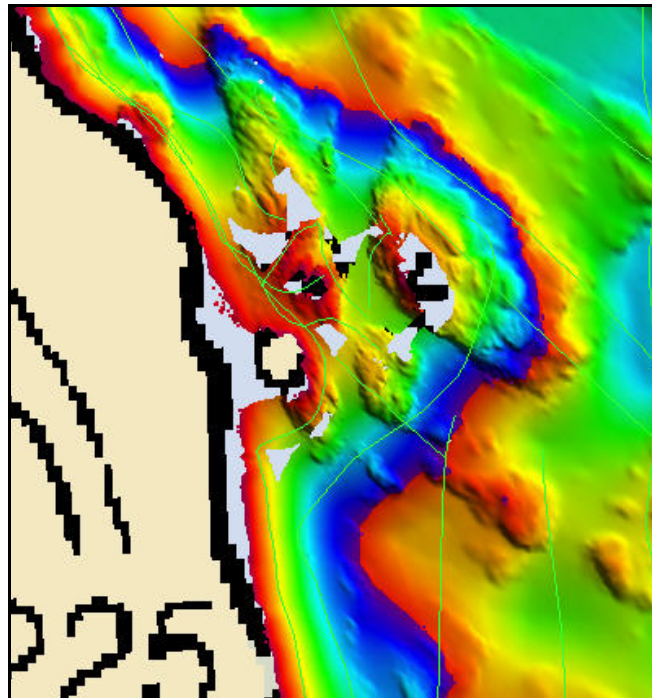


Figure 7: Down-slope Acoustic Shadow Holiday



*Figure 8: Holiday from cleaning out soundings that penetrate the seafloor (see Figure 4)*

A holiday occurs in among the rocks on the east side of Canas Island in approximate position 55-22-53N 133-01-54W. Numerous lines were run around the rocks to attempt to acquire data in this area, but due to kelp and launch safety it was impossible to safely acquire full bottom coverage in this area<sup>9</sup>. See Figure 9.



*Figure 9: Holidays in and around the rocks east of Canas Island*

There is an additional holiday in approximate position 55-24-21.4N 133-03-21.9W at the far NW corner of the survey where H12028 junctions with H12027. Two thirds of this holiday is covered by the junction with H12027, but the southern portion is not. The holiday is 10m wide on a slope ranging from 12m to 8.5m. Due to the steepness of the slope and proximity to shore, this holiday was deemed to be not navigationally significant<sup>10</sup>. See Figure 10.

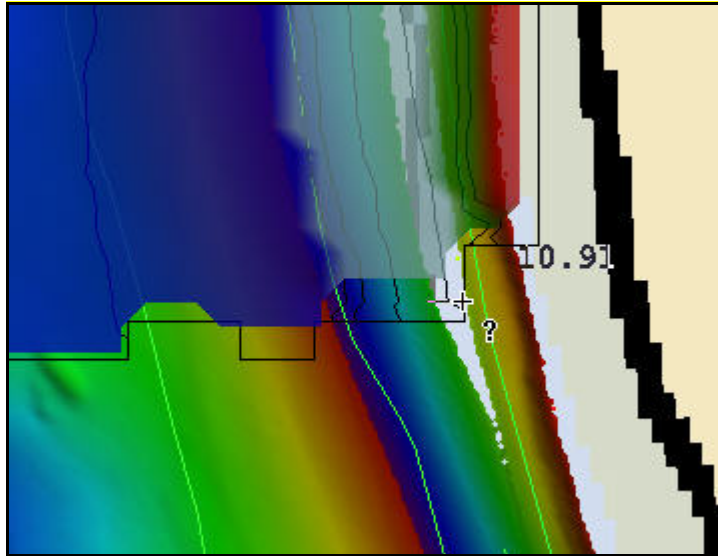


Figure 10: Holiday, shown with surfaces from both H12028 and H12027

#### Data Density

Through visual inspection of the density layer in CARIS HIPS it was determined that 95 % of the nodes meet the 5 soundings per node requirement in accordance with the Specifications and Deliverables section 5.1.2.1. In most instances, nodes with fewer than 5 soundings are the result of the decreased sounding density from outer beams of the tilted Reson 8125 sonar configuration. Due to the nature of tilted 8125 operations, these areas of decreased ping density occur outside of the survey limits. The other primary area of decreased ping density is where soundings that appear to penetrate the seafloor, discussed above, were rejected.<sup>11</sup>

#### **B.2.g. Unusual Conditions**

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

#### **B.3. Corrections to Echo soundings**

Data reduction procedures for survey H12028 conform to those detailed in the *OPR-O190-RA-09 DAPR*.

#### **B.4. Data Processing**

Data processing procedures for survey H12028 conform to those detailed in the DAPR. Data were processed initially using CARIS HIPS & SIPS v6.1, Service Pack 2, and Hotfix 8.

Additional processing details regarding Total Propagated Uncertainty (TPU/TPE) and CUBE Surfaces and Parameters utilized, along with any the deviations from the processing procedures outlined in the DAPR are discussed below.

**TPU VALUES:**

The survey specific parameters used to compute CARIS TPU for H12028 are listed in table 4.

<b>Tide values:</b>	Measured	0.01 m	Zoning	0.12 m
<b>Sound Speed Values:</b>	Measured	0.50 m/s	Surface	As per DAPR

*Table 4: Survey Specific CARIS TPU Parameters*

Many BASE surfaces were used in processing H12028. Final BASE surface resolutions and depth ranges were set according to Table 5 below, with field sheets smaller than  $25 \times 10^6$  nodes. CUBE surfaces were processed with a parameter set corresponding to each resolution as per HTD 2009-2. The CUBE parameter XML file is included with the data deliverables. Vertical Beam data is submitted in a 2 meter resolution uncertainty surface and, with the exception of the final combined surface, was not included in submitted CUBE surfaces. The submission Field Sheet and BASE Surface structure are shown in Figures 11 and 12.

<b>Depth Range (m)</b>	<b>Resolution (m)</b>
0-23	1
20-52	2
46-115	4
103-350	8

*Table 5: Depth range and surface resolutions for H12028*

Contours and soundings 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.

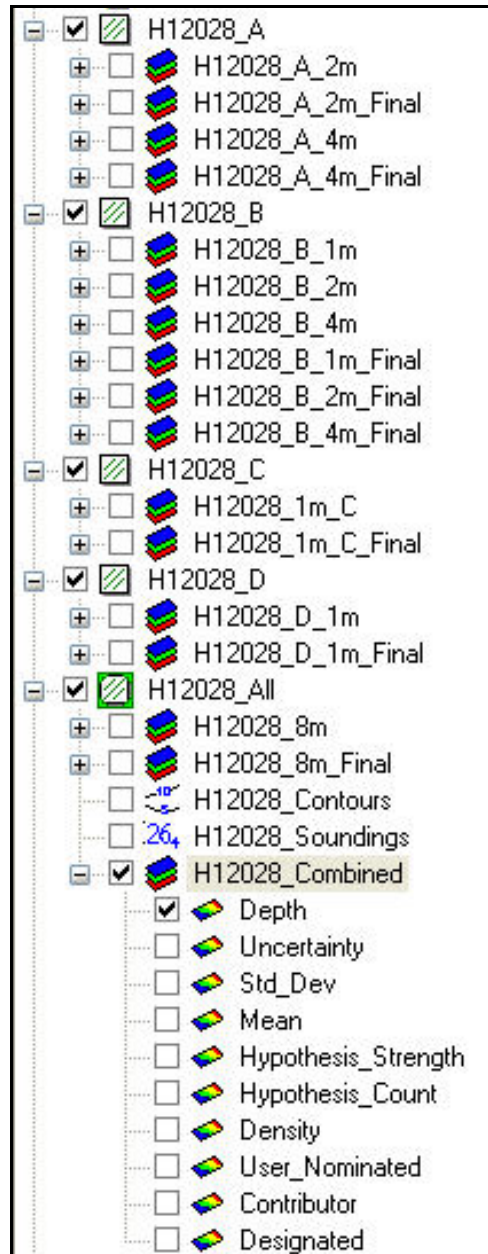


Figure 11: Field sheets and BASE surfaces submitted with H12028

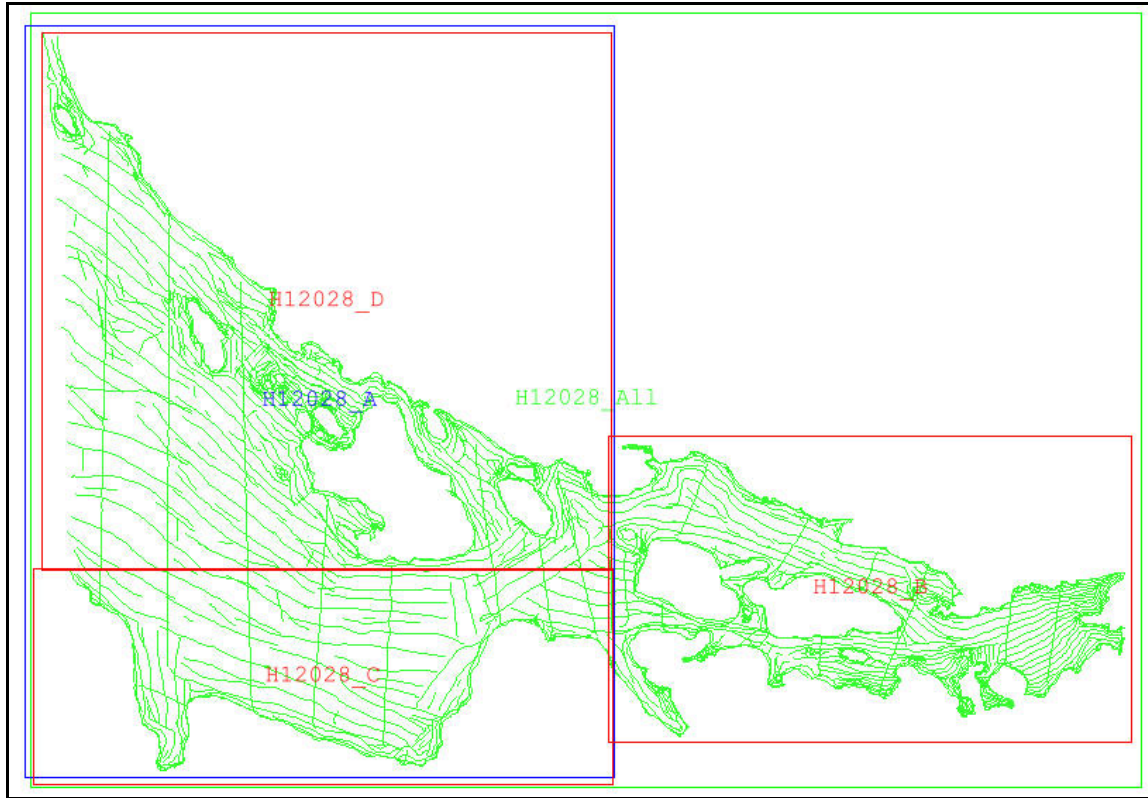


Figure 12: H11852 Field Sheet Layout

**C. VERTICAL AND HORIZONTAL CONTROL**

A complete description of vertical and horizontal control for survey H12028 can be found in the *OPR-O190-RA-09 Horizontal and Vertical Control Report*, submitted under separate cover. A summary of horizontal and vertical control for this survey follows.

**C.1. 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 6.

Location	Frequency	Operator	Priority
Level Island	295 kHz	USCG	Primary
Annette Island	323 kHz	USCG	Secondary

Table 6: Differential Corrector Sources for H12028

**C.2. 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 H12028.

*Rainier* personnel installed a Sutron 8210 “bubbler” tide gauge at the following subordinate station in accordance with the Project Instructions. 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. This station is described in detail in the *OPR-O190-RA-09 Horizontal and Vertical Control Report*.

Station Name	Station Number	Type of Gauge	Date of Installation	Date of Removal
Trocadero Bay	945- 0463	30-day	April 26, 2009	June 9, 2009

Table 7: Tide Station installed by *Rainier* personnel for H12028

As per the Project Instructions, all data were reduced to MLLW using the final approved water levels from the Trocadero Bay station (945-0463) and Sitka, AK station (945-1600) by applying tide file 9450463.tid and 9541600.tid and time and height correctors through the zone corrector file H12028CORF.zdf. **It will not be necessary for the Pacific Hydrographic Branch to reapply the final approved water levels to the survey data during final processing<sup>12</sup>.**

The request for Final Approved Water Levels for H12028 was submitted to CO-OPS on June 11, 2009 in accordance with the Field Procedures Manual (FPM), dated April 2009. The Final Tide Note is dated September 4, 2009. 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

Chart comparison procedures were followed as outlined in section 4.5 of the FPM and section 8.1.3-D.1 of the HSSDM, utilizing CARIS HIPS software program.

Survey H12028 was compared with the following chart:

Chart	Scale	Edition and Date	Local Notice to Mariners Applied Through
17405	1:40,000	16 <sup>th</sup> Ed, Oct 2008	12/3/2008

Table 8: Chart compared with H12028

Soundings from survey H12028 generally agreed with charted depths to within 2 fathoms with two significant discrepancies as noted below. Most differences of greater than 1 fathom were found in waters deeper than 20 fathoms and are thus not deemed navigationally significant given the draft of local traffic<sup>14</sup>.

The eastern end of Trocadero Bay in approximate position 55° 21' N 132° 54.6' W shows significant shoaling, with the 5 fathom contour shifted over 250m to the west<sup>15</sup> (Figure 13).



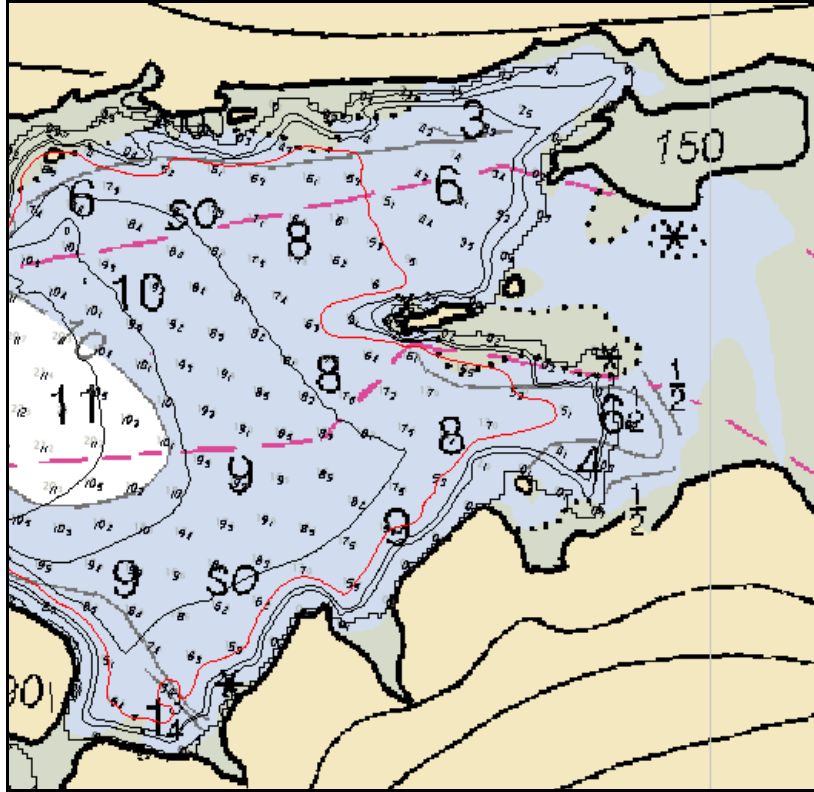


Figure 13: Contour shift in Eastern Trocadero Bay. Red contour is the new 5 fathom contour

The northern shore of Trocadero Bay in position 55° 21.6' N 132° 57' W has two outcroppings that are significantly shoaler than charted, one of which was reported as a DTON (Figure 14)<sup>16</sup>.

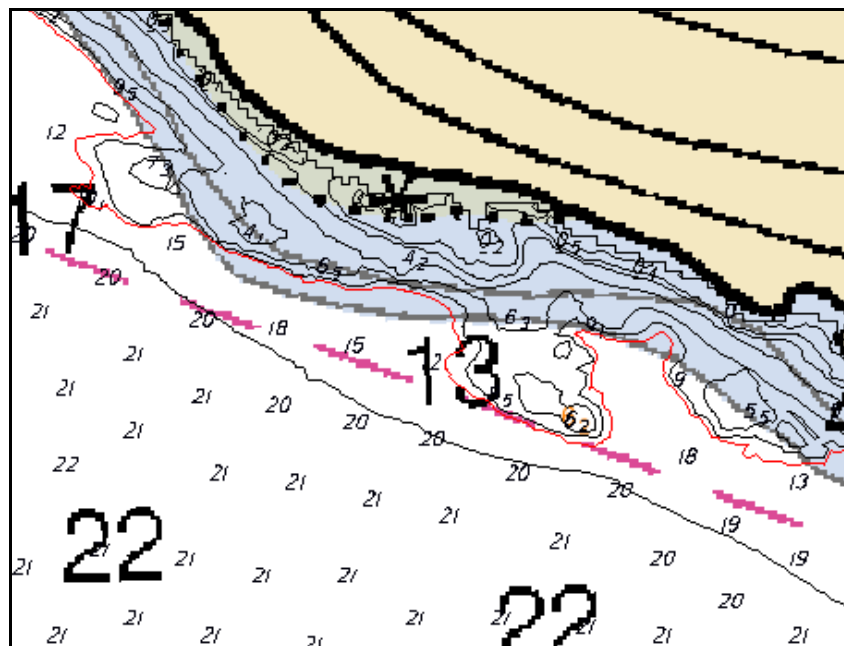


Figure 14: The red contour is the new 10 fathom contour. Two outcroppings can be seen significantly protruding from the charted contours.

The Hydrographer recommends that survey soundings supersede all prior survey and charted depths in the common area<sup>17</sup>.

#### **D.1.b. Automated Wreck and Obstruction Information System (AWOIS) Items**

No AWOIS items were located within the survey limits of H12028<sup>18</sup>.

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

##### Additional Items

No additional charted items were investigated and no other features were located on survey H12028.

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

Twenty-four (24) Dangers to Navigation (DTONs) were found on survey H12028, and reported to the Marine Chart Division via email on 25 November, 2009<sup>19</sup>. 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>20</sup>.

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

#### **D.2.a. Shoreline Verification**

##### Shoreline Source

Limited shoreline verification was accomplished using the composite source file (CSF) provided with the project instructions. The CSF has been created using the latest ENC's, most recent aerial photogrammetry, and prior hydrographic surveys. Prior survey features within the CSF are for reference. This composite source was printed on paper "boat sheets" and displayed in CARIS Notebook and/or Hypack for field verification.

##### Shoreline Verification

Limited shoreline verification was conducted near predicted low water in accordance with the Specifications and Deliverables and FPM sections 6.1 and 6.2. Detached positions (DPs) acquired during shoreline verification were recorded and S-57 attributed in CARIS Notebook. These indicate revisions to features and features not found in the provided CSF. In addition, annotations describing shoreline were recorded on the hard copy plots of the CSF as described above.

All shoreline data is submitted in CARIS Notebook HOB files. The session H12028\_NTBK contains the following:

<b>HOB File</b>	<b>Purpose and Contents</b>
H12028_Original_Comp_Source.hob	Original Source Data as provided for project OPR-O190-RA-09 and filtered to the limits of survey H12028.
H12028_Reference.hob	Survey outline and limit lines, and AWOIS item positions and radii.
H12028_Final_Feature_File.hob	Composite source data modified by the field to best represent the shoreline at survey scale. This includes the addition of new features and modification of source features. This file retains all features neither verified nor disproved by this survey
H12028_Disprovals.hob	Composite source items that were deleted or modified in position or geographic type.

*Table 9: List and Description of Notebook HOB files*

Recommendations

The Hydrographer recommends that the shoreline as depicted in the Notebook HOB files supersede and complement shoreline information compiled on the composite source file and charts as described above<sup>21</sup>.

**D.2.b. Prior Survey Comparison**

Prior survey comparison was not performed.

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

There are no Aids to Navigation within the survey limits of H12028<sup>22</sup>.

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

There are no overhead features within the survey limits of H12028<sup>23</sup>.

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

There are no submarine cables or pipelines charted within the survey limits of H12028, and none were detected by the survey<sup>24</sup>.

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

There are no ferry routes charted within the survey limits of H12028, and none were observed to be operating in the area<sup>25</sup>.

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

Four (4) bottom samples were collected on H12028. Of the four historic bottom samples collected, two did not agree with the charted characteristics. All bottom samples have been

included in the H12028\_Final\_Feature\_File.hob.<sup>26</sup> Due to the low traffic, lack of suitable anchorages, and insufficient time to conduct samples on the six surveys that were run concurrently with H12028, additional bottom samples were not collected. The four samples that were collected were in the area most suitable to large vessel anchorage.

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

There are no other findings to report for this survey.

**E. APPROVAL**

As Chief of Party, field operations for hydrographic survey H12028 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 2009 edition), Field Procedures Manual (April 2009 edition), Standing and Project Instructions, and all HSD Technical Directives issued through June 2009. 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>
Hydrographic Systems Readiness Review Package	<i>Under separate cover</i>	N/CS34
Data Acquisition and Processing Report for OPR-O190-RA-09	27-Oct-2009	N/CS34
Coast Pilot Report for OPR- O190-RA-09	<i>To be submitted</i>	N/CS26
Horizontal and Vertical Control Report for OPR-O190-RA-09	27-Oct-2009	N/CS34
Tides and Water Levels Package for OPR-O190-RA-09	20-Jun-2009	N/OPS1

Approved and Forwarded:



Donald W. Haines, CAPT/NOAA  
I am approving this document  
2009.12.02 10:48:00 -08'00'

Captain Donald W. Haines, NOAA  
Commanding Officer, NOAA Ship *Rainier*

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

Survey Sheet Manager:



Russell Quintero  
I am the author of this document  
2009.12.01 13:42:16 -09'00'

Ensign Russell A. Quintero, NOAA  
Junior Officer, NOAA Ship *Rainier*

Chief Survey Technician:



James B Jacobson  
I have reviewed this document  
2009.12.01 22:15:11 Z

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

Field Operations Officer:



Brent Pounds  
I have reviewed this document  
2009.12.01 13:19:49 -09'00'

Lieutenant Brent J. Pounds, NOAA  
Field Operations Officer, NOAA Ship *Rainier*

---

<sup>1</sup> Concur with clarification. The hydrography did not meet the requirements for 5% crosslines, however crosslines were adequate for QC purposed. Deviations of up to 1.1m were also found between main-scheme and crosslines during office review, however data are still adequate for charting.

<sup>2</sup> Concur

<sup>3</sup> Concur. H12029 is being compiled concurrently with H12028. A common junction has been made between the two HCells.

<sup>4</sup> Concur. H12027 is being compiled concurrently with H12028. A common junction has been made between the two HCells.

<sup>5</sup> Concur with clarification. Additional vertical offsets not due to sound speed were observed during office review in some areas up to 1.45m. Despite not meeting IHO order 1 specifications the data are exceedingly superior in quality and object detection criteria in comparison to prior charted information. As such, data is adequate to supersede charted data in the common area.

<sup>6</sup> Concur

<sup>7</sup> Concur with clarification. The magnitude of the error varies and in some cases was out of specification per depth. Where out of specification data was rejected during review which then led to small holidays being created. These holidays however were insignificant and data are still adequate for charting.

<sup>8</sup> Concur

<sup>9</sup> Concur, chart per HCell with kelp.

<sup>10</sup> Concur, Holiday was insignificant at chart scale and not preserved in the HCell. Chart per HCell.

<sup>11</sup> Concur

<sup>12</sup> Final tides were reapplied to shoreline features during compilation after it was discovered that the tide correction values were incorrect even though it appeared the correct tide file had been applied.

<sup>13</sup> See attached Tide Note

<sup>14</sup> Concur with clarification; all navigationally significant differences were submitted as DTONs. Surveyed soundings should supersede charted soundings in the common area and be charted as depicted in the HCell.

<sup>15</sup> Concur

<sup>16</sup> Concur

<sup>17</sup> Concur

<sup>18</sup> Concur

<sup>19</sup> An additional DTON was found during office processing and reported on 02 Dec 2009 making a total of 25 DTONs submitted. Nine of the submitted DTONs have been applied to the chart. The remaining DTONs were included in compilation and are recommended for charting.

<sup>20</sup> See attached DTON feature report.

<sup>21</sup> Concur with clarification. The submitted .hob files were used in the compilation of HCell H12028. During compilation some modifications were made to accommodate chart scale. Chart features as depicted in the HCell.

<sup>22</sup> Concur

<sup>23</sup> Concur

---

<sup>24</sup> Do not concur, two cable areas are charted on 17405 as entering the bay to converge and extend to the east end of the bay. Although there is no sign of the cables in the depth appropriate surfaces from this survey, cable areas should be retained as charted.

<sup>25</sup> Concur

<sup>26</sup> Four bottom samples from the survey are included in the HCell. Rocky seabed areas were delineated based on final surfaces created and all charted rky designations should be removed and replaced per the rocky seabed area limits indicated in the HCell. All other charted bottom samples were blue-noted in the HCell as retain or remove as appropriate per survey data.

# H12028 Dangers to Navigation

**Registry Number:** H12028  
**State:** Alaska  
**Locality:** West of Prince of Wales Island  
**Sub-locality:** Trocadero Bay  
**Project Number:** OPR-O190-RA-09  
**Survey Dates:** 05/08/2009 - 06/08/2009

## Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
17405	16th	10/01/2008	1:40,000 (17405_1)	USCG LNM: 10/23/2007 (12/09/2008) CHS NTM: None (11/28/2008) NGA NTM: None (12/13/2008)
17407	15th	11/01/2003	1:40,000 (17407_1)	[L]NTM: ?
17400	17th	03/01/2007	1:229,376 (17400_1)	[L]NTM: ?
16016	21st	10/01/2007	1:969,756 (16016_1)	[L]NTM: ?
531	24th	07/01/2007	1:2,100,000 (531_1)	[L]NTM: ?
500	8th	06/01/2003	1:3,500,000 (500_1)	[L]NTM: ?
501	12th	11/01/2002	1:3,500,000 (501_1)	[L]NTM: ?
530	32nd	06/01/2007	1:4,860,700 (530_1)	[L]NTM: ?
50	6th	06/01/2003	1:10,000,000 (50_1)	[L]NTM: ?

\* Correction(s) - source: last correction applied (last correction reviewed--"cleared date")

## Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	Rock	3.10 m	55° 24' 04.2" N	133° 03' 17.3" W	---
1.2	Rock	5.88 m	55° 22' 10.6" N	133° 01' 27.3" W	---
1.3	Rock	12.62 m	55° 21' 52.3" N	132° 58' 50.2" W	---
1.4	Rock	15.24 m	55° 21' 11.7" N	132° 55' 31.0" W	---
1.5	Rock	11.51 m	55° 21' 51.3" N	132° 56' 58.2" W	---
1.6	Rock	16.20 m	55° 21' 51.5" N	132° 59' 35.6" W	---
1.7	Rock	1.76 m	55° 21' 42.6" N	132° 58' 12.2" W	---



1.8	Rock	6.04 m	55° 22' 17.5" N	132° 59' 47.3" W	---
1.9	Rock	3.19 m	55° 22' 22.0" N	132° 59' 52.0" W	---
1.10	Rock	0.60 m	55° 22' 07.6" N	132° 59' 28.9" W	---
1.11	Rock	12.50 m	55° 21' 04.2" N	132° 56' 03.5" W	---
1.12	Rock	11.14 m	55° 21' 05.5" N	132° 56' 27.1" W	---
1.13	Rock	3.65 m	55° 21' 09.7" N	132° 56' 34.8" W	---
1.14	Rock	0.97 m	55° 21' 05.7" N	132° 55' 47.6" W	---
1.15	Rock	1.53 m	55° 21' 26.8" N	132° 55' 45.3" W	---
1.16	Rock	5.40 m	55° 21' 09.4" N	132° 55' 05.5" W	---
1.17	Rock	2.10 m	55° 21' 08.3" N	132° 55' 22.9" W	---
1.18	Rock	10.23 m	55° 22' 58.9" N	133° 01' 44.9" W	---
1.19	Rock	13.48 m	55° 23' 05.5" N	133° 01' 58.0" W	---
1.20	Shoal	8.34 m	55° 23' 03.1" N	133° 02' 24.3" W	---
1.21	Rock	7.42 m	55° 22' 40.1" N	133° 01' 04.0" W	---
1.22	Rock	4.35 m	55° 22' 47.7" N	133° 01' 33.4" W	---
1.23	Rock	0.78 m	55° 22' 34.8" N	133° 01' 38.2" W	---
1.24	Shoal	13.99 m	55° 22' 43.3" N	133° 02' 10.4" W	---

## **1 - Danger To Navigation**

## 1.1) Profile/Beam - 117/256 from h12028 / 2801\_reson7125\_lf\_256 / 2009-159 / 602\_2206

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 24' 04.2" N, 133° 03' 17.3" W  
**Least Depth:** 3.10 m (= 10.17 ft = 1.695 fm = 1 fm 4.17 ft)  
**TPU ( $\pm 1.96\sigma$ ):** **THU (TPEh)**  $\pm 1.962$  m ; **TVU (TPEv)**  $\pm 0.267$  m  
**Timestamp:** 2009-159.22:06:31.820 (06/08/2009)  
**Survey Line:** h12028 / 2801\_reson7125\_lf\_256 / 2009-159 / 602\_2206  
**Profile/Beam:** 117/256  
**Charts Affected:** 17405\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2801_reson7125_lf_256/2009-159/602_2206	117/256	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

1  $\frac{3}{4}$ fm (17405\_1, 17400\_1, 16016\_1, 530\_1)  
 1fm 4ft (531\_1)  
 3.1m (500\_1, 501\_1, 50\_1)

#### S-57 Data

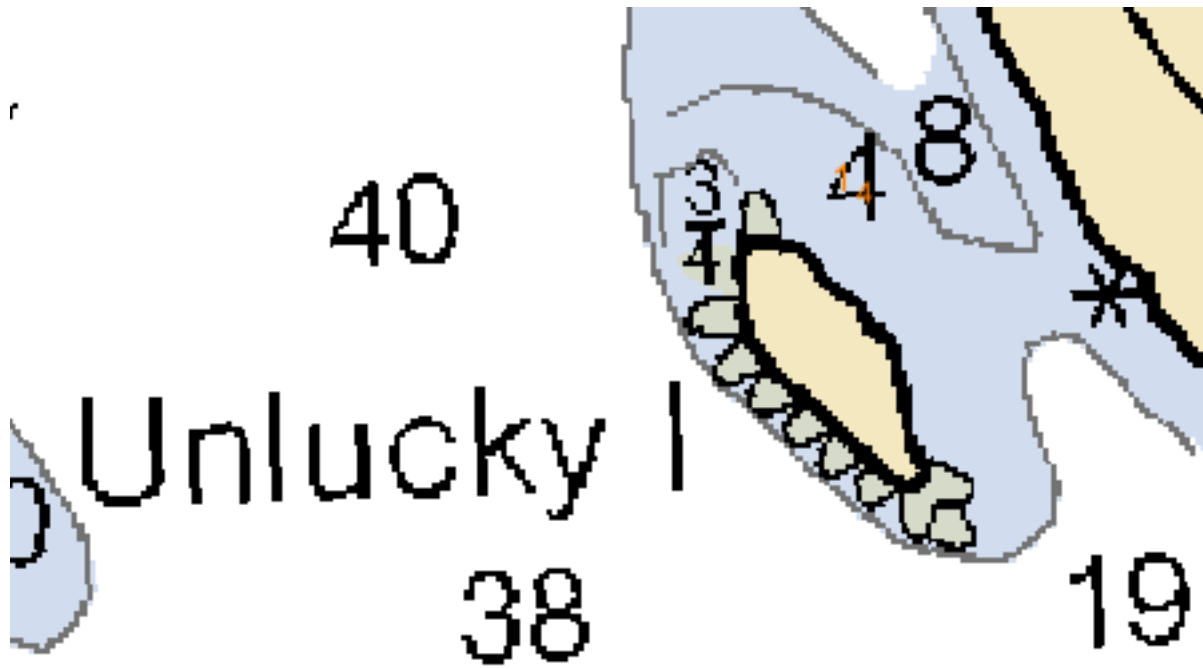
**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** QUASOU - 1:depth known  
 SORDAT - 20090609  
 SORIND - US,US,survey,H12028

TECSOU - 3:found by multi-beam

VALSOU - 3.099 m

WATLEV - 3:always under water/submerged

**Feature Images**



*Figure 1.1.1*

**1.2) Profile/Beam - 252/25 from h12028 / 2802\_reson7125\_hf\_512 / 2009-128 / 000\_1722**

**DANGER TO NAVIGATION**

**Survey Summary**

**Survey Position:** 55° 22' 10.6" N, 133° 01' 27.3" W  
**Least Depth:** 5.88 m (= 19.29 ft = 3.215 fm = 3 fm 1.29 ft)  
**TPU (±1.96σ):** **THU (TPEh)** ±1.963 m ; **TVU (TPEv)** ±0.267 m  
**Timestamp:** 2009-128.17:23:19.069 (05/08/2009)  
**Survey Line:** h12028 / 2802\_reson7125\_hf\_512 / 2009-128 / 000\_1722  
**Profile/Beam:** 252/25  
**Charts Affected:** 17405\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

**Remarks:**

[None]

**Feature Correlation**

Address	Feature	Range	Azimuth	Status
h12028/2802_reson7125_hf_512/2009-128/000_1722	252/25	0.00	000.0	Primary

**Hydrographer Recommendations**

[None]

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

3 ¼fm (17405\_1, 17400\_1, 16016\_1, 530\_1)  
 3fm 1ft (531\_1)  
 5.9m (500\_1, 501\_1, 50\_1)

**S-57 Data**

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survy,H12028  
 VALSOU - 5.880 m

WATLEV - 3:always under water/submerged

Feature Images

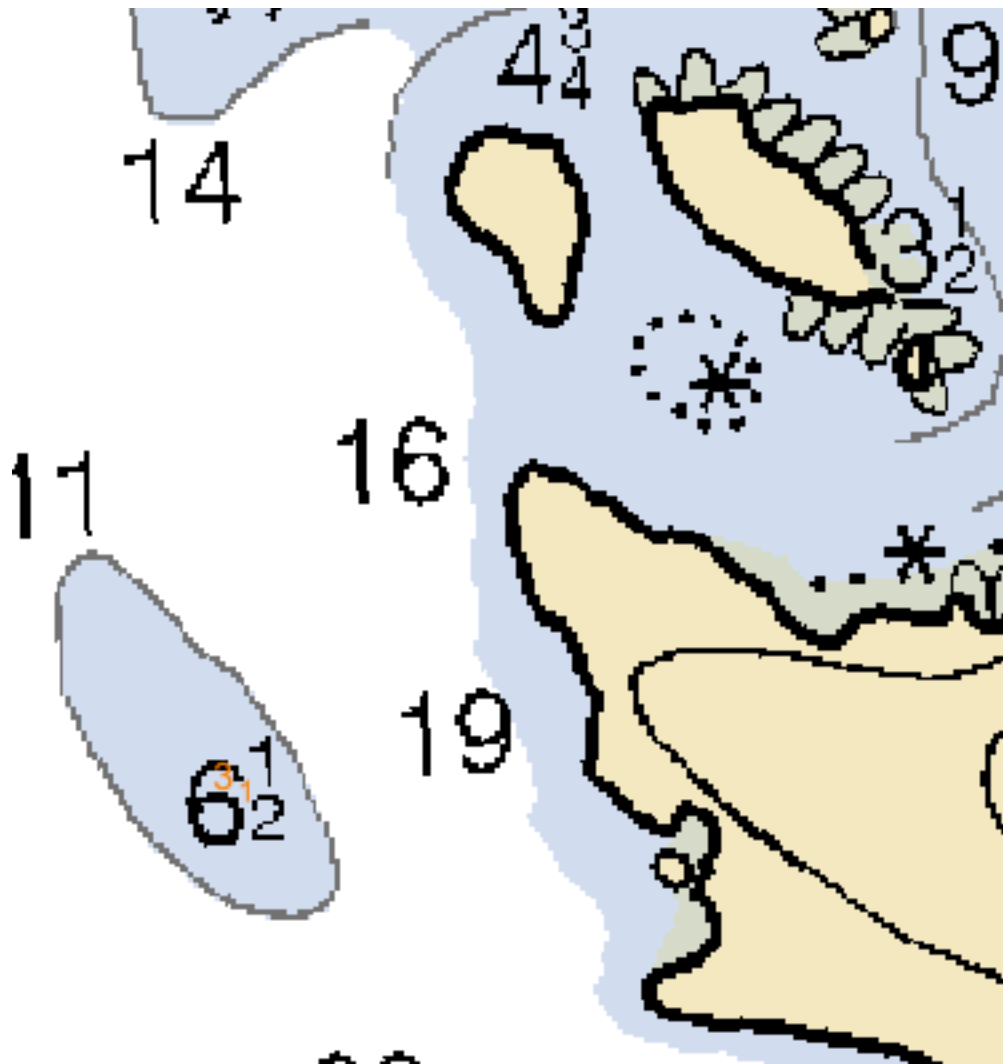


Figure 1.2.1



### 1.3) Profile/Beam - 328/271 from h12028 / 2802\_reson7125\_hf\_512 / 2009-128 / 000\_1806

## DANGER TO NAVIGATION

### Survey Summary

**Survey Position:** 55° 21' 52.3" N, 132° 58' 50.2" W  
**Least Depth:** 12.62 m (= 41.41 ft = 6.901 fm = 6 fm 5.41 ft)  
**TPU ( $\pm 1.96\sigma$ ):** **THU (TPEh)**  $\pm 1.962$  m ; **TVU (TPEv)**  $\pm 0.265$  m  
**Timestamp:** 2009-128.18:07:23.250 (05/08/2009)  
**Survey Line:** h12028 / 2802\_reson7125\_hf\_512 / 2009-128 / 000\_1806  
**Profile/Beam:** 328/271  
**Charts Affected:** 17405\_1, 17407\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2802_reson7125_hf_512/2009-128/000_1806	328/271	0.00	000.0	Primary

### Hydrographer Recommendations

[None]

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

6  $\frac{3}{4}$ fm (17405\_1, 17407\_1, 17400\_1, 16016\_1, 530\_1)

6fm 5ft (531\_1)

12.6m (500\_1, 501\_1, 50\_1)

### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survey,H12028  
 VALSOU - 12.621 m

WATLEV - 3:always under water/submerged

### Feature Images

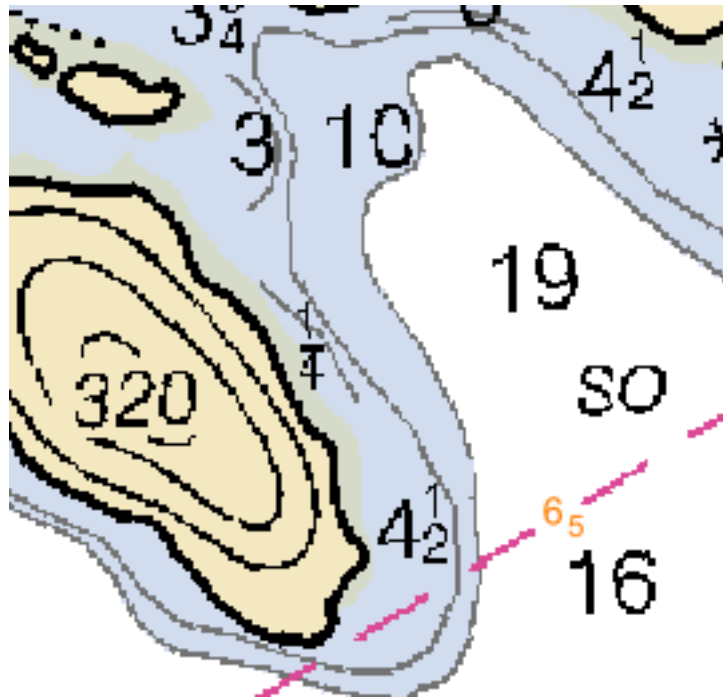


Figure 1.3.1

## 1.4) Profile/Beam - 577/51 from h12028 / 2802\_reson7125\_hf\_512 / 2009-134 / 000\_2238

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 21' 11.7" N, 132° 55' 31.0" W  
**Least Depth:** 15.24 m (= 50.01 ft = 8.335 fm = 8 fm 2.01 ft)  
**TPU ( $\pm 1.96\sigma$ ):** **THU (TPEh)**  $\pm 1.973$  m ; **TVU (TPEv)**  $\pm 0.286$  m  
**Timestamp:** 2009-134.22:40:23.503 (05/14/2009)  
**Survey Line:** h12028 / 2802\_reson7125\_hf\_512 / 2009-134 / 000\_2238  
**Profile/Beam:** 577/51  
**Charts Affected:** 17405\_1, 17407\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2802_reson7125_hf_512/2009-134/000_2238	577/51	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

8 ¼fm (17405\_1, 17407\_1, 17400\_1, 16016\_1, 530\_1)

8fm 2ft (531\_1)

15.2m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survey,H12028  
 VALSOU - 15.243 m

WATLEV - 3:always under water/submerged

### Feature Images

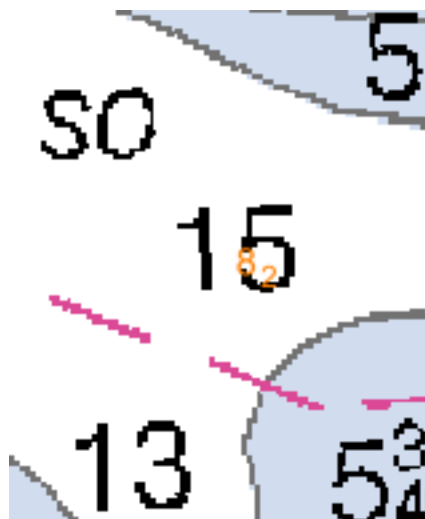


Figure 1.4.1

## 1.5) Profile/Beam - 145/187 from h12028 / 2802\_reson7125\_hf\_512 / 2009-155 / 634\_1946

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 21' 51.3" N, 132° 56' 58.2" W  
**Least Depth:** 11.51 m (= 37.78 ft = 6.296 fm = 6 fm 1.78 ft)  
**TPU ( $\pm 1.96\sigma$ ):** **THU (TPEh)**  $\pm 1.963$  m ; **TVU (TPEv)**  $\pm 0.266$  m  
**Timestamp:** 2009-155.19:47:25.451 (06/04/2009)  
**Survey Line:** h12028 / 2802\_reson7125\_hf\_512 / 2009-155 / 634\_1946  
**Profile/Beam:** 145/187  
**Charts Affected:** 17405\_1, 17407\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2802_reson7125_hf_512/2009-155/634_1946	145/187	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

6 ¼fm (17405\_1, 17407\_1, 17400\_1, 16016\_1, 530\_1)

6fm 2ft (531\_1)

11.5m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survey,H12028  
 VALSOU - 11.514 m

WATLEV - 3:always under water/submerged



Feature Images

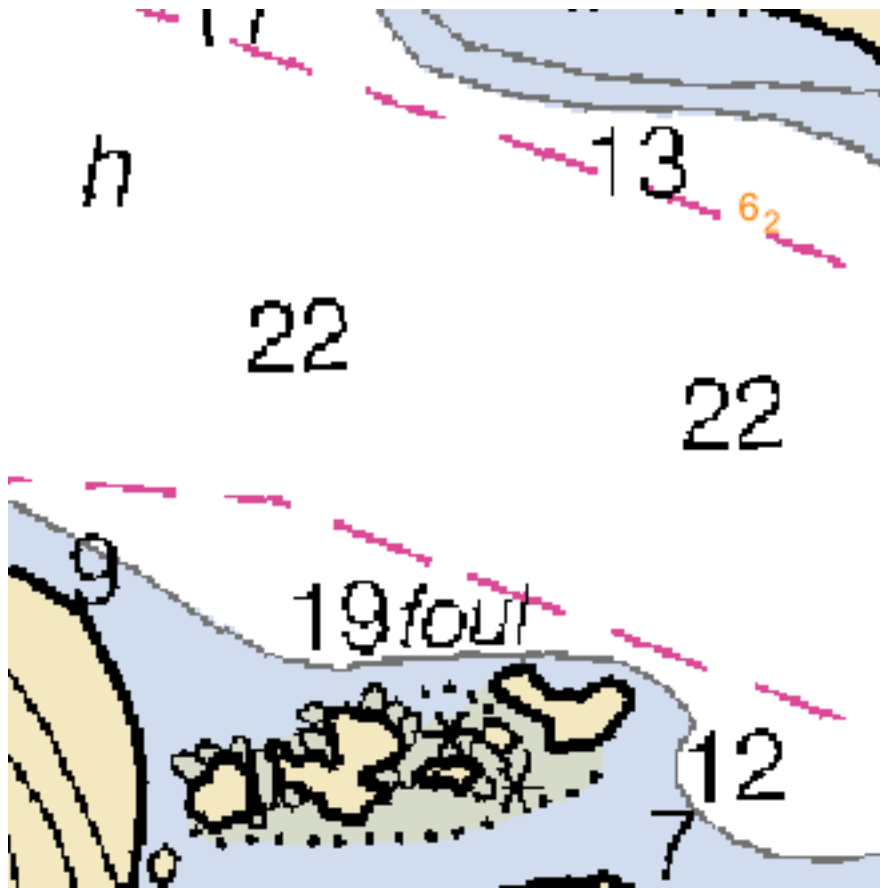


Figure 1.5.1

## 1.6) Profile/Beam - 65/98 from h12028 / 2802\_reson7125\_hf\_512 / 2009-155 / 637\_2116

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 21' 51.5" N, 132° 59' 35.6" W  
**Least Depth:** 16.20 m (= 53.14 ft = 8.857 fm = 8 fm 5.14 ft)  
**TPU ( $\pm 1.96\sigma$ ):** **THU (TPEh)**  $\pm 1.970$  m ; **TVU (TPEv)**  $\pm 0.280$  m  
**Timestamp:** 2009-155.21:16:54.895 (06/04/2009)  
**Survey Line:** h12028 / 2802\_reson7125\_hf\_512 / 2009-155 / 637\_2116  
**Profile/Beam:** 65/98  
**Charts Affected:** 17405\_1, 17407\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2802_reson7125_hf_512/2009-155/637_2116	65/98	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

8  $\frac{3}{4}$ fm (17405\_1, 17407\_1, 17400\_1, 16016\_1, 530\_1)

8fm 5ft (531\_1)

16.2m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survey,H12028  
 VALSOU - 16.198 m

WATLEV - 3:always under water/submerged

## 1.7) Profile/Beam - 230/245 from h12028 / 2803\_reson7125\_hf\_512 / 2009-154 / 000\_1951

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 21' 42.6" N, 132° 58' 12.2" W  
**Least Depth:** 1.76 m (= 5.77 ft = 0.962 fm = 0 fm 5.77 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh)  $\pm 1.960$  m ; TVU (TPEv)  $\pm 0.265$  m  
**Timestamp:** 2009-154.19:51:30.082 (06/03/2009)  
**Survey Line:** h12028 / 2803\_reson7125\_hf\_512 / 2009-154 / 000\_1951  
**Profile/Beam:** 230/245  
**Charts Affected:** 17405\_1, 17407\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2803_reson7125_hf_512/2009-154/000_1951	230/245	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

1fm (17405\_1, 17407\_1, 17400\_1, 16016\_1, 530\_1)  
 -1fm 0ft (531\_1)  
 1.8m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survy,H12028  
 VALSOU - 1.760 m

WATLEV - 5:awash

### Feature Images

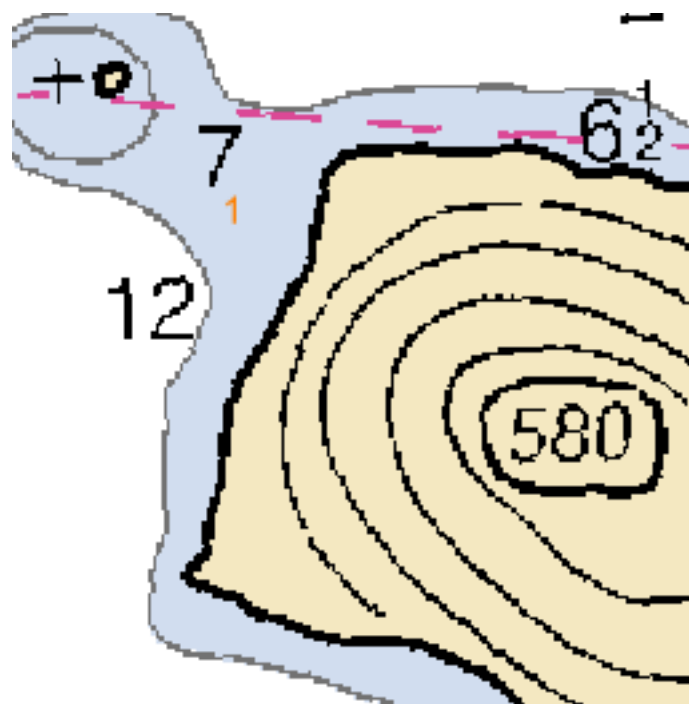


Figure 1.7.1

## 1.8) Profile/Beam - 428/512 from h12028 / 2803\_reson7125\_hf\_512 / 2009-154 / 000\_2304

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 22' 17.5" N, 132° 59' 47.3" W  
**Least Depth:** 6.04 m (= 19.82 ft = 3.304 fm = 3 fm 1.82 ft)  
**TPU ( $\pm 1.96\sigma$ ):** **THU (TPEh)**  $\pm 1.963$  m ; **TVU (TPEv)**  $\pm 0.268$  m  
**Timestamp:** 2009-154.23:05:51.182 (06/03/2009)  
**Survey Line:** h12028 / 2803\_reson7125\_hf\_512 / 2009-154 / 000\_2304  
**Profile/Beam:** 428/512  
**Charts Affected:** 17405\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2803_reson7125_hf_512/2009-154/000_2304	428/512	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

3 ¼fm (17405\_1, 17400\_1, 16016\_1, 530\_1)

3fm 2ft (531\_1)

6.0m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survy,H12028  
 VALSOU - 6.042 m

WATLEV - 3:always under water/submerged



### Feature Images

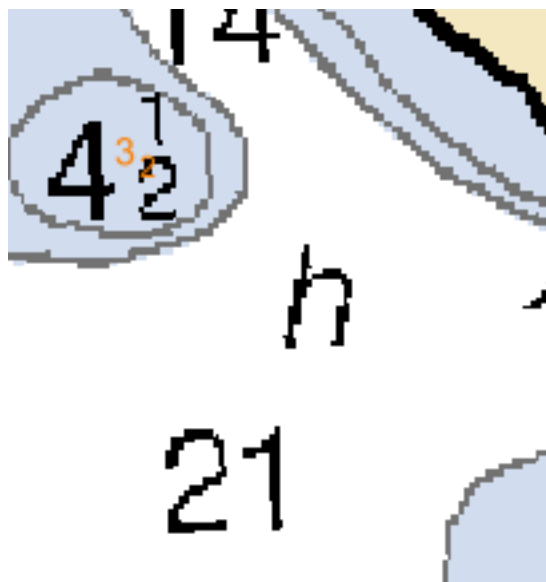


Figure 1.8.1

## 1.9) Profile/Beam - 1126/151 from h12028 / 2803\_reson7125\_hf\_512 / 2009-154 / 000\_2304

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 22' 22.0" N, 132° 59' 52.0" W  
**Least Depth:** 3.19 m (= 10.45 ft = 1.742 fm = 1 fm 4.45 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh)  $\pm 1.961$  m ; TVU (TPEv)  $\pm 0.264$  m  
**Timestamp:** 2009-154.23:06:51.140 (06/03/2009)  
**Survey Line:** h12028 / 2803\_reson7125\_hf\_512 / 2009-154 / 000\_2304  
**Profile/Beam:** 1126/151  
**Charts Affected:** 17405\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2803_reson7125_hf_512/2009-154/000_2304	1126/151	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

1  $\frac{3}{4}$ fm (17405\_1, 17400\_1, 16016\_1, 530\_1)

1fm 4ft (531\_1)

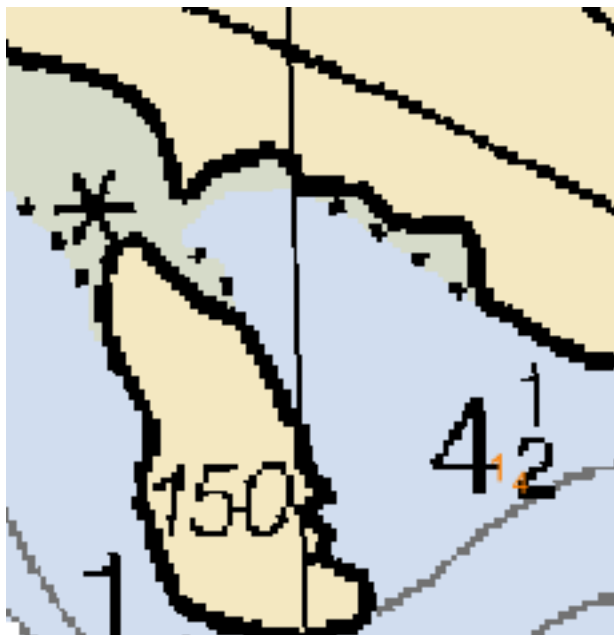
3.2m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survy,H12028  
 VALSOU - 3.186 m

WATLEV - 5:awash

### Feature Images



*Figure 1.9.1*

## 1.10) Profile/Beam - 156/207 from h12028 / 2803\_reson7125\_hf\_512 / 2009-154 / 000\_2319

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 22' 07.6" N, 132° 59' 28.9" W  
**Least Depth:** 0.60 m (= 1.96 ft = 0.327 fm = 0 fm 1.96 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh)  $\pm 1.960$  m ; TVU (TPEv)  $\pm 0.264$  m  
**Timestamp:** 2009-154.23:19:24.573 (06/03/2009)  
**Survey Line:** h12028 / 2803\_reson7125\_hf\_512 / 2009-154 / 000\_2319  
**Profile/Beam:** 156/207  
**Charts Affected:** 17405\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2803_reson7125_hf_512/2009-154/000_2319	156/207	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

0 ¼fm (17405\_1, 17400\_1, 16016\_1, 530\_1)  
 0fm 2ft (531\_1)  
 .6m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survy,H12028  
 VALSOU - 0.598 m

WATLEV - 4:covers and uncovers

### Feature Images

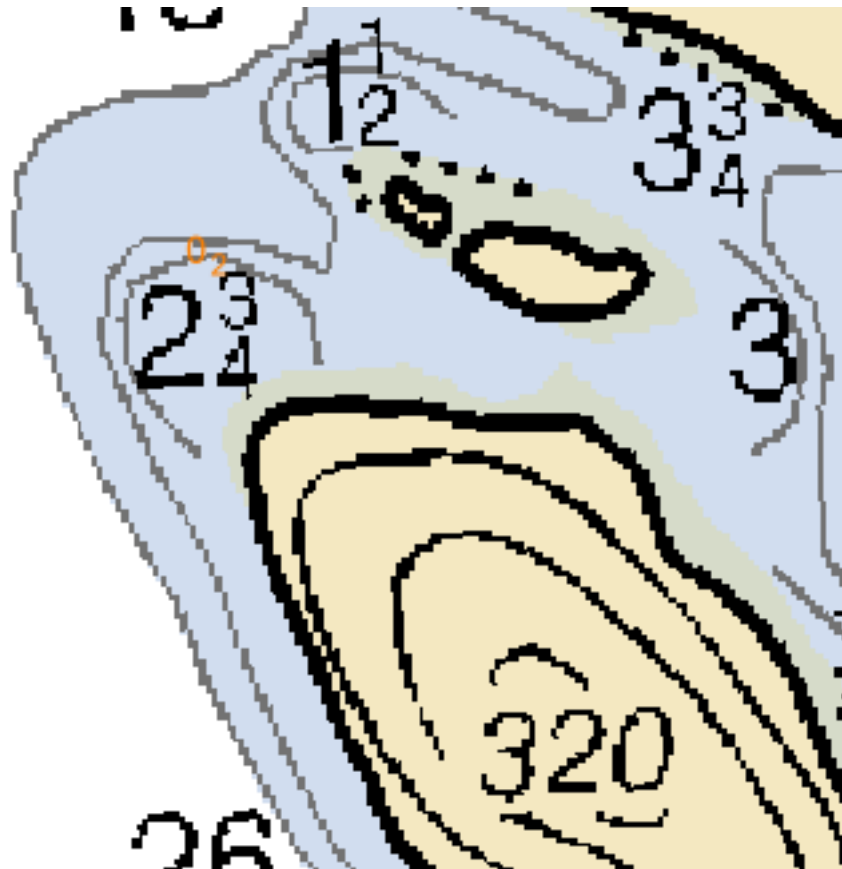


Figure 1.10.1

## 1.11) Profile/Beam - 452/437 from h12028 / 2804\_reson7125\_hf\_512 / 2009-134 / 000\_2322

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 21' 04.2" N, 132° 56' 03.5" W  
**Least Depth:** 12.50 m (= 41.01 ft = 6.835 fm = 6 fm 5.01 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh)  $\pm 1.968$  m ; TVU (TPEv)  $\pm 0.276$  m  
**Timestamp:** 2009-134.23:23:37.001 (05/14/2009)  
**Survey Line:** h12028 / 2804\_reson7125\_hf\_512 / 2009-134 / 000\_2322  
**Profile/Beam:** 452/437  
**Charts Affected:** 17405\_1, 17407\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2804_reson7125_hf_512/2009-134/000_2322	452/437	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

6  $\frac{3}{4}$ fm (17405\_1, 17407\_1, 17400\_1, 16016\_1, 530\_1)

6fm 5ft (531\_1)

12.5m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survey,H12028  
 VALSOU - 12.499 m



WATLEV - 3:always under water/submerged

### Feature Images



*Figure 1.11.1*

## 1.12) Profile/Beam - 69/136 from h12028 / 2804\_reson7125\_hf\_512 / 2009-134 / 000\_2354

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 21' 05.5" N, 132° 56' 27.1" W  
**Least Depth:** 11.14 m (= 36.56 ft = 6.093 fm = 6 fm 0.56 ft)  
**TPU ( $\pm 1.96\sigma$ ):** **THU (TPEh)**  $\pm 1.964$  m ; **TVU (TPEv)**  $\pm 0.268$  m  
**Timestamp:** 2009-134.23:54:53.810 (05/14/2009)  
**Survey Line:** h12028 / 2804\_reson7125\_hf\_512 / 2009-134 / 000\_2354  
**Profile/Beam:** 69/136  
**Charts Affected:** 17405\_1, 17407\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2804_reson7125_hf_512/2009-134/000_2354	69/136	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

6fm (17405\_1, 17407\_1, 17400\_1, 16016\_1, 530\_1)

6fm 0ft (531\_1)

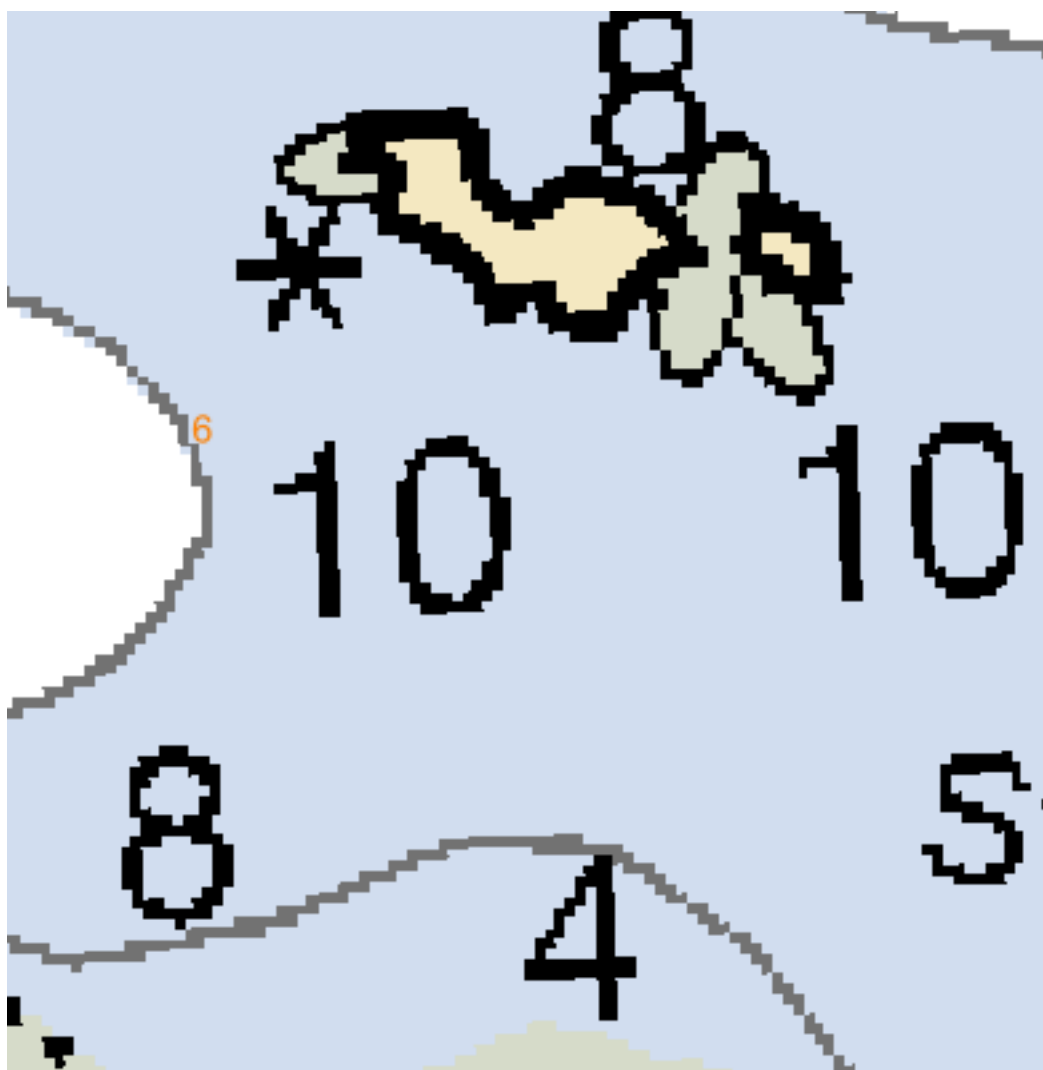
11.1m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survey,H12028  
 VALSOU - 11.143 m

WATLEV - 3:always under water/submerged

### Feature Images



*Figure 1.12.1*

## 1.13) Profile/Beam - 489/122 from h12028 / 2804\_reson7125\_hf\_512 / 2009-153 / 004\_2312

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 21' 09.7" N, 132° 56' 34.8" W  
**Least Depth:** 3.65 m (= 11.99 ft = 1.998 fm = 1 fm 5.99 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh)  $\pm 1.961$  m ; TVU (TPEv)  $\pm 0.264$  m  
**Timestamp:** 2009-153.23:13:26.850 (06/02/2009)  
**Survey Line:** h12028 / 2804\_reson7125\_hf\_512 / 2009-153 / 004\_2312  
**Profile/Beam:** 489/122  
**Charts Affected:** 17405\_1, 17407\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2804_reson7125_hf_512/2009-153/004_2312	489/122	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

2fm (17405\_1, 17407\_1, 17400\_1, 16016\_1, 530\_1)

0fm 0ft (531\_1)

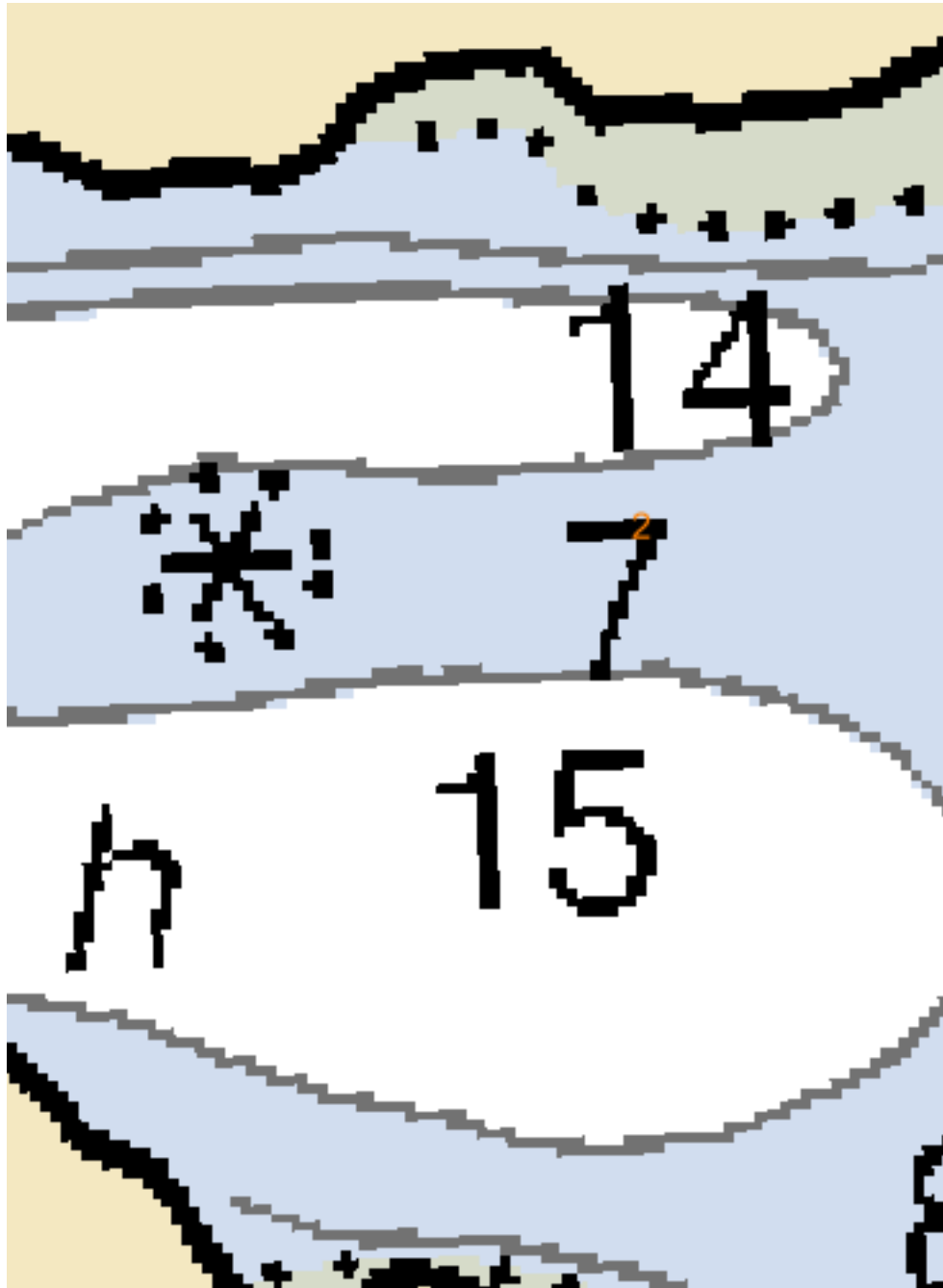
3.7m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survy,H12028  
 VALSOU - 3.654 m

WATLEV - 5:awash

### Feature Images



*Figure 1.13.1*



## 1.14) Profile/Beam - 1371/491 from h12028 / 2804\_reson7125\_hf\_512 / 2009-153 / 300\_2216

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 21' 05.7" N, 132° 55' 47.6" W  
**Least Depth:** 0.97 m (= 3.18 ft = 0.530 fm = 0 fm 3.18 ft)  
**TPU ( $\pm 1.96\sigma$ ):** **THU (TPEh)**  $\pm 1.960$  m ; **TVU (TPEv)**  $\pm 0.264$  m  
**Timestamp:** 2009-153.22:19:18.892 (06/02/2009)  
**Survey Line:** h12028 / 2804\_reson7125\_hf\_512 / 2009-153 / 300\_2216  
**Profile/Beam:** 1371/491  
**Charts Affected:** 17405\_1, 17407\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2804_reson7125_hf_512/2009-153/300_2216	1371/491	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

0 ½fm (17405\_1, 17407\_1, 17400\_1, 16016\_1, 530\_1)

0fm 3ft (531\_1)

1.0m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survey,H12028  
 VALSOU - 0.969 m

WATLEV - 4:covers and uncovers

### Feature Images



*Figure 1.14.1*

## 1.15) Profile/Beam - 217/202 from h12028 / 2804\_reson7125\_hf\_512 / 2009-153 / 301\_1955

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 21' 26.8" N, 132° 55' 45.3" W  
**Least Depth:** 1.53 m (= 5.01 ft = 0.834 fm = 0 fm 5.01 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh)  $\pm 1.960$  m ; TVU (TPEv)  $\pm 0.264$  m  
**Timestamp:** 2009-153.19:55:50.356 (06/02/2009)  
**Survey Line:** h12028 / 2804\_reson7125\_hf\_512 / 2009-153 / 301\_1955  
**Profile/Beam:** 217/202  
**Charts Affected:** 17405\_1, 17407\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2804_reson7125_hf_512/2009-153/301_1955	217/202	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

0  $\frac{3}{4}$ fm (17405\_1, 17407\_1, 17400\_1, 16016\_1, 530\_1)

0fm 5ft (531\_1)

1.5m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survey,H12028  
 VALSOU - 1.526 m

WATLEV - 4:covers and uncovers

### Feature Images

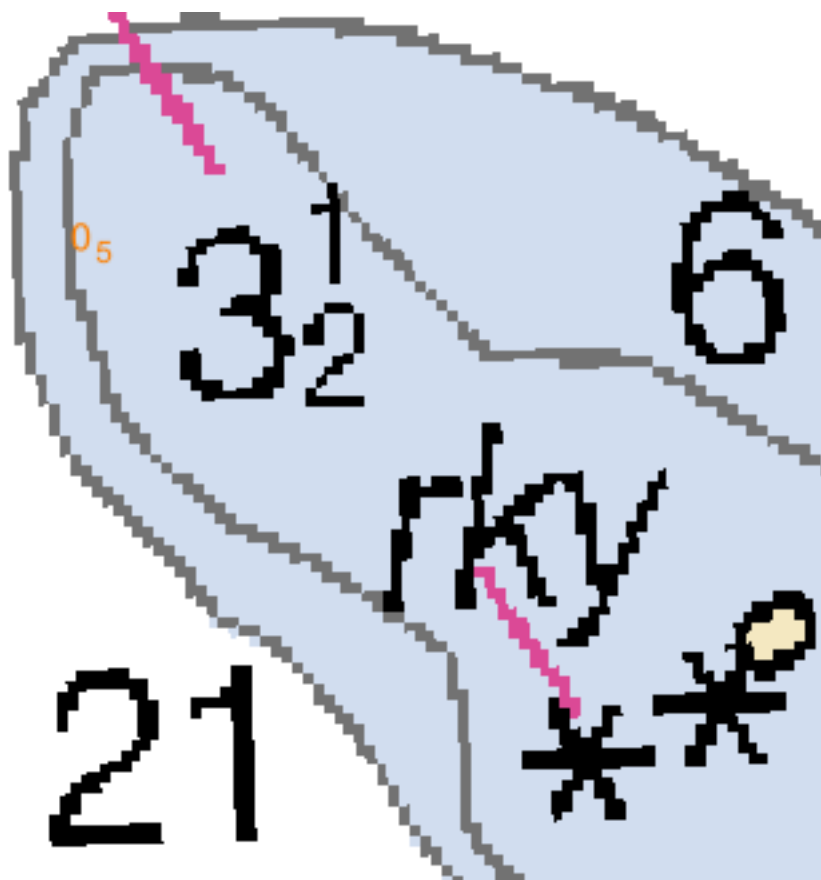


Figure 1.15.1

## 1.16) Profile/Beam - 197/120 from h12028 / 2804\_reson7125\_hf\_512 / 2009-153 / 301\_2042

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 21' 09.4" N, 132° 55' 05.5" W  
**Least Depth:** 5.40 m (= 17.73 ft = 2.954 fm = 2 fm 5.73 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh)  $\pm 1.962$  m ; TVU (TPEv)  $\pm 0.265$  m  
**Timestamp:** 2009-153.20:42:55.671 (06/02/2009)  
**Survey Line:** h12028 / 2804\_reson7125\_hf\_512 / 2009-153 / 301\_2042  
**Profile/Beam:** 197/120  
**Charts Affected:** 17405\_1, 17407\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2804_reson7125_hf_512/2009-153/301_2042	197/120	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

3fm (17405\_1, 17407\_1, 17400\_1, 16016\_1, 530\_1)

2fm 5ft (531\_1)

5.4m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survey,H12028  
 VALSOU - 5.403 m

WATLEV - 5:awash



### Feature Images

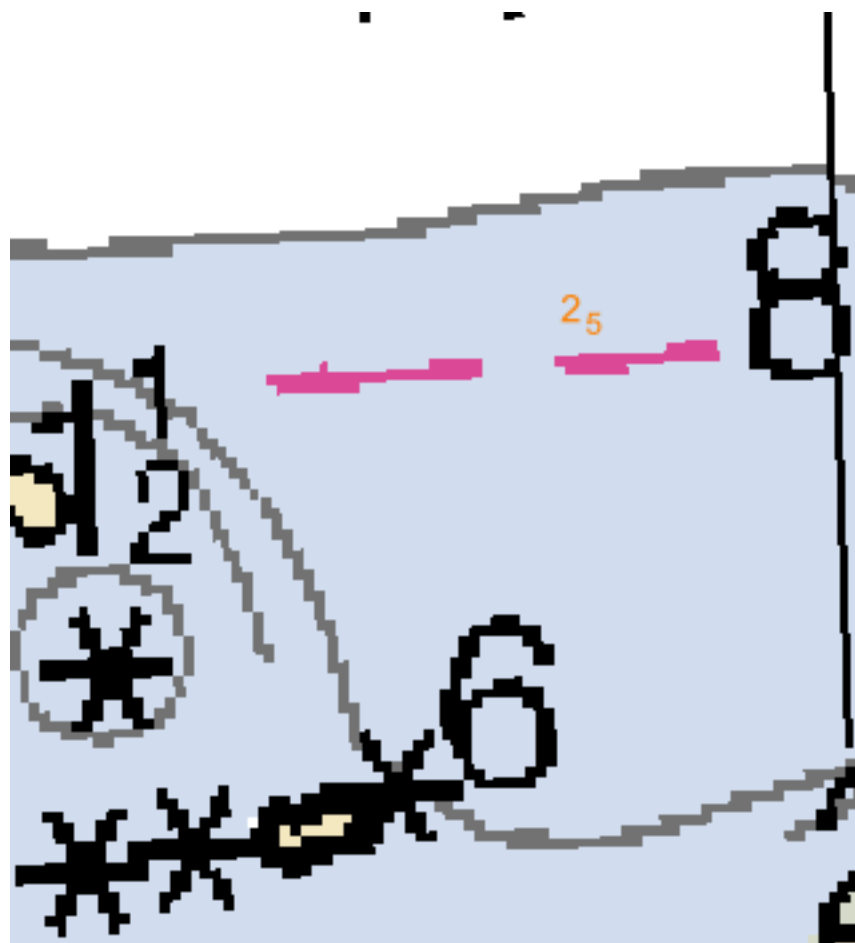


Figure 1.16.1

## 1.17) Profile/Beam - 2256/365 from h12028 / 2804\_reson7125\_hf\_512 / 2009-153 / 301\_2158

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 21' 08.3" N, 132° 55' 22.9" W  
**Least Depth:** 2.10 m (= 6.88 ft = 1.147 fm = 1 fm 0.88 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh)  $\pm 1.961$  m ; TVU (TPEv)  $\pm 0.264$  m  
**Timestamp:** 2009-153.22:03:32.979 (06/02/2009)  
**Survey Line:** h12028 / 2804\_reson7125\_hf\_512 / 2009-153 / 301\_2158  
**Profile/Beam:** 2256/365  
**Charts Affected:** 17405\_1, 17407\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2804_reson7125_hf_512/2009-153/301_2158	2256/365	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

1fm (17405\_1, 17407\_1, 17400\_1, 16016\_1, 530\_1)

1fm 1ft (531\_1)

2.1m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survey,H12028  
 VALSOU - 2.097 m

WATLEV - 4:covers and uncovers

### Feature Images



*Figure 1.17.1*

## 1.18) Profile/Beam - 331/264 from h12028 / 2804\_reson7125\_hf\_512 / 2009-154 / 000\_2225

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 22' 58.9" N, 133° 01' 44.9" W  
**Least Depth:** 10.23 m (= 33.56 ft = 5.593 fm = 5 fm 3.56 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh)  $\pm 1.962$  m ; TVU (TPEv)  $\pm 0.265$  m  
**Timestamp:** 2009-154.22:26:31.958 (06/03/2009)  
**Survey Line:** h12028 / 2804\_reson7125\_hf\_512 / 2009-154 / 000\_2225  
**Profile/Beam:** 331/264  
**Charts Affected:** 17405\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2804_reson7125_hf_512/2009-154/000_2225	331/264	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

5 ½fm (17405\_1, 17400\_1, 16016\_1, 530\_1)

5fm 3ft (531\_1)

10.2m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survey,H12028  
 VALSOU - 10.229 m

WATLEV - 3:always under water/submerged

### Feature Images

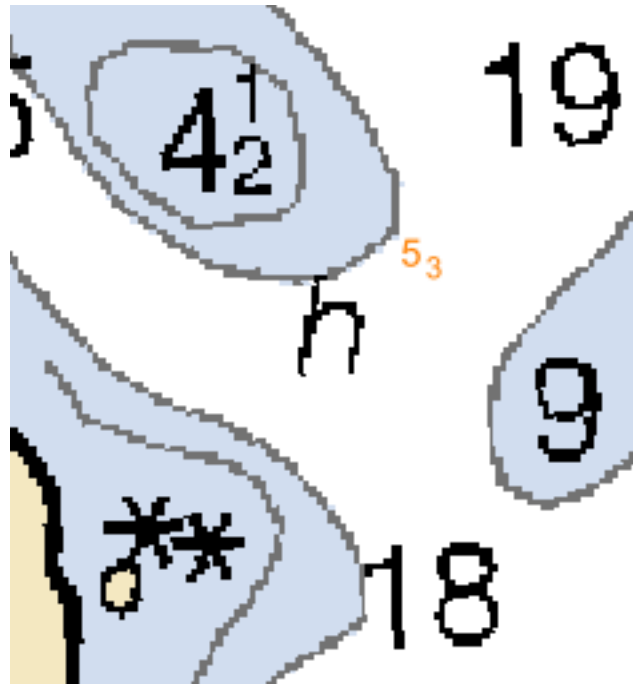


Figure 1.18.1

## 1.19) Profile/Beam - 30/76 from h12028 / 2804\_reson7125\_hf\_512 / 2009-154 / 000\_2318

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 23' 05.5" N, 133° 01' 58.0" W  
**Least Depth:** 13.48 m (= 44.21 ft = 7.368 fm = 7 fm 2.21 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh)  $\pm 1.968$  m ; TVU (TPEv)  $\pm 0.276$  m  
**Timestamp:** 2009-154.23:18:50.111 (06/03/2009)  
**Survey Line:** h12028 / 2804\_reson7125\_hf\_512 / 2009-154 / 000\_2318  
**Profile/Beam:** 30/76  
**Charts Affected:** 17405\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2804_reson7125_hf_512/2009-154/000_2318	30/76	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

7 ¼fm (17405\_1, 17400\_1, 16016\_1, 530\_1)

7fm 2ft (531\_1)

13.5m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survey,H12028  
 VALSOU - 13.475 m



WATLEV - 3:always under water/submerged

### Feature Images

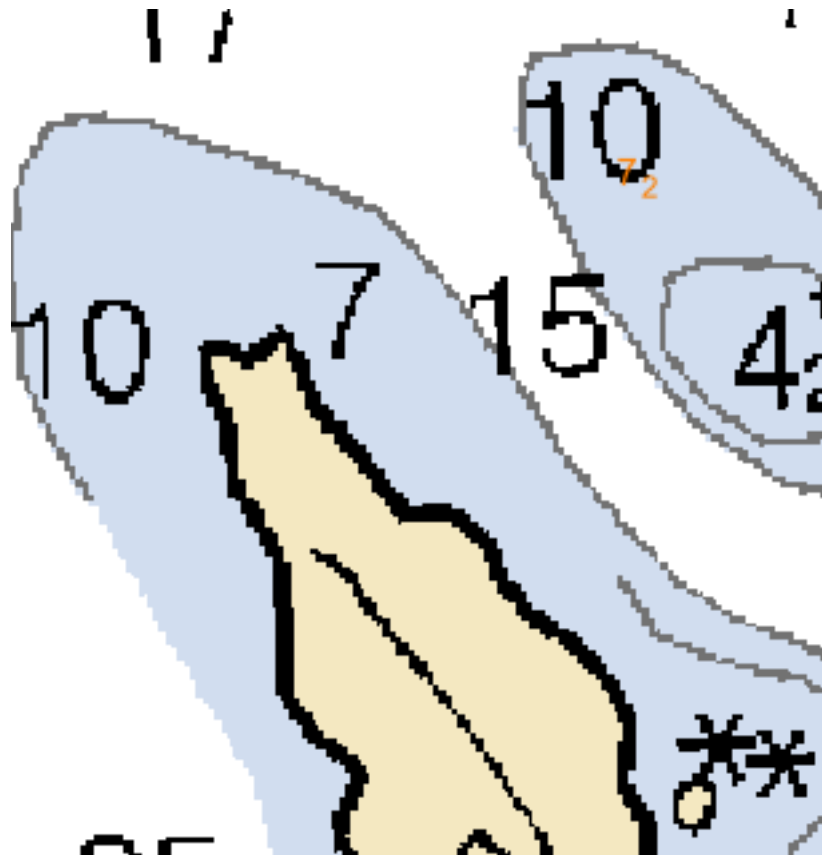


Figure 1.19.1

## 1.20) Profile/Beam - 979/37 from h12028 / 2804\_reson7125\_hf\_512 / 2009-154 / 917\_2121

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 23' 03.1" N, 133° 02' 24.3" W  
**Least Depth:** 8.34 m (= 27.36 ft = 4.559 fm = 4 fm 3.36 ft)  
**TPU ( $\pm 1.96\sigma$ ):** **THU (TPEh)**  $\pm 1.965$  m ; **TVU (TPEv)**  $\pm 0.272$  m  
**Timestamp:** 2009-154.21:26:17.305 (06/03/2009)  
**Survey Line:** h12028 / 2804\_reson7125\_hf\_512 / 2009-154 / 917\_2121  
**Profile/Beam:** 979/37  
**Charts Affected:** 17405\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2804_reson7125_hf_512/2009-154/917_2121	979/37	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

4 ½fm (17405\_1, 17400\_1, 16016\_1, 530\_1)

4fm 3ft (531\_1)

8.3m (500\_1, 501\_1, 50\_1)

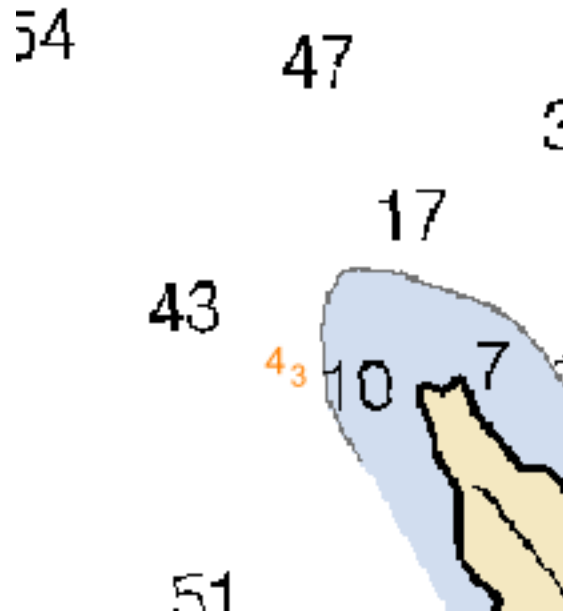
#### S-57 Data

**Geo object 1:** Sounding (SOUNDG)  
**Attributes:** QUASOU - 1:depth known  
 SORDAT - 20090609  
 SORIND - US,US,survey,H12028

TECSOU - 3:found by multi-beam

VERDAT - 12:Mean lower low water

**Feature Images**



*Figure 1.20.1*

**1.21) Profile/Beam - 2395/149 from h12028 / 2804\_reson7125\_hf\_512 / 2009-155 / 000\_2212**

**DANGER TO NAVIGATION**

**Survey Summary**

**Survey Position:** 55° 22' 40.1" N, 133° 01' 04.0" W  
**Least Depth:** 7.42 m (= 24.33 ft = 4.055 fm = 4 fm 0.33 ft)  
**TPU (±1.96σ):** **THU (TPEh)** ±1.962 m ; **TVU (TPEv)** ±0.266 m  
**Timestamp:** 2009-155.22:16:30.978 (06/04/2009)  
**Survey Line:** h12028 / 2804\_reson7125\_hf\_512 / 2009-155 / 000\_2212  
**Profile/Beam:** 2395/149  
**Charts Affected:** 17405\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

**Remarks:**

[None]

**Feature Correlation**

Address	Feature	Range	Azimuth	Status
h12028/2804_reson7125_hf_512/2009-155/000_2212	2395/149	0.00	000.0	Primary

**Hydrographer Recommendations**

[None]

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

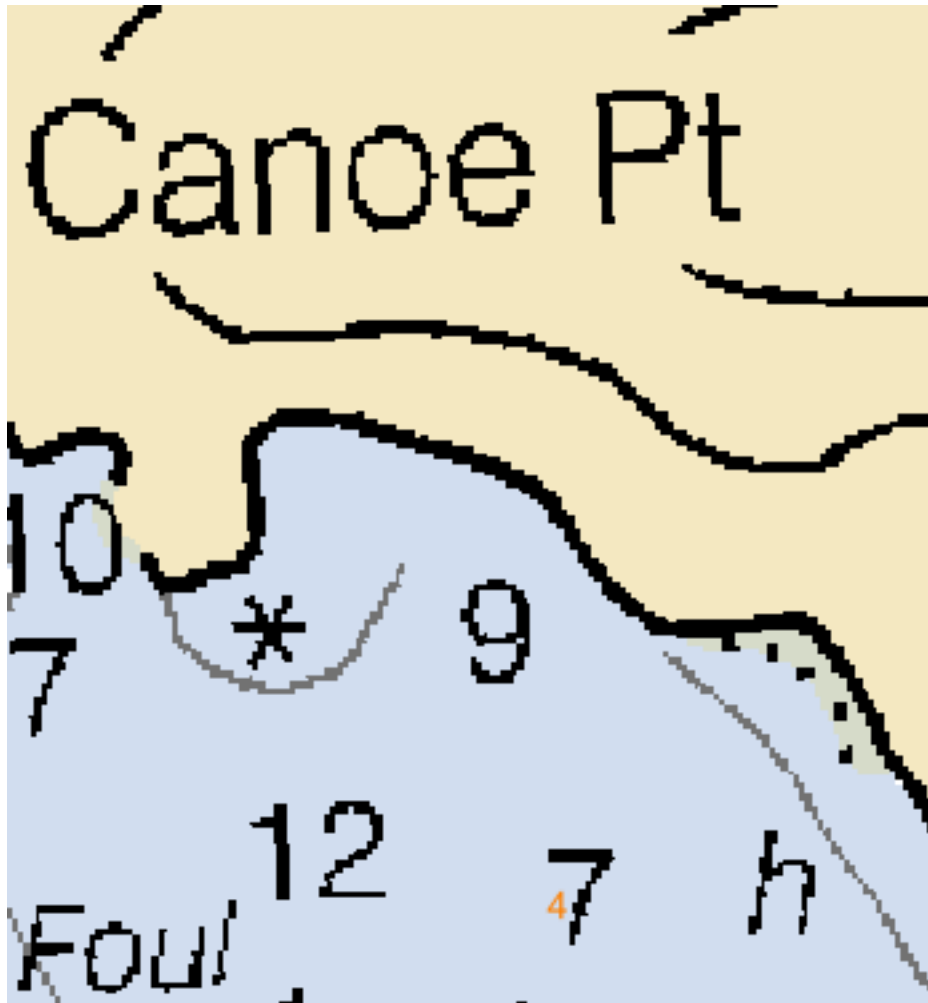
4fm (17405\_1, 17400\_1, 16016\_1, 530\_1)  
 4fm 0ft (531\_1)  
 7.4m (500\_1, 501\_1, 50\_1)

**S-57 Data**

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survy,H12028  
 VALSOU - 7.416 m

WATLEV - 3:always under water/submerged

### Feature Images



*Figure 1.21.1*



## 1.22) Profile/Beam - 463/253 from h12028 / 2804\_reson7125\_hf\_512 / 2009-155 / 000\_2222

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 22' 47.7" N, 133° 01' 33.4" W  
**Least Depth:** 4.35 m (= 14.26 ft = 2.377 fm = 2 fm 2.26 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh)  $\pm 1.960$  m ; TVU (TPEv)  $\pm 0.265$  m  
**Timestamp:** 2009-155.22:23:09.260 (06/04/2009)  
**Survey Line:** h12028 / 2804\_reson7125\_hf\_512 / 2009-155 / 000\_2222  
**Profile/Beam:** 463/253  
**Charts Affected:** 17405\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2804_reson7125_hf_512/2009-155/000_2222	463/253	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

2 ¼fm (17405\_1, 17400\_1, 16016\_1, 530\_1)

2fm 2ft (531\_1)

4.3m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survey,H12028  
 VALSOU - 4.347 m

WATLEV - 3:always under water/submerged

Feature Images

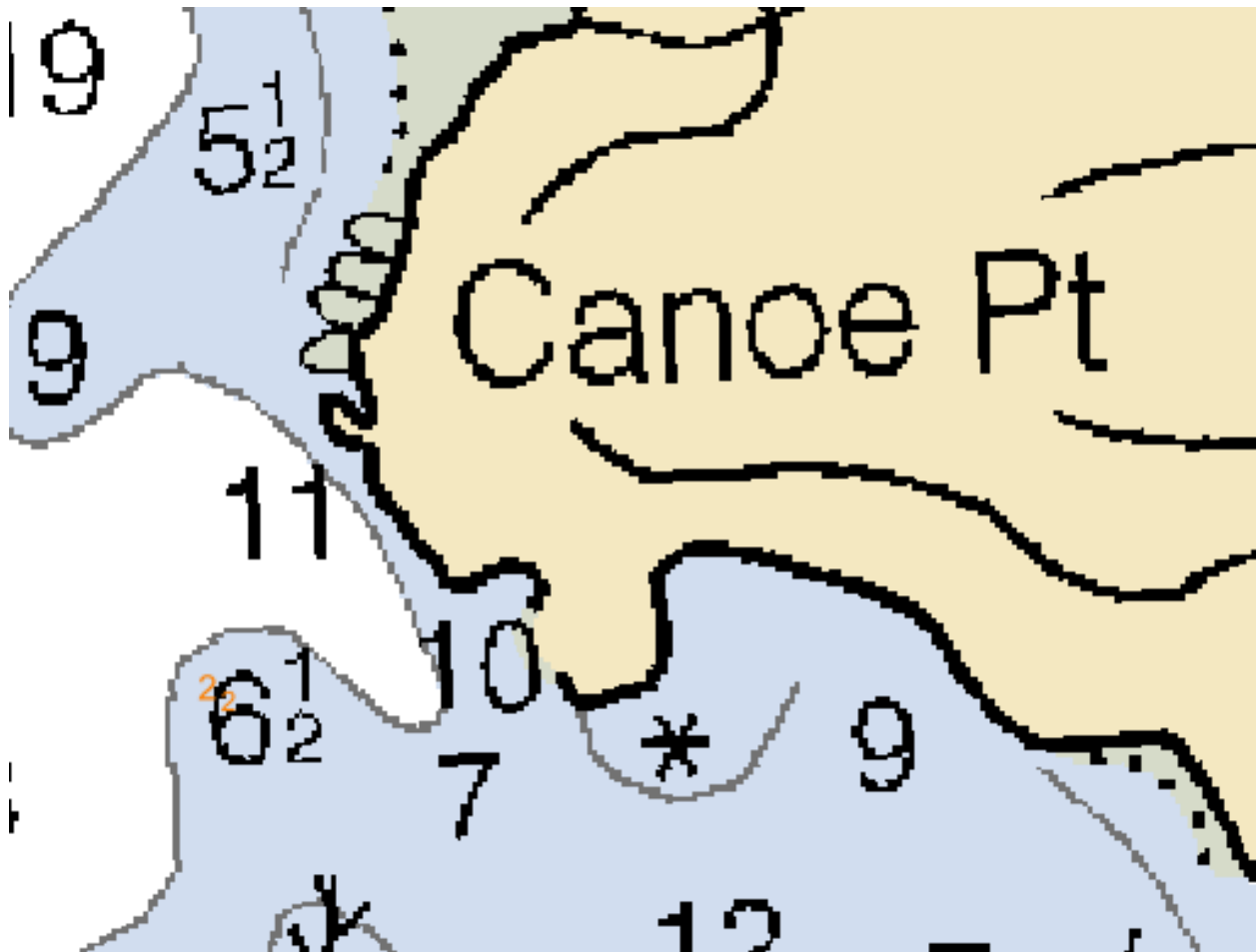


Figure 1.22.1

## 1.23) Profile/Beam - 769/512 from h12028 / 2804\_reson7125\_hf\_512 / 2009-158 / 907\_2313

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 22' 34.8" N, 133° 01' 38.2" W  
**Least Depth:** 0.78 m (= 2.55 ft = 0.425 fm = 0 fm 2.55 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh)  $\pm 1.961$  m ; TVU (TPEv)  $\pm 0.264$  m  
**Timestamp:** 2009-158.23:15:40.460 (06/07/2009)  
**Survey Line:** h12028 / 2804\_reson7125\_hf\_512 / 2009-158 / 907\_2313  
**Profile/Beam:** 769/512  
**Charts Affected:** 17405\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2804_reson7125_hf_512/2009-158/907_2313	769/512	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

0 ¼fm (17405\_1, 17400\_1, 16016\_1, 530\_1)  
 0fm 2ft (531\_1)  
 .8m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survy,H12028  
 VALSOU - 0.778 m

WATLEV - 4:covers and uncovers

### Feature Images

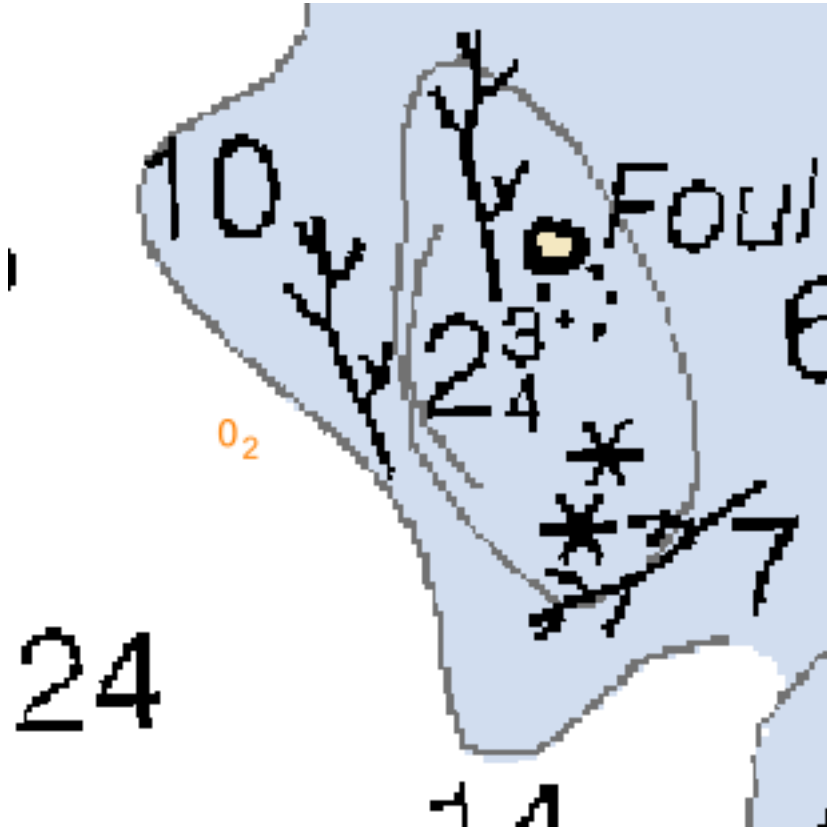


Figure 1.23.1

## 1.24) Profile/Beam - 89/83 from h12028 / 2804\_reson7125\_lf\_256 / 2009-155 / 676\_1741

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 22' 43.3" N, 133° 02' 10.4" W  
**Least Depth:** 13.99 m (= 45.89 ft = 7.648 fm = 7 fm 3.89 ft)  
**TPU ( $\pm 1.96\sigma$ ):** **THU (TPEh)**  $\pm 1.964$  m ; **TVU (TPEv)**  $\pm 0.270$  m  
**Timestamp:** 2009-155.17:41:44.429 (06/04/2009)  
**Survey Line:** h12028 / 2804\_reson7125\_lf\_256 / 2009-155 / 676\_1741  
**Profile/Beam:** 89/83  
**Charts Affected:** 17405\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2804_reson7125_lf_256/2009-155/676_1741	89/83	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

7 ½fm (17405\_1, 17400\_1, 16016\_1, 530\_1)

7fm 4ft (531\_1)

14.0m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Sounding (SOUNDG)  
**Attributes:** QUASOU - 1:depth known  
 SORDAT - 20090609  
 SORIND - US,US,survey,H12028

TECSOU - 3:found by multi-beam



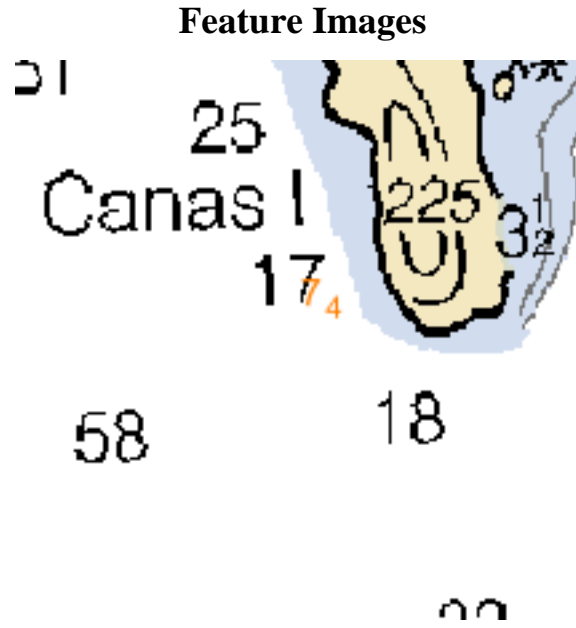


Figure 1.24.1

# H12028 Dangers to Navigation

**Registry Number:** H12028  
**State:** Alaska  
**Locality:** West of Prince of Wales Island  
**Sub-locality:** Trocadero Bay  
**Project Number:** OPR-O190-RA-09  
**Survey Date:** 06/02/2009

## Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
17405	16th	10/01/2008	1:40,000 (17405_1)	USCG LNM: 10/23/2007 (12/09/2008) CHS NTM: None (11/28/2008) NGA NTM: None (12/13/2008)
17407	15th	11/01/2003	1:40,000 (17407_1)	[L]NTM: ?
17400	17th	03/01/2007	1:229,376 (17400_1)	[L]NTM: ?
16016	21st	10/01/2007	1:969,756 (16016_1)	[L]NTM: ?
531	24th	07/01/2007	1:2,100,000 (531_1)	[L]NTM: ?
500	8th	06/01/2003	1:3,500,000 (500_1)	[L]NTM: ?
501	12th	11/01/2002	1:3,500,000 (501_1)	[L]NTM: ?
530	32nd	06/01/2007	1:4,860,700 (530_1)	[L]NTM: ?
50	6th	06/01/2003	1:10,000,000 (50_1)	[L]NTM: ?

\* Correction(s) - source: last correction applied (last correction reviewed--"cleared date")

## Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	Rock	4.18 m	55° 21' 05.1" N	132° 55' 41.1" W	---

## **1 - Danger To Navigation**

## 1.1) Profile/Beam - 74/376 from h12028 / 2804\_reson7125\_hf\_512 / 2009-153 / 301\_2232

### DANGER TO NAVIGATION

#### Survey Summary

**Survey Position:** 55° 21' 05.1" N, 132° 55' 41.1" W  
**Least Depth:** 4.18 m (= 13.72 ft = 2.287 fm = 2 fm 1.72 ft)  
**TPU ( $\pm 1.96\sigma$ ):** THU (TPEh)  $\pm 1.961$  m ; TVU (TPEv)  $\pm 0.264$  m  
**Timestamp:** 2009-153.22:32:37.443 (06/02/2009)  
**Survey Line:** h12028 / 2804\_reson7125\_hf\_512 / 2009-153 / 301\_2232  
**Profile/Beam:** 74/376  
**Charts Affected:** 17405\_1, 17407\_1, 17400\_1, 16016\_1, 531\_1, 500\_1, 501\_1, 530\_1, 50\_1

#### Remarks:

[None]

#### Feature Correlation

Address	Feature	Range	Azimuth	Status
h12028/2804_reson7125_hf_512/2009-153/301_2232	74/376	0.00	000.0	Primary

#### Hydrographer Recommendations

[None]

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

2 ¼fm (17405\_1, 17407\_1, 17400\_1, 16016\_1, 530\_1)

2fm 1ft (531\_1)

4.2m (500\_1, 501\_1, 50\_1)

#### S-57 Data

**Geo object 1:** Underwater rock / awash rock (UWTROC)  
**Attributes:** SORDAT - 20090609  
 SORIND - US,US,survy,H12028  
 VALSOU - 4.182 m

WATLEV - 3:always under water/submerged

### Feature Images

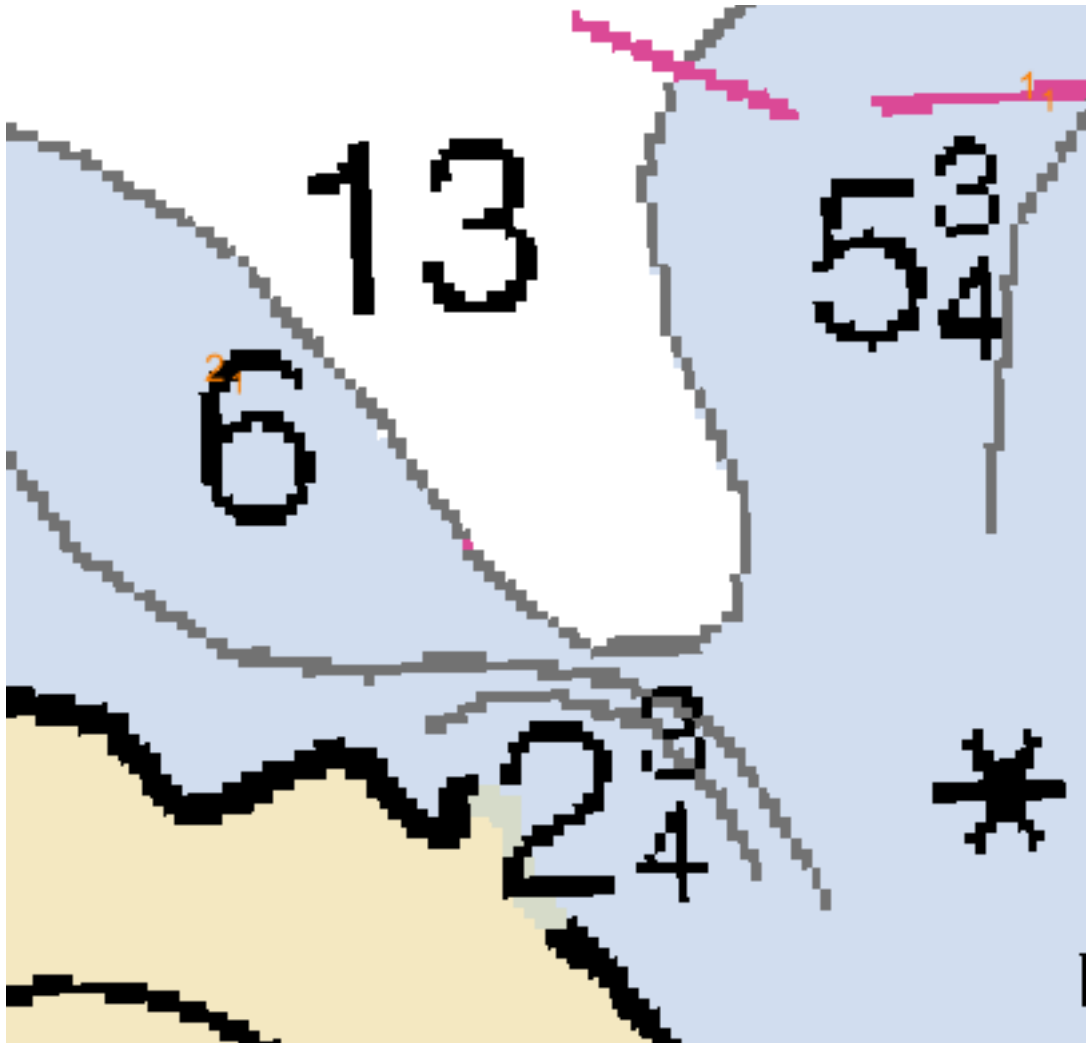


Figure 1.1.1



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

**TIDE NOTE FOR HYDROGRAPHIC SURVEY**

**DATE :** September 4, 2009

**HYDROGRAPHIC BRANCH:** Pacific  
**HYDROGRAPHIC PROJECT:** OPR-0190-RA-2009  
**HYDROGRAPHIC SHEET:** H12028

**LOCALITY:** West of Prince of Wales Island, Trocadero Bay  
**TIME PERIOD:** April 29 - June 9, 20069

**TIDE STATION USED:** 945-0463 Trocadero Bay, AK  
Lat. 55° 21.1'N Long. 132° 56.3' W  
**PLANE OF REFERENCE (MEAN LOWER LOW WATER):** 0.000 meters  
**HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE:** 2.825 meters

**TIDE STATION USED:** 945-1600 Sitka, Baronof AK  
Lat. 57° 3.1' N Long. 135° 20.5' W  
**PLANE OF REFERENCE (MEAN LOWER LOW WATER):** 0.000 meters  
**HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE:** 2.791 meters

**REMARKS:** RECOMMENDED ZONING  
Use zone(s) identified as: SA250

**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).

**Note 2:** Use tide data from the appropriate station with applicable zoning correctors for each zone according to the order in which they are listed in the Tidezone corrector file (\*.ZDF). For example, tide station one (TS1) would be the first choice for an applicable zone followed by TS2, etc. when data are not available.

**Peter J. Stone**

Digitally signed by Peter J. Stone  
DN: cn=Peter J. Stone, o=CO-OPS, ou=NOAA/  
NOS, email=peter.stone@noaa.gov, c=US  
Date: 2009.09.10 16:44:05 -04'00'

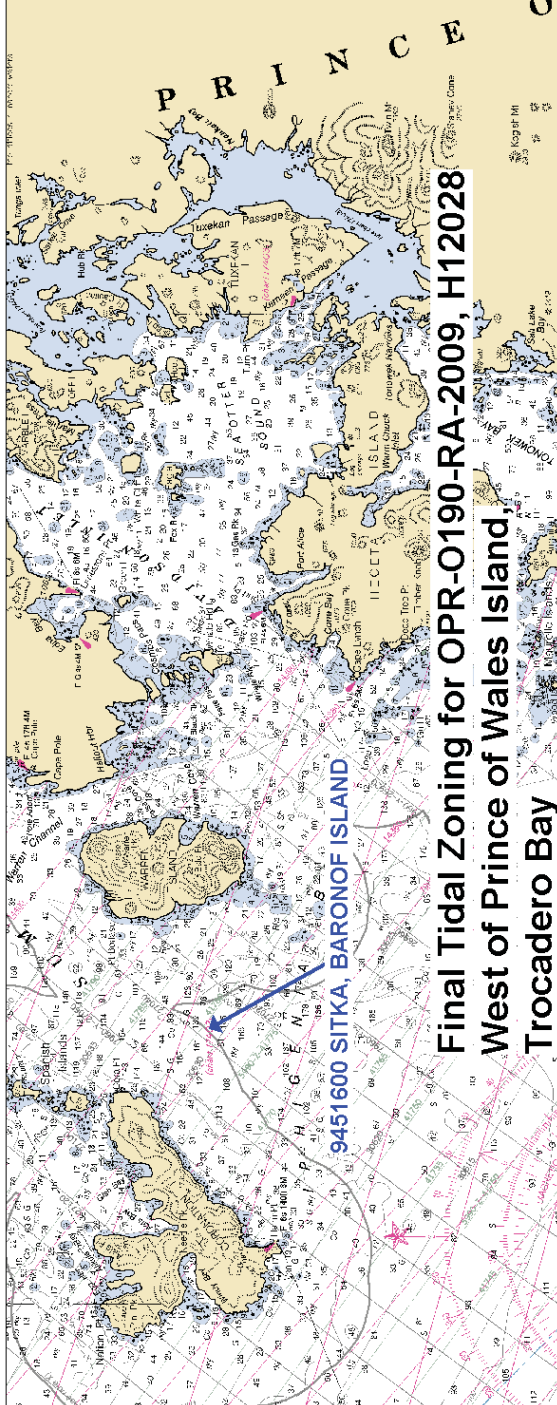
CHIEF, OCEANOGRAPHIC DIVISION



**LOWRY LINEAR INTERPOLATOR**

The data in this report were prepared from the most recent hydrographic survey, but also the data obtained at other dates, if known, and from other sources. The data are subject to the same uncertainties as the original data. The data are subject to the same uncertainties as the original data. The data are subject to the same uncertainties as the original data.

DATE	DEPTH	REMARKS
1900	100	...
1901	100	...
1902	100	...
1903	100	...
1904	100	...
1905	100	...
1906	100	...
1907	100	...
1908	100	...
1909	100	...
1910	100	...
1911	100	...
1912	100	...
1913	100	...
1914	100	...
1915	100	...
1916	100	...
1917	100	...
1918	100	...
1919	100	...
1920	100	...



9451600 SITKA, BARONOF ISLAND

**Final Tidal Zoning for OPR-O190-RA-2009, H12028  
West of Prince of Wales Island,  
Trocadero Bay**

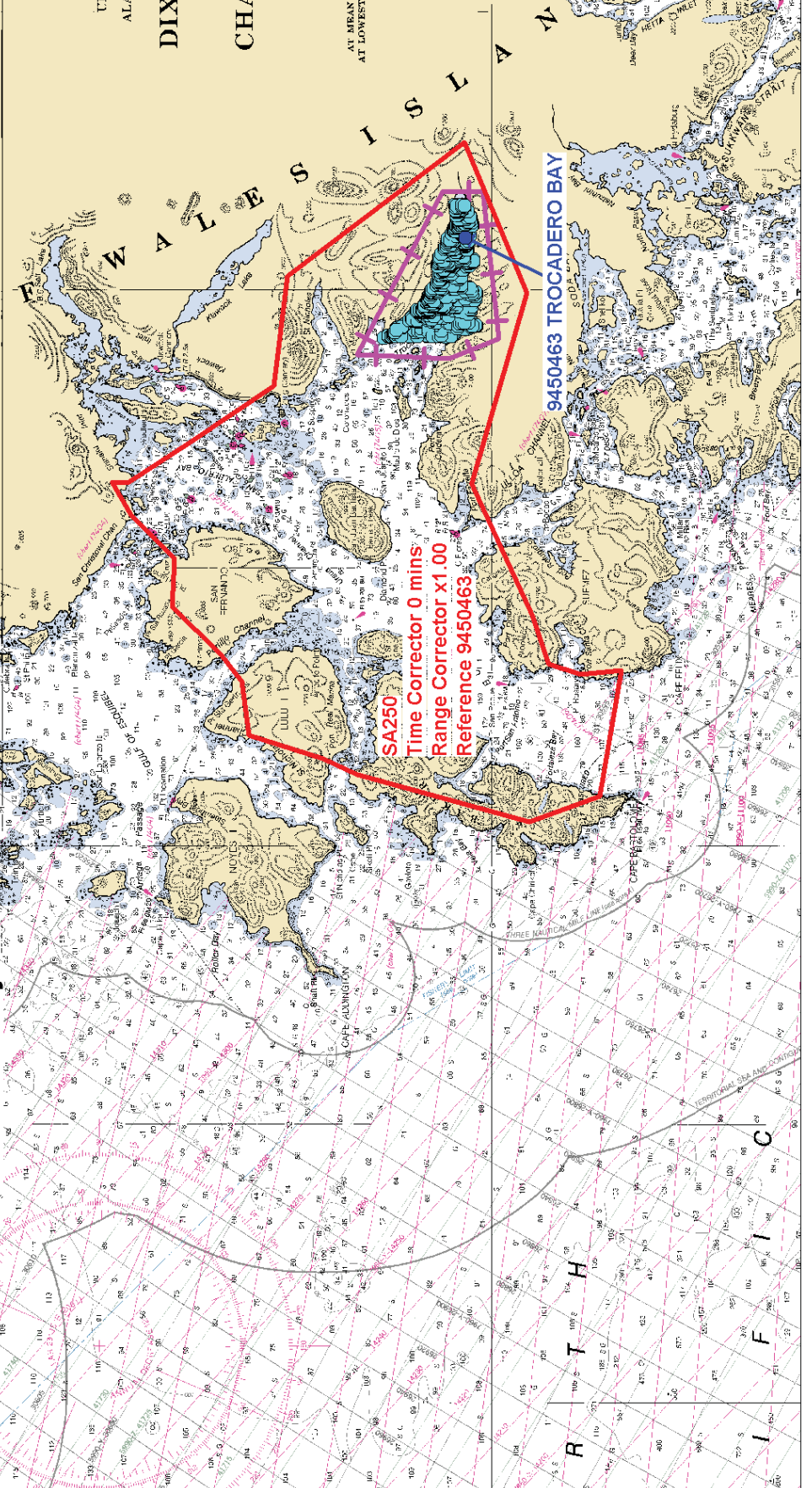


UNITED STATES - CANADA  
ALASKA - SOUTHEAST COAST  
**DIXON ENTRANCE  
TO  
CHATHAM STRAIT**

Meridian Projection  
Scale: 1:225,000 (Lat. 56°)  
North American Datum of 1983  
(World Geodetic System 1984)  
**SOUNDINGS IN FATHOMS**  
AT MEAN LOWER LOW WATER IN U.S. TIME  
AT LOWEST NORMAL TIDES IN CANADIAN TIME

**SA250**  
Time Corrector 0 mins  
Range Corrector x1.00  
Reference 9450463

9450463 TROCADERO BAY



1:225,000  
Scale of U.S. Coast and Geodetic Survey  
Chart No. 1616  
Copyright 1983  
U.S. Government Printing Office  
Washington, D.C. 20540



**H12028 HCell Report**  
Annie Raymond, Physical Scientist  
Pacific Hydrographic Branch

**1. Specifications, Standards and Guidance Used in HCell Compilation**

HCell compilation of survey H12028 used:

Office of Coast Survey HCell Specifications: Draft, Version: 4.0, 17 March, 2010.  
HCell Reference Guide: Version 2.0, 22 February, 2010.

**2. Compilation Scale**

Depths and features for HCell H12028 were compiled to the largest scale raster charts shown below:

Chart	Scale	Edition	Edition Date	NTM Date
17405	1:40,000	16th	10/01/2008	09/11/2010

The following ENC's were also used during compilation:

Chart	Scale
US5AK4BM	1:40,000

**3. Soundings**

A survey-scale sounding (SOUNDG) feature object layer was built from the 8-meter Combined Surface in CARIS BASE Editor. A shoal-biased selection was made at 1:10,000 survey scale using a Radius Table file with values shown in the table, below.

Shoal Limit (m)	Deep Limit (m)	Radius (mm)
-4.7	10	3
10	20	4
20	50	4.5
50	500	5

In CARIS BASE Editor soundings were manually selected from the high density sounding layers (SS) and imported into a new layer (CS) created to accommodate chart density depths. Manual selection was used to accomplish a density and distribution that closely represents the seafloor morphology.

#### 4. Depth Contours

Depth contours at the intervals on the largest scale chart are included in the H12028\_SS HCell for MCD raster charting division to use for guidance in creating chart contours. The metric and fathom equivalent contour values are shown in the table below.

Chart Contour Intervals in Fathoms from Chart 16708	Metric Equivalent to Chart Fathoms, Arithmetically Rounded	Metric Equivalent of Chart Fathoms, with NOAA Rounding Applied	Fathoms with NOAA Rounding Applied	Fathoms with NOAA Rounding Removed for Display on H12028_SS.000
0	0	0.2286	0.000	0
3	5.4864	5.715	3.125	3
5	9.144	9.3726	5.125	5
10	18.288	18.5166	10.125	10
50	91.44	92.8116	50.750	50

With the exception of the zero contours included in the H12028\_CS file, contours have not been deconflicted against shoreline features, soundings and hydrography, as all other features in the H12028\_CS file and soundings in the H12028\_SS have been. This may result in conflicts between the H12028\_SS file contours and HCell features at or near the survey limits. Conflicts with M\_QUAL, COALNE and SBDARE objects, and with DEPCNT objects representing MLLW, should be expected. HCell features should be honored over H12028\_SS.000 file contours in all cases where conflicts are found.

#### 5. Meta Areas

The following Meta object areas are included in HCell H12028:

M\_QUAL

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

#### 6. Features

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

## 7.S-57 Objects and Attributes

The H12028\_CS HCell contains the following Objects:

\$CSYMB	Blue Notes-Notes to the MCD chart Compiler
DEPCNT	Modified GC MLLW
MORFAC	Mooring buoy
M_QUAL	Data quality Meta object
OBSTRN	Foul areas
SBDARE	Modified GC ledges and reefs, bottom samples, and rocky seabed areas
SOUNDG	Soundings at the chart scale density
UWTROC	Rock features
WEDKLP	New and retained kelp

The H12028\_SS HCell contains the following Objects:

DEPCNT	Contours at chart scale intervals
SOUNDG	Soundings at the survey scale density

## 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 decimeter

See the HCell Reference Guide for details of conversion from metric to charting units, and application of NOAA rounding.

## 9. Data Processing Notes

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

## 10. QA/QC and ENC Validation Checks

H12028 was subjected to QA checks in S-57 Composer prior to exporting to the metric HCell base cell (000) file. The millimeter precision metric S-57 HCell was converted to chart units and NOAA rounding applied. dKart Inspector was then used to further check the data set for conformity with the S-58 ver. 2 standard (formerly Appendix B.1 Annex C of the S-57 standard). All tests were run and warnings and errors investigated and corrected unless they are MCD approved as inherent to and acceptable for HCells.

## 11. Products

### 11.1 HSD, MCD and CGTP Deliverables

H12028_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:40,000
H12028_SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:10,000
H12028_DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H12028_outline.gml	Survey outline
H12028_outline.xsd	Survey outline

### 11.2 Software

CARIS HIPS Ver. 6.1	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 3.0	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, SP 1	Validation of the base cell file.
Northport Systems, Inc., Fugawi View ENC Ver.1.0.0.3	Independent inspection of final HCells using a COTS viewer.

## **12. Contacts**

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

Annie Raymond

Physical Scientist

Pacific Hydrographic Branch

Seattle, WA

206-526-6849

[annemieke.raymond@noaa.gov](mailto:annemieke.raymond@noaa.gov).

APPROVAL SHEET  
H12028

Initial Approvals:

The survey evaluation and verification has been conducted according to branch processing procedures and the HCell compiled per the latest OCS HCell Specifications.

The survey and associated records have been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, S-57 classification and attribution of soundings and features, cartographic characterization, and verification or disproof of charted data within the survey limits. The survey records and digital data comply with OCS requirements except where noted in the Descriptive Report and are adequate to supersede prior surveys and nautical charts in the common area.

I have reviewed the HCell, accompanying data, and reports. This survey and accompanying digital data meet or exceed OCS requirements and standards for products in support of nautical charting except where noted in the Descriptive Report.