

H-11161

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. .... H11161

### LOCALITY

State ..... ALASKA

General Locality ..... NORTHERN CLARENCE STRAIT

Sublocality ..... SHRUBBY ISLAND TO BLASHKE ISLAND

**2002**

CHIEF OF PARTY

DEAN MOYLES

### LIBRARY & ARCHIVES

DATE .....

<b>HYDROGRAPHIC TITLE SHEET</b>		<b>H-11161</b>
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 <u>Alaska</u>		
General Locality <u>Northern Clarence Strait</u>		
Sublocality <u>Shrubby Island to Blashke Island</u>		
Scale <u>1:10,000</u>	Date of Survey <u>8/4/02-9/17/02</u>	
Instructions Dated <u>6/24/2002</u>	Project No. <u>OPR-O327-KR-02</u>	
Vessel <u>R/V Quicksilver, R/V Minotaur, R/V Mistral</u>		
Chief of Party <u>Dean Moyles</u>		
Surveyed by <u>Moyles, Arumugam, Reynolds, Orthman, Sipos, Greene, Harrison, Nadeau, et.al.</u>		
Soundings taken by echo sounder, hand lead, pole <u>Reson 8101</u>		
Graphic record scaled by <u>Thales Geosolutions Personnel</u>		
Graphic record checked by <u>Thales Geosolutions Personnel</u>		
Evaluation by <u>G. Nelson</u>	Automated plot by <u>HP Designjet 500</u>	
Verification by <u>B. Taylor</u>		
Soundings in <u>Fathoms and tenths</u>	at <u>MLLW</u>	
REMARKS: <u>The purpose of this work is to provide NOAA with modern and accurate hydrographic survey data for Northern Clarence Strait.</u>		
<u>Revisions and annotations appearing as endnotes were generated during office processing. As a result, page numbering may be interrupted or non-sequential.</u>		
<u>All separates are filed with the hydrographic data.</u>		

**<sup>1</sup>A - Area Surveyed**

H11161 (Sheet A), is bounded by the coordinate listing below, and encompasses Shrubby Island to Blashke Island.<sup>2</sup>

Hydrographic data collection began on August 4, 2002 and ended on September 17, 2002.

**Table 1 H11161 Survey Limits**

<b>Survey Limits</b> Task Order # 10 H11161 Sheet A Scale 1:10,000		
Point #	Positions on NAD83	
	Degrees Latitude (N)	Degrees Longitude (W)
1	56°10'47.770" N	133°03'25.027" W
2	56°13'33.953" N	132°57'59.540" W
3	56°08'43.278" N	132°49'59.578" W
4	56°05'56.742" N	132°55'25.061" W

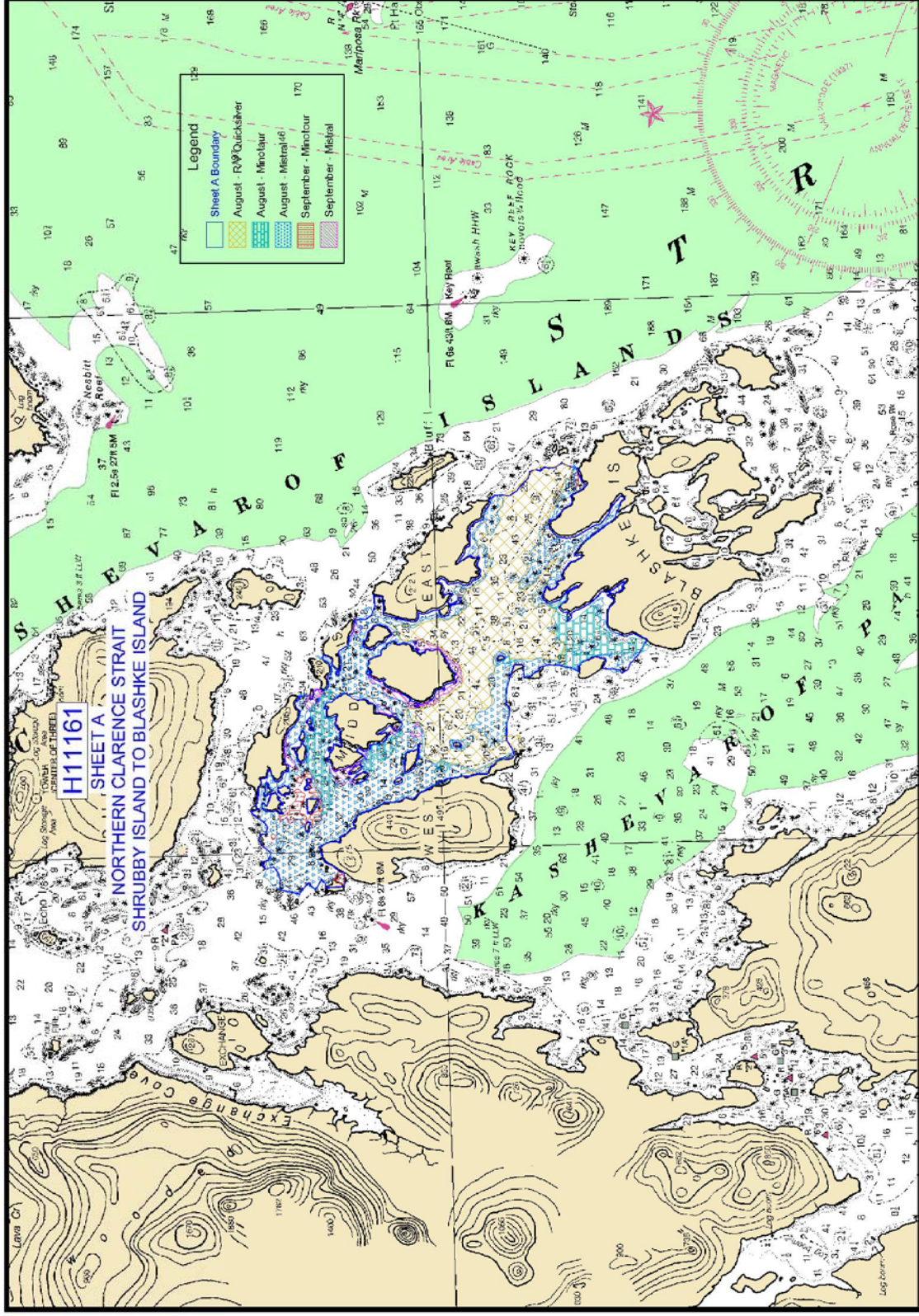


Figure 1 H11161 Survey Limits

## **B – Data Acquisition & Processing**

Refer to the OPR-O327-KR Data Acquisition and Processing Report<sup>3</sup> for a detailed description of all equipment, survey vessels, processing procedures and quality control features. Items specific to this survey and any deviations from the Data Acquisition and Processing Report are discussed in the following sections.

### Equipment & Vessels

The R/V's Quicksilver, Minotaur and Mistral acquired all sounding data for H11161. The Quicksilver, which is 32 feet in length with a draft of 3 feet, was equipped with a Reson 8101 with option 033 (pseudo SideScan) for medium multibeam data acquisition. The vessel was also equipped with two AML sound velocity and pressure sensors for sound velocity profiles. Vessel attitude was measured using a TSS Heading and Dynamic Motion Sensor (HDMS) and XTF files logged in ISIS V 5.84.

The Minotaur and Mistral are 29 feet in length, with a draft of 2 feet. The Minotaur was equipped with a Reason 8101 with option 033 (pseudo SideScan) and two AML sound velocity and pressure sensors for sound velocity profiles. Vessel attitude was measured using a TSS Heading and Dynamic Motion Sensor (POS/MV) and XTF files logged in ISIS V 5.84. The Mistral was also equipped with a Reason 8101 with option 033 (pseudo SideScan) and two AML sound velocity and pressure sensors for sound velocity profiles. Vessel attitude was measured using a TSS Heading and Dynamic Motion Sensor (HDMS) and XTF files logged in ISIS V 5.84 (Note: The Mistral with<sup>4</sup> mobilized with the Quicksilver equipment).

WinFrog v3.2.7 was configured to output a Pseudorange Console (PR-Console) position to ISIS v5.84 for all vessels. The PR-Console position was generated by WinFrog v3.2.7 as the weighted arithmetic average of the pseudo-range positions calculated from the RTCM sources.

Refer to OPR-O327-KR Data Acquisition & Processing Report<sup>5</sup> for a complete listing of equipment and vessel descriptions.

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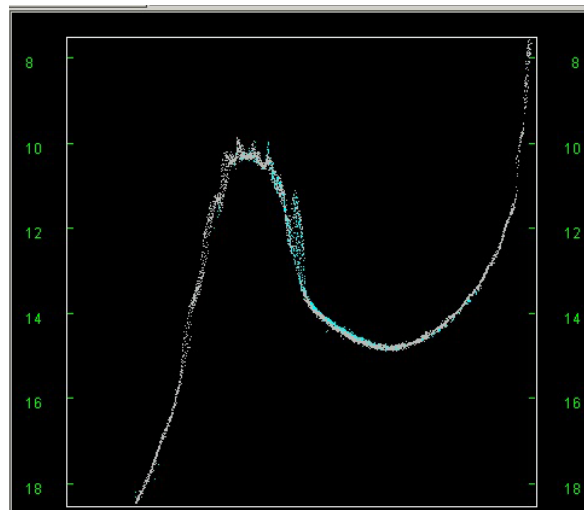
## Quality Control

### Crosslines

Quality control tielines were planned to measure 5 percent of the main scheme line length. Total crossline length surveyed was 16.21 km (8.75 nautical miles) or 4.0 percent of the total main scheme miles. The majority of line kilometers surveyed in Sheet A were near the shoreline. It was deemed impossible to run tie lines in most of these areas. The tielines that were conducted were well distributed throughout the sheet to insure adequate crossline quality control. A total of 82 tie line crossings were examined using the CARIS HIPS Q/C report.

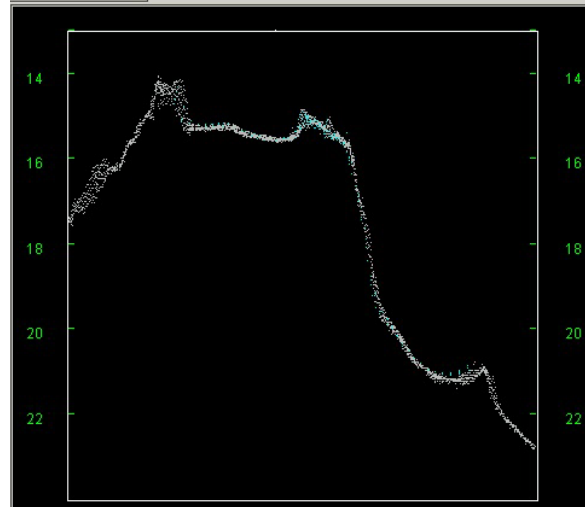
The majority of QC Reports fell well within the required accuracy specifications. Reports that had beams below the 95 percent confidence level are associated with the following areas and conditions:

- The majority of beams that fell outside of the 95 percent confidence level were located in areas having extreme steep slopes and/or rocks. The figures below show a few examples of this.



**Figure 2: Profile of A01-QC037**





**Figure 3: Profile of A01-QC078**

- The accuracy of a typical DGPS unit is between 1 to 3 m, and with the constant coming and going of satellites in these areas; it was not uncommon to get a 1 to 3m- navigation jump. Although this is well within the NOS specifications, Figure 1 shows graphically how navigation error versus vertical error can rapidly affect the specified accuracy. For example, with a 1.5m navigation error at a water depth of 25m, if the slope of the bottom is greater than 20° then the beams are outside of the 95 percent confidence level.
- Although the extreme steep slopes and/or rocks caused the majority of failed beams, another concern was SVP refraction. Due to the fast currents associate with the extreme tides in the area, it was virtually impossible to model the water column. To account for this, more sound velocity casts were conducted and survey line spacing decreased. The problem in most cases was not the survey lines but the tielines. The tielines may have used an SVP cast that was one or two kilometers away, causing cupping in the outer beams and thus not achieving the 95 percent confidence level.<sup>6</sup>

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

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

where, a = 0.5, b = 0.013 and d = depth.

However, since a variance of a difference, rather than a variance from a mean is being used, the a and b values defined in the makehist.cla file within CARIS will use:

$$a = 0.5 * \sqrt{2} = 0.707$$

$$b = 0.013 * \sqrt{2} = 0.018$$

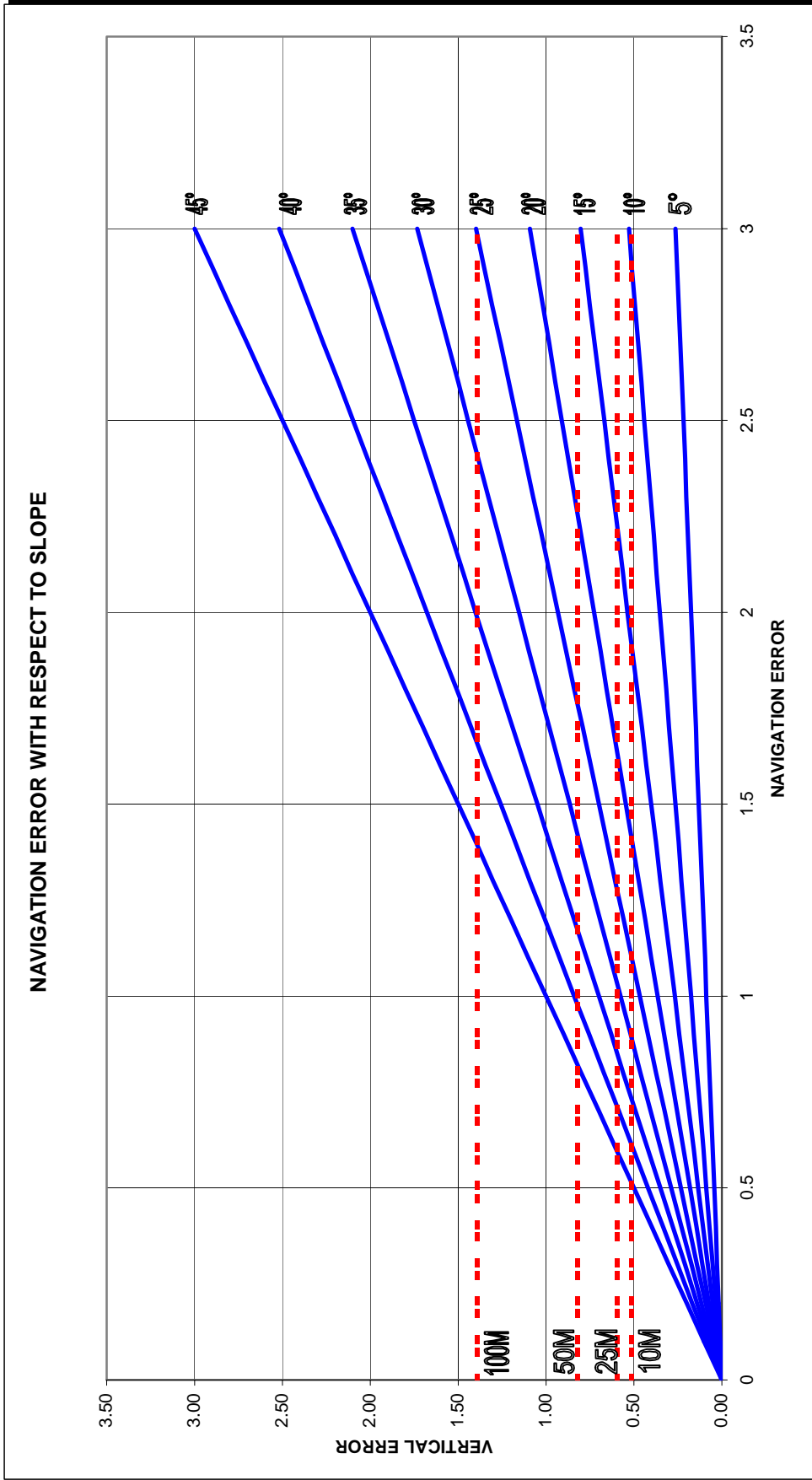


Figure 4: Navigation Error With Respect to Slope



### Data Quality

In general the multibeam data quality for H11161 was excellent.<sup>7</sup> One problem to note is as follows:

WinFrog v3.2.7 was configured to output the Pseudorange Console (PR-Console) position to ISIS v5.84 for the bathymetry data in the XTF files. The PR-Console position was generated by WinFrog v3.2.7 as the weighted arithmetic average of the pseudo-range positions calculated from the RTCM sources. Extensive testing revealed that the time between the calculation and the actual output of the PR-Console position was not constant, and since the computer clock in the Triton ISIS computer is set with the time in the PR-Console string from WinFrog v3.2.7, the time stamps in the XTF files were incorrect.

In most cases the latency varied between 0 and 1 sec, but in some instances (less than 5%) the navigation latency could have been up to 2 seconds. On average the survey speeds ranged from 3 to 5 knots, which would result in a horizontal positioning errors of 1.5 – 2.5 meters.

To rectify the variable latency, the navigation data (time and position) from the WinFrog RAW files were extracted and inserted into the XTF files. Since the time logged in the raw files was the GPS time of the position at the time of the calculation, any navigation time latencies (constant or variable) were removed. The XTF files were then re-converted to a new CARIS project. Then the newly generated navigation files were moved into the existing project to overwrite old navigation data. The navigation was then re-examined and the lines remerged in HDCS.

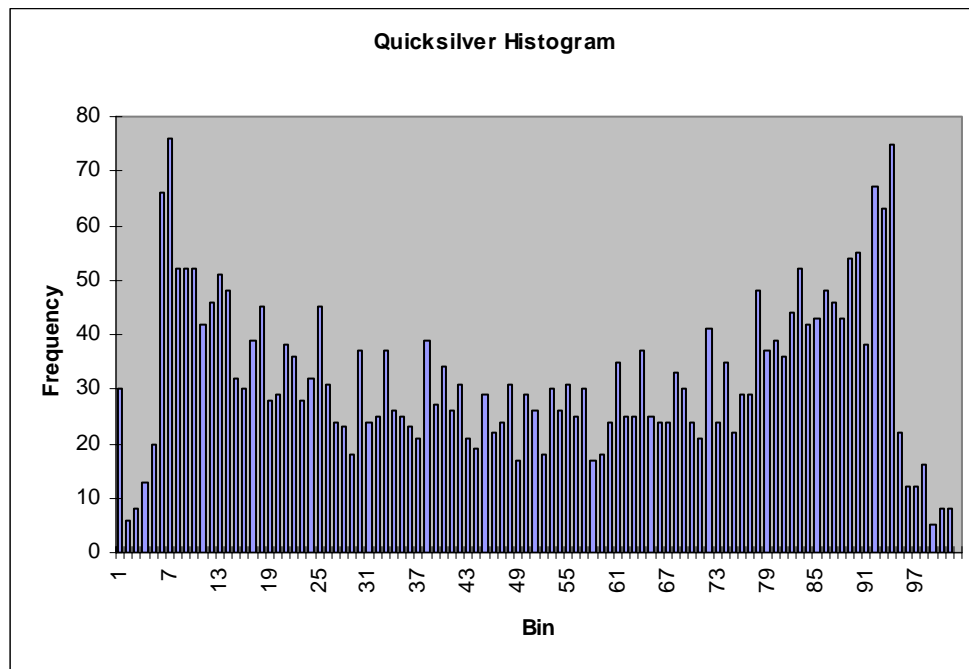
Refer to the Non-Conformance Reports numbered 2002-001 and 2002-002 in Appendix F<sup>8</sup> for a complete description of the problem and resolution.<sup>9</sup>

### Survey Junctions

H11161 (Sheet A) does not junction with any other Sheet assigned under OPR-O327-KR.<sup>10</sup>

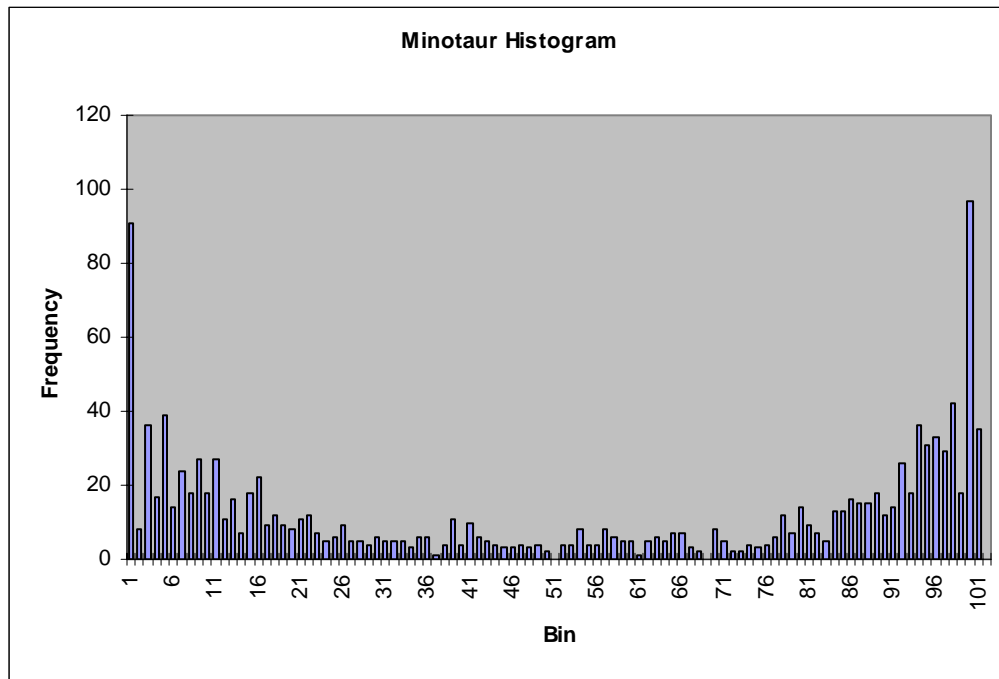
Smooth Sheet Histograms

Figure 5 Histogram is for the Reson 8101 data collected from August 4, 2002 to August 7, 2002 on the Quicksilver. The histogram shows an increase on selected soundings from the outer beams (around beams 8 and 95). This is the result of surveying near the shoreline and the simple fact that the outer beams or<sup>11</sup> the shallowest. Also the majority of lines were run,<sup>12</sup> port beams overlapped with port beams and starboard beams overlapped with starboard beams from the adjacent lines. This makes it possible to have higher density data per square meter on the outer edges, leading to a higher chance of sounding selection on the smooth sheet. Also apparent on these examinations is the transition from phase to amplitude detection method of the sonar (around beams 31 and 73) and any errors due to sound velocity. The other<sup>13</sup> is the decrease of selected soundings on the outer beams, which is the result of deterioration of data quality on the outer beams, especially in deep water. In most cases set filters were used to flag the outer beams as rejected, but in other cases additional cleaning or filters were used on a line by line bases<sup>14</sup> resulting in fewer selected soundings.



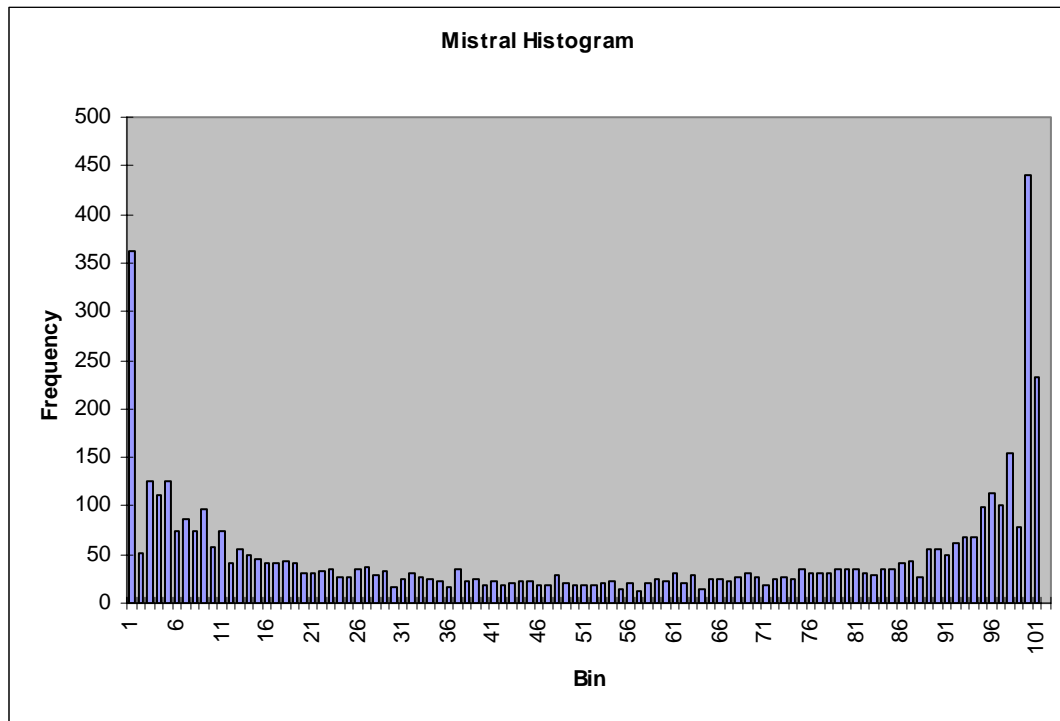
**Figure 5 Histogram for 8101 (Quicksilver)**

Figure 6 Histogram is for the Reson 8101 data, collected from August 19, 2002 to September 17, 2002 on the Minotaur. This histogram shows one distinct feature, which is the increase in the number of selected soundings from the outer beams (more predominant on beams 1 and 100). This does not appear to be the result of equipment failure, survey or processing procedures. Inspection of the smooth sheet reveals trends where those beams are shoaler than the rest of the profiles simply because it is up slope from all other soundings. The crossline comparisons revealed that these beams were within IHO specifications; any differences were only a few centimeters.



**Figure 6 Histogram for 8101 (Minotaur)**

Figure 7 Histogram is for the Reson 8101 data, collected from August 15, 2002 to September 3, 2002 on the Mistral. This histogram also shows an increase in the number of selected soundings from the outer beams (more predominant on beams 1 and 100) similar to the Minotaur. Again, this does not appear to be the result of equipment failure, survey or processing procedures. Inspection of the smooth sheet reveals trends where those beams are shoaler than the rest of the profiles simply because it is up slope from all other soundings. The crossline comparisons revealed that these beams were within IHO specifications; any differences were only a few centimeters.<sup>15</sup>



**Figure 7 Histogram for 8101 (Mistral)**

Quality Control Checks

During the hydrographic survey OPR-O327-KR the R/V’s Davidson, Quicksilver, Minotaur and Mistral conducted a number of confidence checks. This usually consisted of the vessels running two lines in the opposite direction over a reference surface (usually the patch test site). The Reson 8101 systems that were installed on the Quicksilver, Minotaur and Mistral and the Reson 8111 on the Davidson usually compared to within 5 to 10 centimeters. This was also apparent from the results of the confidence checks that were performed during OPR-O309-KR (Approaches to Icy Bay).

The patch tests that were conducted during OPR-O309-KR (Approaches to Icy Bay) to derive: timing, pitch, heading, roll errors, was<sup>16</sup> also used for OPR-O327-KR (Clarence Strait). It should be noted that due to the navigation latency and the re-processing of the XTF files for the patch test lines, new values were derived for timing, pitch, heading and roll.

These values were then enter<sup>17</sup> into the vessel configuration files for each vessel and utilized in the routine processing for OPR-O327-KR (Clarence Strait).

Positioning system confidence checks where<sup>18</sup> conducted on a daily basis. WinFrog has built in QC windows, where the positioning data was displayed and monitored. The graphics window was configured to show the navigation information in plan view. This includes vessel position, survey lines, and background plots and charts. The Vehicle window can be configured to show any tabular navigation information required. Typically, this window displays position, time, line name, heading, HDOP, speed over ground, distance to start of line, distance to end of line, and distance off line. The Calculation window is used to look at specific data items in tabular or graph format. Operators look here to view GPS satellite constellations and position solutions.

Corrections to Echo Soundings

Refer to the OPR-O327-KR Data Acquisition and Processing Report<sup>19</sup> for a detailed description of all corrections to echo soundings. No deviations from the report occurred.

**C – Horizontal & Vertical Control**

Refer to the OPR-O327-KR Horizontal and Vertical Control Report<sup>20</sup> for a detailed description of the horizontal and vertical control used on this Survey. A summary of the projects<sup>21</sup> horizontal and vertical control follows. No deviations from the report occurred.

Horizontal Control

The horizontal control datum for this survey was the North American Datum of 1983 (NAD83). All positions were originally collected in WGS84 and transformed to NAD83 during HIPS workfile creation. Projection of smooth sheet is in NAD83, UTM (Central Meridian 135°00’00’’).

Two MBX-3 differential receivers that used the U.S. Coast Guard (USCG) network of differential beacons were the main source of RTCM. Biorka Island, Level Island and Annette Island were the USCG stations utilized during the OPR-O327-KR survey.

Vertical Control

All sounding data were reduced to MLLW initially using unverified tidal data from one tide station located on Beck Island. A sub-contractor, LCMF, operated the gauge and the data was emailed to the Coffman Cove office at the end of every Julian day.

**Table 2 Tide Gauges**

Gauge	Model	Gauge Type	Location	Latitude	Longitude <sup>22</sup>	Operational
9450906	H350/355	Digital Bubbler	Beck Island	56°02’47’’N	132°51’45’’ W	07/15/02–09/18/02
9450973	H350/355	Digital Bubbler	Blashke Is.	56°07’38’’N	158°06’47’’W	08/25/02–09/17/02

On September 24, 2002, LCMF issued verified tidal data and final zoning for OPR-O327-KR and all sounding data was re-merged. For the Preliminary Smooth Sheet verified tidal data were used. Refer to the Vertical and Horizontal Control Report<sup>23</sup> for additional tidal information and station descriptions.<sup>24</sup>

## D – Results and Recommendations

### Chart Comparison

H11161 survey was compared with charts:

- 17360, 32nd Edition (September 22, 2001, 1:217,828)
- 17382, 14th Edition (September, 2002, 1:80,000)
- 17383, 1st Edition (June, 2002, 1:30,000)

### Comparison of Soundings

The soundings and contours in general compare well with the existing chart.<sup>25</sup> Areas of differences to note are:

- Hydrographic survey H11161 revealed a depth of 9.6 fathoms in the vicinity of a 18 fathom sounding on chart 17360 located at 56°11'17.251" N, 132°58'28.042" W<sup>26</sup> (625704.451 E, 6228864.218 N). This area was surveyed with 100% multibeam coverage. Note: A shoaler sounding in the vicinity was issued as a Danger to Navigation.<sup>27</sup>
- Hydrographic survey H11161 revealed a depth of 1.9 fathoms in the vicinity of a 0.25 fathom sounding on chart 17360 located at 56°09'36.552" N, 132°57'33.574" W<sup>28</sup> (626735.382 E, 6225779.378 N). A 0.3 fathom sounding developed from H11161 is located 150 meters to the east of the 0.25 fathom charted sounding. This area was surveyed with 100% multibeam coverage.
- Hydrographic survey H11161 revealed a depth of 17.9 fathoms in the vicinity of a 24 fathom sounding on chart 17382 located at 56°11'12.699" N, 132°58'40.353" W<sup>29</sup> (625496.373 E, 6228717.285 N). This area was surveyed with 100% multibeam coverage.
- Hydrographic survey H11161 revealed a depth of 14.2 fathoms in the vicinity of a 21 fathom sounding on chart 17382 located at 56°10'56.612" N, 132°56'34.869" W<sup>30</sup> (627674.133 E, 6228284.066 N). This area was surveyed with 100% multibeam coverage.
- Hydrographic survey H11161 revealed a depth of 18.7 fathoms in the vicinity of a 23 fathom sounding on chart 17382 located at 56°10'13.143" N, 132°57'30.844" W<sup>31</sup> (626748.992 E, 6226911.767 N). This area was surveyed with 100% multibeam coverage.
- Hydrographic survey H11161 revealed a depth of 27 fathoms in the vicinity of a 35 fathom sounding on chart 17382 located at 56°09'23.711" N, 132°55'06.194" W<sup>32</sup>

- (629289.450 E, 6225458.463 N). This area was surveyed with 100% multibeam coverage.
- Hydrographic survey H11161 revealed a depth of 33 fathoms in the vicinity of a 43 fathom sounding on chart 17382 located at 56°09'10.108" N, 132°54'21.244" W<sup>33</sup> (630077.591 E, 6225061.504 N). This area was surveyed with 100% multibeam coverage.
  - Hydrographic survey H11161 revealed a depth of 9.8 fathoms in the vicinity of a 20 fathom sounding on chart 17382 located at 56°08'38.033" N, 132°56'08.969" W<sup>34</sup> (628248.838 E, 6224014.059 N). This area was surveyed with 100% multibeam coverage. Note: A shoaler sounding in the vicinity was issued as a Danger to Navigation.<sup>35</sup>
  - Hydrographic survey H11161 revealed a depth of 5.3 fathoms in the vicinity of a 13 fathom sounding on chart 17383 located at 56°11'14.260" N, 132°58'55.441" W<sup>36</sup> (625234.895 E, 6228757.924 N). This area was surveyed with 100% multibeam coverage. Note: A shoaler sounding in the vicinity was issued as a Danger to Navigation.<sup>37</sup>
  - Hydrographic survey H11161 revealed a depth of 17.9 fathoms in the vicinity of a 24 fathom sounding on chart 17383 located at 56°11'12.234" N, 132°58'39.632" W<sup>38</sup> (625509.220 E, 6228703.291 N). This area was surveyed with 100% multibeam coverage.
  - Hydrographic survey H11161 revealed a depth of 0.4 fathoms in the vicinity of a 4.3 fathom sounding on chart 17383 located at 56°11'21.509" N, 132°57'13.050" W<sup>39</sup> (626993.107 E, 6229034.031 N). This area was surveyed with 100% multibeam coverage. Note: A shoaler sounding in the vicinity was issued as a Danger to Navigation.<sup>40</sup>
  - Hydrographic survey H11161 revealed a depth of 17.5 fathoms in the vicinity of a 21 fathom sounding on chart 17383 located at 56°10'57.224" N, 132°56'34.054" W<sup>41</sup> (627687.616 E, 6228303.392 N). This area was surveyed with 100% multibeam coverage.
  - Hydrographic survey H11161 revealed a depth of 5.4 fathoms in the vicinity of a 8 fathom sounding on chart 17383 located at 56°10'53.212" N, 132°56'51.410" W<sup>42</sup> (627392.122 E, 6228170.469 N). This area was surveyed with 100% multibeam coverage. Note: A shoaler sounding in the vicinity was issued as a Danger to Navigation.<sup>43</sup>
  - Hydrographic survey H11161 revealed a depth of 8.2 fathoms in the vicinity of a 0.3 fathom sounding on chart 17383 located at 56°10'41.693" N, 132°58'39.154" W<sup>44</sup> (625545.156 E, 6227759.535 N). This area was surveyed with 100% multibeam coverage.
  - Hydrographic survey H11161 revealed a depth of 7.3 fathoms in the vicinity of a 16 fathom sounding on chart 17383 located at 56°10'6.360" N, 132°57'54.915" W<sup>45</sup> (626340.099 E, 6226689.837 N). This area was surveyed with 100% multibeam coverage.
  - Hydrographic survey H11161 revealed a depth of 18.3 fathoms in the vicinity of a 23 fathom sounding on chart 17383 located at 56°10'12.808" N, 132°57'30.422" W<sup>46</sup> (626756.580 E, 6226901.629 N). This area was surveyed with 100% multibeam coverage.

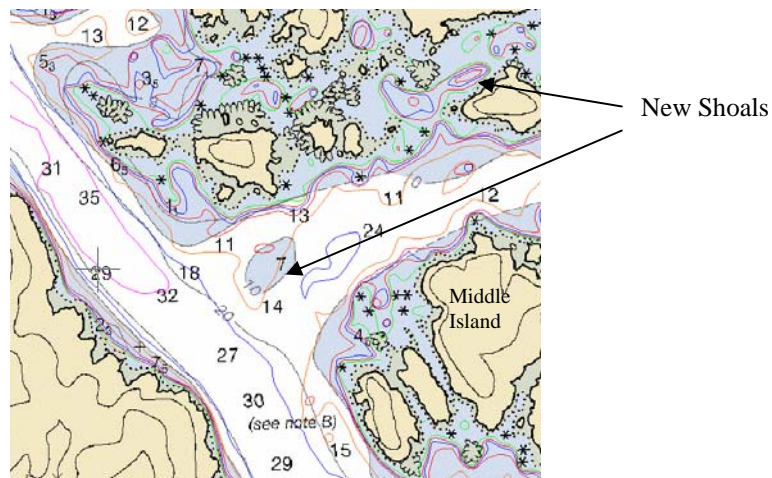


- Hydrographic survey H11161 revealed a depth of 18.3 fathoms in the vicinity of a 13 fathom sounding on chart 17383 located at 56°09'48.417" N, 132°56'22.400" W<sup>47</sup> (627952.069 E, 6226182.630 N). This area was surveyed with 100% multibeam coverage.
- Hydrographic survey H11161 revealed a depth of 17.8 fathoms in the vicinity of a 22 fathom sounding on chart 17383 located at 56°09'1.760" N, 132°55'42.306" W<sup>48</sup> (628686.906 E, 6224761.231 N). This area was surveyed with 100% multibeam coverage.

Soundings that differ from hydrographic survey H11161 are highlighted in red on the chart comparison sheet included in Separate 6.<sup>49</sup> Other soundings that differed resulted in a Danger to Navigation and are listed in Appendix A Danger to Navigations.<sup>50</sup>

Since Charts 17360 and 17382 have little or no detail pertaining to the contours, the hydrographer compared the contours from H11161 to Chart 17383.<sup>51</sup> Areas of differences to note are:

- H11161 reveals that the 10-fathom contour located northwest of Middle Island as<sup>52</sup> migrated to the south and new shoals are present.<sup>53</sup>



**Figure 8 Comparison of Contours-1**

- H11161 reveals that the 10-fathom contour located east of Middle Island as<sup>54</sup> migrated further to the southeast and random shoaling as<sup>55</sup> occurred.<sup>56</sup>

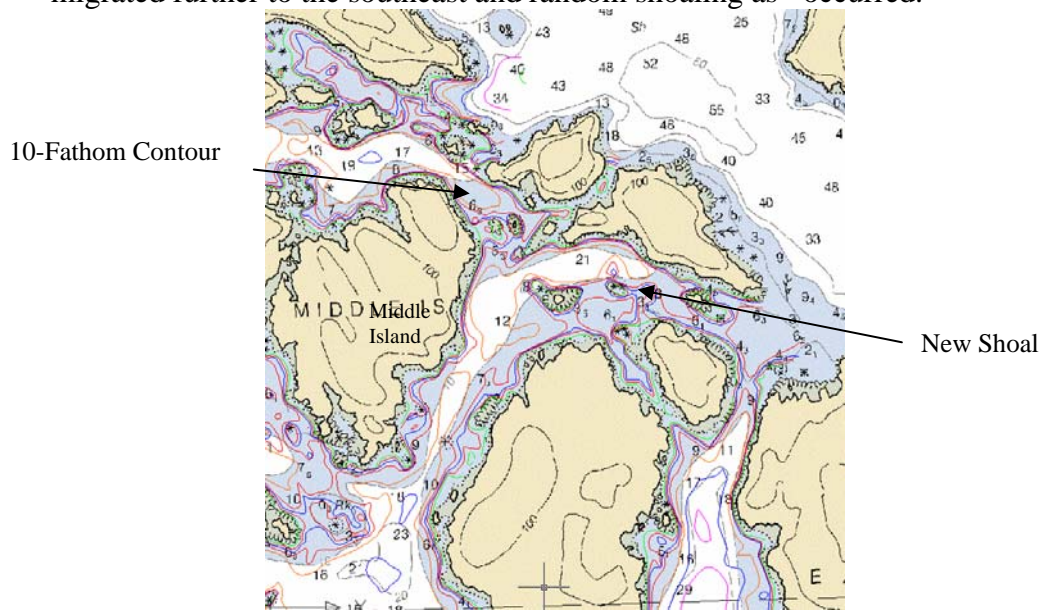


Figure 9 Comparison of Contours-2

- H11161 reveals significant shoaling and deepening in an area located between West Island and East Island.<sup>57</sup>

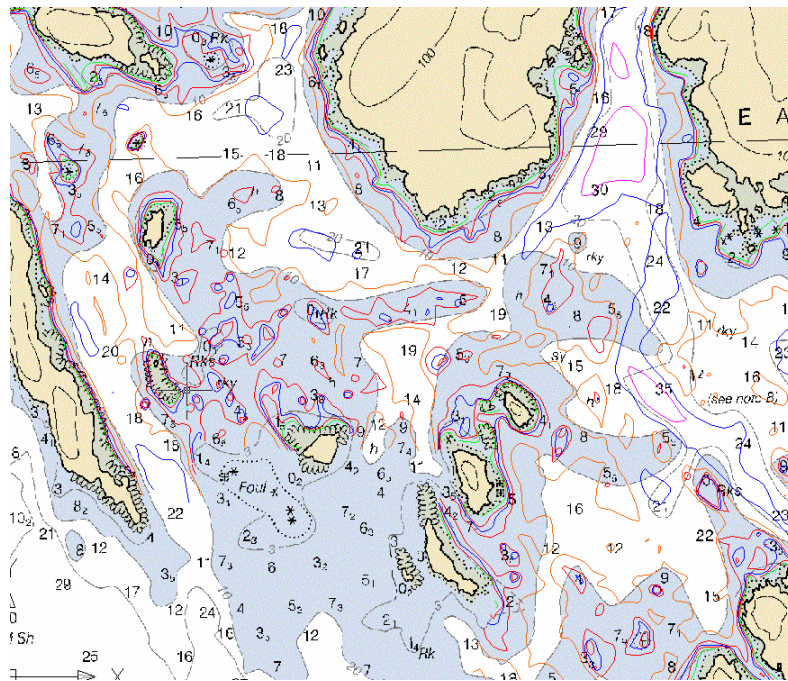


Figure 10 Comparison of Contours-3



- H11161 reveals a shoal area, which is bounded by the 10-fathom contour located on the northeast side of Blashke Island. Also the<sup>58</sup> area to the south of East Island as<sup>59</sup> been further developed to reveal the following.<sup>60</sup>

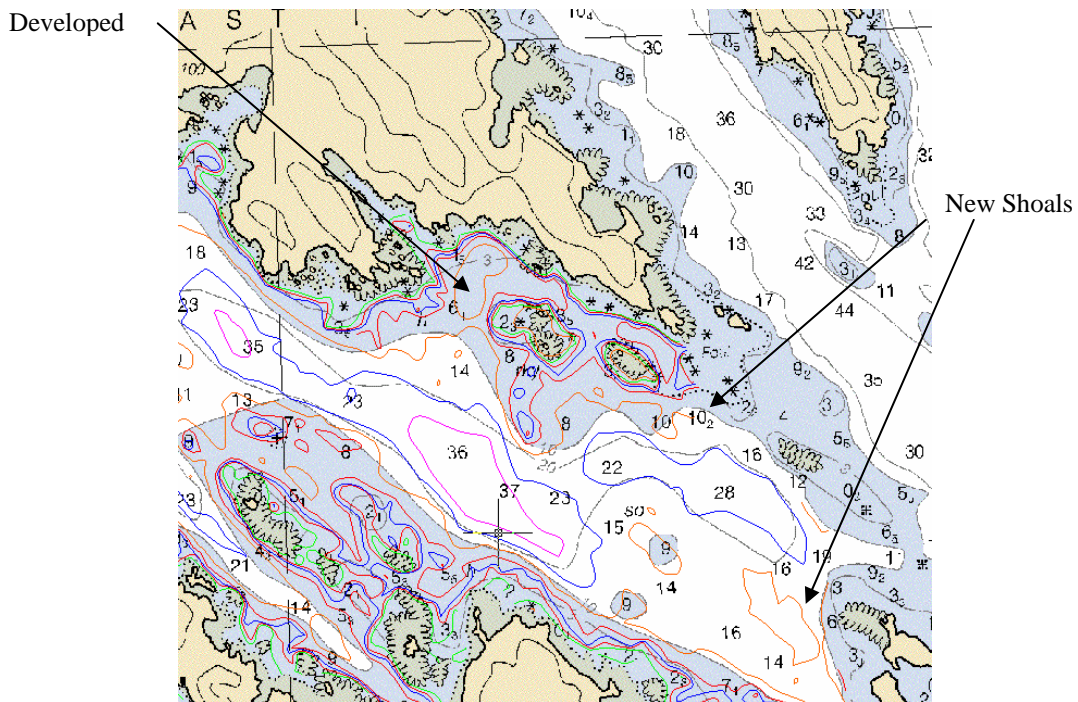


Figure 11 Comparison of Contours-4

- H11161 further developed an area north of Middle Island to reveal the following.<sup>61</sup>

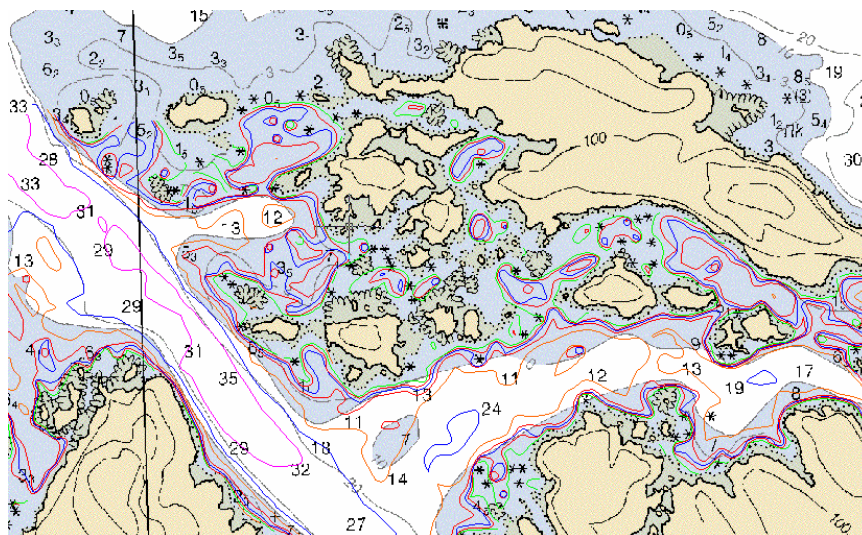


Figure 12 Comparison of Contours-5

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## Automated Wreck and Observation Information System

There were three AWOIS items assigned to OPR-O327-KR, but none within the limits of H11161.<sup>62</sup>

### Charted Features

There were no charted features in H11161.<sup>63</sup>

### Dangers to Navigation

Seventy-one dangers to navigation were located during the hydrographic survey of H11161 and were submitted on October 20, 2002.<sup>64</sup> Refer to Appendix A for Submitted Report<sup>65</sup>

### Additional Results

#### Shoreline Verification<sup>66</sup>

Limited shoreline verification was conducted in accordance with SOW 3.4.2 for remote sensing features inshore of the 4-meter curve, including the MHW line. Traditional shoreline verification was conducted in accordance with SOW 3.4.3 for remote sensing features seaward of the 4-meter curve.<sup>67</sup> The 4-meter curve was determined from H11161 multibeam data, where present, and at the hydrographer's discretion in areas where no multibeam data was available.

A 19ft skiff, referred to as DP Skiff, was used to perform shoreline verification. The skiff was owned and piloted by Mr. Clayton Smalley, a local resident of Coffman Cove, AK, who has over 35 years of extensive local knowledge of the survey area. The DP skiff could generally safely navigate in any area where it could maintain 0.5 meters of under-keel clearance, except in locations of heavy swells near shore. The DP skiff was outfitted with a Garmin GPSMAP 176C differential GPS receiver and a WINFROG data acquisition system. NOAA supplied Thales with photogrammetric shoreline data in raster format for TP-00582, TP-00583 for use as source shoreline. The T-sheet raster images were registered and digitized in AutoCAD by Thales personnel and the resultant vector data were used in WINFROG for field verification. In addition, the multibeam 4-meter curve and CH 17382 was displayed as a layer in WINFROG for reference. The DP skiff was not outfitted with an echosounder, however a leadline was used to take soundings on submerged features.

Traditional verification of remote sensing offshore features was generally performed within a few hours of predicted low water. Traditional verification of remote sensing offshore features was performed by running along the 4-meter curve and taking Detached Positions (DPs) on any feature observed near, on, or off-shore of the 4-meter curve. Although the SOW only required that new features observed were to be noted and recommended for additional

investigation, all new features actually observed near, on, or off-shore of the 4-meter curve were immediately investigated with a DP. Observed features included exposed rocks, reefs, ledges, and islets, as well as submerged features indicated by visual sightings in clear water, kelp patches, surface action, and the pilot's local knowledge. DPs and their corresponding hydrographer's remarks were digitally recorded in WINFROG. Digital photographs were taken for features when feasible. However, photographs were not taken on features that were submerged beneath the water's surface at the time of the DP. Digital photographs were favored over sketches in order to increase efficiency during the limited low tide windows. However, some hand-drawn sketches were also taken and are included in the Hydrographer's Field Notes. A DP form for each DP was digitally produced from the WINFROG file. The DP form also includes the digital photograph, if taken, and shows the DP overlaid onto the largest scale chart, the vector shoreline data, and associated multibeam coverage. The DP forms and raw field notes can be found on the Project CD under the Reports Directory.<sup>68</sup>

It should be noted that large rocks, generally greater than 20m in size, often received at least 2 DPs, with a DP taken at each physical extent. The physical extents of DP'd rocks were also often outlined as corresponding gaps in associated multibeam coverage. In such instances, the corresponding smooth sheet rock symbol was placed in the center of the extents as defined by DPs and/or the gap in multibeam coverage.<sup>69</sup>

Limited verification of the MHW line (remote sensing shoreline) was generally performed during periods of mid to high tide. However, limited verification of the MHW line was also performed concurrently with low tide investigation of offshore features in select areas at the hydrographer's discretion. The general location of the MHW line was determined by running as close to the shoreline as possible, generally 2-20 meters offshore, and periodically recording an EVENT in WINFROG approximately every 10-45 seconds. Taking an EVENT digitally recorded the vessel's time and position and the hydrographer's remarks. Typical hydrographer's remarks were "GL HWL OK" for sections where the general location of the MHW line appeared to match the photogrammetric shoreline data to within 20 meters. In areas where there appeared to be a potential discrepancy, remarks typically described the location of the apparent MHW line in reference to the skiff at the time of the EVENT. For example, "HWL 5m to E" meant that the apparent MHW line was 5m to the east of the skiff at the time of the EVENT. EVENTS were plotted during office review and overlaid onto H11163<sup>70</sup> multibeam coverage plots, T-sheets, and affected charts for final MHW verification. DP Forms were not produced for EVENTS and EVENTS are not depicted on the DP plot, however, EVENTS are provided in a supplemental AutoCAD file.<sup>71</sup>

Limited verification of remote sensing features inshore of the 4-meter curve was performed concurrently with both limited verification of the MHW line (performed at mid-high tide) and traditional verification of offshore features (performed at low tide). EVENTS were taken to record hydrographer's remarks for most inshore features. Typical remarks included "DM rk ok" and "DM rk not seen". It should be noted that in such instances, the skiff's location, and therefore the EVENT position, was often at a significant distance (> 20 meters) away from the actual location of the inshore feature. The EVENTS for features inshore of the 4-meter curve were plotted during office review and compared to the multibeam coverage, T-

sheets, and the chart. If a feature inshore of the 4-meter curve appeared to be inadequately located on the remote sensing source, it is listed as a recommendation for additional item investigation. Although it was not required by the SOW, some select inshore features were investigated by traditional verification (i.e. coming alongside the feature and recording a DP and photograph) when it was determined by the hydrographer that doing so had minimal operational impact on collecting required DPs.<sup>72</sup>

## Results

### MHW line (including islets)<sup>73</sup>

All sections of T-sheet MHW line that were within the survey area and were determined to be in the correct general location (within 20 meters) by means of limited shoreline verification are shown on the smooth sheet in black. T-sheet MHW line compared very well to field verification observations<sup>74</sup> and the smooth sheet shows only a few changes which are itemized below:

1. T-sheet islet (no height) was positioned by DPs JD249\_80 and JD249\_79 to be a rock (-11 ft height MLLW) at 56 11 29.94 N, 132 58 33.37 W (N6229253.74, E625601.06). The T-sheet islet is considered disproved and a rock is depicted on the smooth sheet instead.<sup>75</sup>
2. T-sheet islet (no height) was positioned by DPs JD249\_81, JD249\_82, and JD249\_83 to be a rock (-16 ft height MLLW) at 56 11 24.13 N, 132 58 35.21 W (N6229073.35, E625574.73). The T-sheet islet (also a charted islet on 17383\_1) is considered disproved and a rock surrounded by a ledge is depicted on the smooth sheet instead.<sup>76</sup>
3. T-sheet islet (no height) was positioned by DPs JD247\_95 and JD247\_97 to be a rock (-15 ft height MLLW) at 56 10 50.72 N, 132 56 42.13 W (N6228098.22, E627554.46). The T-sheet islet (also a charted islet on 17383\_1) is considered disproved and a rock is depicted on the smooth sheet instead.<sup>77</sup>
4. T-sheet islet (3 ft height MHW) was positioned by DPs JD247\_77 and JD247\_78 to be a rock (-17 ft height MLLW) at 56 10 35.38 N, 132 55 34.23 W (N6227659.18, E628739.19). The T-sheet islet (also a charted islet on 17383\_1) is considered disproved and a rock is depicted on the smooth sheet instead.<sup>78</sup>
5. New islet (3 ft height MHW) at 56 11 30.72 N, 132 58 45.30 W (N6229271.82, E625394.78) was positioned by DPs JD249\_88 and JD249\_87. This feature is depicted as a rock on AK9702B, but this survey found the item to have a height that warrants depiction as an islet. The feature is present as an islet on chart 17383\_1 as well.<sup>79</sup>
6. New islet (4 ft height MHW) at 56 10 40.37 N, 132 59 10.53 W (N6227702.84, E625005.36) was positioned by DPs JD248\_71 and JD248\_70. This feature is depicted as a rock on TP00572, but this survey found the item to have a height that warrants depiction as an islet.<sup>80</sup>
7. New islet (3 ft MHW) at 56 11 13.49 N, 132 57 59.81 W (N6228762.24, E626194.52) was positioned by DPs JD249\_62, JD249\_63, JD249\_64, and JD249\_65. This feature is depicted as a rock on AK9702B, but this survey found the



- item to have a height that warrants depiction as an islet. The feature is present as an islet on chart 17383\_1 as well.<sup>81</sup>
8. New islet (3 ft MHW) at 56 11 20.07 N, 132 57 09.29 W (N6228991.52, E627059.28) was positioned by DPs JD248\_82 and JD248\_83. This feature is depicted as a rock on AK9702B and TP00572, but this survey found the item to have a height that warrants depiction as an islet.<sup>82</sup>
  9. New islet (4 ft MHW) at 56 10 41.39 N, 132 56 49.95 W (N6227805.75, E627428.17) was positioned by DP JD247\_94. This feature is depicted as a rock on AK9702B, but this survey found the item to have a height that warrants depiction as an islet. The feature is present as an islet on chart 17383\_1 as well.<sup>83</sup>
  10. New islet (4 ft MHW) at 56 10 39.79 N, 132 56 52.29 W (N6227755.21, E627389.29) was positioned by DPs JD247\_91, JD247\_92, and JD247\_93. This feature is depicted as a rock on AK9702B, but this survey found the item to have a height that warrants depiction as an islet. The feature is present as an islet on chart 17383\_1 as well.<sup>84</sup>
  11. New islet (4 ft MHW) at 56 08 56.43 N, 132 55 21.89 W (N6224607.20, E629044.17) was positioned by DPs JD246\_32 and JD246\_33. This feature is depicted as a rock on TP00577, but this survey found the item to have a height that warrants depiction as an islet.<sup>85</sup>
  12. New islet (6 ft MHW) at 56 08 55.95 N, 132 55 20.17 W (N6224593.13, E629074.18) was positioned by DPs JD246\_30 and JD246\_31. This feature is depicted as part of the larger islet to the south on AK9702B (as well as on chart 17383\_1) but this survey found it to be an independent islet, not connected to the southern islet. The new extents are presented as dashed red lines on the smooth sheet.<sup>86</sup>
  13. New islet (4 ft MHW) at 56 09 04.33 N, 132 55 09.59 W (N6224857.71, E629248.97) was positioned by DP JD247\_54. This feature is depicted as a rock on TP00577, but this survey found the item to have a height that warrants depiction as an islet. The item is separate from the larger islet to the southeast at MHW.<sup>87</sup>
  14. New islet (3 ft MHW) at 56 09 22.82 N, 132 54 01.94 W (N6225464.47, E630398.70) was positioned by DP JD247\_65. This feature is depicted as a rock on TP00572 and AK9702B, but this survey found the item to have a height that warrants depiction as an islet. The item is charted as an islet on chart 17383\_1 as well.<sup>88</sup>
  15. New islet (6 ft MHW) at 56 09 21.44 N, 132 53 44.75 W (N6225430.85, E630696.53) was positioned by DPs JD247\_62 and JD247\_61. This feature is depicted as a rock on AK9702B, but this survey found the item to have a height that warrants depiction as an islet. The item is charted as an islet on chart 17383\_1 as well.<sup>89</sup>
  16. New islet (4 ft MHW) at 56 08 28.38 N, 132 53 01.00 W (N6223814.07, E631508.49) was positioned by DPs JD246\_67 and JD246\_68. This feature is depicted as a rock on TP00577, but this survey found the item to have a height that warrants depiction as an islet.<sup>90</sup>
  17. Small knob of land at 56 09 12.41 N, 132 58 14.89 W (N6225012.07, E626044.67) on chart 17383\_1 was investigated by DP JD248\_62 and was determined to be an islet separate from the land to the southwest. The shoreline change is represented by a red dashed line on the smooth sheet.<sup>91</sup>



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18. T-sheet islet at 56 10 47.35 N, 132 58 23.91 W (N6227942.10, E625802.84) was positioned by DP 249\_92 as a rock (height 12 ft MLLW).<sup>92</sup>

Features that are itemized and discussed are as follows:

1. T-sheet rock just northwest of DP JD248\_66 at 56 09 56.29 N, 132 58 43.87 W (N6226353.82, E625504.96) was not found during shoreline investigation, and full multibeam coverage disproves the T-sheet item.<sup>93</sup>
2. T-sheet rock just northwest of DP JD248\_67 at 56 09 57.07 N, 132 58 45.43 W (N6226377.14, E625477.35) was not found during shoreline investigation, and full multibeam coverage disproves the T-sheet item.<sup>94</sup>
3. Navigationally significant T-sheet rock at 56 11 10.82 N, 132 57 47.92 W (N6228685.76, E626401.83) was not found during shoreline investigation (DP JD249\_69) or by full multibeam coverage.<sup>95</sup>

#### Charted Shoreline - Disprovals and Exceptions (from CH 17382 and 17383)

Charted rocks within the survey limits were generally identified to correspond with a smooth sheet rock, or cluster of smooth sheet rocks. It should be noted that charted rock symbols are often centered at positions up to 200m away from their corresponding smooth sheet rocks. Charted rock symbols within the survey limits were generally disproved at their centered positions with multibeam coverage, and/or, by DPs taken on actual highpoints observed in the area during shoreline verification. The hydrographer therefore recommends that existing charted rock symbols within the survey limits be deleted, and rocks be charted in these areas based on the position of rocks or ledges shown on the smooth sheet.<sup>96</sup> Exceptions where the hydrographer recommends that charted rocks be retained are itemized below. Charted rock disprovals are not itemized except for instances of important navigational significance or where further comment is warranted. In areas where the multibeam data indicated an isolated submerged rock of navigational significance, an “Rk” text label was placed adjacent to selected sounding (multibeam least depth) on the smooth sheet. In areas where the multibeam data indicated a submerged rocky bottom with numerous high points, an “rky” text label was placed in the area on the smooth sheet.

1. Charted rock (on chart 17382) at 56 08 03.36 N, 132 56 45.08 W (N6222923.73, E627657.67) proved to be an islet (12 ft MHW) surrounded by a ledge. A total of seven DPs (see JD247\_16) found extents for the islet and ledge. T-sheet TP00577 also recognized a MHW line and provided the islet extents.<sup>97</sup>
2. Charted rock at 56 08 37.54 N, 132 54 40.78 W (N6224044.78, E629771.04) on chart 17382\_1 was confirmed by DPs JD246\_44 and JD246\_45. Normally this does not meet criteria for itemization since the rock is proved by shoreline investigation, but in this case the rock does not appear on the newer chart of the area, 17383\_1. In addition, the old chart position was selected for the rock position instead of the DP since it provided a navigationally better position, and therefore is presented in the charted position on the smooth sheet.<sup>98</sup>

3. Charted rock at 56 08 32.75 N, 132 53 26.95 W (N6223935.29, E631049.54) on chart 17382\_1 was not found during traditional shoreline investigation. DP JD246\_61 investigated the site. In addition, multibeam coverage over the site found no features. It is noted that DP JD248\_28 and multibeam coverage confirmed a rock about 50 meters to the northeast of charted rock.<sup>99</sup>
4. Charted rock at 56 08 14.39 N, 132 57 00.35 W (N6223256.76, E627383.98) on chart 17382\_1 was not found during traditional shoreline investigation. DPs JD247\_05 and JD249\_06 were taken at the site at negative tides. Leadline drops were also performed and demonstrated the water depth to be approximately 13.5 to 14 meters in the area.<sup>100</sup>
5. Charted islet at 56 09 21.80 N, 132 54 01.03 W (N6225433.42, E630415.29) on chart 17383\_1 was found to be a rock (height -11 ft MLLW). DP JD247\_63 visited the site. In addition, there was 100% multibeam coverage over the feature.<sup>101</sup>
6. Charted islet (also T-sheet MHW) at 56 09 32.09 N, 132 54 02.33 W (N6225750.96, E630383.13) on chart 17383\_1 was found to be a rock (height -14 ft MLLW). DPs JD247\_69 and JD247\_68 investigated the site.<sup>102</sup>
7. Charted rock at 56 09 17.24 N, 132 56 49.80 W on chart 17383\_1 was confirmed by DP JD248\_34. The hydrographer recommends the existing chart position be used for the rock instead of the DP or DM positions. The rock therefore appears in the charted position on the smooth sheet surrounded by a ledge.<sup>103</sup>
8. Charted ledge at 56 09 17.26 N, 132 57 32.07 W (N6225183.91, E626778.98) on chart 17383\_1 was found by DPs JD248\_42 through JD248\_44 and multibeam data to consist of two ledges, with a channel between.<sup>104</sup>
9. Charted rock at 56 10 02.58 N, 132 58 10.19 W on chart 17383\_1 was confirmed by DPs JD248\_52 and JD248\_53. However, the previously charted position is considered by the hydrographer to be navigationally “better” than either DP or the DM position. The rock therefore appears in the charted position on the smooth sheet.<sup>105</sup>
10. Charted rock at 56 10 14.58 N, 132 57 49.95 W on chart 17383\_1 was confirmed by DPs JD248\_54 and JD248\_55. However, the previously charted position is considered by the hydrographer to be navigationally “better” than either DP position. The rock therefore appears in the charted position on the smooth sheet. In addition, the charted height of the rock at 0.3 fathoms MLLW is incorrect—this survey found the rock to be much more significant at -9 ft. MLLW.<sup>106</sup>
11. Charted rock at 56 10 24.73 N, 132 57 28.15 W (N6227271.36, E626784.80) on chart 17383\_1 was confirmed by DP JD248\_56. It is itemized here because it is a navigationally significant charted rock that the hydrographer recommends be moved to the DP position.<sup>107</sup>
12. Charted ledge at 56 10 31.15 N, 132 57 05.91 W (N6227481.17, E627162.41) on chart 17383\_1 was found by multibeam coverage at DP JD248\_61 to actually extend more seaward than<sup>108</sup> charted. The ledge is therefore extends more seaward on the smooth sheet.<sup>109</sup>
13. Charted islet at 56 11 35.69 N, 132 58 20.28 W (N6229438.04, E625821.47) on chart 17383\_1 was investigated by DP JD248\_74 and it was determined to have a height that warrants depiction as a rock instead of an islet (-11 ft MLLW). Topo AK9702B also showed the feature as a rock instead of an islet.<sup>110</sup>

14. Charted rock at 56 11 29.38 N, 132 57 05.76 W (N6229281.10, E627111.51) on chart 17383\_1 was investigated by DP JD248\_81 and it was determined to have a height that warrants depiction as an islet instead of a rock (5 ft MHW). Topo AK9702B also showed the feature as an islet instead of a rock.<sup>111</sup>
15. Charted rock at 56 11 20.07 N, 132 57 09.29 W (N6228991.52, E627059.28) was investigated by DPs JD248\_82 and JD248\_83. This feature is depicted as a rock on chart 17383\_1, but this survey found the item to have a height that warrants depiction as an islet (3 ft MHW).<sup>112</sup>
16. Charted rock at 56 08 14.78 N, 132 57 00.72 W (N6223268.62, E627377.20) on chart 17382\_1 was investigated by DPs JD249\_06 and JD247\_05 during negative tides. Leadline drops were also conducted. No rock was found.<sup>113</sup>
17. Charted rock at 56 10 30.82 N, 132 58 02.62 W (N6227441.87, E626185) on chart 17383\_1 was confirmed by DPs JD249\_14 and JD249\_15. However, the previously charted position is considered by the hydrographer to be navigationally “better” than either DP position. The rock therefore appears in the charted position on the smooth sheet.<sup>114</sup>
18. Charted rock at 56 10 55.95 N, 132 58 47.32 W (N6228195.94, E625391.52) on chart 17383\_1 was confirmed by DPs JD249\_26 and JD249\_25. However, the previously charted position is considered by the hydrographer to be navigationally “better” than either DP position. The rock therefore appears in the charted position on the smooth sheet.<sup>115</sup>
19. Charted rock at 56 11 05.17 N, 132 58 42.24 W (N6228483.69, E625470.68) on chart 17383\_1 was confirmed by DPs JD249\_29 and JD249\_28. However, the previously charted position is considered by the hydrographer to be navigationally “better” than either DP position. The rock therefore appears in the charted position on the smooth sheet.<sup>116</sup>
20. Charted rock at 56 11 04.39 N, 132 58 32.91 W (N6228464.28, E625632.20) on chart 17383\_1 was confirmed by DPs JD249\_36 and JD249\_37. However, the previously charted position is considered by the hydrographer to be navigationally “better” than either DP position. The rock therefore appears in the charted position on the smooth sheet.<sup>117</sup>
21. Charted rock at 56 11 21.73 N, 132 58 31.58 W (N6229000.89, E625639.33) on chart 17383\_1 was confirmed by DPs JD249\_46 and JD249\_45. However, the previously charted position is considered by the hydrographer to be navigationally “better” than either DP position. The rock therefore appears in the charted position on the smooth sheet.<sup>118</sup>
22. Charted rock at 56 11 23.91 N, 132 58 28.22 W (N6229069.87, E625695.34) on chart 17383\_1 was confirmed by DPs JD249\_48 and JD249\_47. However, the previously charted position is considered by the hydrographer to be navigationally “better” than either DP position. The rock therefore appears in the charted position on the smooth sheet.<sup>119</sup>
23. Charted rock at 56 11 34.03 N, 132 58 07.47 W (N6229393.35, E626043.74) on chart 17383\_1 was confirmed by DPs JD249\_56 and JD249\_57. However, the previously charted position is considered by the hydrographer to be navigationally “better” than either DP position. The rock therefore appears in the charted position on the smooth sheet.<sup>120</sup>

24. Charted rock at 56 11 30.31 N, 132 58 01.04 W (N6229281.64, E626157.88) on chart 17383\_1 was confirmed by DPs JD249\_59 and JD249\_58. However, the previously charted position is considered by the hydrographer to be navigationally “better” than either DP position. The rock therefore appears in the charted position on the smooth sheet.<sup>121</sup>
25. Navigationally significant charted rock at 56 11 10.82 N, 132 57 47.92 W (N6228685.76, E626401.83) on chart 17383\_1 was not found during shoreline investigation (DP JD249\_69) or by full multibeam coverage. This rock should be removed from the chart.<sup>122</sup>
26. Charted islet at 56 11 24.13 N, 132 58 35.21 W (N6229073.35, E625574.73) on chart 17383\_1 was positioned by DPs JD249\_81, JD249\_82, and JD249\_83 and determined to be a rock (-16 ft height MLLW). The islet is considered disproved and a rock surrounded by a ledge is depicted on the smooth sheet instead.<sup>123</sup>
27. Charted islet at 56 11 33.41 N, 132 58 33.21 W (N6229361.03, E625600.71) on chart 17383\_1 was investigated by DPs JD249\_90 and JD249\_91 and determined to be a rock (-14 ft MLLW).<sup>124</sup>
28. Floating stationary structure is present at 56 11 06.56 N, 132 57 32.54 W (N6228561.93, E626670.90) and is not charted on chart 17383\_1. DPs JD249\_98 and JD249\_99 were taken at the site. Small vessels can easily moor next to the structure and it appears to be anchored securely and is structurally sound. Local knowledge says it has been there for 20 years. It is depicted on the smooth sheet to scale as two parallel red lines with a text label.<sup>125</sup>
29. Charted rock at 56 09 26.41 N, 132 54 44.57 W (N6225553.17, E629659.93) on chart 17383\_1 was investigated with DP JD253\_09. It was found that the rock is larger than the charted symbol. Therefore, it is presented as a ledge (height -6 ft MLLW) on the smooth sheet, using DM shoreline and multibeam data for extents.<sup>126</sup>
30. Two charted rocks at 56 10 52.12 N, 132 56 22.91 W (N6228157.37, E627884.43) on chart 17383\_1 were investigated with DPs JD253\_14 and JD253\_15 and appear to be one large rock. Therefore, it is presented as a ledge (height -7 ft MLLW) on the smooth sheet, using DM shoreline and multibeam data for extents.<sup>127</sup>
31. Charted rock at 56 11 19.09 N, 132 59 24.83 W (N6228892.56, E624724.04) on chart 17383\_1 was confirmed by DPs JD253\_23 and JD253\_24. However, the previously charted position is considered by the hydrographer to be navigationally “better” than either DP position. The rock therefore appears in the charted position on the smooth sheet.<sup>128</sup>

### Recommendations for Additional Item Investigations

Recommendations for additional item investigations are categorized as follows:

1. T-sheet items inshore of the 4-meter curve that were not investigated by either traditional or limited shoreline investigation. These items appear in black on the smooth sheet:<sup>129</sup>

56 11 52.482 N, 133 0 7.512 W (N6229903.1726, E623958.4047)

56 11 41.524 N, 132 59 51.422 W (N6229572.524, E624245.505)

56 11 51.542 N, 132 59 35.727 W (N6229890.0294, E624506.956)  
56 11 21.187 N, 132 59 25.207 W (N6228957.0481, E624715.5905)  
56 11 17.209 N, 132 59 4.460 W (N6228844.5222, E625076.7768)  
56 11 17.209 N, 132 59 4.460 W (N6228844.5222, E625076.7768)  
56 11 30.900 N, 132 59 1.879 W (N6229269.0258, E625108.8944)  
56 11 32.584 N, 132 58 58.973 W (N6229322.5249, E625157.4459)  
56 11 30.169 N, 132 58 54.876 W (N6229249.943, E625230.2472)  
56 11 30.654 N, 132 58 52.723 W (N6229266.0264, E625266.9013)  
56 11 30.654 N, 132 58 52.723 W (N6229266.0264, E625266.9013)  
56 11 21.494 N, 132 58 46.532 W (N6228986.0234, E625381.8978)  
56 10 37.129 N, 132 58 13.342 W (N6227631.5291, E625994.3249)  
56 10 28.789 N, 132 57 48.227 W (N6227386.529, E626434.9499)  
56 9 42.183 N, 132 55 12.713 W (N6226026.0359, E629159.7644)  
56 8 14.202 N, 132 56 44.461 W (N6223259.1579, E627658.3331)  
56 10 25.164 N, 132 58 39.988 W (N6227248.2027, E625545.7777)  
56 11 18.455 N, 132 57 15.223 W (N6228938.5231, E626958.4538)  
56 10 23.813 N, 132 56 12.058 W (N6227282.0302, E628097.6914)  
56 10 23.125 N, 132 56 12.519 W (N6227260.5246, E628090.3938)  
56 9 10.327 N, 132 56 36.536 W (N6224998.0252, E627743.3839)  
56 9 8.838 N, 132 56 36.452 W (N6224952.0245, E627746.2123)

2. T-sheet items inshore of the 4-meter curve that were not investigated by either traditional or limited shoreline investigation but are located just out of the survey area, though adjacent to multibeam data and other shoreline verification work and still appear on the smooth sheet:<sup>130</sup>

56 20.162 N, 133 50 39.195 W (N6228105.5226, E628600.9023)  
56 18.714 N, 133 49 21.108 W (N6225485.026, E631014.7577)  
56 20.331 N, 133 53 21.337 W (N6228320.029, E623588.839)  
56 20.741 N, 133 53 25.282 W (N6229072.3788, E623466.8798)  
56 20.829 N, 133 51 26.760 W (N6229305.5431, E627130.573)  
56 20.610 N, 133 51 19.835 W (N6228905.5298, E627344.6479)  
56 18.430 N, 133 51 37.963 W (N6224878.232, E626784.3114)  
56 18.406 N, 133 51 37.560 W (N6224834.2286, E626796.7532)  
56 18.298 N, 133 51 21.326 W (N6224645.3215, E627298.5764)

3. Items inshore of the 4-meter curve that received limited shoreline investigation and were perceived as “new” rocks that had no corresponding T-sheet item. These items do not appear on the smooth sheet:<sup>131</sup>

56 11 52.482 N, 133 0 7.512 W (N6229903.1726, E623958.4047)  
56 11 36.918 N, 132 58 32.850 W (N6229469.692, E625603.7218)  
56 10 57.588 N, 132 58 34.392 W (N6228253.2399, E625612.8395)  
56 10 54.012 N, 132 58 34.458 W (N6228142.6741, E625614.9468)  
56 10 37.129 N, 132 58 13.342 W (N6227631.5291, E625994.3249)  
56 10 32.958 N, 132 57 46.572 W (N6227516.2222, E626459.6796)

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56 10 27.228 N, 132 57 41.448 W (N6227341.7229, E626553.2621)  
56 10 6.960 N, 132 55 42.822 W (N6226776.2252, E628617.4532)  
56 9 51.192 N, 132 55 30.468 W (N6226295.2572, E628845.1601)  
56 9 41.682 N, 132 54 41.100 W (N6226027.0202, E629705.4913)  
56 8 32.832 N, 132 54 36.462 W (N6223901.3676, E629849.9811)  
56 8 41.718 N, 132 55 0.282 W (N6224163.5877, E629430.6399)  
56 10 11.628 N, 132 57 19.680 W (N6226870.6522, E626942.8901)  
56 10 24.978 N, 132 59 6.198 W (N6227229.2181, E625094.012)  
56 11 3.468 N, 132 59 42.600 W (N6228400.631, E624431.7473)  
56 11 2.112 N, 132 59 41.358 W (N6228359.3402, E624454.3759)  
56 10 1.752 N, 132 58 51.108 W (N6226518.9269, E625375.2275)  
56 10 0.360 N, 132 58 51.222 W (N6226475.8433, E625374.5215)

4. T-sheet items inshore of the 4-meter curve that were not observed at their T-sheet location during limited shoreline verification. These items appear in black on the smooth sheet:

56 8 13.776 N, 132 55 31.827 W (N6223283.5124, E628912.306) DM rock not seen; appears to be north/seaward extent of a sand bar<sup>132</sup>

5. Other items that warrant further investigation:

56 10 35.172 N, 132 56 53.16 W (N6227611.9658, E627378.5451) Small cove with a stream entering it – possible small boat anchorage<sup>133</sup>

T-sheet items inshore of the 4-meter curve not itemized above are considered verified at their approximate T-sheet positions and appear on the smooth sheet in black.<sup>134</sup>

It is recommended that above items be investigated by traditional shoreline investigation methods and / or multibeam survey at high tide.

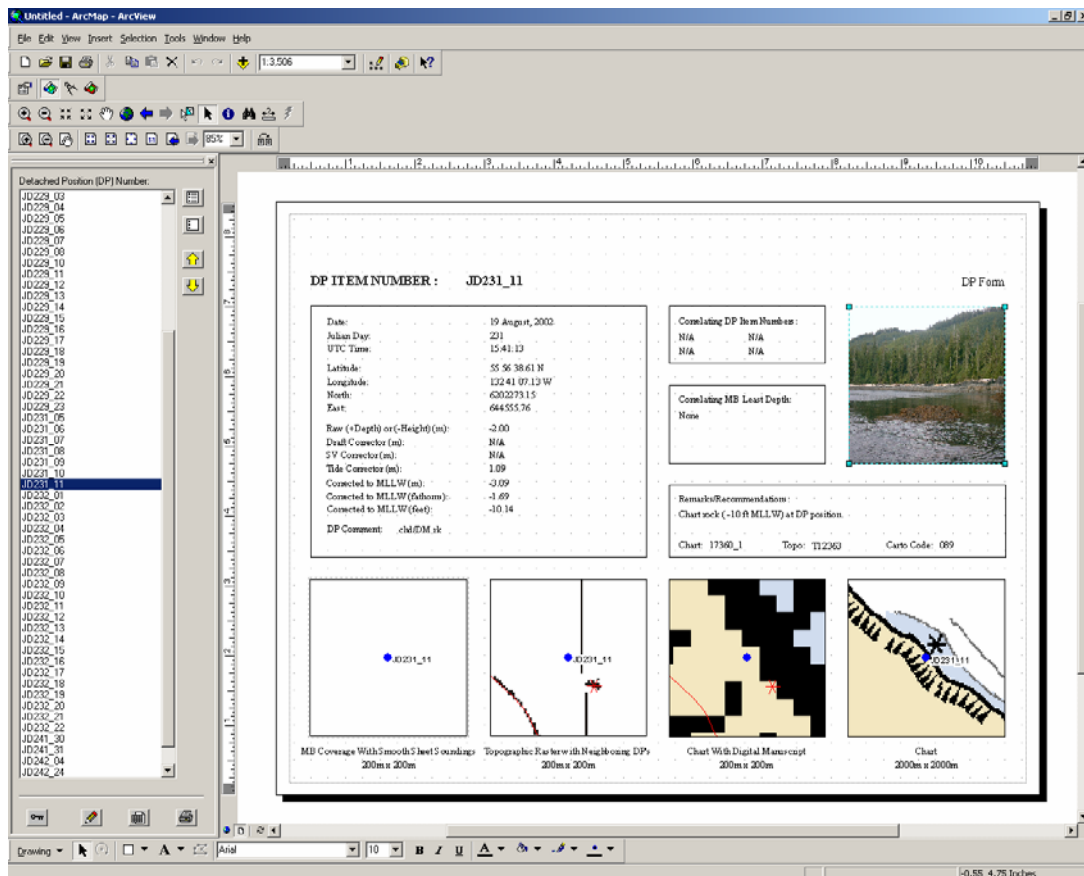
### Tidal Range

LCMF established the tidal range for OPR-O327-KR Clarence Strait to be 4.632 meters (15.19feet or 2.53 fathoms). This value was used in determining height above MHL.<sup>135</sup>



Shoreline Correlator Sheet

ArcMap v8.2 with the Shoreline Correlator add-on, written by the Thales GeoSolutions (Pacific) Inc. GIS department, aided in the processing of the Shoreline Verification results. The correlator utilized the Winfrog Log files to create an individual DP form for all acquired DP's. The correlator was mapped to the Log, Tide, Photos, NOAA Chart (largest scale available), T-Sheet Data, Smooth Sheet Soundings and Multibeam Coverage files to calculate and display the desired information for each DP. Figure 1 shows an example of a DP form produced from the Correlator. The DP forms and raw field notes can be found on the Project CD under the Reports Directory.<sup>136</sup>



**Figure 13 DP Correlator Sheet**

Bottom Samples

Bottom Samples were not required under this contract.<sup>137</sup>

Aids to Navigation

There were no charted aids to navigation in the survey area. No uncharted aids to navigation were found in the survey area.<sup>138</sup>



## E – Approval Sheet

**Approval Sheet**

For

**H11161**

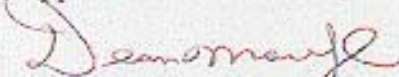
Standard field surveying and processing procedures were followed in producing this survey in accordance with the following documents:

OPR-O327-KR-02 statement of work and hydrographic manual;  
Thales GeoSolutions (Pacific) Inc. Acquisition Procedures (AP-2438-01 & AP-ISIS-01);  
Thales GeoSolutions (Pacific) Inc. Processing Procedures (PP-2438-01);  
Technical Report for Tides, Clarence Strait.

This report has been reviewed and approved. All records are forwarded for final review and processing to the Chief, Pacific Hydrographic Branch.

The data were reviewed daily during acquisition and processing.

Approved and forwarded,



Dean Moyles, Thales GeoSolutions (Pacific) Inc.  
Lead Hydrographer  
TGP Survey Party

**Appendix A - Danger to Navigation**

Seventy-one dangers to navigation were located during the hydrographic survey of H11161. <sup>139</sup>

**Hydrographic Survey Registry Number: H11161**

**Survey Title:**      **State:**      **ALASKA**      **Locality:**      **Northern Clarence Strait** **Sub-locality:**  
**Shrubby Island to Blashke Island**

**Project Number:**    **OPR-0327-KR-02**

**Survey Dates:**     **August - September 2002**

Depths are reduced to Mean Lower Low Water using predicted tides.

Positions are based on the NAD83 horizontal datum.

**CHARTS AFFECTED:**

<b>Chart</b>	<b>Scale</b>	<b>Edition</b>	<b>Date</b>
17382	1:80,000	14 <sup>th</sup>	04/26/97
17383	1:30,000	1 <sup>st</sup>	06//01/02
17360	1:217,828	32 <sup>nd</sup>	09/22/01
17400	1:229,376	16 <sup>th</sup>	06/02/01

**DANGER:**

<b>Feature</b>	<b>Depth(ft or fms)</b>	<b>Latitude (N)</b>	<b>Longitude (W)</b>
Rock	Unc 6 ft	56/11/39.6	133/00/37.9
Sounding	1	56/11/25.9	133/00/30.6
Sounding	1/2	56/11/39.9	132/59/46.4
Rock	Unc 3 ft	56/11/48.9	132/59/20.2
Sounding	5 3/4	56/11/38.5	132/59/33.1
Rock	Unc 1 ft	56/11/35.4	132/59/25.1
Rock	Unc 3 ft	56/11/18.9	132/59/23.8
Sounding	3 1/4	56/11/10.5	132/59/02.0
Rock	Unc 5 ft	56/11/18.3	132/58/42.5
Sounding	2	56/11/19.5	132/58/19.0
Rock	0	56/11/28.4	132/58/57.7
Sounding	1 3/4	56/11/29.6	132/57/47.1
Sounding	2 1/4	56/11/20.2	132/57/49.9
Sounding	1/2	56/11/19.8	132/57/22.3
Rock	0	56/11/16.0	132/57/01.1
Sounding	3 3/4	56/11/05.8	132/57/05.5
Sounding	2 1/4	56/10/59.7	132/56/58.8
Sounding	2 1/4	56/10/45.8	132/55/34.0

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Rock	0	56/10/46.8	132/55/54.4
Sounding	1 1/2	56/10/25.9	132/55/59.2
Sounding	1 1/4	56/10/07.8	132/55/51.1
Sounding	1/4	56/10/50.7	132/56/04.8
Sounding	7 1/4	56/10/48.3	132/56/53.2
Sounding	3 1/2	56/10/38.6	132/57/03.9
Sounding	1/4	56/10/22.1	132/57/16.8
Rock	Unc. 6 ft	56/10/15.2	132/57/49.4
Sounding	1 1/4	56/10/36.5	132/58/07.5
Sounding	3 3/4	56/10/52.1	132/58/54.6
Sounding	1/2	56/10/27.5	132/58/05.8
Sounding	3 3/4	56/10/12.9	132/58/35.2
Sounding	3 1/2	56/10/07.1	132/58/23.5
Sounding	4 1/4	56/09/58.9	132/58/38.6
Sounding	5 1/4	56/09/56.8	132/58/07.0
Sounding	1	56/09/49.5	132/58/26.9
Sounding	2 1/4	56/09/43.2	132/58/13.4
Sounding	9	56/09/34.4	132/58/20.2
Sounding	1 1/2	56/09/23.7	132/58/10.5
Sounding	8 1/2	56/09/49.3	132/57/36.5
Sounding	1	56/09/39.5	132/57/45.8
Sounding	1 1/4	56/09/35.1	132/57/04.1
Sounding	1 1/2	56/09/23.8	132/57/23.6
Sounding	6 1/4	56/09/47.8	132/56/34.2
Sounding	9 1/4	56/09/47.3	132/56/12.1
Sounding	2 1/2	56/09/36.3	132/56/21.7
Sounding	3 1/2	56/09/32.4	132/56/36.9
Sounding	3 1/4	56/09/29.9	132/56/08.2
Sounding	3 1/2	56/09/21.6	132/57/02.0
Sounding	1	56/09/18.0	132/56/18.8
Sounding	3 3/4	56/09/10.0	132/56/07.9
Sounding	1/4	56/09/42.0	132/55/41.0
Sounding	1/4	56/09/44.5	132/55/16.1
Sounding	5 1/4	56/09/33.9	132/55/36.0
Sounding	3 3/4	56/09/27.1	132/55/46.5
Sounding	6 1/4	56/09/23.2	132/55/26.7
Sounding	4 1/2	56/09/16.1	132/55/54.7
Sounding	2 1/2	56/09/11.3	132/55/21.2
Sounding	1 1/2	56/09/02.0	132/55/28.0

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Sounding	4 1/4	56/09/22.7	132/54/37.8
Sounding	3/4	56/09/13.4	132/54/06.9
Sounding	2 3/4	56/09/11.0	132/54/44.9
Rock	0	56/09/04.5	132/54/43.3
Sounding	1/4	56/08/35.8	132/54/25.6
Sounding	6 1/4	56/08/55.0	132/53/38.2
Sounding	6 1/2	56/08/50.5	132/53/14.7
Sounding	1 1/2	56/08/54.0	132/55/55.8
Sounding	5 1/4	56/08/29.6	132/55/46.3
Sounding	1/4	56/08/45.5	132/56/12.9
Sounding	2	56/08/38.7	132/56/30.6
Sounding	1 3/4	56/07/52.2	132/56/27.9
Sounding	4	56/08/53.0	132/57/46.4
Sounding	9 1/2	56/08/38.1	132/57/07.3

**COMMENTS:**

Questions concerning this report should be directed to the Chief, Pacific Hydrographic Branch (N/CS34), at (206) 526-6836.

**Appendix B - List of Geographic Names**

No new geographic names in the survey were discovered.<sup>140</sup>

**Appendix C – Progress Sheet**



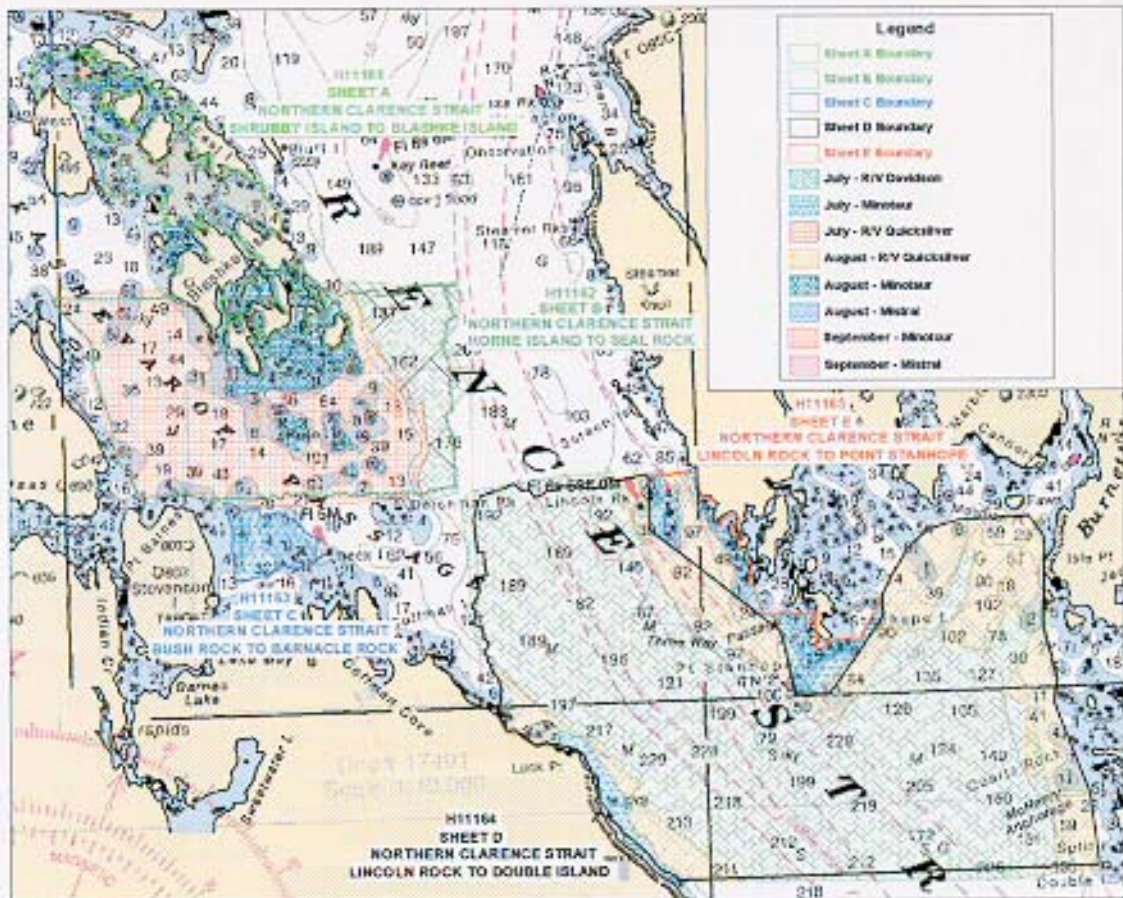
## PROGRESS SKETCH

OPR-0327-KR-02  
Northern Clarence Strait  
Shrubby Island to Point Stanhope  
Thales GeoSolutions (Pacific) Inc.

Dean Moyles, Lead Hydrographer  
Chart 16360

Start Date: 7/17/02  
End Date: 9/17/02  
Submitted Date: N/A

Sheet	Month	DAS	LNM	SQNM	SVP Casts	Bottom Samples	AWOIS Completed	No. of Tide Gauges	Diff. Stations	Weather Downtime	Equipment Downtime
Sheet A	July	0	0	0	0	N/a	0	0	0	0	0
Sheet B	July	15	267.12	14.61	37	N/a	0	1	0	0	0
Sheet C	July	15	66.09	1.20	22	N/a	0	1	0	0	0
Sheet D	July	15	279.59	24.96	40	N/a	0	1	0	0	0
Sheet E	July	15	97.25	3.62	17	N/a	0	1	0	0.05	0.13
Sheet A	August	31	213.39	3.68	72	N/a	2	1	0	0	0
Sheet B	August	31	225.64	5.6	77	N/a	2	2	0	0	0
Sheet C	August	31	5.4	0.03	3	N/a	2	1	0	0	0
Sheet D	August	31	97.68	1.56	23	N/a	2	1	0	0	0
Sheet E	August	31	22.35	0.12	17	N/a	2	1	0	7.2	0.13
Sheet A	September	17	74.9	0.4	25	N/a	1	1	0	3.9	0.7
Sheet B	September	17	46.9	0.2	23	N/a	1	2	0	0	0
Sheet C	September	17	1	0	3	N/a	1	1	0	0	0
Sheet D	September	6	1	0	1	N/a	1	1	0	0	0
Sheet E	September	9	1	0	1	N/a	1	1	0	0	0





## 2002 FIELD and FINAL TIDE NOTE

### Hydrographic Sheet: H11161

#### Sheet A

#### Shrubby Island to Blashke Island Northern Clarence Strait, Alaska

NOAA Project No:	OPR-O327-KR-2002 Clarence Strait, AK					
NOAA Contract No:	50-DGNC-8-90028					
The NOS Ketchikan, AK tide station (945-0460) served as control for the subordinate station on this project. Datum determinations were made for the tertiary subordinate station: Beck Island (945-0906). The NTDE 1960-78 was utilized. A zoning gauge was intalled inside of Blashke Island: Blashke Island (945-0973).						
Location and Time Meridian	Name:	Lat (NAD 83)	Long (NAD 83)	Time Meridian:		
	Beck Island	56° 02' 47"	132° 51' 45"	0° (UTC)		
	Blashke Island	56° 07' 38"	132° 53' 39"	0° (UTC)		
Time Period and Datum Reference	Name:	Established:	Removed:	MLLW	MHW	units
	Beck Island	7/15/2002	9/18/2002	0.000	4.632	meters
	Blashke Island	8/25/2002	9/17/2002	0.000	4.633	meters
Tide observer	LCMF, Inc. 139 E. 51st Avenue Anchorage, AK 99503 (907) 273-1825					
Gauges	Design Analysis H350/355 bubbler systems.					
Installation	Each gauge was secured inside a waterproof Pelican case, and fastened vertically inside of an Weatherport Tent.  Refer to the tide station package for additional site specific details of installation.					
Tide staff	No tide staff was installed. Leveling was performed from a tidal benchmark to the water surface. The water height was read using a metric rod with a stilling well attached to remove interference from waves.					
Benchmarks	The following benchmarks were installed at this site: Beck Island: none Blashke Island: 0973 A 2002, 0973 B 2002, 0973 C 2002  The following NOS benchmarks were recovered at this site: Beck Island: 0906 A 1978, 0906 B 1978, 0906 C 1978, 0906 D 1978, 0906 E 1978 Blashke Island: none					
Levels	Benchmarks were leveled at the installation and removal of each tidal station. The benchmarks and station datums were connected through frequent measurements to the water. The level runs closed within NOS tolerance and the benchmarks were stable.					
Final Tidal Zoning	Tide zones SA139A, SA139B, SA139C, SA140 and SA145 were used to apply tide data from Beck Island to reduce hydrographic soundings to MLLW.					
Reduction of Hydrographic data	Thales Geosolutions, Pacific (the prime contractor) was provided with preliminary datums developed by LCMF during July 2002 based upon a short series simultaneous comparison between Ketchikan and the subordinate station. Six minute tide data reduced to MLLW and smoothed with a 5th order 5 hour polynomial curve fit was provided to Thales throughout the field season. In October 2002, LCMF finalized datums and forwarded all data necessary to reduce hydrographic soundings to the prime contractor.					

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**Revisions Compiled During Office Processing and Certification**

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- <sup>1</sup> In header date, strikethrough 2002, replace with “2003.”
- <sup>2</sup> Concur with clarification. The coordinates listed define the sheet limits. Refer to Surdex for the survey area. The northern survey boundary is south of Shrubby Island and encompasses only the northern end of Blashke Island.
- <sup>3</sup> Filed with the hydrographic data.
- <sup>4</sup> Strikethrough ~~with~~, replace with “was.”
- <sup>5</sup> Filed with the hydrographic data.
- <sup>6</sup> Crossline data met or exceeded requirements for quality control.
- <sup>7</sup> Concur. The data is adequate to supersede all prior surveys except as specifically discussed in this report.
- <sup>8</sup> Filed with the hydrographic data.
- <sup>9</sup> Concur. The navigational offset was satisfactorily resolved and the data is considered acceptable for charting.
- <sup>10</sup> Concur. Comparison with adjoining survey H10950 in PHB processing was generally very good (within zero to 1 fathom). Supersede depths from H10950 with current survey depths in the junction areas except as specifically noted in this report and the HDrawing.
- <sup>11</sup> Strikethrough ~~or~~, replace with “are.”
- <sup>12</sup> Strikethrough ~~the majority of lines were run~~, replace with “in the majority of lines run.”
- <sup>13</sup> Strikethrough ~~The other~~, replace with “Another factor affecting the histogram.”
- <sup>14</sup> Strikethrough ~~bases~~, replace with “basis.”
- <sup>15</sup> Concur. Survey data is acceptable for charting.
- <sup>16</sup> Strikethrough ~~was~~, replace with “were.”
- <sup>17</sup> Strikethrough ~~enter~~, replace with “entered.”
- <sup>18</sup> Strikethrough ~~where~~, replace with “were.”
- <sup>19</sup> Filed with the hydrographic data.
- <sup>20</sup> Filed with the hydrographic data.
- <sup>21</sup> Strikethrough ~~projects~~, replace with “project’s.”
- <sup>22</sup> Longitude for Blashke Island gauge 9450973 is in error. Strikethrough ~~158°06’47”W~~, replace with 132°53’39”W.
- <sup>23</sup> Filed with the hydrographic data.
- <sup>24</sup> Also see Final Tide Note attached to this report.
- <sup>25</sup> Do not concur. As discussed below and in the following pages, while some areas were found to be consistent with the chart, the survey also found considerable deviation from charted contours and soundings in many areas.
- Note that numerous errors occurred in the depiction of contours on the smooth sheet. Contour errors have been corrected on the HDrawing.
- In addition, the MLLW contours surrounding areas at Lat 56/9/24.07N, Lon 132/54/1.9W and Lat 56/9/19.9N, Lon 132/53/42.55W are not identified on the mylar smooth sheet. Chart as MLLW lines as depicted on the HDrawing.
- Chart areas discussed below based on the current survey information.
- <sup>26</sup> No 18 fathom sounding was found at this location on 17360, 33<sup>rd</sup> Edition.
- <sup>27</sup> Concur.

28 Concur.

29 Concur.

30 Concur.

31 No 23 fathom sounding appears at this location on 17382, 15<sup>th</sup> Edition.

32 Concur.

33 No 43 fathom sounding appears in this vicinity on 17382, 15<sup>th</sup> Edition.

34 No 20 fathom sounding appears in this vicinity on 17382, 15<sup>th</sup> Edition.

35 Concur.

36 Concur.

37 Concur.

38 Concur.

39 Concur.

40 Concur.

41 Concur.

42 Concur.

43 Concur.

44 Concur.

45 Concur.

46 Concur.

47 Concur.

48 Concur.

49 Filed with the hydrographic data. The specific differences between the survey and charted soundings named above constitute only a partial list. There are many other instances in the survey area of depth changes up to six fathoms from charted soundings.

50 Attached to this report.

51 Soundings and contours have been compiled on the Hdrawings 17383h11.161 and 17382h11.161 based on the present survey.

52 Strikethrough ~~as~~, replace with “has.”

53 Concur with clarification. While new shoals are present, the upper arrow in Figure 8 points to a hole, not a shoal.

54 Strikethrough ~~as~~, replace with “has.”

55 Strikethrough ~~as~~, replace with “has.”

56 Concur.

57 Concur.

58 Insert “shoal.”

59 Strikethrough ~~as~~, replace with “has.”

60 Insert “in depths and contours.” Concur.

61 Insert “in depths and contours.” Concur.

62 Concur.

63 Do not concur. The survey area encompasses many charted features detailed and discussed in the Descriptive Report. One New Cultural Feature, a floating dock, was located at the north end of Middle Island, Lat 56/11/06.56N, Lon 132/57/32.54W. The feature is discussed under Charted Shoreline – Disprovals and Exceptions, Item 28. Other uncharted natural features were found in the survey and are discussed in the report.



<sup>64</sup> Concur. Differences between the reported Dangers to Navigation and the final smooth sheet are discussed below.

- ✚ In many instances, there is a variance of 1 to 2 feet between charted and smooth sheet soundings. Since the DtoNs were issued with predicted tides, it is assumed that the discrepancies arose as a result. Chart final depths according to the smooth sheet.
- ✚ DtoN Rock, Unc 6 ft, Lat 56/11/39.6, Lon 133/00/37.9 is portrayed as a ledge on the smooth sheet. Chart according to the smooth sheet.
- ✚ DtoN Sounding, 1 fathom, Lat 56/11/25.9, Lon 133/00/30.6 is shown as a rock on the smooth sheet. Chart according to the smooth sheet.
- ✚ DtoN Sounding, 1 ¾ fathoms, Lat 56/11/29.6, Lon 132/57/47.1 is shown on the smooth sheet as a rock. Chart according to the smooth sheet.
- ✚ DtoN Sounding, ½ fathom, Lat 56/11/19.8, Lon 132/57/22.3 is shown on the smooth sheet as a 0.8 fathom *Rk*. Chart according to the smooth sheet.
- ✚ DtoN Rock, 0 fathom, Lat 56/11/16.0, Lon 132/57/01.1 appears on the smooth sheet as a sounding. Office examination of the DTM indicates that the feature is most likely a rock as originally reported. Retain charted rock awash.
- ✚ DtoN Sounding, 2 ¼ fathoms, Lat 56/10/59.7, Lon 132/56/58.8 is not shown on the Hdrawing. A nearby shoaler sounding was chosen instead. Chart the area as shown on the Hdrawing.
- ✚ DtoN Sounding, 2 ¼ fathoms, Lat 56/10/45.8, Lon 132/55/34.0 is in the vicinity of a 6.4 fathom sounding on the smooth sheet. Since the reported DtoN falls just beyond the outer limit of SWMB coverage, it is unsupported by the smooth sheet data. However, a shoal in the same location was recorded by survey H10950. Retain charted shoal sounding from DtoN.
- ✚ DtoN Rock, 0 fathom, Lat 56/10/46.8, Lon 132/55/54.4 is not portrayed on the smooth sheet. Retain charted rock awash.
- ✚ DtoN Sounding, 1 ¼ fathoms, Lat 56/10/07.8, Lon 132/55/51.1 is in the same location as an 8.4 fathom sounding on the smooth sheet. Re-examination of the raw data at PHB proved the DtoN to have been noise in the data, leading to the erroneous shoal sounding originally reported. Chart correct depth according to the smooth sheet.
- ✚ DtoN Sounding, ¼ fathom, Lat 56/10/50.7, Lon 132/56/04.8 abuts the shore and is not charted. Chart the area according to the Hdrawing.
- ✚ DtoN Sounding, ¼, Lat 56/10/22.1, Lon 132/57/16.8 falls shoreward of the MLLW line and has not been depicted on the Hdrawing. Do not chart.
- ✚ DtoN Sounding, ½ fathom, Lat 56/10/27.5, Lon 132/58/05.8 is portrayed as a *Rk* on the smooth sheet. Chart according to the smooth sheet.
- ✚ DtoN Sounding, 1 fathom, Lat 56/09/49.5, Lon 132/58/26.9 is portrayed as a *Rk* on the smooth sheet. Chart according to the smooth sheet.
- ✚ DtoN Sounding, 1 ½ fathom, Lat 56/09/23.7, Lon 132/58/10.5 is portrayed as a 1.8 fathom *Rk* on the smooth sheet. Chart according to the smooth sheet.
- ✚ DtoN Sounding, 1 fathom, Lat 56/09/39.5, Lon 132/57/45.8 is portrayed as a *Rk* on the smooth sheet. Chart according to the smooth sheet.

- ✚ DtoN Sounding, 6 ¼ fathoms, Lat 56/09/47.8, Lon 132/56/34.2 is not shown on the Hdrawing. A nearby sounding of the same depth was chosen instead. Chart the area according to the smooth sheet and Hdrawing.
- ✚ DtoN Sounding, 1 fathom, Lat 56/09/18.0, Lon 132/56/18.8 is portrayed as a *Rk* on the smooth sheet. Chart according to the smooth sheet.
- ✚ DtoN Sounding, ¼ fathom, Lat 56/09/42.0, Lon 132/55/41.0 is portrayed as a rock awash on the smooth sheet. Chart according to the smooth sheet.
- ✚ DtoN Sounding, ¼ fathom, Lat 56/09/44.5, Lon 132/55/16.1 is portrayed as a rock awash on the smooth sheet. Chart according to the smooth sheet.
- ✚ DtoN Sounding, 4 ½ fathoms, Lat 56/09/16.1, Lon 132/55/54.7 should be charted in the smooth sheet position.
- ✚ DtoN Sounding, ¾ fathom, Lat 56/09/13.4, Lon 132/54/06.9 is portrayed as a *Rk* on the smooth sheet. Chart according to the smooth sheet.
- ✚ DtoN Sounding, ¼ fathom, Lat 56/08/35.8, Lon 132/54/25.6 abuts the shore at chart scale. A seaward sounding has been chosen for the Hdrawing. Chart according to the smooth sheet and Hdrawing.
- ✚ DtoN Sounding, 5 ¼ fathoms, Lat 56/08/29.6, Lon 132/55/46.3 is not charted. Chart according to the smooth sheet and Hdrawing.
- ✚ DtoN Sounding, ¼ fathom, Lat 56/08/45.5, Lon 132/56/12.9 is not portrayed on the smooth sheet. Re-examination of the raw data at PHB proved the DtoN to have been noise in the data, leading to the erroneous shoal sounding originally reported. Chart according to the smooth sheet.
- ✚ DtoN Sounding, 1 ¾ fathoms, Lat 56/07/52.2, Lon 132/56/27.9 is not charted. Chart according to the smooth sheet.
- ✚ DtoN Sounding, 4 fathoms, Lat 56/08/53.0, Lon 132/57/46.4 and Sounding 9 ½ fathoms, Lat 56/08/38.1, Lon 132/57/07.3 are outside the survey limits. Retain as charted.

<sup>65</sup> Attached to this report.

<sup>66</sup> Shoreline verification was analyzed during office processing and compiled to the Hdrawings 17383h11.61 and 17382h11.161 as warranted.

<sup>67</sup> Concur.

<sup>68</sup> Filed with the hydrographic data.

<sup>69</sup> Chart according to smooth sheet except as specifically noted in this report.

<sup>70</sup> Strikethrough ~~11163~~, replace with 11161.

<sup>71</sup> Filed with the hydrographic data.

<sup>72</sup> Features have been compiled on the Hdrawing as depicted on the smooth sheet, except as specifically noted in this report.

<sup>73</sup> In a number of areas, the hydrographer's Detached Positions supported charted ledges that had been depicted on the RSD source as MLLW lines. Since the scope of the survey did not include complete shoreline investigation, charted ledges in these areas are not considered disproved. The evaluator recommends retaining the ledges as depicted in the Hdrawing, with revisions based on the current survey.

In two cases RSD rocks present on the chart and inshore of the 4-meter curve were verified but no further information was acquired by the hydrographer. Since depth

information was available from the chart (ie, symbol denoting depth range), the charted symbol was retained:

✚ Lat 56/9/10.4868N, Lon 132/56/36.4488W Rock awash 2 feet below to 2 feet above MLLW

✚ Lat 56/9/9.0108N Lon 132/56/36.2508W Rock awash 2 feet below to 2 feet above MLLW

In two areas, charted rocks have been retained in place of RSD MLLW lines:

✚ Lat 56/11/33.29, Lon 132/59/3.29

✚ Lat 56/11/32.03, Lon 132/59/2.46

<sup>74</sup> Concur.

<sup>75</sup> Concur. Remove islet, chart rock in smooth sheet position. Note that the tide range established for the survey and used to determine heights above MHW plane of reference is 15.19 feet.

<sup>76</sup> Concur with exception. The rock is not depicted on the smooth sheet. Remove islet, chart ledge in smooth sheet position.

<sup>77</sup> Concur. Remove islet, retain charted ledge.

<sup>78</sup> Concur with exception. The rock is not depicted on the smooth sheet. Remove islet, chart ledge in smooth sheet position.

<sup>79</sup> Concur. Chart according to smooth sheet.

<sup>80</sup> Concur. Chart according to smooth sheet.

<sup>81</sup> Concur with clarification. The DP Correlator Sheet for the islet recommends to “retain as charted,” and the chart depicts ledgeline around the islet. DP photos also show ledge around the islet. However, the smooth sheet shows a MLLW line at the same location. The evaluator recommends charting a ledge and islet as found by the hydrographer.

<sup>82</sup> Concur with clarification. The DP Correlator Sheet recommends charting the islet using the DPs for its extent. The islet symbol depicted on the smooth sheet does not cover the extent of the islet. Therefore, on the HDrawing it has been portrayed as a dashed red shape spanning the area between the DPs. Chart according to the HDrawing.

<sup>83</sup> Concur. Chart according to smooth sheet.

<sup>84</sup> Concur. Chart according to smooth sheet.

<sup>85</sup> Concur with clarification. The DP Correlator Sheet for the feature recommends, “Chart islet ...using extents 10x20,” but does not provide units. If the units are assumed to be meters (as on the other DP forms for the survey), the area depicted for the islet on the smooth sheet is approximately correct. Chart this area based on the present survey information.

<sup>86</sup> Concur. Chart according to smooth sheet.

<sup>87</sup> Concur. Chart according to smooth sheet.

<sup>88</sup> Concur. Chart islet according to smooth sheet and retain charted ledge.

<sup>89</sup> Concur. Chart islet according to smooth sheet and retain charted ledge.

<sup>90</sup> Concur. Chart according to smooth sheet.

<sup>91</sup> Concur. Chart according to smooth sheet.

<sup>92</sup> Concur. Chart according to smooth sheet.

<sup>93</sup> Concur. Item is not on raster. Chart according to smooth sheet.

<sup>94</sup> Concur. Item is not on raster. Chart according to smooth sheet.

<sup>95</sup> Concur. Chart according to smooth sheet.



<sup>96</sup> Concur, except as noted below and elsewhere in this report.

Three significant charted rocks are not specifically discussed by the hydrographer and were not present in the RSD source sheets. The evaluator re-examined the smooth sheet and DTMs to insure that the rocks were not found. They are discussed below.

- ✚ Lat 56/10/59.174N, Lon 132/59/30.354W is charted as a dangerous underwater rock of uncertain depth. The nearest smooth sheet sounding shows a depth of 8 fathoms, 2 feet. The shoalest nearby sounding is 3 fathoms. Since 100% multibeam coverage found no rock in the vicinity, it is recommended that the charted rock be considered disproved and removed.
- ✚ Lat 56/10/27.8652N, Lon 132/57/16.8372W is charted as a dangerous underwater rock of uncertain depth. The nearest smooth sheet sounding shows a depth of 10 fathoms, and the shoalest nearby sounding is 4 fathoms 3 feet. 100% multibeam coverage found no rock in the vicinity and none is evident in the DTM. It is recommended that the charted rock be considered disproved and removed.
- ✚ Lat 56/8/28.49N, Lon 132/56/29.22 is charted as a dangerous underwater rock of uncertain depth. The nearest smooth sheet sounding shows a depth of 12 fathoms. 100% multibeam coverage found no rock in the immediate vicinity and none is evident in the DTM. It is recommended that the rock be considered disproved and removed.

Note that much of the former charted ledgeline was converted to MLLW line with individual rocks on the RSD source sheets. The survey verified shoreline and individual rocks visually or with DPs as noted in the report.

Due to chart scale, some features were generalized during compilation.

<sup>97</sup> Positon given is not of the islet, but of a point southeast of the islet charted as a rock on 17382, 15<sup>th</sup> Edition. Concur with comparison to 14<sup>th</sup> Edition of 17382, as shown on the DP Correlator forms. Chart according to smooth sheet.

<sup>98</sup> Concur with comparison to 17382, 14<sup>th</sup> Edition, as shown on the DP Correlator forms. Retain charted ledge.

<sup>99</sup> Concur. Chart according to smooth sheet.

<sup>100</sup> Concur. Rock has been removed from 17382, 15<sup>th</sup> Edition. Chart vicinity according to smooth sheet.

<sup>101</sup> Concur. Remove islet, retain charted ledge.

<sup>102</sup> Concur with clarification. The DP Correlator Sheet recommends, "Chart rock at mid position between DPs." It is correctly positioned on the smooth sheet. Remove islet, retain charted ledge.

<sup>103</sup> Concur with exception. The rock is missing from the smooth sheet, although its height is shown. Chart ledge according to smooth sheet.

<sup>104</sup> Concur. Chart according to smooth sheet.

<sup>105</sup> Concur with clarification. The rock has been shown on the Hdrawing with a danger curve, as originally charted, in order to depict the extent of the rock. Chart in smooth sheet position as portrayed on Hdrawing.

<sup>106</sup> Concur with clarification. The rock has been shown on the Hdrawing with a danger curve, as originally charted, in order to depict the extent of the rock. Chart in smooth sheet position as portrayed on Hdrawing.

<sup>107</sup> Concur with clarification. Chart in DP position with danger curve as shown on the Hdrawing.

<sup>108</sup> Strikethrough ~~then~~, replace with “than.”

<sup>109</sup> Concur with clarification. The rock positioned on the DP Correlator Sheet is missing from the smooth sheet, although its height is shown (-9 feet MLLW). Chart ledge at smooth sheet position.

<sup>110</sup> Concur. Remove islet, chart rock in smooth sheet position.

<sup>111</sup> Concur. Remove rock, chart islet in smooth sheet position. Note that height data (5 ft MHW) from the DP Correlator Sheet is missing from the smooth sheet.

<sup>112</sup> Concur with clarification. This is the same feature as #8 in the MHW Line section, discussed above in endnote 82. The DP Correlator Sheet recommends charting the islet using the DPs for its extent. The islet symbol depicted on the smooth sheet does not cover the extent of the islet. Therefore, on the HDrawing it has been portrayed as a dashed red shape spanning the area between the DPs. Chart according to the HDrawing.

<sup>113</sup> This item appears to be the same as Item 14, referencing the same two DP Correlator forms at nearly the same position. Chart the vicinity according to smooth sheet.

<sup>114</sup> Concur with clarification. The rock has been shown on the Hdrawing with a danger curve, as originally charted, in order to depict the extent of the rock. Retain charted rock..

<sup>115</sup> Concur. Retain charted rock.

<sup>116</sup> Concur with clarification. The position given is for the northerly of the 2 DPs. The charted position of the rock is Lat 56/11/4.38N, Lon 132/58/42.82W. It is positioned correctly on the smooth sheet. Retain charted rock.

<sup>117</sup> Concur with clarification. The rock has been incorporated into a new ledgeline on the the smooth sheet, along with 2 other rocks charted on 17383 at Lat 56/11/2.48N, Lon 132/58/33.81W and Lat 56/11/4.37N, Lon 132/58/35.14W. Chart ledge according to smooth sheet.

<sup>118</sup> Concur. Retain charted rock.

<sup>119</sup> Concur. Retain charted rock.

<sup>120</sup> Concur with clarification. The position given is for the northerly of the 2 DPs. The charted position of the rock is Lat 55/11/33.46N, Lon 132/58/8.22W. It is positioned correctly on the smooth sheet. Retain charted rock.

<sup>121</sup> Concur. Retain charted rock.

<sup>122</sup> Concur. Re-examination of the DTM during office processing revealed no evidence of a rock in the vicinity. Recommend removing charted rock.

<sup>123</sup> Concur with exception. (This is the same feature discussed under item 2, MHW line section.) The rock is not shown on the smooth sheet. Remove islet, chart ledge in smooth sheet position.

<sup>124</sup> Concur. Remove islet, chart rock.

<sup>125</sup> Concur. Chart according to smooth sheet.

<sup>126</sup> Concur with clarification. The position given is the DP at the seaward extent of the ledge. The position of the charted rock is Lat 56/9/27.95N, Lon 132/54/45.59W. Chart according to the smooth sheet.

<sup>127</sup> Concur with clarification. The position given is the DP at the southeastern extent of the ledge. The charted rock positions (now within the ledge) are:

Lat 56/10/52.56N, Lon 132/56/23.29W

Lat 56/10/52.78N, Lon 132/56/25.34W

Chart according to smooth sheet.

<sup>128</sup> Concur. Retain charted rock.

<sup>129</sup> Concur, with the following clarifications:

~~Strikethrough repeated 56 11 17.209 N, 132 59 4.460 W (N6228844.5222, E625076.7768)~~

~~Strikethrough repeated 56 11 30.654 N, 132 58 52.723 W (N6229266.0264, E625266.9013)~~

Chart these items as portrayed on the smooth sheet with the exception of the last two items. These are retained as charted (rock awash MLLW symbol). All other features have been shown in blue on the HDrawing.

<sup>130</sup> Concur, with revisions. The latitudes given are incomplete and longitudes are incorrect.

The UTM coordinates are correct, with corrected latitude/longitude and additional information as follows:

~~Strikethrough 56 20.162 N, 133 50 39.195 W, replace with 56 10 49.94N, 132 55 41.466W –uncharted rock~~

~~Strikethrough 56 18.714 N, 133 49 21.108 W, replace with 56 09 22.87N, 132 53 26.22W –charted rock~~

~~Strikethrough 56 20.331 N, 133 53 21.337 W, replace with 56 11 1.65N, 133 00 31.59W –charted rock~~

~~Strikethrough 56 20.741 N, 133 53 25.282 W, replace with 56 11 26.086N, 133 00 37.40W –charted rock, retain danger curve~~

~~Strikethrough 56 20.829 N, 133 51 26.760 W, replace with 56 11 30.154N, 132 57 4.613W –charted rock~~

~~Strikethrough 56 20.610 N, 133 51 19.835 W, replace with 56 11 17.018N, 132 56 52.89W –charted rock~~

~~Strikethrough 56 18.430 N, 133 51 37.963 W, replace with 56 09 7.376N, 132 57 32.28W –charted rock~~

~~Strikethrough 56 18.406 N, 133 51 37.560 W, replace with 56 09 5.94N, 132 57 31.64W –charted rock~~

~~Strikethrough 56 18.298 N, 133 51 21.326 W, replace with 56 08 59.35N, 132 57 2.903W –No feature appears at this location on the smooth sheet.~~

The above features appear in blue on Level 5 of the HDrawing, with the exception of the last item. Chart as shown on the smooth sheet.

<sup>131</sup> Concur, with exceptions. Revise the list of new rocks as follows:

~~Strikethrough 56 11 52.482 N, 133 0 7.512 W (N6229903.1726, E623958.4047)~~ This item is discussed above under Subsection 1 of Recommendations for Additional Item Investigations. It is a charted islet which appears on the smooth sheet in black and on the HDrawing in blue.

~~Strikethrough 56 10 37.129 N, 132 58 13.342 W (N6227631.5291, E625994.3249)~~ This item is discussed above under Subsection 1 of Recommendations for Additional Item

Investigations. It is a charted rock which appears on the smooth sheet in black and on the HDrawing in blue.

The other items listed are not shown on the HDrawing.

<sup>132</sup> Concur. The evaluator recommends charting the RSD rock in the smooth sheet position until further investigation.

<sup>133</sup> Concur.

<sup>134</sup> Concur. Items from RSD source are shown on the HDrawing in blue.

<sup>135</sup> Strikethrough ~~MHL~~, replace with MHW.

<sup>136</sup> Filed with the hydrographic data.

<sup>137</sup> Concur. Bottom samples have been retained in green from Chart 17383 on the HDrawing.

<sup>138</sup> Concur.

<sup>139</sup> Attached to this report. See endnote 64 for additional information.

<sup>140</sup> Strikethrough ~~in the survey were discovered~~, replace with “were discovered in the survey area.”

APPROVAL SHEET  
H11161

Initial Approvals:

The survey and associated records have been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, cartographic symbolization, and verification or disproof of charted data. The survey records and digital data comply with NOS requirements except where noted in the Descriptive Report and are adequate to supersede prior surveys and nautical charts in the common area.

Bruce A. Olmstead  
B. A. Olmstead  
Cartographic Team  
Pacific Hydrographic Branch

Date: 7/7/2005

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

AWH, CDR/NOAA  
Donald W. Haines  
CDR, NOAA  
Chief, Pacific Hydrographic Branch

Date: 28 JULY 2005



