

H-11162

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. OPR-0327-KR

Registry No. H-11162

LOCALITY

State ALASKA

General Locality NORTHERN CLARENCE STRAIT

Sublocality THORNE ISLAND TO SEAL ROCK

2002

CHIEF OF PARTY
DEAN MOYLES

LIBRARY & ARCHIVES

DATE

HYDROGRAPHIC TITLE SHEET

H-11162

INSTRUCTIONS - The hydrographic sheet should be accompanied by this form,
filled in as completely as possible, when the sheet is forwarded to the office.

FIELD NO.

State AlaskaGeneral Locality Northern Clarence StraitSublocality Thorne Island to Seal RockScale 1:10,000Date of Survey 7/20/02-9/17/02Instructions Dated 6/24/2002Project No. OPR-O327-KR-02Vessel RV Davidson, RV Quicksilver, RV Minotaur, RV MistralChief of Party Dean MoylesSurveyed by Moyles, Arumugam, Reynolds, Orthman, Sipos, Greene
Harrison, Nadeau, et alSoundings taken by echo sounder, hand lead, pole Reson 8101 and Reson 8111 and leadlineGraphic record scaled by Thales Geosolutions PersonnelGraphic record checked by Thales Geosolutions PersonnelEvaluation by B Taylor Automated plot by HP Design Jet 500Verification by G NelsonSoundings in Fathoms and tenths at MLLWREMARKS: Time in UTC.**Revisions and annotations appearing as endnotes were generated during office****processing. All separates are filed with the project data. As a result, page numbering-****may be interrupted or non-sequential.**

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A - Area Surveyed

H11162 (Sheet B), which¹ is bounded by the coordinate listing below², and encompasses Horne Island to Seal Rock.³

Hydrographic data collection began on July 20, 2002 and ended on September 17, 2002.⁴

Table 1 H11162 Survey Limits

Survey Limits Task # 10 H11162 Sheet B Scale 1:10,000		
Point #	Positions on NAD83	
	Degrees Latitude (N)	Degrees Longitude (W)
1	56°03'40.014"	133°00'34.078"
2	56°03'40.014"	132°46'38.492"
3	56°08'06.691"	133°00'34.078"
4	56°08'06.691"	132°46'38.492"

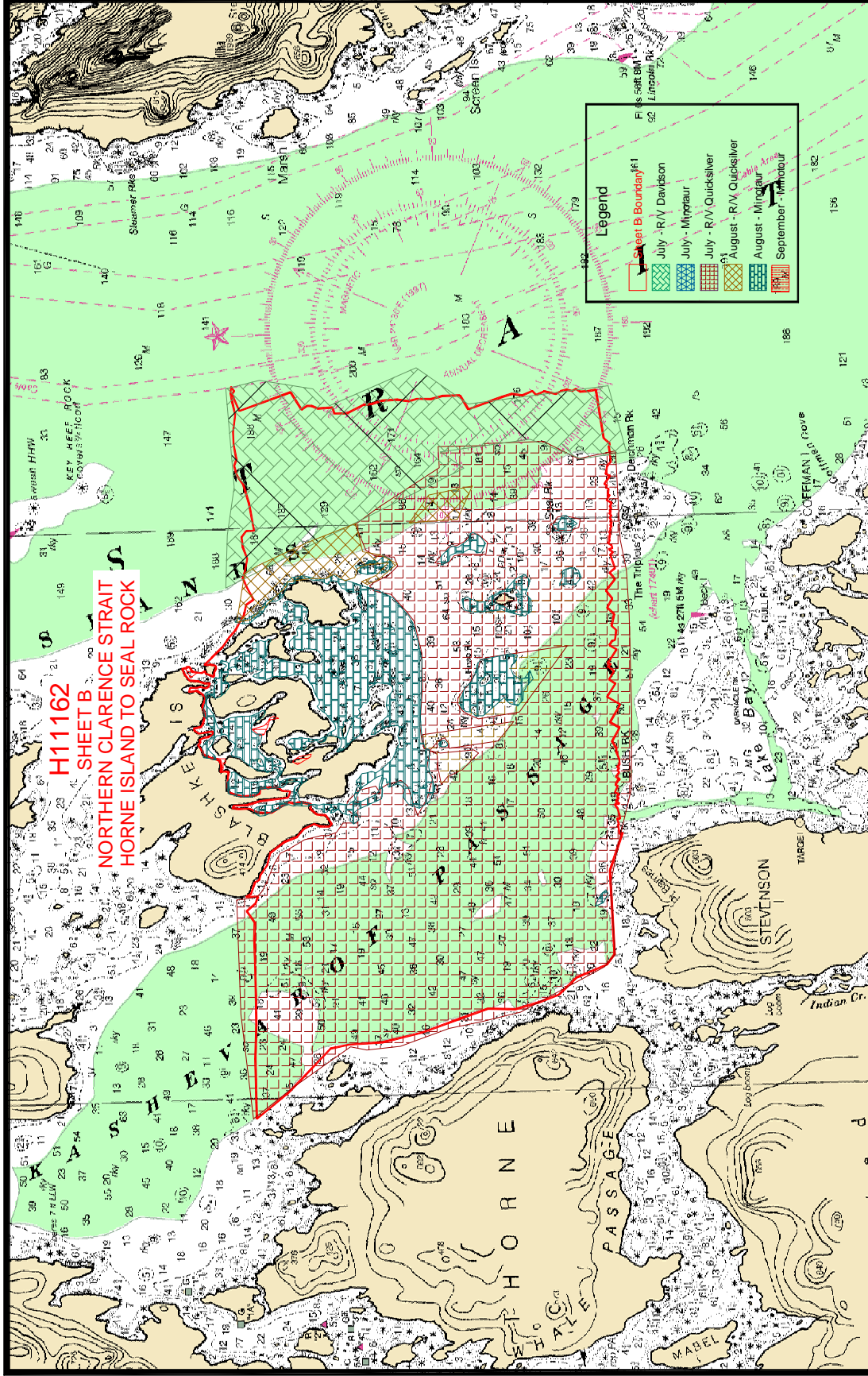


Figure 1 H11162 Survey Limits

B – Data Acquisition & Processing

Refer to the OPR-O327-KR Data Acquisition and Processing Report⁵ 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 Davidson, Quicksilver, Minotaur and Mistral acquired all sounding data for H11162. The R/V Davidson is 153-foot survey vessel, with a draft of 17.75 feet, equipped with a hull mounted Reson SeaBat 8111 with option 033 (pseudo SideScan) for deep multibeam data acquisition. The Davidson 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 (POS/MV) and XTF files logged in ISIS V 5.84.

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 were utilized for near shore multibeam data acquisition. The vessels are 29 feet in length, with a draft of 2 feet. The Minotaur was equipped with a Reson 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 Reson 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 with⁶ 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 Report⁷ for a complete listing of equipment and vessel descriptions.

Quality Control

Crosslines

Sheet B was divided into 6 areas for survey operations. Quality control tielines were planned to measure 5 percent of the main scheme line length. Total crossline length surveyed was 46.34 km (25.02 nautical miles) or 4.8 percent of the total main scheme miles. The majority of line kilometers surveyed in Sheet B 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 91 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.

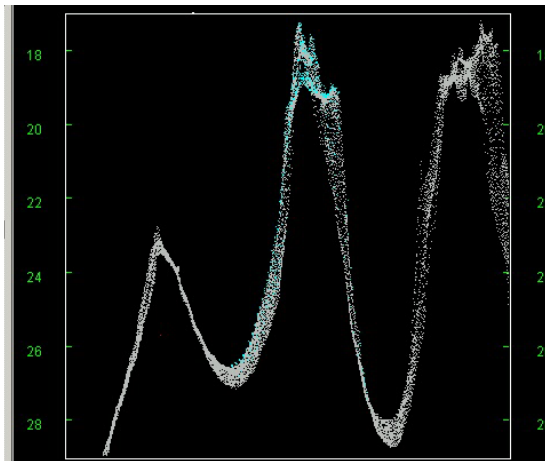


Figure 2: Profile of B01-QC010

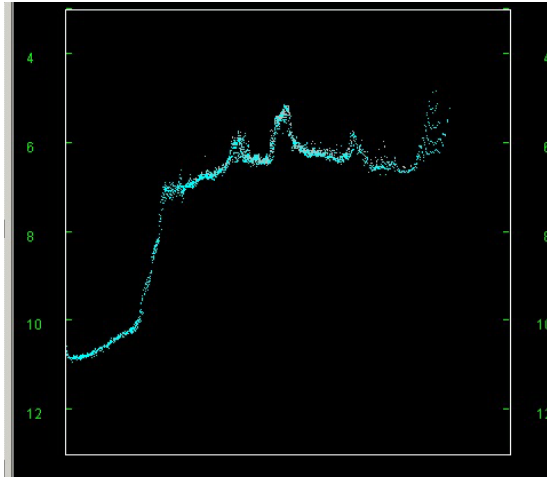


Figure 3: Profile of B01-QC076

- 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.⁸

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:

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

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

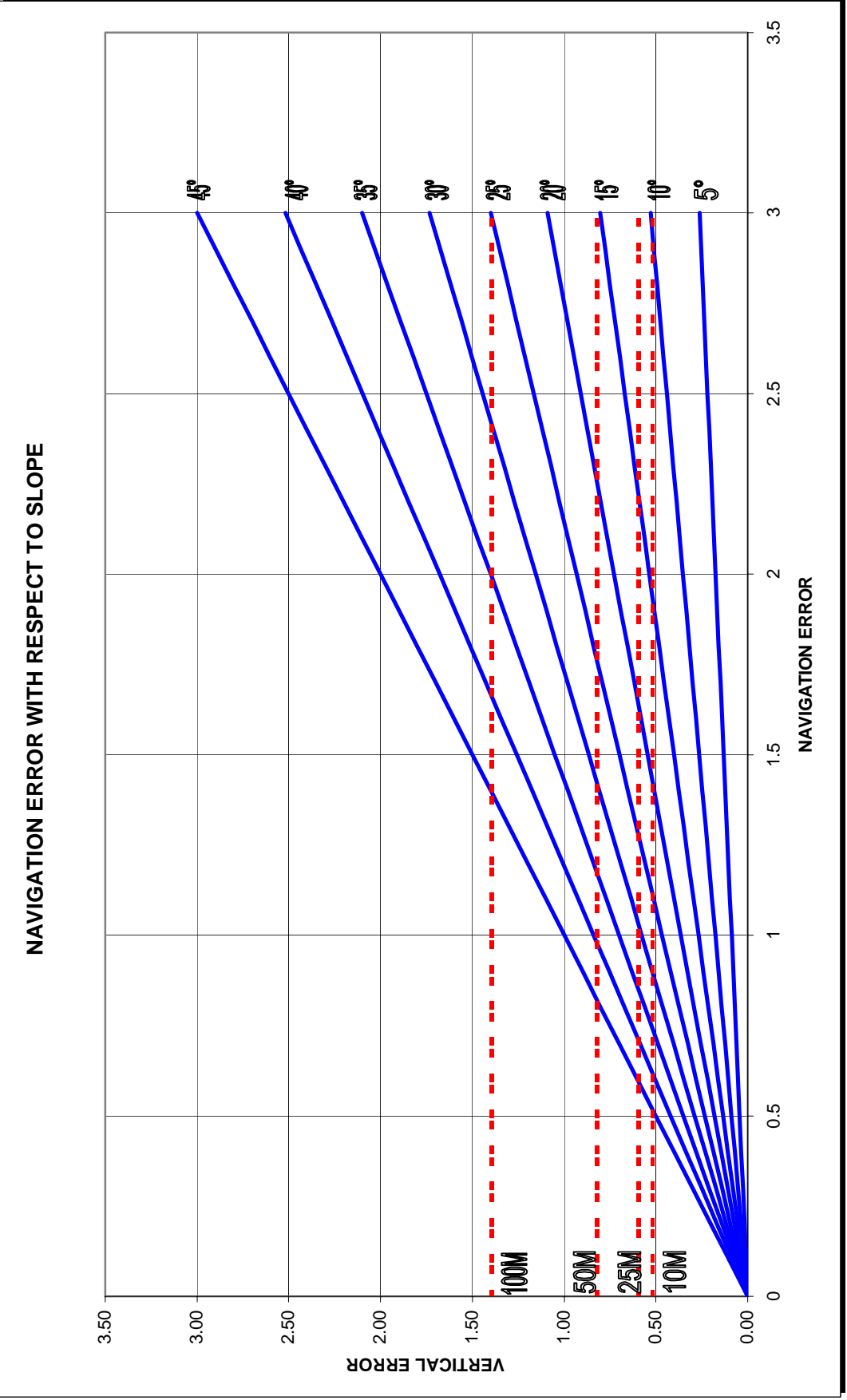


Figure 4: Navigation Error With Respect to Slope

Data Quality

In general the multibeam data quality for H11162 was excellent.⁹ A few problems to note are as follows:

- During processing, a general downward and/or upward cupping was noticed in the sounding data for certain areas. This problem was resolved by conducting more sound velocity casts and by decreasing the lengths of the survey lines.¹⁰
- During the H11162 Survey it was apparent that the inner Blashke Island tide curve was different from Beck Island curve around low tide. This was only apparent during the periods of large tidal ranges, when the tide curve for Beck Island was approximately 4.4 meter or greater. To resolve this problem, data acquisition was conducted during high tidal periods. Refer to Horizontal and Vertical Control Report¹¹ for a more detailed description.

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 are 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.

Refer to the Non-Conformance Reports numbered 2002-001 and 2002-002 in Appendix F¹² for a complete description of the problem and resolution.

Survey Junctions

H11162 (Sheet B) does not junction with any other Sheet assigned under OPR-O327-KR.¹³

Smooth Sheet Histograms

Figure 5 Histogram is for the Reson 8111 data, collected from July 20, 2002 to July 21, 2002 on the Davidson. This histogram shows a number of distinct features, one being the valley on the port side. This is the result of the transition from phase to amplitude detection of the sonar. The other¹⁴ 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 bases¹⁵ resulting in fewer selected soundings.

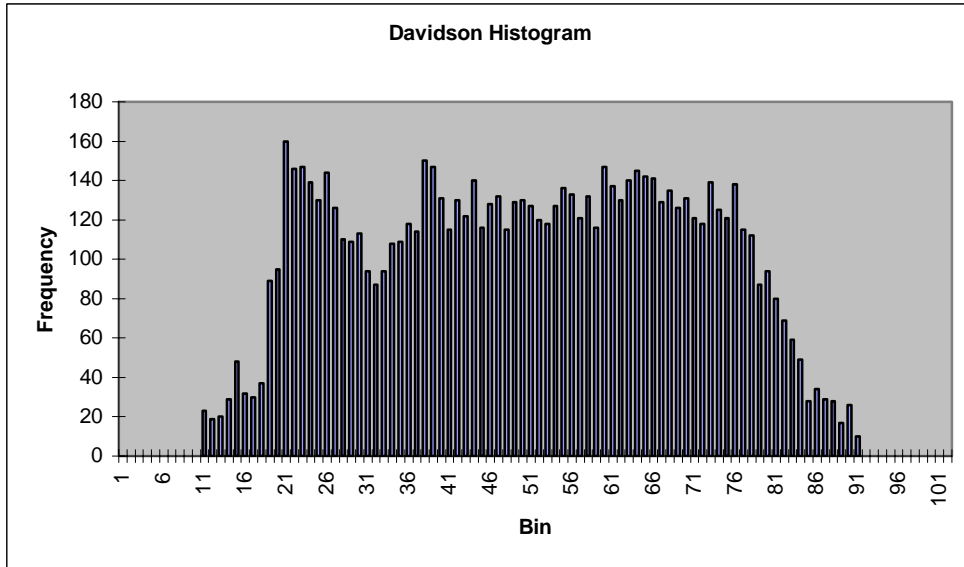


Figure 5 Histogram for 8111 (Davidson)

Figure 6 Histogram is for the Reson 8101 data, collected from August 4, 2002 to August 7, 2002 on the Quicksilver. This histogram shows an increase in the selected sounding around beams 10-16 and 85-91. This is the result of surveying near the shoreline and the simple fact that the outer beams are the shallowest. Also the majority of lines were run¹⁶, 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. The decrease of selected soundings on the outer beams is the result of deterioration of data quality on the outer beams. 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 bases¹⁷ resulting in fewer selected soundings.

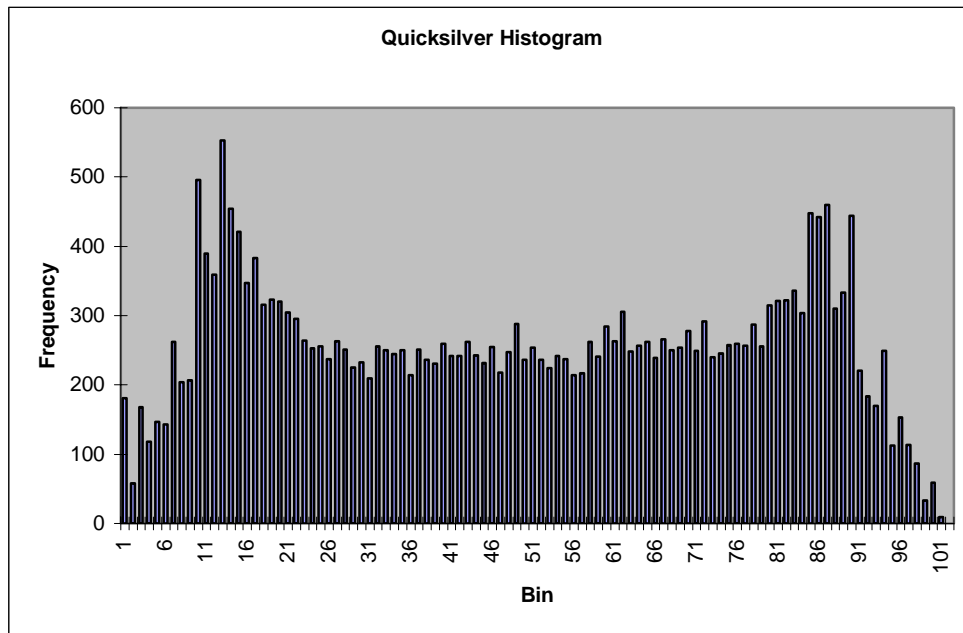


Figure 6 Histogram for 8101 (QuickSilver)

Figure 7 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 quantity of selected soundings from beam 100. The feature is difficult to explain, but does not appear to be the result of equipment failure, survey or processing procedures. Inspection of the smooth sheet reveals trends where beam 100 is shoaler than the rest of the profile simply because it is up slope from all other soundings. The crossline comparisons revealed that beam 100 was within IHO specifications; any differences were only a few centimeters.

Why beams 99 and 101 aren't similarly affected is unknown. At any rate, this trend is not pervasive enough to generate the spike seen in the histogram.¹⁸

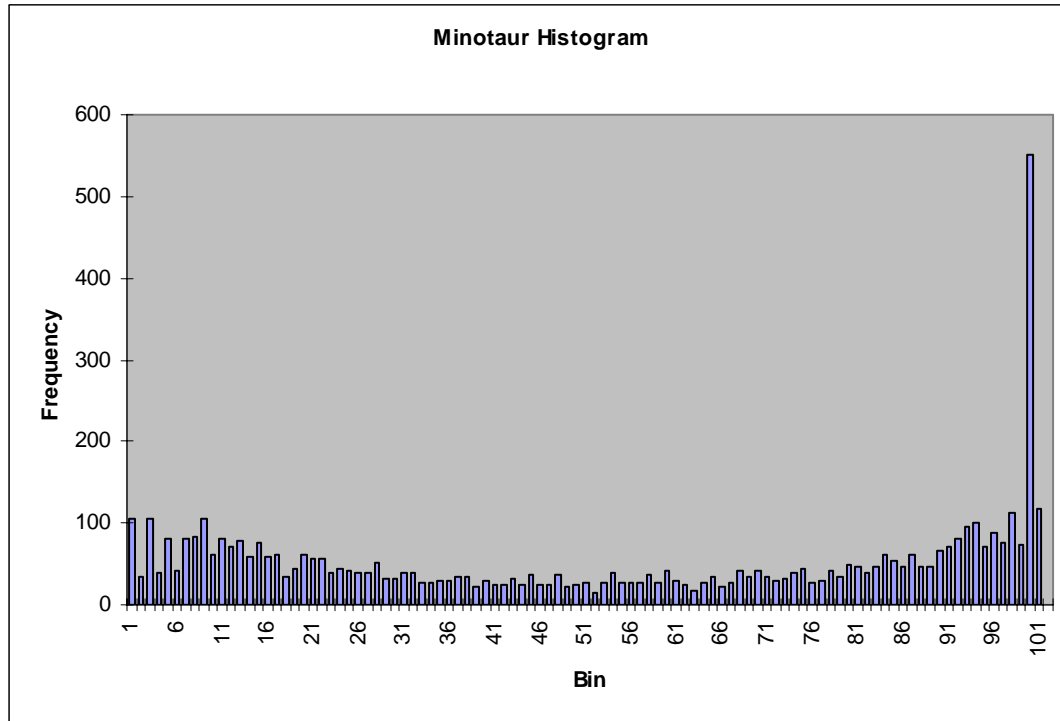


Figure 7 Histogram for 8101 (Minotaur)

Figure 8 Histogram is for the Reson 8101 data, collected from August 15, 2002 to September 3, 2002 on the Mistral. The Mistral was only utilized for minimal shoreline work and fill-in's on H11162, hence the limited numbers of selected soundings. This histogram shows a spike on beam 98, similar to the previous histogram for the Minotaur. Inspection of the smooth sheet reveals trends where beam 98 is shoaler than the rest of the profile simply because it is up slope from all other soundings. The crossline comparisons revealed that beam 98 was within IHO specifications; any differences were only a few centimeters.¹⁹

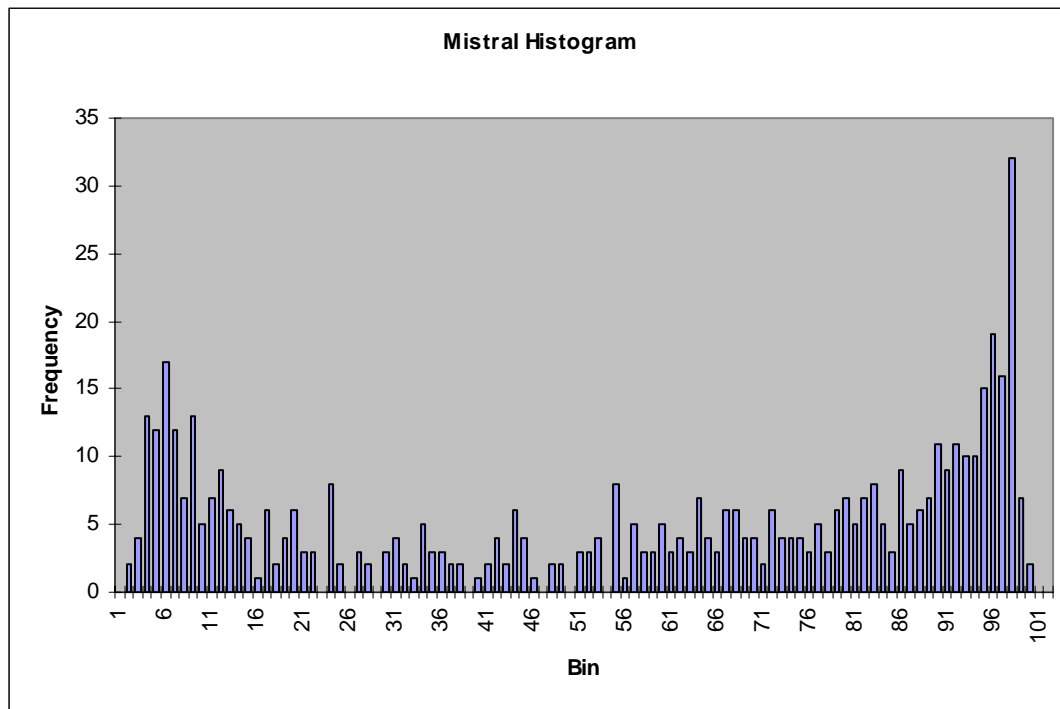


Figure 8 Histogram for 8101 (Mistral)

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. This²⁰ usually consisted of the vessels running two lines in the opposite direction²¹ 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, was²² 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 entered²³ into the vessel configuration files for each vessel and utilized in the routine processing for OPR-O327-KR (Clarence Strait).

Positioning system confidence checks were²⁴ 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 Report²⁵ 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 Report²⁶ for a detailed description of the horizontal and vertical control used on this Survey. A summary of the projects²⁷ 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 gauges 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 ²⁸	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 Report²⁹ for additional tidal information and station descriptions.³⁰

D – Results and Recommendations

Chart Comparison

H11165³¹ survey was compared with charts:³²

- 17360, 32nd Edition (September 22, 2001, 1:217,828)
- 17382, 14th Edition (September, 2002, 1:80,000)
- 17401, 10th Edition (September 4, 1999, 1:10,000)

Comparison of Soundings³³

The soundings in general compare well with the existing charts. Areas of differences to note are:³⁴

- Hydrographic survey H11162 revealed a depth of 20.3 fathoms in the vicinity of a 34 fathom sounding on chart 17401 located at 56°04'01.299" N, 132°50'56.334" W (633910.203 E, 6215625.572 N). This area was surveyed with 100% multibeam coverage.
- Hydrographic survey H11162 revealed a depth of 19.6 fathoms in the vicinity of a 26 fathom sounding on chart 17401 located at 56°04'05.828" N, 132°49'43.338" W (635167.869 E, 6215805.062 N). This area was surveyed with 100% multibeam coverage.
- Hydrographic survey H11162 revealed a depth of 54 fathoms in the vicinity of a 60 fathom sounding on chart 17401 located at 56°04'22.396" N, 132°49'30.647" W (635371.164 E, 6216324.040 N). This area was surveyed with 100% multibeam coverage.
- Hydrographic survey H11162 revealed a depth of 49 fathoms in the vicinity of a 53 fathom sounding on chart 17401 located at 56°04'29.011" N, 132°49'45.462" W

- (635108.616 E, 6216520.436 N). This area was surveyed with 100% multibeam coverage.
- Hydrographic survey H11162 revealed a depth of 21 fathoms in the vicinity of a 24 fathom sounding on chart 17401 located at 56°04'22.501" N, 132°50'49.318" W (634011.067 E, 6216284.642 N). This area was surveyed with 100% multibeam coverage.
 - Hydrographic survey H11162 revealed a depth of 17.6 fathoms in the vicinity of a 30 fathom sounding on chart 17401 located at 56°04'26.701" N, 132°50'49.998" W (633995.263 E, 6216414.117 N). This area was surveyed with 100% multibeam coverage.
 - Hydrographic survey H11162 revealed a depth of 29 fathoms in the vicinity of a 35 fathom sounding on chart 17401 located at 56°04'40.875" N, 132°50'10.441" W (634665.325 E, 6216873.577 N). This area was surveyed with 100% multibeam coverage.
 - Hydrographic survey H11162 revealed a depth of 25 fathoms in the vicinity of a 33 fathom sounding on chart 17401 located at 56°04'43.955" N, 132°49'53.995" W (634946.597 E, 6216977.683 N). This area was surveyed with 100% multibeam coverage.
 - Hydrographic survey H11162 revealed a depth of 17.3 fathoms in the vicinity of a 23 fathom sounding on chart 17401 located at 56°04'58.478" N, 132°50'46.120" W (634031.636 E, 6217398.361 N). This area was surveyed with 100% multibeam coverage.
 - Hydrographic survey H11162 revealed a depth of 30 fathoms in the vicinity of a 24 fathom sounding on chart 17401 located at 56°04'57.816" N, 132°51'1.616" W (633764.460 E, 6217369.552 N). This area was surveyed with 100% multibeam coverage.³⁵
 - Hydrographic survey H11162 revealed a depth of 20 fathoms in the vicinity of a 40 fathom sounding on chart 17382 located at 56°05'38.313" N, 132°53'12.986" W (631455.685 E, 6218551.118 N). This area was surveyed with 100% multibeam coverage.
 - Hydrographic survey H11162 revealed a depth of 18 fathoms in the vicinity of a 39 fathom sounding on chart 17382 located at 56°05'37.191" N, 132°52'04.673" W (632637.061 E, 6218552.754 N). This area was surveyed with 100% multibeam coverage.
 - Hydrographic survey H11162 revealed a depth of 24 fathoms in the vicinity of a 40 fathom sounding on chart 17382 located at 56°05'50.204" N, 132°51'15.055" W (633481.853 E, 6218981.533 N). This area was surveyed with 100% multibeam coverage.
 - Hydrographic survey H11162 revealed a depth of 15.8 fathoms in the vicinity of a 26 fathom sounding on chart 17382 located at 56°06'29.174" N, 132°53'11.757" W (631428.765 E, 6220123.801 N). This area was surveyed with 100% multibeam coverage.
 - Hydrographic survey H11162 revealed a depth of 26 fathoms in the vicinity of a 32 fathom sounding on chart 17382 located at 56°06'43.979" N, 132°52'40.408" W (631956.147 E, 6220598.020 N). This area was surveyed with 100% multibeam coverage.

- Hydrographic survey H11162 revealed a depth of 15.1 fathoms in the vicinity of a 21 fathom sounding on chart 17382 located at 56°07'28.412" N, 132°52'13.367" W (632380.734 E, 6221985.778 N). This area was surveyed with 100% multibeam coverage.
- Hydrographic survey H11162 revealed a depth of 34 fathoms in the vicinity of a 19 fathom sounding on chart 17360 located at 56°04'23.200" N, 132°56'59.757" W (627606.494 E, 6216111.287 N). This area was surveyed with 100% multibeam coverage.³⁶
- Hydrographic survey H11162 revealed a depth of 32 fathoms in the vicinity of a 13 fathom sounding on chart 17360 located at 56°05'57.435" N, 132°57'13.283" W (627286.297 E, 6219017.047 N). This area was surveyed with 100% multibeam coverage.³⁷
- Hydrographic survey H11162 revealed a depth of 177 fathoms in the vicinity of a 187 fathom sounding on chart 17360 located at 56°07'02.413" N, 132°49'50.128" W (634878.898 E, 6221259.265 N). This area was surveyed with 100% multibeam coverage.

Soundings that differ from hydrographic survey H11162 are highlighted in red on the chart comparison sheet included in Separate 6.³⁸ Other soundings that differed resulted in a Danger to Navigation and are listed in Appendix A Danger to Navigations.³⁹

Since the current charts have very little detail pertaining to the contours, the hydrographer was only able to make a general comment.⁴⁰ From the figure below you can see that there as⁴¹ been considerable migrating⁴² of shoals and some random⁴³ deepening as⁴⁴ also occurred.

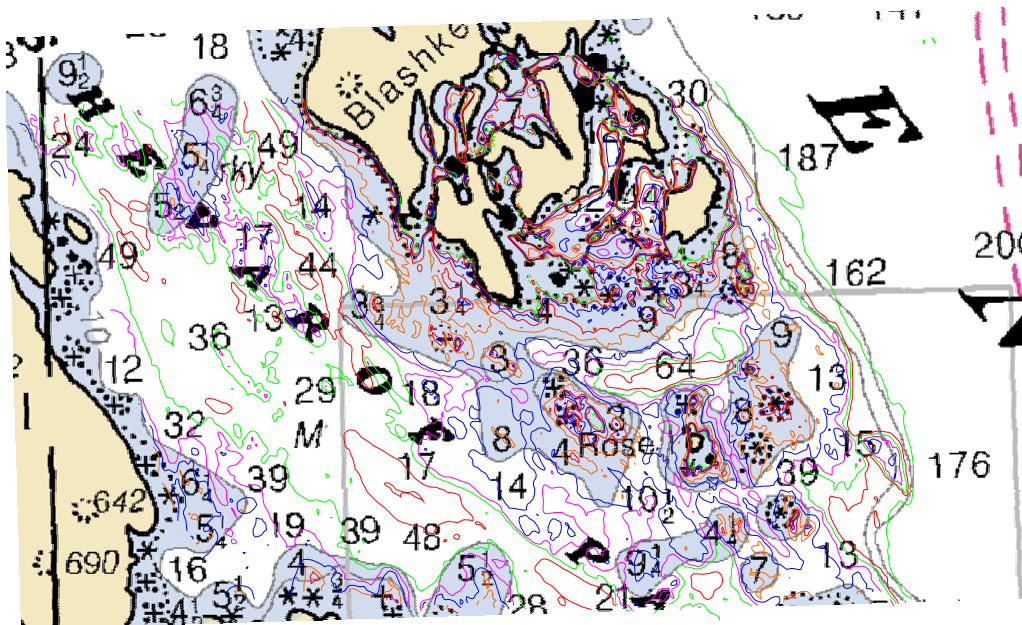


Figure 9 Comparison of Contours

Automated Wreck and Observation Information System

There were three AWOIS items assigned to OPR-O327-KR, but only one within the limits of H11162.

- AWOIS Item 52535-this item is described has⁴⁵ being an exposed rock with a PD label.

Survey lines were conducted to provide 200% coverage over the required search radius. The multibeam and backscatter data was reviewed in Delphmap and CARIS and the rock was not located in the search area. Therefore, it is recommended that the rock be removed from charts 17360, 17382 and 17401. Refer to Appendix E for AWOIS Form.⁴⁶

Charted Features

There were no charted features labeled PA, ED, PD,⁴⁷ or Rep. The only charted feature within the limits of H11162 was a PD located at 56°04'52.279" N and 132°50'29.653" W, which was an assigned AWOIS item and was investigated accordingly.⁴⁸

Dangers to Navigation

Seventy-Nine dangers to navigation were located during the hydrographic survey of H11162 and were submitted on October 22, 2002. Refer to Appendix A for Submitted Report⁴⁹

Additional Results

Shoreline Verification⁵⁰

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.⁵¹ The 4-meter curve was determined from H11162 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-00577,

TP-00578, and T12313 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 was⁵² 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.⁵³

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 rock symbol was placed in the center of the extents as defined by DPs and/or the gap in multibeam coverage.⁵⁴

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 H11162 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.⁵⁵

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.

Results

MHW line (including islets)

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. The T-sheet MHW line compared very well to field verification⁵⁶ and was accepted to be within 20m except as itemized below. All itemized items appear in red on the smooth sheet indicating changes to source data.⁵⁷

1. New islet (5 ft ht MHW), at 56 06 34.44 N, 132 55 11.55 W (N6220223.70, E629354.84) was positioned by DP JD246_21. The feature was depicted as a rock on T12313 but was determined in the field to be an islet with a ledge extending seaward.⁵⁸
2. Islet (9 ft ht MHW), at 56 06 31.87 N, 132 55 06.42 W (N6220147.00, E629445.84) was positioned by DP JD246_08 and JD246_20. This feature was depicted as an islet on T12313 but it was determined in the field to have smaller extents than⁵⁹ the T-sheet item.⁶⁰
3. New islet (3 ft ht MHW), at 56 06 36.47 N, 132 55 02.45 W (N6220291.13, E629510.15) was positioned by DP JD246_13 and JD246_14. This feature was depicted as a rock on TP00577. It was charted as an islet on chart 17382.⁶¹
4. Islet (19 ft ht MHW), at 56 06 38.81 N, 132 55 06.99 W (N6220361.09, E629429.53) was positioned by DP JD246_10 and JD246_19. This feature was depicted as a small peninsula of land entirely above MHW on TP00577. Investigation revealed the feature to be an islet connected to the land by a ledge at low tide. It appears on the smooth sheet similar to the depiction on chart 17382 and T-sheet T12313.⁶²
5. New islet (3 ft ht MHW), at 56 06 49.88 N, 132 54 50.94 W (N6220711.62, E629696.37) was positioned by DP JD246_03 and JD246_04. This feature was not depicted on T12313.⁶³

6. New islet (5 ft ht MHW), at 56 07 00.62 N, 132 54 52.24 W (N6221042.90, E629663.85) was positioned by DP JD246_02 and JD246_01. The feature was depicted as a rock on TP00577.⁶⁴
7. MHW at 56 06 58.65 N, 132 54 38.37 W (N6220989.26, E629905.26) was shifted slightly southward due to multibeam coverage on the T-sheet shoreline.⁶⁵
8. New islet (5 ft ht MHW), at 56 07 20.54 N, 132 54 34.54 W (N6221667.85, E629950.84) was positioned by DP JD245_27 and correlating DPs. The feature was depicted as a rock on TP00577.⁶⁶
9. New islet (4 ft ht MHW), at 56 07 42.37 N, 132 54 14.69 W (N6222353.0, E630273.0) was positioned by DP JD237_07. The feature was depicted as a rock on TP00577. It was charted as an islet on chart 17382.⁶⁷
10. MHW at 56 07 32.42 N, 132 54 18.19 W (N6222043.66, E630222.0) was shifted 3-5 meters southward due to multibeam coverage on the T-sheet shoreline.⁶⁸
11. New islet (5 ft ht MHW), at 56 07 16.58 N, 132 52 15.55 W (N6221618.85, E632354.30) was positioned by DP JD244_66 and JD244_67. The feature is depicted as a rock on TP00578. It was charted as a small islet on chart 17382.⁶⁹
12. MHW at 56 07 23.36 N, 132 52 31.62 W (N6221819.86, E632070.37) is depicted as a series of small islets on TP00578. However, during limited shoreline verification the islets were determined to be connected at MHW. The feature is shown as a red dashed line on the smooth sheet since no direct measurements were made.⁷⁰
13. MHW at 56 07 13.48 N, 132 52 9.84 W (N6221526.01, E632455.87) was shifted up to 18 meters southward due to multibeam coverage on the T-sheet shoreline. A ledge was determined to exist where the T-sheet MHW line was presented.⁷¹
14. New islet (6 ft ht MHW), at 56 06 55.82 N, 132 50 55.67 W (N6221019.98, E633753.55) was positioned by DP JD244_27 and DP JD244_26. This feature was not depicted on TP00578. It appears as an extension of land (not an islet) on chart 17382.⁷²
15. New islet (7 ft ht MHW), at 56 06 41.18 N, 132 50 58.16 W (N6220566.14, E633724.66) was positioned by DP JD244_23 and JD244_24. This feature was depicted as a rock on TP00578. It was charted as a small islet on chart 17382.⁷³
16. New islet (7 ft ht MHW), at 56 06 31.58 N, 132 50 59.74 W (N6220268.57, E633706.55) was positioned by DP JD244_20 and JD244_21. This feature was depicted as two rocks on TP00578. It was charted as an islet on chart 17382.⁷⁴
17. New islet (6 ft ht MHW), at 56 06 20.74 N, 132 51 17.32 W (N6219924.20, E633413.34) was positioned by DP JD244_12 to be an islet surrounded by a ledge. This feature was not depicted on TP00578.⁷⁵
18. New islet (3 ft ht MHW), at 56 06 21.86 N, 132 51 15.19 W (N6219959.84, E633449.06) was positioned by DP JD244_13 and JD244_14. This feature was depicted as a rock on TP00578. It also was charted as a rock on chart 17382.⁷⁶
19. New islet (8 ft ht MHW), at 56 06 05.20 N, 132 50 46.44 W (N6219460.44, E633961.74) was positioned by DP JD254_10 and JD254_11. This feature was depicted as a rock on TP00578. It also was charted as a rock on chart 17382.⁷⁷
20. New islets (13 ft ht MHW on western, unknown on other), at 56 04 48.77 N, 132 51 15.38 W (N6217082.49, E633535.32) were positioned by DP JD235_08 and

- neighbors. These features were depicted as rocks on TP00578. They were charted as islets (heights 4 ft MHW and 3 ft MHW) on chart 17382.⁷⁸
21. MHW line around Rose Rock at 56 05 06.53 N, 132 52 45.34 W (N6217583.36, E631963.51) was positioned by JD235_29 and correlating DPs. This feature was depicted as an islet on TP00577 but investigation revealed it to not extend above MHW. It is shown on the smooth sheet as a ledge with a height of 14 ft above MLLW.⁷⁹
 22. MHW at 56 07 4.91 N, 132 52 17.74 W (N6221256.96, E632327.6) was shifted approximately 8 meters east due to multibeam coverage on the MHW shoreline.⁸⁰
 23. MHW at 56 6 58.12 N, 132 54 21.91 W (N6220981.69, E630189.88) was shifted 10-15 meters east due to multibeam coverage on the MHW shoreline.⁸¹
 24. MHW in the vicinity of 56 6 56.38 N, 132 54 2.66 W (N6220938, E630524) was shifted slightly due to multibeam coverage on the MHW shoreline.⁸²

Features (Rocks, ledges, reefs)

1. New Rocks -- DP'd rocks with no correlating T-sheet rock. New rocks are shown on smooth sheet in black at surveyed position.⁸³
2. Verified T-sheet rocks -- DP'd rocks found to be within 20m of T-sheet rocks. Shown on the smooth sheet in black at their⁸⁴ DP'd position.⁸⁵
3. T-sheet rocks inshore of 4m curve that received only limited verification (no DP's) and appear to be in correct general location. The T-sheet rocks are shown on smooth sheet in black at their T-sheet positions.⁸⁶
4. Charted rocks where the survey found a correlating rock by DP or multibeam (generally within 10-200m of the center of the charted rock symbol) and the hydrographer recommends that the charted rock symbol be "moved" to the smooth sheet rock position.⁸⁷ However, exceptions of important navigational significance are still itemized.

Ledges presented on the smooth sheet were positioned using either limited or traditional shoreline verification. During limited shoreline investigation, ledges inshore of the 4m curve were approximately positioned with field comments such as, "ldg extends along shore". Ledges offshore of the 4m curve were positioned using traditional shoreline verification with DPs taken on exact extents.⁸⁸

In several areas on the smooth sheet, a MLLW water line is presented. This is because during limited verification the areas in question were noted as being dry at low tide, or passable at high tide.

Features that are itemized and discussed are as follows:

1. T-sheet rocks near 56 07 35.00 N, 132 51 54.59 W (N6222199.37, E632698.64) were positioned by DPs JD244_51 and JD244_52. They were found to be 35m to 45m (seaward edge) from their T-sheet positions. Therefore, the T-sheet rocks are

- considered disproved and the DP rocks new. It is possible, however, that the T-sheet rocks were extents of the ledge present in the area.⁸⁹
2. T-sheet rock at 56 07 21.15 N, 132 51 39.33 W (N6221779.48, E632975.28) was investigated by DP JD244_46. A rock was found approximately 50m southeast of the T-sheet rock. The T-sheet rock is therefore considered disproved and the DP rock considered new.⁹⁰

Charted Shoreline - Disprovals and Exceptions (from CH 17382 and CH 17401)

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 or ledges be charted in these areas based on the position of rocks or ledges shown on the smooth sheet.⁹¹ 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.⁹² 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. Navigationally significant charted rock southwest of Seal Rock at 56 04 17.77 N, 132 50 15.94 W (N6216156.53, E634592.62) was investigated by DP JD233_01 and no rock was found. In addition, 100% multibeam coverage revealed no rock and a depth of approximately 11 fathoms at the charted position. However, an uncharted rock was located by DP JD233_04 and confirmed by full multibeam coverage about 90 meters east-southeast of the charted rock.⁹³
2. The position for Seal Rock on chart 17401 at 56 04 21.00 N, 132 50 07.63 W (N6216260.79, E634733.25) was retained on the smooth sheet. The position as charted conformed to the center of the multibeam gap and the central position between the four DPs taken there (see DP JD233_07). Given the open area where this rock exists, a central position was considered navigationally “better” than⁹⁴ any of the DP positions. In addition, shoreline investigation revealed the rock to be higher than previously charted at 12 ft above MLLW.⁹⁵
3. Position Doubtful (PD) rock on chart 17401 at 56 04 52.22 N, 132 50 29.74 W (N 6217213.72, E 634320.75) was investigated by JD235_27 and no rock was found. In addition, 100% multibeam coverage revealed no rock and a depth of approximately 13 fathoms at the charted position. No rocks were found nearby that could correlate.⁹⁶
4. Rose Rock at 56 05 06.53 N, 132 52 45.34 W (N6217583.36, E631963.51) was positioned by JD235_29 and correlating DPs. It was found that it does not extend above MHW as charted on chart 17401. It is presented on the smooth sheet as a ledge

with a height of 14 feet above MLLW. Changes to the T-sheet shoreline around Rose Rock are discussed above in the section concerning the MHW line.⁹⁷

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:⁹⁸

56 6 27.97 N, 132 53 26.50 W (N6220078.79, E631175.29)
56 7 52.69 N, 132 53 30.39 W (N6222695.41, E631028.02)
56 7 53.75 N, 132 53 28.35 W (N6222729.09, E631062.19)
56 7 52.41 N, 132 53 22.83 W (N6222690.71, E631158.76)
56 7 51.31 N, 132 53 21.41 W (N6222657.50, E631184.39)
56 7 48.92 N, 132 53 27.27 W (N6222580.60, E631085.45)

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:

None

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:⁹⁹

56 6 9.59 N, 132 54 16.10 W (N6219484.54, E630335.89)
56 6 48.98 N, 132 55 16.18 W (N6220670.64, E629261.31)
56 6 41.57 N, 132 53 39.83 W (N6220492.07, E630932.25)
56 7 54.20 N, 132 52 47.48 W (N6222764.65, E631767.34)
56 7 53.31 N, 132 52 48.09 W (N6222737.43, E631757.60)

4. T-sheet items inshore of the 4-meter curve that were observed to deviate from their T-sheet location during limited shoreline verification:¹⁰⁰

56 7 24.64 N, 132 52 33.02 W (N 6221858.80, E 632045.07) Series of islets noted during limited shoreline investigation to actually be connected at MHW

5. Other items that warrant further investigation:

56 07 43.01 N, 132 52 11.99 W (N6222437.66, E 632390.61) DM/charted rock investigated by DP JD244_59 and found no rock; but DP was taken at 1.94m tide

20m SE of DM position. Considered inadequately investigated; appears on the smooth sheet in black at DM position.¹⁰¹

Foul area centered around 56 06 09.48 N, 132 53 09.89 W (N6219516.09, E631479.67) located inshore of the 4m curve. This area was investigated by limited verification and many features (ledges, rocks, islets, and partially submerged spits) were approximately located, but it is a large area generally unsafe for navigation and is presented as foul on the smooth sheet¹⁰²

Small bay at 56 6 55.94 N, 132 54 3.05 W (N6220924.06, E630517.67). Blashke oyster farm is located here. Traditional shoreline investigation was not performed. Many pens, floats, and lines are present. It is presented on the smooth sheet in red as a new cultural feature.¹⁰³

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.¹⁰⁴

It is recommended that above items be investigated by traditional shoreline investigation methods and / or multibeam survey at high tide.¹⁰⁵

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.¹⁰⁶

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.¹⁰⁷

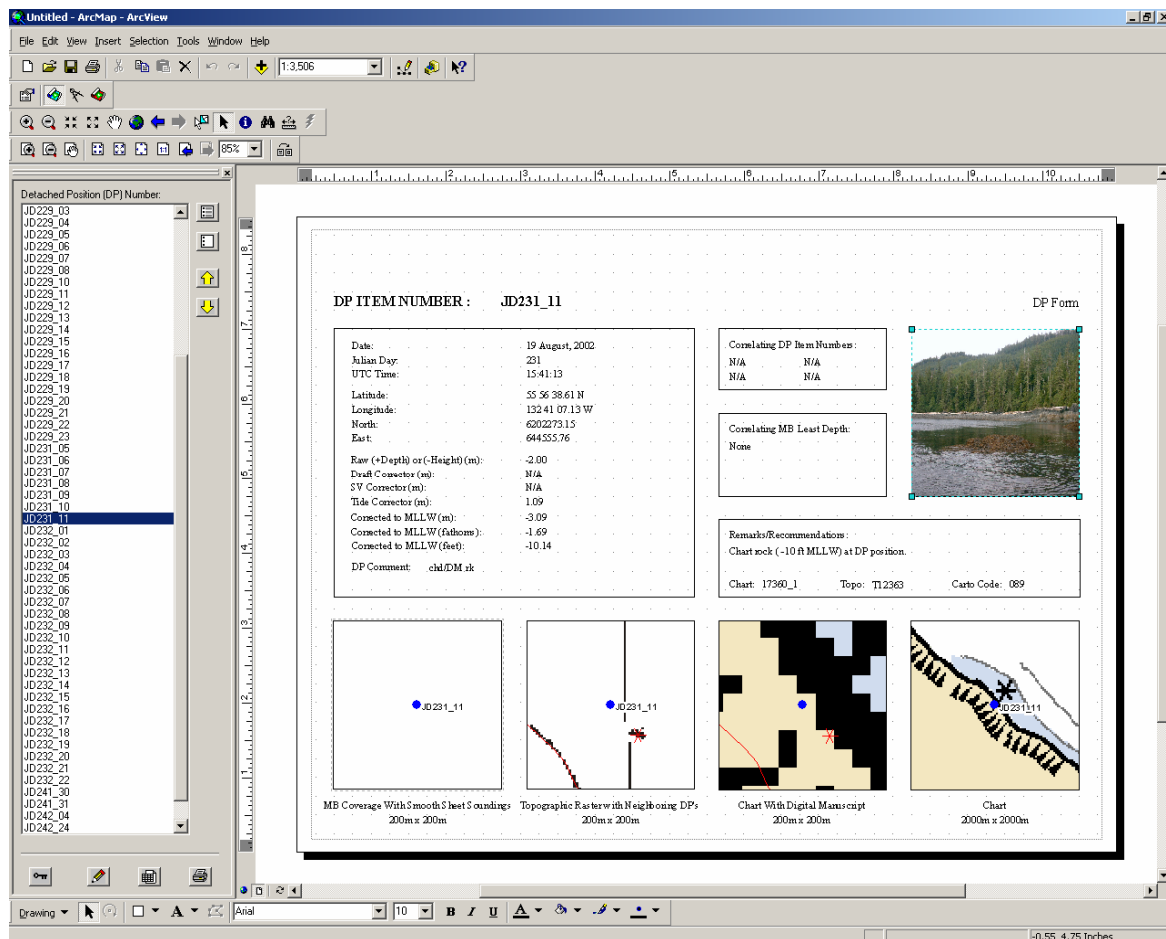


Figure 10 DP Correlator Sheet

Bottom Samples

Bottom Samples were not required under this contract.¹⁰⁸

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.¹⁰⁹

Appendix A - Danger to Navigation

Seventy-Nine dangers to navigation were located during the hydrographic survey of H11162.¹¹⁰

Danger to Navigation Report

Hydrographic Survey Registry Number: H11162

Survey Title: State: ALASKA Locality: Northern Clarence Strait Sub-locality:
Horne Island to Seal Rock

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:

<u>Chart</u>	<u>Scale</u>	<u>Edition</u>	<u>Date</u>
17360	1:217,828	32 nd	09/22/01
17382	1:80,000	14 th	04/26/97
17401	1:10,000	10 th	09/04/99
17400	1:229,376	16 th	06/02/01

DANGER:

<u>Feature</u>	<u>Depth(ft or fms)</u>	<u>Latitude (N)</u>	<u>Longitude (W)</u>
Sounding	1/2	56/06/19.3	132/52/07.8
Rock	Unc 3 ft	56/06/18.8	132/50/43.9
Sounding	8 1/2	56/05/36.3	132/49/47.2
Sounding	4 3/4	56/05/51.6	132/50/28.4

COMMENTS:

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

Danger to Navigation Report

Hydrographic Survey Registry Number: H11162

Survey Title: State: ALASKA Locality: Northern Clarence Strait Sub-locality:
Horne Island to Seal Rock

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:

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

DANGER:

<u>Feature</u>	<u>Depth(ft or fms)</u>	<u>Latitude (N)</u>	<u>Longitude (W)</u>
Rock	Unc 1 ft	56/07/13.4	132/52/21.4

COMMENTS:

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

Danger to Navigation Report

Hydrographic Survey Registry Number: H11162

Survey Title:

State: ALASKA

Locality: Northern Clarence Strait

Sub-locality: Horne Island to Seal Rock

Project Number: OPR-0327-KR-02

Survey Dates: August - September 2002

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

Positions are based on the NAD83 horizontal datum.

CHARTS AFFECTED:

Chart	Scale	Edition	Date
17360	1:217,828	33rd	05/01/03
17382	1:80,000	15th	05/01/03
17401	1:10,000	11th	02/01/04

DANGER:

Feature	Depth(ft or fms)	Latitude (N)	Longitude (W)
Sounding	3 fms 3 ft	56/04/52.9	132/50/08.2
Sounding	2 fms	56/04/15.3	132/50/00.2

COMMENTS: The DTONs noted above were found during office processing of H11162.

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

Danger to Navigation Report

Hydrographic Survey Registry Number: H11162

Survey Title:

State: ALASKA

Locality: Northern Clarence Strait

Sub-locality: Thorne Island to Seal Rock

Project Number: OPR-0327-KR-02

Survey Dates: August - September 2002

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

Positions are based on the NAD83 horizontal datum.

CHARTS AFFECTED:

Chart	Scale	Edition	Date
17360	1:217,828	33rd	05/01/03
17382	1:80,000	15th	05/01/03
17401	1:10,000	11th	02/01/04

DANGER:

Feature	Depth(ft or fms)	Latitude (N)	Longitude (W)
Sounding	9 fms 5 ft	56/06/53.6	132/56/29.3
Sounding	9 fms 1 ft	56/05/18.8	132/49/34.2
Sounding	2 fms 1ft	56/05/23.2	132/50/23.5
Sounding	1 fms 2 ft	56/05/09.6	132/50/29.4
Sounding	3 fms 3 ft	56/04/50.1	132/53/04.8
Sounding	3 fms 2 ft	56/04/18.5	132/50/52.7
Sounding	7 fms	56/04/10.5	132/50/48.0
Sounding	3 fms 2 ft	56/04/15.4	132/50/57.3
Sounding	1 fms 5 ft	56/04/40.5	132/51/34.4
Sounding	7 fms 4 ft	56/04/57.3	132/50/56.3
Sounding	2 fms 2 ft	56/04/44.7	132/50/35.4
Sounding	4 fms 2 ft	56/05/05.9	132/50/47.7
Sounding	9 fms	56/05/02.0	132/49/47.0
Sounding	5 fms 2 ft	56/04/56.1	132/50/18.7
Sounding	7 fms 5 ft	56/04/50.1	132/49/03.0
Sounding	8 fms 4 ft	56/04/50.6	132/49/49.9

Danger to Navigation Report

Sounding	6 fms 1 ft	56/04/39.5	132/50/42.0
Sounding	5 fms 4 ft	56/04/27.1	132/50/13.7
Sounding	4 fms 3 ft	56/05/00.8	132/50/02.2
Sounding	5 fms 4 ft	56/04/56.5	132/49/58.8
Sounding	3 fms 4 ft	56/04/52.5	132/50/08.0
Sounding	8 fms 2 ft	56/04/48.8	132/50/50.0
Sounding	8 fms 1 ft	56/03/54.8	132/50/45.5
Sounding	2 fms 2 ft	56/04/59.5	132/52/29.0
Sounding	8 fms 4 ft	56/05/02.2	132/51/15.7
Sounding	1 fms 5 ft	56/05/07.9	132/50/33.0
Sounding	8 fms 2 ft	56/04/09.9	132/50/09.3
Sounding	6 fms 2 ft	56/04/06.0	132/50/41.9
Sounding	6 fms 5 ft	56/03/50.7	132/50/31.1
Sounding	2 fms	56/04/15.0	132/50/00.1

COMMENTS: The DTONs noted above were found during office processing of H11162.

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

Appendix B - List of Geographic Names

No new geographic names in the survey were discovered.¹¹¹

Appendix C – Progress Sheet

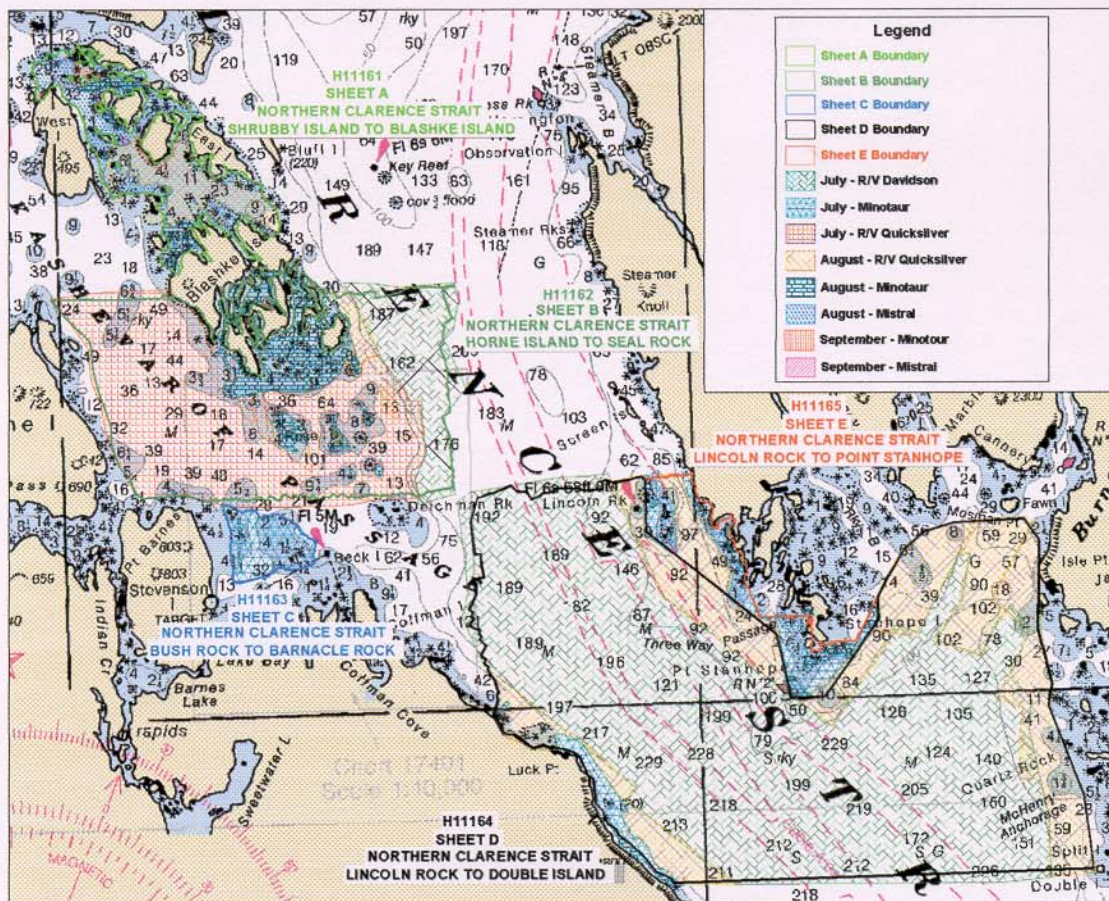
PROGRESS SKETCH

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	3.88	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



Appendix D - Tides and Water Levels

2002 FIELD and FINAL TIDE NOTE

Hydrographic Sheet: H11162

Sheet B

Home Island to Seal Rock Northern Clarence Strait, Alaska

NOAA Project No:		OPR-0327-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.					
Location and Time Meridian	Name:	Lat (NAD 83)	Long (NAD 83)	Time Meridian:	
	Beck Island	56° 02' 47"	132° 51' 45"	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
Tide observer	LCMF, Inc. 139 E. 51st Avenue Anchorage, AK 99503 (907) 273-1825				
Gauges	Three 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 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				
Levels	Benchmarks were leveled at the installation, reinstallation and removal of the 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 SA133, SA135, SA139A, SA139C and SA140 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.				

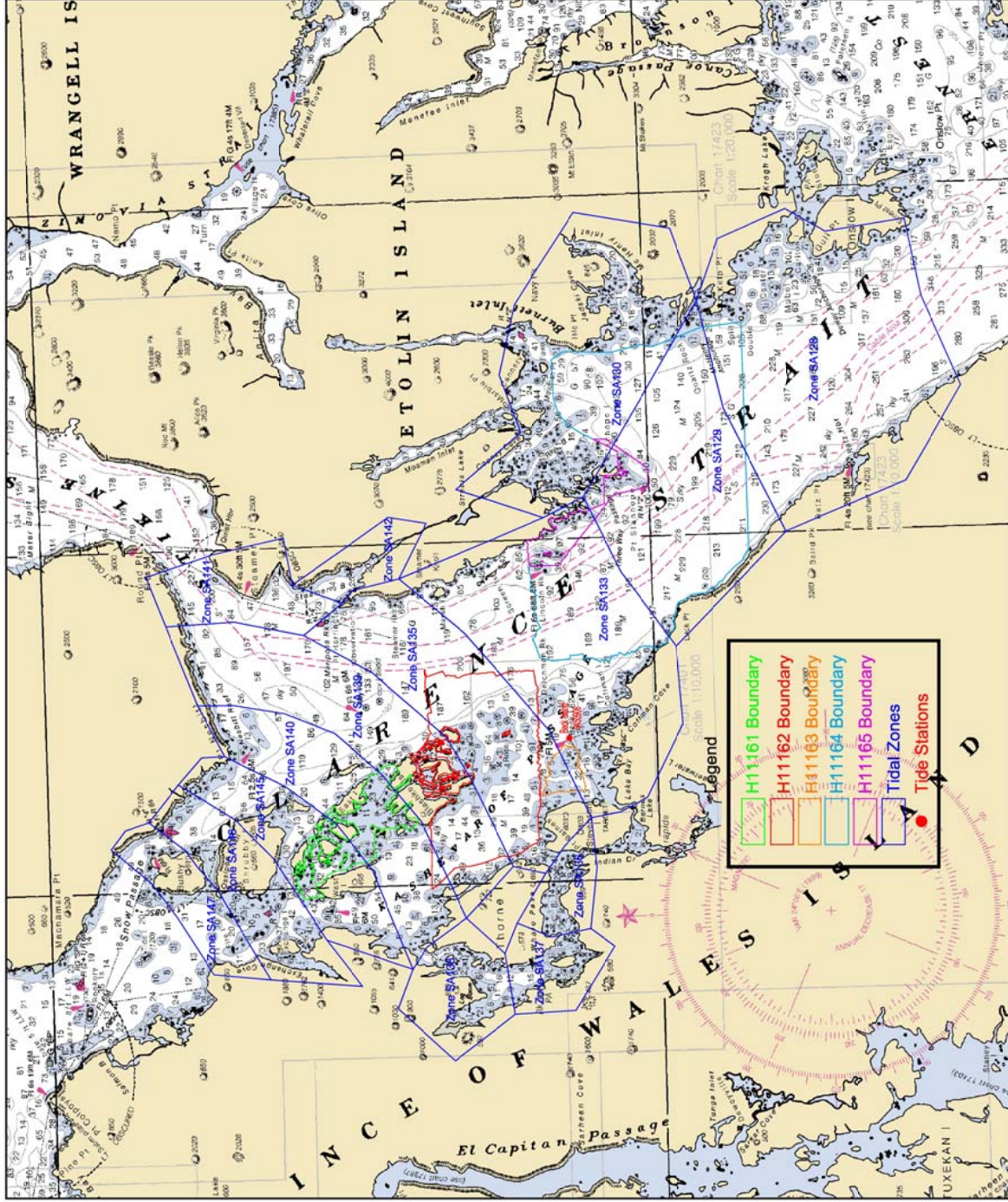


Figure 1 Tide Zoning

Appendix E - AWOIS

RECRD **VESSELTERMS** **CHART** **AREA**
CARTOCODE **SNDINGCODE** **DEPTH**

NATIVLAT	<input type="text"/>	NATIVLON	<input type="text"/>	NATVDATUM	<input type="text" value="31"/>
LAT83	<input type="text" value="56 04 51.2"/>	LONG83	<input type="text" value="132 50 29.8"/>	GPQUALITY	<input type="text" value="Poor"/>
LATDEC	<input type="text" value="56 4 51.2"/>	LONDEC	<input type="text" value="132 50 29.8"/>	GPSOURCE	<input type="text" value="Scaled"/>
	<input type="text" value="56.0808888888889"/>		<input type="text" value="132.84161111111"/>		

PROJECT **ITEMSTATUS** **SEARCHTYPE**
RADIUS **INIT** **ASSIGNED**
TECNIQ

Techniqnote

History
HISTORY
 CL492/08--REPORT FROM THE SS FARALLON TO THE USN, 1908; SS FARALLON REPORTS THAT A ROCK SHOWS AT LOW TIDE, 1/2 NM EAST (TRUE) OF THE CENTER OF ROSE ISLAND. APPROXIMATE POSITION LAT. 55-05N, LONG.132-50W. ENTERED 2/00 MCR

Fieldnote
INVESTIGATION
 DATE: 09/02/02 (DN: 245)
 HYDROGRAPHIC SURVEY NUMBER: H11162
 VN: Minotaur TIME: 00:26:42
 INVESTIGATION METHODS USED: 200% Multibeam and backscatter coverage
 SURVEYED POSITION : Lat 56 04 51.2N Lon 132 50 29.8W, searched 400m radius circle
 POSITION DETERMINED BY: Differential GPS
 INVESTIGATION SUMMARY: Survey lines were conducted to provide 200% coverage over the required search radius. The multibeam and backscatter data was reviewed in Delphmap and CARIS and the rock was not located.
 CHARTING RECOMMENDATION (HYDROGRAPHER): It is recommended that the rock be removed from charts 17360, 17382 and 17401.
 EVALUATOR COMMENTS: Concur. Remove rock and PD symbols from charts 17360, 17382, and 17401.

Proprietary

YEARSUNK **NIMANUM** **SYSTEMNUM** **Print Record**

E – Approval Sheet**Approval Sheet**

For

H11162

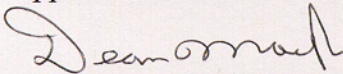
Standard field surveying and processing procedures were followed in producing this survey in accordance with the following documents:

OPR-O327-KR 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

Revisions Compiled During Office Processing and Certification

¹ Strikethrough ~~, which~~.

² Concur with clarification. The coordinates listed define the sheet limits. Refer to Surdex for the survey area.

³ Strikethrough ~~Horne~~, replace with Thorne. The NOAA task order defined the survey limits as Horne Island to Seal Rock. Thorne Island is west of the western survey limit, while Seal Rock is west of the eastern survey limit. Wherever the Descriptive Report refers to ~~Horn~~ or ~~Horne~~ Island, strikethrough and replace with Thorne Island.

⁴ In header date, strikethrough 2002, replace with “2003”.

⁵ Filed with the project reports.

⁶ Strikethrough ~~with~~, replace with “was”.

⁷ Filed with the project reports.

⁸ Crossline data met or exceeded requirements for quality control.

⁹ Concur. The data is adequate to supersede all prior surveys except as specifically discussed in this report.

¹⁰ The data is acceptable for charting.

¹¹ Filed with the project reports.

¹² Filed with the project reports.

¹³ Do not concur. H11162 junctions with H11163 (2002) in two areas around Lat 55/03/45N, Lon 132/55/00W and around Lat 55/03/45N, Lon 132/54/50W. Comparison of the junction areas in PHB processing showed excellent correlation, generally within a few feet or less. H11162 was also compared in PHB processing with H11058 (2001), H10950 (2000) and H10959 (2000). The southern junction with H11058 also compared very well, generally within 0-1 fathom. The northern junction with H10950 compared very well, generally within 0-2 fathoms. The eastern junction with H10959 was nearly all over 150 fathoms deep, and showed good correlation generally within 0-4 fathoms.

¹⁴ Strikethrough ~~The Other~~, replace with “Another distinct feature”.

¹⁵ Strikethrough ~~bases~~, replace with “basis,”.

¹⁶ Strikethrough ~~the majority of lines were run~~, replace with “in the majority of lines run”.

¹⁷ Strikethrough ~~bases~~, replace with “basis,”.

¹⁸ Concur. The data was reviewed at PHB and is acceptable for charting.

¹⁹ Concur. The data was reviewed at PHB and is acceptable for charting.

²⁰ Strikethrough ~~This~~, replace with “These”.

²¹ Strikethrough ~~in the opposite direction~~, replace with “in opposite directions”.

²² Strikethrough ~~was~~, replace with “were”.

²³ Strikethrough ~~enter~~, replace with “entered”.

²⁴ Strikethrough ~~where~~, replace with “were”.

²⁵ Filed with the project data.

²⁶ Filed with the project data.

²⁷ Strikethrough ~~projects~~, replace with “project’s”.

²⁸ Longitude for Blashke Island gauge 9450973 is in error. Strikethrough ~~158°06’47”W~~, replace with “132°53’39”W”.

²⁹ Filed with the project data.

³⁰ Also see Final Tide Note attached to this report.

³¹ Strikethrough ~~H1165~~ and replace with “11162”.

³² H11162 was also compared with Charts 17360, 33rd Edition, 17382, 16th Edition, and 17401, 11th Edition, in PHB processing.

³³ 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.

³⁴ Concur with hydrographer's findings on the following chart comparisons, except as endnoted.

³⁵ Concur with clarification. The charted 24 fathom sounding is at the northern end of a charted shoal east of Rose Island. Other shoal soundings charted south of the 24 fathom sounding are as follows:

13 fathoms at Lat 56/4/53.4N, Lon 132/51/1.57W, in the vicinity of a 34 fathom smooth sheet sounding.

11 fathoms at Lat 56/4/50.59N, Lon 132/51/1.18W, in the vicinity of a 33 fathom smooth sheet sounding.

10 fathoms at Lat 56/4/46.92N, Lon 132/51/1.32W, in the vicinity of a 26 fathom smooth sheet sounding.

PHB re-examination of the DTM and smooth sheet revealed no evidence of the charted shoal at this location. Chart the area according to the smooth sheet.

³⁶ Concur with clarification. A 19-fathom sounding was charted on 17382 southeast of its position on 17360. The sounding was also found in the survey.

³⁷ Concur with clarification. A 13-fathom sounding was charted on 17382 east of its position on 17360. The sounding was also found in the survey.

³⁸ Filed with the project 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 more than six fathoms from charted soundings.

³⁹ ~~Strikethrough Danger to Navigations~~, replace with "Dangers to Navigation". Attached to this report.

⁴⁰ Note that numerous errors occurred in the depiction of contours on the smooth sheet. Errors have been corrected on the Hdrawings.

⁴¹ ~~Strikethrough as~~, replace with "has".

⁴² ~~Strikethrough migrating~~, replace with "migration".

⁴³ ~~Strikethrough random~~.

⁴⁴ ~~Strikethrough as~~, replace with "has".


⁴⁵ ~~Strikethrough has~~, replace with "as".


⁴⁶ Attached to this report. See AWOIS form for evaluator recommendation.




⁴⁷ ~~Strikethrough PD~~.

⁴⁸ See remarks above and endnote 46.

⁴⁹ Thirty-five Dangers to Navigation were submitted after PHB review. Differences between the smooth sheet and the 5 charted DtoNs are discussed below.

 DtoN Sounding, ½ fm, Lat 56/06/19.3N and Lon 132/52/07.8W appears as a 0.4 fm sounding on the smooth sheet. The charted position is offset from the smooth sheet position. Chart in smooth sheet position.

 DtoN Rock, Unc 3 ft, Lat 56/06/18.8N and Lon 132/50/43.9W appears on the chart as a rock awash. The smooth sheet shows a rock awash *cov 2 ft at MLLW*. Chart according to the smooth sheet.

-  DtoN Sounding, 8½ fm, Lat 56/05/36.3N and Lon 132/49/47.2W appears as an 8.7fm sounding on the smooth sheet. Chart in smooth sheet position.
-  DtoN Sounding, 4¾ fm, Lat 56/05/51.6N and Lon 132/50/28.4W appears on the smooth sheet as a 4.9 fm sounding. Chart in smooth sheet position.
-  DtoN Rock, Unc 1 ft, Lat 56/07/13.4N and Lon 132/52/21.4W is missing from the smooth sheet. It appears on the chart as a rock awash. Chart as *rock awash less than 2 feet above MLLW* (symbol) in charted position.
- ⁵⁰ Shoreline verification was analyzed during office processing and compiled to Hdrawings 17401h11.162 and 17382h11.162 as warranted.
- ⁵¹ Concur.
- ⁵² Strikethrough ~~was~~, replace with “were”.
- ⁵³ Filed with the project data.
- ⁵⁴ Chart according to smooth sheet except as specifically noted in this report.
- ⁵⁵ Filed with the project data.
- ⁵⁶ Concur.
- ⁵⁷ Items listed below appear on the smooth sheet in red or black. Changes to the MHWL and new features with detached positions appear on the Hdrawings in red.
- ⁵⁸ Concur with clarification. No rock is depicted at the location on the 16th edition of 17382. Chart islet according smooth sheet. Due to scale, it is recommended that the small ledge not be depicted.
- ⁵⁹ Strikethrough ~~then~~, replace with “than”.
- ⁶⁰ Concur with clarification. Chart islet as depicted on the smooth sheet. Due to scale, use rock awash symbol to show ledge, as depicted on the Hdrawing.
- ⁶¹ Concur with clarification. Feature was charted as a rock on 17382, 16th edition. Chart islet according to the smooth sheet.
- ⁶² Concur. Chart islet and ledge according to the smooth sheet.
- ⁶³ Concur with clarification. An islet is depicted at the location on 17382, 16th edition. Chart islet according to the smooth sheet. Due to scale, chart rock to depict small ledge, as shown on the Hdrawing.
- ⁶⁴ Concur. Chart islet according to the smooth sheet.
- ⁶⁵ Concur. Chart MHWL revision as depicted on the smooth sheet.
- ⁶⁶ Concur with clarification. Chart islet on ledge according to the smooth sheet as recommended on the DP Correlator sheet.
- ⁶⁷ Concur with clarification. Feature was positioned from 200m distance using range and bearing. See DP correlator JD237_07 for further information. Positioning is considered adequate for charting. Chart according to the smooth sheet.
- ⁶⁸ Concur. Chart MHWL revision as depicted on the smooth sheet.
- ⁶⁹ Concur with clarification. Chart islet as depicted on the smooth sheet. Due to scale, chart rock awash at location of ledge, as shown on the Hdrawing.
- ⁷⁰ Concur. Chart MHWL revision as depicted on the smooth sheet.
- ⁷¹ Concur. Chart MHWL according to the smooth sheet.
- ⁷² Concur with clarification. 17382, 16th edition, depicts a rock near the position. Chart islet according to the smooth sheet.
- ⁷³ Concur with clarification. Chart islet according to the smooth sheet, with ledges retained from chart as depicted on the Hdrawing.

⁷⁴ Concur with clarification. Chart islet surrounded by ledge as depicted on the smooth sheet and recommended on the DP Correlator sheet.

⁷⁵ Concur. Chart according to the smooth sheet.

⁷⁶ Concur with clarification. The islet appears on Chart 17382, 16th Edition. The position given in Item 18 is for DP JD244_13. The position of the islet is between the two DP's at Lat 56/6/22.28N and Lon 132/51/15.11W, as stated on the DP Correlator Sheet. Chart islet according to the smooth sheet.

⁷⁷ Concur with clarification. The islet is depicted on the smooth sheet with ledges on the eastern and southeastern sides. Due to scale and nearby rocks, chart without ledge as shown on the Hdrawing.

⁷⁸ Do not concur. The position given is that of DP JD235_08. The verification was of two T-sheet rocks (centered at approximately Lat 56/4/47.37N, Lon 132/51/15.44W and Lat 56/4/46.02N, Lon 132/51/13.18W), the positions of which are not given in the Descriptive Report. The DP Correlator Sheet for JD235_08 recommends charting "islet" and using the DP's (JD235_08, JD235_09) as ledge extents. The smooth sheet islets are therefore depicted at the approximate positions of the T-Sheet rocks, with northwestern and southwestern ledge extents defined by DP JD235_08 and DP JD235_09 as shown.

DP JD235_06 and DP JD235_07 are defined as ledge extents of the same islets. However, they are seaward of the ledges depicted on the smooth sheet. Since the ledge extents defined by the detached positions more closely align with charted ledges, the evaluator recommends charting the ledges as defined by the DP's, as depicted on the Hdrawing.

Chart islets as depicted on the smooth sheet with ledge extents as shown on the Hdrawing.

⁷⁹ Concur. Chart according to smooth sheet.

⁸⁰ Concur. Chart according to smooth sheet.

⁸¹ Concur. Chart according to smooth sheet.

⁸² No new MHWL appears on the smooth sheet at this location. New MHW (dashed red) lines are shown at two nearby locations:

Lat 56/6/59.886N
Lon 132/54/03.391W

Lat 56/6/54.918N
Lon 132/53/56.332W

Chart MHWL according to smooth sheet.

⁸³ New rocks appear on the Hdrawings in red on Level 1.

⁸⁴ Strikethrough ~~there~~, replace with "their".

⁸⁵ DP'd rocks appear on the Hdrawings in red on Level 1.

⁸⁶ Remote source rocks without DP's appear on the Hdrawings in blue on Level 5.

⁸⁷ A charted rock repositioned by DP JD243_13 was not shown on the smooth sheet. Its DP position is:

Lat 56/06/34.08N
Lon 132/52/20.91W

The ledge associated with the rock was depicted on the smooth sheet as described on the DP Correlator Sheet. Chart rock at DP as shown on the Hdrawing. Due to scale, do not chart ledge.

⁸⁸ Since the scope of the survey did not include complete shoreline investigation, charted ledges in some areas are not considered disproved. The evaluator recommends retaining the ledges in green as depicted in the Hdrawings, with revisions based on the current survey.

⁸⁹ These rocks have been incorporated into the ledgeline on 17382h11.162.

⁹⁰ Concur. Chart according to smooth sheet.

⁹¹ Concur, except as noted in this report. Due to chart scale, some features were generalized during compilation.

⁹² In two areas where there was insufficient data for disproval at the outer edges of the multibeam coverage, the evaluator recommends retaining charted rocks. Retained rocks appear in green on Level 3 of the Hdrawings. It is recommended that the charted danger curve around the repositioned rock at Lat 56/5/8.7N and Lon 132/53/3.5W also be retained as depicted on the Hdrawing.

⁹³ Concur. Remove charted rock and danger curve and chart rock at smooth sheet position, with danger curve as depicted on the Hdrawing.

⁹⁴ Strikethrough ~~then~~, replace with “than”.

⁹⁵ Concur. Retain as charted.

⁹⁶ Concur with clarification. This rock was an assigned AWOIS investigation. See section Automated Wreck and Observation Information System, page 16, and AWOIS form attached to this report for charting recommendation.

⁹⁷ Concur. Chart the area according to the smooth sheet.

⁹⁸ Concur.

⁹⁹ Concur.

¹⁰⁰ Concur with clarification. This is the same feature discussed under Item 12 of section MHW line (including islets), above. The MHW revision is shown as a dashed red line on the smooth sheet. Chart according to the smooth sheet.

¹⁰¹ Concur. The rock appears on the Hdrawing in blue on level 5.

¹⁰² Concur. Chart this area as depicted on the smooth sheet.

¹⁰³ Concur. Chart this area as depicted on the smooth sheet.

¹⁰⁴ Concur. Items from RSD source are shown on the Hdrawing in blue.

¹⁰⁵ Designate items to be investigated as local conditions and national survey priorities allow.

¹⁰⁶ Strikethrough ~~MHL~~, replace with “MHW”.

¹⁰⁷ Filed with the project reports.

¹⁰⁸ Bottom samples have been retained in green from Charts 17401 and 17382 on the Hdrawings.

¹⁰⁹ Concur.

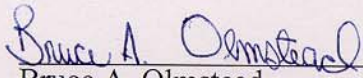
¹¹⁰ Attached to this report. See endnote 49 for additional information.

¹¹¹ Concur. Strikethrough ~~in the survey were discovered~~, replace with “were discovered in the survey area.”

APPROVAL SHEET
H11162

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
Cartographic Team
Pacific Hydrographic Branch

Date: 11/10/2005

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.



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

Date: 16 Nov. 2005

