H-11163

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-11163

LOCALITY

State ALASKA

General Locality NORTHERN CLARENCE STRAIT

Sublocality Bush Island to Barnacle Rock

2002

CHIEF OF PARTY
DEAN MOYLES

LIBRARY & ARCHIVES

DATE

NOAA FORM 77-28 (11-72)

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

REGISTER NO.

HYDROGRAPHIC TITLE SHEET

H-11163

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 **Alaska**

General Locality **Northern Clarence Strait**

Sublocality **Bush Rock to Barnacle Rock**

Scale **1:10,000** Date of Survey **7/17/02-9/17/02**

Instructions Dated **6/24/2002** Project No. **OPR-O327-KR-02**

Vessel **RV Minotaur, RV Mistral and skiff**

Chief of Party **Dean Moyles**

Surveyed by **Moyles, Arumugam, Reynolds, Orthman, Sipos, Greene**
Harrison, Nadeau, et al

Soundings taken by echo sounder, hand lead, pole **Reson 8101, leadline**

Graphic record scaled by **Thales Geosolutions Personnel**

Graphic record checked by **Thales Geosolutions Personnel**

Evaluation by **B Taylor** Automated plot by **HP Design Jet 500**

Verification by **G Nelson**

Soundings in **Fathoms and tenths** at **MLLW**

REMARKS: **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.

Thales Geosolutions	**LCMF**	**Terra Surveys**
3738 Ruffin Road	**139 E. 51st Ave**	**1930 Whiting Circle**
San Diego, CA 92123	**Anchorage, AK 99503**	**Palmer, AK 99645**

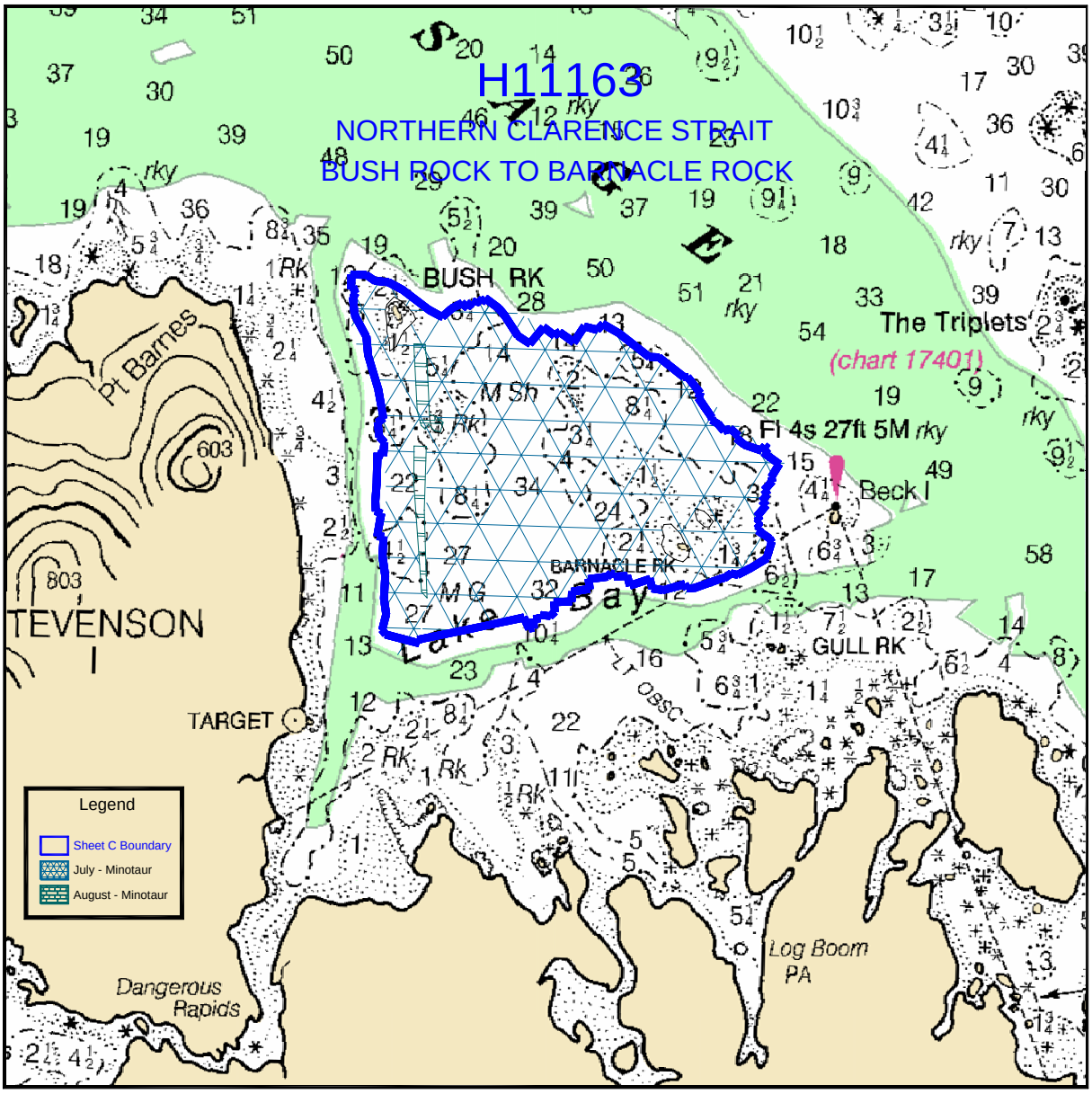
A - Area Surveyed

H11163 (Sheet C), is bounded by the coordinate listing below, and encompasses Bush Rock to Barnacle Rock.[1]

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

Table 1 H11163 Survey Limits

Survey Limits[2] Task Order # 10 H11163 Sheet C Scale 1:10,000		
Point #	Positions on NAD83	
	Degrees Latitude (N)	Degrees Longitude (W)
1	56º04’45. 707” N	132º57’23. 792” W
2	56º04’45. 707” N	132º50’03. 343” W
3	56º00’39. 650” N	132º50’03. 343” W
4	56º00’39. 650” N	132º57’23. 792” W


H11163
NORTHERN CLARENCE STRAIT
BUSH ROCK TO BARNACLE ROCK
BUSH RK
The Triplets
(chart 17401)
Fl 4s 27ft 5M rky
Beck I
BARNACLE RK
Bay
GULL RK
TEVENSON
I
TARGET
Pt Barnes
Log Boom
PA
Dangerous
Rapids
Legend
Sheet C Boundary
July - Minotaur
August - Minotaur

B – Data Acquisition & Processing

Refer to the OPR-O327-KR Data Acquisition and Processing Report[3] 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 Minotaur and Mistral were utilized for shallow and medium water multibeam data acquisition and collected all the data for H11163. The vessels are 29 feet in length, with a draft of 2 feet. The Minotaur was equipped with a Reason[4] 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[5] with option 033 (pseudo SideScan) and AML two[6] 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[7] 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[8] for a complete listing of equipment and vessel descriptions.

Quality Control

Crosslines

Quality control tielines were planned to measure 5 percent of the main scheme line length. Total crossline length surveyed[9] 10.65 km (5.75 nautical miles) or 7.7 percent of the total main scheme miles. A total of 49 tie line crossings were examined using the CARIS HIPS Q/C report.[10]

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.

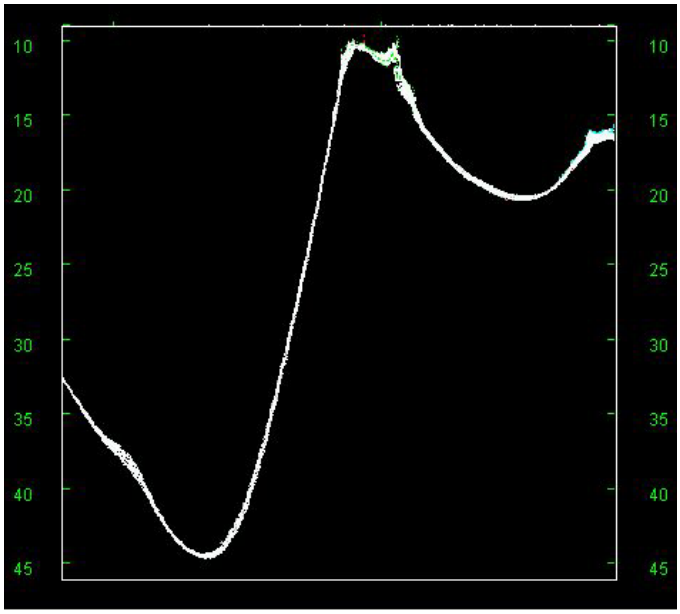


Figure 2: Profile of C01-QC000

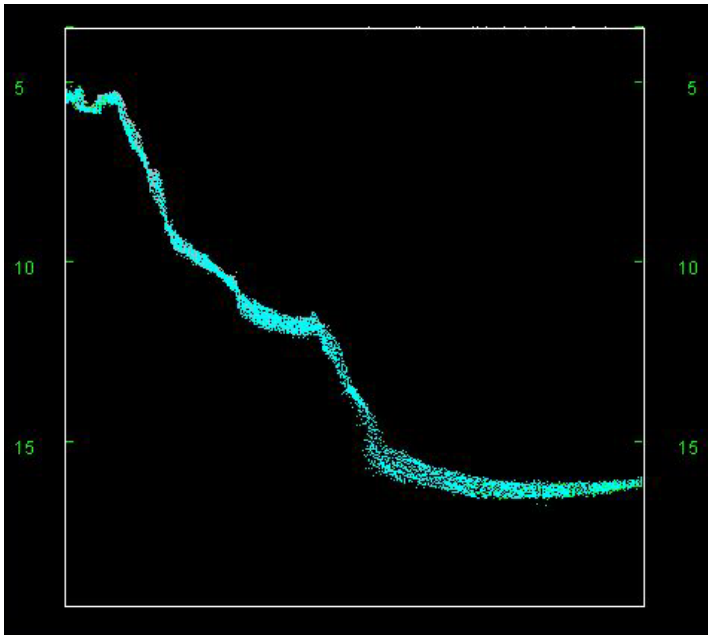


Figure 3: Profile of C01-QC039

- 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 then 20º then the beams are outside of the 95 percent confidence level.

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:

$$a = 0.5*\sqrt{2} = 0.707$$
$$b = 0.013*\sqrt{2} = 0.018$$

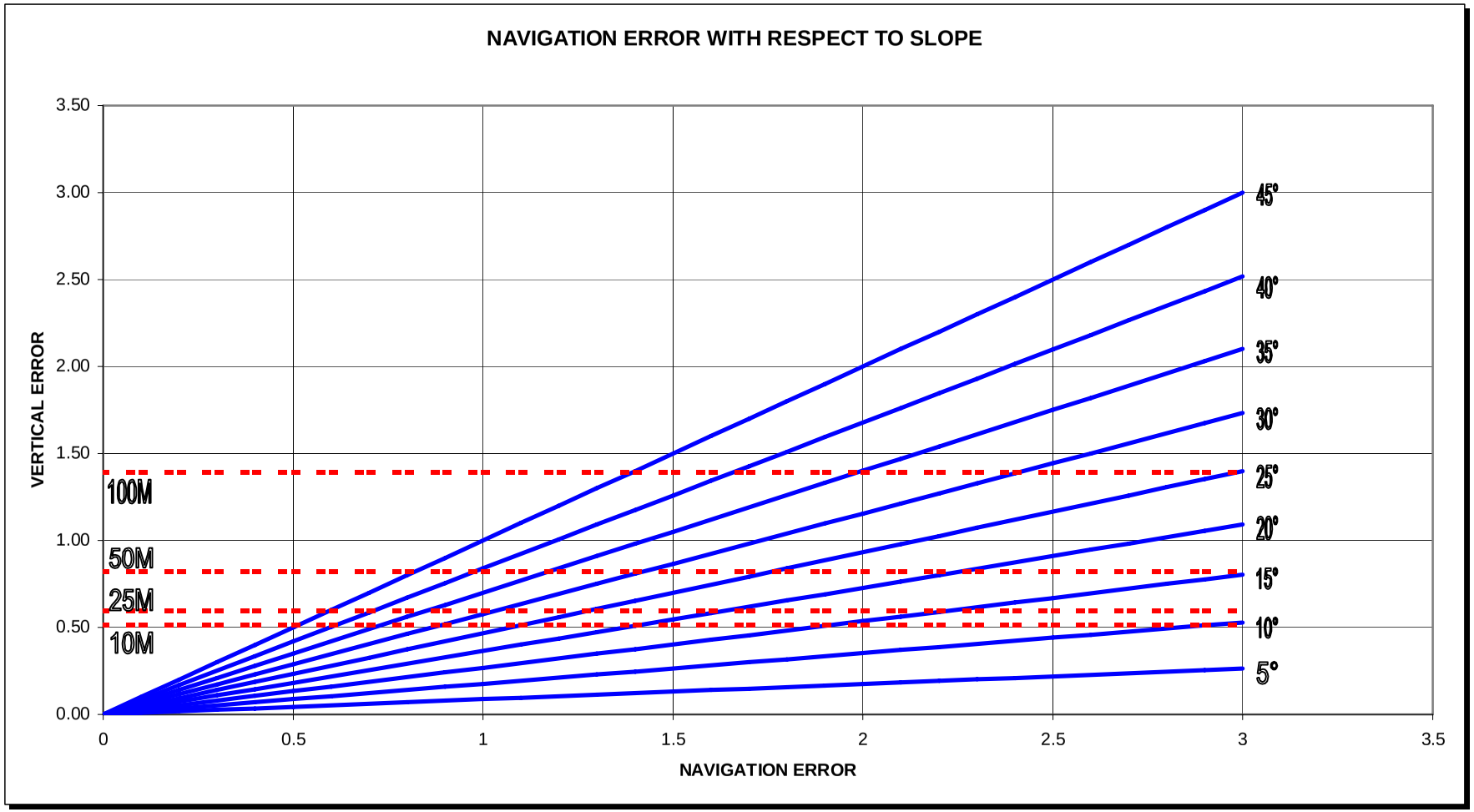


Figure 4: Navigation Error With Respect to Slope

Data Quality

In general the multibeam data quality for H11163 was excellent.[11] A few problems to note are as follows:

- During processing, heave related features were noticed in the data set on one day (J.D. 202) of acquisition. This was the result of the weather conditions. This data was flagged as rejected in the HDCS Subsets and the area was re-surveyed. Note: These rejected soundings are not present on the Smooth Sheet for H11163.
- The RTCM devices were configured incorrectly in WinFrog 3.2.7 (part of J.D.198), and erroneous positioning values were written to the XTF files in ISIS 5.84. These devices were re-configured and the area was re-surveyed.

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.

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.[12]

Refer to the Non-Conformance Reports[13] numbered 2002-001 and 2002-002 in Appendix F[14] for a complete description of the problem and resolution.

Survey Junctions

H11163 (Sheet C) does not junction with any other Sheet assigned under OPR-O327-KR.[15]

Smooth Sheet Histograms

Figure 5 Histogram is for the Reson 8101 data collected from July 17, 2002 to September 17, 2002 on the Minotaur. The histogram shows an increase on selected soundings from the outer beams. 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 run,[16] 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, is the transition from phase to amplitude detection of the sonar (beams 36 and 71) and any errors due to sound velocity.

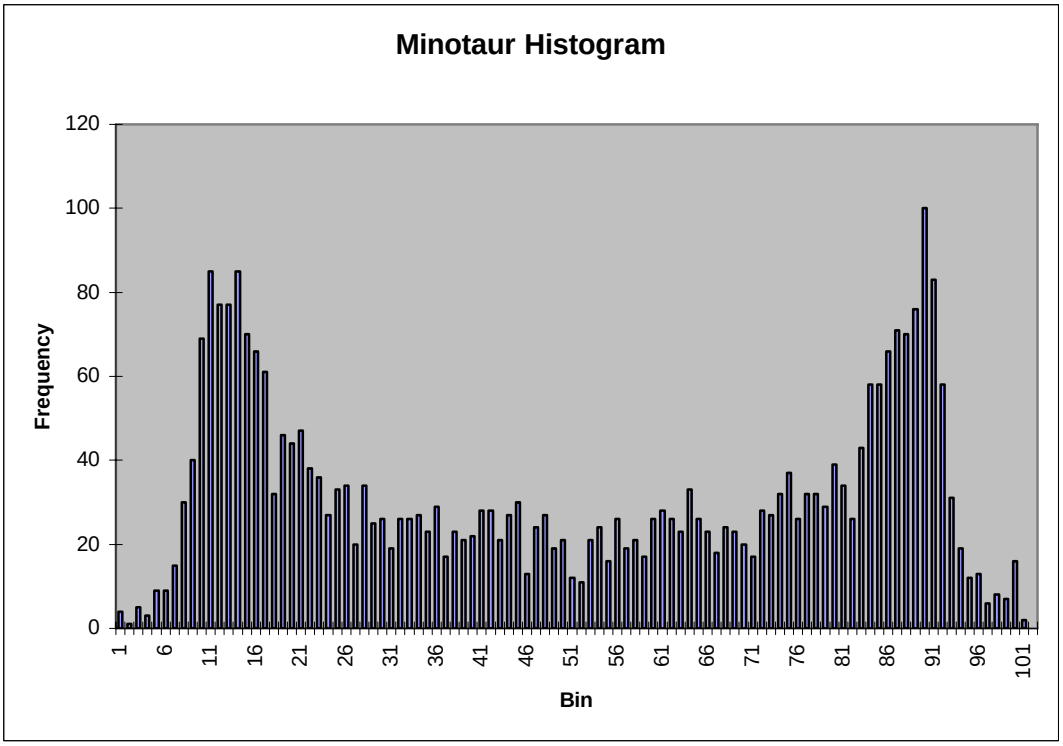


Figure 5 Histogram for 8101 (Minotaur)

This Figure 6 Histogram is for the Reson 8101 data collected from August 14, 2002 to September 3, 2002 on the Mistral. The Mistral was only utilized for fill-in's on H11163, hence the limited numbers of selected soundings.

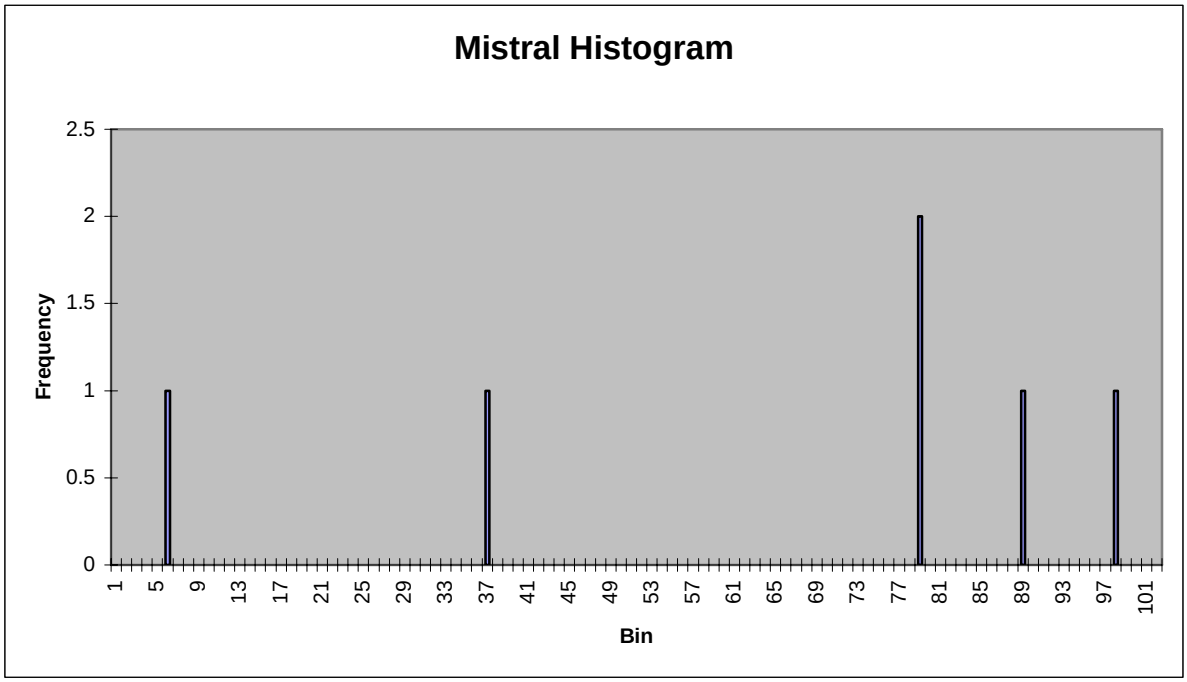


Figure 6 Histogram for 8101 (Mistral)

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[17] 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 preformed 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[18] 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[19] 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[20] 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[21] 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[22] for a detailed description of the horizontal and vertical control used on this Survey. A summary of the projects[23] 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 135º00'00").

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[24]	Operational
9450906	H350/355	Digital Bubbler	Beck Island	56º02'47"N	132º51'45" W	07/15/02–09/18/02
9450973	H350/355	Digital Bubbler	Blashke Is.	56º07'38"N	158º06'47"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[25] for additional tidal information and station descriptions.[26]

D – Results and Recommendations

Chart Comparison

H11163 survey was compared with charts:

- 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 Soundings

All charted rocks and islets were identified with corresponding DPs or multibeam data. There are no new rocks or disprovals of charted rocks.[27]

The soundings and contours in general compare well with the existing charts.[28] Areas of differences to note are:[29]

- The foul areas on chart 17401 around Bush Rock and Barnacle Rock were investigated and categorized with traditional shoreline investigation and DPs were taken on all rocks. In addition, 100% multibeam coverage was obtained over the foul areas with the exception of Bush and Barnacle Rocks themselves. The hydrographer recommends that the shoreline as depicted on the smooth sheet supercede and compliment the shoreline information compiled on the T-sheets as noted in the shoreline section.[30]
- Hydrographic survey H11163 revealed a depth of 17.6 fathoms in the vicinity of a 15 fathom sounding on chart 17401 located at 56º03’31.762” N, 132º55’04.970” W (629638.831 E, 6214580.808 N). This area was surveyed with 100% multibeam coverage.[31]
- Hydrographic survey H11163 revealed a depth of 37 fathoms in the vicinity of a 27 fathom sounding on chart 17401 located at 56º03’30.071” N, 132º53’40.539” W (631100.553 E, 6214572.807 N). A 27 fathom sounding developed from H11163 is located 33 meters to the northeast of the 27 fathom charted sounding. This area was surveyed with 100% multibeam coverage.
- Hydrographic survey H11163 revealed a depth of 19.8 fathoms in the vicinity of a 16 fathom sounding on chart 17401 located at 56º03’15.862” N, 132º52’51.104” W (631968.941 E, 6214159.801 N). A 15.7 fathom sounding developed from H11163 is located 35 meters to the north of the 16 fathom charted sounding. This area was surveyed with 100% multibeam coverage.
- Hydrographic survey H11163 revealed a depth of 35 fathoms in the vicinity of a 26 fathom sounding on chart 17401 located at 56º03’28.463” N, 132º53‘30.461” W (631276.350 E, 6214528.433 N). A 25 fathom sounding developed from H11163 is

located 36 meters to the south of the 26 fathom charted sounding. This area was surveyed with 100% multibeam coverage.

- Hydrographic survey H11163 revealed a depth of 27 fathoms in the vicinity of a 23 fathom sounding on chart 17401 located at 56º03'23.779" N, 132º53'45.804" W (631015.423 E, 6214375.555 N). This area was surveyed with 100% multibeam coverage.
- Hydrographic survey H11163 revealed a depth of 9.6 fathoms in the vicinity of a 13 fathom sounding on chart 17401 located at 56º03'08.702" N, 132º53'35.280" W (631211.645 E, 6213915.107 N). This area was surveyed with 100% multibeam coverage.
- Hydrographic survey H11163 revealed a depth of 20.8 fathoms in the vicinity of a 14 fathom sounding on chart 17401 located at 56º02'45.227" N, 132º53'16.106" W (631565.486 E, 6213199.673 N). This area was surveyed with 100% multibeam coverage.
- Hydrographic survey H11163 revealed a depth of 8.7 fathoms in the vicinity of a 10.25 fathom sounding on chart 17401 located at 56º03'25.533" N, 132º54'34.686" W (630168.379 E, 6214404.102 N). This area was surveyed with 100% multibeam coverage.
- Hydrographic survey H11163 revealed a depth of 8.4 fathoms in the vicinity of a 13 fathom sounding on chart 17401 located at 56º03'24.907" N, 132º54'45.032" W (629990.042 E, 6214379.350 N). This area was surveyed with 100% multibeam coverage.

Soundings that differ from hydrographic survey H11163 are highlighted in red on the chart comparison sheet included in Separate 6.[32] Other soundings that differed resulted in a Danger to Navigation and are listed in Appendix A Danger to Navigations.[33]

Automated Wreck and Observation Information System

There were three AWOIS items assigned to OPR-O327-KR, but none within the limits of H11163.[34]

Charted Features

There were no charted features labeled PA, ED, PD, or Rep within the limits of H11163.[35]

Dangers to Navigation

Twelve dangers to navigation were located during the hydrographic survey of H11163. Refer to Appendix A.[36]

Additional Results

Shoreline Verification

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.[37] The 4-meter curve was determined from H11163 multibeam data, where present, and at the hydrographer's discretion in areas where no multibeam data was available.

A 19ft skiff, referred to as the 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. 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 T-12402 and T-12403 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 17401 were displayed as layers 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 not required by the SOW, all new features observed were also 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.[38] 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.[39]

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 records 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 multibeam coverage plots, T-sheets, and CH17401 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.[40]

Limited verification of remote sensing features inshore of the 4-meter curve were[41] 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 specific inshore features were investigated by 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.[42]

Source Shoreline – Verified features

T-sheet rocks and features that were located by traditional verification (DP or multibeam) and determined to be within 20 meters of their source position are shown on the smooth sheet in black at their surveyed positions with associated surveyed depth/height values.[43] They are not itemized in this report.

T-sheet rocks and features that fell in areas that received only limited verification were retained and are shown on the smooth sheet in black at their T-sheet positions. They are not itemized in this report except when recommended for additional item investigation. (Paragraph not applicable to H11163 Sheet "C", but will be for all other sheets)[44]

T-sheet MHW lines within the survey area that were verified to be in the correct general location (within 20 meters) are shown on the smooth sheet in black.[45]

Source Shoreline – Changes

There were no changes to the T-sheet MHW line. However, the T-sheet shows a 9 ft height (MHW) for Barnacle Rock Island, located at 56 02 42.42 N, 132 52 51.07 W, where H11163 observed a 13 ft height (MHW).[46]

Source Shoreline –New features

The following are new features in reference to the T-sheet and were located by DP or multibeam and are shown on the smooth sheet in black:

1. New rock, (5 ft height above MLLW), 56 03 32.22 N, 132 54 47.92 W, DP# JD230_13. Rock is shown on CH 17401.[47]

2. New rock, (0 ft height above MLLW), 56 03 30.09 N, 132 54 46.09 W, DP# JD231_04. Rock is shown on CH 17401.[48]

3. New rock (1 ft height above MLLW), 56 02 45.53 N, 132 52 54.83 W, DP # JD231_03. Rock is shown on CH 17401 as a 0 fathom contour.[49]

4. New rock (1 ft height above MLLW), 56 02 48.08 N, 132 52 38.36 W, DP # JD231_01. Rock is shown on CH17401.[50]

Source Shoreline – Disprovals

There were no disprovals of source shoreline features.

Recommendations for Additional Item Investigations

There are no recommendations for Additional Item Investigations.

Chart – Changes

Chart 17401 shows a 35 ft height (MHW) for Bush Rock, located at 56 3 34.913 N, 132 54 46.465 W, where H11163 observed an 11 ft height (MHW).[51]

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.[52]

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.[53]

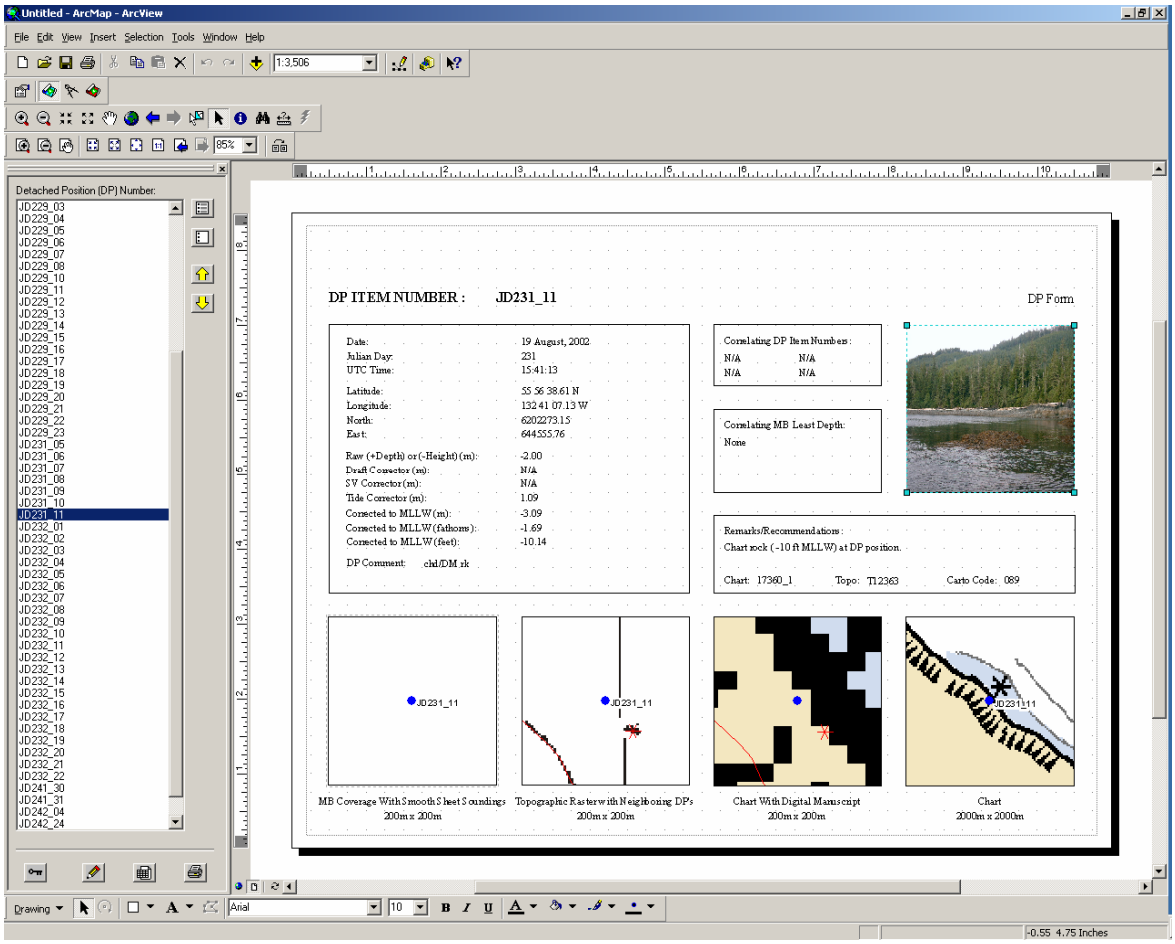


Figure 7 DP Correlator Sheet

Bottom Samples

Bottom Samples were not required under this contract.[54]

Aids to Navigation

There were no charted aids to navigation within H11163. Beck Island Light (Aid Number-22475) was used as a control check for the shoreline verification skiff, the results showed that the Light is charted correctly but the listed position is erroneous. Beck Island Light is listed at 56º02'54" N, 132º51'48" W, Thales GeoSolutions (Pacific) Inc. position was 56º02'51.09" N, 132º51'45.28" W and the NGS Data Sheet as[55] a position of 56º02'51.11224" N, 132º51'45.23685" W. Other then[56] the erroneous listed position the aid is in good working order and is serving its intended purpose.[57]

Table 3 Position of Aid to Navigation

Name	Type	Surveyed Position	Charted Position (17401)	Listed Position	Position Difference (m) Survey-Charted	Position Difference (m) Charted-Listed
FI 4s 27ft 5M	Fixed Aid	56º02'51.09"N	56º02'51.409"N	56º02'54"N		
		132º51'45.28"W	132º51'45.092"W	132º51'48"W	10.39	94.63

Miscellaneous

The geographic name Barnacle Rock on the Smooth Sheet for H11163, is not present on any of the existing charts, but was obtained from T-Sheet T12403.[58]

E – Approval Sheet

Approval Sheet

For

H11163

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

Twelve Dangers to Navigation were located in the survey.[59]

Danger to Navigation Report

Hydrographic Survey Registry Number: H11163

Survey Title: **State:** **ALASKA** **Locality:** **Northern Clarence Strait Sub-locality: Bush Rock to Barnacle 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:

Chart	Scale	Edition	Date
17360	1:217,828	32nd	09/22/01
17382	1:80,000	14th	04/26/97
17401	1:10,000	10th	09/04/99

DANGER:

Feature	Depth(fms)	Latitude	Longitude
Sounding	6 1/4	56/03/27.685N	132/54/30.643W
Sounding	9 3/4	56/03/39.621N	132/54/07.495W
Sounding	8 1/4	56/03/30.408N	132/54/07.280W
Sounding	5	56/03/16.732N	132/54/26.213W
Sounding	8	56/03/04.899N	132/53/31.358W
Sounding	8 1/4	56/03/14.676N	132/53/05.025W
Sounding	9 1/2	56/03/00.280N	132/52/39.412W
Sounding	4	56/02/47.376N	132/52/11.527W
Sounding	8 3/4	56/02/39.135N	132/53/13.213W

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.[60]

Appendix C – Progress Sheet

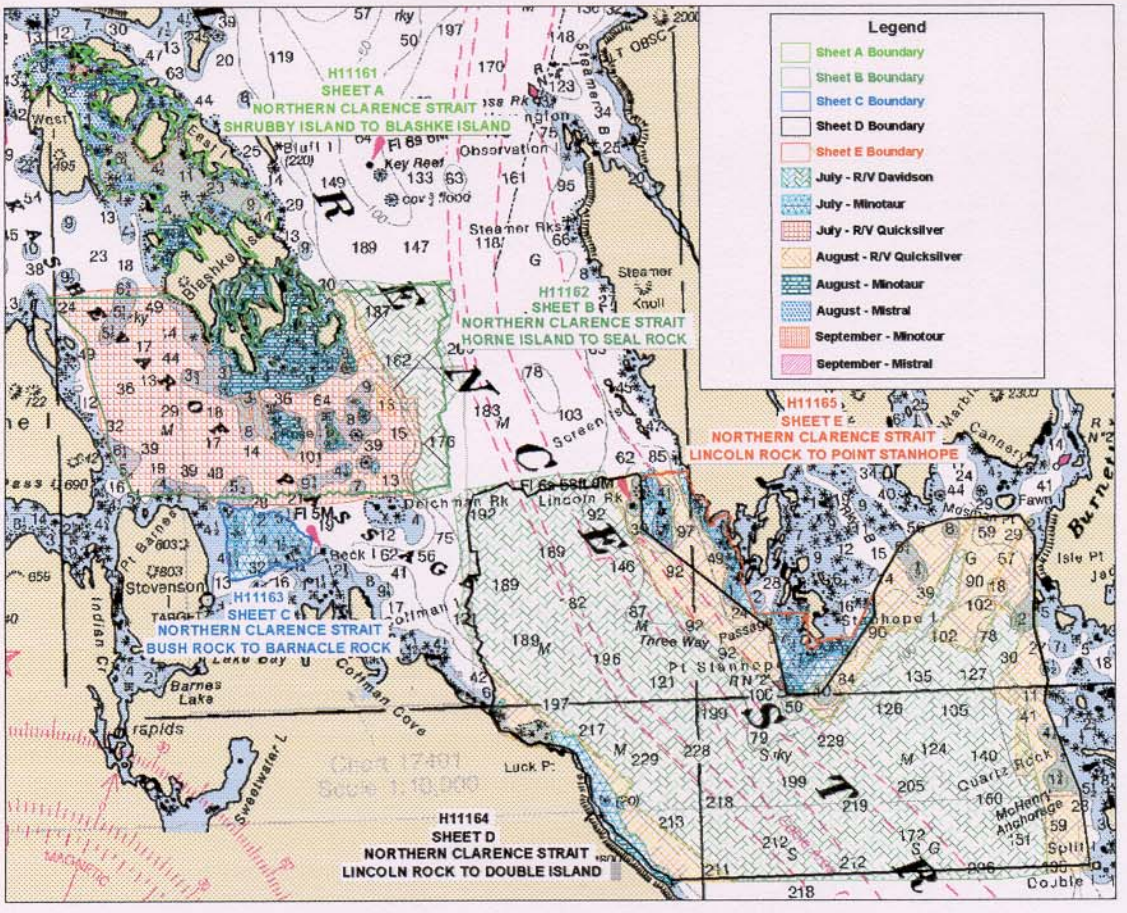
PROGRESS SKETCH

OPR-O327-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: H11163

Sheet C
Bush Rock to Barnacle Rock
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.						
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 and SA135 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.					

Appendix F - Non-Conformance Reports

NON-CONFORMANCE REPORT

Project Number:	P2544	Date: 11/5/2002
Project:	Hydrographic Survey, Alaska 2002	
Client:	NOAA (OPR-O327-KR-02)	
Vessel:	R/V Davidson, F/V Quicksilver, M/V Minotaur, F/V Mistral	
Reported:	D. Arumugam, D. Moyles	
Compiled:	D. Arumugam	

Description of Non-Conformance:

Positioning errors in some bottom features were noted during processing. The Navigation latency in the Patch tests were not consistent. Variable navigation latency in the navigation software (WinFrog) has been identified as the source of the positioning errors.

Discussion:

In most cases the Navigation latency was between 0 and 1 sec, causing a maximum horizontal positional error of 4m (maximum speed of survey was 8knots). On average the survey speeds were in the range of 3 to 5 knots, which result in horizontal position errors of 1.5 – 2.5 meters. There are also some instances (less than 5%) that the Navigation latency could be up to 2 seconds. Since the area of survey in Clarence strait had features of steep slopes any little error in horizontal position created a vertical error that failed IHO specifications.

The computer clock in the ISIS (acquisition software) computer is set with the time in the NMEA Position string, which comes from WinFrog v3.2.16 (navigation software) computer. The time between the calculation and the output of the NMEA Position string is not constant, hence the variable Navigation time latency. In addition to the above WinFrog outputs the same time and position if no new calculation was complete in time for the output cycle. Since ISIS uses this time to set its clock, the time in ISIS gets set back by a second. If two calculations occur before an output, you would see the time go ahead by one second. This causes some of the time stamps in the XTF files to be incorrect. The XTF file stores 5 different time stamps for each ping, which are listed below:

1. PING TIME (hh:mm:ss.00) The Bathy time.

2. FIX TIME (hh:mm:ss.00) The most recent navigation update time.

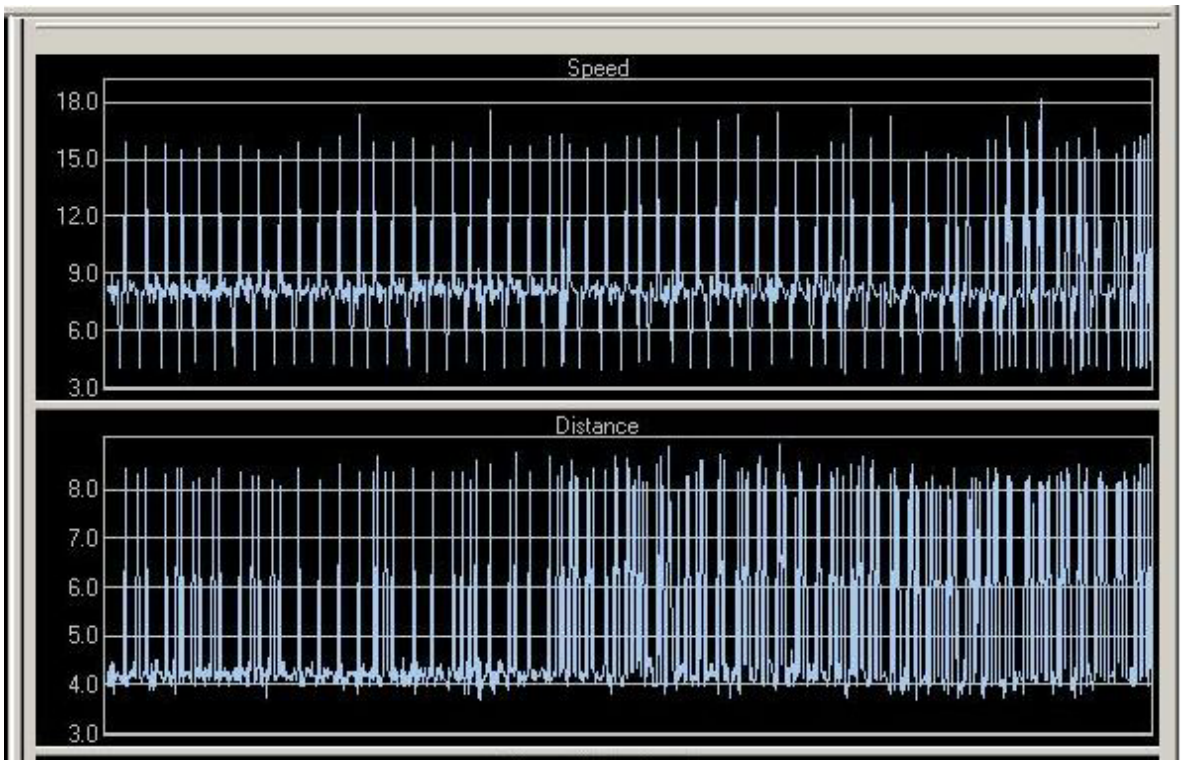
3. ATTITUDE TIME (milliseconds) The time used to coordinate Bathy data with Attitude data. The time the Bathy ping was received.

4. NAV FIX TIME (milliseconds) The time when navigation received.

5. BYTE COMPUTER CLOCK TIME (hh:mm:ss.00) The ISIS computer clock time when ping was received.

Of the five clocks only the three hh:mm:ss.00 clocks gets reset by ISIS. The 2 millisecond clocks (timers) continues to increment.

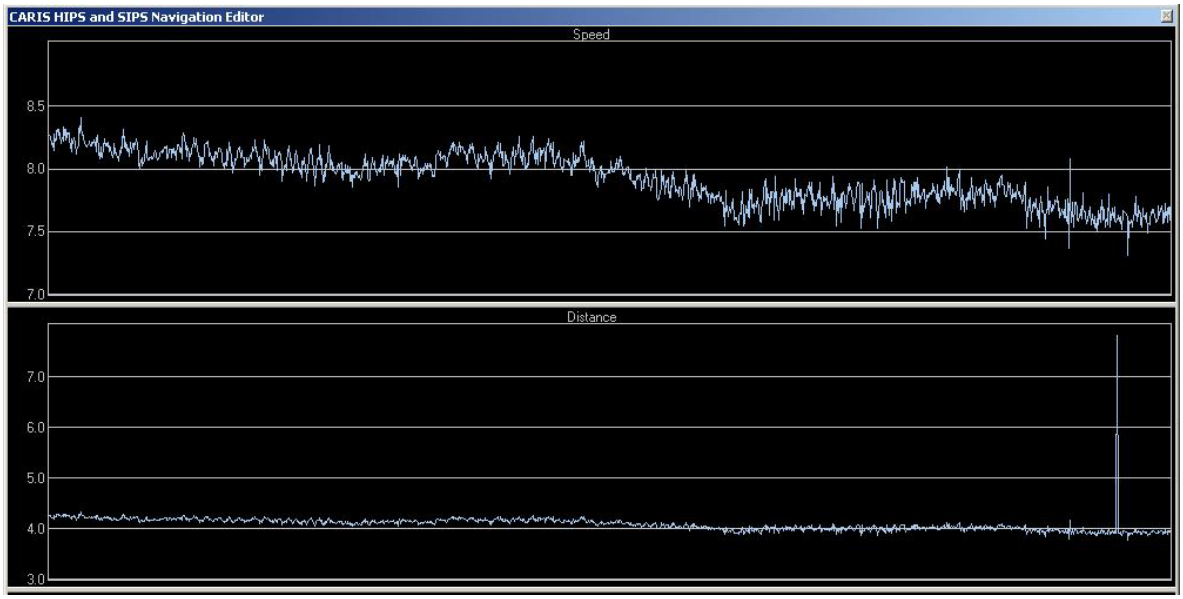
When converted to Caris the millisecond times are used to generate all the times in Caris. Since the millisecond timers have no reference the first ping used to set the reference time (Attitude time = Ping time). As a result if the first ping time is off by a second the whole line will have that error. Once converted to Caris the Navigation editor shows the following:



Since Caris users the millisecond clocks to generate its clocks we see speed jumps in the Navigation data.

Resolution

The XTF files were fixed (detailed below) then reconverted to a new Caris project. Then the newly generated Navigation files moved into the existing project to overwrite old Navigation data. This Navigation was then examined the data remerged in Caris.



In fixing the XTF files the problem was broken into 2 parts.

1. Fix the variable latency.
2. Calculate the time error in the first ping.

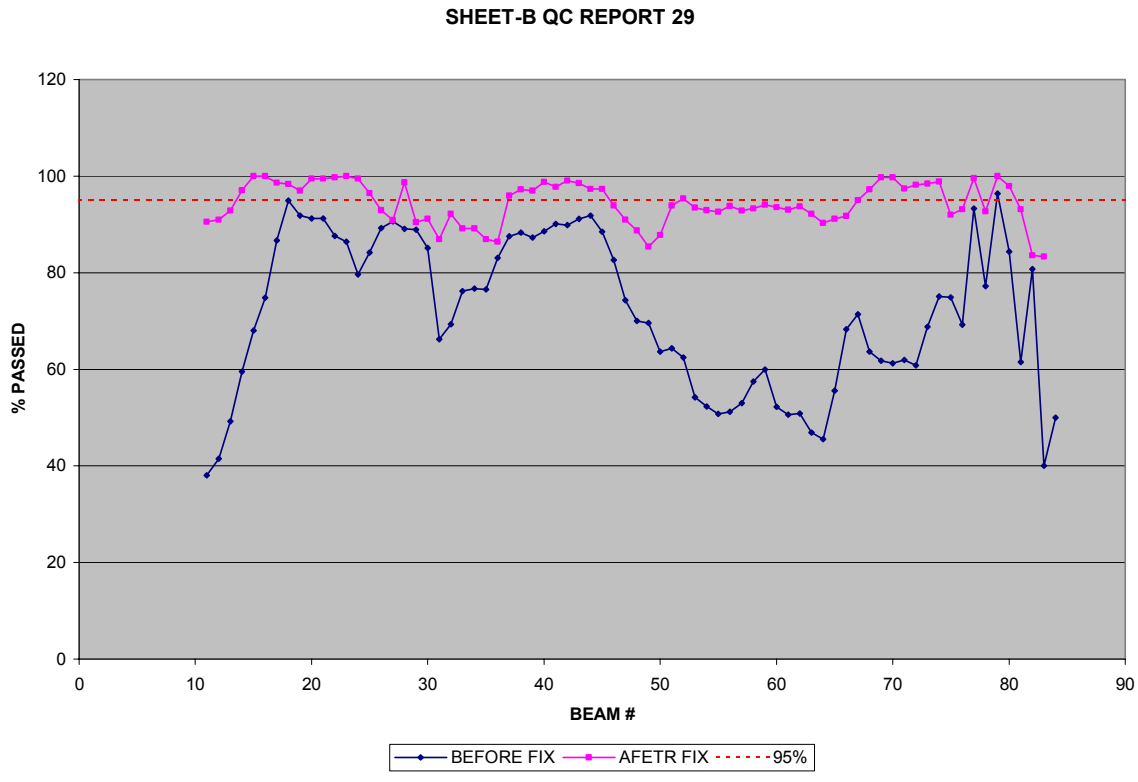
To fix the variable latency the Navigation data (time and position) from the WinFrog RAW files were extracted and inserted into the XTF files. Since the time logged in the raw files was the GPS time of the position at the time of the calculation, any Navigation time latencies (constant or variable) were removed.

To calculate the time error in the first ping, the time differences between each Attitude time and Ping time were calculated. The minimum from this data was the time error in the first ping. The ping time as logged in the XTF file (comes from the NMEA string) can never go ahead in time, since that was true it was possible to use this formula. This difference was then applied to the first ping time.

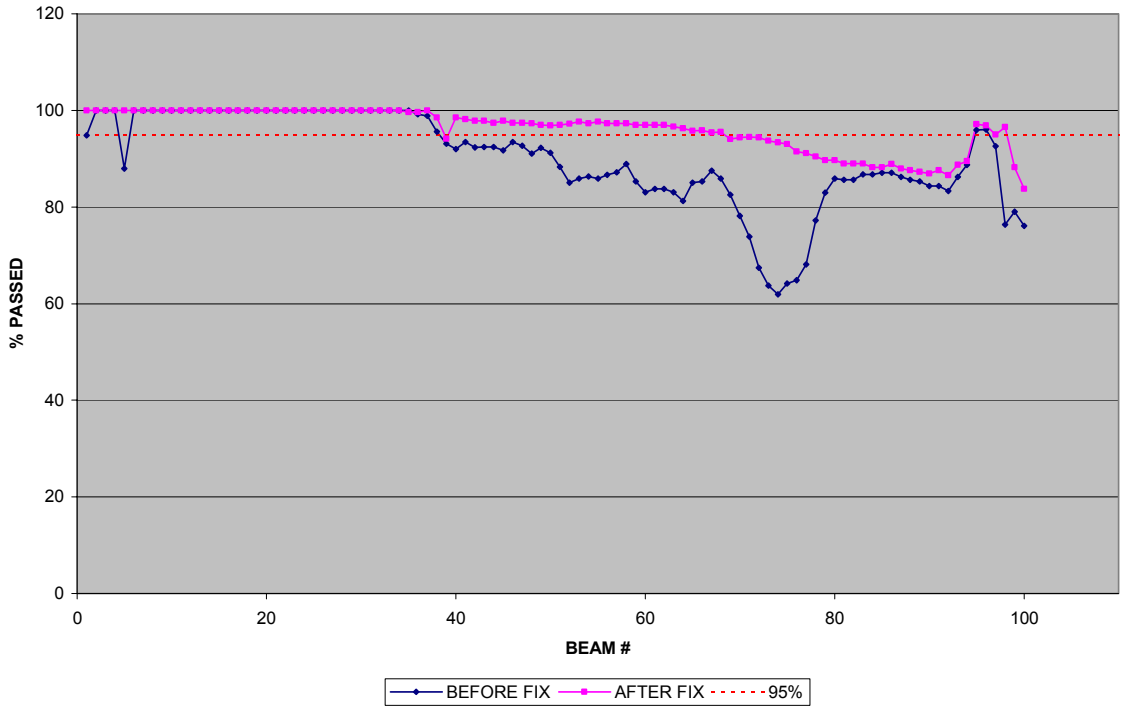
To keep things consistent all ping times were also corrected using the first ping time and the attitude time. The corrected XTF files are named with a *_C* at the end of the original filename.

Results

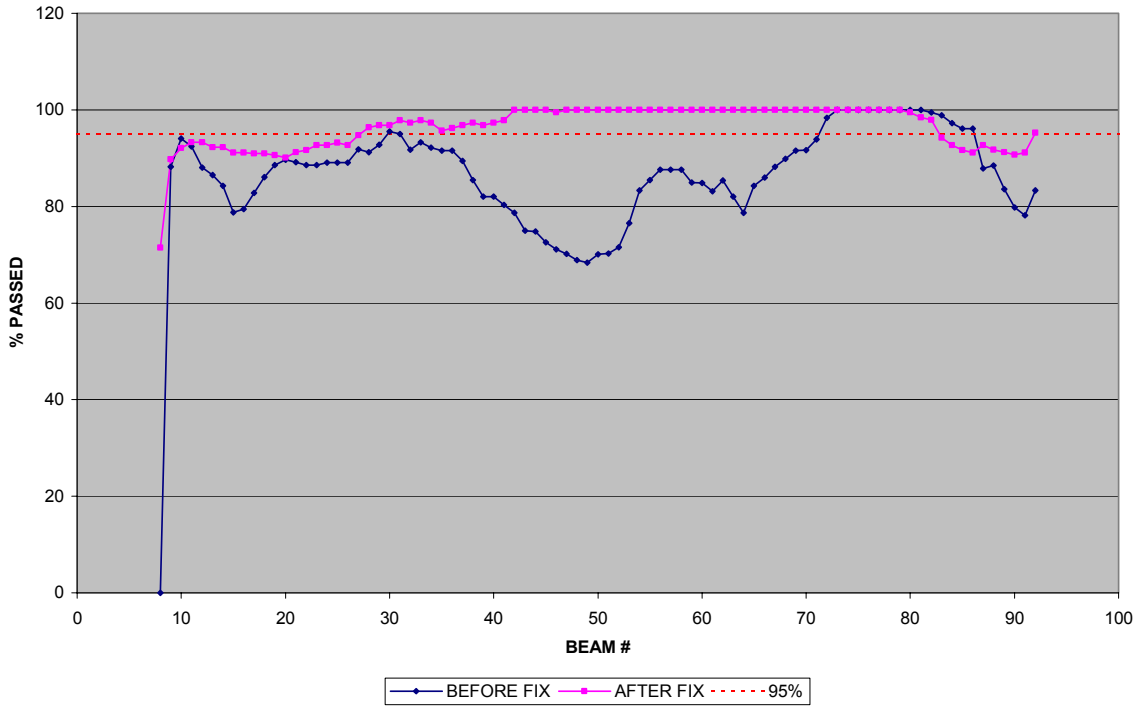
Below are some examples of QC Reports before and after the fix.



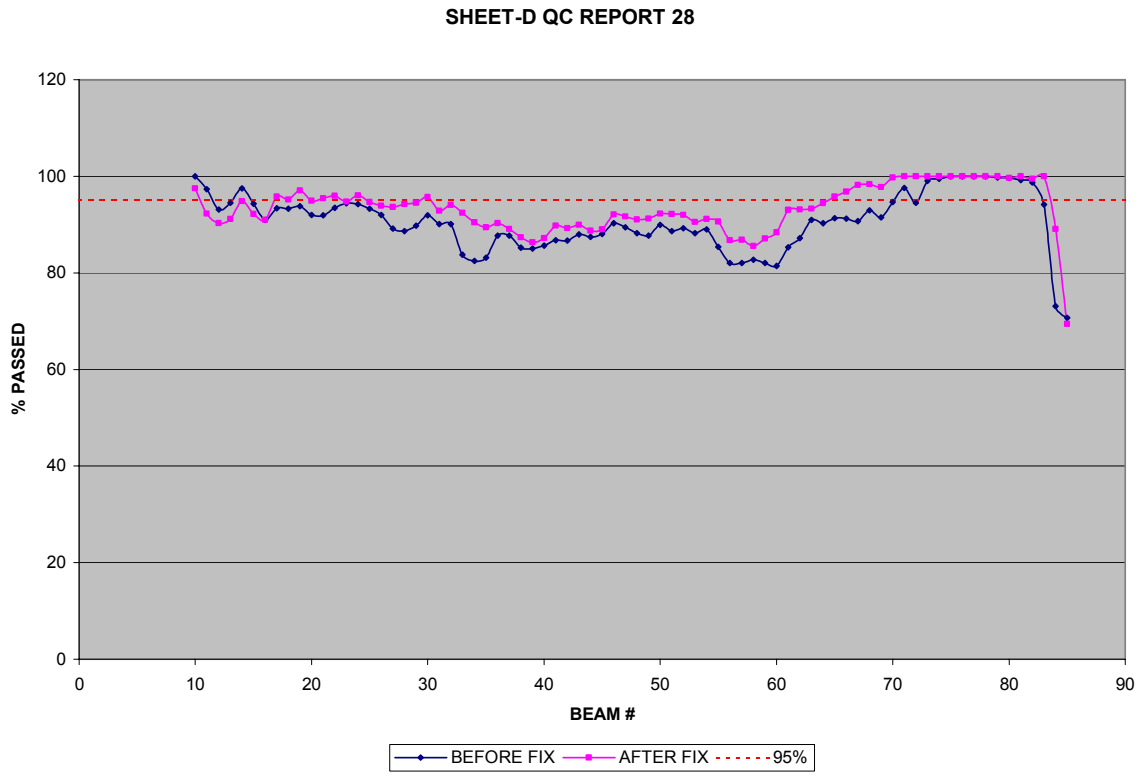
SHEET-B QC REPORT 25



SHEET-C QC REPORT 44



As per the graph it is clear that the QC results improved greatly for the above QC reports. This was true for about 80 – 90% of the QC reports. There were a few instances in which the results after the fix did not improve by much. The following is an example.



Around 40 QC results were compared by graphing the before and after. In no instances was it visible that this resolution degraded the QC results.

Revisions Compiled During Office Processing and Certification

[1] Concur with clarification. The coordinates listed define the sheet limits. Refer to Surdex for the survey area. The western survey boundary is west of Bush Rock and the eastern boundary is east of Barnacle Rock.
[2] Limits of the actual area surveyed are roughly defined by the following points:
Lat 56/03/50N, Lon 132/55/10W
Lat 56/03/50N, Lon 132/50/00W
Lat 56/02/15N, Lon 132/50/00W
Lat 56/02/15N, Lon 132/55/10W
[3] Filed with the project reports.
[4] Strikethrough ~~Reason~~ and replace with Reson. Insert "8101".
[5] Strikethrough ~~Reason~~ and replace with Reson. Insert "8101".
[6] Strikethrough ~~AML two~~ and replace with "two AML".
[7] Strikethrough ~~with~~ and replace with "was".
[8] Filed with the project reports.
[9] Insert "was".
[10] Crossline data met or exceeded requirements for quality control.
[11] Concur. The data is adequate to supersede all prior surveys and miscellaneous charted data except as specifically discussed in this report.
[12] PHB review of the data after reprocessing indicated that the latency issue was satisfactorily resolved and the data is within IHO standards.
[13] The title Non-Conformance Reports is in error. The problem described was satisfactorily resolved and the data is in conformance with IHO standards.
[14] Attached to this report.
[15] Do not concur. H11163 junctions with H11162 in two areas around Lat 55/03/45N, Lon 132/55/00W and around Lat 55/03/40N, Lon 132/54/10W. Comparison of soundings in the junction areas in PHB processing showed excellent correlation, generally within a few feet or less. H11163 was also compared in PHB processing with H11058 (2001). Sounding correlation was very good, generally within 0-1 fathom. Standard depth curves were in good agreement within the common areas.
[16] Strikethrough ~~the majority of lines were run~~ and replace with "in the majority of lines run".
[17] Strikethrough ~~the opposite direction~~ and replace with "opposite directions".
[18] Strikethrough ~~was~~ and replace with "were".
[19] Strikethrough ~~enter~~ and replace with "entered".
[20] Strikethrough ~~where~~ and replace with "were".
[21] Filed with the project reports.
[22] Filed with the project reports.
[23] Strikethrough ~~projects~~ and replace with "project's".
[24] Longitude for Blashke Island gauge 9450973 is in error. Strikethrough ~~158°06'47"W~~ and replace with "132°53'39"W".
[25] Filed with the project reports.
[26] Also see Final Tide Note attached to this report.

[27] Concur with clarification. Two rocks in the survey area that were not shown on the smooth sheet or 17401, 10th Edition, were found on the continuous maintenance raster. Their locations are:

- Lat. 56/3/28.77N and Lon.132/54/45.086W
- Lat. 56/3/33.27N and Lon.132/54/41.15W

Because these rocks were not specifically discussed in the Descriptive Report and could not be disproved from office examination of the DTM, they have been retained on the Hdrawing.

In some areas, the hydrographer's Detached Positions supported charted ledges that had been depicted on the RSD source data 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 charted ledges as depicted in the Hdrawing, with revisions based on the current survey.

[28] Concur. Note that errors occurred in the depiction of contours on the smooth sheet. Contour errors have been corrected on the Hdrawing.

[29] Except as noted, the evaluator concurs with the discussion below. Chart these areas as shown on the smooth sheet.

[30] Concur with clarification. The foul areas present on Chart 17401 were not designated as such on the smooth sheet. However, the evaluator has revised the foul area around Bush Rock and deleted the charted foul areas around Barnacle Rock and vicinity based on shoreline verification and the present hydrography.

[31] Concur with clarification. Because the shoaler charted sounding is at the edge of the survey, it has been retained in green on the Hdrawing.

[32] Filed with the project reports.

[33] Strikethrough ~~Danger to Navigations~~ and replace with "Dangers to Navigation". Nine Dangers to Navigation were submitted after PHB review and are attached to this report.

[34] Concur.

[35] Concur.

[36] Concur with clarification. Nine Dangers to Navigation were submitted after PHB review. Differences between the smooth sheet and charted Dangers to Navigation are detailed below. Chart soundings and contours according to the smooth sheet and Hdrawing.

- DtoN Sounding, 9 ¾ fm, Lat. 56/03/39.621N, Lon.132/54/07.495W is charted as 9 fathoms and is shown on the smooth sheet as 9.9 fathoms.
- DtoN Sounding, 8 ¼ fm, Lat. 56/03/30.408N, Lon. 132/54/07.280W is charted as 8 fathoms and shown on the smooth sheet as 8.3 fathoms.
- DtoN Sounding, 5 fm, Lat. 56/03/16.732N, Lon. 132/54/26.213W is charted outside the 5 fathom curve.
- DtoN Sounding, 8 ¼ fm, Lat. 56/03/14.676N, Lon.132/53/05.025W is charted as 8 fathoms and shown on the smooth sheet as 8.4 fathoms.
- DtoN Sounding, 9 ½ fm, Lat. 56/03/00.280N, Lon.132/52/39.412W is charted as 9 fathoms and shown on the smooth sheet as 9.7 fathoms.
- DtoN Sounding, 8 ¾ fm, Lat. 56/02/39.135N, Lon.132/53/13.213W is charted as 8 fathoms and shown on the smooth sheet as 8.9 fathoms.

[37] Concur.

[38] Filed with the project reports.
[39] Filed with the project reports.
[40] Filed with the project reports.
[41] Strikethrough ~~were~~ and replace with "was".
[42] Features have been compiled on the Hdrawing as depicted on the smooth sheet, except as specifically noted in this report.
[43] Verified features with Detached Positions are shown on the Hdrawing in red on Level 1.
[44] Concur.
[45] Concur. Shown on the Hdrawing in blue on Level 5.
[46] Chart according to the smooth sheet.
[47] Concur with clarification. The rock is on a charted ledge. On the Hdrawing, the ledge has been retained and completed to surround the rock. The rock has not been depicted separately. Note that due to scale the ledge extends past the smooth sheet 5 fathom curve in order to show the extents of the rock.
[48] Concur. Chart according to smooth sheet.
[49] Concur with clarification. On the 11th edition of the chart raster, the rock is shown surrounded by the MHWL. Chart rock with MHWL according to the smooth sheet.
[50] Concur with clarification. Charted height is 3 feet above MLLW. Chart rock awash 1 foot above MLLW according to smooth sheet.
[51] Concur. Chart according to smooth sheet.
[52] Strikethrough ~~MHL~~ and replace with MHW.
[53] Filed with the project reports.
[54] Concur. Bottom samples have been retained in green from Chart 17401 on the Hdrawing.
[55] Strikethrough ~~as~~ and replace with "has".
[56] Strikethrough ~~then~~ and replace with "than".
[57] Chart aid to navigation with the most recent information from USCG, District 17.
[58] Concur. The evaluator recommends adding the Geo-name "Barnacle Rock" to chart 17401.
[59] Concur with clarification. Nine Dangers to Navigation were submitted after PHB review. See endnote 36 for additional information.
[60] Do not concur. See endnote 58. In addition, strikethrough ~~in the survey were discovered~~ and replace with "were discovered in the survey area".

APPROVAL SHEET
H11163

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 disproval 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 Date: 12/6/2005

Bruce A. Olmstead
Cartographic Team
Pacific Hydrographic Branch

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.

, CDR/NOAA Date: 21 DEC 2005

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

Digitally signed by Jeremy McHugh
Reason: AWOIS / SURF check complete
Date: 2005.12.23 11:30:29 -05'00'

NOAA FORM 75-96
(10-83)

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

MARINE CHART BRANCH

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H 11163

INSTRUCTIONS

A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart.
1. Letter all information.
2. In "Remarks" column cross out words that do not apply.
3. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.

CHART	DATE	CARTOGRAPHER	REMARKS
17401	9/28/05	Beth Taylor	Full Part Before After Marine Center Approval Signed Via
			Drawing No. Application of Soundings and
			features from smooth sheet
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
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			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED.