

H11579

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic Survey

Field No. N/A

Registry No. H11579

LOCALITY

State Alaska

General Locality Keku Strait

Sublocality High Island to Rocky Pass

2006

CHIEF OF PARTY

Commander Guy T. Noll, NOAA

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DATE

NOAA FORM 77-28
(11-72)

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

REGISTRY No

HYDROGRAPHIC TITLE SHEET

H11579

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 Keku Strait

Sub-Locality High Island to Rocky Pass

Scale 1:10,000 Date of Survey April 25, 2006 - June 8, 2006

Instructions dated 4/11/2006 Project No. OPR-O180-RA06

Vessel RAINIER

Chief of party Commander Guy T. Noll, NOAA

Surveyed by RAINIER Personnel

Soundings by echo sounder, hand lead, pole Reson SEABAT 8101, Seabeam/Elac 1180, Reson SeaBat 8125, Knudsen 320M

Graphic record scaled by RAINIER Personnel

Graphic record checked by RAINIER Personnel Automated Plot N/A

Verification by Dave Sinson Evaluation By Sarah Wolfskehl

Soundings in Feet at MLLW

REMARKS: All times are UTC.

The purpose of this survey was to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Revisions and end notes in red were generated during office processing. Page numbering may be interrupted or non-sequential.

Descriptive Report to Accompany Hydrographic Survey H11579

Project OPR-O180-RA-06
Keku Strait, Alaska
High Island to Rocky Pass
Scale 1:10,000
April-June 2006
NOAA Ship RAINIER (s221)
Chief of Party: Commander Guy T. Noll, NOAA

A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions OPR-O180-RA-06 dated April 11, 2006, and all applicable direction¹, with the exception of deviations noted in this report. The survey area is Keku Strait, Alaska. This survey corresponds to sheet “B” in the sheet layout provided with the Letter Instructions. OPR-O180-RA-06 responds to a request from the Seventeenth U.S. Coast Guard District for contemporary hydrography. Keku Strait forms a protected passage from Frederick Sound in the north to Sumner Strait in the south. Because of the limited depth which can be carried through the strait, this route is primarily used by small fishing boats and pleasure craft, and for these craft, provides an alternate to the heavily trafficked Wrangell Narrows, located 25 nm to the east. The survey area also includes areas frequented by sportsmen, an oyster cultivation operation, and numerous anchorages.

The area seaward of the 4m curve and offshore of the Navigable Area Limit Line (NALL) was surveyed with a combination of 100% multi-beam echosounder (MBES) and 200% side scan sonar (SSS) coverage, with the exception of limited inshore areas that were navigationally insignificant and unsafe to approach. Two hundred percent side scan sonar (SSS) was obtained in lieu of one hundred percent MBES in four shallow bays away from the main channel. Additional MBES coverage was obtained to acquire least depths over significant features or shoals, as appropriate for this survey. Vertical-beam echo sounder (VBES) data were acquired to define the navigable area limit, aid in the planning of full bottom coverage data acquisition, and provide inshore bathymetry in navigationally significant areas. Limited Shoreline Verification was performed for the survey area.

Data acquisition was conducted from April 25 to June 8, 2006 (DN115 to DN159). Total area survey is 5.3 square nautical miles.

Data Acquisition Type	1101	1103	1021	1016	1006	1015	Total
MBES (mainscheme) (nm)	-	-	72	111	93	68	344
XL (MBES & VBES) (nm)	-	22	-	1	-	-	23
SSS (all w/ concurrent MBES) (nm)	-	-	-	-	-	68	68
Shoreline (nm)	28	18	-	-	-	-	46
Bottom Samples		17	-	-	-	-	17
Number of Items Investigated	33	16	-	-	-	3	52

Table 1. Data Acquisition Statistics for H11579.

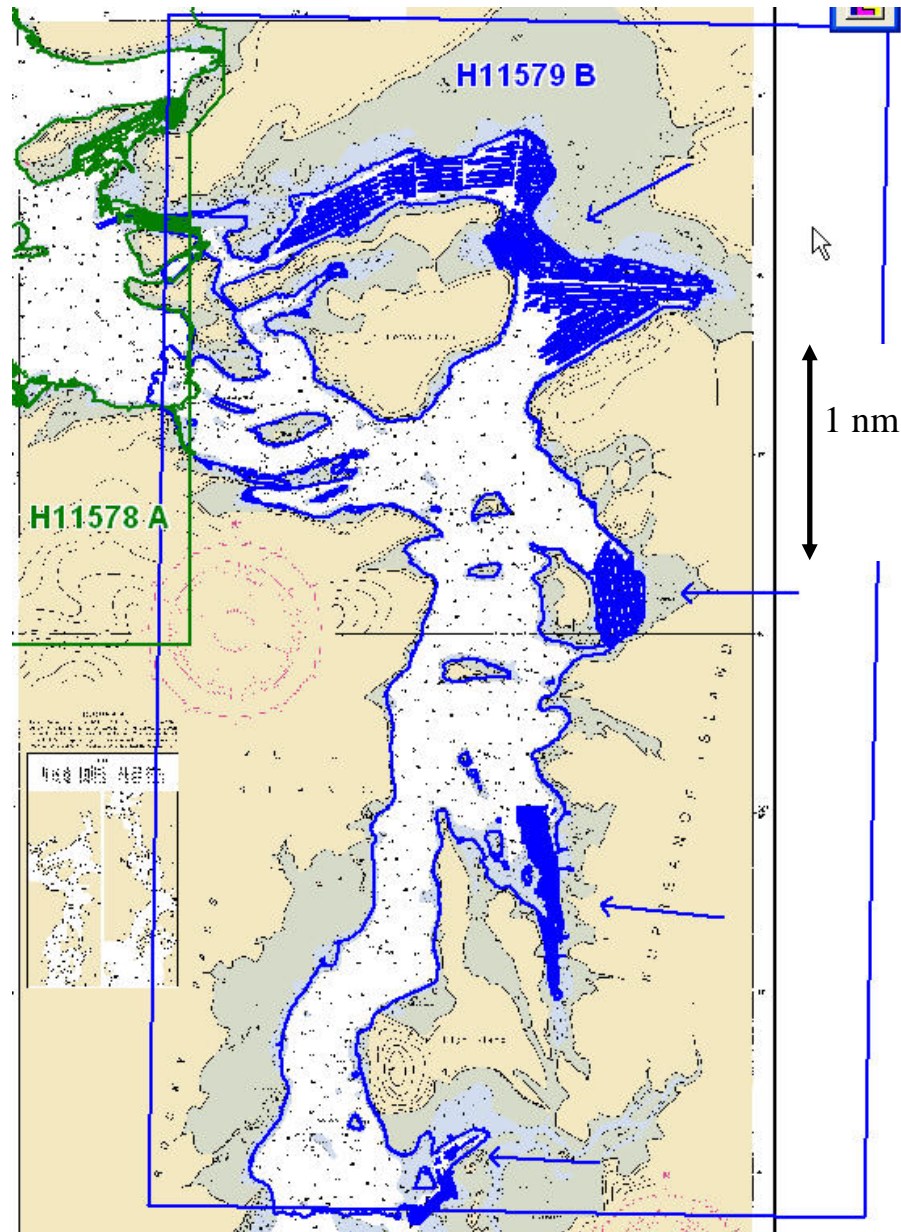


Figure 1. H11579 Survey Limits overlaid on chart 17372 One hundred percent MBES coverage was obtained as shown. Two hundred percent side scan coverage was obtained in lieu of one hundred percent MBES in the four bays indicated by arrows.

B. DATA ACQUISITION AND PROCESSING

A complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods can be found in the *OPR-O180-RA-06 Data Acquisition and Processing Report (DAPR)*², submitted under separate cover. Items specific to this survey, and any deviations from the DAPR are discussed in the following sections.

Final Approved Water Levels have been applied to this survey. See Section C. for additional information.

B1. Equipment and Vessels

Data for this survey were acquired by the following vessels:

Hull Number	Name	Acquisition Type
1101	RA-1	Vertical-Beam Echosounder Detached Positions
1103	RA-2	Vertical-Beam Echosounder Detached Positions Bottom Samples
1021	RA-3	Multi-Beam Echosounder
1016	RA-4	Multi-Beam Echosounder
1006	RA-5	Multi-Beam Echosounder
1015	RA-6	Multi-Beam Echosounder Side Scan Sonar

Table 2. Data Acquisition Vessels for H11579.

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

No unusual vessel configurations were used for data acquisition.

B2. Quality Control

Crosslines

Vertical Beam Echo Sounder (VBES) cross lines, including buffer lines, totaled 70 nautical miles, comprising 20% main scheme hydrography. Less than 1 nautical mile of SWMB cross lines were acquired. Cross line and Main Scheme bathymetry were manually compared in CARIS HIPS Subset Mode. Differences between the cross lines and main scheme hydrography were generally less than 0.25 meters³.

A statistical Quality Control Report has been conducted on representative data acquired with each system used on this survey. Results of these tests are included in the updated 2006 RAINIER Hydrographic System Readiness Review⁴ package submitted with this survey.

Junctions

The following contemporary survey adjoins H11578 (See Figure 1):

<u>Registry #</u>	<u>Scale</u>	<u>Date</u>	<u>Junction side</u>
H11578	1:10,000	2006	Northwest

Survey H11578 compares well with this survey. A one meter base surface was made of the common area using both datasets and examined for jump discontinuities. None were found. In addition, the data was examined using the Caris subset tool. Disagreements between the surveys were generally less than 0.15 meters, and in all cases less than 0.3 meters.

Data Quality Factors

Filtered Outer Beams

All data acquired with a Reson 8101 (vessels 1021 and 1006) were filtered to reject beams past 65 degrees from nadir. These outer beams were removed because they produced along-track striping or ridging of the modeled seafloor, especially when down slope. This is caused by the relatively high depth measurement and positioning error of the outer beams, combined with large across track beam spacing and high along track sounding density. As needed, these outer beams were re-accepted over holidays or to extend inshore coverage around the perimeter of the survey area.

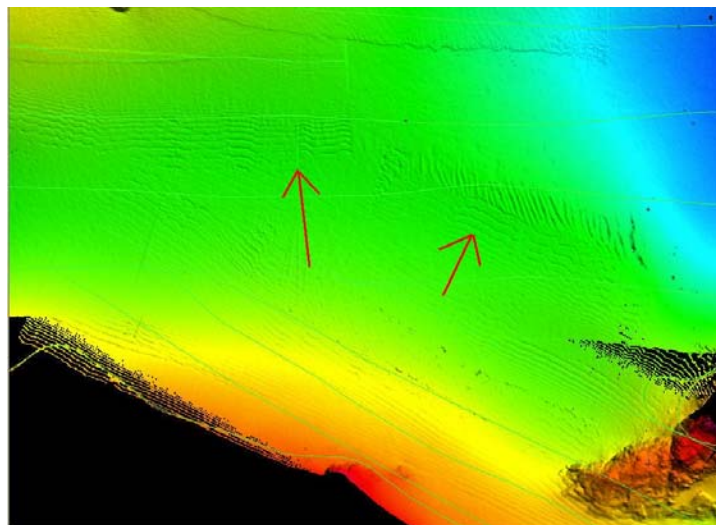


Figure 2. Modeled seafloor before 65/65 filtering of 8101 data. Note ridges caused by down slope outer beams indicated by arrows.

Elac True Heave

TrueHeave correctors were not applied to Elac data due to an offset between the time stamps on the TrueHeave data and the Elac data as converted in Caris Hips & Sips 6.0. This offset is approximately 14 seconds. Launch 1015 (RA-6) is the only vessel which acquired Elac data for this survey. Throughout the project, TrueHeave was recorded on launch 1015 but TrueHeave correctors were not applied to the HDCS data. All of the bathymetry acquired

with the Elac system was in conjunction with the hull mounted SSS. In most cases, any heave artifacts in the bathymetry were less than 0.2 meters⁵. However, near the western extent of High Island, the SSS mounted on launch 1015 (RA-6) was used for AWOIS investigations. Because of the sharp maneuvers of the vessel in this area, and the lack of TrueHeave data, there were substantial (up to 1 meter) heave artifacts in the associated Elac bathymetry data. This Elac data has been rejected, and bathymetry of the area was acquired with other systems.

SSS Navigation

On May 9 (DN129) SSS data acquired by 1015 (RA6) was recorded without any navigation data due to a loose cable. Navigation data recorded simultaneously by the Elac multibeam system was manually applied to the converted SSS data. The time offset of Elac data as discussed above was discovered after the completion of this survey. This time offset results in a positional shift of any SSS contact along the direction of the track when the Elac navigation data is applied to the SSS data. At the acquisition speeds of 3-5 m/s, this 14 second time offset would result in a positional displacement of approximately 40-70 m. This effect will not, however, result in indications of coverage outside of the area actually ensonified by the SSS, because the navigation data recorded by the Elac system, while shifted in time, is correctly positioned. The only significant contact from this day corresponds to a charted reef that was well positioned during shoreline investigation⁶.

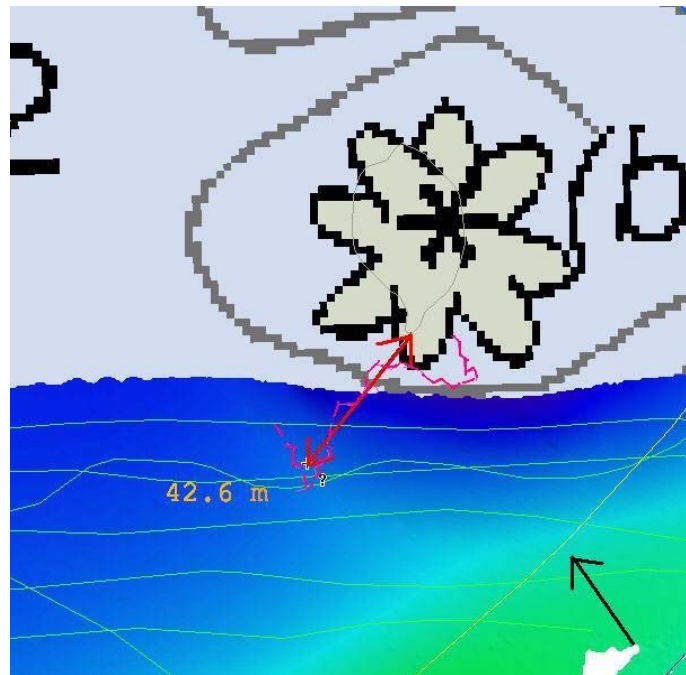


Figure 3. SSS contact shifted along track by application of time offset Elac navigation data. Contact is in dashed pink, navigation line is indicated by black arrow, CFF Reef is in light gray. The speed of the launch was 3 m/s. The 14 s time offset results in an along track displacement of 42 m.

Apparent SSS Holiday

In the bay covered with 200% SSS north-east of High Island, there is an apparent holiday in the 200% mosaic. Logging of one line of data, (060428185900), was continued through the

turn from a planned 100% line and onto a planned 200% line. As this line was assigned to the 100% mosaic, there is an apparent holiday in the 200% coverage. This is a problem only in the mosaic. The area has been ensouffied to the 200% coverage requirements. There are no SSS contacts in this immediate area⁷.

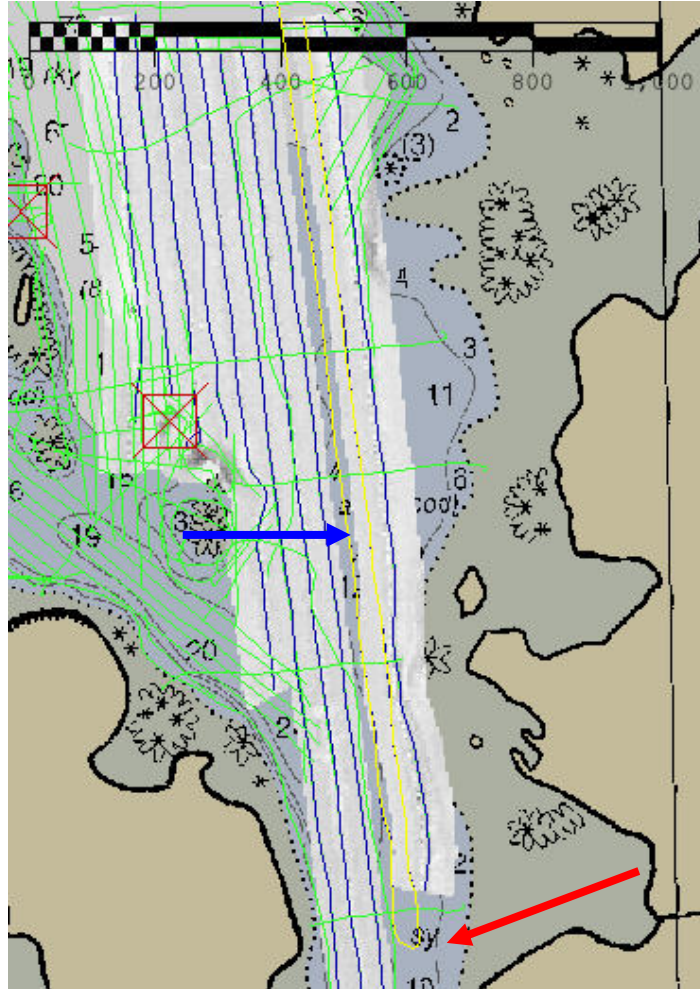


Figure 4. Apparent holiday in the 200% coverage. This holiday is caused by the continuation of logging between a planned 100% line and a planned 200% line (indicated by the red arrow). If the segment of the line indicated by the blue arrow were included with the 200% mosaic, there would be no holiday in either mosaic. 200% coverage requirements have been met.

B3. Data Reduction

Data reduction procedures for survey H11579 conform to those detailed in the *OPR-O180-RA-05 DAPR*.

B4. Data Representation

Though many BASE surfaces were used for the processing of H11579, the final submission is shown in Figures 4 and 5. The submission field sheets have fewer than 25×10^6 nodes. BASE surfaces have been finalized using depth range filtering according to the Field Procedures Manual v1.1.

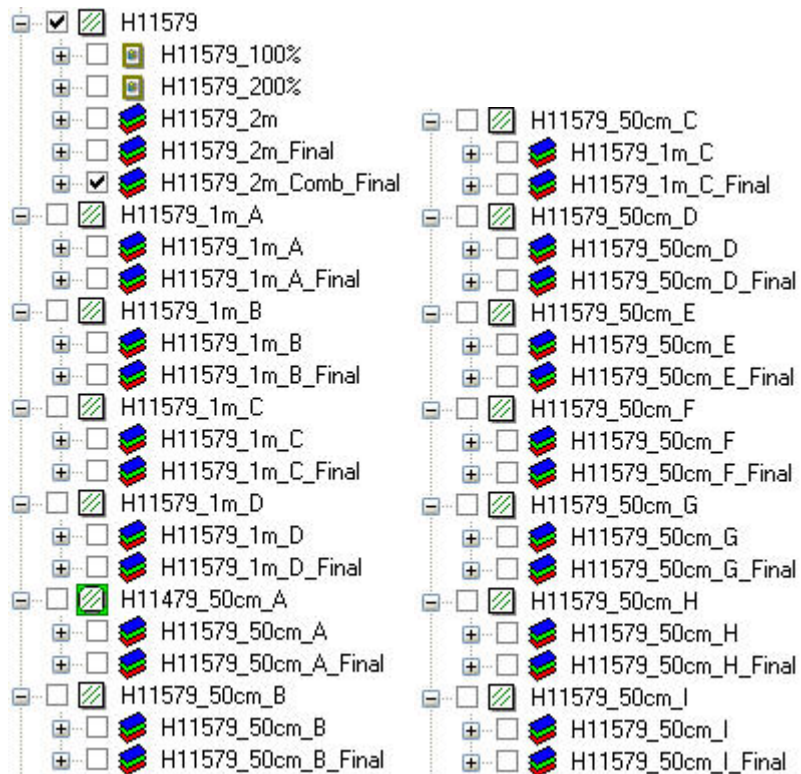


Figure 5. Field sheets, SSS mosaics, and BASE surfaces submitted with H11579.

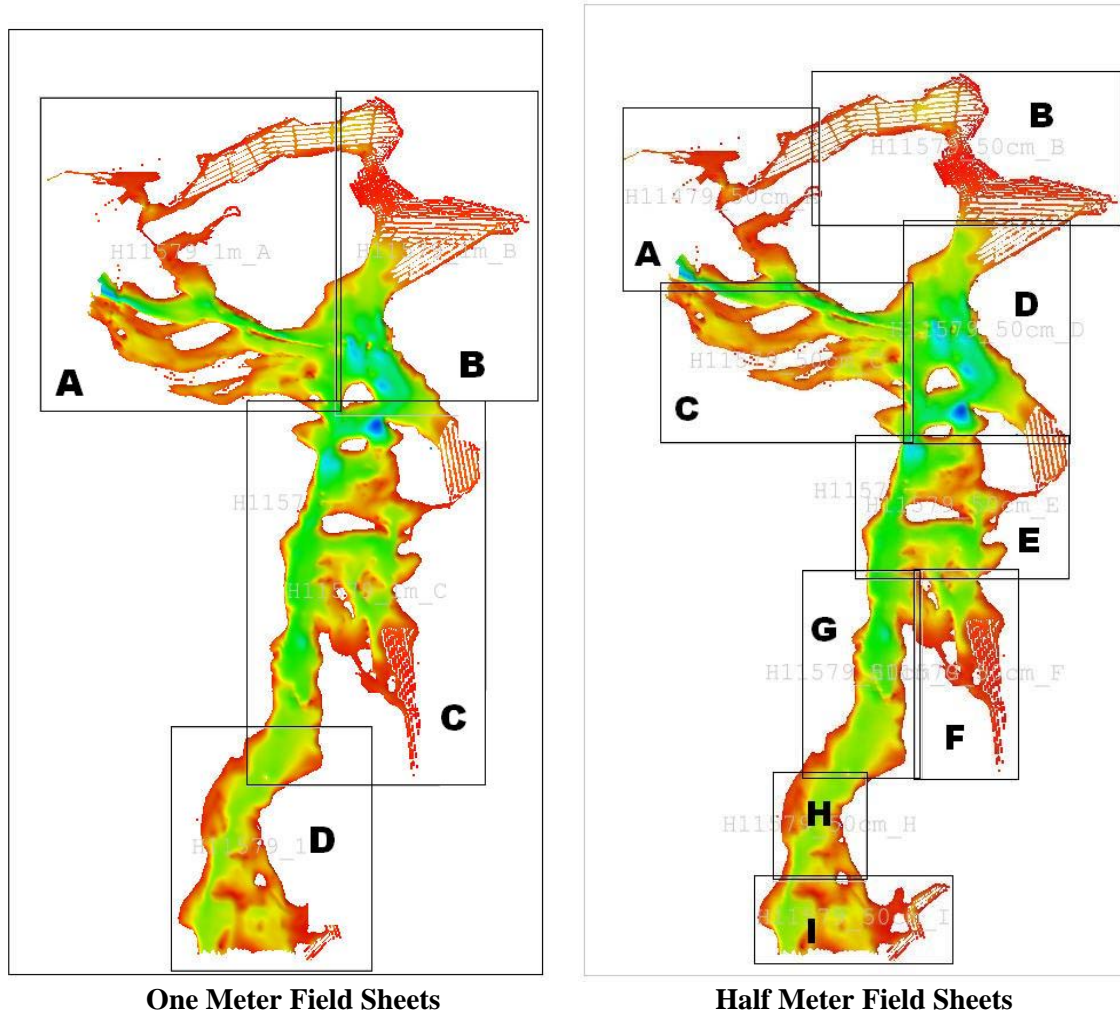


Figure 6. Layout of field sheet and BASE surfaces for H11579. The 2m and combined BASE surface are contained in a field sheet that encompasses the entire survey area.

C. VERTICAL AND HORIZONTAL CONTROL

A complete description of vertical and horizontal control for survey H11579 can be found in the *OPR-O180-RA-06 Horizontal and Vertical Control Report*⁸, submitted under separate cover. A summary of horizontal and vertical control for this survey follows.

Horizontal Control

The horizontal datum for this project is the North American Datum of 1983 (NAD83). Differential GPS (DGPS) was the sole method of positioning. The differential corrector beacons utilized for this survey are given in Table 2.

Location	Frequency	Operator	Distance	Priority
Level Island	295 kHz	USCG	30nm	Primary
Biorka Island	305 kHz	USCG	61nm	Backup

Table 3. Differential Corrector Sources for H11579.

Vertical Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) primary tide station at Ketchikan, Tongass Narrows, AK (945-0460) served as control for datum determination.

RAINIER personnel installed Sutron 8210 “bubbler” tide gauges at the following subordinate stations in accordance with the Letter Instructions. These stations are described in detail in the *OPR-O180-RA-06 Horizontal and Vertical Control Report*.

Station Name	Station Number	Type of Gauge	Date of Installation	Date of Removal
The Summit, AK	945-1349	Tertiary	April 17th	June 8th
Entrance Island	945-1438	Tertiary	April 16th	June 8th

Table 4. Tide Stations installed by RAINIER personnel for H11579

All data were reduced to MLLW using **Final Approved Water Levels** from these two stations using the tide files 9451349.tid and 9451438.tid and zone corrector file H11579CORF.zdf.

The request for Final Approved Water Levels for H11579 was submitted to N/OPS1 on June 14, 2006, and the final tide note was received on September 28, 2006. This documentation is included in Appendix IV⁹.

D. RESULTS AND RECOMMENDATIONS

D.1. Chart Comparison

D.1.a. Survey Agreement with Chart

Survey H11579 was compared with the following chart:

Chart	Scale	Edition and Date	Cleared Through
17372	1:20,000	11 th Ed, Sep 2003	October 28, 2006

Table 5. Chart compared with H11579

Generally, the least depths over the significant shoals in or near the main channel were found to be comparable to charted, however, there were some significant differences. Two have been submitted as DTONs.

An example of an area of uncharted shoaling north of High Island is shown in figure 7. An example of shoaling west of High Island is shown in figure 8. Because of the limited draft carried through Keku Strait, the hydrographer recommends these not be considered DTONs¹⁰.

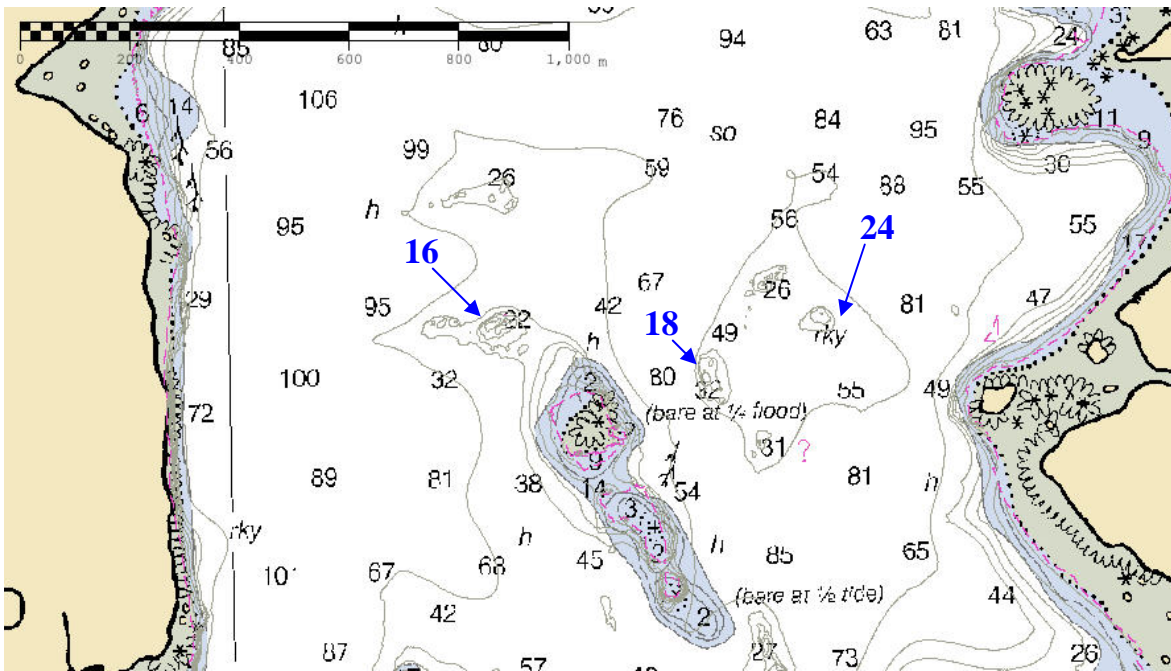


Figure 7. H11579 survey contours and selected survey sounding on chart 17372. Location is just north of High Island. Soundings are in feet.

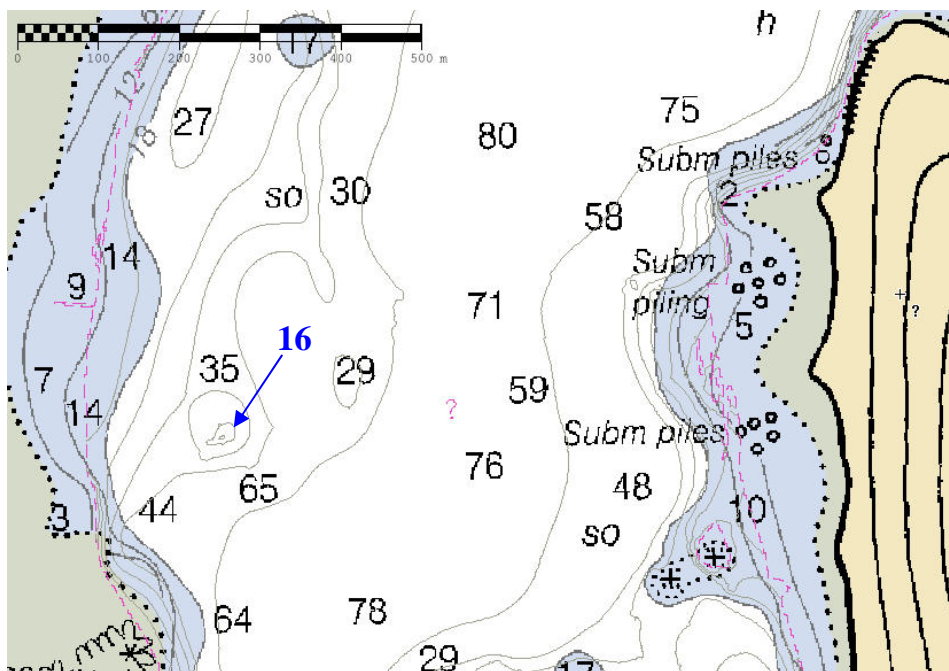


Figure 8. H11579 survey contours and selected survey sounding on chart 17372. Location is west of High Island. Soundings are in feet.

D.1.b. Dangers to Navigation

Two (2) Dangers to Navigation (DTONs) were found on survey H11579, and reported to the Marine Chart Division via email on June 20, 2006. Both of these DTONs have been correctly compiled to the raster chart¹¹. The original DTON submission package is included in Appendix I. Descriptions of each DTON are included in the Survey Feature Report in Appendix II¹².

D.1.c. Other Features

Automated Wreck and Obstruction Information System (AWOIS) Investigations

Three (3) AWOIS items fall within the survey limits of H11579. They are charted pilings west of High Island. All were assigned for full investigation, and all were disproved during this survey¹³. Detailed descriptions of each AWOIS item investigation are included in the Survey Feature Report in Appendix II¹⁴.

East of Horseshoe Island, a rock was identified with hull mounted side scan sonar, but not further investigated as it was inside the four meter contour. Further analysis indicates this rock may be navigationally significant, as it is a lone rock in a smoothly sloping area with a soft bottom. Two side scan passes positioned this feature within ten meters of each other. The heights from side scan both indicate a height of 1.5 meters. The surrounding depth is approximately 3.3 meters. The hydrographer recommends this feature be added to the chart with a least depth of 1.8 meters¹⁵. The position is sufficiently accurate that the hydrographer does not recommend adding the position approximate notation. However, the hydrographer does recommend that this feature be added to the AWOIS database for later verification¹⁶.

Additional Items

An oyster cultivation area has been established in Steadman's Cove. The operation consists of long strings of buoyed ropes separated by approximately 75 meters. There are also two small, movable floats that are used to tend the operation. These structures were correctly positioned in the CFF. The extents of the marine culture areas have been demarked with a buffer line and categorized as a marine culture area (S-57 object: MARCUL, CATMF: 2, oysters) in Notebook¹⁷.



Figure 9. Two views of the oyster cultivation area in Steadman's Cove. The picture on the left faces east. The picture on the right faces west.

Additional features investigated within the limits of H11579 are described in the Survey Feature Report in Appendix II.

D.2. Additional Results

D.2.a. Prior Survey Comparison

Prior survey comparison was not performed.

D.2.b. Shoreline Verification

Shoreline Source

Vector photogrammetric projects AK-0504 was supplied by N/NGS3 in the form of cartographic feature file GC-10584 (CFF). Original positions of features from prior surveys were provided as a MapInfo table "OPR-O180-RA-06_PriorFeatures.tab". Charted features that were not linked to prior source were provided as a MapInfo table "OPR-O180-RA-06-NotLinked.tab." RAINIER personnel de-conflicted the CFF, prior source, and charted features. The order of positional preference for features found in more than one source was CFF, prior source, then charted. This de-confliction was done in Caris Notebook. RAINIER conducted limited shoreline verification of the de-conflicted source (H11579_Deconflicted_Source.hob).

Shoreline Verification

Charted and source features seaward of the navigational area limit line (NALL) were fully investigated.

Limited shoreline verification was conducted near predicted low water in accordance with the Standing Project Instructions and FPM sections 6.1 and 6.2. Detached positions (DPs) acquired during shoreline verification were recorded in HYPACK and Trimble ProXRS DGPS receivers with TSCe data collectors, logged on DP forms, and processed in Pydro. These indicate revisions to features and features not found on the de-conflicted shoreline source. In addition, annotations describing shoreline were recorded on hard copy plots of digital shoreline, and where appropriate, transferred to the *remarks* section of the object in Notebook field verified source. DP forms are included in the *Separates to be Included with Survey Data*.

All shoreline data is submitted in Caris Notebook .hob files. The session H11579_NTBK contains the following:

H11579_Original_Combined_Source.hob	All original source data.
H11579_Deconflicted_Source.hob	Source data following RAINIER de-confliction
H11579_Field_Verified.hob	De-conflicted source data as modified by field observations
H11579_Pydro_Modify.hob	DPs and other point features processed in Pydro. Includes new features, and cartographic symbols where height or extents of source features were observed.
H11579_Pydro_Delete.hob	Disprovals of charted or source features processed in Pydro. Includes GPs of CHD features inshore of the NALL that were disproved visually.

Table 6: HOB files included with notebook session

The combination of the H11579_Field_Verified and H11579_Pydro_Modify files represents the shoreline as surveyed.

Many charted and source features were not seen during shoreline verification. Where these features were inshore of the NALL but their absence could be clearly observed from a survey launch at spring low tide, they have been deleted from the field verified layer with no further investigation. Many of these features are rocks superimposed on other source features such as ledges, mudflats, or foul areas. Geographic positions (GPs) have been digitized in Pydro to hold investigation notes for all items recommended for removal from the chart. These GPs have been attributed as cartographic symbols and are in the Pydro delete layer.

Where the position of the source feature appeared to be correct by visual inspection, a remark stating that the feature was “noted” has been added to the remarks section of the Notebook object. In these cases the SORDAT and SORIND of the original feature has been retained.

Where a feature was observed in the field to be different from the source, the feature has been modified to best match field observations. In many cases, line and area features such as mean lower low water, reefs, and ledges were modified to the position of other source data (e.g. CFF rocks that were observed to be extents of CFF ledges) as well as VBES, SWMB, and visual information. Where the object type, position, or other attributes of a feature have been modified, the SORDAT has been updated to June 8, 2006 (the last day of acquisition) and the SORIND to US,US,Graph,H11579.

Source Shoreline Changes and New Features

Items for survey H11579 that require further discussion and are associated with a detached position, have been flagged “Report” in Pydro in H11579.pss, and are included in the Survey Feature Report in Appendix II. Investigation methods and recommendations are listed in the Remarks and Recommendation tabs.

Rocks on Ledges and Reefs

In numerous areas within the survey limits, there are charted and CFF rocks on ledges and reefs. In most cases, these were found to be non-conspicuous high points and not distinct rocks. These charted features are not navigationally significant and may be misleading to the mariner. In these cases, the rock feature has been removed from the field verified source file. The hydrographer recommends they be removed from the chart¹⁸.

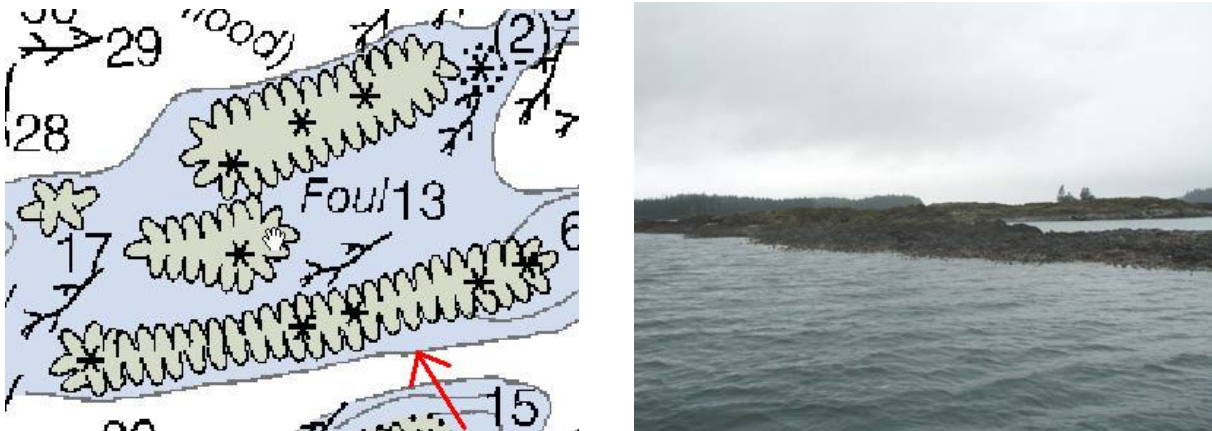


Figure 10. Charted (17372) rocks are high points of reef. Red arrow indicates location of picture. High points are neither conspicuous nor navigationally significant.

Charted Islets on Mudflats

There are also many small islets charted in the inter-tidal zone. There are no islets or navigationally significant rocks in these areas. The hydrographer recommends these islets be removed from the chart¹⁹.

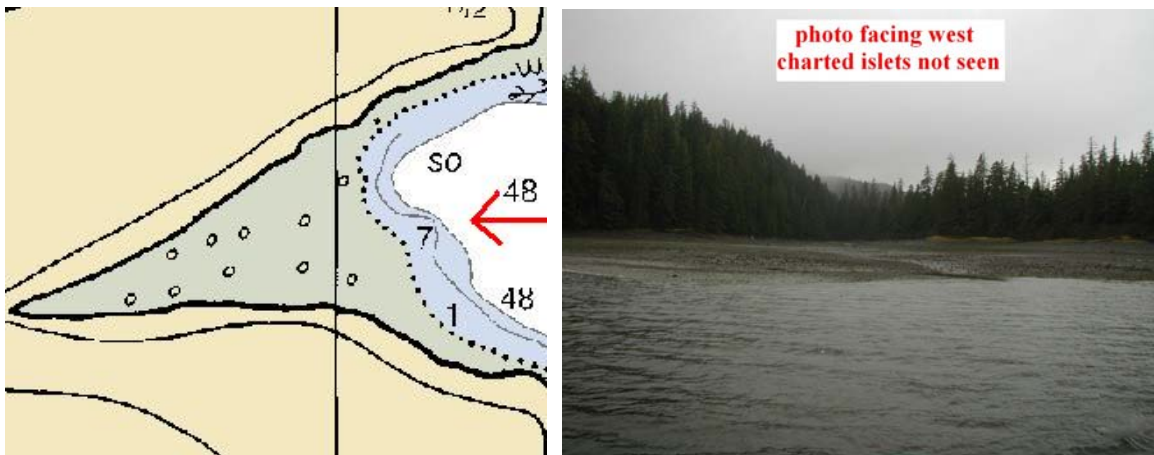


Figure 11. Numerous charted (17372) islets on featureless inter-tidal zone. Red arrow indicates direction of picture. This small bay is immediately south of Stadia Rock.

Recommendations

The Hydrographer recommends that the shoreline as depicted in the Notebook .HOB files supersede and complement shoreline information compiled on the CFF and charts as described above²⁰.

D.2.c. Aids to Navigation

Survey H11579 included four aids to navigation (ATONs). Each ATON's position was verified by detached position. Each of the ATONs was found to serve its intended purpose. Detached positions were taken on each ATON for check purposes only. No GPS static surveys were conducted for Survey H11579²¹.

D.2.d. Overhead features

There are no overhead features in survey H11579²².

D.2.e. Submarine Cables and Pipelines

There are no submarine cables or pipelines charted within the limits of H11579, and none were detected by the survey²³.

D.2.f. Ferry Routes

There are no ferry routes charted within the limits of survey H11579, and none were observed to be operating in the area.

D.2.g. Bottom Samples

Seventeen (17) bottom samples were collected on H11579. Many of these samples were collected at locations charted as either "soft" or "hard." In general, the bottom was found as charted. More descriptive characterizations of the bottom composition at the areas charted as soft have been included in the Survey Feature Report in Appendix II²⁴.

D.2.h Miscellaneous

There are various non-standard notations on chart 17372 regarding the heights of inter-tidal features (see Figure 12). Some examples are: "covers at 1/2 tide", "awash at 1/2 tide", "bare at 3/4 flood". However, these descriptions were observed to be generally accurate²⁵.

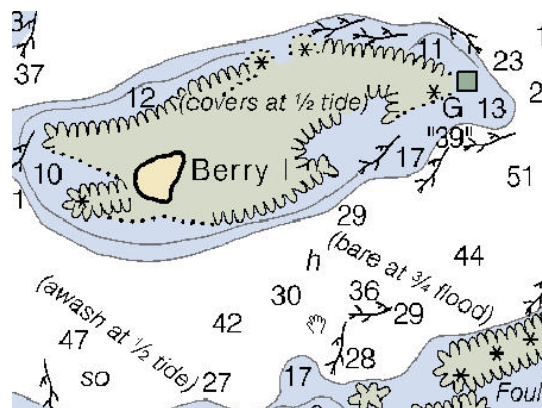



Figure 12. Non-standard height notation on chart 17372.

E. APPROVAL

As Chief of Party, Field operations for hydrographic survey H11579 were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports. The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual (March 2003 edition), Field Procedures Manual (March 2005 edition), Standing and Letter Instructions (Dated April 2006), and all HSD Technical Directives issued through June 2006. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required. All data and reports are respectfully submitted to N/CS34, Pacific Hydrographic Branch.


Listed below are supplemental reports submitted separately that contain additional information relevant to this survey:

<u>Title</u>	<u>Date Sent</u>	<u>Office</u>
Data Acquisition and Processing Report for OPR-P183-RA-06	April 9, 2007	N/CS34
Coast Pilot Report for OPR- P183-RA-06	April 9, 2007	N/CS26
Horizontal and Vertical Control Report for OPR-P183-RA-06	April 9, 2007	N/CS26


Approved and Forwarded:  Guy Noll
I am approving this document
2007.04.06 09:23:22 -07'00'

Guy T. Noll
Commander, NOAA
Commanding Officer


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

Survey Sheet Manager:  Samuel Greenaway
I am the author of this document
2007.04.06 15:45:04 Z

Samuel F. Greenaway
Lieutenant (junior grade), NOAA

Chief Survey Technician:  James B Jacobson
I have reviewed this document
2007.04.06 17:07:01 Z

James B. Jacobson
Chief Survey Technician, NOAA Ship RAINIER

Field Operations Officer:  LT Benjamin K. Evans, NOAA
I have reviewed this document
2007.04.06 15:52:16 Z

Benjamin K. Evans
Lieutenant, NOAA

Revisions Compiled During Office Processing and Certification

¹ Standing Project Instructions dated April 3, 2006, NOS Hydrographic Specifications and Deliverables dated March 2003, Field Procedures Manual v1.1 dated March 2005, and Hydrographic Survey Directives through June 2006. The Standing Instructions are filed with the Project Records.

² Filed with Project Records

³ Concur with Clarification. Actual amount of run crosslines acceptable for valid comparison is 6%, which is within spec. Crossline agreement was found to show differences between 0.2 and 0.5 m and is within spec.

⁴ Filed with Project Records

⁵ Concur

⁶ Concur with method used to correct SSS positioning. Along track shift is not navigationally significant because only one significant contact was found, which received a correct position during shoreline investigation.

⁷ Concur

⁸ Filed with the Project Records

⁹ Final Tide Note is attached to this report

¹⁰ Concur. DTONs and Shoals discussed in figures 7 and 8 have been included in the HCell

¹¹ Concur

¹² DTON Report submitted by the field and one report submitted by the office have been appended to this report and verified as charted.

¹³ Concur

¹⁴ Filed with Hydrographic Records

¹⁵ Concur. Feature is charted in the HCell

¹⁶ Concur

¹⁷ Concur. Features are charted in the HCell

¹⁸ Concur

¹⁹ Concur

²⁰ Concur

²¹ Use latest ATONIS information

²² Concur

²³ Concur

²⁴ Bottom samples have been included in conjunction with office delineated rocky seabed areas. Conflicting bottom samples were removed and charted bottom samples were retained where necessary

²⁵ It is recommended that notations be removed if a height is attributed by the field. See blue notes where applicable.

H11579_DTON Report

Registry Number: H11579
State: Alaska
Locality: Keku Strait
Sub-locality: High Island to Rocky Pass
Project Number: OPR-O180-RA-06
Survey Dates: 05/11/2006 - 06/07/2006

Charts Affected

Number	Version	Date	Scale
17372	11th Ed.	09/01/2003	1:20000
17360	34th Ed.	03/01/2006	1:217828
16016	20th Ed.	11/01/2003	1:969756
531	23rd Ed.	01/01/2006	1:2100000
500	8th Ed.	06/01/2003	1:3500000
530	31st Ed.	06/01/2005	1:4860700
50	6th Ed.	06/01/2003	1:10000000

Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	Rock	0.60 m	056° 44' 43.689" N	133° 42' 46.624" W	---
1.2	Rock	2.23 m	056° 48' 26.693" N	133° 42' 57.264" W	---

1 - Danger To Navigation

1.1) Profile/Beam - 831/66 from h11579 / 1021_reson8101_hvf / 2006-131 / 959_1854

DANGER TO NAVIGATION

Survey Summary

Survey Position: 056° 44' 43.689" N, 133° 42' 46.624" W
Least Depth: 0.60 m
Timestamp: 2006-131.18:55:10.610 (05/11/2006)
Survey Line: h11579 / 1021_reson8101_hvf / 2006-131 / 959_1854
Profile/Beam: 831/66
Charts Affected: 17372_1, 17360_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

Shoal Sounding on Submerged RK

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11579/1021_reson8101_hvf/2006-131/959_1854	831/66	0.00	000.0	Primary
h11579/1103_echosounder_dp/2006-120/dp-1103-120	1/1	4.57	216.0	Secondary
h11579/1015_k5k_200_hvf/2006-118/sonar_data060428194100	0001	9.38	249.1	Secondary

Hydrographer Recommendations

Chart Submerged RK

Cartographically-Rounded Depth (Affected Charts):

2ft (17372_1)

0 ¼fm (17360_1, 16016_1, 530_1)

0fm 2ft (531_1)

.6m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)

Attributes: VALSOU - 0.600 m

Feature Images

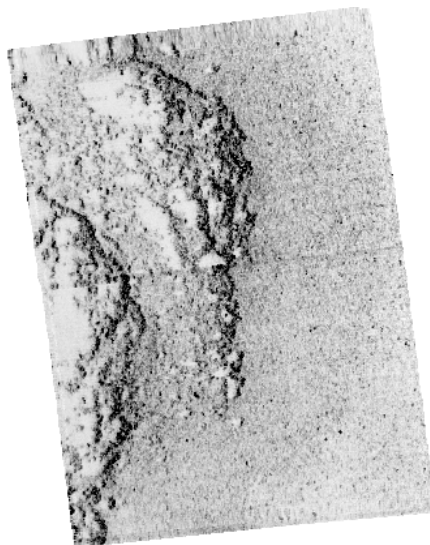


Figure 1.1.1

1.2) Profile/Beam - 366/88 from h11579 / 1006_reson8101_hvf / 2006-158 / 416_1945

DANGER TO NAVIGATION

Survey Summary

Survey Position: 056° 48' 26.693" N, 133° 42' 57.264" W
Least Depth: 2.23 m
Timestamp: 2006-158.19:45:41.800 (06/07/2006)
Survey Line: h11579 / 1006_reson8101_hvf / 2006-158 / 416_1945
Profile/Beam: 366/88
Charts Affected: 17372_1, 17360_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

Shoal Sounding on Large Submerged RK in Big John Bay

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11579/1006_reson8101_hvf/2006-158/416_1945	366/88	0.00	000.0	Primary
h11579/1015_k5k_100_hvf/2006-117/sonar_data060427225100	0001	8.23	227.5	Secondary
h11579/1006_reson8101_hvf/2006-158/416_1945	335/41	9.82	025.5	Secondary (grouped)
h11579/1015_k5k_100_hvf/2006-117/sonar_data060427204400	0001	19.65	255.9	Secondary (grouped)

Hydrographer Recommendations

Chart Submerged RK

Cartographically-Rounded Depth (Affected Charts):

7ft (17372_1)

1 ¼fm (17360_1, 16016_1, 530_1)

1fm 1ft (531_1)

2.2m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)

Attributes: VALSOU - 2.231 m

Feature Images

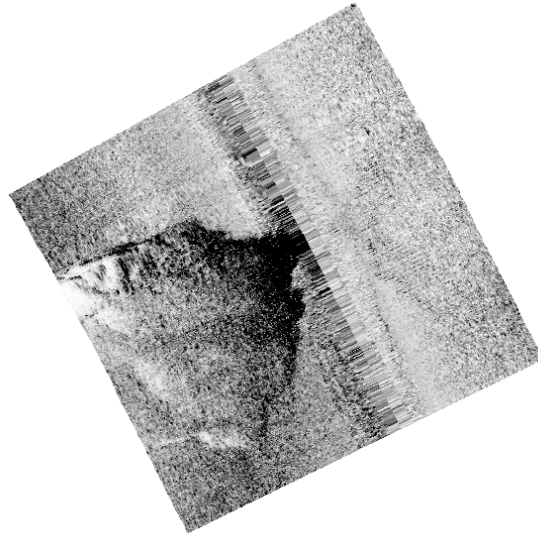


Figure 1.2.1

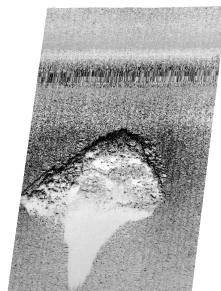


Figure 1.2.2

H11579 Office DTON Report

Registry Number: H11579
State: Alaska
Locality: Keku Strait
Sub-locality: High Island to Rocky Pass
Project Number: OPR-O180-RA-06
Survey Date: 05/15/2006

Charts Affected

Number	Version	Date	Scale
17372	11th Ed.	09/01/2003	1:20000
17368	6th Ed.	08/09/1997	1:40000
17360	34th Ed.	03/01/2006	1:217828
16016	20th Ed.	11/01/2003	1:969756
531	23rd Ed.	01/01/2006	1:2100000
500	8th Ed.	06/01/2003	1:3500000
530	31st Ed.	06/01/2005	1:4860700
50	6th Ed.	06/01/2003	1:10000000

Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	Rock	[None]	56° 48' 19.885" N	133° 46' 42.325" W	---

1 - Danger To Navigation

1.1) Contact/Point - 0003/1 from h11579 / 1015_k5k_200_hvf / 2006-117 / sonar_data060428001400

DANGER TO NAVIGATION

Survey Summary

Survey Position: 56° 48' 19.885" N, 133° 46' 42.325" W
Least Depth: [None]
Timestamp: 2006-135.11:42:57 (05/15/2006)
Survey Line: h11579 / 1015_k5k_200_hvf / 2006-117 / sonar_data060428001400
Contact/Point: 0003/1
Charts Affected: 17372_1, 17368_1, 17360_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

Underwater feature has 4-meter height off the bottom based upon SSS shadow length. Nadir depth is 6.7 meters. This contact represents a significant shoal sounding of 8 3/4 feet in a charted channel with 20-26 feet depth.

Feature position is from hull-mounted SSS 10 meters to starboard of the trackline. Feature least depth was not determined during survey H11579.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h11579/1015_k5k_200_hvf/2006-117/sonar_data060428001400	0003	0.00	000.0	Primary

Hydrographer Recommendations

Chart 8 3/4 feet (2.7 meter) sounding and revise depth curves.

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: EXPSOU - 2:shoaler than range of depth of the surrounding depth area
 QUASOU - 4:unreliable sounding
 RECDAT - 20060608
 STATUS - 1:permanent
 TECSOU - 2:found by side scan sonar
 VERDAT - 15:Approximate mean lower low water



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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : September 19, 2006

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-0180-RA-2006
HYDROGRAPHIC SHEET: H11579

LOCALITY: High Island to Rocky Pass, Keku Strait, AK
TIME PERIOD: April 25 - June 8, 2006

TIDE STATION USED: 945-1438 Entrance Island, AK
Lat. 56° 48.7' N Long. 133° 47.4' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 4.177 meters

TIDE STATION USED: 945-1349 The Summit, AK
Lat. 56° 40.9' N Long. 133° 44.2' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 4.321 meters

REMARKS: RECOMMENDED ZONING

Use zone(s) identified as: SA405, SA407 and SA408

Refer to attachments for zoning information.

- Note 1:** Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).
- Note 2:** Use tide data from the appropriate station with applicable zoning correctors for each zone according to the order in which they are listed in the Tidezone corrector file (*.ZDF). For example, tide station one (TS1) would be the first choice for an applicable zone followed by TS2, etc. when data are not available.

FR [Signature]

CHIEF, PRODUCTS AND SERVICES DIVISION



Final tide zone node point locations for OPR-O180-RA-2006, H11579

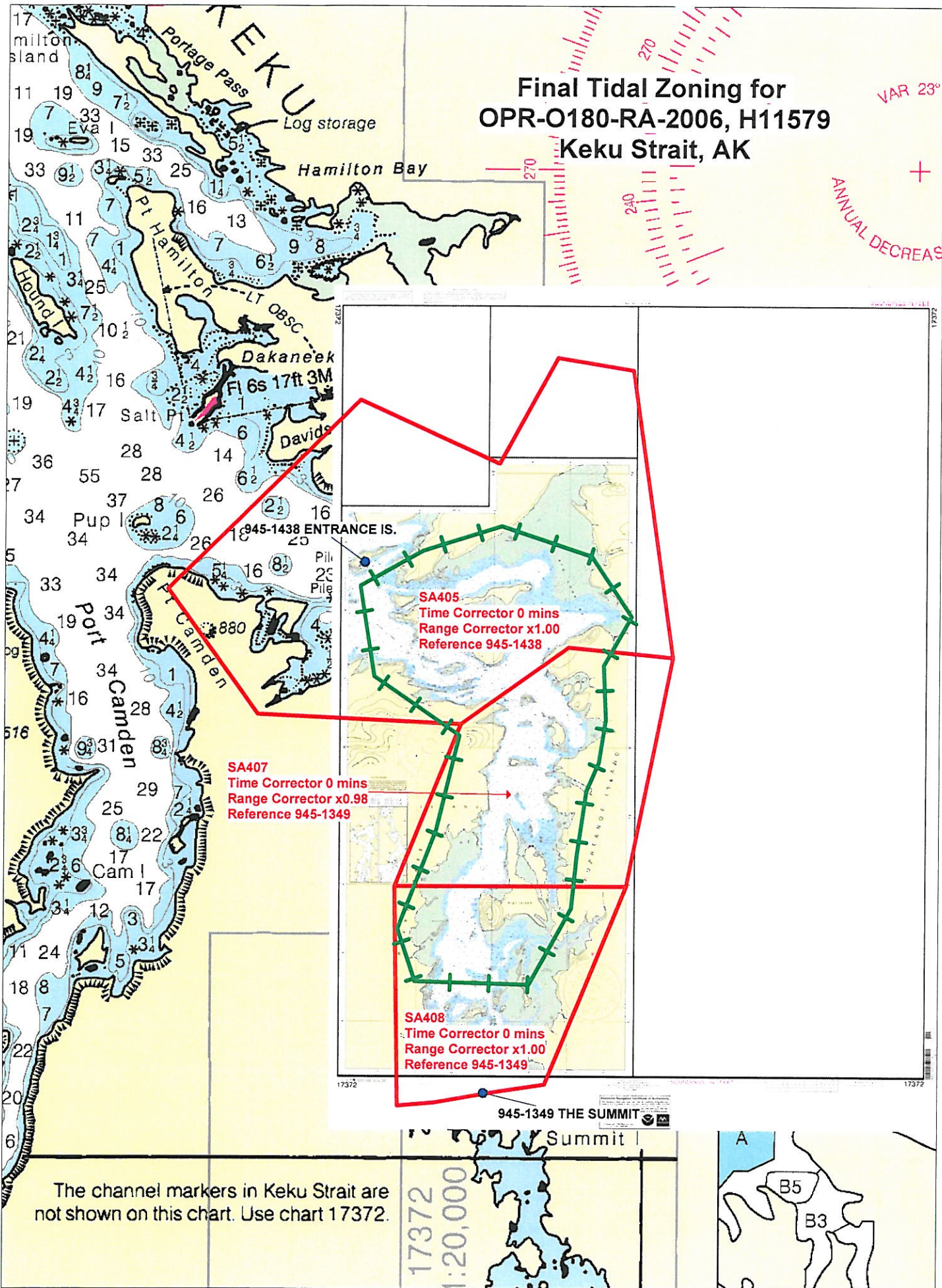
Format: Tide Station (in recommended order of use)
 Average Time Correction (in minutes)
 Range Correction
 Longitude in decimal degrees (negative value denotes Longitude West),
 Latitude in decimal degrees

	Tide Station Order	AVG Time Correction	Range Correction
Zone SA405	945-1438	0	1.00
-133.837711 56.774571			
-133.747567 56.772214			
-133.700186 56.790943			
-133.653744 56.788463			
-133.672157 56.858249			
-133.705734 56.861216			
-133.731188 56.835546			
-133.7929 56.85094			
-133.87764 56.805027			
-133.837711 56.774571			
Zone SA407	945-1349	0	0.98
-133.700186 56.790943			
-133.653744 56.788463			
-133.674185 56.732794			
-133.686354 56.732764			
-133.776576 56.732764			
-133.747567 56.772214			
-133.700186 56.790943			
Zone SA408	945-1349	0	1.00
-133.709915 56.684454			
-133.674185 56.732794			
-133.686354 56.732764			
-133.776576 56.732764			
-133.774903 56.679312			
-133.758541 56.680078			
-133.729035 56.682863			
-133.709915 56.684454			

Final Tidal Zoning for OPR-O180-RA-2006, H11579 Keku Strait, AK

VAR 23°

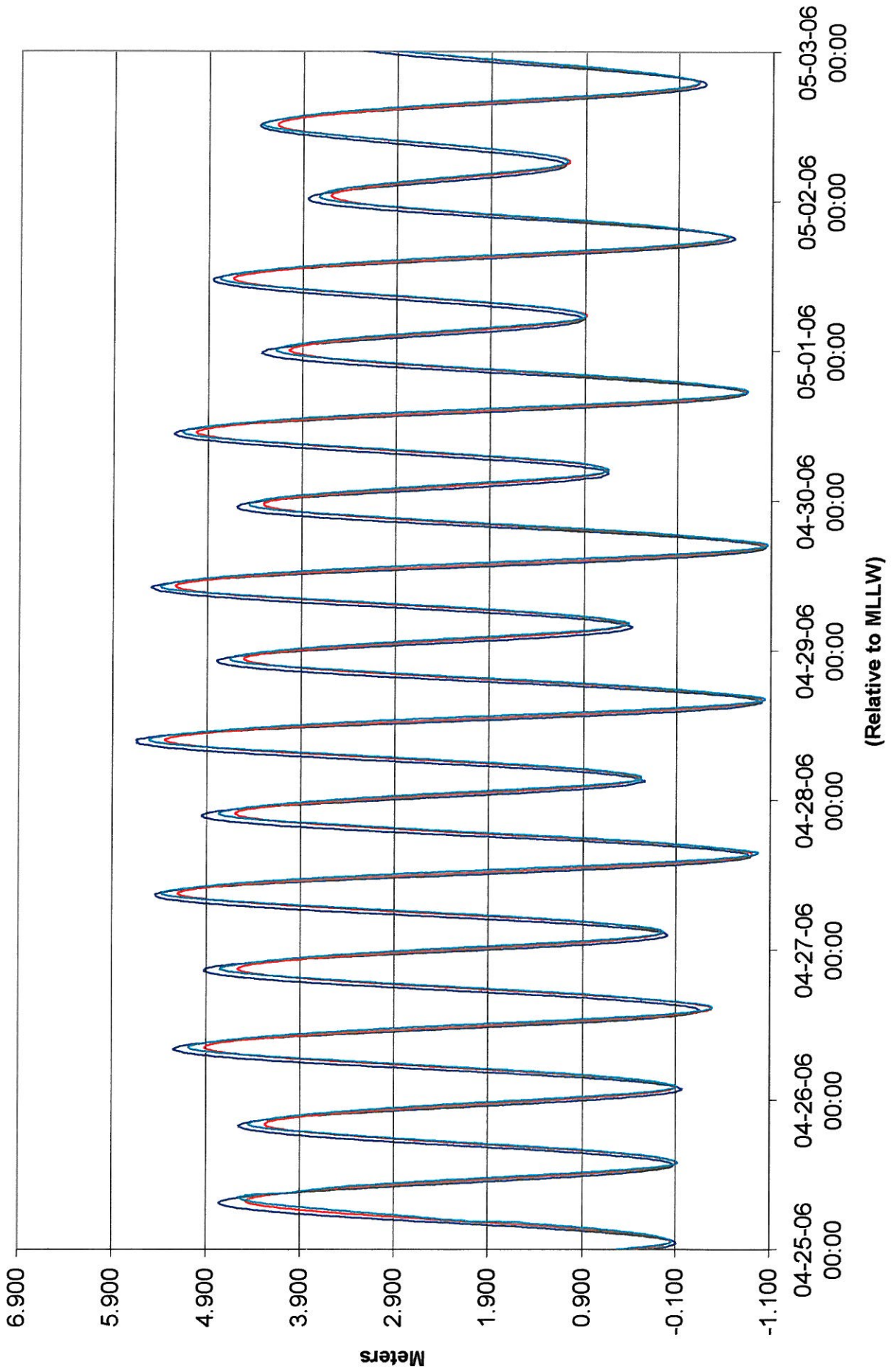
ANNUAL DECREASE



9/20/2006

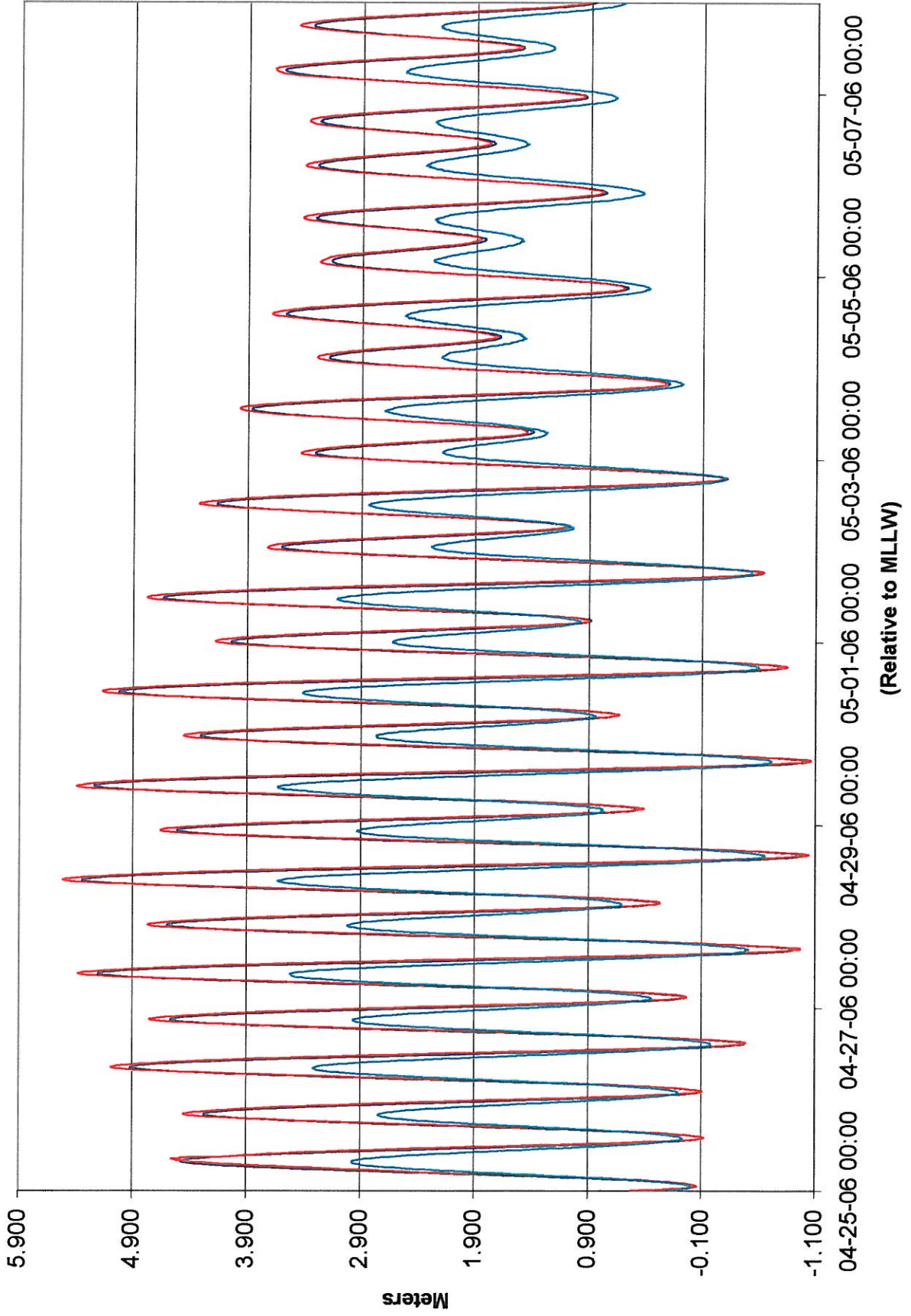
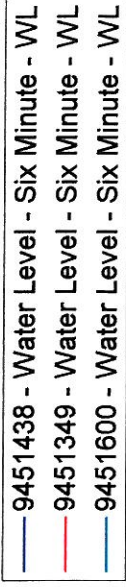
9450460 KETCHIKAN, TONGASS NARROWS AK
9451438 ENTRANCE IS., KEKU STRAIT AK
9451349 THE SUMMIT, N.W. SUMMIT ISLAND AK

9450460 - Water Level - Six Minute - WL
9451438 - Water Level - Six Minute - WL
9451349 - Water Level - Six Minute - WL



9/20/2006

9451438 ENTRANCE IS., KEKU STRAIT AK
9451349 THE SUMMIT, N.W. SUMMIT ISLAND AK
9451600 SITKA, BARONOF ISLAND, SITKA SOUND AK



H11579 HCell Report
Sarah Wolfskehl, Physical Scientist
Pacific Hydrographic Branch

Introduction

The primary purpose of the HCell is to provide new survey information in International Hydrographic Organization (IHO) format S-57 to update the largest scale RNC and ENC in the region:

RNC 17372
ENC US5AK3JM

HCell compilation of survey H11579 utilized Office of Coast Survey HCell Specifications Version 3.1, with approved modifications to better align with PHB's HCell process and to meet MCD needs.

1. Compilation Scale

Depths for HCell H11579 were compiled to the largest scale chart in the region, 17372 (1:20,000). Density and distribution of soundings and features emulate the chart.

2. Soundings

A survey-scale sounding (SOUNDG) feature object layer was built from the H11579 2 meter combined surface and the H11727 (junction Lidar survey) 3m combined surface in CARIS BASE Editor. A shoal-biased selection was made at 1:10,000 survey scale using a Radius Table file with values shown in the table, below. The resultant sounding layer contains 31,247 depths ranging from 0 to 51 meters.

For coverage over Chart 17372, 1:20,000		
Upper Limit (m)	Lower Limit (m)	Radius (mm)
0	30	2.7
30	60	3.2

In CARIS BASE Editor chart scale soundings were manually selected from the survey scale high density sounding layers and imported into a new layer. Manual selection was used to accomplish a density and distribution that closely represents the seafloor morphology.

3. Depth Areas and Depth Contours

3.1 Depth Areas

The Base Surface H11579_2m_Combined_final.hns and H11727_Office_Combined_3m.hns was used to auto generate a depth area. This depth area was used to generate the Meta layers.

3.2 Depth Contours

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

Chart Contours in Feet	Metric Equivalent of Chart Contours	Metric Equivalent of Chart Contours Generalized	Actual Value of Chart Contours
6	1.8288	2.0574	6.75
12	3.657	3.8862	12.75
18	5.486	5.715	18.75

Contours delivered in the *_SS file have not been deconflicted against shoreline features, soundings and hydrography as all other features in the *_CS file and soundings in the *_SS have been. This may result in conflicts between the *_SS file contours and HCell features at or near the survey limits. Conflicts with M_QUAL, DEPARE, COALNE and SBDARE objects, and with DEPCNT objects representing MLLW, should be expected. HCell features should be honored over *_SS.000 file contours in all cases where conflicts are found.

The MLLW and MHW lines included in the southern area of the HCell that junctions with H11727 were created by Fugro using CARIS Field Sheet Editor v6.1 from a 3m gridded surface. The MLLW line represents 0.000m and the MHW line represents 4.366m, derived from the tidal datum plane at tide station 9451349 at The Summit Island. Zero soundings within the survey scale sounding layer may fall outside the 0 contour as they are rounded from millimeter precision to whole feet during conversion to chart units.

4. Meta Areas

The M_QUAL meta object area is included in HCell H11579. The M_QUAL was constructed on the basis of the limits of the hydrography for H11579 and H11727 LIDAR coverage. (See 3.1 *Depth Areas*.)

5. Features

5.1 Generalization of Features to Chart Scale

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

Feature generalization to emulate chart scale is accomplished primarily through reduction in the number of features included in the HCell, and in some cases generalizing area features to point objects. Some instances of reduction of area features to point objects is entrusted to the RNC division, for example rocky seabed areas that will display as point features on the RNC. Where line and area objects are included in the HCell, complexity of the lines and edges comprising the features have been smoothed to commensurate with chart scale.

5.2 Compilation of Features to the HCell

Shoreline features for H11579 were delivered from the field in five different hob files defining new features, modification to GC or charted features, and disprovals. Features from Lidar survey H11727 were delivered in one hob file H11727_Features_PHB. All features were deconflicted against GC shoreline, the chart and hydrography during office processing.

During office processing, several submerged rocks and numerous rocky seabed areas were digitized from the high resolution BASE Surfaces.

The source of all features included in the H11579 HCell can be determined by the SORIND field.

5.3 Mean High Water Used for HCells

For the purposes of determining the height at which a rock becomes an islet and a DRVAL1 (Depth Range Value) for intertidal areas, the CO-OPS "*Tide Note for Hydrographic Survey*", "*Height of High Water Above the Plane of Reference*" is used. A separate MHW value is used from the tide note for features from Lidar survey H11727.

6. S-57 Objects and Attributes

The *_CS HCell contains the following Objects:

\$CSYMB	Blue Notes
COALNE	Coastline
DEPARE	The all-encompassing depth area
DEPCNT	Depth Contour
LNDARE	Islets and islands
LNDELV	Islet heights

MARCUL	Oyster Cultivation Area
M_QUAL	Data quality Meta object
OBSTRN	Foul Area
SBDARE	Bottom samples and rocky seabed areas
SOUNDG	Soundings at the chart scale density
UWTROC	Submerged LIDAR rock
WEDKLP	Kelp

The *_SS HCell contains the following Objects:

DEPCNT	Generalized contours at chart scale intervals
SOUNDG	Soundings at the survey scale density

All S-57 Feature Objects in the *_CS HCell have been attributed as fully as possible based on information provided by the Hydrographer and in accordance with current guidance and the OCS HCell Specifications.

7. Blue Notes

Notes to the RNC and ENC chart compilers are included in the HCell as \$CSYMB features with the Blue Note information located in the INFORM field. By agreement with MCD, the NINFOM field is populated with an abbreviated version of the Blue Note (30 characters or less), describing the chart disposition, to be used by MCD in generating their Chart History spreadsheet.

8. Spatial Framework

8.1 Coordinate System

All spatial map and base cell file deliverables are in an LLDG geographic coordinate system, with WGS84 horizontal, MHW vertical, and MLLW (1983-2001 NTDE) sounding datums.

8.2 Horizontal and Vertical Units

DUNI, HUNI and PUNI are used to define units for depth, height and horizontal position in the chart units HCell, as shown below.

Chart Unit Base Cell Units:

Depth Units (DUNI):	Feet
Height Units (HUNI):	Feet
Positional Units (PUNI):	Meters

During creation of the HCell in CARIS BASE Editor and CARIS S-57 Composer, all soundings and features are maintained in metric units with as high precision as possible. Depth units for soundings measured with sonar maintain millimeter precision. Depths on

rocks above MLLW and heights on islets above MHW are typically measured with range finder, so precision is less. Units and precision are shown below.

BASE Editor and S-57 Composer Units:

Sounding Units: Meters rounded to the nearest millimeter
Spot Height Units: Meters rounded to the nearest decimeter

Conversion to charting units and application of NOAA rounding is completed in the same step, at the end of the HCell compilation process.

Conversion to feet charting units with NOAA rounding ensures that:

- All depths display as whole feet.
- All depth units skyward of 0 feet (MLLW) to 2.0 feet above MHW display in feet.
- All height units (HUNI) which have been converted to charting units, and that are 2.00 feet above MHW and greater, are shown in feet.

In an ENC viewer fathoms and feet depth units (DUNI) display in the format X.YZZZ, where X is fathoms, Y is feet, and ZZZ is decimals of the foot. In an ENC viewer, heights (HUNI) display as whole feet.

9. Data Processing Notes

H11579 junctions with H11578 on the northwest side, H12034 to the south, and Lidar survey H11727 on the southern extents.

200% side scan sonar coverage was obtained in shallow coves in conjunction with multibeam for survey H11579. Three depths were applied from the SSS. Two as submerged rocks and one as a sounding, submitted as a Danger to Navigation. See appended DTON report for further information.

10. QA/QC and ENC Validation Checks

H11579 was subjected to QA checks in S-57 Composer prior to exporting to the HCell base cell (000) file. The millimeter precision metric S-57 HCell was converted to chart units and NOAA rounding applied. dKart Inspector was then used to further check the data set for conformity with the S-58 ver. 2 standard (formerly Appendix B.1 Annex C of the S-57 standard). All tests were run and warnings and errors investigated and corrected unless they are MCD approved as inherent to and acceptable for HCells.

11. Products

11.1 HSD, MCD and CGTP Deliverables

H11579_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:20,000.
H11579_SS.000	Base Cell File, Chart Units, Soundings compiled to 1:10,000.
H11579_DR.doc	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items.
H11579_outline.gml/.xsd	Survey outline to populate SURDEX.

11.2 Software

CARIS HIPS Ver. 6.1	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 2.3	Creation of soundings and bathy-derived features, creation of the depth area, meta area objects, and Blue Notes; Survey evaluation and verification; Initial HCell assembly.
CARIS S-57 Composer Ver. 2.0	Final compilation of the HCell, correct geometry and build topology, apply final attributes, export the HCell, and QA.
CARIS GIS 4.4a	Setting the sounding rounding variable for conversion of the metric HCell to NOAA charting units with NOAA rounding.
CARIS HOM Ver. 3.3	Perform conversion of the metric HCell to NOAA charting units with NOAA rounding.
HydroService AS, dKart Inspector Ver. 5.1	Validation of the base cell file.

12. Contact

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

Sarah Wolfskehl
Physical Scientist
Pacific Hydrographic Branch
Seattle, WA
206-526-6859
Sarah.Wolfskehl@noaa.gov

APPROVAL SHEET
H11579

Initial Approvals:

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

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

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