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. RA-20-02-05

Registry No. H11272

LOCALITY

State Alaska

General Locality Southern Approaches to Sitka

Sublocality SE of Necker Islands

2005

CHIEF OF PARTY
CDR John W. Humphrey, NOAA

LIBRARY and ARCHIVES

DATE

NOAA FORM 77-28 (11-72)

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

REGISTRY No

H11272

HYDROGRAPHIC TITLE SHEET

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

RA-20-02-05

State: **Alaska**

General Locality: **Southern Approaches to Sitka**

Sub-Locality: **SE of Necker Islands**

Scale: **1:20,000** Dates of Survey: **6/8/2005 - 6/16/2005**

Instructions dated: **3/18/2005** Project No.: **OPR-O112-RA-05**

Vessel: **RA4 (1016_Elac1180D), RA6 (1015), RAINIER (S221)**

Chiefs of party: **CDR John W. Humphrey, NOAA**

Surveyed by: **RAINIER Personnel**

Soundings by echo sounder, hand lead, pole: **Seabeam/Elac 1180, Seabeam/Elac 1050D MKII**

Graphic record scaled by: **N/A**

Graphic record checked by: **N/A** Automated Plot: **N/A**

Verification by: **Katie Reser, Martha Herzog**

Soundings in: **Fathoms at MLLW**

REMARKS: **All times are UTC. UTM Projection (zone #8).**

Revisions and annotations appearing as endnotes were generated during office processing. As a result, page numbering may be interrupted or non-sequential.

All separates are filed with the hydrographic data.

NOAA FORM 77-28 SUPERSEDES FORM C&GS-537

Descriptive Report to Accompany Hydrographic Survey H11272

Project OPR-O112-RA-05
Southern Approaches to Sitka, AK
SE of Necker Islands
Scale 1:20,000
June 2005
NOAA Ship RAINIER (s221)
Chief of Party: Commander John W. Humphrey, NOAA

A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions OPR-O112-RA-05, dated March 18, 2005, and all other applicable direction[1], with the exception of deviations noted in this report. The survey area is south of the Necker Islands in Sitka Sound. This survey corresponds to sheet "AQ" in the sheet layout provided with the Letter Instructions.

One hundred percent multi-beam echosounder (MBES) coverage was obtained in the survey area.[1]

Data acquisition was conducted from June 8, 2005 to June 16, 2005 (DN 159 to DN 167).

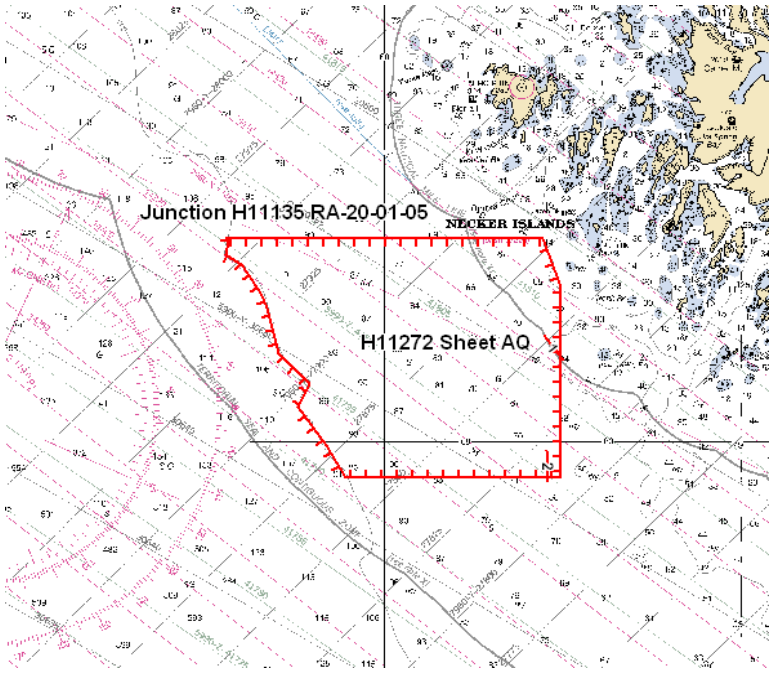


Figure 1. H11272 Survey Limits and Junctions

[1] Standing Instructions for Hydrographic Surveys (March 2004), NOS Hydrographic Surveys Specifications and Deliverables (March 2004), OCS Field Procedures Manual for Hydrographic Surveying (March 2005), and all Hydrographic Surveys Technical Directives issued through June 2005.

B. DATA ACQUISTION 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-O112-RA-05 Data Acquisition and Processing Report* (DAPR), submitted under separate cover.[2] Items specific to this survey, and any deviations from the aforementioned report are discussed in the following sections.

Final Approved Water Levels have been applied to these data. The BASE surface "H11272_Combined" is the combined and final surface from which the Pydro PSS and MapInfo table "H11272_PSS" is created.

B1. Equipment and Vessels

Data were acquired by RAINIER, and survey launches 1015 (RA-6) and 1016 (RA-4). RAINIER's Elac 1050D was operated in 50 kHz mode for this survey. Both launches acquired Elac 1180 data for this survey. Sound velocity profiles were acquired using Sea-Bird SEACAT SBE 19 and 19 Plus CTDs.

No unusual vessel configurations were used for data acquisition.[3]

B2. Quality Control

Crosslines

SWMB crosslines totaled 34.33 nautical miles, comprising 9.0% of main scheme hydrography. Crosslines were manually compared to SWMB main scheme lines for consistency in CARIS subset mode. The mainscheme bathymetry was manually compared to the crossline nadir beams in CARIS subset mode and agreed well with differences typically less than one tenth of a meter.

A statistical Quality Control Report was generated for SWMB data acquired on this project to validate launch offsets and sonar biases. A copy of this report is included in the *OPR-O112-RA-05 DAPR*.

Junctions

The following contemporary survey junctions with H11272 (see Figure 1). The two surveys agree to within 1 meter throughout the common area.[4]

Registry #	Scale	Date	Junction side
H11135	1:20,000	2005	North

Data Quality Factors

Unresolved Heave:
Moderate seas were noted on many days of data acquisition. A pervasive unresolved heave artifact with amplitude of up to +/- 1 meter is present throughout the ELAC 1050D data (see Figure 3). A complete description of this issue can be found in the *OPR-O112-RA-05 Data Acquisition and Processing Report* (DAPR), submitted under separate cover. Despite efforts by shipboard and OCS Hydrographic Systems and Technology Programs personnel, this problem remains unexplained and unresolved. However, since the magnitude of the error is relatively small and the affected data are all in water depths of 100 m or greater, the bathymetry meets specified accuracy requirements.[5]

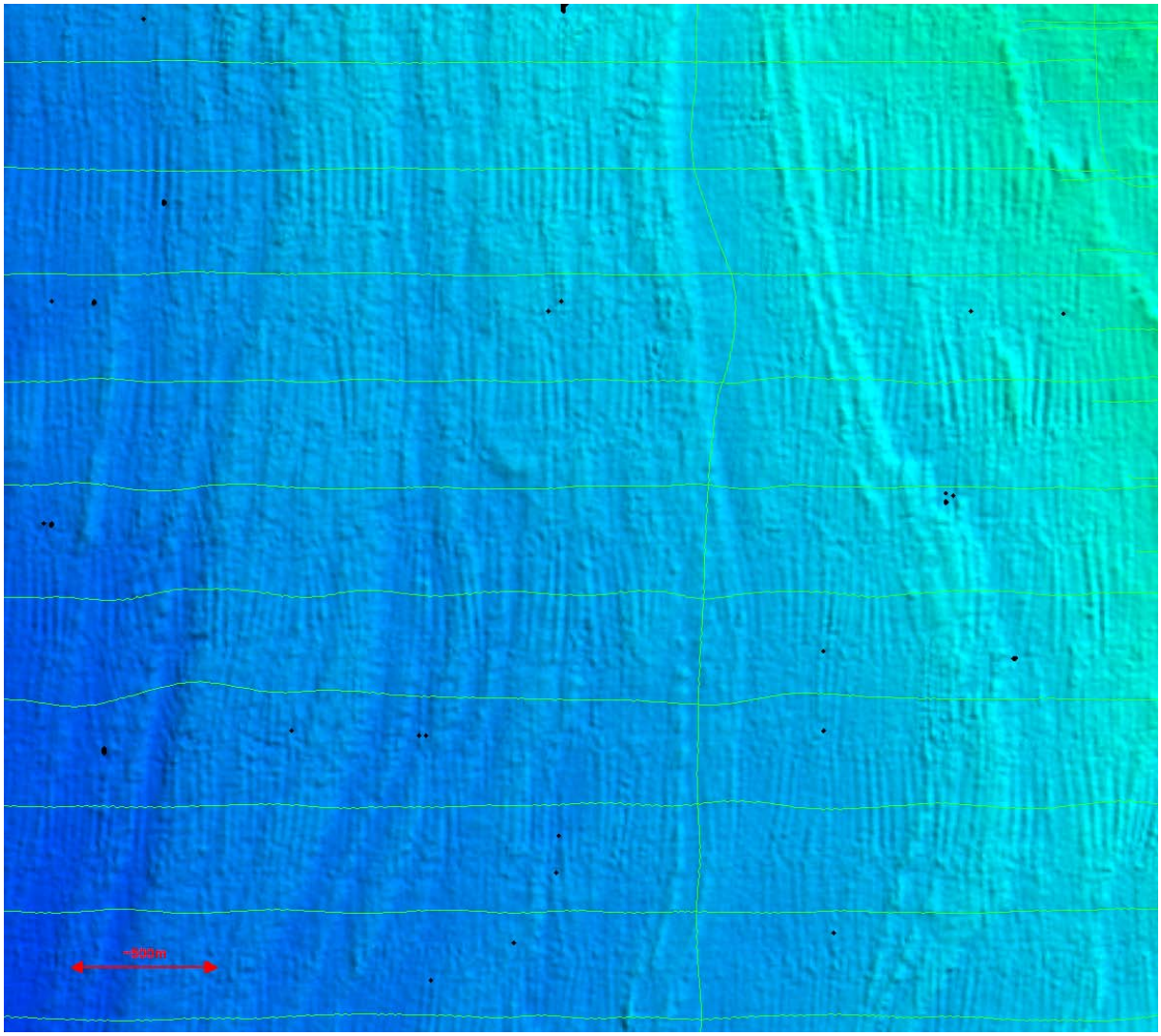


Figure 3. Unresolved heave in BASE surface H11272_Final_Combined_10m (5x vertical exaggeration).

Sounding Density
The ELAC 1050D and 1180 produce lower sounding density than the 2005 Field Procedures

Manual BASE Surface resolution specification. As a result, there are many small holidays in the 5 and 10 m BASE Surfaces because sounding density of the Elac systems are not sufficient to populate every grid cell at these resolutions in the depth ranges specified by the FPM. With the exception of a submarine cliff or fault on extreme eastern edge of the survey, all areas covered by H11272 are deeper than 100m. All features indicated by the bathymetry which had inadequate coverage were further developed to increase sounding density. The hydrographer considers this data adequate to supersede all prior survey soundings in the common area and recommends the source diagram show full bottom coverage despite these isolated coverage gaps.[6]

B3. Data Reduction

Data reduction procedures for survey H11272 conform to those detailed in the *OPR-O112-RA-05 DAPR.*

B4. Data Representation

Many BASE surfaces were used for the processing of H11135. Final BASE surface resolutions and depth ranges were set in accordance with the Field Procedures Manual. The submission Field Sheet and BASE Surface structure is shown in Figures 4 and 5.

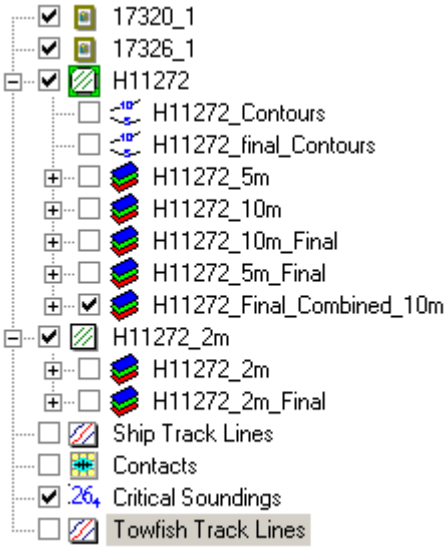


Figure 4. Field sheet and BASE surfaces submitted with H11272.

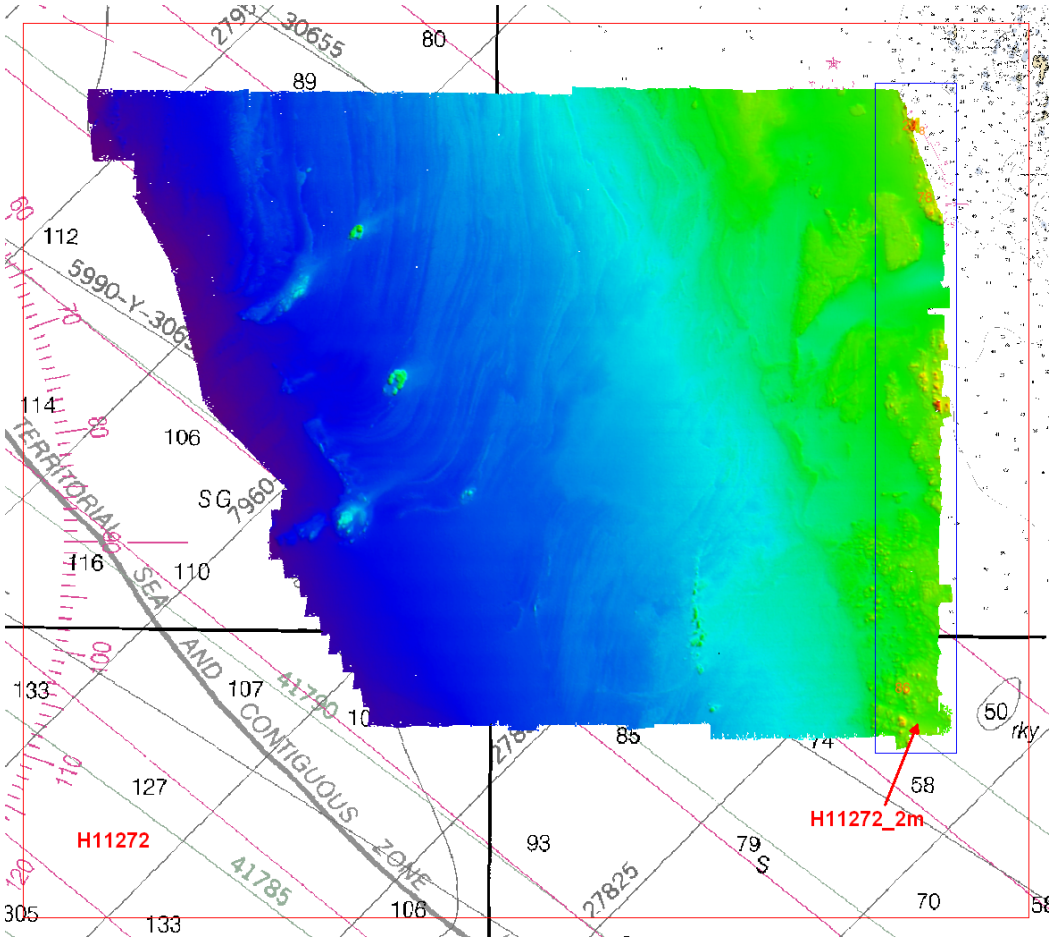


Figure 5. H11272 field sheet layout.

C. VERTICAL AND HORIZONTAL CONTROL

Project OPR-O112-RA-05 did not require static GPS observations or other horizontal control work, and all tide corrections were generated from CO-OPS maintained tide stations. Thus, no Horizontal and Vertical Control Report will be submitted. 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. Differential corrections from the U.S. Coast Guard beacon at Biorka Island (305 kHz) were utilized exclusively during this survey. This site is approximately 10 nm from the H11272 survey area.

Vertical Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). The operating National Water Level Observation Network (NWLON) primary tide station at Sitka, AK, (945-1600) served as control for datum determination and as the primary source for water level reducers for survey H11272.

No additional water level stations were required.

All data were reduced to MLLW using **Final Approved Water Levels** from station Sitka, AK, (945-1600) using the tide file 9451600.tid, and time and height zone corrector file H11272CORF.zdf.[7] Documentation of the Approved Water Levels Request is included in Appendix IV.[8]

D. RESULTS AND RECOMMENDATIONS

D.1 Chart Comparison

D.1.a Agreement with Charts

Survey H11272 was compared with the following charts:

Chart	Scale	Edition and Date	Corrected for Notice to Mariners through:
17326	1:40,000	13th Ed.; Aug/00	June 2005
17320	1:80,000	15th Ed.; Mar/99	May 2005

Chart 17320

H11272 survey soundings generally agree very well with depths portrayed on chart 17320, with differences typically less than 3 fathoms in depths of 50 fathoms or greater. H11272 did locate several large, uncharted formations on the seabed in the western third of the survey area. These appear to be rock outcroppings similar in nature to those found in the Necker Islands area to the NE. The most significant of these features is rises to a least depth of approximately 55 fathoms from the surrounding seabed of roughly 90 fathoms, in approximate position 56° 44' 50" N, 135° 42' 57" W. The hydrographer recommends that H11272 survey bathymetry supersede all charted depths in the common area.[9]

Chart 17326

H11272 survey soundings generally agree very well with depths portrayed on chart 17326, with differences typically less than 3 fathoms in depths of 50 fathoms or greater. H11272 did find a region of rocky outcroppings at the extreme eastern edge of the survey area, roughly following the 50 fathom curve. These formations were fully developed with additional multibeam echosounder coverage to ensure accurate least depths as described in section B.2. Although isolated areas of soundings up to 25 fathoms less than charted were identified, the

shoalest least depth surveyed was approximately 12 fathoms, and is thus not considered navigationally significant. The hydrographer recommends that H11272 survey bathymetry supersede all charted depths in the common area.[10]

D.1.b Dangers to Navigation

No Dangers to Navigation (DTONs) were found within the limits of H11272.[11]

D.2 Additional Features

D.2.a Prior Survey Comparison

There was no prior survey with which H11272 could be compared.

D.2.b Shoreline

The H11272 survey area does not include any shoreline.

D.2.c Aids to Navigation

No Aids to Navigation (ATONs) are located within the limits of H11272.[12]

D.2.d AWOIS

No AWOIS items were located within the survey limits of H11272.[13]

D.2.e Miscellaneous

Bottom samples were not collected during H11272.[14]

E. ADDITIONAL DOCUMENTATION

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

Title	Date Sent	Office
Data Acquisition and Processing Report for OPR-O112-RA-05	21 July 2006	N/CS34
Coast Pilot Report for OPR-O112-RA-05	10 May 2006	N/CS26

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office of Marine and Aviation Operations
NOAA Ship RAINIER (S221)
1801 Fairview Ave E, Seattle, WA 98102

July 21, 2006

MEMORANDUM FOR: CDR Donald W. Haines, NOAA
Chief, Pacific Hydrographic Branch

FROM: CDR Guy T. Noll, NOAA
Commanding Officer

SUBJECT: Approval of Hydrographic Survey H11272

Field operations for hydrographic survey H11272 were conducted under the direct supervision of the previous Commanding Officer, CDR John W. Humphrey, 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, Field Procedures Manual, Standing and Letter Instructions, and HSD Technical Directives. 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.

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

Survey Sheet Manager: For Daniel C. Boles
Assistant Survey Technician, NOAA Ship RAINIER

Chief Survey Technician: James B. Jacobson
Chief Survey Technician, NOAA Ship RAINIER

Field Operations Officer:
Benjamin K. Evans
Lieutenant, NOAA

[1] Concur.
[2] DAPR is filed with the project records.
[3] Concur.
[4] Do not concur. The survey acceptance review Memo states that differences of up to 5m were detected between this survey and H11135 in some locations although the majority of the data agreed within 1m.
[5] Concur.
[6] Concur. All correctors are adequate. All bathymetry submitted for H11272 is acceptable for charting and is adequate to supersede prior survey data within the common area.
[7] The tide note dated July 21, 2006 is appended to this report.
[8] The Approved Water Level Request is filed with the hydrographic records.
[9] Concur.
[10] Concur.
[11] Concur.
[12] Concur.
[13] Concur.
[14] Charted bottom samples were retained.

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : August 2, 2005

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-O112-RA-2005
HYDROGRAPHIC SHEET: H11272

LOCALITY: Approaches to Sika Sound, Sitka Sound, AK
TIME PERIOD: June 8 - June 16, 2005

TIDE STATION USED: 945-1600 Sitka, Alaska
Lat. 57 03.1'N Long. 135 20.5' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.791 meters

REMARKS: RECOMMENDED ZONING
Use zone(s) identified as: PAC294

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).

Thomas M. Meier 12/6/05
CHIEF, REQUIREMENTS AND DEVELOPMENT DIVISION

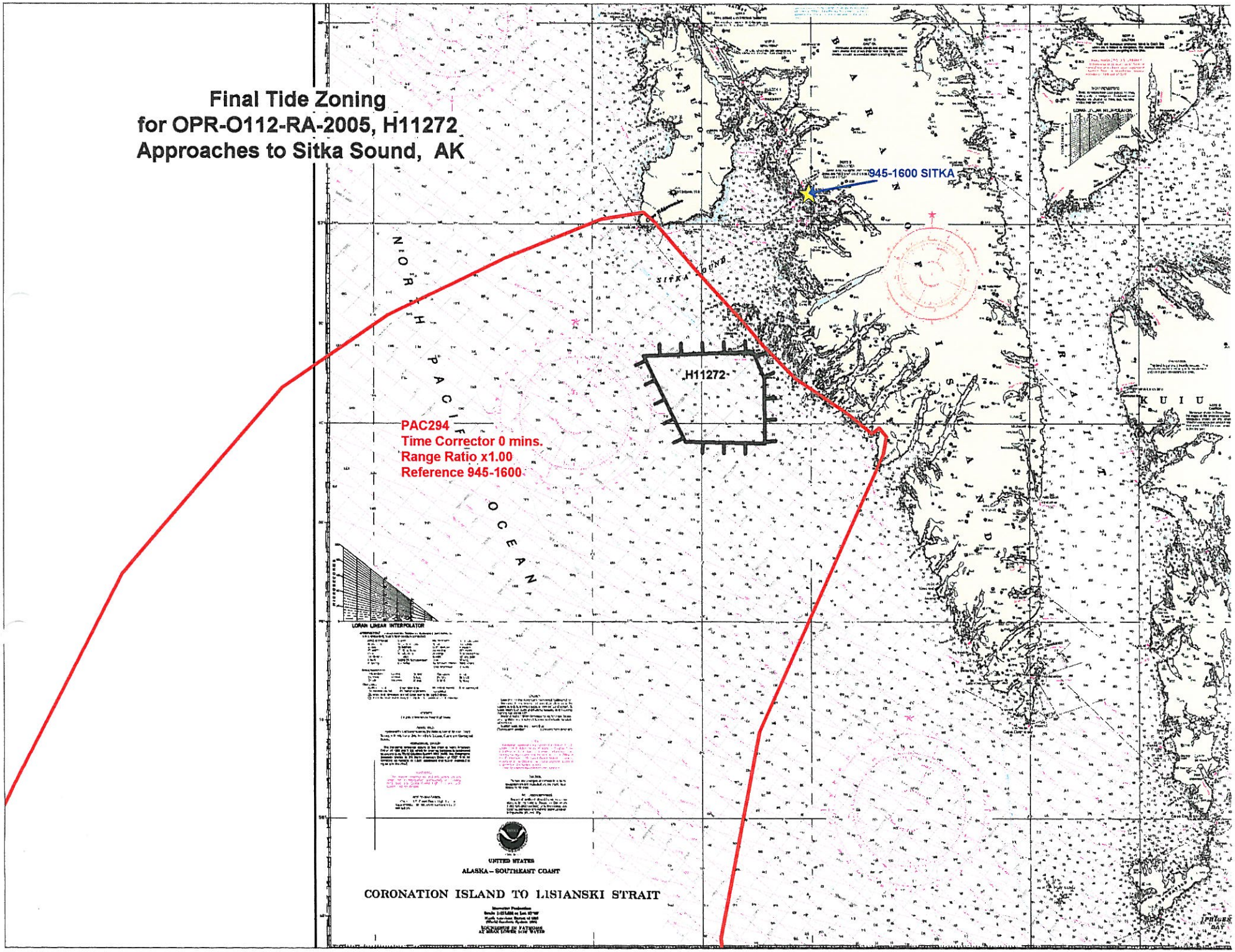
Final tide zone node point locations for OPR-O112-RA-2005, H11272

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 PAC294	945-1600	0	1.00

-135.440188 54.935465
-135.614954 55.795537
-135.492618 56.147404
-135.115122 56.61479
-135.10454 56.644458
-135.126555 56.659616
-135.148569 56.649656
-135.223263 56.683423
-135.384031 56.742995
-135.483657 56.799068
-135.560208 56.847672
-135.578921 56.858887
-135.678821 56.918667
-135.816846 57.006056
-135.846324 57.019177
-135.973296 57.007633
-136.264491 56.943316
-136.624163 56.848139
-136.947944 56.725833
-137.436839 56.413838
-138.019247 55.780057
-137.347411 55.196148
-136.26123 54.471396
-136.071777 54.627221
-135.440188 54.935465

Final Tide Zoning
for OPR-O112-RA-2005, H11272
Approaches to Sitka Sound, AK



H11272 HCell Report

Martha Herzog, 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 ENC and RNC in the region: NOAA ENCs, US3AK4PM and US5AK3GM, and NOAA RNCs, 17320 and 17326.

HCell compilation of survey H11272 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 H11272 were compiled to each largest scale chart where appropriate in the region, 17326, 1:40,000 and chart 17320, 1:80,000.

2. Soundings

A survey-scale sounding (SOUNDG) feature object layer was built from the 10-meter Combined Surface **H11272_Final_Combined_10m** 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 37,284 depths ranging from 37.9 to 192.0 meters.

Upper limit (m)	Lower limit (m)	Radius (mm)
0	10	3
10	20	4
20	50	4.5
50	200	5

In CARIS BASE Editor soundings were manually selected from the high density sounding layers and imported into a new layer created to accommodate chart density depths. 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 extents of the highest resolution BASE Surface together with the extents of the soundings layer were used to digitize the hydrographic extents, which were then used to create the single, all encompassing depth area (DEPARE).

3.2 Depth Contours

Depth contours at the intervals on the largest scale chart are included in the H11272_SS HCell for MCD raster charting division to use for guidance in creating chart contours. The generalized metric and fathom equivalent contour values are shown in the table below.

Chart Contours in Fathoms	Metric Equivalent of Chart Contours	Metric Equivalent of Chart Contours Generalized	Actual Value of Chart Contours
10	18.288	18.517	10.125
20	36.576	37.948	20.750
50	91.440	92.812	50.750
100	182.880	184.252	100.750

4. Meta Areas

The following Meta object areas are included in HCell H11272:

M_QUAL
M_COVR
M_CSCL

Meta area objects were constructed on the basis of the limits of the hydrography. (See 3.1 *Depth Areas*.)

5. Features

5.1 Generalization of Features to Chart Scale

Features gathered by field units are delivered to PHB and applied to the preliminary HCell without reduction in number or character. This preliminary HCell is used to perform evaluation and verification of survey soundings and features, features are deconflicted against hydrography, and geometry is corrected as needed. Linear and area features are also digitized against the BASE Surfaces, and features to be retained are imported from the chart. This features file is used as the basis for the final HCell compilation with features reduced to the largest scale RNC and ENC.

Pending further guidance from MCD, features generalization has been accomplished primarily through reduction in the number of features included in the HCell. Generalizing area features to point objects is entrusted to the RNC division. Where line and area objects are included in the HCell, complexity of the lines and edges comprising the features have been smoothed commensurate with chart scale.

5.2 Compilation of Features to the HCell

Bottom sample features were imported from ENCs US3AK4PM and US3AK3GM. The source of all features included in the H11272 HCell can be determined by the SORIND field.

6. S-57 Objects and Attributes

The H11272_CS HCell contains the following Objects:

$CSYMB	Blue Notes
DEPARE	The all-encompassing depth area
M_COVR	Data coverage Meta object
M_QUAL	Data quality Meta object
M_CSCL	Delineation of compilation scale
SBDARE	Bottom samples
SOUNDG	Soundings at the chart scale density

The H11272_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 H11272_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):	Fathoms and feet
Height Units (HUNI):	Feet
Positional Units (PUNI):	Meters

During creation of the HCell in CARIS BASE Editor and CARIS S-57 Composer, all soundings and features are maintained in metric units with as high precision as possible. Depth units for soundings measured with sonar maintain millimeter precision. Depths on rocks above MLLW and heights on islets above MHW are typically measured with range finder, so precision is less. Units and precision are shown below.

BASE Editor and S-57 Composer Units:

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

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 fathoms and feet charting units with NOAA rounding ensures that:

- All depths deeper or equal to 11 fathoms display as whole fathoms.
- All depth units between 0 fathoms (MLLW) and 11 fathoms display as fathoms and whole feet.
- All depth units skyward of 0 fathoms (MLLW) to 2.0 feet above MHW display in feet for values that round to 5 feet or less, and in fathoms and feet skyward of that.
- 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

9.1 Junction with H11508

H11272 junctions with H11135, submitted in May 2006. A common junction was made between the two surveys.

10. QA/QC and ENC Validation Checks

H11272 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 a 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

- H11272 Base Cell File, Chart Units, Soundings and features compiled to 1:40,000.
- H11272 Base Cell File, Chart Units, Soundings compiled to 1:20,000.
- H11272 Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items.
- H11272 Survey outline to populate the SURDEX.

11.2 File Naming Conventions

• Chart units base cell file, chart scale soundings	H11272 _CS.000
• Chart units base cell file, survey scale sounding set	H11272 _SS.000
• Descriptive Report package	H11272 _DR.pdf
• Survey outline	H11272_Outline.gml & *.xsd

11.3 Software

CARIS HIPS Ver. 6.1	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 2.2	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. Contacts

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

Martha Herzog, Physical Scientist, PHB, Seattle, WA; 206-526-6730;
Martha.herzog@noaa.gov.

APPROVAL SHEET
H11478

Initial Approvals:

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

Digitally signed by Martha Herzog
DN: cn=Martha Herzog, o=NOAA, ou=Pacific Hydrographic Branch, email=martha.herzog@noaa.gov, c=US
Date: 2009.05.26 12:39:15 -07'00'

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.

Digitally signed by Charles R. Davies
DN: cn=Charles R. Davies, o=Pacific Hydrographic Branch, ou=NOAA,NOS,OCS, email=Russ.Davies@NOAA.GOV, c=US
Date: 2009.05.27 14:18:55 -07'00'

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

Gary C. Nelson
2009.05.27
14:24:38 -07'00'

Digitally signed by Erin Nagel
DN: cn=Erin Nagel, o=NOAA, ou=NOAA-HSD-OCS, email=Erin.Nagel@noaa.gov, c=US
Reason: AWOIS & SURF Check Complete
Date: 2009.05.28 14:16:27 -04'00'