

H12034

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. H12034

LOCALITY

State Alaska

General Locality Keku Strait

Sublocality Northern Keku Strait

2009

CHIEF OF PARTY

Captain Donald W. Haines, NOAA

LIBRARY & ARCHIVES

DATE

HYDROGRAPHIC TITLE SHEET

H12034

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 Northern Keku Strait

Scale 1:5,000 Date of Survey May 19, 2009 - May 24, 2009

Instructions dated 4/2/2009 Project No. OPR-O180-RA-09

Vessel RA1 (1101), RA2 (1103), RA4 (2801), RA5 (2802), RA3 (2803), RA6 (2804)

Chief of party Captain Donald W. Haines, NOAA

Surveyed by RAINIER Personnel

Soundings by echo sounder, hand lead, pole Tilted Reson 8125, Knudsen 320M, Reson SeaBat 7125

Graphic record scaled by RAINIER Personnel

Graphic record checked by RAINIER Personnel Automated Plot N/A

SAR by Andrew Clos Compilation by Sarah Wolfskehl

Soundings in Feet at MLLW

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

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 H12034

Project OPR-O180-RA-09

Keku Strait, Alaska

Northern Keku Strait

Scale 1:5,000

May 2009

NOAA Ship *Rainier* (s221)

Chief of Party: Captain Donald W. Haines, NOAA

A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Project Instructions OPR-O180-RA-09 dated April 2, 2009 and all other applicable direction¹, with the exception of deviations noted in this report. The survey area is Northern Keku Strait, Alaska and corresponds to sheet "A" in the sheet layout provided with the Project Instructions. OPR-O180-RA-09 responds to a request from USCG to determine more accurate extents of shoals and dangers to navigation for improved placement of aids to navigation.

Complete multibeam echosounder (MBES) coverage was achieved in the survey area in waters 8 meters and deeper. In depths less than 8 meters additional MBES coverage was acquired to identify least depths over significant features or shoals, as appropriate for this survey. Additional multibeam coverage was achieved in water depths between 8 m and 4 m that meet or exceed the project instruction requirements. In the area of Rocky Pass, complete MBES coverage was attained regardless of depth as per the project instructions. Total mileage acquired by each vessel and system is reference in Table 1.

Data Acquisition Type	Hull Number with Mileage (nm)						Total
	1101	1103	2801	2802	2803	2804	
VBES (main scheme)	-	10.48	-	-	-	-	10.48
MBES (main scheme)	12.09	-	23.27	54.65	39.89	42.98	172.88
Crosslines	-	-	-	2.67	5.17	-	7.84
Developments	-	-	-	0.22	-	-	0.22
Shoreline	-	-	-	-	-	-	0
Bottom Samples	-	53	-	-	-	-	53
Total Number of Items Investigated	2	-	-	-	-	-	2
Total Area Surveyed (sq. nm)	-	-	-	-	-	-	2.89

Table 1: Statistics for survey H12034

Shoreline Verification was performed for the survey area seaward of the Navigable Area Limit Line (NALL) for H12034, as per section 3.5.5 of the Field Procedures Manual April 2009 (FPM). Shoreline features were given S-57 attribution and included for submission in Notebook HOB files.

Data acquisition was conducted from May 19 to May 24, 2009 (DN139 to DN144).

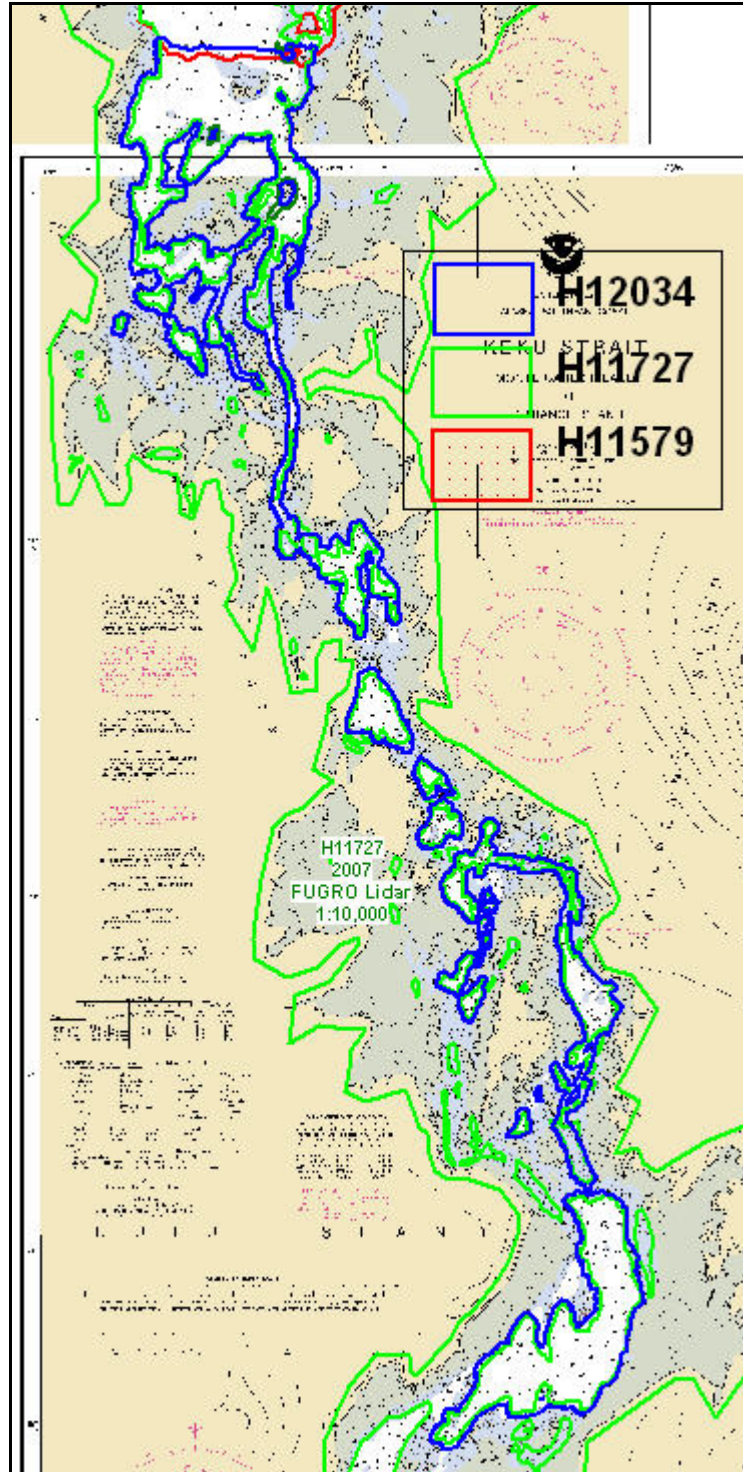


Figure 1: H12034 Survey Outline and Junctions

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-09 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.

B.1. Equipment and Vessels

Data for this survey were acquired by the following vessels:

Hull Number	Name	Length (ft)	Draft (ft)	Acquisition Type
1101	RA-1	29	2	Tilted Reson 8125 Multibeam Echosounder
1103	RA-2	29	2	Knudsen 320M Vertical Beam Echosounder Detached Positions Bottom Samples
2803	RA-3	29	3.5	Reson 7125 Multibeam Echosounder
2801	RA-4	29	3.5	Reson 7125 Multibeam Echosounder
2802	RA-5	29	3.5	Reson 7125 Multibeam Echosounder
2804	RA-6	29	3.5	Reson 7125 Multibeam Echosounder

Table 2: Data acquisition vessels and systems for H12034

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

Multibeam vessel navigation and attitude data were measured and recorded using Applanix POS/MV 320 systems, versions 4. Vertical Beam echosounder navigation and attitude data were measured using a Trimble DSM212L GPS receiver and a TSS MAHRS system.

A complete description of survey vessels, hardware, and software systems is included in the *OPR-O180-RA-09 DAPR*.

No unusual vessel configurations were used for data acquisition.

B.2. Quality Control

B.2.a. Crosslines

Multibeam Echosounder (MBES) crosslines totaled 7.84 nautical miles, comprising 4.53%³ of main scheme MBES hydrography. The mainscheme bathymetry was manually compared to the XL nadir beams in CARIS subset mode and generally agreed within 0.2 meters⁴.

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 2009 *Rainier* Hydrographic System Readiness Review package submitted with this survey.

B.2.b. Final Uncertainty

Uncertainty values of submitted, finalized grids are calculated in CARIS using the “Greater of the Two” of total propagated uncertainty and standard deviation (scaled to 95%). An IHO_1 “child” attribute layer was created for the H12034_Final_Combined surface in CARIS HIPS for analysis. Throughout the vast majority of the survey, uncertainty values for H12034 fall below the IHO levels as described in the NOS Specifications and Deliverables. The exception to these results occurred along very near-shore areas when using the tilted Reson 8125 sonar configuration, refer to OPR-O180-RA-09 Data Acquisition and Processing Report for specifics.

B.2.c. Junctions

Survey H12034 junctions with survey H11579 and H11727⁵, which is a FUGRO Lidar survey. The sheet limits and area of overlap can be seen in Figure 1.

Junction Survey	Survey Scale	Date of Survey	Survey Location
H11579	1:10,000	2006	North
H11727	1:10,000	2007	Near-shore Areas

Table 3: Junction surveys

A bathy attributed grid file (BAG) for H11579 was provided by Pacific Hydrographic Branch for junction comparison. H12034 BASE surfaces were compared to this junction surface in CARIS HIPS. Agreement was excellent with offsets within 0.2 meters⁶.

A CARIS BASE surface for H11727 was provided by Pacific Hydrographic Branch for junction comparison. A difference layer of the H12034_Combined surface and the provided LIDAR surface was created in CARIS DataBase Editor, and examined in DataBase and Notebook. Agreement was excellent with offsets within 0.5 meters⁷. The Lidar data was deeper than the MBES data except along the far western shore north of The Summit and in The Devil’s Elbow, but was consistently shoaler than the VBES data in common areas. See Figure 2. The difference surface is included with the Notebook HOB files for reference.

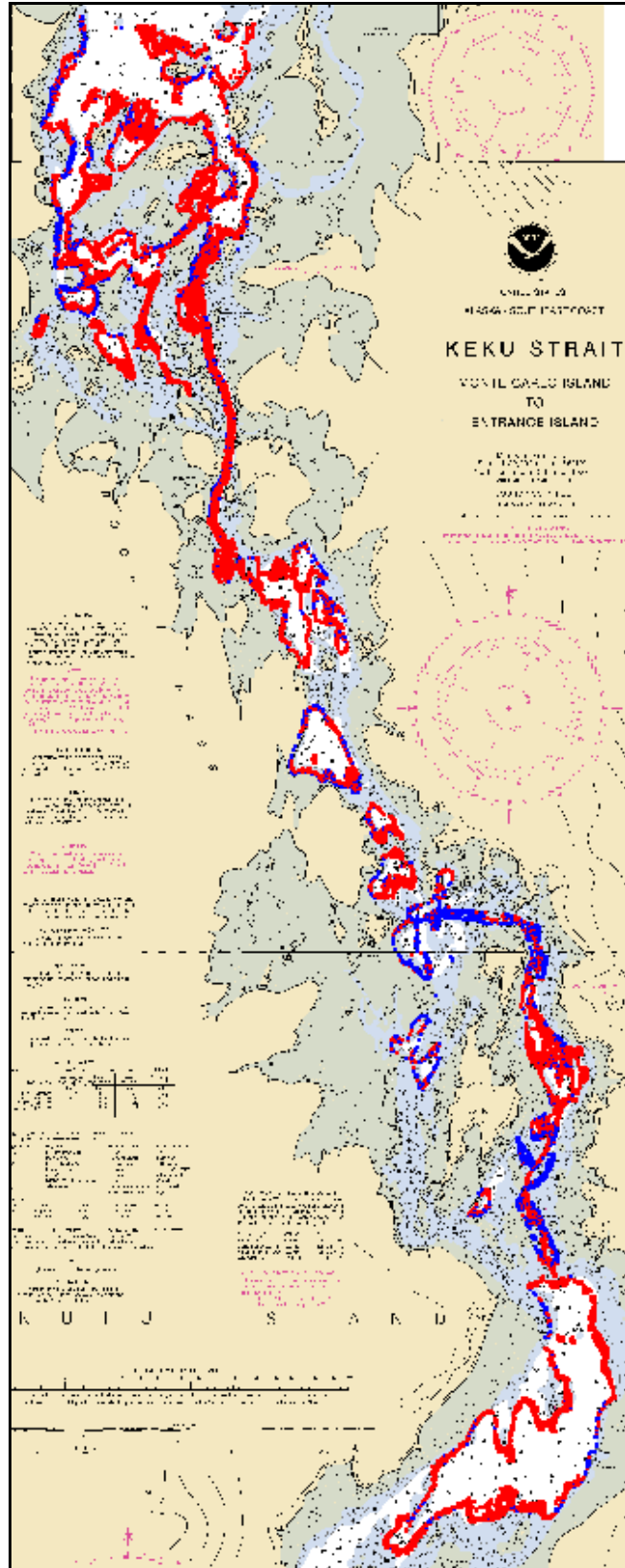


Figure 2: Difference surface comparing H12034 and LIDAR survey H11727. Red shows areas where the LIDAR is deeper than H12034, blue where the LIDAR is shallower.

B.2.d. Quality Control Checks

MBES quality control checks were conducted as discussed in the quality control section B of the DAPR.

B.2.e. Data Quality Factors

Sound Speed Artifacts

After correction for sound velocity in HDCS, some lines still exhibited the characteristic "frowns" indicative of inaccurate sound velocity corrections. These errors are due to heating of the extremely shallow water, many areas of freshwater runoff, and the extremely dynamic nature of such a narrow strait. Nowhere did these errors exceed 0.5m and, where the outer beams affected the surface, the outer beams were rejected by the hydrographer⁸.

Mid Water Column Acoustic Scatters

Throughout the survey, thick kelp often obscured the detection of the bottom. In the MBES data, removal of soundings obtained over kelp was not possible in HDCS Swath Editor, as there is no definitive way to determine if a sounding is on a feature such as a rock, or on kelp. In HDCS Subset Mode, in some instances, it was possible to discern the true bottom, as kelp often appeared as soundings "disconnected" from the continuous bottom. In these instances soundings over kelp were rejected. However, when unable to clearly distinguish between the bottom and kelp, the kelp was not rejected⁹.

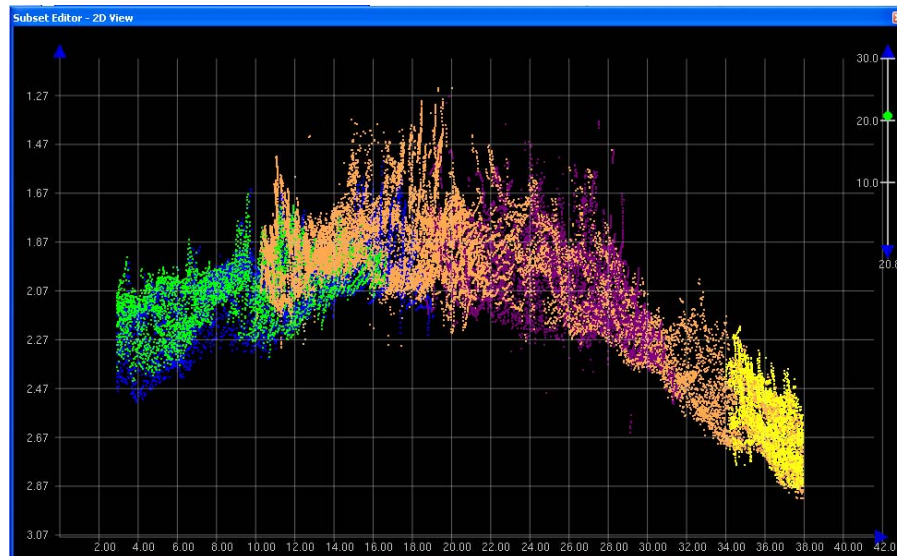


Figure 3: Cluttered seafloor in 2m of water. Note data slice is only 2m thick

Vertical Offsets

Data acquired for H12034 exhibited vertical offsets throughout the survey area, which were attributed to tide modeling error. Offsets fall within IHO Order 1 specifications, with the greatest difference of 0.33 meters in depth of 3.5 meters (Figure 4)¹⁰. These errors are greatest within and at the south end of the narrow channel known as "The Summit" which has

a controlling depth of 4ft. Within such a narrow and shallow channel, tide errors are expected due to the restriction of the tidal flow. Correspondence with the Center for Operational Oceanographic Products and Services (CO-OPS) regarding the tidal modeling of this area is included in Appendix V.

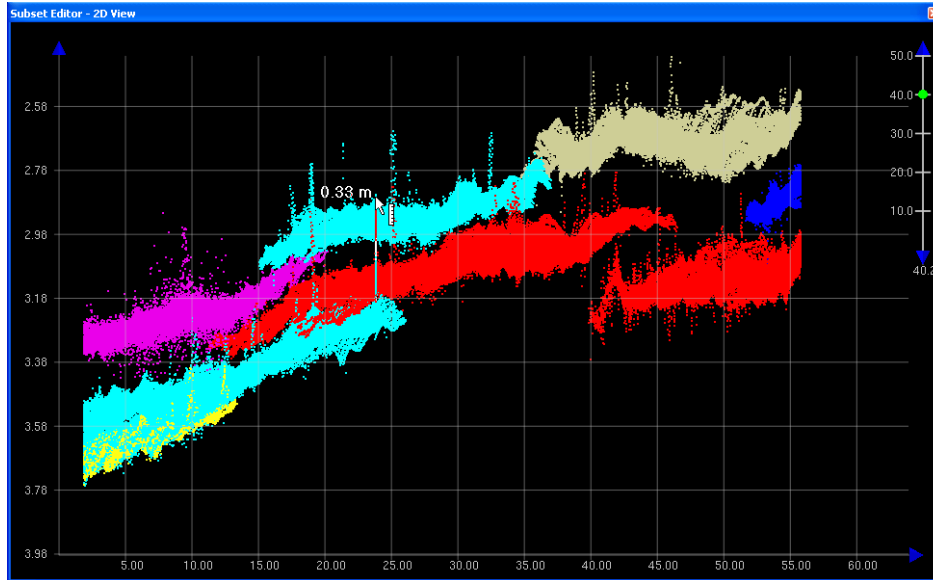


Figure 4: Vertically offset lines from just south of The Summit

B.2.f. Object Detection and Coverage Assessment

Complete coverage was obtained as per project instructions¹¹.

B.2.g. Unusual Conditions

No unusual conditions were encountered during the survey that affected the expected accuracy and quality of survey data.

B.3. Corrections to Echo soundings

Data reduction procedures for survey H12034 conform to those detailed in the *OPR-O180-RA-09 DAPR*.

B.4. Data Processing

Data processing procedures for survey H12034 conform to those detailed in the DAPR. Data were processed using CARIS HIPS & SIPS v6.1, Service Pack 2, and Hotfix 8. Additional processing details regarding Total Propagated Uncertainty (TPU/TPE) and CUBE Surfaces and Parameters utilized, along with any the deviations from the processing procedures outlined in the DAPR are discussed below.

TPU VALUES:

The survey specific parameters used to compute CARIS for H12034 are listed in Table 4.

Tide values:	Measured	0.01 m	Zoning	0.182 m
Sound Speed Values:	Measured	0.50 m/s	Surface	As per DAPR

Table 4: Survey Specific CARIS TPU Parameters

Many BASE surfaces were used in processing H12034. Final BASE surface resolutions and depth ranges were set according to Table 5 below, with field sheets smaller than 25×10^6 nodes. CUBE surfaces were processed with a parameter set corresponding to each resolution as per HTD 2009-2. The CUBE parameter XML file is included with the data deliverables. Vertical Beam data is submitted in a 2 meter resolution uncertainty surface and, with the exception of the final combined surface, was not included in submitted CUBE surfaces. The submission BASE Surface and Field Sheet structure are shown in Figures 5 and 6.

Depth Range (m)	Resolution (m)
0-23	1
20-52	2
46-115	4
103-350	8

Table 5: Depth range and surface resolutions for H12034

In addition, a 0.5m resolution BASE surface, H12034_AWOIS, was added over the search area for the one AWOIS object to ensure that all features were accurately portrayed in the bathymetric model. This practice reduced the number of designated soundings required.

Soundings and contours were generated in Caris HIPS from the final combined BASE surface for field unit review purposes. They are included for reference only and are not intended as a deliverable.

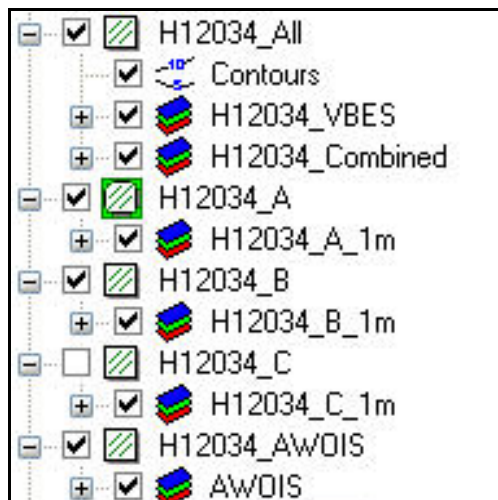


Figure 5: Field sheets and BASE surfaces submitted with H12034

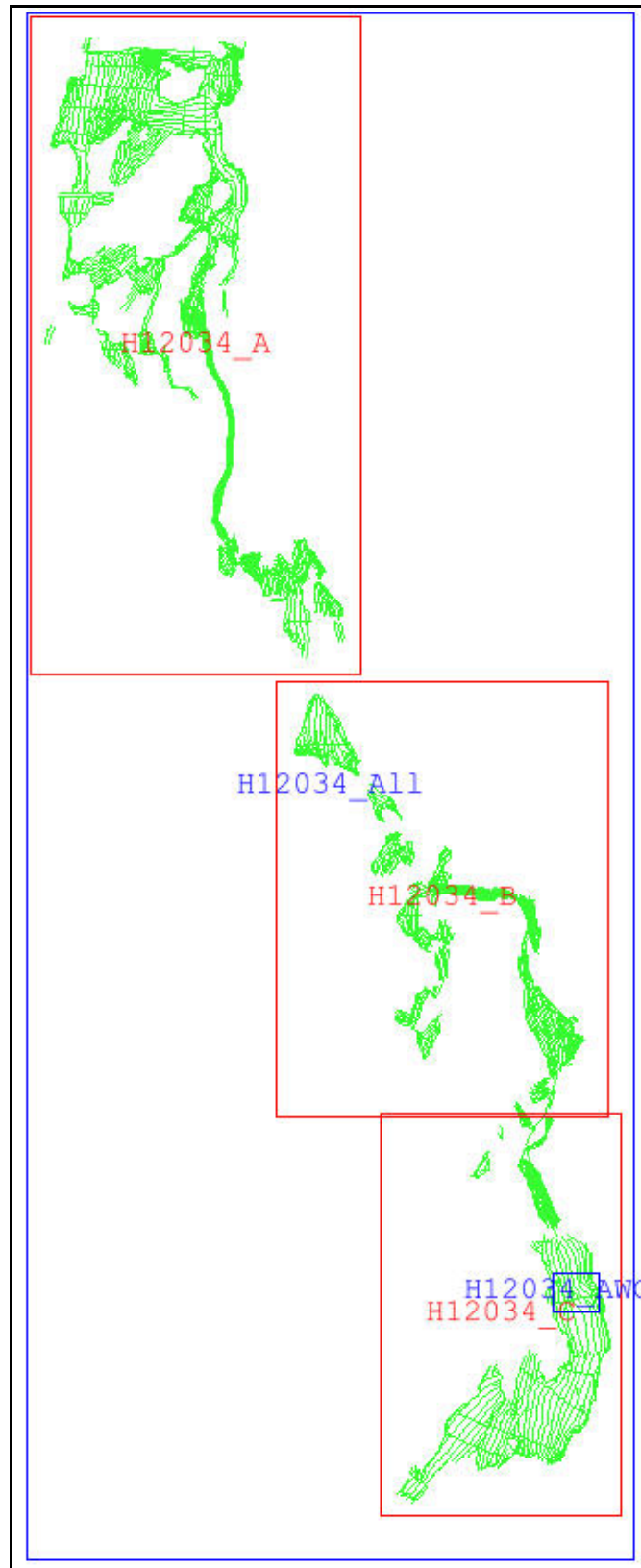


Figure 6: H12034 Field Sheet Layout

C. VERTICAL AND HORIZONTAL CONTROL

A complete description of vertical and horizontal control for survey H12034 can be found in the *OPR-O180-RA-09 Horizontal and Vertical Control Report*¹², submitted under separate cover. A summary of horizontal and vertical control for this survey follows.

C.1. 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 6.

Location	Frequency	Operator	Priority
Level Island	295 kHz	USCG	Primary
Biorka Island	305 kHz	USCG	Secondary

Table 6: Differential Corrector Sources for H12034

C.2. 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 Ketchikan, AK (945-0460) served as control for datum determination and as the primary source for water level reducers for survey H12034.

Rainier personnel installed a Sutron 8210 “bubbler” tide gauge at the following subordinate station in accordance with the Project Instructions. The gauge was installed in order to provide information to the Center for Operational Oceanographic Products and Services (CO-OPS N/OPS1) for the determination of time and height correctors. This station is described in detail in the *OPR-O180-RA-09 Horizontal and Vertical Control Report*.

Station Name	Station Number	Type of Gauge	Date of Installation	Date of Removal
The Summit	945-1349	30-day	April 25, 2009	May 26, 2009

Table 7: Tide Stations installed by Rainier personnel for H12034

Contrary to project instructions, TCARI tides were deemed unusable by CO-OPS (see correspondence in Appendix V¹³) and tide correctors were applied using tide zoning models. All data were reduced to MLLW using the final approved water levels from the Ketchikan (945-0460) and The Summit (945-1349) stations by applying tide files 9450460.tid and 9451349.tid and time and height correctors through the zone corrector file H12034CORF.zdf. **It will not be necessary for the Pacific Hydrographic Branch to reapply the final approved water levels to the survey data during final processing.**

The request for Final Approved Water Levels for H12034 was submitted to CO-OPS on June 2, 2009 in accordance with the Field Procedures Manual (FPM), dated April 2009. The Final Tide Note was received on August 25, 2009¹⁴. This documentation is included in Appendix IV¹⁵.

D. RESULTS AND RECOMMENDATIONS

D.1. Chart Comparison

D.1.a. Survey Agreement with Chart

Chart comparison procedures were followed as outlined in section 4.5 of the FPM and section 8.1.3-D.1 of the HSSDM, utilizing CARIS HIPS & SIPS software program.

Survey H12034 was compared with the following charts¹⁶:

Chart	Scale	Edition and Date	Local Notice to Mariners Applied Through
17372	1:20,000	11 th Ed, Sept 2003	06/2008

Table 8: Charts compared with H12034

Soundings from survey H12034 generally agreed with charted depths to within 6 feet with only isolated significant discrepancies as noted below and in section D.1.d. Most differences of greater than 3 feet were found in waters deeper than 40 feet and are thus not navigationally significant for this area, since the vessels transiting this area are of shallow draft due to the 4ft channel depth at The Summit¹⁷.

Only one area of significant discrepancy other than the two dangers to navigation was found when comparing charted depths with the soundings generated from the H12034 data. Northeast of the R “8” daymark in approximate position 56° 59.41’ N 133° 40.2’ W¹⁸, the charted depths of 22 and 28 fathoms are considerably shoaler than the survey soundings of 35 and 47 fathoms.

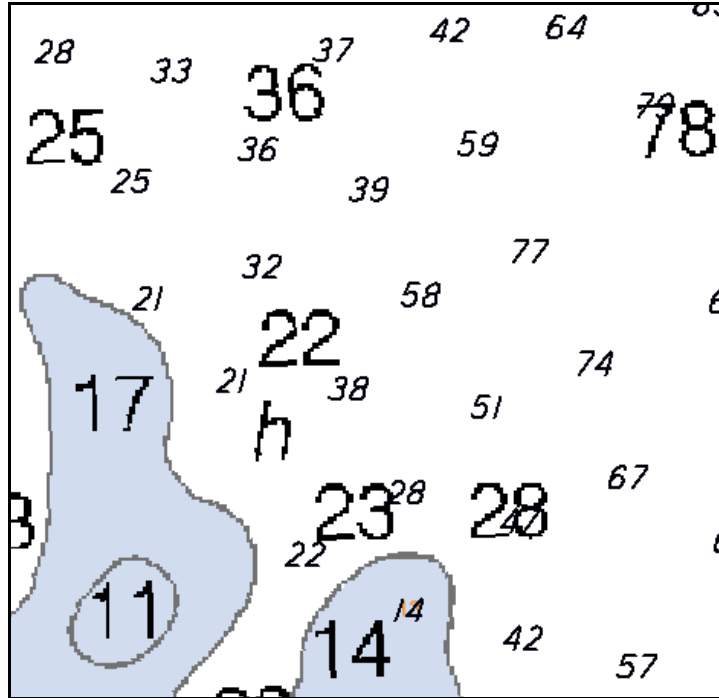


Figure 7: Charted soundings shoaler than measured depth

D.1.b. Automated Wreck and Obstruction Information System (AWOIS) Items

One (1) AWOIS item fell within the survey limits of H12034, and was assigned for full investigation. Descriptions of the AWOIS item investigation are included in the Survey Feature Report in Appendix II¹⁹.

AWOIS#	Latitude	Longitude	remark	recommendation
53748	56° 36' 00.6"	133° 40' 40.8"	Disproved w/ 100% MBES	remove

Table 9: Assigned AWOIS Items and the Hydrographer’s remarks and recommendations

While no navigationally significant submerged pilings were found within the search radius, there were four small objects, possibly pilings, to the west of the charted piling with heights of 0.3m to 0.8m above the seafloor, in depths of 8m to 12m.

D.1.c. Other Investigated Features

Additional Items

No additional charted items were investigated and no other features were located on survey H12034²⁰.

D.1.d. Dangers to Navigation

Two (2) Dangers to Navigation (DTONs) were found on survey H12034, and reported to the Marine Chart Division via email on 25 November, 2009. The original DTON submission package is included in Appendix I. Descriptions of each DTON are included in the Survey Feature Report in Appendix II²¹.

D.2. Additional Results

D.2.a. Shoreline Verification

Shoreline Source

Shoreline verification was accomplished using a combination of the composite source file (CSF) and project reference file (PRF) provided with the project instructions. The CSF has been created using the latest ENC's, most recent aerial photogrammetry, prior hydrographic surveys, and accepted Lidar survey features. Prior survey and Lidar features in the CSF are for reference. Lidar items assigned to the ship for further investigation were provided in the PRF as features with S-57 feature acronym BUAARE. The composite source along with Lidar items for further investigation are printed on paper "boat sheets" and displayed in CARIS Notebook and/or Hypack for field verification.

Shoreline Verification

Traditional "limited shoreline verification" was not required for this survey, since much of the near shore area was covered by junction Lidar survey H11727 and thus outside the limits of H12034. The following field procedures were followed:

- H11727 Lidar items selected for further investigation and provided in the PRF were addressed by visual, Detached Position (DP), VBES, or MBES techniques as appropriate and feasible, near predicted low water. Note that some of these features were located in areas unsafe to approach and/or were considered insignificant to navigation, and were not further investigated.
- The composite source file was used for orientation and navigation while transiting between assigned H12034 items. Composite source features noted to be both egregiously misrepresented in source data and significant to navigation were investigated. In some cases these items were inshore of the limits of H12034.
- All new, charted, and AWOIS items within the limits of H12034 (i.e., offshore of the limits prescribed in the Project Instructions and discussed in Section A.) were addressed.

Detached positions (DPs) were recorded and S-57 attributed and recorded in CARIS Notebook. These DPs indicate revisions to features and features not found on the verified shoreline. In addition, annotations describing shoreline were recorded on hard copy plots of digital shoreline, and transferred to the "remrks" attribute on the corresponding features in Notebook.

All shoreline data is submitted in CARIS Notebook HOB files. The session H12034_NTBK.wrk contains the following:

HOB File	Purpose and Contents
H12034_Comp_Source.hob	Original Source Data as provided for project OPR-O180-RA-09 and filtered to the limits of survey H12034
H11727_lidar_extents.hob	Extents of Lidar junction survey H11727
H12034_Reference.hob	Survey outline and limit lines, and AWOIS item positions and radii.
H12034_Final_Feature_File.hob	Composite source data modified by the field to best represent the shoreline at survey scale. This includes the addition of new features and modification of source features. This file retains all features neither verified nor disproved by this survey. This file contains “Lidar Investigation Features” that were confirmed to exist or were unable to be investigated.
H12034_Disprovals.hob	Composite source items which were deleted or modified in position or geographic type. This file contains Lidar investigation items that were found in the field to not exist.

Table 10: List and Description of Notebook HOB files

Recommendations

The Hydrographer recommends that the shoreline as depicted in the Notebook HOB files supersede and complement shoreline information compiled on the composite source file and charts as described above²².

D.2.b. Prior Survey Comparison

Prior survey comparison was not performed.

D.2.c. Aids to Navigation

Two (2) Aids to Navigation fell within the limits of H12034, R “30” and G “33”. All other ATONs fell within the limits of the Lidar Survey H11727. It should be noted that some of these ATONs are missing or damaged due to heavy abuse from winter ice and spring tide debris moving through the narrow and high current channels. However, United States Coast Guard is aware of this issue and is determining the optimal placement of the new ATONs. This is the reason this survey was requested. It is also worth noting that the green dayshape “25” is positioned on the shoreward most of two charted rocks at the mouth of The Summit channel, instead of the rock nearest to the channel²³.

D.2.d. Overhead Features

There are no overhead features within the survey limits of H12034.

D.2.e. Submarine Cables and Pipelines

There are no submarine cables or pipelines charted within the survey limits of H12034, and none were detected by the survey²⁴.

D.2.f. Ferry Routes

There are no ferry routes charted within the survey limits of H12034, and none were observed to be operating in the area.

D.2.g. Bottom Samples

There were 53 bottom samples collected on H12034. Of the 49 historic bottom sample sites collected, 38 did not agree with the charted characteristics. In most cases the charted bottom type was incorrectly labeled as hard or rocky, which is likely due to the heavy vegetation observed in the area preventing a good sample. All samples have been S-57 attributed and are included in H12034_Final_Features_File.hob in the CARIS Notebook session²⁵.

D.2.h. Other Findings

There are no other findings to report for this survey.

E. APPROVAL

As Chief of Party, field operations for hydrographic survey H12034 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 (April 2009 edition), Field Procedures Manual (April 2009 edition), Standing and Project Instructions, and all HSD Technical Directives issued through May 2009. 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>
Hydrographic Systems Readiness Review Package	<i>Under separate cover</i>	N/CS34
Data Acquisition and Processing Report for OPR-O180-RA-09	20-Nov-2009	N/CS34
Coast Pilot Report for OPR- O180-RA-09	<i>To be submitted</i>	N/CS26
Horizontal and Vertical Control Report for OPR-O180-RA-09	20-Nov-2009	N/CS34
Tides and Water Levels Package for OPR-O180-RA-09	17-Jun-2009	N/OPS1

Approved and Forwarded:



Donald W. Haines, CAPT/NOAA
I am approving this document
2009.12.02 10:45:14 -08'00'

Captain Donald W. Haines, NOAA
Commanding Officer, NOAA Ship *Rainier*

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

Survey Sheet Manager:



Russell Quintero
I am the author of this document
2009.12.02 07:19:22 -09'00'

Ensign Russell A. Quintero, NOAA
Junior Officer, NOAA Ship *Rainier*

Chief Survey Technician:



James B Jacobson
I have reviewed this document
2009.12.02 16:13:15 Z

James B. Jacobson
Chief Survey Technician, NOAA Ship *Rainier*

Field Operations Officer:



Brent Pounds
I have reviewed this document
2009.12.02 08:19:11 -09'00'

Lieutenant Brent J. Pounds, NOAA
Field Operations Officer, NOAA Ship *Rainier*

Revisions Compiled During Office Processing and Certification

¹ NOS Hydrographic Surveys Specifications and Deliverables (April 2009), OCS Field Procedures Manual for Hydrographic Surveying (April 2009), and all Hydrographic Surveys Technical Directives issued through the dates of data acquisition.

² Filed with Project Records

³ Concur with clarification. Does not meet 5% requirement for crosslines, but is sufficient for comparison purposes.

⁴ Concur

⁵ H12034 has been compiled in conjunction with LIDAR survey H11727. Each shares a common junction with H11579 to the north. LIDAR data does not meet object detection requirements and is therefore not used to supersede shoaler data or features.

⁶ Concur

⁷ Concur

⁸ Concur. Data meets Specifications.

⁹ Additional kelp area features were added to the HCell, as well as retained from the chart.

¹⁰ Concur

¹¹ Concur

¹² Filed with Project Records

¹³ Filed with Project Records and attached to this report

¹⁴ See attached Tide Note

¹⁵ Filed with Project Records

¹⁶ Office comparison was performed with Chart 17372, 11th Edition, NM 01/16/2010.

¹⁷ Concur

¹⁸ Concur with clarification. The approximate location of this discrepancy is 56° 35.82' N 133° 40.76' W. The deeper depths have been accurately represented in the HCell.

¹⁹ Concur with charting recommendation per AWOIS feature report; submerged piling is not included in the HCell. The Feature Report is appended to this report.

²⁰ Concur with Clarification, a wreck was found with LIDAR at position 56° 40' 41.73" N 133° 44' 53.11" W. Recommend adding this wreck to the AWOIS database.

²¹ The DTON located at 56° 36' 48.7" N 133° 41' 00.8" W is not included in the HCell. A shoaler sounding in the vicinity was found and charted. See attached DTON feature report.

²² Concur

²³ Chart ATONS per latest ATONIS information.

²⁴ Concur

²⁵ 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 applicable. In all, 52 field surveyed bottom samples are included in the HCell and 103 are retained from the chart.

H12034 Survey Feature Report

Registry Number: H12034
State: Alaska
Locality: Keku Strait, AK
Sub-locality: Northern Keku Strait
Project Number: OPR-O180-RA-09
Survey Dates: 05/21/2009 - 05/22/2009

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
17372	11th	09/01/2003	1:20,000 (17372_4)	USCG LNM: 07/10/2007 (12/09/2008) CHS NTM: None (11/28/2008) NGA NTM: None (12/13/2008)
17360	35th	06/01/2008	1:217,828 (17360_1)	[L]NTM: ?
16016	21st	10/01/2007	1:969,756 (16016_1)	[L]NTM: ?
531	24th	07/01/2007	1:2,100,000 (531_1)	[L]NTM: ?
500	8th	06/01/2003	1:3,500,000 (500_1)	[L]NTM: ?
530	32nd	06/01/2007	1:4,860,700 (530_1)	[L]NTM: ?
50	6th	06/01/2003	1:10,000,000 (50_1)	[L]NTM: ?

* Correction(s) - source: last correction applied (last correction reviewed--"cleared date")

Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	AWOIS	[no data]	[no data]	[no data]	---
2.1	Shoal	1.45 m	56° 36' 48.7" N	133° 41' 00.8" W	---
2.2	Rock	1.50 m	56° 35' 11.4" N	133° 41' 16.2" W	---

1 - AWOIS Features

1.1) AWOIS #53748 - OBSTRUCTION

No Primary Survey Feature for this AWOIS Item

Search Position: 56° 36' 00.6" N, 133° 40' 40.8" W
Historical Depth: [None]
Search Radius: 200
Search Technique: MB
Technique Notes: [None]

History Notes:

Undetermined source.

Survey Summary

Charts Affected: 17372_4, 17360_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

no piling seen, however there is significant shoaling over a broad area. Rises to a depth of 6.5m in an area with prevailing depths of 11.5m

Feature Correlation

Address	Feature	Range	Azimuth	Status
OPR-O180-RA-09awois	AWOIS # 53748	0.00	000.0	Primary

Hydrographer Recommendations

delete

S-57 Data

[None]

Feature Images

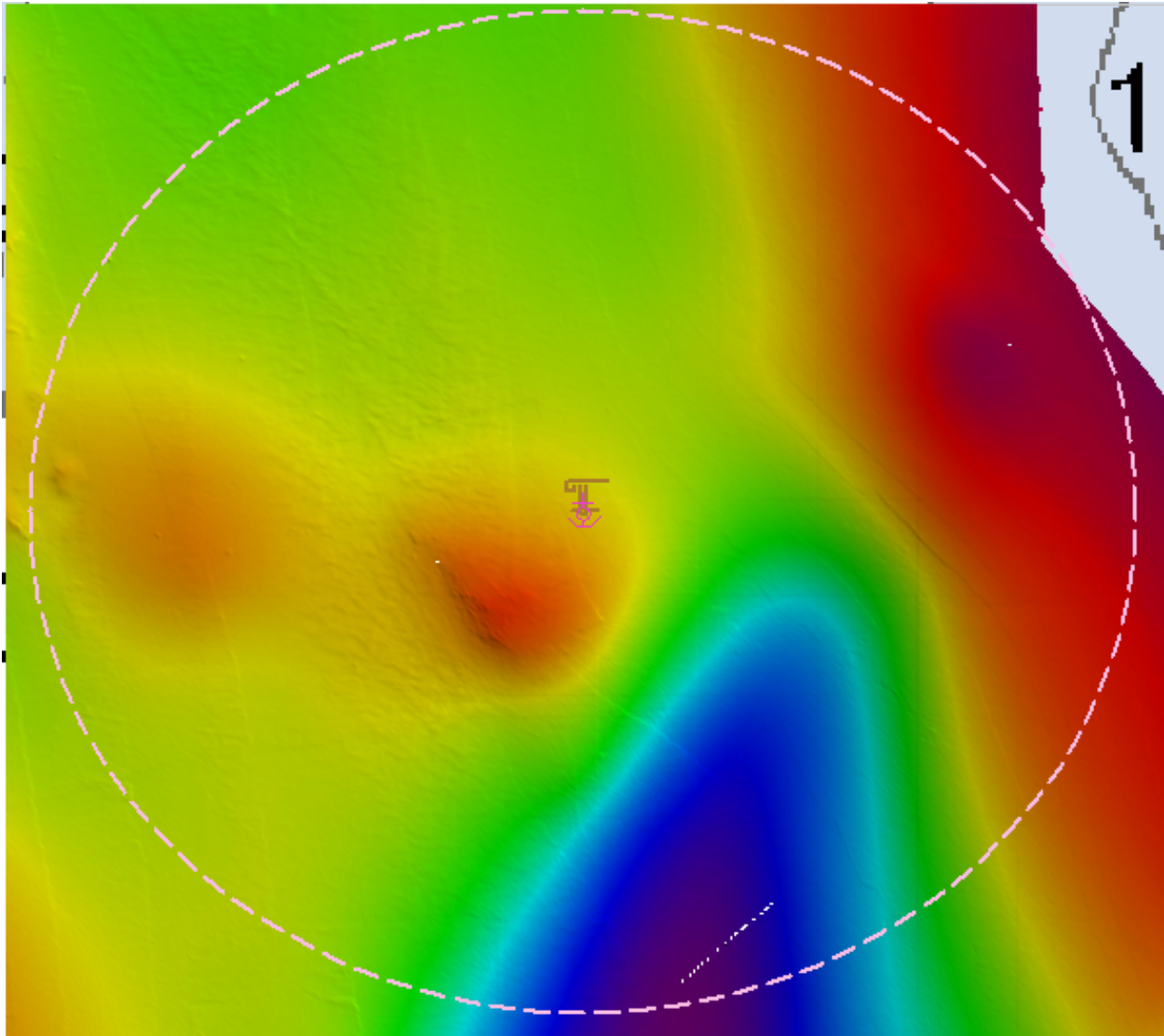


Figure 1.1.1

2 - Dangers to Navigation

2.1) Profile/Beam - 165/30 from h12034 / 2802_reson7125_hf_512 / 2009-141 / 000a0109

DANGER TO NAVIGATION

Survey Summary

Survey Position: 56° 36' 48.7" N, 133° 41' 00.8" W
Least Depth: 1.45 m (= 4.76 ft = 0.793 fm = 0 fm 4.76 ft)
TPU (±1.96σ): **THU (TPEh)** ±1.960 m ; **TVU (TPEv)** ±0.715 m
Timestamp: 2009-142.01:09:52.180 (05/22/2009)
Survey Line: h12034 / 2802_reson7125_hf_512 / 2009-141 / 000a0109
Profile/Beam: 165/30
Charts Affected: 17372_4, 17360_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

5' sounding beyond the 10' contour suggests a deep channel that is not present.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12034/2802_reson7125_hf_512/2009-141/000a0109	165/30	0.00	000.0	Primary

Hydrographer Recommendations

chart and redraw contours

Cartographically-Rounded Depth (Affected Charts):

- 5ft (17372_4)
- 0 ¾fm (17360_1, 16016_1, 530_1)
- 0fm 5ft (531_1)
- 1.5m (500_1, 50_1)

S-57 Data

Geo object 1: Sounding (SOUNDG)
Attributes: QUASOU - 1:depth known
 SORDAT - 20090524

SORIND - US,US,survey,H12034

TECSOU - 3:found by multi-beam

Feature Images

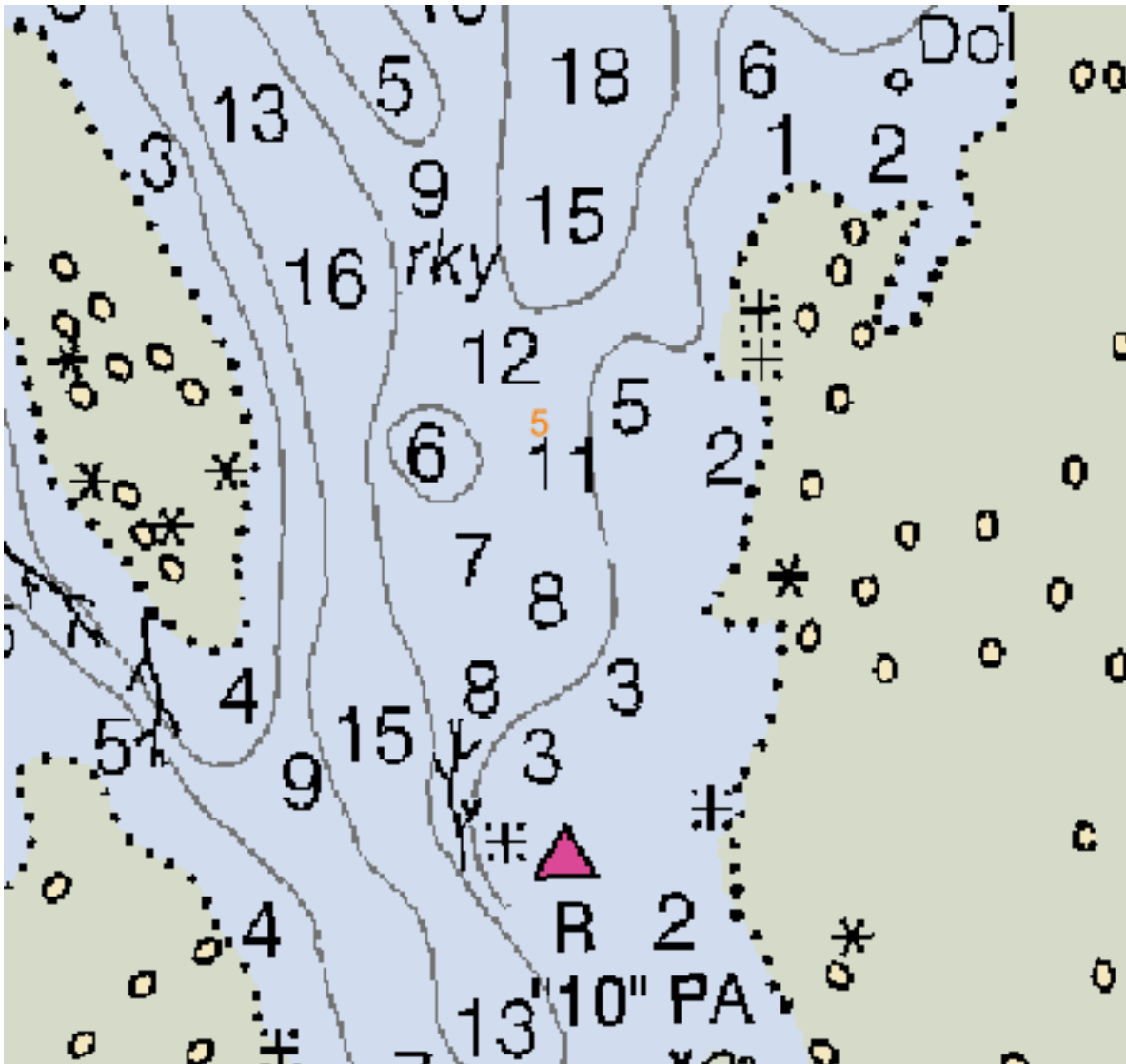


Figure 2.1.1

2.2) Profile/Beam - 355/433 from h12034 / 2804_reson7125_hf_512 / 2009-141 / 001_2121

DANGER TO NAVIGATION

Survey Summary

Survey Position: 56° 35' 11.4" N, 133° 41' 16.2" W
Least Depth: 1.50 m (= 4.92 ft = 0.820 fm = 0 fm 4.92 ft)
TPU (±1.96σ): **THU (TPEh)** ±1.961 m ; **TVU (TPEv)** ±0.716 m
Timestamp: 2009-141.21:21:48.097 (05/21/2009)
Survey Line: h12034 / 2804_reson7125_hf_512 / 2009-141 / 001_2121
Profile/Beam: 355/433
Charts Affected: 17372_4, 17360_1, 16016_1, 531_1, 500_1, 530_1, 50_1

Remarks:

5' sounding on charted 8'.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12034/2804_reson7125_hf_512/2009-141/001_2121	355/433	0.00	000.0	Primary

Hydrographer Recommendations

update sounding

Cartographically-Rounded Depth (Affected Charts):

- 5ft (17372_4)
- 0 ¾fm (17360_1, 16016_1, 530_1)
- 0fm 5ft (531_1)
- 1.5m (500_1, 50_1)

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: QUASOU - 1:depth known
 SORDAT - 20090524

SORIND - US,US,survey,H12034

STATUS - 1:permanent

TECSOU - 3:found by multi-beam

VALSOU - 1.500 m

WATLEV - 3:always under water/submerged

Feature Images

29

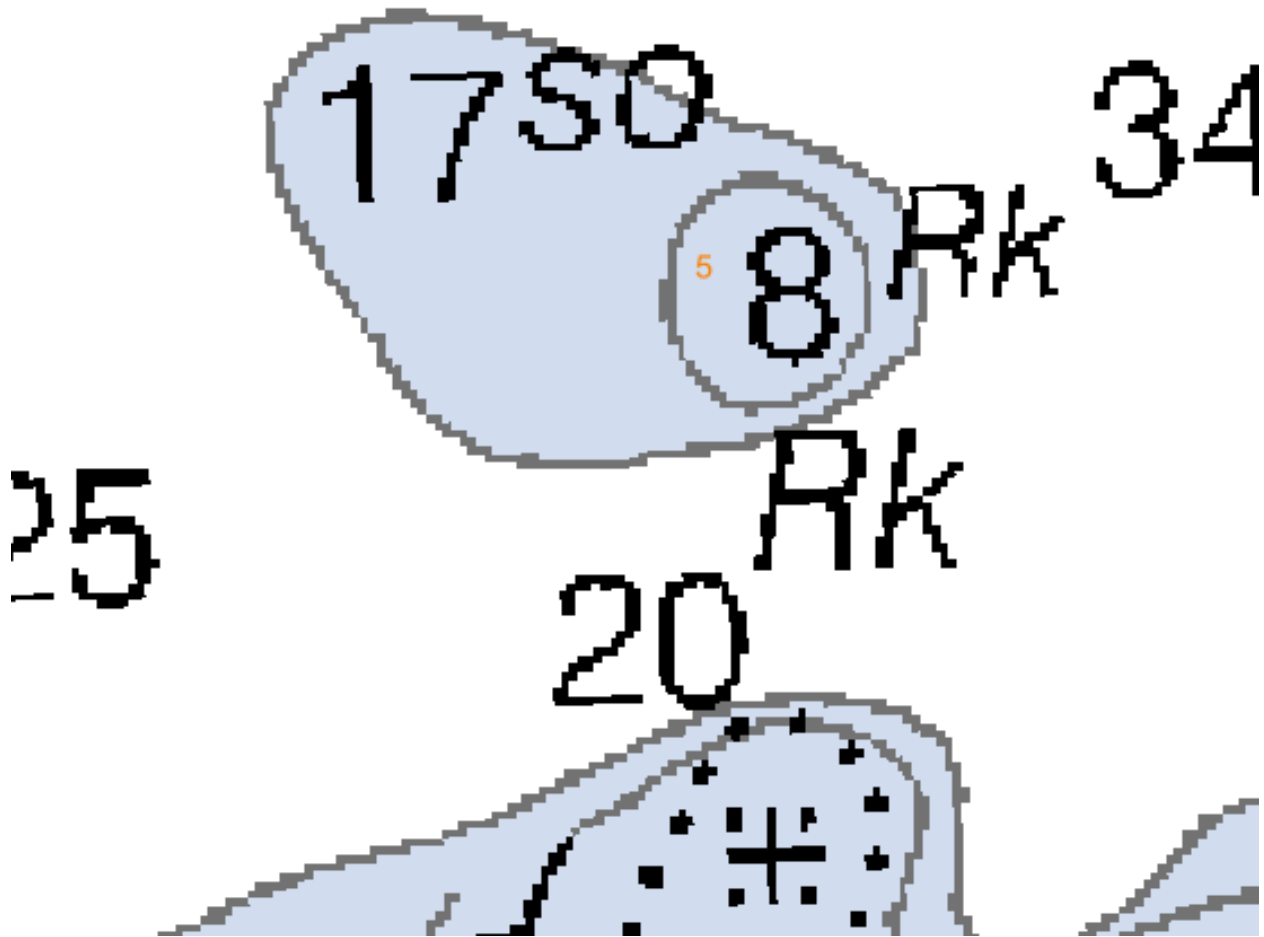


Figure 2.2.1

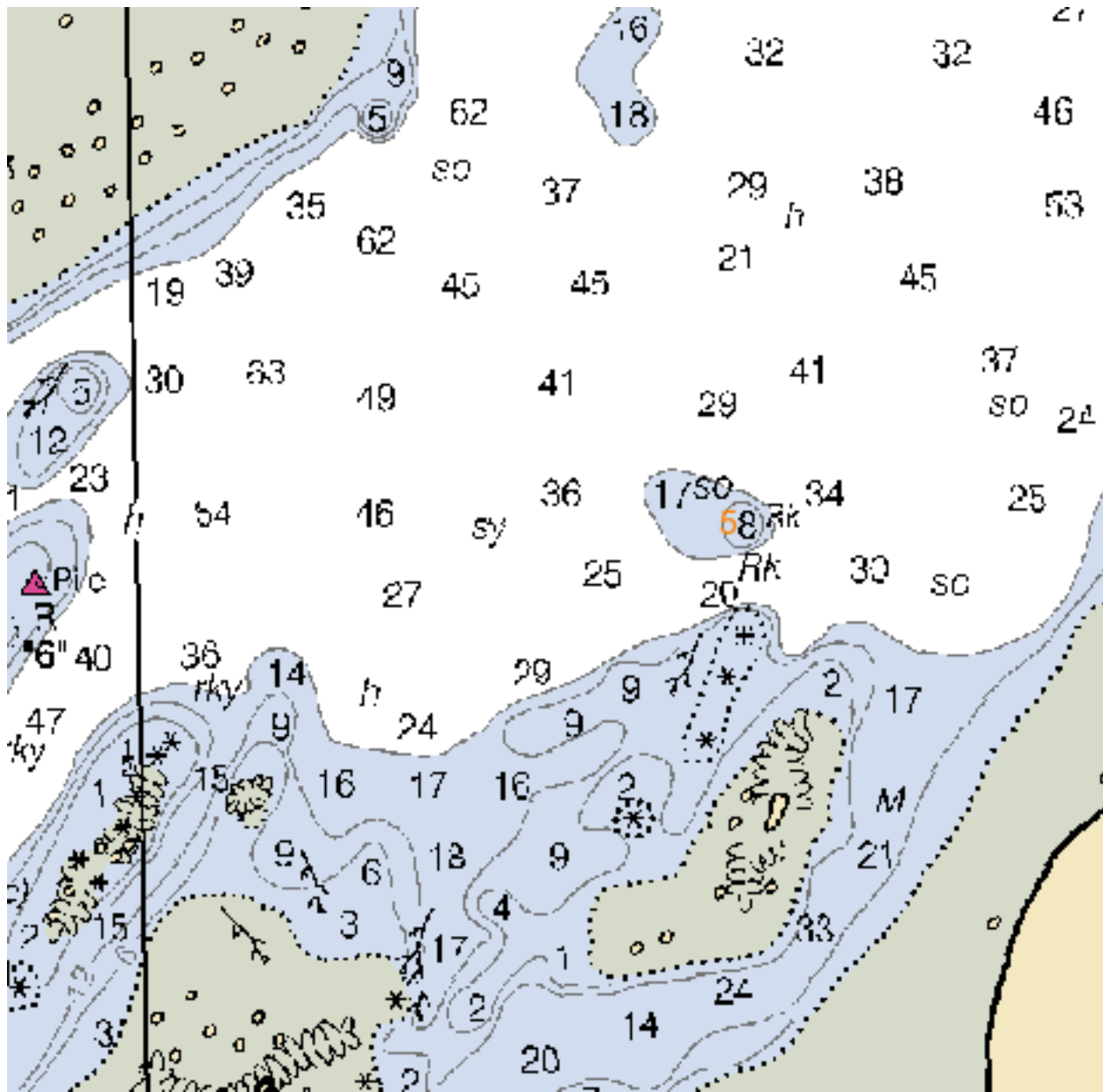


Figure 2.2.2



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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : August 25, 2009

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-O180-RA-2009
HYDROGRAPHIC SHEET: H12034

LOCALITY: Northern Keku Strait, AK
TIME PERIOD: May 19 - 25, 2009

TIDE STATION USED: 945-1349 The Summit
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: 4.365 meters

REMARKS: RECOMMENDED ZONING

Use zone(s) identified as: SA200, SA408, SA409, SA410, SA410A,
SA410B, SA411, SA412, SA413, SA414,
SA415, SA416 and SA417

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).

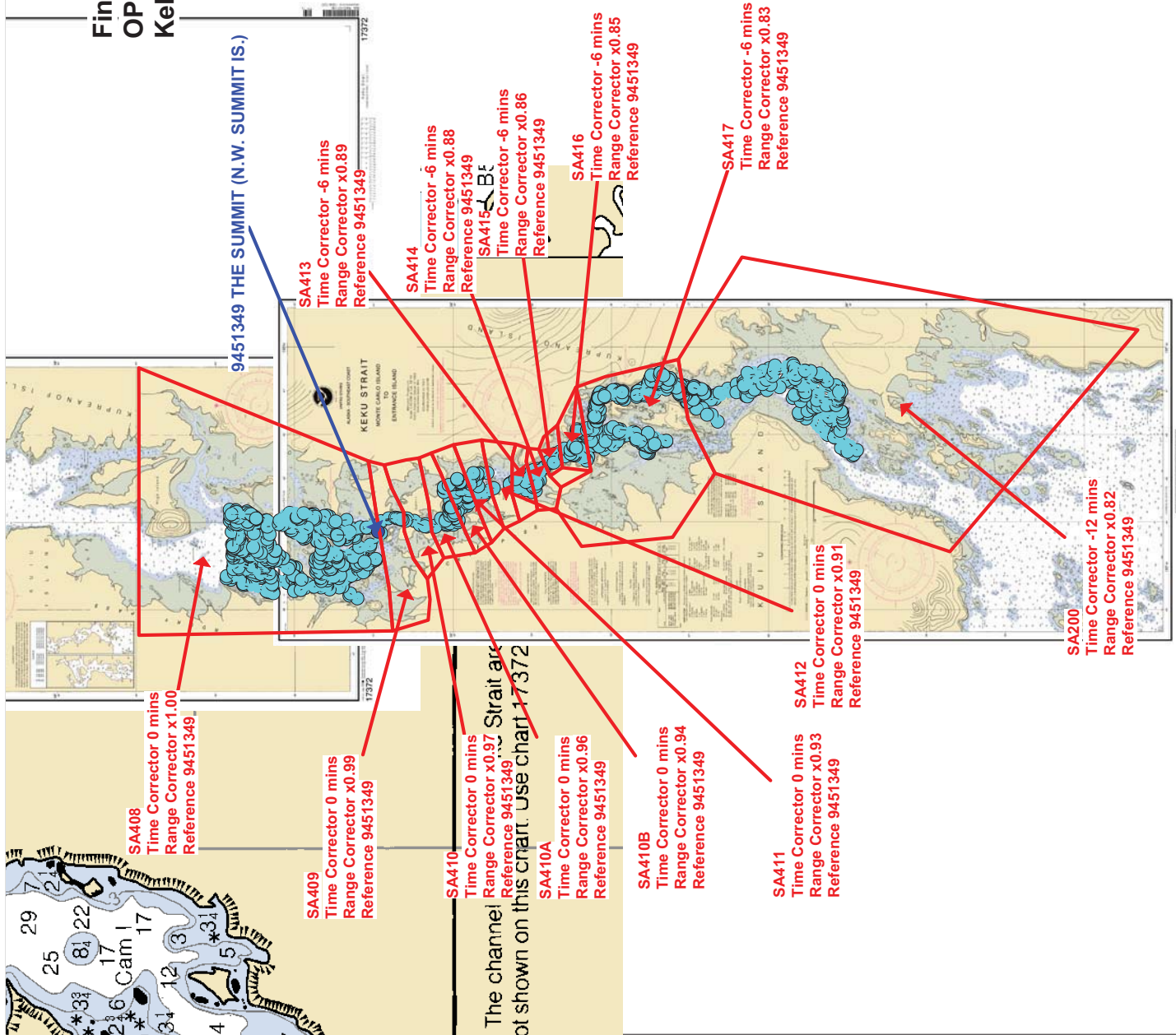
Peter J. Stone

Digitally signed by Peter J. Stone
DN: cn=Peter J. Stone, o=CO-OPS,
ou=NOAA/NOS,
email=peter.stone@noaa.gov, c=US
Date: 2009.08.26 16:42:41 -04'00'

CHIEF, OCEANOGRAPHIC DIVISION



Final Tidal Zoning for OPR-O180-RA-2009, H12034 Keku Strait, AK



Subject: [Fwd: Re: [Fwd: Re: Final Tides for OPR-O180-RA-2009 H12034 & H12035]]
From: FOO Rainier <FOO.Rainier@noaa.gov>
Date: Wed, 28 Oct 2009 10:23:24 -0800
To: ChiefST.Rainier@noaa.gov

Subject: Re: [Fwd: Re: Final Tides for OPR-O180-RA-2009 H12034 & H12035]
From: Lijuan Huang <Lijuan.Huang@noaa.gov>
Date: Tue, 08 Sep 2009 16:06:52 -0400
To: _OMAO MOP FOO RAINIER <FOO.Rainier@noaa.gov>
CC: NOS.COOPS.HPT@noaa.gov

Hi Brent,
The estimated tidal error (TPU/TPE) for O180 is 0.364 m. Let me know if you have any questions.

Lijuan
Carolyn Lindley wrote:

FYI, anyone have a chance to address this today? I have HAB this morning and need to move this afternoon.

Subject:
Re: Final Tides for OPR-O180-RA-2009 H12034 & H12035
From: FOO Rainier <FOO.Rainier@noaa.gov>
Date: Fri, 04 Sep 2009 20:37:00 -0800
To: Carolyn.Lindley@noaa.gov
To: Carolyn.Lindley@noaa.gov

Carolyn,

We have received the discrete zoning files for Keku, but I am not sure what TPU (formerly TPE) values should be associated with this zoning? Could you please provide this information or direct me to where I can locate it?

Thanks,
LT Brent Pounds, NOAA
Field Operations Officer
NOAA Ship Rainier

Carolyn Lindley wrote:

Just wanted to give you a heads up that we found an issue today in terms of how well the TCARI grid interpolates through the narrow passage way near Beck Island that is of concern. We will generate discrete zoning for the survey area and send it out as final tides for these two registry sheets.

Thanks,
Carolyn

FOO Rainier wrote:

I am unable to open the zipped files available on the ftp server. H12035 downloads as 0-bytes and appears to be empty and H12034 downloads as 1.00-MB, but will not open and gives the following error

"Cannot open file: it does not appear to be a valid archive." Please advise. Thank you for your attention to this matter.

V/R,
LT Brent Pounds, NOAA
Field Operations Officer
NOAA Ship /Rainier/

Carolyn Lindley wrote:

DATE: 08/21/2009 MEMORANDUM FOR: CDR David Neander
Chief, Pacific Hydrographic Branch

FROM: Gerald Hovis
Oceanographic Division/Requirements and Development Division,
N/OPS1

SUBJECT: Delivery of Tide Requirements for Hydrographic Surveys

Attached are Final Tide Notes for hydrographic survey project OPR-O180-RA-2009, registry Nos. H12034 & H12035. A final TCARI Grid for OPR-O180-RA-2009, H12034 & H12035 are being provided at ftp://140.90.121.83/pub/outgoing/HPT/Smooth_Tides_TCARI/O180RA2009/H12034 and ftp://140.90.121.83/pub/outgoing/HPT/Smooth_Tides_TCARI/O180RA2009/H12035. Six minutes verified data for Ketchikan, AK (945-0460) and The Summitt, AK (945-1349) may be retrieved in one month increments over the internet from the CO-OPS Home Page at <http://tidesandcurrents.noaa.gov/olddata> by clicking on "Verified Data".

Please let us know when you have retrieved all files.

--
Name: Lijuan Huang
Title: IMSG Contractor
Organization: NOAA/NOS/CO-OPS
Address: 1305 East-West Highway
N/OPS3, Sta. 6342, SSMC4
Silver Spring, MD 20910-3218
Email: lijuan.huang@noaa.gov
Phone: 1-301-713-2890 x192

Re: [Fwd: Re: Final Tides for OPR-O180-RA-2009 H12034 & H12035].eml	Content-Type: message/rfc822 Content-Encoding: 7bit
--	--

H12034 HCell Report
Sarah Wolfskehl, Physical Scientist
Pacific Hydrographic Branch

1. Specifications, Standards and Guidance Used in HCell Compilation

HCell compilation of survey H12034 used:

Office of Coast Survey HCell Specifications: Draft, Version: 4.0, 17 March, 2010.
HCell Reference Guide: Version 2.0, 22 February, 2010.

2. Compilation Scale

Depths and features for HCell H12034 were compiled to the largest scale raster charts shown below:

Chart	Scale	Edition	Edition Date	NTM Date
17372	1:20,000	11th	9/01/2003	01/16/2010
17372 (insets)	1:10,000	11th	9/01/2003	01/16/2010

The following ENC's were also used during compilation:

Chart	Scale
US5AK3JM	1:20,000

3. Soundings

A survey-scale sounding (SOUNDG) feature object layer was built from the H12034 1-meter Combined Surface and the junction LIDAR survey H11727 3-meter combined surface in CARIS BASE Editor. A shoal-biased selection was made at 1:5,000 survey scale using a Radius Table file with values shown in the table below.

Shoal Limit (m)	Deep Limit (m)	Radius (mm)
0	30	2.25

A separate sounding layer of higher density was created for areas covering the insets. Radius Table values are shown below.

Shoal Limit (m)	Deep Limit (m)	Radius (mm)
0	30	1.75

In CARIS BASE Editor soundings were manually selected from the high density sounding layers (SS) and imported into a new layer (CS) created to accommodate chart density depths. Manual selection was used to accomplish a density and distribution that closely represents the seafloor morphology.

4. 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 metric and feet equivalent contour values are shown in the table below.

Chart Contour Intervals in Feet from Chart 17372	Metric Equivalent to Chart Feet, Arithmetically Rounded	Metric Equivalent of Chart Feet, with NOAA Rounding Applied	Feet with NOAA Rounding Applied	Feet with NOAA Rounding Removed for Display on H12034_SS.000
0	0	0.000	0.000	0
6	1.8288	2.0574	6.749	6
12	3.6576	3.8862	12.749	12
18	5.4864	5.715	18.749	18

The MLLW and MHW lines included in HCell were created by Fugro using CARIS Field Sheet Editor v6.1 from the H11727 LIDAR 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.

With the exception of the zero contours included in the *_CS file, contours 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, 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.

5. Meta Areas

The following Meta object areas are included in HCell H12034:

M_QUAL
M_CSCL

The Meta area objects were constructed on the basis of the limits of the hydrography.

6. Features

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 may be modified to emulate chart scale per the HCell Reference Guide on compiling features to the chart scale HCell.

7.S-57 Objects and Attributes

The *_CS HCell contains the following Objects:

\$CSYMB	Blue Notes
COALNE	Coastline, MHW
DEPCNT	MLLW
LNDARE	Islands and islets
LNDELV	Height of islands and islets
MORFAC	Mooring facility
M_CSCL	Compilation scale Meta area to define an inset
M_QUAL	Data quality Meta object
OBSTRN	Obstruction objects
PILPNT	Pilings
SBDARE	Ledges and reefs, bottom samples, and rocky seabed areas
SLCONS	Shoreline Construction
SOUNDG	Soundings at the chart scale density
UWTROC	Rock features
WEDKLP	New and retained kelp areas
WRECKS	Wrecks

The *_SS HCell contains the following Objects:

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

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

See the HCell Reference Guide for details of conversion from metric to charting units, and application of NOAA rounding.

9. Data Processing Notes

There were no significant deviations from the standards and protocols given in the HCell Specification and HCell Reference Guide.

10. QA/QC and ENC Validation Checks

H12034 was subjected to QA checks in S-57 Composer prior to exporting to the metric 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

H12034_CS.000 Base Cell File, Chart Units, Soundings and features compiled to 1:20,000
 H12034_SS.000 Base Cell File, Chart Units, Soundings and Contours compiled to 1:5,000
 H12034_DR.pdf Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
 H12034_outline.gml Survey outline
 H12034_outline.xsd Survey outline

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, meta area objects, and Blue Notes; Survey evaluation and verification; Initial HCell assembly.
CARIS S-57 Composer Ver. 2.1	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, SP 1	Validation of the base cell file.
Northport Systems, Inc., Fugawi View ENC Ver.1.0.0.3	Independent inspection of final HCells using a COTS viewer.

12. Contacts

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
H12034

Initial Approvals:

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