H12086

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.

Registry No. H12086

LOCALITY

State Alaska

General Locality Southern Portion of Cook Inlet

Sublocality Tutka Bay

2009

CHIEF OF PARTY
Captain Donald W. Haines, NOAA

LIBRARY & ARCHIVES

DATE

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

HYDROGRAPHIC TITLE SHEET

REGISTRY No

H12086

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: N/A

State: Alaska

General Locality: Southern Portion of Cook Inlet

Sub-Locality: Tutka Bay

Scale: 1:10,000 Date of Survey: 09/03/2009 to 09/08/2009

Instructions dated: 7/16/2009 Project No.: OPR-P357-RA-FA-09

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

Chief of party: Captain Donald W. Haines, NOAA

Surveyed by: RAINIER Personnel

Soundings by: Reson SeaBat 8125, 8101, 7125 and Knudsen 320M

SAR by: Joe Tegeder Compilation by: Fernando Ortiz

Soundings compiled in: Fathoms

REMARKS: All times are UTC. UTM Projection 5

The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. Revisions and end notes in red were generated during office processing.

Page numbering may be interrupted or non sequential.

All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via http://www.ngdc.noaa.gov/.

Descriptive Report to Accompany Hydrographic Survey H12086

Project OPR-P357-RA-FA-09
Southern Portion of Cook Inlet, Alaska
Tutka Bay
Scale 1:10,000
September 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-P357-RA-FA-09 dated July 16, 2009 and all other applicable direction[1], with the exception of deviations noted in this report. The survey area is Tutka Bay and corresponds to sheet "C" in the sheet layout provided with the Project Instructions. The purpose of this project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts, in addition to supporting a total regional examination of Kachemak Bay.

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 or vertical beam echosounder (VBES) coverage was acquired to identify least depths over significant features or shoals, as appropriate for this survey. Additional multibeam and vertical beam coverage was achieved in water depths between 8 m and 4 m that meet or exceed the project instruction requirements.[1] 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)	-	-	-	-	-	-	-
MBES (main scheme)	20.80	-	24.78	33.37	15.17	2.02	96.14
SSS (main scheme)	-	-	-	-	-	-	-
Crosslines	-	-		2.22	0.92	-	3.14
Developments	-	-	-	-	-	-	
Shoreline	-	18.47	-	-	-	-	18.47
Bottom Samples	-		-	-	-	-	-
Total Number of Items Investigated	-	-	-	-	-	-	-
Total Area Surveyed (sq. nm)	-	-	-	-	-	-	3.702

Table 1: Statistics for survey H12086

Limited Shoreline Verification was performed for the survey area seaward of the Navigable Area Limit Line (NALL) for H12086, as per section 3.5.5 of the Field Procedures Manual

[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.

April 2009 (FPM). Shoreline features were given S-57 attribution and included for submission in Notebook HOB files.

Data acquisition was conducted from September 3 to September 8, 2009 (DN 246 to 251).

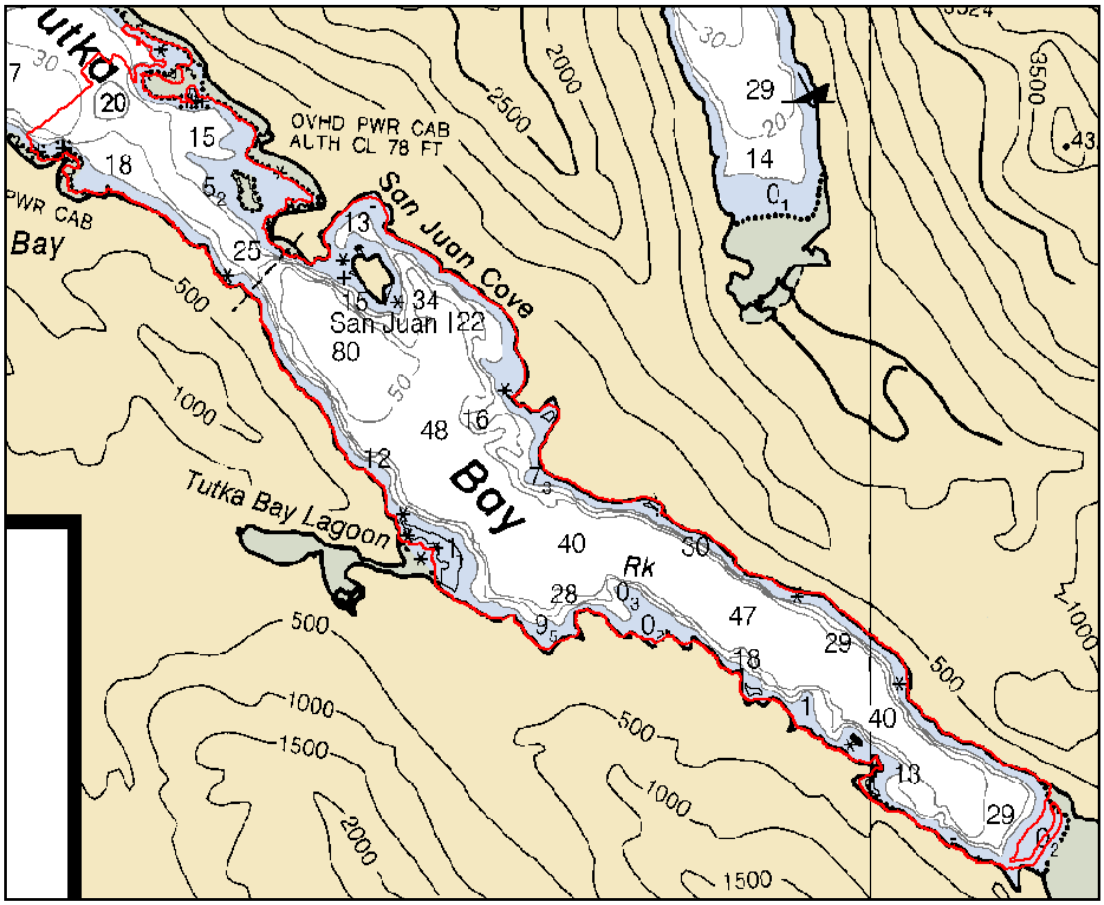


Figure 1: H12086 Tutka Bay Survey Outline

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-P357-RA- 09 Data Acquisition and Processing Report* (DAPR), 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	Reson 8125 Multibeam Echosounder
1103	RA-2	29	2	Knudsen 320M Vertical Beam Echosounder Detached Positions
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 H12086

Sound speed profiles were measured in accordance with the Specifications and Deliverables using SEACAT SBE-19 and 19+ profilers, as well as the Brooke Ocean Technology Moving Vessel Profiler.

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-P357-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 3.14 nautical miles, comprising 3.3% of main scheme MBES hydrography. *Rainier* was unable to achieve the required 4% multibeam crossline data due to time constraints on project operations. The main scheme bathymetry was manually compared to the crossline nadir beams in CARIS subset mode and generally showed excellent agreement, with no discernable difference.[2]

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 H12086_Final_Combined surface in CARIS HIPS for analysis. Throughout the majority of the survey, uncertainty values for H12086 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, [3] refer to OPR-O190-RA-09 Data Acquisition and Processing Report for specifics.

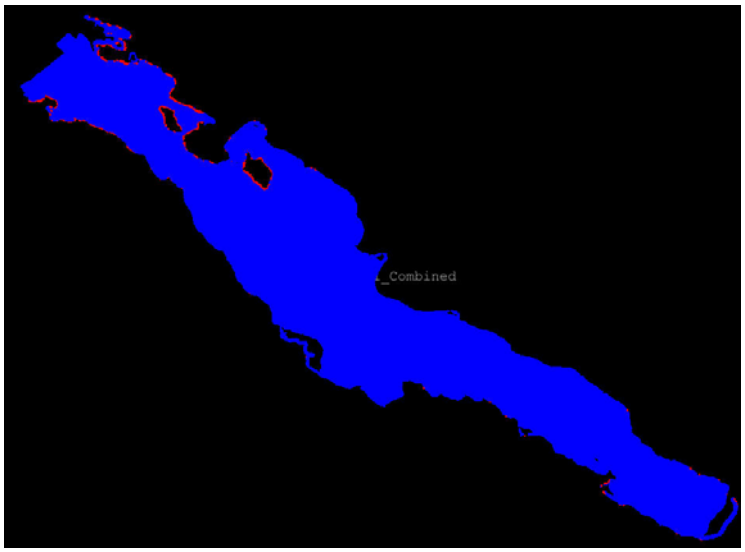


Figure 2: Sounding Density; Red less than 5, Blue being more than 5

B.2.c. Junctions

Survey H12086 junctions with H12087, which is Sheet D of the same project. [4] The area of overlap between the sheets was reviewed in CARIS Subset Editor for consistency and data were found to be in good general agreement within 0.5m on steep slopes and 0.2 meters in the deep (40-60m) waters mid-channel. The sheet limits and area of overlap for sheets H12086 and H12087 are shown in Figure 3. Table 3 lists all H12086 junction surveys.

Junction Survey	Survey Scale	Date of Survey	Survey Location
H12087	1:10,000	2009	Northwest

Table 3: Junction Surveys

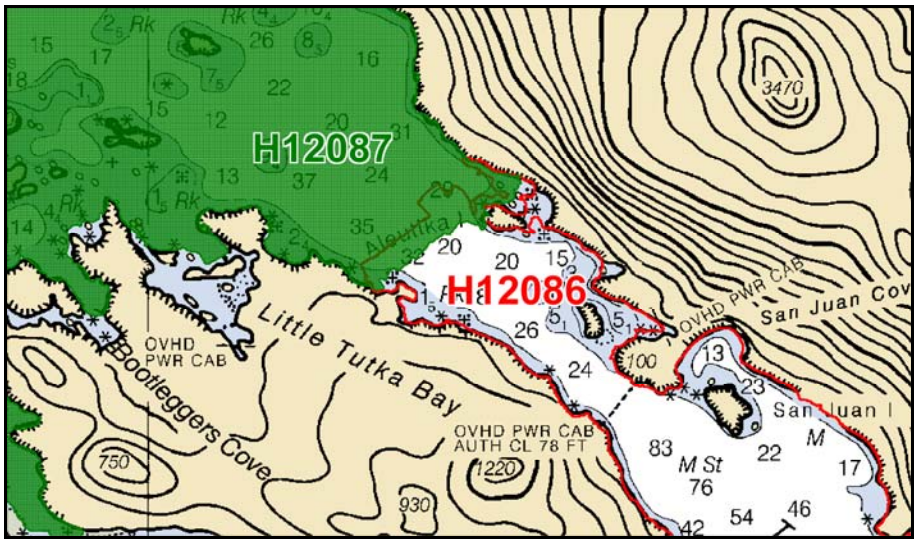


Figure 3: Junction between H12086 and H12087

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

There were no data quality issues noted on survey H12086.

B.2.f. Object Detection and Coverage Assessment

For holidays larger than 3 nodes across, the corresponding multibeam backscatter side scan was examined and no navigationally significant item were found. Additionally the least depths in these areas are represented by surrounding data. Such holidays occurred at the following locations:[5]

- 59°27’37”N 151°25’54”W
- 59°27’22”N 151°25’39”W
- 59°27’27”N 151°19’50”W

There are two areas where the 4m curve was not defined; the mouth of the small inlet behind Aleutika Island (Figure 4), and a small section of the northern shore of Tutka Bay around 2.3 nm from the head of the bay (Figure 5).[6]

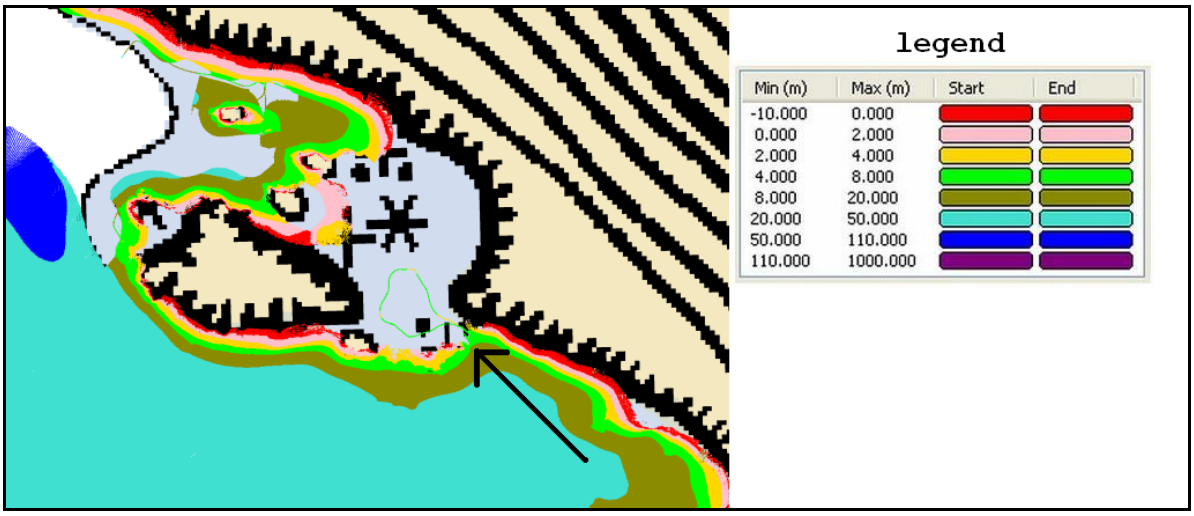


Figure 4: A near shore holiday located near Aleutika Island

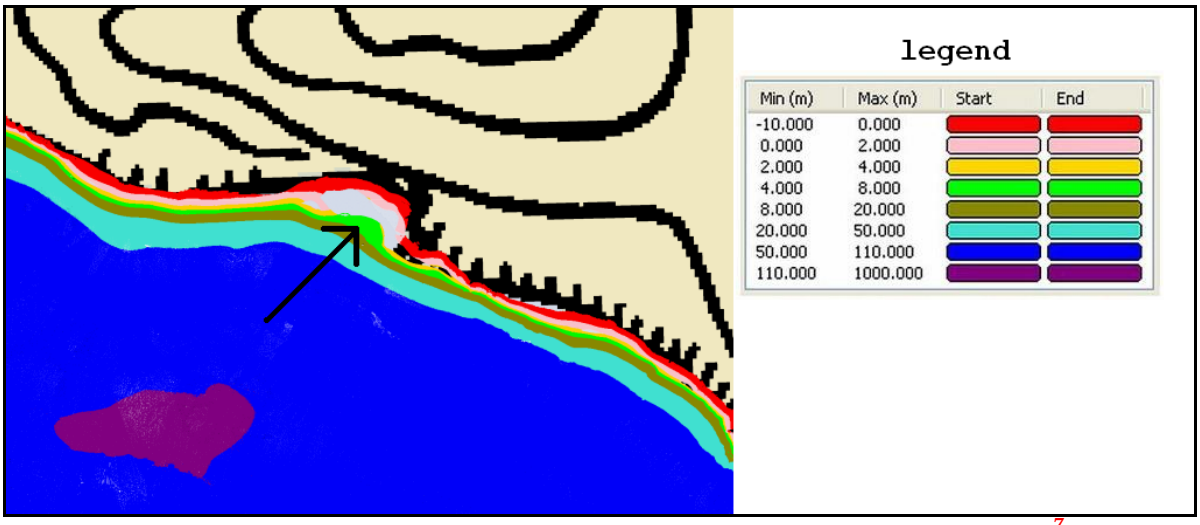


Figure 5: A near shore holiday approximately 2.3 nm from the head of the Tutka Bay[7]

Density of Soundings

Data density for survey H12086 met the 5 sounding per node density requirement with 98.54% of nodes having greater than 5 contributing soundings in accordance with the Specifications and Deliverables section 5.1.2.1. The analysis was performed using an ASCII file derived from the final combined surface for H12088. A Python script written by *Fairweather* Survey Tech Weston Renoud was run on this ASCII file, which tallied the total nodes and nodes with at least five soundings contributing and calculated the overall percentage of passing nodes.

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 H12086 conform to those detailed in the *OPR- P357-RA--09 DAPR.*

B.4. Data Processing

Data processing procedures for survey H12086 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 TPU in CARIS for H12086 are listed in Table 4.

Tide values:	Measured	0.01 m	Zoning	0.07 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 H12086. Final BASE surface resolutions and depth ranges were set according to Table 5 below, with field sheets smaller than 25 million 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. The submission Field Sheet and BASE Surface structure are shown in figures 6 and 7.

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 H12086

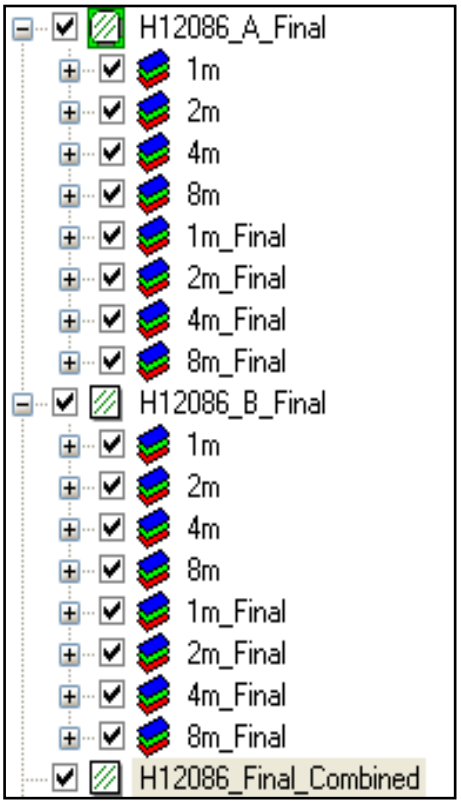


Figure 6: Field sheets and BASE surfaces submitted with H12086

Figure 7: H12086 Field Sheet Layout

C. VERTICAL AND HORIZONTAL CONTROL

A complete description of vertical and horizontal control for survey H12086 can be found in the *OPR-P357-RA-FA-09 Horizontal and Vertical Control Report*, 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. Changes in the corrector source were noted in the data acquisition logs.

Location	Frequency	Operator	Priority
Kenai	310 kHz	USCG	Primary
Kodiak	313 kHz	USCG	Secondary

Table 6: Differential Corrector Sources for H12086

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 at Seldovia, AK

(945-5500) served as control for datum determination and as the primary source for water level reducers for survey H12086.

Rainier personnel installed 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-P357-RA-FA-09 Horizontal and Vertical Control Report*.

Station Name	Station Number	Type of Gauge	Date of Installation	Date of Removal
Bear Cove, AK	945-5595	30-day	August 11, 2009	September 18, 2009

Table 7: Tide Stations installed by Rainier personnel

As per the Project Instructions, all data were reduced to MLLW using the final approved water levels from the Seldovia, AK station (954-5500) by applying tide file 9455500.tid and time and height correctors through the zone corrector file P357FARA2009CORPzdf. **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 H12086 was submitted to CO-OPS on September 13, 2009 in accordance with the Field Procedures Manual (FPM), dated April 2009. The Final Tide Note was received on October 9, 2009. This documentation is included in Appendix IV.[8]

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 the FPM and section 8.1.3- D.1 of HSSD, utilizing CARIS HIPS software program.

Survey H12086 was compared with the following charts:

Chart	Scale	Edition and Date	Local Notice to Mariners Applied Through
16645	1:82,662	18th; January 2002	LNM - 9/1/2009
16647	1:100,000	3rd; May 2001	LNM – 1/31/2009

Table 8: Charts compared with H12086

During acquisition and subsequent processing it was noted that significant discrepancies existed between chart 16645 (1:82,662 scale) and chart 16647 (1:100,000 scale). In spite of the fact that chart 16645 is larger scale than chart 16647, the shoreline of chart 16647 appears to have been compiled at a higher resolution than that of chart 16645. Shoreline as depicted on chart 16647 appears to be consistent with shoreline features from the most recent prior surveys and observations made during shoreline acquisition for survey H12086, while chart 16645 shows inconsistencies in common areas.

One of the most significant differences is in the area covered by survey H09941. While low water features are depicted on the smooth sheet for survey H09941, the mean high water (MHW) line is conspicuously absent from the smooth sheet. Chart 16647 reproduces this error depicting reefs or mean lower-low water (MLLW) lines in the place of islands (figure 8). While chart 16645 does correctly depict the MHW features as islands, the location of these islands often does not match with actual charted location or the location as depicted on survey H09941.

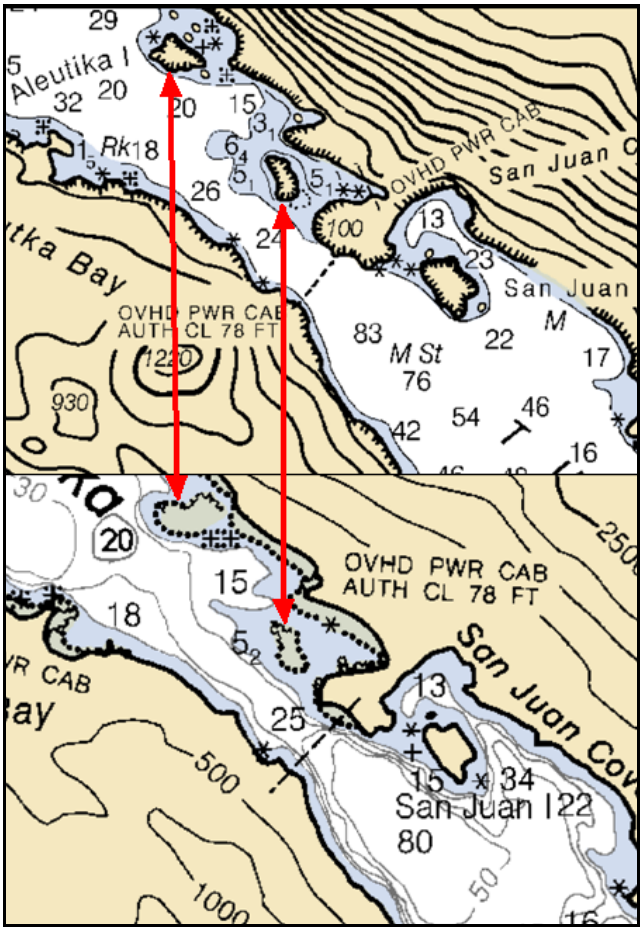


Figure 8: MHW discrepancy between Chart 16645 (top) and 16647 (bottom)

While charted depths were far less dense on chart 16647, significant bathymetric features and least depths appeared to agree with survey soundings from this project and prior survey soundings far better than charted depths on chart 16645. Chart comparison was conducted with chart 16647 in addition to chart 16645 and there were two notable discrepancies between these two charts within the survey limits of H12086 (figures 9 and 10). In both cases, prior survey data supported the charted depths on chart 16647.

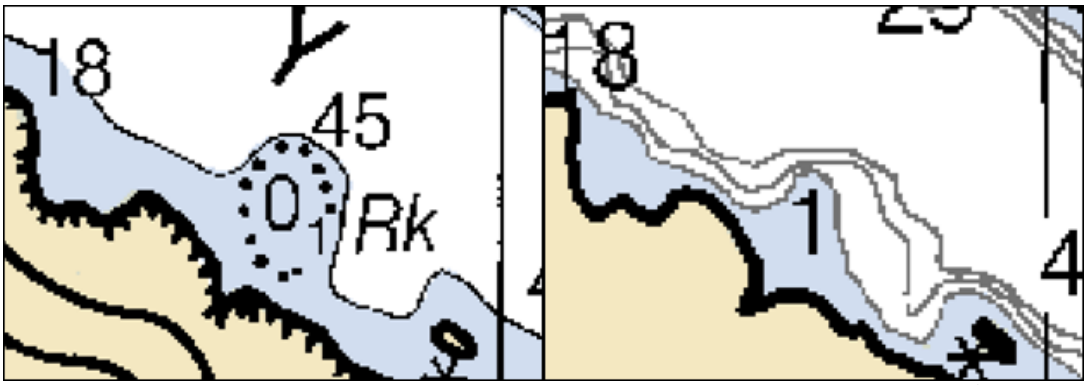


Figure 9: Discrepancy between Chart 16645 (left) and Chart 16647 (right) in position 59°25'43"N 151°20'35"W. Survey found least depth in area of 1-fathom.

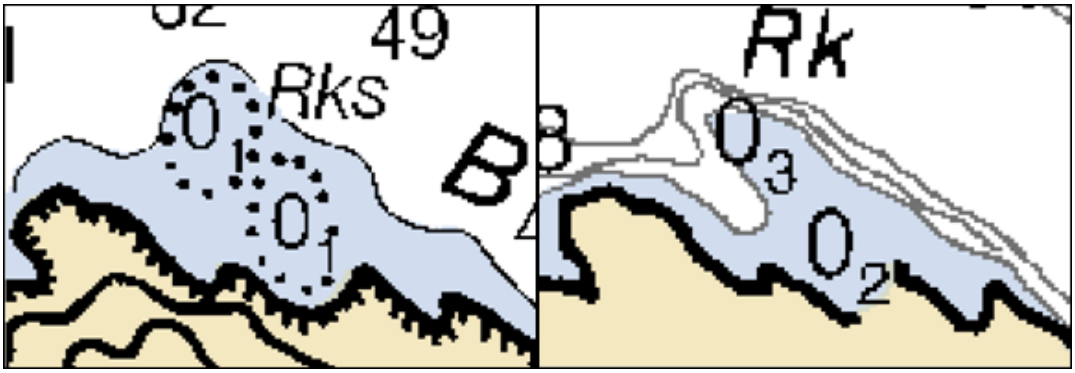


Figure 10: Discrepancy between Chart 16645 (left) and Chart 16647 (right) in approximate position 59°26'11"N 151°22'13"W. Survey found least depth of 0- fathoms 1.6-feet on the offshore feature and 0-fathoms 0-feet on the inshore feature.

It appears that the most recent prior survey data may not have been applied to chart 16645, but was applied to chart 16647. These discrepancies were noted during acquisition and brought to the attention of Laurie Bennett, a visiting cartographer from the Marine Charting Division (MCD). Additionally, an e-mail was sent to MCD reiterating these issues by the Chief of the Pacific Hydrographic Branch and the Field Operations Officer, *Rainier*. This e-mail correspondence is included in Appendix V.[9]

The Composite Source File (CSF) supplied with this project was based on the largest scale chart of the area and corresponds to the inaccurate shoreline depicted on chart 16645. For this reason, prior surveys smooth sheets were registered and displayed in CARIS Notebook or Hypack during survey acquisition. Prior survey features were used as reference during shoreline acquisition and, when appropriate, prior survey features were noted and their positions used to locate features in the final features HOB file.

Charted depths agree with H12086 survey soundings with no discernable offsets, with the following exceptions:

- Survey soundings show a minimum depth of 17-fathom in the area of a14-fathom charted depth, with a 16-fathom shoal located immediately to the south (figure 11).[10]

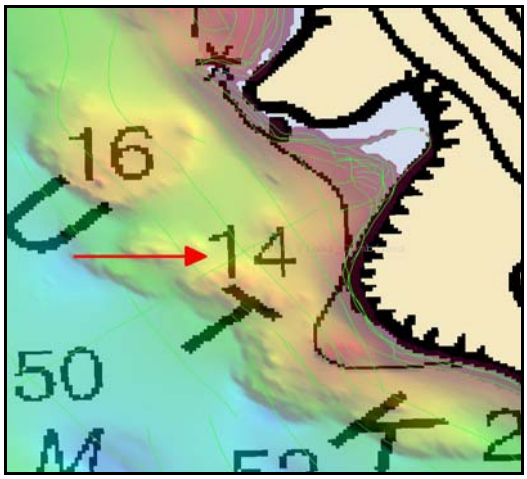


Figure 11: A 14 fathom charted depth in 18 fathoms of water

- Survey soundings show a depth of 19½-fathom shoal in the vicinity of a 32-fathom charted depth (figure 12).[11]

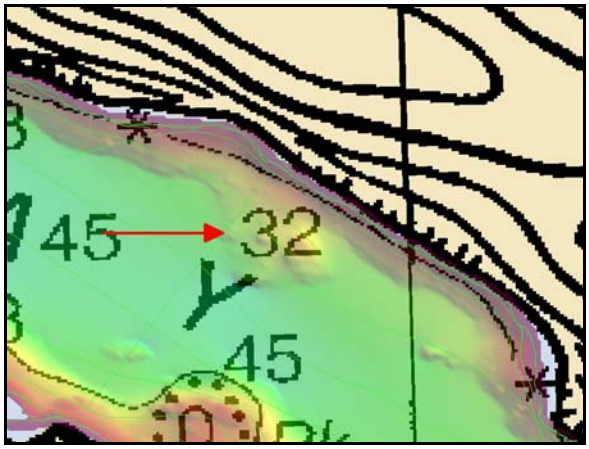


Figure 12: A 32 fathom charted depth on a 19½ fathom shoal

While agreement was good at charted depth locations, shoaler soundings were found between accurately charted depths. This can be attributed to increased coverage developed by multibeam sonar and rugged bottom characteristics.[12]

The Hydrographer recommends that survey soundings supersede all prior survey and charted depths in the common area.[13]

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

No AWOIS items were located within the survey limits of H12086.[14]

D.1.c. Other Investigated Features

No additional charted items were investigated and no other features were located on survey H12086.

D.1.d. Dangers to Navigation

Two (2) Dangers to Navigation (DTONs) were found on survey H12086 and reported to the Marine Chart Division via email on February 9, 2010. The original DTON submission package is included in Appendix I.[15]

An additional DTON, a submerged pile, was subsequently found on survey H12086 and reported to the Marine Chart Division as "H12086_DTON_Report_#2" via email on March 3, 2010. The original DTON submission package is included in Appendix I.[16]

D.2. Additional Results

D.2.a. Shoreline Verification

Shoreline Source
Limited shoreline verification was accomplished using the composite source file (CSF) provided with the project instructions. The CSF has been created using the latest ENCs, most recent aerial photogrammetry, and prior hydrographic surveys. Prior survey features within the CSF are for reference. This composite source was printed on paper "boat sheets" and displayed in CARIS Notebook and/or Hypack for field verification.

Shoreline Verification
Limited shoreline verification was conducted near predicted low water in accordance with the Specifications and Deliverables section 8.2 and the Field Procedures Manual section 3.5 and 4.4. Detached positions (DPs) acquired during shoreline verification were recorded and S-57 attributed in CARIS Notebook. These indicate revisions to features and features not found in the provided CSF. In addition, annotations describing shoreline were recorded on the hard copy plots of the CSF as described above.

All shoreline data is submitted in CARIS Notebook HOB files. The session H12086_NTBK contains the following:

HOB File	Purpose and Contents
H12086_Comp_Source.hob	Original source data as provided for project OPR-P357-RA-FA-09 and filtered to the limits of survey H12086.
H12086_Reference.hob	Survey outline and limit lines.
H12086_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.
H12086_Disprovals.hob	Composite source items which were deleted or modified in position or geographic type.

Table 9: 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 above.[17]

D.2.b. Prior Survey Comparison

Although a comparison of depths and soundings was not made with the prior survey, the prior was registered for use in the field for shoreline verification.

D.2.c. Aids to Navigation

There are no Aids to Navigation within the limits of H12086.[18]

D.2.d. Overhead Features

H12086 contains one overhead feature, a power-line that crosses Tutka Bay in two different locations (figure 13). This power-line is charted in the correct location and the Coast Pilot reported height of 78 feet above mean high water (MHW) appeared to be appropriate, although no direct measurement was conducted in the field.[19]

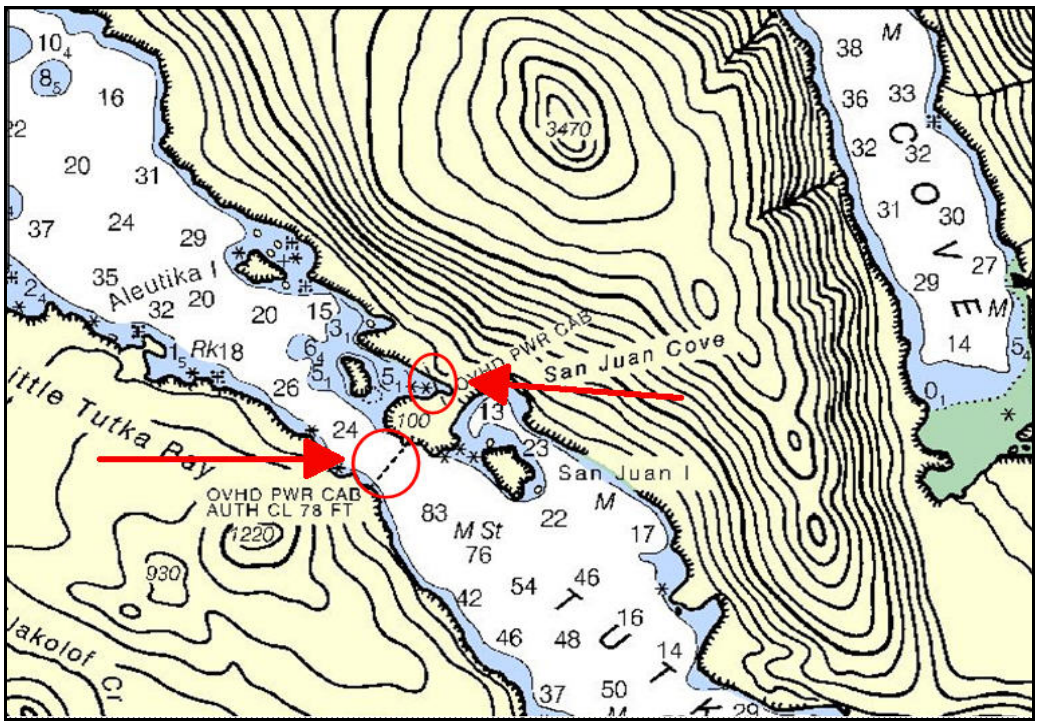


Figure 13: Location of overhead features

D.2.e. Submarine Cables and Pipelines

There are no submarine cables or pipelines charted were located within the survey limits of H12086, and none were detected by the survey.[20]

D.2.f. Ferry Routes

There are no ferry routes charted within the survey limits of H12086, and none were observed to be operating in the area.[21]

D.2.g. Bottom Samples

Bottom samples were not performed on survey H12086.[22]

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 H12086 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 September 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:

Title	Date Sent	Office
Hydrographic Systems Readiness Review Package	*Under separate cover*	N/CS34
Data Acquisition and Processing Report for OPR-P184-RA-FA-09	February 8, 2010	N/CS34
Coast Pilot Report for OPR-P184-RA-FA-09	*To be submitted*	N/CS26
Horizontal and Vertical Control Report for OPR-P357-RA-FA-09	December 14, 2009	N/CS34
Tides and Water Levels Package for OPR-P184-RA-FA-09	October 21, 2009	N/OPS1

Approved and Forwarded: Donald W. Haines, CAPT/NOAA
I am approving this document
2010.03.08 10:27:22 -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: Manuel Cruz
I am the author of this document
2010.03.05 08:51:28 -09'00'

Manuel J. Cruz
Hydrographic Assistant Survey Technician, NOAA

Chief Survey Technician: James B Jacobson
I have reviewed this document
2010.03.05 18:05:49 Z

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

Field Operations Officer: Brent Pounds
I have reviewed this document
2010.03.05 11:24:28 -09'00'

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

Revisions and Corrections Compiled Duiring Office Processing and Certification

[1] Concur.
[2] Concur. Crosslines were adequate to generate QC report.
[3] No soundings from red areas were selected for charting. There was nothing navigationally significant in the "red" areas.
[4] A common junction will be made with H12087 to the NW during compilation process.
[5] Concur.
[6] Concur. The holiday has been preserved in the HCell and proper modifications were made to the area.
[7] Concur. The holiday has been preserved in the HCell and proper modifications were made to the area.
[8] See attached Tide Note
[9] E-mail correspondence is appended to this report.
[10] Concur with clarification. A 14 fathom sounding was added to the HCell representing the shoalest point in that area.
[11] Concur. Chart depths as depicted in the HCell.
[12] Concur.
[13] Concur.
[14] Concur.
[15] All reported DTONs have been applied to the chart, however in working with the full survey dataset different soundings were chosen as more appropriate for charting than some of the DTONs. See blue notes in HCell.
[16] See second attached DTON report.
[17] Concur with clarification. The submitted hob files were used in the compilation of HCell H12086. During compilation, some modifications were made to accommodate chart scale. Chart features as depicted in the HCell.
[18] Concur.
[19] Concur. The overhead features have been blue noted to be retained.
[20] Concur.
[21] Concur.
[22] Concur. All 5 charted bottom samples were imported from the ENC to be retained.

H12086 Danger to Navigation

Registry Number: H12086

State: Alaska

Locality: Southern Portion of Cook Inlet

Sub-locality: Tutka Bay

Project Number: OPR-P357-RA-FA-09

Survey Dates: 09/04/2009 - 09/05/2009

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
16645	18th	01/12/2002	1:82,662 (16645_1)	[L]NTM: ?
16647	3rd	05/12/2001	1:100,000 (16647_1)	USCG LNM: 09/16/2008 (01/20/2009) CHS NTM: None (12/26/2008) NGA NTM: 11/27/2004 (01/31/2009)
16640	24th	09/15/2001	1:200,000 (16640_1)	[L]NTM: ?
16680	11th	07/01/2008	1:200,000 (16680_1)	[L]NTM: ?
16013	30th	07/01/2006	1:969,761 (16013_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	Rock	1.82 m	59° 27' 54.2" N	151° 25' 51.3" W	---
1.2	Rock	0.66 m	59° 28' 17.0" N	151° 26' 01.9" W	---

1 - Danger To Navigation

1.1) Profile/Beam - 2325/74 from h12086 / 1101_reson8125 / 2009-248 / 000_2021

DANGER TO NAVIGATION

Survey Summary

Survey Position: 59° 27' 54.2" N, 151° 25' 51.3" W

Least Depth: 1.82 m (= 5.96 ft = 0.994 fm = 0 fm 5.96 ft)

TPU (±1.96σ): **THU (TPEh)** ±1.962 m ; **TVU (TPEv)** ±0.182 m

Timestamp: 2009-248.20:27:26.553 (09/05/2009)

Survey Line: h12086 / 1101_reson8125 / 2009-248 / 000_2021

Profile/Beam: 2325/74

Charts Affected: 16645_1, 16647_1, 16640_1, 16680_1, 16013_1, 531_1, 500_1, 530_1, 50_1

Remarks:

Underwater rock.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12086/1101_reson8125/2009-248/000_2021	2325/74	0.00	000.0	Primary

Hydrographer Recommendations

Cartographically-Rounded Depth (Affected Charts):

1fm (16645_1, 16640_1, 16680_1, 16013_1, 530_1)

-1fm 0ft (16647_1, 531_1)

1.8m (500_1, 50_1)

S-57 Data

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

Attributes: OBJNAM - UWTROC

QUASOU - 6:least depth known

SORDAT - 20090908

SORIND - US,US,nsurf,H12086

STATUS - 1:permanent

TECSOU - 3:found by multi-beam

VALSOU - 1.818 m

WATLEV - 3:always under water/submerged

Feature Images

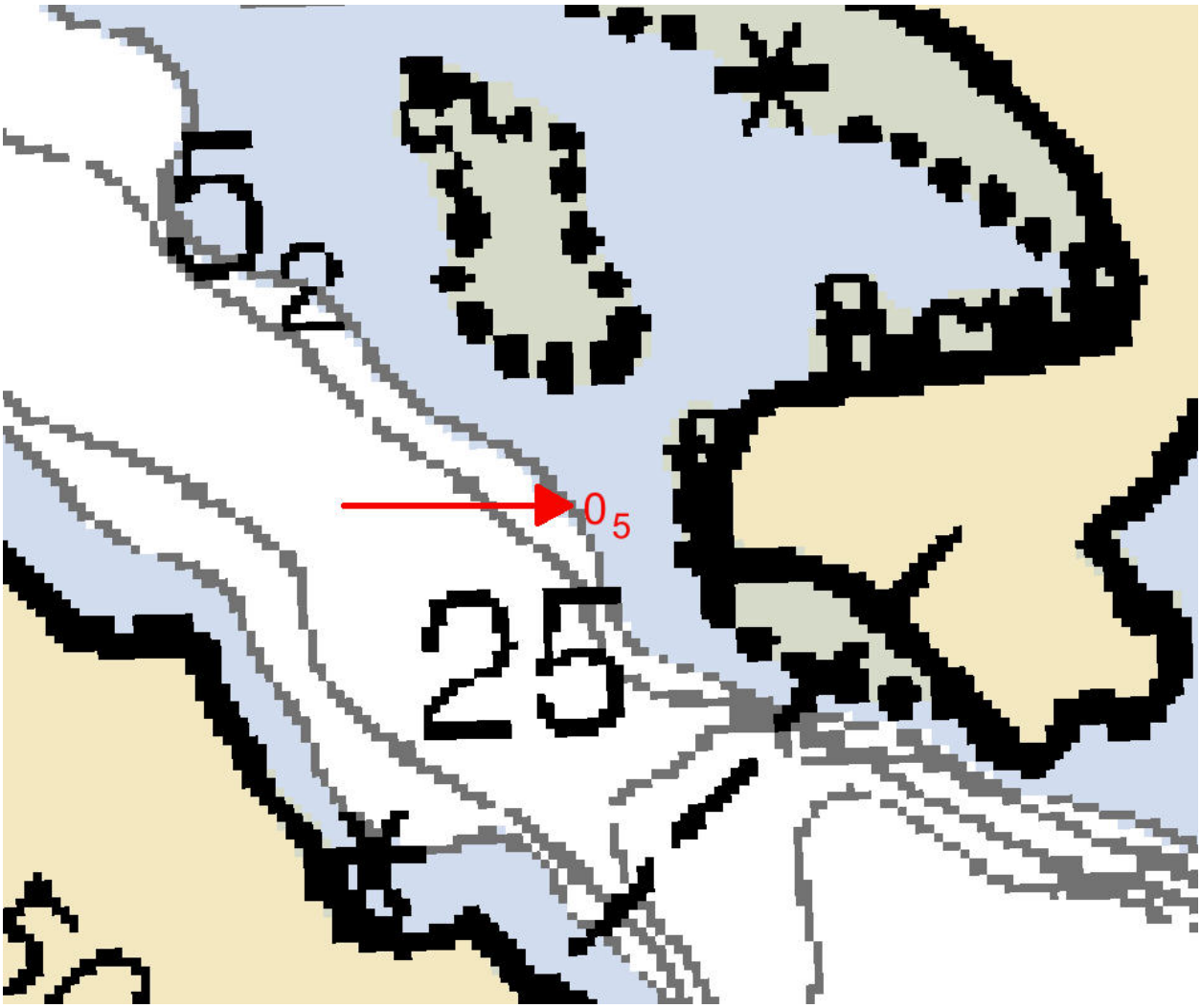


Figure 1.1.1

1.2) Profile/Beam - 893/511 from h12086 / 2803_reson7125_hf_512 / 2009-247 / 000_2136

DANGER TO NAVIGATION

Survey Summary

Survey Position: 59° 28' 17.0" N, 151° 26' 01.9" W

Least Depth: 0.66 m (= 2.17 ft = 0.361 fm = 0 fm 2.17 ft)

TPU (±1.96σ): **THU (TPEh)** ±1.962 m ; **TVU (TPEv)** ±0.185 m

Timestamp: 2009-247.21:37:37.097 (09/04/2009)

Survey Line: h12086 / 2803_reson7125_hf_512 / 2009-247 / 000_2136

Profile/Beam: 893/511

Charts Affected: 16645_1, 16647_1, 16640_1, 16680_1, 16013_1, 531_1, 500_1, 530_1, 50_1

Remarks:

Underwater Rock.

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12086/2803_reson7125_hf_512/2009-247/000_2136	893/511	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

0 ¼fm (16645_1, 16640_1, 16680_1, 16013_1, 530_1)

0fm 2ft (16647_1, 531_1)

.7m (500_1, 50_1)

S-57 Data

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

Attributes: QUASOU - 6:least depth known

SORDAT - 20090908

SORIND - US,US,nsurf,H12086

STATUS - 1:permanent

TECSOU - 3:found by multi-beam

VALSOU - 0.660 m

WATLEV - 3:always under water/submerged

Feature Images

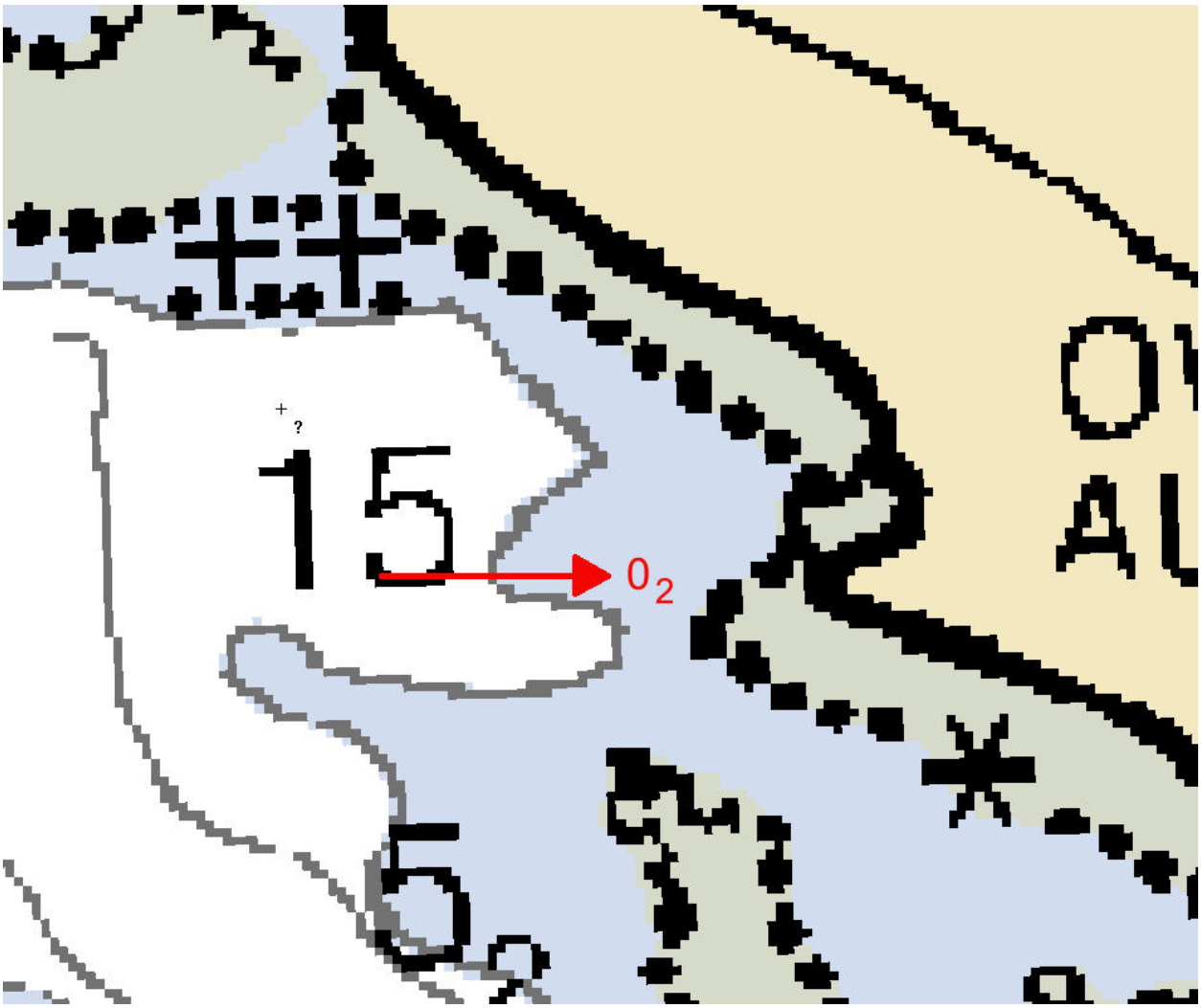


Figure 1.2.1

H12086 Danger to Navigation #2

Registry Number: H12086

State: Alaska

Locality: Southern Portion of Cook Inlet

Sub-locality: Tutka Bay

Project Number: OPR-P357-RA-FA-09

Survey Date: 09/04/2009

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
16645	18th	01/12/2002	1:82,662 (16645_1)	[L]NTM: ?
16647	3rd	05/12/2001	1:100,000 (16647_1)	USCG LNM: 09/16/2008 (01/20/2009) CHS NTM: None (12/26/2008) NGA NTM: 11/27/2004 (01/31/2009)
16640	24th	09/15/2001	1:200,000 (16640_1)	[L]NTM: ?
16680	11th	07/01/2008	1:200,000 (16680_1)	[L]NTM: ?
16013	30th	07/01/2006	1:969,761 (16013_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	Shoal	0.34 m	59° 27' 56.8" N	151° 24' 40.3" W	---

1 - Danger To Navigation

1.1) Profile/Beam - 346/512 from h12086 / 2802_reson7125_hf_512 / 2009-247 / 000_1918

DANGER TO NAVIGATION

Survey Summary

Survey Position: 59° 27' 56.8" N, 151° 24' 40.3" W

Least Depth: 0.34 m (= 1.12 ft = 0.186 fm = 0 fm 1.12 ft)

TPU (±1.96σ): **THU (TPEh)** ±1.960 m ; **TVU (TPEv)** ±0.182 m

Timestamp: 2009-247.19:18:51.298 (09/04/2009)

Survey Line: h12086 / 2802_reson7125_hf_512 / 2009-247 / 000_1918

Profile/Beam: 346/512

Charts Affected: 16645_1, 16647_1, 16640_1, 16680_1, 16013_1, 531_1, 500_1, 530_1, 50_1

Remarks:

DTON

Submerged pile

Feature Correlation

Address	Feature	Range	Azimuth	Status
h12086/2802_reson7125_hf_512/2009-247/000_1918	346/512	0.00	000.0	Primary

Hydrographer Recommendations

[None]

Cartographically-Rounded Depth (Affected Charts):

0fm (16645_1, 16640_1, 16680_1, 16013_1, 530_1)

0fm 1ft (16647_1, 531_1)

.3m (500_1, 50_1)

S-57 Data

Geo object 1: Pile (PILPNT)

Attributes: CATPLE - 3:post

CONDTN - 2:ruined

CONVIS - 2:not visual conspicuous

HEIGHT - 0.34 m

SORDAT - 20090908

SORIND - US,US,nsurf,H12086

Feature Images

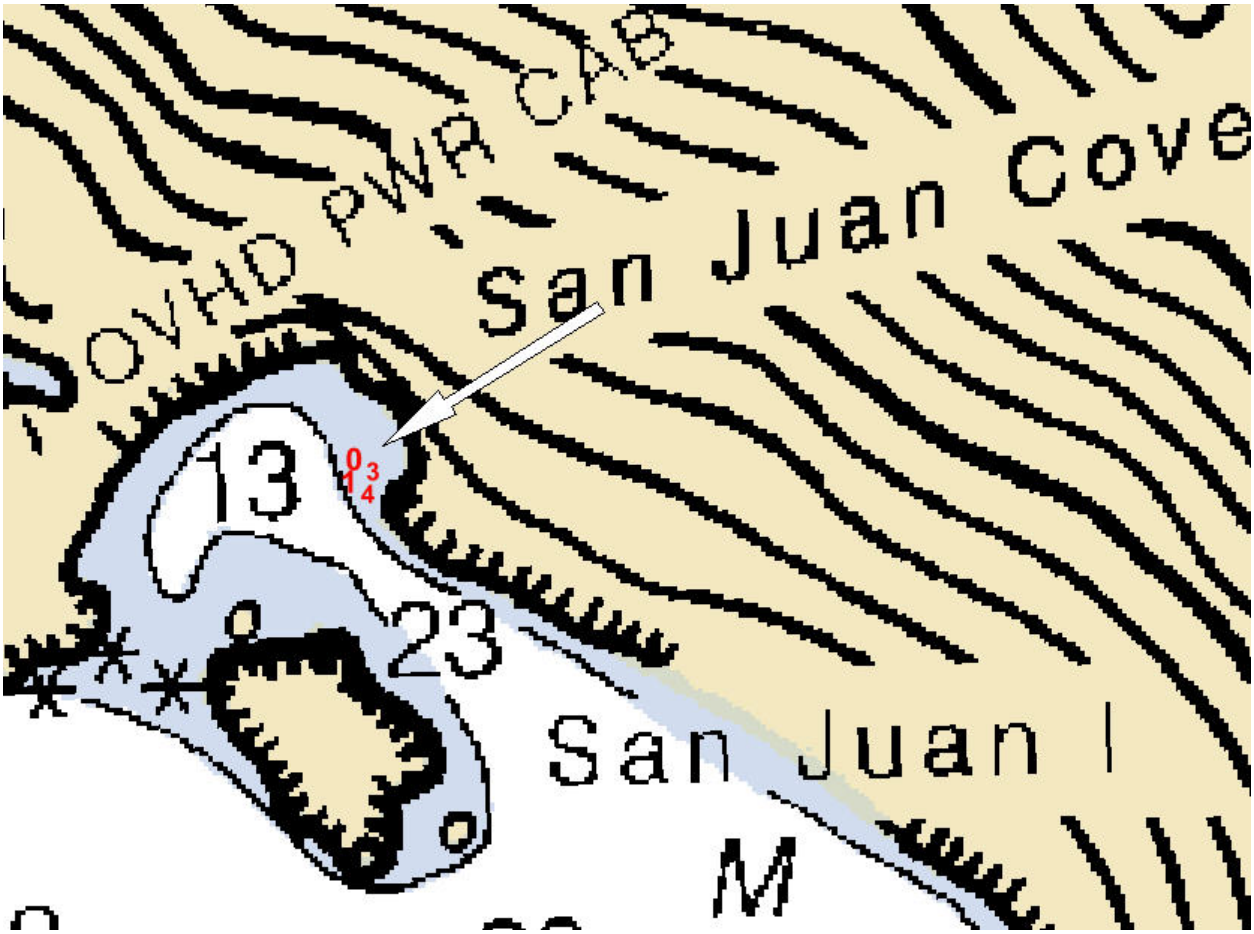


Figure 1.1.1

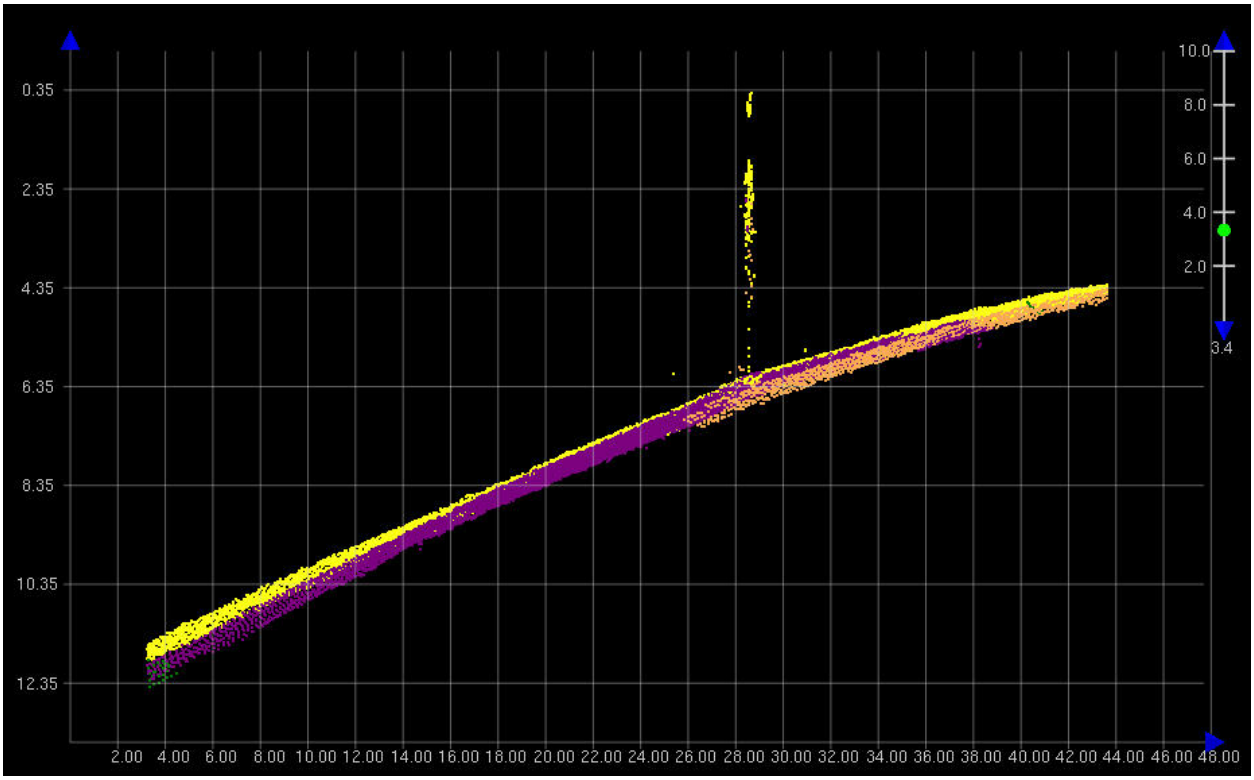

0.35
2.35
4.35
6.35
8.35
10.35
12.35
2.00 4.00 6.00 8.00 10.00 12.00 14.00 16.00 18.00 20.00 22.00 24.00 26.00 28.00 30.00 32.00 34.00 36.00 38.00 40.00 42.00 44.00 46.00 48.00
10.0
8.0
6.0
4.0
2.0
3.4

Figure 1.1.2

Subject: Chart 16645 and 16647 Discrepancies from OPR-P357-RA-FA-09
From: "foo.rainier" <foo.rainier@noaa.gov>
Date: Wed, 03 Mar 2010 15:07:21 -0900
To: Andrew.Kampia@noaa.gov
CC: Doug.Baird@noaa.gov, laurie.bennett@noaa.gov, CO Rainier <co.rainier@noaa.gov>, Gary Nelson <Gary.Nelson@noaa.gov>, "james.m.crocker" <James.M.Crocker@noaa.gov>

Andrew,

During shoreline acquisition for the Katchemak Bay Project (OPR-P357-RA-FA-09) it was noted that significant discrepancies existed between chart 16645 (1:82,662 scale) and chart 16647 (1:100,000 scale) throughout the survey project area. At the time these discrepancies were identified they were brought to the attention of Laurie Bennett, who was visiting the ship from the Marine Charting Division (MCD). The inconsistencies between these to charts have again been noted during final processing of the surveys from this project and this e-mail is intended to reiterate the inaccuracies in this area.

In spite of the fact that chart 16645 is larger scale than chart 16647, the shoreline of chart 16647 appears to have been compiled at a higher resolution than that of chart 16645. Shoreline as depicted on chart 16647 appears to be consistent with shoreline features from the most recent prior surveys and observations made during this season's shoreline acquisition. Chart 16645 has numerous inaccuracies in comparison to prior surveys and observed shoreline during this project, including many mischarted islets and rocks. While charted depths were far less dense on chart 16647, significant bathymetric features and least depths appeared to agree with survey soundings from this project and prior survey soundings far better than charted depths on chart 16645.

It appears that the most recent prior survey data may not have been applied to chart 16645, but was applied to chart 16647.

Additionally, an apparent compilation error was noted on chart 16647 in the area covered by survey H09941. While low water features are depicted on the smooth sheet for survey H09941, the meal high water (MHW) line is conspicuously absent from the smooth sheet. Chart 16647 reproduces this error depicting reefs or mean lower-low water (MLLW) lines in the place of islands. While chart 16645 does correctly depict the MHW features as islands, the location of these islands often does not match with actual observed location or the location as depicted on survey H09941.

If you would like specific examples of the discrepancies between these charts or have any other questions regarding this matter, please do not hesitate to contact me.

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

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : October 6, 2009

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-P357-RAFA-2009
HYDROGRAPHIC SHEET: H12086

LOCALITY: Kachemak Bay, AK
TIME PERIOD: September 3 - September 8, 2009

TIDE STATION USED: 945-5500 Seldovia, Cook Inlet, AK
Lat. 59° 26.4'N Long. 151° 43.2' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 5.252 meters

REMARKS: RECOMMENDED ZONING

Preliminary zoning is accepted as the final zoning for project OPR-P357-RAFA-2009, H12086, during the time period between September 3 to September 8, 2009.

Please use the zoning file "P357FARA2009CORP" submitted with the project instructions for OPR-P357-RAFA-2009 Kachemak Bay, AK. Zone CIC42 is the applicable zone for H12086.

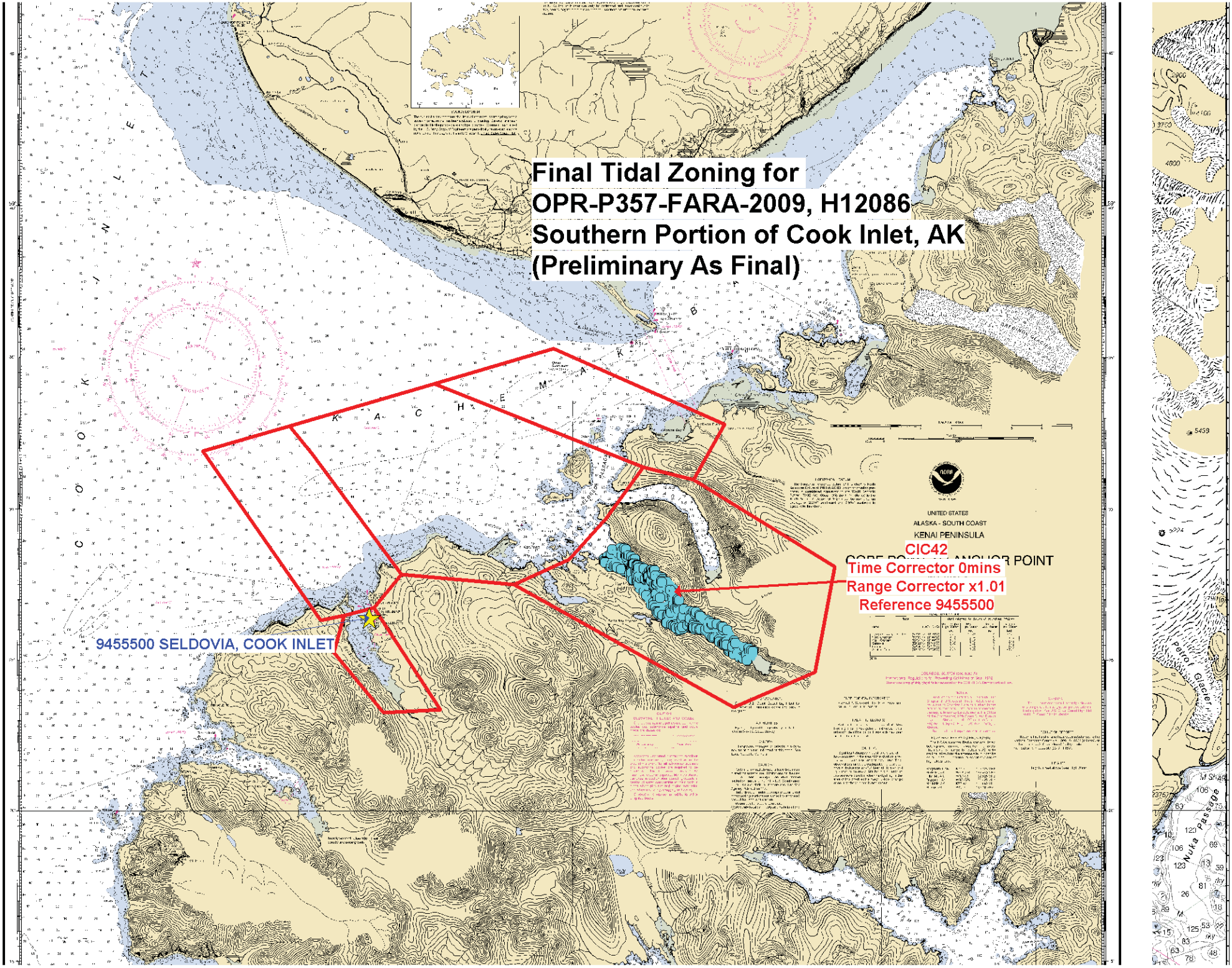
Refer to attachments for zoning information.

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: 2009.10.09 16:30:59 -04'00'

CHIEF, OCEANOGRAPHIC DIVISION


Final Tidal Zoning for
OPR-P357-FARA-2009, H12086
Southern Portion of Cook Inlet, AK
(Preliminary As Final)
CIC42
Time Corrector 0mins
Range Corrector x1.01
Reference 9455500
9455500 SELDOVIA, COOK INLET
UNITED STATES
ALASKA - SOUTH COAST
KENAI PENINSULA
K A C H E M A K B A Y
C O O K I N L E T

H12086 HCell Report

Fernando Ortiz, Physical Scientist
Pacific Hydrographic Branch

1. Specifications, Standards and Guidance Used in HCell Compilation

HCell compilation of survey H12086 used:

Office of Coast Survey HCell Specifications: Draft, Version: 4.0, 17 March 2010.
HCell Reference Guide: Version 2.0, July 29, 2010.

2. Compilation Scale

Depths and features for HCell H12086 were compiled to the largest scale raster charts shown below:

Chart	Scale	Edition	Edition Date	NTM Date
16645	1:82,662	19th	07/2010	09/07/2010

The following ENCs were also used during compilation:

Chart	Scale
US5AK1BM	

3. Soundings

A survey-scale sounding (SOUNDG) feature object layer was built from the 8-meter Combined Surface in CARIS BASE Editor. A shoal-biased selection was made at 1:10,000 for the16645 chart at survey scale using a Radius Table file with values shown in the table, below.

Shoal Limit (m)	Deep Limit (m)	Radius (mm)
-5	10	2
10	20	3
20	50	3.5
50	500	4

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 fathom equivalent contour values are shown in the table below.

Chart Contour Intervals in fathoms from Chart 16645	Metric Equivalent to Chart Fathoms, Arithmetically Rounded	Metric Equivalent of Chart Fathoms, with NOAA Rounding Applied	Fathoms with NOAA Rounding Applied	Fathoms with NOAA Rounding Removed for Display on H12086_SS.000
0	0	0.2286	0	0
3	5.4864	5.715	3.125	3
5	9.144	9.3726	5.125	5
10	18.288	18.5166	10.125	10
50	91.44	92.8116	50.75	50

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 H12086:

M_QUAL

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-Notes to the MCD chart Compiler
COALNE	Coastline
DEPCNT	Zero contour lines
LNDARE	Land area
M_QUAL	Data quality Meta object
OBSTRN	Obstruction
PONTON	A floating structure
SBDARE	Bottom samples- rocky seabed areas
SLCONS	Shoreline Construction
SOUNDG	Soundings at the chart scale density
UWTROC	Rocks

The *_SS HCell contains the following Objects:

DEPCNT	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):	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

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

H12086 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

H12086_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:82,662
H12086 _SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:10,000
H12086 _DR.pdf	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H12086 _outline.gml	Survey outline
H12086 _outline.xsd	

11.2 Software

CARIS HIPS Ver. 6.1	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 3.0	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. 2.1	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:
Fernando Ortiz
Physical Scientist
Pacific Hydrographic Branch
Seattle, WA
206.526.6859
Fernando.ortiz@noaa.gov.

APPROVAL SHEET
H12086

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

Fernando Ortiz
2010.11.17
10:03:39 -08'00'

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 Pete Holmberg
DN: cn=Pete Holmberg, o=NOAA, ou=PHB, email=peter.holmberg@noaa.gov, c=US
Date: 2010.11.17 10:46:24 -08'00'

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.

Digitally signed by Gary C. Nelson
DN: cn=Gary C. Nelson, o=NOAA, ou=Pacific Hydrographic Branch, email=gary.nelson@noaa.gov, c=US
Date: 2010.11.18 09:49:22 -08'00'

Megan Greenaway
AWOIS and SURF Check Complete
2010.11.22 08:54:01 -05'00'