

H11491

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. H11491

LOCALITY

State Alaska

General Locality Eastern Prince William Sound

Sublocality Entrance to Valdez Arm

2005

CHIEF OF PARTY

..... Commander Guy T. Noll, NOAA

LIBRARY & ARCHIVES

DATE

NOAA FORM 77-28 (11-72)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION REGISTRY No H11491
HYDROGRAPHIC TITLE SHEET	
INSTRUCTIONS – The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.	FIELD No
<p> State <u>Alaska</u> General Locality <u>Eastern Prince William Sound</u> Sub-Locality <u>Entrance to Valdez</u> Scale <u>1:10,000</u> Date of Survey <u>8/30/2005 - 10/01/2005</u> Instructions dated <u>8/3/2005</u> Project No. <u>OPR-P132-RA-05</u> Vessel <u>NOAA Ship Rainier</u> Chief of party <u>Commander Guy. Noll, NOAA</u> Surveyed by <u>RAINIER Personnel</u> Soundings by echo sounder, hand lead, pole <u>Seabeam/Elac 1180, 1050D MKII</u> Graphic record scaled by <u>N/A</u> Graphic record checked by <u>N/A</u> Automated Plot <u>N/A</u> SAR by <u>Steven Lardy</u> Compilation by <u>Andrew R. Clos</u> Soundings in <u>Fathoms</u> at <u>MLLW</u> </p> <p> REMARKS: <u>All times are UTC., UTM Zone 6</u> <u>The purpose of this survey is 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.</u> </p>	

Descriptive Report to Accompany Hydrographic Survey H11491

Project OPR-P132-RA-05
Eastern Prince William Sound
Entrance to Valdez Arm, AK
Scale 1:10,000
August - October 2005
NOAA Ship RAINIER
Chief of Party: Commander Guy T. Noll, NOAA

A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions OPR-O132-RA-05, dated August 3, 2005 and all other applicable direction¹, with the exception of deviations noted in this report. The survey area is located at the Entrance to Valdez Arm. This survey corresponds to sheet H in the sheet layout provided with the Letter Instructions.

One hundred percent multi-beam echosounder (MBES) coverage was obtained in the survey area in waters 8 meters and deeper. Survey H11491 contains no depths less than 8 meters of water. Depths surveyed ranged from 274.63 and 455.06 meters. Survey H11491 required no vertical-beam echosounder (VBES) data acquisition to define the navigable area limit, aid in the planning of SWMB data acquisition, or provide inshore bathymetry in navigationally significant areas.

Data acquisition was conducted from August 30 to October 1, 2005 (DN 242 to DN 274).

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

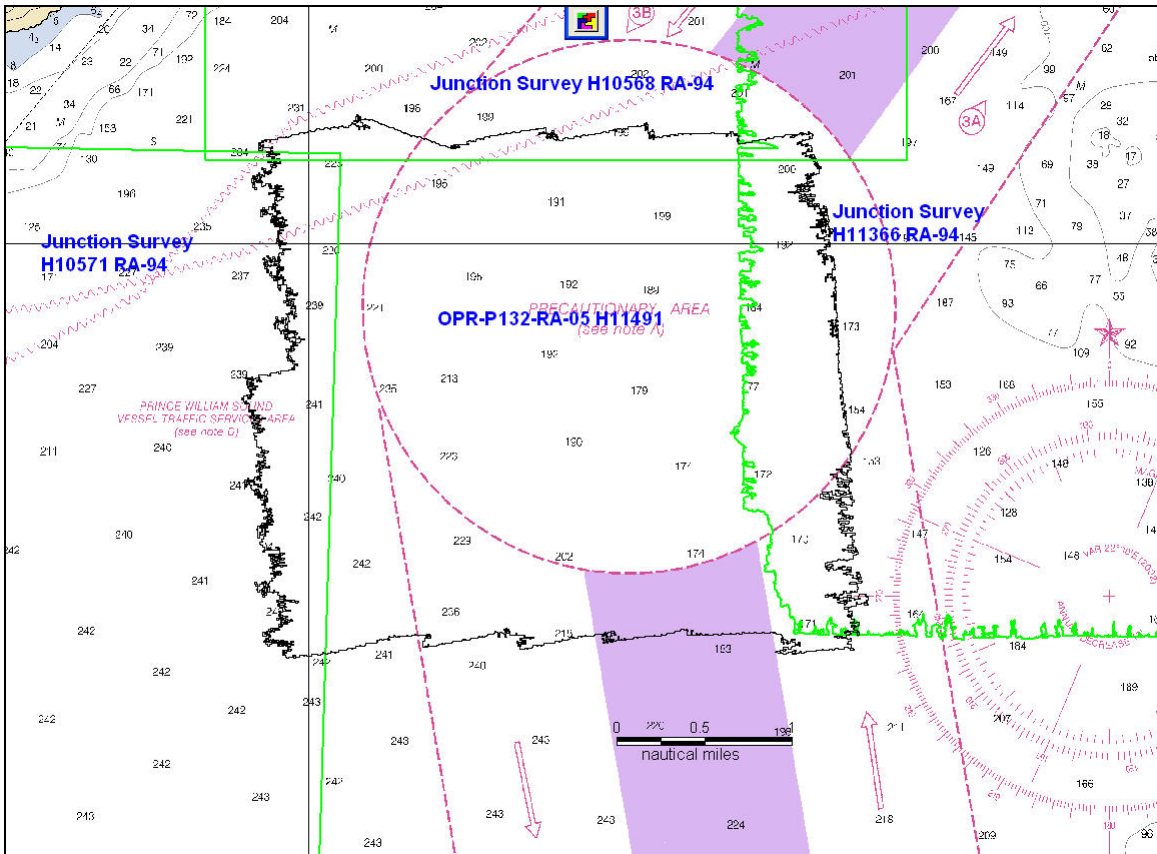


Figure 1. H11491 Survey Limits and Junctions

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-132-RA-05 *Data Acquisition and Processing Report (DAPR)*¹, submitted under separate cover. Items specific to this survey and any deviations from the aforementioned report are discussed in the following sections.

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

B1. Equipment and Vessels

Data for this survey were acquired by the following vessels:

Hull Number	Name	Acquisition Type
S221	RAINIER	Multi-Beam Echosounder Sound Speed Profiles
1015	RA-6	Multi-Beam Echosounder Sound Speed Profiles

Table 1. Data Acquisition Vessels for H11491.

No unusual vessel configurations were used for data acquisition.

B2. Quality Control

Crosslines

A single 3.00nm multi-beam echosounder crossline was run (20050921184740_002), comprising 13.32% of main scheme MBES hydrography. Main scheme and crossline bathymetry were manually compared in CARIS HIPS subset editor. Agreement was excellent at the nadir beams of the crossline, with differences of 2m or less in water approximately 400m deep. Major disagreements occurred in the outer beams of crossline 20050921184740_002 as a result of imperfect sound speed correction, which is discussed in the “Data Quality Factors” section of this report.

A statistical Quality Control Report has been conducted on representative data collected with each system used on this survey and is included in the *OPR-P132-RA-05 DAPR*.

Junctions

The following contemporary surveys junctions with H11491 (see Figure 1):

Registry#	Scale	Date	Junction Side
H11366	1:10,000	2004	East
H10568	1:10,000	1994	North
H10571	1:20,000	1994	West

Junction comparison was accomplished by viewing junction survey smooth sheet soundings alongside current survey soundings in MapInfo. A cursory comparison of H11491 with surveys H11366, H10568 and H10571 indicates sounding differences less than 3 meters in depths (<2% of depth) in the common areas.²

Data Quality Factors

Sound Speed Artifacts

After correction for the sound speed profile, crossline 20050921184740_002 (DN 264) exhibited the characteristic “frowns” indicative of inaccurate sound speed correction. Reapplication of correctors using the “Nearest in Distance” and “Nearest in Time” options yielded no improvement, and “Previous in Time” SVP correctors were reapplied.

The hydrographer suggests that this error may have resulted from the lack of real time sound speed correctors at the face of the Elac 1050D transducer. Significant fresh water “lensing” may have been present in the survey area due to its proximity to Columbia Glacier. At the time of this survey, RAINIER was not equipped with a surface sound velocimeter.

To minimize the effects of the refraction error in the HDCS data on the final BASE surface, crossline 20050921184740_002 (DN 264) was filtered 50/50 degrees port/starboard. Figure 3 illustrates the crossline (green) after filtering. The effect of this refraction error on the final BASE surface is insignificant.³

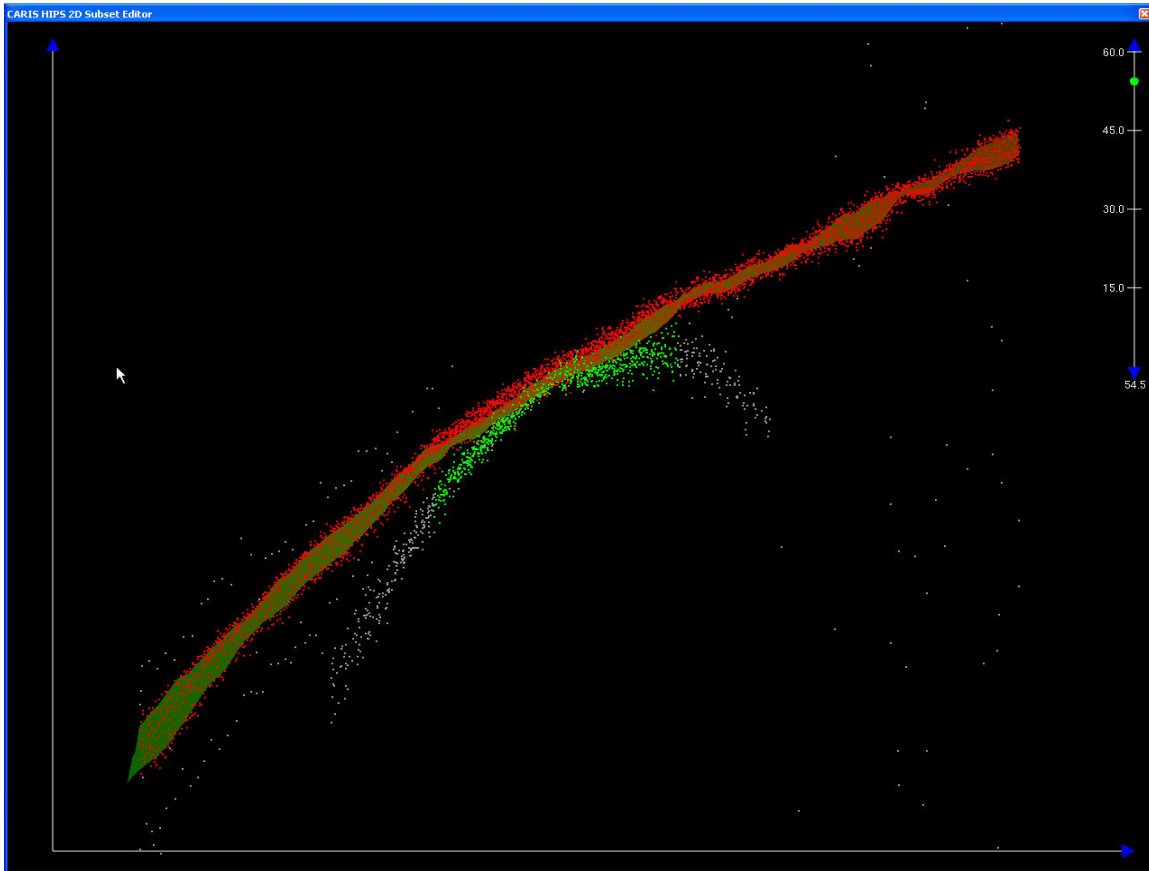


Figure 3. Crossline 20050921184740_002 after filtering. (Rejected soundings in grey)

Sparse Coverage

One hundred percent multibeam echosounder coverage was obtained for survey H11491, populating a 20m BASE surface. Bottom coverage suggested adequate overlap for feature detection. In accordance to Field Procedures Manual (March 2005) specifications, a base surface of 10-meter resolution was generated after acquisition was complete. Final review determined that the 10-meter BASE surface indicated inadequate coverage. Rejected outer beams which were of sufficient quality were reaccepted to improve coverage, but this did not significantly improve the results.

Figure 4 illustrates the 10-meter BASE surface coverage. This sparse dataset is the result of the inherent along-track coverage limitations of the Elac multi-beams, described in detail in the OPR-P132-RA-05 DAPR. Given that the depth range for survey H11491 is between approximately 275 and 455 meters and no significant features are indicated by the bathymetry, the hydrographer recommends acceptance of the 20m BASE surface as the final product of the survey.⁴

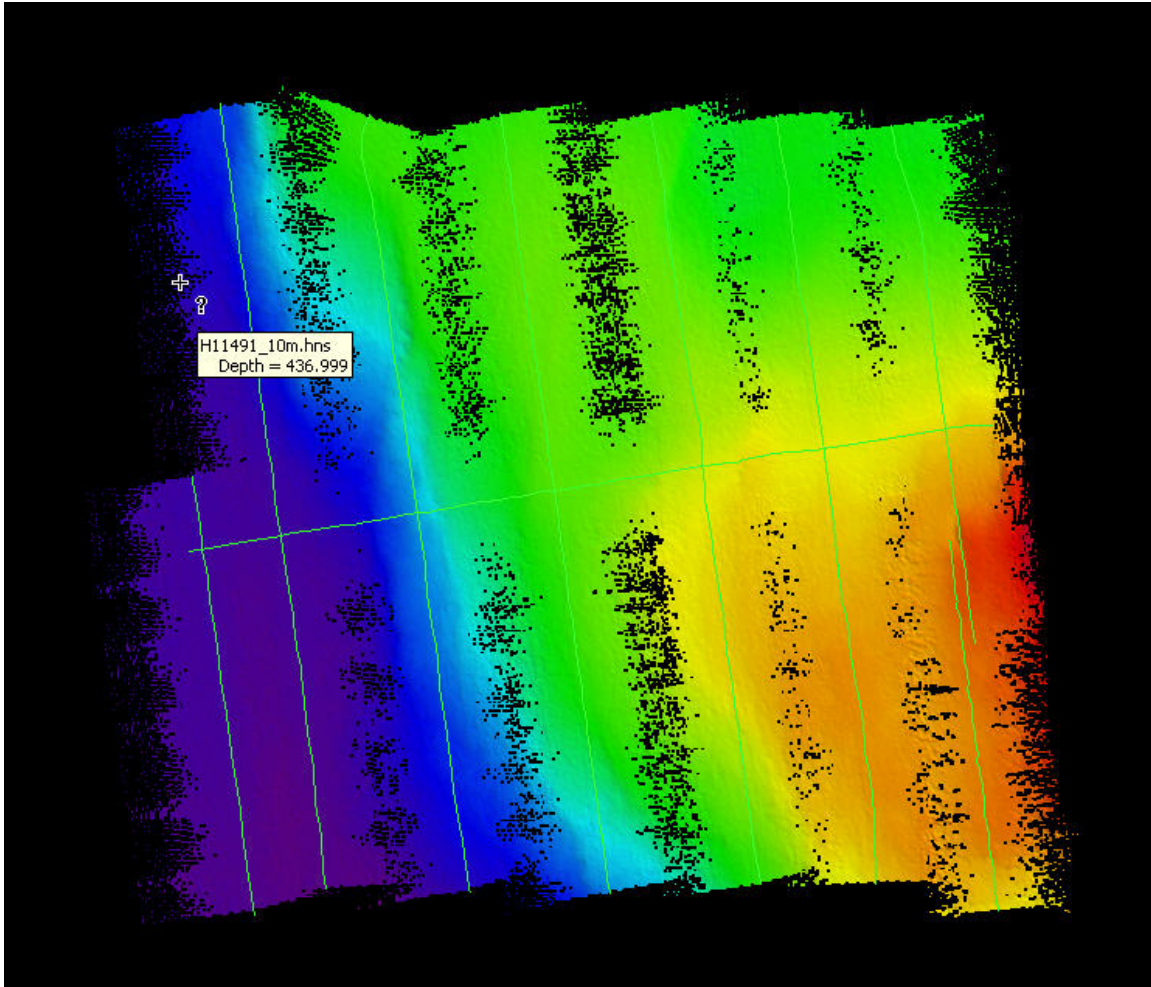


Figure 4. 10-meter Base surface after reaccepting outer beams.

B3. Data Reduction

Data reduction procedures for survey H11491 conform to those detailed in the *OPR-P132-RA-05 DAPR*.⁵

B4. Data Representation

The final BASE Surface submission is shown in Figures 5 and 6. The submission field sheets have fewer than 25×10^6 nodes. The final BASE surface is submitted at 20m resolution rather than 10m as called for in the Field Procedures Manual (FPM), as discussed in Section B.2.

Final review and BASE surface recomputation was completed in CARIS HIPS 6.0, SP2, HF19. BASE Surfaces were computed with uncertainty weighting, using the same parameters as described in the *OPR-P132-RA-05 DAPR*.



Figure 5: Field sheets and BASE surfaces submitted with H11491.

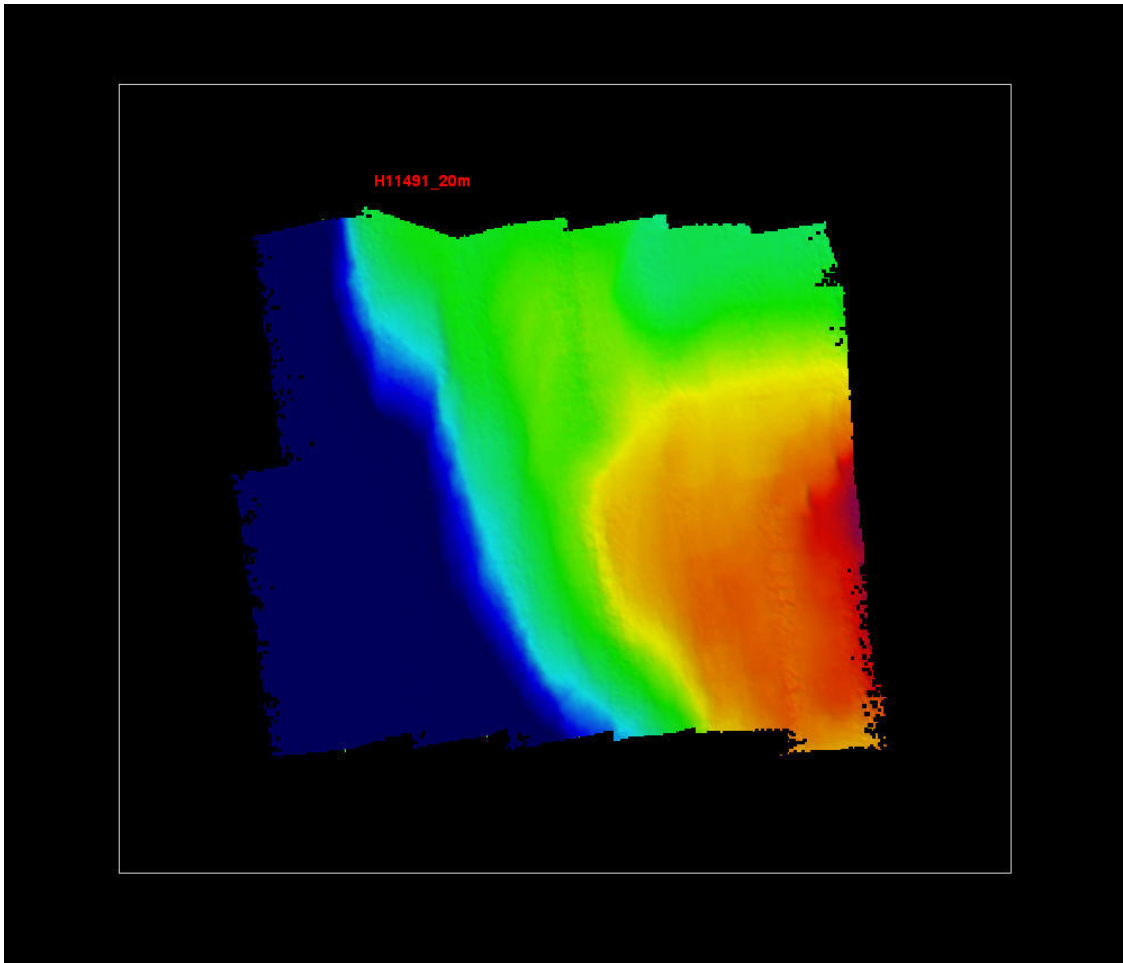


Figure 6: Layout of final field sheet and 20m resolution BASE surface for H11491.

C. VERTICAL AND HORIZONTAL CONTROL

A summary of horizontal and vertical control for this survey follows.

Horizontal Control

The horizontal datum for this project is the North American Datum of 1983 (NAD 83). Differential GPS (DGPS) was the sole method of positioning. Differential corrections from U.S. Coast Guard beacon at Potato Point (298 kHz) and Cape Hichinbrook were utilized during this survey. The differential corrector beacons utilized for this survey are listed in Table 2.

Location	Frequency	Custodian	Distance	Priority
Cape Hinchinbrook	292 kHz	USCG	45nm	Primary
Potato Point	298 kHz	USCG	5nm	Backup

Table 2: Differential Corrector Source for H11491.

The Cape Hinchinbrook beacon was used as the primary corrector source for this survey despite the longer distance from the survey grounds because of the more robust view of the satellite constellation available at this site.

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 located at Valdez, AK (945-4240) served as control for datum determination and primary source for water level reducers for survey H11491.

RAINIER personnel installed two Sutron 8210 “bubbler” tide gauges at the following subordinate station in accordance with Letter Instructions (see table 3). This station is described in detail in the OPR-P132-RA-05 Horizontal and Vertical Control Report.

Station Name	Station Number	Type of Gauge	Date of Installation	Date of Removal
Columbia Bay Glacier 1, AK	944- 44601	30-day	August 31 st , 2005	October 3 rd , 2005
Columbia Bay Glacier 2, AK	944- 44602	30-day	August 31 st , 2005	October 3 rd , 2005

Table 3: Tide Stations installed by RAINIER personnel for H11491.

All data were reduced to MLLW using **FINAL APPROVED WATER LEVELS** from stations Columbia Bay Glacier, AK (944-460) and Valdez, AK (945-4240) using the tide files 9454460.tid and 9454240.tid, and time and height corrector file H11491CORP.zdf.

Final Approved Water Levels for H11491 were requested November 8th, 2005 from CO-OPS. Water level data was received by RAINIER on February 21st, 2006. Refer to Appendix IV for documentation.⁶

The final zoning ZDF file for Sheet H11491 designates the Columbia Glacier station (945-4240) as the primary station for water level measurements, with Valdez (945-4240) as secondary. Acquisition on survey H11491 began prior to installation of the Columbia Glacier gauge. When applying water level correctors to the bathymetric data, CARIS HIPS 6.0 applies data from the station designated as primary in the ZDF file and will not defer to the data from the secondary station unless there is a gap in data from the primary station. Because the missing data from the primary station is at the beginning of the time series, there is no gap, and CARIS does not switch to the secondary gauge data. This results in a “tide data out of range” error when water levels are applied. In order to solve this problem, a gap was created in the primary station data (Columbia Glacier 945-4460) by adding a false data point 24 hours prior to the first recorded measurement. This point was given a value of 20 meters because this value is significantly different from measured water levels. This forces CARIS 6.0 to switch to the secondary gauge, and allows the user to manually verify that proper water levels have been applied. This process is a workaround to a programming deficiency and is not an error in the acquired data set.

D. RESULTS AND RECOMMENDATIONS

D.1 Chart Comparisons

D.1.a Survey Agreement with Chart

Survey H11491 was compared with the following chart:

Chart	Scale	Edition and Date	Notice to Mariners applied through
16713	1:50,000	2 nd Ed., Jan 2002	5/20/2006 ⁷

Depths from survey H11491 generally agreed within 3 fathoms of depths on chart 16713.⁸

Soundings were commonly deeper than those on chart 16713.⁹

D.1.b Dangers to Navigation

No DTONS were identified in H11491.¹⁰

D.1.c Other features

No AWOIS items were located within the limits of H11491.¹¹

D.2. Additional Results

Prior survey comparison was not performed for survey H11491.

D.2.b Shoreline Verification

Shoreline verification was not performed for survey H11491.¹²

Charted Features

There are no hydrographer recommendations.¹³

D.2.c Aids to Navigation

No ATONS are located within the limits of H11491.¹⁴

D.2.d Overhead features

There are no overhead features within the limits of survey H11491.¹⁵

D.2.e Submarine Cables and Pipelines

No submarine cables or pipelines are located within the limits of H11491.¹⁶

D.2.f Ferry Routes

There are no charted ferry routes within the limits of H11491. Alaska Marine Highway System vessels transit the survey area as part of their scheduled service between the ports of Prince William Sound.

D.2.g Bottom Samples

Bottom samples were not performed in survey H11491.¹⁷

D.2.h Other Findings

No items to report for survey H11491.¹⁸

E. Additional Documentation

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

<u>Title</u>	<u>Date sent</u>	<u>Office</u>
Data Acquisition and Processing Report for OPR-P132- RA-05	10/04/06	N/CS34
Horizontal and Vertical Control Report for OPR-P132-RA-05	06/02/06	N/CS34
Tides and Water Levels Package for OPR-P132-RA-05	11/08/05	N/CS34
Coast Pilot Report for OPR-P132-RA-05	08/18/06	N/CS34



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

October 2, 2006

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

FROM: CDR Guy T. Noll, NOAA
Commanding Officer

SUBJECT: Approval of Hydrographic Survey H11491

Field operations for hydrographic survey H11491 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, Field Procedures Manual, Standing and Letter Instructions, and HSD Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required. All data and reports are respectfully submitted to N/CS34, Pacific Hydrographic Branch.

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

Survey Sheet Manager:

Matthew Z. Boles
Survey Technician, NOAA

Tides Officer:

^{for}

Nicola Samuleson
Lieutenant (junior grade), NOAA

Horizontal Control Officer:

^{for}

Andrew P. Halbach
Lieutenant (junior grade), NOAA

Chief Survey Technician:

James B. Jacobson
Chief Survey Technician, NOAA

Field Operations Officer:

Benjamin K. Evans
Lieutenant, NOAA



Revision Compiled During Office Processing and Certification

¹ Filed with the project records.

² Concur.

³ Concur.

⁴ Concur. Density requirements are met for most of the survey area with a 20 meter surface. Given that the shoalest point in the survey is approximately 275 meters, this coverage density should be sufficient for compilation.

⁵ Filed with the project records.

⁶ Tide note is appended to this report.

⁷ At time of compilation, chart 16713 has been corrected through Apr. 21st, 2007.

⁸ Concur. Most soundings agree well within 3 fathoms, closer to 1-2 in most cases.

⁹ Concur.

¹⁰ Concur.

¹¹ There was no shoreline present on H11491.

¹² Concur.

¹³ Concur.

¹⁴ Concur.

¹⁵ Concur.

¹⁶ Two submarine cables indicated on 16713 in the northern portion of the survey area. Not noticed in bathymetry.

¹⁷ Concur. Depths are in excess of 100 meters throughout survey. One bottom sample was imported from the ENC.

¹⁸ Concur.



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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : January 12, 2006

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-P132-RA-2005
HYDROGRAPHIC SHEET: H11491

LOCALITY: Entrance to Valdez Arm, Prince William Sound, AK
TIME PERIOD: August 30 - October 1, 2005

TIDE STATION USED: Columbia Glacier, AK 945-4460
Lat. 61 01.4' N Long. 147 05.1' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.384 meters

TIDE STATION USED: Valdez, AK 945-4240
Lat. 61 07.5' N Long. 146 21.8' W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.417 meters

REMARKS: RECOMMENDED ZONING
Use zone(s) identified as: PWS64 & PWS67

Refer to attachments for zoning information.

Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

Note 2: Use tide data from the appropriate station with applicable zoning correctors for each zone according to the order in which they are listed in the Tidezone corrector file (*.ZDF). For example, tide station one (TS1) would be the first choice for an applicable zone followed by TS2, etc. when data are not available.

CHIEF, PRODUCTS AND SERVICES DIVISION



LODRANC
GENERAL EXPLANATION
 Symbols and Abbreviations used on this chart are explained in the General Explanation of the Symbols and Abbreviations of the Hydrographic Survey, which is published as a separate sheet. For a complete list of symbols and abbreviations, see the General Explanation of the Symbols and Abbreviations of the Hydrographic Survey, which is published as a separate sheet. For a complete list of symbols and abbreviations, see the General Explanation of the Symbols and Abbreviations of the Hydrographic Survey, which is published as a separate sheet.

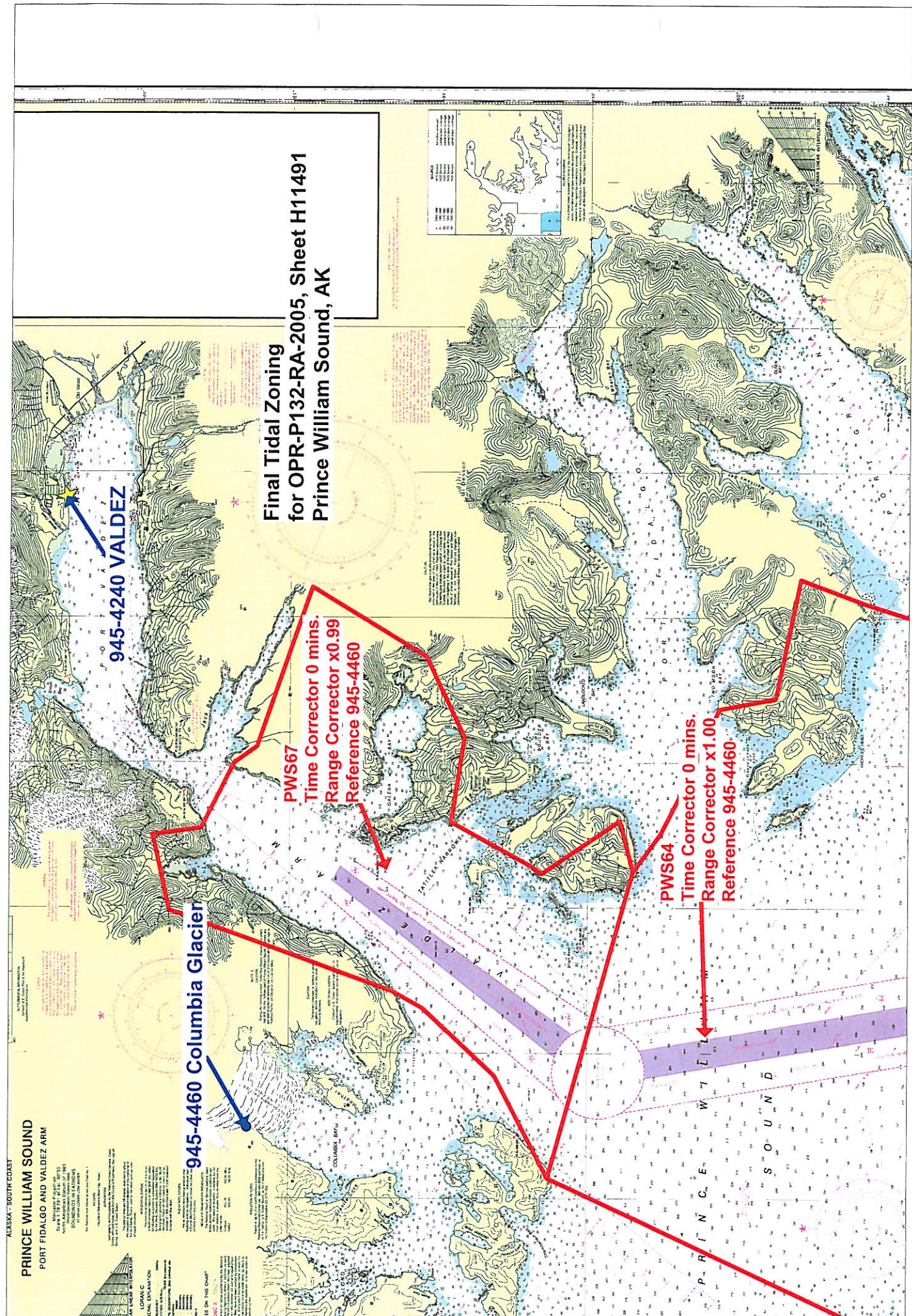
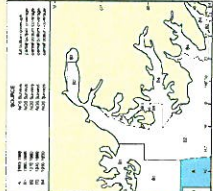
945-4240 VALDEZ

945-4460 Columbia Glacier

Final Tidal Zoning
for OPR-P132-RA-2005, Sheet H11491
Prince William Sound, AK

PWS67
Time Corrector 0 mins.
Range Corrector x0.99
Reference 945-4460

PWS64
Time Corrector 0 mins.
Range Corrector x1.00
Reference 945-4460



H11491 HCell Report
Andrew Clos, Hydrographer Intern
Pacific Hydrographic Branch

Introduction

The primary purpose of the HCell is to provide new survey information in International Hydrographic Organization (IHO) format S-57 to update the largest scale ENC's and RNC's in the region: NOAA RNC's, 16713 (1:50,000) and corresponding NOAA ENC's, US5AK23M, US5AK11M, and US4AK24M. (See section 4. Meta Areas.)

HCell compilation of survey H11491 utilized Office of Coast Survey HCell Specifications Version 3.1, with approved modifications to better align with PHB's HCell process and to meet MCD needs.

1. Compilation Scale

Depths and features for HCell H11491 were compiled to the largest scale chart in the region, 16713, 1:50,000. There were no insets and the largest scale chart fully encompassed H11491.

2. Soundings

A survey-scale sounding (SOUNDG) feature object layer was built from the 20-meter Combined Surface in CARIS BASE Editor. A shoal-biased selection was made at 1:17,000 survey scale using a Radius Table file with values shown in the table, below. The resultant sounding layer contains 3451 depths ranging from 275.97 meters to 449.7 meters.

Shoal Limit (m)	Deep Limit (m)	Radius (mm)
0	10	3
10	20	4
20	50	4.5
50	200	5

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

3. Depth Areas and Depth Contours

3.1 Depth Areas

New guidelines specify that the creation and submission of an all encompassing DEPARE is no longer necessary. The extents of the highest resolution BASE Surface together with the extents of the soundings layer were used to digitize the hydrographic extents, which were then used to create the single, all encompassing meta area (M_QUAL).

3.2 Depth Contours

No depth contours of the largest scale chart fell within the survey limits. Depth contours are therefore not included in the HCell.

4. Meta Areas

The following Meta object areas are included in HCell H11491:

M_QUAL

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

5. Features

5.1 Generalization of Features to Chart Scale

There were no features verified or disproved by the field. The only feature being carried forwards is a single bottom sample from the ENC.

5.2 Compilation of Features to the HCell

The source of all features included in the H11491 HCell can be determined by the SORIND field.

5.2 Mean High Water Used for HCells

For the purposes of determining the height at which a rock becomes an islet, the CO-OPS “*Tide Note for Hydrographic Survey*”, “*Height of High Water Above the Plane of Reference*” is used.

6. S-57 Objects and Attributes

The H11491_CS HCell contains the following Objects:

\$CSYMB	Blue Notes
M_QUAL	Data quality Meta object
SBDARE	Bottom sample from ENC
SOUNDG	Soundings at the chart scale density

The H11491_SS HCell contains the following Objects:

SOUNDG	Soundings at the survey scale density
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All S-57 Feature Objects in the H11491_CS HCell have been attributed as fully as possible based on information provided by the Hydrographer and in accordance with current guidance and the OCS HCell Specifications.

7. Blue Notes

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

8. Spatial Framework

8.1 Coordinate System

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

8.2 Horizontal and Vertical Units

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

Chart Unit Base Cell Units:

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

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

BASE Editor and S-57 Composer Units:

Sounding Units: Meters rounded to the nearest millimeter

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

Conversion to fathoms and feet charting units with NOAA rounding ensures that:

- All depths deeper or equal to 11 fathoms display as whole fathoms.

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

9. Data Processing Notes

9.1 Junction with H11508

H11491 junctions with H11366, completed in October 2004 and H11743, submitted in March 2009. Soundings along the border shared with H11366 have already made it to the raster chart, so a common junction was not made and soundings from H11491 should supersede those from H11366 in this eastern border region. The southern border of H11491 is shared with H11743, so the extents of H11491 were clipped back. Soundings were generally in good agreement and only some minor changes were made to select a more shoal biased sounding.

10. QA/QC and ENC Validation Checks

H11491 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

H11491_CS.000	Base Cell File, Chart Units, Soundings and features compiled to 1:50,000
H11491_SS.000	Base Cell File, Chart Units, Soundings and Contours compiled to 1:10,000
H11491_DR.doc	Descriptive Report including end notes compiled during office processing and certification, the HCell Report, and supplemental items
H11491_outline.gml	Survey outline to populate SURDEX

11.3 Software

CARIS HIPS Ver. 6.1 SP2	Inspection of Combined BASE Surfaces
CARIS BASE Editor Ver. 2.3	Creation of soundings and bathy-derived features, creation of the depth area, meta area objects, and Blue Notes; Survey evaluation and verification; Initial HCell assembly.
CARIS S-57 Composer Ver. 2.1	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	Validation of the base cell file.

12. Contacts

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

Andrew Clos
Hydrographer Intern
Pacific Hydrographic Branch
Seattle, WA
206-526-6871
Andrew.clos@noaa.gov

APPROVAL SHEET
H11491

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.

 Digitally signed by Andrew
Clos
Date: 2010.03.15 13:59:21
-07'00'

The survey and associated records have been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, S-57 classification and attribution of soundings and features, cartographic characterization, and verification or disapproval 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.