

H11493

NOAA FORM 76-35A

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

## DESCRIPTIVE REPORT

*Type of Survey* ..... HYDROGRAPHIC

*Field No.* ..... RA-10-17-05

*Registry No.* ..... H11493

### LOCALITY

*State* ..... Alaska

*General Locality* ..... Eastern Prince William Sound

*Sublocality* ..... Columbia Bay - North of Heather Island

2005

### CHIEF OF PARTY

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

### LIBRARY & ARCHIVES

DATE .....

**HYDROGRAPHIC TITLE SHEET**

**H-11493**

INSTRUCTIONS The hydrographic sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the office.

FIELD NO.

**RA-10-17-05**

State Alaska

General Locality Eastern Prince William Sound

Sublocality Columbia Bay - North of Heather Island

Scale 1:10,000

Date of Survey 9/1/2005 - 10/3/2005

Instructions Date 8/3/2005

Project No. OPR-P132-RA-05

Vessel RA5 (1006), RA6 (1015), RA4 (1016), RA1 (1101),  
RA2 (1103), RA7 (817)

Chief of Party Commander Guy T. Noll, NOAA

Surveyed by Rainier Personnel

Soundings taken by echo sounder, hand lead, pole Reson 8101, Reson 8125

Seabeam/Elac 1180, Knudsen 320M, Ross

Graphic record scaled by Rainier Personnel

Graphic record checked by Rainier Personnel

Evaluation by P. Holmberg Automated plot by N/A

Verification by P. Holmberg

Soundings in Fathoms at MLLW

REMARKS: Time in UTC. Revisions and end notes in red

were generated during office processing. All separates

are filed with the hydrographic data. As a result, page

numbering may be interrupted or non-sequential.

# Descriptive Report to Accompany Hydrographic Survey H11493

Project OPR-P132-RA-05  
Eastern Prince William Sound, AK  
Scale 1:10,000  
September - October 2005  
**NOAA Ship RAINIER (S221)**  
Chief of Party: Commander Guy T. Noll, NOAA

## A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions OPR-P132-RA-05, dated August 03, 2005 and all other applicable direction<sup>1</sup>, with the exception of deviations noted in this report. The survey area is South Columbia Bay. This survey corresponds to sheet "S" in the sheet layout provided with the Letter Instructions.<sup>i</sup>

One hundred percent shallow-water multibeam (SWMB) coverage was obtained in the survey area to the extent possible in waters 8 meters and deeper. Although every effort was made to complete the survey in accordance with the Letter Instructions, some regions within the survey limits were not addressed due to heavily packed ice calved from Columbia Glacier. This ice was trapped in Columbia Bay by the prevailing winds during the period of acquisition, rendering some areas inaccessible. Ice conditions were particularly severe on the west side of the bay, and in the vicinity of the terminal moraine separating Columbia and Heather Bays.

Additionally, ice and weather conditions during the limited time allotted for this survey severely limited shoreline verification. The Chief of Party, in consultation with embarked Office of Coast Survey personnel<sup>ii</sup>, determined that the survey would be considered complete despite these deficiencies.

A charted shoal at the north end of Heather Bay adjacent to the anchorage utilized by RAINIER during data acquisition for H11493 and H11494 was investigated with Vertical Beam Echosounder lines at 20m spacing. This feature, in position 60° 59' 37.87" N, 147° 00' 22.04" W, is inside the H11493 sheet limits, but outside the survey limits. It is depicted as an offshore mud flat on chart 16713, and with a danger circle and "Shoals Reported (1994)" annotation on chart 16708. Results of this investigation are included in Section D.2 (Chart Comparison).

Data acquisition was conducted from September 1 to October 3, 2005 (DN 244 to 276).

---

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

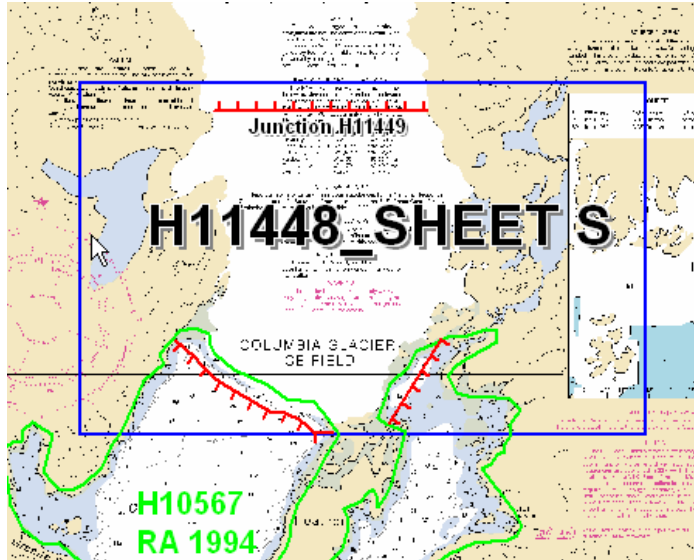


Figure 1. H11493 Survey limits<sup>iii</sup> and junctions shown on chart 16713.

**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-P132-RA-05 Data Acquisition and Processing Report (DAPR)*<sup>iv</sup>, 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 were acquired by RAINIER survey launches listed in Table 1.

Hull Number	Name	Acquisition Type
1101	RA-1	Vertical-Beam Echosounder Detached Positions
1103	RA-2	Vertical-Beam Echosounder Detached Positions
1016	RA-4	Multi-Beam Echosounder
1006	RA-5	Multi-Beam Echosounder
1015	RA-6	Multi-Beam Echosounder
817	RA-7	Vertical-Beam Echosounder Detached Positions

Table 1. Data Acquisition Vessels for H11493.

No unusual vessel configurations were used for data acquisition.

**B2. Quality Control**

**Crosslines**

Vertical Beam Echosounder (VBES) cross lines and buffer lines were run during the course of this survey.<sup>v</sup> Mileage for main scheme VBES totaled 25.5 nautical miles.

Shallow-Water Multibeam (SWMB) crosslines totaled 13.35 nautical miles, comprising 11.3% of SWMB hydrography. The mainscheme bathymetry was manually compared to the XL nadir beams in CARIS subset mode. XL nadir depths in general agreed well with main scheme bathymetry. No significant deviations were noted.

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

**Junctions**

The following contemporary survey junctions with H11493 (see Figure 1):

<u>Registry #</u>	<u>Scale</u>	<u>Date</u>	<u>Junction side</u>
H11494	1:10,000	2005	North
H10567	1:10,000	1994	South

Survey H11494 junctions well with this survey.<sup>vi</sup> Visual inspection with CARIS subset mode shows no discernable deviations.

Data for H10567 was provided in a Mapinfo table of XYZ data. H11494 soundings were visually compared with the junction survey in Mapinfo. Although agreement was generally good considering the tremendous changes in Columbia Bay since the completion of H10567, some areas of non-navigationally significant discrepancies were noted on the ridge of the terminal moraine at the mouth of the bay. The hydrographer recommends that soundings from H11493 supersede H10567 in the common area.<sup>vii</sup>

**Data Quality Factors**

It is noteworthy that despite the large amount of freshwater influx due to the close proximity of Columbia Glacier, the bathymetry was largely unaffected by refraction correction errors caused by stale sound speed profiles.

**B3. Data Reduction**

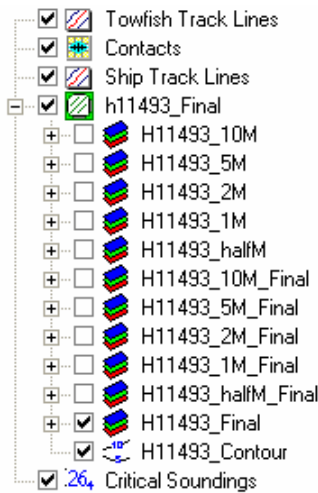
Data reduction procedures for survey H11493 conform to those detailed in the *OPR-P132-RA-05 DAPR*.

Note that a finalized CARIS BASE surface cannot include negative soundings. Several exploratory lines of VBES hydrography were run at high tide through the moraine and a charted drying shoal at the head of Heather Bay. After correction for water levels, some soundings were found to have negative depths (i.e., elevations above MLLW). Under the current process, these cannot be portrayed in the finalized BASE surface, so an apparent data gap appears.<sup>viii</sup> If these soundings are needed, please see the original HDCS data.

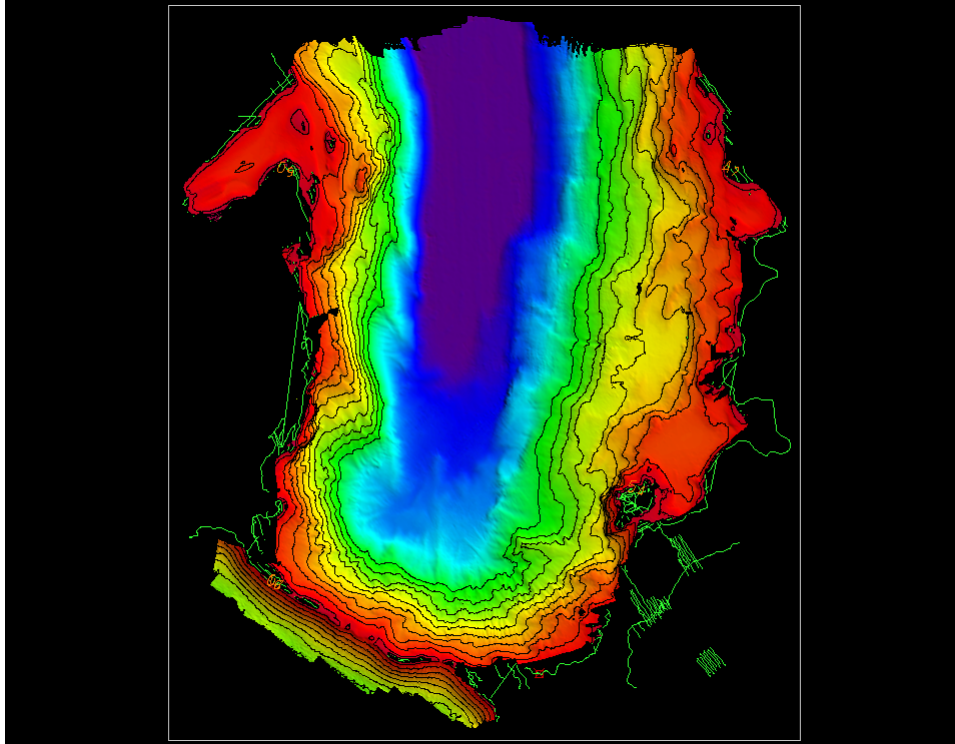
Final review and BASE Surface recomputation was completed in CARIS HIPS 6.0, SP2, HF13. BASE Surfaces were computed with uncertainty weighting, using the same parameters as described in the DAPR.

**B4. Data Representation**

Though many BASE surfaces were used in processing H11493, the final submission is shown in Figures 2 and 3. Final BASE surface resolutions and depth ranges were set in accordance with the Field Procedures Manual, with field sheets smaller than 25x10<sup>6</sup> nodes.



*Figure 2: Field sheet and BASE surfaces submitted with H11493.*



*Figure 3: Field sheet and BASE surface layout. The border above is field sheet h11493\_final, the only field sheet for this survey. All intermediate BASE surfaces contain only those lines that contain processed depths relevant to their resolution as given by table 4-9 in Field Procedures Manual v1.1.*

**C. VERTICAL AND HORIZONTAL CONTROL**

A complete description of vertical and horizontal control for survey H11493 can be found in the *OPR-P132-RA-05 Horizontal and Vertical Control Report<sup>ix</sup>*, submitted under separate cover. A summary of horizontal and vertical control for this survey follows.

**Horizontal Control**

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

Location	Frequency	Custodian	Distance	Priority
Cape Hinchinbrook	292 kHz	USCG	50 nm	Primary
Potato Point	298 kHz	USCG	10 nm	Backup

*Table 2: Differential Corrector Sources for H11493*

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 complete view of the satellite constellation available at this site.

RAINIER personnel conducted no performance checks between these two stations during the data acquisition period.

### 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 Valdez, AK (945-4240) served as control for datum determination and as the primary source for water level reducers for survey H11493.

RAINIER personnel installed two Sutron 8210 “bubbler” tide gauges at the same site for redundancy at the following subordinate station in accordance with the 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 <sup>st</sup> , 2005	October 3 <sup>rd</sup> , 2005
Columbia Bay Glacier 2, AK	944- 44602	30-day	August 31 <sup>st</sup> , 2005	October 3 <sup>rd</sup> , 2005

*Table 3: Tide Stations installed by RAINIER personnel for H11493*

All data were reduced to MLLW using **FINAL APPROVED WATER LEVELS** from stations Columbia Bay Glacier, AK (944-4460) (computed from both gauge data sets) and Valdez, AK (945-4240) using the tide files: 9454460.tid and 9454240.tid. Time and height correctors were from the final zone corrector file H11490CORF.zdf.

The request for Final Approved Water Levels for H11493 was submitted to CO-OPS on November 8<sup>th</sup>, 2005 and water level data were received by RAINIER on February 21<sup>st</sup>, 2006. This documentation is included in Appendix III.

## D. RESULTS AND RECOMMENDATIONS

### D.1 Automated Wreck and Obstruction Information System (AWOIS) Investigations

No AWOIS items were located within the limits of H11493.<sup>x</sup>

### D.2 Chart Comparison

The majority of H11493 covers an area currently charted as Columbia Glacier. A small portion of the survey south of the terminal moraine at the glacier’s former terminus does overlap a region charted with depths. This area of H11493 was compared with the following charts:



Chart	Scale	Edition and Date	Corrected for Notice to Mariners through
16700	1:200,000	29 <sup>th</sup> Ed, July 2004	NM: 04/22/2006, LNM: 04/18/2006
16708	1:79,291	26 <sup>th</sup> Ed; October 2004	NM: 04/22/2006, LNM: 04/18/2006
16713	1:50,000	2 <sup>nd</sup> Ed; January 2002	NM: 04/22/2006, LNM: 04/18/2006

*Table 4: Charts compared with H11493*

### **Chart 16700**

Soundings from survey H11493 agree well with the lone charted sounding that they overlapped. The hydrographer recommends that current survey soundings supersede the charted depth in the common area.<sup>xi</sup>

### **Chart 16708**

Depths portrayed on chart 16708 were visually compared with survey soundings in Pydro. Agreement between H11493 and the chart were generally good, with differences less than 2 fathoms and no evident migration of depth curves. The hydrographer recommends that current survey soundings supersede all charted depths in the common area.<sup>xii</sup>

Although it lies outside the assigned survey limits, the “Shoals Reported (1994)” area in the vicinity of 60° 59' 37.87" N, 147° 00' 22.04" W on chart 16708 was investigated. VBES 20-meter splits over the position of the reported shoal confirmed its existence (see Fig. #4) with a least depth of 0.5 meters<sup>xiii</sup> (0.3 fathoms). The hydrographer recommends removal of the “*Shoals Rep (1994)*” annotation, and super cession of charted depths with current survey soundings in the common area.<sup>xiv</sup>



Figure 4: Soundings (in meters) over a reported shoal spot.<sup>xv</sup>

### Chart 16713

Depths portrayed on chart 16713 were visually compared with survey soundings in Pydro. Agreement between H11493 and the chart were generally good, with differences less than 2 fathoms and no evident migration of depth curves. The hydrographer recommends that current survey soundings supersede all charted depths in the common area.<sup>xvi</sup>

Chart 16713 portrays a mud flat in position 60° 59' 37.87" N, 147° 00' 22.04" W (the same location as the "Shoals Reported (1994)" area depicted on chart 16708). The area was investigated as described above. It was found to have a least depth of 0.3 fathoms, and is centered approximately 50m SSE of its charted position. The hydrographer recommends that current survey data supersede charted features and depths in the common area.<sup>xvii</sup>

As per project instructions, raster charts were used for chart comparison. The survey data was not compared to the ENC charts.<sup>xviii</sup>

### D.3 Shoreline

#### Shoreline Source

Vector photogrammetric project GC10573 was supplied by N/NGS3 in the form of cartographic feature files (CFF). Due to heavy ice presence and time constraints, RAINIER personnel performed only fragmentary shoreline verification during the course of survey H11493.

#### Shoreline Verification

The amount of glacial ice present in Columbia Bay prevented systematic shoreline verification. Shoreline data were obtained in ice-free areas during favorable wind conditions but major sections of shoreline could not be approached during low water windows. Specifically, ice prevented shoreline verification north of  $61^{\circ}01'40''$  N along the western shore and north of  $61^{\circ}02'09''$  N along the eastern shore. Casual observation of shoreline during normal survey operations suggests that the source shoreline is accurate.

An uncharted reef was discovered in the vicinity of  $61^{\circ}00'55.64''$  N,  $147^{\circ}05'13.21''$  W. This feature was seen when the NALL line was collected during shoreline verification but no detached positions were taken. In the days that followed glacial ice prevented return to the site for acquisition of any DPs. To produce the outline of this reef, the NALL trackline was used to position the approximate edge of this feature (see Figure 4).

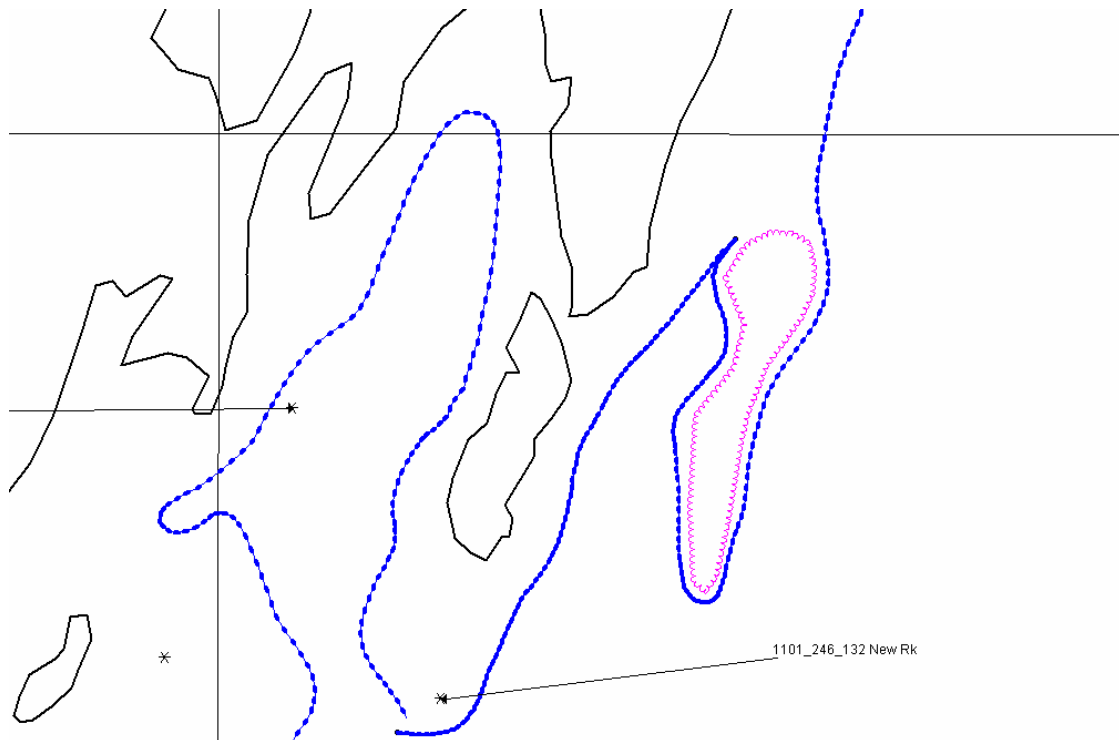


Figure 4: The position of the new reef is shown in relation to the blue colored NALL trackline.

#### Recommendations

The Hydrographer recommends that the shoreline as depicted in the MapInfo feature plot digital file supersede and complement shoreline information compiled on the CFF and charts

as noted.<sup>xix</sup> In addition, field notes made by the Hydrographer, including verification of source features or charted features if no source shoreline was available, are submitted in the digital MapInfo file “H11493\_Shoreline\_Notes.” In areas where ice prevent shoreline verification as previously discussed, the hydrographer recommends that charted shoreline and features be compiled from vector photogrammetric project GC10573 data.<sup>xx</sup>

#### **D.4 Dangers to Navigation**

No dangers to navigation were located within the limits of H11493.<sup>xxi</sup>

#### **D.5 Aids to Navigation**

No ATONS were located within the limits of H11493.<sup>xxii</sup>

#### **D.6 Miscellaneous**

No bottom samples were collected for H11493.

##### **D.2.d. Overhead features**

There are no overhead features in survey H11493.

##### **D.2.e. Submarine Cables and Pipelines**

There are no submarine cables or pipelines in the navigable areas of survey H11493

##### **D.2.f. Ferry Routes**

There are no ferry routes in survey H11493.

##### **D.2.g. Bottom Samples**

No bottom samples were taken in survey H11493.<sup>xxiii</sup>

##### **D.2.h Miscellaneous**

None.

### **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	TBD <sup>xxiv</sup>	N/CS34
Horizontal and Vertical Control Report for OPR-P132-RA-05	2 Jun 2006	N/CS34
Tides and Water Levels Package for OPR-P132-RA-05	8 Nov 2005	N/OPS1
Coast Pilot Report for OPR-P132-RA-05	18 Aug 2006	N/CS26



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

August 18, 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 H11493

Field operations for hydrographic survey H11493 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, with the exceptions noted in the Descriptive Report. All data and reports are respectfully submitted to N/CS34, Pacific Hydrographic Branch.

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

Survey Sheet Manager:

for Gregory J. King  
Hydrographic Survey Technician, NOAA Ship RAINIER

Tides Officer:

for Nicola Samuelson  
Lieutenant (junior grade), NOAA

Horizontal Control Officer:

for Andrew P. Halbach  
Lieutenant (junior grade), NOAA

Chief Survey Technician:

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

Field Operations Officer:

Benjamin K. Evans  
Lieutenant, NOAA



## Revisions Compiled During Office Processing and Certification

---

- <sup>i</sup> Concur
- <sup>ii</sup> Kyle Ward, Physical Scientist OCS/HSD/OPS.
- <sup>iii</sup> The Figure 1 label for Sheet S, H11448 is incorrect. It should read H11493.
- <sup>iv</sup> Filed with Project Reports
- <sup>v</sup> While all hydrographic data has been included in the archived product, not all buffer line data were included in the final H-Cell.
- <sup>vi</sup> Concur
- <sup>vii</sup> Concur
- <sup>viii</sup> The negative soundings were evaluated and deemed non significant for purposes of chart compilation, so were not included in the Combined BASE surface used to generate the H-Cell.
- <sup>ix</sup> Filed with Project Records
- <sup>x</sup> Concur
- <sup>xi</sup> Concur
- <sup>xii</sup> Concur
- <sup>xiii</sup> A more shoal depth of 0.4 meters, from the sounding layer created from the Combined BASE Surface, was selected for compilation to the chart.
- <sup>xiv</sup> Concur
- <sup>xv</sup> Screen grab is from Pydro. A shoaler depth was selected from the BASE surface for compilation to the H-Cell
- <sup>xvi</sup> Concur
- <sup>xvii</sup> Concur
- <sup>xviii</sup> Chart comparison to ENC during processing branch review revealed minor discrepancies that are de-conflicted in the H-cell.
- <sup>xix</sup> Further manipulation of reef limits was performed based on hydrography.
- <sup>xx</sup> Concur
- <sup>xxi</sup> Concur
- <sup>xxii</sup> Concur
- <sup>xxiii</sup> Bottom samples were not required by the Letter Instructions.
- <sup>xxiv</sup> DAPR was sent on 28 Sep 2006



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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : January 13, 2006

HYDROGRAPHIC BRANCH: Pacific  
HYDROGRAPHIC PROJECT: OPR-P132-RA-2005  
HYDROGRAPHIC SHEET: H11493

LOCALITY: Columbia Bay-North of Heather Island, Prince William Sound, AK  
TIME PERIOD: September 1- October 3, 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: PWS72 & PWS72A

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.

*Fm [Signature]*

CHIEF, PRODUCTS AND SERVICES DIVISION





**Final tide zone node point locations for OPR-P132-RA-2005, H11493**

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

Zone	Tide Station Order	AVG Time Correction	Range Correction
PWS72	945-4460	0	x0.99
	945-4240	0	x0.98
-147.373266 60.876709			
-147.320454 60.878014			
-147.248924 60.873126			
-147.226276 60.867232			
-147.1433 60.855198			
-147.025646 60.885186			
-146.948102 60.925559			
-146.928717 60.942475			
-146.95637 61.014771			
-146.985435 61.024049			
-147.019075 61.020785			
-147.064676 61.021148			
-147.08486 61.022599			
-147.104297 61.027314			
-147.29477 61.02981			
-147.373266 60.876709			
PWS72A	945-4460	0	x1.01
	945-4240	0	x0.99
-147.29477 61.02981			
-147.272639 61.10537			
-147.176302 61.151329			
-146.99144 61.148811			
-146.944574 61.098437			
-146.944575 61.044195			
-146.95637 61.014771			
-146.985435 61.024049			
-147.019075 61.020785			
-147.064676 61.021148			
-147.08486 61.022599			
-147.104297 61.027314			
-147.29477 61.02981			





UNITED STATES  
ALASKA - EDITION CD451

PRINCE WILLIAM SOUND  
PORT VALDEZ AND VALDEZ

Time Corrector 0 mins.  
Range Corrector x1.01  
Reference 945-4460

945-4460 Columbia Glacier

PWS72

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

945-4240 VALDEZ

Final Tidal Zoning  
for OPR-P132-RA-2005, H11493  
Columbia Bay-North of Heather Island  
Prince William Sound, AK

**H-11493 H-Cell Supplemental Report**  
Peter Holmberg, Physical Scientist  
Pacific Hydrographic Branch

**Introduction**

The primary purpose of the H-Cell is to directly update NOAA ENC's with new survey information in International Hydrographic Organization (IHO) format S-57. H-Cell compilation of survey H-11493 utilized Office of Coast Survey H-Cell Specifications Version 1.2, draft, March 2, 2007. H-Cell H-11493 will be used to update charts 16713,1:50,000 (2nd<sup>1</sup> Ed.; Jan 19, 2002, NM 2/10/2007), and US5AK11M.

**1. Compilation Scale**

The density of soundings in the H-Cell are compiled as appropriate to emulate those soundings of Chart 16713, 1:50,000. Position and density of non-bathymetric features included in the H-Cell have not been generalized from the scale of the hydrographic survey, 1:10,000.

**2. Soundings**

**2.1 Source Data**

A 10 m resolution Combined BASE surface, **H-11493\_10m\_Combined**, was used as the basis for H-Cell production following Branch certification. This surface contained four designated soundings, none of which were DtoNs.

A survey-scale full density sounding (SOUNDG) feature object source layer was built from the **H-11493\_10m\_Combined\_Final** surface in CARIS BASE Editor. A shoal-biased selection was made at 1:10,000 survey scale using a radius table with values shown in **Table 1**, below. The sounding feature object source layer was exported from BASE Editor as **Soundings-SS.HOB**, and imported into HOM.

Upper limit (m)	Lower limit (m)	Radius (mm)
0	10	3
10	20	4
20	50	4.5
50	500	5

**Table 1**



## 2.2 Sounding Feature Objects

In CARIS BASE Editor soundings were manually selected from the high density sounding layer, **H-11493\_SS\_soundings.HOB**, and imported into a new layer created to accommodate chart density depths, **H-11493\_CU\_soundings.HOB**. Manual selection was used to accomplish a density and distribution that more closely represents the seafloor morphology and that emulates density and distribution of soundings on chart 16713 than is possible using automated methods. See section 10.1, Data Processing Notes, for details about the use of manual sounding selection for H-11493. The sounding feature object source layer was exported as **H-11493\_CU\_soundings.HOB**, and imported into HOM.

## 3. Depth Areas

### 3.1 Source Data

The BASE surface **H-11493\_10m\_Combined** was used to generate both an all encompassing depth area, and, for survey evaluation and verification purposes only, a set of chart equivalent contours. No actual depth contours were delivered per OCS H-Cell Specifications ver.1.2, draft.

### 3.2 Depth Area Feature Objects

One all-encompassing depth range, -10 meters to 400meters, was used for all depth area objects created for the H-Cell. Upon conversion to NOAA charting units, this depth range is -5.7 fms to 218.7 fms.

## 4. Meta Areas

The following Meta object areas are included in H-Cell 11493:

M\_COVR  
M\_QUAL  
M\_NSYS

Meta area objects were constructed on the basis of perimeter lines delineating the hydrographic limits, “islands of coverage” for point features surveyed outside the hydrographic limits, and extents of data gaps inside the survey area. These perimeters were first used to create the Skin of The Earth (SOTE) layer, then were duplicated to the Meta object layers and attributed per the H-Cell Specifications, ver. 1.2, draft.

## 5. Survey Features

There were 5 reef objects and 13 rocks (UWTROCs) included in the H-11493 H-Cell. These features have been characterized per H-Cell Specifications, ver. 1.2, draft. Reefs

are shown as SBDARE area objects and require a geometrically coincident intertidal depth area for proper S-57 characterization.

Manual digitizing of some of the new reefs by the field unit led to discrepancies in the true representation of their extents, Figure 1. During office processing, hydrography and the limits of the hydrographic coverage were used to refine the reef extents, as in the example, Figure 2.

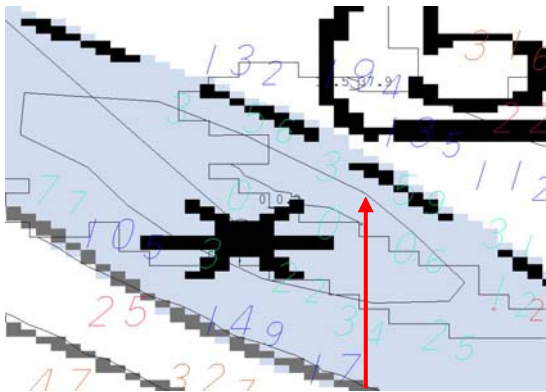


Figure 1. Original Reef extents

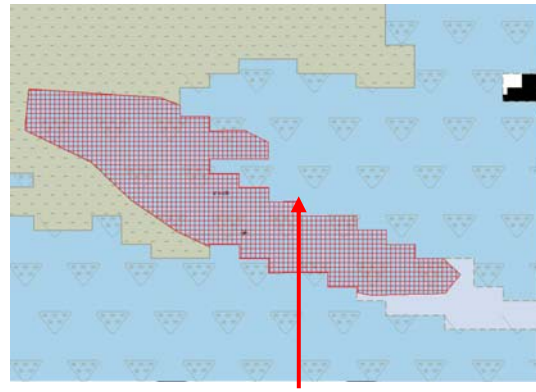


Figure 2. Reef extents overruled.

Several rocks were surveyed outside the hydrographic limits using singlebeam, Figure 3. These are included in the H-Cell inside discrete “islands of coverage”.

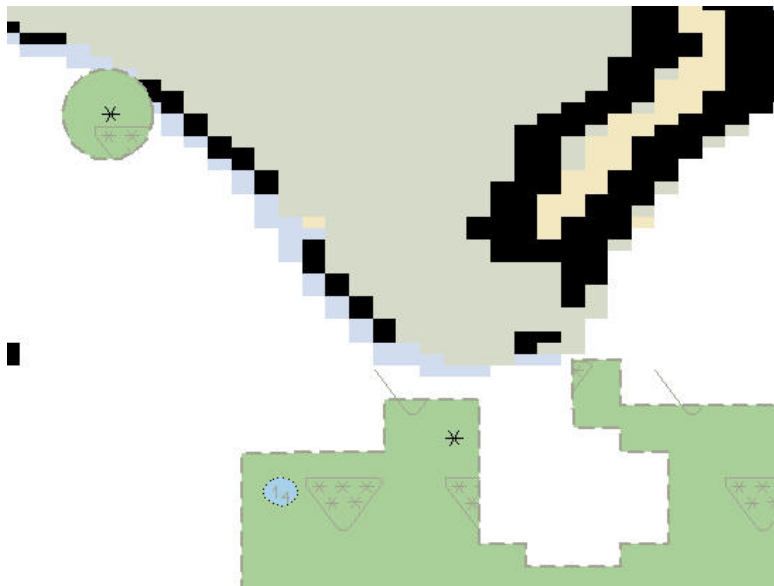


Figure 3. Surveyed rock isolated from main survey area.

## **6. Shoreline / Tide Delineation**

No shoreline features, including Mean Lower Low Water (MLLW) or Mean High Water (MHW) lines, were used in the creation of H-Cell H-11493.

In accordance with H-Cell Specifications, ver. 1.2, draft, depth areas for reefs were not created. SBDARE area objects were created for reefs. The MHW to MLLW depth area for these should be created during ENC compilation.

## **7. Attribution**

All S-57 Feature Objects have been attributed as fully as possible based on information provided by the Hydrographer and in accordance with OCS H-Cell Specifications, ver. 1.2, draft.

## **8. Layout**

### **8.1 CARIS HOM Layering Scheme**

100	Soundings
200	Group 1 objects (Skin of the Earth)
300	Point objects (UWTROC)
500	Area objects (SBDARE for reefs)
600-603	Meta layers
800	Items used for creation of Blue Notes

### **8.2 Blue Notes**

Notes regarding data sources are in CARIS HOM layer 800 and as Shapefile sets, **H11493bluenotes\_p** and **H11493bluenotes\_I** (with the appropriate extensions) for point and line figures, respectively.

## **9. Spatial Framework**

### **9.1 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.

### **9.2 Horizontal and Vertical Units**

During creation of sounding sets in CARIS BASE Editor, and creation of the H-Cell in CARIS HOM, units are maintained as metric with millimeter resolution. NOAA rounding is applied at the same time that conversion to chart units is made to the metric H-Cell base cell file, at the end of the H-Cell compilation process.

A CARIS environment variable, `uslXsounding_round`, controls the depth at which rounding occurs. Setting this variable to NOAA fathoms and feet displays all soundings from 0 to equal to or greater than 11 fathoms as whole units.

In an ENC viewer fathoms and feet display in the format `X.YZZZ`, where X is fathoms, Y is feet, and ZZZ is decimals of the foot. For fathoms and feet between 0 and 10 fathoms 4.5 feet (10.75 fms), soundings round to the deeper foot if the decimals of the foot are `X.Y75000` or greater. For fathoms and feet deeper or equal to 11 fathoms, soundings round to the deeper fathom if feet and decimals of the foot are `X.45000` (`X.Y75000`) or greater. Drying heights are in feet and are rounded using arithmetic methods. In an ENC viewer, heights greater than 6 feet will register in fathoms and feet using the above stated rules.

#### HOM Units

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

#### Chart Unit Base Cell Units

Depth Units (DUNI):	Fathoms and feet
Height Units (HUNI):	Feet (or fathoms and feet above 6 feet)
Positional Units (PUNI):	Meters

## 10. QA/QC

### 10.1 Data Processing Notes

Manual chart scale sounding selections were made for this survey. Experience has shown that in areas where bathymetry is steep sided, as in the case of this glacially carved fjord, automated sounding selection is impractical. None of the default sounding suppression options offered in CARIS BASE Editor or HOM yields an acceptable density and distribution of depths, generally bunching soundings nearshore with too sparse coverage seaward. While the customized options are more practical for this type of terrain, an inordinate amount of time must be spent in experimentation with variations on the algebraic terms in order to devise the most suitable formula, and manual adjustments are still required to the resulting sounding set.

Shoreline deliverables from the field, typically conveyed in Pydro or CARIS Notebook formats, were instead delivered in MapInfo and Pydro formats. MapInfo was used for all new point features and for defining extents of new reefs. Pydro was used for delivery of bathymetric features. The non-CARIS-compatible MapInfo files required conversion to Pydro format, then export to CARIS Notebook. The Notebook hob files were then imported into CARIS HOM.

## 10.2 ENC Validation Checks

H-11493 was subjected to QA and Validation checks in HOM prior to exporting to the H-Cell base cell (000) file. Full millimeter precision was retained in the export of the metric S-57 base cell data set. This data set was converted to a chart unit 000 file. dKart Inspector 5.0 (Service Pack 1) was then used to further check the data set for conformity using the S-58 ver. 2 standard (formerly Appendix B.1 Annex C of the S-57 standard). All tests were run and errors investigated and corrected where necessary. Errors associated with the final \*.000 file are discussed, below:

Testing for redundant vertices: 591 warnings generated.

- Edge [00192] vertex [ 3420 ] Warning GG2101: (T0087) vertex lies on straight line
- Edge [00192] vertex [ 3413 ] Warning GG2101: (T0087) vertex lies on straight line
- Edge [00192] vertex [ 3412 ] Warning GG2101: (T0087) vertex lies on straight line...

These errors are most likely due to the edge coincidences in the H-Cell, and will be eliminated when the edges are removed or modified during application of the H-Cell to the ENC.

-----  
Testing for ed3 objects, attributes, binary data structure: 3 errors generated.

- ERROR LG0150: (T0531) illegal value of DSID.DSNM - differs from file name or has wrong format
- ERROR LG0150: (T1513) illegal value of DSPM.HUNI
- ERROR LG0150: (T0524) illegal value of DSPM.DUNI

These are known and acceptable H-Cell errors.

-----  
Testing for ed3 objects, attributes, binary data structure: 2 warnings generated.

- [FE-000055] UWTR0C Warning LG0101: (T2000) meaningless value of 'tecsou' in <Underwater/awash rock>  
-- 61°00'07.49"N : 147°05'33.98"W
- [FE-000223] UWTR0C Warning LG0101: (T2000) meaningless value of 'quasou' in <Underwater/awash rock>  
-- 61°00'30.01"N : 147°01'17.81"W

These were investigated and it was determined that TECSOU and QUASOU are correctly attributed for NOAA and H-Cell purposes.

-----  
Testing for ed3 encoding rules: 4 warnings generated.

- [FE-000055] UWTR0C Warning LG0101: (T1657) meaningless value of 'watlev' in <Underwater/awash rock>  
-- 61°00'07.49"N : 147°05'33.98"W
- [FE-000215] UWTR0C Warning LG0101: (T1657) meaningless value of 'watlev' in <Underwater/awash rock>  
-- 61°00'35.57"N : 147°00'22.30"W
- [FE-000216] UWTR0C Warning LG0101: (T1657) meaningless value of 'watlev' in <Underwater/awash rock>  
-- 61°00'35.66"N : 147°01'05.77"W
- [FE-000223] UWTR0C Warning LG0101: (T1657) meaningless value of 'quasou' in <Underwater/awash rock>  
-- 61°00'30.01"N : 147°01'17.81"W

These were investigated and it was determined that WATLEV and QUASOU are correctly attributed for NOAA and H-Cell purposes.

-----  
Testing TG1 for S57 ed.3: 1 error generated.

- [FE-000217] DEPARTURE ERROR TG5016: (T0549) object is not properly covered by M\_QUAL --  
61°00'30.66"N : 147°01'18.13"W

These are chain node topology errors expected with H-Cells. These errors are easily corrected upon import of the H-Cell into MCD charting software.

-----  
Testing TG1 for S57 ed.3: 1 warning generated.

- Edge [00193] Warning TG5012: (T0019) edge coincides with data limit border, but has no USAG=C  
in object [FE-000051] M\_COVR

These are chain node topology errors expected with H-Cells. These errors are easily corrected upon import of the H-Cell into MCD charting software.

## **11. Products**

### **11.1 HSD, MCD and CGTP Deliverables**

- H-11493 Base Cell File, Chart Units, Soundings compiled to 1:50,000
- H-11493 Base Cell File, Chart Units, Soundings compiled to 1:10,000
- H-11493 Descriptive Report including end notes compiled during office processing and certification
- H-11493 H-Cell Supplemental Report
- Blue Notes shape files
- BAG (Bathymetry Attributes Grid)
- 000 Features File

### **11.2 File Naming Conventions**

HOM file set prefix: *H11493\_hc*

Chart units base cell file: *US511493\_CU.000*

Chart units base cell file, survey scale soundings: *US11493\_SS.000*

BAG (for CGTP): *H11493\_10m.bag*

Features File (for CGTP): *H11493\_Features.000*



### 11.3 Software

CARIS HIPS 6.0:	Management and inspection of BASE surfaces
CARIS BASE Editor 2.0:	Combination of BASE Surfaces and initial creation of the S-57 bathymetry-derived (SOUNDG) features
MapInfo 8.0:	Shoreline deliverables from the field unit
Pydro 7.2.2:	MapInfo shoreline files from the field imported into Pydro
CARIS Notebook 3.0:	Shoreline Pydro files imported into Notebook
CARIS HOM 3.3:	H-Cell compilation, generation of S-57 products, QA
CARIS GIS 4.4a:	Setting the sounding rounding variable
dKart Inspector 5.0:	S-58 QA checks and validation of the base cell file
Fugawi View ENC 1.1.1.3	QA review of Base Cell Files

### 12. Contacts

Inquiries regarding this H-Cell content or construction should be directed to:

Peter Holmberg, Physical Scientist, PHB, Seattle, WA; 206-526-6843;  
[Peter.Holmberg@noaa.gov](mailto:Peter.Holmberg@noaa.gov).

APPROVAL SHEET  
H-11493

Initial Approvals:

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

The survey and associated records have been inspected with regard to survey coverage, 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 H-Cell, accompanying data, and reports. This survey and accompanying digital data meet or exceed OCS requirements and standards for products in support of nautical charting except where noted in the Descriptive Report.