

H11182

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-10-15-02**

*Registry No.* ..... **H-11182**

### LOCALITY

*State* ..... **Alaska**

*General Locality* ..... **Northeast Prince William Sound**

*Sublocality* ..... **Valdez Narrows**

.....  
**2002**  
.....

**CHIEF OF PARTY**  
.....  
**CAPT. James C. Gardner, NOAA**

### LIBRARY & ARCHIVES

**DATE** .....

**HYDROGRAPHIC TITLE SHEET****H-11182**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 10-15-02**State AlaskaGeneral Locality Northeast Prince William SoundSublocality Valdez NarrowsScale 1:10,000Date of Survey 9/13/2002-9/21/2002Instructions Date 9/23/2002Project No. OPR-P151-RA-02-RA-02**Change #1 10/03/2002, Change #2 11/01/2002**Vessel RA-2 (2122), RA-5(2125), RA-6 (2126)Chief of Party CAPT James C. Gardner, NOAASurveyed by Ship personnel and physical scientists from Pacific & Atlantic  
Hydrographic BranchesSoundings taken by echo sounder, hand lead, pole Knudson 320 M, Reson SeaBat 8101, Seabeam/Graphic record scaled by RAINIER PERSONNELGraphic record checked by RAINIER PERSONNELEvaluation by R. Shipley Automated plot by HP Design Jet 1050CVerification by E. Domingo, R. ShipleySoundings in Fathoms at MLLWREMARKS: All times are UTC.**Revisions and annotations appearing as endnotes were**  
**generated during office processing.****All depths listed in this report are referenced to**  
**mean lower low water unless otherwise noted.****UTM Projection (zone 6).**

# Descriptive Report to Accompany Hydrographic Survey H11182

Project OPR-P151-RA-02

Port Valdez and Valdez Harbor, Alaska

Scale 1:10,000

September 2002

**NOAA Ship RAINIER**

Commanding Officer: Captain James C. Gardner, NOAA

Lead Hydrographer: Kimberley Sampadian, NOAA

## A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions OPR-P151-RA-02, dated September 23, 2002, and the Draft Standing Project Instructions dated March 21, 2001. The survey area is Valdez Narrows, located at the approach to Port Valdez in northeast Prince William Sound, Alaska. This survey corresponds to sheet "C" in the sheet layout provided with the Letter Instructions. Additionally, the University of New Hampshire's Coastal Center for Ocean Mapping/Joint Hydrographic Center (CCOM/JHC) tested, in parallel with standard operations, new mechanisms and methods for the advancement of NOAA's hydrographic data processing paradigm through the use of CUBE and Navigation Surface.

One hundred percent shallow-water multibeam (SWMB) coverage was obtained in the survey area in waters 8 meters and deeper. In waters from 4 meters to 8 meters, SWMB data were acquired at 25-meter line spacing, and in these areas additional coverage was obtained to ensure least depths over features or shoals. Vertical-beam echo sounder (VBES) data were acquired in depths from 4 to 50 meters to define the four-meter curve and to aid in the planning of SWMB data acquisition.<sup>1</sup>

Data acquisition was conducted from September 13 to September 21, 2002 (DN 256 to 264).

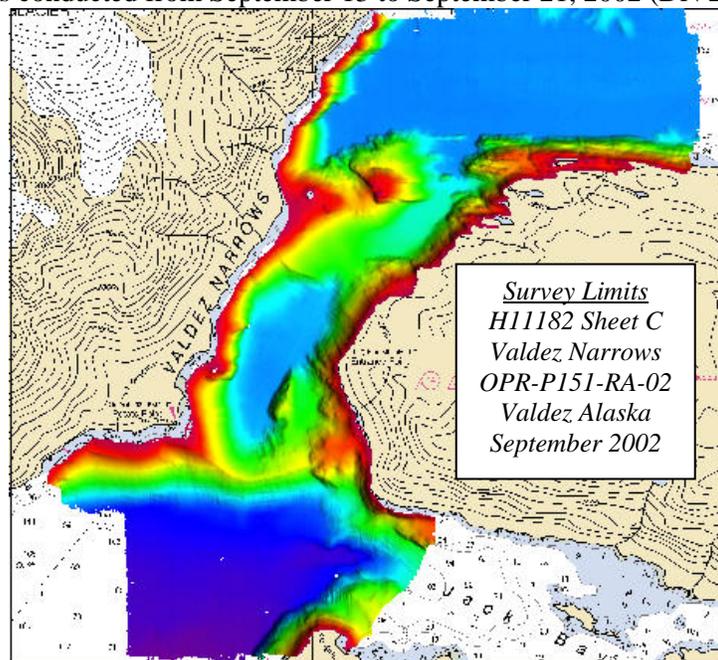


Figure 1. H11182 SurveyLimits.

## 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-P151-RA-02 Data Acquisition and Processing Report*<sup>2</sup> submitted under separate cover. Items specific to this survey, and any deviations from the aforementioned report are discussed in the following sections.

### B1. Equipment and Vessels

Data were acquired by RAINIER's survey launches (RA2, RA5, and RA6). Vessels RA5 and RA6 were used to acquire shallow-water multibeam (SWMB) soundings and sound velocity profiles. Vessel RA2 acquired vertical-beam echo soundings (VBES) and detached positions (DPs). No unusual vessel configurations or problems were encountered during this survey.<sup>3</sup> This survey was processed throughout software upgrades for both Pydro (from version 2.9.0 to 3.6.2) and CARIS HIPS (from version 5.2 to 5.3 + service pack 2).

The traditional fix numbers associated with detached positions (DPs) have been replaced with a unique identifier. The unique identifier consists of the combination of vessel, day number and the numerical sequence, beginning with one, in which the feature was positioned (e.g. the unique identifier 22643 refers to a feature positioned by RA2 on day number 264 and it was the third position taken on that day).

### B2. Quality Control

#### Crosslines

Shallow-Water Multibeam (SWMB) crosslines totaled 12.27 nautical miles, comprising 11% of SWMB hydrography. The Quality Control Report (CARIS HIPS) for the checkline file averaged 81.2% for RA6 (Elac 1180), with a depth tolerance factor of 0.013, which conforms to International Hydrographic Organization Order 1 specifications detailed in Special Publication S-44, Edition 4, as well as NOS Hydrographic Surveys Specifications and Deliverables Manual.<sup>4</sup> The low QCR agreement of the Elac 1180 on RA6 is due to the steep and irregular bathymetry in the mid-channel area of Valdez Narrows. The Hydrographer manually examined the data in CARIS Subset Mode and believes the data is accurate and adequate to supersede the charted soundings in their common areas. See Appendix V for the detailed report.<sup>5</sup>

Crossline comparisons for RA5 (Reson 8101) were not run because the vessel was only used in nearshore areas which were very steep and irregular, and a CARIS QC Report would have yielded unfavorable results regardless of the accuracy of the data. Upon manual examination of overlapping data from adjacent swaths during subset editing, the Hydrographer believes that the data meet accuracy requirements set forth in the HSSDM."

#### Junctions

The following contemporary survey junctions with H11182:

<u>Registry #</u>	<u>Scale</u>	<u>Date</u>	<u>Junction side</u>
H09711	1:10,000	1977	Southeast

Survey H09711 junctions well with this survey. A cursory comparison indicates differences are generally less than a fathom with the exception of greater differences of up to 10 fathoms along the steep slopes.

Final comparisons will be made after the application of smooth tides.<sup>6</sup>

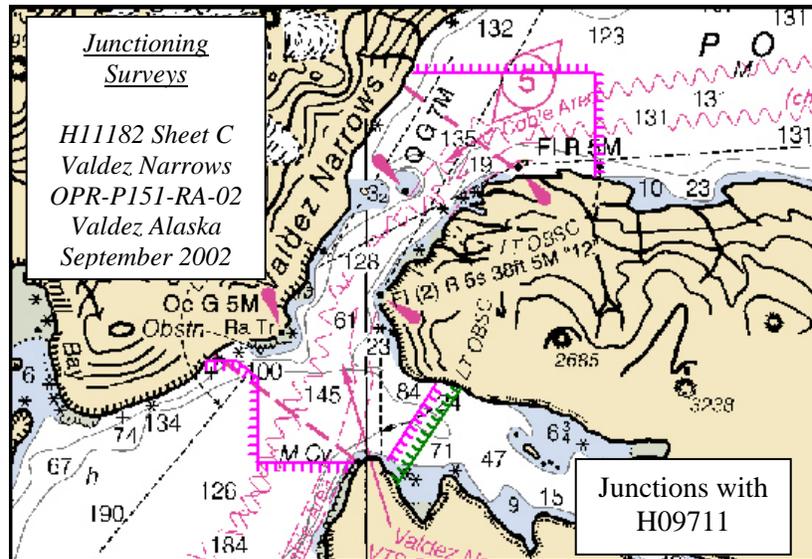


Figure 2. H11182 Junction Surveys.

### Data Quality Factors

Sound velocity inaccuracies were observed throughout the survey due to melting glacial ice and river runoff. After correction for sound velocity in HDCS, some lines still exhibited the characteristic "frowns" indicative of inaccurate sound velocity corrections despite the best efforts of the Hydrographer to conduct sufficient sound velocity casts distributed both spatially and temporally. Depth discrepancies between adjacent lines were as much as 3 meters, but the problem was negated by adequate coverage of soundings from more nadir beams, the standard daily processing step of filtering beams outside of 60 degrees from nadir, and rejection of soundings by the Hydrographer during processing.<sup>7</sup>

### B3. Data Reduction

Data reduction procedures for survey H11182 conform to those detailed in the *OPR-P151-RA-02 Data Acquisition and Processing Report*.

## C. VERTICAL AND HORIZONTAL CONTROL

A complete description of vertical and horizontal control for survey H11182 can be found in the *OPR-P151-RA-02 Horizontal and Vertical Control Report*,<sup>8</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. Differential corrections from U.S. Coast Guard beacon at Potato Point (298 kHz) and Cape Hinchinbrook (292 kHz) were utilized during this survey. Launch-to-launch DGPS performance checks were performed weekly in accordance with Section 3.2 of the FPM. Copies of the performance checks are included in the *OPR-P151-RA-02 Horizontal and Vertical Control Report*.

### **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 H11182.

All data were reduced to MLLW using unverified observed tides from station Valdez, AK using the tide file 9454240.tid and time and height correctors using the zone corrector file P151RA2002CORP.zdf.

The Pacific Hydrographic Branch will apply final approved (smooth) tides to the survey data during final processing. A request for delivery of final approved (smooth) tides for survey H11182 was forwarded to N/OPS1 on October 4, 2002 in accordance with FPM 4.8. A copy of the request is included in Appendix IV.<sup>9</sup>

## **D. RESULTS AND RECOMMENDATIONS**

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

No AWOIS items were located within the limits of H11182.<sup>10</sup>

### **D.2 Chart Comparison**

Survey H11182 was compared with chart 16707 and inset (10<sup>th</sup> Ed, September 29 2001, chart 1:40,000 and inset 1:20,000).

#### **Chart 16707 and Inset**

Depths from survey H11182 generally agreed with chart 16707 to within 1 – 2 fathoms. Greater differences between adjacent charted and survey soundings can be attributed to the steep and rugged character of the bathymetry and to increased bottom coverage using SWMB methods.

The automated excessing routine in Pydro did not bring through enough soundings to adequately represent the passage (located at 61°05'03" N, 146°36'45" W) between Entrance Island and the mainland. Shoreline verification and 100% SWMB coverage demonstrate that this area is deep enough to serve as safe passage for small boat traffic. The Hydrographer recommends selecting additional deep, mid-channel soundings (of approximately 4-5 fathoms) from the surveys' 100% SWMB coverage and charting these soundings to indicate that the passage is clear for small boats.<sup>11</sup> An additional preliminary smooth sheet "H11182\_inset.pss", at a higher sounding density, is included in the digital data submission for ease of processing and sounding selection.

The Hydrographer has determined that data accuracy standards and bottom coverage requirements have been met and survey data are adequate to supersede charted data in their common areas.

Final chart comparisons will be made after the application of smooth tides.<sup>12</sup>

### **D.3 Shoreline**

#### **Shoreline Source**

Shoreline for this project was from the NOAA ENC US5AK23M digital vector database and supplied by N/CS31 in native format (.000) and as MapInfo tables (.tab) of S-57 objects. Remote Sensing Division N/NGS3 supplied ortho-rectified aerial photography (once compiled this photogrammetry will be the source for the official shoreline) for reference purposes only. In addition, features shown on the current raster edition of chart 16707 that were not depicted on the ENC shoreline were digitized in MapInfo and displayed in Hypack for field verification. The Hydrographer recommends that if processing of the photogrammetric shoreline is complete at the time of cartographic review, revisions and recommendations from the shoreline verification conducted by RAINIER personnel should be incorporated to update the official shoreline.

#### **Shoreline Verification**

Limited shoreline verification was conducted near predicted low water in accordance with the Standing Project Instructions and FPM sections 6.1 and 6.2. However, the scheduling of the survey only allowed verification operations to be conducted at a tide of 4.5 feet. VBES and SWMB were used to further develop areas and features that could not be visually identified at this state of tide. Detached positions (DPs) taken during shoreline verification were recorded in HYPACK and on DP forms, and processed in Pydro. These indicate revisions to features and features not found on the ENC or charted shoreline. In addition, annotations describing shoreline were recorded on hard copy plots of digital shoreline during shoreline verification. DP forms are included in Section I of the *Separates to be Included with Survey Data*.<sup>13</sup>

A detailed Detached Position plot<sup>14</sup>, in both paper copy and MapInfo format, is provided showing all detached positions with notes relating to each feature. The updated shoreline and features are also depicted on the final field sheet. Verified ENC shoreline that did not require revision are in corresponding object type Mapinfo tables and shown in brown. Charted features not depicted on the ENC shoreline are in MapInfo tables "H11182\_chdrk" and "H11182\_chd\_islets" and displayed in brown.

#### **Source Shoreline Changes and New Features**

The existence doubtful (ED) ENC rock at 61°05'03.92" N 146°40'27.16" W ; (517573.73 , 6772234.34) was disproved by shoreline verification, VBES, and 100% SWMB. The Hydrographer recommends removing the charted rock.<sup>15</sup>

A new rock was located at 61°04'16.01" N 146°41'04.02" W ; (517027.38 , 6770750.54) during shoreline verification. The Hydrographer recommends charting the new rock at the surveyed location.<sup>16</sup>

An obstruction at 61°03'14.27" N 146°42'16.73" W ; (515947.32 , 6768834.21) was disproved by shoreline verification, VBES, and 100% SWMB. The Hydrographer recommends removing the charted obstruction.<sup>17</sup>

Twelve existence doubtful (ED) rocks and foul area in the vicinity of 61°03'11.65" N 146°43'05.14" W ; (515221.51 , 6768749.92) were disproved by shoreline verification, VBES, and 100% SWMB. The Hydrographer recommends removing the charted rocks.<sup>18</sup>

Two MLLW lines (61°02'07.12" N 146°39'56.26" W ; (518082.92 , 6766765.33) and 61°03'15.87" N 146°39'17.77" W ; (518637.13 , 6768887.24)) were verified as ledges and adequately positioned. The Hydrographer recommends revising the MLLW lines as ledges.<sup>19</sup>

A rock located at 61°03'26.63" N 146°39'34.8" W ; (518373.86 , 6769228.38) was disproved by shoreline verification, VBES, and 100% SWMB. The Hydrographer recommends removing the charted rock.<sup>20</sup>

A new rock was located at 61°03'29.81" N 146°39'32.19" W ; (518411.07 , 6769328.26) during shoreline verification. The Hydrographer recommends charting the new rock at the surveyed location.<sup>21</sup>

A rock located at 61°04'13.02" N 146°39'08.92" W ; (518754.41 , 6770665.72) was disproved by shoreline verification, VBES, and 100% SWMB. The Hydrographer recommends removing the charted rock.<sup>22</sup>

Two existence doubtful (ED) rocks (61°04'13.29" N 146°39'05.5" W ; (518805.58 , 6770674.13) and 61°04'13.68" N 146°39'03.08" W ; (518841.89 , 6770686.46)) were disproved by shoreline verification, VBES, and 100% SWMB. The Hydrographer recommends removing the charted rocks.<sup>23</sup>

The existence doubtful (ED) rock at 61°04'16.77" N 146°38'50.14" W ; (519035.38 , 6770783.18) was disproved by shoreline verification, VBES, and 100% SWMB. The Hydrographer recommends removing the charted rock.<sup>24</sup> A 2.4 fathom and 2.9 fathom shoal were found approximately 50 meters and 90 meters northwest of this position respectively and may account for the reporting of the ED rock.

Two rocks located at 61°04'22.65" N 146°38'42.23" W ; (519152.95 , 6770965.71) and 61°04'24.48" N 146°38'38.99" W ; (519201.16 , 6771022.56) were disproved by shoreline verification, VBES, and SWMB. The Hydrographer recommends removing the charted rocks.<sup>25</sup>

The existence doubtful (ED) ENC rock at 61°04'25.87" N 146°38'27.21" W ; (519377.42 , 6771066.63) was disproved by shoreline verification, VBES, and 100% SWMB. The Hydrographer recommends removing the charted rock.<sup>26</sup>

Four existence doubtful (ED) ENC rocks in the vicinity of 61°04'31.27" N 146°38'17.33" W ; (519524.68 , 6771234.52) were disproved by shoreline verification, VBES, and 100% SWMB. The Hydrographer recommends removing the charted rocks.<sup>27</sup>

The existence doubtful (ED) ENC rock at 61°04'35.01" N 146°38'11.49" W ; (519611.6 , 6771350.84) was disproved by shoreline verification, VBES, and 100% SWMB. The Hydrographer recommends removing the charted rock.<sup>28</sup>

## Charted Features

Two rocks located at 61°03'18.01" N 146°42'16.55" W ; (515949.5 , 6768949.73) and 61°03'25.1" N 146°41'44.28" W ; (516432.36 , 6769171.26) appear on the paper and raster version of chart 16707, but not on the ENC source shoreline. The existence and position of the rocks were confirmed during shoreline verification. The Hydrographer recommends retaining these rocks on the paper and raster charts, and adding them to the ENC.<sup>29</sup>

Two very small islets located at 61°04'51.19" N 146°40'05.42" W ; (517901.54 , 6771842.23) and 61°04'54.12" N 146°40'03.98" W ; (517922.66 , 6771933.11) appear on the paper and raster version of chart 16707 but not on the ENC source shoreline. The existence and position of the islets were confirmed during shoreline verification. The Hydrographer recommends retaining the islets on the paper and raster charts, and adding the islets to the ENC.<sup>30</sup>

## Recommendations

The Hydrographer recommends that the shoreline as depicted on the Detached Position plot and final sounding plot supersede and complement shoreline information compiled on the ENC and charts as noted.<sup>31</sup> In addition, field notes made by the sheet manager, including verification of source features or charted features if no source shoreline was available are submitted in the digital MapInfo file "H11182\_Shoreline\_Notes."

### D.4 Dangers to Navigation

Six Dangers to Navigation were found and reported to the Marine Charting Division (MCD) on March 3, 2003. A copy of the Danger to Navigation Report is included in Appendix I.<sup>32</sup>

### D.5 Aids to Navigation

All aids to navigation (ATONs) were found to be correctly charted and serve their intended purpose.<sup>33</sup>

Detached positions were taken on each ATON for check purposes only. No GPS static surveys were conducted for Survey H11182.

### D.6 Miscellaneous

Bottom samples were not collected for H11182. All historical samples were too deep for current operational limits and there were no areas suitable for anchorage on this sheet.<sup>34</sup>

**E. APPROVAL**

As Lead Hydrographer, I have ensured that standard field surveying and processing procedures were followed in producing this examination in accordance with the Hydrographic Manual, Fourth Edition, Hydrographic Survey Guidelines, Field Procedures Manual and the NOS Hydrographic Surveys Specifications and Deliverables, as updated for 2001.

Field certification and transfer of data from NOAA Ship RAINIER to the Pacific Hydrographic Branch occurred on September 30, 2002. See attached memorandum.

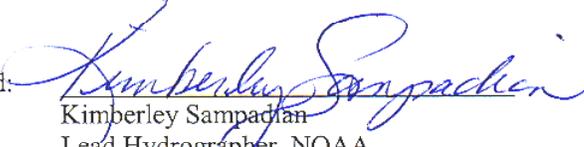
The digital data and supporting records have been reviewed by me, are considered complete and adequate for charting purposes, and are approved.

Survey H11182 is complete and adequate to supersede charted soundings<sup>35</sup> in their common areas. No additional work is required for this survey.<sup>36</sup>

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-P151-RA-02	10/01/2002	N/CS34
Horizontal and Vertical Control Report for OPR-P151-RA-02	TBD <sup>37</sup>	N/CS34
Coast Pilot Report for OPR-P151-RA-02	TBD <sup>38</sup>	N/CS26

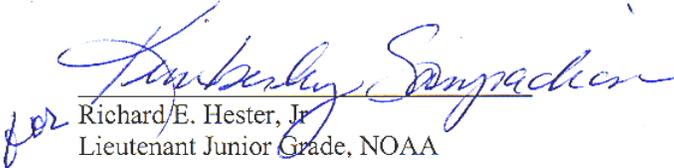
Approved and Forwarded:



Kimberley Sampadian  
Lead Hydrographer, NOAA

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

Survey Sheet Manager:



Richard E. Hester, Jr  
Lieutenant Junior Grade, NOAA

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**Revisions Compiled During Office Processing and Certification**

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- <sup>1</sup> Concur.
- <sup>2</sup> Filed with the Project Records.
- <sup>3</sup> Concur.
- <sup>4</sup> Concur.
- <sup>5</sup> Filed with Hydrographic Records.
- <sup>6</sup> Concur with clarification. H-9711 is not a contemporary survey. No junction comparison with H-9711 was completed at PHB. A comparison with H11181 (1:10,000, 2002, NE) results in good agreement within the junction.
- <sup>7</sup> Concur.
- <sup>8</sup> Filed with the Project Records.
- <sup>9</sup> Approved Tide Note dated October 30, 2002 is attached.
- <sup>10</sup> Concur.
- <sup>11</sup> Concur with clarification. See Hdrawing for depiction.
- <sup>12</sup> During office processing, survey H11182 was compared to charts 16707 (12th Ed., Dec 05, 2005) with very good agreement.
- <sup>13</sup> Filed with Hydrographic Records.
- <sup>14</sup> Filed with Hydrographic Records.
- <sup>15</sup> Concur.
- <sup>16</sup> Concur. Chart using survey information.
- <sup>17</sup> Concur.
- <sup>18</sup> Concur.
- <sup>19</sup> Concur.
- <sup>20</sup> Concur. Chart as shown on the Hdrawing.
- <sup>21</sup> Concur. Chart using survey information.
- <sup>22</sup> Concur.
- <sup>23</sup> Concur.
- <sup>24</sup> Concur.
- <sup>25</sup> Concur.
- <sup>26</sup> Concur.
- <sup>27</sup> Concur.
- <sup>28</sup> Concur.
- <sup>29</sup> Concur.
- <sup>30</sup> Concur with clarification. Chart as shown on the SS.
- <sup>31</sup> Concur with clarification. Chart as shown on the Hdrawing.
- <sup>32</sup> PHB Revision--Strikethrough ~~Appendix I.~~ and add this report.
- <sup>33</sup> Chart with latest ATONIS information.
- <sup>34</sup> Concur. Some charted bottom samples were retained on the Hdrawing.
- <sup>35</sup> and features
- <sup>36</sup> Concur with hydrographer's statements.
- <sup>37</sup> Report received but date of receipt unknown.
- <sup>38</sup> PHB Revision--Strikethrough ~~TBD~~ and add 10/23/02

# Danger to Navigation Report

Hydrographic Survey Registry Number: H11182

Survey Title: State: Alaska  
Locality: Prince William Sound  
Sub-locality: Valdez Narrows

Project Number: OPR-P151-RA-02

Survey Dates: September 13-21, 2002

Depths are reduced to Mean Lower Low Water using unverified observed tides.  
Positions are based on the NAD83 horizontal datum.

## CHARTS AFFECTED:

Chart	Scale	Edition	Date
16707	1:40,000	10 <sup>th</sup>	9/29/01
16707 inset	1:20,000	10 <sup>th</sup>	9/29/01
16708	1:25,291	25 <sup>th</sup>	10/6/01

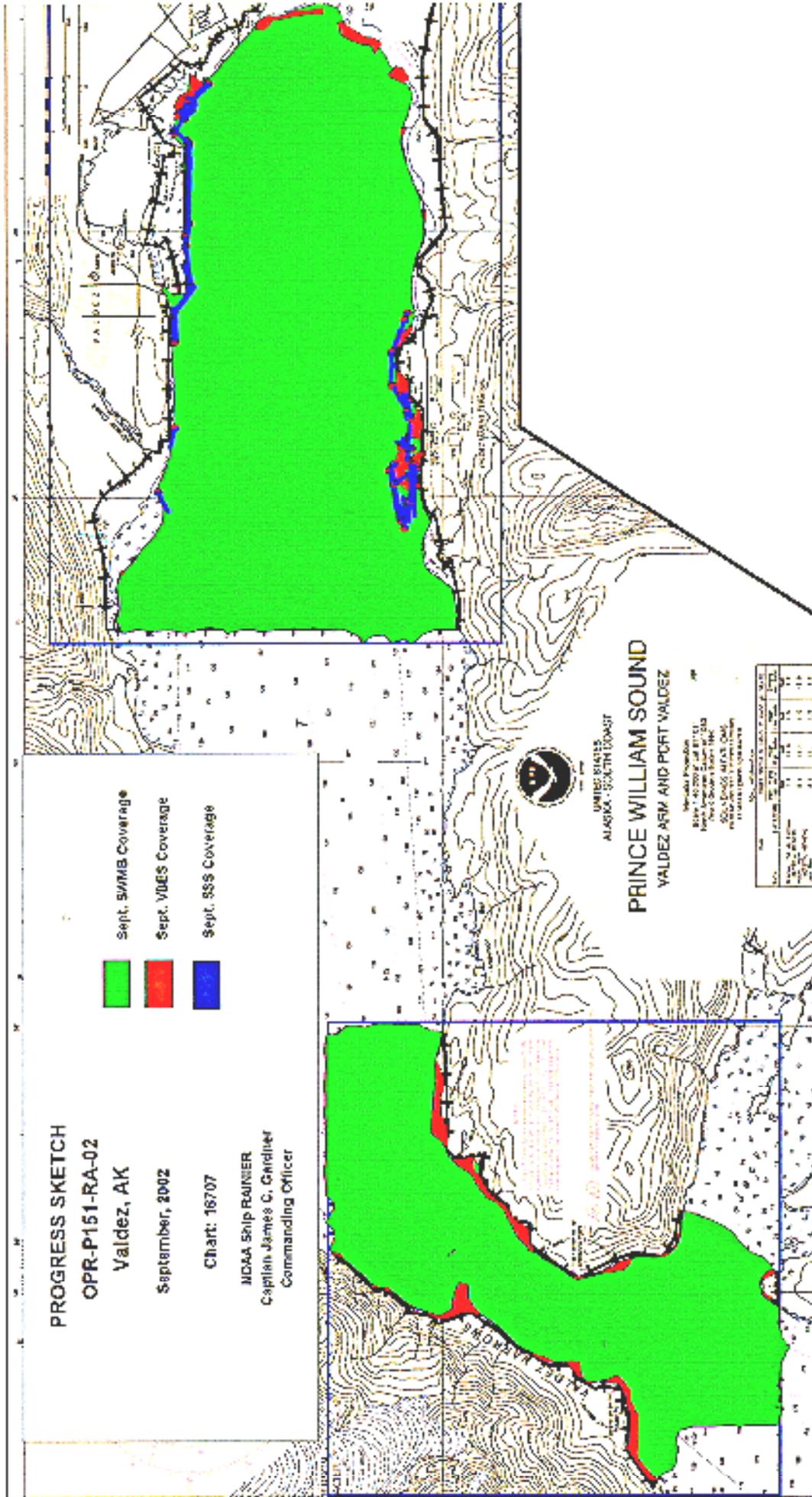
## DANGERS:

Feature	Depth	Latitude (N)	Longitude (W)
Shoal	2 fathoms 3 feet	61°05'00.48"	146°37'01.99"
Shoal	2 fathoms 5 feet	61°04'18.59"	146°38'54.54"
Shoal	1 fathom 1 foot	61°05'04.84"	146°36'07.38"
Shoal	3 fathoms 3 feet	61°05'03.89"	146°36'58.68"
Shoal	2 fathoms 5 feet	61°04'56.46"	146°39'12.32"
Shoal	2 fathoms 4 feet	61°04'47.45"	146°39'52.29"

## COMMENTS:

Questions concerning this report should be directed to the Chief, Pacific Hydrographic Branch (N/CS34), at 526-6836.

Project	Month	LNM_Hydr	LNM_ME	SONM_A	LNM_SS	SV_Casts	Bottom_Sampl	AWOIS_Items	DeiPos	Tide_Gauge_Lev	Tide_Gauge_Inst	DAS
OPR-P151	September	33.54	324.44	0.00	10.81	85	9	13	213	0	0	9:00





UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL OCEAN SERVICE  
Silver Spring, Maryland 20910

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: October 30, 2002

HYDROGRAPHIC BRANCH: Pacific  
HYDROGRAPHIC PROJECT: CPR-P151-RA-2002  
HYDROGRAPHIC SHEET: H11182

LOCALITY: Valdez Narrows, AK  
TIME PERIOD: September 13-21, 2002

TIDE STATION USED: 945-4240 Valdez, Alaska  
Lat. 61° 07.5'N Lon. 146° 21.8'W  
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters  
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.389 meters

REMARKS: RECOMMENDED ZONING  
Use zone(s) identified as: FWS67, and FWS68.

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.

*Thomas V. Mero* 10/30/02  
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CHIEF, REQUIREMENTS AND DEVELOPMENT DIVISION





## Final tide zone node point locations for OPR-P151-RA-2002, Sheet H11182.

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

	Tide Station Order	AVG Time Correction	Range Correction
Zone PWS67	945-4240	0	0.99
-147.1433 60.855198			
-147.025646 60.885186			
-146.948102 60.925559			
-146.928717 60.942475			
-146.834715 61.078366			
-146.702896 61.058932			
-146.646956 61.051538			
-146.369014 61.003979			
-146.637467 60.902731			
-146.758827 60.946173			
-146.799509 60.926378			
-146.818153 60.895011			
-146.793773 60.859141			
-146.732848 60.815648			
-147.1433 60.855198			
Zone PWS68	945-4240	0	1.00
-146.702896 61.058932			
-146.646956 61.051538			
-146.226838 61.08284			
-146.231047 61.140634			
-146.614604 61.146727			
-146.702896 61.058932			

APPROVAL SHEET  
H-11182

Initial Approvals:

The survey and associated records have been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, cartographic symbolization, and verification or disproval of charted data. The survey records and digital data comply with NOS requirements except where noted in the Descriptive Report and are adequate to supersede prior surveys and nautical charts in the common area.

  
\_\_\_\_\_ Date: 12 October 2006  
Gary Nelson  
Chief, Cartographic Team  
Pacific Hydrographic Branch

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

  
\_\_\_\_\_ Date: 12 Oct. 2006  
Donald W. Haines  
CDR, NOAA  
Chief, Pacific Hydrographic Branch

