

H10933

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-10-23-99
Registry No. H-10933

LOCALITY

State Alaska
General Locality Southwest Prince William Sound
Sublocality Snug Harbor and Vicinity

1999

CHIEF OF PARTY

..... Commander D.R. Herlihy, NOAA

LIBRARY & ARCHIVES

DATE November 30, 2001

HYDROGRAPHIC TITLE SHEET

H-10933

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-10-23-99

State Alaska

General locality Southwest Prince William Sound

Locality Snug Harbor and Vicinity

Scale 1:10,000 Date of survey Sept. 9, 1999 - Oct. 20, 1999

Instructions dated July 30, 1999 Project No. OPR-P139-RA

Vessel RA-1(2121), RA-2(2122), RA-3(2123), RA-4(2124), RA-5(2125), RA-6(2126)

Chief of party CDR Daniel R. Herlihy, NOAA

Surveyed by RAINIER Personnel

Soundings taken by echo sounder, ~~and lead line~~ DSF 6000N, RESON 8101MB, Knudsen 320M

Graphic record scaled by RAINIER Personnel

Graphic record checked by RAINIER Personnel

Evaluation by: B.A. Olmstead Automated plot by HP Design Jet 1050C

~~Plotted by~~ B.A. Olmstead, E. Domingo

Verification by B.A. Olmstead, E. Domingo

Soundings in fathoms ~~xxx~~ at ~~MHW~~ MLLW and tenths

REMARKS: All times are UTC, revisions and marginal notes in black were generated during office processing. All separates are filed with the hydrographic data, as a result page numbering may be interrupted or non-sequential. All depths listed in this report are referenced to mean lower low water unless otherwise noted.

Smooth Sheet Parameters: UTM (Zone 6) Central Meridian 147/00/00W, Scaling Factor 0.9996

*AWCIS / SURF 10/26/01
MUR*



Sheet AP
85.4 sq nm

Sheet AC
1.97 sq nm

Sheet AD
14.46 sq nm

Sheet AG
13.58 sq nm

Sheet AJ
19.89 sq nm

Sheet AF
5.85 sq nm

Sheet AH
14.34 sq nm

Sheet AE
9.79 sq nm

Sheet AK
7.40 sq nm

Sheet AL
8.32 sq nm

Sheet AM
9.19 sq nm

Sheet AN
10.91 sq nm

Sheet AR
14.19 sq nm

AQ

AT

AU

AV

PROGRESS SKETCH
OPR-P139-RA
Southwest
Prince William Sound
ALASKA

October 1999

Chart 16700
NOAA Ship RAINIER
CDR Daniel R. Herlihy
Commanding

Downtime_Type	August	September	October
Weather -Hr	0	0	0
Mechanical -Hr	0	0	0
Electronic -Hr	0	0	0

Sheet	Reg No	Started	Percent	Completed	Submitted	SQNM
AC	H10923	8/15/99	100	8/27/99	9/4/99	1.97
AD	H10921	8/11/99	100	10/6/99		14.46
AE	H10920	8/11/99	100	9/28/99		9.79
AF	H10932	9/9/99	100	10/19/99		5.85
AG	H10929	8/29/99	100	10/20/99		13.58
AH	H10927	8/26/99	100	10/20/99		14.34
AJ	H10918	8/12/99	100	10/20/99		19.89
AK	H10933	9/9/99	100	10/20/99		7.40
AL	H10928	8/27/99	100	10/20/99		8.32
AM	H10922	8/13/99	100	9/28/99		9.19
AN	H10919	8/12/99	100	10/11/99		10.91
AP	H10925	8/16/99	100	10/7/99		85.4

Accomplished	August	September	October
LNM Hydro	1166.48	1204.09	629.37
LNM SSS	0	0	0
SQ NM	65.89	39.77	109.63
AWOIS Invest.	7	4	10
Other Invest.	0	0	0
LNM Multibeam	654.67	609.86	980.62
Days at Sea	17	26	17

Descriptive Report to Accompany Hydrographic Survey H10933

Field Number RA-10-23-99

Scale 1:10,000

October 1999

NOAA Ship RAINIER

Chief of Party: CDR Daniel R. Herlihy, NOAA

A. PROJECT ✓

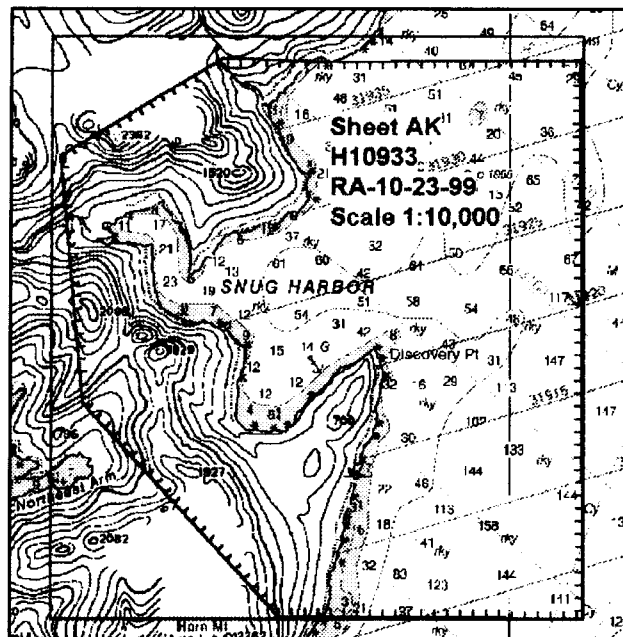
This basic hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions OPR-P139-RA, dated July 30, 1999, and the Draft Standing Project Instructions dated April 6, 1998. Survey H10933 corresponds to sheet AK as defined in the sheet layout. This survey will provide data to supersede prior surveys conducted in the early to mid 1900s, and will affect Charts 16700, and 16701. Requests for hydrographic surveys and updated charts in this area have been received from the National Imagery and Mapping Agency (NIMA), the U.S. Coast Guard, the Southwest Alaska Pilot's Association, cruise ship lines, and local fishermen.

Significant changes in depths and shoreline may have occurred in the project area as a result of the earthquake of March 27, 1964. Concur

B. AREA SURVEYED See Eval Rpt., Section B

The survey covers approximately 7.9 square nautical miles in the vicinity of Snug Harbor. The area surveyed is depicted below overlaid onto chart 16701. The survey's northern limit is latitude $60^{\circ}17'00''\text{N}$ and the southern limit is latitude $60^{\circ}12'40''\text{N}$. The survey's western limit is the eastern shore of Knight Island and the eastern limit longitude is $147^{\circ}38'50''\text{W}$.

Data acquisition was conducted from September 9 to October 21, 1999 (DN 252 to 293).



C. SURVEY VESSELS ✓

Data were acquired by RAINIER's survey launches (Vessels 2121, 2122, 2123, 2124, 2125 and 2126), as noted in the Survey Information Summary included with this report. Vessels 2121, 2123, and 2126 were used for acquisition of shallow-water multibeam (SWMB) data and sound velocity profiles. Vessels 2122, 2124 and 2125 were used for acquisition of VBES data. Vessel 2125 was used for acquisition of bottom samples and for shoreline verification. See the Project Related Data for OPR-P139-RA-99 for vessel descriptions. Vessels 2121, 2123, and 2126 also used the Knudsen 320M, a single beam, dual Frequency Fathometer.

D. AUTOMATED DATA ACQUISITION AND PROCESSING ✓

All vertical beam echo sounder (VBES) data were acquired using Coastal Oceanographic's HYPACK version 8.9 and processed with the Hydrographic Processing System (HPS) version 9.3 and MapInfo 5.0. Final detached positions, features, and soundings based on observed tides were saved in MapInfo format.

Shallow-water multibeam (SWMB) echosounder data were acquired using Triton-Elics' ISIS software version 4.32 and processed using Universal Systems Limited's CARIS HIPS software version 4.3.

Shallow-water multibeam data were reviewed with the CARIS Hydrographic Data Cleaning System (HDCS). Depth fliers were identified and manually flagged as "rejected". Vessel positioning and attitude data from each system were similarly displayed and manually cleaned. Additionally, instantaneous speed as computed from the positioning data was checked for speed jumps exceeding 3 knots as an indication of potential position fliers. For this survey, all mainscheme soundings beyond a maximum angle of 60° off nadir were rejected in an attempt to reduce the noise and refraction errors observed in these outer beams. All development soundings beyond a maximum angle of 45° off nadir were rejected, except in one instance where additional beams were needed for additional coverage over the development. In that particular case (at location 60°15'40.36N, 147°43'41.72"W) the sounding data were closely inspected to ensure quality and consistency. A Shoal depth of 9.8 Fathoms was found in this area based on Final Vertical Corrections.

After review and cleaning, depth, position and attitude data were merged with sound velocity, predicted tide and dynamic draft correctors to compute the corrected depth and position of each sounding. Processed soundings were read into a CARIS Workfile by selecting shoal-biased "line-by-line" binning at two densities; one at 5m x 5m, the other at 1.5mm x 1.5mm at survey scale. The former was used to create digital terrain models (DTMs) that were used to demonstrate multibeam coverage and perform multibeam quality-assurance, while the latter was used to export soundings into HPS through HPTools. Observed tides were applied in the Hydrographic Processing System (HPS) and the processed soundings were excessed using a 3mm character size, and plotted at a 2 mm character size to produce the final sounding plot. Final selected soundings were saved and plotted in MapInfo. Raster images registered in MapInfo facilitated chart and prior survey comparisons.

Survey H10933 is defined as sheet 08 in HPS. The CARIS workfile names are defined as "h10933_5m" and "h10933_15m" (based on the respective bin size), and the project name is identified as "P139_SheetAK" in HDCS.

All final plots were created in MapInfo using UTM Zone 6 projection. Concux

A complete listing of software is included in Appendix H.* A data flow diagram is included in Appendix G.*

E. SONAR EQUIPMENT ✓

Side Scan Sonar (SSS) equipment was not used on this survey. However, it should be noted that the Reson SeaBat 8101 SWMB system provides a low-resolution digital SSS record of the SWMB swath. This SSS imagery is primarily used during final processing of SWMB depth data to aid in determining whether anomalous soundings are true features or noise. *Concur*

F. SOUNDING EQUIPMENT ✓

Two different categories of echo sounder systems were used and are described below. The individual system(s) chosen for use in a given area were decided at the discretion of the Hydrographer using the guidance stated in the Project Instructions, and depended upon the limitations of each system, the bottom topography, the water-depth, and the ability of the platform vessel to safely navigate the area.

1. Launch Vertical Beam Echo Sounder (VN 2121, 2122, 2123, 2124, 2125, and 2126) ✓

The vertical beam echo sounders (VBES) utilized for this survey were the Raytheon DSF-6000N (VN 2122, 2124, 2125) and Knudsen 320M (VN2121, 2123, 2126), which are dual frequency (100 kHz, 24 kHz), digital recording singlebeam fathometers with analog paper records.* Soundings were acquired in meters for both frequencies, with high frequency utilized as the primary frequency. VBES serial numbers are included in Appendix H.*

VBES data were also acquired concurrently with SWMB data and were compared to nadir beams of the shallow water multibeam in real-time during data acquisition to assure SWMB data quality. In addition, digital VBES depth data are used by Isis to assist the Reson 8101 in tracking the bottom. The latter is extremely helpful in areas of extreme relief, when the shallow water multibeam tends to lose bottom lock. VBES data acquired during SWMB were not used for final sounding plot compilation, and are not included with the digital survey data. *Concur*

2. Launch Shallow-Water Multibeam (VN 2121, 2123, and 2126) ✓

The shallow-water multibeam (SWMB) system utilized for this survey was the Reson SeaBat 8101, which is a 240 kHz multibeam system that measures relative water depths across a wide swath perpendicular to the vessel's heading. The Reson 8101 has a 150° swath, consisting of 101 individual 1.5° x 1.5° beams. A TSS POS/MV Position and Orientation Sensor was used to correct for the effects of vessel motion during survey operations. Serial numbers for the Reson 8101 and POS/MV are included in Appendix H.*

SWMB was used to develop shoal areas and acquire least depths over significant features identified during VBES data acquisition and to investigate AWOIS items. In addition, full multibeam coverage was obtained inside Snug Harbor and the approaches to the harbor. *AWOIS items 52430 and 52499 were not investigated using SWMB.*

G. CORRECTIONS TO ECHO SOUNDINGS ✓**Water Level Correctors**

Soundings were reduced to Mean Lower-Low Water (MLLW) using unverified observed tide data for station Cordova, AK (945-4050) obtained from the Center for Operational Oceanographic Products and Services (CO-OPS) web site. These data were used in creating HPS tide table #1.

Listings of HPS tide tables used for H10933 and tidal correctors as provided in the Project Instructions are provided in the Survey Information Summary included with this report.

The operating National Water Level Observation Network (NWLON) primary tide stations at Cordova, Alaska (945-4050) and Valdez, Alaska (945-4240) will serve as control for datum determination at four subordinate stations. Because a Next Generation Water Level Measurement System (NGWLMS) Aquatrak sensor is the only sensor installed at these primary stations, RAINIER personnel were neither required nor able to inspect and perform leveling at these stations.

RAINIER personnel installed Sutron 8200 "bubbler" tide gauges at the following subordinate stations:

Station Name	Station Number	Type of Gauge	Date of Installation	Date of Removal
Zaikof Point	945-4411	30-day	10 August 1999	14 October 1999
Port Chalmers	945-4511	30-day	10 August 1999	20 October 1999
Snug Harbor**	945-4662	30-day	11 August 1999	20 October 1999
Montague Island	945-4616	30-day	31 August 1999	20 October 1999

** Snug Harbor was used for final reduction of soundings and elevations on the smooth sheet.

Refer to the Field Tide Notes and supporting data in Appendix D* for individual gauge performance and level closure information.

Raw water level data from these gauges was forwarded to N/OPS1 throughout the project period, with the final package submitted on October 29, 1999 in accordance with HSG 50 and FPM 4.7. 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 to the Pacific Hydrographic Branch was forwarded to N/OPS1 on October 29, 1999 in accordance with FPM 4.8. Approved Tide Note dated May 15, 2000 is attached.

Sound Velocity Correctors ✓

The velocity of sound through water was determined by a minimum of one cast every four hours of acquisition for SWMB data, in accordance with the Draft Standing Project Instructions. The velocity of sound through water was determined by one cast for VBES data, in accordance with the one cast per week minimum required by the NOS Hydrographic Surveys Specifications and Deliverables (April 23, 1999). Cast information is included in the Survey Information Summary and in Appendix I.*

The sound velocity casts were acquired with SBE SEACAT Profilers (S/N 2543, 2044 and 219). Calibration reports and dates are included with the Project Related Data for OPR-P139-RA-99. Velocity correctors were computed using the program VELOCWIN version 4 beta 2, which generates correction tables for both CARIS and HPS. Sound velocity correctors were applied in CARIS and HPS during post processing.

Settlement and Squat and Static Draft Correctors ✓

The following table shows when the vessel offset correctors used for this survey were last measured:

Vessel No.	Date of Static Draft and Transducer Offset Measurements	Method of Settlement and Squat Measurement	Date of Settlement and Squat Measurement	Location of Settlement and Squat Measurement
2121	March 1999	OTF	March 1999	Port Angeles, WA
2122	March 1999	Rod leveling	March 1999	Port Angeles, WA

* Filed with the hydrographic data.

2123	March 1999	OTF	March 1999	Port Angeles, WA
2124	March 1999	Rod leveling	March 1999	Port Angeles, WA
2125	March 1999	Rod leveling	March 1999	Port Angeles, WA
2126	March 1999	OTF	March 1999	Port Angeles, WA

Settlement and squat correctors, static draft measurements and vessel offsets are included with the Project Related Data for OPR-P139-RA-99.

Heave, Pitch, Roll and Heading, Including Biases and Navigation Timing Errors ✓

SWMB launches (VN 2121, 2123, and 2126) utilize a TSS POS/MV Model 320 Position and Orientation System (POS), which provides accurate navigation and attitude data to correct for the effects of heave, pitch, roll and heading. The POS generates attitude data in three axes (roll, pitch and heading) to an accuracy of 0.05° or better. Heave measurements supplied by the POS maintain an accuracy of 5% of the measured vertical displacement for movements that have a period of up to 10 seconds. The POS delivers heading measurements by two distinct methods. First, the Dynamic Heading Alignment determines the vessels heading by using the data supplied by the Internal Measurement Unit (IMU) and GPS receivers to achieve heading that is, at best, accurate to within 0.35°. This method suffers from drift but is relatively unaffected by noise. Second, the GPS Azimuth Measurement System (GAMS) determines the geographic vector between two GPS antennas fixed to the vessel by comparing the phase of satellite signals they receive. The error from this method is largely due to noise, but exhibits no drift. The POS uses the advantages of each method to compensate for the disadvantages of the other to arrive at an optimal accuracy of 0.05°. Serial numbers are located in Appendix H.*

Heave, roll, pitch, and navigation latency biases were determined during patch tests conducted at Port Angeles, WA on March 26-28, 1999 for vessels 2126 and 2123, and at Shilshole, WA, on July 7, 1999 for vessel 2121. SWMB vessel offsets, dynamic draft correctors, and system bias values are contained in CARIS Vessel Configuration Files (VCF's) and were created using the program "VCFEDIT" in CARIS. These offsets and biases are applied to the sounding data during processing in CARIS. A printout of each VCF is contained in Project Related Data for OPR-P139-RA-99, and the VCF's themselves are included with the digital HDCS data.

H. HYDROGRAPHIC POSITION CONTROL *See Eul Rpt., Section H.*

The horizontal datum for this project is NAD 83. Differential GPS was the sole method of positioning. The US Coast Guard Beacons at Cape Hinchinbrook (ID# 894) and Potato Point (ID# 883) were the sources of differential correctors.

Launch-to-launch DGPS performance checks were performed in accordance with Section 3.2 of the FPM. Copies of the performance checks are included in the Project Related Data for OPR-P139-RA-99.

I. SHORELINE *See Eul Rpt., Section I.*

Method of Shoreline Verification ✓

N/NGS3 supplied photogrammetric shoreline in MapInfo format for the digital manuscript (hereafter DM) 10300 for use as source shoreline. The DM shoreline was imported into Hypack for field verification. In addition, features shown on the current editions of charts 16700 and 16701 were digitized in MapInfo by RAINIER personnel and displayed in Hypack for field verification.

* Filed with the hydrographic data.

Shoreline verification was conducted near predicted low water in accordance with the Project Instructions and FPM 6.1 and 6.2. For this survey the general limit of safe navigation of a survey launch was 5-30 meters offshore of apparent low tide. Water depths along this limit of safe navigation are generally 2-5 meters at Mean Lower Low Water (MLLW). Features unreachable by survey launch shown inshore of the Navigable Area Limit Line (NALL) are the hydrographer's approximate representation of the shoreline.

Detached positions taken during shoreline verification were recorded within HYPACK and on DP forms, and processed in HPS. These indicate revisions to features, and features not found on the DM or chart. *

A detailed "DP and BS Plot" is provided showing all detached positions and bottom samples with notes relating to each feature. Updated shoreline and features are also depicted on the final sounding plot. Concur *

Source Shoreline Changes and New Features ✓

Several changes and new features were found and are depicted on the final DP plot. DM rocks were often identified as high points or extents of new ledges. Concur

The DM/charted rock at location $60^{\circ}16'56.37''N$, $147^{\circ}42'48.14''W$ (Pos. #42995) was disproved using a 5-minute visual search in a grid pattern over a 75m radius in water with 20 feet of visibility. The charted rock originates from DM-10500 and has been disproved by the hydrographer and not shown on the smooth sheet. Ledge feature on the smooth sheet should be charted as a rock based on chart scale at latitude $60/16/51N$, longitude $147/42/45W$. Concur

The Hydrographer recommends that the shoreline as depicted on the DP and BS plot and final sounding plot ^{map (DM 10300) with revisions} ~~supersede and complement~~ shoreline information compiled on the DM as noted. These revisions are recorded in the MapInfo digital files named "H10933_shoreline" and "H10933_shorelineupdate".

Charted Features ✓

Charted rocks were identified as DM rocks or high points or extensions of new ledges or reefs. Concur

A charted rock at location $60^{\circ}16'11.3''N$, $147^{\circ}43'04.5''W$ was disproved (Pos. #43005). For further information concerning this disproof see AWOIS item 52499 in Section M - Item Investigations. Concur

A charted rock at location $60^{\circ}15'56.71''N$, $147^{\circ}43'04.45''W$ was disproved (Pos. #43008). This was an assigned AWOIS item and is discussed further in Section M. This investigation was not an assigned AWOIS item. The charted rock is actually part of a ledge that has been delineated by the hydrographer and shown on the smooth sheet. Ledge feature on the smooth sheet should be charted as a rock based on chart scale. Concur

The charted shoreline should be revised using the DM shoreline and fieldwork notes as recorded in the MapInfo digital files named "H10933_shoreline" and "H10933_shorelineupdate". Concur

J. CROSSLINES ✓

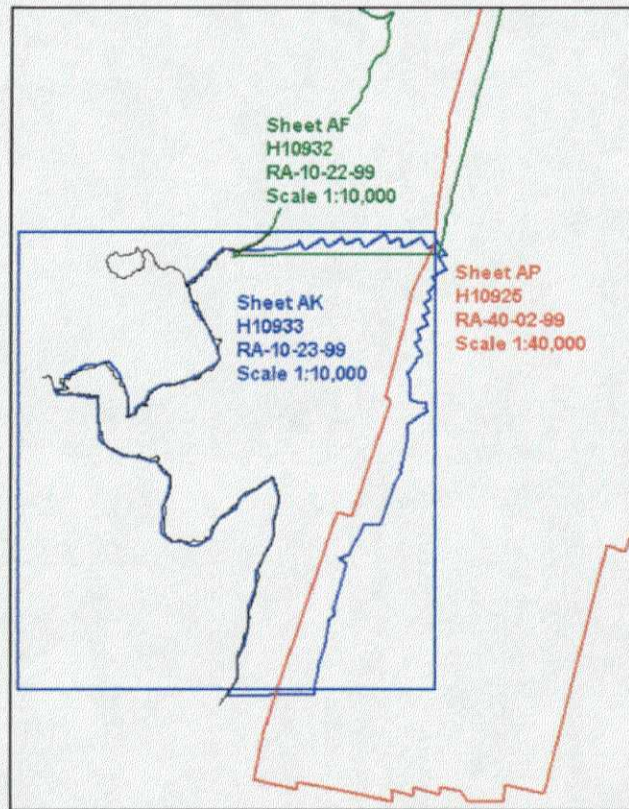
VBES crosslines totaled 10.46 nautical miles, comprising 11.99 % of mainscheme hydrography. Crosslines agreed within 1 meter of mainscheme hydrography. Concur

SWMB crosslines totaled 9.27 nautical miles, comprising 8.64 % of SWMB hydrography. The Quality Control Report (CARIS HIPS) for the checkline file averaged 94.87%, with a depth tolerance of 0.023. See Appendix E for the detailed report.

K. JUNCTIONS See Eval Rpt., section K.

The following contemporary surveys junction with H10933:

Registry #	Scale	Date	Junction side
H10925	1:40,000	1999	East
H10932	1:10,000	1999	North



Soundings from junction survey H10932 agree well with H10933, generally matching within 1 meter. Similarly, soundings from junction survey H10925 agree well with H10933, matching within 1-3 meters in depths of 80-250 m. A contemporary survey was not conducted on the southern end of H10933. *Concur*

Final comparisons will be made at the Pacific Hydrographic Branch (PHB) after application of smooth tides.

L. COMPARISON WITH PRIOR SURVEYS See Eval Rpt., section L.

The following prior surveys share common area with survey H10933:

Registry #	Scale	Date	Area covered
H-2984	1:20,000	1908	North Edge
H-3026	1:20,000	1909	Entire Survey
H-2741	1:40,000	1911	Eastern Edge
H-9513	1:20,000	1975	Southeast Edge

Prior survey H-2984 junctions with prior survey H-3026. Soundings on the south extent of H-2984 are identical to the northern extent of H-3026. Because H-2984 overlaps only the extreme northern end of current survey H10933, H10933 is compared with H-3026 only. *There are no charted depths from H-2984 which are in common with the present survey.*

Prior survey H-3026 covers the entire survey H10933 with the exception of 700 meters to the east along the northern portion of the sheet. The prior survey agrees well with the present survey, with soundings from H10933 generally 1-3 fathoms shoaler than soundings depicted on H-3026 in their common positions. However, this survey often located much shoaler depths in close proximity to soundings depicted on the prior. In general, these soundings were 2 to 8 fathoms shoaler, but in some extreme cases were up to 20 fathoms shoaler. This is attributed to increased coverage of the survey area from the use of SWMB and possible uplift from the 1964 earthquake. Exceptions to this general trend are noted below. Horizontal positioning of the shoreline depicted on H-3026 agrees well with the present survey.

Near a 132-foot sounding on prior H-3026 at $60^{\circ}17'02.97''N$, $147^{\circ}41'35.08''W$, this survey found a least depth of 171 feet (28.5 fathoms, Pos. #86160). This sounding is at the junction of H10932, and soundings from the junctioning survey agree well with this survey. The area was covered with 100% SWMB. *Concur*

In the location of an 84-foot ^{*}sounding on prior H-3026 at $60^{\circ}14'47.59''N$, $147^{\circ}43'02.25''W$, this survey found a least depth of 159 feet (26.4 fathoms, Pos. #185333). This is on a slope, which may account for the discrepancy. The area was covered with 100% SWMB. ** Charted as a 14 fm depth. Delete charted 14 and chart depths as found on the present survey.*

In the location of a 581-foot ^{*}sounding on prior H-3026 at $60^{\circ}12'44.98''N$, $147^{\circ}41'37.75''W$, this survey found a depth of 811 feet (135.2 fathoms, Pos. #43634). The sounding from the prior is located near the edge of H10933 and is covered by mainscheme VBES hydrography. Examination of junction survey H10925, which covers this region using 100% ship multibeam, shows depths ranging from 700 ft to 840 feet within a 200m radius of the prior sounding. ** Charted as a 97 fm depth. Delete charted 97 and chart depths as found on the present survey.*

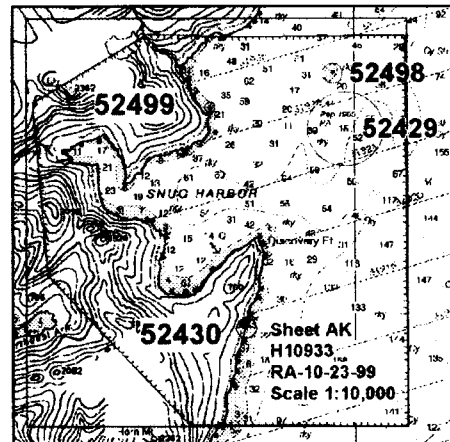
A comparison of the current survey with survey H-2741 was not conducted. The scan was of poor quality and the lack of shoreline made registration or overlay comparisons impossible. *Concur*

Prior survey H-9513 agrees well with H10933, matching generally within 1 fathom. H-9513 covers the southeast portion of H10933. *Concur*

Final comparisons will be made at the Pacific Hydrographic Branch after application of smooth tides.

M. ITEM INVESTIGATIONS

There were four Automated Wreck and Obstruction Information System (AWOIS) items investigated within the survey area. They are depicted on the figure to the right.



AWOIS 52429 ✓

1. Area of Investigation:

AWOIS Number: 52429 ✓
 State and Locality: Prince William Sound, AK ✓
 Reported Position: Latitude: 60/15/57.00 N ✓
 Longitude: 147/40/12.00 W ✓
 Datum: NAD83
 Type of Feature: Sounding
 Reported Depth: 15 fathoms ✓

2. Description and Source of Item:

CL1390/74-USC&GS SHIP SURVEYOR, COAST PILOT REPORT, 1965;
 SURVEY VESSEL CROSSED AN UNCHARTED 15 FM PINNACLE, 1.5 MILES BEARING 040 T,
 OFF DISCOVERY POINT.

3. Survey Requirements: Shallow-water multibeam or VBES. 750m search radius. Update least depth.

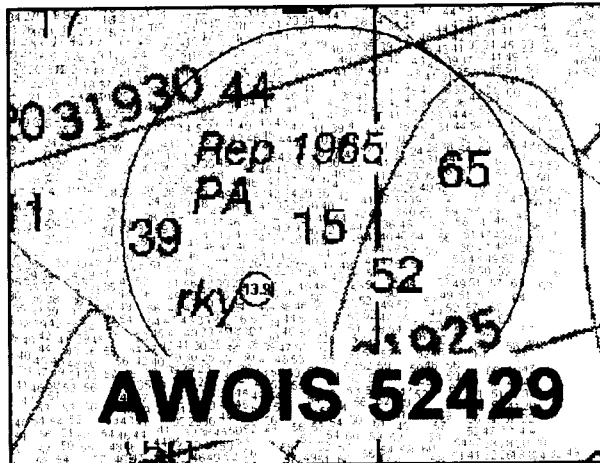
4. Method of Investigation: Shallow-water multibeam.

5. Results of Investigation: Soundings from 100% SWMB coverage indicate a 13.9-fathom shoal (Pos. #150805) at 60°15'49.69"N, 147°40'28.56"W. ✓

6. Comparison with Prior Surveys: There is no indication of the shoal on the prior surveys. Concur

7. Comparison with the Chart and Charting Recommendation: Compared with chart 16700; 26th Ed.; Sept 19, 1998; 1:200,000. The chart shows a 15-fathom shoal charted as position-approximate, 300m ENE of the 13.9-fathom sounding. Compared with chart 16701; 17th Ed; July 25, 1998; 1:81,436. This chart also shows the position-approximate sounding 330m northeast of the 13.9-fathom shoal. The present survey found depths ranging from 29-34 fathoms over the charted 15 fms Rep 1965 PA.

The Hydrographer recommends removing the position-approximate sounding and replacing it with soundings from this survey. Concur Chart 14fm depth from the present survey.



AWOIS 52430 ✓

1. Area of Investigation:

AWOIS Number: 52430
 State and Locality: Prince William Sound, AK
 Reported Position: Latitude: 60°13'45.89" N ✓
 Longitude: 147°42'19.28" W
 Datum: NAD83
 Type of Feature: Wreck ✓
 Reported Depth: N/A

2. Description and Source of Item:

LN18/76-17TH CGD, 5/4/76; M/V KING RAN AGROUND IN LAT. 60-13.8N, LONG. 147-42.2W (NAD27). LOOSE DEBRIS HAS BEEN REPORTED IN THE AREA.

3. Survey Requirements: Visual search, echo sounder, salvage documents. Update status and position.

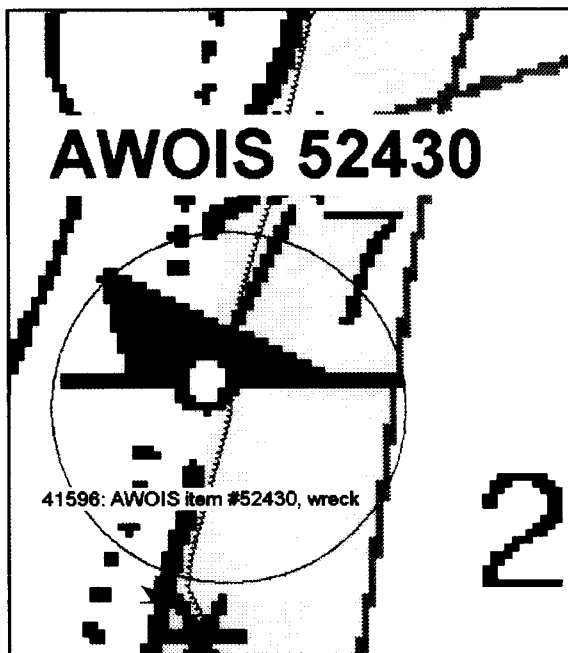
4. Method of Investigation: Visual search.

5. Results of Investigation: A visual search located the broken hull of a vessel atop a ledge 230m south of the charted location. There was no positive identification of the vessel name. The vessel poses no threat to navigation in its current location of 60°13'38.66"N, 147°42'24.12"W. ✓ *Concur*

6. Comparison with Prior Surveys: There is no indication of the wreck on the prior surveys since the wreck postdates the priors. *Concur*

7. Comparison with the Chart and Charting Recommendation: Compared with chart 16700; 26th Ed.; Sept 19, 1998; 1:200,000. The chart shows a wreck 230m north of the wreck's surveyed location. Compared with chart 16701; 17th Ed; July 25, 1998; 1:81,436. This chart also shows the wreck 230m north of its surveyed location. *Concur*

It is recommended that the position of the wreck be revised to 60°13'38.66"N, 147°42'24.12"W on all charts. *Concur Chart visible wreck as found on the present survey.*



AWOIS 52498 ✓

1. Area of Investigation:

AWOIS Number: 52498
 State and Locality: Prince William Sound, AK
 Reported Position: Latitude: 60/16/33.40 N ✓
 Longitude: 147/40/27.96 W ✓
 Datum: NAD83
 Type of Feature: Shoal Sounding
 Reported Depth: 44 feet ✓

2. Description and Source of Item:

H-3026/09-SHOAL AREA SHOWN WITH MIN DEPTH OF 44 FT. ADDITIONAL 55 FT AND 56 FT DEPTHS SHOWN IN WITHIN THE FEATURE WICH RUNS IN A SW TO NE ORIENTATION.

3. Survey Requirements: Shallow-water multibeam, echo sounder or dive investigation. 200m radius.

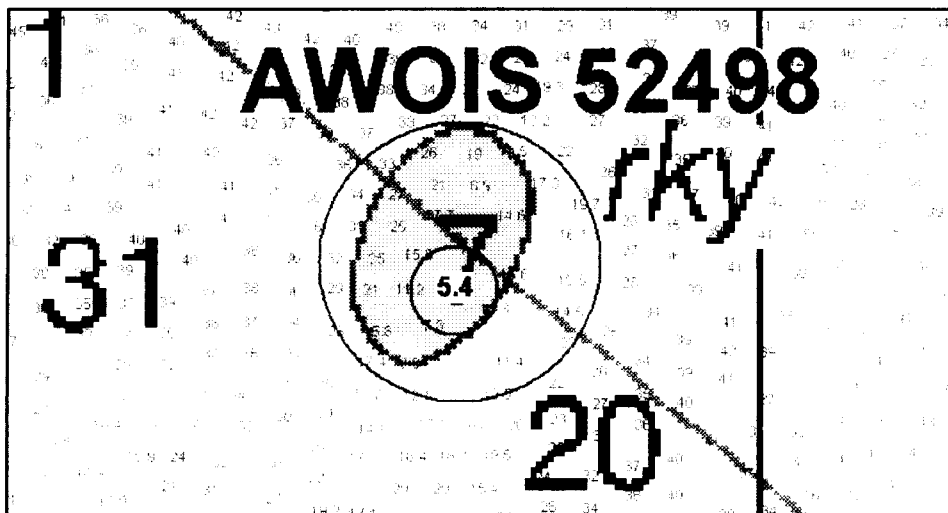
4. Method of Investigation: Shallow-water multibeam over 200m radius.

5. Results of Investigation: Soundings from 100% SWMB coverage revealed a 32-foot (5.4-fathom) shoal (Pos. #189076) in same vicinity as the 44-foot sounding on prior survey H-3026. *Concur*
Present survey found depths ranging from 5.4 - 8.8 Fathoms over the prior 7 Fathom.

6. Comparison with Prior Surveys: See above.

7. Comparison with the Chart and Charting Recommendation: Compared with chart 16700; 26th Ed.; Sept 19, 1998; 1:200,000 and with chart 16701; 17th Ed; July 25, 1998; 1:81,436. Both charts show a 7-fathom shoal. *Concur*

The hydrographer recommends superseding the charted 7-fathom sounding with soundings from this survey. *Concur Chart 5.4 Fm depth from the present survey.*



AWOIS 52499 ✓

1. Area of Investigation:

AWOIS Number: 52499
 State and Locality: Prince William Sound, AK
 Reported Position: Latitude: 60/16/11.30 N ✓
 Longitude: 147/43/04.5 W ✓
 Datum: NAD83
 Type of Feature: Rock Awash ✓
 Reported Depth: N/A

2. Description and Source of Item:

T-2946/09—ROCK AWASH SHOWN, CHARTED IN POS. 60-16-11.3 N 147-43-04.5 W NAD 83.

3. Survey Requirements: Shallow-water multibeam. Echo sounder, diver investigation, visual search. 100m search radius. Confirm existence and position.

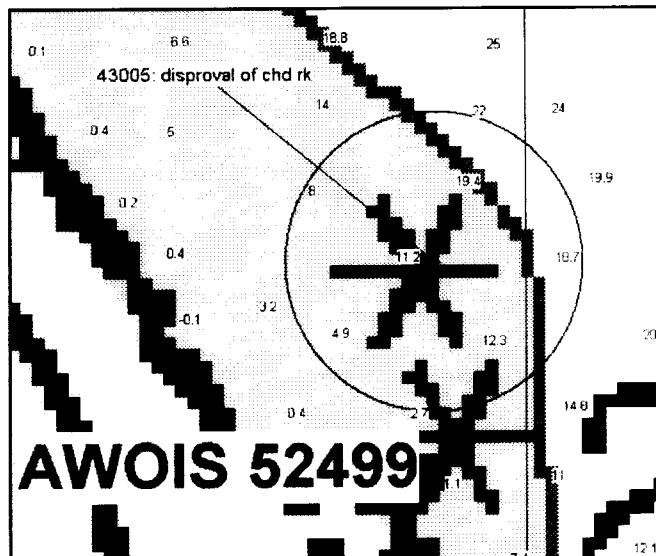
4. Method of Investigation: Visual search using star pattern over 100m radius with visibility of 20 feet.

5. Results of Investigation: The rock awash was not located in the visual search. At the location of the reported rock awash a detached position (Pos. #43005) was taken with a sounding of 24.0 meters. *Concur. The present survey found depths ranging from 11.2-15.1 fathoms over the charted rock.*

6. Comparison with Prior Surveys: Prior survey H-3026 showed no indication of an offshore rock at the AWOIS item location.

7. Comparison with the Chart and Charting Recommendation: Compared with chart 16701; 17th Ed; July 25, 1998; 1:81,436. Two rocks are depicted 130 meters apart on this chart and near the location of the AWOIS item. The northern rock is the disproved AWOIS item and the southern rock is actually the high point of a ledge. The hydrographer recommends removing both rocks and replacing the southern rock with a ledge. Compared with chart 16700; 26th Ed.; Sept 19, 1998; 1:200,000. This chart depicts one rock which represents the two rocks on 16701. The Hydrographer recommends removing this rock and placing a ledge in its location. *Do not concur.*

Chart ledge as a rock based on present survey information. Delete charted AWOIS item 52499 (rock) as recommended by the hydrographer.



N. COMPARISON WITH THE CHART *See Encl Rpt., Section N.*

Survey H10933 was compared to Chart 16700 (26th Ed.; Sept 19, 1998; 1:200,000), and to Chart 16701 (17th Ed; July 25, 1998; 1:81,436). All soundings on Chart 16700 within the region of the current survey are a subset of the soundings from Chart 16701.

Depths from Chart 16701 and 16700 are generally 2 to 8 fathoms deeper than H10933, and in some cases up to 20 fathoms deeper. The differences are likely a result of increased coverage with SWMB technology as well as uplift from the 1964 earthquake and are discussed previously in Section L. An exception to this general trend is noted below.

Chart 16701 and Chart 16700 depict a 14-fathom sounding at $60^{\circ}14'46.61''N$, $147^{\circ}42'59.57''W$, where the present survey revealed a depth of 27 fathoms (Pos. # 115933). This depth corresponds to the 84-foot depth from prior survey H-3026. This area was covered with 100% SWMB. *Chart this area based on the present survey information.*

Dangers to Navigation

Sixteen Dangers to Navigation were found and reported to the Seventeenth Coast Guard District.

A ~~0.3~~⁴-fathom shoal (Pos. #193350) was discovered at $60^{\circ}16'40.57''N$, $147^{\circ}43'13.93''W$, in the vicinity of a 16-fathom depth shown on Chart 16701.

A 1-fathom shoal (Pos. #44260) was discovered at $60^{\circ}14'38.29''N$, $147^{\circ}41'49.09''W$, just east of Discovery point beyond the 10-fathom curve on chart 16701.

A 1.9-fathom shoal (Pos. #84848) was located at $60^{\circ}16'31.30''N$, $147^{\circ}43'07.25''W$, at the same location as a 16-fathom depth depicted on Chart 16701.

A ~~4.5~~⁶-fathom shoal (Pos. #145479) exists at location $60^{\circ}14'59.06''N$, $147^{\circ}44'07.45''W$, at the same location as a 12-fathom depth depicted on Chart 16701.

A 5.4-fathom shoal (Pos. # 189076 – AWOIS Item 52498) was discovered at $60^{\circ}16'32.16''N$, $147^{\circ}40'28.25''W$, near a 7-fathom shoal depicted on Chart 16701.

A ~~5.3~~⁶-fathom shoal (Pos. #74739) was discovered at $60^{\circ}15'16.98''N$, $147^{\circ}44'55.55''W$, which lies on the edge of the 10-fathom curve on Chart 16701 in the vicinity of a 6-fathom sounding.

A 6.7-fathom shoal (Pos. #83398) was found at $60^{\circ}15'18.91''N$, $147^{\circ}44'08.41''W$, in the vicinity of a 13-fathom sounding depicted on Chart 16701.

A 7.7-fathom shoal (Pos. #40611) was found at $60^{\circ}16'52.12''N$, $147^{\circ}42'46.39''W$, which lies between depths of 31 and 7 fathoms outside of the 10-fathom curve on Chart 16701.

A ~~7.7~~⁸-fathom shoal (Pos. #43887) was found at $60^{\circ}13'30.34''N$, $147^{\circ}42'01.25''W$, in the vicinity of an 18-fathom depth depicted on Chart 16701.

An 8.6-fathom shoal (Pos. #79759) was found at $60^{\circ}16'43.97''N$, $147^{\circ}39'17.91''W$, in the vicinity of a 29-fathom depth depicted on Chart 16701.

An 8.7-fathom shoal (Pos. #77475) was found at $60^{\circ}16'20.61''N$, $147^{\circ}41'01.35''W$, in the vicinity of a 17-fathom depth depicted on Chart 16701.

An 8.8-fathom shoal (Pos. #76025) was found at $60^{\circ}15'46.29''N$, $147^{\circ}43'06.22''W$, outside of the 10-fathom curve on Chart 16701 and near a 9-fathom sounding.

A 9.3-fathom shoal (Pos. #72850) was found at $60^{\circ}15'36.16''N$, $147^{\circ}45'16.48''W$, at the same location as a 21-fathom depth depicted on Chart 16701.

A 9.7-fathom shoal (Pos. #133084) was found at $60^{\circ}15'58.42''N$, $147^{\circ}41'24.94''W$, at the same location as an 11-fathom depth depicted on Chart 16701.

A 9.8-fathom shoal (Pos. #96329) was found at $60^{\circ}14'28.12''N$, $147^{\circ}41'21.99''W$, at the same location as an 11-fathom depth depicted on Chart 16701.

A 10.2-fathom shoal (Pos. #40574) was found at $60^{\circ}16'55.53''N$, $147^{\circ}42'16.37''W$, in the vicinity of a 31-fathom depth depicted on Chart 16701.

A copy of the Danger to Navigation report is included in ^{this report} Appendix A.

O. ADEQUACY OF SURVEY

Survey H10933 is complete and adequate to supersede charted soundings and features in their common areas.

P. AIDS TO NAVIGATION See Eval Rpt., Section P.

There are no aids to navigation within the survey area of H10933. Concur

Q. STATISTICS ✓

Refer to the Survey Information Summary attached to this report.

R. MISCELLANEOUS ✓

Bottom samples were collected and sent to the Smithsonian Institute in accordance with the Project Instructions.

No unusual tidal currents or magnetic variations were found during this survey. Concur

S. RECOMMENDATIONS ✓

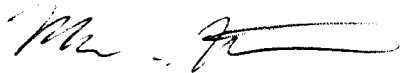
None.

T. REFERRAL TO REPORTS ✓

The following supplemental reports contain additional information relevant to this survey:

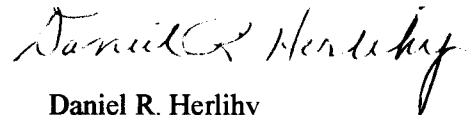
<u>Title</u>	<u>Date Sent</u>	<u>Office</u>
OPR-P139-RA-99 1999 Coast Pilot Report Project Related Data for OPR-P139-RA-99	TBD December 1999	N/CS26 N/CS34

Respectfully Submitted,



Mark A. Wetzler
Lieutenant, NOAA

Approved and Forwarded,



Daniel R. Herlihy
Commander, NOAA
Commanding Officer

Survey Information Summary

Project: OPR-P139-RA **Project Name:** SOUTHWEST PRINCE WILLIAM SOUND
Instructions Dated: July 30,1999 **Project Change Info:**
Sheet Letter: AK **Registry Number:** H10933
Sheet Number: RA-10-23-99

Survey Title: Snug Harbor and Vicinity

Data Acquisition Dates: **From:** 9-Sept-99 252 **To:** 27-Oct-99 293

Vessel Usage Summary

VESNO	MS	SPLITS	DEV	XL	S/L	DP	BS	DIVE
2121						1		
2122		1			1	1		
2123	1							
2124	6	2		1	3	4		
2125						1		
2126								

Sound Velocity Cast Information

Cast Name	HPS Table #	Cast DN	Max Depth	Position	Applicable DN
99243014	4	243	183.1	60/19/01 147/17/30	236-253
99267202	8	267	230.0	60/19/49 146/30/35	261-267
99270224	12	270	329.3	60/11/00 147/41/10	268-274
99277214	13	277	293.2	60/27/24 147/09/36	278-285
99286165	14	286	369.9	60/17/18 147/35/24	286-293

Tide Zone Information

Zone #	Time Corr.	Height Corr.
PWS10	-00 hr 06 min	0.90
PWS11	-00 hr 06 min	0.88

Tide Gage Information

Tide Gauge #	Gauge Name	Installed	Removed
945-4511	Port Chalmers	8/10/1999	10/20/1999
945-4616	Montague Island	8/31/1999	10/20/1999
945-4662	Snug Harbor	8/11/1999	10/20/1999
945-4411	Zaikof Point	8/10/1999	10/14/1999

Statistics Summary

Type	Total
BS	12
DP	60
MS	87.17
S/L	6.6
SPLIT	12.62
SWMB	107.3
XL	10.46

Percent XL	12%
SQNM	7.4



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office of NOAA Corps Operations
Pacific Marine Center
1801 Fairview Avenue East
Seattle, Washington 98102-3767

NOAA Ship RAINIER

November 12, 1999

ADVANCE
INFORMATION

Commander (mon)
Seventeenth Coast Guard District
Post Office Box 25517
Juneau, Alaska 99802-5517

Dear CDR Hamblett:

It is requested that the following dangers to navigation be included in the Local Notice to Mariners. The NOAA Ship RAINIER positioned these features while conducting hydrographic survey H10933 from September through October 1999 in Prince William Sound, Alaska. The dangers are shown graphically on the attached chartlet.

The following dangers to navigation affect the following charts:

<u>Chart</u>	<u>Scale</u>	<u>Edition</u>	<u>Date</u>
16700	1:200,000	26 th	September 19, 1998
16701	1:81,436	17 th	July 25, 1998

The positions are on the NAD 83 datum and depths have been corrected to Mean Lower Low Water using predicted tides.

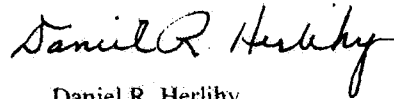
<u>Feature</u>	<u>Depth (fm)</u>	<u>Latitude (N)</u>	<u>Longitude (W)</u>	<u>Depth (m)</u>
Shoal	0.3	60/16/40.57 N	147/43/13.93 W	0.6
Shoal	1	60/14/38.29 N	147/41/49.09 W	1.8
Shoal	1.9	60/16/31.30 N	147/43/07.25 W	3.5
Shoal	4.5	60/14/59.06 N	147/44/07.45 W	8.3
Shoal	5.4	60/16/32.16 N	147/40/28.25 W	9.9
Shoal	5.5	60/15/16.98 N	147/44/55.55 W	10.2
Shoal	6.7	60/15/18.91 N	147/44/08.41 W	12.3
Shoal	7.7	60/16/52.12 N	147/42/46.39 W	14.2
Shoal	7.7	60/13/30.34 N	147/42/01.25 W	14.2
Shoal	8.6	60/16/43.97 N	147/39/17.91 W	15.8
Shoal	8.7	60/16/20.61 N	147/41/01.35 W	16
Shoal	8.8	60/15/46.29 N	147/43/06.22 W	16.2
Shoal	9.3	60/15/36.16 N	147/45/16.48 W	17
Shoal	9.7	60/15/58.42 N	147/41/24.94 W	17.8
Shoal	9.8	60/14/28.12 N	147/41/21.99 W	18
Shoal	10.2	60/16/55.53 N	147/42/16.37 W	18.7



ADVANCE
INFORMATION

This is advance information subject to office review. Questions concerning this letter should be directed to the Chief, Pacific Hydrographic Branch, (206) 526-6835. Refer to survey project OPR-P139-RA-99 and Danger to Navigation message RA-20-99. More information on current RAINIER survey projects may be obtained by e-mail; contact the Field Operations Officer at FOO.RAINIER@NOAA.GOV.

Sincerely,

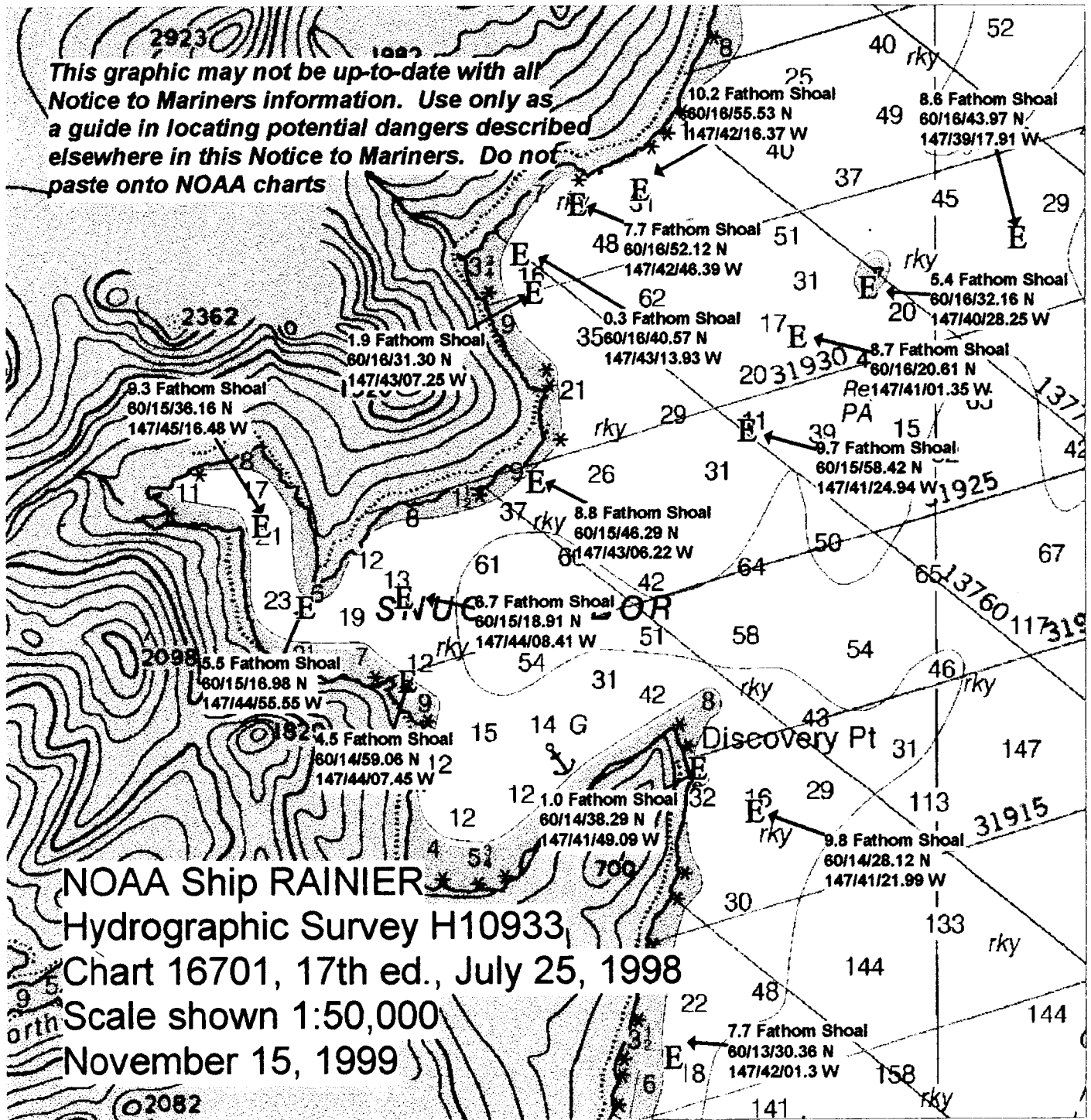


Daniel R. Herlihy
Commander, NOAA
Commanding Officer

Attachment

cc: NIMA
PMC
N/CS261
N/CS34

This graphic may not be up-to-date with all
Notice to Mariners information. Use only as
a guide in locating potential dangers described
elsewhere in this Notice to Mariners. Do not
paste onto NOAA charts



NOAA Ship RAINIER
Hydrographic Survey H10933
Chart 16701, 17th ed., July 25, 1998
Scale shown 1:50,000
November 15, 1999

©2082

ADVANCE INFORMATION

It is requested that the following dangers to navigation be included in the Local Notice to Mariners. The NOAA Ship RAINIER positioned these features while conducting hydrographic survey H10933 from September through October 1999 in Prince William Sound, Alaska.

The following dangers to navigation affect Chart 16700 (scale 1:200,000; 26th edition, September 19, 1998) and Chart 16701 (scale 1:81,436; 17th edition, July 25, 1998)

The positions are on the NAD 83 datum and depths have been corrected to Mean Lower Low Water using predicted tides.

Feature: Shoal
Depth: 0.3 fathoms
Latitude: 60/16/40.57 N
Longitude: 147/43/13.93 W

Feature: Shoal
Depth: 1 fathom
Latitude: 60/14/38.29 N
Longitude: 147/41/49.09 W

Feature: Shoal
Depth: 1.9 fathoms
Latitude: 60/16/31.30 N
Longitude: 147/43/07.25 W

Feature: Shoal
Depth: 4.5 fathoms
Latitude: 60/14/59.06 N
Longitude: 147/44/07.45 W

Feature: Shoal
Depth: 5.4 fathoms
Latitude: 60/16/32.16 N
Longitude: 147/40/28.25 W

Feature: Shoal
Depth: 5.5 fathoms
Latitude: 60/15/16.98 N
Longitude: 147/44/55.55 W

Feature: Shoal
Depth: 6.7 fathoms
Latitude: 60/15/18.91 N
Longitude: 147/44/08.41 W

Feature: Shoal
Depth: 7.7 fathoms
Latitude: 60/16/52.12 N
Longitude: 147/42/46.39 W

Feature: Shoal
Depth: 7.7 fathoms
Latitude: 60/13/30.34 N
Longitude: 147/42/01.25 W

Feature: Shoal
Depth: 8.6 fathoms
Latitude: 60/16/43.97 N
Longitude: 147/39/17.91 W

Feature: Shoal
Depth: 8.7 fathoms

ADVANCE
INFORMATION

Latitude: 60/16/20.61 N
Longitude: 147/41/01.35 W

Feature: Shoal
Depth: 8.8 fathoms
Latitude: 60/15/46.29 N
Longitude: 147/43/06.22 W

Feature: Shoal
Depth: 9.3 fathoms
Latitude: 60/15/36.16 N
Longitude: 147/45/16.48 W

Feature: Shoal
Depth: 9.7 fathoms
Latitude: 60/15/58.42 N
Longitude: 147/41/24.94 W

Feature: Shoal
Depth: 9.8 fathoms
Latitude: 60/14/28.12 N
Longitude: 147/41/21.99 W

Feature: Shoal
Depth: 10.2 fathoms
Latitude: 60/16/55.53 N
Longitude: 147/42/16.37 W

This is advance information subject to office review. Questions concerning this letter should be directed to the Chief, Pacific Hydrographic Branch, (206) 526-6835. Refer to survey project OPR-P139-RA-99 and Danger to Navigation message RA-20-99. More information on current RAINIER survey projects may be obtained by e-mail; contact the Field Operations Officer at FOO.RAINIER@NOAA.GOV.

GEOGRAPHIC NAMES

H-10933

Name on Survey	<div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">A ON CHART NO. 16700, 16701</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">B ON PREVIOUS SURVEY NO.</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">C ON U.S. QUADRANGLE MAPS</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">D FROM LOCAL INFORMATION</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">E ON LOCAL MAPS</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">F P.O. GUIDE OR MAP</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">G RAND McNALLY ATLAS</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">H U.S. LIGHT LIST</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">K</div> </div>											
	ALASKA (title)	X		X								
DISCOVERY POINT	X		X									2
KNIGHT ISLAND	X		X									3
MONTAGUE STRAIT	X		X									4
PRINCE WILLIAM SOUND (title)	X		X									5
SNUG HARBOR	X		X									6
												7
												8
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Deanna J. Riebeling
Chief Scientist
 MAY 15 2000



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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: May 15, 2000

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-P139-RA-99
HYDROGRAPHIC SHEET: H-10933

LOCALITY: Southwest Prince William Sound, AK

TIME PERIOD: September 9 - October 20, 1999

TIDE STATION USED: 945-4662 Snug Harbor
Lat. 60° 14.4'N Lon. 147° 43.2'W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 3.218 meters

REMARKS: RECOMMENDED ZONING
Use zone(s) identified as: PWS42 & PWS43.

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 L. Mero 5/16/00

CHIEF, REQUIREMENTS AND DEVELOPMENT DIVISION



Printed on Recycled Paper

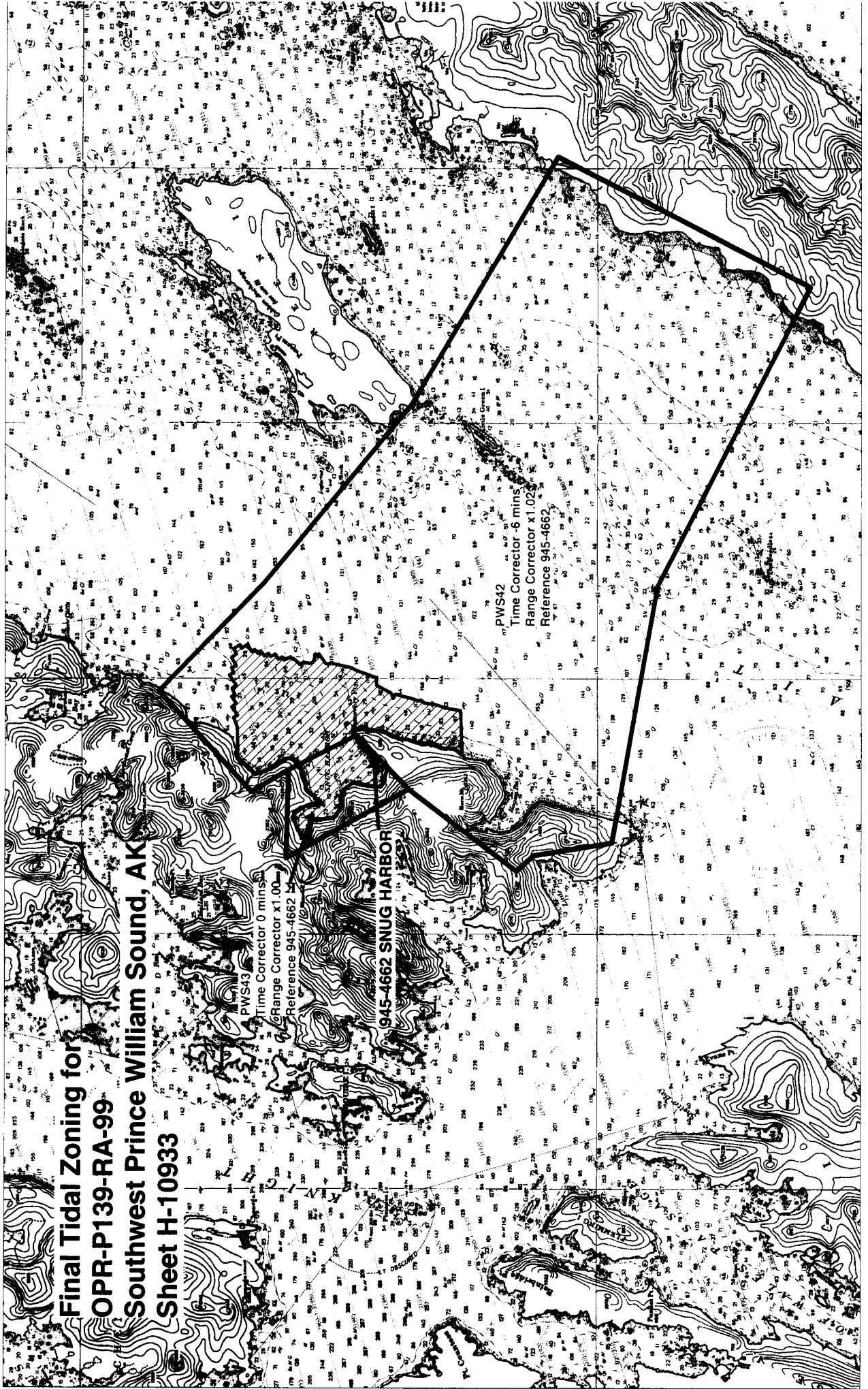


Final tide zone node point locations for OPR-P139-RA-99,
Sheet H-10933.

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

	Tide Station Order	AVG Time Correction	Range Correction
Zone PWS42			
-147.703642 60.244653	945-4662	-6	1.02
-147.738627 60.227865			
-147.792175 60.19276			
-147.781996 60.187238			
-147.773635 60.161998			
-147.606335 60.147238			
-147.411023 60.097978			
-147.325832 60.179367			
-147.487763 60.226861			
-147.604351 60.274729			
-147.674795 60.308452			
-147.740374 60.278784			
-147.726093 60.266771			
-147.703642 60.244653			
Zone PWS43			
-147.726093 60.266771	945-4662	0	1.00
-147.78366 60.267492			
-147.738627 60.227865			
-147.703642 60.244653			
-147.726093 60.266771			

**Final Tidal Zoning for
OPR-P139-RA-99
Southwest Prince William Sound, AK
Sheet H-10933**



APPROVAL SHEET

for


H10933

RA-10-23-99

Standard field surveying and processing procedures were followed in producing this survey in accordance with the NOS Hydrographic Surveys Specifications and Deliverables; the Hydrographic Survey Guidelines; and the Field Procedures Manual, as updated for 1998.

The field sheet and accompanying records have been examined by me, are considered complete and adequate for charting purposes, and are approved. All records are forwarded for final review and processing to N/CS34, Pacific Hydrographic Branch.

Approved and Forwarded,



Daniel R. Herlihy
Commander, NOAA
Commanding Officer
NOAA Ship RAINIER

HYDROGRAPHIC SURVEY STATISTICS

H-10933

RECORDS ACCOMPANYING SURVEY: To be completed when survey is processed.

RECORD DESCRIPTION		AMOUNT	RECORD DESCRIPTION		AMOUNT
SMOOTH SHEET		1	SMOOTH OVERLAYS: POS., ARC, EXCESS		NA
SCRIPTIVE REPORT		1	FIELD SHEETS AND OTHER OVERLAYS		NA

DESCRIP-TION	DEPTH/POS RECORDS	HORIZ. CONT. RECORDS	SONAR-GRAMS	PRINTOUTS	ABSTRACTS/SOURCE DOCUMENTS
ACCORDION FILES	1				
ENVELOPES					
VOLUMES					
CAHIERS					
BOXES					

SHORELINE DATA

SHORELINE MAPS (List): DM-10300

PHOTOBATHYMETRIC MAPS (List): NA

NOTES TO THE HYDROGRAPHER (List): NA

SPECIAL REPORTS (List): NA

NAUTICAL CHARTS (List):

OFFICE PROCESSING ACTIVITIES

The following statistics will be submitted with the cartographer's report on the survey

PROCESSING ACTIVITY	AMOUNTS		
	VERIFICATION	EVALUATION	TOTALS
POSITIONS ON SHEET			
POSITIONS REVISED			
SOUNDINGS REVISED			
CONTROL STATIONS REVISED			
	TIME-HOURS		
	VERIFICATION	EVALUATION	TOTALS
PRE-PROCESSING EXAMINATION			
VERIFICATION OF CONTROL			
VERIFICATION OF POSITIONS			
VERIFICATION OF SOUNDINGS			
VERIFICATION OF JUNCTIONS			
APPLICATION OF PHOTOBATHYMETRY			
SHORELINE APPLICATION/VERIFICATION			
COMPILATION OF SMOOTH SHEET			153
COMPARISON WITH PRIOR SURVEYS AND CHARTS			
EVALUATION OF SIDE SCAN SONAR RECORDS			
EVALUATION OF WIRE DRAGS AND SWEEPS			
EVALUATION REPORT			26
GEOGRAPHIC NAMES			
OTHER (Chart Compilation)			70
USE OTHER SIDE OF FORM FOR REMARKS	TOTALS		249

Pre-processing Examination by	Beginning Date	12/06/1999	Ending Date	
Verification of Field Data by Olmstead, E. Domingo, R. Mayor	Time (Hours)	153	Ending Date	
Quality Control Check by	Time (Hours)		Ending Date	
Evaluation and Analysis by B. Olmstead	Time (Hours)	26	Ending Date	04/23/2001
Inspection by D. Hill <i>D. Hill</i>	Time (Hours)	3	Ending Date	10/1/2001

**EVALUATION REPORT
H-10933**

A. PROJECT

The hydrographers' report contains a complete discussion of the project information.

B. AREA SURVEYED

The survey area is adequately described in the hydrographers' report except as follows.

The hydrographer has determined the inshore limits of safe navigation by defining a Navigable Area Limit Line (NALL) throughout the survey area. Charted features and soundings inshore of this limit line have not been specifically addressed during survey operations and should be retained as charted. A page-size plot of the charted area depicting the specific limits of supersession accompanies this report as Attachment 1.

The bottom consists mainly of mud, shells, and pebbles. Depths generally range from one fathom along the shoreline and in areas of shoal developments, to 139 fathoms along the southeastern limits of the survey area.

C. SURVEY VESSELS

The hydrographers' report contains adequate information relating to survey vessels.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

The acquisition and processing of data in the field has been adequately addressed in the hydrographer's report, section D.

Office processing of survey data was conducted using the same Computer Aided Resource Information System (CARIS) and Hydrographic Processing System (HPS) used by the hydrographer. MicroStation 95 was used during office processing to compile the smooth sheet.

Processed digital data for this survey exists in the standard HPS format, a database format using the .dbf extension. In addition, the smooth sheet drawing is filed in the MicroStation format, i.e., .dgn extension. Copies of these files have been forwarded to the Hydrographic Surveys Division and a backup copy retained at PHB. Database records forwarded are in the Internal Data Format (IDF) and are in compliance with specifications in existence at the time of survey processing.

The drawing files necessarily contain information that is not part of the HPS data set such as geographic names text, line-type data, and minor symbolization. In addition, those soundings deleted from the drawing for clarity purposes remain unrevised in the HPS digital files to preserve the integrity of the original hydrographic data set. Cartographic codes used to describe the digital data are those authorized by the Hydrographic Surveys Specifications and Deliverables dated 1999.

The data are plotted using a Universal Transverse Mercator (UTM) projection, zone 6, and are depicted on a single sheet.

E. SONAR EQUIPMENT

Side scan sonar equipment was not used during survey H-10933.

F. SOUNDING EQUIPMENT

Sounding equipment has been adequately addressed in the hydrographers' report.

G. CORRECTIONS TO SOUNDINGS

Soundings and elevations below Mean High Water (MHW) have been reduced to Mean Lower Low Water (MLLW). The reducers include corrections for an actual tide, dynamic draft, and sound velocity. Additional reducers for multibeam survey data include heave, pitch and roll. These reducers have been reviewed and are consistent with NOS specifications.

Predicted tides were used for reduction of soundings during field processing. During office processing, soundings and elevations have been reduced to Mean Lower Low Water (MLLW) or Mean High Water (MHW) as appropriate with verified tide correctors obtained from the Center for Operational Oceanographic Products and Services (CO-OPS). The correctors are zoned from tide gage Snug Harbor, Southwest Prince William Sound, Alaska, 945-4662.

H. CONTROL STATIONS

Section H of the hydrographers' report contains adequate discussions of horizontal control and hydrographic positioning.

The positions of horizontal control stations used during hydrographic operations are published values based on NAD 83. The geographic positions of all survey data are based on NAD 83. The smooth sheet is annotated with an NAD 27 adjustment tick based on values determined with the NGS program NADCON. Geographic positions based on NAD 27 may be plotted on the smooth sheet utilizing the NAD 83 projection by applying the following corrections:

Latitude:	-2.126 seconds	(-65.807 meters)
Longitude:	7.265 seconds	(111.762 meters)

The prior survey work (1908-1911) in common with the present survey is plotted on the Valdez datum. To convert from the Valdez datum to NAD 83 the user must apply +8.28 seconds to the latitude and -21.12 seconds to the longitude.

I. HYDROGRAPHIC POSITION CONTROL

Differential GPS (DGPS) was used to control this survey. A horizontal dilution of precision (HDOP) not to exceed 3.75 for 1:10,000 was computed for survey operations. There were no positions that exceeded limits in terms of HDOP. NAD 83 is used as the horizontal datum for plotting and position computations.

DGPS performance checks were not conducted in the field. Additional information concerning specific control system type, calibrations and system checks, can be found in the hydrographers' report and the separates related to horizontal position control and corrections to position data. The evaluation report, section P, contains information regarding performance check requirements.

J. SHORELINE

Shoreline map DM-10300, scale 1:20,000, was compiled on NAD 83 and applies to this survey. Shoreline drawn on the smooth sheet in black originates from the above digital data as provided by the Coastal Mapping Program. The shoreline data and the hydrographic data were merged in MicroStation during the compilation of the smooth sheet.

There were no MHW revisions delineated during this survey.

The shoreline maps and the results of the fieldwork as portrayed on the smooth sheet should supersede charted shoreline.

K. CROSSLINES

Crosslines are adequately discussed in the hydrographers' report.

L. JUNCTIONS

<u>Survey</u>	<u>Scale</u>	<u>Year</u>	<u>Area</u>
H-10925	1:40,000	1999	East
H-10932	1:10,000	1999	North

The junctions with surveys H-10925 and H-10932 are complete. Soundings and depth curves are in good agreement. A few soundings and features have been transferred in color within the common area to better delineate the bottom configuration. A "Joins" note has been added to the smooth sheet where applicable.

There is no contemporary junction along the southern limit of the present survey. Future surveys are planned in this area and the junction with H-10933 will be discussed in the evaluation report for that survey.

M. COMPARISON WITH PRIOR SURVEYS

The following prior surveys fall within the common area of the present survey and have been compared with during office processing. These surveys are the source data for the existing chart and are discussed below.

<u>Survey</u>	<u>Year</u>	<u>Scale</u>	<u>Datum</u>
H-2741	1911	1:40,000	Valdez
H-3026	1909	1:20,000	Valdez

Prior surveys H-3026 and H2741 are the source data for most all of the depths, bottom characteristics, and associated information shown on Chart 16701. Comparison with H-3026 was made using a digital copy. The registration and legibility of this prior work to the present survey was good. The digital copy of H-2741 was illegible and found not useful for comparison. However, only a few charted depths originate with this prior work along the extreme eastern portion of the present survey. Prior survey H-2984 was listed by the hydrographer for comparison but has been superseded within the common area of H-3026 and does not require discussion.

H-3026 and H-2741 were conducted using lead lines and visual positioning techniques. Considering the data gathering techniques employed in 1910-11, a comparison of depths generally reflects fair agreement. Present survey depths do however reflect a consistent shoal bias of 2-4 fathoms with a few extreme differences (shoaler) exceeding 5-8 fathoms. Although a few prior survey depths located along the steeper slopes reflect both a shoal and deep bias that exceed 5 fathoms, the evaluator feels these depths are likely the result of erroneous lead line depths and or positional errors. In these cases, similar depths with the present survey can be found within 50-100 meters in generally a NE or SW direction. Comparison with the prior shoreline reveals good agreement. There appears to be no major changes to the mean high water line. Aside from the effects of past earthquake activity, depth differences may well be attributed to improved positioning and sounding methods.

A more thorough coverage of the area utilizing the shallow water multibeam system has provided better definition of the bottom in Snug Harbor and associated areas along the eastern side of Knight Island. Additional information can be found in the hydrographers' report sections L and N.

<u>Survey</u>	<u>Year</u>	<u>Scale</u>	<u>Datum</u>
H-9513	1975	1:20,000	NAD 83

This prior survey covers the southern limit of the present survey and was conducted using Raydist positioning

and the Ross Fathometer. Although this prior survey overlaps with H-3026, the more current survey data was not fully applied to the chart. It appears this prior survey was incomplete and only used to update the chart with critical corrections. The present survey depths reflect a consistent shoal bias of 0.5 to 1 fathom with survey work conducted in 1975.

In accordance with Hydrographic Survey Guideline No. 39, the effect of the 1964 Prince William Sound earthquake were considered in the comparison of this survey. Prince William Sound experienced a bottom uplift of 4-32 feet during the 1964 earthquake. However, due to the depths of water and the differences in data acquisition methods, no reasonable adjustment value for prior soundings could be determined.

Survey H-10933 is adequate to supersede the prior surveys within the common area.

N. ITEM INVESTIGATIONS

There were four(4) AWOIS items assigned for investigation within the survey area. These items were investigated during survey operations and have been adequately addressed in the hydrographer's report.

O. COMPARISON WITH CHART

Survey H-10933 was compared with the following chart.

<u>Chart</u>	<u>Edition</u>	<u>Date</u>	<u>Scale</u>
16701	17th	July 25, 1998	1:81,436

a. Hydrography

Charted hydrography originates with the previously discussed prior surveys, contemporary photogrammetric shoreline, and miscellaneous source data and has been adequately addressed in sections I and L of the hydrographers' report and section M of the evaluation report except as discussed below;

The charted anchorage symbol portrayed at latitude 60/14/39N, longitude 147/43/00W originates from an unknown source. As Snug Harbor does provide protected shelter and relatively deep water, the evaluator recommends retaining this symbol on the chart but revising the position to latitude 60/14/39N, longitude 147/43/15W. The recommendation is based on discussion with the hydrographer.

The application of this survey to charts of a scale less than 1:40,000 may require the generalization of features such as ledges, and reefs. The recommended charting disposition of specific ledges or reefs is their depiction as isolated rocks. The application of this survey to charts of a scale greater than 1:40,000 may be accomplished without generalization of features.

Survey H-10933 is adequate to supersede charted hydrography within the common area.

b. Dangers To Navigation

Sixteen (16) potential dangers to navigation were identified during survey operations. These potential dangers were reported to the USCG, NIMA, N/CS261, N/CS 34, and the NOAA Navigation Advisor, Alaska dated November 12, 1999. A copy of this report is attached. No additional dangers to navigation were identified during office processing.

P. ADEQUACY OF SURVEY

Hydrography contained on survey H-10933 is adequate to:

- a. Delineate the bottom configuration, determine least depths, and draw the required depth curves;
- b. Reveal there are no significant discrepancies or anomalies requiring further investigation; and
- c. Show the survey was properly controlled and soundings are correctly plotted.

With the exception of the following, the hydrographic records and reports received for processing are adequate and conform to the requirements of the Hydrographic Manual, 4th Edition, revised through Change No. 3, the Hydrographic Survey Guidelines, the NOS Hydrographic Surveys Specifications and Deliverables, and the Field Procedures Manual, April 1998 Edition.

Prior sounding and feature comparisons already mentioned in section L, Comparison with Prior Surveys, does not require further discussion in section N. Discussion in section N should be limited to miscellaneous data not originating from prior surveys. Reference the FPM, Figure 5.3, Descriptive Report Checkoff List.

Q. AIDS TO NAVIGATION

There are no fixed or floating aids to navigation within the survey area.

There were no features of landmark value located and or recommended for charting within the area of this survey.

R. STATISTICS

Statistics are adequately itemized in the hydrographers' report.

S. MISCELLANEOUS

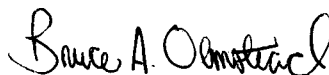
Miscellaneous information is adequately discussed in the hydrographers' report. No additional miscellaneous items were noted during office processing.

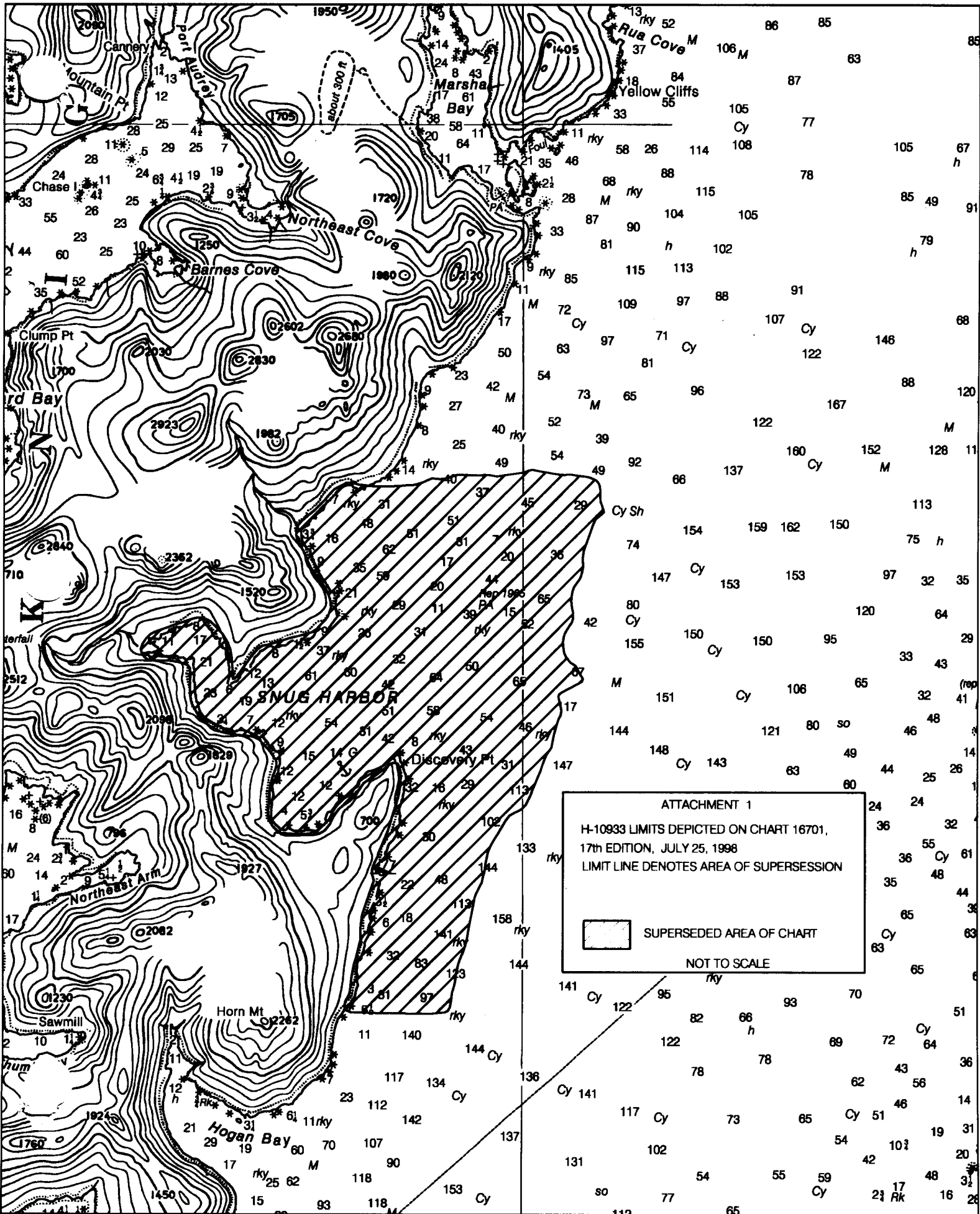
T. RECOMMENDATIONS

This is a good hydrographic survey. No additional work is recommended. Additional information regarding recommendations is found in the hydrographers' report.

U. REFERRAL TO REPORTS

Referral to reports is adequately discussed in the hydrographers' report.

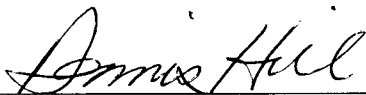

Bruce A Olmstead
Cartographer



APPROVAL SHEET
H-10933

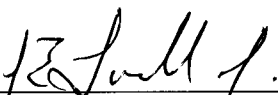
Initial Approvals:

The completed survey has been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, cartographic symbolization, comparison with prior surveys and verification or disproval of charted data. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report.



Date: 9/21/01
Dennis J. Hill
Chief, Cartographic Team
Pacific Hydrographic Branch

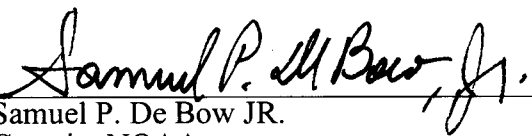
I have reviewed the smooth sheet, accompanying data, and reports. This survey and accompanying digital data meet or exceed NOS requirements and standards for products in support of nautical charting except where noted in the Evaluation Report.



Date: 10/5/01
John E. Lowell JR.
Commander, NOAA
Chief, Pacific Hydrographic Branch

Final Approval

Approved:



Date: 11/30/01
Samuel P. De Bow JR.
Captain, NOAA
Chief, Hydrographic Surveys Division

MARINE CHART BRANCH
RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-10933

INSTRUCTIONS

A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart.

1. Letter all information.
2. In "Remarks" column cross out words that do not apply.
3. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.

CHART	DATE	CARTOGRAPHER	REMARKS
16701	3/20/2001	B. Olmstead	Full Part Before After Marine Center Approval Signed Via Drawing No. Full application of soundings and features From smooth sheet.
16701	12/18/01	J. Shery	Full Part Before After Marine Center Approval Signed Via Drawing No. full application of soundings, curves and features from BP 175983
16700	12/18/01	J. Shery	Full Part Before After Marine Center Approval Signed Via Drawing No. full application of soundings, curves and features from 16701 Ref: BP-175983
			Full Part Before After Marine Center Approval Signed Via Drawing No.
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