

H10944

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-10-25-99

Registry No. H-10944

LOCALITY

State Alaska

General Locality Eastern Tracy Arm

Sublocality Vicinity of Sawyer Glaciers

1999

CHIEF OF PARTY

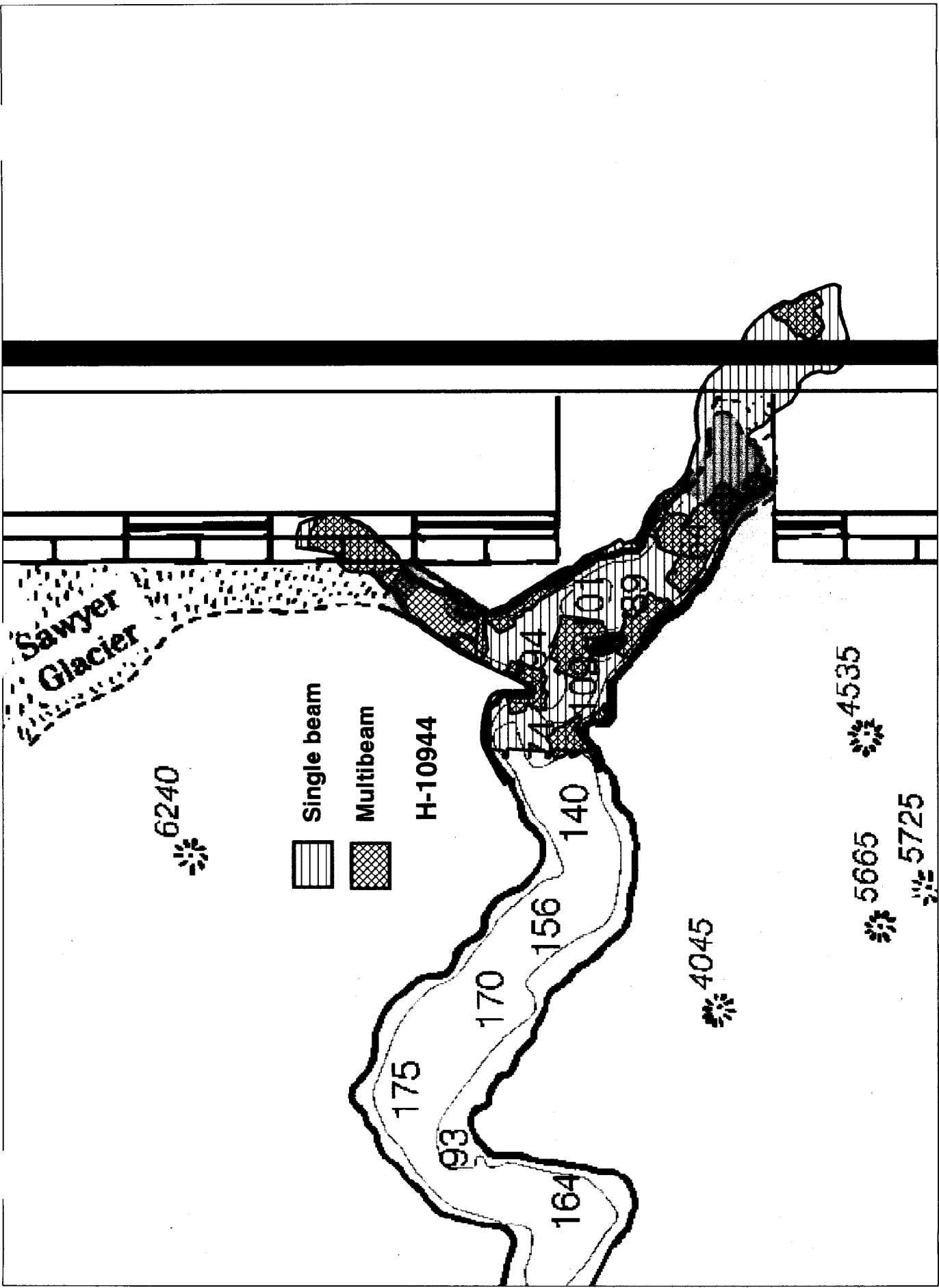
Commander D.R. Herlthy

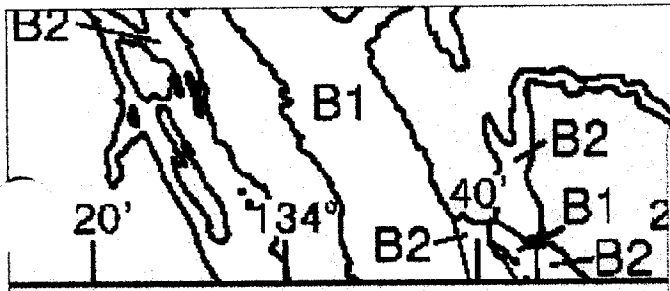
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DATE

FEB 28 2000

NOAA FORM 77-28 (11-72)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTER NO. H-10944
HYDROGRAPHIC TITLE SHEET		FIELD NO. RA-10-25-99
INSTRUCTIONS The hydrographic sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the office.		
State <u>Alaska</u>		
General Locality <u>Eastern Tracy Arm</u>		
Sublocality <u>Vicinity of Sawyer Glaciers</u>		
Scale <u>1:10,000</u>		Date of Survey <u>October 25 - 28, 1999</u>
Instructions Date <u>10/7/1999</u>		Project No. ⁰³²⁵ <u>OPR-P139-RA</u>
Vessel <u>RA-1 (2121), RA-2 (2122), RA-3 (2123), RA-4 (2124), RA-5 (2125), RA-6 (2126)</u>		
Chief of Party <u>Commander D.R. Herlihy, NOAA</u>		
Surveyed by <u>RAINIER Personnel</u>		
Soundings taken by echo sounder, hand lead, pole <u>Singlebeam: DXF 6000N, KNUDSEN 320M; Shallow Water Multibeam: Reson 8101</u>		
Graphic record scaled by <u>RAINIER Personnel</u>		
Graphic record checked by <u>RAINIER Personnel</u>		
Evaluation by <u>D.Hill</u>		Automated plot by <u>HP Design Jet 650C</u>
Verification by <u>M.Bigelow, R.Davies, D.Hill</u>		
Soundings in <u>Fathoms</u> at <u>MLLW</u>		
REMARKS: <u>Time in 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.</u>		
<i>AWOIS/SURE ✓ MA 2/25/00</i>		





PROGRESS SKETCH

OPR-O325-RA
 Eastern
 Tracy Arm
 ALASKA

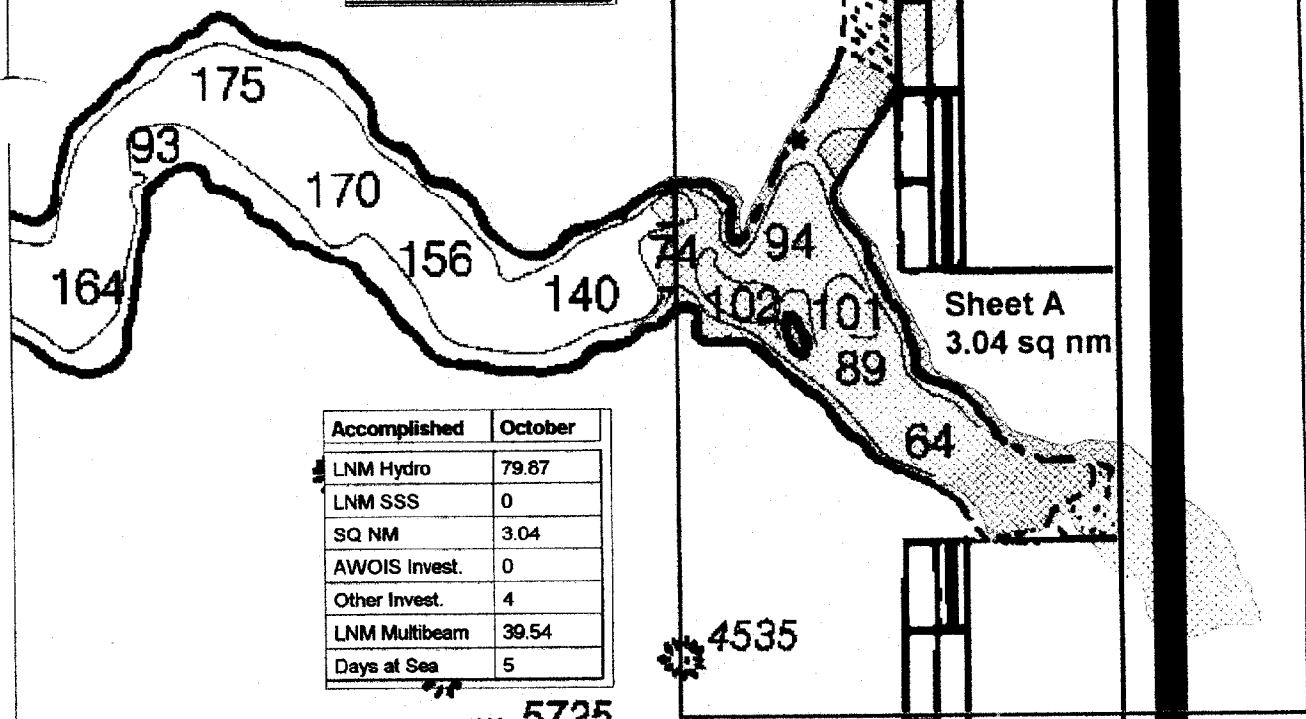
October 1999

Chart 17300

NOAA Ship RAINIER
 CDR Daniel R. Herlihy
 Commanding

6240

Downtime Type	October
Weather - Hr	0
Mechanical -Hr	0
Electronic -Hr	0



Accomplished	October
LNM Hydro	79.87
LNM SSS	0
SQ NM	3.04
AWOIS Invest.	0
Other Invest.	4
LNM Multibeam	39.54
Days at Sea	5

Sheet	Reg No	Started	Percent	Completed	Submitted	SQNM
A	H10944	10/25/9	100	10/29/99		3.04

50'

Descriptive Report to Accompany Hydrographic Survey H10944

Field Number RA-10-25-99

Scale 1:10,000

October 25–28, 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-O325-RA, dated October 7, 1999, and the Draft Standing Project Instructions dated April 6, 1998. Survey H10944 corresponds to sheet A, as defined in the sheet layout. This survey will provide data to supersede prior surveys conducted in 1974 and 1997, and will affect chart 17300 and chart 17311 (for future release). A request for a hydrographic survey and a new larger scale chart covering Tracy Arm, Holkham Bay and portions of Endicott Arm, has been received from the Seventeenth Coast Guard District, Marine Safety Division and the Alaska Small Passenger Vessel Task Force. As a result of the U.S. Coast Guard's request, the Marine Chart Division will produce a new nautical chart (chart 17311, 1:40,000 scale of Tracy Arm, with a 1:20,000 inset of Sawyer Glaciers).

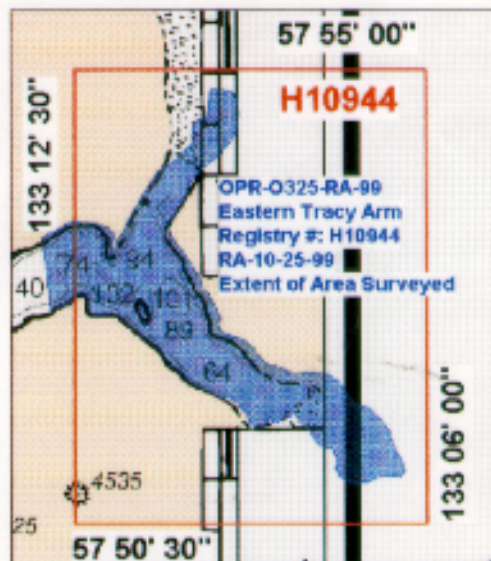
B. AREA SURVEYED ✓

The survey area is located in eastern Tracy Arm, Stephens Passage, Alaska. The survey's northern limit is latitude 57°55'00"N and the southern limit is latitude 57°50'30"N. The survey's western limit is longitude 133°12'30"W and the eastern limit is the 133°06'00"W.

Data acquisition was conducted from October 25 to 28, 1999 (DN 298 to 301).

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. Vessel 2121 was used for acquisition of shallow-water multibeam (SWMB) data, sound velocity profiles, vertical beam echo sounder (VBES) data, and shoreline verification. Vessels 2122 and 2124 were used for acquisition of VBES data and shoreline verification. Vessel 2123 was used for acquisition of SWMB data, sound velocity profiles, and VBES data. Vessel 2125 was used to collect bottom samples and VBES data. Vessel 2126 was used for acquisition of SWMB data and sound velocity profiles. See Project Related Data for OPR-O325-RA-99 for vessel descriptions.



D. AUTOMATED DATA ACQUISITION AND PROCESSING ✓

All 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 unverified observed tides were saved in MapInfo format.

SWMB data were acquired using Triton-Elics' ISIS software version 4.32 and processed using Universal Systems Limited's CARIS HIPS software version 4.3.

SWMB 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 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 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. In addition, for lines designated as "developments", all soundings beyond a maximum angle of 45° off nadir were rejected.

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 SWMB sounding. Processed soundings were read into a CARIS workfile by selecting shoal-biased, "line-by-line" binning at two densities: 5m x 5m and 1.5mm x 1.5mm at survey scale. The former was used to create digital terrain models (DTMs), which were used to demonstrate SWMB coverage and perform SWMB quality-assurance. The latter was used to export soundings into HPS through HPTools. Unverified observed tides were applied in the Hydrographic Processing System (HPS).

All processed soundings were excessed using a 2.5mm character size, and plotted at a 2mm 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 H10944 is defined as sheet 01 in HPS. The CARIS workfile names are defined as "h10944_5m" (used for QC and DTM generation) and "h10944_15m" (used for sounding export to HPS), and the project name is identified as "O325_SheetA" in HDCS.

All final plots were created in MapInfo using UTM Zone 8 projection.

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.

F. SOUNDING EQUIPMENT ✓

Two different categories of echosounder 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

* Filed w/field data

guidance stated in the Project Instructions, and depended upon the limitations of each system, the bathymetry, 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, and 2125)

The vertical beam echo sounders (VBES) utilized for this survey were the Raytheon DSF-6000N (VN 2122, 2124, 2125) and Knudsen 320M (VN2121, and 2123), 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 hydrography was collected at 100-meter line spacing in all areas considered too deep for SWMB, with additional lines run at a spacing of 50 meters in some areas. VBES data were also acquired concurrently with SWMB data and were compared to nadir beams of the SWMB 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 SWMB 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.

Agreement between soundings run by different boats, different VBES models, or by the same boat in opposite directions, is often poor over very steep slopes. The automated bottom tracking function of either model VBES can begin following a relatively strong side lobe return and lose track of the weaker main beam return. Therefore, in steep and deep areas, lines run in the offshore direction can be shoaler than lines run in the inshore direction. The Hydrographer attempted to correct these problems by editing the raw sounding data; however, the quality of the echo sounder trace is such that the edits are often based on judgement rather than quantifiable data. Due to the extremely steep slopes and deepness of these areas, as well as the fact that the error that occurs is in the conservative (shoal) direction, such anomalies are not significant to navigation.

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.

100% SWMB coverage was obtained in each area designated as a first priority in the Hydrographic Survey Letter Instructions (see section M for discussions on these items). Additionally, with the exception of very steep slopes close to shore, 100% SWMB coverage was obtained in all depths within the operational range of the SeaBat 8101, which was generally 125 meters or less.

G. CORRECTIONS TO ECHO SOUNDINGS ✓

Water Level Correctors

Soundings were reduced to Mean Lower-Low Water (MLLW) using unverified observed tide data for station Juneau, AK (945-2210) obtained from the Center for Operational Oceanographic Products and Services (CO-OPS) web site. The entire survey area is located within tide zone SEA11C, which is

* Filed with field data

referenced to the Juneau station and has a time corrector of +6 min and a height corrector of 0.96. These data were used in creating HPS tide table #99.

The HPS tide table and tidal correctors used for this survey, as provided in the Project Instructions, are listed in the Survey Information Summary* included with this report.

The operating National Water Level Observation Network (NWLON) primary tide station at Juneau, Alaska (945-2210) will serve as control for datum determination at two subordinate stations. Because a Next Generation Water Level Measurement System (NGWLMS) Aquatrak sensor is the only sensor installed at this primary station, RAINIER personnel were neither required nor able to inspect and perform leveling there.

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
Sawyer Island	945-2022	3-day	October 24, 1999	October 29, 1999
Tracy Arm, Holkham Bay	945-2069	3-day	October 23, 1999	October 29, 1999

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

Raw water level data from these gauges was forwarded to N/OPS1 on November 5, 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 November 8, 1999 in accordance with FPM 4.8.

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 2044, 2543, and 219). Calibration reports and dates are included with the Project Related Data for OPR-O325-RA-99. Velocity correctors were computed using the program VELOCWIN version 4 beta 2, which generates correction tables for both CARIS and HPS. For SWMB data, sound velocity correctors were applied in CARIS during post processing. For VBES data, sound velocity correctors were applied in HPS.

Settlement and Squat and Static Draft Correctors

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

** Survey Information Summary, not provided by hydrographer, Appendix I filed w/ field data.*

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
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-O325-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), that 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 vessel's 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 2123 and 2126, 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 (VCFs) and were created using the program "VCFEDIT" in CARIS. These offsets and biases were applied to the sounding data during processing in CARIS. A printout of each VCF is contained in Project Related Data for OPR-O325-RA-99, and the VCFs themselves are included with the digital HDCS data.

H. HYDROGRAPHIC POSITION CONTROL ✓

The horizontal datum for this project is NAD 83. All hydrographic features were positioned using differential GPS (DGPS). RAINIER personnel established a portable DGPS reference station at station SAWYER (57°52'42.790"N, 133°11'14.618"W). In addition, differential corrections from the US Coast Guard beacon at Gustavus (ID# 892) were utilized during this survey. The portable DGPS reference station "scatterplot" is included in Appendix F* of this report, and serial numbers for positioning equipment are included in Appendix H.* See the OPR-O325-RA-99 Horizontal Control Report for more information.

** Filed w/ field data*

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-O325-RA-99.

At times, vessels using the POS/MV collected VBES data over very short distances with high HDOP (over 4.0). This resulted from a decrease in the number of visible satellites next to very steep fjord walls. The IMU, which is a component of the POS/MV, is able to maintain positional accuracy during short temporary decreases in the number of visible satellites; therefore, under the discretion of launch personnel, data continued to be collected. These data were closely scrutinized during processing for any indication of loss of accuracy. This is only true for data collected while running towards shore, when the HDOP and number of satellites were at acceptable values and the POS/MV had a good positional fix before supplementing the position determination with input from the IMU. The POS/MV controller software displays a constant indication of positional accuracy, and data acquisition was halted when accuracy limitations were exceeded (greater than 5 meters). At no times were SWMB data collected with less than the minimum allowable number of satellites, or when the HDOP was exceeded.

I. SHORELINE ✓

Method of Shoreline Verification

N/NGS3 supplied photogrammetric digital manuscript (DM) and satellite imagery geographic cell (GC) source shoreline in MapInfo format (file names DM10310 and GC10439). These two files were compiled into a single digital shoreline file (with DM10310 taking precedence in areas of overlap) that was imported into Hypack for field verification. In addition, features shown on the current edition of chart 17300 and prior survey H10758, and the approximate location of the glacier face on prior survey H10758, were digitized in MapInfo by RAINIER personnel and displayed in Hypack for field verification.

Shoreline verification was conducted near predicted low water in accordance with the Draft Standing Project Instructions and FPM 6.1 and 6.2. For this survey, the general limit of safe navigation of a survey launch was 3-10m offshore at apparent low tide. Water depths along this limit of safe navigation are generally 5-30m at MLLW.

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

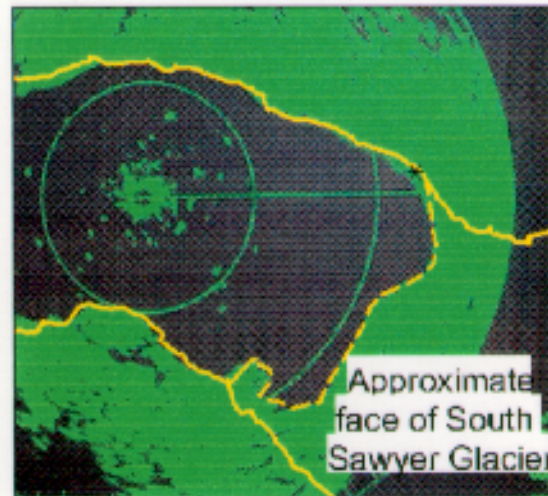
A detailed "Detached Position and Bottom Sample Plot" is provided showing all detached positions and bottom samples with notes relating to each feature. Updated shoreline and features are also depicted on the Final Field Sheet.

Source Shoreline Changes and New Features

Several new features and changes to source shoreline were found and are depicted on the final "Detached Position and Bottom Sample Plot".

The positioning of the T-Sheet shoreline was excellent* with the exception of the locations of the glacier faces and the shoreline in the northernmost region of the north branch of Tracy Arm, which extends toward Sawyer Glacier. **Do not concur. See Evaluation Report,*

The face of the South Sawyer Glacier was repositioned approximately with a photograph of a launch RADAR screen taken concurrently with a detached position when the launch was located roughly one half mile from the glacier face. This photograph was then geo-registered by RAINIER personnel in MapInfo using registration points from the rough shoreline of the south branch of Tracy Arm, as depicted in the MapInfo file named "H10944_Sglac_RADAR". The approximate location of the glacier face was then digitized in MapInfo, as depicted in the MapInfo digital file named "H10944_shorelineupdate". Because positional errors are likely from the projection and distortion of this image, the South Sawyer Glacier is the only feature positioned using this method. The glacier has receded approximately 0.1nm from the position indicated on the most recent shoreline source (GC-10439, 1991).



The face of the Sawyer Glacier was repositioned very roughly using a distance of approximately 0.1nm (based on RADAR) from the closest line of hydrography. A RADAR image with no associated position was used to approximate the shape of the face. Registration of the RADAR image of the north branch of Tracy Arm was not possible due to the lack of prominent shoreline features. The Sawyer Glacier has receded approximately 0.5nm from the position indicated on the most recent shoreline source (GC-10439, 1991).

The shoreline of the northernmost region of the north branch of Tracy Arm was repositioned using 6 detached positions and the NALL-line, as depicted in the MapInfo digital files named "H10944_shorelineupdate" and "H10944_Features". The agreement between the source shoreline and the approximately repositioned shoreline varies by as much as 80m. The shoreline is a nearly vertical fjord wall; therefore this difference cannot be attributed to differences in tide stages.

Several additional modifications were made to the source shoreline to agree with the NALL-line and mainscheme hydrography when they were found to be inshore of remote sensing shoreline. These changes are generally 3m to 8m horizontal differences and are negligible at the scale of the survey. They are depicted as approximate shoreline on the Final Field Sheet for clarity purposes only. These discrepancies could be due to differences in stages of tide between the acquisition of remote sensing data and hydrography (the tide range in Tracy Arm during the survey was 7.3m).

Recommendations

The Hydrographer recommends* that the shoreline as depicted on the "Detached Position and Bottom Sample Plot" and Final Field Sheet supersede and complement shoreline information compiled on the source shoreline as noted. These revisions are recorded in the MapInfo digital files named "H10944_shoreline" and "H10944_shorelineupdate". In addition, the Hydrographer recommends* that hydrographic shoreline supersede remote sensing shoreline in the northernmost region of the north branch of Tracy Arm, where the remote sensing shoreline was found to be inaccurate.

* Concur

Charted Features

There is one charted rock in the survey area, located at 57°43'42"N, 133°11'12"W. Refer to Section M (Item Investigations) for a discussion of this rock.

Recommendations

The charted shoreline should be revised using the DM/GC shoreline and fieldwork notes as recorded in the MapInfo digital files named "H10944 shoreline" and "H10944 shorelineupdate". In addition, the Hydrographer recommends revising the eastern limit of chart 17300 to include the current extents of the Sawyer Glaciers. *Concur. See smooth sheet for final shoreline delineation.*

J. CROSSLINES ✓

VBES crosslines totaled 9.81nm, comprising 20.2% of mainscheme hydrography. Crosslines agreed with mainscheme hydrography within 1 fathom in areas with regular and even bathymetry. In the north branch of Tracy Arm, the crossline agreement was poor; however, the steep slope over which this crossline was run renders it useless for analysis. Comparison of VBES crossline data and SWMB data in the deepest and flattest area of this branch (in front of Sawyer Glacier) shows agreement within 2 fathoms, with the VBES data generally being the deeper set. The greater disparity in agreement here may be due to sound velocity complexities from fresh water and salt water mixing close to the glacier face.

SWMB crosslines totaled 4.35nm, comprising 10.5% of SWMB hydrography. The Quality Control Report (CARIS HIPS) for the checkline file averaged 79.91%, with a depth tolerance of 0.023. See Appendix E for the detailed report.

K. JUNCTIONS ✓

There are no contemporary surveys which junction with H10944.

L. COMPARISON WITH PRIOR SURVEYS ✓

The following prior surveys share common area with survey H10944:

Registry #	Scale	Date	Area covered
H10758	1:10,000	1997	Entire prior shares common area
H09480	1:20,000	1974	Prior shares common area between latitudes 57°52'00"N and 57°54'00"N

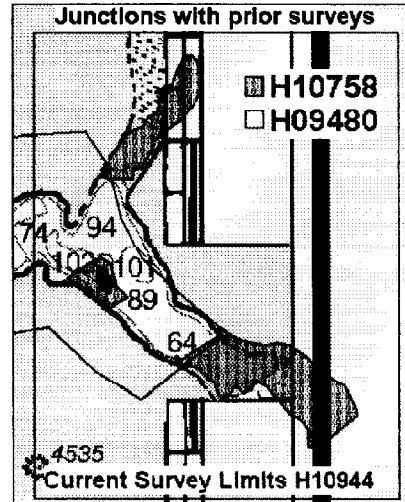
H10758 (RA-10-14-97, 1997)

The bathymetry of Tracy Arm is extremely steep, with fjord walls sloping up to 50°. The combination of this steep bathymetry with the use of varying equipment between and within surveys can result in poor agreement on steep slopes. Despite this fact, prior and current surveys generally agree within 10 fathoms on the slopes of the south branch of Tracy Arm, with no general trend of one data set being shoaler than the other. Prior and current surveys agree poorly in the north branch, on the slopes directly in front of Sawyer Glacier, with the prior depths generally being shoaler by up to 30 fathoms. During the current

** Filed w/ field charts*

survey, this area was covered with 100% SWMB and mainscheme VBES. These two methods yielded data that did not agree well on the slopes; VBES data was generally shoaler by up to 15 fathoms. These differences are likely due to the performance limitations of the VBES on very steep slopes that are discussed in section F.

The prior soundings also agree poorly with the present survey in the deep and flat area directly in front of the Sawyer Glacier, with the present survey having soundings 10 to 12 fathoms shoaler than those of survey H10758. During the current survey, this area was covered with 100% SWMB as well as VBES hydrography. The two methods used in the current survey yielded data that generally agree within 2 fathoms.



The prior soundings agree very well with the present survey in the southern half of the northern branch of Tracy Arm. Depths of 60 fathoms or less characterize this area, including a shoal area with a minimum depth of 0.8 fathoms. Soundings generally agree within 0 to 2 fathoms. At the location of the least depth over the shoal area of 0.8 fathoms found by the current survey, the prior survey shows a depth of 1.6 fathoms.

The prior soundings agree well with the present survey in the deep and flat area in front of South Sawyer Glacier, with the present survey having soundings 0 to 5 fathoms shoaler than prior H10758. The exceptions are the 23- and 29-fathom soundings assigned as priority items, which are addressed in section M.

The prior soundings agree poorly with the present survey in the shoaler area at the south end of Sawyer Island (name pending approval). The difference between the two surveys varies widely in this area, with the prior soundings being shoaler by generally 10 to 25 fathoms. During the current survey, this area was covered with 100% SWMB as well as VBES hydrography. The two methods used in the current survey yielded data that agree within 1 to 5 fathoms.

H09480 (DA-20-6-73, 1974)

Prior survey H09480 covers the area within the current survey limits that lies approximately between latitudes 57°52'00"N and 57°54'00"N. In areas of regular and even bathymetry, the prior soundings are generally 0-6 fathoms deeper than those of the current survey. The soundings agree well in the shoaler areas on the north and south ends of Sawyer Island. They also agree well over the terminal moraine located at latitude 57°52'04"N, although the current survey provides a new minimum depth of 59 fathoms (vs. 64 fathoms), which was obtained with 100% SWMB coverage.

Prior soundings agree well with the current survey in the north branch of Tracy Arm, generally within 2 fathoms. Over the shoal located at 57°53'40.2"N, 133°10'47.3"W, the current survey provides a least depth of 0.8 fathoms; whereas the shoalest depth from the prior is 2.4 fathoms. Soundings over this shoal were obtained with 100% SWMB coverage. *Concur*

The shoal area which extends from shore at 57°52'40.5"N, 133°12'8.0"W on prior survey H09480 is not supported by the data collected during the current survey. H10944 shows a steeply sloping shoreline at

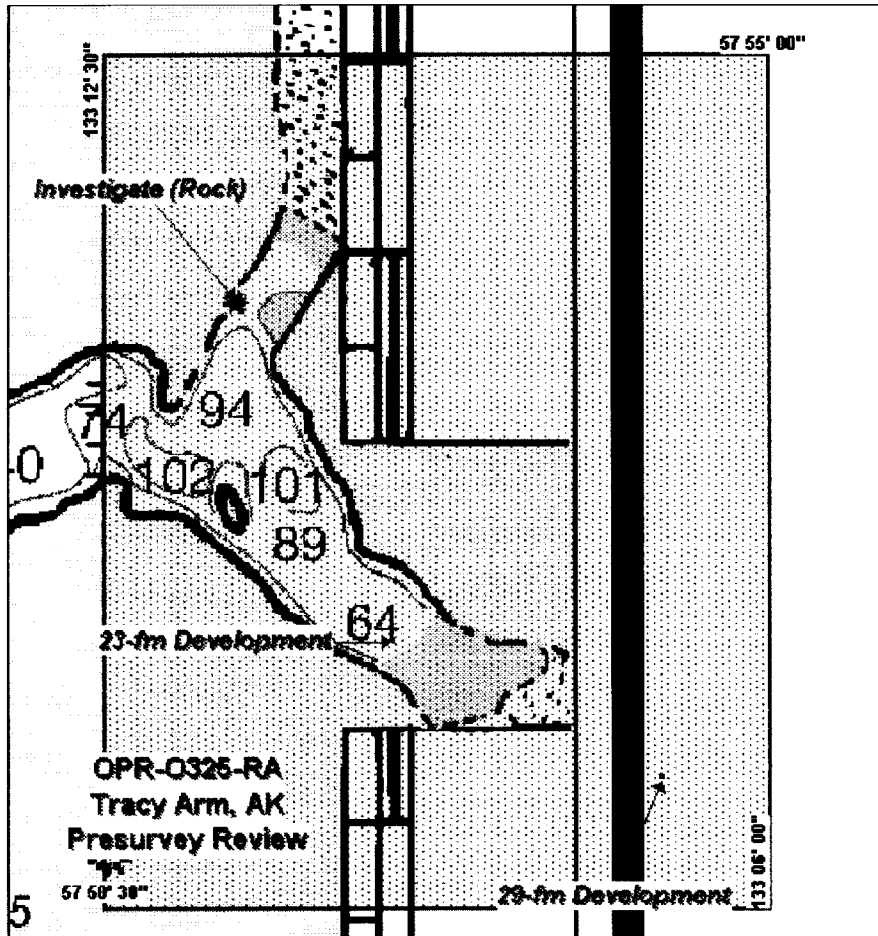
this location. Both surveys used VBES hydrography to survey this area; additionally, the current survey covered a small portion with SWMB. *Concur*

The rock located at 57°52'24.7"N, 133°09'52.8"W on prior survey H09480 was verified during shoreline verification for H10944. *Concur*

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

M. ITEM INVESTIGATIONS ✓

There were no Automated Wreck and Obstruction Information System (AWOIS) items investigated within the survey area. However, the Hydrographic Survey Letter Instructions for OPR-O325-99 specified three items as priorities for investigation: a rock from prior survey H09480, and two areas with significantly shoaler depths than their surrounding areas on survey H10758 (a 23-fathom sounding and a 29-fathom sounding). These items are discussed below.

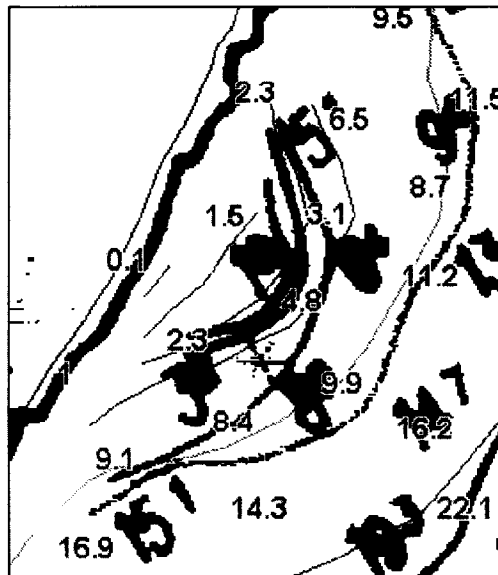


ROCK FROM PRIOR SURVEY H09480

1. Area of Investigation:

AWOIS Number: N/A
 State and Locality: Eastern Tracy Arm, AK
 Reported Position: Latitude: 57°53'43"N
 Longitude: 133°11'11"W
 Datum: NAD83
 Type of Feature: Rock
 Reported Depth: N/A

- 2. **Description and Source of Item:** Rock on prior surveys H09480 and H10758 (brought through from prior survey H09480). It is worth mentioning that the Hydrographic Survey Inspection Team Report (May 26, 1976) for survey H09480 stated that there was no detached positional data to substantiate the existence of this rock, but it was included on the survey in the interest of conservatism and safety.
- 3. **Survey Requirements:** Verify or disprove existence of rock. If found, provide least depth over feature.
- 4. **Method of Investigation:** 100% SWMB over a 70m radius.
- 5. **Results of Investigation:** No rock was found at this location. However, there is a shoal area that extends from shore in the vicinity of the rock. Current soundings reveal depths between 5 and 10 fathoms at the position of the rock.
- 6. **Comparison with Prior Surveys:** See above.
- 7. **Comparison with the Chart and Charting Recommendation:** Compared with chart 17300; 28th Ed.; September 12, 1998, 1:209,978. The chart shows a rock located at 57°53'42"N, 133°11'12"W. The Hydrographer recommends removing the rock from chart 17300, and charting depths from this survey on charts 17300 and 17311. *Concur*

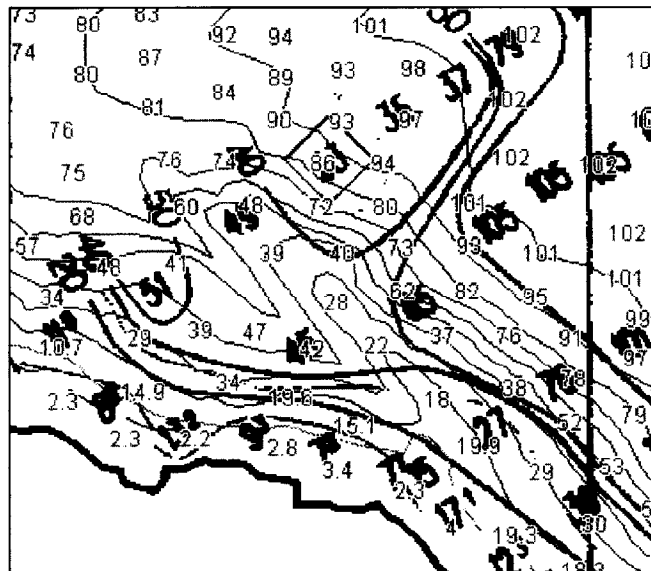


23-FATHOM SOUNDING FROM H10758

1. Area of Investigation:

AWOIS Number: N/A
 State and Locality: Eastern Tracy Arm, AK
 Reported Position: Latitude: 57°51'55"N
 Longitude: 133°09'41"W
 Datum: NAD83
 Type of Feature: Sounding
 Reported Depth: 23 fathoms

2. **Description and Source of Item:** 23-fathom sounding on prior survey H10758. This sounding is significantly shoaler than those in the surrounding area.
3. **Survey Requirements:** Investigate to ascertain the least depths and develop the full extent of the area.
4. **Method of Investigation:** 100% SWMB coverage over a 170m radius. VBES with 100m spacing.
5. **Results of Investigation:** Current soundings show the depth to be 86 fathoms at this location. However, soundings from 100% SWMB coverage revealed a ridge 100 meters to the south which trends NW-SE and have minimum depths between 28 and 48 fathoms.
6. **Comparison with Prior Survey H09480:** No shoal area is found at this location. The 23-fathom sounding lies 50m ESE of a 68-fathom sounding on survey H09480.
7. **Comparison with the Chart and Charting Recommendation:** Compared with chart 17300; 28th Ed.; September 12, 1998, 1:209,978. The chart shows a sounding of 64 fathoms in the vicinity of the 23-fathom sounding on prior survey H10758. This charted sounding exists over a moraine for which the current survey shows the minimum depth to be 59 fathoms. The Hydrographer recommends charting depths from this survey on charts 17300 and 17311. *Concur*

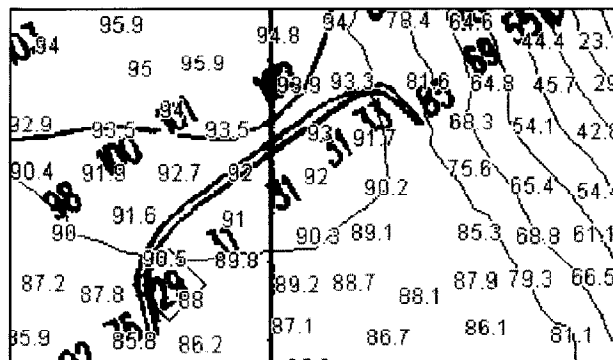


29-FATHOM SOUNDING FROM H10758

1. Area of Investigation:

AWOIS Number: N/A
 State and Locality: Eastern Tracy Arm, AK
 Reported Position: Latitude: 57°51'12"N
 Longitude: 133°07'05"W
 Datum: NAD83
 Type of Feature: Sounding
 Reported Depth: 29 fathoms

- 2. Description and Source of Item:** 29-fathom sounding on prior survey H10758. This sounding is significantly shoaler than those in the surrounding area.
- 3. Survey Requirements:** Investigate to ascertain the least depths and develop the full extent of the area.
- 4. Method of Investigation:** 100% SWMB coverage over a 100m radius. VBES with 100m spacing.
- 5. Results of Investigation:** No shoal area was found at this location. Current soundings reveal an area that is flat and deep (90 fathoms).
- 6. Comparison with Prior Surveys:** See Above. This item is beyond the limits of survey H09480
- 7. Comparison with the Chart and Charting Recommendation:** Compared with chart 17300; 28th Ed.; September 12, 1998, 1:209,978. This location lies outside the area covered by chart 17300 and there is no chart covering the adjoining area to the east. In addition, chart 17300 shows the extent of South Sawyer Glacier to be significantly seaward of its present location, implicitly covering this location. The Hydrographer recommends extending the area covered by chart 17300, and charting depths from this survey on charts 17300 and 17311. *Concur*



N. COMPARISON WITH THE CHART ✓

Survey H10944 was compared to chart 17300 (28th Ed.; September 12/98, 1:209,978). Due to the small scale of the chart, there were only 6 soundings located in the survey area; they range in depth from 64 fathoms to 102 fathoms. Charted soundings that are 75 fathoms or shoaler agree within one fathom of survey depths. Charted soundings that are greater than 75 fathoms are 5 to 7 fathoms deeper than survey depths. In these deep regions the area was covered with VBES hydrography at 100m-line spacing.

Sawyer and South Sawyer Glaciers have each receded approximately one nautical mile from their charted positions. The regions in front of the glaciers contain no soundings and are shaded blue on chart 17300 to indicate that they are uncharted. Survey H10944 provides soundings to within approximately 150m of the present location of each glacier.

Dangers to Navigation

One Danger to Navigation was found and reported to the Seventeenth Coast Guard District on December 1, 1999:

A 0.8-fathom shoal (Pos. #99065) was discovered at 57°53'40.22"N, 133°10'47.29"W. On chart 17300, this position lies within an area shaded blue and contained by a 10-fathom contour.

O. ADEQUACY OF SURVEY ✓

Survey H10944 is complete and adequate to supersede charted soundings and features in their common areas. *Concur*

P. AIDS TO NAVIGATION ✓

There are no aids to navigation located within the H10944 survey area.

Q. STATISTICS ✓

Refer to the Survey Information Summary ^{*} attached to this report.

R. MISCELLANEOUS ✓

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

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

Visibility through the water column is low due to suspended glacial sediments.

No anchorages were found in the survey area.

The name "Sawyer Island" has been submitted to the Board of Geographic Names and is pending official approval.

** Survey Information Summary not provided by hydrographer.*

S. RECOMMENDATIONS ✓

The Sawyer and South Sawyer Glaciers are active tidewater glaciers. Due to the heavy commercial and recreational traffic in Tracy Arm, it is recommended that Note G on chart 17300 be expanded to include a warning of caution while navigating in proximity to the glacier faces. This note should also be included on chart 17311. *Concur*

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-0325-RA-99 1999 Coast Pilot Report	TBD	N/CS26
Project Related Data for OPR-0325-RA-99	December, 1999	N/CS34
Horizontal Control Report for OPR-0325-RA-99	TBD	N/CS34

Respectfully Submitted,

E. J. Van Dine LT/NOAA
FIELD OPERATIONS OFFICER

for Mark A. Wetzler
Lieutenant, NOAA

Approved and Forwarded,

Daniel R. Herlihy

Daniel R. Herlihy
Commander, NOAA
Commanding Officer

Sandra L. Zirnheld

Sandra L. Zirnheld
Assistant Survey Technician, NOAA



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 22, 1999

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

**ADVANCE
 INFORMATION**

Dear CDR Hamblett:

It is requested that the following danger to navigation be included in the Local Notice to Mariners. The NOAA Ship RAINIER positioned this feature while conducting hydrographic survey H10944 in October, 1999, in eastern Tracy Arm, Alaska. The danger is shown graphically on the attached chartlet.

The following danger to navigation affects the following chart:

Chart	Scale	Edition	Date
17300	1:209,978	28 th	September 12, 1998

The horizontal datum is NAD 83 and the depth has been corrected to Mean Lower Low Water using preliminary observed tides.

Feature	Depth (fm)	Latitude (N)	Longitude (W)	Depth (m)
Shoal	0.8	57/53/40.22	133/10/47.29	1.5

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-O325-RA-99 and Danger to Navigation message RA-22-99. 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

Attachments

cc: NIMA
 PMC
 N/CS261
 N/CS34

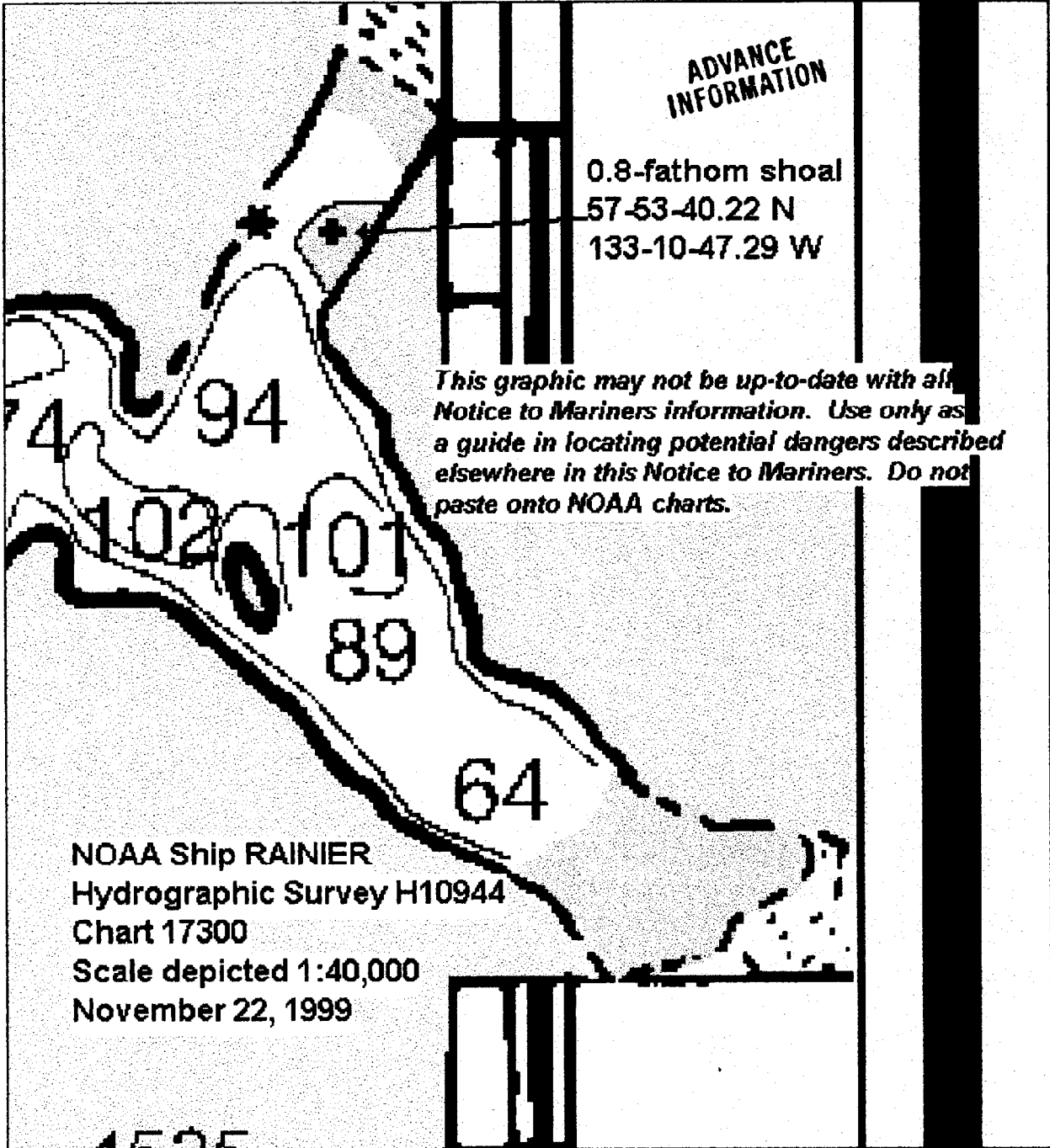


**ADVANCE
INFORMATION**

0.8-fathom shoal
57-53-40.22 N
133-10-47.29 W

*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 H10944
Chart 17300
Scale depicted 1:40,000
November 22, 1999



**ADVANCE
INFORMATION**

Date: 12/2/1999
Sender: FOO Rainier
To: Chief Survey Technician Rainier, Lynn [NDS-NCG22] Preston, navinfonet@nima.mil,
Inm@cgalaska.uscg.mil, Dennis.Hill@noaa.gov
Priority: Normal
Subject: DTON Messge RA-22-99

It is requested that the following danger to navigation be included in the Local Notice to Mariners. The NOAA Ship RAINIER positioned this feature while conducting hydrographic survey H10944 in October, 1999, in eastern Tracy Arm, Alaska.

The following danger to navigation affects chart 17300 (scale 1:209,978; 28th edition, September 12, 1998).

The horizontal datum is NAD 83 and the depth has been corrected to Mean Lower Low Water using preliminary observed tides.

Feature: Shoal
Depth: 0.8 fathoms
Latitude: 57/53/40.22 N
Longitude: 133/10/47.29 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-0325-RA-99 and Danger to Navigation message RA-22-99. More information on current RAINIER survey projects may be obtained by e-mail; contact the Field Operations Officer at FOO.RAINIER@NOAA.GOV.

APPROVAL SHEET

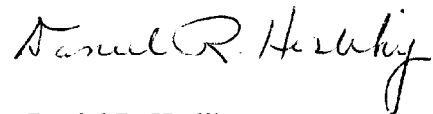
for

H10944

Standard field surveying and processing procedures were followed in producing this examination in accordance with the Hydrographic Manual, Fourth Edition; the Hydrographic Survey Guidelines; and the Field Procedures Manual, as updated for 1998.

The digital data and supporting records have been reviewed 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



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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: December 2, 1999

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-0325-RA-99
HYDROGRAPHIC SHEET: H-10944

LOCALITY: Eastern Tracy Arm, AK
TIME PERIOD: October 25 - October 28, 1999

TIDE STATION USED: 945-2022 Sawyer Island, Tracy Arm, AK
Lat. 57° 52.7'N Lon. 133° 11.4'W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 4.545 meters

REMARKS: RECOMMENDED ZONING
Use zone(s) identified as: SEA11B.

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.

Note 2: Juneau, AK(945-2210) was used as datum control for the subordinate tide station used in zoning for this hydrographic survey. Accepted datums for Juneau have been updated recently and have changed significantly from previous values.

The current National Tidal Datum Epoch (NTDE) used to compute tidal datums is the 1960-78 NTDE. Traditionally, NTDEs have been adjusted when significant changes in Mean Sea Level (MSL) trends are found through analyses among the stations of the National Water Level Observation Network (NWLON). Epochs are updated to ensure that tidal datums are the most accurate and practical for navigation, surveying and engineering applications and reflect the existing local sea level conditions. For instance, analyses of sea level trends show that a new NTDE is necessary and efforts are underway to update the 1960-78 NTDE to a more recent 19-year time period.



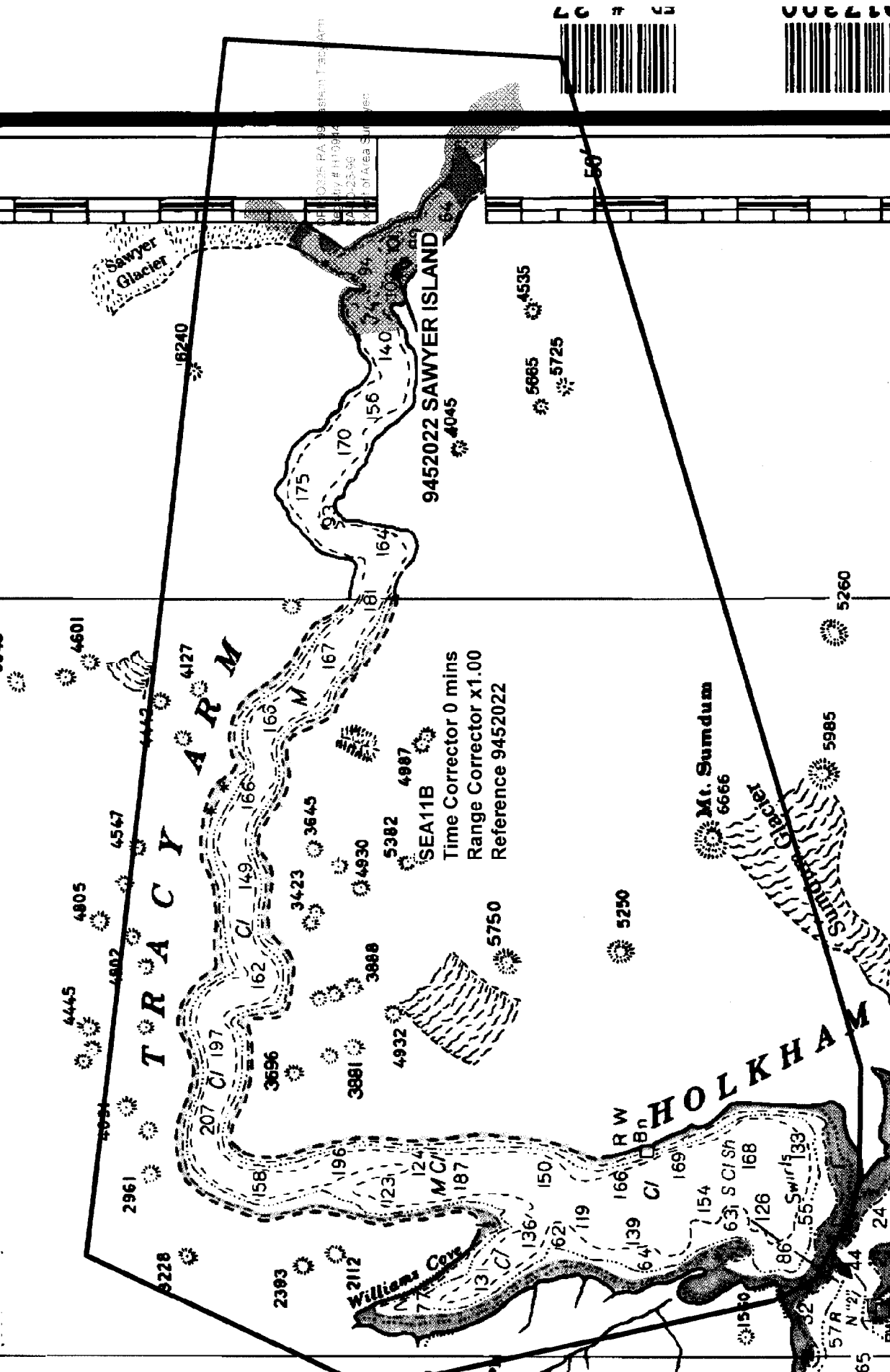
TIDE NOTE FOR HYDROGRAPHIC SURVEY SHEET H-10944 cont.

However, analyses also show that there are several geographic areas which are strongly anomalous from the average sea level trends found across the NWLON and must be treated differently. One of these areas is in southeast Alaska, in the vicinity of Juneau. This region shows a relative sea level trend of -0.038 ft/yr due to land emergence from the retreat of glaciers over recent geological time. NOS has adopted a procedure of computing accepted tidal datums for these anomalous regions by using an MSL value calculated from the last several years of data rather than the 19-year NTDE. The accepted range of tide is still based on the 19-year NTDE and, when applied to the updated MSL, will result in updated values for Mean High Water (MHW) and Mean Lower Low Water (MLLW) derived through standard datum calculation procedures. For Juneau, the MSL value was computed from the period of 1994-1998. This resulted in a lowering of the MLLW datum relative to land by -0.40 ft, compared to the previous MLLW elevation used in past surveys. Subordinate tide stations in the area used for hydrographic surveys and controlled by Juneau will be affected similarly. Accepted datums have been computed and may be accessed on the Internet through the URL specification <http://co-ops.nos.noaa.gov>.

fa -----
CHIEF, REQUIREMENTS AND DEVELOPMENT DIVISION

waters.

Final Tidal Zoning for OPR-0325-RA-99 Eastern Tracy Arm, AK - Sheet H-10944



Final tide zone node point locations for OPR-O325-RA-99,
Sheet H-10944.

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 SEA11B			
-133.622517 57.950602	945-2022	0	1.00
-133.088243 57.917752			
-133.096549 57.84015			
-133.539419 57.771644			
-133.589086 57.772034			
-133.602689 57.773762			
-133.632324 57.782224			
-133.642364 57.792063			
-133.681076 57.884875			
-133.622517 57.950602			

GEOGRAPHIC NAMES

H10944

Name on Survey	A ON CHART NO. 17300	B ON PREV. SURVEY NO. H10758 ON PREV. SURVEY NO. H09480		C ON U.S. QUAD. MAPS	D FROM LOCAL INFORMATION	E ON LOCAL MAPS	F P.O. GUIDE MAP	G RAND McNALLY ATLAS	H U.S. LIGHT LIST	K pending at Board of Geographic Names	L Board of Geographic Names Website	
Sawyer Island										X		1
South Sawyer Glacier		X	X								X	2
												3
												4
												5
												6
												7
												8
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												25

NOAA FORM 77-27(H) (9-83)		U.S. DEPARTMENT OF COMMERCE		REGISTRY NUMBER	
HYDROGRAPHIC SURVEY STATISTICS				H-10944	
RECORDS ACCOMPANYING SURVEY: To be completed when survey is processed.					
RECORD DESCRIPTION		AMOUNT	RECORD DESCRIPTION		AMOUNT
SMOOTH SHEET		1	SMOOTH OVERLAYS: POS., ARC, EXCESS		N/A
DESCRIPTIVE REPORT		1	FIELD SHEETS AND OTHER OVERLAYS		N/A
DESCRIP-TION	DEPTH/POS RECORDS	HORIZ. CONT. RECORDS	SONAR-GRAMS	PRINTOUTS	ABSTRACTS/SOURCE DOCUMENTS
ACCORDION FILES	1				
ENVELOPES					
VOLUMES					
CAHIERS					
BOXES				1	
SHORELINE DATA					
SHORELINE MAPS (List):		DM-10310, DM -10439			
PHOTOBATHYMETRIC MAPS (List):		N/A			
NOTES TO THE HYDROGRAPHER (List):		N/A			
SPECIAL REPORTS (List):		N/A			
NAUTICAL CHARTS (List):		NOS Chart 17300, 28th Ed., 9/12/98			
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 (HPS, CAD, EVAL)			36		36
COMPARISON WITH PRIOR SURVEYS AND CHARTS					
EVALUATION OF SIDE SCAN SONAR RECORDS					
EVALUATION OF WIRE DRAGS AND SWEEPS					
EVALUATION REPORT				8	8
GEOGRAPHIC NAMES					
OTHER (Chart Compilation)				20	20
USE OTHER SIDE OF FORM FOR REMARKS			TOTALS	36	28
					64
Pre-processing Examination by <u>Russ Davies</u>			Beginning Date	12/15/99	Ending Date
Verification of Field Data by <u>Russ Davies, Mark Lathrop, D. Hill</u>			Time (Hours)	36	Ending Date
Evaluation Check by			Time (Hours)		Ending Date
Evaluation and Analysis by <u>D. Hill</u>			Time (Hours)	8	Ending Date
Inspection by <u>Russ Davies</u>			Time (Hours)	2	Ending Date
					2/14/00
					2/21/00

**EVALUATION REPORT
H-10944**

A. PROJECT

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

B. AREA SURVEYED

The survey area is adequately described in the hydrographer's report.

C. SURVEY VESSELS

The hydrographer's 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 Hydrographic Survey Guideline No. 35 and No. 75.

The data are plotted using a Universal Transverse Mercator (UTM) projection, Zone 8 and are depicted on a single sheet.

E. SONAR EQUIPMENT

Side scan sonar equipment was not used during the survey.

F. SOUNDING EQUIPMENT

Sounding equipment has been adequately addressed in the hydrographer's 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 gauge Sawyer Island, Tracy Arm, Alaska, 945-2022.

H. CONTROL STATIONS

Section H and I of the hydrographer's report contain adequate discussions of horizontal control and hydrographic positioning.

The positions of horizontal control stations used during hydrographic operations are published and field 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: -1.199 seconds (-37.080 meters)
Longitude: 6.171 seconds (101.946 meters)

I. HYDROGRAPHIC POSITION CONTROL

Differential GPS (DGPS) was used to control this survey. A horizontal dilution of precision (HDOP) not to exceed 4.0 for 1:10,000 was used as the limit for survey operations. The quality of some positions exceeded limits in terms of HDOP. These positions are isolated and occur randomly throughout the survey area. A review of the data, however, suggests that none of these fixes are used to position dangers to navigation. The features or soundings located by these fixes are consistent with the surrounding information. These fixes are considered acceptable. NAD 83 is used as the horizontal datum for plotting and position computations.

During shallow water multibeam (SWMB) data gathering, satellite configuration as indicated by HDOP and the number of satellites, is monitored visually on HYPACK. The final positions are provided by the POS-MV that combines the DGPS position with inertial navigation information. In the event that the differential GPS corrector signal is lost, the POS-MV will continue to provide positions based on inertial navigation. Data was analyzed during processing to ensure it contained no significant errors.

DGPS performance checks were conducted in the field and found adequate. Additional information concerning specific control system type, calibrations and system checks can be found in the hydrographer's report and in the separates related to horizontal position control and corrections to position data.

J. SHORELINE

Shoreline maps DM10310, scale 1:20,000, and GC10439 were compiled on NAD 83 and applied 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. Significant portions of the high water line were revised during smooth sheet compilation based on the hydrographer's approximation as depicted on the field sheet and the location of sounding data. These changes are all considered to be approximate and are depicted on the smooth sheet in dashed red. The location of glacier faces is also approximate and is based on navigation radar imagery as discussed in section I of the hydrographer's report. It is clear from comparison with prior shoreline sources that the glaciers are receding thereby making any delineation of their location temporary at best.

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 hydrographer's report.

L. JUNCTIONS

There are no contemporary surveys which junction with H-10944.

M. COMPARISON WITH PRIOR SURVEYS

The following prior surveys fall within the common area of the present survey and have been compared to during office processing.

<u>Survey</u>	<u>Year</u>	<u>Scale</u>	<u>Datum</u>
H9480	1974	1:20,000	NAD 83
H10758	1997	1:10,000	NAD 83

Comparison with the prior surveys was made using digital raster copies. The surveys listed above cover the entire area of the present survey. The quality of the survey H10758 raster was acceptable while that of survey H9480 was not. Features and detail near shore is for the most part illegible making an adequate comparison impossible.

Differences between present hydrography and prior are relatively minor with the most noticeable changes occurring in the deeper depths near the center of Tracy Arm. The present depths are typically more shoal than prior depths. The cause may be related to continued filling of the fiord with glacial sediment. There are no significant changes that might affect navigation.

The locations of both Sawyer Glacier and South Sawyer Glacier have changed since last surveyed. Significant recession is underway with the most noticeable change affecting Sawyer Glacier. A detailed discussion of this is contained in section L of the hydrographer's report.

Survey H-10944 is adequate to supersede survey H10758 within the common area. Despite the illegibility of the raster image of survey H9480 this survey is also superseded. The supersession is based on a close examination of nautical charts common this survey. It is assumed that all significant features from survey H9480 would be depicted on charts thereby providing the means for an indirect comparison to this survey.

N. ITEM INVESTIGATIONS

There were no AWOIS items assigned within the survey area. There were, however, three items listed in the Hydrographic Survey Letter Instructions as priorities for investigation. These items have been adequately discussed in the hydrographer's report, section M.

O. COMPARISON WITH CHART

Survey H-10944 was compared with the following chart.

<u>Chart</u>	<u>Edition</u>	<u>Date</u>	<u>Scale</u>
17300	28th	Sept. 12, 1998	1:209,978

a. Hydrography

Charted hydrography originates with the previously discussed prior surveys and has been adequately addressed in section M of the evaluation report and in the hydrographer's report, section N.

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-10944 is adequate to supersede charted hydrography within the common area.

b. Dangers To Navigation

One danger to navigation was identified during survey operations. This danger was reported to the USCG, NIMA, N/CS261, and N/CS 34 on December 1, 1999. There were no additional dangers to navigation found during office processing.

P. ADEQUACY OF SURVEY

Hydrography contained on survey H-10944 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.

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.

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 hydrographer's report.

S. MISCELLANEOUS

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

T. RECOMMENDATIONS

This is a good hydrographic survey. No additional work is recommended.

U. REFERRAL TO REPORTS

Referral to reports is adequately discussed in the hydrographer's report.



Dennis Hill
Chief, Cartographic Team

APPROVAL SHEET
H-10944

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.

Russ Davies Date: 2/21/00
Russ Davies
Cartographer, 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.

James C. Gardner Date: 2-22-00
James C. Gardner
Commander, NOAA
Chief, Pacific Hydrographic Branch

Final Approval

Approved:

Samuel P. De Bow Jr. Date: 2-23-00
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-10944

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
17300	2/22/00	R. Davies	Full Part Before After Marine Center Approval Signed Via full application of Drawing No. soundings, curves and features from smooth sheet
17311	2/23/00	L. Bennett	Full Part Before After Marine Center Approval Signed Via Full application of Drawing No. Soundings, curves + features from S.S. and BP 170564 714
17300			Full Part Before After Marine Center Approval Signed Via Full application of Drawing No. Snd, curves + features from S.S. and BP 170564 + 17311
			Full Part Before After Marine Center Approval Signed Via Drawing No.
			Full Part Before After Marine Center Approval Signed Via Drawing No.
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SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED.