H10881

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-20-02-99

Registry No. H-10881

LOCALITY

State Alaska

General Locality Lynn Canal

Sublocality Funter Bay to Point Retreat

1999

CHIEF OF PARTY
CAPT Alan D. Anderson, NOAA

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HYDROGRAPHIC TITLE SHEET

H-10881

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-20-02-99

State: Alaska

General locality: Lynn Canal

Locality: Funter Bay to Point Retreat

Scale: 1:20,000 Date of survey: 5/2/99 - 6/5/99

Instructions dated: March 3, 1998 Project No.: OPR-0340-RA

Vessel: RAINIER(2120),RA-1(2121),RA-4(2124),RA-5(2125),RA-6(2126),RA-7(2127)

Chief of party: CAPT Alan D. Anderson, NOAA

Surveyed by: RAINIER Personnel

Soundings taken by echo sounder, ~~hand lead, pole~~ Multibeam DSF-6000N,Knudsen 320M, RESON 8101 MB SeaBeam 1050D LF

Graphic record scaled by: RAINIER Personnel

Graphic record checked by: RAINIER Personnel

Evaluation: ~~Processed by~~ R. Mihailov Automated plot by: HP 750C & HP 755 CM

Verification by: R. Davies, M. Bigelow, R. Mayor, D. Doles, B. Mihailov

Soundings in fathoms ~~feet~~ at ~~MLW~~ MLLW and tenths (data collected in Meters)

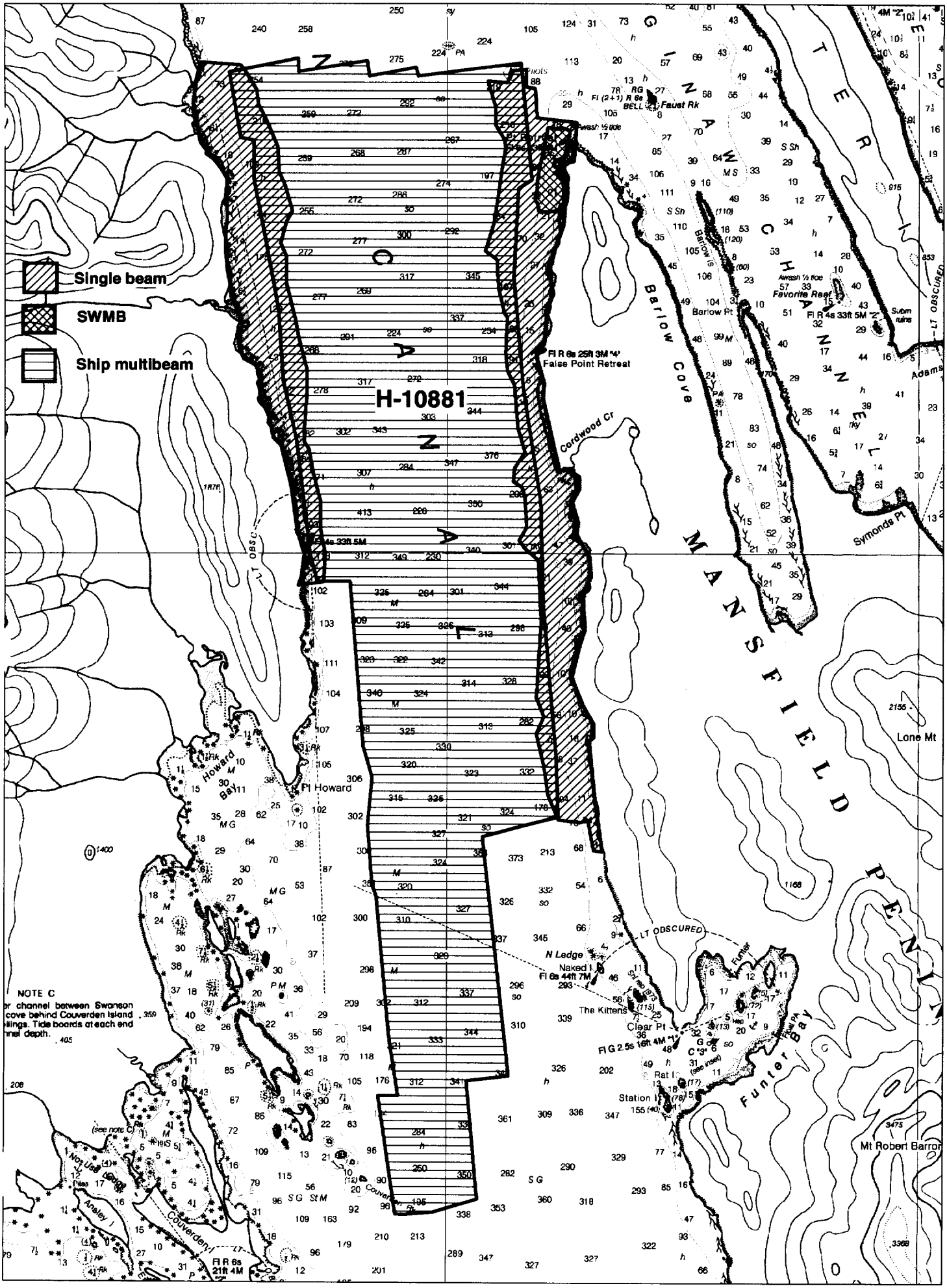
REMARKS: All times are UTC, revisions and marginal notes in black were generated during office processing. All separates are filed with the hydrographic data, as a result page numbering may be interrupted or non-sequential.

All depths listed in this report are referenced to mean lower low water unless otherwise noted.

AWOIS / SURF 5/30/00 mcr

NOAA FORM 77-28 SUPERSEDES FORM C&GS-537.

U.S. GOVERNMENT PRINTING OFFICE: 1986 - 652-007/41215


Single beam
SWMB
Ship multibeam
H-10881
Barlow Cove
Cordwood Cr
Fl R 6s 25ft 3M "4"
False Point Retreat
Barlow Pt
Favorite Reef
Awash ½ fm
Subm ruins
LT OBSCURED
Symonds Pt
Adams
Lone Mt
MANSFIELD PENINSULA
Howard Bay
Pt Howard
N Ledge
Naked I
Fl 6s 44ft 7M
The Kittens
Clear Pt
Fl G 2.5s 16ft 4M "7"
Rat I
Station I
Funter Bay
Mt Robert Barron
Couverden I
Ansley I
Fl R 6s 21ft 4M
NOTE C
channel between Swanson
cove behind Couverden Island
sings. Tide boards at each end
mal depth.

Descriptive Report to Accompany Hydrographic Survey H-10881

Field Number RA-20-02-99
Scale 1:20,000
May-June 1999
NOAA Ship RAINIER
Chief of Party: Captain Alan D. Anderson, NOAA

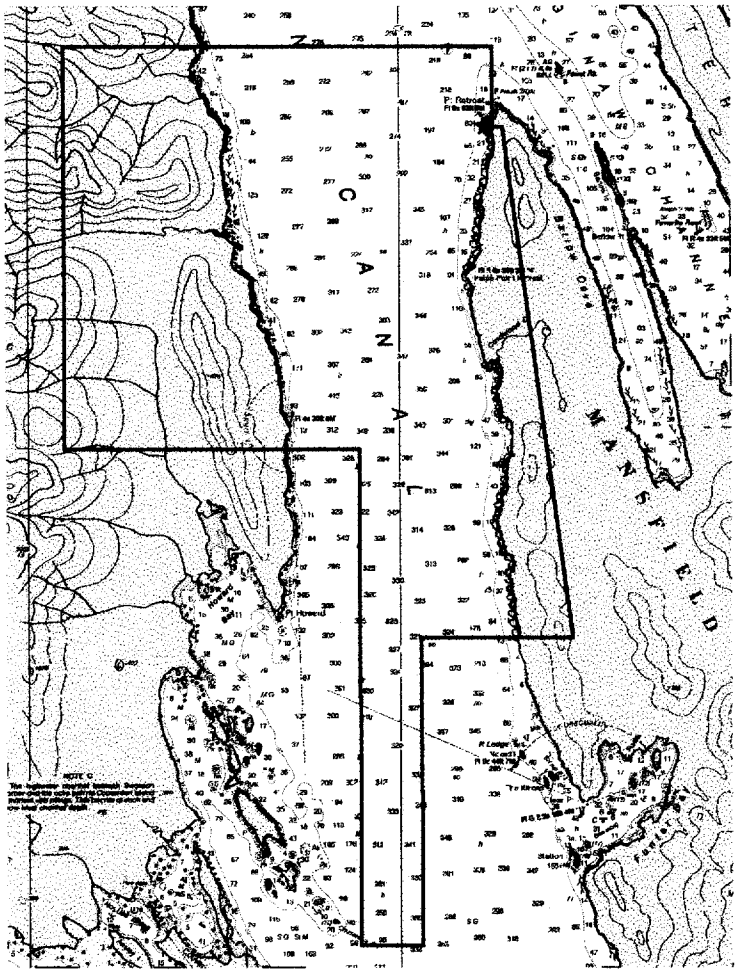
A. PROJECT ✓

This hydrographic survey was completed as specified by Project Instructions OPR-O340-RA dated March 5, 1998 and Change number 2, dated April 12, 1999. Survey H-10881corresponds to **sheet V** as defined in the sheet layout. This survey will provide contemporary hydrographic survey data as part of a continuing program to improve chart coverage of the Inside Passage in southeast Alaska. Requests for hydrographic surveys and updated charts in this area have been received from the Southeastern Alaska Pilot's Association (SEAPA) and the commercial fishing industry.

Change #1 dated 3/30/98
Change #3 dated 5/6/99

B. AREA SURVEYED See Eval Rpt, section B

The survey area is Lynn Canal. The survey's northern limit is 58° 25' ~~25"~~ 30" and the southern limit is latitude 58° 12' 39". The survey's western limit is the mainland shoreline and the eastern limit is the Mansfield Peninsula. Commercial fishing vessels, pleasure craft, and cruise ships were frequently observed transiting from the north and south. Data acquisition was conducted from May 2 to June 5 1998 (DN 122 to 156).



C. SURVEY VESSELS

Data were acquired by RAINIER and her survey launches (vessel numbers, 2121, 2124, 2125 and 2126) as noted in the Survey Information Summary ~~included with~~ attached to this report.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

All singlebeam data were acquired using HYPACK version 8.9 and preliminary processing was accomplished with HPS and MapInfo. Final Detached Positions, Features, and Soundings based on predicted and observed tides were saved in MapInfo 5.0 format. Swath data collected by Triton Elics using the SeaBeam 1050D MKII and HydroStar ONLINE programs with ISIS version 4.32 and processed using CARIS software. Shallow water multibeam (SWMB) echosounder data were acquired using the Reson SeaBat 8101 with ISIS version 4.32 and processed using CARIS software. Raster image and shoreline data in MapInfo facilitated charted and prior survey comparisons. Final Detached Positions and soundings based on predicted tides were saved in MapInfo 5.0 format. A complete listing of software for HYPACK and HPS is included in Appendix VI. *

E. SONAR EQUIPMENT

Side Scan Sonar (SSS) equipment was not used on this survey. However, it should be noted that the Reson SeaBat 8101 and the Seabeam 1050D MKII provides a low-resolution digital SSS record of the SWMB swath. This SSS imagery is primarily used to aid in final processing of the SWMB depth data but can also be used to provide imagery of features such as wrecks, rocks, and obstructions.

F. SOUNDING EQUIPMENT

Three 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 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 (VBES) (VN 2121, 2123, 2125, 2126):

The VBES sounding instruments for this survey were the Raytheon DSF-6000N and Knudsen 320M, which are dual frequency (100 kHz, 24 kHz), digital recording singlebeam fathometers with analog paper traces. Soundings were acquired in meters using the High + Low, high frequency digitized setting, but in depths over 300 meters, low frequency was scanned in place of the high when the fathometer lost its high frequency trace. Serial numbers are included in the Separates.* VBES launches were used to collect mainscheme hydrography in areas that were considered too hazardous or too shallow for shipboard Elac SeaBeam coverage, generally areas less than 100 meters of depth. In addition, singlebeam launches were used to perform all shoreline verification.

2. Launch Shallow Water Multibeam (SWMB) (VN 2121, 2123, 2126):

Prior to beginning SWMB data acquisition, the launch CARIS Vessel Configuration Files were updated to define the physical relationship between the various components that comprise the systems, including the transducer head, TSS motion sensor and POS/MV positioning system. In addition, these offset files contain heave, roll and pitch biases determined during a "patch test" conducted at Port Angeles, WA on March 26-28, 1999. A copy of the Vessel Configuration Files are contained in Project Related Data for OPR-O340-RA.

The Reson SeaBat 8101 is a multibeam echosounder system that measures relative water depths across a wide swath perpendicular to the vessel's path. The Reson SeaBat 8101 ensonifies the seafloor with a 150° swath consisting of 101 individual 1.5° x 1.5° beams. The system was designed to meet International

* Filed with the hydrographic data

Hydrographic Organization standards to measure the seafloor at a maximum range of 320 meters. The system's maximum depth range under actual field conditions has proven to be much less. RAINIER has discovered that maximum attainable depths are approximately 80-150 meters, depending on sea conditions and bottom topography. But the installation this winter of an extended range projector on VN 2126 has extended this maximum depth to greater than 250 meters under good conditions with cleaner data in the shallower ranges also. Serial numbers are included in the Separates.* SWMB launches were used to collect full-bottom coverage of select areas identified during singlebeam hydrography, generally all areas determined to be less than 60 meters deep that could safely be investigated without the risk of damaging the SWMB transducer. SWMB launches were not used for shoreline verification due to the extremely high risk of damaging the SWMB transducers on submerged rocks.

SeaBat depth data are displayed during acquisition and reviewed with CARIS-HIPS Data Cleaning programs. Depth flyers were identified and manually flagged as "rejected". Vessel positioning and attitude data from DGPS, POS/MV, heave, roll and pitch sensors were similarly displayed and manually cleaned. Additionally, instantaneous speed as computed from the positioning data was checked for jumps. For this survey, the outer ten beams on each side of the swath (beam numbers 1-10 and 92-101) were not used, reducing the effective swath width to 120°.

After review and cleaning, the depth, position and attitude data were merged with sound velocity, predicted tide and dynamic draft correctors to compute the true depth and position of each sonar footprint. These processed data were excessed by selecting shoal soundings at a density of 5 meters x 5 meters. Processed soundings were then exported into HPS through HSD Utilities.

3. ELAC SeaBeam 1050D MKII

The SeaBeam 1050D MKII is a hull-mounted, dual frequency, high resolution multibeam echosounder system for shallow and medium water depths. The high frequency array (180 kHz) is used to acquire soundings ranging from 1 meter to 590 meters, while the published effective range of the low frequency array (50 kHz) is from 10 meters to 3100 meters. The SeaBeam ensonifies the seafloor with a swath that ranges from 18° to 153°, depending on depth, using 42 beams in three fans at up to approximately 3.6°? beamwidth, covering 2.8 along track. Low frequency was used exclusively on survey H-10864 with a swath width of 128° in an effort to both increase the system's ping rate and minimize the outer beam "waggle" in the wider 150° swath. This yields 105 1.5 x 2.8 depths per swath.

ELAC depth data is corrected for heave, pitch and roll during data acquisition. Depth data is then reviewed with the CARIS-HIPS Data Cleaning programs. Depth flyers were identified and manually flagged as "rejected". Vessel positioning and attitude data from DGPS and digital gyro repeater were similarly displayed and manually cleaned. As a means of troubleshooting, TSS Hippy data was also examined for erroneous values even though these correctors were already applied to the data online. Additionally, instantaneous speed as computed from the positioning data was checked for jumps. For this survey, all soundings beyond a maximum angle of 50° off nadir were rejected in an attempt to further reduce the noise observed in these outer beams.

After review and cleaning, the depth, position and attitude data were merged with sound velocity, predicted tide and dynamic draft correctors to compute the true depth and position of each sonar footprint. Prior to the final application of correctors in CARIS, the heave, pitch and roll data were manually deleted from the HDCS data to prevent these values from being applied twice. These heave, pitch and roll values have been TAR'ed and left with the HDCS data in the event they are needed at some future date. These processed data were then extracted to a workfile with a grid size of 5 meters. These soundings were further excessed by suppressing soundings with a shoal bias to produce one sounding every 50 square meters. Processed soundings were then exported into HPS through HP Tools, and combined with the VBES data for final compilation in HPS/Mapinfo excessing.

* Filed with the hydrographic records.

G. CORRECTIONS TO ECHO SOUNDINGS ✓

Three sound velocity casts were used for this survey. Information on the casts is included in the Survey Information Summary report, attached.

The sound velocity casts were acquired with SBE SEACAT Profiler (S/N 219), calibrated November 13, 1998 and (S/N 2543), calibrated November 13, 1998 and (S/N 2477), calibrated November 13, 1998. Velocity correctors were computed using the PC program VELOCITY, version 4.0, 1998, in accordance with Hydrographic Survey Guideline (HSG) No. 69. For singlebeam launches, sound velocity correctors were applied to the raw sounding data in HPS during post-acquisition processing. For SWMB launches and RAINIER SeaBeam soundings, sound velocity correctors were applied in Caris during post-acquisition processing. *

Vessel Offset 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
2120	March 1999	OTF	March 1999	Port Angeles, WA
2121	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 were computed in accordance with Hydrographic Manual Section 4.9.4.2, using FPM Fig. 2.4, and are included with project data for OPR-O340-RA-99. All offset tables contain offsets for the GPS antenna, as well as static draft measurements, and settlement and squat data. Offset tables # 1-6 correspond to the last digit of the vessel number, with RAINIER being designated RA00 for multibeam data processing and #7 for HPS processing. For VBES launches, offset tables were applied to the raw sounding data in HPS during post-acquisition processing. For SWMB launches and RAINIER, offsets were applied during Caris processing.

The offset tables are included with project data for OPR-O340-RA-99.

Predicted Tidal Correctors:

For the 1999 field season the Oceanographic Products and Services Division, User Services Branch (N/CS41), supplied no predicted tides for OPR-O340. Preliminary predicted tide tables were generated for both HPS and CARIS using Tides & Currents v2.5. HPS tides for H-10881 were based on the location William Henry Bay, Lynn Canal that uses Juneau as a reference station. This tide table (HPS #99) was used only for preliminary inspection of the VBES soundings. CARIS tide table juneau99new.tid was also based on Tides & Currents and was used throughout the entire CARIS processing pipeline.

Once data acquisition was complete and all sounding data consolidated in HPS, OPSD preliminary tides for Juneau (945-2210) were downloaded from the Internet and used to create HPS table #1. The MapInfo tidal zoning table supplied by OPSD was then imported into HPS using the MapBasic application HPT_UTIL.MBX and HP Tools. Finally, tide zone correctors were computed and applied to all soundings in HPS (Seabeam, SWMB, & VBES) before HPS excessing, to produce a final product.

Listings of HPS tide tables used for H-10881 are included in the separates of this report. Tidal correctors as provided in the project instructions for H-10881 are provided in the Survey Information Summary included with this report.

* Filed with the hydrographic data.

Juneau, Alaska (945-2210), Sitka, Alaska (945-1600), and Skagway, Alaska (945-2400) are the primary control stations for datum determination. RAINIER personnel installed a Sutron 8200 tide gage at Hawk Inlet (945-2294) on April 29, 1999, and the gage was removed on June 9th, 1999. Refer to the Field Tide Notes and supporting data in Appendix V* for individual gage performance and level closure information. This information has been forwarded to N/CS41 in accordance with HSG 50 and FPM 4.8. A request for approved tides was forwarded to N/CS41 in accordance with FPM 4.8. Approved Tide note dated Oct 6, 1999 is attached.

H. HYDROGRAPHIC POSITION CONTROL √

The horizontal datum for this project is NAD 83. The control stations used for this survey are listed ~~in Appendix III~~ and attached to this report. See the OPR-O340-RA-99 Horizontal Control Report for more information.

All soundings were positioned using differential GPS. Primary control was the VHF differential reference station at CURTIS. The US Coast Guard Beacon at GUSTAVUS and a VHF differential reference station at JOE were used as backup. Launch-to-launch DGPS performance checks were performed in accordance with Section 3.2 of the FPM. Two observations of position were made from two different DGPS base stations, CURTIS and GUSTAVUS, while the launches were rafted together with their GPS antennae within 2-3 meters of each other. RAINIER also used SHIPDIM, version 2.2R (April 1996) with a Trimble Centurion P-code receiver and an Ashtech sensor (both differentially-corrected) to monitor the performance of the reference stations. CURTIS was compared to GUSTAVUS at least once a week while installed. Some outliers were noted, but none indicated systematic or continuous errors in either the GUSTAVUS beacon or the VHF station at CURTIS.

The SWMB launches (VN 2121, 2123, 2126) used a Position and Orientation System for Marine Vessels (POS/MV) to determine their heading. The POS/MV delivers heading measurements by two distinct methods. First, the Dynamic Heading Alignment determines the vessel's heading by using data supplied by the Inertial Measurement Unit (IMU) and GPS receivers to achieve a 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 that they receive. The error from this method is largely due to noise, but it exhibits no drift. The POS/MV uses the advantages of each method to compensate for the disadvantages of the other to arrive at an optimal attitudinal accuracy of 0.05°.

I. SHORELINE See Eval Rpt, section J.

Do not concur. GC10425 & GC10426 was provided in MapInfo format.

The shoreline manuscript from Coastal Mapping survey TP01528 was supplied by N/CS341 in the form of raster image files in a .PCX format for import to MapInfo and Hypack for the western shore of H-10881. No official shoreline document was supplied by N/CS341 for any of the eastern shoreline for the entire Lynn Canal project or the southwestern shoreline of H-10881. This problem was solved with the registration of NASA aerial photos acquired from the U.S. Forest Service. These photos were scanned and registered using the charted geographic positions of prominent landmarks along the shoreline. The registered photos were then digitized in MapInfo using a combination of the chart and notes taken during vertical beam echo sounder mainscheme to differentiate between areas of gently sloping beaches and ledges. The texture, color, and smoothness of the low water line in the infrared NASA photos also proved useful differentiating between types of low water shoreline. The resultant shoreline was then exported in .DXF format for use with Hypack. In the field ledges and reefs were DP'd to field check the NASA photo's registration. This method proved to be reliable and accurately depicted the shoreline when checked against the DP's, soundings, and tracklines. During shoreline verification these digitized NASA photos were treated as official DM shoreline for the purposes of distinguishing new shoreline features.

Limited shoreline verification was conducted in accordance with the Project Instructions. For this survey the general limit of safe navigation of a survey launch is 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. Features shown inshore of the NALL are the hydrographer's representation of the shoreline while slowly transiting along the shore, and are intended to aid chart compilation.

* Filed with the hydrographic records.

There was general agreement between the charted and manuscript shoreline, and what the hydrographer found on this survey. The source of the charted shoreline is from pre-1900 hydrographic surveys. Because of its age, discrepancies between charted and field shoreline should be resolved in favor of the manuscript shoreline (MapInfo digital "Shoreline" and "Shoreline_Update") and field work as shown on the final field Detached Position plot provided to PHB.

Shoreline manuscript and field features were compared to an enlargement of chart 17316, plotted by RAINIER personnel, as well as digital overlay of data on the BSB chart image in MapInfo. Charted features matched the shoreline as observed during the current survey except for the following.

Charted Feature	Geographic Position	Observed Feature
Rock	58° 24′ 16″ N 134° 57′ 42″ W	None, AWOIS 52408, Disproval 100m Search radius, VBES, SWMB, VS
Rock	58° 24′ 31″ N 135° 05′ 03″ W 58° 24′ 28″ N 135° 04′ 56″ W 58° 22′ 57″ N 135° 04′ 29″ W 58° 22′ 55″ N 135° 04′ 29″ W	None, disapproval's verified by 35 m search radius, 2 m water visibility (Dn 122, Vn 2124)
None	58° 23′ 00″ N 135° 04′ 29″ W 58° 22′ 42″ N 134° 58′ 04″ W	Ledge

concur

concur

concur

The following is a list of all Charted features seaward of the NALL that are represented by DM rocks inshore. It is likely that these rocks were either mis-positioned initially or moved by the cartographer for representation purposes. A comparison between chart 17316 and the priors fails to produce a source for these charted features.

concur

Charted Feature	Geographic Position	Observed Feature
Rock	58° 21′ 16″ N 135° 03′ 22″ W	~20m of depth offshore of ledge
	58° 21′ 20″ N 135° 03′ 24″ W	~20m of depth offshore of ledge
	58° 24′ 09″ N 135° 04′ 30″ W	~30m of depth offshore of ledge
	58° 21′ 44″ N 135° 03′ 47″ W	~8.5m of depth at fix #40540

Shoreline manuscript (DM) features matched the shoreline as observed during the current survey except for the following.

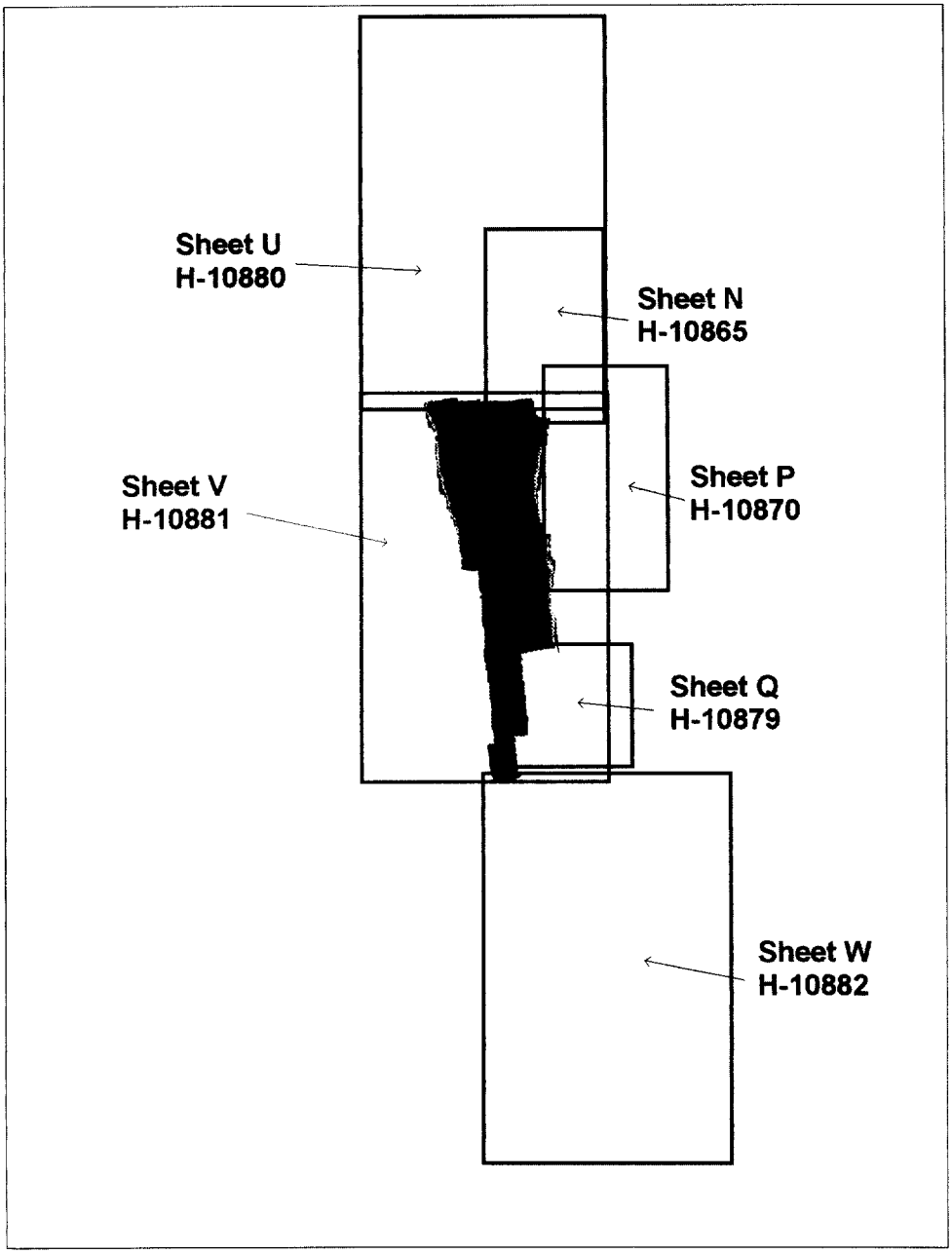
Shoreline Manuscript Feature	Geographic Position	Observed Feature
Rock	58° 24′ 31″ N 135° 05′ 03″ W 58° 24′ 28″ N 135° 04′ 56″ W 58° 22′ 57″ N 135° 04′ 29″ W 58° 22′ 55″ N 135° 04′ 29″ W	None, disapproval's verified by 35 m search radius, 2 m water visibility (Dn 122, Vn 2124)
None	58° 23′ 00″ N 135° 04′ 29″ W	Ledge
Ledge	58° 20′ 09″ N 134° 57′ 25″ W 58° 22′ 42″ N 134° 58′ 04″ W	New Position

concur

J. CROSSLINES ✓

VBES Crosslines agreed within 1 meter with mainscheme hydrography. There was a total of 13.9 nautical miles of crosslines, comprising 25.0% of mainscheme hydrography. Ships Multi-Beam crosslines were conducted over all mainscheme lines. The Quality Control Report (CARIS HIPS) for the checkline file averaged ~96%, with a depth tolerance of 2.30%. See appendices section VI for the detailed report.

K. JUNCTIONS ✓

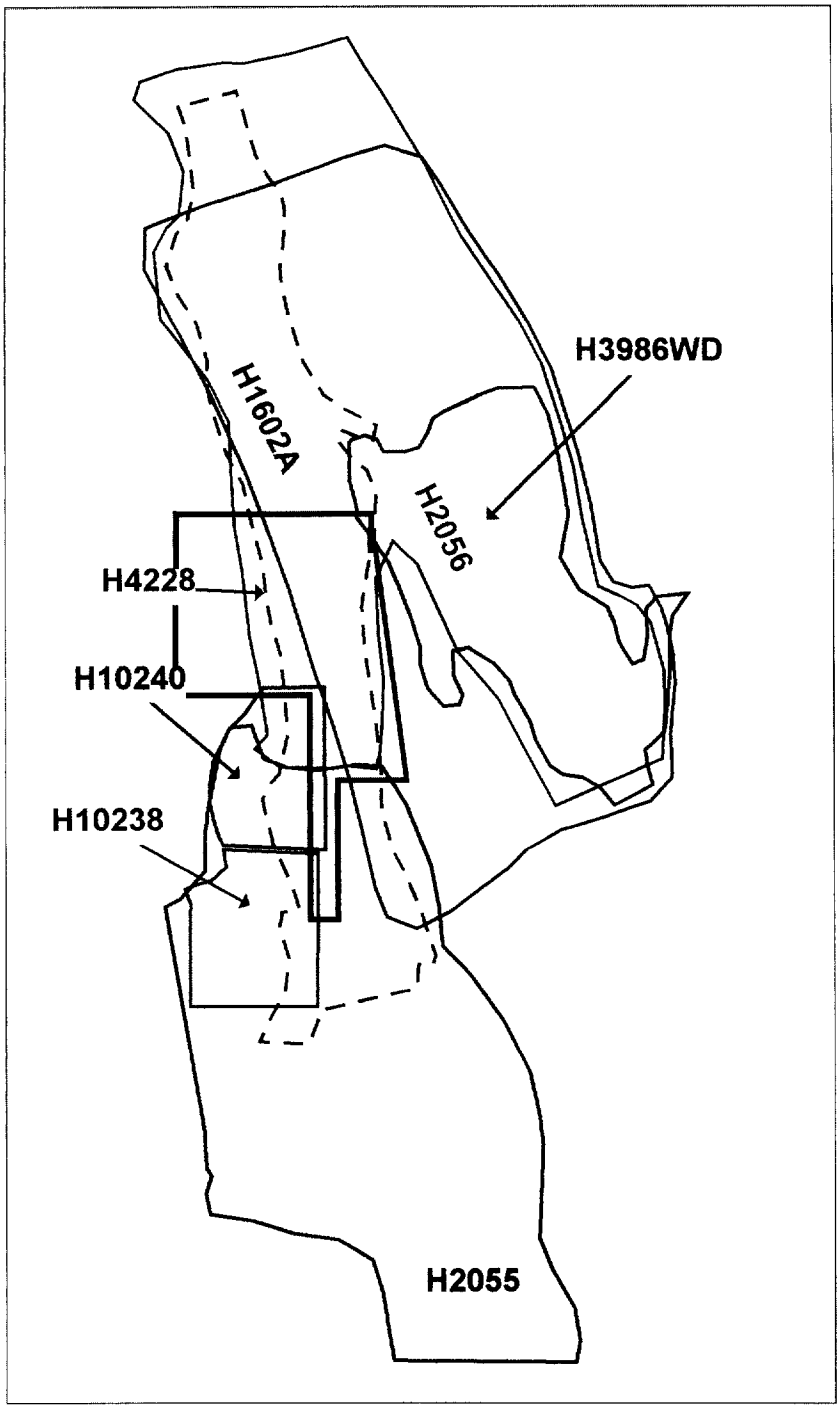


The following contemporary surveys junction with H-10881:

Registry #	Scale	Date	Junction side
H-10880	1:20,000	1999	North
H-10865	1:10,000	1999	North-Northeast
~~H-10816~~	~~1:20,000~~	~~1999~~	~~Northeast~~
H-10879	1:10,000	1999	Southeast
H-10882	1:20,000	1999	South
H-10870	1:10,000	1999	Northeast

Soundings on these surveys were found to be in good agreement, matching to within 1 meter, in waters shoaler that 150 meters. In deeper waters (200-300 meters), the difference between soundings increased to between one and five meters. Most of the differences were within 2 meters but no other patterns were observed. The greatest differences between sounding at all depths occurred in areas of extreme slope. Final comparisons will be made at the Pacific Hydrographic Branch (PHB) after reduction to final vertical datum.

L. COMPARISON WITH PRIOR SURVEYS



Registry #	Scale	Date
H-10238	1:10,000	1987
H-10240	1:10,000	1987
H-4228	1:40,000	1922
H-1602A	1:40,000	1884 - No sndgs in common area
H-3986WD	1:20,000	1917
H-2056	1:40,000	1890
H-2055	1:40,000	1890 - NO sndgs in common area.

Most prior survey soundings were found to be in fair agreement with those from the current survey. Prior H-10238 had shoaler depths of up to ~~30~~ 45 fathoms along the steeps south of 58° 14' 30. The hydrographer believes this is due to the reduced ability of the VBES equipment to accurately digitize the extremely deep depths of this vicinity. The leadline surveys H-2056 and H-2055 compared well with the contemporary Multi-Beam survey. Prior H-3986WD was not legible. – concur

Differences between the current survey and priors can probably be attributed to scale and improved modern positioning and sounding equipment. Final comparisons will be done at PHB after reduction to final sounding datum using tidal information collected concurrently with this survey.

M. ITEM INVESTIGATION REPORTS

There was one AWOIS items assigned for survey H-10881. Ten SWMB lines from H-10870 (RA-10-07-99) were used to create a workfile (52408) in CARIS to investigate AWOIS 52408.

SWMB lines used for AWOIS investigation:

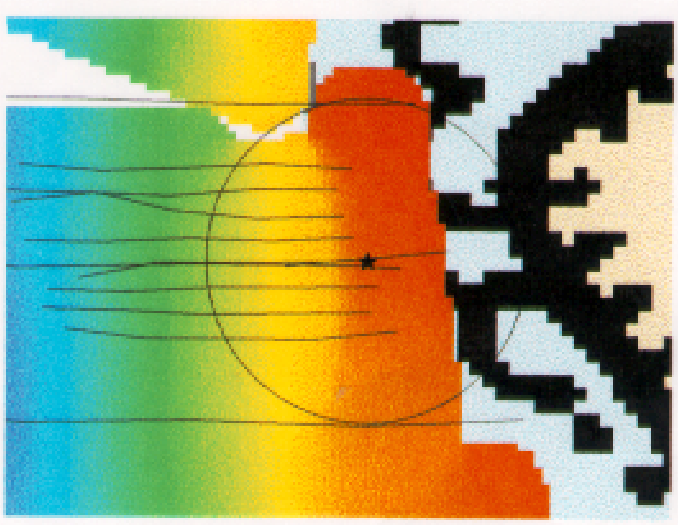
RA-6
H-10870 (Sheet P)
DN 141
247_2223, 248_2150, 249_2118, 250_2236, 251_2156, 252_2203, 253_2113, 254_2108, 255_2214, 256_2208

Item Investigation #1

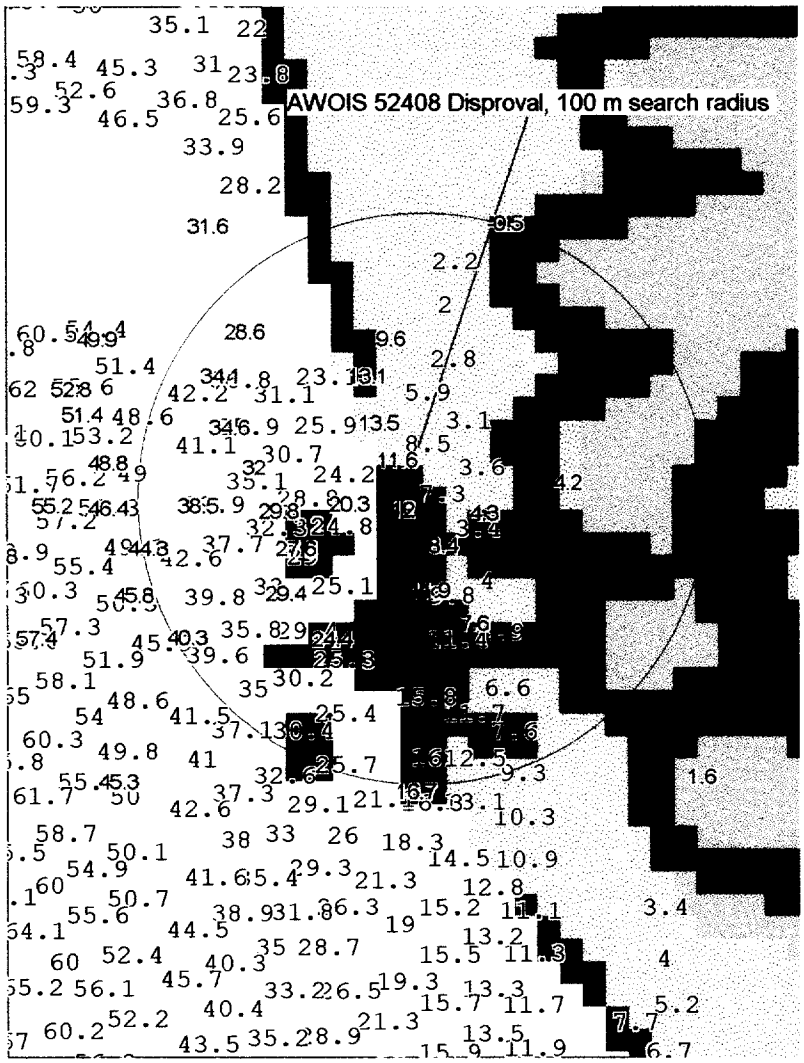
AWOIS # : 52408	**DN:** 141
CHART #:17316 (1:80,000, 18th Edition, 7/18/98)	**VESNO:** 2125
ITEM DESCRIPTION: Obstruction	
SOURCE: Canadian Power Squadron	

Geographic Position

	LATITUDE	LONGITUDE	POSITION #
CHARTED:	58° 24' 16.79" N	134° 57' 42.48" W	
OBSERVED:	58° 24' 17.01" N	134° 57' 42.82" W	50533
POSITIONED BY:	DGPS	**DATUM:**	MLLW (NAD 83)
METHOD OF INVESTIGATION: 100 m visual search radius at negative low tide, VBES, SWMB			
FINDINGS: Disproval of AWOIS# 52408			



Color representation of SWMB coverage. Black lines represent VBES tracklines and AWOIS search diameter.



Black Soundings = SWMB
Blue Soundings = VBES

Charting Recommendations

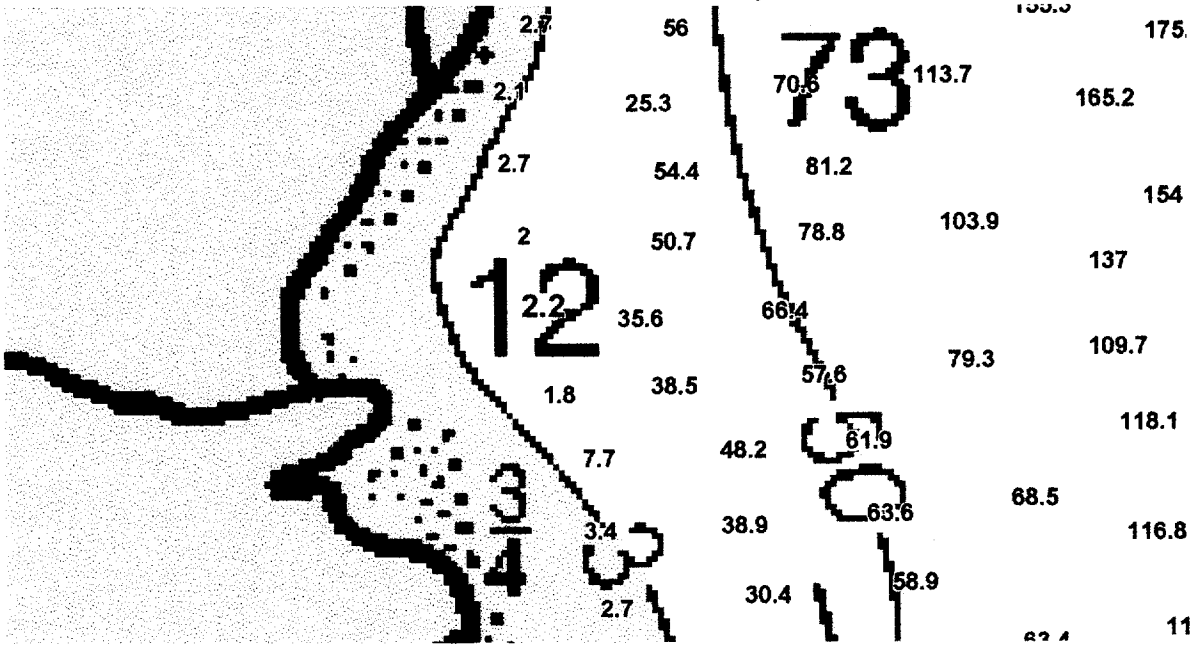
The hydrographer recommends removing the rock awash at the level of chart datum at 58° 24' 16.79" N 134° 57' 42.48" W. – Concur

N. COMPARISON WITH THE CHART ✓ See Eval Rpt, section O.

This survey was compared in the field to features portrayed on the following charts:

Chart	Scale	Edition Number	Date	Datum
17316	1:80,000	18th	July 18, 1998	NAD 83

The survey was compared with Chart 17316 and was in good agreement, generally within several fathoms of H-10881. The deep area trending N-S for most of the surveyed area fluctuates with some depths from the contemporary survey being shoaler, and others deeper by several fathoms. Poor horizontal and vertical control, along with errors introduced when surveying deep water with leadline techniques probably compensates for the minor sounding differences between chart 17316 and the contemporary survey in deep areas. The shallower areas paralleling the shoreline on chart 17316 are in good agreement with H-10881, with the contemporary survey producing shoaler soundings. One exception is a charted 12 fathom sounding (58° 25' 06" N 135° 05' 15" W) at the deposition area of a small stream, the current survey detected a 2.2 fathom shoal. Non-sounding features are discussed in Section I. Final sounding comparisons will be made at PHB after reduction to final vertical datum. 2.0 fm with smooth tides applied, chart 2 fms at survey position.



Dangers to Navigation ✓

No dangers to navigation were discovered during the survey.

O. ADEQUACY OF SURVEY

Survey H-10811 is complete and adequate to supersede prior soundings and features in their common areas.

P. AIDS TO NAVIGATION

Both False Point Retreat Light 4 (Light List # 23960) and Lynn Canal Southwest Light 4 (Light List # 23965) were positioned on DN 153. The lights are charted adequately on chart 17316. Refer to Section ~~H~~ Q in this report ~~the Appendices~~ for more information on the discrepancy between the charted position and the surveyed position.

Q. STATISTICS

Statistics are listed in the Survey Information Summary included with this report.

R. MISCELLANEOUS

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

S. RECOMMENDATIONS

The hydrographer recommends that photogrammetric shoreline be acquired for survey areas before the hydrographic field party begins the survey. Precise, low-water shoreline information can greatly facilitate the acquisition of soundings and expedite the shoreline verification process.

T. REFERRAL TO REPORTS

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

Title	Date Sent	Office
OPR-O340-RA Horizontal Control Report	July 1999	N/CS34
Project related data for OPR-O340-RA	July 1999	N/CS34

Respectfully Submitted,

Mike Stecher
Survey Technician

Approved and Forwarded,

See next page

Alan D. Anderson
Captain, NOAA
Commanding Officer

Respectfully Submitted,

Mike Stecher
Survey Technician

Approved and Forwarded,

Alan D. Anderson
Captain, NOAA
Commanding Officer

List of Horizontal Control Stations

NAME	STATE	TYPE	LATITUDE	LONGITUDE	SITEID	DEC_LAT	DEC_LON
CURTIS	AK	DGPS Flyaway	58 27.2687N	134 58.7415W	n/a	58.45447833	134.97902500
GUSTAVUS	AK	USCG Beacon	58 25.1000N	135 41.8000W	892	58.41833333	135.69666667
JOE	AK	DGPS Flyaway	58 40.7343N	134 59.3429W	n/a	58.67890500	134.98904833

Section Q: Descriptive Report Insert

Name of Aid: Lynn Canal South West Light 4
Light List #: 23965

Method of Positioning GPS: X DGPS: Other:

Positioning Information

	Latitude (N)	Longitude (W)
Charted Pos.	58-20-00	135-03-00
Survey Pos.	58-20-01.25819	135-02-59.48765

	Easting	Northing
Charted Pos.	497072.1	6465823.3
Survey Pos.	497080.4	6465862.2

Difference between Charted and Surveyed Position: Distance: 39.8 meters
(Bearing from Surveyed to Charted Position) Bearing: 192.3 deg T

Characteristics Flashing White, 4 seconds
Do characteristics match Light List? Yes x No
If no, what are the characteristics?

Does the aid adequately serve its apparent purpose? Yes x No
If no, why not?

New/Uncharted Aids (if information is known or easily obtained)
Date Est:
Maintained By: Coast Guard Private? Yes No
Is aid seasonally maintained? Yes No
Frequency of Maintenance:

Apparent Purpose:

Other Information:

Section Q: Descriptive Report Insert

Name of Aid: False Point Retreat Light
Light List #: 23960

Method of Positioning GPS: X DGPS: Other:

Positioning Information

	Latitude (N)	Longitude (W)
Charted Pos.	58-22-03.33	134-58-03.33
Survey Pos.	58-22-11.3394	134-58-11.2441

	Easting	Northing
Charted Pos.	501895.9	6469637
Survey Pos.	501767.2	6469884.6

Difference between Charted and Surveyed Position: Distance: 49 meters
(Bearing from Surveyed to Charted Position) Bearing: 106 deg T

Characteristics Flashing Red, 6 seconds
Do characteristics match Light List? Yes x No
If no, what are the characteristics?

Does the aid adequately serve its apparent purpose? Yes x No
If no, why not?

New/Uncharted Aids (if information is known or easily obtained)
Date Est:
Maintained By: Coast Guard Private? Yes (No)
Is aid seasonally maintained? Yes (No)
Frequency of Maintenance:

Apparent Purpose:

Other Information:

APPROVAL SHEET

for

H-10881

RA-20-02-99

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,

Alan D. Anderson

Alan D. Anderson
Captain, NOAA
Commanding Officer
NOAA Ship RAINIER

Survey Information Summary

Project: OPR-O340-99 **Project Name:** LYNN CANAL

Instructions Dated: 3/5/98 **Project Change Info:**

Change #	Dated
1	3/30/98
2	4/14/99
3	5/6/99

Sheet Letter: V **Registry Number:** H-10881

Sheet Number: RA-20-02-99

Survey Title: Funter Bay to Pt. Retreat

Data Acquisition Dates: **From:** 02-May-99 122 **To:** 05-Jun-99 156

Vessel Usage Summary

VESNO	MS	SPLITS	DEV	XL	S/L	DP	BS	DIVE
2120								
2121	1	2		1		1		
2124	1				1	1		
2125	1	1	1		1	2	1	
2126	1	1		1				
2127								

Sound Velocity Cast Information

Launch Table #	Ship Table #	Cast DN	Max Depth	Position	Applicable DN
9		121	265	58/14/33	
				134/56/30	
10		139	585	58/14/25	
				134/57/05	
14		157	619	57/58/05	
				134/48/55	

Tide Zone Information

Zone #	Time Corr.	Height Corr.
SEA3	00 hr 00 min	X0.98
SEA59	00 hr 00 min	X0.97
SEA58	00 hr 00 min	X0.95
SEA57	00 hr 00 min	X0.93

Tide Gage Information

Tide Gage #	Gage Name	Installed	Removed
945-2294	HAWK INLET	4/29/99	6/9/99

Statistics Summary

Type	Total:
BS	15
DEV	0.85
DP	17
MBMS	45.1
MBXL	5
MS	55.64
S/L	13.86
SPLIT	22.63
SWMB	2.88

XL 13.9

Percent XL:	25.0%
SQNM:	23.4

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: October 6, 1999

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-0340-RA
HYDROGRAPHIC SHEET: H-10881

LOCALITY: Funter Bay to Pt. Retreat, Lynn Canal, AK
TIME PERIOD: May 2 - June 6, 1999

TIDE STATION USED: 945-2321 Funter Bay, Mansfield Peninsula, AK
Lat. 58° 15.3'N Lon. 134° 53.8'W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 4.399 meters

TIDE STATION USED: 945-2318 Barlow Cove, AK
Lat. 58° 19.3'N Lon. 134° 52.7'W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 4.509 meters

TIDE STATION USED: 945-2294 Hawk Inlet Entrance, AK
Lat. 58° 05.2'N Lon. 134° 46.6'W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 4.393 meters

REMARKS: RECOMMENDED ZONING
Use zone(s) identified as: SEA61, SEA63 & SEA64.

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY SHEET H-10881 cont.

Note 3: Juneau, AK and Skagway, AK were used as datum control for subordinate tide stations and for tidal zoning in this hydrographic survey. Accepted datums for these two stations have been updated recently and have changed significantly from previous values.

The current National Tidal Datum Epoch (NTDE) used to compute tidal datums at tide stations 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.

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 covering the Lynn Canal, Icy Strait, and Glacier Bay region. Juneau and Skagway show relative sea level trends of -0.038 ft/yr and -0.052 ft/yr, respectively 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 a 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 both Juneau and Skagway, the MSL values were computed from the period of 1994-1998. This resulted in a lowering of the MLLW datums relative to land by -0.40 ft at Juneau and -0.53 ft at Skagway compared to the previous MLLW elevations used in last year's surveys. Subordinate tide stations in the area used for hydrographic surveys and controlled by Juneau or Skagway will be affected similarly. Accepted datums have been computed and may be accessed on the Internet through the URL specification http://www.co-ops.nos.noaa.gov.

for **CHIEF, REQUIREMENTS AND DEVELOPMENT DIVISION**

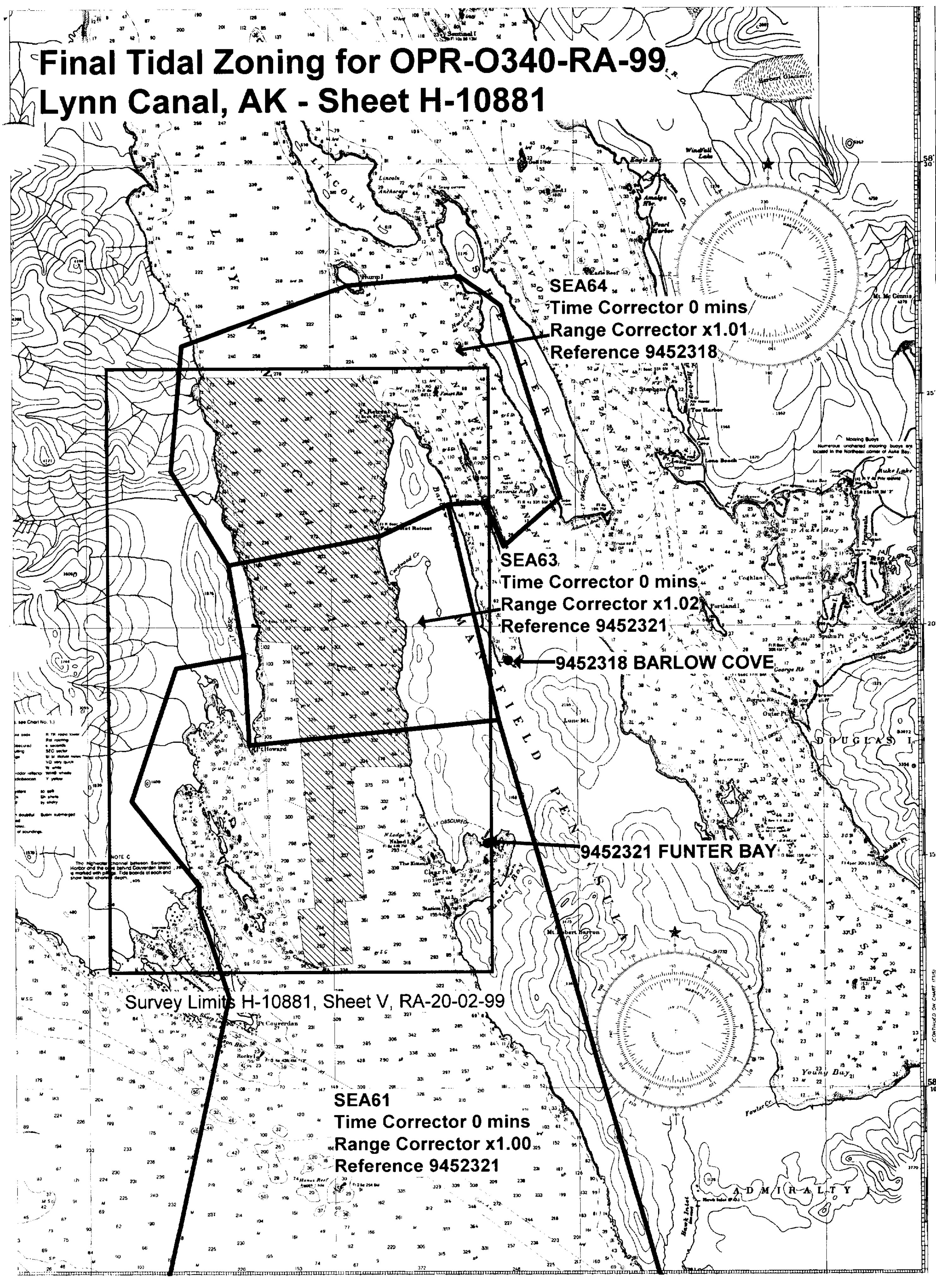
Final tide zone node point locations for OPR-O340-RA-99,
Sheet H-10881.

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 SEA61			
-134.959218 58.041117	9452321	0	1.00
-135.14771 58.054253	9452294	0	1.00
-135.118932 58.083961			
-135.071513 58.199522			
-135.091253 58.231806			
-135.091462 58.239746			
-135.136994 58.270642			
-135.106151 58.318618			
-135.059847 58.322891			
-135.056682 58.290764			
-134.886639 58.299621			
-134.779935 58.099384			
-134.759117 58.079735			
-134.761492 58.034383			
-134.805447 58.055403			
-134.959218 58.041117			
Zone SEA63			
-134.886639 58.299621	9452321	0	1.02
-135.056682 58.290764	9452318	0	0.99
-135.059847 58.322891			
-135.070146 58.355822			
-134.966311 58.366237			
-134.920234 58.377383			
-134.886639 58.299621			
Zone SEA64			
-134.966311 58.366237	9452318	0	1.01
-135.070146 58.355822			
-135.108804 58.389757			

-135.101046 58.434896
-134.987639 58.456439
-134.911523 58.459634
-134.883282 58.448923
-134.843845 58.379935
-134.882525 58.362237
-134.894794 58.378041
-134.920234 58.377383
-134.966311 58.366237

Final Tidal Zoning for OPR-O340-RA-99
Lynn Canal, AK - Sheet H-10881



NOAA FORM 76-155
(11-72)

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

GEOGRAPHIC NAMES

SURVEY NUMBER
H-10881

Name on Survey	A On chart no. 17316	B On previous survey no.	C On U.S. quadrangle maps	D From local information	E On local maps	F P.O. guide or map	G Rand McNally atlas	H U.S. light list	K	
ADMIRALTY ISLAND	X		X							1
ALASKA (title)	X		X							2
CORDWOOD CREEK	X		X							3
FALSE POINT RETREAT	X		X							4
FUNTER BAY	X		X							5
LYNN CANAL	X		X							6
MANSFIELD PENINSULA	X		X							7
RETREAT, POINT	X		X							8
										9
										10
										11
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										25

Dennis J. Romesburg
Chief Geographer
OCT 20 1999

NOAA FORM 77-27(H) (9-83) | U.S. DEPARTMENT OF COMMERCE | REGISTRY NUMBER

HYDROGRAPHIC SURVEY STATISTICS

H-10881

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

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

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

SHORELINE DATA

SHORELINE MAPS (List): GC10425/GC10426/TP01528

PHOTOBATHYMETRIC MAPS (List):

NOTES TO THE HYDROGRAPHER (List):

SPECIAL REPORTS (List):

NAUTICAL CHARTS (List): 17316 18th Ed., July 18, 1998

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	18.0		18.0
VERIFICATION OF CONTROL			
VERIFICATION OF POSITIONS			
VERIFICATION OF SOUNDINGS	31.0		31.0
VERIFICATION OF JUNCTIONS			
APPLICATION OF PHOTOBATHYMETRY			
SHORELINE APPLICATION/VERIFICATION			
COMPILATION OF SMOOTH SHEET	126.0		126.0
COMPARISON WITH PRIOR SURVEYS AND CHARTS			
EVALUATION OF SIDE SCAN SONAR RECORDS			
EVALUATION OF WIRE DRAGS AND SWEEPS			
EVALUATION REPORT		40.0	40.0
GEOGRAPHIC NAMES			
OTHER* (Chart Compilation)		35.0	35.0
*USE OTHER SIDE OF FORM FOR REMARKS — TOTALS	175.0	75.0	250.0

Pre-processing Examination by M.Bigelow, R. Davies	*Beginning Date* 7/2/99	*Ending Date* 11/4/99
Verification of Field Data by R.Davies,L.Deodato,D.Doles,R.Mayor,R.Mihailov	*Time (Hours)* 175.0	*Ending Date* 4/4/00
erification Check by	*Time (Hours)*	*Ending Date*
Evaluation and Analysis by B.Mihailov	*Time (Hours)* 40	*Ending Date* 4/14/00
Inspection by D. Hill	*Time (Hours)* 4	*Ending Date* 5-11-00

EVALUATION REPORT

H-10881

A. PROJECT

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

B. AREA SURVEYED

The survey area is adequately discussed in the hydrographer's report

The hydrographer has determined the inshore limits of safe navigation by defining a Navigable Area Limit Line (NALL) throughout the survey. Charted features and soundings inshore of this limit line which have not been specifically addressed during survey operations 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 sand. Depths range from 0 to 377 fathoms.

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 discussed 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 and MicroStation 95.

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 which 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 is plotted using a Universal Transverse Mercator Zone 8 projection and are depicted on a single sheet.

E. SONAR EQUIPMENT

Multibeam echo sounder equipment was used during survey H-10881.

F. SOUNDING EQUIPMENT

Sounding equipment has been adequately addressed in the hydrographer's report.

G. CORRECTIONS TO SOUNDINGS

Soundings and elevations have been reduced to Mean Lower Low Water (MLLW) or Mean High Water (MHW) as appropriate, with approved tide correctors obtained from the Center For Operational Oceanographic Products and Services. The approved tide correctors are zoned from Funter Bay, Alaska, gage 945-2321, Barlow Cove, Alaska, gage 945-2318.

Other sounding reducers include corrections for static draft, dynamic draft, sound velocity, heave, roll and pitch. These reducers have been reviewed and are consistent with NOS specification.

H. CONTROL STATIONS

Section H 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 values based on NAD 83. The geographic positions of all survey data are based on NAD 83. The smooth sheet is annotated with an NAD27 adjustment tick based on values determined with the NGS program NADCON. Geographic positions based on NAD27 may be plotted on the smooth sheet utilizing the NAD 83 projection by applying the following corrections.

Latitude:	-1.027 seconds	(-37.341 meters)
Longitude:	6.485 seconds	(105.572 meters)

I. HYDROGRAPHIC POSITION CONTROL

Hydrographic position control is adequately discussed in the hydrographer's report.

Differential GPS (DGPS) was used to control this survey. A horizontal dilution of precision (HDOP) not to exceed 7.5 was computed for survey operations. Except as mention in the hydrographer's report section I, the maximum (HDOP) allowable limit has not been exceeded during this survey and the quality of data obtained is good. 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 which 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 analyze during processing to ensure it contains no significant errors. The reference site confirmation test and daily DGPS performance checks were conducted in the field and found adequate.

NAD 83 is used as the horizontal datum for plotting and position computations.

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 correction to position data.

J. SHORELINE

Shoreline maps GC 10425, GC 10426 and TP 01528, scale 1:20,000 were compiled on NAD83 and apply to this survey. Shoreline drawn on the smooth sheet in black originates from this 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 revisions to the Mean High Water Line (MHWL).

K. CROSSLINES

Crosslines are discussed in the hydrographer's report.

L. JUNCTIONS

Survey H-10881 junctions with the following surveys.

Survey	Year	Scale	Area
H-10880	1999	1:20,000	North
H-10865	1999	1:10,000	North-Northeast
H-10870	1999	1:10,000	Northeast
H-10879	1999	1:10,000	Southeast
H-10882	1999	1:20,000	South

The junction with surveys H-10865, H-10870, H-10879, H-10880 and H-10882 are complete. There is good agreement between sounding and depth curves. A "Joins" note has been shown on the survey. A few soundings in color from survey H-10880 have been transferred to better portray the common area.

M. COMPARISON WITH PRIOR SURVEYS

Survey	Year	Scale
H-10238	1987	1:10,000
H-10240	1987	1:10,000
H-2056	1890	1:40,000

The prior surveys H-10238 and H-10240 cover the southwest portion of the present survey. The present survey was compared to digital copies of these surveys. The registration and legibility of this prior survey to the present survey was adequate. With the exception of some differences in depths listed in the hydrographer's report, comparison of depths reveals that the present survey is generally shoaler by about 0.5-5.0 fathoms than the prior surveys. These differences could primarily be attributed to the accuracy of the surveying methods used, increase in bottom coverage.

Prior survey H-2056 covers the majority of the present survey. The present survey was compared to a digital copy of prior survey H-2056. The registration and legibility of this prior survey to the present survey was adequate. Soundings are sparse. Sounding agreement is good with the present survey, depths are either shoaler or deeper by 1-5 fathoms. These differences may be attributed to greater sounding coverage, improved positioning and sounding methods and relative accuracy of the data acquisition techniques.

Survey	Year	Scale
H-4228WD	1922	1:40,000
H-3986WD	1917	1:20,000

The present survey was compared to a digital copy of H-4228WD and a mylar copy of survey H-3986WD. The registration of these prior surveys to the present survey is good. The legibility of the copies was poor.

The above wire-drag surveys cover the area of the present survey. An adequate sounding coverage of the area utilizing the shallow water multibeam system to substantiate the supersession of the prior wire drag information was accomplished during this survey. It is therefore recommended that the charted wire drag green tint with the common area on chart 17316 be removed.

Additional information regarding prior survey comparison is found in the hydrographer's report, section M.

Survey H-10881 is adequate to supersede the prior surveys within the area of common coverage.

N. ITEM INVESTIGATIONS

AWOIS item 52408 was assigned to this survey. It is adequately addressed in the Hydrographer's Report Section M.

O. COMPARISON WITH CHART

Survey H-10881 was compared with the following chart.

Chart	Edition	Date	Scale	Datum
17316	18th	July 18, 1998	1:80,000	NAD 83

a. Hydrography

Charted hydrography originates with the previously discussed prior surveys. The prior surveys have been adequately addressed in section M and require no further discussion.

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-10881 is adequate to supersede charted hydrography within the common area.

b. Dangers to navigation

No dangers to navigation were discovered during survey operations or office processing.

P. ADEQUACY OF SURVEY

The hydrography contained on survey H-10881 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, and the Field Procedures Manual, April 1998 Edition with the following exceptions.

Charted items should be addressed under "Comparison with Chart" in the hydrographer's report rather than in section I, Shoreline.

Q. AIDS TO NAVIGATION

There are two fixed aids to navigation within the survey area. These aids were positioned and adequately serve their intended purpose. See the hydrographer's report, section P and section Q, descriptive report insert (attached) for additional information. There are no floating aids to navigation located within the survey area.

There were no features of landmark value found during this survey.

R. STATISTICS

Statistics are adequately itemized on the attached Survey Information Summary.

S. MISCELLANEOUS

Miscellaneous information is adequately discussed in the hydrographer's report.

T. RECOMMENDATIONS

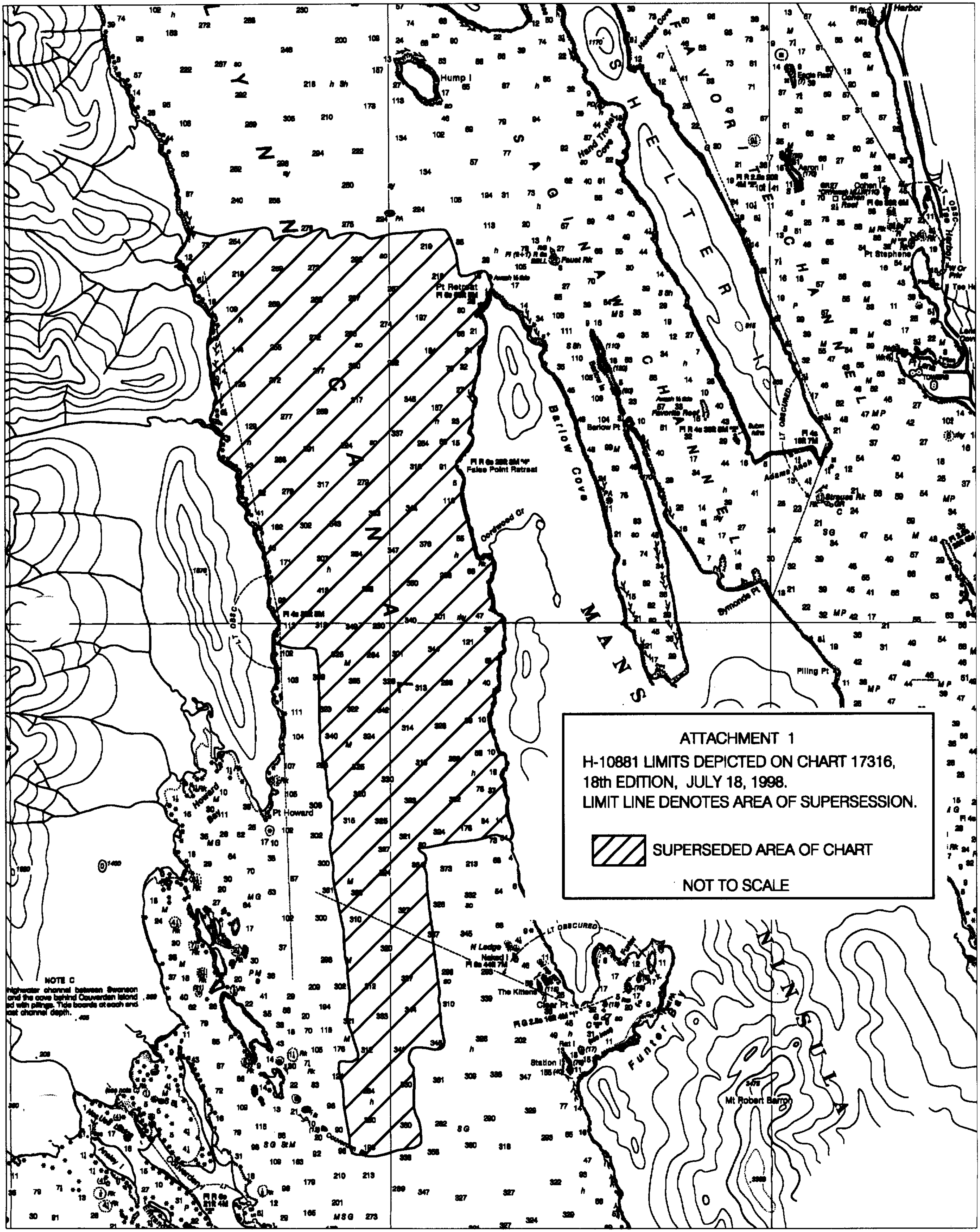
The hydrographer makes no recommendations for this survey.

Survey H-10881 is a good hydrographic survey. No additional work is recommended.

U. REFERRAL TO REPORTS

Referral to reports is not adequately discussed in the hydrographer's report

Bob Mihailov
Cartographer


ATTACHMENT 1
H-10881 LIMITS DEPICTED ON CHART 17316,
18th EDITION, JULY 18, 1998.
LIMIT LINE DENOTES AREA OF SUPERSESSION.
SUPERSEDED AREA OF CHART
NOT TO SCALE
LYNN CANAL
SAGINAW CHANNEL
FAVORITE CHANNEL
SHELTER I
MANS
Hump I
Hand Trollers Cove
Pt Retreat
False Point Retreat
Barlow Cove
Barlow Pt
Favorite Reef
Faust Rk
Aaron I
Cohen I
Pt Stephens
Adams Anch
Symonds Pt
Piling Pt
Cordwood Cr
Pt Howard
N Ledge
Naked I
The Kittens
Clear Pt
Rat I
Station I
Funter Bay
Mt Robert Barron
LT OBSCURED
NOTE C

APPROVAL SHEET
H-10881

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.

Dennis Hill Date: 5-11-00

Dennis Hill
Supervisory Cartographer
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.

Dennis Hill Date: 5-11-00

James C. Gardner
Commander, NOAA
Chief, Pacific Hydrographic Branch

****

Final Approval

Approved:

Samuel P. De Bow Jr. Date: July 23, 2000

Samuel P. De Bow
Captain, NOAA
Chief, Hydrographic Surveys Division

NOAA FORM 75-96
(10-83)

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

MARINE CHART BRANCH

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-10881

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
17316	4/14/00	B. Michaels	Full ~~Part~~ ~~Before~~ After Marine Center Approval Signed Via
			Drawing No. Full application of sndgs & features
			from the smooth sheet
			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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			Drawing No.

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED.