

H10682

NOAA FORM 78-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic
Field No. RA-10-7-96
Registry No. H-10682

LOCALITY

State Alaska
General Locality Northern Stephens Passage
Sublocality Favorite Channel from
Eagle Reef to Point Lena

1996

CHIEF OF PARTY
CAPT Dean R. Seidel, NOAA

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DATE JAN 14 1997

H-10682

HYDROGRAPHIC TITLE SHEET

INSTRUCTIONS - The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

FIELD NO.

RA-10-7-96

State Alaska

General locality Northern Stephens Passage

Locality Favorite Channel from Eagle Reef to Point Lena

Scale 1:10,000 Date of survey May 8, 1996 to May 21, 1996

Instructions dated 3/29/96 Project No. OPR-0328-RA

Vessel NOAA Ship RAINIER(2120), (2123), (2124), (2125), (2126)

Chief of party CAPT Dean R. Seidel, NOAA

Surveyed by CAPT D. Seidel, LT M. Larsen, LT S. Lemke, LT S. Meador, LTJG M. Harrison, ENS E. Christensen, ENS J. Crocker

Soundings taken by echo sounder, ~~hand lead, pot~~ ^{Dives} DSF-6000N, MODIII Diver Least Depth gauge

Graphic record scaled by RAINIER Personnel

Graphic record checked by RAINIER Personnel

Evaluation by: R. Davies Automated plot by HP 650C Design Jet Plotter

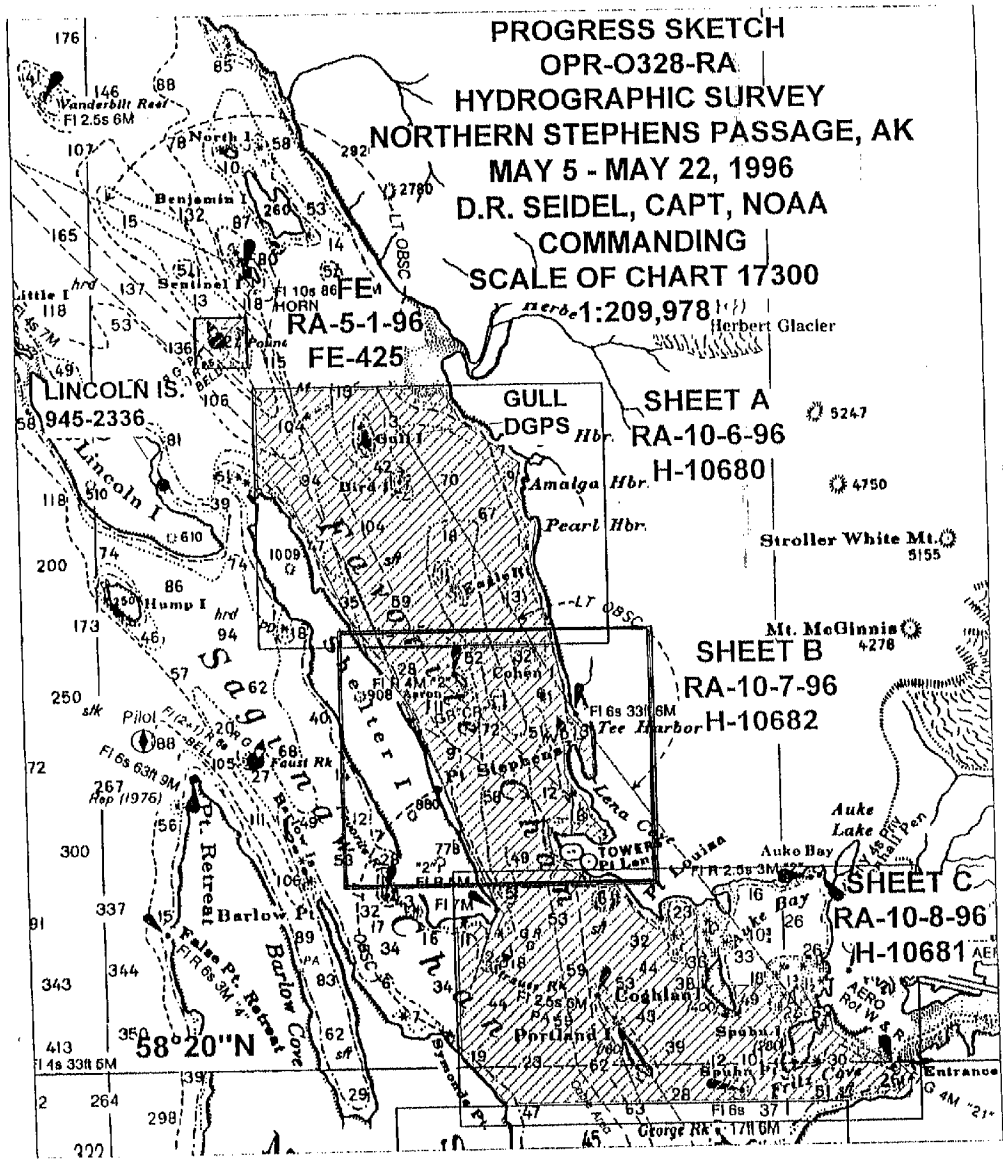
Verification by R. Davies

Soundings in fathoms ~~feet~~ at ~~MLLW~~ MLLW

REMARKS: 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.

SC 1-14-97 AWOIS & SURF 1/97 RWD



	MAY		MAY
SQ. NM SOUNDINGS	39.6	C.T.D. CASTS	6
L.N.M. SOUNDINGS	1080	GEODETIC CONTROL STATIONS	2
L.N.M. SIDE SCAN SONAR	0	TIDE GAGES	1
BOTTOM SAMPLES (GRAB)	111	AWOIS ITEMS INVESTIGATED	12
ELECT. CONTROL STATIONS	1		

Descriptive Report to Accompany Hydrographic Survey H-10682

Field Number RA-10-07-96

Scale 1:10,000

May 1996

NOAA Ship RAINIER

Chief of Party: Captain Dean R. Seidel, NOAA

A. PROJECT ✓

This basic hydrographic survey was completed in Favorite Channel, Alaska, as specified by Project Instructions OPR-O328-RA dated March 29, 1996. Survey H-10682 corresponds to sheet B as defined in the sheet layout included in the Project Instructions.

This survey will provide contemporary hydrographic survey data for updating existing nautical charts in Southeast Alaska. Requests for hydrographic surveys and updated charts have been received from the United States Coast Guard, the Southeastern Alaska Pilot's Association, and the Alaska Department of Transportation to support the cruise, logging and commercial fishing industries.

B. AREA SURVEYED ✓ See Eval Rpt., section B

The survey area is in Favorite Channel, Alaska, extending from ^{vicinity} Eagle Reef south to Point Lena. The survey's northern limit is 58° 27' 10" N joining survey H-10680, and its southern limit is 58° 23' 15" N joining survey H-10681. Its western limit is the eastern shoreline of Shelter Island; its eastern limit is the shoreline north of Point Lena. Data acquisition was conducted from May 8, 1996 (DN 129) to May 21, 1996 (DN 142).

C. SURVEY VESSELS ✓

Data were acquired by RAINIER (bottom samples only) and by RAINIER survey launches as noted below:

Vessel	EDP #	Operation
RA-3	2123	Hydrography Shoreline Verification
RA-4	2124	Hydrography
RA-5	2125	Hydrography Shoreline Verification Sound Velocity Casts Bottom Samples
RA-6	2126	Hydrography Shoreline Verification

D. AUTOMATED DATA ACQUISITION AND PROCESSING ✓

All data were acquired and processed with HDAPS. A complete listing of software for HDAPS is included in Appendix VI. *

E. SONAR EQUIPMENT ✓

Sonar equipment was not used on H-10682. *Concur*

F. SOUNDING EQUIPMENT ✓

The Raytheon DSF-6000N is a dual frequency (100 kHz, 24 kHz), paper trace echo sounder. Serial numbers are included on the headers of the daily Raw Master Printouts. * No problems which affect survey data were encountered. All DSF-6000N soundings were acquired using the High + Low, high frequency digitized setting.

G. CORRECTIONS TO ECHO SOUNDINGS ✓

Correctors for the velocity of sound through water were determined from the casts listed below:

Velocity Table #	Cast #	DN	Cast Position	Deepest Depth (m)	Applicable DN
2	2	129	58° 25' 47" N 134° 40' 36" W **	131	129-132
4	4	136	58° 25' 51" N 134° 48' 41" W	114	133-142

*** Outside Survey area.*

The sound velocity casts were acquired with SBE SEACAT Profiler (S/N 219), calibrated January 16, 1996. Velocity correctors were computed using the PC programs SEACAT and VELOCITY, version 2.11 (1995), in accordance with Hydrographic Survey Guideline (HSG) No. 69.

A printout of the Sound Velocity Corrector Table used in the HDAPS Post Survey program is included in the "Separates to be Included with Survey Data, IV. Sounding Equipment Calibrations and Corrections". *

Static Draft ✓

A transducer depth was determined using FPM Fig 2.2 for vessels 2123-2126 in the spring of 1996. These values were entered into the offset tables for each survey platform.

** Filed with the hydrographic data.*

Settlement and Squat ✓

Correctors were computed in accordance with Hydrographic Manual Section 4.9.4.2., using FPM Fig. 2.3, and are included with project data for OPR-O328-RA. The data for vessels 2123-2126 were collected in Shilshole Bay, Washington in the Spring of 1996.

Offset Tables ✓

Offset tables^{*} contain offsets for the GPS antenna, as well as static draft measurements, and settlement and squat data. Offset tables 3-6 correspond to the last digit of the vessel number. The offset tables are contained in the "Separates to be Included with Survey Data".^{*}

Heave ✓

The launches are not equipped with heave, roll and pitch sensors.

Bar Check and Lead Lines ✓

Bar check lines were calibrated by RAINIER personnel during Spring 1996. Calibration forms are included with project data for OPR-O328-RA. Bar checks were performed weekly and served as a functional check of the DSF-6000N.

Tide Correctors ✓

Predicted tides for the project were provided on diskette by N/OES334 through N/CG241 for the Juneau, Alaska reference station (945-2210). As per the Project Instructions provided by N/OES231 for H-10682 dated March 26, 1996, the tidal time and heights for this project correspond to Zone 2 and were based on the Juneau, Alaska reference station (945-2210).

HDAPS listings of the data used in generating tide corrector tables are included in Appendix V^{*} of this report.

Juneau, Alaska (945-2210) was used as the primary control station for datum determination at all subordinate stations.

RAINIER personnel installed one 8200 digital gage for this survey at Lincoln Island (945-2336) on May 6, 1996. The gage was removed on May 22, 1996. The tide staff was connected to five bench marks during opening and closing level runs. The tide gage functioned without problems during data acquisition.

The station descriptions, field tide records, preliminary field tide notes, and data (Appendix V)^{*} have been forwarded to N/OES212 in accordance with HSG 50 and FPM 4.3. A request for approved tides was forwarded to N/OES23 in accordance with FPM 4.2.3. *Approved Tide Note dated September 12, 1996 is attached.*

** Filed with the hydrographic data.*

H. CONTROL STATIONS ✓ See Eval Rpt., section H.

The horizontal datum for this project is NAD 83. First Order station GULL on Gull Island was the basis for control for this project. Reference mark measurements confirmed that it had not been disturbed since its last recovery. A static GPS vector from GPS order A station 2210 A TIDAL was used to check station GULL on DN 139 to 1:123,400. The control stations are listed in ~~Appendix H~~. See the OPR-0328-RA-96 Horizontal Control Report for more information.
this report.

I. HYDROGRAPHIC POSITION CONTROL ✓ See Eval Rpt., section I.

Method of Position Control ✓

All soundings and features were positioned using differential GPS. Serial numbers for vessel GPS equipment are annotated on the raw data printouts. *A VHF differential reference station was established at GULL. The differences between the computed locations and the published positions were recorded by the MONITOR 3.0 program on DN 127 with approximately a 1 meter offset between the Ashtech sensor and the reference GPS station. No multi-path or other systemic error was indicated. The United States Coast Guard Differential GPS reference station GUSTAVUS was also checked from station GULL on DN 141. A sensor was set up 0.3 meter east of GULL due to simultaneous use of GULL as a VHF "fly away" setup. No systematic error was found. The MONITOR 3.0 results for GULL and GUSTAVUS are in the OPR-0328-RA-96 Horizontal Control Report.

Calibrations & Systems Check Methods ✓

Launch-to-launch DGPS performance checks were performed in accordance with Section 3.4.4 of the FPM. Six observations of position were made from two DGPS base stations (GULL and GUSTAVUS) while the launches were rafted together with their GPS antennae within 2 meters of each other. RAINIER used SHIPDIM (version 2.2R) for periodic performance checks between station GULL and station GUSTAVUS. Some outliers were noted, but none indicated systematic or continuous errors in the GUSTAVUS beacon. Performance checks were performed periodically using SHIPDIM while the beacon was in use. The SHIPDIM OUTLIER.SUM results are included in the project data for OPR-0328-RA.

J. SHORELINE ✓ See Eval Rpt., section J

Photogrammetric survey CM-8904 was provided in digital format by N/NGS3 through the Pacific Hydrographic Branch (N/CS34). The digital file was projected to the survey grid with OPR-0328-RA geodetic parameters using program SHORE version 2.0 (provided by N/CS32) and stored in HDAPS format. Shoreline was plotted at survey scale on boat sheets and processing sheets from HDAPS.

CM-8904 provided no shoreline coverage for the eastern portion of this survey. Digitized USGS topographical quadrangle maps (Juneau B-3 through C-3) in .DXF format were provided by N/CS34 in accordance with Project Instructions. It is plotted in brown for orientation purposes only.

Method of Shoreline Verification ✓

Limited shoreline verification was conducted in accordance with the Project Instructions. For this survey the general limit of safe navigation of a survey launch was 30 meters offshore of apparent low tide, or approximately 3 to 5 meters of depth at Mean Lower Low Water. This NALL (Navigational Area Limit Line) varied in distance from shore and depth of water based on the apparent usefulness of the nearshore waters for navigation in the judgement of the hydrographer. See the Shoreline Flow Chart and Limited Shoreline Verification "New Rules" memoranda in Appendix XII for more information regarding the NALL.

The manuscript high water line was the seaward extent of flora in most areas of the survey, with a sand, gravel, and rock beach fronting this foliage. Detached positions and foul limit lines were acquired on manuscript features offshore of the NALL line to verify positions and determine extent of reefs, kelp, and connecting ledges which were not fully represented on the manuscript.

Shoreline notes describing offshore features found and the nature of the foreshore are in the detached position folders and portrayed on the Detached Position and Bottom Sample final plot submitted with this survey. Field cartographic codes were assigned to detached positions; until their heights can be reduced in final processing, rocks have been assigned code 089 if near vertical datum and code 165 if submerged. Heights are recorded in meters and decimeters and are corrected to predicted MLLW. All shoreline positions offshore of the NALL are plotted on the final field sheet. *Heights of rocks plotting along the shoreline were not determined during survey operations. There were no revisions to the mean high water line.*

Charted Features ✓

Survey data was compared to Chart 17316, 16th Edition, January 5, 1991, 1:80,000 (NAD 83), and Chart 17300, 27th Edition, August 14, 1993, 1:209,978 (NAD 83). Comparisons to the chart were complicated by the fact that the USGS shoreline for the western portion of the survey sheet was not consistent with that on the chart due to a 200 meter east-west offset. However, the charted shoreline was generally found to be in good agreement with this survey. Charted shoreline features such as rocks and reefs were in good agreement as well. Piles and floating docks within Tee Harbor that were offshore of the navigational area limit line were identified as new and positioned. *The USGS shoreline is shown in brown on the smooth sheet for orientation only. There were no significant discrepancies between the present survey data and USGS shoreline. Piles and floating docks have been shown on the smooth sheet as found during survey operations.*

K. CROSSLINES ✓

(0.5 Fms)
Crosslines agreed within 1 meter with mainscheme hydrography. Total mileage, including the buffer line (NALL), was 31.1 nautical miles or 13.3 % of total mainscheme hydrography.

L. JUNCTIONS ✓ See Final Report, section L

This survey junctions with surveys H-10680, RA-10-06-96, 1:10,000, at the northern limit, and H-10681, RA-10-08-96, at the southern limit. Soundings were found to be in good agreement. Final comparisons will be done at PHB after reduction to final sounding datum using tidal information collected concurrently with this survey.

* Filed with the hydrographic data.

M. COMPARISON WITH PRIOR SURVEYS See *Encl Report, Section M*

Three prior surveys cover this project area: H-2056 (1:40,000, 1890); H-3986WD (1:20,000, 1917); and T-3680 (1:20,000, 1917). Though the scale and age of the prior survey made comparisons somewhat inexact, the soundings from the prior surveys were generally in good agreement with the present survey. Differences in soundings were probably due to modern sounding and positioning equipment. In many cases, least depths found by previous wire drag survey were deeper than those found in the current survey. Final comparisons will be done at PHB after reduction to final sounding datum using tidal information collected concurrently with this survey.

N. ITEM INVESTIGATIONS ✓

Summary of AWOIS Items Assigned to this survey:

<u>Number</u>	<u>Short Description</u>	<u>Search Used</u>	<u>Results</u>	<u>Day/Fix Numbers</u>
50212	Wreck	Echo Sounder/Dive	Confirmed	136/ 69004
52286	Obstruction	Visual	Confirmed	129/ 60030-60035
52287	Obstruction	Visual	Disproved	132/ 60313
52288	Obstruction	Visual/Echo Sounder	Confirmed	136/50911-50958

Detailed Investigation Reports:

ITEM NO.: AWOIS 50212
Wreck

CHART NO.: 17316 (1:80,000)
EDITION: 16th Edition
CHART DATE: January 5, 1991

DESCRIPTION AND SOURCE OF ITEM:

Wreck of S.S. Princess Kathleen (1952) off Point Lena. Minimum depth of forty feet at MLLW. Source is NM 40/52 dated 10/4/52.

SOURCE POSITION:

latitude 58° 23' 44" N 58° 23' 42.80" N
longitude 134° 46' 42 " W (NAD 27) 134° 46' 48.44" W (NAD 83)

Note: Pre-Survey Review states NAD27 position latitude as 58° 28' 44" N. The hydrographer assumes this position was an error based on the position on the chart, and that the correct NAD 27 position latitude was 58° 23' 44" N. *Concur*

SURVEY REQUIREMENTS: Echo Sounder, Bottom Drag, Dive, Side Scan Sonar

METHOD OF INVESTIGATION:

Echo Sounder was used on DN 132 and DN 135, and dive operations were conducted on DN 136. Additionally, RAINIER personnel discussed the wreck with a local authority, Dr. C. William Carlson of NMFS Laboratory at Auke Bay. Dr. Carlson has written about the wreck and has dived on it several times. He was very helpful in assisting RAINIER personnel to determine the high point of the wreck.

RESULTS OF INVESTIGATION:

The Princess Kathleen was found to be laying on her port side, bow facing north, with her masts extending downward and offshore. The investigation dive and echo sounding work showed the high point to be the starboard bridgewing, at a depth of 8.0 meters at MLLW using predicted tides. *4.3 WK is plotted on the smooth sheet after application of approved tides. Wreck plots in 8 fathom depths. (4.3 fathoms)*

COMPARISON WITH PRIOR SURVEYS:

No prior survey was conducted after the date of the wreck.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS:

Charted position on Chart 17316 (1:80,000) appears to be in close agreement with that found in this survey. Recommend charting wreck with a dive-determined least depth of 4.3 fm and deleting the "PA" remark from Chart 17316. *Concur Pos. 691004 - Lat. 58/23/42.6828' long. 134/46/45.3320 Chart 44 WK*

Chart 17300 (1:209,978) does not show the wreck. The hydrographer recommends charting the wreck with a dive-determined least depth of 4.3 fm. *Wreck cannot be shown at Chart Scale. Do not chart*

ITEM NO.: AWOIS 52286
Obstruction

CHART NO.: 17316 (1:80,000)
EDITION: 16th Edition
CHART DATE: January 5, 1991

DESCRIPTION AND SOURCE OF ITEM:

Floating dock approximately 375 feet long and 10 feet wide, with piles spaced 40-60 feet across. Source is CL963, submitted by US Army Corps of Engineers in 1950.

SOURCE POSITION:

latitude 58° 24' 45" N
longitude 134° 45' 40" W (NAD 83)

SURVEY REQUIREMENTS:

Visual Search, Echo Sounder, Bottom Drag, Dive

METHOD OF INVESTIGATION: Visual Search at low water.

RESULTS OF INVESTIGATION:

The floating dock is no longer in existence; however, support piles remain in place and were positioned with DGPS on DN 129.

COMPARISON WITH PRIOR SURVEYS:

H-2056 (1:40,000, 1890), H-3986WD (1:20,000, 1917), and T-3680 (1:20,000, 1917) do not show this feature.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS:

Neither Chart 17316 (1:80,000) nor Chart 17300 (1:209,978) show the pile positions. Chart 17316 shows a dock (also described on DN 129) in the southwest part of Tee Harbor, but does not show the pile positions extending east-west across the southern head of Tee Harbor, east of this dock. The hydrographer recommends charting the piles and dock positions as depicted in this survey. Piles are located between $58^{\circ}24'43.199N, 134^{\circ}45'35.124W$ and $58^{\circ}24'42.867N, 134^{\circ}45'39.439W$. *cancel*

ITEM NO.: AWOIS 52287
Obstruction
CHART NO.: 17316 (1:80,000)
EDITION: 16th Edition
CHART DATE: January 5, 1991

DESCRIPTION AND SOURCE OF ITEM:

Barge ramp, fender and float. Ramp is 14 ft wide x 350 ft long. Fender is 375 ft long, along side with five attached 3-pile dolphins at 75 ft intervals. Float is furthest offshore and is 10 x 80 ft. Source is CL963, submitted by US Army Corps of Engineers in 1950.

SOURCE POSITION:

latitude $58^{\circ} 24' 45'' N$
longitude $134^{\circ} 45' 33'' W$ (NAD 83)

SURVEY REQUIREMENTS: Visual Search, Echo Sounder, Bottom Drag, Dive

METHOD OF INVESTIGATION:

Visually investigated on DN 132 (NALL). at lat. $58^{\circ}24'44.989N, 134^{\circ}45'32.378W$ (pos# 60313)

RESULTS OF INVESTIGATION:

The location given put the feature inside the NALL. No evidence of the barge ramp, float, fender, or dolphins was found. A fifty meter-radius area was searched for ten minutes; water depth was approximately five meters, and visibility was greater than five meters. A detached position (Fix: 60313, DN 132) was taken at the given location.

COMPARISON WITH PRIOR SURVEYS:

H-2056 (1:40,000, 1890), H-3986WD (1:20,000, 1917), and T-3680 (1:20,000, 1917) do not ~~show~~ show these features.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS:

Chart 17316 (1:80,000) shows a dock extending to the north from the southern head of Tee Harbor. The hydrographer recommends deleting this feature from the chart. *cancel*

ITEM NO.: AWOIS 52288
Obstruction
CHART NO.: 17316 (1:80,000)
EDITION: 16th Edition
CHART DATE: January 5, 1991

DESCRIPTION AND SOURCE OF ITEM:

Prior survey H-3986WD (1917) shows a rock submerged nine feet at MLLW and is 3 x 5 feet long and covered with kelp. The feature is referenced in CL521 (1961) and CL891 (1964). CL1596 (1964) describes a rock submerged 1.2 fathoms. CL1596 was submitted from BP66905, prepared by C&GS Ship LESTER JONES. The least depth was found using a leadline. CL275 (1991) was submitted by the USCG concerning a one fathom shoal. USCGC WOODRUSH determined the feature to be a pinnacle with a thirty foot diameter in 1987.

SOURCE POSITION: (of northernmost point scaled from chart)

latitude 58° 25' 12" N 58° 25' 10.81" N
longitude 134° 46' 12" W (NAD 27) 134° 46' 18.44" W (NAD 83)

SURVEY REQUIREMENTS: Echo Sounder, Bottom Drag, Dive

METHOD OF INVESTIGATION:

Developed with echo sounder using 10 meter line spacing on DN 120, DN 135, and DN 136.

RESULTS OF INVESTIGATION:

Ten meter line spacing was used on DN 120 and DN 135 in an attempt to locate the feature at the given location. The bottom was determined to be sloping away from the shore with depths near the position ranging between 25 and 45 meters. However, a nearby shoal marked by red buoy "2" has a pinnacle rock which fits the description. This feature is located outside Tee Harbor, 150 meters to the northeast of the given position for AWOIS #52288, and was developed with ten meter line spacing on DN 136. The least depth found was 0.8 meters. (0.5 fathoms)
pos # 58941/2 at lat. 58/25/15.865 N, long. 134/46/2.923 W.

COMPARISON WITH PRIOR SURVEYS:

None of the prior surveys indicate shoaling in the vicinity of the given position for AWOIS #52288. H-2056 (1:40,000, 1890) and T-3680 (1:20,000, 1917) indicate no shoal in the vicinity of the feature 150 meters to the northeast of the given AWOIS position, but H-3986WD (1:20,000, 1917) shows a submerged rock with an adjacent 9 fath sounding.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS:

Chart 17316 (1:80,000) does not show shoaling in the vicinity of the given AWOIS position.

The chart shows the feature 150 meters to the northeast of the given AWOIS position as a large one fathom shoal marked by navigational buoy "2" and "RK". In actuality, this feature is a ledge extending northward from Point Stephens with a pinnacle rock whose least depth is 0.8 meters (one-half fathom). The hydrographer recommends that this feature be charted as a submerged rock with known depth one-half fathom, while retaining the foul line as appropriate to indicate the extent of the submerged ledge. (Chart 1/2 RK) *Concur*

O. COMPARISON WITH THE CHART *See Envr report, section O*

This survey was compared in the field to NOS chart 17316, 16th Edition, dated January 5, 1991, 1:80,000 (NAD 83), and NOS chart 17300, 27th Edition, August 14, 1993, 1:209,978 (NAD 83).

In general, charted soundings were found to be in good agreement with those from the current survey. Least depths from this survey were often shoaler than charted soundings due to the use of modern positioning equipment and increased sounding densities. In areas where charted soundings appear shoaler than those from this survey, they generally differ by less than 10%. Differences probably arise from positioning and scaling errors from the prior surveys. Areas in which charted soundings were significantly shoaler than those from this survey were as follows:

<u>Latitude</u>	<u>Longitude</u>	<u>Charted Sounding</u>	<u>Current Sounding</u>	<u>Line Spacing</u>
58° 26' 07" N	134° 49' 28" W	3 1/4 fm	6 fm	50 m
58° 25' 04" N	134° 46' 42" W	27 fm	33 fm	100 m
58° 24' 03" N	134° 46' 12" W	5 fm	7 fm	10 m
58° 23' 50" N	134° 45' 30" W	4 3/4 fm	9 fm	50 m
58° 23' 30" N	134° 49' 06" W	3 3/4 fm	9 fm	50 m

Each of these charted soundings was obtained from a 1:40,000 scale prior survey (H-2056, 1890), so survey positioning and chart scaling errors were a possible source of error in chart compilation. In addition, all soundings except one (27 fathom) were located near the shoreline, suggesting intentional offset by the cartographer. In the case of the charted 27 fathom sounding, it appears that this depth may have been mistakenly offset; a shoal area was found approximately 300 ¹⁵⁰ meters to the west and developed with 25 meter line spacing, with least depth 2 ^{2 1/2} fathoms. These areas have been adequately developed by the current survey, and the erroneous soundings on the current chart should be superseded by soundings from this survey. *concur*

Many of the charted shoal areas were found to be significantly shoaler using modern sounding equipment in this survey. This is particularly true of the charted 8 fathom shoal near the entrance to Tee Harbor (approximately 58° 25' 30" N latitude, 134° 46' 45" W longitude) and the 6 1/2 fathom shoal at the southern end of Aaron Island; least depths determined for these shoals were 5 3/4 fm and 2 fm, respectively. Lesser depths were also found for some of the shoals off of the eastern shore of Shelter Island. In addition, the shoal area beneath buoy "2" at the entrance to Tee Harbor was fully developed by echo sounder, as were other shoals within this harbor.

The hydrographer recommends that 5 fathom contours be charted to better reflect the extent of the shoal area south of Aaron Island as well as the shoal area north of Point Lena. *Do not concur*

Non-sounding features are discussed in Section J. Final comparisons will be made at PHB after application of real tide correctors. *The three (3) fathom is fine.*

Dangers to Navigation

Twelve dangers to navigation within the limits of H-10682 were reported to the Seventeenth Coast Guard District, June 6, 1996. Copies of the correspondence can be found in *Appendix I* *this report.*

P. ADEQUACY OF SURVEY ✓

Survey H-10682 is complete and adequate to supersede prior soundings and features in their common areas. *Do not concur, see Exam Report, section III.*

Q. AIDS TO NAVIGATION See Eum report, section Q.

Two navigational lights exist within the survey area, Aaron Island light and Tee Harbor light. These lights were positioned by static GPS techniques from control station GULL on DN 135. Positions were determined using Ashtech GPPS software. In addition, a DGPS detached position (#50973) was obtained on DN 136 for buoy "2" at the entrance to Tee Harbor. See Section Q, Descriptive Report Insert, Appendix II.

R. STATISTICS ✓

NM Hydrography	233.8
Velocity Casts	2
Detached Positions	14
Selected Soundings	12766
Bottom Samples	35
Tide Stations	1
NM ² Hydrography	8.7
Dives	1

S. MISCELLANEOUS ✓

Bottom samples were collected and sent to the Smithsonian Institution in accordance with Project Instructions. No unusual tidal currents were found during the time of this survey. Secchi disk observations were performed during hydrographic data operations, and results will be forwarded upon completion of this project. Although a submerged cable area is indicated on the chart, it was not investigated and should therefore be retained as charted. Concur

T. RECOMMENDATIONS ✓

None


U. REFERRAL TO REPORTS ✓

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


<u>Title</u>	<u>Date Sent</u>	<u>Office</u>
Spring 1996 Horizontal Control Report for OPR-O328-RA.	June, 1996	N/CS34
Spring 1996 Coast Pilot Report for OPR-O328-RA.	June, 1996	N/CS26

<u>Title</u>	<u>Date Sent</u>	<u>Office</u>
Project related data for OPR-O328-RA.	Incremental	N/CS34
Secchi Disk Observations for OPR-O328-RA	June, 1996	N/CS31

Respectfully Submitted,


Stephen Meador
Lieutenant, NOAA

Approved and Forwarded,


Dean R. Seidel
Captain, NOAA
Commanding Officer

CONTROL STATIONS as of 2 Dec 1999 ✓

No	Type	Latitude	Longitude	H	Cart	Freq	Vel	Code	MM/DD/YY	Station Name
* 1	F	058°31'42.000	134°56'00.000	0	0	0.0	0.0	0.0	03/01/92	POUNDSSTONE LIGHTHOUSE
* 2	F	058°31'42.860	134°56'02.680	0	0	0.0	0.0	0.0	03/01/92	POUNDSSTONE HOOPS
3	F	058°30'16.042	134°52'09.349	2	250	0.0	0.0	0.0	03/20/96	GULL, 1917 <i>used</i>

* Used for CALIBRATION only



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

June 6, 1996

**ADVANCE
INFORMATION**

Commander
Seventeenth Coast Guard District
Post Office Box 3-5000
Juneau, Alaska 99802

Dear Sir:

During the processing of hydrographic survey H-10682, in Northern Stephens Passage twelve dangers to navigation have been discovered. These dangers affect the following charts:

<u>Number</u>	<u>Edition</u>	<u>Date</u>	<u>Scale</u>	<u>Datum</u>
17300	27TH ED.	93/08	1:209,978	NAD 83
17316	16TH ED.	91/01	1:80,000	NAD 83

It is recommended that these dangers to navigation be included in the Local Notice to Mariners.

Questions concerning this report should be directed to the Pacific Hydrographic Branch at (206) 526-6835.

Sincerely,

Dean R. Seidel
Captain, NOAA
Commanding Officer
NOAA Ship RAINIER

Enclosure

cc: DMA/HTC
PMC
N/CS262



P 062356Z JUN 96
 FM NOAA S RAINIER
 TO CCGDSEVENTEEN JUNEAU AK
 DMAHTCCNAVWARN WASHINGTON DC//MCNM//
 INFO NOAA MOP SEATTLE WA
 BT
 UNCLAS

**ADVANCE
 INFORMATION**

NOAA SHIP RAINIER HAS LOCATED 12 DANGERS TO NAVIGATION IN
 NORTHERN STEPHENS PASSAGE (PROJECT: OPR-0328-RA)
 WITHIN THE LIMITS OF HYDROGRAPHIC SURVEY H-10682.

THE FOLLOWING INFORMATION IS PROVIDED FOR PUBLICATION IN
 LOCAL NOTICE TO MARINERS:

DEPTHS ARE REDUCED TO MLLW BASED ON PREDICTED TIDES.

AFFECTED CHARTS:

NUMBER	EDITION	DATE	SCALE
17300	27TH ED.	93/08	1:209,978
17316	16TH ED.	91/01	1:80,000

ALL CHART DATUM ARE NAD83.

ITEM	DANGER	DEPTH	LATITUDE (N)	LONGITUDE (W)
A*	ROCK	COVERED 1/4 FM (1/2)	058:25:15.5	134:46:12.9
B	SHOAL	8 1/2 FM	058:25:27.0	134:45:46.2
C	SHOAL	5 3/4 FM	058:25:32.0	134:46:45.7
D	SHOAL	2 1/2 FM	058:25:47.9	134:48:16.5
E	SHOAL	5 FM	058:25:51.1	134:49:06.9
F*	ROCK	COVERED 3/4 FM	058:26:32.5	134:49:38.5
G*	SHOAL	9 3/4 FM (9 1/2)	058:26:43.1	134:50:23.9
H*	SHOAL	8 1/2 FM (8 3/4)	058:25:42.9	134:46:48.3
I	SHOAL (Wreck)	4 1/4 FM	058:23:42.7	134:46:45.4
J*	SHOAL	6 FM (6 1/4)	058:23:49.2	134:46:47.4
K*	SHOAL	3 1/2 FM (3 3/4)	058:23:56.5	134:46:10.4
L	SHOAL	7 1/2 FM	058:25:03.1	134:49:45.7

* Revised on smooth sheet based on actual tides. Item I cannot be shown on chart due to wreck and a submerged rock.
 THIS IS ADVANCE INFORMATION SUBJECT TO OFFICE REVIEW. QUESTIONS
 CONCERNING THIS MESSAGE SHOULD BE DIRECTED TO THE CHIEF, PACIFIC
 HYDROGRAPHIC BRANCH AT (206) 526-6835. A LETTER WITH ATTACHED

DANGERS TO NAVIGATION

OPR-0328-RA

NORTHERN STEPHENS PASSAGE

**ADVANCE
INFORMATION**

REGISTRY NUMBER H-10682

<u>AFFECTED CHARTS:</u>	<u>Number</u>	<u>Edition</u>	<u>Date</u>	<u>Scale</u>	<u>Datum</u>
	17300	27 TH ED	93/08	1:209,97	NAD 83
	17316	16 TH ED	91/01	1:80,000	NAD 83

<u>ITEM</u>	<u>DANGER</u>	<u>DEPTH</u>	<u>LATITUDE (N)</u>	<u>LONGITUDE (W)</u>
A *	ROCK	Submerged COVERS 1/4 FM (2)	058:25:15.465	134:46:12.923
B	SHOAL	8 1/2 FM	058:25:27.046	134:45:46.223
C	SHOAL	5 3/4 FM	058:25:32.005	134:46:45.717
D	SHOAL	2 1/2 FM	058:25:47.852	134:48:16.525
E	SHOAL	5 FM	058:25:51.146	134:49:06.869
F *	ROCK	Submerged COVERS 3/4 FM	058:26:32.476	134:49:38.508
G *	SHOAL	9 3/4 FM (9 1/2)	058:26:43.101	134:50:23.857
H *	SHOAL	8 1/2 FM (8 3/4)	058:25:42.865	134:46:48.329
I	SHOAL (wk)	4 1/4 FM	058:23:42.682	134:46:45.382
J *	SHOAL	6 FM (6 1/4)	058:23:49.216	134:46:47.397
K *	SHOAL	3 1/2 FM (3 1/4)	058:23:56.471	134:46:10.403
L	SHOAL	7 1/2 FM	058:25:03.086	134:49:45.730

* Revised on smooth sheet based on actual tides, Item J cannot be shown on the chart due to 2 4 1/4 wk and a submerged rock.

APPROVAL SHEET

for

H-10682

RA-10-07-96

Standard procedures were followed in accordance with the Hydrographic Manual, Fourth Edition; the Hydrographic Guidelines; and the 1994 version of the Field Procedures Manual in producing this survey. The data were examined daily during data acquisition and processing.

The field sheet and accompanying records have been examined by me, are considered complete and adequate for charting purposes, and are approved.



Dean R. Seidel
Captain, NOAA
Commanding Officer



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Office of Ocean and Earth Sciences
Rockville, Maryland 20852

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: September 12, 1996

ORIGINAL

HYDROGRAPHIC BRANCH: Pacific

HYDROGRAPHIC PROJECT: OPR-0328-RA

HYDROGRAPHIC SHEET: H-10682

LOCALITY: Favorite Channel, from Eagle Rock to Point Lena,
Northern Stephens Passage, Alaska

TIME PERIOD: May 8 - 21, 1996

TIDE STATION USED: 945-2336 Lincoln Island, AK
Lat. 58° 29.9'N Lon. 134° 57.9'W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 4.595 meters



page 2 of 2 pages for H-10682.

REMARKS: RECOMMENDED ZONING

Zone SEA3 - bounded by the polygon points:

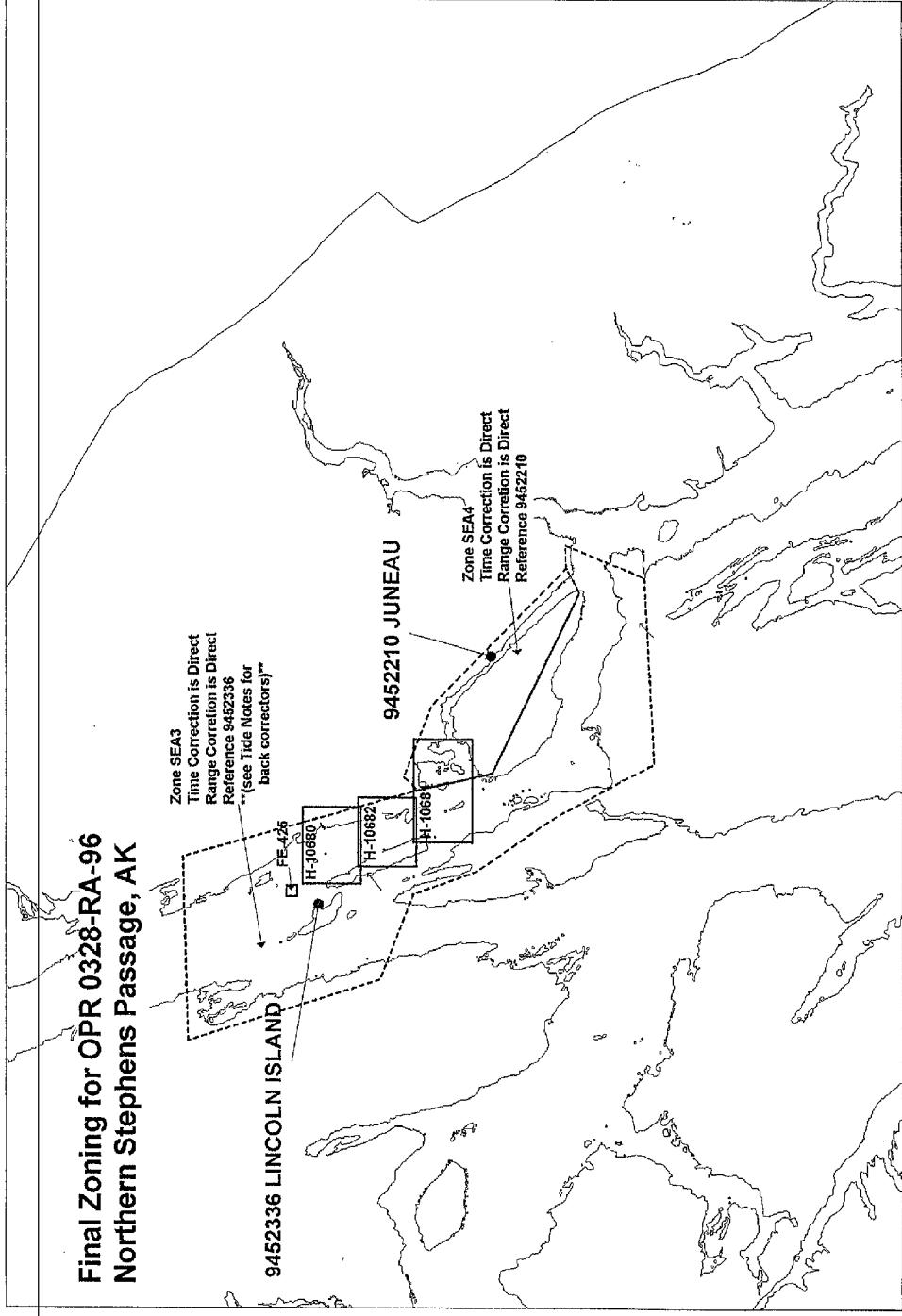
LONGITUDE (W)	LATITUDE (N)
-135.270539	58.649457
-134.858495	58.655566
-134.710781	58.382241
-134.673853	58.297194
-134.269583	58.196589
-134.215162	58.212147
-134.164629	58.213184
-134.234985	58.121934
-134.651985	58.110941
-134.770999	58.224961
-134.891071	58.314673
-134.942379	58.387689
-135.133243	58.426392
-135.270539	58.649457

Times and heights are direct using Lincoln Island, AK (945-2336).

Note: Times are tabulated in Greenwich Mean Time.


CHIEF, DATUMS SECTION

**Final Zoning for OPR 0328-RA-96
Northern Stephens Passage, AK**




Zone SEA3
Time Correction is Direct
Range Correction is Direct
Reference 9452336
*(see Tide Notes for
back correctors)*

9452336 LINCOLN ISLAND

9452210 JUNEAU

Zone SEA4
Time Correction is Direct
Range Correction is Direct
Reference 9452210

NOAA FORM 76-155 (11-72)		U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION						SURVEY NUMBER H-10682										
GEOGRAPHIC NAMES																		
Name on Survey	A PH. CHART NO. 17516		B ON PREVIOUS SURVEY 17500		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	
	AARON ISLAND	X		X														
ALASKA (title)	X		X															2
COHEN ISLAND	X		X															3
COHEN REEF	X		X															4
EAGLE REEF (title)*	X		X															5
FAVORITE CHANNEL	X		X															6
LENA BEACH	X																	7
LENA COVE	X		X															8
LENA, POINT	X		X															9
SHELTER ISLAND	X		X															10
STEPHENS PASSAGE (title)	X		X															11
STEPHENS, POINT	X		X															12
TEE HARBOR (bay)	X		X															13
TEE HARBOR (pp1)	X		X															14
																		15
																		16
* Plots outside the survey area.																		17
																		18
																		19
																		20
																		21
																		22
																		23
																		24
																		25

Approved:

 Chief Geographer
 AUG 12 1996

NOAA FORM 77-27(H) (9-83)		U.S. DEPARTMENT OF COMMERCE			REGISTRY NUMBER H-10682		
HYDROGRAPHIC SURVEY STATISTICS							
RECORDS ACCOMPANYING SURVEY: To be completed when survey is processed.							
RECORD DESCRIPTION		AMOUNT		RECORD DESCRIPTION		AMOUNT	
SMOOTH SHEET		1		SMOOTH OVERLAYS: POS., ARC, EXCESS			
DESCRIPTIVE REPORT		1		FIELD SHEETS AND OTHER OVERLAYS			
DESCRIP- TION	DEPTH/POS RECORDS	HORIZ. CONT. RECORDS	SONAR- GRAMS	PRINTOUTS	ABSTRACTS/ SOURCE DOCUMENTS		
ACCORDION FILES	2						
ENVELOPES							
VOLUMES							
CAHIERS							
BOXES				1			
SHORELINE DATA							
SHORELINE MAPS (List):							
PHOTOBATHYMETRIC MAPS (List):							
NOTES TO THE HYDROGRAPHER (List):							
SPECIAL REPORTS (List):							
NAUTICAL CHARTS (List):							
OFFICE PROCESSING ACTIVITIES <i>The following statistics will be submitted with the cartographer's report on the survey</i>							
PROCESSING ACTIVITY				AMOUNTS			
Selected Soundings				VERIFICATION	EVALUATION	TOTALS	
POSITIONS ON SHEET						12766	
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				88		88	
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							
*USE OTHER SIDE OF FORM FOR REMARKS				TOTALS	88	8	96
Pre-processing Examination by J. Stringham				Beginning Date 6/17/96	Ending Date 6/21/96		
Verification of Field Data by D. Doles, R. Mayor, R. Davies				Time (Hours) 88	Ending Date 10/28/96		
Verification Check by B. Olmstead				Time (Hours) 6	Ending Date 10/29/96		
Evaluation and Analysis by R. Davies				Time (Hours) 8	Ending Date 10/28/96		
Inspection by B. Olmstead				Time (Hours) 12	Ending Date 11/1/96		

**EVALUATION REPORT
H-10682**

A. PROJECT

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

B. AREA SURVEYED

This survey was conducted in Northern Stephens Passage, Alaska. Specifically, the area is centered in Favorite Channel between Point Lena and Aaron Island.

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

Depths range from 0 to 79 fathoms. The bottom consists primarily of mud and gravel.

C. SURVEY VESSELS

The hydrographer's report contains information relating to survey vessels.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

Survey data were processed using the same Hydrographic Data Acquisition/Processing System (HDAPS) software used by the hydrographer; the Hydrographic Processing System (HPS) and AutoCad, Versions 12 and 13.

At the time of the survey certification the format for the transmission of digital data had not been finally approved. In the interim, digital data for this survey exists in the standard HPS format which is a database format using the .dbf extension. In addition, the sounding plot, created with the .dbf data and enhanced using the AutoCad system, is filed both in the AutoCad drawing format, i.e., .dwg; and in the more universally recognized graphics transfer format, .dxf. Copies of these data files will be retained at PHS until data transfer protocols are developed and approved.

The drawing files necessarily contain information which is not part of the HPS data set such as geographic name text, line-type, 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. 75.

The field sheet parameters have been revised to center the hydrography on the office plot. Data is plotted using a Modified Transverse Mercator projection and are depicted on a single sheet.

E. SONAR EQUIPMENT

Side scan sonar was not used on survey H-10682.

F. SOUNDING EQUIPMENT

Sounding equipment is discussed in the hydrographer's report.

G. CORRECTIONS TO SOUNDINGS

Predicted tides for Juneau, Alaska were used for the reduction of soundings during field processing. Approved hourly heights zoned direct from Lincoln Island, Alaska, gage 945-2336, were used during office processing. Soundings have been corrected for dynamic draft, actual tides and sound velocity. These reducers have been reviewed and are consistent with NOS specifications.

H. CONTROL STATIONS

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

The positions of the horizontal control stations used during hydrography are published values based on NAD 83. The smooth sheet is annotated with a NAD 27 adjustment tick based on values determined with 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: -1.191 seconds (-36.848 meters)
Longitude: 6.458 seconds (104.824 meters)

The year of establishment of control stations originate with the horizontal control records for this survey.

I. HYDROGRAPHIC POSITION CONTROL

Differential GPS(DGPS) was used to control this survey. A horizontal dilution of precision (HDOP) not to exceed 3.75 was computed for survey operations. No positions exceeded the limits in terms of horizontal dilution of precision (HDOP). NAD 83 is used as the horizontal datum for plotting and position computations.

J. SHORELINE

Shoreline drawn on the smooth sheet originates with one digital cartographic feature file (CFF), DM-10046 and U.S. Geological Survey Quadrangles, Juneau B-3, NW and NE.

The shoreline from the above sources have been digitized during office processing and merged with the survey file during ACAD processing. Changes to alongshore and offshore features shown on the shoreline maps were verified and revised as warranted during survey operations. These changes have been shown on the smooth sheet.

Shoreline originating with the USGS Quads is drawn in brown on the smooth sheet for orientation purposes only.

K. CROSSLINES

Crosslines are adequately discussed in the hydrographer's report.

L. JUNCTIONS

Survey H-10682 junctions with the following surveys.

<u>Survey</u>	<u>Year</u>	<u>Scale</u>	<u>Area</u>
H-10680	1996	10,000	North
H-10681	1996	10,000	South

M. COMPARISON WITH PRIOR SURVEYS

H-2056(1890) 1:40,000

Survey H-2056 covers the entire area of the present survey. Comparison with the present survey generally reveals differences of one fathom between survey depths. There appears to be no consistent pattern of shoaling or an increase of depths. These differences can be attributed to greater sounding coverage and relative accuracy of the data acquisition techniques. All critical depths originating from the prior survey were adequately addressed during survey operations.

T-3680(1917) 1:20,000

Prior shoreline map T-3680 covers the entire area common to survey H-10682. The shoreline has remained relatively stable and survey H-10682 compares adequately, however, there were two piles that were not investigated. These piles have been brought forward to this survey and depicted as submerged piles at latitude 58/23/39N, longitude 134/45/35W and latitude 58/23/41.5N, longitude 134/45/30.5W.

Except for the two piles mentioned above, survey H-10682 is adequate to supersede the prior surveys within the common area

H-3986 WD(1917) 1:20,000

Wire-drag survey H-3986 covers the entire area of the present depths. All wire-drag depths were investigated and found to be deeper than depths found by the present survey.

N. ITEM INVESTIGATIONS

There are four AWOIS items within the survey area. They are adequately addressed in the hydrographer's report, section N.

O. COMPARISON WITH CHART

Survey H-10682 was compared with the following charts.

<u>Chart</u>	<u>Edition</u>	<u>Date</u>	<u>Scale</u>	<u>Datum</u>
17316	16th	January 5, 1991	1:80,000	NAD 83
17300	2nd	August 14, 1993	1:209,978	NAD 83

a. Hydrography

Charted hydrography originates with the prior surveys mentioned in section M and miscellaneous sources. The prior surveys are discussed in section M and requires no further discussion. Charted miscellaneous source data was adequately addressed with the following exceptions.

Except two charted aids to navigation and two landmarks mention in section Q of this report, survey H-10682 is adequate to supersede charted hydrography seaward of the NALL limit line. In addition, a charted mooring buoy at latitude 58/25/54N and longitude 134/45/52W, was not addressed during survey operations and should be retained as charted.

b. Dangers to Navigation

Twelve dangers to navigation were reported to the USCG, DMAHTC and N/CS 261 on June 6, 1996. A copy of the report is attached. No additional dangers to navigation were found during office processing.

P. ADEQUACY OF SURVEY

Hydrography is adequate:

- a. delineate the bottom configuration, determine least depth, and draw the standard curves;
- b. reveal there are no significant discrepancies or anomalies requiring further investigations; 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 1994 Edition, with the exceptions of the following:

All aids to navigation within the survey area should be located and described. In addition, all charted features outside of the NALL limit line, should be investigated. Reference sections M, O and Q for specific items.

Q. AIDS TO NAVIGATION

There is one floating and two fixed aids to navigation within the surveys area. All were located and serve there intended purpose.

The following aids to navigation are located within the survey area but were not located or discussed. They should be retained as charted.

<u>Light List #</u>	<u>Name</u>	<u>Latitude(N)</u>	<u>Longitude(W)</u>
23830	Tee Harbor Control Buoy	58/24/51	134/45/36
23835	Cohen Reef Daybeacon C	58/25/54	134/48/18

There are two charted landmarks (TOWERS) which are located within the survey area at latitude 58/23/30N, longitude 134/46/12W. These landmarks were not positioned or discussed. The two landmarks (TOWERS) should be retained as charted.

R. STATISTICS

Statistics are itemized in the hydrographer's report.

S. MISCELLANEOUS

Miscellaneous information is found in the hydrographer's report. There were no additional miscellaneous items noted during office processing.

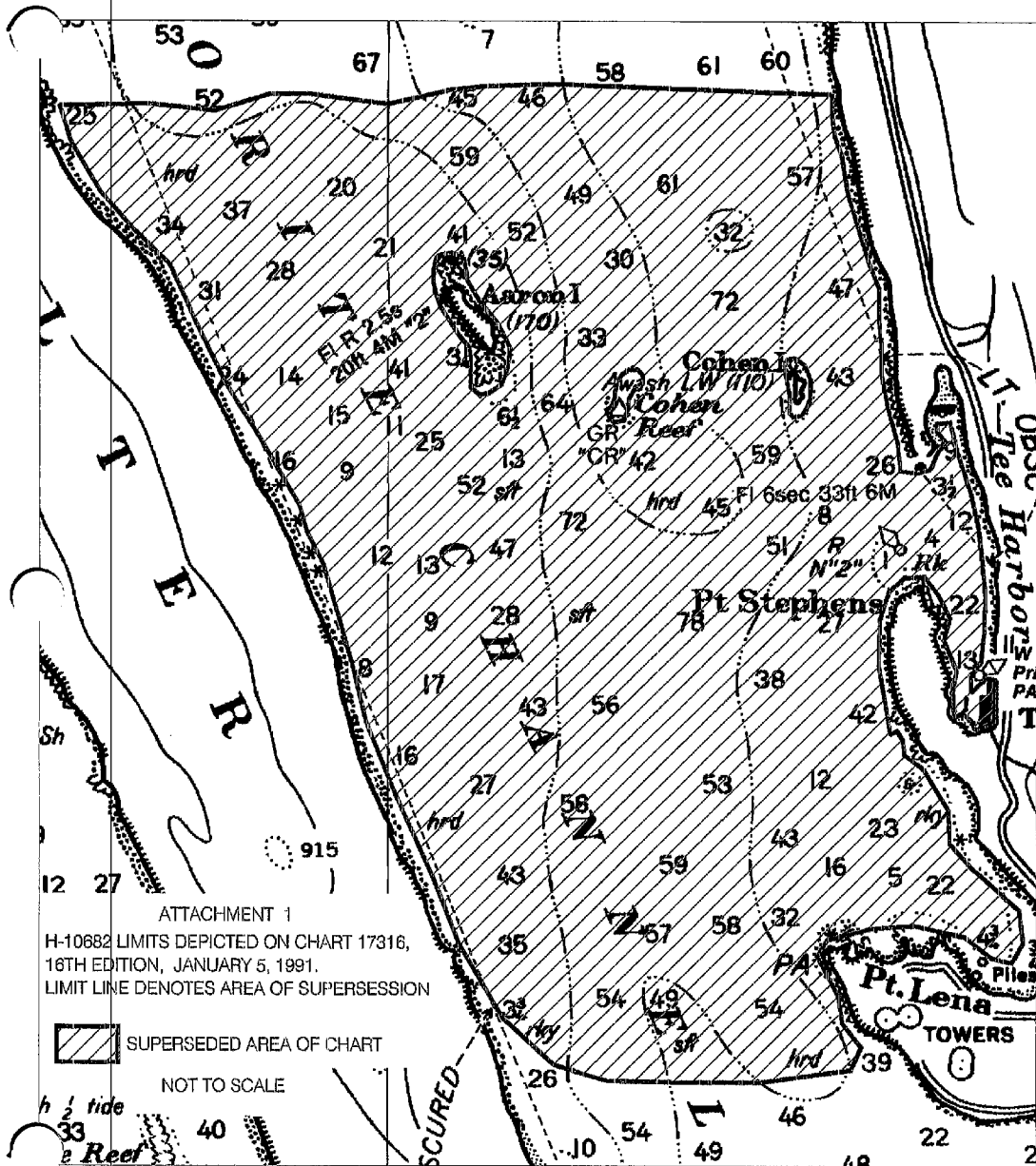
T. RECOMMENDATIONS

This is an adequate hydrographic survey. Additional field work is recommended to investigate the two piles mention in section M and the aids and landmarks mention in section Q of this report.

U. REFERRAL TO REPORTS

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

Charles R. Davies
C.R. Davies
Cartographer



APPROVAL SHEET
H-10682

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.

Bruce A. Olmstead Date: 11/1/96
Bruce A. Olmstead
Senior Cartographer, Cartographic Section
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.

Kathy Timmons Date: 11/18/96
Kathy Timmons
Commander, NOAA
Chief, Pacific Hydrographic Branch

Final Approval

Approved:

Andrew A. Armstrong III Date: Jan 13, 1997
Andrew A. Armstrong III
Captain, NOAA
Chief Hydrographic Surveys Division

