

H110676

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic
Field No. RA-10-3-96
Registry No. H-10676

LOCALITY

State Alaska
General Locality Southern Stephens Passage
Sublocality Spruce Island and Vicinity

1996

CHIEF OF PARTY
CAPT Dean R. Seidel, NOAA

LIBRARY & ARCHIVES

DATE MAY 29 1997

DIAGRAM 8201-4

Ⓐ

Ref: Bp 161500

PRODUCTS

17368

17360

17320

16016NC

HYDROGRAPHIC TITLE SHEET

H-10676

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-10-3-96

State Alaska

General locality Southern Stephens Passage

Locality Spruce Island and Vicinity

Scale 1:10,000 Date of survey April 11, to April 25, 1996

Instructions dated 2/12/96, Change #1-3/7/96* Project No. OPR-0136-RA

Vessel NOAA Ship RAINIER, Launches (2122), (2123), (2124), (2125), (2126)

Chief of party CAPT Dean R. Seidel, NOAA

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

Soundings taken by echo sounder, hand lead, pole DSF-6000

Graphic record scaled by RAINIER Personnel

Graphic record checked by RAINIER Personnel

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

Verification by R. Davies, D. Doles

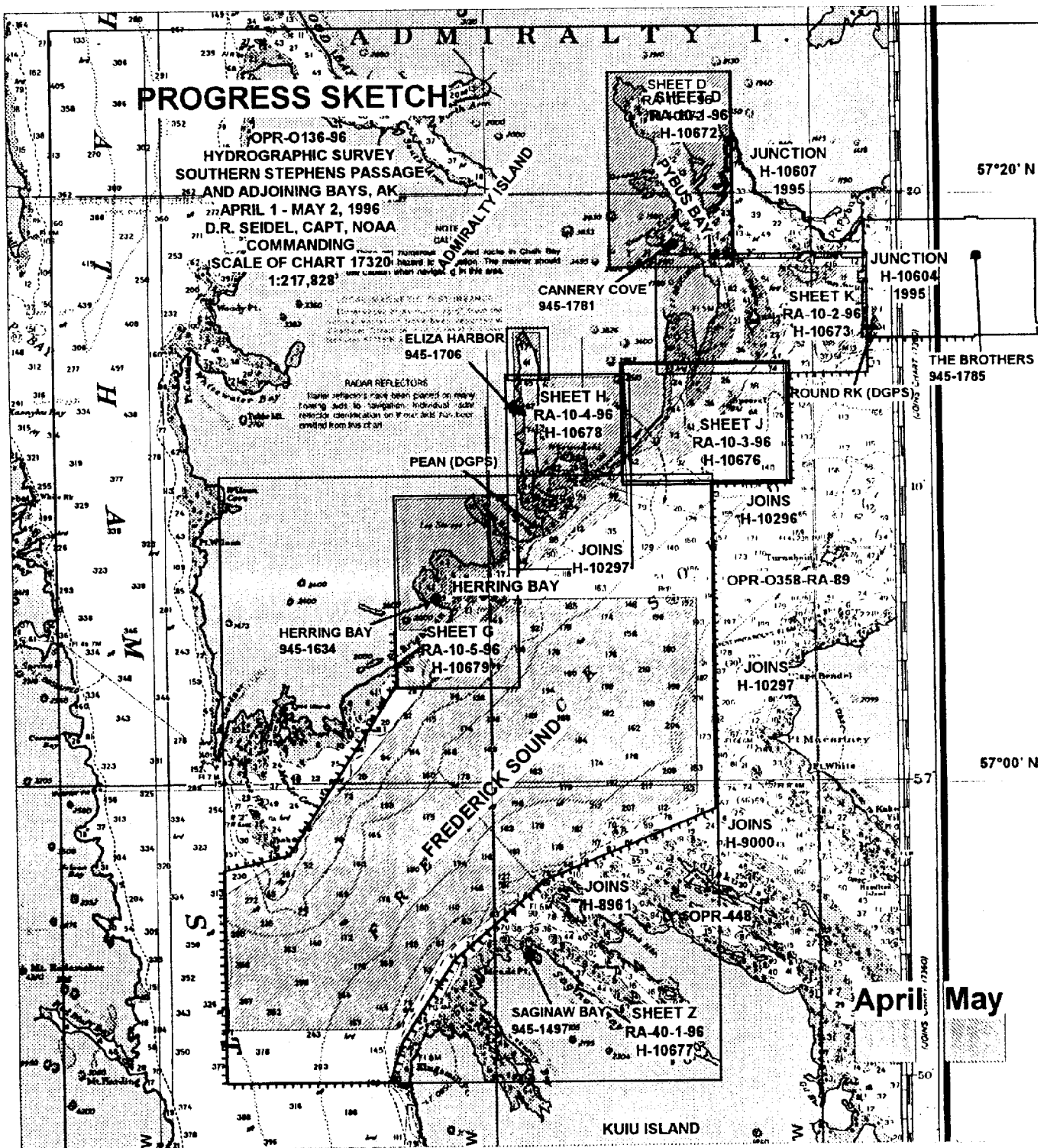
Soundings in fathoms ~~feet~~ at MEW MLLW and tenths

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.

* Change No. 2 dated April 11, 1996

SC 5-29-97 AWOIS and SURF ✓ END 5/97



PROGRESS SKETCH

OPR-0136-96
 HYDROGRAPHIC SURVEY
 SOUTHERN STEPHENS PASSAGE
 AND ADJOINING BAYS, AK
 APRIL 1 - MAY 2, 1996
 D.R. SEIDEL, CAPT, NOAA
 COMMANDING

SCALE OF CHART 17320
 1:217,828

ELIZA HARBOR
 945-1706

CANNERY COVE
 945-1781

JUNCTION
 H-10607
 1995

JUNCTION
 H-10604
 1995

SHEET K
 RA-10-2-96
 H-10673

SHEET H
 RA-10-4-96
 H-10678

SHEET J
 RA-10-3-96
 H-10676

PEAN (DGPS)

ROUND RK (DGPS)

THE BROTHERS
 945-1785

JOINS
 H-10297

JOINS
 H-10296

OPR-0358-RA-89

HERRING BAY
 945-1634

SHEET G
 RA-10-5-96
 H-10679

JOINS
 H-10297

FREDERICK SOUND

JOINS
 H-9000

JOINS
 H-8961

OPR-448

SAGINAW BAY
 945-1497

SHEET Z
 RA-40-1-96
 H-10677

April May

KUIU ISLAND

57°20' N

57°00' N

Descriptive Report to Accompany Hydrographic Survey H-10676

Field Number RA-10-3-96

Scale 1:10,000

April 1996

NOAA Ship RAINIER

Chief of Party: Captain Dean R. Seidel, NOAA

A. PROJECT ✓

This basic hydrographic survey was completed in Frederick Sound, Alaska, as specified by Project Instructions OPR-O136-RA dated February 12, 1996, Change number 1 dated March 7, 1996, and Change number 2 dated April 11, 1996. Survey H-10676 corresponds to sheet J 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 ✓

The survey area is located in Frederick Sound in the vicinity of Spruce Island. The survey's northern limit is 57° 14' 06" N, its eastern limit is 134° 02' 00" W, its southern limit is 57° 09' 54" N, and its western limit is 134° 11' 00" W. Data acquisition was conducted from April 11, 1996 (DN 102) to April 25, 1996 (DN 116).

C. SURVEY VESSELS ✓

Data were acquired by RAINIER survey launches as noted below:

Vessel	EDP #	Operation
RA-2	2122	Hydrography
RA-3	2123	Hydrography Shoreline Verification
RA-4	2124	Hydrography Shoreline Verification
RA-5	2125	Hydrography Shoreline Verification Sound Velocity Casts Bottom Samples
RA-6	2126	Hydrography

D. AUTOMATED DATA ACQUISITION AND PROCESSING ✓

Most data were acquired with HDAPS. Some data were acquired with HYPACK for Windows ver. 5.9 (September 1995) with vessel 2122. All data were processed using HDAPS. A complete listing of software for HDAPS and HYPACK is included in Appendix VI. *

E. SONAR EQUIPMENT ✓

Sonar equipment was not used on H-10676.

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 cast listed below:

Velocity Table #	Cast #	DN	Cast Position	Deepest Depth (m)	Applicable DN
3	3	102	57° 10' 28" N 134° 10' 11" W	220	102-116

The sound velocity cast was 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 2122-2126 in the spring of 1996. These values were entered into the offset tables * for each survey platform.

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-O136-RA. The data for vessels 2122-2126 were collected in Shilshole Bay, Washington in the Spring of 1996.

* Filed with the hydrographic data.

Offset Tables ✓

Offset tables^{*} contain offsets for the GPS antenna, as well as static draft measurements, and settlement and squat data. Offset tables 2-6 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-O136-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). Predicted tidal correctors as provided in the Project Instructions for H-10676 are amended by N/OES231 in a change dated April 4, 1996:

Zone	Time Correction	Height Correction
19	-0 hr 12 min	X0.87

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

Ketchikan, AK (945-0460) was used as the primary control station for datum determination at all subordinate stations.

RAINIER personnel installed four 8200 digital gages for this survey, one at Cannery Cove, Pybus Bay (945-1781) on April 1, 1996; one at The Brothers (945-1785) on April 2, 1996; one at Herring Bay (945-1634) on April 9, 1996; and one at Saginaw Bay (945-1497) on April 10, 1995. Each tide staff was connected to five bench marks during the opening level runs. The tide gages 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 4.

The horizontal datum for this project is NAD 83. First Order station ROUND ROCK, on Round Rock outside Pybus Bay, was the basis for control for this project as it was recovered in 1989 (OPR-O358-RA) and 1995. A static GPS vector from Second Order station PEAN, located at Point Napean, was used to check ROUND ROCK to 1:64,000. Reference mark measurements at PEAN confirmed that it had not been disturbed since its last recovery in 1989. The control stations are listed in ^{this report} Appendix H. See the OPR-O136-RA-96 Horizontal Control Report for more information.

I. HYDROGRAPHIC POSITION CONTROL ✓

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. *VHF differential reference stations were established at both ROUND ROCK and PEAN. The differences between the computed locations and the published positions were recorded by the MONITOR 3.0 program on DN 092-093 (ROUND ROCK) and DN 103-104 (PEAN) with a 1 meter offset between the Ashtech sensor and the reference GPS station. No multi-path or other systemic error was indicated for either reference station. The United States Coast Guard Differential GPS reference station at Gustavus, Alaska, was used for positioning of vessel 2126 during main scheme hydrography on DN 104. No systematic differences in positions between the Gustavus Beacon and the VHF reference station were apparent.

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 three DGPS base stations (ROUND ROCK, PEAN, and GUSTAVUS) while the launches were rafted together with their GPS antennae within 2 meters of each other. RAINIER began using SHIPDIM, version 2.2R (April 1996) on April 16 (DN 107) after this program was modified for use with the Trimble Centurion P-code receiver. Either station ROUND ROCK or station PEAN, and station GUSTAVUS provided input for periodic comparisons. 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-O136-RA.

Problems ✓

The reception of VHF correctors by vessel 2126 in the northern portion of the survey on DN 104 was intermittent, so the Gustavus beacon was used for positioning. Sounding comparisons between these data and other boats' data indicated no systemic error in positioning. *Data was analyzed during office processing and found to contain no significant problems.*

* Filed with the hydrographic data

J. SHORELINE *See Eval Rpt., Section J.*

Shoreline maps from Coastal Mapping project CM-8810 was supplied by N/CS341 in Standard Digital Data Exchange Format (SDDEF). The digital file was projected to the survey grid with OPR-O136-RA geodetic parameters using program Shore version 2.0, provided by N/CS32, and stored in HYPACK (*.DIG) format as well as HDAPS format. Shoreline was plotted at survey scale on boat sheets and processing sheets from HDAPS. *Shoreline map DM-10031, date of photography, May 1989, was used for the shoreline for this survey.*

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 offshore of the NALL line are shown on the smooth sheet in feet and have been corrected for approved tides. 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 ✓
Chart 17363, 11th Edition, April 27, 1991, 1:40,000 scale, (NAD 83) was enlarged to 1:10,000 for comparison purposes. Some positional differences were attributed to the enlargement process. Charted rocks offshore of the navigational area limit line were either identified as shoreline manuscript rocks or positioned as new rocks. Manuscript rocks inshore of the NALL were often matched to charted rocks, but were not positioned hydrographically; refer to the hydrographer's notes on the final Detached Position and Bottom Sample Plot.

K. CROSSLINES ✓

Crosslines agreed within 1 meter with mainscheme hydrography. Total mileage, including the shoreline buffer "NALL" was 25.8 nautical miles or 8.3% of total mainscheme hydrography.

* Filled with the hydrographic data.

L. JUNCTIONS ✓

This survey junctions with surveys H-10673, RA-10-2-96, 1:10,000, at the northern limit; H-10678, RA-10-4-96, at the western limit; H-10297, 1:20,000, 1989 at the southern limit; and H-10296, 1:20,000, 1989 at the eastern limit. Soundings were found to be in good agreement. Final comparison will be made at the Pacific Hydrographic Branch (PHB). *See Eval Rpt, section L.*

M. COMPARISON WITH PRIOR SURVEYS *See Eval Rpt, section M.*

Four prior surveys cover different parts of this survey: T-1964, 1:80,000, 1889; H-1996, 1:80,000, 1889-92; H-4511A, 1:20,000, 1925-26; and H-4511B WD, 1:20,000, 1925-26. Though the scale and age of the prior surveys made comparisons somewhat inexact, the soundings from these prior surveys were generally in good agreement with the present survey. Differences in soundings were probably due to modern sounding and positioning equipment as well as larger survey scale. 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 Number</u>
51198	Obstruction/Reef	Visual	Confirmed	103
51830	Obstruction/Rock	Visual/Echo Sounder	Disproved	114 / 52082
51839	Obstruction/Rock	Visual	Confirmed	103

Detailed Investigation Reports:

ITEM NO.: AWOIS 51198 ✓
Reef

CHART NO.: 17363 (1:40,000)
EDITION: 11th Edition
CHART DATE: April 27, 1991

DESCRIPTION AND SOURCE OF ITEM:

Rock awash was scaled from USGS quad (Sitka 1948). A reef uncovering 8 ft at MLLW was located by H-10296 in 1989; rock position scaled from DM10031 in 1989 is approximately 50 meters off the reef from H-10296. Resolve position discrepancy.

SOURCE POSITION:

	NAD27	H-10296-NAD83	DM10031-NAD83
Latitude	57° 12' 39" N	57° 12' 31.84" N	57° 12' 30.5" N
Longitude	134° 05' 29" W	134° 05' 47.46" W	134° 05' 47.2" W

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

METHOD OF INVESTIGATION:

Visually investigated on DN 103 (NALL).

RESULTS OF INVESTIGATION:

Both items were determined to be part of the same reef which lies at the end of a ledge extending from the southern end of Spruce Island. All features lie within the Navigable Area Limit Line.

COMPARISON WITH PRIOR SURVEYS:

The reef was positioned by H-10296 in 1989. Survey H-4511A (1926) indicated an extensive ledge extending offshore of the islet in a southwesterly direction, but the scale of the survey prevents further comparisons. H-1996 (1892) indicated a reef uncovering 4 feet at MLLW.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS:

The positions from both H-10296 and DM10031 appear to be correct, indicating different parts of the same reef feature. The hydrographer recommends that the reef be carried forward as depicted on the current chart. *Concur, shown on the smooth sheet as foul.*

ITEM NO.: AWOIS 51830 ✓
Rock Awash

CHART NO.: 17363 (1:40,000)
EDITION: 11th Edition
CHART DATE: April 27, 1991

DESCRIPTION AND SOURCE OF ITEM:

Rock awash scaled from USGS quad (Sitka 1948); subsequent photogrammetry did not show charted rock.

SOURCE POSITION:

Latitude	57° 11' 50" N	57° 11' 48.77" N
Longitude	134° 10' 00" W (NAD27)	134° 10' 06.24" W (NAD83)

SURVEY REQUIREMENTS: Visual Search, Bottom Drag, Dive

METHOD OF INVESTIGATION:

Visual Search at low water, followed by echosounder development.

RESULTS OF INVESTIGATION:

A large submerged rock extending from shore was identified visually on DN 114 by VN 2125 near position 52082, with >5 meter water visibility. The shoalest depth found during this search was ^{3.8}5.5 meters at MLLW, based on predicted tides. *Added rocky notation to 1.8 Fm depth. (1.8 Fathoms) with approved tides*

COMPARISON WITH PRIOR SURVEYS:

T-1964 (1889) indicated a series of rocks tending parallel to the shoreline in the general vicinity. The scale of this survey limits further comparisons.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS:

The rock awash position indicated on the chart is essentially located at the shoalest sounding found in the immediate area (3.8 meters) during this survey.

(1.8 FATHOMS) at lat. 57/11/48.4N

another shoal sounding was located south of the above feature at lat. 57/11/45.8N long. 134/10/9.5W, a 1.6 Fathom sounding. This sounding, 1.6 fm, is recommended for charting. Also a note "rky" should be in this general area.

The large submerged rock that was detected does not uncover at MLLW as indicated on the chart and is not significantly different from the many other shoals in the area, some of which have shoaler depths. The hydrographer recommends that this rock awash be removed as a separate feature and replaced with soundings from this survey. In addition, the near shoreline area indicated on the smooth sheet should be labeled "Foul with Rocks". *see above annotation*

ITEM NO.: AWOIS 51839 ✓
Rock Awash

CHART NO.: 17363 (1:40,000)
EDITION: 11th Edition
CHART DATE: April 27, 1991

DESCRIPTION AND SOURCE OF ITEM:

Rock awash scaled from USGS quad (Sitka 1948); subsequent photogrammetry did not show charted rock, although a rock is shown approximately 60 meters to the north.

SOURCE POSITION:

latitude 57° 13' 10" N 57°13' 08.77" N
longitude 134° 07' 07" W (NAD27) 134° 07' 13.24" W (NAD83)

SURVEY REQUIREMENTS: Visual Search, Bottom Drag, Dive

METHOD OF INVESTIGATION:

Visually investigated on DN 103 (NALL).

RESULTS OF INVESTIGATION:

Item was determined to be an outcropping from the charted reef located at approximately 57° 13' 15" N latitude and 134° 07' 10" W longitude. The reef and outcropping lie within the Navigable Area Limit Line.

COMPARISON WITH PRIOR SURVEYS:

Survey H-4511A (1926) did not indicate a rock in this area, only a 4 1/2 fathom sounding in the general vicinity.

COMPARISON WITH THE CHART AND CHARTING RECOMMENDATIONS:

The outcropping does not appear to uncover at MLLW as charted. However, the feature extends slightly further off the reef than is charted and represents a danger to navigation.* The hydrographer recommends that the rock awash be changed to a rock/kelp foul area and extended south from the charted reef to the NALL. The waters around the eastern face of the charted reef are generally foul with kelp and should be labeled as such. *Chart foul limit line, kelp and a shoal sounding of 1.2 fm at lat. 57/13/06.3N, long. 134/07/14.7 W. Also chart "rky" note*

O. COMPARISON WITH THE CHART

This survey was compared in the field to NOS chart 17363, 11th Edition, April 27, 1991, 1:40,000 scale, (NAD 83). In addition, an enlargement of this chart was used to place features and soundings (converted to meters) on the boat sheet.

* Rock awash currently charted conveys dangerous nature of survey area. At chart scale, survey data does not have critical information in vicinity of charted rock other than dangers reported by field.

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 due to the use of modern positioning and sounding equipment. Areas in which charted soundings appear shoaler than those from this survey have been adequately sounded and probably arise from positioning and scaling errors from the older surveys. Charte shoreline features such as rocks and reefs were in general agreement with this survey. Minor differences were probably due to positioning and scaling errors from the prior surveys. *Concur*

Charted 10 fathom contours were generally found to be conservative along the shoreline of Admiralty Island as well as Spruce Island. However, the complexity of the northwest section of the survey area (around the islands and reefs between Pybus and Little Pybus Bays) was not reflected in the charted contours or soundings. The 3 and 10 fathom contours* are not conservative enough in certain parts of this area, and there are numerous shoals* around the islands, some of which may present a hazard to navigation. This is particularly true of the small shoals that fall between the charted 3 and 10 fathom contours at the southern end of these islands. There are also small shoals present along the southern portion of the Admiralty Island shoreline between the 3 and 10 fathom contours (approximately 300 - 400 meters offshore) which are not adequately identified on the chart and which may present a hazard to navigation.

The hydrographer recommends that additional contours* be charted to reflect the complexity of the area between Little Pybus Bay and Pybus Bay, as well as the southern portion of the Admiralty Island shoreline and the waters around Spruce Island. (A portion of the Admiralty Island shoreline should also be labeled "Foul with Rocks" as specified in the final plot sheets.) *Concur*

Non-sounding features are discussed in Section J. Final comparisons will be made at PHB after application of real tide correctors.

See EVAK report, section 0

Dangers to Navigation ✓

Nine dangers to navigation within the limits of H-10676 were reported to the Seventeenth Coast Guard District, May 9, 1996. Copies of the correspondence can be found in Appendix I of this report.

P. ADEQUACY OF SURVEY ✓

Survey H-10676 is complete and adequate to supersede prior soundings and features in their common areas. *Concur*

Q. AIDS TO NAVIGATION ✓

No Aids to Navigation exist within the survey area. *Concur*

* The present survey information reflects the bottom complexity and additional shoal information which will be used to update the next chart edition. This data will more accurately portray the charted depth curves and provide a better graphic portrayal to the users in navigating these areas.

R. STATISTICS ✓

NM Hydrography	311.1
Velocity Casts	1
Detached Positions	4
Selected Soundings	12472
Bottom Samples	28
Tide Stations	4
NM ² Hydrography	8.5
Dives	0

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. General water visibility was 5-10 meters, which is common in this area before the spring plankton blooms, which usually occur in late May.

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-O136-RA.	June, 1996	N/CS34
Spring 1996 Coast Pilot Report for OPR-O136-RA.	June, 1996	N/CS26
Project related data for OPR-O136-RA.	Incremental	N/CS34
Secchi Disk Observations for OPR-O136-RA	June, 1996	N/CS31

Respectfully Submitted,


Stephen S. Meador
Lieutenant, NOAA

Approved and Forwarded,


Dean R. Seidel
Captain, NOAA
Commanding Officer

CONTROL STATIONS as of 23 Apr 1996 ✓

No	Type	Latitude	Longitude	H	Cart	Freq	Vel	Code	MM/DD/YY	Station Name
1	F	057:15:35.178	133:56:12.977	17	250	0.0	0.0	04/01/96		ROUND ROCK, 1917
2	F	057:08:32.216	134:16:45.822	7	250	0.0	0.0	04/12/96		PEAN, 1917
3	F	057:15:59.415	134:05:00.129	14	250	0.0	0.0	04/15/96		GRAVE ISLAND, 1996 (Field Position)



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

May 9, 1996

**ADVANCE
INFORMATION**

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

Dear Sir:

During the processing of hydrographic surveys H-10673, H-10676, and H-10678, in Southern Stephens Passage forty-five dangers to navigation have been discovered. These dangers affect the following charts:

<u>Chart</u>	<u>Edition/Date</u>	<u>Datum</u>
17320	11TH ED. JUN 01/91	NAD83
17360	29TH ED. JUL 09/94	NAD83
17363	11TH ED. APR 27/91	NAD83
17365	11TH ED. MAR 23/91	NAD83

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



**ADVANCE
INFORMATION**

REGISTRY NUMBER H-10673

AFFECTED CHARTS: 17320 11TH ED. JUN 01/91 1:217828 NAD83
 17360 29TH ED. JUL 09/94 1:217,828 NAD83
 17363 11TH ED. APR 27/91 1:40,000 NAD83

<u>ITEM</u>	<u>DANGER</u>	<u>DEPTH</u>	<u>LATITUDE (N)</u>	<u>LONGITUDE (W)</u>
A	ROCK	AWASH	57/17/40.5	133/59/38.8
B	SHOAL	COVERS 1 FM	57/17/27.3	134/04/23.4
C	ROCK	COVERS 1/2 FM	57/17/18.2	134/02/02.4
D	ROCK	COVERS 2 FM	57/17/16.1	134/06/11.4
E	SHOAL	COVERS 7 FM	57/17/09.6	134/03/37.8
F	SHOAL	COVERS 10 FM	57/17/09.2	134/04/48.7
G	ROCK	COVERS 3/4 FM	57/17/06.4	133/59/14.8
H	SHOAL	COVERS 3/4 FM	57/16/45.1	133/59/46.9
I	ROCK	COVERS 1 1/4 FM	57/16/42.7	134/04/22.3
J	ROCK	AWASH	57/16/39.2	134/01/16.0
K	SHOAL	COVERS 4 FM	57/16/28.3	134/04/12.4
L	SHOAL	COVERS 4 FM	57/16/24.3	134/05/08.5
M	SHOAL	COVERS 3 3/4 FM	57/15/57.5	134/04/00.2
N	ROCK	COVERS 1/4 FM	57/15/29.6	134/05/40.3
O	SHOAL	COVERS 2 FM	57/15/19.7	134/05/13.5
P	ROCK	AWASH	57/14/51.1	134/08/20.3
Q	ROCK	COVERS 1 3/4 FM	57/14/49.8	134/05/19.4
R	ROCK	COVERS 3/4 FM	57/14/42.7	134/07/54.4
S	SHOAL	COVERS 5 1/4 FM	57/14/37.6	134/05/08.8
T	ROCK	COVERS 1 1/4 FM	57/14/31.8	134/03/37.8
U	SHOAL	COVERS 3 FM	57/14/27.3	134/08/06.5

REGISTRY NUMBER H-10676

AFFECTED CHARTS: 17320 11TH ED. JUN 01/91 1:217828 NAD83
 17360 29TH ED. JUL 09/94 1:217,828 NAD83
 17363 11TH ED. APR 27/91 1:40,000 NAD83

<u>ITEM</u>	<u>DANGER</u>	<u>DEPTH</u>	<u>LATITUDE (N)</u>	<u>LONGITUDE (W)</u>
V	SHOAL	COVERS 2 FM	57/14/04.2	134/07/39.4
W	ROCK	COVERS 1 1/4 FM	57/14/03.8	134/06/16.5
X	SHOAL	COVERS 7 FM	57/13/44.4	134/05/53.0
Y	SHOAL	COVERS 3 1/2 FM	57/13/31.5	134/06/23.0
Z	ROCK	COVERS 3/4 FM	57/13/15.5	134/06/49.4
AA	ROCK	COVERS 1 3/4 FM	57/13/07.3	134/07/38.0
AB	SHOAL	COVERS 7 1/4 FM	57/12/48.0	134/07/46.6
AC	SHOAL	COVERS 7 1/2 FM	57/12/24.4	134/06/00.2
AD	ROCK	COVERS 1/4 FM	57/11/57.7	134/09/41.0

**ADVANCE
INFORMATION**

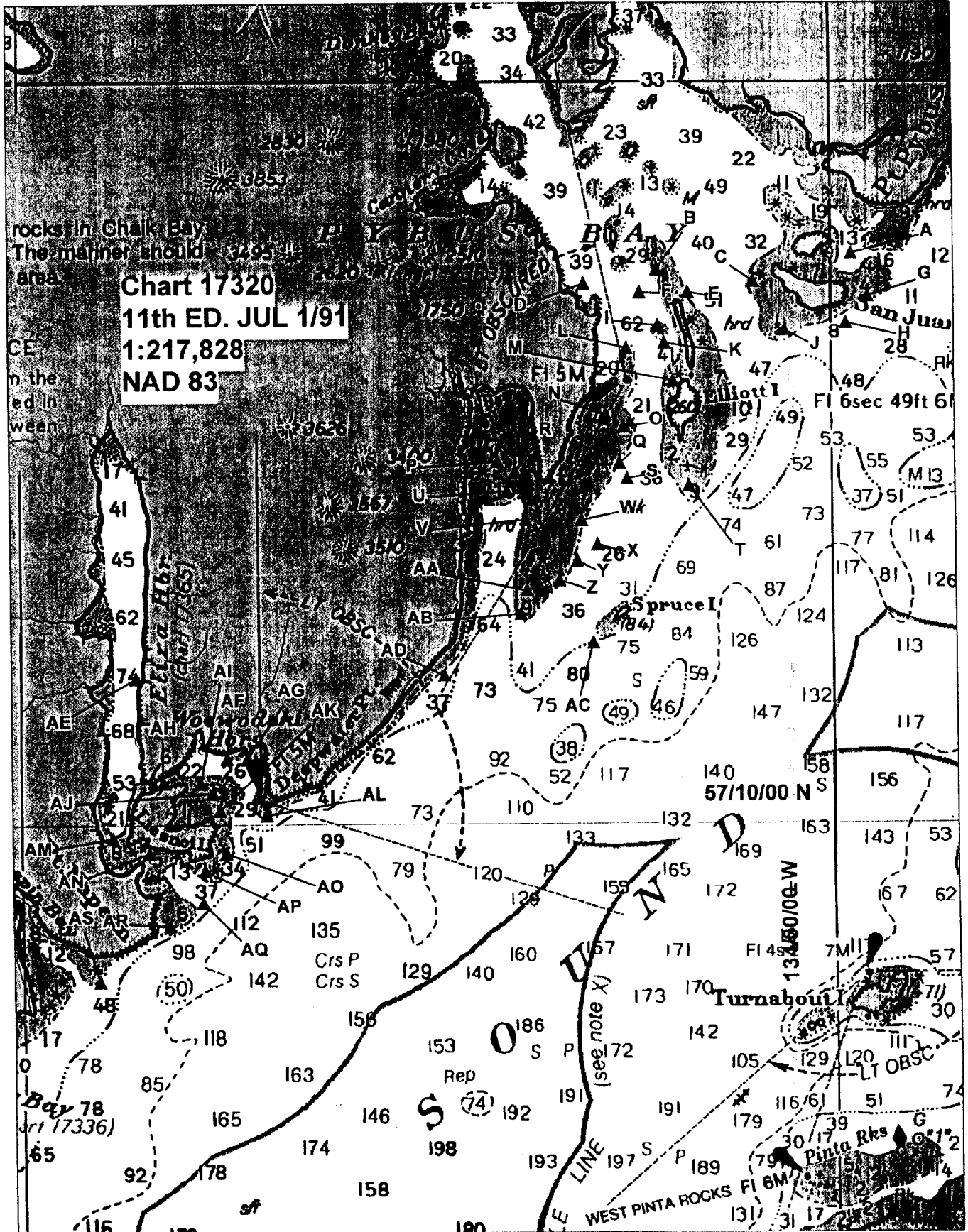
REGISTRY NUMBER H-10678

AFFECTED CHARTS: 17320 11TH ED. JUN 01/91 1:217828 NAD83
17360 29TH ED. JUL 09/94 1:217,828 NAD83
17363 11TH ED. APR 27/91 1:40,000 NAD83
17365 11TH ED. MAR 23/91 1:20,000 NAD83

<u>ITEM</u>	<u>DANGER</u>	<u>DEPTH</u>	<u>LATITUDE (N)</u>	<u>LONGITUDE (W)</u>
AE	ROCK	COVERS 2 3/4 FM	57/11/55.5	134/17/15.6
AF	ROCK	COVERS 3/4 FM	57/10/51.6	134/15/03.1
AG	SHOAL	COVERS 4 1/4 FM	57/10/51.1	134/14/33.1
AH	SHOAL	COVERS 2 1/2 FM	57/10/32.4	134/16/36.8
AI	ROCK	COVERS 2 FM	57/10/32.2	134/15/41.7
AJ	ROCK	COVERS 1 1/4 FM	57/10/24.2	134/15/24.0
AK	SHOAL	COVERS 1/2 FM	57/10/10.4	134/15/14.0
AL	ROCK	AWASH	57/10/06.5	134/14/04.7
AM	SHOAL	COVERS 2 1/2 FM	57/09/47.8	134/17/51.0
AN	SHOAL	COVERS 2 1/2 FM	57/09/35.6	134/16/57.6
AO	SHOAL	COVERS 1 1/4 FM	57/09/35.6	134/15/04.8
AP	SHOAL	COVERS 1 3/4 FM	57/09/21.0	134/15/36.7
AQ	SHOAL	COVERS 5 1/4 FM	57/08/54.7	134/15/40.1
AR	ROCK	COVERS 1 1/4 FM	57/08/35.7	134/16/28.6
AS	ROCK	COVERS 1 1/2 FM	57/07/50.4	134/18/12.1

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

ADVANCE
INFORMATION



rocks in Chalk Bay.
The manner should be
observed in this
area.

Chart 17320
11th ED. JUL 1/91
1:217,828
NAD 83

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Bay 78
Chart 17336)

LINE
(see note X)

Turnabout I.

WEST PINTA ROCKS FI 6M



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF CHARTING AND GEODETIC SERVICES
Seattle, Washington 98115-0070

January 24, 1997

Commander (OAN)
Seventeenth Coast Guard District
P.O Box 25517
Juneau, AK 99802

Dear Sir:

During office review of hydrographic survey H-10676, Alaska, Southern Stephens Passage, Spruce Island and Vicinity, seven shoal soundings were found and are considered potential dangers to navigation affecting the following chart.

<u>Chart</u>	<u>Edition/date</u>	<u>Datum</u>
17363	11th, 4/21/91	NAD 83

It is recommended that the enclosed Report of 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) 526-6853.

Sincerely,

Kathy A. Timmons
Commander, NOAA
Chief, Pacific Hydrographic Branch

Enclosures

cc: DMA/HTC
NCS/261



REPORT OF DANGERS TO NAVIGATION

Hydrographic Survey Registry Number: H-10676

Survey Title: State: ALASKA
 Locality: SOUTHERN STEPHENS PASSAGE
 Sublocality: SPRUCE ISLAND AND VICINITY

Project Number: OPR-O136-RA, NOAA Ship Rainier

Survey Date: April 11 - April 25, 1996

Features are reduced to Mean Lower Low Water using approved tides and are positioned on NAD 83.

Chart affected: 17363 11th Edition/April 27, 1991, scale 1:40,000, NAD 83

<u>DANGER TO NAVIGATION</u>	<u>LATITUDE(N)</u>	<u>LONGITUDE(W)</u>
Shoal, covers 2 3/4 fathoms	57/11/35.08	134/10/18.62
Shoal, covers 1 fathoms	57/12/02.67	134/09/35.43
Shoal, covers 2 fathoms	57/12/57.55	134/07/31.88
Shoal, covers 9 1/4 fathoms	57/13/52.57	134/08/34.38
Shoal, covers 7 1/4 fathoms	57/13/54.27	134/07/43.18
Shoal, covers 10 1/2 fathoms	57/13/59.11	134/05/45.61
Shoal, covers 10 3/4 fathoms	57/13/16.00	134/04/49.85

Questions concerning this report should be directed to the Chief, Pacific Hydrographic Branch at (206)526-6853.

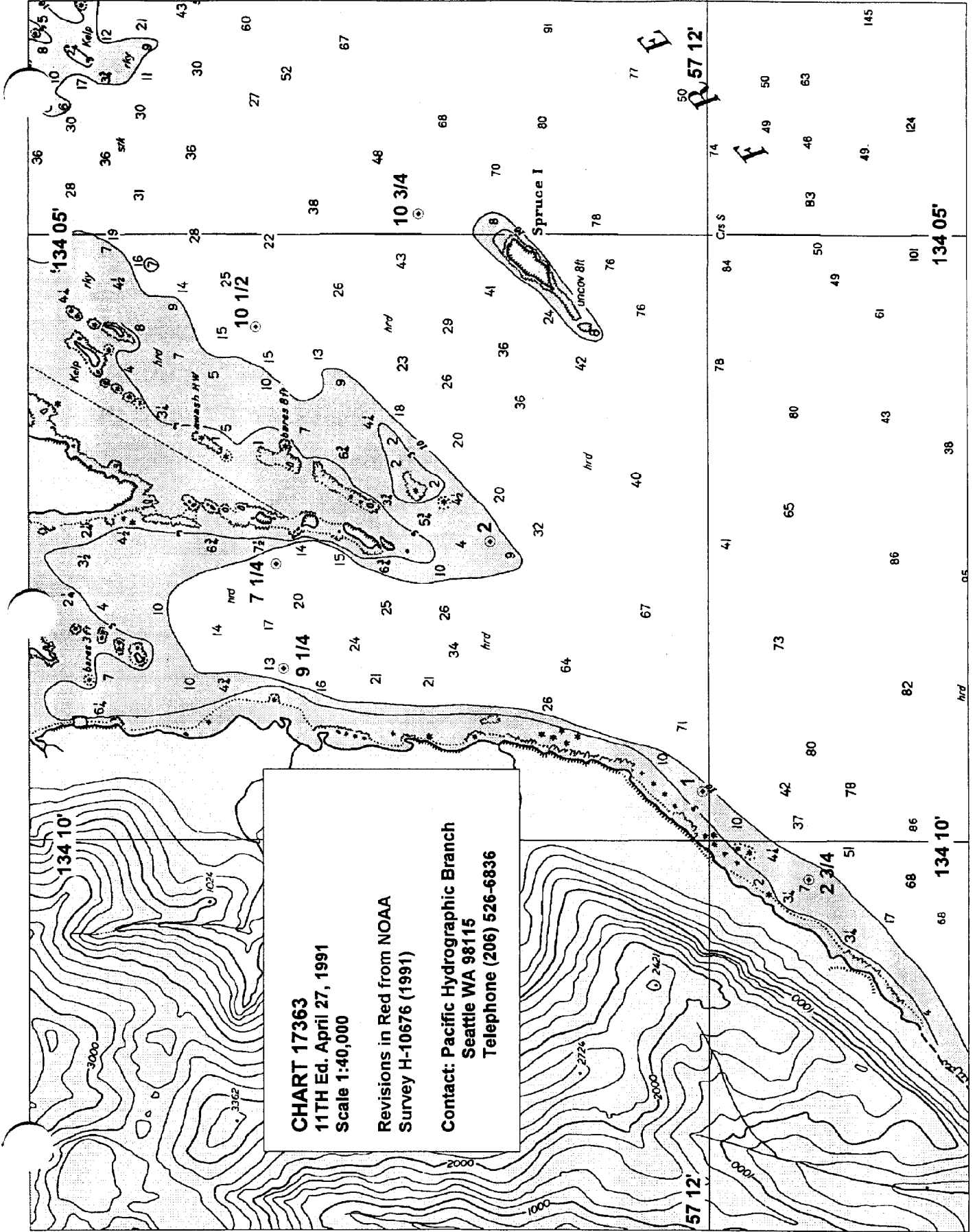


CHART 17363
 11TH Ed. April 27, 1991
 Scale 1:40,000

Revisions in Red from NOAA
 Survey H-10676 (1991)

Contact: Pacific Hydrographic Branch
 Seattle WA 98115
 Telephone (206) 526-6836

CHART 17363

11TH Ed. April 27, 1991
 Scale 1:40,000

Revisions in Red from NOAA
 Survey H-10676 (1991)

Contact: Pacific Hydrographic Branch
 Seattle WA 98115
 Telephone (206) 526-6836

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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

ORIGINAL

DATE: September 12, 1996

HYDROGRAPHIC BRANCH: Pacific

HYDROGRAPHIC PROJECT: OPR-0136-RA

HYDROGRAPHIC SHEET: H-10676

LOCALITY: Spruce Island and Vicinity, Southern Stephens Passage,
Alaska

TIME PERIOD: April 11 - 25, 1996

TIDE STATION USED: 945-1781 Cannery Cove, Pybus Bay, AK
Lat. 57° 18.4'N Lon. 134° 08.0'W

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

HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 4.180 meters

REMARKS: RECOMMENDED ZONING

Zone SEA21 -bounded by the polygon points:

LONGITUDE (W)	LATITUDE (N)
-134.119252	57.247369
-134.12829	57.278526
-134.257082	57.34634
-134.17348	57.43187
-133.983188	57.31749
-133.566535	57.19033
-133.880569	57.090141
-134.119252	57.247369

Times and heights are direct using Cannery Cove, AK (945-1781).



page 2 of 2 pages for H-10676

Zone SEA25 -bounded by the polygon points:

LONGITUDE (W)	LATITUDE (N)
-134.119252	57.247369
-134.12829	57.278526
-134.17461	57.270584
-134.223011	57.18332
-134.002726	57.066095
-133.880569	57.090141
-134.119252	57.247369

Times are direct, and apply a X0.98 range ratio to heights using Cannery Cove, AK (945-1781).

Note: Times are tabulated in Greenwich Mean Time.

William M. Gibson
CHIEF, DATUMS SECTION

GEOGRAPHIC NAMES

Name on Survey	A 99 CHART NO. 17503-11500 B ON PREVIOUS SURVEY 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										
	A	B	C	D	E	F	G	H	K		
ADMIRALTY ISLAND	X		X							1	
ALASKA (title)	X		X							2	
FREDERICK SOUND	X		X							3	
LITTLE PYBUS BAY	X		X							4	
SPRUCE ISLAND	X		X							5	
STEPHENS PASSAGE (title)	X		X							6	
										7	
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Approved

Chris C. [Signature]
Chief Geographer

AUG 7 1996

APPROVAL SHEET

for

H-10676

RA-10-03-96

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

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

RECORD DESCRIPTION		AMOUNT	RECORD DESCRIPTION		AMOUNT
SMOOTH SHEET		1	SMOOTH OVERLAYS: POS., ARC, EXCESS		NA
DESCRIPTIVE REPORT		1	FIELD SHEETS AND OTHER OVERLAYS		NA
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): **DM-10031**
 PHOTOBATHYMETRIC MAPS (List): **NA**
 NOTES TO THE HYDROGRAPHER (List): **NA**
 SPECIAL REPORTS (List): **NA**
 NAUTICAL CHARTS (List): **Chart 17363 11th ED., April 27, 1991**

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			12472	
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	61		61	
COMPARISON WITH PRIOR SURVEYS AND CHARTS				
EVALUATION OF SIDE SCAN SONAR RECORDS				
EVALUATION OF WIRE DRAGS AND SWEEPS				
EVALUATION REPORT		26	26	
GEOGRAPHIC NAMES				
OTHER*				
*USE OTHER SIDE OF FORM FOR REMARKS	TOTALS	61	26	87

Pre-processing Examination by J. Stringham	Beginning Date 6/5/96	Ending Date 6/6/96
Verification of Field Data by J. Stringham, R. Davies	Time (Hours) 61	Ending Date 12/5/96
Verification Check by B. Olmstead, R. Davies	Time (Hours) 6	Ending Date 1/10/97
Evaluation and Analysis by R. Davies	Time (Hours) 26	Ending Date 1/23/97
Inspection by B. Olmstead	Time (Hours) 10	Ending Date 1/24/97

**EVALUATION REPORT
H-10676**

A. PROJECT

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

B. AREA SURVEYED

This survey was conducted in Southern Stephens Passage, Alaska. Specifically, the area around Spruce Island and vicinity.

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 102 fathoms. The bottom consists primarily of mud, pebbles and shells.

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 PHB 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 Guidelines No. 35 and 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-10676.

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 Cannery Cove, Pybus Bay, AK, gage 945-1781, 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 and field 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: -1.220 seconds (-37.726 meters)
Longitude: 6.248 seconds (104.888 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. Several positions exceeded the limits in terms of horizontal dilution of precision (HDOP). A review of this data, however, indicates that none of these fixes are used to position dangers to navigation. NAD 83 is used as the horizontal datum for plotting and position computations.

Additional information concerning calibrations and system checks can be found in the hydrographer's report and in the separates related to horizontal position control and corrections to position data.

J. SHORELINE

Shoreline map DM-10031, photography dated May 1989, scale 1:20,000 was compiled on NAD 83 and applies to this survey. Shoreline drawn on the smooth sheet originates from a 1:20,000 scale digital file provided by the Coastal Mapping Program. This file has been merged with the survey file during ACAD processing.

There were no MHW revisions on this survey.

K. CROSSLINES

Crosslines are adequately discussed in the hydrographer's report.

L. JUNCTIONS

Survey H-10676 junctions with the following surveys.

<u>Survey</u>	<u>Year</u>	<u>Scale</u>	<u>Area</u>
H-10296	1989	1:20,000	East
H-10297	1989	1:20,000	South
H-10673	1996	1:10,000	North
H-10678	1996	1:10,000	West

The junction with surveys H-10673 and H-10678 are complete. The junction with surveys H-10296 and H-10297 were not formally completed since these surveys were previously processed and forwarded for charting. Soundings are in good agreement.

M. COMPARISON WITH PRIOR SURVEYS

H-1996(1889-92) 1:80,000
H-4511a(1925-26) 1:20,000

Surveys H-1996 and H-4511a cover the entire area of the present survey. Comparison with the present survey generally reveals differences of 1 to 2 fathoms 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 surveys were adequately addressed during survey operations. However most ledges, reefs and isolated rocks from these prior

surveys fall within the NALL limit line and should be retained as charted.

Survey H-10676 is adequate to supersede the prior surveys within the common area. See Attachment 1 for the area of supersession.

T-1964(1889) 1:80,000

Prior shoreline map T-1964 solely depicts the mean high waterline, ledges, reefs and isolated rocks which fall within the area common to the present survey. Comparison with the shoreline reflects very little change since 1889. Most of the prior rocks, ledges and reefs fall within the NALL limit line of the present survey and should be retained.

Survey H-10676 is adequate to supersede the prior topographic survey within the common area. See Attachment 1 for the area of supersession.

H-4511b WD(1925-26) 1:20,000

Wire-drag survey H-4511B covers the eastern half of the present survey. AWOIS items, 51199 and 51200, are two charted 9 fathom clearance depths which originate from prior wire drag survey H-4511b and fall within the common area of the present survey. Both AWOIS items were adequately investigated and addressed during survey work conducted in 1989. There were no specific features or unusual contour configurations to substantiate the charted 9 fathom clearance depths. Representative depths and contours from the junctional survey H-10296 (1989) have been recommended to chart within these areas.

N. ITEM INVESTIGATIONS

There were three AWOIS items within the survey area. They were adequately addressed in the Descriptive Report, section N.

O. COMPARISON WITH CHART

Survey H-10676 was compared with the following chart.

<u>Chart</u>	<u>Edition</u>	<u>Date</u>	<u>Scale</u>	<u>Datum</u>
17363	11th	April 27, 1991	1:40,000	NAD 83

a. Hydrography

Charted hydrography originates with the prior surveys mentioned in section M. The prior surveys are discussed in section M and requires no further discussion.

Survey H-10676 is adequate to supersede charted hydrography seaward of the NALL limit line.

b. Dangers to Navigation

Nine dangers to navigation were reported to the USCG, DMAHTC and N/CS 261 on April 18, 1996. Seven additional dangers to navigation were found during office processing. Copies of these reports are attached.

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.

Q. AIDS TO NAVIGATION

There no aids to navigation located within the survey area.

There are no charted landmarks or features that would be of landmark value within the survey area.

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.

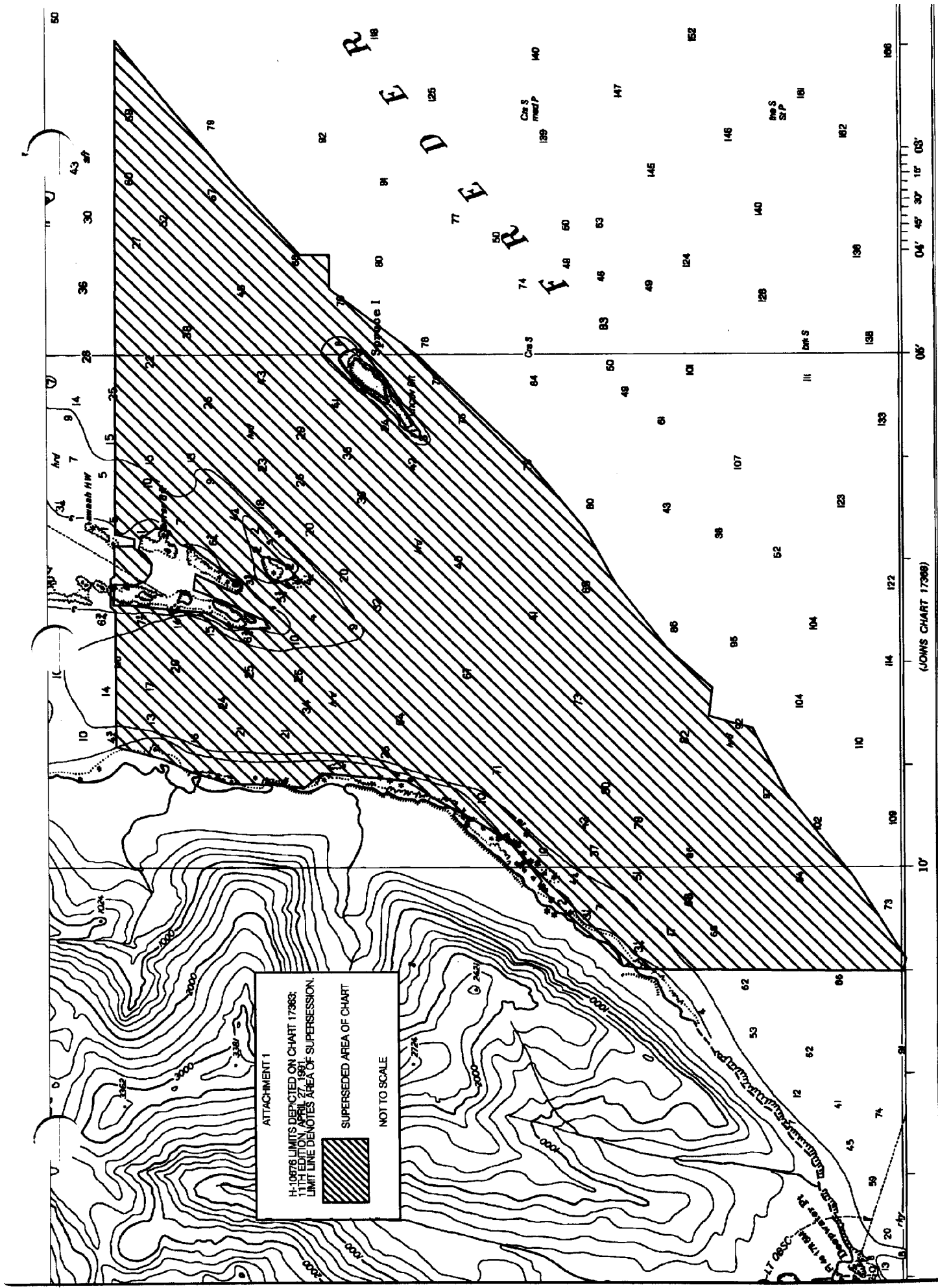
T. RECOMMENDATIONS

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

U. REFERRAL TO REPORTS

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

Charles R. Davies
C.R. Davies
Cartographer



APPROVAL SHEET
H-10676

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 disproof of charted data. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report.

Bruce A. Olmstead Date: 1/27/97
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: 1/30/97
Kathy Timmons
Commander, NOAA
Chief, Pacific Hydrographic Branch

Final Approval

Approved:

Andrew A. Armstrong III Date: May 14, 1997
Andrew A. Armstrong III
Captain, NOAA
Chief Hydrographic Surveys Division

