

H10869

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-10-06-99
Registry No. H-10869

LOCALITY

State Alaska
General Locality Lynn Canal
Sublocality St. James Bay and Vicinity
..... and William Henry Bay

1999

CHIEF OF PARTY
CAPT Alan D. Anderson, NOAA

LIBRARY & ARCHIVES

DATE JUL 23 2000

HYDROGRAPHIC TITLE SHEET

H-10869

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-10-06-99

State Alaska

General locality Lynn Canal

Locality Saint James Bay and Vicinity and William Henry Bay

Scale 1:10,000 Date of survey 4/18/99 - 6/2/99

Instructions dated March 5, 1998 Project No. OPR-0340-RA
Change #1, March 30, 1998; Change #2, April 12, 1999; Change #3, May 6, 1999

Vessel RAINIER (2120), RA-1(2121), RA-2(2122), RA-3(2123), RA-4(2124), RA-5(2125), RA-6(2126)

Chief of party CAPT Alan D. Anderson, NOAA

Surveyed by RAINIER Personnel

Soundings taken by echo sounder, ~~hand lead, pole~~ SDF-6000N, Knudsen 320M, RESON 8101 MB
SeaBeam 1050D MK11 (Low Frequency)

Graphic record scaled by RAINIER Personnel

Graphic record checked by RAINIER Personnel

Evaluation by: I. Almacen Automated plot by HP Design Jet 750C

Verification by E.Domingo, L.Deodato, R.Davies, D.Doles, R.Mayor, G. Nelson, I.Almacen

Soundings in fathoms ~~feet~~ at MLLW ~~MHW~~ (data collected in Meters)

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

PROGRESS SKETCH

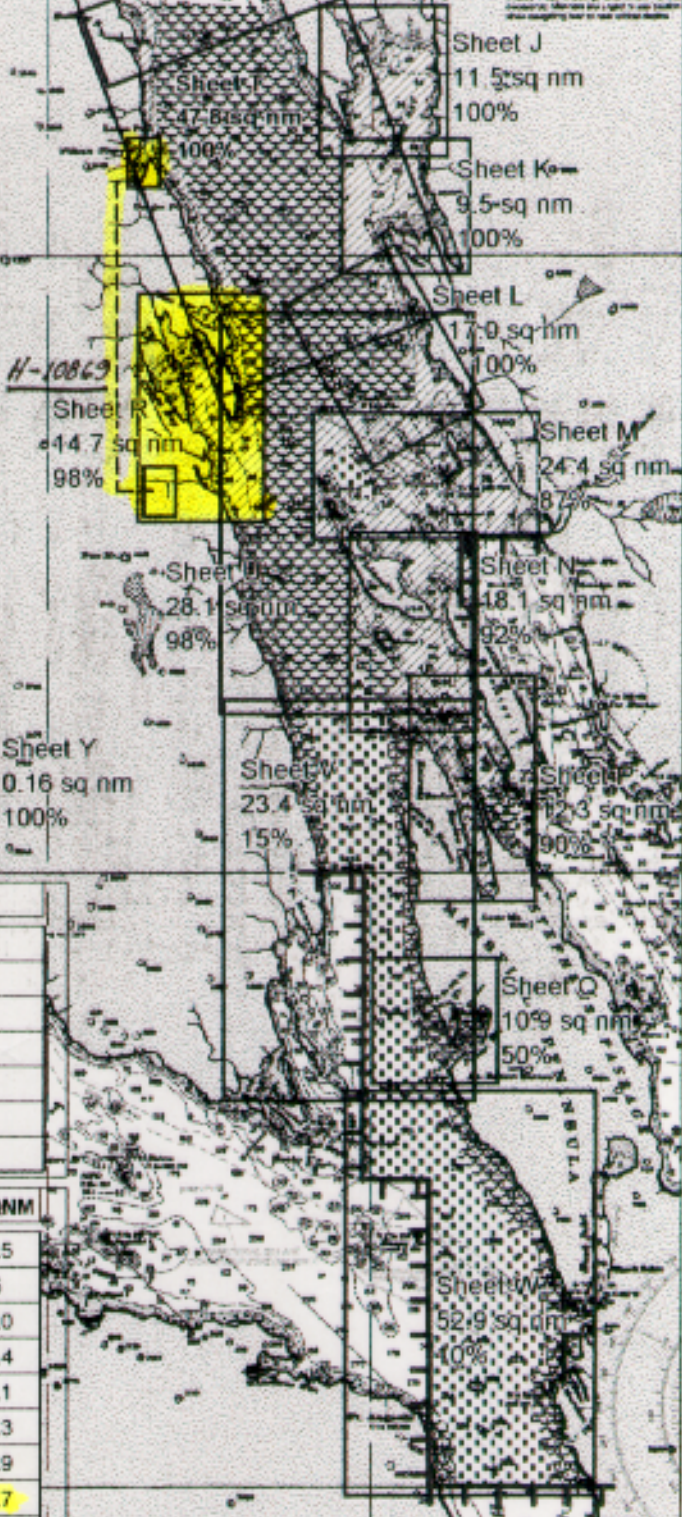
May, 1999
 OPR-C040-RA-99
 Lynn Canal, Alaska
 Capt. A. D. Anderson
 COMMANDING
 Chart 17300



Downtime Type	April	May	June
Weather -Hr	0	0	0
Mechanical -Hr	2	0	0
Electronic -Hr	2	2	0

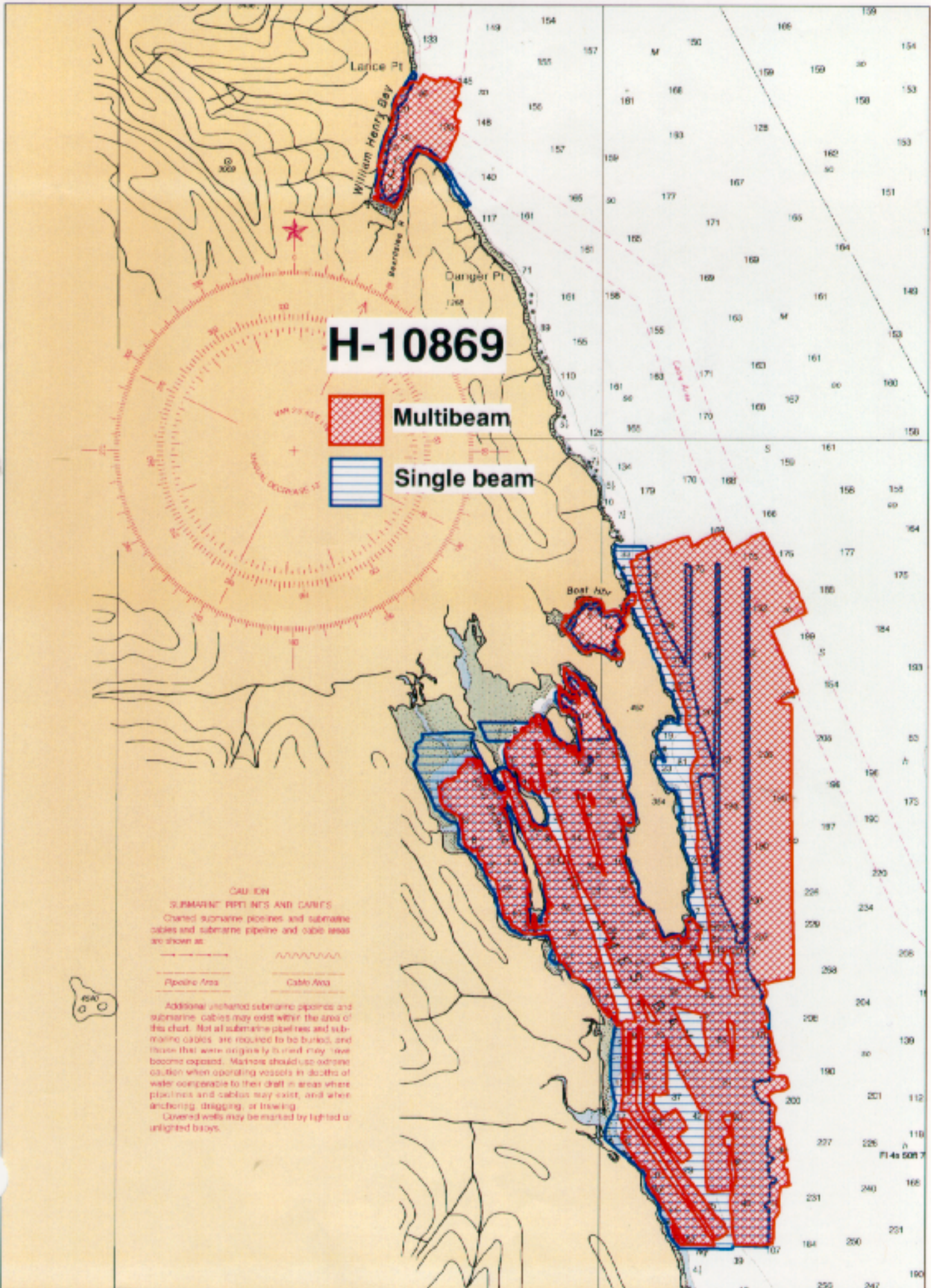
Accomplished	April	May	June
LNM Hydro	2910	679	41.8
LNM SSS	0	0	0
SQ NM	43.89	144.17	102.3
AWOIS Invest.	0	9	5
Other Invest.	0	4	2
LNM Multibeam	174.4	1053.64	290.5
Days at Sea	28	26	11

Sheet	Reg No	Started	Percent	Completed	Submitted	SQNM
J	H-10860	4/6	100	5/24		11.5
K	H-10861	4/6	100	5/22		9.5
L	H-10862	4/8	100	5/25		17.0
M	H-10866	4/14	100	6/3		24.4
N	H-10865	4/14	100	6/7		18.1
P	H-10870	4/20	100	6/7		12.3
Q	H-10879	5/1	100	6/5		10.9
R	H-10869	4/18	100	6/2		14.7
T	H-10864	4/13	100	5/25		47.8
U	H-10880	5/3	100	6/2		28.1
V	H-10881	5/2	100	6/5		23.4
W	H-10882	5/6	100	6/8		52.9
Y	F00451	5/20	100	5/20		0.16
X	H-10883	5/10	100	5/20		19.6



NOTES: The progress sketch shows the area to be surveyed for the project. The area to be surveyed is shown in the legend. The area to be surveyed is shown in the legend. The area to be surveyed is shown in the legend.

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H-10869

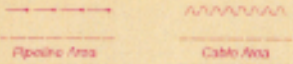


Multibeam



Single beam

CAUTION
SUBMARINE PIPELINES AND CABLES
 Chained submarine pipelines and submarine cables and submarine pipeline and cable areas are shown as:



Additional uncharted submarine pipelines and submarine cables may exist within the area of this chart. Not all submarine pipelines and submarine cables are required to be marked, and those that were originally marked may have become exposed. Mariners should use extreme caution when operating vessels in depths of water comparable to their draft in areas where pipelines and cables may exist, and when anchoring, dragging, or trawling. Covered wells may be marked by lighted or unlighted buoys.

71-4a 5081 7

Descriptive Report to Accompany Hydrographic Survey H10869

Field Number RA-10-06-99

Scale 1:10,000

June 1999

NOAA Ship RAINIER

Chief of Party: Captain Alan D. Anderson, NOAA

A. PROJECT ✓

This hydrographic survey was completed as specified by Project Instructions OPR-O340-RA dated March 5, 1998, Change number 1, dated March 30, 1998, Change number 2, dated April 12, 1999, and Change number 3, dated May 6, 1999. Survey H10869 corresponds to Sheet R (Sheet 08 in HPS) as defined in the sheet layout. This survey will provide contemporary hydrographic survey data as part of a continuing program to improve chart coverage of the Inside Passage in southeast Alaska. Requests for hydrographic surveys and updated charts in this area have been received from the Southeastern Alaska Pilot's Association (SEAPA) and the commercial fishing industry.

B. AREA SURVEYED (See EVAL RPT., Sec. B)

The survey area is located in Lynn Canal, Alaska in St. James and William Henry Bays. Survey limits are depicted below in Figure 1. The survey's northern limit is latitude $58^{\circ}38'46''\text{N}$ ($58^{\circ}43'47''\text{N}$ for the inset) and the southern limit is latitude $58^{\circ}31'23''\text{N}$ (shoreline for the inset). The survey's western limit is the shoreline and the eastern limit is longitude $135^{\circ}06'36''\text{W}$ ($135^{\circ}13'03''\text{W}$ for the inset). Data acquisition was conducted from April 18 to June 2, 1999 (DN 108 to 153).

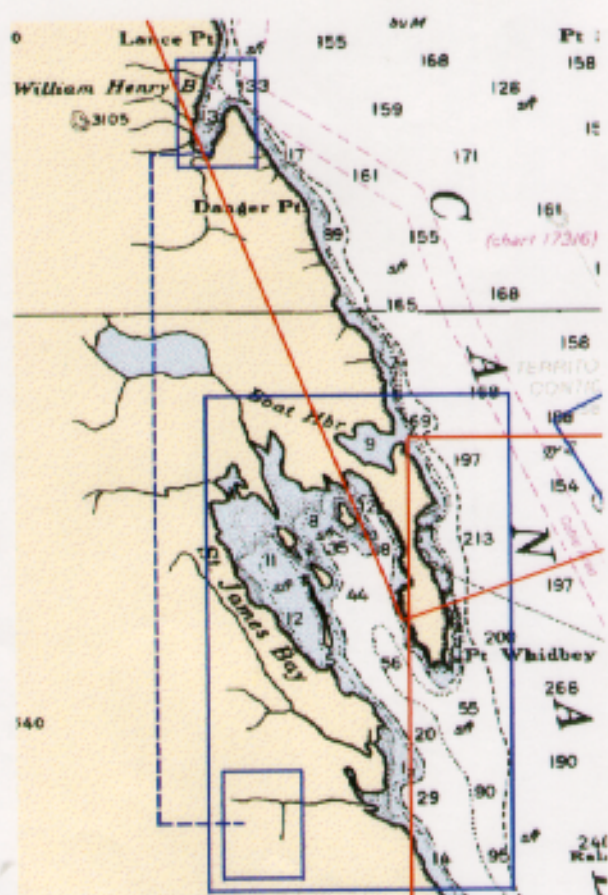


Figure 1. Survey Limits

C. SURVEY VESSELS ✓

Data were acquired by RAINIER and her survey launches (vessel numbers 2120, 2121, 2122, 2123, 2124, 2125 and 2126) as noted in the Survey Information Summary included with this report. See OPR-O340-RA project related data for vessel descriptions. No unusual vessel configurations or problems were encountered during this survey.

D. AUTOMATED DATA ACQUISITION AND PROCESSING ✓

All vertical beam echo sounder (VBES) data were acquired using HYPACK version 8.9 and preliminary processing was accomplished with HPS version 9.3 and MapInfo version 5.0. Final detached positions, features, and soundings based on observed tides were saved in MapInfo format. Raster image and shoreline data in MapInfo facilitated charted and prior survey comparisons.

Shallow water multibeam (SWMB) echosounder data were acquired using the Reson SeaBat 8101 with Triton Elics ISIS version 4.32 and processed using CARIS software version 4.3.

Multibeam data collected by RAINIER were acquired using the SeaBeam 1050D MKII and HydroStar ONLINE version 2.8.5b with Triton Elics ISIS version 4.32 and processed using CARIS software version 4.3.

Reson 8101 and SeaBeam 1050D MKII depth data were reviewed with CARIS-HIPS data cleaning programs. Depth flyers were identified and manually flagged as "rejected". Vessel positioning and attitude data from each system were similarly displayed and manually cleaned. Additionally, instantaneous speed as computed from the positioning data was checked for speed jumps exceeding 2 knots. ✓

After review and cleaning, Reson 8101 depth, position and attitude data were merged with sound velocity, predicted tide and dynamic draft correctors to compute the true depth and position of each sonar footprint. These processed data were excessed in a CARIS Workfile by selecting shoal soundings at a density of 5 meters x 5 meters. These excessed soundings were then suppressed at 2.5 mm at survey scale, and exported into HPS through HP Tools. For this survey, the outer ten beams of the Reson 8101 on each side of the swath (beam numbers 1-10 and 92-101) were not used, reducing the effective swath width to 120°. ✓

After review and cleaning, SeaBeam 1050D MKII depth, position and attitude data were merged with sound velocity, predicted tide and dynamic draft correctors to compute the true depth and position of each sonar footprint. Prior to the final application of correctors in CARIS, the heave, pitch and roll data were manually deleted from the HDCS data to prevent these data from being applied twice. The heave, pitch and roll values have been archived in TAR format and left with the HDCS data in the event they are needed at a future date. These data were then extracted to a CARIS Workfile with a grid size of 5 meters x 5 meters. These soundings were further excessed by suppressing soundings with a shoal bias to produce one sounding every 2.5 mm at survey scale. Processed soundings were then exported into HPS through HP Tools. ✓

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

A complete listing of software is included in Appendix VI. *

E. SONAR EQUIPMENT ✓

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

* Filed with the hydrographic data. 2

F. SOUNDING EQUIPMENT ✓

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

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

The vertical beam echosounders (VBES) utilized for this survey were the Raytheon DSF-6000N and Knudsen 320M, which are dual frequency (100 kHz, 24 kHz), digital recording echosounders with analog paper traces. Soundings were acquired in meters using the High + Low, high frequency digitized setting. In depths over 250 meters, low frequency was scanned in place of the high when the fathometer lost its high frequency trace. VBES launches were used to collect mainscheme hydrography in areas that were considered too hazardous or too shallow for shipboard SeaBeam 1050 MKII coverage, generally areas less than 150 meters of depth. In addition, singlebeam launches were used to perform all shoreline verification. VBES serial numbers are included in the Separates.

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

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

Although the Reson 8101 was designed to survey to depths in excess of 300 meters, RAINIER has discovered that maximum attainable depths are approximately 80-150 meters, depending on sea conditions and bottom topography. However, the installation this winter of an extended range projector on VN 2126 has extended the maximum depth range by 30-40%. SWMB launches were used to collect full-bottom coverage of select areas identified during singlebeam hydrography, generally all areas determined to be less than 100 meters deep that could safely be investigated without the risk of damaging the SWMB transducer. SWMB launches were not used for shoreline verification due to the extremely high risk of damaging the SWMB transducers on submerged rocks.

3. ELAC SeaBeam 1050D MKII ✓

The SeaBeam 1050D MKII is a hull-mounted, dual frequency (180 kHz, 50 kHz), high resolution multibeam echosounder system for shallow and medium water depths. A TSS 335B attitude sensor was used to correct for the effects of vessel motion during survey operations, and a Sperry MK227 gyro was used for heading. The SeaBeam 1050D MKII ensonifies the seafloor utilizing two narrow beam width transducer arrays pinging into 14 sectors. The receiving beamformer generates 3 narrow beams each sector with a beam width of 1.5° and a spacing of 1.25°. Three subfans are one total fan. Hence, there are 14 sectors x 3 beams x 3 subfans resulting in 126 total beams. Serial numbers for the SeaBeam 1050D MKII, TSS335B and Sperry MK227 are included in the Separates. *

The high frequency array (180 kHz) is used to acquire soundings ranging from 10 to 300 meters, while the low frequency array (50 kHz) is used to acquire soundings ranging from 100 to 3100 meters. Low frequency was used exclusively on survey H10869 with an acquisition swath width of 128°. During processing, all soundings beyond a maximum angle of 50° off nadir were rejected to further reduce noise in the outer beams.

G. CORRECTIONS TO ECHO SOUNDINGS ✓

Sixteen sound velocity casts were used for this survey: twelve for the Reson 8101 SWMB, two for SeaBeam 1050D MKII, and two for VBES. Information on the casts is included in the Survey Information Summary report and in Separate IV--Sounding Equipment Calibrations and Corrections. *

The sound velocity casts were acquired with SBE SEACAT Profilers (S/N 219, 2543 and 2477), calibrated November 13, 1998. Calibration reports are included with the project data for OPR-O340-RA-99. Velocity correctors were computed using the PC program VELOCITY, version 4.0, 1998. New for the 1999 field season is the program VELOCWIN version 4 beta 2, a GUI interface for the DOS program VELOCITY, with the additional ability to directly generate and export sound velocity correction tables for both CARIS and HPS.

For VBES launches, sound velocity correctors were applied to the raw sounding data in HPS during post processing. For Reson 8101 and SeaBeam 1050D MKII data, sound velocity correctors were applied in CARIS during post processing.

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

Vessel No.	Date of Static Draft and Transducer Offset Measurement	Method of Settlement and Squat Measurement	Date of Settlement and Squat Measurement	Location of Settlement and Squat Measurement
2120	March 1999	OTF	March 1999	Port Angeles, WA
2121	March 1999	OTF	March 1999	Port Angeles, WA
2122	March 1999	Rod leveling	March 1999	Port Angeles, WA
2123	March 1999	OTF	March 1999	Port Angeles, WA
2124	March 1999	Rod leveling	March 1999	Port Angeles, WA
2125	March 1999	Rod leveling	March 1999	Port Angeles, WA
2126	March 1999	OTF	March 1999	Port Angeles, WA

Settlement and squat correctors, static draft measurements and vessel offsets are included with the project data for OPR-O340-RA-99. Offset tables # 1-6 correspond to the last digit of the vessel number, with RAINIER being designated as #7 for HPS processing. For VBES launches, offset tables were applied to the raw sounding data in HPS during post processing.

SWMB launches (VN2121, 2123 and 2126) utilize a TSS POS/MV Model 320 Position and Orientation System (POS), which provides accurate navigation and attitude data (heave, pitch, roll and heading) to correct for the effects of vessel motion during survey operations. The POS generates attitude data in three axes (roll, pitch and heading) to an accuracy of 0.05° or better. Heave measurements supplied by the POS maintain an accuracy of 5% of the measured vertical displacement for movements that have a period of up to 10 seconds. The POS delivers heading measurements by two distinct methods. First, the Dynamic Heading Alignment determines the vessels heading by using the data supplied by the Internal Measurement Unit (IMU) and GPS receivers to achieve heading that is, at best, accurate to within 0.35°. This method suffers from drift but is relatively unaffected by noise. Second, the GPS Azimuth Measurement System (GAMS) determines the geographic vector between two GPS antennas fixed to the vessel by comparing the phase of satellite signals they receive. The error from this method is largely due to noise, but exhibits no drift. The POS uses the advantages of each method to compensate for the disadvantages of the other to arrive at an optimal accuracy of 0.05° and a heave accuracy of 0.1 meter. Serial numbers are located in Appendix VI. *

* Filed with the Hydrographic data.

RAINIER utilizes a TSS 335B attitude sensor, which provides attitude data (heave, pitch and roll) to correct for the effects of vessel motion during survey operations. Heave resolution is 1cm, with an accuracy of 5cm or 5% of the range, whichever is the greater. The roll and pitch resolution is 0.01° with an accuracy of 0.05° – 0.1°. During acquisition, SeaBeam depth data are corrected for roll in HYDROSTAR to account for beam steering at the transducer face. A Sperry MK227 digital gyro was utilized for vessel heading, which has a resolution of 0.1° and an accuracy of better than 1°. Serial numbers are located in Appendix VI. ✖

SWMB launches and RAINIER Vessel Configuration Files (VCF) were created within the CARIS program VCFEDIT, and applied to the sounding data during processing. VCF files define the physical relationship between the various components that comprise the systems. The VCF files contain offsets, dynamic draft, timing errors, and heave, roll and pitch biases. System biases for the SWMB launches were determined during a "patch test" conducted at Port Angeles, WA on March 26-28, 1999. System biases for RAINIER were determined during a "patch test" conducted in Lynn Canal, southeast Alaska on May 21, 1999. A copy of each vessels VCF are included in the Project Related Data for OPR-O340-RA.

Predicted Tidal Correctors ✓

For the 1999 field season, the Oceanographic Products and Services Division (OPSD), User Services Branch (N/CS41), supplied no predicted tides for OPR-O340-RA-99. Predicted tide tables were generated for both HPS and CARIS using Tides & Currents v2.5. Tide correctors for H10869 were based on the location William Henry Bay, Lynn Canal (945-1705) which uses Juneau (945-2210) as a reference station. Tide table HPS #99 was used only for preliminary inspection of the VBES soundings. CARIS tide table whbay_new.tid was also based on Tides & Currents and was used throughout the entire CARIS processing pipeline.

Once data acquisition was complete and all sounding data consolidated in HPS, OPSD preliminary observed tides for Juneau (945-2210) were downloaded from the Internet and used to create HPS table #1. The MapInfo tidal zoning table supplied by OPSD was then imported into HPS using the MapBasic application HPT_UTIL.MBX and HP Tools v.3.4.1. Tide zone correctors were then computed and applied to all soundings in HPS (SeaBeam, SWMB, & VBES) to produce a final sounding plot.

Listings of HPS tide tables used for H10869 are included in the Separates of this report.*Tidal correctors as provided in the Project Instructions for H10869 are provided in the Survey Information Summary included with this report.

Juneau, Alaska (945-2210), Sitka, Alaska (945-1600), and Skagway, Alaska (945-2400) are the primary control stations for datum determination. RAINIER personnel installed a Sutron 8200 tide gage at St. James Bay (945-2377) on April 7, 1999 and at Boat Harbor (945-2378) on April 22, 1999. The St. James Bay gage was removed on April 28, 1999 and the Boat Harbor gage was removed May 3, 1999. Refer to the Field Tide Notes and supporting data in Appendix V for individual gage performance and level closure information. This information has been forwarded to N/CS41 in accordance with HSG 50 and FPM 4.8. A request for approved tides was forwarded to N/CS41 in accordance with FPM 4.8. *Approved Tide Note dated October 6, 1999, is attached.*

H. HYDROGRAPHIC POSITION CONTROL (See EVAL RPT, Secs H & I)

The horizontal datum for this project is NAD 83. See the OPR-O340-RA-99 Horizontal Control Report for more information.

All hydrographic features were positioned using differential GPS (DGPS). VHF reference stations were set up at stations JOE and CURTIS. Due to it's proximity to the H10869 survey area, station JOE was used as the primary station for VHF differential correctors. In addition, differential corrections from the US Coast Guard Beacon at Gustavus were also utilized during this survey. DGPS reference station information is

located in Appendix III of this report.* Serial numbers for positioning equipment are included in the Appendix VI.*

Launch to launch DGPS performance checks were performed weekly in accordance with Section 3.2 of the FPM. Differential corrections from two reference stations were received by the independent launch positioning systems as they were rafted together with their GPS antennae 2-3 meters apart. RAINIER performance checks were conducted weekly by comparing DGPS positions acquired by RAINIER's positioning system and the launches positioning systems, while at rest in the davits. Copies of DGPS performance checks are included in the Separates.*

I. SHORELINE (See EVAL RPT., Sec. J)

Method of Shoreline Verification ✓

The shoreline manuscript from Coastal Mapping survey CM-8709 was supplied by N/CS341 in the form of raster image files in a .PCX format for import to MapInfo and Hypack. Prior surveys and digitized versions of chart 17316 proved to be of poor quality for the area covered by H10869. This problem was solved with the registration of NASA satellite photos acquired from the U.S. Forest Service. These photos were scanned and registered using charted positions of prominent landmarks along the shoreline. The registered photos were then digitized in MapInfo using a combination of the shoreline on the photograph, CM-8709 and notes taken during vertical beam echo sounder mainscheme to differentiate between areas of gently sloping beaches and ledges. The resultant shoreline was then exported in .DXF format for use with Hypack during data acquisition. While conducting shoreline verification, numerous detached positions were obtained on ledges and rocks to field check the NASA photo's registration. Adjustments to the registration of the digitized shoreline were then made based upon the detached positions. This method proved to be remarkably reliable and accurately depicted the shoreline when checked against the detached positions, soundings, and tracklines. During shoreline verification these digitized NASA photos were treated as official digital manuscript (DM) shoreline for the purpose of distinguishing new shoreline features. ✓

The following table lists reference points used to register NASA satellite photographs into MapInfo. *Do not concur.*
The digitized NASA photos is just a good aid to shoreline verification. Shoreline manuscript's from Coastal Mapping Survey (CM-8709) is still the official NOS shoreline information for this survey.

Photo #	Point	Latitude	Longitude	Geographical Location
123	1	58.678710	-134.988540	Pt. Bridget
123	2	58.731440	-135.026230	Pt. St. Mary
123	7	58.635330	-135.159960	Boat Harbor, entrance
123	8	58.621760	-135.187970	St. James Bay, upbay
123	9	58.615840	-135.175570	St. James Bay, island ledge
123	7	58.599680	-135.138480	Rock, NE of Pt. Whidbey
123	7	58.628300	-135.170450	Boat Harbor, South
123	8	58.621820	-135.179610	St. James Bay, upbay
49	4	58.631790	-135.179480	Boat Harbor, West
49	5	58.577900	-135.138750	Pt. Whidbey
49	6	58.616060	-135.140110	Ledge, South of Boat Harbor
49	7	58.620110	-135.176390	St. James Bay, upbay
49	8	58.582430	-135.185830	Lynn Brothers, South Point
49	9	58.561990	-135.164980	South of St. James Bay, river mouth
49	1	58.635400	-135.159260	Boat Harbor, entrance
49	2	58.603890	-135.142120	Ledge North of Pt. Whidbey
51	1	58.615970	-135.175370	St. James Bay, island ledge
51	2	58.604150	-135.195480	East of Lynn Brothers
51	3	58.636710	-135.157480	Boat Harbor, entrance
51	4	58.723760	-135.240440	North of William Henry Bay
51	5	58.679650	-135.189020	South of Danger Point, river mouth

Shoreline verification was conducted near predicted low water in accordance with the Project Instructions and FPM 6.1 and 6.2. For this survey the general limit of safe navigation of a survey launch is 5-30 meters offshore of apparent low tide, with the exception of river mouth ^{north} south of St. James Bay, where the shoaling is quite extensive. Water depths along this limit of safe navigation are generally 2-5 meters at Mean Lower Low Water (MLLW). Features shown inshore of the Navigable Area Limit Line (NALL) are the hydrographer's representation of the shoreline while slowly transiting along the shore, and are intended to aid chart compilation. ✓

Detached positions taken during shoreline verification were recorded within HYPACK and on DP forms. These indicate significant features and features not found on the DM or chart. ✓

Detailed "DP and BS Plots" are provided showing all detached positions and bottom samples with notes relating to each feature. Updated shoreline and features were then transferred to the final sounding plot. ✓

Changes and New Features ✓

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

Detached Positions (Pos. # 40290-40293) bound a seasonal fish pen in Boat Harbor at position 58°38'11.33"N, 135°10'03.62"W. The time of operation is mid-March to mid-May. State permit requires the fish pen to be removed by the end of May each year. The Hydrographer recommend that the fish pen be added to the chart with a note stating the period of operation (mid-March through mid-May). *Concur.*

A ^{charted} DM rock inside Boat Harbor at 58°38'07.45"N, 135°09'48.12"W was not found during shoreline verification. However, a -0.2m sounding, located 27m N of the DM rock at position 58°38'08.33"N, 135°09'47.96"W was located using SWMB. The hydrographer recommends that a rock be charted at position 58°38'08.33"N, 135°09'47.96"W. *Concur. This DM rock is most likely the same rock presently charted in the area.*

Recommendations ✓

The Hydrographer recommends that the shoreline depicted on the DP and BS plot (Mapinfo digital files "Shoreline" and "Shoreline_Update") and final sounding plot be used to supersede shoreline information compiled on CM-8709, and the digitized NASA photos. *Concur. (Digitized NASA photos are not an official NOT shoreline manuscripts)*

Charted Features ✓

Charted rocks were either identified as new rocks, DM rocks, high points or extensions of DM ledges and reefs with the following exceptions:

① *William Henry Bay*
 Nine charted rocks centered at position 58°43'25.24"N, 135°14'19.48"W plot approximately 60 to 100 meters offshore of the verified DM rocks. It is the opinion of the Hydrographer that these charted rocks are indeed the DM rocks which were moved further from the shoreline during chart compilation in an effort to both leave the high water shoreline unobscured and to better depict these rocks at the scale of the chart. *Concur.* This theory proved difficult to prove since the source of these charted rocks remains in question. Careful examination of the priors revealed one rock that corresponds with the charted rocks in question. In a few cases a note of *hrd* was seen on the prior in roughly the same position as the charted rocks. A 50m radius and/or five minute visual search for the charted rocks was conducted at MLLW. The water visibility varied from 1 to 5m. In addition, 100% SWMB coverage was used to disprove these charted features (fix # 21155-21163). *Concur.* ✓

A charted rock at 58°38'27.784"N, 135°09'24.158"W was not found (Pos. #40317, DN108, VN2124). Depths in the vicinity are approximately 13 meters, water visibility 5m. A visual search was conducted at MLLW for 5 minutes. The Hydrographer recommends deleting the charted rock at 58°38'27.784"N, 135°09'24.158"W. *Concur. Chart the area based on the present survey.*

A charted rock at 58°34'48.569"N, 135°11'11.908"W was not found (Pos. #20033, DN108, VN2122). Depths in the vicinity are approximately 4 meters, water visibility 3m. A 50 meter visual search was conducted at MLLW. The Hydrographer recommends deleting the charted rock at 58°34'48.569"N, 135°11'11.908"W. *Concur. Chart the area based on the present survey.*

The charted shoreline should be revised using the manuscript shoreline and fieldwork notes as recorded in the MapInfo digital files named "Shoreline" and "Shoreline_Update". *Concur.*

I. CROSSLINES ✓

VBES crosslines totaled 32.64 nautical miles, or 17.3% of mainscheme VBES hydrography. VBES crosslines agreed to within 1-2 meters with mainscheme VBES hydrography in regions of relatively flat bathymetry. Differences as large as 3-4 meters can be attributed to steep and irregular topography where the crosslines were acquired outside St. James Bay versus the relatively flat areas where crosslines were ran inside the bay. VBES and SWMB generally agreed to within 1 meter of one another and SWMB crosslines generally agreed to within 1-2 meters within SWMB hydrography in regions of low vertical gradients.

Ship multibeam and VBES tended to agree within 2 meters of each other in regions of low vertical gradients. Larger differences between ship multibeam and VBES occurred in areas of steep relief. These differences between the two methods of surveying are a function of horizontal positioning, beam width, water depth, slope and echo return processing. *Concur.*

Included in Appendix VI is a quality control report, which was generated in CARIS. This report summarizes a compression of the crosslines against a DTM of the mainscheme soundings. For this report, IHO statistics a/b of 1.0 and 0.023 were selected and all beams passed. ~~with an average of 76 percent.~~ *

J. JUNCTIONS (*See EVAL RPT., Sec. 4*)

The following contemporary surveys junction with H10869, and are shown in Figure 2 below.

Registry #	Scale	Date	Junction Sides
H10864	1:20,000	1999	North and East
H10880	1:20,000	1999	South and East

Soundings from these 1999 surveys were found to be in good agreement. Depths which junction survey H10880 are ship multibeam and are generally in depths greater than 200 meters. At the junction of the Boat Harbor inset and H10864, depths agree within 3 meters. It should be noted that in this area, ship multibeam soundings compare slightly better, within one to five meters, than in the shoaler depths where singlebeam soundings were compared with each other. Both junction surveys are located in areas of steep relief, dropping off from the shoreline to over 200 meters. VBES data for H10880 and H-10864 generally matches within one meter with the singlebeam data for H10869. ✓

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

** Filed with the hydrographic data.*

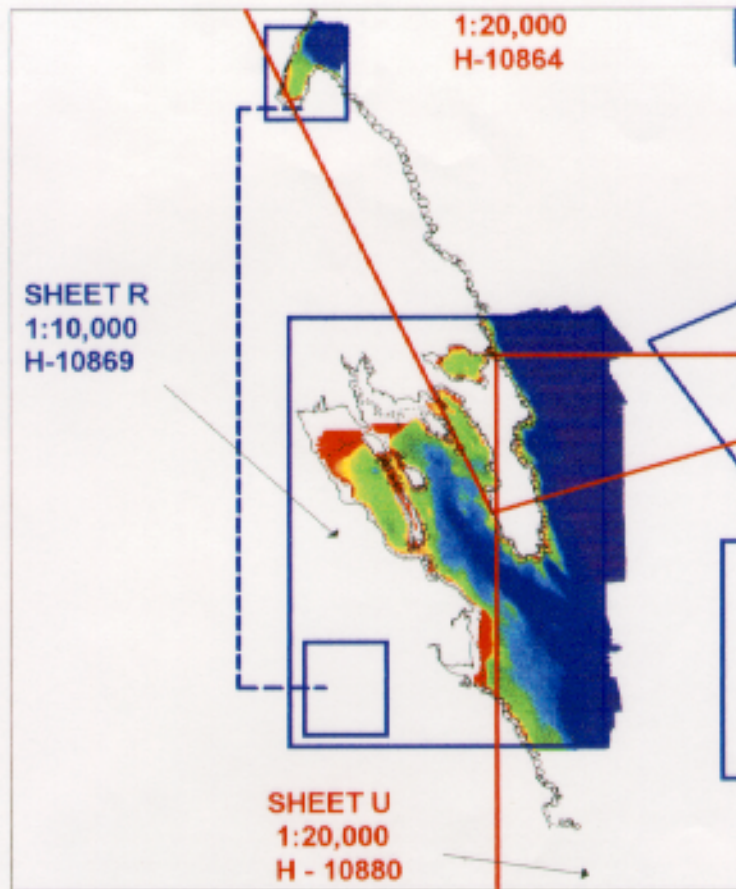


Figure 2 - Junction Surveys

L. COMPARISON WITH PRIOR SURVEYS (See EVAL RPT., Sec. M)

The following prior surveys share common area with H10869 and are shown in Figure 3 below.

Registry #	Scale	Date	Area covered
H-1602A	1:40,000	1890	S of St. James Bay
H-2056	1:40,000	1890	E of St. James Bay
H-2057	1:40,000	1890-1905	William Henry Bay
H-2059	1:10,000	1890	William Henry Bay
H-2060	1:20,000	1890	St. James Bay
H-3985WD	1:20,000	1917	E of St. James Bay
H-4202WD	1:40,000	1921	N of St. James Bay and William Henry Bay
H-4228 WD	1:40,000	1922	E of St. James Bay

Due to the fact that modern sounding and positioning equipment results in higher density of sounding data, many least depths from the current survey were found to be shoaler and several new features were located. Preliminary comparisons revealed no prior least depths shoaler than the current survey except in areas of steep bathymetry. *Concur.*

A comparison of survey H10869⁹ with surveys H-3985WD, H-4202WD and H-4228WD was not conducted. The scans are of very poor quality; no least depths were discernable and annotations on the priors were illegible. *Concur.*

A comparison of survey H10869³ with survey H-1602a was not conducted. No visible soundings were depicted on the prior survey. *Concur. A very few soundings were depicted on this prior survey of 1830 and none of these soundings are common to H-1602.*

Final comparisons will be done at PHB after application of smooth tides. ✓

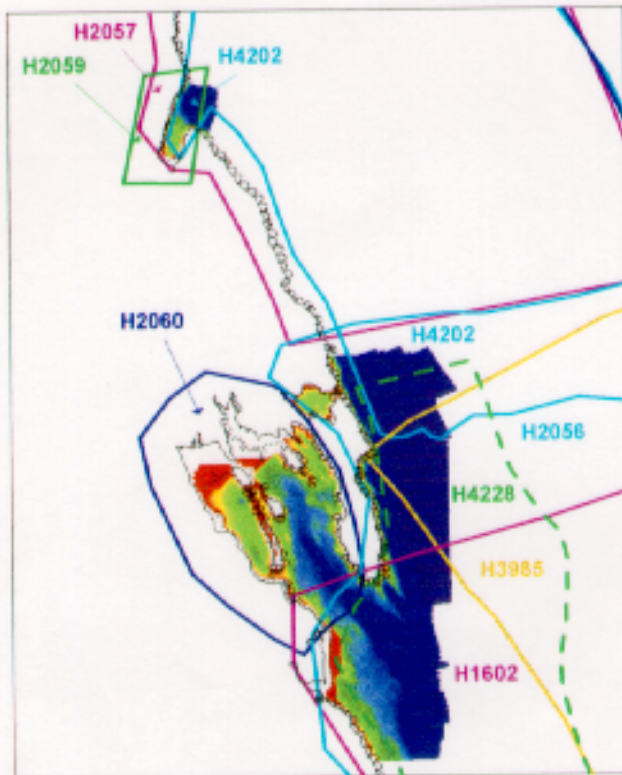


Figure 3 - Prior Surveys

M. ITEM INVESTIGATION REPORTS ✓

No AWOIS items were assigned for this survey. *Concur.*

N. COMPARISON WITH THE CHART (*See EVAL RPT., Sec. 0*)

This survey was compared to the following NOS charts:

Chart	Scale	Edition Number	Date	Datum
17316	1:80,000	18 th	July 18, 1998	NAD 83
17300	1:209,978	27 th	August 14, 1993	NAD 83

The survey was compared with both charts and was found to be in good agreement, generally within one fathom. Exceptions are noted below.

Chart 17316 shows a 5 fathom sounding at the entrance to the western basin of St. James Bay (58/34/46.960N 135/11/17.837W), while the present survey revealed a depth of 2 fathoms. *Chart the area based on the present survey.*

A 12 fathom sounding located at the southwest entrance to St. James Bay, depicted on chart 17316 at 58°33'03.1"N 135°09'33.1"W, is incorrectly charted. ^{Concur} Soundings from the current survey are less than 1 fathom. *Chart the area based on the present survey.*

Chart 17316 depicts navigable water in St. James Bay between the mainland and an un-named island, in the vicinity of 58°37'10.5"N 135°11'14.4"W. Based on depths from the current survey, this area should be considered non-navigable. *Concur. This area should be charted based on the present survey.*

The only ^{13. fathom} sounding in William Henry Bay on chart 17300 appears to be an adequate representation of the bay. *Concur.*

A charted underwater cable crossing lies within the H10869 survey areas of both the main sheet and the William Henry Bay inset. The cable crossing was not investigated and is shown in brown on the final DP and BS plot. The Hydrographer recommends retaining the cable crossing as charted. *Concur.*

The Hydrographer recommends that soundings and shoreline detail from survey H10869 be used to update the chart in their common areas. ^{Concur} Non-sounding features are discussed in Section J, Shoreline.

Final sounding comparisons will be made at PHB after application of smooth tides.

Dangers to Navigation *(See EVAL RPT., Sec. 06)*

Four dangers to navigation were discovered during the survey and reported to the Seventeenth Coast Guard District. Copies of the correspondence can be found in Appendix I of this report.

A shoal sounding of 4 fathoms (7.3 m) at 58°35'25.707"N 135°10'57.640"W was submitted as a danger to navigation (Pos. #50627). Surrounding charted depths are 7½ fathoms. After further review of SWMB data, the depth was revised to 3.6 fathoms (6.8 m) at 58°35'24.522"N 135°10'56.736"W (Pos. # 86,681). The revised shoal depth is approximately 39 m SE of the reported position. *Chart 3.6 fathoms based on the present survey.*

A shoal sounding of 5.5 fathoms (10.1 m) at 58°36'33.748"N 135°09'53.122"W was submitted as a danger to navigation (Pos. # 32929). Surrounding charted depths are from 8 to 20 fathoms. After further review of SWMB data, the depth was revised to 4.5 fathoms (8.5 m) at 58°36'34.172"N, 135°09'52.641"W (Pos. # 81313). The revised shoal depth is approximately 15 m NE of the reported position. *Chart the 4.5 fathoms shoal sounding based on the present survey.*

O. ADEQUACY OF SURVEY *(See EVAL RPT., Sec. P)*

Survey H10869 is complete and adequate to supersede charted depths and features in their common areas.

P. AIDS TO NAVIGATION ✓

There are no fixed navigational aids within the survey area.

Q. STATISTICS ✓

Refer to the Survey Information Summary attached to this report.

R. MISCELLANEOUS ✓

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

Heavy rip currents appear at the entrance to the basin west of the Lynn Brothers and the entrance to Boat Harbor. The hydrographer recommends that mariners take caution when navigating these waterways during extreme tides. *Concur.*

Both William Henry Bay and St. James Bay provide excellent anchorages for recreational motor vessels and sailboats. Numerous crab pot buoys were sighted near the mouth of St. James Bay.

S. RECOMMENDATIONS ✓

The Hydrographer recommends that shoreline depicted on Survey H10869 be used to update the chart in their common areas. Precise, low-water shoreline information is imperative when conducting basic hydrographic surveys along the complex Alaska coast. When shoreline manuscripts are not provided, significant effort is required to adequately delineate the shoreline and its features. *Concur.*

The hydrographer recommends placing a notice near the entrance to Boat Harbor stating that Boat Harbor has a delayed tidal flow and that thirty to forty minutes after low tide in Lynn Canal, Boat Harbor is still draining. *Concur.*

T. REFERRAL TO REPORTS ✓

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

<u>Title</u>	<u>Date Sent</u>	<u>Office</u>
OPR-O340-RA Horizontal Control Report	July 1999	N/CS34
Project related data for OPR-O340-RA	July 1999	N/CS34
OPR-O340-RA Coast Pilot Report	July 1999	N/CS26

Respectfully Submitted

Paul J. McAnally
 Paul J. McAnally
 Senior Survey Technician

Approved and Forwarded,

Daniel R. Herlihy CDR/NOAA
 Alan D. Anderson *for*
 Captain, NOAA
 Commanding Officer

APPROVAL SHEET

for

H10869

RA-10-06-99

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

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

Approved and Forwarded,

Daniel P. Herby CDR NOAA

Alan D. Anderson
Captain, NOAA

Commanding Officer
NOAA Ship RAINIER

for

Survey Information Summary

Project: **Project Name:**

Instructions Dated: **Project Change Info:**

Change #	Dated
1	3/30/1998
2	4/12/1999
3	5/6/1999

Sheet Letter: **Registry Number:**

Sheet Number:

Survey Title:

Data Acquisition Dates: **From:** **To:**

Vessel Usage Summary

VESNO	MS	SPLITS	DEV	XL	S/L	DP	BS	DIVE
2120								
2121	1	2		1				
2122	3	2		1	2	2		
2123	2	1						
2124	1			1	1	1		
2125	1				1	1	1	
2126	1	1						

Sound Velocity Cast Information

Launch Table #	Ship Table #	Cast DN	Max Depth	Position	Applicable DN
3		104	340	58/34/18	104-115
				134/57/54	
5		107	116	58/35/00	107-113
				135/10/12	

Tide Zone Information

Zone #	Time Corr.	Height Corr.
SEA2C	00 hr 00 min	X0.99
SEA2G	00 hr 06 min	X0.97
SEA3A	00 hr 00 min	X0.98
SEA3	00 hr 00 min	X0.98

Tide Gage Information

Tide Gage #	Gage Name	Installed	Removed
945-2377	ST JAMES BAY	4/7/1999	4/28/1999
945-2346	COVE POINT	4/4/1999	6/2/1999
945-2318	BARLOW COVE	4/5/1999	6/7/1999
945-2378	BOAT HARBOR	4/22/1999	5/3/1999

Statistics Summary

Type	Total:
BS	14
DP	62
MBMS	21.2
MS	188.39
S/L	29.98
SPLIT	96.26
SWMB	92.62
XL	32.64

Percent XL:

SQNM:

List of Horizontal Control Stations

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



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 13, 1998

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

ADVANCE
INFORMATION

Dear CDR Hamblett:

It is requested that the following dangers to navigation be included in the Local Notice to Mariners. The NOAA Ship RAINIER positioned these features while conducting hydrographic surveys in Lynn Canal, southeast Alaska. The dangers are shown graphically on the attached chartlets and are listed below by chart without duplication. The following dangers to navigation affect chart 17300, 28th edition, 1998, 1:209,978, chart 17316, 18th edition, 1998, 1:80,000 and chart 17316 inset, 1:20,000. All positions are on the NAD 83 datum and depths have been corrected to Mean Lower Low Water using predicted tides.

<u>Feature</u>	<u>Depth (fm)</u>	<u>Latitude (N)</u>	<u>Longitude (W)</u>	<u>Position #</u>	<u>Depth (m)</u>	<u>Survey #</u>
Shoal	4-1/4	58:48:00.774	135:06:16.368	70244	7.7	H-10864
Shoal	2-1/2	58:35:34.920	135:01:22.697	71066	4.5	H-10862
Shoal	1	58:38:05.634	134:57:05.888	72344	2.1	H-10862
Shoal	7-3/4	58:34:27.884	135:08:13.734	30239	14.1	H-10869
Shoal	4	58:35:25.707	135:10:57.640	50627	7.3	H-10869
Shoal	10	58:35:06.281	135:10:51.786	50867	18.3	H-10869
Shoal	5-1/2	58:36:33.748	135:09:53.122	32929	10.1	H-10869
Shoal	10-3/4	58:32:21.215	134:56:39.068	81722	19.9	H-10866
Shoal	5-1/2	58:33:15.011	134:52:45.735	90233	10.2	H-10866
Reef Awash	-1/2	58:27:24.022	134:54:49.679	21701	-0.8	H-10865
Reef Awash	-3/4	58:29:33.511	134:55:35.116	21852	-1.5	H-10865
Ledge Awash	-1/2	58:29:02.271	134:57:03.555	51386	-0.5	H-10865
Shoal	6-3/4	58:21:10.318	134:51:20.371	52556	12.5	H-10870
Shoal	9-1/4	58:20:58.510	134:50:44.181	22272	16.8	H-10870
Shoal	6-3/4	58:24:09.722	134:52:39.130	52663	12.5	H-10870
Shoal	10-3/4	58:25:24.880	134:55:59.271	24865	19.8	H-10870
Shoal	4-3/4	58:23:14.373	134:51:53.168	22975	8.5	H-10870

The following dangers to navigation affect chart 17316, 18th edition, 1998, Funter Bay inset, 1:20,000. All positions are on the NAD 83 datum and depths have been corrected to Mean Lower Low Water using predicted tides.

<u>Feature</u>	<u>Depth (fm)</u>	<u>Latitude (N)</u>	<u>Longitude (W)</u>	<u>Position #</u>	<u>Depth (m)</u>	<u>Survey #</u>
Shoal	4	58:15:19.824	134:55:54.210	4442	7.2	H-10879
Shoal	2-1/2	58:13:41.092	134:55:21.337	40920	4.5	H-10879
Shoal	2-1/2	58:14:41.896	134:55:42.686	3650	4.5	H-10879
Shoal	3-1/4	58:14:45.416	134:55:47.303	4619	6.1	H-10879
Shoal	4	58:15:09.439	134:55:49.519	3015	7.5	H-10879
Shoal	6-1/2	58:14:34.097	134:54:59.502	2349	11.9	H-10879
Shoal	5	58:14:25.285	134:53:51.867	2884	9.3	H-10879
Shoal	3-1/4	58:14:47.757	134:53:47.436	50683	6.0	H-10879



**ADVANCE
INFORMATION**

This is advance information subject to office review. Questions concerning this letter should be directed to the Chief, Pacific Hydrographic Branch, (206) 526-6835. Refer to survey project OPR-O340-RA-99 and Danger to Navigation message RA-06-99. More information on current RAINIER survey projects may be obtained by e-mail; contact the Field Operations Officer at FOO.RAINIER@NOAA.GOV.

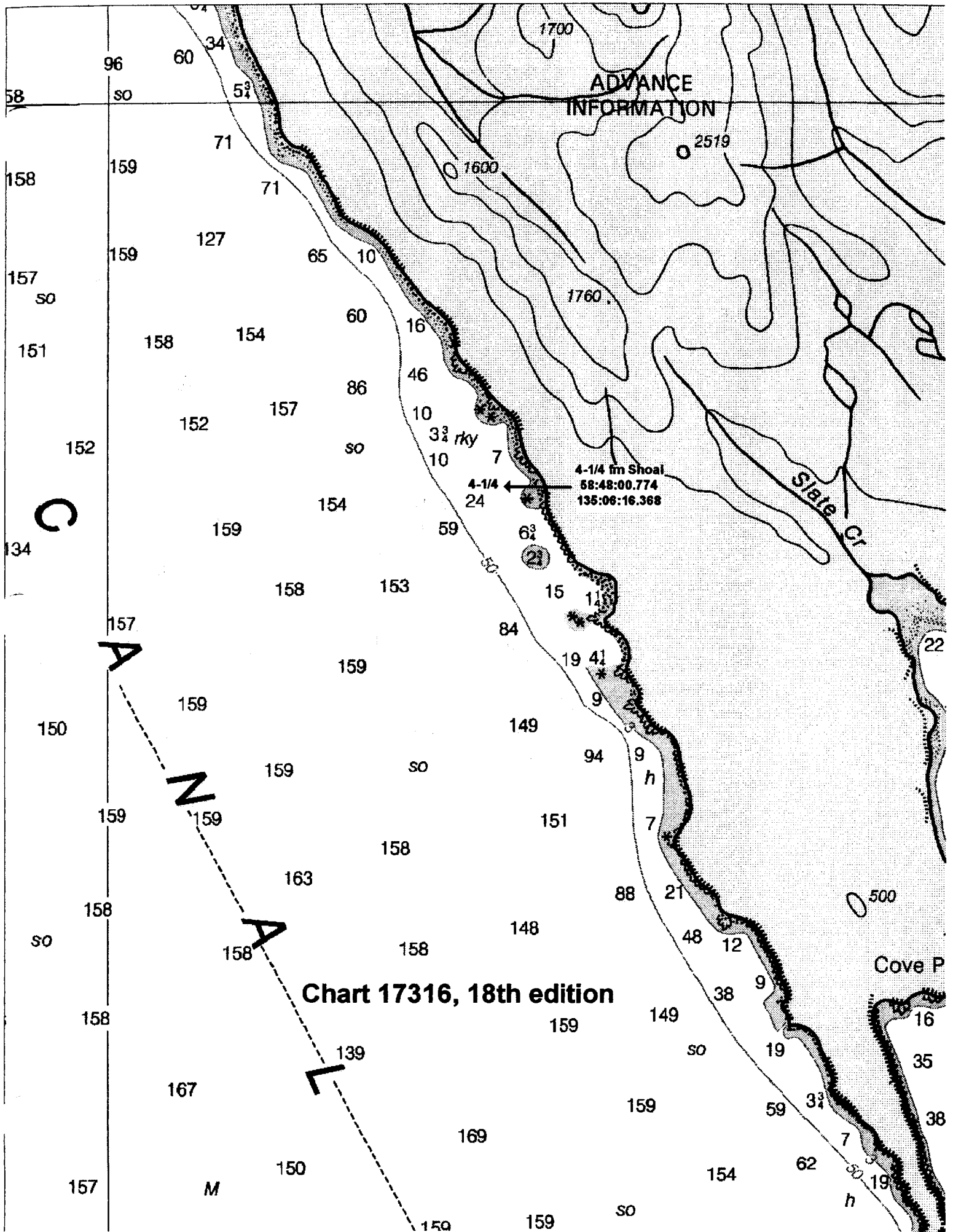
Sincerely,

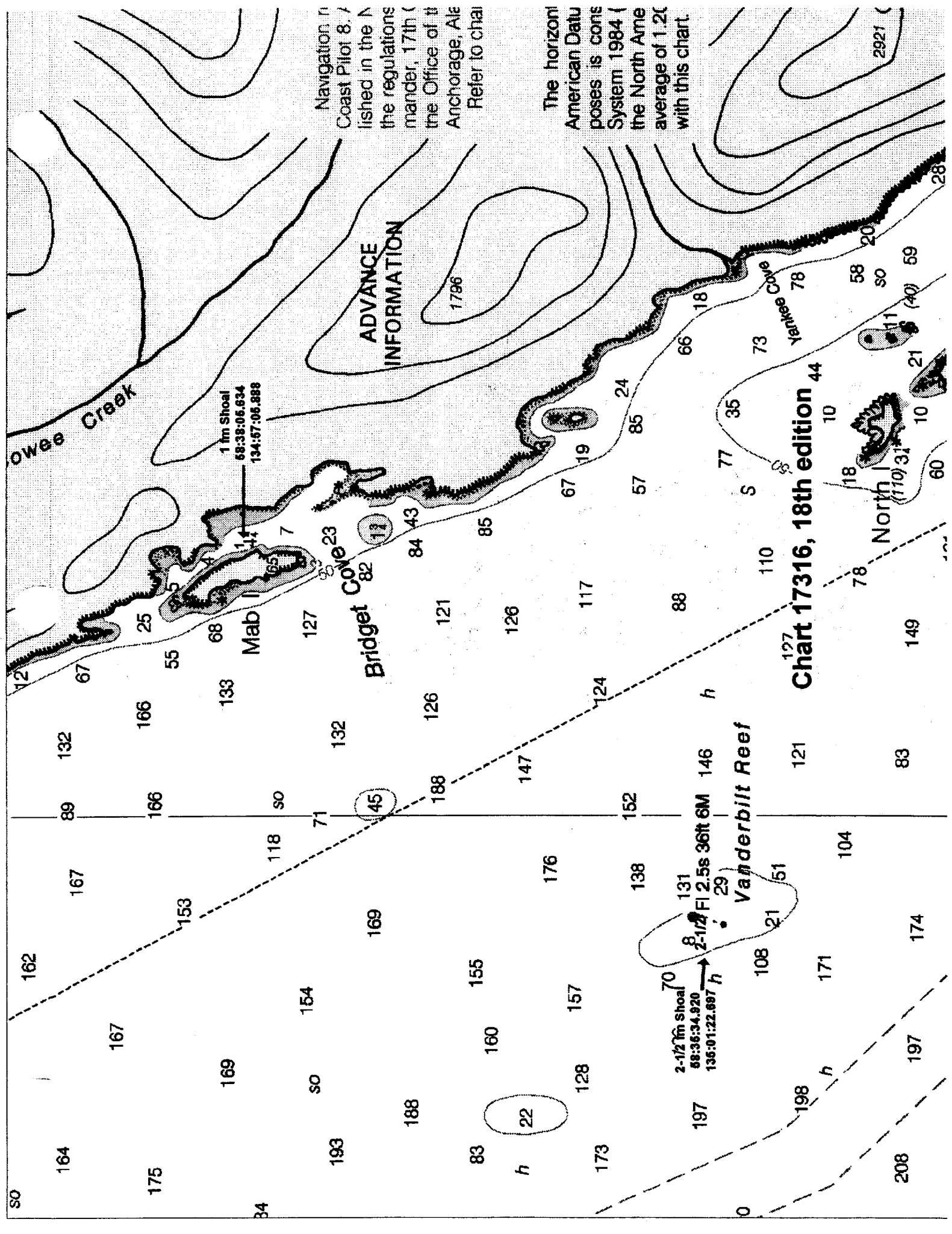


Alan D. Anderson
Captain, NOAA
Commanding Officer

Attachments

cc: NIMA
PMC
N/CS261
N/CS34



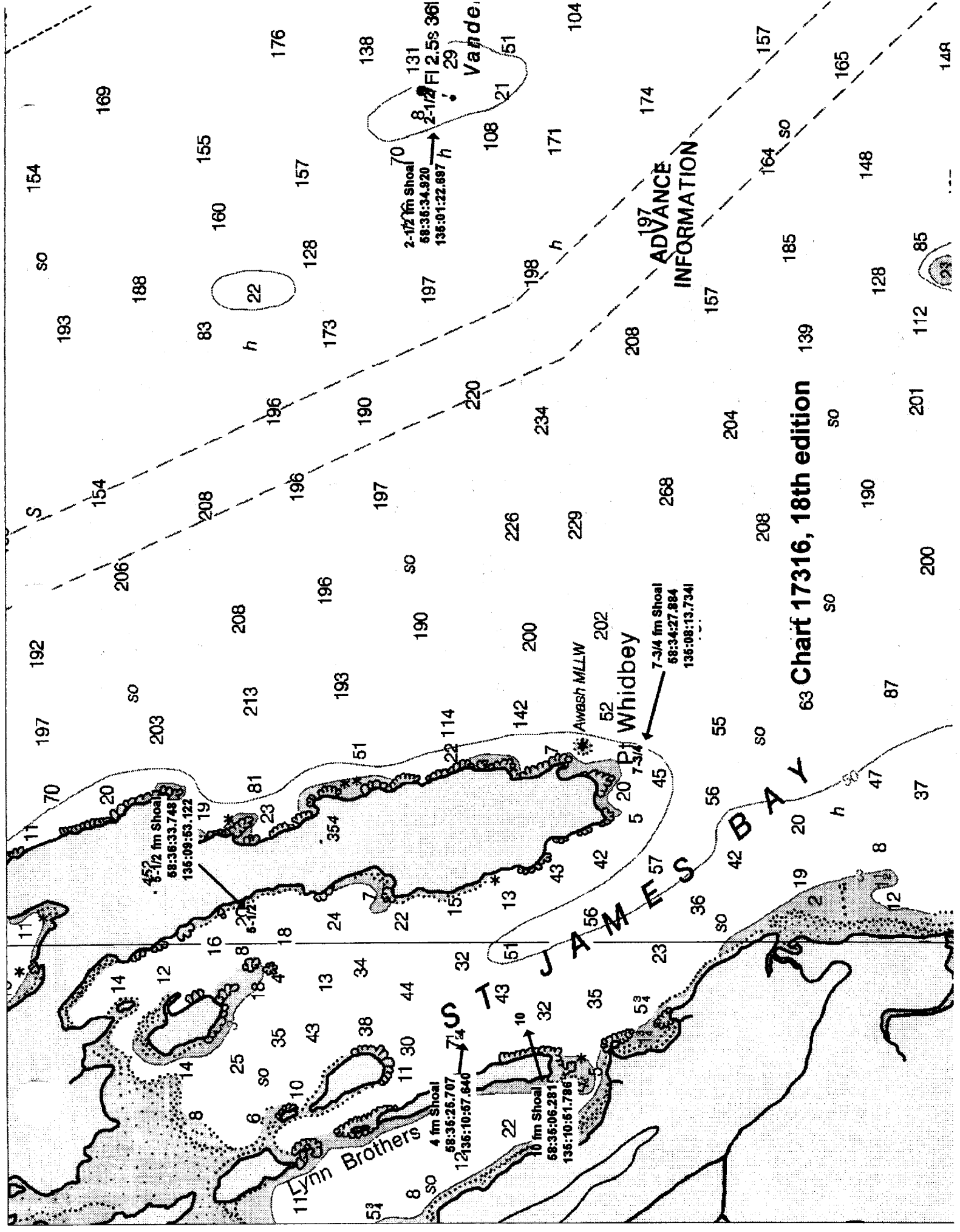


ADVANCE INFORMATION

Navigation in
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with this chart.

Chart 17316, 18th edition 44



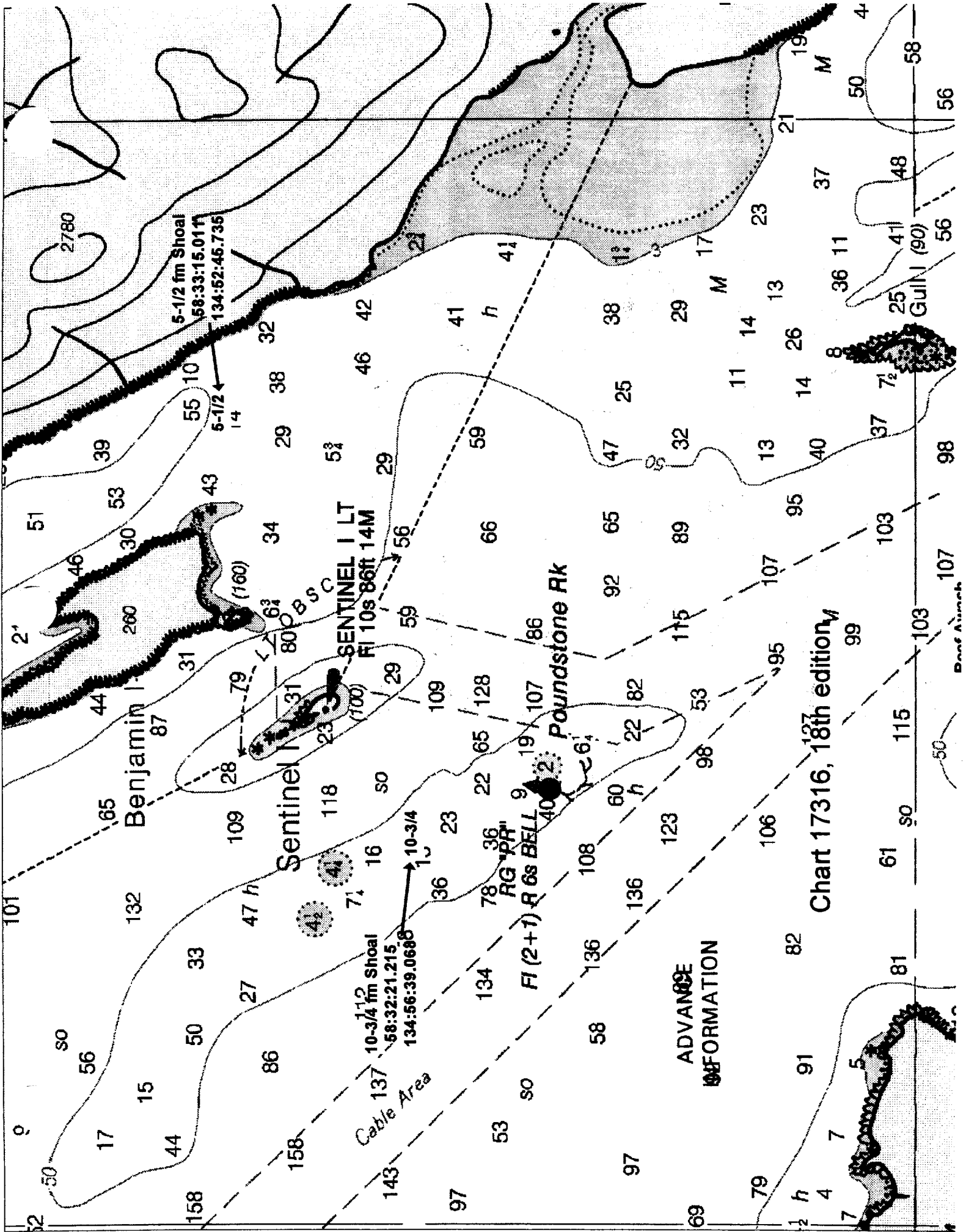


Chart 17316, 18th edition

ADVANCE INFORMATION

Scale of Advance

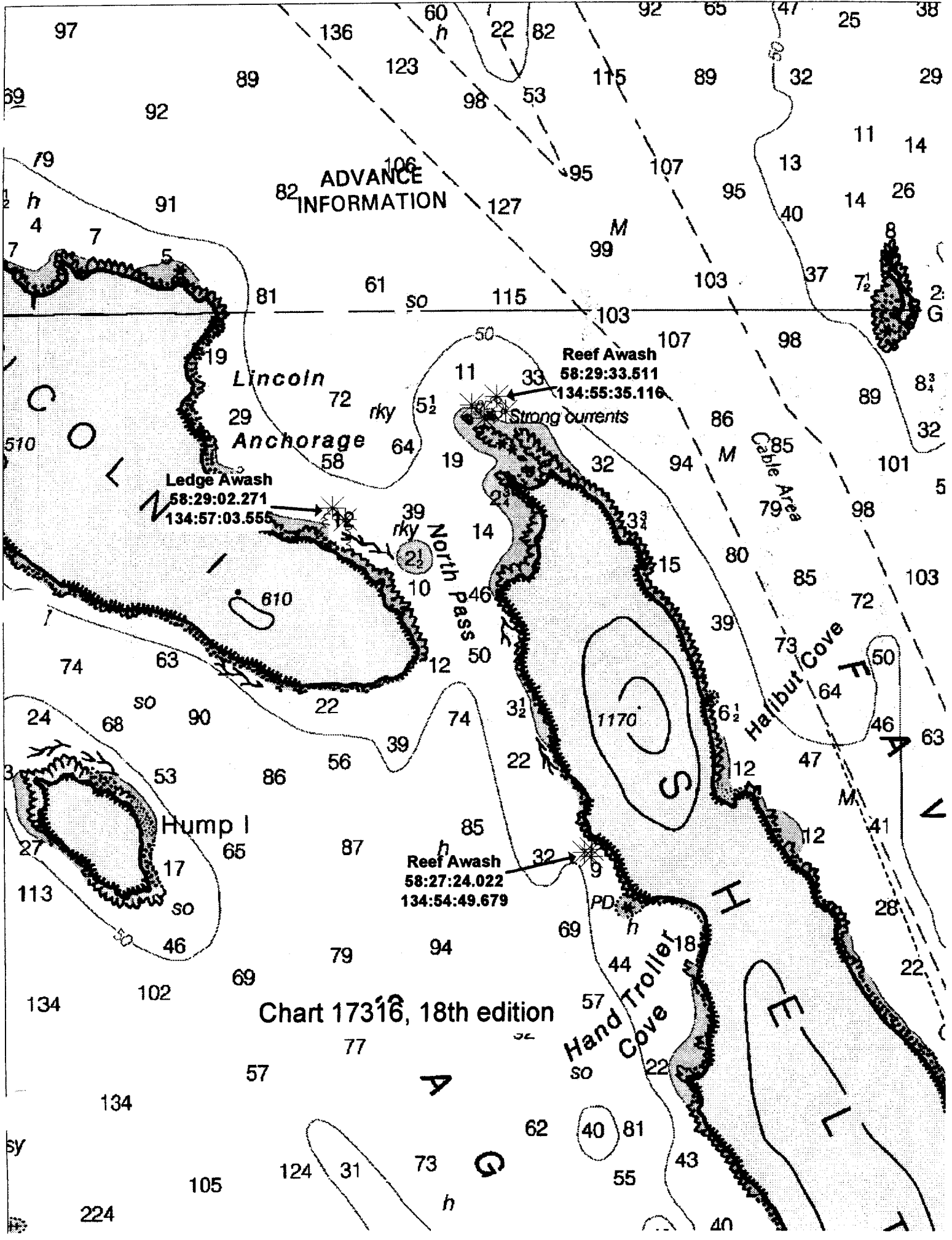
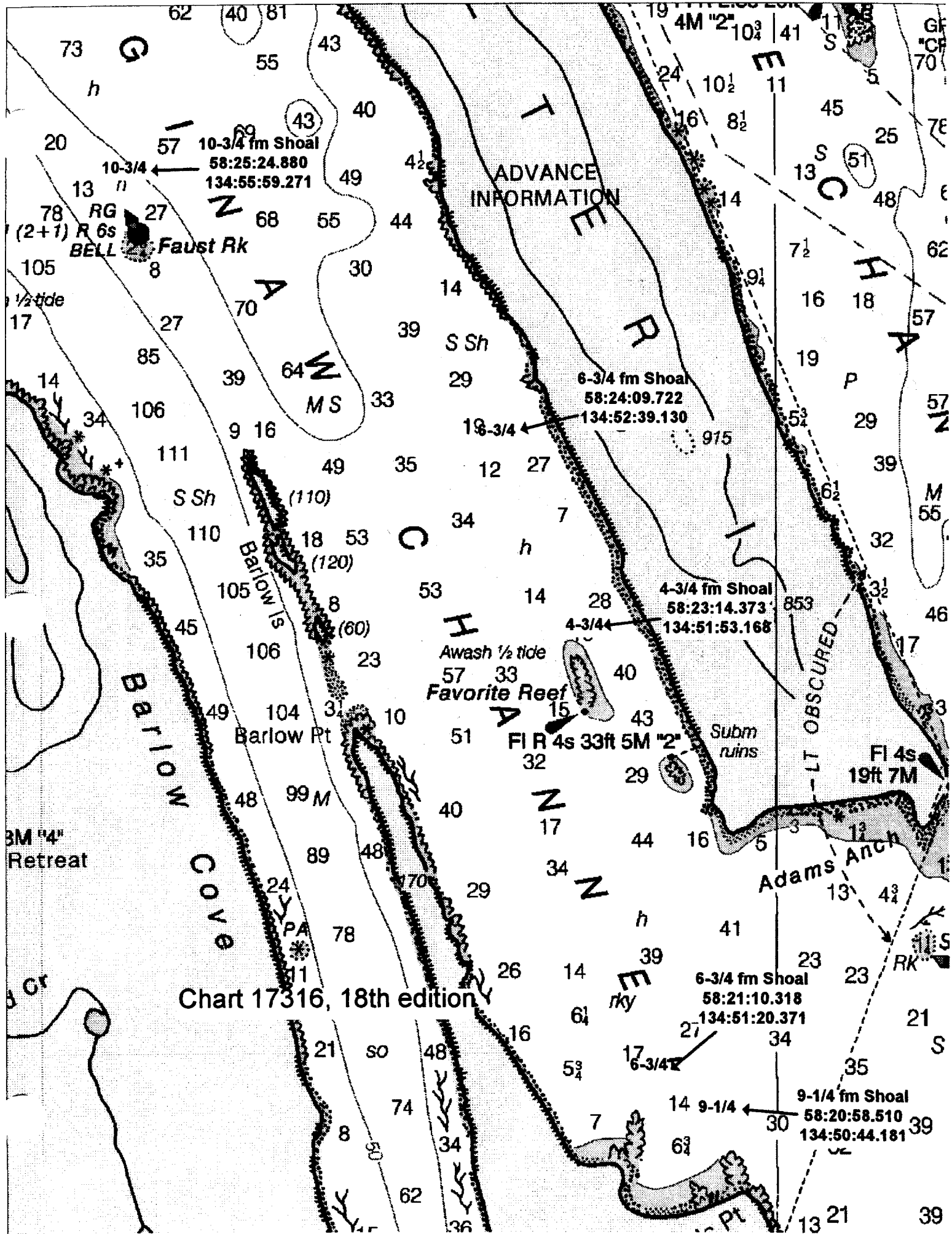


Chart 17316, 18th edition



ADVANCE INFORMATION

10-3/4 fm Shoal
58:25:24.880
134:55:59.271

6-3/4 fm Shoal
58:24:09.722
134:52:39.130

4-3/4 fm Shoal
58:23:14.373
134:51:53.168

6-3/4 fm Shoal
58:21:10.318
134:51:20.371

9-1/4 fm Shoal
58:20:58.510
134:50:44.181

Chart 17316, 18th edition

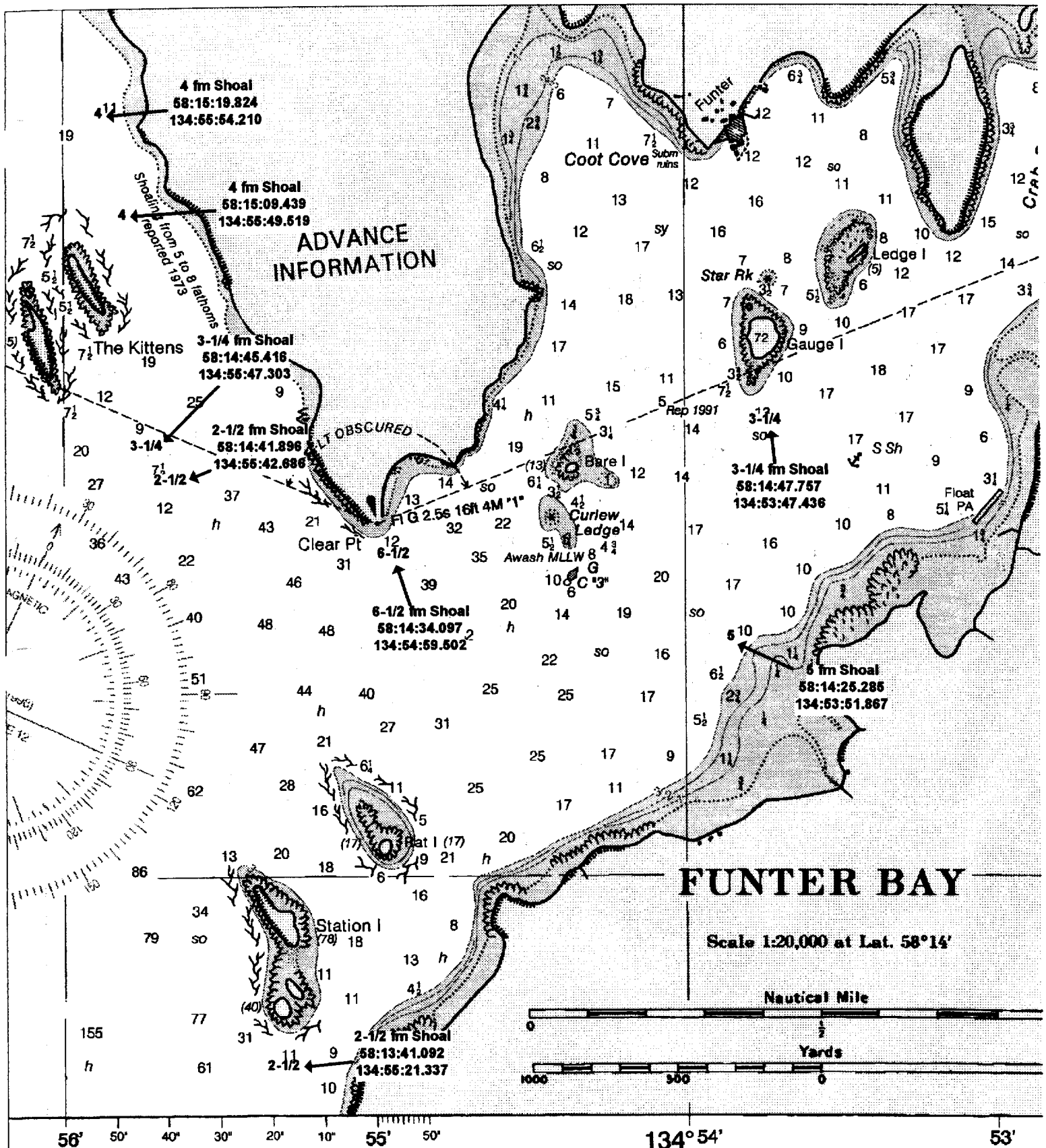
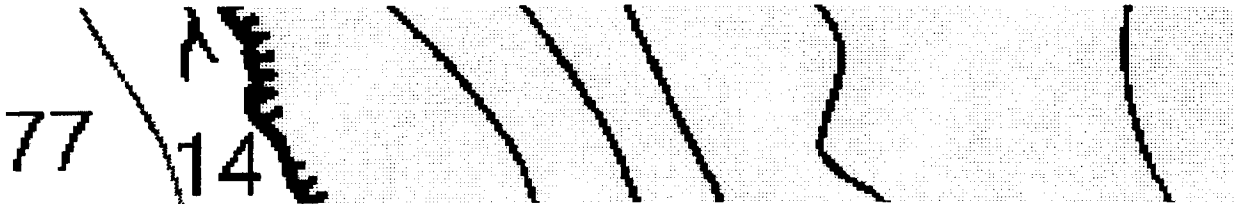


Chart # 17316 (inset)





UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF COAST SURVEY
Pacific Hydrographic Branch
Seattle, Washington 98115-0070

September 23, 1999

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

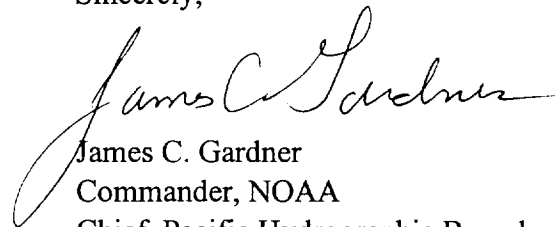
Dear Sir:

During office review of hydrographic survey H-10869, Alaska, Lynn Canal, St. James and William Henry Bays, seven additional shoal soundings were found and are considered to be potential dangers to navigation.

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) 526-6836.

Sincerely,



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

Enclosure

cc: NIMA
NCS/261
NOAA Navigation Advisor Alaska



REPORT OF DANGERS TO NAVIGATION

Hydrographic Survey Registry Number: H-10869

Survey Title: State: ALASKA
 Locality: LYNN CANAL
 Sublocality: ST. JAMES AND WILLIAM HENRY BAYS

Project Number: OPR-O340-RA

Survey Date: APRIL - JUNE 1999

Soundings are reduced to Mean Lower Low Water using preliminary tides and are positioned on NAD 83.

Chart affected: 17316 18TH Edition July 18, 1998, scale 1:80,000 NAD 83

<u>DANGER TO NAVIGATION</u>	<u>LATITUDE(N)</u>	<u>LONGITUDE(W)</u>
2.2 fathom sounding	58/37/07.53	135/10/20.46
10.4 fathom sounding	58/36/09.28	135/10/19.38
7.9 fathom sounding	58/36/01.01	135/09/44.53
2.0 fathom sounding	58/34/41.27	135/11/19.97
8.7 fathom sounding	58/34/16.14	135/10/09.05
7.9 fathom sounding	58/32/53.63	135/09/18.25
6.4 fathom sounding	58/37/54.15	135/10/02.17

Questions concerning this report should be directed to the Chief, Pacific Hydrographic Branch at (206)526-6836.

CHART 17316

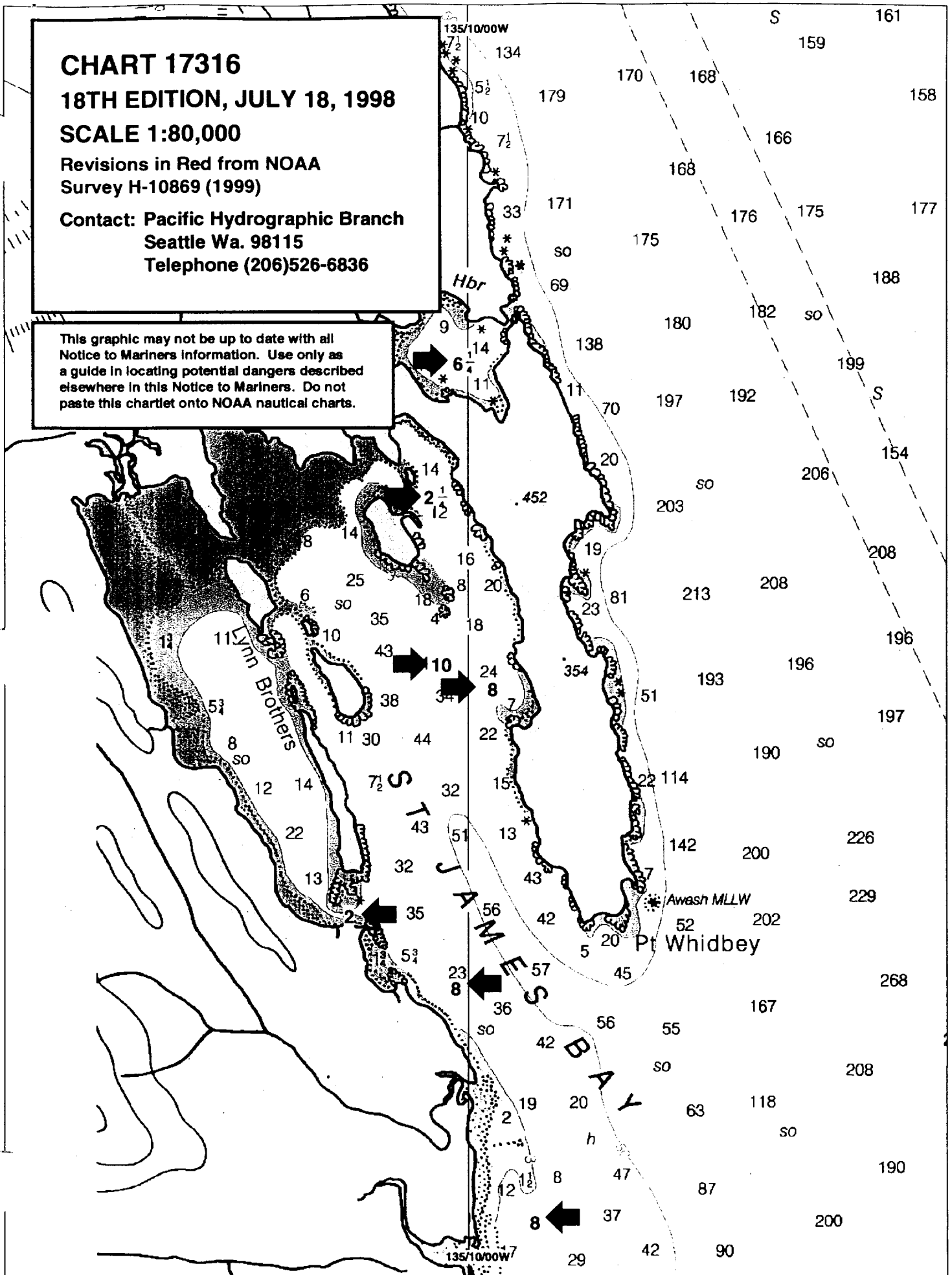
18TH EDITION, JULY 18, 1998

SCALE 1:80,000

Revisions in Red from NOAA
Survey H-10869 (1999)

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

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





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
July 21, 1999

MEMORANDUM FOR: CDR James Gardner
Chief, Pacific Hydrographic Branch

THROUGH: RADM Nicholas A. Prah
Director, Pacific Marine Center

FROM: *Daniel R. Herlihy*
CDR Daniel R Herlihy
Commanding Officer

SUBJECT: Survey Data Transmittal Delay

There will be a delay in the transmission of survey data for projects OPR-O340-RA-99 and OPR-O351-RA-99. The transmission of data will exceed four weeks from completion of field work.

The surveys affected are H-10866 (RA-10-4-99), H-10865 (RA-10-5-99), H-10869 (RA-10-6-99), H-10870 (RA-10-7-99), H-10879 (RA-10-8-99), H-10880 (RA-20-3-99), H-10882 (RA-20-4-99), H-10883 (RA-10-9-99), F-00451 (RA-10-10-99), and H-10902 (RA-10-11-99). There are numerous reasons for this delay including, but not limited to, use of untested software for the acquisition of data, lack of experienced personnel, and the need to efficiently use the vessels as acquisition platforms while processing data already collected. In addition, the Commanding Officer and Field Operations Officer rotated during the summer inport; there was a ramp up period on the above projects to allow for adequate review.

The four week submittal of survey data recommendation noted in the Field Procedures Manual (FPM) does not reflect knowledge of current data acquisition and processing timelines. As you know, the shallow water multibeam (SWMB) systems allow for extremely large data sets to be collected in a very short amount of time. The processing of these data sets takes a much longer amount of time than does the processing of single beam data. In fact, the ratio of time processing SWMB data to time collecting SWMB data is 4:1. In comparison, the ratio of processing single beam data to the collection of single beam data is 1:3. The FPM should be updated to recognize the larger amount of time needed to process SWMB data by the field units. It is recommended that the FPM be changed to allow eight weeks for the submittal of survey data from the date of field work completion.

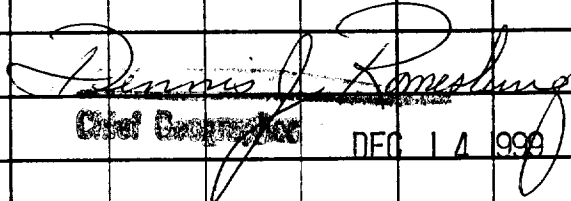
The anticipated transmittal date for the above mentioned surveys is the beginning of August 1999.



GEOGRAPHIC NAMES

H-10869

Name on Survey	<div style="display: flex; justify-content: space-between;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">A ON CHART NO. 17316</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">B ON PREVIOUS SURVEY NO.</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">C ON U.S. QUADRANGLE MAPS</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">D FROM LOCAL INFORMATION</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">E ON LOCAL MAPS</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">F P.O. GUIDE OR MAP</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">G RANG MCNALLY ATLAS</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">H U.S. LIGHT LIST</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">K</div> </div>										
	ALASKA (title)	X		X							
BEARDSLEE RIVER	X		X								2
BOAT HARBOR	X		X								3
LANCE POINT	X		X								4
LYNN BROTHERS	X		X								5
LYNN CANAL	X		X								6
SAINT JAMES BAY	X		X								7
SAINT JAMES POINT			X								8
WHIDBEY, POINT	X		X								9
WILLIAM HENRY BAY	X		X								10
											11
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 Chief Geographer
 DEC 14 1999



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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: October 6, 1999

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-0340-RA
HYDROGRAPHIC SHEET: H-10869

LOCALITY: St. James and William Henry Bays, Lynn Canal, AK
TIME PERIOD: April 18 - June 2, 1999

TIDE STATION USED: 945-2378 Boat Harbor, AK
Lat. 58° 37.7'N Lon. 135° 09.9'W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 4.620 meters

TIDE STATION USED: 945-2377 St. James Bay, AK
Lat. 58° 36.9'N Lon. 135° 09.8'W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 4.554 meters

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

TIDE STATION USED: 945-2346 Cove Point, Berners Bay, AK
Lat. 58° 45.1'N Lon. 135° 01.6'W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 4.637 meters

REMARKS: RECOMMENDED ZONING
Use zone(s) identified as: SEA65, SEA66, SEA67 & SEA68

Refer to attachments for zoning information.

Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time.



TIDE NOTE FOR HYDROGRAPHIC SURVEY SHEET H-10869 cont.

Note 2: Use tide data from the appropriate station with applicable zoning correctors for each zone according to the order in which they are listed in the Tidezone corrector files. For example, tide station one (TS1) would be the first choice for an applicable zone followed by TS2, etc. when data are not available.


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

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

However, analyses also show that there are several geographic areas which are strongly anomalous from the average sea level trends found across the NWLON and must be treated differently. One of these areas is in southeast Alaska covering the Lynn Canal, Icy Strait, and Glacier Bay region. Juneau and Skagway show relative sea level trends of -0.038 ft/yr and -0.052 ft/yr, respectively due to land emergence from the retreat of glaciers over recent geological time. NOS has adopted a procedure of computing accepted tidal datums for these anomalous regions by using a MSL value calculated from the last several years of data rather than the 19-year NTDE. The accepted range of tide is still based on the 19-year NTDE and, when applied to the updated MSL, will result in updated values for Mean High Water (MHW) and Mean Lower Low Water (MLLW) derived through standard datum calculation procedures. For both Juneau and Skagway, the MSL values were computed from the period of 1994-1998. This resulted in a lowering of the MLLW datums relative to land by -0.40 ft at Juneau and -0.53 ft at Skagway compared to the previous MLLW elevations used in last year's surveys. Subordinate tide stations in the area used for hydrographic surveys and controlled by Juneau or Skagway will be affected similarly. Accepted datums

TIDE NOTE FOR HYDROGRAPHIC SURVEY SHEET H-10869 cont.

have been computed and may be accessed on the Internet through the URL specification <http://www.co-ops.nos.noaa.gov>.

Fen 

CHIEF, REQUIREMENTS AND DEVELOPMENT DIVISION

Final tide zone node point locations for OPR-O340-RA-99,
Sheet H-10869.

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

	Tide Station Order	AVG Time Correction	Range Correction
Zone SEA65			
-134.712062 58.395475	9452346	0	0.99
-134.81273 58.375272	9452318	0	1.02
-134.843845 58.379935			
-134.883282 58.448923			
-134.911523 58.459634			
-134.987639 58.456439			
-135.101046 58.434896			
-135.198572 58.523417			
-135.19381 58.574286			
-135.146121 58.586495			
-135.157859 58.623886			
-135.156902 58.635886			
-135.164237 58.644226			
-134.988058 58.676589			
-134.765259 58.517721			
-134.712062 58.395475			
Zone SEA66			
-135.146121 58.586495	9452377	0	1.00
-135.157859 58.623886	9452318	0	1.01
-135.193021 58.631584			
-135.204758 58.64147			
-135.251445 58.630675			
-135.24044 58.597122			
-135.19381 58.574286			
-135.146121 58.586495			
Zone SEA67			
-135.156902 58.635886	9452378	0	1.00
-135.157859 58.623886	9452318	+12	1.03

-135.193021 58.631584
-135.183382 58.64245
-135.164237 58.644226
-135.156902 58.635886

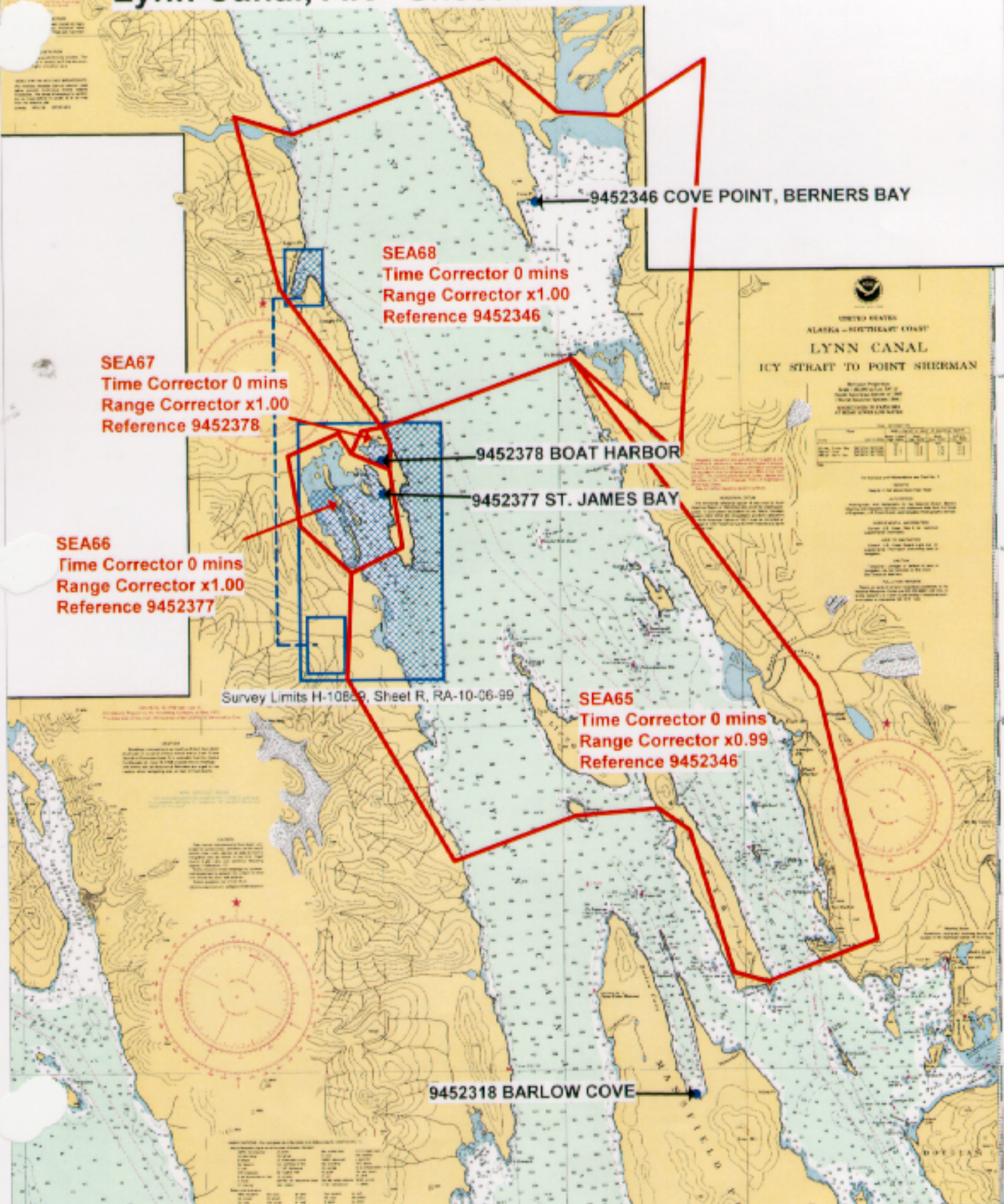
Zone SEA68

-134.988058 58.676589	9452346	0	1.00
-135.164237 58.644226	9452318	0	1.03
-135.257051 58.710643			
-135.297679 58.793456			
-135.244377 58.784761			
-135.055203 58.820501			
-134.998485 58.794516			
-134.942256 58.792502			
-134.862756 58.819161			
-134.888503 58.629799			
-134.988058 58.676589			

Final Tidal Zoning for OPR-O340-RA-99 Lynn Canal, AK - Sheet H-10869

DEPT. OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL SYSTEM OF SURVEYING
SOUNDINGS IN FATHOMS

17316



SEA68
Time Corrector 0 mins
Range Corrector x1.00
Reference 9452346

SEA67
Time Corrector 0 mins
Range Corrector x1.00
Reference 9452378

SEA66
Time Corrector 0 mins
Range Corrector x1.00
Reference 9452377

9452346 COVE POINT, BERNERS BAY

9452378 BOAT HARBOR

9452377 ST. JAMES BAY

Survey Limits H-10869, Sheet R, RA-10-06-99

SEA65
Time Corrector 0 mins
Range Corrector x0.99
Reference 9452346

9452318 BARLOW COVE

UNITED STATES
ALASKA - SOUTHEAST COAST
LYNN CANAL
ICY STRAIT TO POINT SHERMAN

Scale: 1:50,000
Vertical Exaggeration: 1.00

Scale	Vertical Exaggeration	Horizontal Exaggeration
1:50,000	1.00	1.00

Vertical Exaggeration: 1.00
Horizontal Exaggeration: 1.00

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	1				
ENVELOPES					
VOLUMES					
CAHIERS					
BOXES					

SHORELINE DATA

SHORELINE MAPS (List): TP01526 and TP01527 (Coastal Mapping Survey CM-8709)

PHOTOBATHYMETRIC MAPS (List): None

NOTES TO THE HYDROGRAPHER (List): None

SPECIAL REPORTS (List): None

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

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

PROCESSING ACTIVITY	AMOUNTS		
	VERIFICATION	EVALUATION	TOTALS
POSITIONS ON SHEET			
POSITIONS REVISED			
SOUNDINGS REVISOR (Selected)			49,180
CONTROL STATIONS REVISED			

PROCESSING ACTIVITY	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	227.5		227.5
COMPARISON WITH PRIOR SURVEYS AND CHARTS		18.0	18.0
EVALUATION OF SIDE SCAN SONAR RECORDS			
EVALUATION OF WIRE DRAGS AND SWEEPS			
EVALUATION REPORT		24.0	24.0
GEOGRAPHIC NAMES			
OTHER (Chart Compilation)			
USE OTHER SIDE OF FORM FOR REMARKS	TOTALS		227.5

Pre-processing Examination by R. Davies	Beginning Date 9/24/99	Ending Date 9/24/99
Verification of Field Data by E. Domingo, L. Deodato, R. Davies, D. Doles, R. Mayor	Time (Hours) 227.5	Ending Date 3/1/00
Verification Check by G. Nelson, I. Almacén	Time (Hours)	Ending Date
Evaluation and Analysis by I. Almacén	Time (Hours) 42.0	Ending Date 3/6/00
Inspection by D. Hill	Time (Hours) 2	Ending Date 4-11-00

**EVALUATION REPORT
H10869**

A. PROJECT

The hydrographer's report contains an adequate discussion of the project information.

B. AREA SURVEYED

The hydrographer's report contains an adequate discussion of the area surveyed.

The hydrographer has determined the inshore limits of safe navigation by defining a Navigable Area Limit Line (NALL) throughout the survey. Charted features and soundings inshore of this limit line which have not been specifically addressed during survey operations should be retained as charted. Page-size plots of the charted areas depicting the specific limits of supersession accompany this report as Attachments 1 and 2.

The bottom consists mainly of mud mixed with shells. Depths range from 0 to 218 fathoms.

C. SURVEY VESSELS

The hydrographer's report contains an adequate discussion of survey vessels.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

The hydrographer's report contains an adequate discussion of data acquisition and processing.

Office processing of survey data was conducted using the same Computer Aided Resource Information System (CARIS), and Hydrographic Processing System (HPS) used by the hydrographer. The smooth sheet was compiled with MicroStation 95.

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

The drawing files necessarily contain information that is not part of the HPS data set such as geographic names text, line-type data, and minor symbolization. In addition, those soundings deleted from the drawing for clarity purposes remain unrevised in the HPS digital files to preserve the integrity of the original hydrographic data set. Cartographic codes used to describe the digital data are those authorized by Hydrographic Survey Guideline No. 35 and No. 75.

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

E. SONAR EQUIPMENT

Side scan sonar was not used during this survey.

F. SOUNDING EQUIPMENT

The hydrographer's report contains an adequate discussion of sounding equipment.

G. CORRECTIONS TO SOUNDINGS

Soundings and elevations have been reduced to Mean Lower Low Water (MLLW) or Mean High Water (MHW) as appropriate, with approved tide correctors obtained from the Center for Operational Oceanographic Products and Services. The approved tide correctors are zoned from Cove Point, Berners Bay, Alaska, gage 945-2346, Boat Harbor, Alaska, gage 945-2378, James Bay, Alaska, 945-2377, and Barlow Cove, Alaska, 945-2318.

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

H. CONTROL STATIONS

The hydrographer's report contains an adequate discussion of horizontal control.

The positions of horizontal control stations used during hydrographic operations are published values based on NAD 83. The geographic positions of all survey data are based on NAD 83. The smooth sheet is annotated with an NAD27 adjustment tick based on values determined with the NGS program NADCON. Geographic positions based on NAD27 may be plotted on the smooth sheet utilizing the NAD 83 projection by applying the following corrections.

Latitude: -1.189 seconds (-36.778 meters)
Longitude: 6.507 seconds (105.112 meters)

I. HYDROGRAPHIC POSITION CONTROL

The hydrographer's report contains an adequate discussion of hydrographic position control.

Differential GPS (DGPS) was used to control this survey. A horizontal dilution of precision (HDOP) not to exceed 3.75 for a 1:10,000 scale survey was computed for survey operations. The maximum (HDOP) allowable limit has not been exceeded during this survey and the quality of data obtained is good. During shallow water multibeam (SWMB) data gathering, satellite configuration as indicated by HDOP and the number of satellites, is monitored visually on HYPACK. The final positions are provided by the POS-MV that combines the DGPS position with inertial navigation information. In the event that the differential GPS corrector signal is lost, the POS-MV will continue to provide positions based on inertial navigation. Data was analyzed during processing to ensure it contains no significant errors. The reference site confirmation test and daily DGPS performance checks were conducted in the field and found adequate.

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

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

J. SHORELINE

Shoreline maps TP01526 and TP01527 from Remote Sensing Division survey project CM-8709; compiled on NAD83, apply to this survey. These maps were provided in a digital raster format from which shoreline and some nearshore hydrographic features were depicted on the smooth sheet in black. There were some changes observed in the photogrammetric location of the Mean High Water Line (MHWL) as compared to the presently charted shoreline. These changes were verified during survey operations and are depicted on the smooth sheet.

The presently charted shoreline should be revised based on the latest shoreline map information and the results of the recent field shoreline verification as depicted on the smooth sheet.

K. CROSSLINES

The hydrographer's report contains an adequate discussion of Crosslines.

L. JUNCTIONS

Survey H10869 junctions with the following surveys:

<u>Survey</u>	<u>Year</u>	<u>Scale</u>	<u>Area</u>
H10864	1999	1:10,000	Northern Limit
H10880	1999	1:20,000	Southern and eastern limits

The junctions with surveys H10864 and H10880 are complete and "Joins" notes have been added to the smooth sheet. Comparison is considered good. However, a few soundings were carried forward from the above contemporary surveys to delineate depth curves and portray shoaler information within the junction areas.

M. COMPARISON WITH PRIOR SURVEYS

Survey H10869 was compared to the following surveys.

Survey	Year	Scale	Datum
H01602A	1890	1:40,000	Valdez
H02056	1890	1:40,000	Valdez
H02057	1905	1:40,000	Valdez
H02059	1890	1:10,000	Valdez
H02060	1890	1:10,000	Valdez
H03985WD	1917	1:20,000	Valdez
H04202WD	1922	1:40,000	NAD 27
H04228WD	1922	1:40,000	NAD 27

The prior surveys H01602A, H02056, H02057, H02059, H02060, H03985WD, H04202WD and H04228WD cover the entire area of the present survey. With the exception of the wire drag surveys listed above, the legibility of the prior survey image files is good and they were adequately registered to the present survey smooth sheet. The registration was accomplished by matching known geographic points between the present and prior survey smooth sheets.

With the exception of the charted soundings listed below, comparison of depths reveals that the present survey is generally shoaler by 2-10 fathoms for depths up to about 200 fathoms. These changes are likely related to the significant uplift occurring during the major 1964 Good Friday earthquake. However, some of the differences may be attributed to greater sounding coverage, improved positioning and sounding methods, and relative accuracy of the data acquisition methods used in the field. A more thorough coverage of the area utilizing the shallow water multibeam (SWMB) system as compared to the sparsely sounded prior hydrography of the area has revealed some significantly shallower depths not detected during the earlier surveys.

The following charted soundings originating from prior surveys are found to be significantly shallower as compared to the present survey. No indications of shoaler depths were noted within their respective charted locations. These discrepancies could most likely be attributed to the lesser accuracy of positioning and depth determination methods used in the past, and/or due to probable compilation errors. These depths should be superseded by the present survey and the areas be charted based on the latest survey information.

Charted Depth (fathoms)	Latitude (N)	Longitude (W)	Prior Survey
5-3/4	58°31'24"	135°08'05"	H02056
8	58°32'06"	135°08'48"	H02056
8	58°33'10"	135°09'02"	H02056
5-3/4	58°34'28"	135°10'42"	H02060
5	58°34'29"	135°08'43"	H02056
13	58°35'10"	135°09'33"	H02060
51	58°35'58"	135°08'00"	H02056
4	58°36'26"	135°10'22"	H02060
9	58°36'50"	135°08'37"	H02060
20	58°37'21"	135°08'26"	H02056
70	58°37'39"	135°08'25"	H02056
11	58°37'45"	135°08'49"	H02056
69	58°38'22"	135°08'59"	H02056

Wire-drag surveys H03985WD, H04202WD and H04228WD cover the same area of the present hydrography, however, their available survey images are found not legible. A comparison with the chart was made on the

assumption that all significant hangs and groundings would have been properly charted. An adequate sounding coverage of the area utilizing the shallow water multibeam system to substantiate the supersession of the prior wire drag information was accomplished during this survey. It is therefore recommended that the charted wire drag green tint within the common area of coverage of the multibeam survey be removed from the chart.

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

Survey H10869 is adequate to supersede the prior surveys within the area of common coverage.

N. ITEM INVESTIGATIONS

There were no AWOIS items assigned to this survey.

O. COMPARISON WITH CHART

Survey H10869 was compared with the following chart.

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

a. Hydrography

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

The application of this survey to charts of a scale less than 1:40,000 may require the generalization of features such as ledges and reefs. The recommended charting disposition of specific ledges or reefs is their depiction as isolated rocks. The application of this survey to charts of a scale greater than 1:40,000 may be accomplished without generalization of features. Features from survey H10869 have been generalized on chart 17316 along the shoreline where applicable.

The cable area located within the area of the survey was not investigated and should be retained as charted.

It was noted during office processing that the charted anchorage inside William Henry Bay at latitude 58°42'55" N, longitude 135°14'20"W, now lies in 12 fathoms of water, contrary to the Coast Pilot published information of 14 fathoms. Shoaling of about 1-2 fathoms was observed within the area of the bay. It is recommended that the charted symbol be retained, however, a revised statement based on the present survey information be incorporated on the latest edition of the U.S. Coast Pilot. A Coast Pilot Report dated April 12, 2000 was submitted to N/CS261 for the revision of the existing information.

With the exception of the feature mentioned above, survey H10869 is adequate to supersede charted hydrography within the common area.

b. Dangers to Navigation

Four (4) dangers to navigation were discovered during this survey and four (4)⁷ additional dangers were identified during office processing. These dangers were reported to the USCG, NIMA, N/CS261 and N/CS3 on June 13, 1999 and September 23, 1999. Copies of the reports are attached.

P. ADEQUACY OF SURVEY

The hydrography contained on survey H10869 is adequate to:

- delineate the bottom configuration, determine least depths, and draw the required depth curves;
- reveal there are no significant discrepancies or anomalies requiring further investigation;
- show the survey was properly controlled and soundings are correctly plotted.

The hydrographic records and reports received for processing are adequate and conform to the requirements of the Hydrographic Manual, 4th Edition, revised through Change No. 3, the Hydrographic Survey Guidelines, and the Field Procedures Manual, April 1998 Edition with the following exceptions.

Q. AIDS TO NAVIGATION

There are no fixed and floating aids to navigation within the survey area. There were no features of landmark value found during this survey.

R. STATISTICS

Statistics are adequately itemized in the hydrographer's report.

S. MISCELLANEOUS

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

T. RECOMMENDATIONS

Survey H10869 is a good hydrographic survey. No additional work is recommended.

U. REFERRAL TO REPORTS

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

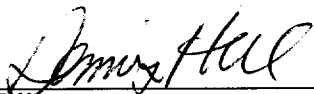


Isagani A. Almacen
Isagani A. Almacen
Cartographer

APPROVAL SHEET
H-10869


Initial Approvals:

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



Dennis Hill
Supervisory Cartographer
Pacific Hydrographic Branch
Date: 4-13-00


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



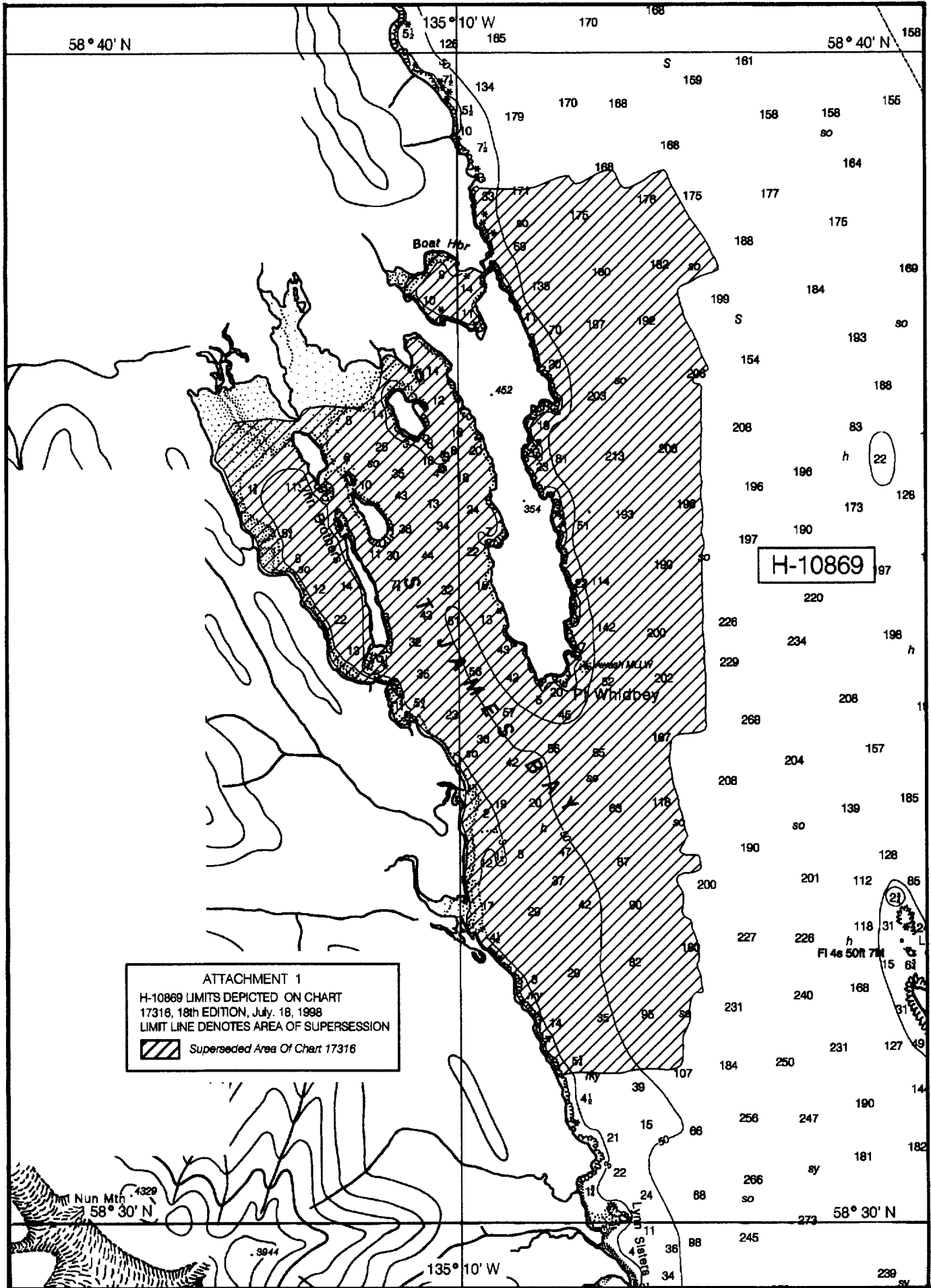
James C. Gardner
Commander, NOAA
Chief, Pacific Hydrographic Branch
Date: 4-17-00


Final Approval

Approved:



Samuel P. De Bow, Jr.
Captain, NOAA
Chief, Hydrographic Surveys Division
Date: July 23, 2000



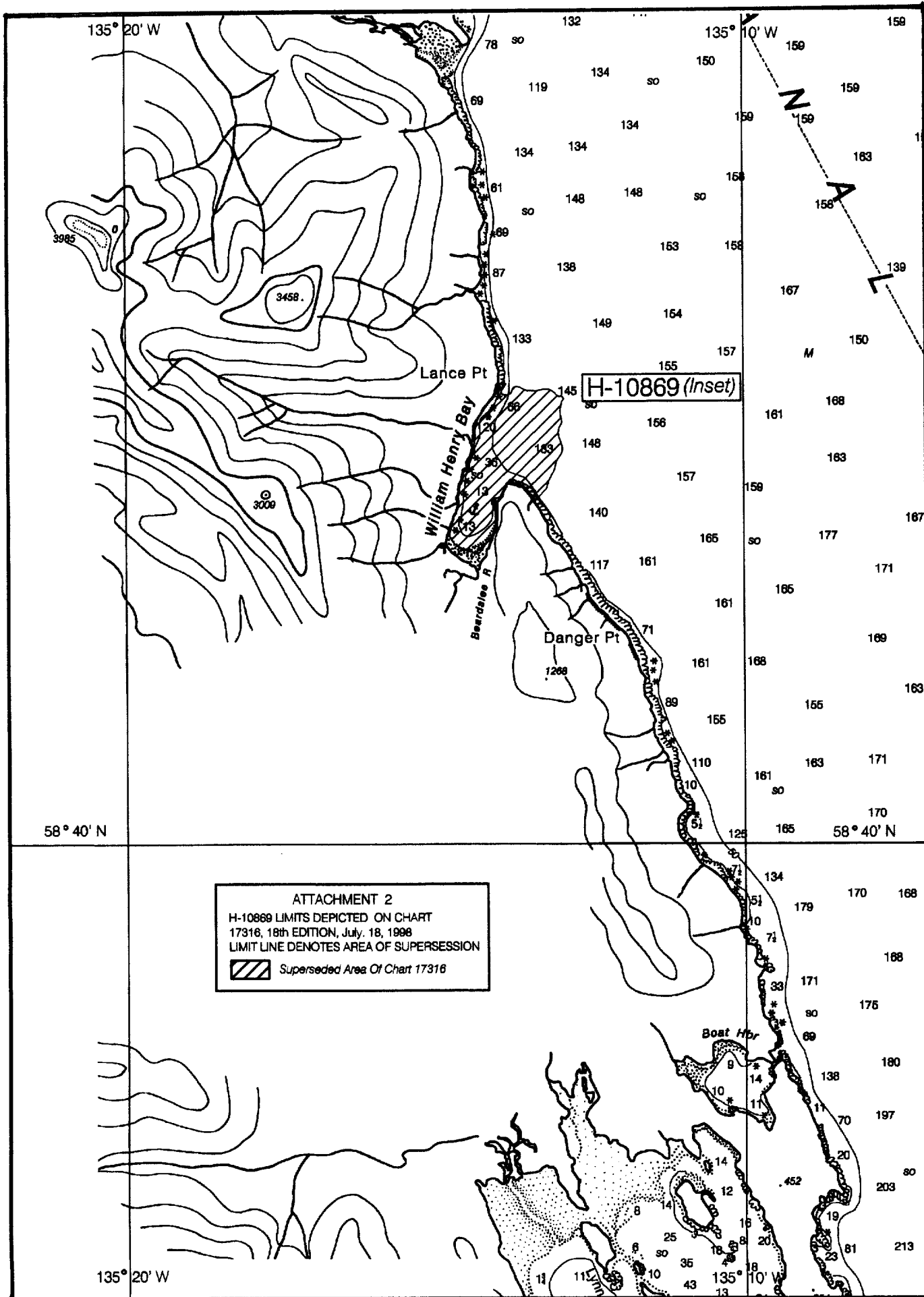
ATTACHMENT 1
 H-10869 LIMITS DEPICTED ON CHART
 17316, 18th EDITION, July, 18, 1998
 LIMIT LINE DENOTES AREA OF SUPERSESSION
 Superseded Area Of Chart 17316


Nun Mth 4329
 58° 30' N

135° 10' W

58° 30' N

239



ATTACHMENT 2
 H-10869 LIMITS DEPICTED ON CHART
 17316, 18th EDITION, July, 18, 1998
 LIMIT LINE DENOTES AREA OF SUPERSESSION
 Superseded Area Of Chart 17316

MARINE CHART BRANCH
RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-10869

INSTRUCTIONS

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

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

CHART	DATE	CARTOGRAPHER	REMARKS
17316	3/6/00	<i>D. A. Nelson</i>	Full Part Before After Marine Center Approval Signed Via <i>Full application of</i> Drawing No. <i>soundings and features from smooth sheet.</i>
17316	8/7/00	L. Bennett	Full Part Before After Marine Center Approval Signed Via <i>fully</i> Drawing No. <i>guide soundings</i> <i>curves + tints + shoreline</i> <i>tw</i>
17300	9/15/00	L. Bennett	Full Part Before After Marine Center Approval Signed Via <i>Fully applied</i> Drawing No. <i>soundings, tints + curves</i> <i>chart 17316 tw</i>
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
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