H10866

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-10-04-99

Registry No.: H-10866

LOCALITY

State: Alaska

General Locality: Lynn Canal

Sublocality: Ralston Island to Benjamin Island

1999

CHIEF OF PARTY
CAPT Alan D. Anderson, NOAA

DATE

NOAA FORM 77-28 (11-72)

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

REGISTER NO.

H-10866

HYDROGRAPHIC TITLE SHEET

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

FIELD NO.

RA-10-04-99

State: Alaska

General locality: Lynn Canal

Locality: Ralston Island to Benjamin Island

Scale: 1:10,000 Date of survey: 4/14/99 - 6/3/99

Instructions dated: March 5, 1998 * Project No.: OPR-0340-RA

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: NOAA Ship RAINIER Personnel

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

Graphic record scaled by: RAINIER Personnel

Graphic record checked by: RAINIER Personnel

Evaluated by: L. Deodato Automated plot by: HP 750C

Verification by: R. Davies, G. Nelson, D. Doles, R. Mayor, L. Deodato

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

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.

* Change #1 March 30, 1998

* Change #2 April 12, 1999

* Change #3 May 6, 1999

AWOIS / SURF 5/4/00

mcl2

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

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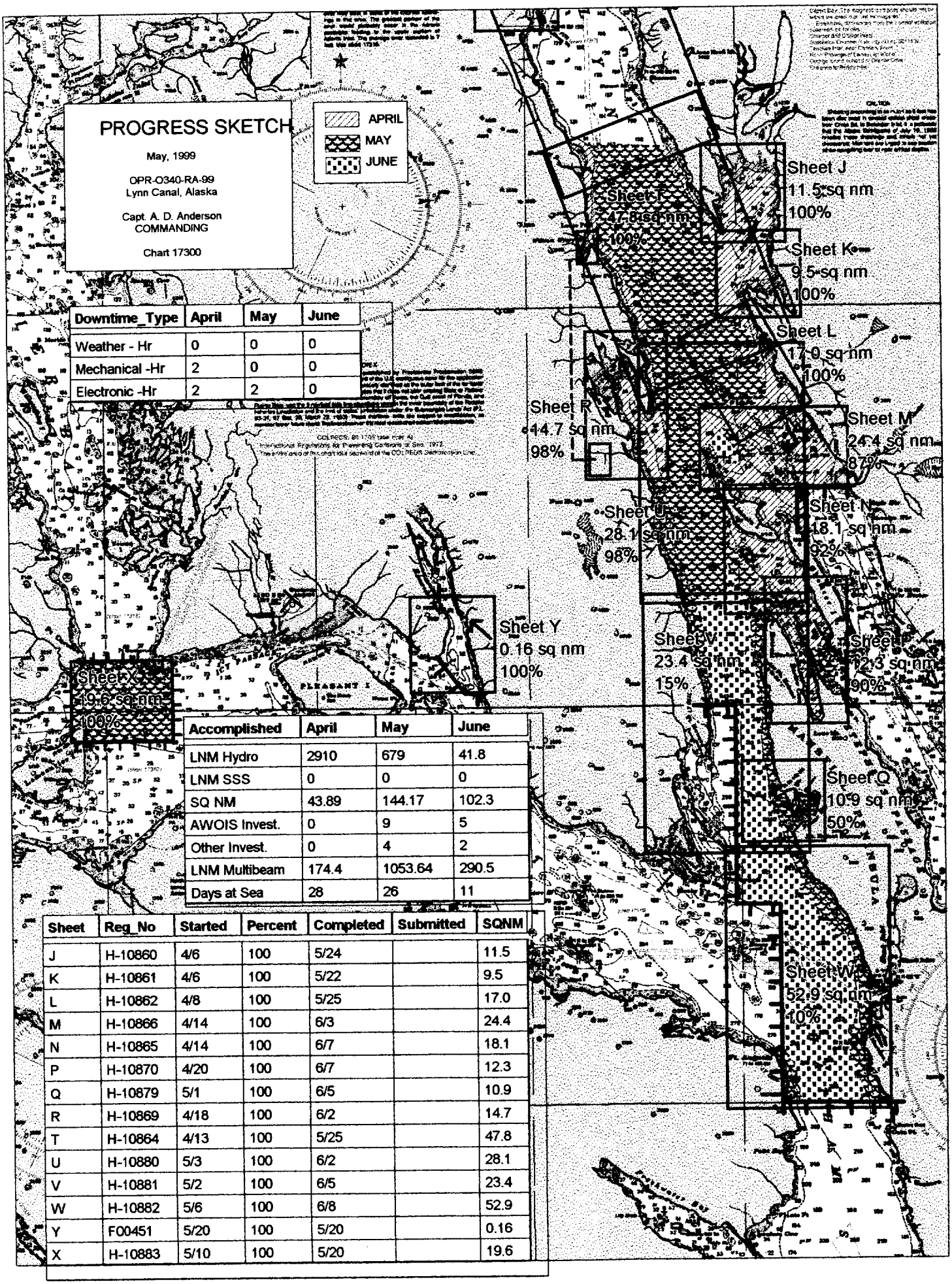
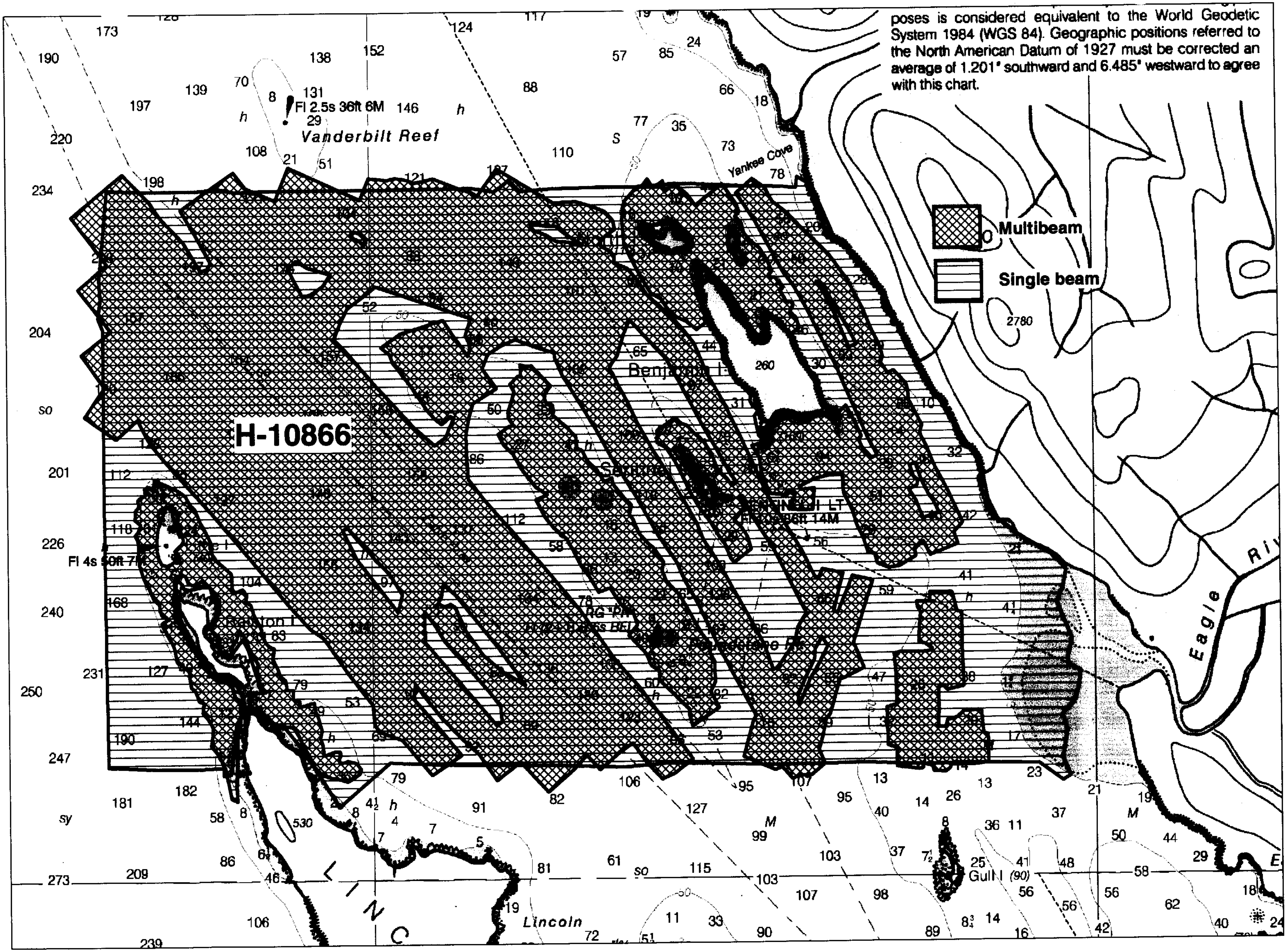


Downtime_Type	April	May	June
Weather - Hr	0	0	0
Mechanical -Hr	2	0	0
Electronic -Hr	2	2	0

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


poses is considered equivalent to the World Geodetic System 1984 (WGS 84). Geographic positions referred to the North American Datum of 1927 must be corrected an average of 1.201" southward and 6.485" westward to agree with this chart.
Multibeam
Single beam
H-10866
Vanderbilt Reef
Fl 2.5s 36ft 6M
Yankee Cove
Benjamin I
Eagle
Lincoln
Gull I

Descriptive Report to Accompany Hydrographic Survey H10866

Field Number RA-10-04-99
Scale 1:10,000
April-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 H10866 corresponds to Sheet M (Sheet 04 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, section B*

The survey area is located in Lynn Canal from Ralston Island to Benjamin Island. Survey limits are depicted below in Figure 1. The survey's northern limit is latitude 58°34'55"N and the southern limit is latitude 58°30'49"N. The survey's western limit is longitude 135°03'37"W and the eastern limit is the shoreline. Data acquisition was conducted from April 14 to June 3, 1999 (DN 104 to 154).

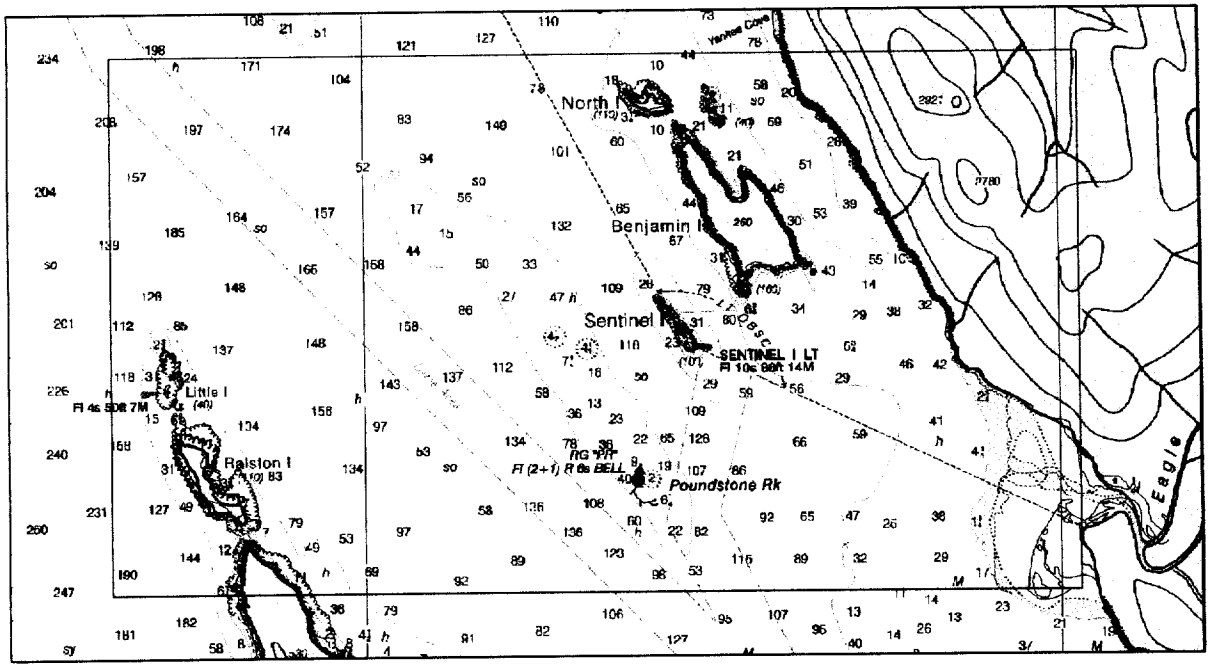


Figure 1 - Survey Limits

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 Project Related Data for OPR-O340-RA 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 was 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 chart 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. Filed with the hydrographic data.

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.

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, 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)

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, and when the echosounder lost its high frequency trace, the low frequency was scanned in place of the high. 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 vessel's 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. 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 H10866 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.

* Filed with the hydrographic data.

G. CORRECTIONS TO ECHO SOUNDINGS ✓

Fourteen sound velocity casts were used for this survey: Nine for the Reson 8101 SWMB, three for SeaBeam 1050D MKII, and three for VBES (one of which was also a SWMB cast). 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 Measurements	Method of Settlement and Squat Measurement	Date of Settlement and Squat Measurement	Location of Settlement and Squat Measurement
2120	March 1999	OTF	March 1999	Port Angeles, WA
2121	March 1999	OTF	March 1999	Port Angeles, WA
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 H10866 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 H10866 are included in the Separates of this report. Tidal correctors as provided in the Project Instructions for H10866 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 Cove Point (945-2346) on April 4, 1999 and at Barlow Cove (945-2318) on April 4, 1999. The Cove Point gage was removed on June 2, 1999 and the Barlow Cove gage was removed June 7, 1999. Refer to the Field Tide Notes* and supporting data in Appendix V for individual gage performance and level closure information. This information has been forwarded to N/CS41 in accordance with HSG 50 and FPM 4.8. A request for approved tides was forwarded to N/CS41 in accordance with FPM 4.8. Approved tide note dated Oct 6, 1999 is attached.

H. HYDROGRAPHIC POSITION CONTROL ✓ See Evaluation Rpt., section 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 its proximity to the H10866 survey area, station JOE was used as the primary station for VHF differential correctors. In addition, differential corrections from the U.S. Coast Guard Beacon at Gustavus were also utilized during this survey. DGPS reference station information is

* Filed with the hydrographic data.

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., section J.
Do not concur - GC10424 was provided in mapinfo format.

No official registered shoreline was supplied by N/CS341 for any of the eastern shoreline for the entire Lynn Canal project. Prior surveys and digitized versions of chart 17316 also proved to be of poor quality for the area covered by H10866. This problem was resolved by registering NASA aerial photos acquired from the U.S. Forest Service. The photos were scanned and registered using prominent landmarks along the shoreline. To differentiate between areas of gently sloping beaches and ledges, the registered photos were digitized in MapInfo using a combination of the shoreline on the photograph, chart, and notes taken during vertical beam echo sounder mainscheme. 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 photograph number 23 into MapInfo.

Location Name	Point Number	Geographic Position		Photo Pixel Position	
		Latitude	Longitude	Image Y	Image X
North edge of Eastern bulge on Lincoln Isl	1	58-30-14.54 N	134-59-28.94 W	1,541	422
North tip of Shelter Isl	2	58-29-14.67 N	134-55-07.77 W	1,764	920
Southwestern point South of Bridget Cove	3	58-36-27.41 N	134-56-07.54 W	177	818
Large bolder on beach of mainland	4	58-33-19.28 N	134-52-05.56 W	872	1,277
Southwestern tip of Benjamin Isl	5	58-33-04.68 N	134-54-32.44 W	923	995
Reef on Southwestern tip of Benjamin Isl	6	58-33-15.00 N	134-54-41.75 W	885	979
Western edge of Ralston Isl	7	58-31-36.56 N	135-02-27.37 W	1,237	90

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 the mouth of Eagle River, 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.

Filed with the hydrographic data.

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 final sounding plot. DM rocks and islets were often identified as high points of new ledges or reefs.

The charted mean high water line (MHWL) of Sentinel Island and Ralston Island were shifted based upon detached positions and NASA photos. Prior to the shift, the western MHWL edge for each island was directly atop of the islands western ledge.

The positions of the islets northeast of Benjamin Island on chart 17316 are approximately 50 to 75 m east of their position on the DM. Detached positions were used to determine the positions of the islets (fix 21373 to 21376 and 21380 to 21386). Shoreline shown on the smooth sheet in dashed red.

Recommendations

Do not concur.

The Hydrographer recommends that the shoreline as depicted on the DP and BS plot (MapInfo digital files "shoreline" and shoreline_update") and final sounding plot be used to supercede shoreline information compiled on the digitized NASA photos.

Charted Features

Charted rocks were either identified as new rocks, DM rocks, high points or extensions of DM ledges or reefs. Where identified new rocks is close to manuscript rock (GC10424), the manuscript rock is shown on the smooth sheet.

Recommendations

GC10424

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

J. CROSSLINES ✓

VBES crosslines totaled 36.4 nautical miles, or 8.0% of mainscheme hydrography. VBES crosslines agreed to within 1 meter with mainscheme VBES hydrography in regions of relatively flat bathymetry. VBES and SWMB data agree to within 1 meter of one another and SWMB crosslines generally agreed to within 0.1 meters with mainscheme 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. Figure 2 (next page) indicates the differences between the contour grid produced by ship's multibeam and that of VBES using a difference centered color map in the area to the west of North Island. Regions in light blue to dark blue indicate differences of less than 2 meters. Regions in orange to red indicate differences of 8 to 10 meters while gray represents differences between 10 and 38 meters. Locations with differences of more than 8 meters have slopes of at least 25 degrees and at least 100 meters deep. These differences between the two methods of surveying are a function of horizontal positioning, beam width, water depth, slope and echo return processing.

The Quality Control Report (CARIS HIPS) for the checkline file averaged 90.60%, with a depth tolerance of 2.3%. See Appendix VI for the detailed report.

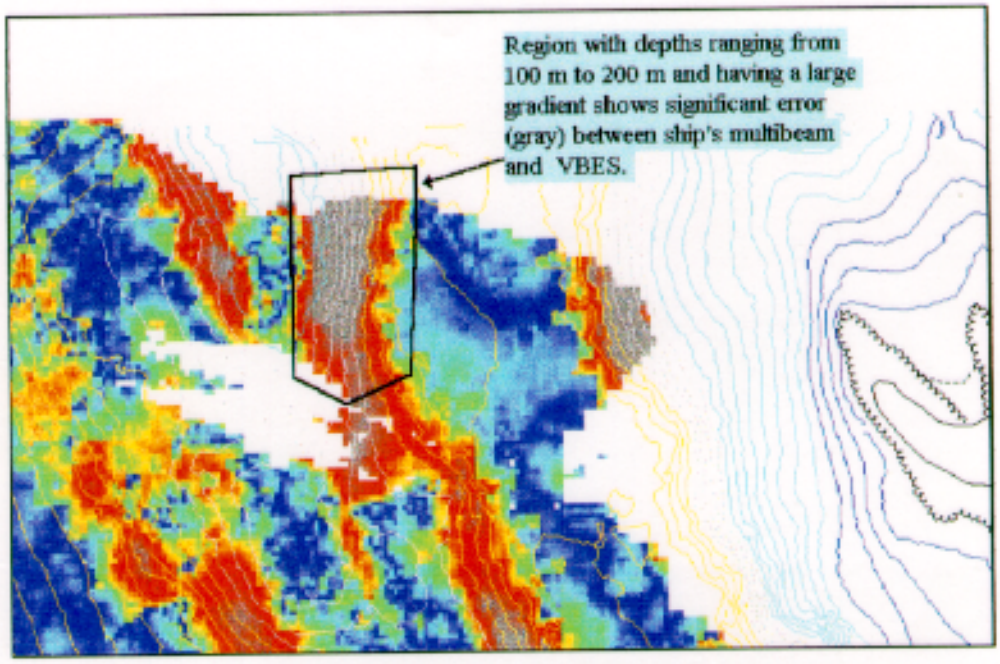


Figure 2 – Ship Multibeam vs. VBES Gradients

K. JUNCTIONS ✓ See Eval Rpt., section L.

The following contemporary surveys junction with H10866, and are shown in Figure 3 below.

Registry #	Scale	Date	Junction side
H-10862	1:10,000	1999	North
H10880	1:20,000	1999	West
H10865	1:10,000	1999	South
H-10680	1:10,000	1996	South
F00425	1:10000	1996	Poundstone Rk and vicinity

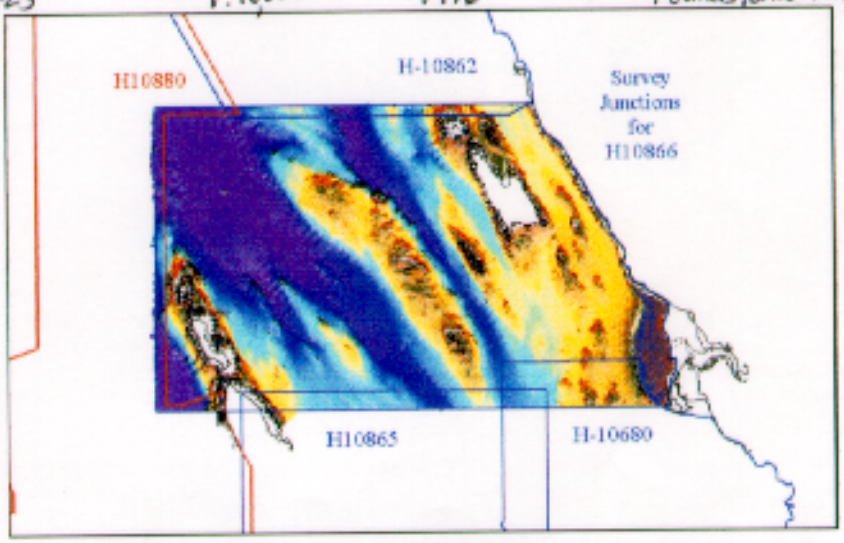


Figure 3 – Junction Surveys

Soundings from these junction surveys were found to be in good agreement, matching to within 1 meter, in depths shoaler than 150 meters and having gentle slopes. In depths from 200-300 meters, the difference between soundings increased to between one and five meters. Most of the differences were within 2 meters but no other patterns were observed.

Project Instructions (dated March 5, 1998) listed FE-425 as a junction survey. FE-425 is fully encompassed by H10866 and is addressed in Section L, Comparison with Prior Surveys.

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

L. COMPARISON WITH PRIOR SURVEYS ✓ See Eval Rpt., section M.

Six prior surveys were compared to H10866 and are shown in Figure 4 below.

Registry #	Scale	Date	Region
H-1602A	1:40,000	1884	Encompasses Survey No hydro data in common area.
H-2056	1:40,000	1890	Encompasses Survey
H-3985WD	1:20,000	1917	Encompasses Survey
H-4228	1:40,000	1922	Western Edge
H-4311WD	1:20,000	1923	Center of Survey
~~FE-425~~	~~1:10,000~~	~~1996~~	~~Center of Survey~~ Junction Survey

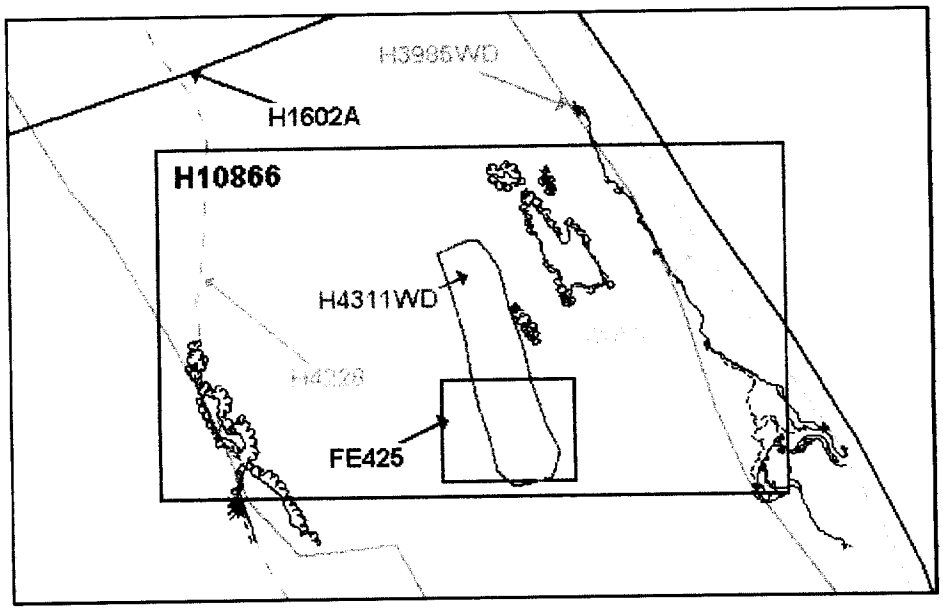


Figure 4 – Prior Surveys

Survey H-1602A, conducted in 1884, is a rough sketch of the landforms in the region with relative positioning to one another. Shoreline matches poorly and there is only one sounding in the region of H10866. Do not concur. No hydro data in common area.

Survey H-2056, conducted in 1890, is amazingly detailed and accurate for the technology used at the time. Shoreline and soundings from H-2056 generally match survey H10866. The table below lists soundings from H-2056 which were shoaler than that of H10866.

H-2056 Depth (fm)	H10866 Depth (fm)	H10866 Fix #	Geographic Position Latitude	Longitude	Comments
148 ✓	~~153.5~~ 154	42,886	58-33-~~08.98~~ N 13.0	135-01-~~48.00~~ 50 W	Prior shoaler than current determined by Ship MB and VBES.
141 ✓	~~150~~ 165	96,338	58-32-~~40.09~~ N 48.0	135-01-20.03 W ✓	Prior shoaler than current determined by Ship MB and VBES.
89 ✓	~~97.5~~ 98	13,733	58-31-~~09.91~~ N 06.0	134-57-~~48.64~~ W 50.0	Prior shoaler than current determined by Ship MB and VBES.
23 ✓	~~34.8~~ 33	79,944	58-32-~~43.39~~ N 46.0	134-55-~~30.30~~ W 33.0	Prior shoaler than current determined by 100% SWMB.

The hydrographer recommends that soundings from survey H10866 supercede all prior soundings from H-2056. concur.

A comparison of the current survey with surveys H-4311WD, H-4228 and H-3985 WD was not conducted. The scans were of very poor quality; no least depths were discernible and annotations on the priors were illegible. concur.

Survey FE-425 examines the area around Poundstone Rock for bathymetry and a least depth at Poundstone Rock. FE-425 reported a divers least depth of 2 fm at position 58° 31' 43.5" N and 134° 55' 52.7" W on Poundstone Rock. During survey H10866, SWMB was completed over Poundstone Rock and the least depth was found to be 3.9 m (2.1 fm) at position 58° 31' 43.3" N and 134° 55' 52.9" W. This compares well to the least depth and position found during FE-425. The Hydrographer recommends retaining the least depth from FE-425. concur Figure 5 depicts present survey results overlaid on the chart.

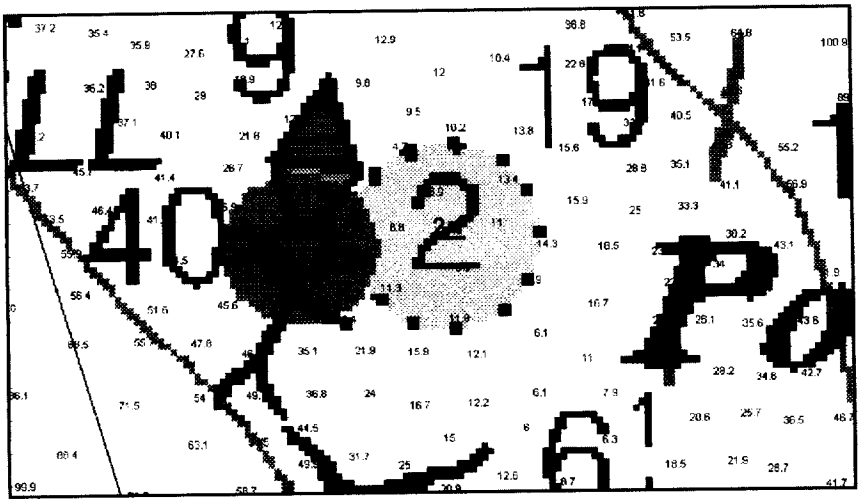


Figure 5 – AWOIS 52290 Poundstone Rock

Differences between the current survey and priors can probably be attributed to scale and improved modern positioning and sounding equipment. Final comparisons will be conducted at PHB after application of smooth tides. concur

M. ITEM INVESTIGATION REPORTS ✓

One AWOIS item fell within the limits of survey H10866. This item was not assigned in the AWOIS listing, and was labeled as COMPLETED. Prior survey FE-425 resolved this item in 1996. SWMB was acquired over the item, and is discussed in Section L, Comparisons with Prior Surveys. ↖ concur

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

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

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

The survey was compared with Chart 17316 (see Figure 1) and was in good agreement, generally within one to two fathoms. The survey which forms the basis for soundings on chart 17316 and 17300 in the region of H10866 is H-2056, a 1:40,000 scale survey from 1890. The sounding and positioning methods used during that time period were less accurate and less comprehensive. The soundings marked in the table below as "Shoalest sounding in area" refer to the fact that the soundings plotted on the chart are within 125 m radius of the center of the sounding, but that shoaler soundings exist within the same area.

Chart affected	Chart Depth (fm)	H10866 Depth (fm)	H10866 Fix #	Geographic Position Latitude	Longitude	Comments
17316	31	~~10.7~~ 11.9	75,563	58-32-31.80 N	135-03-02.32 W	Shoalest sounding in area determined by 100% SWMB coverage.
17316	127	171 ✓	32,277	58-31-29.99 N	135-02-57.33 W	Charted depth is probably mis-positioned, but not disproved. ← concur
17316	86	~~50.2~~ 69	41,011	58-33-~~08.22~~ N	134-58-~~27.76~~ W	Shoalest sounding in area determined by VBES at 100 m line spacing.
17316 17300	13	10.~~9~~ 8	71,722	58-32-21.21 N	134-56-39.07 W	Shoalest sounding in area determined by 100% SWMB coverage.
17316	4 1/4	~~0.5~~ 2.2	31,671	58-31-~~52.67~~ N	134-51-11.97 W	Shoalest sounding in area determined by VBES at 25 m line spacing.
17316	46	~~28.8~~ 35.0	77,399	58-32-~~31.93~~ N	134-52-~~11.94~~ W	Shoalest sounding in area determined by 100% SWMB coverage.
17316 17300	14	6.2 ✓	80,232	58-33-15.01 N	134-52-45.74 W	Shoalest sounding in area determined by 100% SWMB coverage.
17316	55	~~46.6~~ 41	80,316	58-33-~~29.47~~ N	134-52-~~44.17~~ W	Shoalest sounding in area determined by 100% SWMB coverage.
17316 17300	10	0.4 ✓	73,453	58-34-25.08 N	134-55-45.77 W	Shoalest sounding in area determined by 100% SWMB coverage.

The shoal sounding of 2 ¾ fathoms at 58° 32' 45.55" N 135° 02' 54.93" W was not found using 100% SWMB coverage. The charted sounding is most likely the ledge at the northern tip of Little Island

The Hydrographer recommends that soundings and shoreline detail from the current survey be used to update the chart in their common areas. ← concur Non sounding features are addressed in Section I, Shoreline. Final comparisons will be made at PHB after application of smooth tides. concur.

A charted underwater cable crossing lies within the H10866 survey area. 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.

Dangers to Navigation ✓

Two dangers to navigation were discovered during survey H10866 and reported to the Seventeenth Coast Guard District. Copies of the Danger to Navigation Reports are included in Appendix I. Copy attached to this report. Additional dangers were reported during office processing.

A shoal sounding of 10 ¾ fm at 58°32'21.21"N, 134°56'39.07"W was submitted as a danger to navigation (Pos. #81722 submitted to Coast Guard; Pos. #71722 in survey data due to renumbering). Surrounding charted depths are 13 fm. After application of preliminary tide correctors, the depth depicted on the final sounding plot is 20.1 m (10.9 fm).

A shoal sounding of ~~5 ½~~ 6 ¼ fm at 58°33'15.01"N, 134°52'45.74"W was submitted as a danger to navigation (Pos. #90233 submitted to Coast Guard; Pos. #80232 in survey data due to renumbering). Surrounding charted depths are 14 fm. After application of preliminary tide correctors, the depth depicted on the final sounding plot is 11.3 m (6.2 fm). Depths submitted to Coast Guard differ from depths on final sounding plot since predicted tide correctors were used in the calculation instead of preliminary tides.

O. ADEQUACY OF SURVEY

Survey H10866 is complete and adequate to supersede prior soundings and features in their common areas. concur.

P. AIDS TO NAVIGATION ✓

Two non-floating aids to navigation were positioned using static GPS methods: Little Island Light (Light List #23855) and Sentinel Island Light (Light List # 23850). The lights are charted adequately on chart 17316 and 17300. Additional information is contained in Appendix II of this report and the Horizontal Control Report for OPR-O340-RA-99.

One floating aid to navigation was positioned using DGPS.

Poundstone Rock Lighted Bell Buoy
RG "PR" Fl (2+1) R 6 Sec BELL
Light List # 23845
Position number: 52865, 52866

	Latitude (N)	Longitude (W)
Charted Position:	58° 31' 42.0"N	134° 56' 00.0"W
Survey Position:	58° 31' 42.9"N	134° 56' 001.7"W

	Easting	Northing
Charted Position:	503,760	6,487,640
Survey Position:	503,855.1	6,487,563.5

The buoy's characteristics match the Light List characteristics, and the aid adequately serves its purpose, which is to mark the location of Poundstone Rock. The aid is maintained by the USCG.

Q. STATISTICS ✓

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

R. MISCELLANEOUS ✓

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

On survey H10866 temporary anchorage, with protection against severe northerly winds, may be had in the bight in the south side of Benjamin Island. Another temporary anchorage can be found north of Benjamin, slightly north of and between North Island and the islets. These grouped islands provide a lee from moderate southerly winds. Marine traffic in the region includes Alaskan State Ferries, cruise ships, both large and small commercial fishing vessels and small recreational boats.

S. RECOMMENDATIONS

GC10424 was provided in MapInfo format.

Due to the fact that photogrammetric shoreline was not provided for the entire survey area, the Hydrographer recommends that shoreline depicted on Survey H10866 be used to update the chart in their common areas. do not concur. 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.

T. REFERRAL TO REPORTS ✓

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

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

Respectfully Submitted,

Mark A. Wetzler
Lieutenant, NOAA
Navigation Officer

Approved and Forwarded,

Daniel R Herlihy CDR/NOAA for

Alan D. Anderson
Captain, NOAA
Commanding Officer

Survey Information Summary

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

Instructions Dated: 3/5/1998 **Project Change Info:**

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

Sheet Letter: M **Registry Number:** H-10866

Sheet Number: RA-10-04-99

Survey Title: Ralston Island to Benjamin Island

Data Acquisition Dates: **From:** 14-Apr-99 104 **To:** 05-May-99 125

Vessel Usage Summary

VESNO	MS	SPLITS	DEV	XL	S/L	DP	BS	DIVE
2120							1	
2121	3	3						
2122	2	2	1		2	2		
2123	2	1						
2124	1			1				
2125	4	2			2	3	1	
2126	3							

Sound Velocity Cast Information

Launch Table #	Ship Table #	Cast DN	Max Depth	Position	Applicable DN
1		95	477	58/34/06	095-103
				135/05/54	
3		104	330	58/34/18	104-112
				134/57/54	
7		116	302	58/36/05	116-
				135/00/06	

Tide Zone Information

Zone #	Time Corr.	Height Corr.
SEA3	00 hr 00 min	X0.98

Tide Gage Information

Tide Gage #	Gage Name	Installed	Removed
945-2318	BARLOW COVE	4/4/1999	

Statistics Summary

Type	Total:
BS	17
DEV	0.93
DP	89
MS	456.54
S/L	15.81
SPLIT	91.57
SWMB	76.74
XL	36.4

Percent XL:	8.0%
SQNM:	24.4

List of Horizontal Control Stations

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

Section P: Descriptive Report Insert

Name of Aid: Sentinel Island Light
Light List #: 23850

Method of Positioning Static GPS: [X] DGPS: [ ] Other: _____

Positioning Information

	Latitude (N)	Longitude (W)
Charted Pos.	58/32/48	134/55/24
Survey Pos.	58/32/46.5	134/55/23.6

	Easting	Northing
Charted Pos.	504,462.40	6,489,577.40
Survey Pos.	504469	6489531.0

Difference between Charted and Surveyed Position: Distance: 47 meters
(Bearing from Surveyed to Charted Position) Bearing: 352 deg T

Characteristics
Do characteristics match Light List? Yes [X] No [ ]
If no, what are the characteristics? _____

Does the aid adequately serve its apparent purpose? Yes [X] No [ ]
If no, why not? _____

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

Apparent Purpose: Designate location of Sentinal Island.

Other Information:

Sentinel Island Light has an obscured sector as depicted on the chart. The obscured sector was not investigated during survey operations. The Hydrographer recommends that the designation of LT OBSC remain as depicted on the chart.

See Horizontal Control report for OPR-O340 for further information.

Section P: Descriptive Report Insert

Name of Aid: Little Island Light
Light List #: 23855

Method of Positioning Static GPS: [X] DGPS: [ ] Other: _____

Positioning Information

	Latitude (N)	Longitude (W)
Charted Pos.	58/32/24	135/02/48
Survey Pos.	58/32/24.9	135/02/49.7

	Easting	Northing
Charted Pos.	497283.2	6488833.5
Survey Pos.	497255.7	6488861.4

Difference between Charted and Surveyed Position: Distance: 39 meters
(Bearing from Surveyed to Charted Position) Bearing: 135 deg T

Characteristics
Do characteristics match Light List? Yes [X] No [ ]
If no, what are the characteristics?

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

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

Apparent Purpose: Mark location of Little Island

Other Information:

See Horizontal Control Report for OPR-O340 for further information.

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.

Feature	Depth (fm)	Latitude (N)	Longitude (W)	Position #	Depth (m)	Survey #
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~~ 6 1/4	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.

Feature	Depth (fm)	Latitude (N)	Longitude (W)	Position #	Depth (m)	Survey #
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.

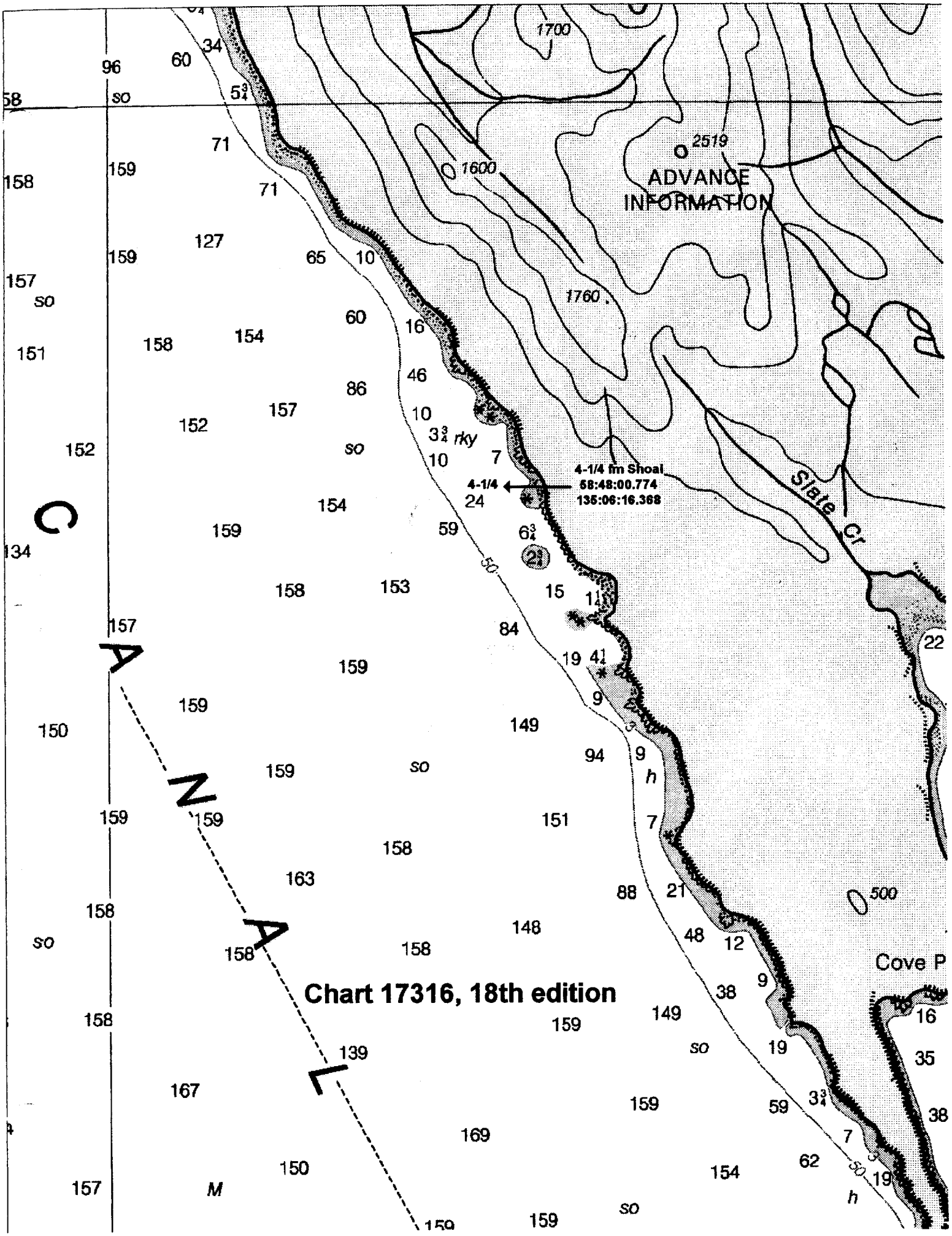
Sincerely,

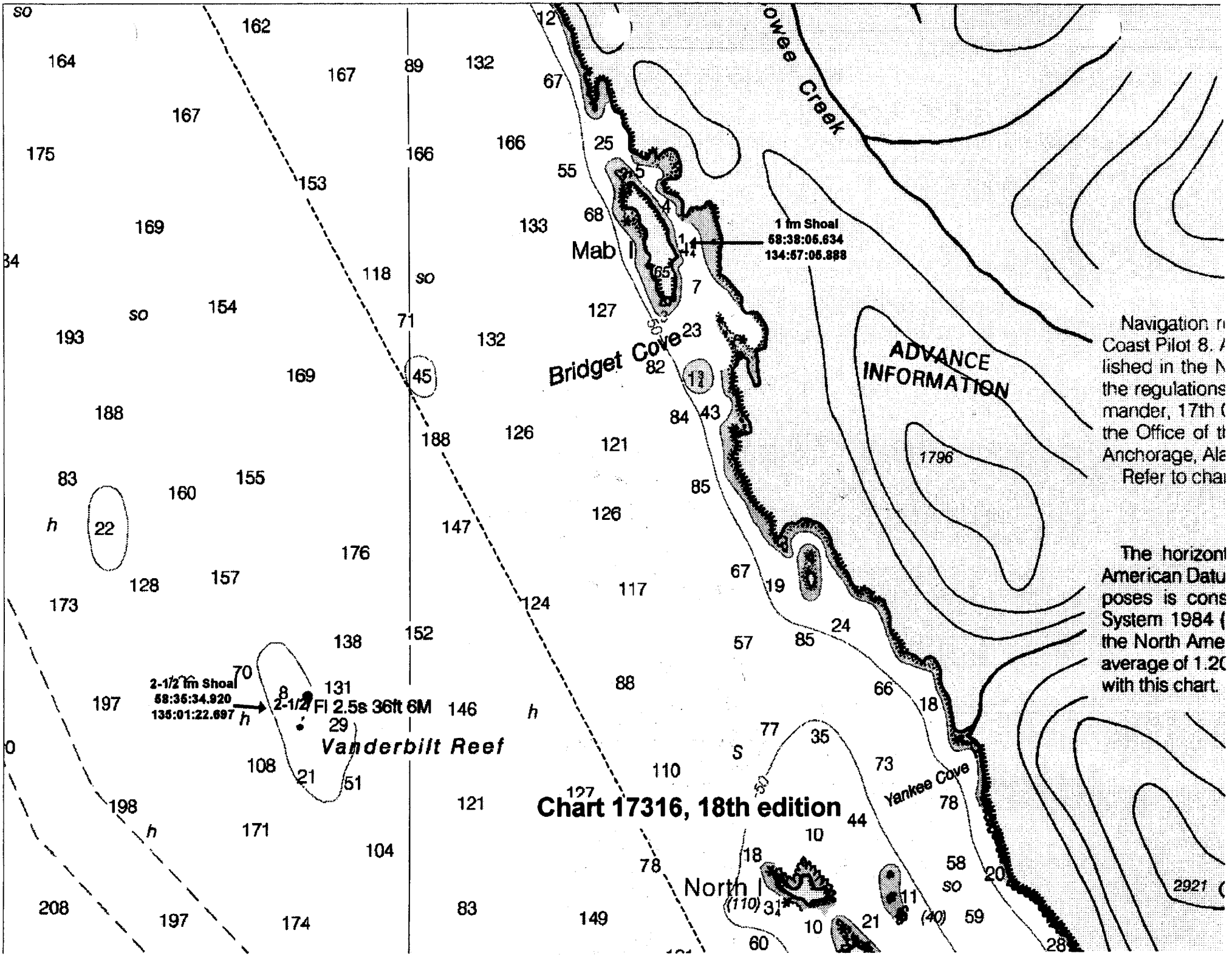
Alan D Anderson

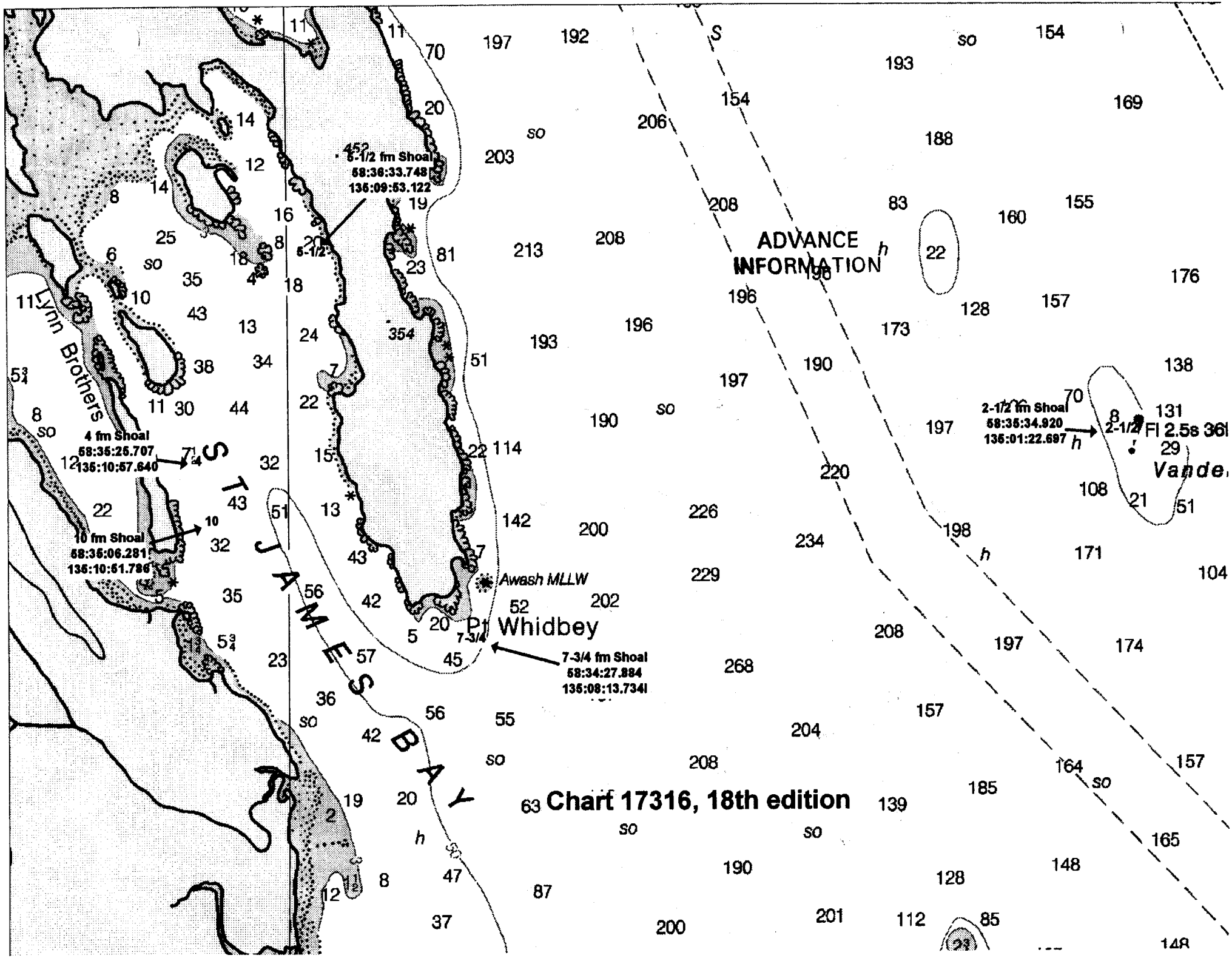
Alan D. Anderson
Captain, NOAA
Commanding Officer

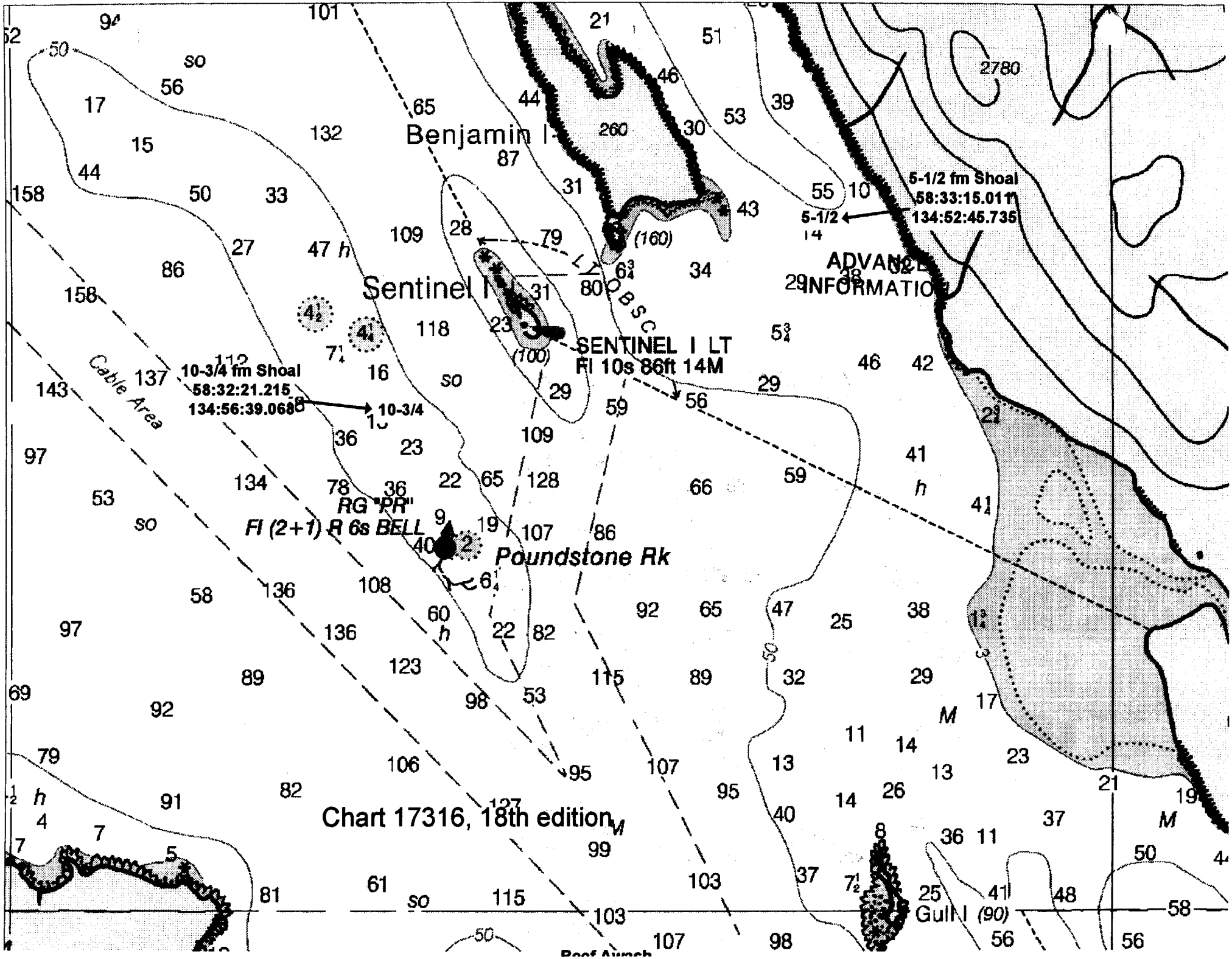
Attachments

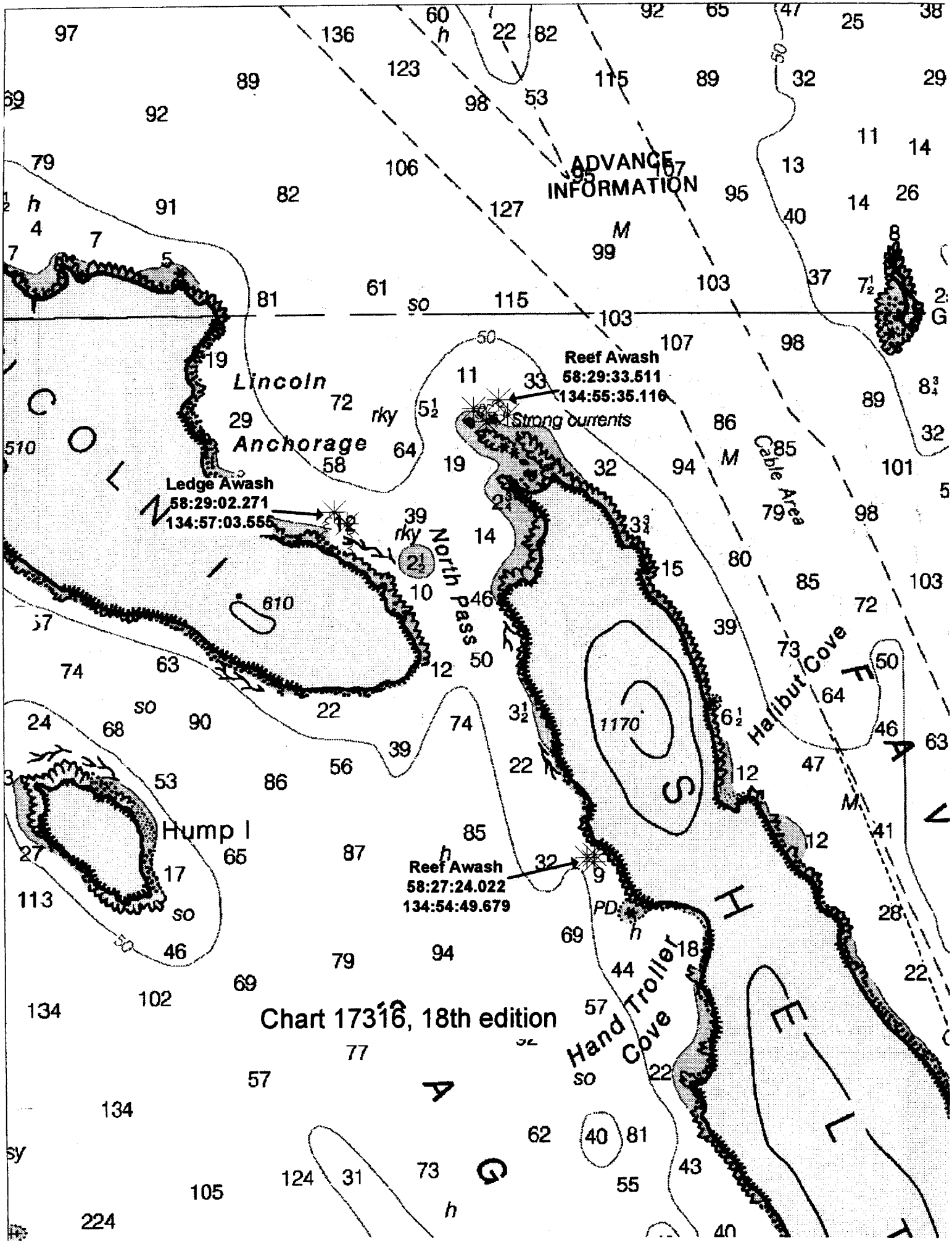
cc: NIMA
PMC
N/CS261
N/CS34

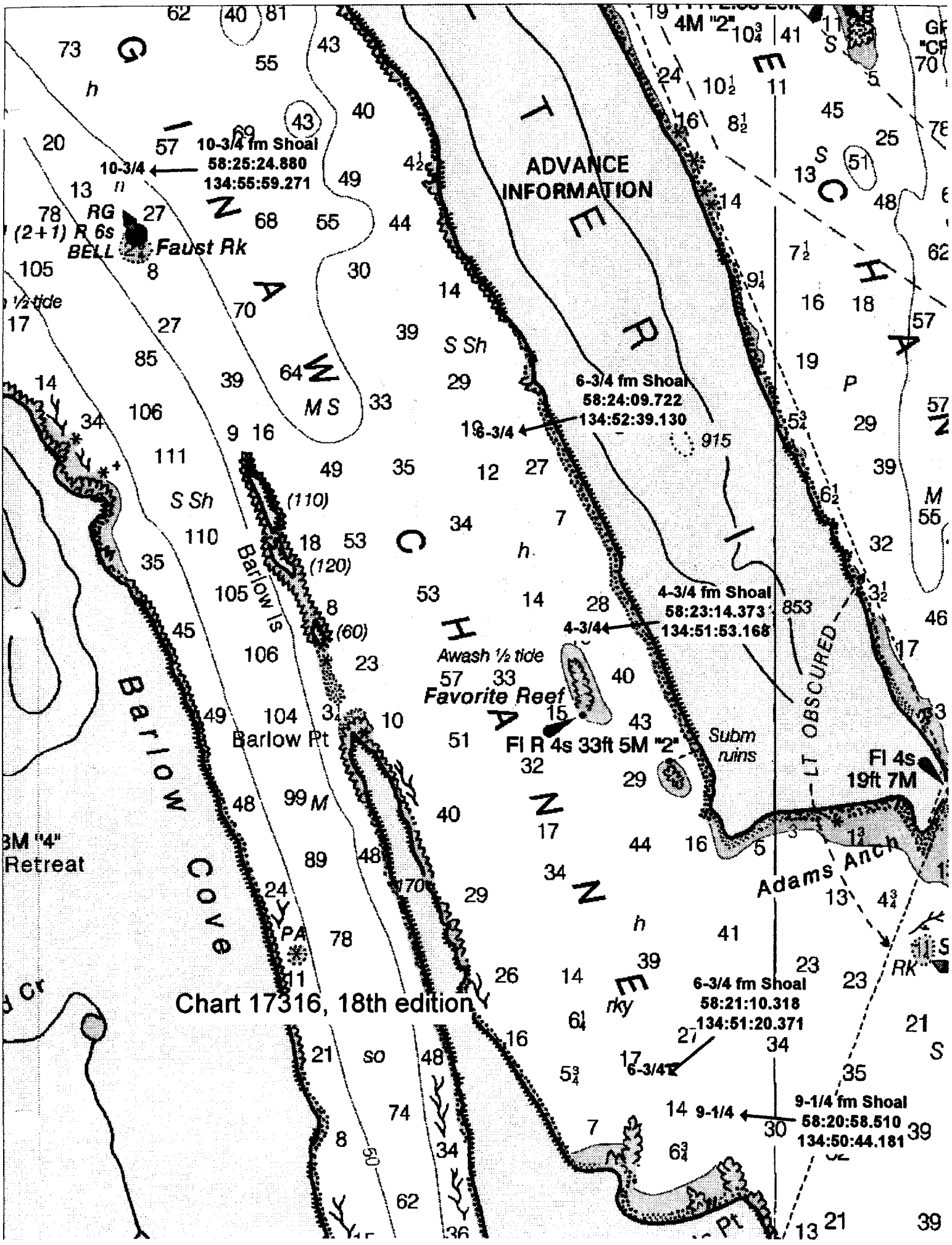

ADVANCE INFORMATION
4-1/4 fm Shoal
58:48:00.774
135:06:16.368
4-1/4
Slate Cr
CANAL
Chart 17316, 18th edition
Cove P
1700
1600
2519
1760
500


Owee Creek
1 fm Shoal
58:38:05.634
134:57:05.888
Mab I
Bridget Cove
ADVANCE
INFORMATION
1796
2-1/2 fm Shoal
58:35:34.920
135:01:22.697
2-1/2 Fl 2.5s 36ft 6M
Vanderbilt Reef
Yankee Cove
North I
2921
Chart 17316, 18th edition
Navigation r
Coast Pilot 8. A
lished in the N
the regulations
mander, 17th (
the Office of t
Anchorage, Ala
Refer to char
The horizont
American Datu
poses is cons
System 1984 (
the North Ame
average of 1.2(
with this chart.


ADVANCE INFORMATION
Lynn Brothers
4 fm Shoal
58:35:25.707
135:10:57.640
10 fm Shoal
58:36:06.281
135:10:51.786
5-1/2 fm Shoal
58:36:33.748
135:09:53.122
2-1/2 fm Shoal
58:35:34.920
135:01:22.697
7-3/4 fm Shoal
58:34:27.884
135:08:13.734
Awash MLLW
Pt Whidbey
STRAIT OF JUAN DE FUCA
JAMES BAY
Chart 17316, 18th edition


Benjamin I
Sentinel I
SENTINEL I LT
Fl 10s 86ft 14M
5-1/2 fm Shoal
58:33:15.011
134:52:45.735
5-1/2
10-3/4 fm Shoal
58:32:21.215
134:56:39.068
10-3/4
RG "PR"
Fl (2+1) R 6s BELL
Poundstone Rk
Cable Area
OBSC
ADVANCED
INFORMATIO
Chart 17316, 18th edition
Gull I (90)


ADVANCE INFORMATION
Reef Awash
58:29:33.511
134:55:35.116
Strong currents
Lincoln
Anchorage
Ledge Awash
58:29:02.271
134:57:03.555
North Pass
Cable Area
Halibut Cove
Hump I
Reef Awash
58:27:24.022
134:54:49.679
Hand Troller Cove
Chart 17316, 18th edition


ADVANCE INFORMATION
10-3/4 fm Shoal
58:25:24.880
134:55:59.271
10-3/4
Faust Rk
BELL
(2+1) R 6s
6-3/4 fm Shoal
58:24:09.722
134:52:39.130
6-3/4
4-3/4 fm Shoal
58:23:14.373
134:51:53.168
4-3/4
Favorite Reef
Awash ½ tide
Fl R 4s 33ft 5M "2"
Subm ruins
LT OBSCURED
Fl 4s
19ft 7M
Adams Anch
Barlow Ls
Barlow Pt
Barlow Cove
Retreat
6-3/4 fm Shoal
58:21:10.318
134:51:20.371
6-3/4
9-1/4 fm Shoal
58:20:58.510
134:50:44.181
9-1/4
Chart 17316, 18th edition

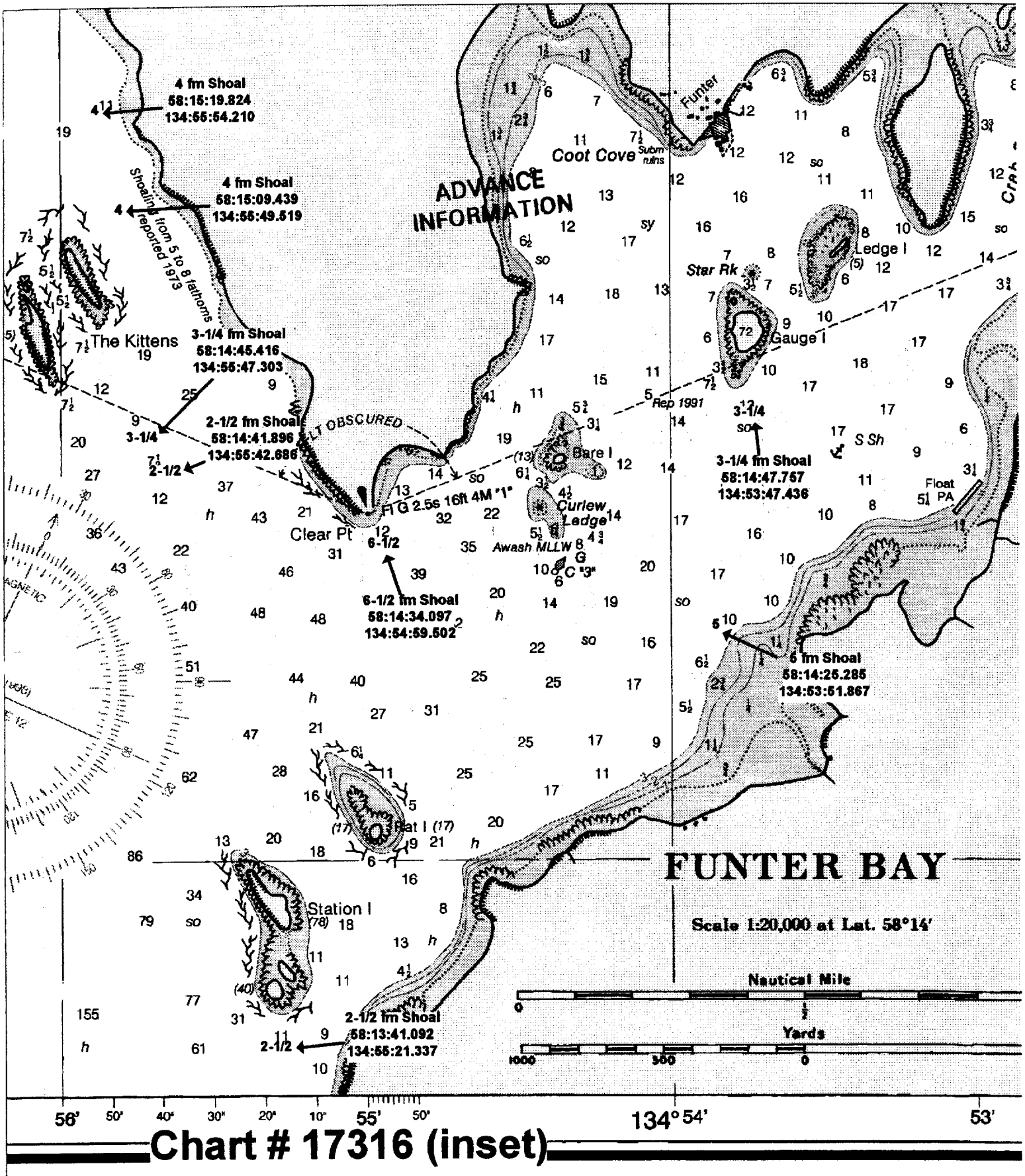


Chart # 17316 (inset)

77 14

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 13, 1999

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

Dear Sir:

During office review of hydrographic survey H-10866, Alaska, Lynn Canal, Ralston Island to Benjamin Island, four 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

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

Enclosure

cc: NIMA
NCS/261
NOAA Navigation Advisor

REPORT OF DANGERS TO NAVIGATION

Hydrographic Survey Registry Number: H-10866

Survey Title:
State: ALASKA
Locality: LYNN CANAL
Sublocality: RALSTON ISLAND TO BENJAMIN ISLAND

Project Number: OPR-O340-RA

Survey Date: APRIL - JUNE 1999

Soundings and features 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

DANGER TO NAVIGATION	LATITUDE(N)	LONGITUDE(W)
Rock exposed 1 ft	58/34/24.61	134/55/51.47
0.4 fathom sounding	58/34/23.98	134/55/40.18
*Ledge exposed 7 ft	58/32/12.97	135/02/43.52
*Ledge exposed 4 ft	58/31/47.92	135/01/49.31

*Portrayed on chart graphic as rocks

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

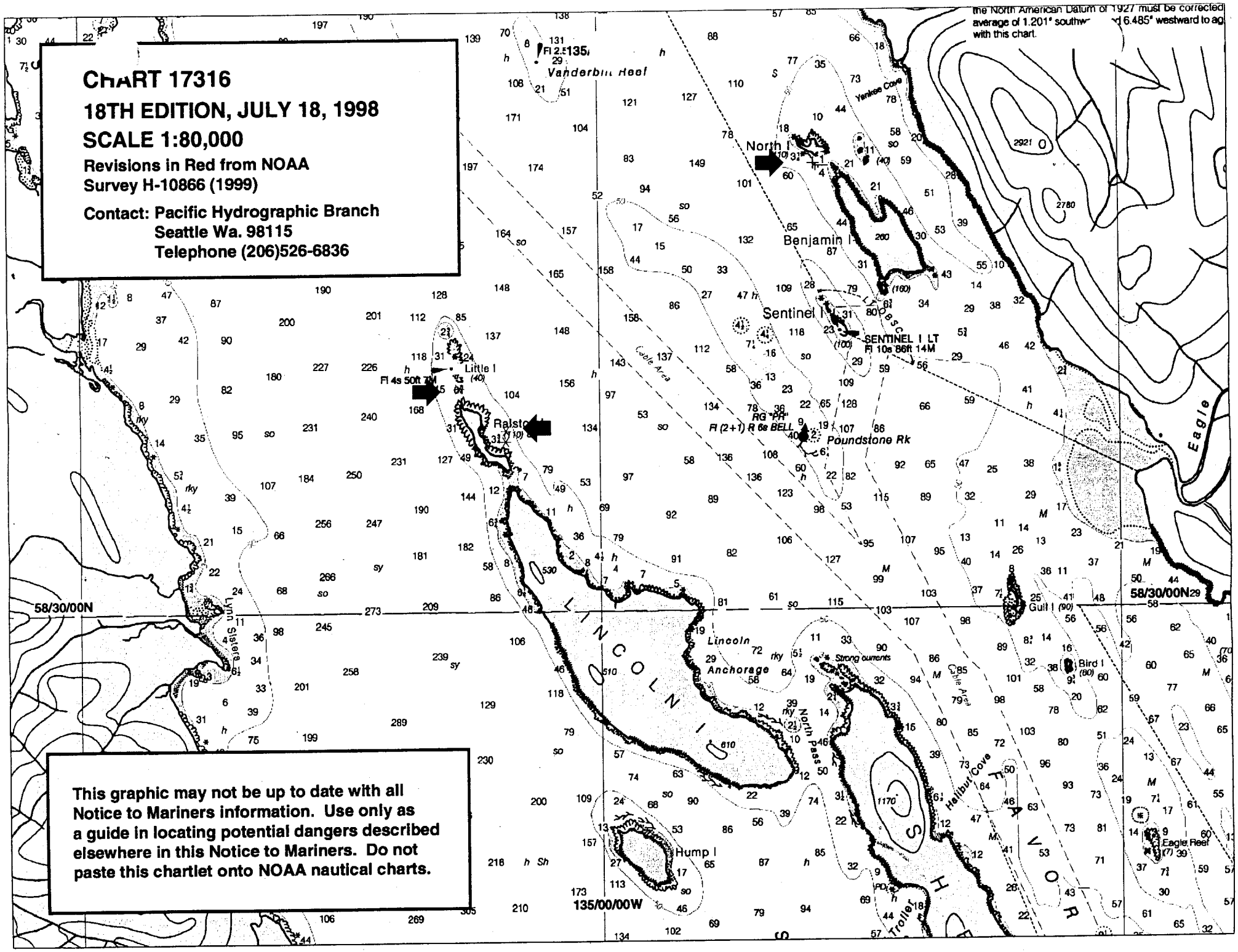


CHART 17316
18TH EDITION, JULY 18, 1998
SCALE 1:80,000
Revisions in Red from NOAA
Survey H-10866 (1999)
Contact: Pacific Hydrographic Branch
Seattle Wa. 98115
Telephone (206)526-6836
the North American Datum of 1927 must be corrected
average of 1.201" southw
d 6.485" westward to ag
with this chart.
This 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.
Vanderbilt Reef
North I
Benjamin I
Sentinel I
SENTINEL I LT
Fl 10s 86ft 14M
Yankee Cove
Little I
Fl 4s 50ft 7M
Ralston
Fl (2+1) R 6s BELL
Poundstone Rk
Eagle
Lynn
Sisters
Lincoln
Anchorage
LINCOLN I
Strong currents
North Pass
Gull I
Bird I
Halibut Cove
Hump I
Eagle Reef
Cable Area
58/30/00N
135/00/00W

APPROVAL SHEET

for

H10866

RA-10-04-99

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 R. Herlihy CDR/NOAA

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

for

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-10866

LOCALITY: Ralston Island to Benjamin Island, Lynn Canal, AK
TIME PERIOD: April 14 - June 3, 1999

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

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

REMARKS: RECOMMENDED ZONING
Use zone(s) identified as: SEA65.

Refer to attachments for zoning information.

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

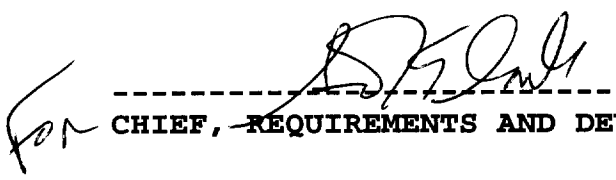
Note 2: Use tide data from the appropriate station with applicable zoning correctors for each zone according to the order in which they are listed in the Tidezone corrector files. For example, tide station one (TS1) would be the first choice for an applicable zone followed by TS2, etc. when data are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

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.

TIDE NOTE FOR HYDROGRAPHIC SURVEY SHEET H-10866 cont.

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

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



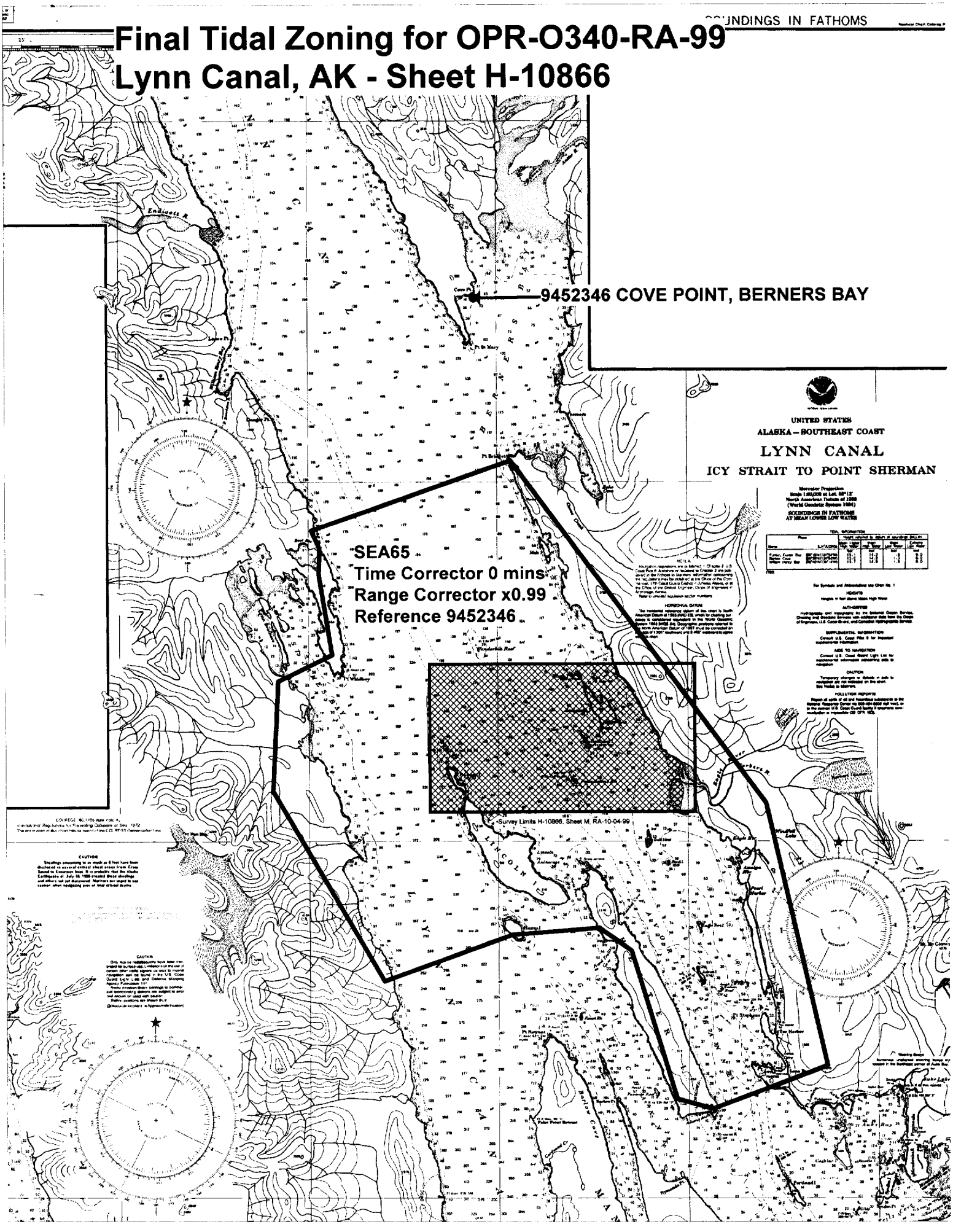
for **CHIEF, REQUIREMENTS AND DEVELOPMENT DIVISION**

Final tide zone node point locations for OPR-O340-RA-99,
Sheet H-10866.

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			

Final Tidal Zoning for OPR-O340-RA-99
Lynn Canal, AK - Sheet H-10866



NOAA FORM 76-155
(11-72)

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

SURVEY NUMBER

H-10866

GEOGRAPHIC NAMES

Name on Survey	A ON CHART NO. 17316	B ON PREVIOUS SURVEY NO.	C ON U.S. QUADRANGLE MAPS	D FROM LOCAL INFORMATION	E ON LOCAL MAPS	F P.O. GUIDE OR MAP	G RAND MCNALLY ATLAS	H U.S. LIGHT LIST	K	
ALASKA (title)	X		X							1
BENJAMIN ISLAND	X		X							2
EAGLE RIVER	X		X							3
FAVORITE CHANNEL	X		X							4
LINCOLN ISLAND	X		X							5
LITTLE ISLAND	X		X							6
LYNN CANAL	X		X							7
NORTH ISLAND	X		X							8
POUNDSTONE ROCK	X		X							9
RALSTON ISLAND	X		X							10
SENTINEL ISLAND	X		X							11
										12
										13
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										23
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Dennis J. Romesburg

OCT 8 1999

NOAA FORM 76-155 SUPERSEDES C&GS 197

NOAA FORM 77-27(H) (9-83)

U.S. DEPARTMENT OF COMMERCE

HYDROGRAPHIC SURVEY STATISTICS

REGISTRY NUMBER: H-10866

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

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

DESCRIPTION	DEPTH/POS RECORDS	HORIZ. CONT. RECORDS	SONAR-GRAMS	PRINTOUTS	ABSTRACTS/ SOURCE DOCUMENTS	
ACCORDION FILES	2					
ENVELOPES						
VOLUMES						
CAHIERS						
BOXES						

SHORELINE DATA

SHORELINE MAPS (List):	GC10424
PHOTOBATHYMETRIC MAPS (List):	NA
NOTES TO THE HYDROGRAPHER (List):	NA
SPECIAL REPORTS (List):	NA
NAUTICAL CHARTS (List):	17316 18th Ed., July 18, 1998

OFFICE PROCESSING ACTIVITIES

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

PROCESSING ACTIVITY	AMOUNTS VERIFICATION	AMOUNTS EVALUATION	AMOUNTS TOTALS
POSITIONS ON SHEET			
...TIONS REVISED			
...NDINGS REVISED			
CONTROL STATIONS REVISED			
	TIME-HOURS VERIFICATION	TIME-HOURS EVALUATION	TIME-HOURS TOTALS
PRE-PROCESSING EXAMINATION	41		41
VERIFICATION OF CONTROL			
VERIFICATION OF POSITIONS			
VERIFICATION OF SOUNDINGS			
VERIFICATION OF JUNCTIONS			
APPLICATION OF PHOTOBATHYMETRY			
SHORELINE APPLICATION/VERIFICATION			
COMPILATION OF SMOOTH SHEET	231.5		231.5
COMPARISON WITH PRIOR SURVEYS AND CHARTS		30	30
EVALUATION OF SIDE SCAN SONAR RECORDS			
EVALUATION OF WIRE DRAGS AND SWEEPS			
EVALUATION REPORT		22	22
GEOGRAPHIC NAMES			
OTHER* (Chart Compilation)		104	104
*USE OTHER SIDE OF FORM FOR REMARKS — TOTALS	272.5	156	428.5

Pre-processing Examination by R. Davies	*Beginning Date* 8/30/99	*Ending Date* 9/15/99
Verification of Field Data by ...Davies,G. Nelson,D. Doles, R.Mayor, L.Deodato	*Time (Hours)* 272.5	*Ending Date* 1/21/2000
...cation Check by R. Davies	*Time (Hours)*	*Ending Date*
Evaluation and Analysis by L. Deodato	*Time (Hours)* 52	*Ending Date* 1/21/2000
Inspection by R. Davies	*Time (Hours)* 6	*Ending Date* 2/2/00

* U.S. GOVT. PRINTING OFFICE 1983: 764-006/6061

EVALUATION REPORT

H-10866

A. PROJECT

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

B. AREA SURVEYED

The survey area is adequately described in the hydrographer's report. A page-size plot of the charted area depicting the limits of supersession accompanies this report as Attachment 1.

The bottom consists mainly of mud, pebble, sand and broken shell. Depths range from –1.3 to 209 fathoms.

C. SURVEY VESSELS

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

D. AUTOMATED DATA ACQUISITION AND PROCESSING

The acquisition and processing of data in the field has been discussed in the hydrographer's report, section D.

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

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

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

The data are plotted using a Universal Transverse Mercator Zone 08 projection and are depicted on a single sheet.

E. SONAR EQUIPMENT

Multibeam echo sounder was used during survey H-10866.

F. SOUNDING EQUIPMENT

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

G. CORRECTIONS TO SOUNDINGS

Soundings and elevations have been reduced to Mean Lower Low Water (MLLW) or Mean High Water (MHW) as appropriate with verified tide correctors obtained from CO-OPS. The correctors are zoned direct from station 945-2346, Cove Point, Berners Bay, Alaska. Barlow Cove, Alaska, gage 945-2318, listed in the approved tide note was not used.

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 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 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 NAD 27 adjustment tick based on values determined with the NGS program NADCON. Geographic positions based on NAD 27 may be plotted on the smooth sheet utilizing the NAD 83 projection by applying the following corrections.

Latitude:	-1.182 seconds	(-36.557 meters)
Longitude:	6.476 seconds	(104.746 meters)

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. The quality of seventy positions exceeds limits in terms of HDOP. These positions are isolated and occur randomly throughout the survey area. A review of the data, however, suggests that none of these fixes are used to position dangers to navigation. The soundings located by these fixes are consistent with the surrounding information. These fixes are considered acceptable.

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

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 GC 10424, scale 1:20,000 was compiled on NAD83 and apply to this survey. Shoreline drawn on the smooth sheet in black originates from the above digital data as provided by the Coastal Mapping Program. The shoreline data and the hydrographic data were merged during MicroStation processing.

The shoreline map and the results of the fieldwork as portrayed on the smooth sheet should supersede charted shoreline.

There is one MHW revision on this survey. This revision have been depicted in dashed red on the smooth sheet and centered at latitude 58/34/32N, longitude 134/55/01W.

K. CROSSLINES

Crosslines are adequately discussed in the hydrographer's report.

L. JUNCTIONS

Survey H-10866 junctions with the following surveys.

Survey	Year	Scale	Area
F00425	1996	1:5,000	Poundstone Rock and vicinity
H-10680	1996	1:10,000	Southern Limit
H-10862	1999	1:10,000	Northern Limit
H-10865	1999	1:10,000	Southern Limit
H-10880	1999	1:20,000	Western Limit

The junctions with surveys H-10862, H-10865, and H-10880 are complete. Several depths within the common area of H-10862 and H-10865 have been transferred to the present survey to better portray the bottom configuration and standard depth curves. A "Joins" note has been added to the smooth sheet where applicable. The junctions with surveys F00425 and H-10680 was not formally completed since this survey was processed previously. However, depths are in good agreement within the common area. An "Adjoins" note has been added to the smooth sheet.

M. COMPARISON WITH PRIOR SURVEYS

Survey	Year	Scale	Datum
H-2056	1890	1:40,000	NAD27

Prior survey H-2056 covers the entire area of the present survey. The present survey was compared to a digital copy of H-2056. The registration of this prior survey to the present survey was good. The legibility of the digital copy was good.

Sounding agreement is good with the present survey, depths are either shoaler or deeper by 1 to 6 fathoms. These differences may be attributed to greater sounding coverage, improved positioning and sounding methods and relative accuracy of the data acquisition techniques. Shallow multibeam soundings disproved the existence of the 15 ½ fathoms at latitude 58/33/36.8N, longitude 134/58/51.1W.

Survey	Year	Scale	Datum
H-3985WD	1917	1:20,000	Valdez
H-4228WD	1922	1:40,000	Valdez
H-4311WD	1923	1:20,000	Valdez

The present survey was compared to the digital copies of the above prior wire drag surveys. The registration of these prior surveys to the present survey is good. The legibility of the digital copies was poor.

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

Survey H-10866 is adequate to supersede the above prior surveys within the common area.

N. ITEM INVESTIGATIONS

There were no AWOIS items assigned to this survey.

O. COMPARISON WITH CHART

Survey H-10866 was compared with the following chart:

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

a. Hydrography

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

The charted kelp in the vicinity of Poundstone Rock should be retained as charted.

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.

With the exception noted above, survey H-10866 is adequate to supersede charted hydrography within the charted area.

b. Dangers To Navigation

Two dangers to navigation were discovered during survey operations and four during office processing. These were reported to the USCG, NIMA and N/CS1 on June 13,1998 and September 13, 1999. Copies of these reports are attached. 2

P. ADEQUACY OF SURVEY

Hydrography contained on survey H-10866 is adequate to:

a. Delineate the bottom configuration, determine least depths, and draw the required depth curves;

b. Reveal there are no significant discrepancies or anomalies requiring further investigation; and

c. Show the survey was properly controlled and soundings are correctly plotted.

The hydrographer used an unauthorized source of shoreline which made the verifier unable to portray the ledge changes that the hydrographer wants specially on the eastern shoreline of the survey area.

The hydrographic records and reports received for processing are adequate and conform to the requirements of the Hydrographic Manual, 4th Edition, revised through Change No. 3, the Hydrographic Survey Guidelines, the Field Procedures Manual, April 1994 Edition, and the NOS Hydrographic Surveys Specifications and Deliverables, dated April 23, 1999 except as noted above.

Q. AIDS TO NAVIGATION

Two fixed aids and one floating aid to navigation exist within the survey area. They were located and adequately mark the features intended.

Aid to Navigation	Latitude N	Longitude W	Light List No.
Sentinel Island Light	58/32/46.5	134/55/23.6	23850
Little Island Light	58/32/24.9	135/02/49.7	23855
Poundstone Rock Lighted	58/31/42.9	134/56/01.7	23845

There were no features of landmark value located within the area of this survey.

R. STATISTICS

Statistics are adequately itemized in the hydrographer's report.

S. MISCELLANEOUS

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

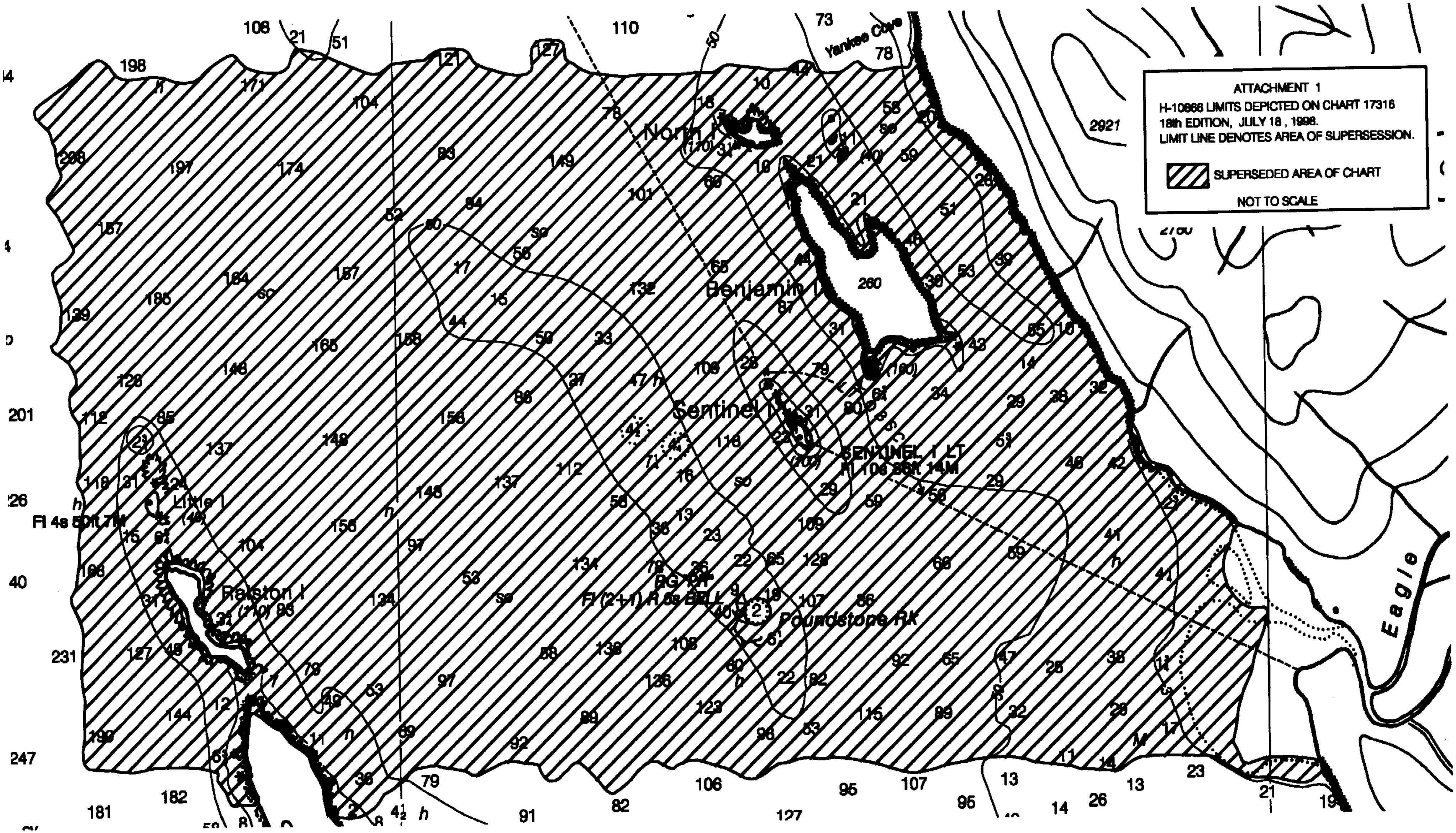
T. RECOMMENDATIONS

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

U. REFERRAL TO REPORTS

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

Leonardo T. Deodato
Cartographer


ATTACHMENT 1
H-10866 LIMITS DEPICTED ON CHART 17316
18th EDITION, JULY 18, 1998.
LIMIT LINE DENOTES AREA OF SUPERSESSION.
SUPERSEDED AREA OF CHART
NOT TO SCALE
Yankee Cove
Benjamin I
Sentinel I
SENTINEL I LT
Fl 10s 86ft 14M
Poundstone RK
Fl (2+1) R 6s BELL
Ralston I
Little I
Fl 4s 50ft 7M
Eagle

APPROVAL SHEET
H-10866

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.

Charles R. Davies Date: 2/2/00

for Dennis Hill
Supervisory Cartographer
Pacific Hydrographic Branch

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

James C Gardner Date: 2-8-00

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

****

Final Approval

Approved:

Samuel P. De Bow, Jr. Date: July 20, 2000

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

NOAA FORM 75-96
(10-83)

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

MARINE CHART BRANCH

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-10866

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	1/25/2000	Leo T. Deodato	Full ~~Part~~ ~~Before~~ After Marine Center Approval Signed Via
			Drawing No. Application of soundings and features from smooth sheet.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
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			Full Part Before After Marine Center Approval Signed Via
			Drawing No.

SUPERSEDES C&GS FORM 8352 WHICH MAY BE USED