

H10861

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-10-02-99  
Registry No. .... H-10861

### LOCALITY

State ..... Alaska  
General Locality ..... Lynn Canal  
Sublocality ..... Entrance to Berner's Bay

1999

CHIEF OF PARTY  
CAPT Alan D. Anderson, NOAA

### LIBRARY & ARCHIVES

DATE ..... MAY 11 2000

**HYDROGRAPHIC TITLE SHEET**

**H-10861**

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-10-2-99**

State Alaska

General Locality Lynn Canal

Sublocality Entrance to Berners Bay

Scale 1:10,000

Date of Survey Apr. 6 - May 22, 1999

Instructions Date 3/5/1998 \*

Project No. OPR-P340-RA

Vessel NOAA Ship Rainier (2120, 2121, 2122, 2123, 2124, 2125, 2126)

Chief of Party CAPT A. D. Anderson, NOAA

Surveyed by Rainier Personnel

Soundings taken by echo sounder, hand lead, pole DSF-6000N, Knudsen 320M, RESON 8101 MB

Graphic record scaled by RAINIER PERSONNEL

Graphic record checked by RAINIER PERSONNEL

Evaluation by M. Lathrop Automated plot by HP Design Jet 750C

Verification by R. Mayor, L. Deodato

Soundings in Fathoms at MLLW

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

AWOL'S / SURF 5/5/00 MCR

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

\* Change No. 1 dated 3/30/98, No. 2 dated 4/12/99 and no. 3 dated 5/6/99

# PROGRESS SKETCH

May, 1999  
 OPR-0340-RA-99  
 Lynn Canal, Alaska  
 Capt. A. D. Anderson  
 COMMANDING  
 Chart 17300

APRIL  
 MAY  
 JUNE

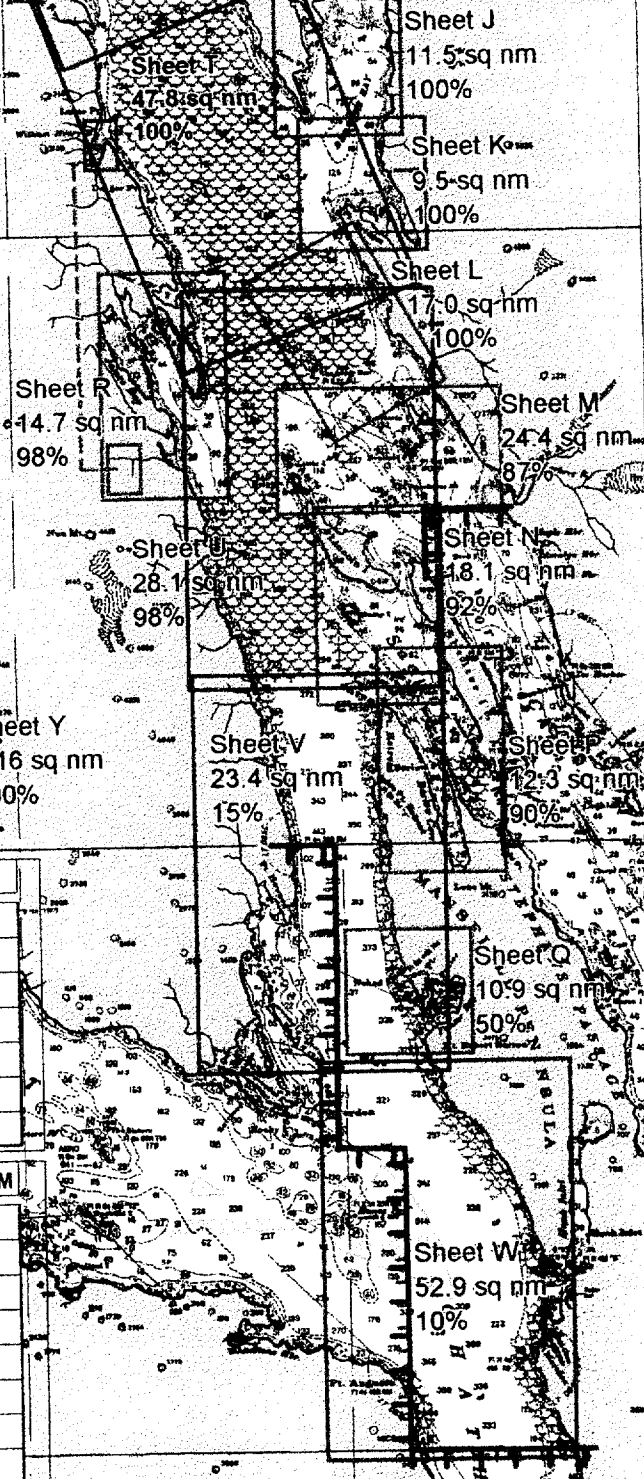
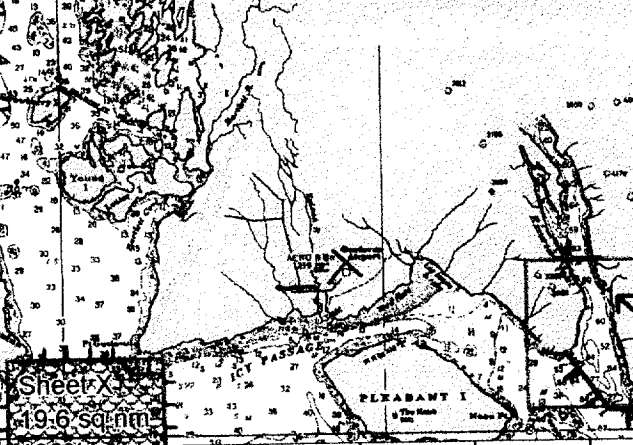
Other may have been done by the contractor...  
 The average area recorded is 7  
 net. Use chart 1731A.

CALCULATED  
 Showing according to an...  
 The average area recorded is 7  
 net. Use chart 1731A.

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

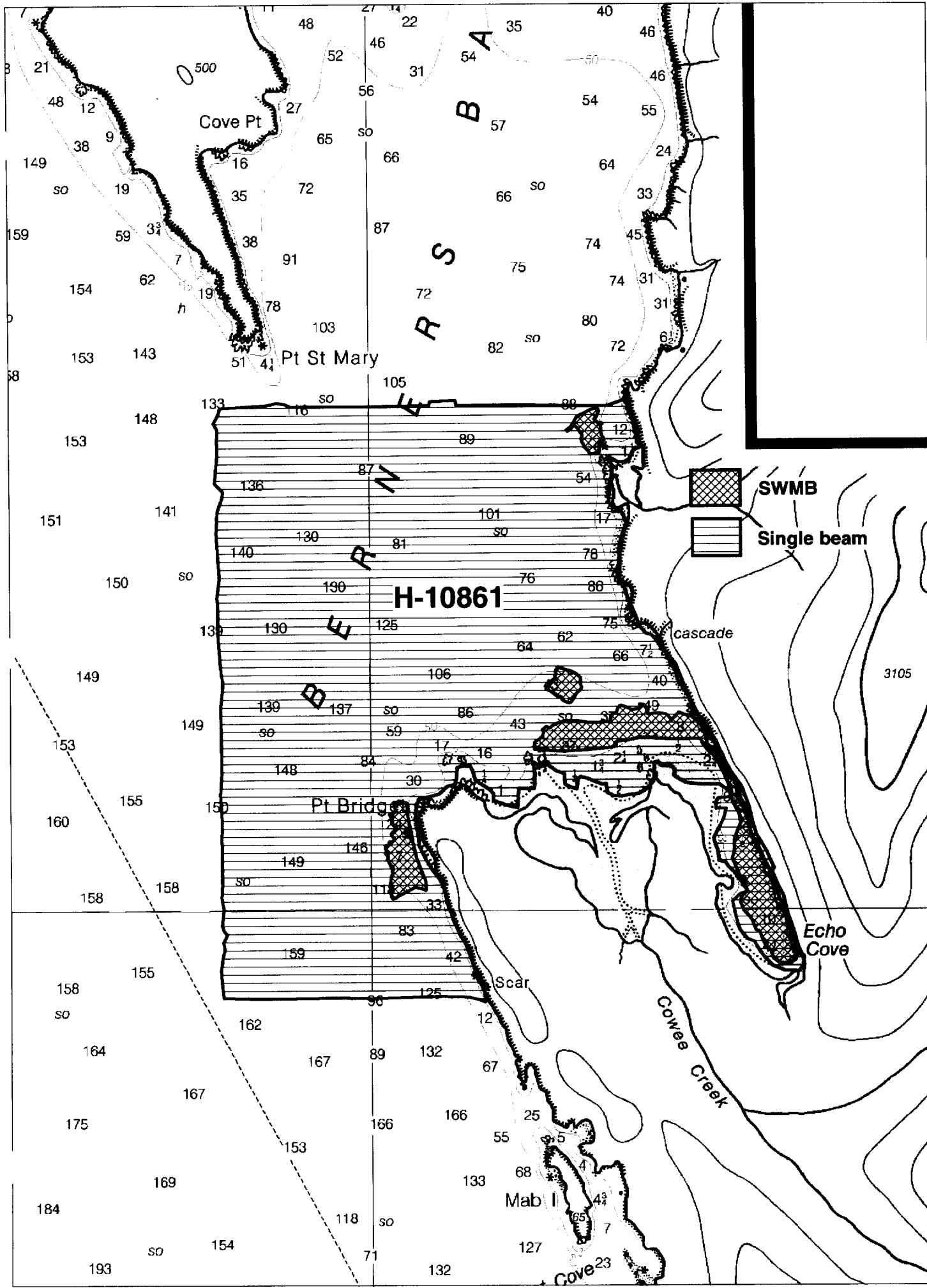
OPERATION...  
 The average area recorded is 7  
 net. Use chart 1731A.

Source: This report is a summary of the...  
 The average area recorded is 7  
 net. Use chart 1731A.



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

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	87			21.2
N	H-10865	4/14	92			16.7
P	H-10870	4/20	90			11.1
Q	H-10879	5/1	50			5.5
R	H-10869	4/18	98	6/2		14.4
T	H-10864	4/13	100	5/25		47.8
U	H-10880	5/3	98	6/2		27.5
V	H-10881	5/2	15			3.5
W	H-10882	5/6	10			5.3
Y	F00451	5/20	100	5/20		0.16
X	H-10883	5/10	100	5/20		19.6



# Descriptive Report to Accompany Hydrographic Survey H-10861

Field Number RA-10-2-99

Scale 1:10,000

April/May 1999

NOAA Ship RAINIER

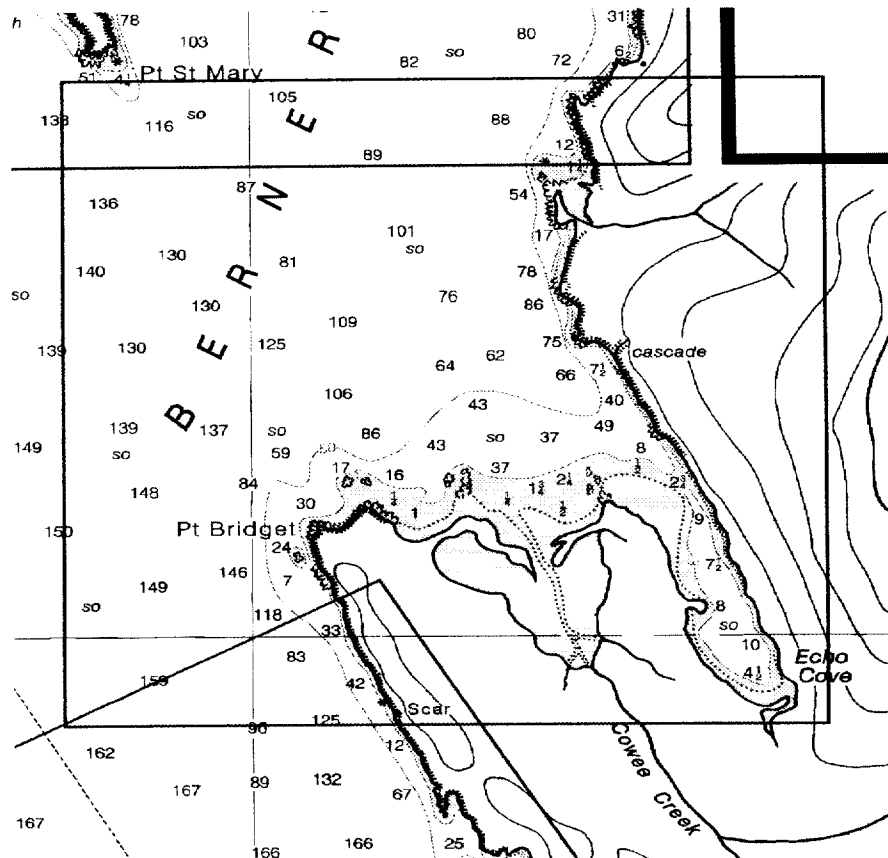
Chief of Party: Captain Alan D. Anderson, NOAA

## 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 H-10861 corresponds to **sheet K** 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 ✓

The survey area is the entrance to Berners Bay. The survey's northern limit is latitude  $58^{\circ} 45' 34''$  N and the southern limit is latitude  $58^{\circ} 36' 46''$  N to the shoreline. The survey's western limit is longitude  $134^{\circ} 59' 17''$  W and the eastern limit is the shoreline. Small and mid-sized recreational boats were often seen within the survey limits, as Berners Bay State Park has a boat ramp located inside Echo Cove. Although other vessels were not usually seen anchoring in the area, one of RAINIER's regular anchorages during the project was approximately 1.1 miles NE of Pt. Bridget at  $58^{\circ} 41.3' N$ ,  $134^{\circ} 57.4' W$ . Data acquisition was conducted from April 6 to May 22, 1999 (DN 096 to 142).



## C. SURVEY VESSELS ✓

Data were acquired by RAINIER's survey launches (vessel numbers 2121, 2122, 2123, 2124, 2125 and 2126) as noted in the Survey Information Summary included with this report.

ADD 2120

## 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 and MapInfo. Final Detached Positions, Features, and Soundings based on predicted and observed tides were saved in MapInfo 5.0 format. Shallow water multibeam (SWMB) echosounder data were acquired using the Reson SeaBat 8101 with ISIS version 4.32 and processed using CARIS software. Raster image and shoreline data in MapInfo facilitated charted and prior survey comparisons. Final Detached Positions and soundings based on predicted tides were saved in MapInfo 5.0 format. A complete listing of software for HYPACK and HPS is included in Appendix VI.

## E. SONAR EQUIPMENT ✓

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

## F. SOUNDING EQUIPMENT ✓

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

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

The VBES sounding instruments for this survey were the Raytheon DSF-6000N and Knudsen 320M, which are dual frequency (100 kHz, 24 kHz), digital recording singlebeam fathometers with analog paper traces. Soundings were acquired in meters using the High + Low, high frequency digitized setting. Serial numbers are included in the Separates. VBES launches were used to perform all shoreline verification.

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

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

The Reson SeaBat 8101 is a multibeam echosounder system that measures relative water depths across a wide swath perpendicular to the vessel's path. The Reson SeaBat 8101 ensonifies the seafloor with a 150° swath consisting of 101 individual 1.5° x 1.5° beams. The system was designed to meet International Hydrographic Organization standards to measure the seafloor at a maximum swath range of 320 meters. The system's usable depth range under actual field conditions is approximately 80-150 meters, depending on sea conditions and bottom topography. The installation this winter of an extended range projector on VN 2126 has extended this maximum depth to greater than 250 meters under good conditions with cleaner data in the shallower ranges. Serial numbers are included in the Separates. SWMB launches were used to collect full-bottom coverage of select areas identified during singlebeam hydrography, generally all areas determined to

be less than 60 meters deep that could safely be investigated without the risk of damaging the SWMB transducer. SWMB launches were not used for shoreline verification due to the extremely high risk of damaging the SWMB transducers on submerged rocks.

SeaBat depth data are displayed during acquisition and reviewed with CARIS-HIPS Data Cleaning programs. Depth flyers were identified and manually flagged as "rejected". Vessel positioning and attitude data from DGPS, POS/MV, heave, roll and pitch sensors were similarly displayed and manually cleaned. Additionally, instantaneous speed as computed from the positioning data was checked for jumps. For this survey, the outer ten beams on each side of the swath (beam numbers 1-10 and 92-101) were not used, and a nadir-angle filter of 60° from vertical was applied, reducing the effective swath width to 120°.

After review and cleaning, the depth, position and attitude data were merged with sound velocity, predicted tide and dynamic draft correctors to compute the true depth and position of each sonar footprint. These processed data were then extracted to a workfile with a grid size of 1 meter. These soundings were further processed by suppressing soundings with a shoal bias to produce one sounding every 25 square meters. Processed soundings were then exported into HPS through HP Tools.

**Explanatory Note about Survey Depth Discrepancies in Steep and Deep Areas:**

Discrepancies between the Knudsen and DSF-6000N echosounders can be noted in deep areas with extremely steep slopes, with DSF-6000N soundings usually being shoaler than Knudsen soundings. Inherent differences between the two measurement systems such as beam width, frequency, power output, receiver sensitivity, bottom tracking functions, and timing latency are greatly exaggerated in such areas, and consequently, differing depths between the two systems can be expected. Due to the extremely steep slopes and deepness of these areas, such differences are not significant to navigation and it is recommended that the ~~shoaler~~ of the soundings be charted. *SEE EVALUATION REPORT, SECTION 2 not correct*

**G. CORRECTIONS TO ECHO SOUNDINGS ✓**

Five sound velocity casts were used for this survey. Information on the casts can be found on the Sound Velocity Cast List table and chartlet included in the Separates.

The sound velocity casts were acquired with SBE SEACAT Profiler (S/N 219), calibrated November 13, 1998 and (S/N 2477), calibrated November 13, 1998. Velocity correctors were computed using the PC program VELOCITY, version 4.0, 1998, in accordance with Hydrographic Survey Guideline (HSG) No. 69. 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 SV correction tables for both HPS and CARIS.

For VBES launches, sound velocity correctors were applied to the raw sounding data in HPS during post-acquisition processing. For SWMB launches, sound velocity correctors were applied in Caris during post-acquisition processing.

**Vessel Offset Correctors**

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

Vessel No.	Date of static draft and transducer offset measurements	Method of Settlement and Squat Measurement	Date of Settlement and Squat Measurement	Location of Settlement and Squat Measurement
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 were computed in accordance with Hydrographic Manual Section 4.9.4.2, using FPM Fig. 2.4, and are included with project data for OPR-O340-RA-99. All offset tables contain offsets for the GPS antenna, as well as static draft measurements, and settlement and squat data. Offset tables # 1-6 correspond to the last digit of the vessel number. For VBES launches, offset tables were applied to the raw sounding data in HPS during post-acquisition processing. For SWMB launches, offsets were applied during Caris processing.

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

#### **Predicted Tidal Correctors:**

For the 1999 field season the Oceanographic Products and Services Division, User Services Branch (N/CS41), supplied no predicted tides for OPR-O340. Preliminary predicted tide tables were generated for both HPS and CARIS using Tides & Currents v2.5. HPS tides for H-10861 were based on the location William Henry Bay, Lynn Canal that uses Juneau as a reference station. This tide table (HPS #99) was used only for preliminary inspection of the VBES soundings. CARIS tide table juneau99new.tid was also based on Tides & Currents and was used throughout the entire CARIS processing pipeline.

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

HPS listings of the data used in generating tide corrector tables are included in Appendix V of this report. Tidal correctors as provided in the project instructions for H-10861 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 the gage was removed on June 2, 1999. Refer to the Field Tide Note 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.

#### **H. HYDROGRAPHIC POSITION CONTROL** ✓

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

All soundings were positioned using differential GPS. Primary control was the VHF differential reference station at JOE. The US Coast Guard Beacon at GUSTAVUS and a VHF differential reference station at CURTIS were used as backup. Launch-to-launch DGPS performance checks were performed in accordance with Section 3.2 of the FPM. Two observations of position were made from two different DGPS base stations, JOE and GUSTAVUS, while the launches were rafted together with their GPS antennae within 2-3 meters of each other. RAINIER also used SHIPDIM, version 2.2R (April 1996) with a Trimble Centurion P-code receiver and an Ashtech sensor (both differentially-corrected) to monitor the performance of the



reference stations. JOE was compared to GUSTAVUS at least once a week while installed. Some outliers were noted, but none indicated systematic or continuous errors in either the GUSTAVUS beacon or the VHF station at JOE. The SHIPDIM OUTLIER.SUM results are included in the project data for OPR-O340-RA.

The SWMB launches (VN 2121, 2123, 2126) used a Position and Orientation System for Marine Vessels (POS/MV) to determine their heading. The POS/MV delivers heading measurements by two distinct methods. First, the Dynamic Heading Alignment determines the vessel's attitude by using data supplied by the Inertial Measurement Unit (IMU) and GPS receivers to achieve a heading that is, at best, accurate to within 0.35°. This method suffers from drift but is relatively unaffected by noise. Second, the GPS Azimuth Measurement System (GAMS) determines the geographic vector between two GPS antennas fixed to the vessel by comparing the phase of satellite signals that they receive. The error from this method is largely due to noise, but it exhibits no drift. The POS/MV uses the advantages of each method to compensate for the disadvantages of the other to arrive at an optimal accuracy of 0.05° in roll, pitch and heading, and within 0.1m in heave.

## I. SHORELINE ✓

No official shoreline document 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 H-10861. This problem was solved with the registration of NASA aerial photos acquired from the U.S. Forest Service. These photos were scanned and registered using prominent landmarks along the shoreline. The registered photos were then digitized in MapInfo using a combination of the chart and notes taken during vertical beam echo sounder mainscheme to differentiate between areas of gently sloping beaches and ledges. The texture, color, and smoothness of the low water line in the infrared NASA photos also proved useful differentiating between types of low water shoreline. The resultant shoreline was then exported in .DXF format for use with Hypack. In the field ledges and reefs were extensively DP'ed to field check the NASA photo's registration. This method proved to be remarkably reliable and accurately depicted the shoreline when checked against the DP's, soundings, and tracklines. During shoreline verification these digitized NASA photos were treated as official shoreline for the purposes of distinguishing new shoreline features. *See Eval. Report, section J*

Limited shoreline verification was conducted in accordance with the Project Instructions. For this survey the general limit of safe navigation of a survey launch is 5-30 meters offshore of apparent low tide, with the exception of the mouth of Cowee Creek and the entrance into Echo Cove, where the shoaling is quite extensive. Water depths along this limit of safe navigation are generally 2-5 meters at Mean Lower Low Water. Features shown inshore of the NALL are the hydrographer's representation of the shoreline while slowly transiting along the shore, and are intended to aid chart compilation.

Shoreline manuscript and field features were compared to an enlargement of chart 17316, plotted by RAINIER personnel, as well as digital overlay of data on the BSB chart image in MapInfo.

The following is a list of all Detached Positions that show discrepancies with charted features.

Fix Number	Charted Feature	Geographic Position	Observed Feature
51077	rock	58-39-32 N 134-58-39 W	high point of ledge ✓
51177	reef	58-40-59 N 134-58-44 W	ledge ✓
51178	reef	58-40-59 N 134-58-51 W	ledge ✓
51179	reef	58-40-59 N 134-58-55 W	ledge ✓
51180	reef	58-40-59 N 134-59-02 W	<del>ledge</del> reef ✓

It should be noted that a charted rock was disproved at position 58° 40' 31" N, 134° 59' 32" W. A DP was not taken for this rock, but a 100m radius star search pattern (fix numbers 51123-51135) was run in the area of the charted rock disproval during shoreline verification, and the area was also covered by 100% SWMB in 4^

meters depth (lines RA1\_dn142\_055\_1737 and RA3\_dn112\_014\_2059). There are also several negative depth soundings in the area around the mouth of Cowee Creek which are not associated with DPs. These soundings fall within newly established ledge limits and/or foul areas depicted on the accompanying DP&BS plot.

The following is a list of all Detached Positions taken on new features. It is recommended that they be added to the chart:

Fix Number	New Feature	Geographic Position	Heights (MLLW)
21429	metal mooring	58-39-59 N 134-55-17 W	<del>-1.8m -4.9m</del>
22042	rock	58-39-55 N 134-55-07 W	0.7m 0.6m
22062	boat ramp	58-39-42 N 134-54-31 W	N/A ✓
22166	rock	58-42-04 N 134-56-39 W	<del>1.3m 1.2m</del>
22173	rock	58-42-12 N 134-56-46 W	<del>0.4m 0.2m</del>
22174	rock	58-42-11 N 134-56-45 W	<del>1.5m 1.3m</del>
22306	rock	58-43-10 N 134-56-59 W	<del>1.0m 0.9m</del>
51195	reef	58-40-58 N 134-58-16 W	<del>-1.7m -1.8m</del>

*correct after tide reduction*

**J. CROSSLINES ✓**

Crosslines agreed within 1-2 meters with mainscheme hydrography. There was a total of 17.67 nautical miles of crosslines, comprising 9.3% of mainscheme hydrography.

**K. JUNCTIONS ✓**

The following contemporary surveys junction with H-10861:

Registry #	Scale	Date	Junction side
H-10860	1:10,000	1999	North
H-10862	1:10,000	1999	South
H-10864	1:20,000	1999	West

Soundings on these 1999 surveys were found to be in good agreement, generally matching within 1-2 meters, except at the southwest corner of this survey where the deepness and extreme steep slope of the area produced larger differences between DSF-6000N and Knudsen soundings. See section F., Sounding Equipment, for further details. Final comparisons will be made at the Pacific Hydrographic Branch (PHB) after reduction to final vertical datum using approved water level data.

**L. COMPARISON WITH PRIOR SURVEYS ✓**

The following prior surveys share common area with H-10861:

Registry #	Scale	Date	Area covered
H-2056	1:40,000	1890	SW corner
H-2057	1:40,000	1890-1905	outside Berners Bay entrance
H-2061	1:20,000	1890	inside Berners Bay
H-3985WD	1:20,000	1917	SW corner
H-4202WD	1:40,000	1921	outside Berners Bay entrance

Prior survey H-2061 covers the majority of the present survey H-10861, and the soundings agree very well between the two surveys. Prior surveys H-2056 and H-2057 each cover small portions of the present survey and are also both in generally good agreement. The newly acquired depths either match the prior depths or reveal shoaler areas. There is one exception to this where prior survey H-2056 reports a shoaler depth at 58°

40' 19" N, 134° 59' 27" W, approximately 0.5 miles SSW of Pt. Bridget (shown as 7 fathoms on Chart 17316). The area was covered with both VBES and 100% SWMB and no 7 fathom shoals were found within the 150-200m radius search area around the reported sounding. A 20 fathom shoal was positioned at 58° 40' 18" N, 134° 59' 42" W, 200m SW of the prior sounding, thus it may have been mischarted due to bad positioning or it may have been transcribed incorrectly onto the chart. concur

Priors H-3985WD and H-4202WD are both wire drag surveys and were found to be illegible and were not used for prior comparisons.

The following table shows a representative sample of how the soundings from the present survey H-10861 compare with those from prior H-2061:

H-2061 Depth (fm)	H-10861 Depth (fm)	H-10861 Fix #	Geographic Position
92	<del>92.3</del> 92.1	62040	58° 42' 46" N 134° 57' 47" W
116	<del>118.8</del> 118.7	60218	58° 43' 21" N 135° 00' 51" W
11.25	<del>4.2</del> 4.3	80564	58° 39' 58" N 134° 55' 06" W
49.5	<del>42.6</del> 42.7	10105	58° 41' 20" N 134° 56' 22" W
87	<del>87.5</del> 87.3	40622	58° 41' 38" N 134° 58' 41" W
125	137.4 ✓	41233	58° 41' 54" N 134° 59' 49" W

*concur after tide reduction*

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

#### M. ITEM INVESTIGATION REPORTS ✓

There were no AWOIS items assigned for survey H-10861.

#### N. COMPARISON WITH THE CHART ✓

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 and was in good agreement, generally within one fathom, with one exception. The sandbar that is shown on the west shore of Echo Cove has expanded further east than shown on Chart 17316. The new limits of this shoal area can be seen on the accompanying DP&BS Plot. The navigable channel out of Echo Cove also appears to be further to the east and can be seen on the accompanying Sounding and Contour Plot. Any other discrepancies in depths have been discussed in Section L, Comparison with Prior Surveys. Non-sounding features are discussed in Section I. Final sounding comparisons will be made at PHB after reduction to final vertical datum.

#### Dangers to Navigation

One danger to navigation was discovered during the survey and reported to the Seventeenth Coast Guard District. A reef was found at 58° 40' 58.036" N, 134° 58' 15.973" W with a high point of ~~-1.7m~~ -1.8m in surrounding depths of between 5 and 10 meters. *concur after tide reduction*

#### O. ADEQUACY OF SURVEY

Survey H-10861 is complete and adequate to supersede prior soundings and features in their common areas.

**P. AIDS TO NAVIGATION ✓**

There are no Aids to Navigation within the survey limits of H-10861.

**Q. STATISTICS ✓**

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

**R. MISCELLANEOUS ✓**

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

**S. RECOMMENDATIONS ✓**

Removal of wire drag green tint. *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,



Danielle Pattison  
Senior Survey Technician

Approved and Forwarded,



Alan D. Anderson  
Captain, NOAA  
Commanding Officer

# Survey Information Summary

Project: OPR-0340-99 Project Name: LYNN CANAL

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

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

Sheet Letter: K Registry Number: H-10860

Sheet Number: RA-10-01-99 RA-10-02-99

Survey Title: Berner's Bay

Data Acquisition Dates: From: 06-Apr-99 96 To: ~~06 Jun 99~~ ~~157~~

### Vessel Usage Summary

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

~~25 May~~ 142  
22 May 99

### Sound Velocity Cast Information

Launch Table #	Ship Table #	Cast DN	Max Depth	Position	Applicable DN
3		104	340	58/34/18 134/57/54	096 - 104
4		105	298	58/41/18 135/00/24	105

### Tide Zone Information

Zone #	Time Corr.	Height Corr.
SEA2C	00 hr 00 min	X0.99

### Tide Gage Information

Tide Gage #	Gage Name	Installed	Removed
945-2346	COVE POINT	4/4/99	6/2/99

### Statistics Summary

Type	Total:
BS	35
DEV	52.92
DP	39
MBMS	4.22
MBSP	3.3
MBXL	2.93
MS	199.41
S/L	13.81
SPLIT	92.99
SWMB	38.97
XL	16.82

Percent XL:	8.4%
SQNM:	11.5



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

**ADVANCE  
INFORMATION**

NOAA Ship RAINIER  
July 1, 1999

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

Dear CDR Hamblett:

It is requested that the following danger to navigation be included in the Local Notice to Mariners. The NOAA Ship RAINIER positioned this feature while conducting hydrographic surveys in Lynn Canal, southeast Alaska. The danger is shown graphically on the attached chartlet and is listed below. The following danger to navigation affects chart 17300, 28<sup>th</sup> edition, 1998, 1:209,978 and chart 17316, 18<sup>th</sup> edition, 1998, 1:80,000. The position is on the NAD 83 datum and the depth has 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>
Reef	-0.9	58:40:58.036	134:58:15.973	51195	-1.7	H-10861

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-07-99. More information on current RAINIER survey projects may be obtained by e-mail; contact the Field Operations Officer at [FOO.RAINIER@NOAA.GOV](mailto:FOO.RAINIER@NOAA.GOV).

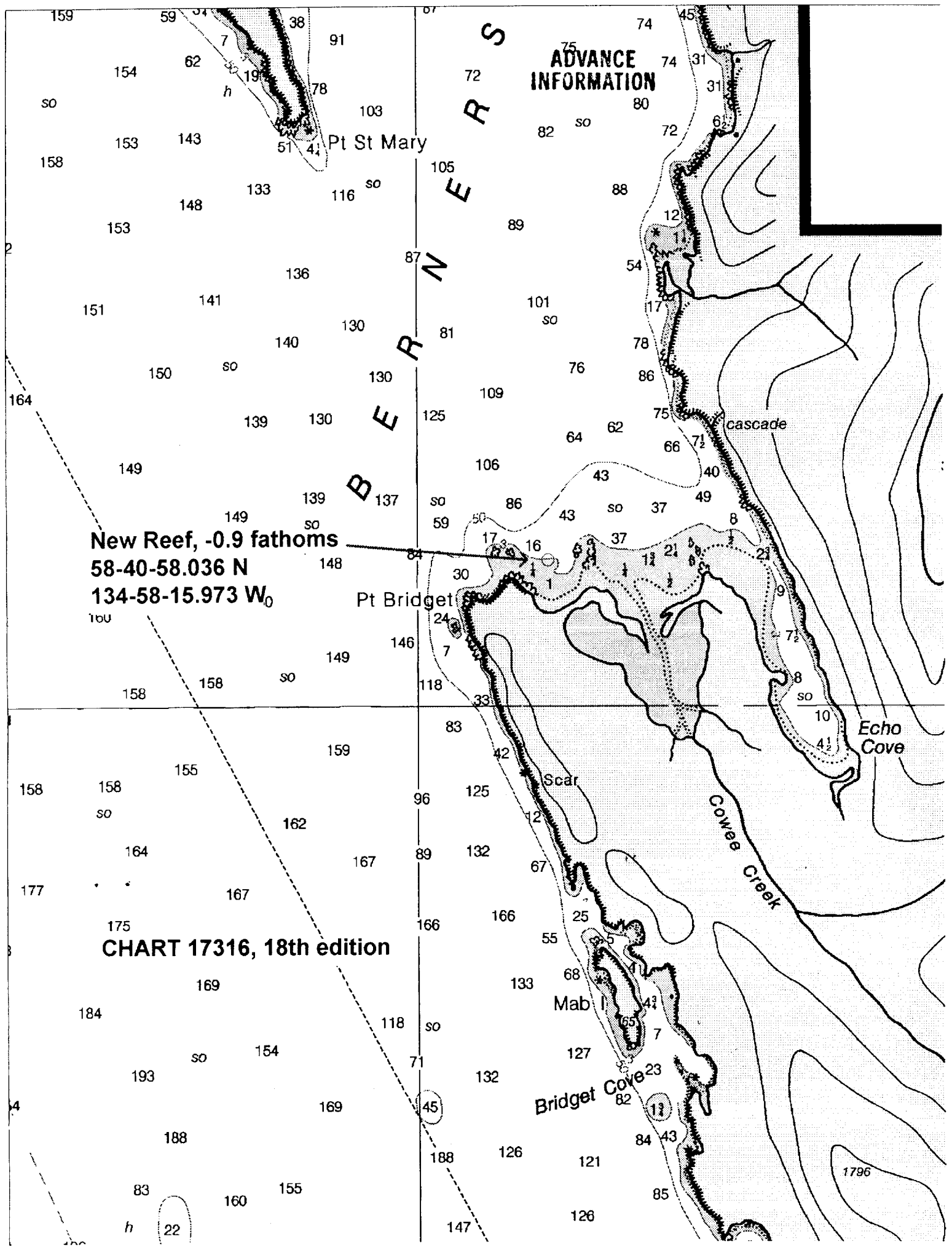
Sincerely,

Daniel R. Herlihy  
CDR, NOAA  
Commanding Officer

Attachment

cc: NIMA  
PMC  
N/CS261  
N/CS34





ADVANCE  
INFORMATION

New Reef, -0.9 fathoms  
58-40-58.036 N  
134-58-15.973 W<sub>0</sub>

CHART 17316, 18th edition

BERNERS

Pt St Mary

Pt Bridget

Mab I

Bridget Cove

Cowe Creek

Echo Cove

cascade

Scar

1796

45

13

22

## 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



APPROVAL SHEET

for

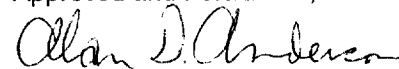
H-10861

RA-10-02-99

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

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

Approved and Forwarded,



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



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-10861

**LOCALITY:** Entrance to Berners Bay, Lynn Canal, AK  
**TIME PERIOD:** April 6 - May 22, 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

**REMARKS: RECOMMENDED ZONING**

**Use zone(s) identified as:** SEA65 & 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.

**Note 2:** 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.

**TIDE NOTE FOR HYDROGRAPHIC SURVEY SHEET H-10861 cont.**

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>.

  
-----  
CHIEF, REQUIREMENTS AND DEVELOPMENT DIVISION

Final tide zone node point locations for OPR-O340-RA-99,  
Sheet H-10861.

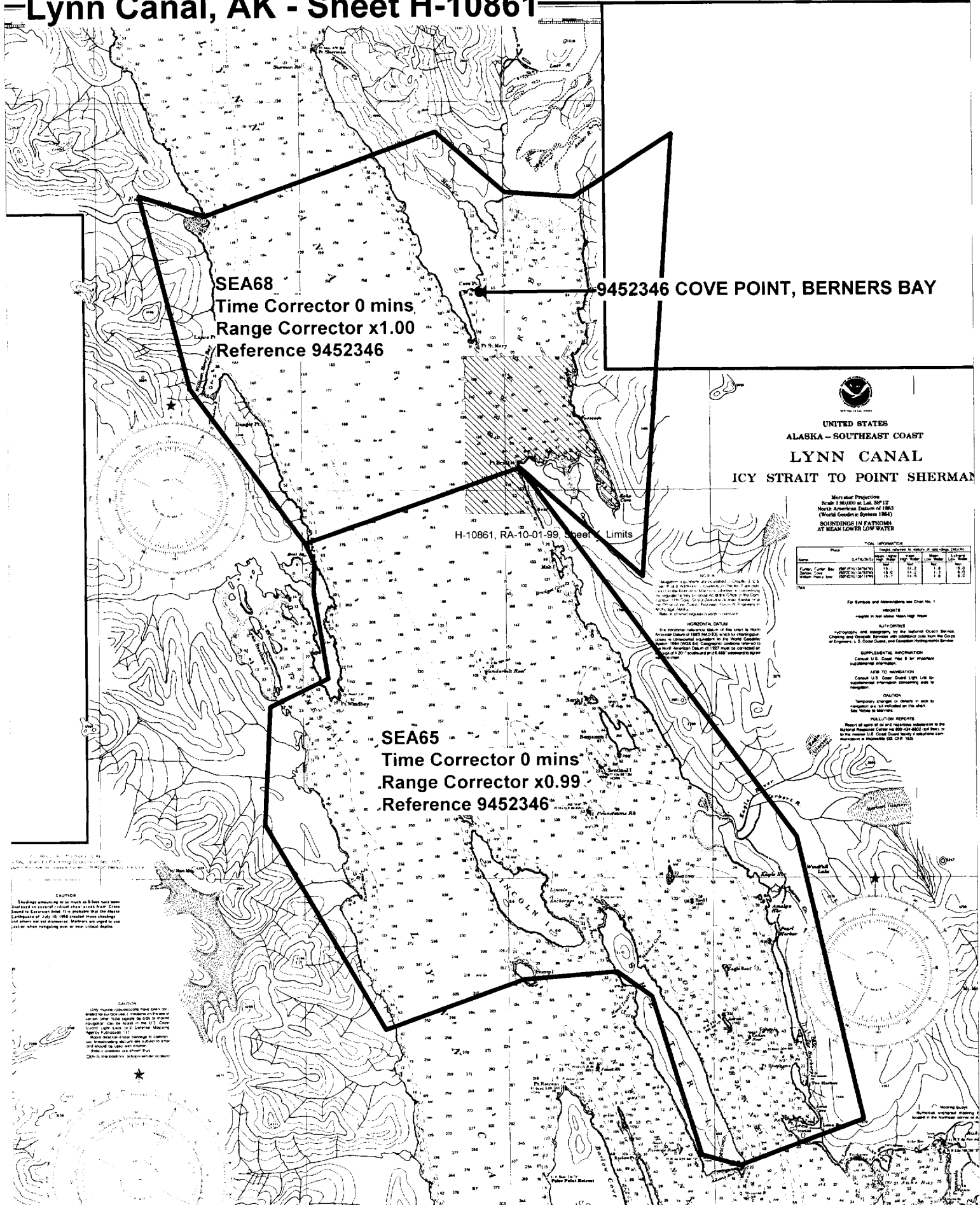
Format: Longitude in decimal degrees (negative value denotes  
Longitude West),  
Latitude in decimal degrees  
Tide Station (in recommended order of use)  
Average Time Correction (in minutes)  
Range Correction

	Tide Station Order	AVG Time Correction	Range Correction
Zone SEA65			
-134.712062 58.395475	9452346	0	0.99
-134.81273 58.375272			
-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 SEA68			
-134.988058 58.676589	9452346	0	1.00
-135.164237 58.644226			
-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-10861

SOUNDINGS IN FATHOMS



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

**9452346 COVE POINT, BERNERS BAY**

H-10861, RA-10-01-99, Sheet Limits

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

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

Metric Properties  
 Scale 1:80,000 at Lat. 59° 12'  
 North American Datum of 1983  
 (World Geodetic System 1984)  
**SOUNDINGS IN FATHOMS**  
 AT MEAN LOWER LOW WATER

Tidal Information		Time		Date	
Code	Value	Start	End	Start	End
Code	Value	Start	End	Start	End
Code	Value	Start	End	Start	End

**NOTES**  
 1. All soundings are in fathoms. 2. US Coast and Geodetic Survey...  
 3. All soundings are in fathoms. 4. US Coast and Geodetic Survey...  
 5. All soundings are in fathoms. 6. US Coast and Geodetic Survey...

**HORIZONTAL DATUM**  
 The horizontal datum of this chart is North American Datum of 1983 (NAD 83), which is interchangeable with the International Geodetic Reference System 1984 (IGRS 84). Computations referred to the North American Datum of 1983 must be corrected by a factor of 0.20" southward per 1.000' measured by the datum.

**REPORTS**  
 For Symbols and Abbreviations see Chart No. 1

**AUTHORITY**  
 Hydrographic and nautical information is derived from the Coast and Geodetic Survey, United States Coast and Geodetic Survey.

**ESSENTIAL INFORMATION**  
 Consult U.S. Coast and Geodetic Survey for the latest information concerning this chart.

**USE TO NAVIGATE**  
 Consult U.S. Coast and Geodetic Survey for the latest information concerning this chart.

**CAUTION**  
 Temporary changes or omissions in this chart are indicated on the sheet. See Notes at bottom.

**POLLUTION REPORTS**  
 Report all spills of oil and hazardous substances to the National Response Center at 800-424-9343 or 202-261-4900, or to the nearest U.S. Coast Guard District Office or the nearest U.S. Coast Guard Auxiliary Office.

**CAUTION**  
 Soundings amounting to as much as 6 feet have been substituted on several soundings in areas from Cape Sabine to Cape Sabine. It is probable that the Alaska Department of Fish and Game has changed the soundings on the chart. Mariners are urged to be alert when navigating over or near critical depths.

**CAUTION**  
 Many navigational aids have been substituted on several soundings in areas from Cape Sabine to Cape Sabine. It is probable that the Alaska Department of Fish and Game has changed the soundings on the chart. Mariners are urged to be alert when navigating over or near critical depths.

GEOGRAPHIC NAMES

H-10861

Name on Survey	ON CHART NO. <del>XXXX</del> 17316 ON PREVIOUS SURVEY NO. CON U.S. QUADRANGLE MAPS FROM LOCAL INFORMATION ON LOCAL MAPS P.O. GUIDE OR MAP RAND McNALLY ATLAS U.S. LIGHT LIST										
	A	B	C	D	E	F	G	H	K		
ALASKA (title)	X		X							1	
BERNERS BAY	X		X							2	
BRIDGET, POINT	X		X							3	
COWEE CREEK	X		X							4	
ECHO COVE	X		X							5	
LYNN CANAL	X		X							6	
										7	
										8	
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										10	
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										25	

*Director J. R. ...*  
AUG 23 1999

**HYDROGRAPHIC SURVEY STATISTICS**

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

RECORD DESCRIPTION		AMOUNT	RECORD DESCRIPTION		AMOUNT
SMOOTH SHEET		1	SMOOTH OVERLAYS: POS., ARC, EXCESS		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):	GC 10423
PHOTOBATHYMETRIC MAPS (List):	NA
NOTES TO THE HYDROGRAPHER (List):	NA
SPECIAL REPORTS (List):	NA
NAUTICAL CHARTS (List):	17316

OFFICE PROCESSING ACTIVITIES

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

PROCESSING ACTIVITY	AMOUNTS		
	VERIFICATION	EVALUATION	TOTALS
POSITIONS ON SHEET			
POSITIONS REVISED			
SOUNDINGS REVISED			
CONTROL STATIONS REVISED			
TIME-HOURS			
	VERIFICATION	EVALUATION	TOTALS
PRE-PROCESSING EXAMINATION			
VERIFICATION OF CONTROL			
VERIFICATION OF POSITIONS			
VERIFICATION OF SOUNDINGS			
VERIFICATION OF JUNCTIONS			
APPLICATION OF PHOTOBATHYMETRY			
SHORELINE APPLICATION-VERIFICATION			
COMPILATION OF SMOOTH SHEET	218.6		218.6
COMPARISON WITH PRIOR SURVEYS AND CHARTS			
EVALUATION OF SIDE SCAN SONAR RECORDS			
EVALUATION OF WIRE DRAGS AND SWEEPS			
EVALUATION REPORT		92.0	92.0
GEOGRAPHIC NAMES			
OTHER (Chart Compilation)		97.16	97.16
USE OTHER SIDE OF FORM FOR REMARKS	TOTALS	218.6	189.16
			407.76

Pre-processing Examination by <b>M. Bigelow</b>	Beginning Date 7/2/99	Ending Date 7/6/99
Verification of Field Data by <b>R. Mayor, L. Deodato, M. Lathrop</b>	Time (Hours) 218.6	Ending Date 4/14/00
Verification Check by	Time (Hours)	Ending Date
Evaluation and Analysis by <b>M. Lathrop</b>	Time (Hours) 92.0	Ending Date 4/14/00
Inspection by <b>D. Hill</b>	Time (Hours) 4	Ending Date 4-14-00

## **EVALUATION REPORT H-10861**

### **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. Page-size plots of the charted area depicting the limits of supersession accompany this report as attachment 1.

The bottom consists mainly of sticky green mud with some rocky and sandy areas. Depths range from 0 to 166 fathoms.

### **C. SURVEY VESSELS**

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

### **D. AUTOMATED DATA ACQUISITION AND PROCESSING**

HYPACK version 8.9 was used for acquisition of all vertical beam echo sounder (VBES) data. Shallow water multibeam (SWMB) data were acquired with ISIS version 4.32 and processed using CARIS software. Both VBES and SWMB were processed using Hydrographic Processing System (HPS). MicroStation 95 was used to compile the smoothsheet.

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 projection and are depicted on a single sheet.

### **E. SONAR EQUIPMENT**

Side scan sonar equipment was not used.

### **F. SOUNDING EQUIPMENT**

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

### **G. CORRECTIONS TO SOUNDINGS**

Soundings and elevations below Mean High Water (MHW) have been reduced to Mean Lower Low Water (MLLW). The reducers include corrections for an actual tide, dynamic draft, and sound velocity. These reducers have been reviewed and are consistent with NOS specifications.

Predicted tides were used for reduction of soundings during field processing. During office processing, tide reductions were derived from approved hourly heights zoned direct from the following tide gage: Cove Point, AK (945-2346) was used for zones SEA65 and SEA68.

Other sounding reducers include corrections for static draft, dynamic draft and sound velocity. Heave, roll and pitch correctors were applied to SWMB data only. These reducers have been reviewed and are consistent with NOS specifications.



## H. CONTROL STATIONS

Section 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: 1.157 seconds (35.799 meters)  
Longitude: -6.471 seconds (-104.315 meters)

## I. HYDROGRAPHIC POSITION CONTROL

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. DGPS performance checks were conducted in the field and found adequate.

## J. SHORELINE

Shoreline map GC 10423 compiled on NAD83 applies to this survey. Shoreline drawn on the smooth sheet in black originates from this digital data as provided by the Coastal Mapping Program. The shoreline data and the hydrographic data were merged during MicroStation processing. There were no MHW revisions on this survey. The shoreline map and the results of the fieldwork as portrayed on the smooth sheet should supersede charted shoreline.

## K. CROSSLINES

Crosslines are adequately discussed in the hydrographer's report.

## L. JUNCTIONS

Survey H-10861 junctions with the following surveys:

<u>Survey</u>	<u>Year</u>	<u>Scale</u>	<u>Area</u>
H-10860	1999	1:10,000	North
H-10862	1999	1:10,000	South
H-10864	1999	1:20,000	West

The junctions with surveys H-10860 and H-10864 are complete. A "Joins" note has been added to the smooth sheet where applicable. The junction soundings are in agreement however; a few soundings from the junctional surveys have been transferred within the common areas of H-10861 to better delineate the bottom configuration.

The junction with survey H-10862 is of considerable spatial extent and contained significant depth discrepancies. This discrepancy can be attributed to differences between the two different vertical-beam echosounders, which is described in Section F of the hydrographer's report. Soundings on surveys H-10861 and H-10862 that were determined to be inconsistent with bottom topography were rejected in order to maintain good agreement between the surveys. Because the wider beamwidth the DSF-6000N sounder tended to select upslope depths, many of these shoaler soundings were either rescanned or rejected in favor of soundings acquired with the Knudsen sounder. A "Joins" note has been added to the smoothsheet to indicate the successful completion of the junction.

The following fix numbers have been rejected and replaced by soundings from H-10862: 42316-42319, 42518-52519, 42667, 50071+1, 50113-50114, 50118-50123, 50160-50161, 50236.

## M. COMPARISON WITH PRIOR SURVEYS

<u>Survey</u>	<u>Year</u>	<u>Scale</u>	<u>Datum</u>
H-2056	1890	1:40,000	NAD27
H-2057	1890-1905	1:40,000	NAD27
H-2061	1890	1:20,000	NAD27
H-3985WD	1917	1:20,000	NAD27
H-4202WD	1921	1:40,000	NAD27

The present survey was compared to digital raster copies of surveys H-2056, H-2057 and H-2061. Prior survey H-2061 covers the majority of the present survey. Due to the lack of gridlines on this prior survey, registration was accomplished by matching significant points of land with the shoreline map. Prior surveys H-2056 and H-2057 cover the portions of the present survey outside Berners Bay. They were also registered to the present survey by matching significant points of land and a limited number of gridlines. Prior surveys H-3985WD and H-4202WD are both wire drag surveys and too illegible to be used for comparison with the present survey.

Sounding agreement is fairly good between prior survey H-2061 and the present survey. Prior surveys H-2056 and H-2057 cover small portions of the present survey and are in generally good agreement. The present survey depths either match the prior depths or reveal shoaler areas. Most discrepancies are due to inaccurate horizontal positioning and undetected rocks and shoals during the prior survey. Shoaling from alluvial deposition has occurred in several places since the time of the prior surveys. There is one notable discrepancy with prior survey H-2056 where it reports a 7-fathom depth at latitude 58°40'19" N, longitude 134°59'27" W. The area was covered with VBES and 100 percent SWMB and no similar depths were found. The prior survey depth is considered to be discredited.

Wire drag surveys H-3985WD and H-4202WD were found to be too illegible to be used for direct comparison with the present survey. A comparison with the chart was made on the assumption that all significant hangs and groundings would have been properly charted. Sounding coverage of the area adequate to supersede 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.

Survey H-10861 is adequate to supersede the prior surveys within the common area.

## N. ITEM INVESTIGATIONS

There were no AWOIS items assigned to this survey.

## O. COMPARISON WITH CHART

Survey H-10861 was compared with the following charts:

<u>Chart</u>	<u>Edition</u>	<u>Date</u>	<u>Scale</u>
17316	18 <sup>th</sup>	July 18, 1998	1:80,000
17300	27 <sup>th</sup>	Aug. 14, 1993	1:209,978

### a. Hydrography

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

The application of this survey to charts of a scale less than 1:40,000 may require the generalization of features such as ledges and reefs. The recommended charting disposition of specific ledges or reefs is their depiction as isolated rocks. The application of this survey to charts of a scale greater than 1:40,000 may be accomplished without generalization of features.

Survey H-10861 is adequate to supersede charted hydrography within the charted area.

b. Dangers To Navigation

One danger to navigation was discovered during survey operations and reported to the USCG on July 1, 1999. No additional dangers to navigation were found during office processing. A copy of this report is attached.

**P. ADEQUACY OF SURVEY**

Hydrography acquired during survey H-10861 and depicted on the smooth sheet 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.

With the exception noted below 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.

The hydrographer employed an unauthorized source for the depiction of shoreline on the fieldsheet and for the conduct of nearshore survey operations. This shoreline data was not used during office processing.

**Q. AIDS TO NAVIGATION**

There are no fixed and floating aids to navigation within the survey area. 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.

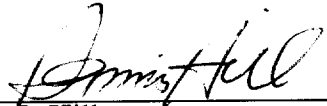


Mark Lathrop  
Physical Scientist


APPROVAL SHEET  
H-10861

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 J. Hill  
Cartographer, Cartographic Team  
Pacific Hydrographic Branch  
Date: 4-14-00

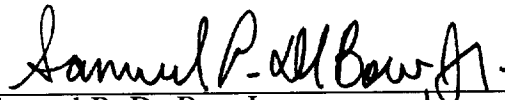
I have reviewed the smooth sheet, accompanying data, and reports. This survey and accompanying digital data meet or exceed NOS requirements and standards for products in support of nautical charting except where noted in the Evaluation Report.

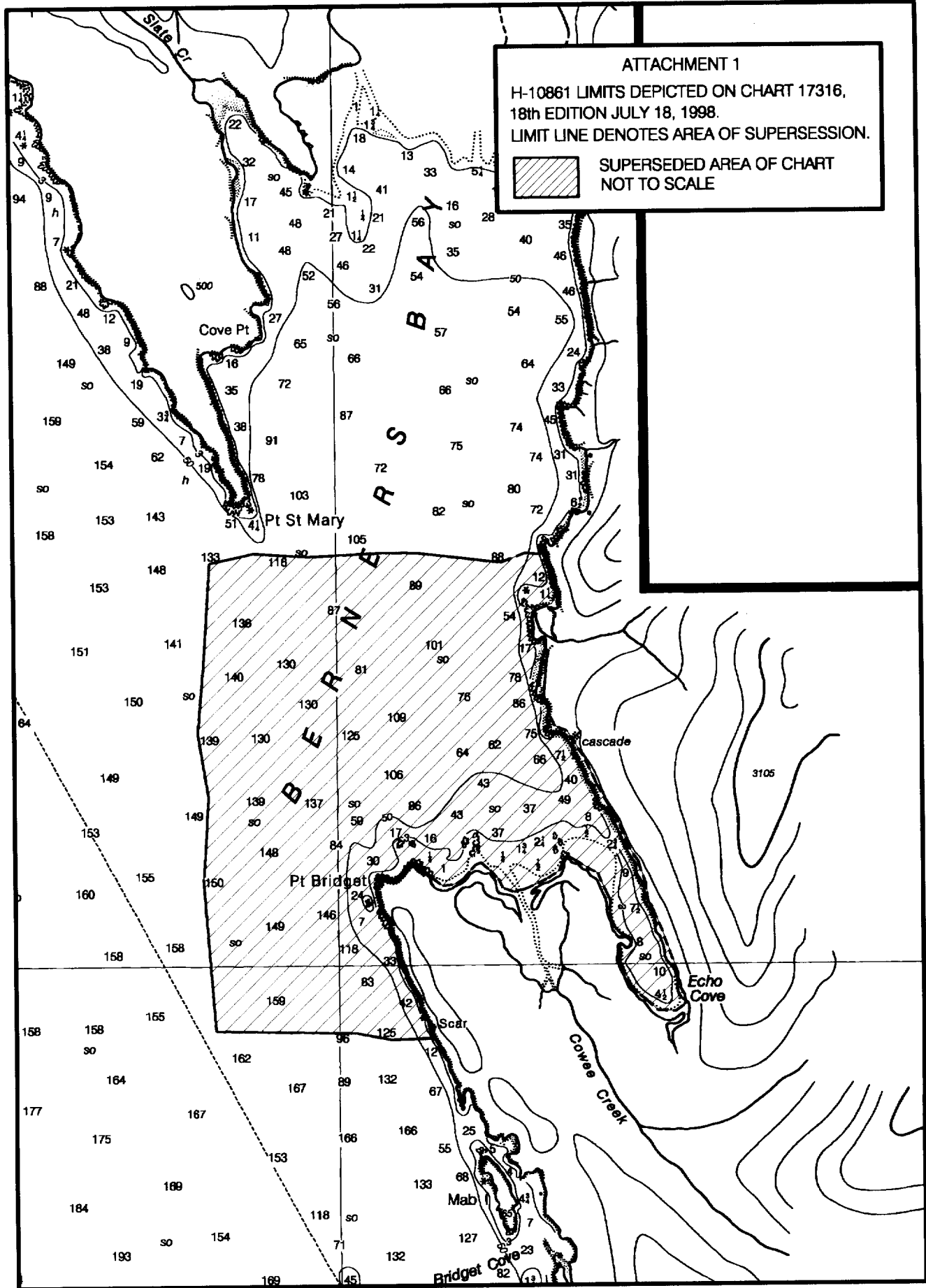
  
\_\_\_\_\_  
James C. Gardner  
Commander, NOAA  
Chief, Pacific Hydrographic Branch  
Date: 4-15-00

\*\*\*\*\*

Final Approval

Approved:

  
\_\_\_\_\_  
Samuel P. De Bow Jr.,  
Captain, NOAA  
Chief, Hydrographic Surveys Division  
Date: May 11, 2000



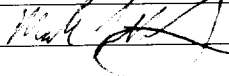
MARINE CHART BRANCH  
**RECORD OF APPLICATION TO CHARTS**

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-10861

**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	12/1/99		Full <del>Part</del> 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
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
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