

H10828

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. PHP 10-2-98

Registry No. H-10828

LOCALITY

State Washington

General Locality South Rosario Straits

Sublocality Deception Island to Colville Island

1999

CHIEF OF PARTY
LT James Crocker, NOAA

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DATE MAY 18 2001

HYDROGRAPHIC TITLE SHEET

H-10828

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.

PHP 10-2-98

State Washington

General Locality South Rosario Straits

Sublocality Deception Island to Colville Island

Scale 1:10,000

Date of Survey July 7, 1998 - June 21, 1999

Instructions Date 05/07/1997 *

Project No. OPR-N368-PHP

Vessel Launch 1101 (0651), Launch 1102 (0652)

Chief of Party LT James Crocker, NOAA

Surveyed by LT Crocker, ST Brown, ST Rothmeyer, ST Simmons, ET Wernicke

Soundings taken by echo sounder, ~~hand lead, plane~~ Raytheon DSF-6000,

Graphic record scaled by PHP PERSONNEL Innerspace 448,

Graphic record checked by PHP PERSONNEL Knudsen 320m

Evaluation by M.E. Bigelow Automated plot by HP 750C

Verification by R. Davies, R. Mayor, C. Barry, B. Olmstead, D. Doles

Soundings in Fathoms and feet 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

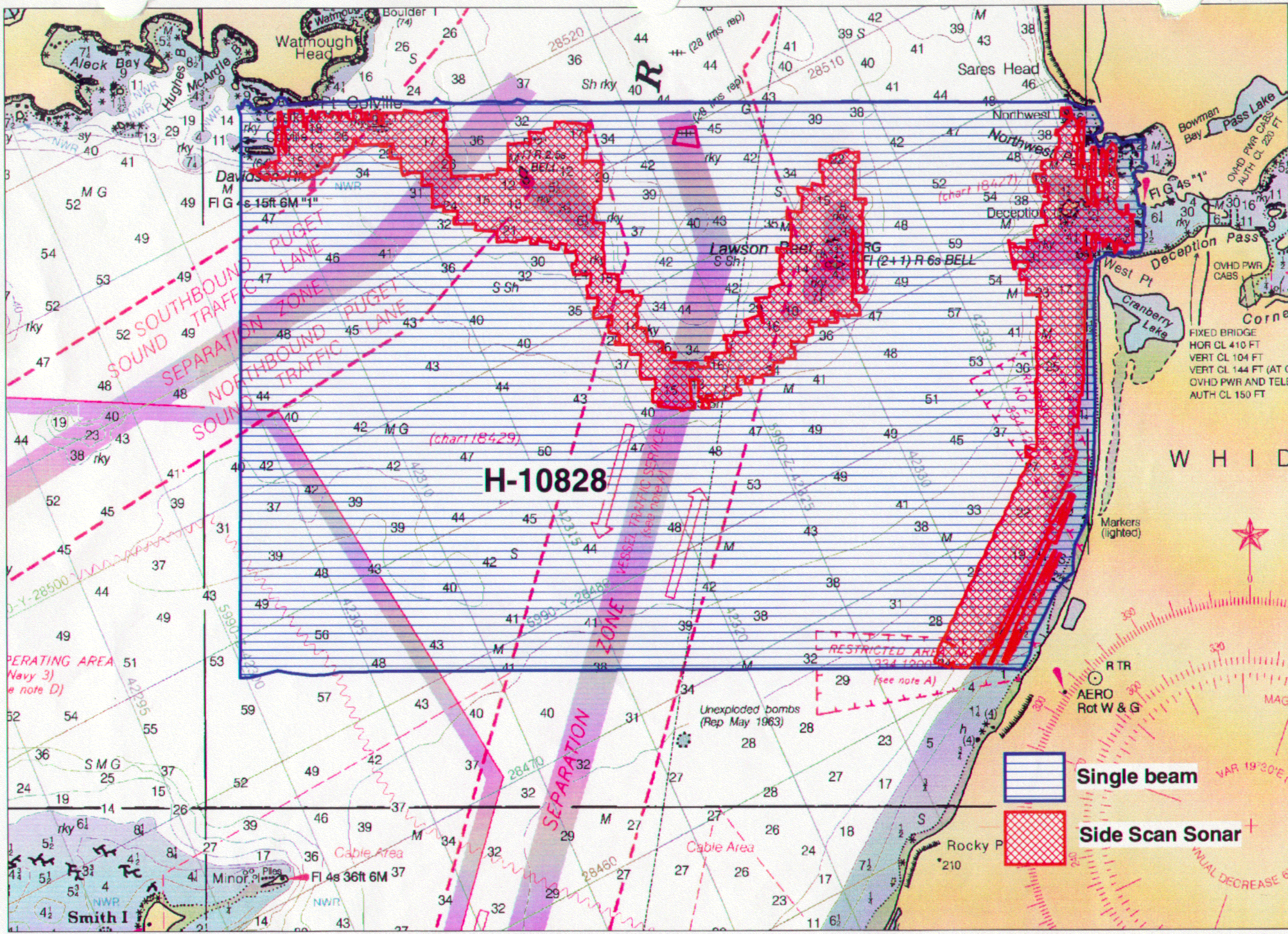
numbering may be interrupted or non-sequential.

All depths listed in this report are referenced to

mean lower low water unless otherwise noted.

* Change No. 1 dated 05/04/1999

AWOIS ✓ & SURF ✓ 2-5-01 by IMBH



Descriptive Report to Accompany Hydrographic Survey H-10828

Field Number PHP-10-2-98

Scale 1:10,000

1998

Pacific Hydrographic Party

Chief: LT James Crocker

A. PROJECT ✓

This navigable area survey was conducted in accordance with Hydrographic Project Instructions OPR-N368-PHP, Northern Puget Sound, Washington, dated May 7, 1997, and Change No. 1, dated May 4, 1999.

This project was authorized in response to requests from the Puget Sound Pilots, the Thirteenth Coast Guard District, and the National Ocean Service (NOS) Office of Ocean and Coastal Resource Management. The primary objective is to have the charted wire drag clearance depths superseded by modern, full-bottom-coverage hydrography. The charted wire drag clearance depths, which originate from surveys conducted in 1935, 1943, 1962 and 1972, are often considered controlling depths.

The project area includes parts of the Strait of Juan de Fuca, Rosario Strait, Haro Strait, Bellingham Channel, Middle Channel and San Juan Channel. Traffic throughout the project area is heavy and includes both foreign and domestic cargo ships, pleasure craft, automobile ferries as well as tugs and barges. Oil refineries north of Lummi Island and in Anacortes are used for receipt of crude oil, shipment of petroleum products, bunkering vessels, and receipt of alumina and liquefied petroleum gas. According to the Puget Sound Pilots, routes for approaches and departures of tankers with drafts up to 56 feet occur throughout the area.

The entire project is environmentally sensitive and lies within the limits of the proposed Northwest Straits National Marine Sanctuary.

This is the fifth survey of the project. The sheet letter is "I" as specified by Project Instructions; registry number is H-10828; designation: Deception Island to Colville Island, South Rosario Strait, Washington.

B. AREA SURVEYED SEE EVAL REPORT SECTION B

Hydrographic limits extend from latitude 48°20'48.6"N to latitude 48°25'30.4"N and from longitude 122°39'14.6"W to longitude 122°49'41.5"W. Hydrographic limits are depicted on the chartlet which follows; inshore sounding limit is the 3-fathom depth curve.

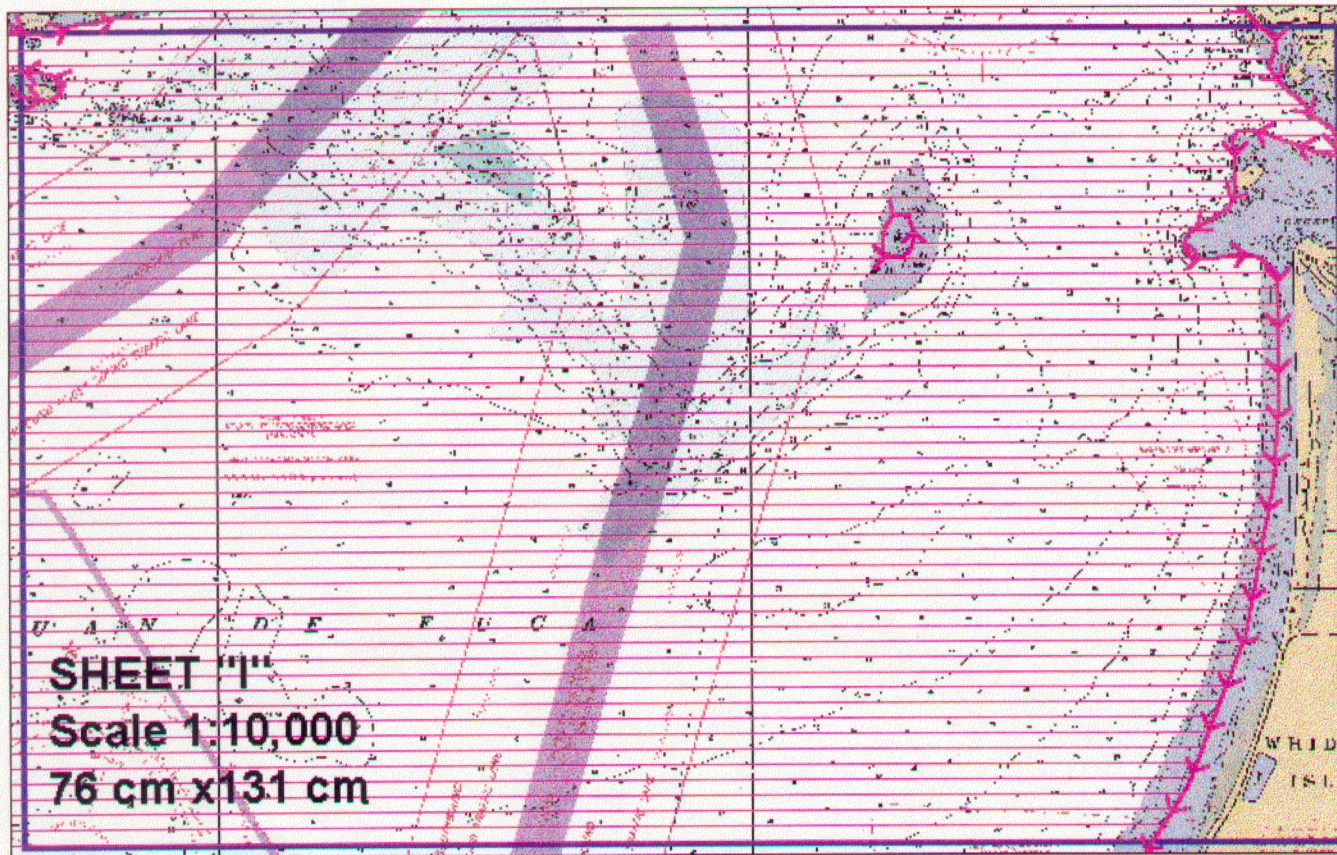


Chart 18429

Data acquisition was conducted from July 7, 1998, (DN 188) through June 21, 1999 (DN 172).

C. SURVEY VESSELS ✓

The following NOAA survey vessels were used throughout the project:

Vessel	EDP #	LOA	Beam	Draft	Tonnage	Power
1101 Jensen	0651	29 feet	10 feet	0.4m	5 tons	Jet Drive
1102 Sea Ark	0652	19 feet	8 feet	0.4m	2 tons	150hp outboard

Both launches were used for mainscheme and development hydrography, detached positions, bottom samples, and velocity casts. In addition, NOAA Launch 1101 was used for side scan sonar operations, and dive investigations. No changes to the standard vessel sounding configuration were necessary for either launch.

D. AUTOMATED DATA ACQUISITION AND PROCESSING ✓

HYPACK Software produced by Coastal Oceanographics was used for all data acquisition. HPTOOLS, a program developed by Hydrographic Surveys Division, Systems Support Branch, N/CS32, was used to convert HYPACK data to HPS format. HPS Software, also developed by HSD/SSB, was used for hydrographic data processing. MapInfo Professional and Vertical Mapper were used in conjunction with HPS for survey planning and layout, data display, and as tools to evaluate data quality.

CAT version 3.0 was used to download data from Seacat conductivity, temperature and depth recorders. The DOS version of the VELOCITY program was used through January 23, 1999, (DN 026) to compute sound velocity correctors. The Windows version called VELOCWIN was used to process all cast data subsequent to DN 026.

A list of software used to complete the survey is included in Appendix H along with respective versions and issue dates *

E. SIDE SCAN SONAR ✓

Side scan sonar (SSS) operations were conducted using an EG&G model 260 slant-range correcting SSS recorder and an EG&G 272-T dual channel, single frequency towfish. The following sonar equipment was used throughout the survey:

Type	Serial Number
272-T Towfish	015598
260 Recorder	015602

The towfish was operated on the 100 kHz frequency and was configured with a 20° beam depression. It was deployed from the aft starboard quarter using a Kevlar cable passed through a block and powered by a Superwinch Model W115. Block and winch were mounted to a swing-arm davit. The Kevlar cable was connected to the EG&G recorder cabling with a slip-ring assembly cable. A Dynapar Max Count 2 cable counter was used to measure cable lengths which were logged real time in HYPACK. Tape markings at measured intervals indicated length of cable deployed from the block up to 55 meters, the maximum deployable. Markings are at one-meter intervals up to 10 meters and at five-meter intervals thereafter. At the beginning of each survey day the cable counter was

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calibrated using these tape markings. Through the course of the survey day the cable counter readout was checked with tape markings and recalibrated if necessary.

SSS operations were conducted at a speed of 5 knots or slower when using range scales of 75 or 100 meters. At higher range scales the speed was maintained at 4 knots or slower. Range scales of 75, 100, 150, 200 and 300 meters were used. The SSS towfish was maintained at a height off the bottom equivalent to 8 to 20 percent of the range scale except where quickly changing depths prohibited compensatory adjustments in cable length. In such cases, the hydrographer believes the sonagram trace is adequate for identification of any significant contacts. Two hundred percent side scan coverage was acquired from the 3-fathom/5.5-meter-curve to the 24-fathom/43.9-meter-curve in accordance with Section 7.2 of project instructions.

Two hundred percent coverage was achieved using lines set in orthogonal patterns, with a line spacing of 150 meters. Primarily 100% SSS lines were oriented East-West, 200% oriented North-South. Exceptions to this scheme were along Whidbey Island in the SE corner of the sheet where the 100% SSS lines were run perpendicular to the shoreline and 200% lines parallel to the shoreline. Another exception is a small area on Lawson Reef where the 100% SSS lines were oriented North-South to better negotiate kelp beds. The coverage was plotted on two separate swath plots and reviewed to assure acquisition of adequate overlap and full coverage.

The SSS recorder gain was adjusted for the best return for the prevalent bottom material. Contacts or identifiable features (e.g., buoy anchors, change in bottom texture) visible on the outer edge of the sonagram assure acceptable SSS recorder tuning and served as confidence checks during operations.

Following guidelines in Section 7.2.2 of project instructions, sonagrams were manually scanned for significant contacts. A total of 627 contacts were labeled and entered into one HPS contact table. Where contacts appeared in a cluster on the sonagram, only the most significant was entered. Apparent significance was determined with the PHP-developed Contact-O-Meter, a scale proportioned for shadow length and fish height. Contact heights and raw depths were derived using the HPS Side Scan Utility Program and all recorded contacts were plotted.

The hydrographer employed various techniques for selecting contacts for development using a combination of criteria based on height, offset, slope, and local depth. Of the 627 pulled contacts, 576 were developed with five meter line spacing. Fifty-one of the contacts were determined to be insignificant based on (1) water depth at contact, (2) height exaggeration caused by proximity to the towfish and/or (3) steepness of the slope; these were not developed.

The HPS contact table, and a listing of contacts not developed are included in Appendix J Supplemental Correspondence.

F. SOUNDING EQUIPMENT ✓

Vessel No. 0652

Innerspace Model 448 (INN448) single-frequency echosounder, Serial Number 239, was used on this launch throughout the survey.

Vessel No. 0651

Raytheon, dual-frequency Digital Sounding Fathometer 6000N (DSF 6000), Serial Number A121N, was employed on all days of hydrography between DN 223 and DN 025. The Knudsen 320M, Serial Number K98577, was used on DN 188, and DN 049 through DN 172. On both of these fathometers the high-frequency beam was selected for plotting throughout the survey. The low-frequency depth was scanned and edited only when the high-frequency did not track the bottom or when a more significant depth was acquired with the low-frequency beam.

Metric leadlines were used for depth comparisons with the echosounder. PHP fabricated the leadlines following Hydrographic Survey Guideline (HSG)69. Leadline calibration forms are included in Appendix E. *

A MOD III diver least depth gauge, S/N 68335, was used to obtain least depths on dive investigations. The unit was operated in accordance with Section 7.2.2.1 of the Field Procedures Manual (FPM). PTC Electronics calibrated the gauge on March 12, 1998, and March 10 1999; the calibration report is included in Appendix E. *

G. CORRECTIONS TO SOUNDINGS ✓

Tides and Water Levels

In compliance with Section 5.8 of Project Instructions, tide stations were established at the historical sites shown below:

Station Number	Station Name	Latitude	Longitude
944-9982	Richardson Point, Lopez Island	48°26'48"N	122°54'00"W
944-9932	Armitage Island	48°32'06"N	122°47'48"W

Real-time, portable acoustic gauges with satellite capability were installed to provide

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information on zoning, tidal datums and harmonic constants for predictions on sheet "I". Primary tide stations at Port Townsend, WA (944-4900), Cherry Point, WA (944-9424), and Friday Harbor, WA (944-9880), serve as controls for datum determination at the above sites.

Project Instructions define nine tide zones within the limits of Sheet I. Time/height correctors are listed below; zone parameters are included in the Field Tide Note located in Appendix D. *

HPS Zone	Tide Zone	Reference Station	Time Corrector	Range Ratio
3.0	NPS80	Port Townsend	-6.0 min	x0.88
3.0*	NPS80	Cherry Point	-78 min	x 0.82
4.0	NPS79	Port Townsend	-6.0 min	x0.90
5.0	NPS86	Port Townsend	-12.0 min	x0.83
9.0	NPS84	Port Townsend	6.0 min	x0.82
10.0	NPS85	Port Townsend	-12.0 min	x0.83
11.0	NPS87	Port Townsend	-12.0 min	x0.86

Preliminary, six-minute, real tides recorded by the two reference stations were downloaded from the NOAA, NOS, CO-OPS web site (<http://www.opsd.nos.noaa.gov/cgi-bin/prelimqry.pl>). Using DPAS Utilities, the tides were imported into the respective HPS table established for each reference station. Zone Utilities computed the appropriate zone for each sounding; time and height adjustments were computed; and corrected tides were applied to sounding data.

*On DN 90 a data gap was reported by NOAA, NOS, CO-OPS in the Port Townsend tide gauge data (Appendix J; supplemental correspondence). All data collected on DN 090 falls within HPS zone 3. On DN 90, Cherry Point correctors were entered in HPS zone 3, and Cherry Point tides were downloaded and applied to the data.

APPROVED TIDE NOTE DATED FEBRUARY 8, 2000 IS ATTACHED
 Velocity of Sound ✓ TO THIS REPORT

Corrections for the speed of sound through the water column were computed from data obtained with a Seacat conductivity, temperature and depth recorder. SEA-BIRD Electronics Model SBE 19-03, 335m, S/N 1912344-1892, was used for casts 1-7 and 14-17; and Model SBE-19, S/N 2044, was used for casts 8-13. The recorder was initialized using program CAT v. 2.0. The DOS version of the VELOCITY program was used to determine the speed of sound correctors for Casts 1-8. VELOCWIN was used to process casts 9-17.

HPS Table	DN	DN range	Extrapolated Depth	Cast Latitude	Cast Longitude
1 *	188	188	113.7 m	48°23'49"N	122°41'19"W
2 *	223	223-225	141.5 m	48°24'01"N	122°11'31"W
3 *	237	237-252	116.9 m	48°24'02"N	122°41'59"W
4 *	253	253-267	136.4 m	48°24'02"N	122°41'59"W
5 *	268	268-272	137.4 m	48°23'52"N	122°41'40"W

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HPS * Table	DN	DN range	Extrapolated Depth	Cast Latitude	Cast Longitude
6	292	292-313	121 m	48°23'51"N	122°41'40"W
7	026	025	70.6 m	48°32'15"N	122°40'36"W
8	057	049	90.8	48°24'02"N	122°41'59"W
9	069	069-075	119	48°24'02"N	122°41'59"W
10	082	082-090	109.3	48°24'02"N	122°42'00"W
11	095	095-111	144.8	48°24'05"N	122°41'16"W
12	112	112-118	144.6	48°24'05"N	122°41'58"W
13	131	130-131	146.7	48°23'54"N	122°41'40"W
14	134	134-141	146	48°23'51"N	122°41'40"W
15	147	147	26.1	48°25'00"N	122°48'00"W
16	158	158-162	46.8	48°25'01"N	122°48'50"W
17	172	172	96.5	48°25'02"N	122°45'11"W

* Appendix I holds copies of all velocity cast data and HPS Velocity Corrector Tables.

SEACAT instrument S/N 1892 was calibrated on February 10, 1998, and March 8 1999; and S/N 2044 was calibrated on November 11, 1995. Copies of the calibration reports, produced by SEA-BIRD Electronics, are included in Appendix E.

Leadline Comparisons

Periodic leadline comparisons, annotated on the echogram, confirm proper digitization of the echosounder depths. Leadline comparison forms are located in Appendix E. *

Static Draft

Static draft for VN 0652 was determined on June 3, 1997, (DN 154). First, the depth of the transducer face from a reference mark on the hull was measured. Next, with the launch in the water, fuel tanks half full and two persons aboard, the depth from this reference mark to the waterline was measured. Combining the two measurements, a static draft of 0.4 meters was calculated.

A static draft of 0.4 meters was determined for vessel 0651 on June 27, 1997, (DN 178) using a method similar to above.

Dynamic Draft

Settlement and squat measurements were conducted for VN 0651 on February 9, 1998, (DN 040) and for VN 0652 on June 3, 1997 (DN 154). All measurements were performed in Guemes Channel, WA. Field records are included in Appendix E. *

Transducer and antenna offsets, static draft, and settlement and squat correctors are entered

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into offset tables: Table 1 for VN 0651 and Table 2 for VN 0652. Correctors are applied during processing in HPS using the Reapply Vertical Correctors Utility. *

Corrections to Echosoundings

Occasional problems with misdigitization or bottom tracking were encountered during this survey. Where the echogram trace was adequate and unambiguous, the digital record was corrected to reflect the analog trace. Where the echogram trace was discontinuous, the selected soundings were deselected or rejected. Gaps in the sounding interval greater than 6mm at the scale of the survey were resurveyed.

H. HYDROGRAPHIC POSITION CONTROL SEE EVAL REPORT SECTION I

Horizontal Datum

The horizontal control datum for this project is North American Datum of 1983 (NAD83).

Position Control

Differential GPS (DGPS) provided hydrographic position control throughout this survey. The U. S. Coast Guard beacon at Whidbey Island (302kHz) and the Canadian Coast Guard beacon in Richmond, BC (320kHz) were used.

The Horizontal Control Report for this project was submitted to the Pacific Hydrographic Branch (PHB) in June 1997, and addenda in July 1997 and June 1999.

DGPS Performance Checks

DGPS performance check stations were established to Third Order, Class 1, standards at pilings in Cornet Bay Marina and Skyline Marina. All DGPS performance checks were successful and are included in Appendix F. *

Positioning Equipment

The following GPS equipment was used:

Equipment Location	Type Receiver/Antenna	Receiver Serial No.	Antenna Serial No.
VN 0651	Ashtech (v.1E08d) CSI Beacon Rcvr MBXI	700417B1042 X-1112	700378A272
VN 0652	Starlink Receiver	865	4207

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I. SHORELINE ✓ SEE EVAL REPORT SECTION J.

Digital shoreline derived from photogrammetric source data was not available for this project. Section 4.1.1 of the Project Instructions directed that shoreline for project field sheets be derived, for orientation purposes only, from NOS Charts 18421, 18424, 18427, 18429, 18430, 18433 and 18434. To facilitate verification in the field for this survey, PHP created a digital shoreline document based on BSB electronic charts produced by Maptech. Chart 18429 was used to evaluate all shoreline for it is the largest scale chart that covers the entire survey area. Chart 18429 was imported into Mapinfo; a trace of the shoreline was created on the cosmetic layer, exported as a DXF file and loaded into HYPACK. As the launch moved along the shore, its position was displayed over the digital shoreline. Correctly charted features were easily verified and uncharted features or items requiring disapproval were also apparent. Field notes can be found on the echogram and in the HPS features file. *

During final evaluation, shoreline from the prior surveys H-6617 and H-6607 were digitized into Mapinfo for comparison. In general, agreement is good between these priors and PHP shoreline verification. CONCUR

Prior H-6577 was not available in digital format. In general, the shoreline appears to be in good agreement with PHP shoreline observations.

Few discrepancies were observed in charted shoreline. (Detached positions were recorded on all charted features) In areas where there were discrepancies, hydrographic data and detached positions were obtained to define the limits of shoreline and features. Discrepancies are noted on the final field sheet. Because the PHP plotter prints the color brown in a shade very close to red, the color green was selected to depict correctly charted shoreline and features; recommended changes are red, and new features in black.

△ NOT ALL

J. CROSSLINES ✓

Twenty-three miles of crosslines were acquired and 69 miles of SSS hydrography was run perpendicular to mainscheme hydrography. In total 93 miles of hydrography was run perpendicular to mainscheme hydrography and represent crossline hydrography equivalent to 13% of mainscheme. Agreement is excellent

K. JUNCTIONS ✓ SEE EVAL REPORT SECTION L.

H-10828 does not join any other contemporary survey.

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L. COMPARISON WITH PRIOR SURVEYS *SEE EVAL REPORT SECTION M.*

The following priors contained data that were covered by this survey. Priors with an asterisk were available in digital format and imported into Mapinfo to facilitate comparison with soundings and shoreline from the current survey:

H-5929WD ✓	1935	1:20,000
H-5659 ✓	1935	1:20,000
H-6577 ✓	1940	1:10,000
H-6607* ✓	1940	1:10,000
H-6617* ✓	1941	1:10,000
H-6747* ✓	1941	1:10,000
H-9283WD* ✓	1972	1:20,000

Prior H-5929WD

No hangs occurred within the limits of this survey. Soundings from H-10828 are consistently deeper than the wire drag clearances of this prior survey. *CONCUR*

The 10-fathom sounding at latitude 48°23'40.9"N, longitude 122°43'23.3"W, is discussed in Item Investigation Report # 8. *SEE ITEM INVESTIGATION # 8*

Prior H-5659

This prior was partially illegible. The area is covered with 200% side scan sonar, all significant contacts were investigated, and the entire area was further developed with 20-meter line spacing. *CONCUR*

Prior H-6577

Two soundings from this prior are shoaler than surveyed soundings and are discussed in detail in Item Investigation Reports:

Item Investigation Report Number	Description	Latitude	Longitude
11 <i>4.0</i>	3 fathom 4 feet sounding	48°24'27.641"N	122°45'54.783"W
17 <i>3.4</i>	4 fathom 5 foot sounding	48°24'29.1 N"	122°45'59.4" W

Five areas surveyed in H-10828 have significantly shoaler soundings than appeared on this prior. They appear to be large underwater rock pinnacles and are discussed in detail in Item Investigation Reports: *SEE ITEM INVESTIGATIONS*

Item Investigation Report Number	Description	Latitude	Longitude
2 5.3	Uncharted rock pinnacle	48°25'03.693"N	122°48'36.645"W
3 7.2	Uncharted rock pinnacle	48°24'48.905"N	122°48'55.520"W
4 9.6	Uncharted rock pinnacle	48°24'58.321"N	122°48'44.207"W
7	Uncharted rock pinnacle	48°24'46.006"N	122°49'11.515"W
10 4.0	Charted shoal	48°25'08.919"N	122°49'22.077"W

Prior H-6607

The Northeast tip of Lawson Reef has shoaled, extending the 30-fathom contour further North, from latitude 48°24'55.1" N, longitude 122°42'39.8" W, on the prior to latitude 48°25'10.2"N, longitude 122°42'41.8"W, on the current survey. *CONCUR*

Changes in the 50-fathom contour within a 300 meter radius of latitude 48°25'08.7" N, longitude 122°40'44.8"W.

Two soundings from this prior are shoaler than surveyed soundings and are discussed in detail in Item Investigation Reports:

Item Investigation Report Number	Description	Latitude	Longitude
12 5.9	4 fathom sounding	48°24'11.232"N	122°42'36.769"W
14	1 fathom ? feet sounding	48°24'08.780"N	122°42'52.094"W

Two areas surveyed in H-10828 have significantly shoaler soundings than appeared on this prior. They appear to be large underwater rock pinnacles are discussed in detail in Item Investigation Reports: *SEE ITEM INVESTIGATION*

Item Investigation Report Number	Description	Latitude	Longitude
5 7.6	Uncharted rock pinnacle	48°24'59.129"N	122°40'14.918"W
6 16.8	Uncharted rock pinnacle	48°24'47.164"N	122°40'17.053"W

Prior H-6617

Shoaler soundings were obtained on Lawson reef throughout the current survey. The shoalest sounding on Lawson reef obtained in the area covered by H-6617 is 4.5 fathoms (*pos no. 34066, 34067; DN096*) at latitude 48°24'01.7" N, longitude 122°42'58.2" W, which compares to depths of 8 and 9.25 fathoms on the prior. Lawson reef was surveyed with 200% SSS; numerous contacts were seen on the sonagram. All significant contacts were developed with 5-meter line spacing. Further, the reef within the 20-meter contours was developed with 20 meter line spacing. *CONCUR*

Soundings on rest of the prior are in good agreement with the current survey. *CONCUR*

Prior H-6747

A comparison with the prior area that covers Lawson Reef shows that there has been scouring approximately between the 20 and 40-fathom contours. In areas that are less than 20-fathoms a combination of shoaling and scouring is evident. Lawson reef was surveyed with 200 % SSS, numerous contacts were seen on the sonargram. All contacts determined significant were developed with 5-meter line spacing. *CONCUR*

Soundings on rest of the prior are in good agreement with the current survey. *CONCUR*

Prior H-9283WD

This prior survey depicts a wire drag hang at latitude 48°25'09.3"N, longitude 122°47'59.5"W. The hang occurred at depth 67 feet/11.2 fathoms/20.6 meters and cleared at 57 feet/9.6 fathoms/17.6 meters. Two-hundred percent SSS was collected over this area, and no significant contacts appeared. The shoalest depth acquired within a 100 meter radius of the hang, 69 feet/11.6 fathoms/21.2 meters, is at latitude 48°25'09.4" N, longitude 122°47'58.2" W (*Pos. No. 26,565, DN 293*). On chart 18429 the depth at this location is 12 fathoms. *CONCUR*

No other hangs occur within the limits of this survey. All other soundings from H-10828 are consistently deeper than the wire drag clearances of this prior survey. *CONCUR*

M. ITEM INVESTIGATION REPORTS

ITEM INVESTIGATION REPORT

AREA OF INVESTIGATION

AWOIS/Reference No.: AWOIS 50436/Item 1
State and Locality: Washington/South Rosario Strait
Reported Position: latitude 48°25'02.36"N
longitude 122°44'33.43"W
Datum: NAD83
Reported Depth: 28 fms; Charts 18421, 18423, and 18429
Largest Scale Chart: 18429; 1:25,000, 7th edition, issued Mar. 16, 1996
Type of Feature: Wreck

DESCRIPTION and SOURCE: South section of a 250 foot tanker "Bunker Hill", which exploded in two and sank 3/6/64; Source, AWOIS listing.

SURVEY REQUIREMENTS: Full Development

METHOD OF INVESTIGATION: Echosounder with 10-meter orthogonal line spacing (DN 140); 200% Side scan coverage (DN158); Echosounder development of contacts (DN 162).

RESULTS OF INVESTIGATION: Based on the soundings acquired, the wreck is lying approximately at 30°/210° true and has a length of 120 meters. The North end of the wreck is located at latitude 48°25'03.660"N, longitude 122°44'32.084"W (Fix No. 53733, DN 140), approximately 55 meters SE of the charted position. The South end of the wreck is located at latitude 48°25'00.174"N, longitude 122°44'34.819"W (Fix No. 53862, DN 140). The center of the wreck is located at latitude 48°25'01.927"N, longitude 122°44'33.588"W (Fix No. 54988, DN 162).. A least depth of ~~36.9~~³⁷ fathoms/67.6 meters/222 feet was acquired at latitude 48°25'03.482"N, longitude 122°44'32.119"W, near North end of the wreck (Fix No. 53732, DN 140). The entire wreck is surrounded by depths of 45 fathoms.

COMPARISON WITH PRIOR SURVEYS: Depths from Prior H-6607 are 45 fathoms in the vicinity of the wreck.

COMPARISON WITH CHART AND CHARTING RECOMMENDATIONS: Charts 18421, 18423, and 18429 have the wreck charted and labeled "28 fathoms reported". On Chart 18429 the wreck is centered at latitude 48°25'04.996"N, longitude 122°44'33.641"W, 55 meters NW of the Northern end of the surveyed. Delete the charted wreck, and chart the wreck centered at latitude 48°25'01.927"N, longitude 122°44'33.588"W based on soundings acquired from this survey. CONCUR

Chart 37 wk at the above position.

ITEM INVESTIGATION REPORT

AREA OF INVESTIGATION

AWOIS/Reference No.: Item 2
State and Locality: Washington/South Rosario Strait
Reported Position: latitude 48°25'02.929"N
longitude 122°48'36.281"W
Datum: NAD83
Reported Depth: NA
Largest Scale Chart: 18429; 1:25,000, 7th edition, issued Mar. 16, 1996
Type of Feature: SSS contact; Uncharted rock pinnacle

DESCRIPTION and SOURCE: Uncharted rock pinnacle observed on the side scan sonagram: Contacts 27997.7s, and 27927.5s (DN 295)

SURVEY REQUIREMENTS: Full Development

METHOD OF INVESTIGATION: Echosounder Development – 5-meter line spacing (Fixes 41389-41757, DN 137), Dive (Fix No. 42544, DN 158)

RESULTS OF INVESTIGATION: PHP divers found a large rock pinnacle with a least depth of 5.3 fathoms/9.7 meters/31.8 feet at latitude 48°25'03.693"N, longitude 122°48'36.645"W (Fix No. 42544, DN 158). See dive report located in Appendix J. A Danger to Navigation report was issued; see Appendix A.

COMPARISON WITH PRIOR SURVEYS: Prior H-6577 depicts sounding of 18 fathoms to the west of this rock pinnacle.

COMPARISON WITH CHART AND CHARTING RECOMMENDATIONS: Chart 18429 shows 18 fathoms charted at latitude 48°25'06.961"N, longitude 122°48'42.033"W which agrees with depths obtained in this survey; 23 fathoms is charted at latitude 48°25'00.876"N, longitude 122°48'39.675"W which agrees with depths obtained in this survey. The rock pinnacle is not charted. Chart the 5 fathom 2 foot sounding from this survey at latitude 48°25'03.693"N, longitude 122°48'36.645"W. CONCUR

ITEM INVESTIGATION REPORT

AREA OF INVESTIGATION

AWOIS/Reference No.: Item 3
State and Locality: Washington/South Rosario Strait
Reported Position: latitude 48°24'46.394"N
longitude 122°49'10.201"W
Datum: NAD83
Reported Depth: NA
Largest Scale Chart: 18429; 1:25,000, 7th edition, issued Mar. 16, 1996
Type of Feature: SSS contact; Shoal, uncharted rock pinnacle

DESCRIPTION and SOURCE: Shoal and an uncharted rock pinnacle observed on the side scan sonagram, Contact 28080.0s (DN 295).

SURVEY REQUIREMENTS: Full Development

METHOD OF INVESTIGATION: Echosounder Development – 5-meter line spacing
(Fixes 42295-42521, DN 137), Dive (Fix No. 42545, DN 158)

RESULTS OF INVESTIGATION: Development hydrography indicates a shoal around latitude 48°24'50.186"N, longitude 122°48'58.008"W (Fix No. 42481, DN 137). PHP divers identified a large rock pinnacle with a least depth of 7.2 fathoms/13.1 meters/43.0 feet at latitude 48°24'48.905"N, longitude 122°48'55.520"W (Fix No. 42545, DN 158). See dive report located in Appendix J/A Danger to Navigation report was issued; see Appendix A.

COMPARISON WITH PRIOR SURVEYS: On Prior survey H06577, the least depth obtained in this survey plots between a 15 fathom and a 20 fathom sounding.

COMPARISON WITH CHART AND CHARTING RECOMMENDATIONS: Chart 18429 shows 15 fathoms charted at latitude 48°24'49.141"N, longitude 122°48'59.420"W which doesn't agree with depths obtained in this survey. The shoal and rock pinnacle are not charted. Delete the charted 15 fathoms at latitude 48°24'49.141"N, longitude 122°48'59.420"W, and chart the diver least depth of 7 fathoms at latitude 48°24'48.905"N, longitude 122°48'55.520"W. CONCUR

* FILED WITH THE SURVEY RECORDS.

ITEM INVESTIGATION REPORT

AREA OF INVESTIGATION

AWOIS/Reference No.: Item 4
State and Locality: Washington/South Rosario Strait
Reported Position: latitude 48°24'57.971"N
longitude 122°48'42.685"W
Datum: NAD83
Reported Depth: NA
Largest Scale Chart: 18429; 1:25,000, 7th edition, issued Mar. 16, 1996
Type of Feature: SSS contact; Uncharted rock pinnacle

DESCRIPTION and SOURCE: An uncharted rock pinnacle observed on the side scan sonagram; Contacts 28000.5p, 28041.5p (DN 295)

SURVEY REQUIREMENTS: Full Development

METHOD OF INVESTIGATION: Echosounder Development – 5-meter line spacing (Fixes 41758-41930, DN 137) Dive (Fix 42543, D158).

RESULTS OF INVESTIGATION: The least depth on the rock pinnacle, ~~9.1~~ 7.6 fathoms/16.8 meters/55 feet, was obtained with echosounder development at latitude 48°24'58.321"N, longitude 122°48'44.207"W (Fix No. 41896.1, DN 137). A Danger to Navigation report was issued; see Appendix A.

COMPARISON WITH PRIOR SURVEYS: Prior survey H-6577 depicts a sounding of 13 fathoms in the vicinity of the rock.

COMPARISON WITH CHART AND CHARTING RECOMMENDATIONS: Chart 18429 has 13 fathoms charted at latitude 48°24'57.257"N, longitude 122°48'44.729"W. The rock pinnacle is not charted. Delete the charted 13 fathom sounding, and chart the 9 fm ~~ft~~ sounding at latitude 48°24'58.321"N, longitude 122°48'44.207"W. CONCUR-

9 fm 3 FT

ITEM INVESTIGATION REPORT

AREA OF INVESTIGATION

AWOIS/Reference No.: Item 5
State and Locality: Washington/South Rosario Strait
Reported Position: latitude 48°24'59.811"N
longitude 122°40'14.487"W
Datum: NAD83
Reported Depth: NA
Largest Scale Charts: 18429; 1:25,000, 7th edition, issued Mar. 16, 1996
18427; 1:25,000, 25th edition, issued July 12, 1997
Type of Feature: SSS contact; Uncharted rock pinnacle

DESCRIPTION and SOURCE: An uncharted rock pinnacle observed on the side scan sonargram: Contacts 31662.5s, and 31629.0s (*DN 084*); 31252.4s, 31241.8p, and 31235.3s (*DN 82*).

SURVEY REQUIREMENTS: Full Development

METHOD OF INVESTIGATION: Echosounder Development – 5-meter line spacing (*Fixes 35812-35829, DN 103*), Dive (*Fix No. 42585, DN 160*)

RESULTS OF INVESTIGATION: PHP divers identified a large rock pinnacle with a least depth of 7.6 fathoms/13.9 meters/ 45.6 feet at latitude 48°24'59.129"N, longitude 122°40'14.918"W (*Fix No. 42585, DN 160*). See dive report located in Appendix J. A Danger to Navigation report was issued; see Appendix A.

COMPARISON WITH PRIOR SURVEYS: Prior survey H-6607 depicts sounding of 14 fathoms at latitude 48°24'59.832"N, longitude 122°40'15.265"W.

COMPARISON WITH CHART AND CHARTING RECOMMENDATIONS: Charts 18429 and 18427 have 14 fathoms charted at latitude 48°25'00.502"N, longitude 122°40'15.141"W. The rock pinnacle is not charted. Delete the charted 14 fathoms and chart the 7 fm 3 ft sounding at latitude 48°24'59.129"N, longitude 122°40'14.918"W.

CONCUR

ITEM INVESTIGATION REPORT

AREA OF INVESTIGATION

AWOIS/Reference No.: Item 6
State and Locality: Washington/South Rosario Strait
Reported Position: latitude 48°24'46.915"N
longitude 122°40'17.380"W
Datum: NAD83
Reported Depth: NA
Largest Scale Charts: 18429; 1:25,000, 7th edition, issued Mar. 16, 1996
18427; 1:25,000, 25th edition, issued July 12, 1997
Type of Feature: SSS contact; Uncharted rock pinnacle

DESCRIPTION and SOURCE: An uncharted rock pinnacle observed on the side scan sonagram: Contacts 31034.5p, 31051.0p (DN 075); 31655.0s (DN 084); and 32070.0p (DN 089).

SURVEY REQUIREMENTS: Full Development

METHOD OF INVESTIGATION: Echosounder Development – 5-meter line spacing
(Fixes 38866-38908, DN 116)

RESULTS OF INVESTIGATION: A least depth of 17 fathoms/30.7 meters/100 feet was located at latitude 48°24'47.164"N, longitude 122°40'17.053"W (Fix No. 38891.1, DN 116). A Danger to Navigation report was issued; see Appendix A.

COMPARISON WITH PRIOR SURVEYS: Prior H-6607 depicts a sounding of 25 fathoms at latitude 48°24'44.753"N, longitude 122°40'14.141"W.

COMPARISON WITH CHART AND CHARTING RECOMMENDATIONS: On charts 18427 and 18429, 24 fathoms is charted at latitude 48°24'44.753"N, longitude 122°40'14.141"W, 90 meters SE of the least depth obtained on this item. The 24 fathom sounding agrees with survey depths obtained in that area. The rock pinnacle is not charted. Chart 17 fathoms at latitude 48°24'47.164"N, longitude 122°40'17.053"W.

(16.8)

CONCUR

ITEM INVESTIGATION REPORT

AREA OF INVESTIGATION

AWOIS/Reference No.: Item 7
State and Locality: Washington/South Rosario Strait
Reported Position: latitude 48°24'46.394"N
longitude 122°49'10.201"W
Datum: NAD83
Reported Depth: NA
Largest Scale Chart: 18429; 1:25,000, 7th edition, issued Mar. 16, 1996
Type of Feature: SSS contact; Uncharted rock pinnacle

DESCRIPTION and SOURCE: An uncharted rock pinnacle observed on the side scan sonargram: Contact 28080.0s (DN 295).

SURVEY REQUIREMENTS: Full Development

METHOD OF INVESTIGATION: Echosounder Development – 5-meter line spacing (Fixes 53067-53109, DN 139).

RESULTS OF INVESTIGATION: Least depth of 8.9 fathoms/16.3 meters/53 feet was acquired at latitude 48°24'46.006^{7.380}"N, longitude 122°49'11.515^{12.656}"W (Fix No. 53095.1, DN 303). A Danger to Navigation report was issued; see Appendix A. 53164/1

COMPARISON WITH PRIOR SURVEYS: Prior survey H-6577 located a depth of 18 fathoms, at latitude 48°24'45.511"N, longitude 122°49'07.465"W, 70 meters East of the surveyed least depth.

COMPARISON WITH CHART AND CHARTING RECOMMENDATIONS: On Chart 18429 18 fathoms is charted at latitude 48°24'45.511"N, longitude 122°49'07.465"W, 70 meters East of the item, which agrees with survey depths. The rock pinnacle is not charted. Chart 8 fm 5 ft at latitude 48°24'46.006"N, longitude 122°49'11.515"W.

DO NOT CONCUR

A 8 FM WAS ADDED TO Smooth sheet.
POS # 53104+1

lat. 48/24/47.38N
N long. 122/49/12.65W

ITEM INVESTIGATION REPORT

AREA OF INVESTIGATION

AWOIS/Reference No.: Item 8
State and Locality: Washington/South Rosario Strait
Reported Position: latitude 48°23'40.964"N
longitude 122°43'23.332"W
Datum: NAD83
Reported Depth: 10 fms; Charts 18421, 18423, 18427, and 18429
Largest Scale Charts: 18429; 1:25,000, 7th edition, issued Mar. 16, 1996
18427; 1:25,000, 25th edition, issued July 12, 1997
Type of Feature: Charted shoal

DESCRIPTION and SOURCE: Charted rocky shoal, observed on side scan sonargram:
Contact 25643.5p (DN 292), 27067.7s (DN294). Source H-5929WD.

SURVEY REQUIREMENTS: Full Development

METHOD OF INVESTIGATION: Echosounder Development – 5-meter line spacing
(Fixes 36420-36805, DN 106/109).

RESULTS OF INVESTIGATION: A least depth of 8.8 fathoms/16.1 meters/53 feet was
obtained at latitude 48°23'40.855"N, longitude 122°43'23.736"W (Fix No. 36636.1, DN 106). A
Danger to Navigation report was issued; see Appendix A.

COMPARISON WITH PRIOR SURVEYS: Prior H-5929WD is the source of the 10
fathom sounding.

COMPARISON WITH CHART AND CHARTING RECOMMENDATIONS: Delete
the charted 10 fathoms at latitude 48°23'40.964"N, longitude 122°43'23.332"W from charts
18421, 18423, 18427 and 18429, and chart 8 fms 5 ft at latitude 48°23'40.855"N, longitude
122°43'23.736"W.

CONCUR

ITEM INVESTIGATION REPORT

AREA OF INVESTIGATION

AWOIS/Reference No.: Item 9
State and Locality: Washington/South Rosario Strait
Reported Position: latitude 48°24'20.782"N
longitude 122°42'49.945"W
Datum: NAD83
Reported Depth: 6 fm 2 ft; charts 18427 and 18429
Largest Scale Charts: 18429; 1:25,000, 7th edition, issued Mar. 16, 1996
18427; 1:25,000, 25th edition, issued July 12, 1997
Type of Feature: SSS contact; rock

DESCRIPTION and SOURCE: Rock observed on side scan sonargram: Contact 25479.3s, (DN 292).

SURVEY REQUIREMENTS: Full Develop Development

METHOD OF INVESTIGATION: Echosounder Development (*Fixes 32473-32487, DN 090; 33032-33049, DN 095*).

RESULTS OF INVESTIGATION: A least depth of 4.⁷ fathoms/8.8 meters/29 feet was obtained at latitude 48°24'20.566"N, longitude 122°42'49.012"W (*Fix No. 32481, DN 090*). A Danger to Navigation report was issued; see Appendix A.

COMPARISON WITH PRIOR SURVEYS: Prior H-6607 obtained a sounding of 6 fathoms at 48°24'20.556"N, longitude 122°42'48.361"W.

COMPARISON WITH CHART AND CHARTING RECOMMENDATIONS: Charts 18427 and 18429 have 6 fm 2 ft charted at latitude 48°24'22.171"N, longitude 122°42'50.261"W, 50 meters North of the item, which agrees with survey depths in that area. Chart 4 fm ⁴5-ft at latitude 48°24'20.566"N, longitude 122°42'49.012"W.

CONCUR

ITEM INVESTIGATION REPORT

AREA OF INVESTIGATION

AWOIS/Reference No.: Item 10
State and Locality: Washington/South Rosario Strait
Reported Position: latitude 48°25'09.543"N
longitude 122°49'20.403"W
Datum: NAD83
Reported Depth: 5 fm; Chart 18429
Largest Scale Chart: 18429; 1:25,000, 7th edition, issued Mar. 16, 1996
Type of Feature: Charted shoal

DESCRIPTION and SOURCE: Charted shoal observed on side scan sonagram: Contact 27898.0p (DN 295).

SURVEY REQUIREMENTS: Full development

METHOD OF INVESTIGATION: Echosounder Development – 5-meter line spacing
(Fixes 40912-41009, DN 137), Dive (Fix 42542, DN 147)

RESULTS OF INVESTIGATION: PHP Divers obtained a least depth of ^{4.0}~~3.9~~ fathoms/~~7.2~~ meters/~~23.6~~ feet at latitude 48°25'09.734"N, longitude 122°49'20.841"W (Fix 42542, DN 147). See dive report located in appendix J. A Danger to Navigation report was issued; see Appendix A.

COMPARISON WITH PRIOR SURVEYS: Prior H-6577 obtained a depth of 5 fathoms at latitude 48°25'08.919"N, longitude 122°49'22.077"W.

COMPARISON WITH CHART AND CHARTING RECOMMENDATIONS: 5 fathoms is charted at latitude 48°25'08.919"N, longitude 122°49'22.077"W. Delete the charted five fathoms and chart ~~3 fm~~ ^{4 Fm} 5 ft, at 48°25'09.734"N, longitude 122°49'20.841"W.

4 Fm Rk

CONCUR

ITEM INVESTIGATION REPORT

AREA OF INVESTIGATION

AWOIS/Reference No.: Item 11
State and Locality: Washington/South Rosario Strait
Reported Position: latitude 48°24'27.641"N
longitude 122°45'54.783"W
Datum: NAD83
Reported Depth: 3 ½ fms; 18429
3 fms 4 ft; charts 18421, and 18423
Largest Scale Chart: 18429; 1:25,000, 7th edition, issued Mar. 16, 1996
Type of Feature: Charted depth

DESCRIPTION and SOURCE: : Charted sounding shoaler than depths acquired in this survey; Source is H-6577. Contact 26170.8p (DN293).

SURVEY REQUIREMENTS: Full Development

METHOD OF INVESTIGATION: Side scan sonar coverage (200%), echosounder development - 5-meter line spacing with crosslines (DN 118/141/162), Dive (Fix No. 42546, DN 158).

RESULTS OF INVESTIGATION: PHP Divers obtained a least depth of 4 fathoms/7.4 meters/24 feet on a large rock at latitude 48°24'28.596"N, longitude 122°45'54.731"W. See dive report located in Appendix J. Echosounder development obtained a 4 fathom sounding at latitude 48°24'28.317"N, longitude 122°45'54.742"W.

COMPARISON WITH PRIOR SURVEYS: H-6577 is the source of the charted 3 fm 4 ft sounding.

COMPARISON WITH CHART AND CHARTING RECOMMENDATIONS: Delete the 3 fm 4 ft sounding charted at latitude 48°24'27.641"N, longitude 122°45'54.783"W on chart 18429 and chart the soundings from the current survey. CONCUR

ITEM INVESTIGATION REPORT

AREA OF INVESTIGATION

AWOIS/Reference No.: Item 12
State and Locality: Washington/South Rosario Strait
Reported Position: latitude 48°24'11.232"N
longitude 122°42'36.769"W
Datum: NAD83
Reported Depth: 4 fms; Charts 18421, 18427 and 18429
Largest Scale Charts: 18429; 1:25,000, 7th edition, issued Mar. 16, 1996
18427; 1:25,000, 25th edition, issued July 12, 1997
Type of Feature: Charted depth

DESCRIPTION and SOURCE: Charted sounding shoaler than depths acquired in this survey; Source prior H-6607.

SURVEY REQUIREMENTS: Full Development

METHOD OF INVESTIGATION: 200% SSS coverage, echosounder development- 5-meter linespacing with crosslines(DN 118/162), Dive (42586, Dn160).

RESULTS OF INVESTIGATION: No significant features were observed on the sonargram in this area. Echosounder hydrography over this area indicates a slope with nothing unusual. On DN 160, PHP divers conducted a circle search and found nothing significant: a rocky bottom with a gradual slope. See dive report located in Appendix J. ✕

COMPARISON WITH PRIOR SURVEYS: H-6607 is the source of the charted 4 fathom depth

COMPARISON WITH CHART AND CHARTING RECOMMENDATIONS: Delete the 4 fathom sounding charted at latitude 48°24'11.232"N, longitude 122°42'36.769"W and chart the depths acquired during this survey. CONCUR

ITEM INVESTIGATION REPORT

AREA OF INVESTIGATION

AWOIS/Reference No.: Item 13
State and Locality: Washington/South Rosario Strait
Reported Position: latitude 48°24'17.133"N
longitude 122°42'43.856"W
Datum: NAD83
Reported Depth: 3 ½ fms; charts 18421 and 18427
3 fms 3 ft; chart 18429
Largest Scale Charts: 18429; 1:25,000, 7th edition, issued Mar. 16, 1996
18427; 1:25,000, 25th edition, issued July 12, 1997
Type of Feature: Charted Depth

DESCRIPTION and SOURCE: : Charted sounding shoaler than depths acquired in this survey; Source prior H-6607. Contact 25427.5p (DN292).

SURVEY REQUIREMENTS: Full Development

METHOD OF INVESTIGATION: 200% SSS coverage, echosounder development- 5-meter linespacing with crosslines (DN 090/095), Dive (42588, Dn160).

RESULTS OF INVESTIGATION: PHP Divers obtained the least depth of the area, 4 fathoms/7.3 meters/24.0 feet, at latitude 48°24'17.192"N, longitude 122°42'44.167"W. See dive report located in Appendix J.

COMPARISON WITH PRIOR SURVEYS: Prior H-6607 obtained a depth 3 ½ fathoms at latitude 48°24'17.133"N longitude 122°42'43.856"W.

COMPARISON WITH CHART AND CHARTING RECOMMENDATIONS: Delete the charted 3 fathoms 3 feet at latitude 48°24'17.133"N longitude 122°42'43.856"W, and chart the soundings acquired in this survey.

CONCUR

ITEM INVESTIGATION REPORT

AREA OF INVESTIGATION

AWOIS/Reference No.: Item 14
State and Locality: Washington/South Rosario Strait
Reported Position: latitude 48°24'08.780"N
longitude 122°42'52.094"W
Datum: NAD83
Reported Depth: 1 fm 5 ft; Charts 18423, 18429
1 ¾ fms; Charts 18421, 18427
Largest Scale Charts: 18429; 1:25,000, 7th edition, issued Mar. 16, 1996
18427; 1:25,000, 25th edition, issued July 12, 1997
Type of Feature: Charted depth

DESCRIPTION and SOURCE: Charted sounding shoaler than depths acquired in this survey;
Source prior H-6607.

SURVEY REQUIREMENTS: Full Development

METHOD OF INVESTIGATION: 200% SSS coverage, echosounder development- 5-meter
linespacing (DN 096/118/162), Dive (42589, Dn160).

RESULTS OF INVESTIGATION: PHP Divers conducted a circle search at the center of the
charted sounding at latitude 48°24'08.605"N longitude 122°42'51.691"W, they identified a
rocky bottom and took a least depth on the largest rock found. See dive report located in
Appendix J. The least depth in the area, 2.8 fathoms/5.1 meters/ 16.0 feet, was obtained with
echosounder development, 50 meters NE of the charted sounding, at latitude 48°24'09.775"N,
longitude 122°42'50.408"W (Fix No. 54289, DN 140).

COMPARISON WITH PRIOR SURVEYS: Prior H-6607 is partially illegible in this area but
there appears to be 1 fathom ? feet at latitude 48°24'09.156"N, longitude 122°42'51.957"W.

COMPARISON WITH CHART AND CHARTING RECOMMENDATIONS: Delete the
charted sounding at latitude 48°24'08.780"N, longitude 122°42'52.094"W, and chart the
soundings acquired in this survey.

CONCUR

ITEM INVESTIGATION REPORT

AREA OF INVESTIGATION

AWOIS/Reference No.: Item 15
State and Locality: Washington/South Rosario Strait
Reported Position: latitude 48°24'04.769"N
longitude 122°42'46.012"W
Datum: NAD83
Reported Depth: NA
Largest Scale Charts: 18429; 1:25,000, 7th edition, issued Mar. 16, 1996
18427; 1:25,000, 25th edition, issued July 12, 1997
Type of Feature: SSS contact; rock

DESCRIPTION and SOURCE: Rock observed on side scan sonargram: Contact 25434.9s (DN 292) and 30276.5p(DN 070).

SURVEY REQUIREMENTS: Full Development

METHOD OF INVESTIGATION: Echosounder development- 5-meter linespacing and crosslines(DN 096/118/162), Dive (42590, Dn160).

RESULTS OF INVESTIGATION: PHP Divers conducted a circle search in the area, they identified a rocky bottom and took a least depth on the largest rock found at latitude 48°24'04.794"N longitude 122°42'45.705"W. See dive report located in Appendix J. The least depth in the area, 2.8 fathoms/5.2 meters/17.0 feet, was obtained with echosounder development, at latitude 48°24'04.769"N, longitude 122°42'46.012"W (Fix No. 33777, DN 096).

COMPARISON WITH PRIOR SURVEYS: Prior H-6607 obtained a depth 4 ½ fathoms at latitude 48°24'04.424"N, longitude 122°42'45.191"W, 20 meters SE of the surveyed least depth.

COMPARISON WITH CHART AND CHARTING RECOMMENDATIONS: This item plots within the Lawson Reef 5 fathom contour on charts 18427, and 18429. Chart the soundings acquired in this survey. CONCUR

ITEM INVESTIGATION REPORT

AREA OF INVESTIGATION

AWOIS/Reference No.: Item 16
State and Locality: Washington/South Rosario Strait
Reported Position: latitude 48°24'03.856"N
longitude 122°42'52.258"W
Datum: NAD83
Reported Depth: NA
Largest Scale Charts: 18429; 1:25,000, 7th edition, issued Mar. 16, 1996
18427; 1:25,000, 25th edition, issued July 12, 1997
Type of Feature: SSS contact- rock

DESCRIPTION and SOURCE: Rock observed on side scan sonargram: Contact 25466.6p
(DN 292).

SURVEY REQUIREMENTS: Full Development

METHOD OF INVESTIGATION: 200% SSS coverage, echosounder development- 5-meter
linespacing with crosslines (DN 096/118), Dive (42591, Dn160).

RESULTS OF INVESTIGATION: PHP Divers located a large rock at latitude
48°24'03.753"N, longitude 122°42'52.501"W with a least depth of 2.2 fathoms/4.0 meters/ 13.1
feet (42591, Dn160). See dive report located in Appendix J.

COMPARISON WITH PRIOR SURVEYS: Prior H-6607 obtained a depth 5 4/6 fathoms at
latitude 48°24'03.296"N longitude 122°42'52.411"W.

COMPARISON WITH CHART AND CHARTING RECOMMENDATIONS: This item
plots just outside the Lawson Reef 5 fathom contour on charts 18427, and 18429. Chart the
soundings acquired in this survey.

CONCUR

ITEM INVESTIGATION REPORT

AREA OF INVESTIGATION

AWOIS/Reference No.: Item 17
State and Locality: Washington/South Rosario Strait
Reported Position: latitude 48°24'29.1" N
longitude 122°45'59.4" W
Datum: NAD83
Reported Depth: 4 fm 5 ft; prior 6577
Largest Scale Chart: 18429; 1:25,000, 7th edition, issued Mar. 16, 1996
Type of Feature: Sounding

DESCRIPTION and SOURCE: Sounding shoaler than depths acquired in this survey; appears on prior H-6577.

SURVEY REQUIREMENTS: Full Development

METHOD OF INVESTIGATION: 200% SSS coverage, echosounder development- 5-meter linespacing (DN 139/141).

RESULTS OF INVESTIGATION: The shoalest sounding in this vicinity is 6 fathoms at latitude 48°24'29.379" N, longitude 122°45'59.752" W (Fix 53472, dn139).

COMPARISON WITH PRIOR SURVEYS: Prior H-6577 is the source of this sounding.

COMPARISON WITH CHART AND CHARTING RECOMMENDATIONS:
Chart the soundings acquired in this survey. CONCUR

N. COMPARISON WITH THE CHART

The survey area is represented on the following charts:

Chart No.	Date	Edition	Scale
18400	Mar. 30, 1996	39th	1:200,000
18421	Mar. 21, 1998	41st	1:80,000
18423	Jun. 18, 1994	30th	1:80,000
18427	Jul. 12, 1997	25th	1:25,000
18429	Mar. 16, 1996	7th	1:25,000

Charts 18400, 18421, 18423 and 18429 cover the entire survey area. Chart 18427 covers the survey area East of longitude 122°44'29.7" W. The survey was compared with all charts but most rigorously with the 18429 the largest scale chart covering the entire survey area.

USCG Notices to Mariners

Local Notice to Mariners (LNM), Monthly Edition Number 21, dated 25 May 1999, reported Davidson Rock Light 1 (LLN 19325) was operating at reduced intensity. Subsequent editions numbers through Monthly Edition Number 26, the most current at the time of submission of this DR, continues to list the Davidson Rock Light operating at reduced intensity.

Copies of the notices are included in Appendix J. *

Dangers to Navigation

Nine Dangers to Navigation were discovered during the survey: CONCUR

Item Investigation Report Reference Number	DN/Fix No.	Description	Sounding	Latitude	Longitude
2	158/42544	Uncharted rock pinnacle	5 fms 2 ft	48°25'03.693"N	122°48'36.645"W
3	158/42545	Uncharted rock pinnacle	7 fms	48°24'48.905"N	122°48'55.520"W
4	137/41896.1	Uncharted rock pinnacle	9 fms 1 ft	48°24'58.321"N	122°48'44.207"W
5	160/42585	Uncharted rock pinnacle	7 fms 3 ft	48°24'59.129"N	122°40'14.918"W
6	116/38891.1	Uncharted rock pinnacle	17 fms	48°24'47.164"N	122°40'17.053"W
7	303/53095.1	Uncharted rock pinnacle	8 fms 5 ft	48°24'46.006"N	122°49'11.515"W
8	106/36636.1	Shoal	8 fms 5 ft	48°23'40.855"N	122°43'23.736"W
9	090/32481	Rock	4 fms 5 ft	48°24'20.566"N	122°42'49.012"W
10	147/42542	Shoal	3 fms 5 ft	48°25'09.734"N	122°49'20.841"W

See Appendix A: Danger to Navigation Reports, and Item Investigation Reports 2-10 for details.

Comparison of Soundings

There is good agreement among the soundings and contours throughout the survey. There

appears to be scouring outside Deception Pass extending the 50 fathom contour further North and South. Shoaling has occurred on the Northeast tip of Lawson reef extending the 30 fathom contour further North. **CONCUR**

The Charted green tint designating areas cleared to specific depth by wire drag should be removed from the chart in all areas covered by this survey. Fifty meter line spacing was run throughout the green tint areas and 200% side scan was acquired in depths less than 24 fathoms. The SSS investigations with echosounder development indicate the least depths found in those areas. **CONCUR**

Significant discrepancies in soundings were investigated and are discussed in detail in Section L, Comparison with Prior Surveys and Section M, Item Investigation Reports.

Comparison of Non-Sounding Features

The charted feature listed below was not found and a disproval detached position was recorded at the charted location. It appears on charts 18423 and 18429 and its source is prior H-6577. The hydrographer recommends removing it from the charts.

Charted Feature	DP/Charted Position		Disproval Position No.	DN
	Latitude	Longitude		
rock	48°24'55.316"N	122°49'33.716"W	50082	246

The following are new features to be added to the chart:

New Feature	Position		Position No.	DN	
	Latitude	Longitude			
Rock	48°25'11.664"N	122°40'16.092"W	36818	109	cov 1 ft
Ledge	48°24'56.345"N	122°39'47.759"W	36819	109	.
Rock	48°24'46.345"N	122°39'23.281"W	36823	109	(1)
Pile	48°24'46.178"N	122°39'16.590"W	36824	109	(8)
Pile	48°24'45.672"N	122°39'14.613"W	36825	109	(8)
Pile	48°24'45.853"N	122°39'15.818"W	36826	109	(8)
Rock	48°24'37.875"N	122°39'29.244"W	50010	246	(1)
Rock	48°24'47.130"N	122°39'25.577"W	50011	246	(2)
Rock	48°24'57.008"N	122°39'36.828"W	50021	246	(1)
Rock	48°24'59.666"N	122°39'41.270"W	50024	246	(9)
Rock	48°24'47.864"N	122°39'43.971"W	50037	246	(1)
Rock	48°24'58.896"N	122°39'57.596"W	50043	246	(1)
Boat launch SAMP	48°25'08.878"N	122°39'52.754"W	50049	246	.
Rock	48°25'12.528"N	122°39'58.258"W	50051	246	(5)

AWOIS 50436 is discussed in Item Investigation Report #1.

All other changes are depicted on the final field sheet. Annotated photographs and a list of detached positions are included in Appendix J. *

Sewers

There are two sewers charted on the Whidbey Island Shoreline. The sewer located at latitude 48°21'15.4" N, longitude 122°40'31.3" W was observed by PHP (photo 5_sewer.tif, dn246). The sewer at latitude 048°21'38.8" N, longitude 122°40'23.5" W (Fix No. 50,075, DN 246) was not observed by PHP but its presence was confirmed by Mike Kurtz, General Engineer at Whidbey Island Naval Air Station (360-257-1462).
See ENUC Report, section C

O. ADEQUACY OF SURVEY ✓

H-10828 is a complete, navigable area hydrographic survey and is adequate to supercede all prior surveys within their common areas.
concur

P. AIDS TO NAVIGATION See ENUC Report, section Q

Below is a list of aids to navigation verified with hydrographic methods in accordance with Section 4.2 of project instructions.

Navigational Aid	LLN	Latitude	Longitude	Fix No.
Lawson Reef Junction Red/Green Lighted Bell Buoy	19320	48°24'03.948" N	122°42'57.178" W	50169
Davidson Rock Green Light #1	19325	48°24'47.899" N	122°48'42.936" W	50086
Lawson Reef Red Lighted Bell Buoy #2	19330	48°24'42.432" N	122°46'22.497" W	50092

Q. STATISTICS

DECEPTION PASS LT. 1# WAS NOT VERIFIED
LL# 18895

Description	Quantities
Total Nautical Miles	1084
Side Scan Sonar	138
SSS 100%	67
SSS 200%	71
MS Hydrography	694
Splits	23
Cross Lines	23
Development	200
Square Nautical Miles	25.2

* FILED WITH THE SURVEY RECORDS

Description	Quantities
Square Nautical Miles SSS	6.4
Days of Acquisition	81
Total Number of Soundings	50657
Detached Positions	103
Bottom Samples	51
Dives	11
Velocity Casts	17
Tide Stations Installed	2

R. MISCELLANEOUS ✓

Bottom samples were acquired and submitted to the Smithsonian Institution in accordance with Section 6.7 of Project Instructions.

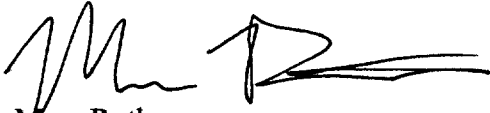
S. RECOMMENDATIONS ✓

Project instructions specify full-scale shoreline verification, but limit inshore hydrography to the three-fathom curve. Unless the zero-meter curve is acquired, the hydrographer cannot define the shoreline. In some parts of this survey, the hydrographer can recommend shoreline compilation changes with confidence; but in others, it is not possible. If digital shoreline derived from modern photogrammetry is not available for a project area, either inshore limits of hydrography should extend to the zero curve, or shoreline verification should not be included in project instructions. *CONCUR*

T. REFERRAL TO REPORTS ✓

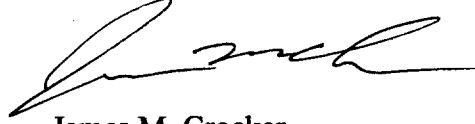
Title	Date
Horizontal Control Report OPR-N368-PHP	June 1997
Horizontal Control Report Addendum	July 1997
Horizontal Control Report Addendum 2	June 1999
Coast Pilot Report	To follow

Submitted for approval,



Marc Rothmeyer
Survey Technician

Approved and forwarded,



James M. Crocker
LT, NOAA, Chief of Party



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE

Pacific Hydrographic Party
P. O. Box 189
Anacortes, Wa 98221
Phone: (360) 293-5171
Fax: (360) 293-8456

July 9, 1999

**ADVANCE
INFORMATION**

Commander
Thirteenth Coast Guard District (OAN)
Federal Building, Room 3410
915 Second Avenue
Seattle, WA 98174-1067

Dear Sir:

The NOAA Pacific Hydrographic Party has discovered potential dangers to navigation while conducting survey operations in Northern Puget Sound. A Danger to Navigation Report is enclosed along with chartlets showing the affected portions of Chart 18429, the largest-scale chart of the area.

I recommend this Danger to Navigation Report be included in the next Local Notice to Mariners.

Sincerely,

A handwritten signature in black ink, appearing to read "James M. Crocker".

James M. Crocker
Lieutenant, NOAA

Enclosures

cc: NIMA
N/CS26
N/CS34



Printed on Recycled Paper



DANGER TO NAVIGATION REPORT

ADVANCE
INFORMATION

SURVEY REGISTRY NUMBER: H-10828
STATE: Washington
GENERAL LOCALITY: North Puget Sound
SUBLOCALITY: Deception Pass to Colville Island
PROJECT NUMBER OPR-N368-PHP

The following soundings are potential dangers to navigation and were discovered during hydrographic survey operations by the NOAA Pacific Hydrographic Party. The soundings have been corrected to MLLW based on preliminary real tides.

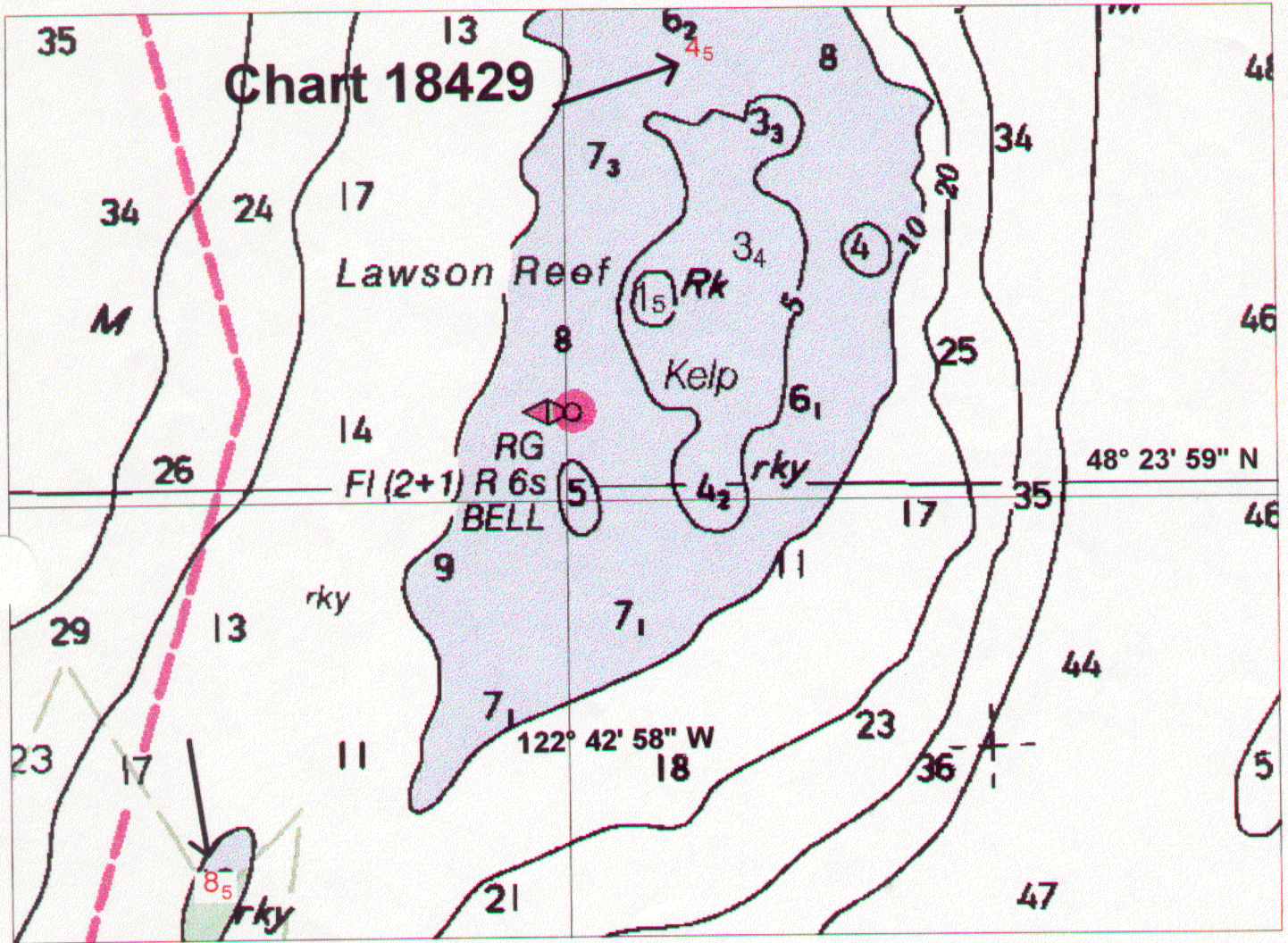
Sounding (Fathom/feet)	Latitude	Longitude	Charts Affected
5 ₂	48° 25' 03.693"N	122° 48' 36.645"W	18429, 18423, 18421
7	48° 24' 48.905"N	122° 48' 55.520"W	18429, 18423, 18421
9 ₁	48° 24' 58.321"N	122° 48' 44.207"W	18429, 18421
7 ₃	48° 24' 59.129"N	122° 40' 14.918"W	18429
17	48° 24' 47.164"N	122° 40' 17.053"W	18429
8 ₅	48° 23' 40.855"N	122° 43' 23.736"W	18429, 18423, 18421
8 ₅	48° 24' 46.006"N	122° 49' 11.515"W	18429
4 ₅	48° 24' 20.566"N	122° 42' 49.012"W	18429
3 ₅	48° 25' 09.734"N	122° 49' 20.841"W	18429

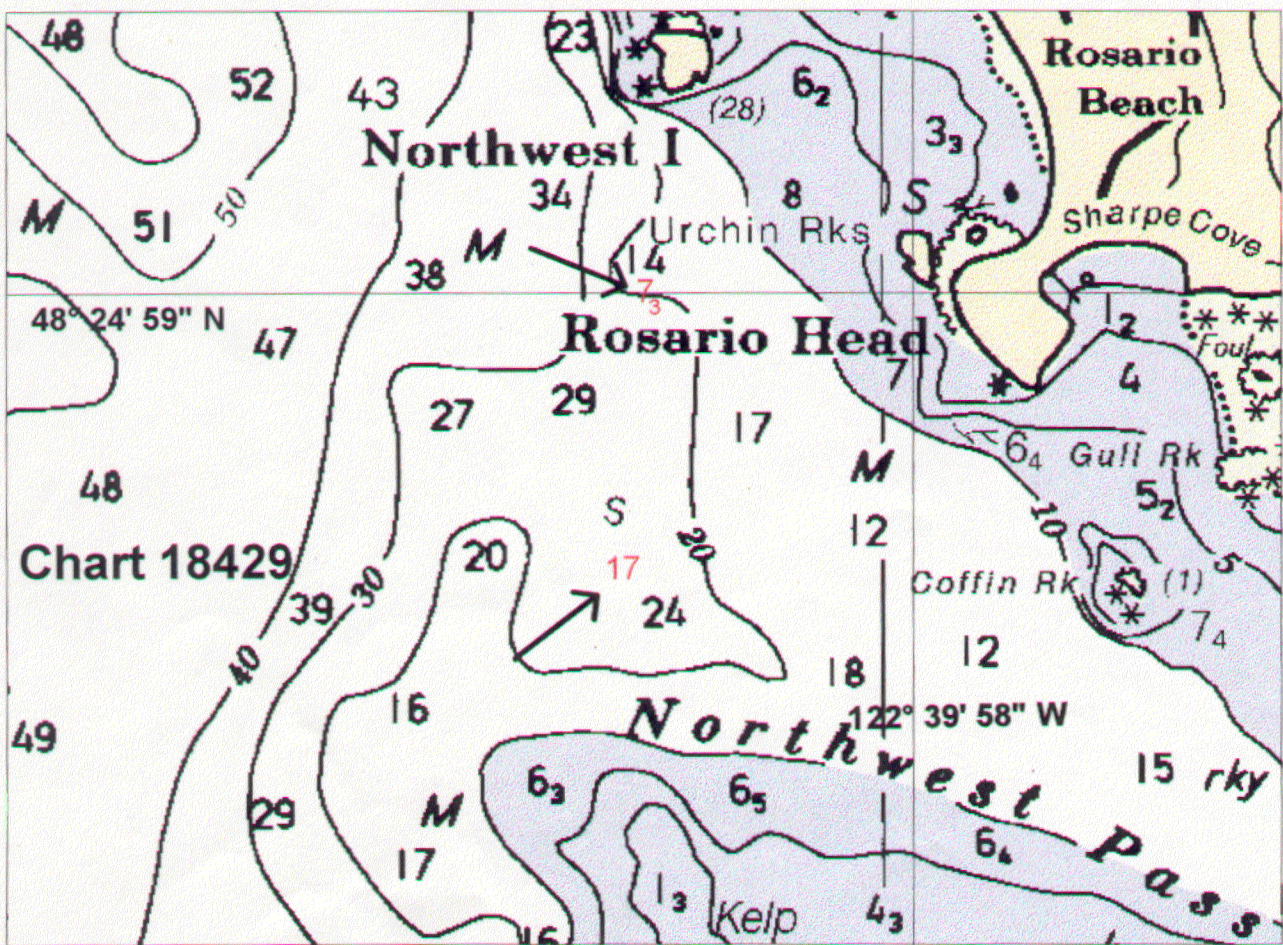
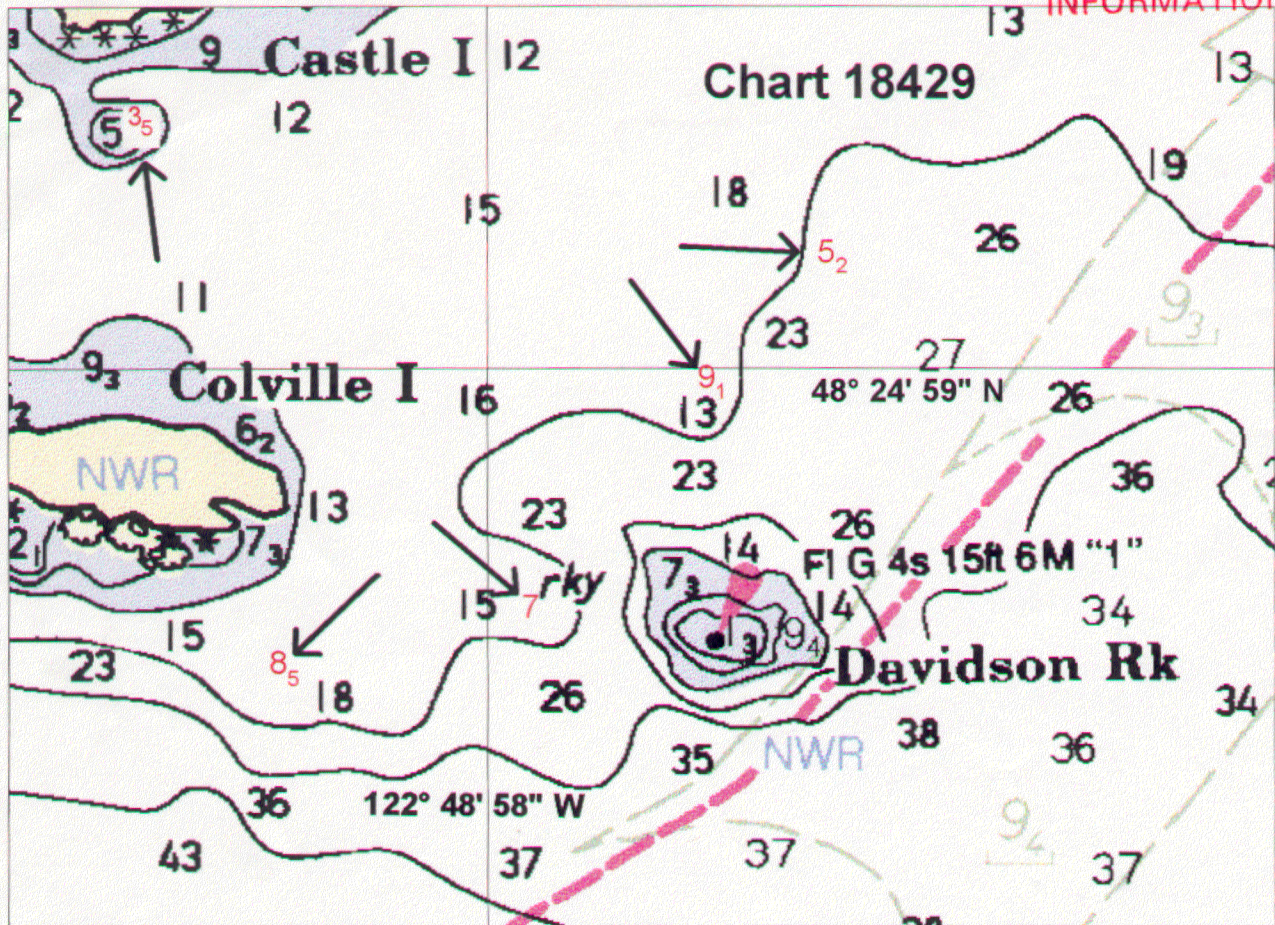
Questions concerning this report should be directed to NOAA, Pacific Hydrographic Branch, N/CS34, 7600 Sand Point Way NE, Bin C25700, Seattle, WA 98115-0070, telephone number (206) 526-6853.

OPR-N368-PHP, H-10828

ADVANCE
INFORMATION

Soundings, Danger to Navigation Report 02-99-PHP
1:10000 chartlets of NOS Chart 18429, 7th Edition, March 16, 1996





APPROVAL SHEET

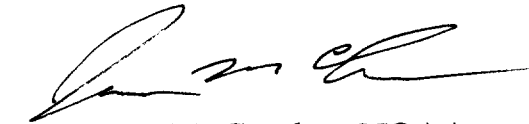
for

SURVEY H-10828

Standard field surveying and processing procedures were followed in producing this survey in accordance with the Hydrographic Manual, Fourth Edition; the Hydrographic Survey Guidelines; and the Field Procedures Manual, as updated for 1998. The data were reviewed daily during acquisition and processing.

The digital data and supporting records have been reviewed 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,



LT James M. Crocker, NOAA
Chief
Pacific Hydrographic Party



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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: February 8, 2000

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: OPR-N368-PHP-98
HYDROGRAPHIC SHEET: H-10828

LOCALITY: Northern Puget Sound, WA

TIME PERIOD: July 7, 1998- June 21, 1999

TIDE STATION USED: 944-9982 Richardson, WA
Lat. 48° 26.8'N Lon. 122° 54.0'W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.012 meters

REMARKS: RECOMMENDED ZONING

Use zone(s) identified as: NPS79, NPS80, NPS83, NPS84, NPS85,
NPS86 & NPS87.

Refer to attachments for zoning information.

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

Thomas N. Mero 2/8/00

CHIEF, REQUIREMENTS AND DEVELOPMENT DIVISION

Final tide zone node point locations for OPR-N368-PHP-98,
Sheet H-10828.

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 NPS79			
-122.76358 48.484537	944-9982	+18	1.07
-122.663222 48.400794			
-122.659097 48.400995			
-122.656329 48.409973			
-122.64317 48.415397			
-122.668234 48.43083			
-122.703949 48.465433			
-122.712721 48.477934			
-122.76358 48.484537			
Zone NPS80			
-122.697724 48.363928	944-9982	+18	1.04
-122.667842 48.360741			
-122.663222 48.400794			
-122.76358 48.484537			
-122.779782 48.469379			
-122.697724 48.363928			
Zone NPS83			
-122.779782 48.469379	944-9982	+18	1.02
-122.802774 48.447446			
-122.79022 48.413743			
-122.773655 48.373561			
-122.697724 48.363928			
-122.779782 48.469379			
Zone NPS84			
-122.828524 48.425006	944-9982	+30	0.97
-122.824811 48.415418			
-122.79022 48.413743			
-122.802774 48.447446			

-122.830255 48.445753
-122.822393 48.426843
-122.828524 48.425006

Zone NPS85

-122.79022 48.413743	944-9982	+18	0.99
-122.824811 48.415418			
-122.828524 48.425006			
-122.850128 48.382088			
-122.850128 48.382088			
-122.773655 48.373561			
-122.79022 48.413743			

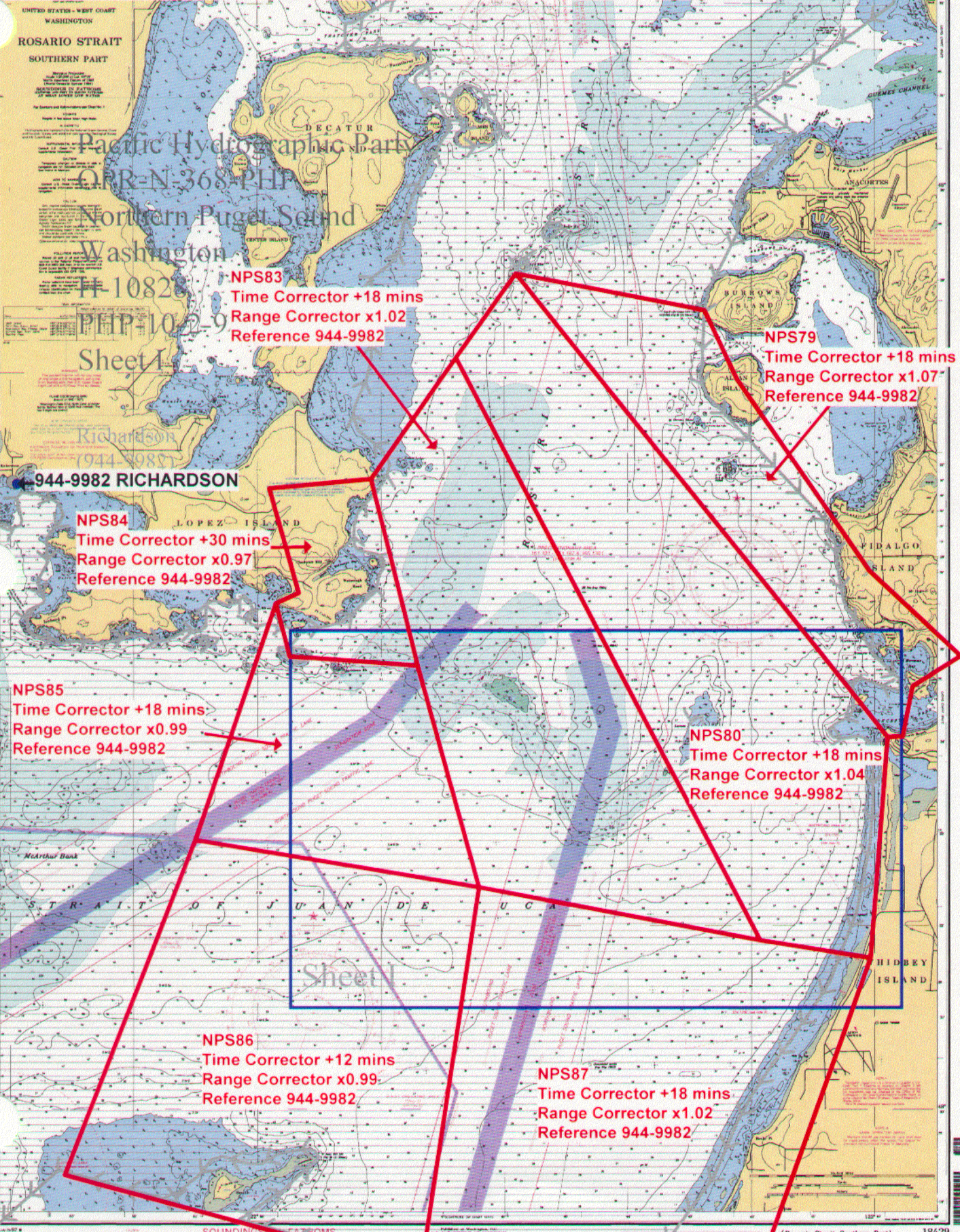
Zone NPS86

-122.850128 48.382088	944-9982	+12	0.99
-122.885328 48.3214			
-122.78938 48.304007			
-122.773655 48.373561			
-122.850128 48.382088			

Zone NPS87

-122.773655 48.373561	944-9982	+18	1.02
-122.78938 48.304007			
-122.701776 48.297396			
-122.667842 48.360741			
-122.697724 48.363928			
-122.773655 48.373561			

Final Tidal Zoning for OPR-N368-PHP-98 Northern Puget Sound, WA - Sheet H-10828



Pacific Hydrographic Party
OPR-N-368-PHP
Northern Puget Sound
Washington
H-10828
PHP-1029
Sheet I

NPS83
Time Corrector +18 mins
Range Corrector x1.02
Reference 944-9982

NPS79
Time Corrector +18 mins
Range Corrector x1.07
Reference 944-9982

944-9982 RICHARDSON

NPS84
Time Corrector +30 mins
Range Corrector x0.97
Reference 944-9982

NPS85
Time Corrector +18 mins
Range Corrector x0.99
Reference 944-9982

NPS80
Time Corrector +18 mins
Range Corrector x1.04
Reference 944-9982

NPS86
Time Corrector +12 mins
Range Corrector x0.99
Reference 944-9982

NPS87
Time Corrector +18 mins
Range Corrector x1.02
Reference 944-9982

GEOGRAPHIC NAMES

H-10828

Name on Survey

Page 1 of 2

A 18425, 18426, 18427, 18428, 18429, 18430, 18431, 18432, 18433, 18434, 18435, 18436, 18437, 18438, 18439, 18440, 18441, 18442, 18443, 18444, 18445, 18446, 18447, 18448, 18449, 18450, 18451, 18452, 18453, 18454, 18455, 18456, 18457, 18458, 18459, 18460, 18461, 18462, 18463, 18464, 18465, 18466, 18467, 18468, 18469, 18470, 18471, 18472, 18473, 18474, 18475, 18476, 18477, 18478, 18479, 18480, 18481, 18482, 18483, 18484, 18485, 18486, 18487, 18488, 18489, 18490, 18491, 18492, 18493, 18494, 18495, 18496, 18497, 18498, 18499, 18500
 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

	A	B	C	D	E	F	G	H	K
WASHINGTON (title)	X		X						1
BLIND ISLAND	X		X						2
BOWMAN BAY	X		X						3
CASTLE ISLAND	X		X						4
COFFIN ROCKS	X		X						5
COLVILLE ISLAND	X		X						6
COLVILLE, POINT	X		X						7
DAVIDSON ROCK	X		X						8
DECEPTION ISLAND	X		X						9
DECEPTION PASS	X		X						10
FIDALGO ISLAND	X		X						11
GULL ROCKS	X		X						12
LAWSON REEF	X		X						13
LIGHTHOUSE POINT	X		X						14
LOPEZ ISLAND	X		X						15
LOTTIE BAY	X		X						16
NORTH BEACH	X		X						17
NORTHWEST ISLAND	X		X						18
NORTHWEST PASS	X		X						19
RESERVATION HEAD	X		X						20
ROSARIO BEACH (pp1)	X		X						21
ROSARIO HEAD	X		X						22
ROSARIO STRAIT	X		X						23
SHARPE COVE	X		X						24
URCHIN ROCKS	X		X						25

GEOGRAPHIC NAMES

H-10828

Name on Survey

Page 2 of 2

A ON CHART NO. 18423, 18425, 18427,
 18428, 18465, 18421
 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

Name on Survey	A	B	C	D	E	F	G	H	K
WEST BEACH	X		X						1
WEST POINT	X		X						2
WHIDBEY ISLAND	X		X						3
									4
									5
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									25

Dennis J. Koresburg
 Chief Surveyor
 MAR 3 2000

HYDROGRAPHIC SURVEY STATISTICS

H-10828

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

RECORD DESCRIPTION		AMOUNT	RECORD DESCRIPTION		AMOUNT
SMOOTH SHEET		1	SMOOTH OVERLAYS: POS., ARC, EXCESS		N/A
DESCRIPTIVE REPORT		1	FIELD SHEETS AND OTHER OVERLAYS		N/A
DESCRIP-TION	DEPTH/POS RECORDS	HORIZ. CONT. RECORDS	SONAR-GRAMS	PRINTOUTS	ABSTRACTS/SOURCE DOCUMENTS
ACCORDION FILES	3				
ENVELOPES					
VOLUMES					
CAHIERS					
BOXES					
SHORELINE DATA					
SHORELINE MAPS (List):		N/A			
PHOTOBATHYMETRIC MAPS (List):		N/A			
NOTES TO THE HYDROGRAPHER (List):		N/A			
SPECIAL REPORTS (List):		N/A			
NAUTICAL CHARTS (List):		18429 8th Ed., July 3, 1999			

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	140.25		140.25	
COMPARISON WITH PRIOR SURVEYS AND CHARTS				
EVALUATION OF SIDE SCAN SONAR RECORDS				
EVALUATION OF WIRE DRAGS AND SWEEPS				
EVALUATION REPORT		46.0	46.0	
GEOGRAPHIC NAMES				
OTHER* (Chart Compilation)		87.5	87.5	
*USE OTHER SIDE OF FORM FOR REMARKS	TOTALS	140.25	133.5	273.75
Pre-processing Examination by Pacific Hydrographic Branch	Beginning Date 7/27/99	Ending Date 7/29/99		
Verification of Field Data by M. Bigelow	Time (Hours) 140.25	Ending Date 11/3/00		
Verification Check by R. Davies	Time (Hours) 57.5	Ending Date 11/21/00		
Evaluation and Analysis by M. Bigelow	Time (Hours) 46.0	Ending Date 11/4/00		
Inspection by R. Davies	Time (Hours) 30.0	Ending Date 11/27/00		

EVALUATION REPORT H-10828

A. PROJECT

The project is adequately discussed in the hydrographer's report.

B. AREA SURVEYED

This navigable area survey was conducted in accordance with Hydrographic Project Instructions OPR-N368-PHP, Northern Puget Sound, Washington, dated May 7, 1997, and Change No. 1, dated May 4, 1999. The primary objective is to have the charted wire drag clearance depths superceded by modern, full-bottom-coverage hydrography. The charted wire drag clearance depths, which originate from surveys conducted in 1935, 1943, 1962 and 1972, are often considered controlling depths.

The survey area is adequately described in the hydrographer's report.

The bottom for survey H-10828 is typically comprised of sand, pebbles and mud. Depths range from 0 to 62.9 fathoms.

C. SURVEY VESSELS

Survey vessels are adequately discussed in the hydrographer's report.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

The acquisition and processing of data in the field have been adequately addressed in the hydrographer's report, section D. Office processing of survey data was conducted using the same Hydrographic Processing System (HPS) software used by the hydrographer. MicroStation 95 was used during office processing to compile the smooth sheet.

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 8 projection and are depicted on a single sheet.

E. SONAR EQUIPMENT

Side scan sonar equipment is adequately discussed in the hydrographer's report.

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.

In compliance with Section 5.8 of Project Instructions, tide stations were established at the historical sites shown below:

Station Number	Station Name	Latitude	Longitude
944-9982	Richardson Point	48°26'48"N	122°54'00"W
	Lopez Island		
944-9932	Armitage Island	48°32'06"N	122°47'48"W

Primary tide stations at Port Townsend, WA (944-4900), Cherry Point, WA (944-9424), and Friday Harbor, WA (944-9880), serve as controls for datum determination at the above sites.

On DN 90 a data gap was reported by NOAA, NOS, CO-OPS in the Port Townsend tide gauge data (Appendix J; supplemental correspondence). All data collected on DN 090 falls within HPS zone 3. On DN 90, Cherry Point correctors were entered in HPS zone 3, and Cherry Point tides were downloaded and applied to the data. (See attached tide note dated February 8, 1999)

H. CONTROL STATIONS

Section H of the hydrographer's report contains adequate discussion of horizontal control and hydrographic positioning.

The positions of horizontal control stations used during hydrographic operations are published values 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: -0.637 seconds (-19.661 meters)
Longitude: 4.625 seconds (95.148 meters)

I. HYDROGRAPHIC POSITION CONTROL

Hydrographic position control is adequately discussed in the hydrographer's report. See the OPR-N368-PHP-98 Horizontal Control Report for more information.

Differential GPS (DGPS) was used to control this survey. A horizontal dilution of precision (HDOP) not to exceed 3.75 for a 1:10,000 scale survey was computed for survey operations. The maximum (HDOP) allowable limit has not been exceeded during this survey and the quality of data obtained is good.

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 shown on the smooth sheet is for orientation only and originates with chart 18429, 8th edition, dated July 3, 1999.

K. CROSSLINES

Crosslines are discussed in the hydrographer's report.

L. JUNCTIONS

Survey H-10828 junctions with the following survey:

<u>Survey</u>	<u>Year</u>	<u>Scale</u>	<u>Area</u>
H-10939	1999	1:10,000	North

The junction with survey H-10939 is complete. A "Joins" note has been added to the smooth sheet.

M. COMPARISON WITH PRIOR SURVEYS

The present survey was compared to the following prior surveys:

Registry No.	Dates of Survey	Scale
H-5929WD	1935	1:20,000
H-5659	1935	1:20,000
H-6577	1940	1:10,000
H-6607	1940	1:10,000
H-6617	1941	1:10,000
H-6747	1941	1:10,000
H-9283WD	1972	1:20,000

The present survey was compared to digital copies of the above prior surveys. The registration of these prior surveys to the present survey was good. The present survey has shoal soundings over rock pinnacles in five areas which are shoaler than the depths on the prior surveys. These pinnacles are adequately discussed in the item investigation forms in the descriptive report. 200% side scan sonar was run over the wire drag clearance depths of prior survey's H-5929WD and H-9283WD. The present survey depths were deeper than the wire drag depths. The present survey is adequate to supersede the prior surveys within the common area.

N. ITEM INVESTIGATION REPORTS

Items that were investigated are thoroughly discussed in Section N. See file item_investigation_report.doc for the 17 item investigation reports. AWOIS items 50435 and 50436 fall within the limits of survey H10828.

O. COMPARISON WITH THE CHART

Survey H10828 was compared with the following charts:

Chart No.	Edition	Date	Scale
18400	39th	Mar. 30, 1996	1:200,000
18421	41st	Mar. 21, 1998	1:80,000
18423	30th	Jun. 18, 1994	1:80,000
18427	25th	Jul. 12, 1997	1:25,000
18429	7th	Mar. 16, 1996	1:25,000

There are two sewers charted on Whidbey Island shoreline. The sewer located at 48°21'15.4" N and 122°40'31.3" W was positioned but the exact limits were not defined. Therefore, it should be retained as charted. The second sewer at 48°21'38.8" N, 122°40'23.5" W was not observed, but was confirmed by Mike Kurtz, General Engineer at Whidbey Island Naval Air Station, therefore, it should be retained as charted. A verification position was taken on a row of piles with airport runway lights at 48°22'10" N, 122°40'02" W. A photo taken by the hydrographer shows more piles extending toward shore. The exact limits were not defined. Therefore, it should be retained as charted.

Survey H-10828 is adequate to supersede charted hydrography within the charted area with the exception noted above.

b. Dangers to Navigation

Nine Dangers to Navigation were discovered during the survey and were reported to the USCG on July 9, 1999. No additional dangers to navigation were found during office processing.

See Appendix A: Danger to Navigation Reports, and Item Investigation Report 2-10 for details.

P. ADEQUACY OF SURVEY

With the following exception, survey H-10828 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 hydrographic records and reports received for processing are adequate and conform to the requirements of the Hydrographic Manual, 4th Edition, revised through Change No. 3, the Hydrographic Survey Guidelines, and the Field Procedures Manual (FPM), April 1998 Edition, and the NOS Hydrographic Surveys Specifications and deliverables, dated April 23, 1999 with the following exceptions:

Section E. Side Scan Sonar of the descriptive report discusses how sss line orientation had to be changed to better negotiate the extent of kelp beds. But, there were no new DP's taken to delineate the extent of the kelp beds.

The hydrographer omitted one fixed aid to navigation, which is within the survey limits, in section Q. It is required to determine whether an aid adequately serves its intended purpose, if its location, description and observed light characteristics are correct in the light list and on the chart.

Q. AIDS TO NAVIGATION

Below is a list of aids to navigation verified with hydrographic methods in accordance with Section 4.2 of project instructions.

Navigational Aid	LLN	Latitude	Longitude	Fix No.
Lawson Reef Lighted Bell Buoy	19320	48°24'03.948" N	122°42'57.178" W	50169
Davidson Rock Light #1	19325	48°24'47.899" N	122°48'42.936" W	50086
Lawson Reef Lighted Bell Buoy #2	19330	48°24'42.432" N	122°46'22.497" W	50092

Deception Pass Light 1, light list number 18895, was not verified or discussed by the hydrographer, it should be retained as charted.

There are 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

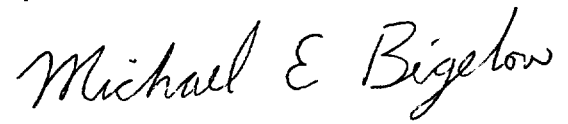
Miscellaneous information is discussed in the hydrographer's report. No additional miscellaneous items were noted during office processing.

T. RECOMMENDATIONS

This is an adequate hydrographic survey.

U. REFERRAL TO REPORTS

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

A handwritten signature in black ink that reads "Michael E Bigelow". The signature is written in a cursive style with a large, prominent 'M' and 'B'.

Michael E. Bigelow
Cartographer

APPROVAL SHEET
H-10828

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.

for Charles R. Davis Date: 11/27/00
Dennis Hill
Chief, Cartographic Team
Pacific Hydrographic Branch

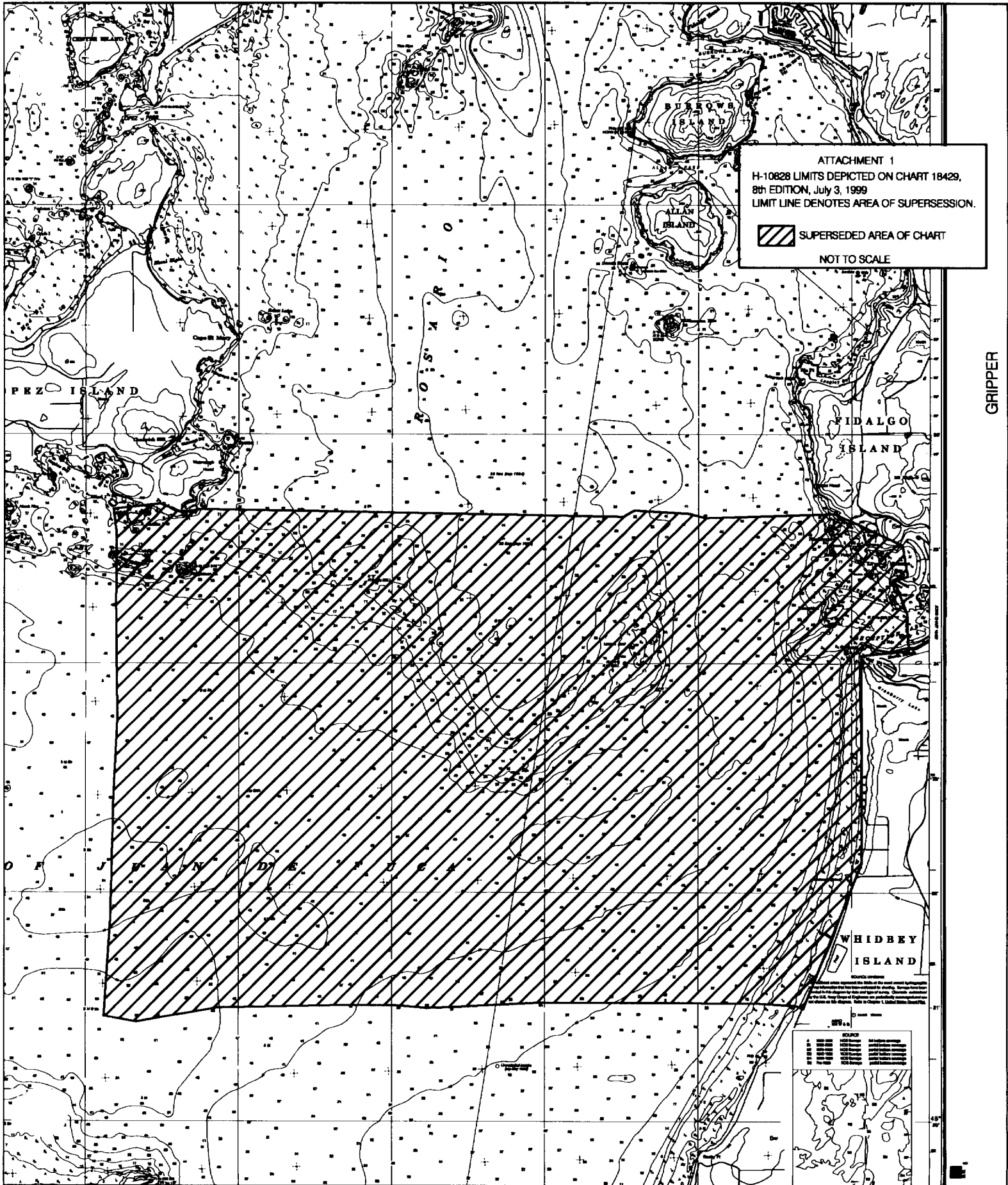
I have reviewed the smooth sheet, accompanying data, and reports. This survey and accompanying digital data meet or exceed NOS requirements and standards for products in support of nautical charting except where noted in the Evaluation Report.

James C. Gardner Date: 12-20-00
James C. Gardner
Commander, NOAA
Chief, Pacific Hydrographic Branch


Final Approval

Approved:

Samuel P. De Bow, Jr. Date: May 18, 2000
Samuel P. De Bow, Jr.
Captain, NOAA
Chief, Hydrographic Surveys Division



ATTACHMENT 1
 H-10828 LIMITS DEPICTED ON CHART 18429,
 8th EDITION, July 3, 1999
 LIMIT LINE DENOTES AREA OF SUPERSESSION.

 SUPERSEDED AREA OF CHART

NOT TO SCALE

GRIPPER

SOUNDINGS	
10	10
20	20
30	30
40	40
50	50
60	60
70	70
80	80
90	90
100	100
110	110
120	120
130	130
140	140
150	150
160	160
170	170
180	180
190	190
200	200
210	210
220	220
230	230
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370	370
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390	390
400	400
410	410
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440	440
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460	460
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MARINE CHART BRANCH
RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-10828

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
18429	11-20-00	ME BIGELOW	Full Part Before After Marine Center Approval Signed Via Drawing No. FULLY APPLIED 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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