

10072

Diagram No. 6450-3

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey ... Hydrographic
Field No. DA-10-1-83
Office No..... H-10072

LOCALITY

State Washington
General Locality Hood Canal
Locality Thorndyke Bay to Bangor

19 83

CHIEF OF PARTY
CDR J.M. Wintermyre

LIBRARY & ARCHIVES

DATE March 6, 1984

☆U.S. GOV. PRINTING OFFICE: 1980-786-230

210072

AREH 5

CHTS

184584

18441

18445 PA+E

18440

18473

18477

to sign off
see Record of Application

HYDROGRAPHIC TITLE SHEET

H-10072

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.

DA-10-1-83

State Washington

General locality Hood Canal

Locality Thorndyke Bay to Bangor

Scale 1:10,000; 5 Subplans (1:5,000)

Date of survey February 22 - March 23, 1983

Instructions dated November 22, 1982

Change No. 1, Feb. 14, 1983

Project No. OPR-N165-DA-83

Vessel NOAA Ship DAVIDSON, Launches 3131, 3132

Chief of party CDR James M. Wintermyre

Surveyed by CDR J. Wintermyre, LCDR D. McFarland, LT G. Wheaton, LT T. Rulon,
ENS E. Hawk, ENS J. Waddell, ENS A. Allen, LT Koehn

Soundings taken by echo sounder, ~~and other~~ Ross Fathometer Model 5000 & BS³

Graphic record scaled by Ship's Personnel

Graphic record checked by Ship's Personnel

Verification Isagani A. Almacen

~~Reviewed by~~ Automated plot by PMC Xynetics Plotter

Evaluation Bruce A. Olmstead

~~Verified by~~

Soundings in fathoms ~~and~~ at ~~MLLW~~ and tenths of fathoms

REMARKS: Survey is Complete.

Time Zone: GMT

Revisions and marginal notes in black were made during
Evaluation.

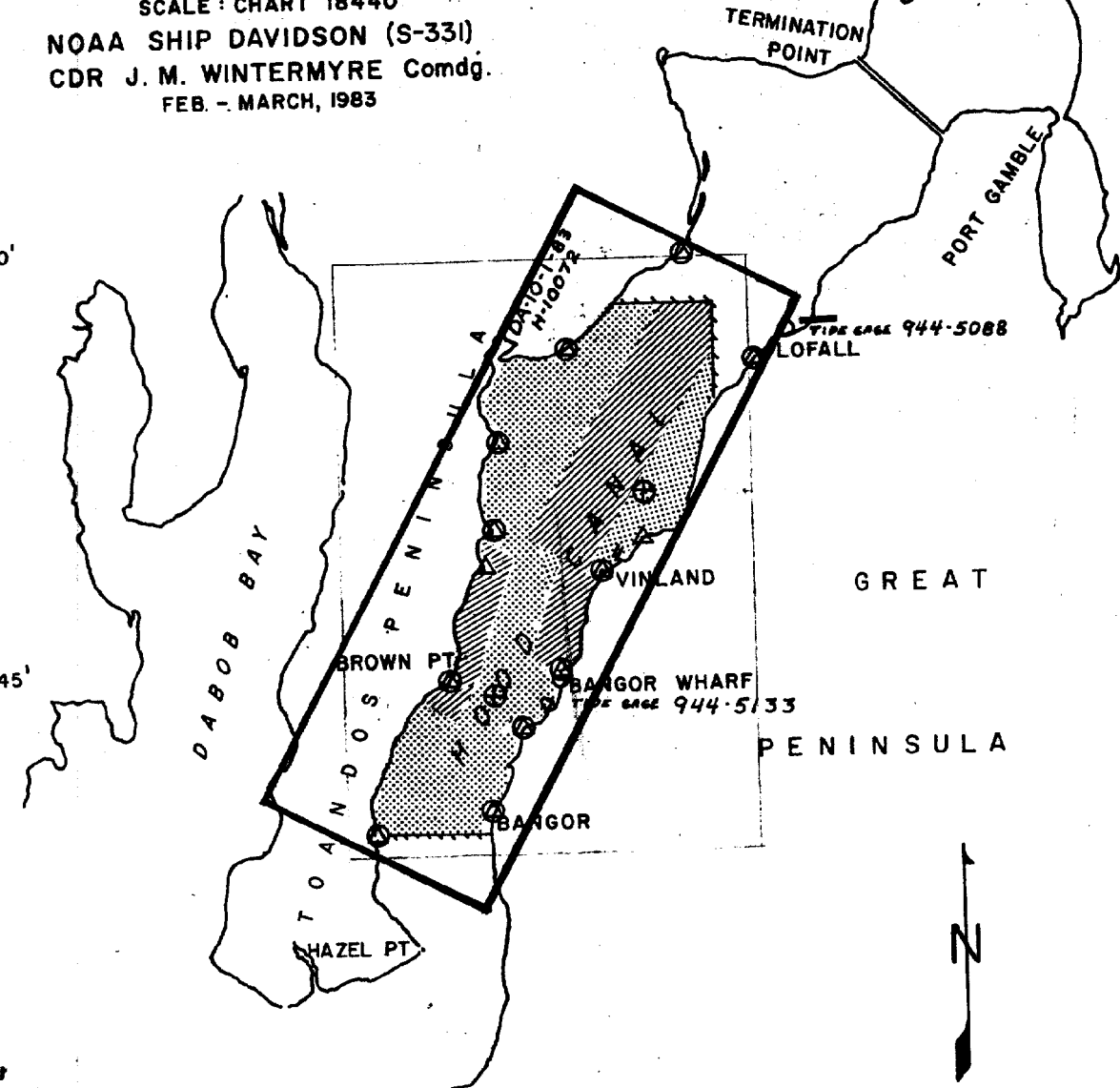
STANDARDS CK'D 3-13-84

C. Loy

AWD15 - 6/15/84 [Signature]

PROGRESS SKETCH
 OPR-NI65-DA-83
 HOOD CANAL, WASHINGTON

SCALE: CHART 18440
 NOAA SHIP DAVIDSON (S-331)
 CDR J. M. WINTERMYRE Comdg.
 FEB. - MARCH, 1983



FEB. MAR.		STATISTICS
370	214.7	L. N. M. SOUNDING LINE
21	5.7	SO. N. M. SOUNDING
11	4	TRIANGULATION STA. RECOVERED
2	2	TRIANGULATION STA. ESTABLISHED
0	14.1	L. N. M. SHORELINE VERIFICATION
1/3	0/4	NANSEN CAST/SOUND VELOCITY CAST
0	62	BOTTOM SAMPLES
2	0	TIDE GAGES ESTABLISHED
7/0	0	BENCH MARKS RECOVERED/ ESTAB.
47.3	150.6	BSSS L. N. M. SOUNDING LINE
4.2	2.7	BSSS SO. N. M. SOUNDING

122°50' 122°45' 122°40' 122°35'

47°55'
 47°50'
 47°45'
 47°40'

DESCRIPTIVE REPORT
H-10072
OPR-N165-DA-83
HOOD CANAL, WASHINGTON

A. PROJECT

Survey operations were conducted in accordance with Project Instructions OPR-N165-DA-83, dated 22 November 1982, and Change No. 1 dated 14 February 1983. Registry No. 10072 was assigned on March 2, 1983. ✓

B. AREA SURVEYED

The area surveyed included the northern portion of Hood Canal. The southern limit of the survey was 47°43.0'N and the northern limit was 47°49.3'N. The eastern limit of the project in the north was 122°40.8'W. The survey area was bounded by Toandos Peninsula on the west and Kitsap Peninsula on the east. Operations commenced in the area on 22 February 1983 and were completed on 23 March 1983. ✓

C. SOUNDING VESSELS

Sounding vessels employed during the survey included the DAVIDSON (#3130), survey launches DA-1 (#3131) and DA-2 (#3132). ✓

No unusual sounding vessel configurations were used and no problems were encountered. ✓

HYDROPLOT data gathered by DA-1 are annotated in red ink and by DA-2 in blue ink for ease in identification. ✓

D. SOUNDING EQUIPMENT AND CORRECTIONS TO ECHO SOUNDINGS

Soundings on the final field sheets are corrected for predicted tides (reference station SEATTLE, WA [944-7130] as per project instructions), transducer draft, and sound velocity. Settlement and squat corrections were not applied, as they were less than 0.1 fathom. ✓

The BS³ system was used in areas deeper than 20 to 30 fathoms, with a junctioning of 200 meters by HYDROPLOT data, as per 6.9.2 of Change No. 1 to the project instructions. ✓

For HYDROPLOT, daily stylus belt tension checks and phase calibrations were conducted. Fathometers were monitored continuously during survey operations and the fathogram initial was maintained at zero.* Fathograms were scanned and the analog ✓

*Except on JD 081, as described in Section P.4 of this report.

records compared to digitized depths. Digitizer errors, missed depths, and peak/deep insertions were identified and corrected according to the fathogram trace. Changes were entered on the edited master tape or via the corrector tape and noted on the raw data printout and fathogram.

The tidal zoning requirement of Section 5.9 of the Project Instructions was not met, as problems arose in junctioning the two areas. Rather, tide corrections of -8 minutes for high water, -5 minutes for low water, and a ht. ratio of 0.91 were applied to all HYDROPLOT data. BS³ data were reduced with predicted tide data for Seattle, WA, from magnetic tapes generated by the Marine Predictions Branch, N/OMS 132, and along with the above same zoning corrector. ✓

A TRA of 0.3 fms was applied to all launch soundings, as determined by daily bar checks. A TRA of 1.9 fms was applied to all BS³ soundings. These corrections were applied to both preliminary and final sounding plots for both the HYDROPLOT and BS³ systems. ✓

Sound velocity corrections were applied to the HYDROPLOT final sounding plot and to the BS³ field sheet and final sounding plot. ✓

On 25 February 1983, PMC notified the ship that the newly-installed transducers on the survey launches were installed level with the hull when D.I.W. rather than level with the waterline when on a plane. DA-1's transducer was remounted when the problem was recognized, but DA-2 operated throughout the project with the improper mounting. On or about 28 February 1983, Mr. Mel Asato (MOP 132) advised the ship via radio that a noticeable difference between recorded and actual depths would be seen only in depths greater than 30 fathoms. Due to the area required to be surveyed by launch, DA-2 necessarily ran some hydrography in areas where the depths were greater than 30 fathoms. Subsequent comparisons with BS³ showed no apparent errors at these greater depths. ✓

On 28 February 1983, Electronic Technician Bill Stultz found that the depth sounder on DA-1 was hooked up to the 12 khz (wide beam) transducer rather than the 100 khz (narrow beam) transducer. This resulted in a mismatch between the transmitter and receiver reducing the power and sensitivity of the unit. Lead line comparisons taken on 28 February 1983 (JD 059) with the wide beam transducer showed that the data collected on 26 and 27 February using the wide beam transducer was acceptable. The narrow beam transducer was used for collecting data on 28 February and for the remainder of the survey. ✓

E. HYDROGRAPHIC SHEETS

Field sheets were prepared by shipboard personnel at a scale of 1:10,000 using DAVIDSON's PDP 8/e, DP-3 plotter, and standard NOS ✓

software. A blowup (1:2500 scale) was prepared for the U.S. Navy's Submarine Base pier area, from south of the Service Pier to north of the Explosives Handling Wharf (EHW), to relieve congestion of the soundings in the pier areas. All data will be submitted to the Pacific Marine Center for verification and smooth plotting. ✓

F. CONTROL STATIONS

Two triangulation stations were established and 12 stations were recovered to control hydrography and locate fixed aids to navigation and landmarks. Station HIAQUA 2 1983 was established when Station HIAQUA 1964 was found destroyed. A new station VINELAND 1964 AZ 1983 was established to control hydrography on the east side of Hood Canal away from the possible electromagnetic effects of the Magnetic Silencing Facility (MSF). Third Order, Class I techniques were used in all geodetic work. All computations are based on the North American Datum of 1927. The stations used to control hydrography are listed below: ✓

<u>Station</u>	<u>Signal Number</u>
SET 2, 1934	001
VINELAND, 1964 AZ 1983	002
VINLAND, 1964	003
WHARF, 1964 1971	004
THREE SPITS 2, 1934	005
KING, 1934	006
CHUTE 3, 1945	007 ✓
CURRENT 2, 1934	008
HIAQUA 2, 1983	009
GREEN 3, 1964	010
EULA 2, 1964	011
SOUTH 3, 1961	013
HOOD CANAL LIGHT #8	014
HOOD CANAL LIGHT #7	015
HOOD CANAL LIGHT #10	017

For further information, consult the appended Signal List, Electronic Control Report, and Horizontal Control Report.

G. HYDROGRAPHIC POSITION CONTROL

Sounding line position control was accomplished by range-range techniques using Motorola Miniranger III. A list of serial numbers and shore station configurations can be found in the appended ✓

Electronic Control Report.

Baseline calibrations were accomplished on 23 February, 04 March, and 25 March 1983. The second initial calibration was conducted on 04 March after R/T unit S/N 1635 failed in the field and console S/N 713166 and R/T unit S/N 1645 became available. The console/RT pairings calibrated on 04 March were used thereafter during the survey. Calibration results and corrector abstracts can be found in the Electronic Control Report. ✓

Daily Miniranger systems checks were performed twice daily each working day, except more often when multiple set-ups were employed on a given day. Critical calibrations of the sextant fix or fixed point methods were performed on every set-up used during the project. Normally, a non-critical calibration (baseline crossing) was performed in conjunction with each critical calibration. ✓

Problems with the Miniranger system ranged from difficulties experienced while running BS³ with a tree at SET 2 1934 obstructing the line of sight, to failure of R/T Unit 1635 early in the project. Other problems included the failure of Code 3, and the necessity of support personnel in skiffs to be available to redirect shore station antennas. ✓

Further information can be obtained from the appended Electronic Control Report. ✓

H. SHORELINE

Shoreline features shown on the field sheet were obtained from revision print numbers 118460 - 118466 dated 06 January 1983. Shoreline verification was accomplished on the entire shoreline within the project area and changes are shown in red on the final field sheets. ✓

A discrepancy between the actual shoreline and that plotted on revision print BP 118462 was noted between 47°46'12"N, 122°44'57"W and 47°46'33"N, 122°44'45"W. Horizontal sextant angles taken along the approximate high water line in the area in question were used to delineate the Mean High Water Line on the final field sheet (fix numbers 5038 - 5041, 5043 - 5045, 5262). This section of the shoreline is shown in red on the final field sheet. During shoreline verification, it was noted by the hydrographer that the shoreline is obscured in this area by overhanging trees. ✓

Features questioned during revision print compilation were verified as per instructions of Section 5.4.1.2 of Change No. 1 to the project instructions. Comments resolving these questions are listed below, by sheet: ✓

BP 118460

Unidentified structure near 47/51/43N, 122/41/20W was not investigated, being well north of the survey area.

BP 118461

Ferry slips at South Point and Lofall still exist, though are abandoned. Residents at the Lofall terminal indicated that the pilings and timber bulkheads will be removed to make way for a private marina at a later date. ✓

The unidentified structure, logs, ramps, groin, rock, and log bulkhead were not investigated, being well north of the survey area. ✓

BP 118462

The groin in question was not investigated, being 12 miles by small boat from the project area. ✓

BP 118463

The U.S. Navy Magnetic Silencing Facility (MSF) shown under construction on the revision print at 47/46/15N, 122/42/35W has been completed and is now operational. ✓

The label in question (log) near 47/46/55N, 122/44/55W was probably a log at the time the photography was flown. Numerous logs in the area when verification was being done made the delineation of a particular log impossible. No other structure was found in the area. ✓

BP 118464

The concrete and log bulkheads questioned near 47/48/13N, 122/40/33W were verified as shown on the revision print. ✓

Likewise, the pile bulkhead and adjoining boulder bulkhead questioned near 47/47/10N, 122/41/10W were verified as shown on the print. ✓

BP 118465

None of the items shown on this sheet for field verification were checked as they were outside of the project area. ✓

BP 118466

The feature in question was verified to be two barges semi-permanently moored to a row of eight dolphins. The dolphins extend 93.2 meters northwest of the northwest face of the T pier.

The second item, "3 dolphins not visible when revised" located to the northwest of the aforementioned dolphins, was listed as a PSR item in the project instructions. A wire drag was made in the area 50 meters from the northernmost dolphin. The area was swept 5 times. One submerged piling was located at 47/44/11.43N, 122/44/23.30W. More details can be found in Section K of this report. ✓

Three U.S.C.G. Aids to Navigation in the project area were located by Third Order methods and subsequently used to control hydrography. Hood Canal Light #10, in the vicinity of Brown Point, and Hood Canal Lights #8 and #7, in the north end of the project area, were used as Miniranger station locations. ✓

I. CROSSLINES

Crosslines constituted 12.1% of the mainscheme HYDROPLOT hydrography and 8.6% of mainscheme BS³ hydrography. All crosslines were scanned and agreement with mainscheme soundings was, in general, found to be good. ✓

Crossline comparisons in depths greater than 5 fathoms resulted in 91 (54%) of the comparisons agreeing exactly with the mainscheme soundings, 61 (36%) agreeing within one fathom, 14 (8%) agreeing within 2 fathoms, and only 3 (2%) showing disagreement of more than 2 fathoms. In the latter 3 cases, the terrain in question was steep, and these discrepancies are not considered significant. ✓

Four crossline comparisons were made in depths less than 5 fathoms. One compared favorably with mainscheme (0.2 fathoms), one sounding differed by 0.5 fathoms, but was in an area of a steep slope and was considered acceptable, while two others differed by 0.4 fathoms in an area of slowly sloping bottom at the north end of Thorndyke Bay. The crossline soundings, run on JD 067, and mainscheme soundings (JD 061) are tabulated below: ✓

	<u>XL Fix No./</u> <u>out</u>	<u>Depth</u> <u>(fms)</u>	<u>MS Fix No./</u> <u>out</u>	<u>Depth</u> <u>(fms)</u>
Discrepancy A	4648/2nd	1.9	4183/1st	2.3
Discrepancy B	4647/1st	3.8	4198/2nd	4.2

It is felt that the use of observed tide data will resolve these discrepancies, as the mainscheme and crosslines were run on different days. ✓

BS³ crosslines are impossible to compare with mainscheme hydrography, as all soundings are plotted in the same color and angle on the sounding plot. However, inspection of the soundings in the vicinity of the crosslines (from overlay of the position plot) shows consistent soundings to the extent that in roughly 80 to 90% of the observed overprinted soundings in the vicinity of a crossline, exact agreement resulted, with only 1 to 2 fathom differences in other cases. Recall the BS³ was run in depths greater than 20 fathoms during this project. ✓

J. JUNCTIONS

Survey H-10072 junctions with the following surveys:

H-8916	1:10,000	1966
H-9035	1:10,000	1969

See
Evaluation
Report
Section 5

In the northern portion of the survey area, H-10072 was found to junction well with H-8916 comparing HYDROPLOT data. In 9 cases (45%), soundings agreed exactly; in 7 cases (35%), the soundings were within 1 fathom of the junctioned survey; and in 2 cases (10%), agreement was within 2 fathoms. In 2 cases along a steep slope, the difference was greater than 2 fathoms, but not judged significant. ✓

Thirty-two comparisons of BS³ soundings with survey H-8916 showed excellent agreement. Thirty-two direct comparisons resulted in exact agreement in 24 cases (75%), agreement within 1 fathom in 7 cases (22%), and agreement within 2 fathoms in 1 case (3%). ✓

Poor agreement was found in depths less than 10 fathoms on the west side of the canal between Hood Canal Light #8 and Station SOUTH 3 1961, although no direct comparisons were made. Differences up to 4 fathoms from nearby soundings indicate change has occurred in this area. The depths from H-10072 are deeper in all cases. A possible cause for this discrepancy may be the instability of the bluff immediately south of the area in question. While conducting operations in this area, near-constant slides along the bluff were witnessed by shipboard personnel. This, coupled with a northward moving current induced primarily by the predominant southerly wind, could cause depths to change in this area. ✓

In the south portion of the project area, junctions with survey H-9035 were generally excellent. HYDROPLOT soundings were compared with the 1969 survey in 101 instances, resulting in exact comparisons in 39 instances; agreement within 1 fathom in 40 cases; and within 2 fathoms in 13 cases. The remaining 9 cases showed disagreement of between 3 and 7 fathoms. In all cases, these disagreements were found in steeply sloping terrain in several different areas. ✓

The bottom topography of the west side of the canal appears to have changed from the earlier survey, as soundings in the 25 to 50 fathom range were recorded nearer the shore than previously. In the more shoal areas (less than 10 fathoms) on the west side, soundings were up to 2.5 fathoms deeper than found on H-9035. ✓

The east side of the canal shows signs of change as well. Both King Spit and Carlson Spit have been reduced in size by the current and several discrepancies in depth (up to 7 fathoms) exist in the vicinity of these two spits, in the range of depths 15 to 35 fathoms. Nearshore depths also show change from the 1969 survey ✓

near King and Carlson Spits. The trend in these areas is toward deeper soundings recorded during the present survey, except immediately north of both King and Carlson Spits, where depths were found to be slightly shoaler.

BS³ and HYDROPLOT soundings were compared in the 200 meter overlap area joining the two survey systems. One hundred and fourteen direct comparisons were made between HYDROPLOT and BS³ soundings recorded during this survey, with excellent agreement overall. 68 soundings (59%) agreed exactly, 36 comparisons (32%) agreed within 1 fathom, and 6 (5%) within 2 fathoms. The remaining comparisons agreed within 3 fathoms. ✓

K. COMPARISON WITH PRIOR SURVEYS

AWOIS No. 50015 AND 50008,

Two PSR items were assigned to OPR-N165-DA-83. The first is three dolphins shown on T-12258 in the vicinity of the Keyport-Bangor Docks which were not visible on the July 1982 photographs. A "feature in question" in the same area is also listed on BP 118466. The feature in question is two floating barges securely moored to a row of 8 dolphins extending northwest of the end of the fixed "T" pier. These dolphins are also shown on T-12258. Visual inspection of the area appears to agree with what is shown on T-12258, but sextant fix (and check fix) #5263 indicates that the northwesternmost dolphin shown on T-12258 is no longer present, as the fix plotted slightly southeast of the T-sheet position. Mr. Jim Massey (MOP 212) recommended a 50 meter radial wire sweep from the end of the westernmost dolphin be conducted. ✓

On JD 081, an investigation utilizing wire drag equipment, divers, skiff 43 and launch DA-1 was undertaken to verify or disprove the existence of 3 dolphins reported in a survey completed in 1969 but not observed in the 1982 revisory photography. The investigation took place in the vicinity of Matson Spit (47°44'10" N, 122°44'22"W). The skiff was tied alongside the northwesternmost of 8 dolphins with Miniranger transponder attached. A six-fathom weighted drag line and float was tethered to the skiff and lowered to the bottom of the canal. A similar line and float was suspended from DA-1. The two weights had a 1/8" cable drawn between them and the launch, with the aid of the Miniranger, ran arcs around the skiff. Four arcs were run at a radius of 50 meters, 1 arc at 40 meters, and 2 arcs at 30 meters. No obstruction was found until a piling was snagged while retrieving the drag gear. The piling was found approximately 10 meters from the dolphin. Sextant angles were then observed to locate the submerged piling. Divers were used to search the area shoreward of the dolphin and to affix the float to the piling. Further details of the operation are located in Sounding Volume #2 (DA-1). ✓

CDR Hamilton, Chief Staff Officer, COMSUBRON Seventeen, stated that a storm during the past winter had destroyed a dolphin which was located on a line with and northwest of the existing end dolphin. ✓

The revision of this area is shown in red on the final field sheet. It is recommended that, since the piling located is within an area of other debris (Section L), the entire area be shown as foul on the chart. This recommendation is included in a letter to the Commander, 13th Coast Guard District, a copy of which is appended to this report.

ANKOIS 50008
PSR item No. 2 is a wreck shown on Chart 18458 at position 47°47'54"W, 122°41'12"W. NOS Wreck and Obstruction Information System files show that the tugboat *FRANCOIS* was refloated on 15 April 1980. Survey of the area showed no signs of any debris and it is recommended that the wreck symbol be removed from the chart.

✓
Evaluator
Concurs

The survey was compared with prior survey H-7099, 1:10,000 scale, dated 1946-47, and with U.S. Navy Survey #306241, 1:12,500 dated 1964. Both BS³ and HYDROPLOT data were compared to the C&GS earlier survey with good overall results. Forty-three direct comparisons were made using BS³ data. In 25 cases (58%) exact agreement resulted; in 14 cases (33%), depths varied within 1 fathom; and in 3 cases (7%), the depths agreed within 2 fathoms. In one case, a 4 fathom discrepancy was found in a steeply sloping area.

See
Evaluator
Report
Section C

Comparison to the 1946-47 survey using HYDROPLOT data showed good results, but several poor comparisons resulted on the west side of Hood Canal north of Brown Point. The bottom appears to drop off closer to the shore now than was charted during the prior survey. These largest differences in depths occur in the 30-50 fathom range near Brown Point and in the 15 to 35 fathom range further north in the vicinity of station GREEN 3 1964.

✓

Seventy-two direct comparisons were made with the HYDROPLOT data. 29 cases (40%) agreed exactly, 30 cases (42%) were within 1 fathom, and 5 cases (7%) agreed within 2 fathoms. Eight other cases with greater than 2 fathom comparisons were located in the sloping area on the west side as previously discussed.

✓

Several minor changes in the shoreline are evident on both sides of the canal, as mentioned in Section J of this report.

✓

The 1.5 mm restriction for comparing depths may have been exceeded when checking this survey against U.S. Navy Survey #306241, due to a difference in scales. 24 comparisons were made in the northern portion of the H-10072 area. 6 cases (25%) agreed exactly, 12 (50%) differed within 1 fathom, 4 cases (17%) within 2 fathoms, and the 2 remaining cases disagreed by 3 and 4 fathoms. In all but one of the cases, the current survey depths were deeper than those shown on the Navy survey.

✓

Other rocks located, but not shown on the revision prints, are listed below:

Fix No.	JD/Time	Lat/Long	Observed Elev.	Reduced Elev. (Pd)	Actual Tides
5015	71/1830	47/43/30.21, 122/44/34.73	Unc 4.6 ft	10.6	* (12)
5037	72/1924	47/44/43.65, 122/45/36.51 ✓	Unc 2.5 ft	7.9	* (9)
5042	72/2040	47/46/23.75, 122/45/00.87 ✓	Unc 3.2 ft	8.6	* (11)
5053	73/2105	47/46/31.24, 122/41/51.70 ✓	Unc 3.0 ft	7.8	* (10)
5054	73/2115	47/46/30.48, 122/41/54.07 ✓	Unc 6.5 ft	11.3	* (3)
5276	80/2354	47/48/16.25, 122/40/23.06 ✓	Unc 4.5 ft (highest of 3 rocks)	5.1	* (5)
5277	81/0002	47/48/16.92, 122/40/24.02 ✓	covered 1.3ft	-0.7	* (0)
5279	81/2050	47/47/55.66, 122/40/58.80 ✓	Unc 3.3 ft	9.3	* (10)
5280	81/2112	47/47/57.02, 122/40/57.74 ✓	Unc 0.8 ft	6.2	* (6)
5275*	80/2338	mean fix: 47/48/16.64, 122/40/22.10 ✓	Unc 6.5 ft	7.1	* (7)

* Inverse distance 7.6 m; rock located north of project area.

Two areas on the west side of the canal were judged foul with rocks by the hydrographer. One area, on the north side of Thorn-dyke Bay, was described by fix numbers 5287, 5292, and 5288. The rock positioned by fix 5292 uncovered 1.0 ft at the time of the fix. A second foul area was located north of the project area in the vicinity of control station SOUTH 3 1961. Fix numbers 5282, 5283, and 5284 delineate this area.

Evaluator
Concur:

Several obstructions were located in the area near Matson Spit (control station THREE SPITS 2, 1964) and are tabulated below:

Fix No.	JD/Time	Lat/Long	Description (reduced elev)
5260	74/192000	47/44/11.28, 122/44/21.80 ✓	4'x4' concrete block covered 2.8 ft at fix time (unc 0.8 ft)
5261	74/193000	47/44/11.48, 122/44/21.26 ✓	Large (1T+) stockless anchor unc 2.0 ft (5.6 ft)
5289- 5291	81/224800	47/44/13.00, 122/44/21.09	40'x15' sunken barge (?) covered 1.8 ft (unc 0.6 ft)
5293	82/171000	47/44/11.43, 122/44/23.30	Submerged piling covered 4.2 ft @ 2302Z JD 081 (unc 3.6 ft) (Cov 1.8 Ft at MLW)

L. COMPARISON WITH THE CHART

The largest scale chart of the area is No. 18458, 10th edition, 15 August 1981, at 1:25,000 scale.

See
Evaluation
Report
Section 7

Twenty-five direct comparisons were made comparing BS³ and HYDROPLOT soundings with the current edition of chart 18458. In depths greater than 20 fathoms, agreement was excellent, with 16 soundings (64%) agreeing exactly, 12 soundings (48%) differing by 1 fathom, and 2 soundings (8%) differing by 2 fathoms. In depths less than 20 fathoms, agreement was good in the north part, but variations were evident in the south. On the west side of the canal, depths were discovered to be up to 6 fathoms deeper than shown on the chart south of Thorndyke Bay. On the east side, however, depths were found to be up to 5 fathoms less than presently charted south of station VINLAND 1964. Longshore currents were found to be quite strong in the southern portion of the survey area (see Section P), and could account for the change.

The heights of fourteen rocks awash shown on the revision prints within the survey area were verified. Most of the shoreline verification performed was conducted under favorable conditions of low water and calm seas from an open skiff. Predicted tide information was applied to the heights of all rocks and these reduced heights are listed in the following tables. The heights of the rocks listed on the revision prints are tabulated below:

BP No.	Approx Lat/Long (From BP Sheet)	JD/Time	Observed Elev.	Reduced Elev. (Pred)	Actual Tide
118465	47/44/21.5, 122/46/17.8	072/190700Z	Unc 13.4 ft	18.8	⊙ (10)
118463	47/46/47.8, 122/44/53.2	075/202000Z	Unc 7.3 ft	10.3	* (11)
118463	47/47/04.7, 122/44/52.2	075/204500Z	Unc 4.5 ft	7.3	* (8)
118463	47/47/07.5, 122/44/52.0	075/205300Z	Unc 5.2 ft	8.2	* (9)
118463	47/47/20.5, 122/44/52.0	Not verified			* (4)
118463	47/48/36.3, 122/43/52.8	Foul area delineated by fixes 5287, 5288, 5292			
118463	47/48/36.1, 122/43/46.8				
118463	47/48/36.5, 122/43/44.3				
118460	47/48/45.2, 122/43/12.1	081/233000Z	Unc 3.5 ft	4.7	* (5)
118460	47/49/17.8, 122/42/22.0	074/221200Z	Unc 2.0 ft	6.8	* (9)
118463	47/45/47.9, 122/43/01.8	071/231500Z	Unc 3.7 ft	11.5	⊙ (4)
118463	47/46/30.3, 122/42/05.2	080/231600Z	Unc 6.7 ft	7.3*	* (8)
118463	47/46/30.3, 122/42/05.2	073/210000Z	Unc 1.5 ft	6.3*	* (8)
118464	47/47/42.3, 122/41/01.6	080/232800Z	Unc 8.6 ft	9.2	* (10)
118464	47/48/24.6, 122/40/15.6	081/215500Z	Unc 1.7 ft	5.3	* (6)

* Same rock observed on two separate occasions.

It is recommended by the hydrographer that this area be delineated as fouled with debris on the chart. Refer to correspondence dated 28 March 1983, appended to this report. ✓

Several changes were evident in the Navy pier area when comparisons were made with the latest edition of the chart. The official name for the Bangor Wharf is now the Bangor Marginal Wharf. The three fixed red lights shown on the wharf have been removed and should be deleted from the chart. The Chief Geographer for NOS (N/CG-215) approved Bangor Wharf as the official name. ✓

A Service Pier has been constructed at 47°43'52", 122°44'25", replacing five mooring buoys shown on the chart at 47°43'49.37", 122°44'27.66", 47°43'49.45", 122°44'30.28", 47°43'51.40", 122°44'28.02", 47°43'53.24", 122°44'28.85", and 47°43'55.60", 122°44'25.88". It is recommended that these buoys be deleted from the chart to make way for the service pier. The charted positions of two mooring buoys north of the service pier at 47°43'59.15", 122°44'22.24" and 47°44'02.40", 122°44'19.67" were verified by the hydrographer. ✕ Evaluator Concurs

Fixed red lights, maintained by the Navy, mark the north and south ends of the service pier. In addition, fixed red lights have been installed on the Explosives Handling Wharf (EHW) (3 lights), the Magnetic Silencing Facility (MSF) (2 lights), and the Delta Pier (2 lights). It is recommended that these lights be shown on the updated chart. See NOAA Form 76-40 appended to this report for positions of these lights. See Evaluation Report Section 7

A leg has been added to the Navy Delta Pier (47°44'35", 122°43'45"), joining the north face of the pier to the shore. The present configuration is shown on BP 118466 and the latest photography, and it is recommended by the hydrographer that the new chart reflect this change. Evaluator Concurs

The configuration of the Keyport-Bangor Docks (47°44'06", 122°44'18") is incorrect as shown. The "T" pier to the southeast is properly shown, but the fixed pier northwest of the "T" pier is actually two barges semi-permanently moored to a row of 8 dolphins extending northwest 93.2 meters from the northwest face of the fixed pier. The hydrographer recommends the "T" pier be shown as it presently appears on the chart, with a row of dolphins shown extending to the northwest. Refer to the smooth sheet for delineation. Evaluator Concurs

The radio tower built on the Explosives Handling Wharf (EHW) is of landmark value and should be labelled in the same manner as the Bangor Wharf Tower. is charted (Aero F1 R). The height of the EHW tower is 459 feet above Mean Sea Level (from Naval Exercise Area Chart 18462, 3rd ed., 08 Nov 1980 [1:18,228], based on C&GS surveys of 1946-47 and 1969). Evaluator Concurs

Several buoyage changes have been made since the latest edition of chart 18458 was published. An unlighted spherical yellow buoy marked "E" is located at 47°46'37.78", 122°42'59.57". Three other buoys have been removed in addition to the five mentioned earlier. Evaluator Concurs

in this section. A white and orange unlighted can buoy maintained by the Navy at position 47°42'36.62", 122°45'57.35" has been removed, * as have mooring buoys at positions 47°46'00.08", 122°44'09.60" and 47°47'19.15", 122°44'00.08". The hydrographer recommends that these buoyage changes be reflected on the next edition of the chart.

Evaluator
Concurs

Geographic names shown on chart 18458 were verified by area residents. The U.S. Navy refers to the area labelled Vinland on 18458 as Floral Point, but none of the residents nearby are familiar with that name. Residents living near the south end of the project area referred to the spit at 47°43'46", 122°44'35" as Carlson Spit, and to the spit north of that at 47°44'12", 122°44'20" as Matson Spit. In addition, LT Meridith Porter, Harbor Operations Officer, verified Carlson Spit as the name of the area in question. It is recommended by the hydrographer that the names Carlson Spit and Matson Spit be added in the appropriate area to the updated chart.

Evaluator
Concurs

The Warehouse shown north of King Spit has been converted to a private residence. The building has the appearance of a warehouse, and it is recommended that the building be shown as such, as it is still of landmark value. ✓

The pier west of the warehouse north of King Spit is in ruins and should be labelled as such on the chart.

Evaluator
Concurs

The house shown on the chart south of King Spit is no longer of landmark value, as many homes now exist in the area, none qualifying in the opinion of the hydrographer as being of landmark value. It is recommended that the symbol be removed. ✓

✓ Residents in the area of Lofall Ferry Terminal indicated that the dolphins and timber bulkheads of the ferry slip will be removed to make way for a private marina to be constructed seaward of the concrete bulkhead (chart 18461). No date was given for this construction. ✓

The stump shown on the chart at 47°48'38", 122°39'57" was not found. A large partially buried stump was found near the high water line, at 47°48'32.32", 122°40'05.14". The hydrographer recommends that the first stump be removed from the chart and the second be charted. High tides accompanied by strong currents are frequently experienced in Hood Canal, which may explain why the charted stump is no longer present. This feature plots outside the sheet limits.

Evaluator
Concurs

M. ADEQUACY OF SURVEY

This survey is complete and adequate within its boundaries to supersede the prior survey for charting, with the recommendations noted in other sections of this report. ✓

N. AIDS TO NAVIGATION

Comparison between the field work and the current U.S. Coast Guard Light List and with the 10th edition of chart 18458 show ✓

several discrepancies. One floating aid has been established at 47°46'37.78"N, 122°42'59.57"W. It is a 4' diameter yellow sphere marked with the letter "E". The Navy indicates that the buoy may be removed at a later date. A Dangers to Navigation Report was sent. Five other mooring buoys shown on the chart have been removed and a fixed pier built in its place. Seven buoys are shown in the area near 47°43'50"N, 122°44'28"W. The two northernmost buoys remain; the others have been removed. Two mooring buoys on the west side of the canal have also been removed: one at position 47°46'00.08"N, 122°44'09.60"W, the other at 47°47'19.15"N, 122°44'00.08"W. In addition, the Dabob Canal Bay Buoy at 47°42'36.62"N, 122°45'57.35"W has been removed. All of these buoys are Navy maintained.

Evaluator
Concurs

Several fixed aids to navigation have been established by the Navy that are not shown on the latest edition of Chart 18458 nor listed in the Light List. Fixed red lights marking the corners of U.S. Navy piers are located on the Service Pier (2), Delta Pier (2), Explosives Handling Wharf (3), and Magnetic Silencing Facility (2). The three fixed red lights shown on the Bangor Wharf (Light List No. 2424) have been removed. See the appended Form 76-40 for exact positions. Revised geodetic positions were computed for Hood Canal Lights #7, 8, 10, and 11, as well as the Hazel Point Light, and are included on the appended form 76-40. Hood Canal Light #11 and the Hazel Point Light are located outside the project area, as is Hood Canal Light #5. The position determined for Hood Canal Light #5 did not meet 3rd Order, Class I specifications, but it is felt that when an adjustment of the area is completed, the position of this light will meet the accuracy standards.

Evaluator
Concurs

Radio messages were sent to the U.S. Coast Guard, 13th District Headquarters, on 27 February and 28 March 1983 concerning the dis-establishment of the Bangor Wharf Lights and buoy "E", respectively. Confirming letters were sent on 01 March and 28 March 1983 requesting publication in the Local Notice to Mariners. Copies of these letters are attached to this report.

The following is a list of floating aids to navigation in the project area:

<u>Buoys in Area</u>	<u>Position</u>	<u>Description</u>
Bangor Explosives Anchorage Buoy "A"	47/45/48.86,122/43/22.70 ✓	White structure buoy "A" with 4 sec white F1 light ✓
Bangor Explosives Anchorage Buoy "B"	47/44/24.90,122/44/24.00 ✓	White structure buoy "B" with 4 sec white F1 light ✓
Bangor Explosives Anchorage Buoy "E"	47/46/37.78,122/42/59.57 ✓	4' yellow sphere with black "E" ✓

Mooring Buoy "2"	47/44/29.70,122/44/12.00'	8' diameter can; B/W
Mooring Buoy (south of 2)	47/43/59.15,122/44/22.24'	4' yellow sphere with eye
Mooring Buoy (north of 2)	47/44/02.40,122/44/19.67'	4' yellow sphere with eye

Buoys No Longer in Area (from chart 18458 and
FFAIDS printout)

Dabob Canal Bay Buoy	47/42/36.62,122/45/57.35'
Mooring Buoys	47/43/49.37,122/44/27.66'
	47/43/49.45,122/44/30.28'
	47/43/51.40,122/44/28.02'
	47/43/53.24,122/44/28.85'
	47/43/55.60,122/45/25.88'
	47/46/00.08,122/44/09.60'
	47/47/19.15,122/44/00.08'

The following is a list of fixed aids to navigation located in or near the project area.

<u>Aid Description</u>	<u>Position</u>	<u>Characteristics</u>
Hood Canal Light #7	47/48/06.574,122/40/51.207'	F1 G 4 sec
Hood Canal Light #8	47/48/49.068,122/42/46.978'	F1 W 4 sec
Hood Canal Light #10	47/45/03.265,122/45/14.407'	F1 R 4 sec
Hood Canal Light #11	47/41/25.449,122/44/45.898'	F1 G 4 sec
Hazel Point Light	47/41/35.676,122/46/10.219'	F1 W 4 sec
Hood Canal Light #5	for adjusted position, contact MOP 222	F1 G 2.5 sec
Fixed Red Light	Service Pier South 47/43/50.48,122/44/30.49'	
Fixed Red Light	Service Pier North 47/43/56.11,122/44/23.98'	
Fixed Red Light	Delta Pier SW Corner 47/44/36.54,122/43/56.70'	
Fixed Red Light	Delta Pier NW Corner 47/44/37.79,122/43/55.92'	
Fixed Red Light	EHW Pier SW Corner 47/45/12.12,122/43/22.64'	
Fixed Red Light	EHW Pier NW Corner 47/45/17.50,122/43/24.21'	

} out of project area.

Fixed Red Light	EHW Pier NE Corner Entrance 47/45/18.47,122/43/22.29'
Fixed Red Light	MSF SW Corner 47/46/13.78,122/42/40.62'
Fixed Red Light	MSF NW Corner 47/46/21.00,122/42/36.44'

Lights to be Deleted from Light List & Chart

3 Bangor Wharf fixed red lights (LL #2424) ✓

0. STATISTICS

1. No. of BS ³ positions (DAVIDSON):	1,743
2. Nautical miles of BS ³ sounding lines:	197.9
3. Square nautical miles of BS ³ hydrography:	6.9
4. No. of HYDROPLOT positions:	
DA-1	1,198
DA-2	729
5. Nautical Miles of HYDROPLOT sounding lines:	251.7
6. Square nautical miles of HYDROPLOT hydrography:	7.8
7. Bottom Samples	62
8. Nansen casts:	1
9. Sound velocity casts:	6
10. Tide stations occupied:	2
11. Dive investigations:	1

P. MISCELLANEOUS

Items addressed in this section include:

1. negative depths appearing on the BS³ sounding plot;
2. geographic names investigation;
3. lack of hydrography in vicinity of Magnetic Silencing Facility;
4. fathometer initial adjustment to data on JD 081;
5. currents experienced along spits;
6. Brown Point Range Markers;
7. 45-meter line spacing in Navy Pier area; and
8. offset between revision prints and final field sheet. ✓

1. Negative depths on BS³ Sounding Plot:

BS³ sounding data show a depth of -625 fathoms in a series of soundings taken on JD 074 at time 173700Z (fix no. 1123) and depths of -647 fathoms for 2 soundings taken on JD 075 at time 193644Z (fix no. 2101). The trace of the depths is uninterrupted in both cases as shown on survey summary files #074171 and 075192, respectively, yet the output of the Combined Offline Program (COP) indicates these depths, which resulted on the final BS³ sounding plot. It appears that ✓

a software error is causing these anomolous depths, and Mr. Thomas Stepka, N/C6X3, has been alerted to the problem. Copies of the Survey Summary File for the times in question have been appended to this report.

2. Geographic Names Investigation

In accordance with the Hydrographic Manual and Hydrographic Survey Guideline No. 10, a geographic names investigation was undertaken concurrent with this survey. Five private citizens from various areas near the project area were asked about the validity of names shown on chart 18458 and whether any additions could be made. LT Meredith Potter, Harbor Operations Officer, Naval Submarine Base, Bangor, Washington, was also consulted. ✓

Two residents verified the names Carlson Spit and Matson Spit, located at 47°43'47"N, 122°44'35"W and 47°44'11"N, 122°44'22"W, respectively. In addition, LT Potter verified the name Carlson Spit. LT Potter and other Navy personnel refer to the area at 47°46'04"N, 122°42'50"W as Floral Point, rather than Vinland, as shown. Nearby residents, however, refer to the area as Vinland. Other names shown on the chart were verified by all five residents questioned. ✓

Names and addresses of Naval personnel and residents surveyed are:

Local Residents

1. Don Lofall
27715 Belam N.W.
Poulsbo, WA
2. Jane Fultz
101 Peabody Way
Port Ludlow, WA
3. Paul Pine
3910 Lakeness N.W.
Poulsbo, WA
4. Calvin McDonald
17222 Olympic View Rd. N.W.
Silverdale, WA
5. Max Starcevich
17208 Olympic View Rd. N.W.
Silverdale, WA

Naval Personnel

1. CDR J.E. Hamilton
Chief Staf Officer
COMSUBRON Seventeen
Bremerton, WA 98315
2. LCDR Leo Taflin
Operations Officer
Commander Submarine Group 9
Bremerton, WA 98315
3. LT Meredith Potter
Harbor Operations Officer
Bremerton, WA 98315
4. QMCM E.J. Doyle
COMSUBGRU NINE
Bremerton, WA 98315

3. Lack of Hydrography in the Vicinity of the Magnetic Silencing Facility

Hydrographic operations were not undertaken in the vicinity of the Magnetic Silencing Facility (MSF) at the request of Mr. John ✓

Vandal and Mr. Jim Balnes, operators of the MSF. The request was necessary due to various submerged electronic devices located throughout the area near the Facility.

4. Fathometer Initial Error, JD 081

While collecting soundings along the west face of the Delta Pier and behind the Service Pier, it was noticed that the fathometer initial adjustment was reading 0.2 fathoms, rather than set on zero. The launch OIC kept the initial adjustment offset throughout the day, thus all fathometer data gathered were digitized with a 0.2 fathom bias. Since all of these data were hand-plotted on the 1:25000 scale blow-up of the pier area, a correction was made when the data were transferred to the final sounding plot of the pier area.

5. Currents

Strong currents were noted in the project area. These currents ran parallel to the shore several hundred meters offshore (see Field Tide Note). These currents were noted particularly in the area of Matson Spit (station THREE SPITS 2 1934), as well as in the north near stations SOUTH 3 1961 and SET 2 1934.

6. Brown Point Range Markers

A temporary navigation range has been constructed on Brown Point by the U.S. Navy. The range markers were located as described in the Horizontal Control Report and this information will be passed on to the Chief Staff Officer, COMSUBRON Seventeen, at his request. It is recommended that these structures not be shown on the chart due to their temporary nature. Permanent structures may be constructed in the future.

7. 45-Meter Line Spacing in Navy Pier Area

On 23 February 1983, a meeting was held with CDR J.E. Hamilton, Chief Staff Officer, concerning hydrographic operations in Hood Canal. CDR Hamilton requested additional hydrography between the EHW Pier and Carlson Spit, due to the large amount of Navy boat traffic in that vicinity. To accommodate the request, 45-meter line spacing was run in this area. Ninety-meter line spacing was shown on the HYDROPLOT final field sheet and the additional 45-meter splits were placed on the overlay to reduce sounding congestion.

8. Offset Between Revision Prints and Final Field Sheet

It was noted during compilation of the final field sheet that sextant fixes locating fixed red lights on the Navy Service Pier, Explosives Handling Wharf, and Magnetic Silencing Facility exceeded allowable tolerances when plotted on the final field sheet. Positions of the lights on the Service Pier (fix numbers 5018, 5019) and the

Evaluate
Concur

Explosives Handling Wharf (5029, 5030, 5031) appear to be offset 1 mm to the south, when compared to the pier shown on the final field sheet. The revision prints in question are BP-118466 and BP-118463. The north light on the Magnetic Silencing Facility (fix number 5049) is offset to the north approximately 1 mm on the scale of the sheet. Sextant fixes and check fixes were checked for inverse distance tolerances and all fixes were found to be satisfactory. Both revision prints were overlaid on the final sheet to ensure the proper transfer of shoreline detail was made. Results of this check were positive. The hydrographer recommends that the revision prints be checked against the latest photography to ensure proper positioning of these features.

Evaluator
Concurs

Q. RECOMMENDATIONS

It is recommended that a chartlet be issued of the area from approximately 47°46'30"N to King Spit on the east side of Hood Canal to 0.5 miles offshore. Numerous changes near the U.S. Navy installation would be dealt with more easily in this manner than by individual changes in the Local Notice to Mariners.

✓

R. AUTOMATED DATA PROCESSING

The following HYDROPLOT programs were utilized for automated data acquisition and processing during this survey:

<u>Program Number</u>	<u>Program Name</u>	<u>Version Date</u>
RK 112	Range-Range Real Time HYDROPLOT	8/ 4/81
RK 201	Grid, Signal, and Lattice Plot	4/18/75
RK 211	Range-Range Non-Real Time Plot	2/ 2/81
RK 300	Utility Computations	10/21/80
RK 330	Reformat and Data Check	5/ 4/76
RK 407	Geodetic Inverse/Direct Computation	9/25/78
AM 500	Predicted Tide Generator	11/10/72
RK 561	Geodetic Calibration	2/19/75
AM 602	Elinore (Line Oriented Editor)	5/20/75
RK 212	Visual Station Table Load and Plot	4/ 1/74
RK 215	Visual Position and Sounding Plot	2/11/81
RK 360	Electronic Corrector Abstract	2/ 2/76
RK 530	Layer Correctors for Velocity	5/10/76

✓

The following programs were used in automated data acquisition and processing on the BS³ during this survey:

<u>Program Name</u>	<u>Version</u>	<u>Date</u>
SURVEY	8	Feb 83
COP	7	Feb 83
TABGEN	4	Feb 83
TIDGEN	3	Feb 83
TIDLST	3	Feb 83
SURF	8	Feb 83
ABSTRT	6	Feb 83
GULP	3	July 81
POP	4	Feb 83
SPLIT	5	Feb 83
MTUTIL	2	Feb 83
MT1EOF	1	Dec 78
SMITEN	6	Feb 83
SMOOTH	1	Feb 83
NAVPLT	1	Feb 83

Programs COPOUT (2/Feb 83), CALIB (3/Feb 83), and GUPPY (2/Feb 83) were attempted without success as part of the BS³ processing routine.

The COP program was modified during the 18-27 March inport to accept Julian day changes.

Geodetic computations were made using the geodetic, triangulation, and EDM programs written for the HP-9815A calculator.

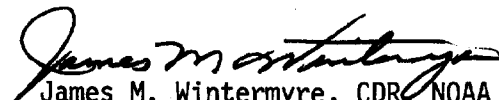
S. REFERRAL TO REPORTS

Horizontal Control Report for H-10072, 1983.
 Field Tide Note
 Electronic Control Report
 Corrections of Echo Soundings Report ✓
 Field Geographic Names
 Coast Pilot Report

Respectfully submitted,


 Mark P. Koehn, LT, NOAA

Approved and forwarded,


 James M. Wintermyre, CDR, NOAA
 Commanding Officer
 NOAA Ship DAVIDSON

/

FIELD TIDE NOTE
OPR-N165 -DA-83
Hood Canal, Washington

Predicted tides for Seattle (Reference Station 944-7130), Washington were used to reduce survey OPR-N165-DA-83 soundings to Mean Lower Low Water Datum. Sounding data was collected using the shipboard Bathymetric Swath Survey System (BS3) and conventional survey launch Hydroplot.

Binary and ASCII predicted tide tapes were generated on the DAVIDSON's PDP8/e computer using Program AM500, Predicted Tides Generator (11/10/72 version) for use during Hydroplot survey operations and postprocessing. BS³ data was reduced with predicted tide data for Seattle, Washington from magnetic tapes generated by the Marine Predictions Branch, N/OMS 132.

Hood Canal was divided into two tidal zones for sounding data reduction. The zone, north of a line between latitude 47°46.0'N, longitude 122°43.0'W and latitude 47°46.5'N, longitude 122°45.0'W, had corrections of -8 minutes for high water, -5 minutes for low water, and a height correction factor of 0.91. Corrections of -7 minutes for high water, 0 minutes for low water, and a height correction factor of 0.95 were applied south of the line.

Fischer and Porter Analog to Digital Recorder (ADR) gages were installed at Bangor (47°44'55"N, 122°43'28"W) and Lofall (47°48'52"N, 122°43'28"W) on the eastern side of Hood Canal in support of survey operations. The Bangor tide station (944-5133) was located on the northeastern tip of the Marginal Wharf (charted as Bangor Wharf on NOAA Chart 18458, 10th Ed., Aug. 15/81), Naval Submarine Base, Bangor, Washington. Gage serial number S/N 2R6406A583N7 operated from 24 February to 7 March 1983. Gage S/N 7403A3402M5 operated from 7 March 1983 until the end of survey operations. The Lofall tide station (944-5088) was established on remnant pilings of old pier immediately south of the Lofall Ferry Dock. Gage S/N 6903A5568M13 operated from 23 February to 25 March 1983. Gage S/N 7601A1469M19 operated from 25 February until survey operations were completed.

Numerous problems were experienced with the Lofall and Bangor gages. The first gage installed at Lofall jammed twice in two days of operation, ostensibly due to a warped punch bar. The replacement gage worked satisfactorily. As a precautionary measure on 7 March a new punch bar was installed in the replacement gage as per Pacific Tides Party (PTP) verbal instructions of 4 March 1983. The replacement gage failed on 23 March as a result of vibration loosening the nut which held the floatwire spool locked against the drive shaft. Fortunately, hydrographic operations had concluded the previous day. The gage installed at Bangor Marginal Wharf appeared to work satisfactorily until a routine observation opportunistly coincided with a gage mispunch, revealing the gage code disks were misindexed. The gage was replaced on 7 March as per PTP verbal instructions of 4 May, and no further problems were experienced with it.

Tide gages were set and records annotated in Universal Coordinated Time (UTC) although the GMT (Greenwich Mean Time) notation was used interchangeably with UTC. Local (watch) time was converted to UTC by applying a +8 zone description.

Third-order levels were run between each gage staff and four or more nearby bench marks at the times of tide station installation and removal. A Zeiss Ni2 Level, a Lietz Sokkisha B-1 Level, and a Keuffel and Esser Metagrad Philadelphia Rod were used. The levels were peg tested prior to use; level error (C) was found to be within acceptable limits of ± 0.00005 .

The elevation differences determined during opening and closing level runs between bench marks at each tide station agreed favorably with historic elevation data. Opening and closing bench mark elevations above zero of the tide staffs agreed within 0.002 m at both tide stations. There was no evidence of staff or gage movement.

Based on the mean of 19 staff-to-gage comparisons made between 25 February and 22 March a punched tape reading of 55.65 (Standard Deviation, SD = +0.06) feet at the Lofall tide station corresponds to 0.0 feet on the staff. Based on 7 comparisons between 27 February and 7 March at Bangor tide station, a reading of 10.14 (SD = +0.02) feet corresponds to 0.0 feet of the staff. The Bangor gage was replaced on 7 March. Thirteen comparisons from March 7 - 23 revealed a staff-to-gage difference of 9.96 (SD = +0.04) feet.

Data was collected in digital format on the ADR gages, rendering it impractical to make comparisons of times of high and low tides between the Lofall and Bangor tide stations. However, observed heights and times of tidal extrema appeared to agree with predicted values. No unusual tides or currents were noted, though strong currents flowing approximately parallel to the shoreline were observed several hundred meters offshore from Horizontal Control Stations SOUTH 3 1961 ($47^{\circ}49'41.181''N$, $121^{\circ}41'37.198''N$), SET 2 1934 ($47^{\circ}48'43.222''N$, $122^{\circ}39'52.267''W$) and THREE SPITS 2 1934 ($42^{\circ}44'11.105''N$, $122^{\circ}44'19.846''W$).

Respectfully submitted,

Eric G. Hawk

Eric G. Hawk
ENS, NOAA

Approved and forwarded,

James M. Wintermye

James M. Wintermye, CDR, NOAA
Commanding Officer
NOAA Ship DAVIDSON

EGH:jaf

OPR-N165-DA-83

DA-10-1-83(H-10072)

PREDICTED TIDES CORRECTOR PRINTOUT

SEATTLE, WASHINGTON

HOOD CANAL

47 48 122 42 -0.08 -0.05 0.0 0.0 0.91 0.91

000

FM

0.1

GEOGRAPHIC NAMES

H-10072

Name on Survey	A	ON CHART NO. 18458							
	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	GRAND McNALLY ATLAS							
	H	U.S. LIGHT LIST							
	I	Sheet							

BANGOR	X							X	1
BANGOR WHARF	X							X	2
BROWN POINT	X							X	3
CARLSON POINT - PER MCGRYS TELECON ON 9/7/83 - PENDING BOARD ON GEOG. NAMES DECISION									4
FLORAL POINT - PENDING BOARD ON GEOG. NAMES DECISION									5
HOOD CANAL	X							X	6
KING SPIT	X							X	7
MATSON SPIT - PENDING BOARD ON GEOG. NAMES DECISION									8
THORNDYKE BAY	X							X	9
TOANDOS PENINSULA	X							X	10
VINLAND	X							X	11
WASHINGTON (Title)									12
									13
									14
									15
									16
									17
									18
									19
									20
									21
I will notify PMC									22
when B&N decisions are made - normally									23
takes approx. 3-4 months									24
									25
NOTE: ERASE ALL PENCILLED NOTES AT APPROPRIATE TIME									25

Approved:

Charles E. Harrington
Chief Geographer - N/CG 2x5

15 AUG. 1983

CGH

OPR-N165-DA-83
DA-10-1-83(H-10072)
VELOCITY TAPE PRINTOUT

TABLE 1:

000063	0	0000	0001	001	000000	010072
000155	0	0001				
000246	0	0002				
000328	0	0003				
000407	0	0004				
000485	0	0005				
000565	0	0006				
000640	0	0007				
000720	0	0008				

TABLE 2:

000054	0	0000	0002	001	000000	010072
000146	0	0001				
000226	0	0002				
000310	0	0003				
000390	0	0004				
000470	0	0005				
000541	0	0006				
000610	0	0007				
000680	0	0008				

OPR-N165-DA-83
DA-10-1-83(H-10072)
TC/PI TAPE PRINTOUT

LAUNCH DA-1(3131)
184920 0 0003 0001 057 313100 000000
172738 0 0003 0002 071 313100 000000
165149 0 0003 0002 075 313100 000000
235900 0 0003

LAUNCH DA-2(3132)
175650 0 0003 0001 061 313200 000000
180000 0 0000 0000 070 313200 000000
171241 0 0003 0002 074 313200 000000
000200 0 0000 0000 081 313200 000000
235900 0 0000

SHIP (3130)
171200 0 0000 0000 062 313000 000000
165700 0 0000 0000 071 313000 000000
235900 0 0000

ELECTRONIC CORRECTOR ABSTRACT

VESSEL : 3130

SHEET : DA-10-1-83

TIME	DAY	PATTERN 1	PATTERN 2
171200	052	+00000	+00000
165700	071	+00000	+00000

ELECTRONIC CORRECTOR ABSTRACT

VESSEL : 3131

SHEET : DA-10-1-83

TIME	DAY	PATTERN 1	PATTERN 2
184920	057	+00001	+0000 ⁹ 2
191726	058	+00001	+00000
174100	059	+00001	+00000
175850	067	+00002	+00002
212114		-00002	+00002
183321	069	+00002	+00002
172738	071	+00002	+00002
173619	073	+00002	-00002
223456		+00002	+00002
232056		-00002	+00002
165149	075	+00002	+00002
222738		+00002	+00001

ELECTRONIC CORRECTOR ABSTRACT

VESSEL : 3132

SHEET : DA-10-1-83

TIME	DAY	PATTERN 1	PATTERN 2
175650	061	+00000	+00001
175035	067	-00003	+00001
205521		+00001	-00003
180120	069	-00001	+00001
171241	074	-00001	+00000
214411		+00001	-00001

OPR-N165-DA-83
 DA-10-1-83(H10072)
 SIGNAL TAPE PRINTOUT

001	7	47	48	43222	122	39	52267	250	0005	000000	SET 2 1934
002	7	47	46	29073	122	42	05457	250	0000	000000	VINELAND 1964 AZ. 1983
003	7	47	46	04679	122	42	48297	250	0002	000000	VINLAND 1964
004	7	47	44	52793	122	43	36218	139	0002	000000	WHARF 1964
005	4	47	44	11105	122	44	19846	250	0002	000000	THREE SPITS 2 1934
006	4	47	43	13151	122	44	50383	250	0002	000000	KING 1934 (not plotted correctly on shoreline manuscript)
007	3	47	42	50446	122	46	50070	250	0003	000000	CHUTE 3 1945
008	3	47	44	46392	122	45	31163	250	0001	000000	CURRANT 2 1934
009	3	47	46	08275	122	44	53555	250	0000	000000	HIAQUA 2 1983
010	3	47	46	35996	122	44	42289	250	0001	000000	GREEN 3 1964
011	3	47	47	38077	122	44	34743	250	0003	000000	EULA 2 1964
012	0	47	48	45733	122	43	13750	139	0001	000000	KWATEE 1964
013	0	47	49	41181	122	41	37198	250	0003	000000	SOUTH 3 1961
014	0	47	48	49068	122	42	46978	250	0000	000000	HOOD CANAL LIGHT 8 1983
015	4	47	48	06574	122	40	51207	250	0000	000000	HOOD CANAL LIGHT 7 1983
016	4	47	45	15473	122	43	19938	250	0000	000000	EHW TOWER 1983
017	3	47	45	03265	122	45	14407	139	0000	000000	HOOD CANAL LIGHT 10 1983
018	3	47	41	25449	122	44	45898	250	0000	000000	HOOD CANAL LIGHT 11 1983
019	4	47	49	32297	122	38	46200	139	0000	000000	TANGENT 2 RM 1 1964
020	2	47	44	53477	122	43	32186	139	0004	000000	BANGOR WHARF TOWER 1983
021	3	47	41	35676	122	46	10219	139	0000	000000	HAZEL POINT LIGHT 1983



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

NOAA Ship DAVIDSON S331
1801 Fairview Avenue East
Seattle, Washington 98102

Ref: S331/101-3M
Ser 3-13

28 March 1983

Commander (OAN)
13th U.S. Coast Guard District
915 Second Avenue
Seattle, Washington 98104

Dear Sir:

This is to confirm our P282139Z March, 1983 message. It is requested the following be published in the Local Notice to Mariners.


The following Danger to Navigation was located in the vicinity of the Keyport Naval Undersea Warfare Engineering Station which is 0.9 mile SSW of the Marginal (Bangor) Wharf. A description and position of the Dangers are listed below:

- | | |
|---|---------------------------------|
| 1. Submerged pile covered
2.6 ft. at MLLW | 47°44'11.43"N
122°44'23.30"W |
| 2. A 15' X 40' concrete obstruct
bares 0.0 ft. at MLLW | 47°44'12.99"N
122°44'21.04"W |
| 3. A 4' X 4' concrete block bares
0.2 feet at MLLW | 47°44'11.28"N
122°44'21.80"W |
| 4. Large ship anchor bares
1.6 ft. at MLLW | 47°44'11.48"N
122°44'21.26"W |

The area in which the above Dangers to Navigation are located should be considered foul. Vessels which approach within 75 yards of the west end of the Keyport Naval Station should approach with caution.

A new yellow "E" Buoy has been located within the 1,000 yard diameter Restricted Area. The buoy has replaced the 4 foot Int. Orange Buoy sited in Local Notice to Mariners #52 (82). The yellow "E" Buoy is located at latitude 47°46'37.78"N, longitude 122°42'59.57"W. CDR J. E. Hamilton, Chief Staff Officer, COMSUBRON SEVENTEEN, Bremerton, Washington informed DAVIDSON personnel that the buoy may be removed at a later date.

Sincerely,


James M. Wintermyre, CDR, NOAA
Commanding Officer
NOAA Ship DAVIDSON





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

NOAA Ship DAVIDSON S331
1801 Fairview Avenue East
Seattle, Washington 98102

Ref: S331/101-3M
Ser 3-1

1 March 1983

Commander (OAN)
13th U.S. Coast Guard District
915 Second Avenue
Seattle, Washington 98104


Dear Sir:

This is to confirm our R271747Z February, 1983 message. It is requested the following be published in the Local Notice to Mariners.

Privately maintained lights on Bangor Wharf (USCG Pub. 162, Vol. 3; LLN 2424) no longer exist and should be removed from Charts 18458, 18445.

Thank you for your cooperation.

Sincerely,


James M. Wintermyre, CDR, NOAA
Commanding Officer
NOAA Ship DAVIDSON

JMW:jaf



17/36/25	57.1	874.00	2844.00	209.2	123.8	59.49
17/36/27	55.3	868.00	2854.00	209.0	255.0	67.46
17/36/27	57.4	866.00	2856.00	209.0	124.5	48.66

17/36/36	55.8	846.00	2895.00	208.5	207.7	4.68
17/36/40	54.2	840.00	2903.00	208.2	294.1	66.22

17/36/45	55.9	832.00	2945.00	208.7	288.9	27.39
17/36/45	54.9	833.00	2946.00	208.7	294.2	67.71

17/36/59	-625.9	806.00	2993.00	209.0	124.6	47.89
17/37/00	-626.0	803.00	3001.00	209.2	294.5	57.34

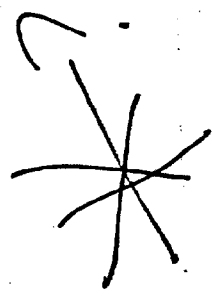
17/37/05	-626.4	797.00	3021.00	209.7	124.3	58.12
17/37/06	-626.1	795.00	3026.00	209.8	197.7	4.77

17/37/15	-624.4	782.00	3057.00	209.7	125.5	39.95
17/37/15	-624.8	783.00	3057.00	209.7	133.2	19.93

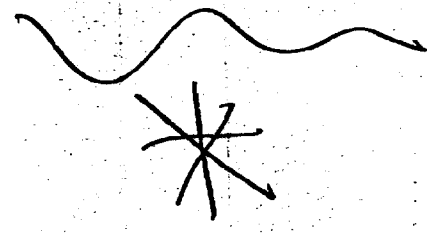
17/37/31	58.1	768.00	3137.00	208.2	294.4	70.50
17/37/32	58.2	768.00	3140.00	208.2	232.9	26.41
17/37/32	58.2	768.00	3140.00	208.2	294.5	71.05

FM

1120
100
80
60
40
17/37/00
17/37/00
17/37/00



19/36/31 19/36/32 19/36/33 19/36/34 19/36/35 19/36/36 19/36/37 19/36/38 19/36/39 19/36/40 19/36/41 19/36/42 19/36/43 19/36/44 19/36/45 19/36/46 19/36/47 19/36/48 19/36/49 19/36/50 19/36/51 19/36/52 19/36/53 19/36/54 19/36/55 19/36/56 19/36/57 19/36/58 19/36/59 19/36/60



?



19/36/44 -647.5 2177.00 1911.30 211.5 228.3 39.58
19/36/58 -647.4 2166.00 1945.00 212.0 130.5 33.59

10 120 140 150 FM

19/36/59 19/36/60

OCEANOGRAPHIC LOG SHEET - M
BOTTOM SEDIMENT DATA

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

VESSEL	DATE	PROJ. NO.		YEAR	DEPTH (Fathoms)	WEIGHT OF SAMPLER	AP. PROX. PENETRATION	LENGTH OF CORE	COLOR OF SEDIMENT	FIELD DESCRIPTION	REMARKS (Unusual conditions, cohesiveness, detritus, etc., type of bottom relief i.e., slope, plain, disposition, etc.)	OBS. INIT.
		LATITUDE	LONGITUDE									
DAVIDSON (3130)	JD-062	OPR-N165-DA-83		83								
		DA-10-1-83 (H-10072)										
268	3/3/83	47/47/20	122/43/24	36	60 lbs	"	"		gy gr	C I	small worm	JPM JR
269	"	47/47/19	122/44/20	31	"	"	"		gy gr	M	small shells	"
270	"	47/46/58	122/43/23	27	"	"	"		gy gr	M	small bivalves sticky	"
271	"	47/47/11	122/42/45	23	"	"	"		gy gr	C I	small worm sticky	"
272	"	47/47/17	122/42/07	20	"	"	"		gy gr	M	sticks broken shells	"
273	"	47/47/35	122/43/10	29	"	"	"		gy gr	M	sticks bivalves broken shells	"
274	"	47/47/57	122/43/50	19	"	"	"		gy gr	S M	broken shells	"
275	"	47/48/01	122/43/23	29	"	"	"		gy gr	S M	medium size broken shells	"
276	"	47/47/37	122/42/15	25	"	"	"		gy gr	M	sea worm three clams	"
277	"	47/47/59	122/41/15	15	"	"	"		gy gr	M	clean no shells etc.	"
278	"	47/49/15	122/42/32	30	"	"	"		gy gr	M	medium broken shells	"
279	"	47/48/36	122/42/45	31	"	"	"		gy gr	S M	clean no shells etc.	"
280	"	47/48/14	122/41/45	28	"	"	"		gy gr	S M	small stool bits	"
281	"	47/47/47	122/44/31	19	"	"	"		gy gr	S M	small shells	"
282	"	47/48/21	122/41/14	28	"	"	"		gy gr	S M	medium broken shells	"
283	"	47/48/45	122/42/23	31	"	"	"		gy gr	S M O Z	medium broken shells	"
284	"	47/48/00	122/42/16	25	"	"	"		gy gr	S M	clean	"

OCEANOGRAPHIC LOG SHEET - M
BOTTOM SEDIMENT DATA

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

VESSEL	DATE	PROJ. NO.		YEAR	DEPTH (Fathoms)	WEIGHT OF SAMPLER	AP. PROX. PENETRATION	LENGTH OF CORE	COLOR OF SEDI-MENT	FIELD DESCRIPTION	CHECKED BY	DATE CHECKED	OBS. INIT.
		DA-10-1-83	(H-10072)										
SERIAL NO.	DATE	LATITUDE	LONGITUDE	YEAR	DEPTH (Fathoms)	WEIGHT OF SAMPLER	AP. PROX. PENETRATION	LENGTH OF CORE	COLOR OF SEDI-MENT	FIELD DESCRIPTION	CHECKED BY	DATE CHECKED	OBS. INIT.
3130	(Ship)	OPR-N165-DA-83		1983							J. Van Arman	3/28/83	
852	3/12/83	47/46/56	122/42/48		24	60 lbs	6 cms		gy gr	M S Sh			broken medium shells
853	"	47/46/44	122/44/07		56	"	"		gy gr	M fine S			small clam
854	"	47/43/08	122/44/02		47	"	"		gy gr	M fine S Sh			crustacean fragments and small red worms
855	"	47/43/23	122/45/26		97	"	"		gy gr	M fine S Sh			small shells red worm
856	"	47/43/39	122/46/02		52	"	"		gy gr	M fine S			small shells red worm
857	"	47/43/50	122/45/08		48	"	"		gy gr	M fine S Sh			small amt. of brown mud
858	"	47/44/07	122/45/38		56	"	"		gy gr	M fine S Sh			br. mud w. br. worm
859	"	47/44/08	122/44/54		56	"	"		gy gr	M fine S Sh			small brown worm
860	"	47/44/35	122/44/57		65	"	"		gy gr	fine S Sh			large limestone rock
861	"	47/44/49	122/44/10		38	"	"		gy gr	Cl Sh			small broken shells
862	"	47/45/11	122/44/43		60	"	"		gy gr	fine S			small broken shells VP
863	"	47/45/04	122/43/56		30	"	"		gy gr	M fine S Sh			small broken shells
864	"	47/45/33	122/44/25		60	"	"		gy gr	M fine S Sh			two small black rocks
865	"	47/45/48	122/43/51		37	"	"		gy gr	M fine S Sh			one red worm one clam
866	"	47/46/02	122/43/15		34	"	"		gy gr	M Sh			worm holes broken shells
867	"	47/46/16	122/44/05		48	"	"		gy gr	S Sh			small shells gritty
868	"	47/46/33	122/43/31		31	"	"		gy gr	fine S			small star fish two clams

OCEANOGRAPHIC LOG SHEET - M
BOTTOM SEDIMENT DATA

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

SERIAL NO.	DATE	PROJ. NO.		YEAR	DEPTH (Fathoms)	WEIGHT OF SAM- PLER	AP. PROX. TREN- CHON	LENGTH OF CORE	COLOR OF SEDI- MENT	FIELD DESCRIPTION	REMARKS (Unusual conditions, cohesiveness, dented cutter, nature, type of bottom relief i.e., slope, plain, disposition, etc.)	OBS. INIT.		
		SAMPLE POSITION												
		LATITUDE	LONGITUDE											
VESSEL		DAVIDSON (3130)		83	DA-10-1-83 (H-10072)								DATE CHECKED	24 Mar 83
OPR. N/65-DA-83		m. Fleet												
268	3/3/83	47/47/20	122/43/24	36	60 lbs	6 cms.	gy gr	C I	small worms		JFM			
269	"	47/47/19	122/44/20	31	"	"	gy gr	M	small shells	gritty	"			
270	"	47/46/58	122/43/23	27	"	"	gy gr	M	small bivalves	sticky	"			
271	"	47/47/11	122/42/45	23	"	"	gy gr	C I	small worms	sticky	"			
272	"	47/47/17	122/42/07	20	"	"	gy gr	M	sticks broken shells	gritty	"			
273	"	47/47/35	122/43/10	29	"	"	gy gr	M	sticks bivalves broken shells	gritty	"			
274	"	47/47/57	122/43/50	19	"	"	gy gr	S M	broken shells	gritty	"			
275	"	47/48/01	122/43/03	29	"	"	gy gr	S M	medium size broken shells	gritty	"			
276	"	47/47/37	122/42/15	25	"	"	gy gr	M	sea worm three stems	gritty	"			
277	"	47/47/59	122/41/15	15	"	"	gy gr	M	clean no shells etc.	gritty	mf			
278	"	47/49/15	122/42/32	30	"	"	gy gr	M	medium broken shells	gritty	"			
279	"	47/48/36	122/42/45	31	"	"	gy gr	S M	clean no shells etc.	gritty	"			
280	"	47/48/14	122/41/45	28	"	"	gy gr	S M	small shell bits	gritty	"			
281	"	47/47/47	122/41/31	19	"	"	gy gr	S M	small shells	gritty	"			
282	"	47/48/21	122/41/14	20	"	"	gy gr	S M	medium broken shells	gritty	"			
283	"	47/48/45	122/42/03	31	"	"	gy gr	S M O Z	medium broken shells	gritty	"			
284	"	47/49/00	122/42/16	25	"	"	gy gr	S M	clean	gritty	"			

Use more than one line per sample if necessary.

OCEANOGRAPHIC LOG SHEET - M
BOTTOM SEDIMENT DATA

VESSEL	DATE	PROJ. NO.		YEAR	DEPTH	WEIGHT OF SAMPLER	AP. PENETRATION	LENGTH OF CORE	COLOR OF SEDIMENT	FIELD DESCRIPTION	CHECKED BY	DATE CHECKED	OBS. (Unusual conditions, cohesiveness, dented cutter, strat. no., type of bottom relief i.e., slope, plain, disposition, etc.)
		DA-10-1-83	(H-10072)										
SERIAL NO.	TIME	LATITUDE	LONGITUDE	1983	(Fathoms)	OF SAMPLER	IN FEET	IN METERS			J. Van Parys	3/28/83	
4989	3/11/83	47/47/46	122/44/27	15.8	10 lbs.	3 cms	gy	M					
4990	"	47/48/25	122/43/51	2.0	"	"	gy	S		grassy			"
4991	"	47/48/01	122/44/34	6.4	"	"	gy	S		small shells			"
4992	"	47/48/15	122/43/17	29.0	"	"	gy	S		small shells			"
4993	"	47/47/37	122/41/20	8.0	"	"	gy	S					"
4994	"	47/47/00	122/41/25	7.2	"	"	gy	S					"
4995	"	47/46/46	122/42/00	11.0	"	"	gy	M					"
4996	"	47/45/37	122/43/19	15.7	"	"	gy gr	M					"
4997	"	47/45/04	122/43/27	14.8	"	"	gy gr	M					"
4998	"	47/44/49	122/43/50	22.5	"	"	gy gr	M					"
4999	"	47/44/28	122/44/11	15.2	"	"	gy	S					"
5000	"	47/44/02	122/44/30	20.0	"	"	gy gr	M					"
5001	"	47/43/32	122/44/47	19.9	"	"	gy gr	M					"
5002	"	47/43/05	122/45/06	24.5	"	"	gy	S		small shells			"
5003	"	47/43/19	122/46/35	27.0	"	"	gy	S					"
5004	"	47/43/50	122/46/28	18.5	"	"	gy	S					"
5005	"	47/44/17	122/44/03	16.0	"	"	gy	S					"

NOAA FORM 76-40 (8-74)
 U.S. DEPARTMENT OF COMMERCE
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NONFLOATING AIDS OR LANDMARKS FOR CHARTS

Replaces C&GS Form 567.

TO BE CHARTED (Field Party, Ship or Office)
 TO BE REVISED
 TO BE DELETED

REPORTING UNIT: NOAA SHIP DAVIDSON
 STATE: WASHINGTON
 LOCALITY: HOOD CANAL
 DATE: 1983

The following objects HAVE BEEN INSPECTED FROM SEAWARD TO DETERMINE THEIR VALUE AS LANDMARKS.
 OPR PROJECT NO.: 01PR-NIGS-DA-83
 JOB NUMBER: DA-10-1-83
 SURVEY NUMBER: H-10072
 DATUM: N.A. 1927

ORIGINATING ACTIVITY:
 HYDROGRAPHIC PARTY
 GEODETIC PARTY
 PHOTO FIELD PARTY
 COMPILATION ACTIVITY
 FINAL REVIEWER
 QUALITY CONTROL & REVIEW GRP.
 COAST PILOT BRANCH
 (See reverse for responsible personnel)

CHARTING NAME	DESCRIPTION (Record reason for deletion of landmark or aid to navigation. Show triangulation station name, where applicable, in parentheses)	LATITUDE		LONGITUDE		METHOD AND DATE OF LOCATION (See instructions on reverse side)	CHARTS AFFECTED
		D.M. Meters	° / ' "	D.P. Meters	° / ' "		
Service Pier South Light	Fixed Red Light	50.48 N	47° 43'	30.49 W	122° 44'	F-4-8-L 1983	18458 18441 18445
Service Pier North Light	Fixed Red Light	56.11 N	47° 43'	23.98 W	122° 44'	F-4-8-L 1983	18458 18441 18445
Delta Pier NW corner Light	Fixed Red Light	37.79 N	47° 44'	55.92 W	122° 43'	F-4-8-L 1983	18458 18441 18445
Delta Pier SW corner Light	Fixed Red Light	36.57 N	47° 44'	56.70 W	122° 43'	F-4-8-L 1983	18458 18441 18445
ENW Pier South Light	Fixed Red Light	12.12 N	47° 45'	22.64 W	122° 43'	F-4-8-L 1983	18458 18441 18445
ENW Pier North Light	Fixed Red Light	17.50 N	47° 45'	24.21 W	122° 43'	F-4-8-L 1983	18458 18441 18445
ENW Pier NE Light	Fixed Red Light	18.47 N	47° 45'	22.28 W	122° 43'	F-4-8-L 1983	18458 18441 18445
Deception Pier						F-4-8-L 1983	
Magnetic Sighting Facility North Light	Fixed Red Light	21.00 N	47° 46'	36.44 W	122° 42'	F-4-8-L 1983	18458 18441 18445
Magnetic Sighting Facility South Light	Fixed Red Light	13.78 N	47° 46'	40.62 W	122° 42'	F-4-8-L 1983	18458 18441 18445

NC Dept. L 389(83)

NOAA FORM 76-40
(6-74)
Replaces C&GS Form 567.

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

NONFLOATING AIDS OR LANDMARKS FOR CHARTS

ORIGINATING ACTIVITY
 HYDROGRAPHIC PARTY
 GEODETIC PARTY
 PHOTO FIELD PARTY
 COMPILATION ACTIVITY
 FINAL REVIEWER
 QUALITY CONTROL & REVIEW GRP.
 COAST PILOT BRANCH
 (See reverse for responsible personnel)

REPORTING UNIT (Field Party, Ship or Office)
 HOOD SHIP DAVIDSON

STATE
 WASHINGTON

LOCALITY
 HOOD CANAL

DATE
 1983

OPR PROJECT NO. OPR-N165-DA-83

JOB NUMBER DA-10-1-83

SURVEY NUMBER H-10072

DATUM N.A. 1927

The following objects HAVE BEEN INSPECTED FROM SEAWARD TO DETERMINE THEIR VALUE AS LANDMARKS.

CHARTING NAME	DESCRIPTION (Record reason for deletion of landmark or aid to navigation. Show triangulation station names, where applicable, in parentheses.)	POSITION		LONGITUDE		METHOD AND DATE OF LOCATION (See instructions on reverse side)		CHARTS AFFECTED
		LATITUDE D.M. Meters	LATITUDE ° / ' "	LONGITUDE D.P. Meters	LONGITUDE ° / ' "	OFFICE	FIELD	
HOOD CANAL LIGHT 7		06.574"	47° 48'	122° 40'	51.207"		F-3-6-L 26 FEB 83	18458 18441 18445
HOOD CANAL LIGHT 8		49.068"	47° 48'	122° 42'	46.978"		F-3-6-L 26 FEB 83	18458 18441 18445
HOOD CANAL LIGHT 10		03.265"	47° 45'	122° 45'	14.407"		F-3-6-L 11 MAR 83	18458 18441 18445
HOOD CANAL LIGHT 11		25.449"	47° 41'	122° 44'	45.898"		F-3-6-L 11 MAR 83	18458 18441 18445
HAZEL POINT LIGHT		36.676"	47° 41'	122° 46'	10.219"		F-3-6-L 27 FEB 83	18458 18441 18445
EXPOSURES MOUNDING WHARF (ENR) TOWER	/	15.473"	47° 45'	122° 43'	19.938"		F-3-6-L 25 FEB 83	18458 18441 18445
BAN 602 MARSHAL WHARF TOWER	/	53.477"	47° 44'	122° 43'	32.186"		F-3-6-L 25 FEB 83	18458 18441 18445

NC Dep L-389(83)

60	3132	R/R @ N. end of Area A. Had good opening calibration and poor closing by 8 meters on code 1. Code 1 calibrated well. Teletype was punching bad, with paper tape was punching but too. This leads one to believe the problem is in the POP. J.W.D.
61	3132	R/R @ N. end of Area A. Good opening & closing calibration. Used codes 1 (Set 2) + 3 (Vineland Az.). Weak rates in middle of Hornsdyke Bay and around Δ Green caused some line deletions on final plot. J.W.D.
67	3132	R/R @ N. end of Area A. Initially used Vineland Az. & What. What couldn't see behind Green 3, so we used Set 2 + Vineland Az. to finish days Hydro. Ran SL, XL, & Main scheme. J.W.D.
69	32	R/R @ N. end of Area A. Used Eula 2 & Serial 3 for east shore. Good to marginal SS. Ran main scheme, XL, & shoreline. J.W.D.
70	32	Bottom Samples J.W.D.
71	32	DP's used Sextants & RK 300 J.W.D.

DAY # LAUNCH

COMMENTS AND INITIALS OF OIC

57	3131	NO Bar checks due to bad current. Fathos weak & not digitizing well. Miniranger intermittent at start of day.
58	3131	RAN SHORE LINE & 3 LINES ALONG DELTA PIER. FOUND 2 PERMANENT OBJECTS APPROX 15'x70' ON NORTH SIDE OF DELTA PIER. 2 BAR CHECKS & CALIBRATIONS. FATHOS WAS WEAK ALL DAY. DETERMINED CAUSE TO BE THAT ROSS WAS ACCIDENTLY HOOKED TO 12 KHZ TRANSDUCER ON DAY 57 & 59. WORK ALONG PIER SHAKY DUE TO WIDE ANGLE TRANSDUCERS.
59	3131	VERY GOOD DAY. RAN LEADLINE CHECK WITH 12 KHZ TRANSDUCER. COMPARISON LOCKED GOOD.
67	3131	Bad weather. Not possible to see signals for sextant calibrations with R1561 - baseline crossings good. Good signal strengths, used codes 4, 5, 6. West side of canal to southern limit of sheet. Good day.
68	3131	RAN 3 LINES ALONG KB PIER... LEADLINE ALONG WEST FACE, THEN 10 & 15 M OFF THE PIER. ALL THIS DONE AMONGST BOAT TRAFFIC - 3 TORPEDO RETRIEVERS & A VF. MPK
69	3131	Ran lower East side X-lines (2), Shorelines (1 st in close, 2 nd 50 m from 1 st) and Main scheme (39). (Completed from Delta Pier south. Miniranger codes worked well w/exception of small skip zone from Code 6 at current 2. Small area between Delta pier and three spits in shadow. Some DR done there but still incomplete. Critical calibration in AM. PM Baseline crossing.
071		Good day. Main scheme and shoreline. EHL PM bar check only partially completed due to weather.
073		Good day. Main scheme, shoreline and splits. EHL
075	3131	Main scheme in Tandyke Bay, Shoreline. Trouble with Plotter, JWD

FIELD SHEET # DA-10-1-83 (H-10072)

ABSTRACT OF POSITIONS
DA-10-1-83 (H-10072)

LAUNCH DAY	DA-1 (3131) POSITIONS	CNTRL	S1	M	S2	REMARKS
057	2001-2007	042	008	---	010	X-Line
057	2008-2017	042	008	---	010	Mainscheme
057	2019-2054	042	008	---	010	Mainscheme
057	2057-2069	042	008	---	010	Mainscheme
057	2077-2108	042	008	---	010	Mainscheme
058	2111-2117	042	008	---	010	Shoreline
059	2144-2154	042	003	---	005	Shoreline
059	2155-2163	042	003	---	005	X-Line
059	2164-2312	042	003	---	005	Mainscheme
061	(2313-2400)	REFER TO NEXT PAGE*				DR Hydro
067	2401-2431	042	003	---	005	Shoreline
067	2432-2440	042	003	---	005	Fill-In
067	2441-2444	042	003	---	005	Splits
067	2445-2463	042	003	---	005	X-Line
067	2464-2481	042	008	---	005	Mainscheme
067	2484-2487	042	008	---	005	Mainscheme
067	2493-2580	042	008	---	006	Mainscheme
067	2582-2586	042	008	---	006	X-Line
069	2601-2618	042	007	---	008	X-Line
069	2619-2641	042	007	---	008	Shoreline
069	2642-2647	042	007	---	008	Mainscheme
069	2650-2652	042	007	---	008	Mainscheme
069	2711-2745	042	007	---	008	Mainscheme
071	2774-2798	042	008	---	009	Splits
071	2800-2813	042	008	---	009	Splits
071	2814-2821	042	008	---	009	Inshore
071	2822-2833	042	008	---	009	Splits
071	2836-2837	042	008	---	009	Splits
071	2839-2850	042	008	---	009	Splits
071	2851-2853	042	008	---	009	Shoreline
071	2854-2864	042	008	---	009	Shoal Development
071	2865-2878	042	008	---	009	Splits
071	2883-2894	042	008	---	009	Shoreline
071	2974-2983	042	008	---	006	Shoreline
071	2984-2993	042	008	---	006	Mainscheme
071	2994-3002	042	008	---	006	Shoreline
073	3003-3020	042	005	---	017	Mainscheme
073	3021-3024	042	005	---	017	Split
073	3025-3027	042	005	---	017	Mainscheme
073	3028-3069	042	007	---	017	Mainscheme
073	3070-3132	042	007	---	017	Splits
073	3134-3141	042	007	---	017	Mainscheme
073	3142-3147	042	007	---	017	Splits
073	3148-3163	042	005	---	006	Shoreline
073	3172-3177	042	010	---	005	Splits
075	3181-3222	042	015	---	002	Inshore/Mainscheme
075	3223-3235	042	015	---	002	Shoreline (Thorndyke Bay)

ABSTRACT OF POSITIONS
DA-10-1-83 (H-10072)

Continued LAUNCH DA-1 (3131)

<u>DAY</u>	<u>POSITIONS</u>	<u>CNTRL</u>	<u>S1</u>	<u>M</u>	<u>S2</u>	<u>REMARKS</u>
061	2313-2317	---	DR	HYDRO		EHF PIER
061	2319-2320	---	DR	HYDRO		EHF PIER
061	2334-2344	---	DR	HYDRO		EHF PIER
061	2345-2356	---	DR	HYDRO		MARGINAL WHARF
061	2359-2365	---	DR	HYDRO		MARGINAL WHARF
061	2366-2377	---	DR	HYDRO		SERVICE PIER
061	2378-2400	---	DR	HYDRO		DELTA PIER
068	2587-2590	---	LEADLINE			K.B. PIER
068	2591-2598	---	DR	HYDRO		K.B. PIER
081	3240-3265	---	DR	HYDRO		SERVICE PIER
081	3266-3273	---	DR	HYDRO		DELTA PIER
081	3274-3299	---	LEADLINE			SERVICE PIER

ABSTRACT OF POSITIONS
 DA-10-1-83 (H-10072)

SHIP DAVIDSON (3130)		CNTRL	S1	M	S2	REMARKS
DAY	POSITIONS					
062	0268-0273	042	011	---	013	Bottom Samples
062	0274	042	001	---	002	Bottom Samples
062	0275-0278	042	011	---	013	Bottom Samples
062	0279	042	001	---	002	Bottom Samples
062	0280-0283	042	011	---	013	Bottom Samples
062	0284	042	001	---	002	Bottom Samples
062	0285-0287	042	011	---	013	Bottom Samples
071	0852-0853	042	017	---	010	Bottom Samples
071	0854-0860	042	005	---	006	Bottom Samples
071	0861-0868	042	017	---	010	Bottom Samples

ABSTRACT OF POSITIONS
DA-10-1-83 (H-10072)

LAUNCH DA-2 (3132)

<u>DAY</u>	<u>POSITIONS</u>	<u>CNTRL</u>	<u>S1</u>	<u>M</u>	<u>S2</u>	<u>REMARKS</u>
061	4045-4070	042	001	---	002	Mainscheme
061	4073-4091	042	001	---	002	Mainscheme
061	4093-4112	042	001	---	002	Mainscheme
061	4114-4142	042	001	---	002	Mainscheme
061	4144-4154	042	001	---	002	Mainscheme
061	4156-4168	042	001	---	002	Mainscheme
061	4170-4184	042	001	---	002	Mainscheme
061	4186-4200	042	001	---	002	Mainscheme
061	4202-4208	042	001	---	002	Mainscheme
061	4210-4215	042	001	---	002	Mainscheme
061	4217-4225	042	001	---	002	Mainscheme
061	4227-4241	042	001	---	002	Mainscheme
061	4243-4259	042	001	---	002	Mainscheme
061	4261-4299	042	001	---	002	Mainscheme
061	4328-4335	042	001	---	002	Mainscheme
061	4337-4454	042	001	---	002	Mainscheme
061	4456-4492	042	001	---	002	Mainscheme
067	4493-4505	042	002	---	004	Mainscheme
067	4507-4526	042	002	---	004	Mainscheme
067	4527-4545	042	002	---	004	X-Line
067	4546-4556	042	002	---	004	Shoreline
067	4559-4570	042	002	---	004	Mainscheme
067	4574-4577	042	002	---	004	Shoreline
067	4580-4600	042	002	---	004	Shoreline
067	4601-4612	042	001	---	002	Shoreline
067	4618-4639	042	001	---	002	Shoreline
067	4640-4649	042	001	---	002	X-Line
069	4650-4667	042	011	---	013	X-Line
069	4668-4676	042	011	---	013	Shoreline
069	4667-4721	042	011	---	013	Mainscheme
069	4723-4756	042	011	---	013	Mainscheme
069	4758-4765	042	011	---	013	Mainscheme
069	4768-4771	042	011	---	013	Split
069	4772-4777	042	011	---	013	Shoreline
069	4785-4845	042	011	---	013	Mainscheme
069	4847-4856	042	011	---	013	Mainscheme
069	4858-4920	042	011	---	013	Mainscheme
069	4922-4942	042	011	---	013	Mainscheme
069	4944-4968	042	011	---	013	Mainscheme
069	4969-4973	042	011	---	013	Mainscheme
069	4975-4979	042	011	---	013	Mainscheme
069	4980-4988	042	011	---	013	X-Line
070-071	4989-5012	010	---	VIS	---	Bottom Samples
071	5013-5031	010	---	VIS	---	Detached Positions
072	5033-5034	010	---	VIS	---	Detached Positions
072	5037-5045	010	---	VIS	---	Detached Positions
073	5046-5054	010	---	VIS	---	Detached Positions
074	5059-5092	042	011	---	014	Shoreline

Continued Abstract of Position
Launch DA-2

<u>DAY</u>	<u>POSITIONS</u>	<u>CNTRL</u>	<u>S1</u>	<u>M</u>	<u>S2</u>	<u>REMARKS</u>
074	5059-5105	042	011	---	014	X-Line
074	5106-5111	042	011	---	014	Splits
074	5112-5119	042	011	---	014	Shoreline
074	5120-5122	042	015	---	002	Splits
074	5124-5132	042	015	---	002	Splits
074	5134-5175	042	015	---	002	Splits
074	5180-5222	042	015	---	002	Shoreline
074	5259-5260	010	---	VIS	---	Detached Positions
074	5262	010	---	VIS	---	Detached Positions
075	5263	010	---	VIS	---	Detached Positions
080	5275-5276	010	---	VIS	---	Detached Positions
081	5277-5288	010	---	VIS	---	Detached Positions
082	5293	010	---	VIS	---	Detached Positions

OPR-N165-DA-83
DA-10-1-83(H-10072)
PARAMETER TAPE PRINTOUT

FEST=7000
CLAT=5283000
CMER=122/44/00
GRID=30
PLSCL=10000
PLAT=47/42/00
PLON=122/45/00
VESNO=3131
YR=83
ANDIST=00.0

SKEW: 062.21.5.60

ENLARGEMENT ,SCALE 1:2500

FEST=7000
CLAT=5283000
CMER=122/44/00
GRID=10
PLSCL=2500
PLAT=47/43/30
PLON=122/44/12
VESNO=3131
YR=83
ANDIST=00.0

SKEW: 062.20.60

SURVEY APPROVAL SHEET

- A. Amount and degree of personal supervision of field work and frequency of record and sheet inspection:

The basic supervision of the work was under the auspice of the Field Operations Office. Where questions or problems were encountered, I became directly involved. I examined the sheets daily for completeness and adequacy. Record inspection was accomplished by the F.O.O. with an occasional inspection by me.

- B. State whether the survey is complete and adequate, or if additional field work is recommended:

The survey is considered complete and adequate for charting with no additional field work required. Unfortunately, current observations were not undertaken nor interviews concerning currents conducted. Strong currents were visually observed but not of an unusual nature.

- C. Cite additional information or references that may be of assistance for verifying and reviewing the survey:

Due to the priority and rush of the processing I feel everything is adequate and complete but a little more time would probably enhance the resulting products.

- D. Signed statement of approval of the field sheet and all accompanying records:

Date: 4/8/83

Approved and forwarded by:



J. M. Wintermyre
CDR, NOAA
Commanding Officer

HYDROGRAPHIC SURVEY STATISTICS

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

RECORD DESCRIPTION	AMOUNT	RECORD DESCRIPTION	AMOUNT
SMOOTH SHEET	1	BOAT SHEETS & PRELIMINARY OVERLAYS	10
DESCRIPTIVE REPORT	1	SMOOTH OVERLAYS: POS. ARC, EXCESS	4

DESCRIP-TION	DEPTH RECORDS	HORIZ. CONT. RECORDS	PRINTOUTS	TAPE ROLLS	PUNCHED CARDS	ABSTRACTS/SOURCE DOCUMENTS
ENVELOPES						
CAHIERS			3			
VOLUMES						
BOXES			3			

T-SHEET PRINTS (List) Shoreline Revision Prints BP118460, BP118462, BP118463, BP118464, BP118465 & BP118466
 SPECIAL REPORTS (List)

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

PROCESSING ACTIVITY	Hydroplot AMOUNTS		TOTALS
	VERIFICATION	VERIFICATION	
POSITIONS ON SHEET			
POSITIONS CHECKED	2020		
POSITIONS REVISED	--		
SOUNDINGS REVISED	134		
SOUNDINGS ERRONEOUSLY SPACED	--		
SIGNALS (CONTROL) ERRONEOUSLY PLOTTED	--		
	TIME - HOURS		
CRITIQUE OF FIELD DATA PACKAGE (PRE-VERIFICATION)	7	*(VER)/(EVAL)	
VERIFICATION OF CONTROL		04/00	04
VERIFICATION OF POSITIONS		120/00	120
VERIFICATION OF SOUNDINGS		119/00	119
COMPILATION OF SMOOTH SHEET		24/00	24
APPLICATION OF TOPOGRAPHY		15/00	15
APPLICATION OF PHOTOBATHYMETRY		00/00	00
JUNCTIONS		00/03	03
COMPARISON WITH PRIOR SURVEYS & CHARTS		02/08	10
VERIFIER'S REPORT (draft), Evaluation Report		03/90	93
OTHER (Quality Control)		08/90	98
TOTALS	7	295/191	486

Pre-Verification by James S. Green	Beginning Date 4/12/83	Ending Date 4/12/83
Verification by Isagani A. Almacen	Beginning Date 4/20/83	Ending Date 9/08/83
Verification Check by Stanley H. Otsubo, James S. Green	Time (Hours) 49	Date 9/13/83
Marine Center Inspection by	Time (Hours)	Date
Quality Control Inspection by	Time (Hours)	Date
Requirements Evaluation by	Time (Hours)	Date

*Time in this column is for Verification (VER) and Evaluation (EVAL)

PACIFIC MARINE CENTER
EVALUATION REPORT

REGISTRY NO: H-10072

FIELD NO: DA-10-1-83

Washington, Hood Canal, Thorndyke Bay to Bangor

SURVEYED: February 22 - March 23, 1983

SCALE: 1:10,000
5 Subplans 1:5,000

PROJECT NO: OPR-N165-DA-83

SOUNDINGS: Ross Fineline Fathometer
and BS³

CONTROL: Mini-Ranger
Range/Range
Estimated Positioning
(Pier Faces)

Chief of Party.....CDR J. M. Wintermyre

Surveyed By.....CDR J. Wintermyre
LCDR D. McFarland
LT G. Wheaton
LT T. Rulon
ENS E. Hawk
ENS J. Waddell
ENS A. Allen
LT Koehn
Ship's Personnel

Automated Plot By.....PMC Xynetics Plotter

Verified By.....I. A. Almacen

Evaluated By.....B. A. Olmstead

1. INTRODUCTION

H-10072 (DA-10-1-83) is a basic survey conducted under the current National Ocean Service methods of planning, executing and processing a hydrographic survey as defined in the Hydrographic Manual, 4th Edition. The PMC OORDER for 1983 further defines field procedures. Project Instructions OPR-N165-DA-83, Hood Canal, Washington dated November 22, 1982 were generated to supplement the Hydrographic Manual. One supplement to instructions was appended for the 1983 field work; Change 1 dated February 14, 1983.

H-10072 (DA-10-1-83), an inshore survey, is located in Hood Canal approximately 7.5 miles southwest of Admiralty Inlet. Hydrographic and field operations surround the navigable waters from near South Point to Bangor and encompass the shoreline to include the Bangor Naval facilities. Alongshore characteristics are composed primarily of rocks, sand, gravel and scattered boulders. Generally, depths of water range from the mean lower low water line to over 60 fathoms west of Bangor Wharf. Bottom characteristics are composed primarily of green sand and mud.

This survey contains the first Bathymetric Swath Survey System data to be approved for charting. Verification and evaluation of this data was according to the principles utilized in conventional survey processing as much as possible.

Hydroplot and BS³ were processed separately, with the Hydroplot being verified by conventional methods. In verifying the BS³ data, the conventional methods were not possible in all cases. The differences are noted below:

a. An analysis of the vessel antenna track plot indicated many positional discrepancies in the collected Mini-Ranger data. Initially, correlation between the vessel antenna track plot and the survey records was difficult and time consuming, until a vessel antenna track plot using the PMC Harris System record number was utilized. When positional discrepancies determined by the vessel track exceeded 1.5mm at survey scale, positions bracketing the area of observable discrepancy were recomputed by time/course.

b. The draft and velocity correctors could be verified by the conventional methods, but recomputation at the Marine Center, if found necessary, was not possible.

c. Sounding selection for the BS³ data was by the Combined Offline Program (COP). The set of minimum depths was then exceeded by the conventional method.

d. An additional factor in sounding reduction and the positioning computations is the Heave-Roll-Pitch sensor. At the present time it is not possible to assure that this unit is operating properly.

e. The PMC plot of the BS³ data was compared in the junction area with the Hydroplot data. The junction was good, attesting to the accuracy of the BS³ data. It should be pointed out that anomalous BS³ data must be either rejected, the anomaly retained, or, if available, a valid excessed sounding brought forward, since available data is limited to the COP output.

f. The smooth position overlay for BS³ data is a plot of record numbers corrected to the vessel antenna track.

Additional software developed during processing proved beneficial. However, developments of additional processing techniques and software will be required. These requirements have been documented in N/MOP letter, Further Requirements for BS³ Operations, September 8, 1983 (copy attached).

Two temporary ADR gages, Bangor and LoFall, were installed and operating during the 1983 field work. The tidal data generated by these gages were employed to zone the survey for office reduction of sounding data. Field tide reduction of soundings was based on predictions from Seattle, Washington, with time and range ratios.

Sounding differences of .1 - 1.0 fathom between the final field sheet and smooth sheet are attributed to the following: (1) application of approved tidal zoning, (2) rescanning of fathograms during office verification, and (3) field rounding procedures between 11 and 21 fathoms.

The final field sheet and descriptive report were amended during the verification/evaluation process. All corrected data is listed in the smooth printouts/descriptive report and supplements the approved smooth sheet.

The digital records for this survey have been updated to include all categories of information required to comply with N/CG2 Hydrographic Survey Guideline No. 23, Completion of Digital Hydrographic Surveys, September 7, 1983. Certain descriptive information, however, may not be included in the digital record due to the restrictions of the presently available cartographic codes. The user should refer to the smooth sheet for complete information.

2. CONTROL AND SHORELINE

Two new horizontal control stations were established in accordance with Third Order, Class I geodetic standards. Existing stations (recovered marks, intersection points) incorporated into the control net were confirmed.

The present survey utilized twenty-one control stations as either Mini-Ranger transmitter sites, sextant objects, and/or calibration points. Four of these stations are located off the sheet limits (SET 2, 1934; HOOD CANAL LIGHT II, 1983; TANGENT 2 RM 1, 1964; HAZEL POINT LIGHT, 1983). The Motorola Mini-Ranger III was configured in a range-range mode to determine positional data during survey operations. Corrections to positional data were determined by calibrations run on baselines accomplished before and after the survey. Confirmation of these correctors was done by daily systems checks using fixed point and/or sextant methods. All remaining information affecting the positioning and station control of this survey is listed in Parts F and G of the ship's Descriptive Report, the Horizontal Control Report and the Electronic Control Report for OPR-N165-DA-83.

The smooth sheet was plotted using NGS data base listings for existing stations and field geodetic positions for newly established control.

The mean high water line and other photogrammetrically determined features were applied from reviewed manuscripts updated using July 1982 photography. Revisions to these manuscripts are incorporated into the hydrographic records. All remaining information affecting the inspection and edit of the shoreline manuscripts is listed in section 4 of the descriptive report.

	<u>Dates of Photography</u>	<u>Dates of Field Edit</u>
T-12248 (BP 118460)	June 1962, Aug. 1965	Apr. 1969
T-12252 (BP 118462)	June 1962, Aug. 1965	Apr. 1969
T-12253 (BP 118463)	June 1962, Aug. 1965	Apr. 1969
T-12254 (BP 118464)	June 1962, Aug. 1965	Apr. 1969
T-12257 (BP 118465)	June 1962, Aug. 1965	Apr. 1969
T-12258 (BP 118466)	June 1962, Aug. 1965	Apr. 1969

3. HYDROGRAPHY

Depths at crossings are in good agreement.

The bottom configuration was adequately developed. Generally, all standard depth curves are complete and adequately developed. However, hydrographic operations were not conducted around the Magnetic Silencing Facility or the southwest leg of the Delta Pier. (Reference Section P, Item 3 of ship's descriptive report and the 1:2,500 enlargement of the Delta Pier.) The determination of least depths was satisfactory with the exception of the following:

	<u>Latitude</u>	<u>Longitude</u>
a. 9 fathoms	47°43'08"N	122°45'04"W
b. 7.5 fathoms	47°43'10"N	122°45'01"W
c. 7.4 fathoms	47°43'07"N	122°45'01"W
d. 1.8 fathoms*	47°44'38"N	122°43'40.5"W

* Transferred from Delta Pier subplan and entered in the hydrographic file.

Launch operations around several of the Bangor Naval Facility piers were positioned by estimated distances off known points. Accompanying sounding information was collected by a Ross Fathometer Model 5000 and interpolated on time and course between fixed points. This data was not automated in the hydrographic file but handled as five individual subplans at 1:5000.

4. CONDITION OF SURVEY

The condition of the survey records and deficiencies in field procedures have been discussed extensively in the Preprocessing Examination Critique dated April 28, 1983. Items contained in the critique are not repeated here and reference should be made to the attached copy for complete information. The following items supplement those contained in the critique:

a. The shoreline revision from latitude 47°46'09"N, longitude 122°44'52"W to latitude 47°46'33"N, longitude 122°44'41"W was accomplished by taking horizontal sextant angles at designated intervals. This data was shown on the final field sheet as a solid red line indicating accurate information. The smooth sheet portrays the area as a dashed red line indicating an approximate location.

b. Signals falling outside the MHWL were not described on the final field sheet. Reference to the Horizontal Control Report provided the description of these stations and were so noted on the smooth sheet.

c. Objects of landmark value as recommended by the hydrographer (76-40) should be so noted on the final field sheet with elevation data above mean sea level. The Bangor Wharf Tower and the EHW Tower were described on the smooth sheet.

d. Several items on the shoreline manuscripts were not verified or disproved in the field. These items are unresolved charted features that

should have been discussed in the appropriate section of the descriptive report. The evaluation report has addressed these deficiencies and resolved them in accordance with hydrographic practices.

5. JUNCTIONS

H-10072 (DA-10-1-83) is bordered by:

a. H-9035 (DA-10-1-69). This survey joins at latitude 47°43'00"N to latitude 47°45'00"N, longitude 122°44'50"W to longitude 122°46'50"W. A large segment of the present survey falls within these area limits. Agreement was satisfactory but standard depth curves could not be made in coincidence throughout the common areas. Therefore, a butt junction was effected and H-9035 is superseded within the common area of the present survey.

b. H-8916 (LJ-10-5-66). The common area of hydrography with this junctional sheet lies in the extreme northern limits of the present survey at latitude 47°48'30"N to latitude 47°49'20"N, longitude 122°40'30"W to longitude 122°42'45"W. A large segment of the present survey falls within these area limits. Agreement was satisfactory but standard depth curves could not be made in coincidence throughout the common areas. Therefore, a butt junction was effected and H-8916 is superseded within the common area of the present survey.

6. COMPARISON WITH PRIOR SURVEYS

H-7099 (1946-47) 1:10,000

Depths since the prior hydrographic survey reveal that this area in Hood Canal has remained relatively unchanged. Generally, depths have increased only slightly (.5 to 1.0 fathom). A shoreline comparison was not accomplished since the prior survey covers only the navigable area. However, several newly constructed piers in and around the Bangor Naval Facility have greatly changed the shoreline configuration in this portion of Hood Canal.

The group of charted pilings centered at latitude 47°43'46"N, longitude 122°46'37"W originate from H-7099 (1946-47). These items were confirmed as still existing on a preliminary field plot but were not transferred to the final field sheet. The smooth sheet shows these items as confirmed by use of a dashed limit line. Several additional piles not addressed by the hydrographer were transferred in red from the prior survey.

The present survey, H-10072 (DA-10-1-83) is adequate to supersede the prior survey within the common area.

USN #306241 (1964) 1:12,500 (Per Project Instructions)

As with the prior NOS hydrographic survey, the U. S. Navy sounding data shows good agreement. Generally, depths have remained within one fathom with no discernible trend of shoaling or an increase in depth. A shoreline comparison was not accomplished since the Navy survey covers only the navigable area.

The present survey, H-10072 (DA-10-1-83) should be the source for charting within the common area.

7. COMPARISON WITH CHART

a. Hydrography - A comparison was made with Chart 18458, 10th Edition, August 15, 1981 and Chart 18461, 10th Edition, September 5, 1981 (chart markups are in cahier). The charted information originates with the previously discussed prior surveys and unknown sources. The two Pre-Survey Review Items were adequately disposed of by the field.

The following charted items were not verified during the present survey:

	<u>Latitude</u>	<u>Longitude</u>
1. Piling (dashed line, three piles)	47°48'16"N	122°44'41"W
2. Pier ruins	47°48'21"N	122°44'39"W

The present survey is adequate to supersede the charted hydrography within the common area.

b. Controlling Depths - There are no controlling depths within the limits of this survey.

c. Aids to Navigation - There are three floating and three fixed aids (Hood Canal Light 7, Hood Canal Light 8 and Hood Canal Light 10) within the survey limits. These structures were compared to the charted positions and adequately serve the purpose intended. Additionally, the nine fixed red lights located during this survey should be charted as private lights (privately maintained).

8. COMPLIANCE WITH INSTRUCTIONS

H-10072 (DA-10-1-83) adequately complies with the project instructions except as noted in section 4, Condition of Survey.

9. ADDITIONAL FIELD WORK

H-10072 (DA-10-1-83) is a good basic survey. However, discrepancies still exist between shoreline and hydrographic data concerning the plots of certain fixed lights on several piers. The evaluator concurs with the ship's recommendation that the revision prints be reexamined for compilation errors.

Respectfully submitted,

Bruce A. Olmstead

Bruce A. Olmstead
Evaluator

This survey has been verified and evaluated. I have examined the survey and it meets Charting and Geodetic Services survey standards and requirements for use in nautical charting except as noted in the Evaluation Report. The survey is recommended for approval.


James S. Green
Supervisory Cartographer

National Ocean Service
 Pacific Marine Center
 1801 Fairview Avenue East
 Seattle, Washington 98102-3767

SEP 8 1983

N/MOP21X1:TC

TO: N/MOP - Charles K. Townsend

FROM: *151 L. Mordock*
 N/MOP21 - Ned C. Austin

SUBJECT: Further Requirements for BS³ Operations

On August 17 several members of my branch met with Lt. Wheaton of the DAVIDSON to explore ideas for improvements in the BS³ system, both for real-time operations and for subsequent processing and quality control.

The following are needs felt by the Nautical Chart Branch:

1. to receive a copy of the ship's NAV plot (i.e., the sheet showing the ship's antenna track).

This would be quite useful to compare against the antenna plot generated by EDAT. At present only the plot of the ship's position at fixes is sent. This is inadequate in that it does not show the inbetween positions, only those at the fixes.

To reflect this, the project instructions, section 6.13, Data Reduction, should include: "The ship's NAV plot shall be submitted along with the data records."

2. a record of HRP sensor output, preferably as an analog trace with time ticks.

The HRP sensor is a new device which bears monitoring due to its influence on the calculated position of a given depth. Having an analog trace with time ticks would allow evaluation of the unit's performance for reasonableness. The trace should be relatively smooth and it should center about 0.0° deflection (or 0.0 ft. in the case of heave); any portion showing excessive spikes or a centering significantly different from 0.0 would be automatically suspect. At present there is no output which would give us this kind of overview of performance. (This would have a side benefit in that ship's personnel could also monitor its performance real time.)

3. more documented calibration of the ship's equipment:

Due to the increased depth of operations, the use of new equipment and the interaction of these units, it is necessary to get better calibration data on all sensors. Of course, there are compromises to be made, as the most complete

CODE	OPERATOR	SURNAME	SECURE	DATE	LEADS	NO. TICS	SURNAME	DATE
MOP21X1	Clark	<i>TJC</i>						
MOP21X1	Mordock	<i>NM</i>						

FILE COPY

1001-20-1

hydrographic operations. The following are suggested requirements to be evaluated in the field:

a. gyro - daily

This might take the form of steaming along a given line for 10 minutes and checking gyro heading against the heading given by Mini-Ranger fixes; any comparable method would be acceptable.

b. HRP sensor

We have no thoughts on how to attempt this, but some method must be found in order to help detect gross malfunctions and evaluate its deterioration over time.

c. sonar - several times a season (?)

This would be analogous to the bar checks performed in the present hydro launches. One method might be anchoring a platform and running the ship past it at various distances, allowing it to be sounded by each beam in succession. Due to the clumsiness of this procedure, it is foreseen that it could be repeated only rarely during the field season. (Perhaps EDO could suggest a better method.)

4. limit crossline data to the vertical beam only

As mentioned in the reports on system evaluation (NOAA Technical Reports OIES-9 and OIES-10) the vertical beam is considered the most accurate (there is little ray bending and the distance covered is the least, limiting inaccuracies due to water variations). In order to provide the best crossline data to check against mainscheme soundings only vertical beam data should be used on crosslines.

This would require:

a. software modification to allow selection of the most nearly vertical beam.

b. a change in project instructions, section 6.5.1.1 to include: "Crossline data shall be taken from the most nearly vertical beam, when software for this option exists. Until that time, crossline data shall be taken from the central beam only."

5. better annotations for the raw data record

a. at times of Mini-Ranger signal jumps (sometimes they were annotated, sometimes they were not)

b. when the ship was seemingly off line (it was difficult to tell if a Mini-Ranger "bust" occurred or if the ship was actually off line)

There was some mention of difficulty entering comments when errors were being recorded by the system, and a log book was supposedly used. This seems to defeat the idea of entering comments either in the real time

SSF printout or in the electronic record itself. Comments should be logged in only one or two places, lest they be lost or overlooked.

Perhaps some code can be devised to speed the entry of certain types of comments through the keyboard.

6. in the survey summary file, flag whenever the Mini-Ranger signal strength is below a specified value.

At present, there is no record of electronic signal strength. Analysis of "jumpy" rates and "busts" would be easier if that information was recorded in the survey summary file.

Some of these needs can be quickly met; others may require considerable time and resources. But all of the suggestions are considered important for efficient use of the system and adequate data quality control.



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Pacific Marine Center
1801 Fairview Avenue East
Seattle, Washington 98102

April 29, 1983

TO: Commanding Officer
NOAA Ship DAVIDSON

FROM: *K.W. Jeffers*
for N/MOP - Charles K. Townsend

SUBJECT: Preprocessing Examination of H-10072, Thorndyke Bay to Bangor,
Hood Canal, Washington

Hydrographic Survey H-10072, Thorndyke Bay to Bangor, Hood Canal, Washington, has been reviewed in accordance with Hydrographic Survey Guideline No. 15, and the Preprocessing Examination Critique for this survey is attached. H-10072 is hereby accepted for Marine Center processing. This is the first registered BSSS survey to be accepted for processing. Please express my appreciation to the officers and crew of the DAVIDSON for their efforts in accomplishing this survey.

The Preprocessing Examination Critique strives to provide information which will be useful to the command for maintaining the quality of future hydrographic surveys. I encourage you to use this information constructively. This is the fifth DAVIDSON survey critiqued by PMC under Guideline No. 15 which has been produced under your command. Your comments on specific items or the process in general are welcome.

Attachment

cc: N/MOP22 w/attachment
✓ H-10072 Descriptive Report w/attachment
N/CG2 w/attachment
N/CG w/o attachment





U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

National Ocean Service
Pacific Marine Center
1801 Fairview Avenue East
Seattle, Washington 98102

April 28, 1983

TO: N/MOP - Charles K. Townsend *KWJ*
FROM: N/MOP21 - Ned C. Austin *Ned C. Austin*
SUBJECT: Preprocessing Examination for H-10072

I. SURVEY INFORMATION

A. Field No. DA-10-1-83 Registry No. H-10072

B. State Washington
General Locality Hood Canal
Sublocality Thomdyke Bay to Bangor

C. Project Instructions: QPR-N165-DA-83
Original dated November 22, 1982
Change No. 1 dated February 14, 1983

D. Date:
Field Work Commenced February 22, 1983
Field Work Completed March 23, 1983
plus 6 weeks = May 4, 1983
Data Received at Marine Center April 8, 1983
plus 1 month = May 8, 1983
Examination critique transmitted to field April 29, 1983
Target for completion of Marine Center processing July 5, 1983



II. PREPROCESSING EXAMINATION CRITIQUE

A. Danger to Navigation Reports

The ship submitted a danger to navigation report on four items in the vicinity of latitude 47°44'12"N, longitude 122°44'22"W. One additional danger was reported during the preprocessing examination (Attachments Q and F).

B. Compliance With Instructions

The DAVIDSON generally complied with project instructions. The ship did not, however, submit all the required BS³ data (Draft BS³ Operations Manual, Table 10). In particular, a copy of all survey summary files should be submitted. Magnetic tape format is preferred, since Nautical Chart Branch does not have floppy disk capability.

C. Final Field Sheet

The legibility of the Hydroplot final field sheet is generally good, but considerable congestion occurs in the nearshore zone where mainscheme and "shore" sounding lines overlap. In some areas significant features are not distinguishable due to overprints (Attachment A). Since copies of the field sheet are sometimes used to update charts, soundings and other hydrographic data must be clearly shown (Hydrographic Manual, section 1.5.6).

Numerous overprints of BS³ soundings rendered a considerable number of them illegible (Attachment B). This problem is a deficiency in the BS³ software and is beyond the control of the ship.

A group of pilings near latitude 47°43'45"N, longitude 122°46'37"W indicated as "confirmed" on the preliminary plot were not transferred onto the final field sheet. A
on 555

The 1:2500 enlargement of the east side of Hood Canal effectively relieves sounding congestion alongside the Navy piers.

A need for additional work in verifying shoreline details was indicated by the failure of detached positions for fixed red lights to plot in their proper relative positions on several piers. The Descriptive Report (section P, Miscellaneous, paragraph 8) recommends reexamination of the revision prints for compilation errors. When discrepancies between shoreline maps and hydrographic data occur, a verification effort similar to that performed in Thorndyke Bay should be undertaken as required by section 4.2.1.1 of the project instructions. Discrepancies should be resolved in the field.

Sounding line orientation and spacing are good. A good junction was made between BS³ and Hydroplot data on both sides of Hood Canal.

Bottom features are generally adequately portrayed, and depth contour agreement between Hydroplot and BS³ sounding plots is excellent.

A number of minor discrepancies occurred in depth contours, on both the BS³ and Hydroplot sounding plots (Attachments C, D and E).

Additional investigation of the 2.3 fathom sounding north of Delta Pier (Attachments F and G) should have been conducted to ensure determination of least depth (Hydrographic Manual, section 1.4.3).

Two errors were observed in the final field sheet notes:

1. H-10072 junctions with H-8916 in the south, and H-9035 in the north. The final field sheets are annotated "NO CONTEMPORARY SURVEY" in both locations. ¹⁹⁶⁶ ¹⁹⁶⁹ *See areas of overlaps on these two (2) prior sur.*

2. Names of horizontal control stations noted on field sheets should be consistent with station names contained in or submitted for entry to the NGS data base. The year is part of the station name if the station was established before January 1977, as KWATEE 1964. After January 1977, the year of establishment supplements the station name and should be separated from it by a comma or parentheses, as "HOOD CANAL LIGHT 8, 1983" or "HOOD CANAL LIGHT 8 (1983)" (Attachment E). Section 2.2.04.3 of the NGS Operations Manual is the reference for naming horizontal control stations.

Field sheet annotations for rocks and other nearshore features (Attachment A) are excellent.

D. Descriptive Report

Several problems were noted with the Descriptive Report:

The title information on the Hydrographic Title Sheet is incomplete. The form should have been completed in accordance with section 5.3.2 of the Hydrographic Manual. Hydrographic Survey Guideline 19, issued after submission of H-10072, also applies.

An elevation discrepancy exists with the rock observed twice (section L, Comparison with the Chart). Discrepancies should be resolved in the field.

The "piling" and adjacent enclosed area near latitude 47°43'45"N, longitude 122°46'37"W (Chart 18458) does not appear on the final field sheet, and should have been discussed in section L of the Descriptive Report. A marginal note on the preliminary plot "confirmed" pilings in the area, but doesn't describe what is there. *SSS*

The plot option used for producing BS³ sounding plots should be indicated in section E (Hydrographic Sheets) of the Descriptive Report.

E. Echograms

The quality of the bottom trace is excellent. Additional attention to several areas of echogram annotation is desirable:

1. The bottom trace should not be defaced in any way.

2. Launch speed should be annotated at the start of the record, and when changes occur.

3. Weather and sea conditions should be noted at the start of the record and when changes occur. During a spot check of echograms it was noted that each echogram stamp was modified to read "Jagged profile caused by seas", but no suggestion of rough seas was indicated by the bottom trace. Sea conditions were not recorded to support the stamp information.

Echogram annotations recommending additional investigation of features observed during the "offline" mode (Attachment H) were excellent, but were apparently not pursued. Several notes of this nature were observed, but no indication of subsequent investigation was found.

Particular care should be taken to ensure accuracy in all notes. Attachment H is a continuation of the Attachment G echogram. The feature on both echograms is probably the same. If so, the Attachment H note appears to contain an error concerning the location of the feature (compare to Attachment F), but this should not have precluded additional investigation at both locations.

The frequency of stylus belt tension checks and phase calibrations was good, but phase checks frequently were not performed in the proper sequence (Attachment I). Adjustment of the initial trace changes the phase on all other scales. Consequently, this adjustment should be made before the phase checks. The sequence of echo sounder checkout procedures should follow Appendix B of the PMC OORDER.

Bar check frequency and conduct generally met the requirements of section 4.9.5.1.1 of the Hydrographic Manual. The result of one bar check was noted with interest (Attachment J). The recommendation to delete a portion of the bar check is presumably based on the change observed in the tenths of fathoms at the six and seven fathom bar depths. Changes of this sort are not unexpected, particularly in an area with a steep sound velocity profile in the surface layer (Attachment K). If a mechanical or procedural failure is suspected, as suggested by the note, the bar check should be reobserved.

Scanning of echograms was generally adequate, but some problems were noted in scanning shallow depths when the primary trace was lost in the fathometer initial (Attachments L and M). In the cited cases the digitizer selected the secondary echo, which is approximately twice the actual depth (Attachments N and O).

F. Sounding Volumes and Raw Data Printouts

Raw data printouts are generally well annotated. Comments concerning nearby features are good.

Sounding volume notes are generally satisfactory, but could be improved by the addition of general comments or sketches for orientation. Field notes for bottom samples (Attachment P) are incomplete because a description of the sample was not included in the field record.

G. Sounding Correctors

Because of the rapid change in sound velocity reported between the surface and five meter depths (Attachment K) there is no positive assurance that the ± 2 meter/second sound velocity accuracy requirement for BS³ operations (Project Instructions, section 6.7) was met between those depths. When the data acquisition capability permits (as when sound velocity sensors are used) the density of data points should be increased in areas of steep sound velocity gradients to ensure satisfying the ± 2 meter/second requirement. The observations are particularly critical in the upper 5 to 10 meters where the projected sound pulse enters the water column. Inaccuracies introduced in this region may have significant effect on both the measured depth and the position assigned to it.

I. Horizontal Control

Nine fixed red lights marking pier corners at the Bangor Naval Facility were located by hydrographic methods. The method does not satisfy project instruction or Hydrographic Manual accuracy requirements for locating federally maintained nonfloating aids to navigation, but is considered adequate in this situation because of the relatively large number of primary USCG fixed aids, and because section 4.5.13.1 of the Hydrographic Manual permits locating "numerous minor day beacons subject to frequent changes in position" by hydrographic methods. As a general rule, however, if a nonfloating aid to navigation is listed in the Light List, a third order position should be established if none exists.

Some errors were noted in the NOAA Forms 76-40:

1. Landmarks for charts and nonfloating aids to navigation should be submitted on separate forms.
2. A charting recommendation and brief explanation for the deletion recommendation for the house charted south of King Spit should have been made via Form 76-40.
3. The warehouse north of King Spit should have been reported on Form 76-40.

Additional guidance for filling out NOAA Form 76-40 is in section 5.5 of the Hydrographic Manual and in Photogrammetric Instruction 64.

The condition of horizontal control station WHARF 1964-1971 mentioned in the Horizontal Control Report conflicts with the condition cited in the recovery note.

The failure to obtain a satisfactory azimuth check at station WHARF 1964-1971 should have been resolved during field operations. If the station was damaged as indicated in the Horizontal Control Report, it should have been repaired as required by section 3.1.1.2 of the Hydrographic Manual.

M. General Comments

The hydrography on H-10072 appears to be well done. Reports and project data were submitted in a very timely manner in accordance with section 1.4 of the Project Instructions. Most of the referenced problems are isolated cases. Time pressures likely contributed to the processing deficiencies.

N. Survey Acceptance

The preprocessing examination for H-10072 was conducted under the time constraints described in Hydrographic Survey Guideline No. 15. All comments contained herein are based on a spot check of the data, and it is likely that some problem areas have not been addressed.

Except for the items noted in the critique, H-10072 is in compliance with project instructions, and I recommend that it be accepted for Nautical Chart Branch processing.

Prepared by:

Donald A. Dreves

Donald A. Dreves

DATE: May 2, 1983

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

TIDE NOTE FOR HYDROGRAPHIC SHEET

Processing Division: Pacific Marine Center:

Hourly heights are approved for

Tide Station Used (NOAA Form 77-12): 944-5088 Lofall, WA
944-5133 Bangor, WA

Period: February 26-March 23, 1983

HYDROGRAPHIC SHEET: H-10072

OPR: N165

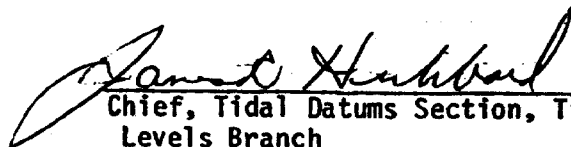
Locality: Hood Canal, Washington

Plane of reference (mean lower low water): 944-5088 = 0.48 ft.
944-5133 = 2.59 ft.

Height of Mean High Water above Plane of Reference is 944-5088 = 9.8 ft.
944-5133 = 10.2 ft.

REMARKS: Recommended Zoning:

1. North of latitude $47^{\circ}47.0'$ zone direct on 944-5088.
2. South of $47^{\circ}47.0'$ zone direct on 944-5133.


Chief, Tidal Datums Section, Tides & Water
Levels Branch

ATTACHMENT TO DESCRIPTIVE REPORT FOR H-10072

I have reviewed the smooth sheet, accompanying data, and reports of this hydrographic survey. Except as noted in the Evaluation Report, the hydrographic survey meets or exceeds Charting and Geodetic Services (C&GS) standards, complies with instructions, and is accurately and completely represented by the smooth sheet and digital data file for use in nautical charting.

M. C. Austin 11/16/83
Chief, Nautical Chart Branch (Date)

CLEARANCE:

N/MOP2:RLSandquist

SIGNATURE AND DATE:

RLSandquist 11/17/83

After review of the smooth sheet and accompanying reports, I hereby certify this survey is accurate, complete, and meets appropriate standards with only the exceptions as noted above. The above recommendations are forwarded with my concurrence.

Philip K. Townsend 11/23/83
Director, Pacific Marine Center (Date)

DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Survey
Rockville, Maryland

Hydrographic Index No. 1041

