H10831

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic/Side Scan

Field No. RU-10-05-98

Registry No. H10831

LOCALITY

State Maine

General Locality Casco Bay

Locality West Cod Ledge to Hussey Sound

1998

CHIEF OF PARTY
LCDR D. A. Cole

NOAA FORM 77-28 (10/72)

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

REGISTER NO.

HYDROGRAPHIC TITLE SHEET

H10831

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.

RU-10-5-98

State: Maine

General locality: Casco Bay

Locality: WEST COD LEDGE TO ~~Approaches to Portland Harbor and~~ Hussey Sound

Scale: 1:10,000

Date of survey: August 4 - October 7, 1998

Instructions dated: 7-28-98

Project No.: OPR-A329

Vessel: NOAA Ship RUDE

Chief of party: LCDR D. A. Cole, NOAA

Surveyed by: LCDR Cole; LT Berkowitz; RPS Parker; RPS Owens, AST Rooney

Soundings taken by echo sounder, hand lead, pole: Raytheon DSF 6000N; SeaBat 9003

Graphic record scaled by: LCDR Cole; RPS Parker; RPS Owens; AST Rooney

Graphic record checked by: LCDR Cole; RPS Parker; RPS Owens; AST Rooney

Protracted by: N/A

Automated plot by: (FIELD) (AHB) HP 750C and 2500C DesignJet

Verification by: ATLANTIC Hydrographic Survey Branch PERSONNEL

Soundings in: Meters (*) (feet) at MLW MLLW (*)

REMARKS:

All times recorded in UTC.

NOTE IN THE DESCRIPTIVE REPORT WERE MADE IN RED DURING OFFICE PROCESSING

AWOIS/SURF ✓ 8/17/99 ST

NOAA FORM 77-28 SUPERSEDES FORM C & GS-837.

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A. PROJECT

A.1 This survey was conducted in accordance with Hydrographic Project Instructions OPR-A329-RU, Portland Harbor and Approaches, Maine.

A.2 The original instructions are dated July 28, 1998.

A.3 There are no amendments to the instructions.

A.4 This survey is designated registry number H10831.

A.5 The purpose of this project is to obtain full bottom coverage using a combination of multibeam and side scan sonar hydrography in the vicinity of Portland Harbor and approach to Hussey Sound. This survey responds to requests from the Portland Pilots, Inc., the Maine Department of Environmental Protection, and the U.S. Coast Guard. Modern hydrographic surveys are required to ensure safe and efficient navigation of commercial shipping. Container carriers, cruise ships, and large petroleum carriers with draft up to 45 feet now frequent Portland Harbor. Calculations of under-keel clearance depend on accurate, full bottom coverage surveys.

B. AREA SURVEYED

B.1 Survey H10831 covers the general vicinity between Portland Harbor, West Cod Ledge, and approach to Hussey Sound. Survey area covers 10.965 square nautical miles.

B.2 The survey is comprised of one sheet with the following approximate survey boundaries starting in the NW corner proceeding clockwise:

	Latitude	Longitude
a.	43°39′54″	070°10′24″
b.	43°40′05″	070°09′24″
c.	43°39′08″	070°09′11″
d.	43°38′40″	070°08′41″
e.	43°33′53″	070°07′39″
f.	43°33′28″	070°08′35″
g.	43°37′43″	070°12′41″
h.	43°38′28″	070°13′14″
i.	43°38′34″	070°12′46″
j.	43°37′59″	070°12′31″
k.	43°37′56″	070°12′03″
l.	43°37′28″	070°11′32″

	Latitude	Longitude
m.	43°37'53"	070°10'38"
n.	43°39'12"	070°10'01"
o.	43°39'42"	070°10'08"
p.	43°40'00"	070°10'41"

B.3 Data acquisition for this survey began on August 3, 1998 (DN 215) and ended on October 7, 1998 (DN 280).

Over 83.596 million multibeam soundings were processed during the survey.

C. SURVEY VESSELS

C.1 All H10831 hydrography, side scan, and multibeam investigations were conducted from NOAA Ship RUDE, S-590, EDP #9040. General functions include side scan sonar and multibeam sounding operations, velocity of sound determinations, bottom sampling, and navigational aid positioning.

C.2 The transducer for the multibeam sonar was deployed on a pivoting pole mounted on the port side, approximately amidships. The multibeam transducer was rotated into the water only during times of data acquisition.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

SEE ALSO THE EVALUATION REPORT

D.1a Coastal Oceanographics' HYPACK for Windows Version 7.1a (12/02/97) was used for data acquisition on this survey. Post processing included the use of HPTools Version 1.6.0 (03/04/98) for all Hypack data conversion data. Data processing was conducted using Hydrographic Processing System (HPS) Version 8.2 (03/02/98) supplied by Atlantic Hydrographic Branch Computer Support Group. Mapinfo Version 4.5 (11/11/97) was utilized for data display during the evaluation process and completion of the field sheet. All software versions used for data processing are listed in Appendix H. FILED WITH THE ORIGINAL FIELD DATA

D.1b Triton Corporation's ISIS software Versions 3.0 (01/08/98) was used to acquire SeaBat multibeam and digital side scan sonar data. SeaBat data was processed on the CARIS-HIPS System Version 4.2.7 (01/17/97).

D.1c The SEABIRD SBE-19 sound velocity profiler unit was utilized with SEASOFT 3.3M (11/27/89) and SEACAT 3.1 (02/25/98) software. The program VELOCITY Version 3.1

(03/03/98) was used to process the acquired data and calculate velocity corrections.

D.2a Multibeam and side scan sonar data (XTF Format) conversion within the CARIS-HIPS System entailed specific conversion selections. Conversion selection for origin of sensor information differs between the two types of data. Multibeam data conversion utilized the standard or default selections. Default selections with CARIS software included "Ship Nav" from Sensor; "Ship Gyro" from Ship; "Fish Nav" from Sensor; "Fish Gyro" from Ship. Data decimation and image correction was not selected during conversion.

Side scan sonar data conversion entailed selecting "Ship Nav" from Sensor; "Ship Gyro" from Ship; "Fish Nav" from Ship; "Fish Gyro" from Ship. Data decimation and image correction was not selected during conversion.

D.2b SeaBat depth data were monitored using ISIS during acquisition and processed utilizing CARIS-HIPS multibeam data cleaning programs. Digital multibeam depth profiles were visually reviewed and fliers were identified and manually flagged as "rejected"; no SeaBat quality flags were used to automatically "reject" data. Vessel navigation data from DGPS and attitude data from heave, pitch, roll, and gyro sensors were displayed and manually cleaned (see Sections G and I). Motion reference data was cleaned using the program *cleanGHPR* supplied by System Support Branch (SSB) N/CS32.

D.2c After reviewing and cleaning, the depth, navigation, and attitude data were merged with sound velocity, tide, and vessel configuration data to compute the true depth and position each sonar beam footprint. Work file processing included importing the multibeam depths (selecting "extended no key" and "group by beam number"). Processed depths were thinned by shoal bias selection with 3m X 3m sounding grid. Soundings were suppressed with a level of 3.0 constant term; this binning level yields data points approximately every 30 meters (3mm X 3mm at 1:10,000 scale). These excessed field sheet soundings were used in CARIS Workfile Processing for cross-data comparisons (see Section J.2). Finally, the CARIS Workfile Processing soundings were transferred into HPS (using HPTools) and MapInfo databases.

D.2d Sounding evaluation included the use of a text file (.txt) created during the multi-beam sounding export process. This text file was used to display the soundings within

MapInfo. The dat file (.dat) created during sounding export process was later converted into HPS via HPTools, generating a HPS multibeam only data file for each day of acquisition. Final field sheet selected soundings originate from these HPS multibeam only data files.

The conversion software translating HYPACK data and the suppressed multibeam soundings into HPS compatible format was supplied by NOAA's Atlantic Hydrographic Branch Computer Support Group. The HPTools Version 1.7.1 was used for data conversion and management.

D.2e Final plots were created in MapInfo, a PC-based GIS package, with assistance from HPS-MI MapInfo tools supplied by Hydrographic Survey Division (HSD). These tools produced depth, track and swath plots from HPS data and allowed plotting on a HP750C and 2500CP DesignJet plotter. Data could also be overlaid on a raster image of the applicable chart.

D.2f The total number of multibeam soundings used and processed during post processing evaluation does not reflect the total number of multibeam soundings provided to N/CS33. Verification sounding grid size of 1.5mm at survey scale was selected with no sounding suppression within HIPS. Sounding excessing will be conducted during the verification process using HPS.

E. SONAR EQUIPMENT

E.1 All side scan sonar data were acquired with an Edgetech (EG&G) model 272 towfish (S/N 11902) and an Edgetech Model 260-TH slant-range correcting side scan sonar recorder (S/N 16670). Additionally, all side scan sonar data were recorded digitally using the Triton ISIS software and archived in the Extended Triton Format (*.XTF) files.

E.2 The side scan towfish used a 50° vertical beam width tilted down 20° from horizontal.

E.3 The 100 kHz frequency was used throughout the survey.

E.4a The 75-meter range scale was used at a line spacing of 120 meters to obtain 100% side scan sonar coverage.

E.4b Confidence checks were conducted by means of verifying identifiable benthic features. Survey H10831 contains numerous areas with sand waves, ripples, rocks, and rock ledges. These features were identified from inner to

outer limits of the range scale. Graphic record annotations indicate the confidence checks. The hydrographer's confidence in side scan sonar area coverage was continuously verified.

E.4c One hundred percent side scan sonar coverage was completed for this survey. Holiday coverage was run to fill in any gaps. All coverage was checked with on-screen zoomable coverage displays in MapInfo, to ensure proper overlap between lines.

E.4d The towfish was deployed exclusively from the stern. An electronic cable counter (M/D Totco) was employed to determined the amount of side scan cable deployed.

E.4f The towfish transducers appeared unbalanced; the starboard transducer image appeared weaker than the port channel. It was noted that the majority of contacts were sighted in the port channel. Transducer imbalance suggests evidence for this phenomenon. Starboard channel was compensated by gain adjustments during data acquisition.

E.5 Sonar records were monitored on-line and reviewed by two persons during processing to identify contacts. Contact offsets and shadow heights were measured on analog sonar records, checked, and entered into the HPS Contact Table to compute contact heights and positions.

E.6 All side scan contacts with computed heights greater than 10% of water depth, or greater than 1.0 meter off the bottom in depths shoaler than 20 meters, and all contacts which appeared man-made were deemed significant. All significant contacts were theoretically developed by definition through the course of obtaining 100% multibeam coverage. Least depth soundings were developed with additional multibeam confidence swaths to ensure data integrity and to obtain near nadir least depths. All coverage was checked with on-screen zoomable coverage displays in MapInfo, to ensure proper overlap between lines.

E.7 Areas in the NE corner of survey area, entrance to Hussy Sound, and entrance to Portland Harbor do not have 100% side scan coverage. The lack of coverage is due to lobster pot density and close quarters maneuvering. These areas were covered by 100% multibeam coverage conducted at slower speeds to increase sounding data density along track.

F. SOUNDING EQUIPMENT

F.1a All multibeam sounding data was collected with the single-frequency (455 kHz) Reson SeaBat 9003 (S/N 10496-447020) shallow-water sonar system. Additional sounding data was acquired with the dual-frequency (24 and 100 kHz) vertical beam Raytheon DSF-6000N Digital Survey Echosounder.

F.2a Both high (100 kHz) and low (24 kHz) frequency vertical beam DSF data were recorded during data acquisition. DSF echograms were monitored on-line. Anomalous DSF echogram traces were immediately cross-referenced to the ISIS multibeam acquisition display online.

F.2b Manual edits were made to the DSF data; only missed depths (9999.9) were edited during field processing. DSF vertical correctors were applied to the raw DSF digital soundings (see Section G). The archived HPS fixes of DSF soundings do not represent the entire character of the seafloor because shoal bias inserts were not selected; graphic records were not scanned for depths edits. **DSF data should not be included on the final field sheet; all final field soundings originate from multibeam data.**

F.3 There were no observed faults in sounding equipment that affected the accuracy or quality of the data. Following table lists the dates and serial numbers of single beam echosounders used during this project :

Date	Day Number	Serial Number
8/03/98	216	A108N
8/04/98	217	A107
8/10/98	222	A108N
8/13/98	225	A116N
8/17/98	229	A109N
8/20/98	232	B037N
8/29/98	241	A109N
9/04/98	247	B050N
9/08/98	251	A109N

DSF 6000N Echosounder serial number A109N was used from DN 251 (9/08/98) through DN 280 (10/7/98). All of the listed echosounders were exchanged due to poor graphic record quality or improper operation. These problems were

indicative of equipment condition due to age and lack of spare parts for proper repairs.

F.4 No diver investigations were performed for this survey.

F.5a The 9003's combined transmit and receive beams yield forty (40) soundings per ping, each formed from a 3° crosstrack x 1.5° alongtrack bottom footprint. During multibeam data processing, the outermost two beams on each side of the swath (beam numbers 1, 2, 39, and 40) were not processed, reducing the effective swath width to 108° (3° x 36 beams). Proper overlap between multibeam sonar coverage lines was verified using a conservative swath width assumption of 108°.

F.5b SeaBat 9003 multibeam data were continuously recorded and served as the primary source for hydrographic digital soundings. Sounding depths ranged from 21 to 177 feet of water, utilizing multibeam range scales of 25, 50, and 100 meters. 100% side scan sonar coverage was based upon 120 meter line spacing. Multibeam development was adjusted yielding 100% multibeam coverage over the survey area. Item investigation and confidence swaths line spacing were based upon contact positions for nadir beam development.

F.6 Vessel speed during the mainschmeme sounding collection consisted of maintaining standards for side scan operations. Multibeam development included vessel speeds between 4 and 7 knots; item and contact investigation speeds were generally slower (3 to 5 kts). Slower vessel speed increases the data density in the along track coverage over the feature. Ping rate is dependant upon multibeam range scale being utilized and determines the number of pings per unit area of the bottom.

F.7 Proper overlap for one hundred percent multibeam sonar coverage between lines was determined in **MapInfo** by using the **HPS_MI** tool for drawing multibeam swath coverage. Multibeam swaths were based on DSF single beam sounding data and were extrapolated to a swath width assumption of 108°, inclusive of beam numbers three through thirty-eight. Due to the limitations of multibeam swath determination by this method, swath coverage over sloping features may be suspect to error due to a flat bottom assumption and not taking into account instantaneous heave, pitch and roll values. Utilizing this tool, full SWMB coverage main scheme line spacing was adjusted to provide full coverage over the entire survey area.

G. CORRECTIONS TO SOUNDINGS

G.1a Sound velocity correctors were computed from a SeaBird SBE19 SEACAT Profiler (S/N 196723-1251). Data quality assurance tests using the CAT program were performed for each cast. The profiler is calibrated at the beginning and end of each field season. See Separate IV for data records. FILED WITH THE ORIGINAL FIELD RECORDS

The following velocity casts were used for this survey:

CAST #	DAY NUMBER
1,2	215
3,4,5	216
6	218
7	219
8,9	222
10,11	224
12,13,14	225
15	226
16	230
17,18,19	231
20,21	232
22,23	233
24,25	234
26	237
27,28,29,30, 31	238
32	240
33,34,35	243
36	245
37,38	246
39	247
40,41	251
42,43,44	252
45,46,47	253
48	254
49	257
50,51	266
52,53,54	267
55,56	268
57,58,59	271

60,61,62	272
63,64	273
65	275
66,67	278
68,69,70	279
71	280

Sound velocities were applied to the SeaBat data in HIPS (incorporating the Nautical Charting Development Lab REFRACT algorithm). Sound velocity correctors for the vertical beam soundings were computed using VELOCITY and applied to the DSF data using HPS.

G.1b A DSF-leadline direct comparison was conducted once during survey H10831 (DN 228) and once during the 1998 field season (DN 179). Direct comparison documentation is listed in Appendix E. *

Continuous comparison between DSF and Seabat multibeam depths were monitored during field acquisition. Sounding comparisons are discussed in Section J.

G.1c Sensor offsets and transducer static drafts were measured during the December 1996 dry-dock period. Sensor offsets were stored in the CARIS-HIPS Vessel Configuration File and HPS Offset Table for use in data processing. See Separate IV* for data records.

G.1d Transducer dynamic draft was measured on March 4, 1998. Dynamic draft correctors were stored in the CARIS-HIPS Vessel Configuration File and HPS Offset Table for use in data processing. See Separate IV* for data records.

G.1e Heave, pitch, and roll data were acquired with a Seatex Seapath Motion Reference Unit (MRU-5) (S/N 0544). Heave, pitch, and roll data were applied to SeaBat multibeam data during Caris/HIPS processing. Heave data were applied to DSF vertical beam data during post processing.

G.1f Heading data were acquired with Seatex Seapath and applied to determine both multibeam transducer and side scan towfish azimuth and position.

Multibeam heave, pitch, roll, and heading sensor data were adjusted using biases as determined during a patch test completed on March 4, 1998 (DN 064). Closing patch test was conducted on November 12, 1998 (DN 316). Closing calibrations confirm offsets determined in opening patch

* FILED WITH THE ORIGINAL FIELD DATA.

test. See the CARIS-HIPS Vessel Configuration File in Appendix E for data records.

G.2 No unusual or unique methods or instruments were used to correct sounding data.

G.3 Tide zoning for this survey is consistent with the Project Instructions. Reference tide station was Portland Harbor, Maine (841-8150). Tide zone ME208 correctors were used during field acquisition (time corrector = -6; range ratio = x0.98). Tide zone ME208 covered the majority of survey area; for ease of preliminary tide correction, one tide

zone was used with a predicted tide file derived from Tides and Currents software package. Tide file was then converted into the COWLIS format necessary for CARIS/HIPS multibeam tide application.

Post-processing required the reapplication of verified zoned tidal correctors. Verified tide data was downloaded from the NOS OPSD web site (*www.opsd.nos.noaa.gov)* and were computed in CARIS-HIPS for re-application to SeaBat data. This procedure was performed using HPTools *Zonehips* software provided by NOAA's Atlantic Hydrographic Branch Computer Support Group.

Preliminary unverified tide correctors were applied to the DSF data for comparison of multibeam mainshceme to DSF soundings. Comparison of verified and preliminary unverified tides indicate that the two files contain identical data; the only difference is the verified tide file has "approved" water levels.

The following table indicates the tide zones that were applied during post-processing application of verified water levels:

Zone Station	Time Corrector (min)	Range Ratio
ME208	-6	X0.98
ME209	-12	X0.98
ME210	-18	X0.95
ME211	-6	X0.95

G.4 The diver least depth gage was not used for this survey.

G.5 No significant systematic errors were detected.

G.6a The vertical reference surface for this survey is Mean Lower Low Water (MLLW).

G.6b Tide data were acquired at Portland, Maine (Station 841-8150) by N/OES231. A request for smooth tides was mailed on October 22, 1998. These data will replace the verified tide data during verification by N/CS33.

G.6c Note that multibeam data processing was accomplished using predicted tide values during acquisition and verified tide values during post processing. Shoal soundings selected through CARIS could change upon the re-application of smooth tides. Small differences between verified and smooth tides may require reapplication of smooth tides to the entire CARIS-HIPS data set to ensure correct selection of least depths for transfer to HPS.

G.6d **In HPS, only tide reapplication processing is permissible on multibeam data. If necessary, all other vertical correctors and horizontal offsets should be reapplied to multibeam data using CARIS software. However, if tide reapplication is necessary* it should be done to the entire CARIS multibeam data set to ensure the correct least depths are identified for transfer to HPS.**

*NOT NECESSARY

H. HYDROGRAPHIC POSITION CONTROL

H.1 The horizontal reference surface for this survey is the North American Datum of 1983 (NAD 83). No horizontal control stations were established for this survey.

H.2 Positioning for this survey was obtained from the NAVSTAR Global Positioning System (GPS) augmented with the U.S. Coast Guard Differential GPS (DGPS) service.

The Seatex Seapath 200 and Starlink systems were used throughout this survey for positioning determination. DGPS Radio Beacon reception sites were automatically selected by the strongest signal available within the survey area at a given time. The following DGPS beacons were within range of the survey area, Brunswick, ME being nearest:

USCG DGPS RadioBeacon Broadcast Site	Freq kHz	Rate BPS	Latitude N	Longitude W	Range nm	Beacon ID #

Brunswick, ME	316	100	43°53.4′	069°56.8′	115	800
Portsmouth, NH	288	100	43°04.3′	070°42.59′	70	801

H.3 Accuracy requirements were met as specified by the Hydrographic Manual, sections 1.3 and 3.1, and Field Procedures Manual, section 3.4.

H.4 GPS and DGPS signals were acquired with the following hardware equipment:

GPS and DGPS Hardware	SERIAL #
Seatex SeaPath 200	0347
MRU-5	0544
StarLink, antenna Model MBA2	4202

H.5 The GPS Horizontal Dilution of Precision (HDOP) was recorded during survey operations and manually checked via the Detailed Data Abstract in HPS, raw data printout, and queried within MapInfo. The calculated maximum allowable HDOP value of 4.47 was rarely exceeded. Anomalous position data were either manually smoothed or flagged "rejected", depending on the extent of the affected data. Instantaneous vessel speed was checked with a 2.0 knot speed jump detector in CARIS-HIPS to aid in the manual cleaning of multibeam navigation data.

DGPS performance checks were not conducted. The necessity for control checks is eliminated when using the Seatex Seapath 200; quality positioning is supported by the continuous calibration routine inherent of SeaPath.

DGPS monitor and scatter plots for USCG beacons are not required as per guidelines mentioned in FPM 3.2.2.1

H.6 Calibration data are not required for differential GPS.

H.7a There were no unusual methods used to operate the positioning equipment.

H.7b There were no positioning equipment malfunctions.

H.7c There were no unusual atmospheric conditions noted which might have affected data quality.

H.7d No significant systematic errors were detected.

H.7e Vertical and horizontal offsets for the GPS antenna were applied to the CARIS-HIPS Vessel Configuration File (VCF) for positioning the SeaBat transducer in relation to the vessel's Reference Point (RP). This offset was applied to positional data for sounding position computation. See Separate III for data records.

Horizontal and vertical offsets of the DSF echo sounder transducer were corrected during post processing. The HPS offset table references the transducer as the origin or Reference Point used in Offset Table 1. Offsets listed in Hypack's survey ".ini" file were acquired with multibeam transducer as the offset point ("batcentric"). See Appendix E for data records.

H.7f A-frame position (tow point), cable length, towfish height, and depth of water were applied to navigation data to compute the position of the towfish. This correction is applied in HPS via Reapply Offset Table and Sounding Corrections.

I. SHORELINE

SEE ALSO THE EVALUATION REPORT

No shoreline is contained within the boundaries of this survey.

J. CROSS COMPARISONS

J.1 A total of 22.9 nm of crosslines were acquired for survey H10831. This equates to over 13% of the mainscheme 100% side scan sonar coverage lines and approximately 6.9% of the total multibeam sonar coverage lines (mainscheme and splits). Although the total linear nm of crosslines is less than 4.1% of the total linear nm hydrography, over 316,498 3D points were compared.

J.2a Processed SeaBat crossline soundings excessed at 3 meters x 3 meters (see Section F.4) were compared to a 3 meter x 3 meter binned digital terrain model (DTM) surface in CARIS Workfile Processing. The DTM surface was built from processed SeaBat mainscheme soundings. Averaged across the statistics computed as a function of beam number (see Appendix E), the mean difference between **SeaBat crossline and SeaBat mainscheme soundings** is +0.349 meters; a "+" symbol means the crossline soundings compared deeper.

J.2b Processed mainscheme multibeam soundings converted in HPS were compared to the non-edited single beam DSF soundings. Sounding variance between **SeaBat mainscheme and DSF crossline soundings** was between 0-3 feet except where the bottom is sloping or irregular.

J.2c Processed multibeam crossline soundings converted in HPS were compared to the non-edited single beam DSF soundings. Sounding variance between **SeaBat crossline and DSF crossline soundings** was between 0-3 feet except where the bottom is sloping or irregular.

J.2d Hydrographer determined that sounding comparison between multibeam and DSF sounding were extremely well. In areas of sloping or irregular bottom the variance is greater than 2 feet and generally less than 4 feet. Because of the horizontal uncertainty in the positions of DSF soundings relative to SeaBat soundings, as well as a wide DSF beam footprint, DSF-to-SeaBat comparisons are more favorable in flatter and/or shoaler areas. The bathymetry on survey H10831 is extremely uneven and undulating due to complex geologic morphology.

J.3 No anomalous crossline comparisons were noted.

J.4 The mainscheme and crossline data were collected with the same suite of survey equipment.

K. JUNCTIONS

See also the Evaluation Report.

Survey H10831 junctions with project OPR-A373, survey H10830. At the time of project instruction no junction surveys were mentioned. During field acquisition Atlantic Hydrographic Party conducted survey H10830 that junctions with H10831. No data from H10830 was available at the time of this comparison.

L. COMPARISON WITH PRIOR SURVEYS

See also the Evaluation Report

A comparison with prior surveys will be performed by N/CS33.

M. ITEM INVESTIGATION REPORTS

M.1 Survey H10831 was covered utilizing 100% side scan sonar with 100% multibeam coverage. Additional multibeam

coverage lines were conducted over correlating side scan contacts and significant bathymetric features to obtain least-depth soundings near nadir. Multibeam confidence swaths were conducted verifying the sounding data.

M.2a In addition, AWOIS Item Number 10034 was investigated. Notable results from this development are summarized as follows:

M.2b **AWOIS NO:10034**

Item Description: OBSTRUCTION

Source: CL429/66; NM24/66; NM10/67

AWOIS Position: **Lat** - 43°39'50.29" N **Lon** - 070°10'06.17" W

Required Investigation: S2,MB, DI -- 250m radius

Charts Affected: 13290, 13292

INVESTIGATION

Date(s)/DN(s): 08/06/98 (DN:218)
09/24/98 (DN:267)
09/28/98 (DN:271)

Position Numbers: **Vessel Number:** 9040

Investigation Used: S2, MB **Water Visibility:** 5m+

Position Determined By: DGPS

Investigation Summary: AWOIS 10034 is located in an area of operational considerations; navigational aid "G #3" is located within the AWOIS search radius. Numerous lobster pots in the area prohibited safe side scan operations. Side scan sonar lines covered a portion of the search area. Side scan operations were terminated due to towfish snags on lobster pots in the immediate area. Multibeam sounding lines were conducted in attempt to complete the search area. Safe vessel operation was priority consideration; the search area was not adequately covered due to the location, currents, and vessel safety. Graphic records obtained yield no indications of submerged obstruction.

CHARTING RECOMMENDATION

The hydrographer recommends the submerged obstruction remain charted. CONCUR. NO CHANGE IN CHARTING. RETAIN OBSTN rep PA

Recommended Position: **Lat** N **Lon** W

Recommended Least Depth:

****

COMPILATION NOTES

M.2c An uncharted wreck was located at the geographic position of 43°38'38.06"N 070°09'48.9"W. The wreck was initially sighted on side scan records on DN 218 with contacts 3000.1p and 3004.0p. Development lines were conducted on DN 278 and 279. A corrected multibeam least depth of 79 feet (24.2m) was determined from survey data. Hydrographer recommends charting a submerged wreck with a least depth of 79 feet at the geographic position listed above. CONCUR. CHART A 79' WK

M.3 AWOIS #10031 search was not conducted during 1998 field season. This item will be investigated during the completion of OPR-A329 in the next field season.

N. COMPARISON WITH THE CHART SEE ALSO THE EVALUATION REPORT.

N.1 Three charts are affected by this survey:

- Chart 13290, 32th Ed., 22 Oct 1994 1:40,000 scale
- Chart 13292, 34th Ed., 10 Jan 1998 1:20,000 scale
- Chart 13288, 36th Ed., 18 Jan 1997 1:80,000 Scale

N.2 One Danger to Navigation report containing eleven depth changes was submitted for this survey. See Appendix I for a copy of ~~each~~ THE report. APPENDED TO THIS REPORT.

N.3a Five hundred and seventy nine charted soundings from Chart #13292 were contained within H10831 survey limits. Approximately 70% of the charted soundings were in agreement with survey depths; differences between one to two feet. Approximately 15% charted soundings have a wider variance of agreement within two to four feet of survey depths. Approximately 14.5% disagree with charted soundings greater that 4 feet.

N.3b The disposal area charted in the vicinity of 43°37'55"N 070°09'34"W requires sounding revision. Forty seven soundings are charted within the limits of the disposal area. Agreement with one to two feet variance occurs with only 31% of the soundings. Agreement with 4 ft or greater variance occurs with 53% of the total number of soundings. Survey data indicates shoaler soundings than charted values. Hydrographer recommends sounding revision in the charted disposal area. CONCUR. ALSO DELETE DISCONTINUED DISPOSAL AREA AND LIMITS

N.3c Small sounding discrepancies may be related to sediment shifting between ledges and in areas of tidal flow. The large discrepancies may be due to inaccurate chart

soundings obtained from prior surveys, where horizontal positioning and depth determination were subject to errors.

N.3d Survey data exhibits characteristics of complex geologic morphology. Rock escarpments, ledges, and other benthic features are indicative of glacial environments. These features were identified via sounding data, side scan, and multibeam records throughout the survey area.

N.4 There were five submarine cable crossing areas within H10831 survey limits. These crossings were not visually identified by signs on the shoreline nor by benthic features portrayed within data records. Hydrographer recommends maintaining charted status of cable crossings. CONCUR

N.5a In several cases the charted depths over features were shoaler than survey depths. Additional sounding swaths were conducted over these features where survey data had not "beat the chart." These additional swaths generally confirmed the 100% multibeam data. The hydrographer believes these features may have shoal biased errors introduced by earlier and less accurate sounding technologies.

N.5b Conversely due to accuracy limitations of swath coverage tools, the hydrographer lacks confidence that near nadir beam soundings were acquired over all the significant charted features. Additional swath coverage over these features is recommended in the 1999 field season. Hydrographer recommends maintaining conservative evaluation and retain charted soundings on features where the multibeam data did not beat the chart.

O. ADEQUACY OF SURVEY SEE ALSO THE EVALUATION REPORT

Survey H10831 was completed and is adequate to supersede all prior surveys in common areas with exceptions as mentioned in section N.

P. AIDS TO NAVIGATION

A comparison was made between the detached positions acquired on floating navigational aids and the largest scale chart of the area. No floating aids were found to deviate from its charted position by greater than 53 meters. Each aid adequately serves the apparent purpose for which it was established. All floating aids are tabulated in the *Light list Vol 1* , 1998.

Q. STATISTICS

Q.1a No. of Processed Multibeam Soundings . . . 83,596,000

Q.1b No. of Multibeam Soundings Transferred to HPS.169,346

Q.1c Lineal Nautical Miles of Sounding Lines. 577.7

Q.2a Square Nautical Miles of Hydrography 11.0

Q.2b Days of Production 35

Q.2d Bottom Samples 40

Q.2e Tide Stations. 1

Q.2f Velocity Casts 71

Q.2g SEABAT Item Investigations 56

R. MISCELLANEOUS SEE ALSO THE EVALUATION REPORT

No evidence of silting, unusual submarine features, or magnetic anomalies were detected during this survey.

S. RECOMMENDATIONS

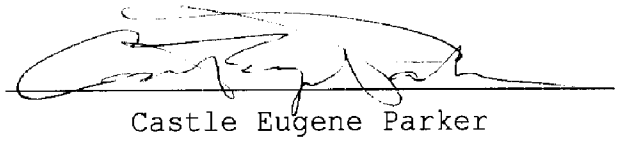
Additional field work with a small boat is required for coverage completion of AWOIS 10034. It is recommended that this item (AWOIS 10034) and AWOIS 10031 be addressed when survey work resumes on OPR-A329. CONCUR. AWOIS 15 NOT WITHIN THE COMMON AREA OF THE PRESENT SURVEY

Additional confidence swaths as discussed in section N.5 may be warranted over some significant charted features to ensure near-nadir least depths have been identified.

T. REFERRAL TO REPORTS

A copy of the Coast Pilot Report, User Evaluation, and Chart Inspection will be included in the Separates.

This report and the accompanying field sheets are respectfully submitted.



Castle Eugene Parker
Physical Scientist
NOAA Ship RUDE

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office of NOAA Corps Operations
NOAA Ship RUDE S-590
439 W. York Street
Norfolk, VA 23510-1114

December 4, 1998

FAXED TO FIRST C.G. DISTRICT
12/7/98

Commander
First Coast Guard District
Aids to Navigation Office
408 Atlantic Avenue
Boston, Massachusetts 02110-3350

REPORT OF DANGER TO NAVIGATION

Dear Sir:

The NOAA Ship RUDE has recently completed a hydrographic survey of the approaches to Portland, Maine:

Hydrographic Survey Registry No.	H-10831
State	Maine
General Locality	Approaches to Portland Harbor
Sublocality	Casco Bay
Project Number	OPR-A329-RU-98

During the course of multibeam sonar operations, several bathymetric rocky features were discovered. This new depth information merits immediate publication in the Local Notice to Mariners. The updated depths affect the following chart(s):

Chart 13290, Casco Bay, 32nd ed, 22 Oct 1994
Chart 13292, Portland Harbor and Vicinity, 34th ed, 10 Jan 1998

All horizontal positions were obtained using Differential GPS.

Depth*	Latitude	Longitude	Charts Affected
38 ft	43 38′ 18.52″ N	070 12′ 45.61″ W	13290, 13292
~~57 ft~~ 58 FT	43 37′ 40.61″ N	070 09′ 36.63″ W	13290, 13292
~~50 ft~~ 51 FT	43 37′ 06.54″ N	070 10′ 12.82″ W	13290, 13292
~~53 ft~~ 54 FT	43 37′ 10.35″ N	070 09′ 45.39″ W	13290, 13292
21 ft	43 37′ 03.33″ N	070 11′ 12.83″ W	13290, 13292
~~37 ft~~ 38 FT	43 36′ 25.64″ N	070 10′ 44.58″ W	13290, 13292
~~51 ft~~ 52 FT	43 36′ 14.91″ N	070 09′ 58.00″ W	13290, 13292
52 ft	43 36′ 09.57″ N	070 09′ 35.09″ W	13290, 13292
~~50 ft~~ 49 FT	43 34′ 00.14″ N	070 08′ 05.22″ W	13290, 13292
50 ft	43 35′ 24.40″ N	070 09′ 38.94″ W	13290, 13292
~~44 ft~~ 42 FT	43 34′ 06.17″ N	070 07′ 41.90″ W	13290, 13292

* Updated depths are reduced to feet at MLLW using predicted tides and should be viewed as preliminary information, subject to office review.

Contact either of the following personnel for further information:

Commanding Officer
NOAA Ship RUDE (757) 441-6386
439 West York Street
Norfolk, VA 23510-1145

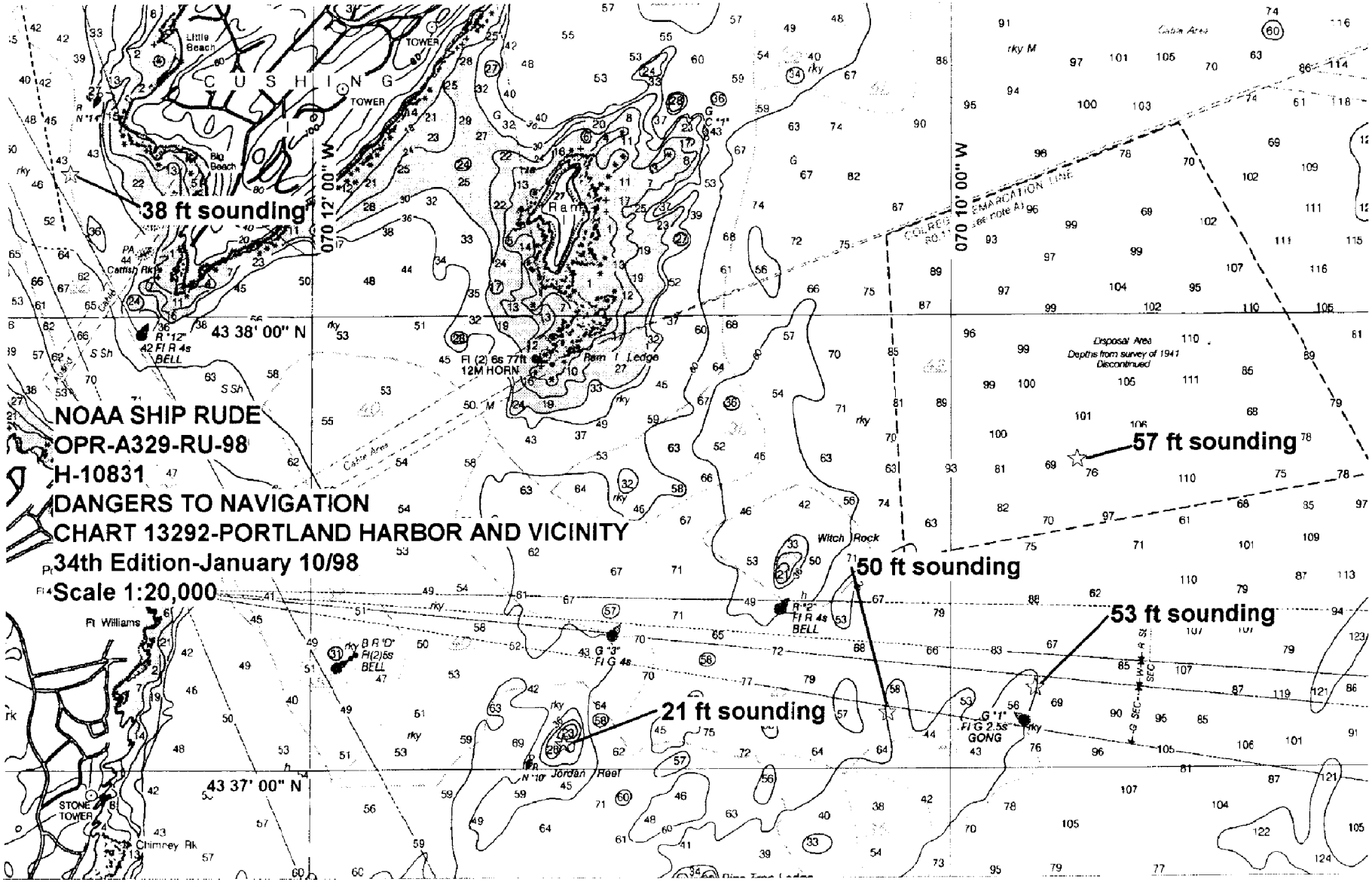
Chief, Atlantic Hydrographic Branch
Atlantic Marine Center (757) 441-6746
439 W. York Street
Norfolk, VA 23510-115

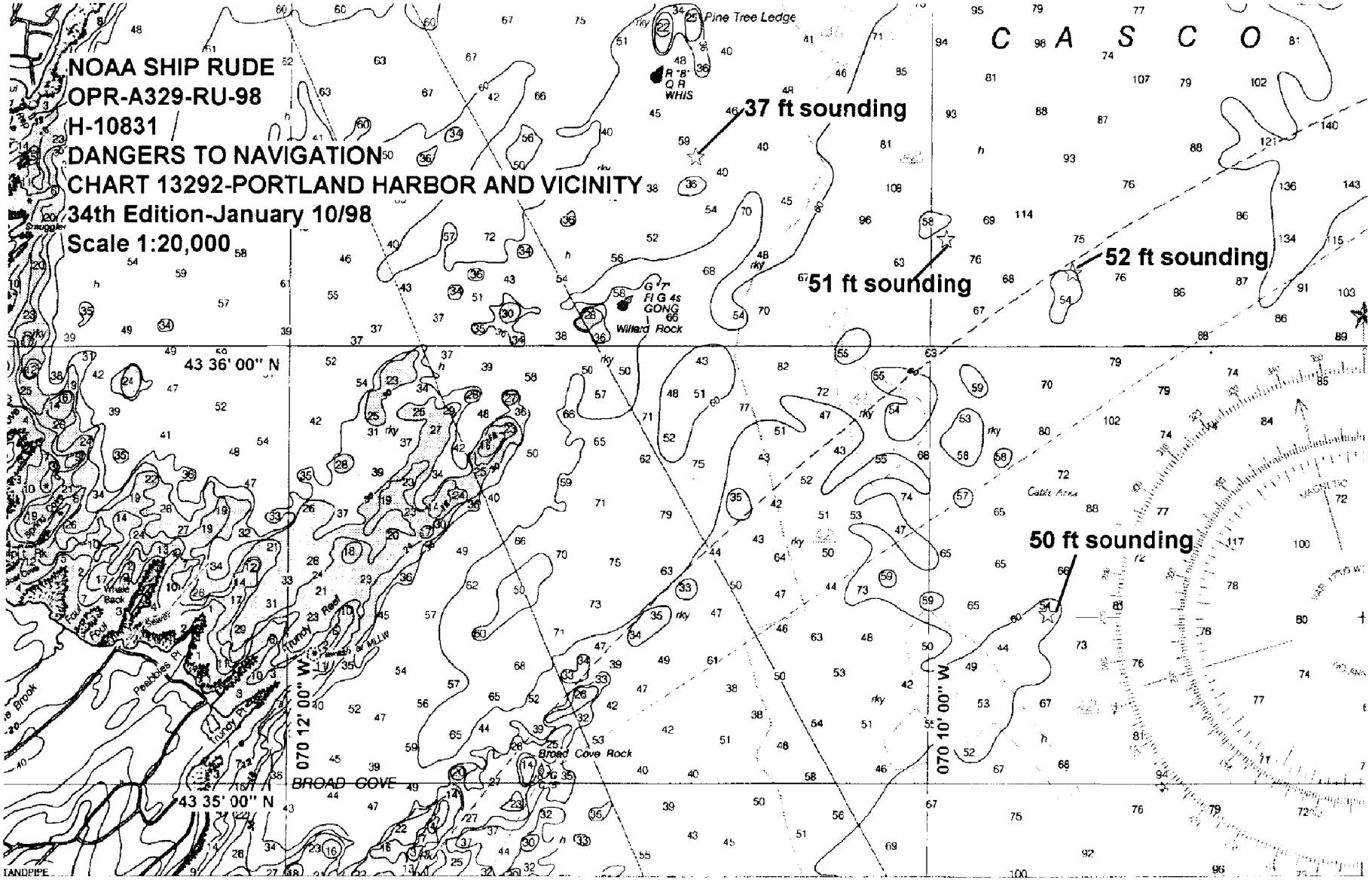
Sincerely,

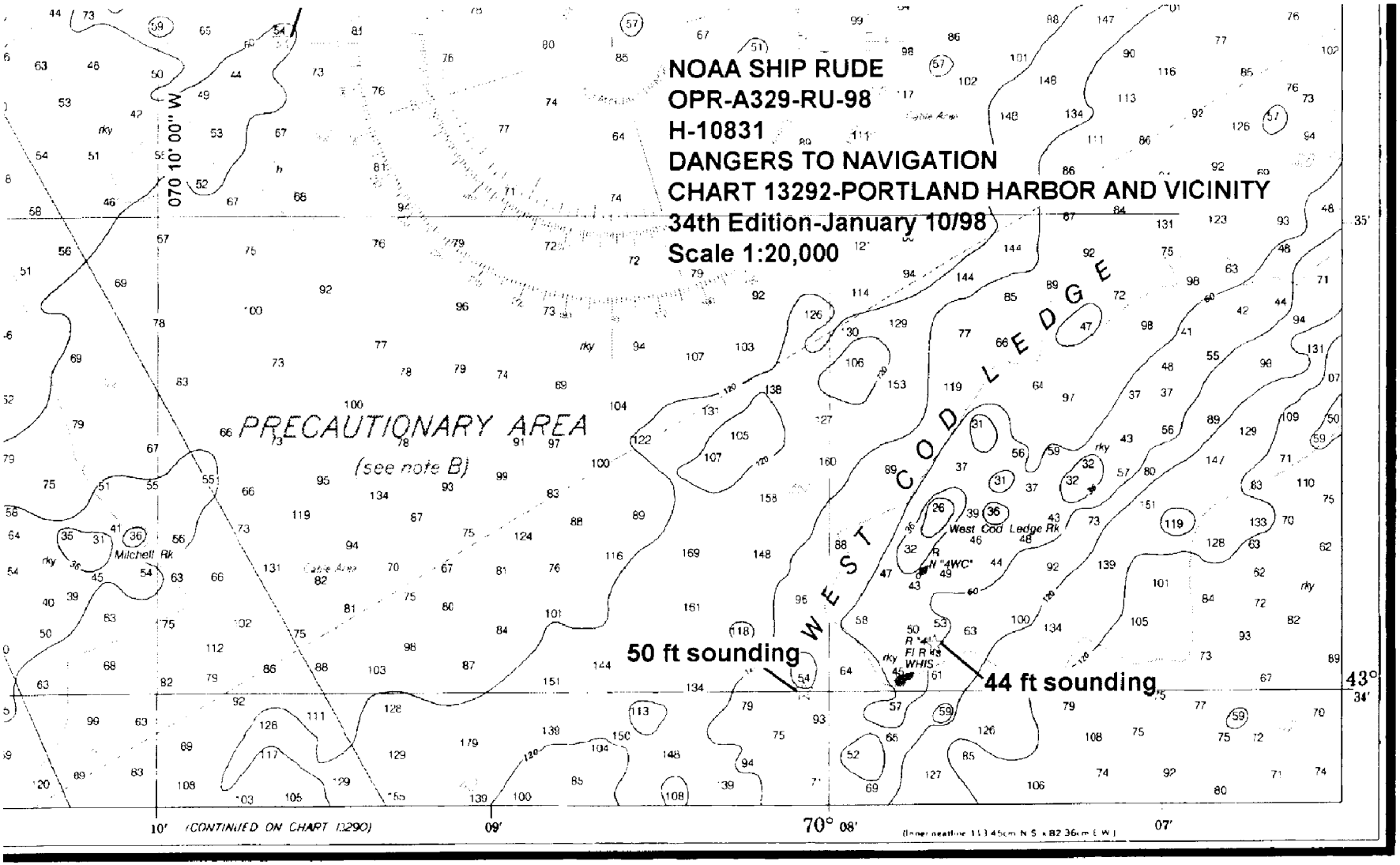
David A. Cole

Lieutenant Commander David A. Cole, NOAA
Commanding Officer, NOAA Ship RUDE

Attachment
cc: AHB, NIMA


38 ft sounding
NOAA SHIP RUDE
OPR-A329-RU-98
H-10831
DANGERS TO NAVIGATION
CHART 13292-PORTLAND HARBOR AND VICINITY
34th Edition-January 10/98
Scale 1:20,000
57 ft sounding
50 ft sounding
53 ft sounding
21 ft sounding
43 38' 00" N
43 37' 00" N
070 12' 00" W
070 10' 00" W
CUSHING
Little Beach
Big Beach
TOWER
Ram I. Ledge
Jordan Reef
Witch Rock
Ft Williams
STONE TOWER
Chimney Rk
Catfish Rk
Disposal Area
Depths from survey of 1941 Discontinued
EMARCATION LINE


NOAA SHIP RUDE
OPR-A329-RU-98
H-10831
DANGERS TO NAVIGATION
CHART 13292-PORTLAND HARBOR AND VICINITY
34th Edition-January 10/98
Scale 1:20,000
37 ft sounding
51 ft sounding
52 ft sounding
50 ft sounding
Pine Tree Ledge
Willard Rock
Broad Cove Rock
BROAD COVE
43 36' 00" N
43 35' 00" N
070 12' 00" W
070 10' 00" W
CASCO



FATHOMS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
FEET	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102

(Portland Harbor and Vicinity)

13292

APPENDIX K

APPROVAL SHEET

LETTER OF APPROVAL

REGISTRY NO. H10831

Field operations contributing to the accomplishment of this Navigable Area survey were conducted under my direct supervision with frequent personal checks of progress and adequacy. All field sheets and reports were reviewed in their entirety and all supporting records were checked as well.

This survey was completed with 100% side scan sonar and 100% multibeam coverage and is more than adequate to supersede all prior surveys in common areas with exceptions as noted in sections N,O, and S. The survey is considered complete and adequate for nautical charting.

David A. Cole

David A. Cole, LCDR, NOAA
Commanding Officer
NOAA Ship RUDE

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE: April 14, 1999

HYDROGRAPHIC BRANCH: Atlantic

HYDROGRAPHIC PROJECT: OPR-A329-RU-98
HYDROGRAPHIC SHEET: H-10831

LOCALITY: Approaches to Portland Harbor and Hussey Sound, ME

TIME PERIOD: August 3 - October 7, 1998

TIDE STATION USED: 841-8150 Portland, ME
Lat. 43° 39.4'N Lon. 70° 14.8'W
PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.880 meters

REMARKS: RECOMMENDED ZONING
Use zone(s) identified as: ME201, ME208, ME209, ME210 & ME211

Refer to attachments for zoning information.

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

Thomas N. Neu 4/14/99
CHIEF, REQUIREMENTS AND DEVELOPMENT DIVISION

NOAA FORM 76-155
(11-72)

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

SURVEY NUMBER

H-10831

GEOGRAPHIC NAMES

Name on Survey	A ON CHART NO. 13292	B ON PREVIOUS SURVEY NO.	C ON U.S. QUADRANGLE MAPS	D FROM LOCAL INFORMATION	E ON LOCAL MAPS	F P.O. GUIDE OR MAP	G RAND MCNALLY ATLAS	H U.S. LIGHT LIST	K	
BIG BEACH	X		X							1
CASCO BAY	X		X							2
CUSHING ISLAND	X		X							3
DANFORD COVE	X		X							4
ELM TREE COVE	X		X							5
FORT WILLIAMS	X		X							6
HUSSEY SOUND	X		X							7
JORDAN REEF	X		X							8
LITTLE BEACH	X		X							9
MAIDEN COVE	X		X							10
MAINE (title)	X		X							11
PEAKS ISLAND	X		X							12
PINE TREE LEDGE	X		X							13
PORTLAND HEAD	X		X							14
RAM ISLAND	X		X							15
SHIP COVE	X		X							16
SPAR COVE	X		X							17
WHARF COVE	X		X							18
WEST COD LEDGE	X		X							19
WEST COD LEDGE ROCK	X		X							20
WILLARD ROCK	X		X							21
WITCH ROCK	X		X							22
										23
										24
										25

Approved:

Dennis J. Kanesburg
Cartographer

APR 12 1999

NOAA FORM 76-155 SUPERSEDES C&GS 197

08/26/99

HYDROGRAPHIC SURVEY STATISTICS
REGISTRY NUMBER: H10831

NUMBER OF CONTROL STATIONS	2
NUMBER OF POSITIONS	169346
NUMBER OF SOUNDINGS	169346

	TIME-HOURS	DATE COMPLETED
PREPROCESSING EXAMINATION	12.0	03/30/99
VERIFICATION OF FIELD DATA	85.0	06/08/99
QUALITY CONTROL CHECKS	16.0	
EVALUATION AND ANALYSIS	2.0	
FINAL INSPECTION	13.0	06/10/99
COMPILATION	183.0	08/10/99
TOTAL TIME	311.0	

ATLANTIC HYDROGRAPHIC BRANCH APPROVAL 06/16/99

NOAA FORM 61-29
(12-71)

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

LETTER TRANSMITTING DATA

REFERENCE NO.

N/CS33-62-99

DATA AS LISTED BELOW WERE FORWARDED TO YOU BY *(Check)*:

☐ ORDINARY MAIL ☐ AIR MAIL

☐ REGISTERED MAIL ☒ EXPRESS

☐ GBL *(Give number)* _____

TO:

NOAA/National Ocean Service
Chief, Data Control Group, N/CS3x1
SSMC3, Station 6815
1315 East-West Highway
Silver Spring, MD 20910-3282

DATE FORWARDED

Aug. 12, 1999

NUMBER OF PACKAGES

1 Box, 1 Tube

NOTE: A separate transmittal letter is to be used for each type of data, as tidal data, seismology, geomagnetism, etc. State the number of packages and include an executed copy of the transmittal letter in each package. In addition the original and one copy of the letter should be sent under separate cover. The copy will be returned as a receipt. This form should not be used for correspondence or transmitting accounting documents.

H10831

Maine, Casco Bay, West Cod Ledge to Hussey Sound

1 Box Containing:

1 Original Descriptive Report for H10831
2 HISTORY OF CARTOGRAPHIC WORK for H10831 for charts 13290 and 13292

1 Tube Containing:

1 Original Smooth Sheet for H10831
1 Paper Composite plot of survey H10831 for chart 13292
1 Paper Composite plot of survey H10831 for chart 13290
1 Mylar H-Drawing of H10831 for chart 13292
1 Mylar H-Drawing of H10831 for chart 13290

FROM: *(Signature)* R. H. Whitfield

Richard H. Whitfield

RECEIVED THE ABOVE
(Name, Division, Date)

Return receipted copy to:

Atlantic Hydrographic Branch N/CS331
439 W. York Street
Norfolk, VA 23510-1114

☆U.S.GPO:1983-0-664-006/1192

ATLANTIC HYDROGRAPHIC BRANCH
EVALUATION REPORT FOR H10831 (1998)

This Evaluation Report has been written to supplement and/or clarify the original Descriptive Report. Sections in this report refer to the corresponding sections of the Descriptive Report.

D. AUTOMATED DATA ACQUISITION AND PROCESSING

The following software was used to process data at the Atlantic Hydrographic Branch:

Hydrographic Processing System(HPS)
NADCON, version 2.10
MicroStation 95, version 5.05
SiteWorks, version 2.01
I/RAS B, version 5.01

The smooth sheet was plotted using a Hewlett Packard DesignJet 2500CP plotter.

H. CONTROL STATIONS

Horizontal control used for this survey during data acquisition is based upon the North American Datum of 1983 (NAD 83). Office processing of this survey is based on these values. The smooth sheet has been annotated with ticks showing the computed mean shift between the NAD 83 and the North American Datum of 1927 (NAD 27).

To place this survey on the NAD 27, move the projection lines 0.303 seconds (9.340 meters or .93 mm at the scale of the survey) north in latitude, and 1.831 seconds (41.059 meters or 4.11 mm at the scale of the survey) east in longitude.

J. SHORELINE

Brown shoreline originates with National Ocean Service (NOS) chart 13292, (34th Edition, Jan 10/98), and is for orientation purposes only.

L. JUNCTIONS

H10830 (1998) to the Northwest

A standard junction was effected between the present survey and survey H10830 (1998). There are no junctional surveys to the south, east or west. Present survey depths are in harmony with the charted hydrography to the south, east, and west.

M. COMPARISON WITH PRIOR SURVEYS

A comparison with prior surveys was not done during office processing. This is in accordance with the common area having both 100% Side Scan coverage and 100% Multibeam coverage.

N. COMPARISON WITH CHART 13292 (34th ED., Jan 10/98) 13290 (32nd ED., Oct 22/94)

Hydrography

The charted hydrography originates with the prior surveys and requires no further consideration. The hydrographer makes adequate chart comparisons in section N. of the Descriptive Report.

N.2. One Danger to Navigation Report containing eleven items was submitted to Commander (oan), First Coast Guard District, 408 Atlantic Avenue, Boston, Massachusetts for inclusion in the Local Notice to Mariners and to the Marine Chart Division, Silver Spring, Maryland. A copy of the report is appended to the Descriptive Report.

The eleven items listed in the Danger to Navigation Report are not presently charted on any of the latest edition of charts within the common area.

One item submitted is a depth of 57 feet in Latitude 43°37'40.61"N, Longitude 70°09'36.63"W. The depth of 57 feet was computed with predicted tides. During office processing approved tides were applied to the present survey. The depth is shown on the present survey as 58-ft. It is recommended that the 58-ft be charted as shown on the present survey.

One item submitted is a depth of 50 feet in Latitude 43°37'06.54"N, Longitude 70°10'12.82"W. The depth of 50 feet was computed with predicted tides. During office processing approved tides were applied to the present survey. The depth is shown on the present survey as 51-ft. It is recommended that 51-ft be charted as shown on the present survey.

One item submitted is a depth of 53 feet in Latitude 43°37'10.36"N, Longitude 70°09'45.39"W. The depth of 53 feet was computed with predicted tides. During office processing approved tides were applied to the present survey. The depth is shown on the present survey as 54-ft. It is recommended that 54-ft be charted as shown on the present survey.

One item submitted is a depth of 37 feet in Latitude

43°36'21.175"N, Longitude 70°10'44.464"W. The depth of 37 feet was computed with predicted tides. During office processing approved tides were applied to the present survey. The depth is shown on the present survey as 38-ft. It is recommended that 38-ft be charted as shown on the present survey.

One item submitted is a depth of 51 feet in Latitude 43°36'14.91"N, Longitude 70°09'58.00"W. The depth of 51 feet was computed with predicted tides. During office processing approved tides were applied to the present survey. The depth is shown on the present survey as 52-ft. It is recommended that 52-ft be charted as shown on the present survey.

One item submitted is a depth of 50 feet in Latitude 43°34'00.14"N, Longitude 70°08'05.17"W. The depth of 50 feet was computed with predicted tides. During office processing approved tides were applied to the present survey. The depth is shown on the present survey as 49-ft. It is recommended that 49-ft be charted as shown on the present survey.

One item submitted is a depth of 44 feet in Latitude 43°34'06.17"N, Longitude 70°07'41.90"W. The depth of 44 feet was computed with predicted tides. During office processing approved tides were applied to the present survey. The depth is shown on the present survey as 42-ft. It is recommended that 42-ft be charted as shown on the present survey.

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

O. ADEQUACY OF SURVEY

This is an adequate hydrographic/side scan sonar survey. No additional work is recommended.

R. MISCELLANEOUS

Chart compilation was done by Atlantic Hydrographic Branch personnel, in Norfolk, Virginia. Compilation data will be forwarded to Marine Chart Division, Silver Spring, Maryland.

The following NOS chart was used for compilation of the present survey: 13292 (34th Ed., Jan 10/98).

H10831

Robert Snow

Robert Snow
Cartographic Technician
Verification of Field Data
Evaluation and Analysis

APPROVAL SHEET
H10831

Initial Approvals:

The completed survey has been inspected with regard to survey coverage, delineation of depth curves, development of critical depths, cartographic symbolization, and verification or disproval of charted data. The digital data have been completed and all revisions and additions made to the smooth sheet during survey processing have been entered in the digital data for this survey. The survey records and digital data comply with NOS requirements except where noted in the Evaluation Report.

Richard H. Whitfield Date: 6/15/99
Richard H. Whitfield
Cartographer
Atlantic Hydrographic Branch

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

Andrew L. Beaver Date: 6/16/99
Andrew L. Beaver, LCDR, NOAA
Chief, Atlantic Hydrographic Branch

****

Final Approval:

Approved: Samuel P. de Bow Date: Sept 7, 1999
Samuel P. De Bow, Jr.
Commander, NOAA
Chief, Hydrographic Surveys Division

NOAA FORM 75-96
(10-83)

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

MARINE CHART BRANCH

RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H10831

INSTRUCTIONS

A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart.
1. Letter all information.
2. In "Remarks" column cross out words that do not apply.
3. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.

CHART	DATE	CARTOGRAPHER	REMARKS
13292	7/6/99		Full ~~Part~~ ~~Before~~ After Marine Center Approval Signed Via
			Drawing No.
13290	7/29/99		Full ~~Part Before~~ After Marine Center Approval Signed Via
			Drawing No.
13292	9/22/99		Full Part Before After Marine Center Approval Signed Via
			Drawing No.
13290	9/23/99		Full Part Before After Marine Center Approval Signed Via
13286	9/23/99		Drawing No.
13288	9/27/99		(Full) Part Before After Marine Center Approval Signed Via
			Drawing No.
13260	9/27/99		
			(Full) Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.
			Full Part Before After Marine Center Approval Signed Via
			Drawing No.

SUPERSEDES C&GS FORM 963 WHICH MAY BE USED