

F00445

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 Sonar

Field No. RU-10-6-98

Registry No. F00445

LOCALITY

State Maine

General Locality Casco Bay

Locality East Cod Ledge

1998

CHIEF OF PARTY
LCDR D. A. Cole

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NOAA FORM 77-28
(11-72)

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

REGISTRY NUMBER:
F00445

HYDROGRAPHIC TITLE SHEET

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

FIELD NUMBER:
RU-10-6-98

State: Maine
General locality: Casco Bay
Locality: East Cod Ledge
Scale: 1: 10,000 Date of survey: September 3 - 28, 1998
Instructions dated: 7/28/98 Project Number: OPR-A329
Vessel: NOAA Ship RUDE
Chief of Party: LCDR D.A. Cole
Surveyed by: LCDR Cole; LT Berkowitz; RPS Parker; AST Rooney
Soundings taken by echo sounder, hand lead-line, or pole: Raytheon DSF 6000N; SeaBat 9003
Graphic record scaled by: RPS Parker, AST Rooney
Graphic record checked by: RPS Parker, AST Rooney
Protracted by: N/A Automated plot by: HP 750C & 2500c DesignJet ^{2500CP} Plotter
Verification by: ~~Hydrographic Surveys Branch~~ Atlantic Hydrographic Branch Personnel
Soundings in: Feet: Fathoms: Meters: at MLW: MLLW: (*)

Remarks: All times recorded in UTC.

* Hand written notes in the Descriptive Report
were made during office processing

AW015/SURF ✓ 8/20/99 SW ✓

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* Data filed with the original file records

APPENDICES *

SEPARATES *

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 were dated July 28, 1998. Specific instructions were not issued for F00445. OPR-A329 instructions listed the charted 31 foot sounding north of Round Shoal as a priority. This charted feature was identified for a field examination on "Sheet C" (Sheet layout dated 07/28/98).
- A.3 There are no amendments to the instructions.
- A.4 This field examination is designated registry number F00445.
- A.5 The purpose of this project is to obtain full bottom coverage using combination of 100% multibeam and 100% side scan sonar hydrography in the area of East Cod Ledge, located in the general vicinity of Casco Bay. This survey responds to requests from Portland Pilots, Inc., the Maine Department of Environmental Protection, and the U.S. Coast Guard.

B. AREA SURVEYED

- B.1 Survey F00445 limits are located approximately 7.5 nm ESE of Portland Head Light, 4.5 nm SE of Junk of Pork, and 7.25 nm ENE of Staples Point. Survey area covers approximately 0.63 square nautical miles.
- B.2 The survey is comprised of one sheet with the following survey boundaries starting in the NW corner proceeding clockwise:

	Latitude	Longitude
a.	43°36'52"N	070°02'31"W
b.	43°36'36"N	070°01'37"W
c.	43°35'43"N	070°02'05"W
d.	43°36'00"N	070°02'59"W

B.3 Data acquisition for this survey included the following days:

DN 246 September 03, 1998
 DN 257 September 14, 1998
 DN 271 September 30, 1998

Over 530,594 multibeam soundings were processed during the survey.

C. SURVEY VESSELS

- C.1 All F00445 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, and bottom sampling.
- 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 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 field sheets. All software versions used for data processing are listed in Appendix H.*
- 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).

* Data filed with original field records

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 with attitude data from heave, pitch, roll, and heading 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 of 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 10 m X 10 m sounding grid. Soundings were not suppressed. 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 10 meters was selected with no sounding suppression within HIPS. Sounding excessing will be conducted during 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 FG00445 contained areas of high relief and identifiable features. 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 determine 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.
- 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 sonar paper records, checked, and entered into the HPS Contact Table to compute contact heights and positions.
- E.6 None of the side scan contacts were individually investigated nor developed. The intent was to correlate contacts to the observed least depths processed from multibeam soundings. Accurate least depths on all features were identified through the process of 100% multibeam coverage. The main features investigated were the charted 31 foot bull's eye sounding positioned on East Cod Ledge. All coverage was checked with on-screen zoomable coverage displays in MapInfo, to ensure proper overlap between lines.

F. SOUNDING EQUIPMENT

- F.1a Single-frequency (455 kHz) multibeam data were acquired with a Reson SeaBat 9003 (S/N 10496-447020) shallow-water sonar system. 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 100°.
- F.1b SeaBat 9003 (455 kHz) multibeam data were continuously recorded during data acquisition and served as the primary source for hydrographic digital soundings. Sounding depths ranged from 31 to 172 feet of water, utilizing multibeam range scales of 25, 50, and 100 meters. Line spacing for 100% multibeam coverage was adjusted to provide full bottom coverage over the survey area. Multibeam development line spacing combined well with 120 meter line spacing of 100% side scan sonar.
- F.1c 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 speeds increase the data density along track over the feature. Line orientation was parallel to the rock ledge axis.
- F.2a Dual-frequency (24 and 100 kHz) vertical beam echo sounding data were acquired with a Raytheon DSF-6000N Digital Survey Echosounder (S/N A109N) and was operational through survey completion.
- F.2b 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.2c Only missed depths (9999.9) were made to the DSF data 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 has not been completely processed and should not be included on the final field sheet; all final field soundings originate from multibeam data.**

- F.3 Full multibeam coverage was conducted over the shoal ridge that transects East Cod Ledge. The shoal ridge extends ENE from the southern survey limit toward the northern limits.
- F.4 No diver investigations were performed for this survey.
- F.5 There were no observed faults in sounding equipment that affected the accuracy or quality of the data.

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.

The following velocity casts were used for this survey:

Sound Velocity Table	Day Number
37, 38	246
49	257
57	271

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 not conducted during survey F00445. Direct comparison was conducted on DN 179

** Data filed with original field records*

(06/28/98) and DN 228 (08/16/98) during the 1998 field season. Documentation is provided 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. 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 (DN316). Closing calibrations confirm offsets determined in opening patch 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. Tide zone ME210 correctors were developed by applying a time correction of -18 minute time and a x0.95 range ratio to the unverified tides at Portland, Maine (Station 841-8150). Unverified tidal data was downloaded from the NOS OPSD web site (www.opsd.nos.noaa.gov) and were computed in CARIS-HIPS and HPS for re-application to SeaBat and DSF data.

* Data filed with original field records

- 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. Verified tides were unavailable during field processing. A request for verified tides was mailed on October 22, 1998. These data will replace the verified tide data during verification by N/CS33.
Approved tides & zoning applied during office processing
- G.6c Note that multibeam data processing was accomplished using predicted tide values during acquisition and preliminary unverified tide values during post processing. Shoal soundings selected through CARIS could change upon the re-application of verified smooth tides. Small differences between preliminary unverified and verified tides may require reapplication of verified 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.**

H. HYDROGRAPHIC POSITION CONTROL *See Also Evaluation Report*

- 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 following USCG reference station beacons were used:

USCG DGPS Radio Beacon Broadcast Sites	Freq (kHz)	Rate (BPS)	Latitude N	Longitude W	Range (N.M.)	Beacon ID #
Brunswick, ME	316	100	43°53'42"	069°56'17"	115	800

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 Offsets for the GPS antenna were applied from the CARIS-HIPS Vessel Configuration File (VCF) to compute the position of the SeaBat transducer. See Appendix E for data records. *

Horizontal positions of the DSF vertical beam echo sounder data were corrected for GPS antenna offsets during field processing. Offsets in Hypack were acquired with multibeam transducer as the offset point ("batcentric"). See Appendix E for data records. *

- H.7g 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 offset table and Reapply Sounding Corrections.

I. SHORELINE

No shoreline is contained within the boundaries of this survey.

J. CROSSLINES

- J.1 A total of 2.96 nm of crosslines were acquired for this survey, equating to over 31.8% of the mainscheme 100% side scan sonar coverage lines; 15.9% of the total 100% multibeam sonar coverage lines; 10.6% of the total linear mileage.
- J.2 Processed SeaBat crossline soundings excessed at 2 meters x 2 meters (see Section F.4) were compared to a 2 meter x 2 meter binned digital terrain model (DTM) surface in CARIS Workfile Processing. The DTM surface was built from processed SeaBat mainscheme soundings (excessed at 2 meters x 2 meters). Averaged across the statistics computed as a function of beam number (see Appendix E), *

** Data filed with original field records*

the mean difference between **SeaBat crossline and SeaBat mainscheme soundings** is approximately +0.33 meters (70,274 comparisons, + means crossline soundings compared deeper-- due to shoal-biased DTM surface).

- 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 Evaluation Report*

Survey F00445 contains no junctions.

L. COMPARISON WITH PRIOR SURVEYS *See Also Evaluation Report*

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

M. ITEM INVESTIGATION REPORTS

- M.1 No Dangers to Navigation were submitted for F00445.
- M.2 Two charted features (31 foot bull's eye) positioned on Chart #13790 at East Cod Ledge were investigated. Search techniques included utilizing 100% side scan sonar and 100% multibeam coverage. Side scan line spacing was based on 120 meter line spacing for 100% bottom coverage, while multibeam line spacing was adjusted to provide complete bottom coverage.
- M.3 The northern charted 31 foot sounding at the geographic position of $43^{\circ}36'42.5''N$ $070^{\circ}02'02''W$ was not found to exist as a 31 foot sounding. Multibeam sounding data indicates that depth revision is required. A least depth of 40 feet (12.3 meters) was positioned at $43^{\circ}36'28.806''N$ $070^{\circ}02'09.613''W$. Data indicates the presence of a benthic mound or rock ledge peak. The least depth acquired from F00445 is nine feet deeper than the presently charted 31 foot sounding situated in the northern survey area. The least depth can be reviewed in

CARIS-HIPS and is attributed with the following information: Day Number 271; Reference Line Number 001_1407; Time 141307 UTC; Beam Number 12; Profile Number 1759. HPS Fix Number is 70,063.

Show present survey depths

- M.4 The southern 31 foot feature (Round Shoal) charted at the geographic position of 43°35'51"N 070°02'31"W was found to exist as the feature in question. A least depth of 31 feet (9.6 meters) was located at the survey position of 43°36'07.28"N 070°02'25.19"W. The least depth can be reviewed in CARIS-HIPS and is attributed with the following information: Day Number 271; Reference Line Number 002_1424; Time 143040 UTC; Beam Number 36; Profile Number 1822; HPS Fix Number is 70,787.

Show present survey depths

N. COMPARISON WITH THE CHART *See Also Evaluation Report*

- N.1 Two charts are affected by this survey:

- Chart 13290 Casco Bay, 32nd ed, October 22, 1998⁴
1:40,000 scale
- Chart 13288 Monhegan Island to Cape Elizabeth, 36th ed,
January 18, 1997 1:80,000 Scale

- N.2 No Danger to Navigation was reported for F00445.

N.3a Thirteen soundings from Chart # 13290 were contained within the limits of F00445. Eleven out of thirteen charted soundings (approximately 84%) were in agreement with survey depths between zero and two feet. Two soundings have wider variance of agreement. One of the soundings is the northern charted 31 foot sounding. The other sounding has 9 feet of disagreement and is located in deep water where the benthic profile is irregular and sloping. *Concur*

N.3b Survey data indicates rocks, rock ledges, and ledge peaks within the survey area. Graphic records indicate that the benthic profile is highly irregular. Small sounding

discrepancies may be related to the irregular bottom profile. The large discrepancies are due to inaccurate chart soundings obtained from prior surveys, where horizontal positioning and depth determination were subject to errors. *CONCUR*

- N.4 Round Shoal's ⁶30 foot contour requires revision. Multibeam data provides numerous data points to delineate the contour accurately. *CONCUR*
- N.5 All soundings from survey F00445 should supercede charted soundings. *CONCUR*

O. ADEQUACY OF SURVEY *See Also Evaluation Report*

Survey F00445 was completed with 100% side scan sonar and 100% multibeam sonar coverage and should supersede ALL prior surveys in common areas.

P. AIDS TO NAVIGATION

- P.1 No navigational aids exist within the survey limits of F00445.
- P.2 There were no submarine or overhead pipelines, cables, tunnels, bridges, or ferry routes found in the survey area.

Q. STATISTICS

Q.1a No. of Processed Multibeam Soundings530,594
Q.1b No. of Multibeam Soundings Transferred to HPS.	22,154
Q.1c Lineal Nautical Miles of Sounding Lines.30.82
Q.2a Square Nautical Miles of Hydrography0.612

Q.2b Days of Production3
Q.2d Bottom Samples3
Q.2e Tide Stations.1
Q.2f Velocity Casts4
Q.2g SEABAT Item Investigations2

R. MISCELLANEOUS

- R.1 No evidence of silting, unusual submarine features, or magnetic anomalies were detected during this survey.
- R.2 The bottom characteristic was considered hard. Detached positions were acquired at sampling locations, with negative results for sample collection. No information concerning bottom characteristics were forwarded to the Smithsonian Institution as instructed in project instructions.

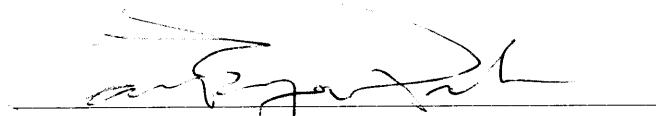
S. RECOMMENDATIONS

No additional field work is required.

T. REFERRAL TO REPORTS

A copy of the Coast Pilot Report will not be included in the Separates for F00445. Coast Pilot report will be submitted with H01831 Approach to Portland Harbor and Hussey Sound.

This report and the accompanying field sheets are respectfully submitted.

A handwritten signature in black ink, appearing to read 'Castle Eugene Parker', is written over a horizontal line.

Castle Eugene Parker
Physical Scientist
NOAA Ship RUDE

APPENDIX K

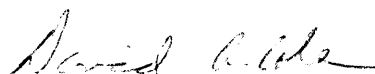
APPROVAL SHEET

LETTER OF APPROVAL

REGISTRY NO. F00445

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. The survey is considered complete and adequate for nautical charting.



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: F00445

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: ME210

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 H. Mero 4/14/99

CHIEF, REQUIREMENTS AND DEVELOPMENT DIVISION

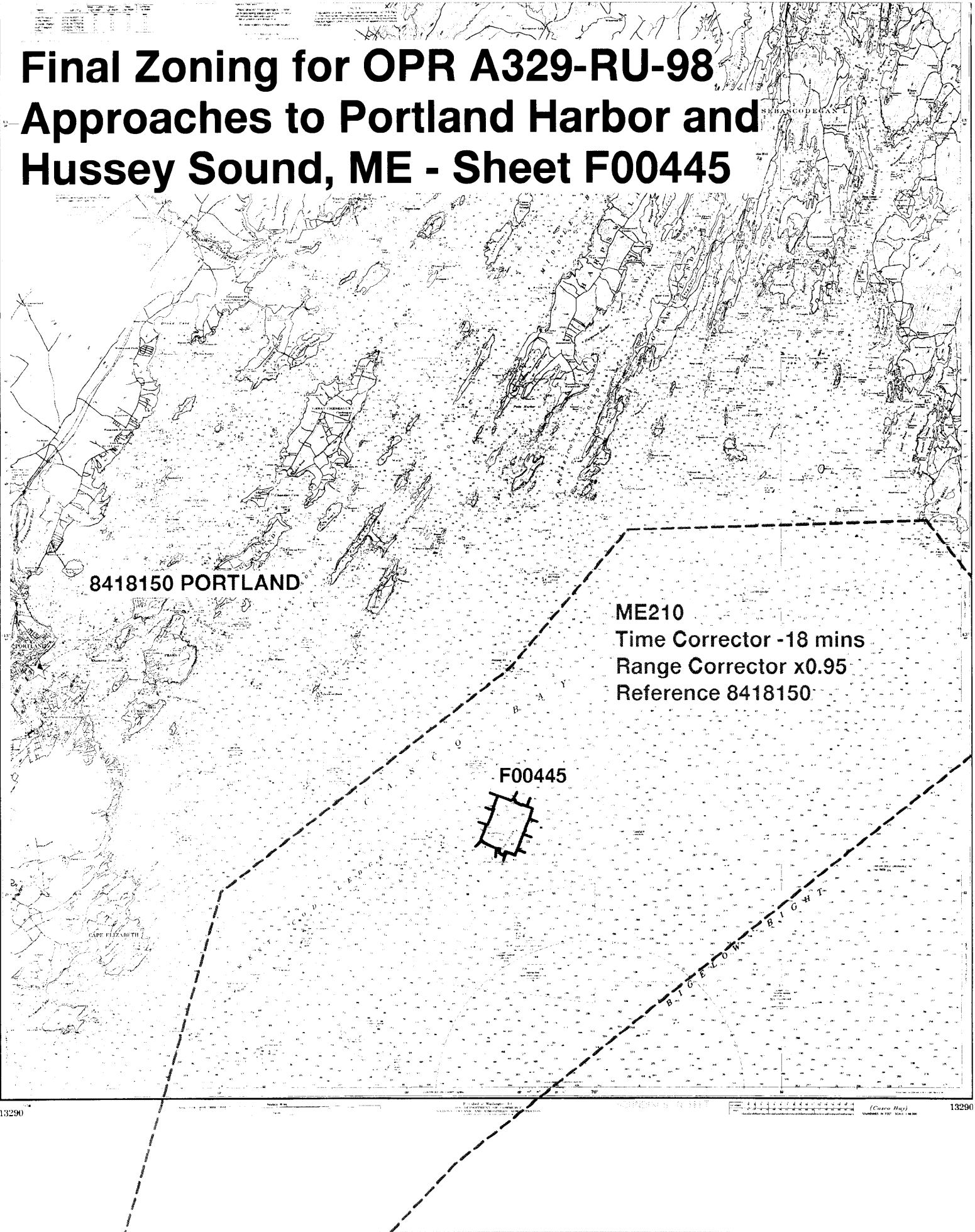


Final tide zone node point locations for OPR A329-RU-98,
Sheet F00445.

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

	Tide Station Order	AVG Time Correction	Range Correction
Zone ME210			
-69.852066 43.704102	841-8150	-18	0.95
-69.984679 43.701134			
-70.037342 43.656168			
-70.165885 43.583514			
-70.259213 43.341089			
-70.061811 43.495085			
-69.793766 43.650208			
-69.852066 43.704102			

Final Zoning for OPR A329-RU-98 Approaches to Portland Harbor and Hussey Sound, ME - Sheet F00445



GEOGRAPHIC NAMES

FO0445

Name on Survey	A CHART NO. 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 K											
	CASCO BAY	X		X								
EAST COD LEDGE	X		X									2
MAINE (title)	X		X									3
ROUND SHOAL	X		X									4
												5
												6
												7
												8
												9
												10
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												23
												24
												25

Denise J. Rosenberg

APR 9 1999

08/24/99

HYDROGRAPHIC SURVEY STATISTICS
REGISTRY NUMBER: F00445

NUMBER OF CONTROL STATIONS	2
NUMBER OF POSITIONS	22154
NUMBER OF SOUNDINGS	22154

	TIME-HOURS	DATE COMPLETED
PREPROCESSING EXAMINATION	3.0	03/22/99
VERIFICATION OF FIELD DATA	10.0	04/20/99
QUALITY CONTROL CHECKS	0.0	
EVALUATION AND ANALYSIS	2.0	
FINAL INSPECTION	26.0	08/02/99
COMPILATION	51.0	08/19/99
TOTAL TIME	92.0	
ATLANTIC HYDROGRAPHIC BRANCH APPROVAL		08/17/99

**ATLANTIC HYDROGRAPHIC BRANCH
EVALUATION REPORT FOR F00445 (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
NADCON, version 2.10
SiteWorks, version 2.1
MicroStation 95, version 5.05
I/RAS B, version 5.01

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

H. HYDROGRAPHIC POSITION CONTROL

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 page size plot has been annotated with ticks showing the computed mean shift between NAD 83 and the North American Datum of 1927 (NAD 27).

To place this survey on NAD 27, move the projection lines 0.308 seconds (9.509 meters or 0.95 mm at the scale of the survey) north in latitude, and 1.835 seconds (41.159 meters or 4.12 mm at the scale of the survey) east in longitude.

K. JUNCTIONS

This survey does not junction with any contemporary surveys. Present survey depths are in harmony with the charted hydrography to the north, south, east and west.

L. COMPARISON WITH PRIOR SURVEYS

A comparison with prior surveys was not performed. This is in accordance with section 4. of the memorandum titled "Changes to Hydrographic Survey Processing", dated May 24, 1995.

N. COMPARISON WITH CHART 13290 (32nd Edition, Oct. 22/94)**Hydrography**

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

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/multibeam 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:

13290 (32nd Ed., Oct, 22/94)

**APPROVAL SHEET
F00445**

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.

Robert R. Hill Jr. Date: 8/16/99
Robert R. Hill Jr.
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: 8/17/99
Andrew L. Beaver,
LCDR, NOAA
Chief, Atlantic Hydrographic Branch

Final Approval:

Approved: Samuel P. DeBow, Jr. Dated: 11-12-99
Samuel P. DeBow, Jr.
Commander, NOAA
Chief, Hydrographic Surveys Division

70° 03' 00" 70° 02' 30" 70° 02' 00" 70° 01' 30" 70° 01' 00"
43° 37' 00" 43° 37' 00"

43° 36' 30" 43° 36' 30" 43° 36' 30" 43° 36' 30" 43° 36' 30"

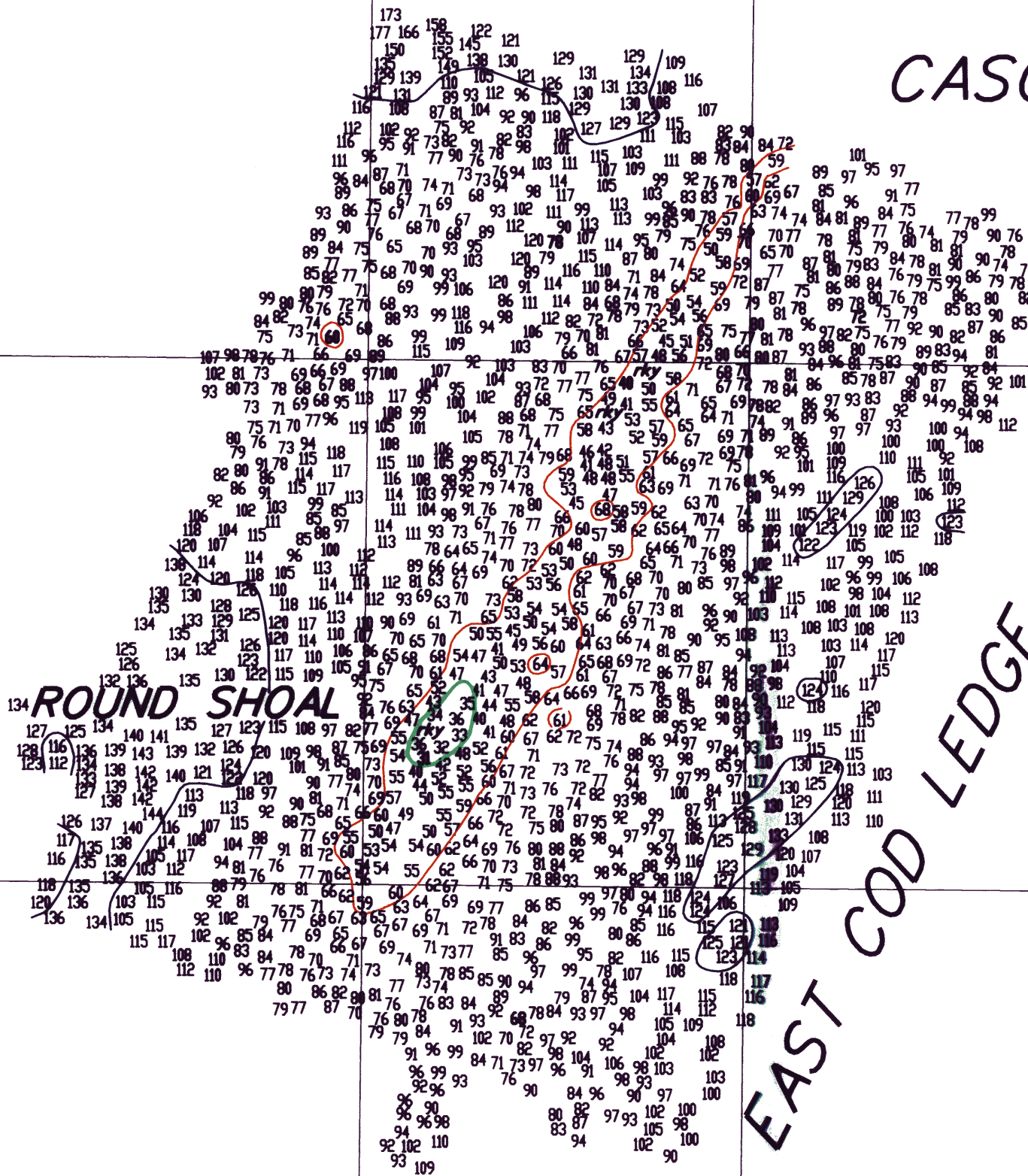
43° 36' 00" 43° 36' 00" 43° 36' 00" 43° 36' 00" 43° 36' 00"

70° 03' 00" 70° 02' 30" 70° 02' 00" 70° 01' 30" 70° 01' 00"

CASCO BAY

ROUND SHOAL

EAST COD LEDGE



70° 01' 30" W
NAD 27
43° 36' 30" N

CHECKED BY: RS
3/22/99

F00445
MAINE
CASCO BAY
EAST COD LEDGE
SEP, 1998
SCALE: 1:10,000
HORIZONTAL DATUM: NAD 1983
VERTICAL DATUM: SOUNDINGS IN FEET AT MLLW
SHEET 1 OF 1