

D00175

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Survey

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: D00175

LOCALITY

State(s): Oregon
Washington

General Locality: Offshore Washington and Oregon

Sub-locality: Oregon - Washington Coast

2013

CHIEF OF PARTY
Richard T. Brennan, CDR/NOAA

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION		REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET		D00175
INSTRUCTIONS: The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.		
State(s):	Oregon Washington	
General Locality:	Offshore Washington and Oregon	
Sub-Locality:	Oregon - Washington Coast	
Scale:	40000	
Dates of Survey:	04/28/2013 to 10/07/2013	
Instructions Dated:	03/21/2013	
Project Number:	S-M921-FARA-13	
Field Unit:	NOAA Ship <i>Rainier</i>	
Chief of Party:	Richard T. Brennan, CDR/NOAA	
Soundings by:	Multibeam Echo Sounder	
Imagery by:	Multibeam Echo Sounder Backscatter	
Verification by:	Pacific Hydrographic Branch	
Soundings Acquired in:	meters at Mean Sea Level	
Remarks: <i>The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Any revisions to the Descriptive Report (DR) generated during office processing are shown in bold red italic text. The processing branch maintains the DR as a field unit product, therefore, all information and recommendations within the body of the DR are considered preliminary unless otherwise noted. The final disposition of surveyed features is represented in the OCS nautical chart update products. All pertinent records for this survey, including the DR, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via http://www.ngdc.noaa.gov/.</i>		

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Descriptive Report to Accompany Survey D00175

Project: S-M921-FARA-13

Locality: Offshore Washington and Oregon

Sublocality: Oregon - Washington Coast

Scale: 1:40000

April 2013 - October 2013

NOAA Ship *Rainier*

Chief of Party: Richard T. Brennan, CDR/NOAA

A. Area Surveyed

The survey area is approximately 25 nautical miles west of the Washington-Oregon Coast. The extents of the survey span from Yaquina Bay, Oregon to the Strait of Juan De Fuca, Washington (Figure 1).

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
48° 27" 2.24' N 124° 7" 13.27' W	44° 30" 31.97' N 125° 6" 51.34' W

Table 1: Survey Limits

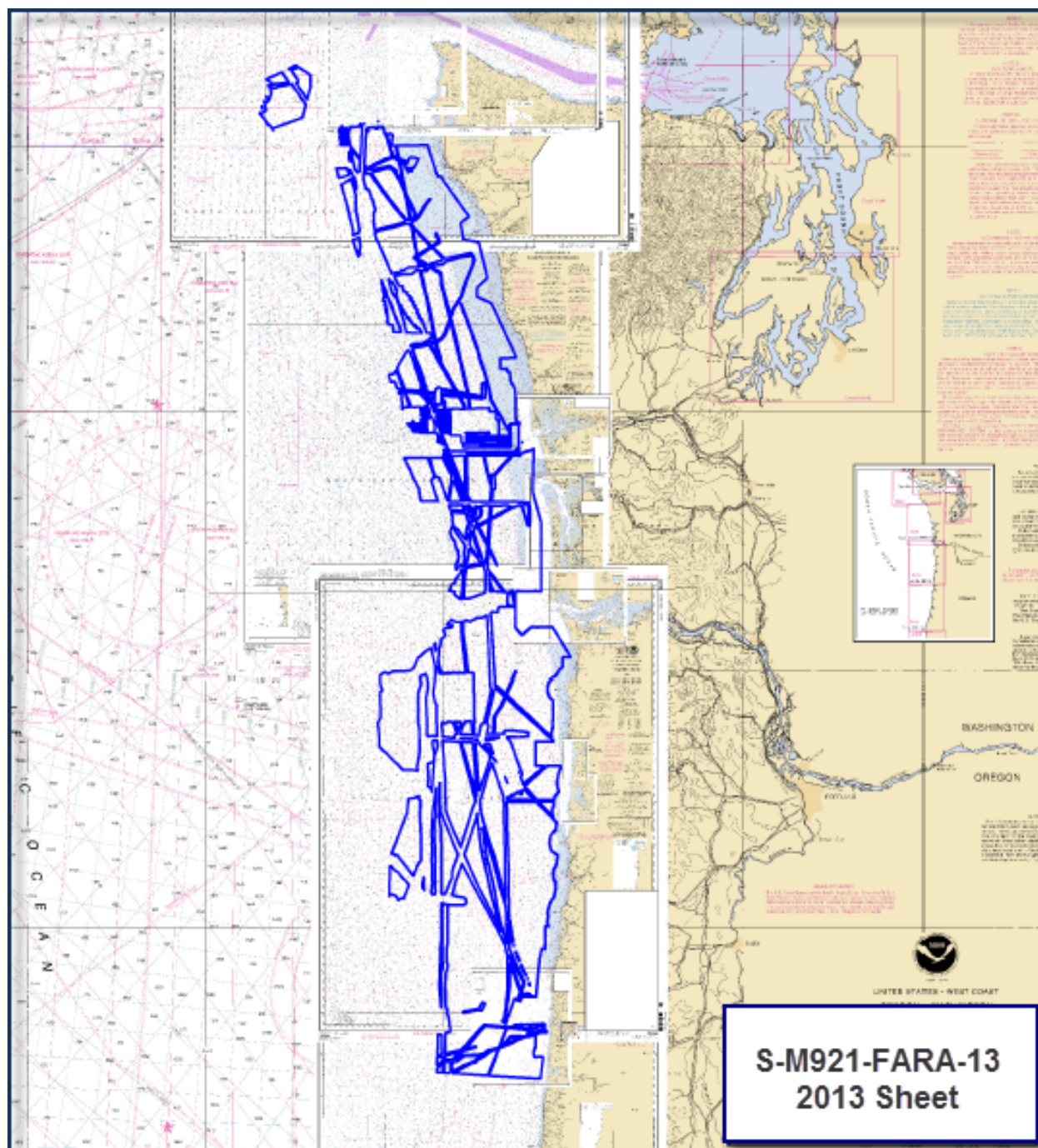


Figure 1: D00175 survey limits.

According to the Project Instructions, data was to be acquired on survey D00175 only during transits of the Pacific Coast. As such, the entirety of the survey limits were not acquired in the two transits included in this survey.

A.2 Survey Purpose

The purpose of this project is to acquire multibeam backscatter data during RAINIER's transit from its home port of Newport, OR and its working grounds in Washington and Alaska.

A.3 Survey Quality

The survey is partially adequate to supersede previous data.

For Survey D00175, no concurrent sound speed profiling was conducted, and no control was applied to account for water levels. The survey does show reasonable agreement with previously charted depths, and could be considered to augment the more sparse regions of the charts. However, in the shoaler areas, like the approaches to Yaquina River or Puget Sound, data from Survey D00175 should not supersede existing data.

A.4 Survey Coverage

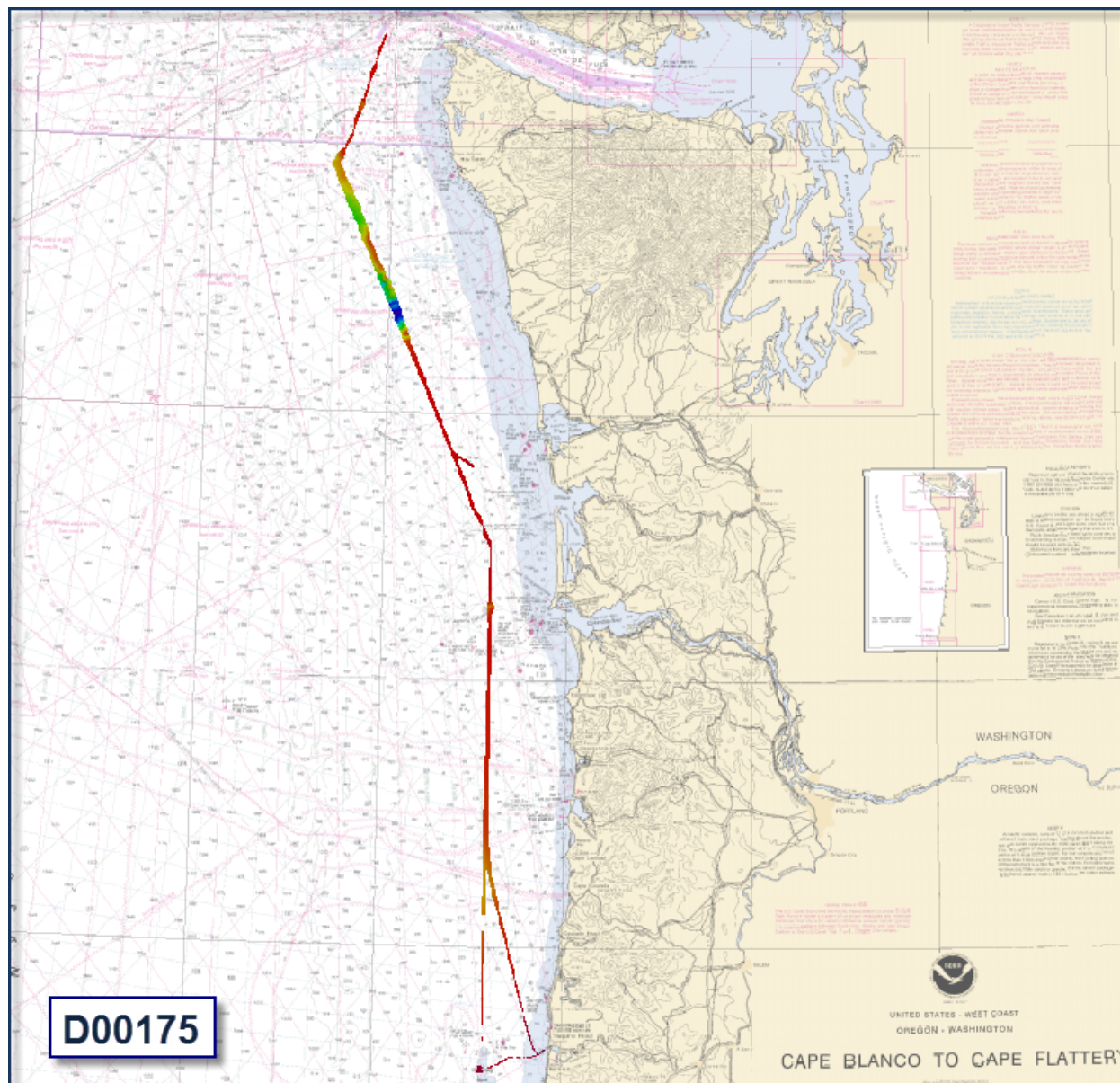


Figure 2: D00175 survey coverage.

In the areas surveyed, survey coverage was in accordance with the requirements in the Project Instructions. There are numerous cases of data gaps due to foul weather and the occasional loss of bottom tracking.

A.5 Survey Statistics

The following table lists the mainscheme and crossline acquisition mileage for this survey:

	Vessel	<i>Total</i>
LNM	SBES Mainscheme	0
	MBES Mainscheme	508.13
	Lidar Mainscheme	0
	SSS Mainscheme	0
	SBES/MBES Combo Mainscheme	0
	SBES/SSS Combo Mainscheme	0
	MBES/SSS Combo Mainscheme	0
	SBES/MBES Combo Crosslines	0
	Lidar Crosslines	0
Number of Bottom Samples		0
Number AWOIS Items Investigated		0
Number Maritime Boundary Points Investigated		0
Number of DPs		0
Number of Items Items Investigated by Dive Ops		0
Total Number of SNM		249.25

Table 2: Hydrographic Survey Statistics

The following table lists the specific dates of data acquisition for this survey:

Survey Dates	Julian Day Number
04/28/2013	118
04/29/2013	119
04/30/2013	120
10/06/2013	279
10/07/2013	280

Table 3: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Refer to the Data Acquisition and Processing Report (DAPR) for a complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods. Additional information to supplement sounding and survey data, and any deviations from the DAPR are discussed in the following sections.

B.1.1 Vessels

The following vessels were used for data acquisition during this survey:

Hull ID	<i>S221</i>
LOA	231 feet
Draft	16.5 feet

Table 4: Vessels Used

B.1.2 Equipment

The following major systems were used for data acquisition during this survey:

Manufacturer	Model	Type
Kongsberg	EM710	MBES
Applanix	POS/MV 320 V4	Positioning and Attitude System
Reson Inc.	SVP70	Sound Speed System
ODIM Brooke Ocean (Rolls-Royce group)	MVP200	Sound Speed System

Table 5: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Crosslines, acquired for this survey, totalled 0% of mainscheme acquisition.

As survey D00175 was designated as a transit survey, no crosslines were acquired.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Measured	Zoning
1.25 meters	0 meters

Table 6: Survey Specific Tide TPU Values

Hull ID	Measured - CTD	Measured - MVP	Surface
S221			0.05 meters/second

Table 7: Survey Specific Sound Speed TPU Values

In accordance with the Project Instructions, there was no vertical control for this project; as such, the tidal uncertainty was unavailable. Similarly, only a single MVP cast from the previous year was used for the entire survey, making an estimate of the MVP measured uncertainty impractical. Lacking these major inputs

to the uncertainty model, the propagated uncertainty of the soundings is of questionable merit. For these reasons, no comparison was made between the alleged uncertainty of the soundings and the allowable IHO uncertainty. A 0.7 meter (1-sigma) uncertainty was entered into the tide measured uncertainty to ensure the reported uncertainties of the surfaces were at least 1.4 meters (2-sigma), thus ensuring any derived product from D00175 could not be interpreted as an IHO Order 1 survey.

B.2.3 Junctions

There are no contemporary surveys that junction with this survey.

B.2.4 Sonar QC Checks

Sonar system quality control checks were conducted as detailed in the quality control section of the DAPR.

B.2.5 Equipment Effectiveness

Kongsberg EM710 Data Artifact

During the 2012 Hydrographic Survey Readiness Review, an artifact was identified in bathymetric data acquired with the RAINIER's Kongsberg EM710. This heave-like artifact amplifies with vessel dynamics; in particular, as the magnitude of the ship's pitch and heave increases (e.g. in heavy weather), so too does the magnitude of the depth errors. This artifact is most apparent in the northbound trackline, and has a magnitude of up to several meters. Before the southbound transit data was acquired, a calibration was performed which significantly reduced this artifact. This calibration is discussed in Section B.3.2 Calibrations.

B.2.6 Factors Affecting Soundings

There were no other factors that affected corrections to soundings.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: A single sound speed cast from the 2012 transit survey (D00165) was applied to all lines due to limitations related to logistics and foul weather experienced in 2013. Given the lack of a more recent cast, there are sound speed artifacts within the data.

The sound speed cast used was from survey D00163.

B.2.8 Coverage Equipment and Methods

All equipment and survey methods were used as detailed in the DAPR.

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

All data reduction procedures conform to those detailed in the DAPR.

B.3.2 Calibrations

The following calibrations were conducted after the initial system calibration discussed in the DAPR:

Calibration Type	Date	Reason
S221 Patch Test	2013-05-25	Update of system configuration.

Table 8: Calibrations not discussed in the DAPR.

In cooperation with University of New Hampshire and The Center for Coastal and Ocean Mapping, a new vessel file was created for S221 to resolve a recurring artifact seen in data collected by the Kongsberg EM710 on the RAINIER. On 25 May (DN146), the ship's system integration was reconfigured, moving the reference point for both the IMU and the sonar to the center of the sonar's transmit array. This implies that both real-time and logged data is in the ship's reference frame, with the EM710 transmitter as the origin.

Necessarily, this new vessel file (S221_Simrad-EM710_TxRef.hvf) contains new patch test values as well as the change to the vessel's reference frame. Twenty-two lines (DN279 and DN280) were acquired using this new configuration. This configuration is further described in the DAPR.

B.4 Backscatter

Backscatter data was acquired, but not formally processed by RAINIER personnel. However, periodic spot checks were performed to ensure backscatter quality. Backscatter was logged as .ALL files and submitted to NGDC, but is not included with the data submitted to the Branch.

B.5 Data Processing

B.5.1 Software Updates

There were no software configuration changes after the DAPR was submitted.

The following Feature Object Catalog was used: NOAA Profile V_5_3_2

All data was processed using CARIS HIPS and SIPS 8.0.4. It should be noted that all Kongsberg EM710 data was intentionally processed without the Simrad Sound Velocity Correction (SVC) module. This was done in order to avoid a known error in the SVC module associated with reverse-mounted transducers. To accomplish this, a custom CARIS license file was used, which excluded the licensing for the Simrad SVC. For further details, refer to the DAPR.

B.5.2 Surfaces

The following surfaces and/or BAGs were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
D00175_8m	CUBE	8 meters	8 meters - 1403 meters	NOAA_8m	MBES TracklineSBES Set Line Spacing
D00175_16m	CUBE	16 meters	8 meters - 1403 meters	NOAA_16m	MBES TracklineSBES Set Line Spacing
D00175_32m	CUBE	32 meters	8 meters - 1403 meters	NOAA_32m	MBES TracklineSBES Set Line Spacing
D00175_8m_0to160m_Final	CUBE	8 meters	8 meters - 160 meters	NOAA_8m	MBES TracklineSBES Set Line Spacing
D00175_16m_144to320m_Final	CUBE	16 meters	144 meters - 320 meters	NOAA_16m	MBES TracklineSBES Set Line Spacing
D00175_32m_288to1403m_Final	CUBE	32 meters	288 meters - 1403 meters	NOAA_32m	MBES TracklineSBES Set Line Spacing
D00175_32m_Combined	CUBE	32 meters	8 meters - 1403 meters	NOAA_32m	MBES TracklineSBES Set Line Spacing

Table 9: Submitted Surfaces

In some areas, primarily the approaches to the Yaquina River (extreme south end of the survey), depths are shoaler than 72 meters. However, given the lack of vertical control and inadequate sound speed

profiling associated with this survey, it would be inappropriate to use the data from survey D00175 for the approaches to a port. To emphasize this, the data was intentionally left gridded at a coarse resolution. Further, software limitations make it impractical to grid the entire survey at resolutions much finer than 8 meters. In accordance with the HSSD, the data was gridded at a maximum (coarsest) resolution of 32 meters. In several instances, a coarser resolution surface would be more appropriate, owing to the extreme depths (exceeding 1400 meters).

C. Vertical and Horizontal Control

In accordance with the Project Instructions, there was no vertical control requirement for this project. As such, a zero tide file was applied to all survey lines.

C.1 Vertical Control

The vertical datum for this project is Mean Sea Level.

C.2 Horizontal Control

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

The projection used for this project is 10N.

The following DGPS Stations were used for horizontal control:

DGPS Stations
Whidbey Island, WA (302) kHz
Fort Stevens, OR (287) kHz

Table 10: USCG DGPS Stations

D. Results and Recommendations

D.1 Chart Comparison

Chart comparisons were not required for this survey, however, a cursory examination was performed as detailed below.

D.1.1 Raster Charts

The following are the largest scale raster charts, which cover the survey area:

Chart	Scale	Edition	Edition Date	LNLM Date	NM Date
18003	1:736560	20	11/2006	04/26/2013	04/26/2013

Table 11: Largest Scale Raster Charts

18003

In accordance with the Project Instructions, chart comparisons were not required for survey D00175; however, a cursory examination of the gridded data was performed against Chart 18003 which covers the entire survey, as well as with larger scale charts which cover small sections of the survey area (18480, 18500, 18520, 18561 and 18581). No discrepancies of navigational significance were noted between the survey data and the raster charts.

The following are the largest scale charts that cover the area: 18581, 18561, 18460, 18480, 18500, 18520. The following are the largest scale ENC's that cover the area: US5OR44M, US5OR43M, US4WA36M, US3WA01M, US3WA03M, US3OR01M. The charted features that fell within and near the survey coverage were examined during the SAR and none of them could be identified in the data. Due to the field statement on data quality and recommendations in section A.3 of the DR, the reviewer recommends that all charted features be retained.

D.1.2 AWOIS Items

No AWOIS items were assigned for this survey.

D.1.3 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.4 Charted Features

No charted features exist for this survey.

D.1.5 Uncharted Features

No uncharted features exist for this survey.

D.1.6 Dangers to Navigation

No Danger to Navigation Reports were submitted for this survey.

D.1.7 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.8 Channels

No channels exist for this survey. There are no designated anchorages, precautionary areas, safety fairways, traffic separation schemes, pilot boarding areas, or channel and range lines within the survey limits.

There is a charted channel on chart 18561, the channel is the main entrance to the Yakima Bay in Oregon, in Addition, on chart 18460 there is a charted traffic separation schema and precautionary areas on the Strait of Juan de Fuca in WA.

D.1.9 Bottom Samples

No bottom samples were required for this survey.

D.2 Additional Results**D.2.1 Shoreline**

Shoreline was not assigned in the Hydrographic Survey Project Instructions or Statement of Work.

D.2.2 Prior Surveys

No prior survey comparisons exist for this survey.

D.2.3 Aids to Navigation

No Aids to navigation (ATONs) exist for this survey.

There are ATONs marking the entrance and channel into Yaquina Bay, however, they were not investigated during this survey.

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

No submarine features exist for this survey.

D.2.6 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.7 Platforms

No platforms exist for this survey.

D.2.8 Significant Features

No significant features exist for this survey.

D.2.9 Construction and Dredging

No present or planned construction or dredging exist within the survey limits.

The channel into Yaquina Bay is regularly maintained by USACE, although no maintenance activity was observed at the time of the survey.

D.2.10 New Survey Recommendations

No new surveys or further investigations are recommended for this area.

D.2.11 New Inset Recommendations




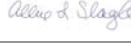
No new insets are recommended for this area.

E. Approval Sheet

As Chief of Party, Field operations for this hydrographic survey were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports.

All field sheets, this Descriptive Report, and all accompanying records and data are approved. All records are forwarded for final review and processing to the Processing Branch.

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual, Field Procedures Manual, Standing and Letter Instructions, and all HSD Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies noted in the Descriptive Report.

Approver Name	Approver Title	Approval Date	Signature
Richard T. Brennan, CDR/NOAA	Chief of Party	11/08/2013	 Richard T. Brennan 2013.11.13 10:28:52 -08'00'
Meghan McGovern, LT/NOAA	Field Operations Officer	11/08/2013	 Date: 2013.11.08 12:56:36 -08'00'
James B. Jacobson	Chief Survey Technician	11/08/2013	 James Jacobson I have reviewed this document 2013.11.08 11:27:49 -08'00'
Allix L. Slagle	Sheet Manager	11/08/2013	 Date: 2013.11.13 08:28:50 -08'00'

F. Table of Acronyms

Acronym	Definition
AHB	Atlantic Hydrographic Branch
AST	Assistant Survey Technician
ATON	Aid to Navigation
AWOIS	Automated Wreck and Obstruction Information System
BAG	Bathymetric Attributed Grid
BASE	Bathymetry Associated with Statistical Error
CO	Commanding Officer
CO-OPS	Center for Operational Products and Services
CORS	Continually Operating Reference Station
CTD	Conductivity Temperature Depth
CEF	Chart Evaluation File
CSF	Composite Source File
CST	Chief Survey Technician
CUBE	Combined Uncertainty and Bathymetry Estimator
DAPR	Data Acquisition and Processing Report
DGPS	Differential Global Positioning System
DP	Detached Position
DR	Descriptive Report
DTON	Danger to Navigation
ENC	Electronic Navigational Chart
ERS	Ellipsoidal Referenced Survey
ERZT	Ellipsoidally Referenced Zoned Tides
FFF	Final Feature File
FOO	Field Operations Officer
FPM	Field Procedures Manual
GAMS	GPS Azimuth Measurement Subsystem
GC	Geographic Cell
GPS	Global Positioning System
HIPS	Hydrographic Information Processing System
HSD	Hydrographic Surveys Division
HSSD	Hydrographic Survey Specifications and Deliverables

Acronym	Definition
HSTP	Hydrographic Systems Technology Programs
HSX	Hypack Hysweep File Format
HTD	Hydrographic Surveys Technical Directive
HVCR	Horizontal and Vertical Control Report
HVF	HIPS Vessel File
IHO	International Hydrographic Organization
IMU	Inertial Motion Unit
ITRF	International Terrestrial Reference Frame
LNM	Local Notice to Mariners
LNM	Linear Nautical Miles
MCD	Marine Chart Division
MHW	Mean High Water
MLLW	Mean Lower Low Water
NAD 83	North American Datum of 1983
NAIP	National Agriculture and Imagery Program
NALL	Navigable Area Limit Line
NM	Notice to Mariners
NMEA	National Marine Electronics Association
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NRT	Navigation Response Team
NSD	Navigation Services Division
OCS	Office of Coast Survey
OMAO	Office of Marine and Aviation Operations (NOAA)
OPS	Operations Branch
MBES	Multibeam Echosounder
NWLON	National Water Level Observation Network
PDBS	Phase Differencing Bathymetric Sonar
PHB	Pacific Hydrographic Branch
POS/MV	Position and Orientation System for Marine Vessels
PPK	Post Processed Kinematic
PPP	Precise Point Positioning
PPS	Pulse per second

Acronym	Definition
PRF	Project Reference File
PS	Physical Scientist
PST	Physical Science Technician
RNC	Raster Navigational Chart
RTK	Real Time Kinematic
SBES	Singlebeam Echosounder
SBET	Smooth Best Estimate and Trajectory
SNM	Square Nautical Miles
SSS	Side Scan Sonar
ST	Survey Technician
SVP	Sound Velocity Profiler
TCARI	Tidal Constituent And Residual Interpolation
TPU	Total Propagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDA	Global Positioning System timing message
ZDF	Zone Definition File

APPROVAL PAGE

D00175

Data meet or exceed current specifications as certified by the OCS survey acceptance review process. Descriptive Report and survey data except where noted are adequate to supersede prior surveys and nautical charts in the common area.

The following products will be sent to NGDC for archive

- D00175_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- D00175_GeoImage.pdf

The survey evaluation and verification has been conducted according current OCS Specifications.

Approved: _____

Peter Holmberg

Cartographic Team Lead, Pacific Hydrographic Branch

The survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.

Approved: _____

CDR, Benjamin K. Evans, NOAA

Chief, Pacific Hydrographic Branch