

W00353

NOAA Form 76-35A

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

DESCRIPTIVE REPORT

Type of Survey: Navigable Area

Registry Number: W00353

LOCALITY

State: Washington

General Locality: Offshore - Washington Coast

Sub-locality: Willapa and Glide Canyons

2017

CHIEF OF PARTY
Benjamin K. Evans, CDR/NOAA

LIBRARY & ARCHIVES

Date:

HYDROGRAPHIC TITLE SHEET

W00353

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: **Washington**

General Locality: **Offshore - Washington Coast**

Sub-Locality: **Willapa and Glide Canyons**

Scale: **1:80,000**

Dates of Survey: **0917/2017 to 10/01/2017**

Instructions Dated: **August 10, 2017**

Project Number: **M-N908-RA-17**

Field Unit: **NOAA Ship *RAINIER***

Project Manager: **Benjamin K. Evans, CDR/NOAA**

Soundings by: **Multibeam Echosounder**

Imagery by: **Multibeam Echosounder backscatter**

Verification by: **Pacific Hydrographic Branch**

Soundings Acquired in: **Meters at Mean Lower Low Water**

Remarks:

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 Centers for Environmental Information (NCEI) and can be retrieved via <http://www.ncei.noaa.gov/>.

Descriptive Report Summary W00353	
Project	M-N908-RA-17
Survey	W00353
State	Washington
Locality	Offshore-Washington Coast
Sub Locality	Willapa and Glide Canyons
Scale of Survey	1:80000
Sonars Used	Kongsberg EM710 MBES
Horizontal Datum	North American Datum - 1983
Vertical Datum	Mean Lower Low Water
Vertical Datum Correction	TCARI
Projection	UTM Zone 10N
Field Unit	NOAA Ship Rainier
Survey Dates	09/17/2017 - 10/01/2017
Chief of Party	Benjamin K. Evans, CDR/NOAA

A. Area Surveyed

This hydrographic survey was acquired in accordance with the requirements defined in the Project Instruction M-N908-RA-17 with the exception of total survey assigned area not being achieved. Total survey area acquired was 124 SNM which is 65.6% of the planned 189 SNM (Figure 1). Full coverage was not acquired due time constraints and weather delays. Deteriorating weather forced the ship north to work on an additional survey area on W00304, placing the ship closer the protected waters while still supporting the project objectives.

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
46° 45' 31.02" N 124° 52' 38.6" W	46° 23' 18.73" N 124° 25' 41.43" W

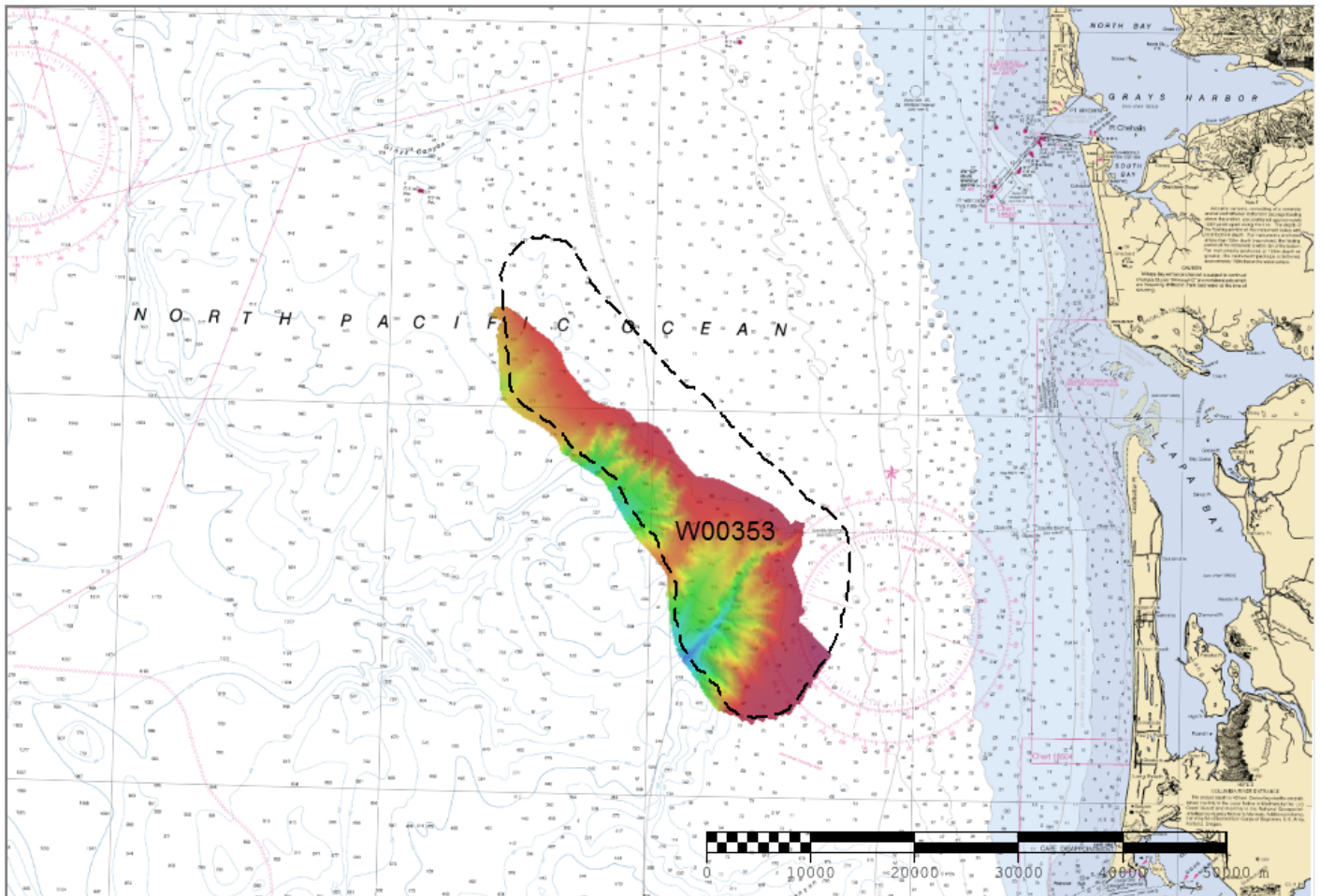


Figure 1. Assigned sheet limits (black outline) with acquired survey coverage (rainbow area).

B. Survey Purpose

This project was conducted in collaboration with the National Ocean Service-Office of Coast Survey's (OCS) Integrated Ocean and Coastal Mapping Program (IOCM) and the Olympic Coast National Marine Sanctuary (OCNMS) and their partners in order to collect bathymetry, acoustic backscatter data, and water column data within high priority areas of OCNMS. The data from this project provides sea floor habitat information to support fishery and resource protection mandates and will be further used to update National Ocean Service nautical chart products within the area.

C. Intended Use of Survey

The entire survey is adequate to supersede previous data.

Survey data were acquired within survey limits in accordance with the requirements in the Project Instructions and the Hydrographic Survey Specifications and Deliverables (HSSD). This survey is recommended for charting by the hydrographer.

D. Data Acquisition and Processing

Please reference NOAA Ship Rainier's Data Acquisition and Processing Report (DAPR) for 2017 for a complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods. Additional information to supplement survey data are discussed in the following sections.

-Survey Coverage

Due to time constraints and poor weather conditions, coverage was not obtained over the entire assigned area of sheet W00353. A large unsurveyed area (25 nautical miles by 4 nautical miles in size) exists on the eastern portion of the sheet in relatively shallow, flat and featureless region. In accordance with guidance from Sanctuary Staff, MBES coverage was prioritized along the deeper canyon on the western portion of the sheet.

-Delayed Heave

An issue occurred while logging POS file 2017_260_S221_A.000. In CARIS HIPS, delayed heave could not be applied to lines 0000-0009 acquired on September 16, 2017 (DN260). Support was requested from HSTB who then created a PP-RTX SBET using the affected POS file, which was successfully applied to these lines. These lines were compared to adjacent lines that did have Delayed Heave applied and appear to agree well.

-Sound Speed Methods

Sound Speed Cast Frequency: Sound speed profiles were acquired using Deep Blue Expendable Bathythermograph (XBT) probes at discrete locations within the survey area about once every four hours, when significant changes in surface sound speed were observed, or when surveying in a new area. Reference the 2017 DAPR for XBT processing. A total of 12 XBT casts were applied to W00353 MBES data using the "Nearest in distance within time" profile selection method found in Caris HIPS. All lines, except two used the 4 hours interval. Lines 0001 and 0002 on DN 260 used the nearest in time sound velocity correction method, which produced better results due to a relatively close grouping of casts occurring in the northern portion of the sheet. (Figure 2)

-Backscatter Data

Raw backscatter data were collected, processed, and sent to NOAA's Pacific Hydrographic Branch. A backscatter mosaic was created using Flaedermaus FMGT version 7.7.8 and included among the deliverables.

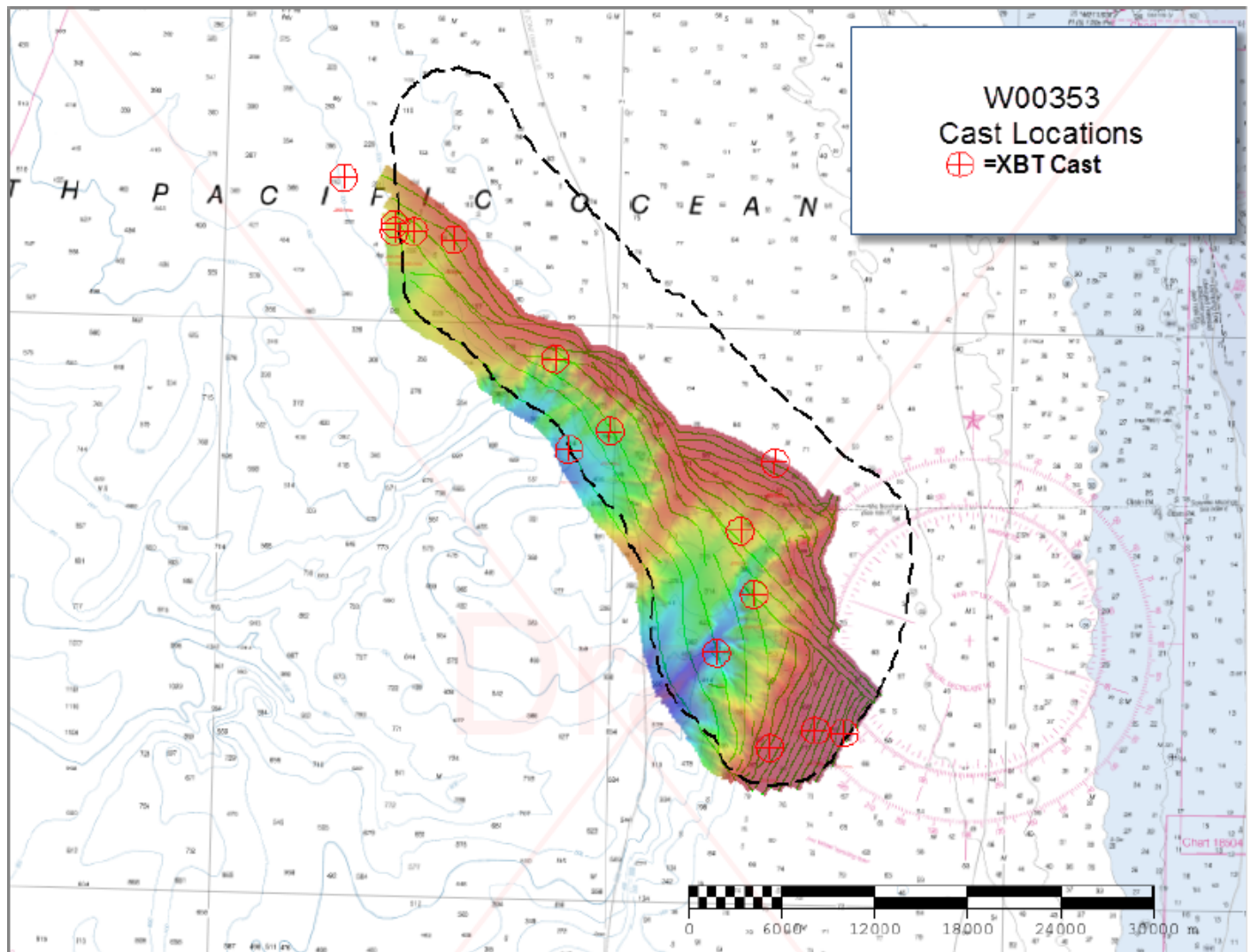


Figure 2: W00353 Locations of XBT Sound Velocity Profiles.

E. Uncertainty

Uncertainty values were measured and applied in accordance with Section B.4 of the DAPR.

Total Propagated Uncertainty (TPU) values for survey W00353 were derived from a combination of fixed values for equipment and vessel characteristics, as well as field assigned values for sound speed uncertainties. Tidal uncertainties were provided by NOAA's Center for Operational Oceanographic Products and Service (CO-OPS), and were applied to depth soundings using a Tidal Constituent and Residual Interpolation (TCARI) grid. TCARI automatically calculates the uncertainty associated with water level interpolation, which is then written into the Caris HDCS files. Therefore, no tidal uncertainty values were entered into the tide value section of the Caris compute TPU function related to TCARI.

A VDatum separation model was provided with the Project Instructions for this survey. Along with this separation model, an uncertainty value of 13.5731cm was provided and entered for the tidal zoning component of TPU calculation in Caris HIPS/SIPS.

Sound speed measurement uncertainty of 4 meters/second was used when computing TPU for XBTs and a value of 0.05 meters/second was used for surface sound velocity uncertainty.

Uncertainty values of the submitted finalized VR grid were calculated in Caris using the "Greater of the Two" of uncertainty and standard deviation (scaled to 95%). The finalized CSAR QA tool within Pydro was used to analyze W00353 MBES data. The results showed that >99.5% of W00353 nodes in the Variable Resolution (VR) surface met HSSD uncertainty requirements (Figure 3).

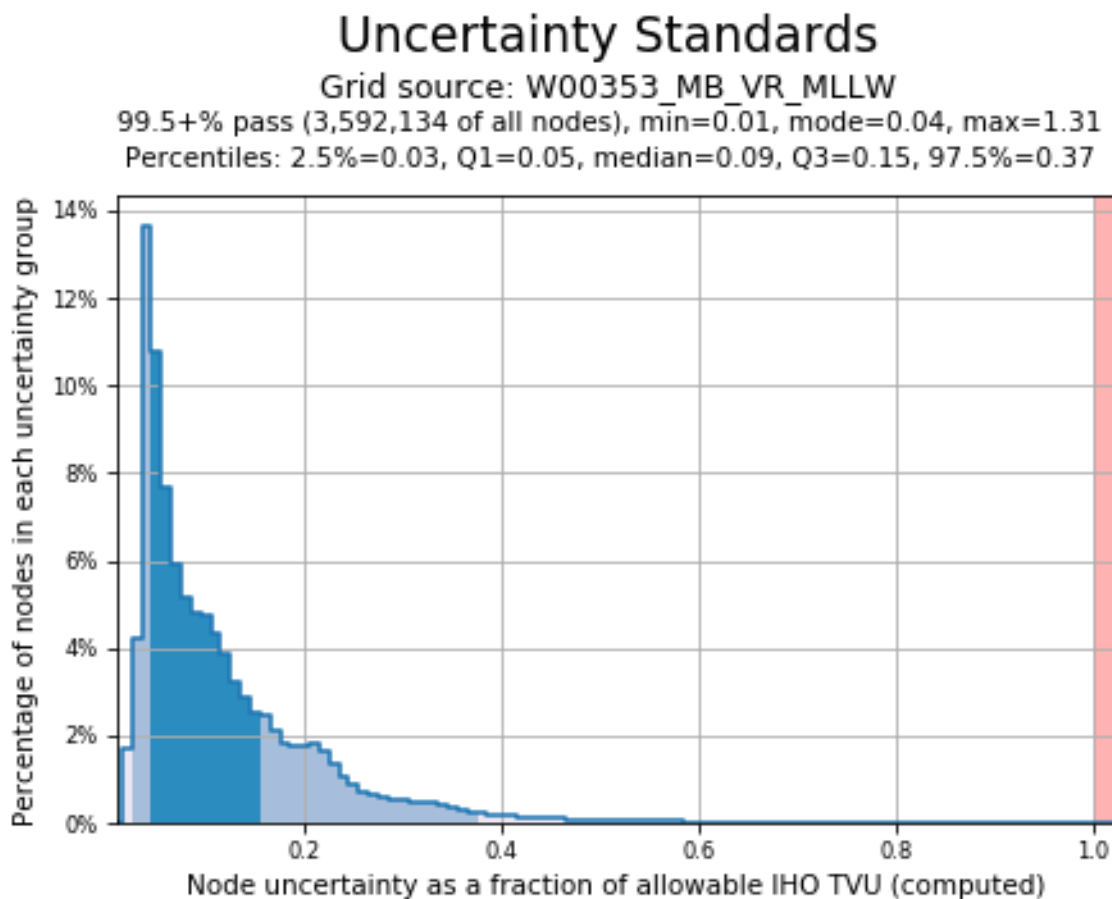


Figure 3. TVU Compliance to NOAA uncertainty standards as calculated using Pydro QC Tools 2.

F. Results and Recommendations

The following are the largest scale RNC and ENC, which cover the survey area:

Chart	Scale	Edition	Edition Date	LNM Date	NM Date
18480	1:180789	32	01/2013	04/01/2017	02/18/2016

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US3WA03M	1:180789	21	07/21/2016	07/21/2016	NO

Raster Nautical Chart (RNC) 18480 as well as Electronic Nautical Chart (ENC) US3WA03M were compared to W00353 survey data using a 32 meter resolution combined CUBE surface. In general, charted depths and curves agree with surveyed soundings, but some areas show horizontal divergence in contour position up to 1.4 nautical miles (2,593 meters). Figures 4-7.

RNC Chart 18480

W00353 survey data contours were generally in agreement with charted contours. However, several places showed disparities such as the 100ftm curve is off by 0.95NM (Figure 4) and the 300ftm curve has a section off by 1.4NM (Figure 5).

ENC Chart US3WA03M

W00353 survey data contours were generally in agreement with charted contours. However, several places showed disparities such as the 300ftm curve is off by 0.7NM (Figure 6) in the northwestern section of the sheet, and the 400ftm curve has a section off by 1.1NM (Figure 7).

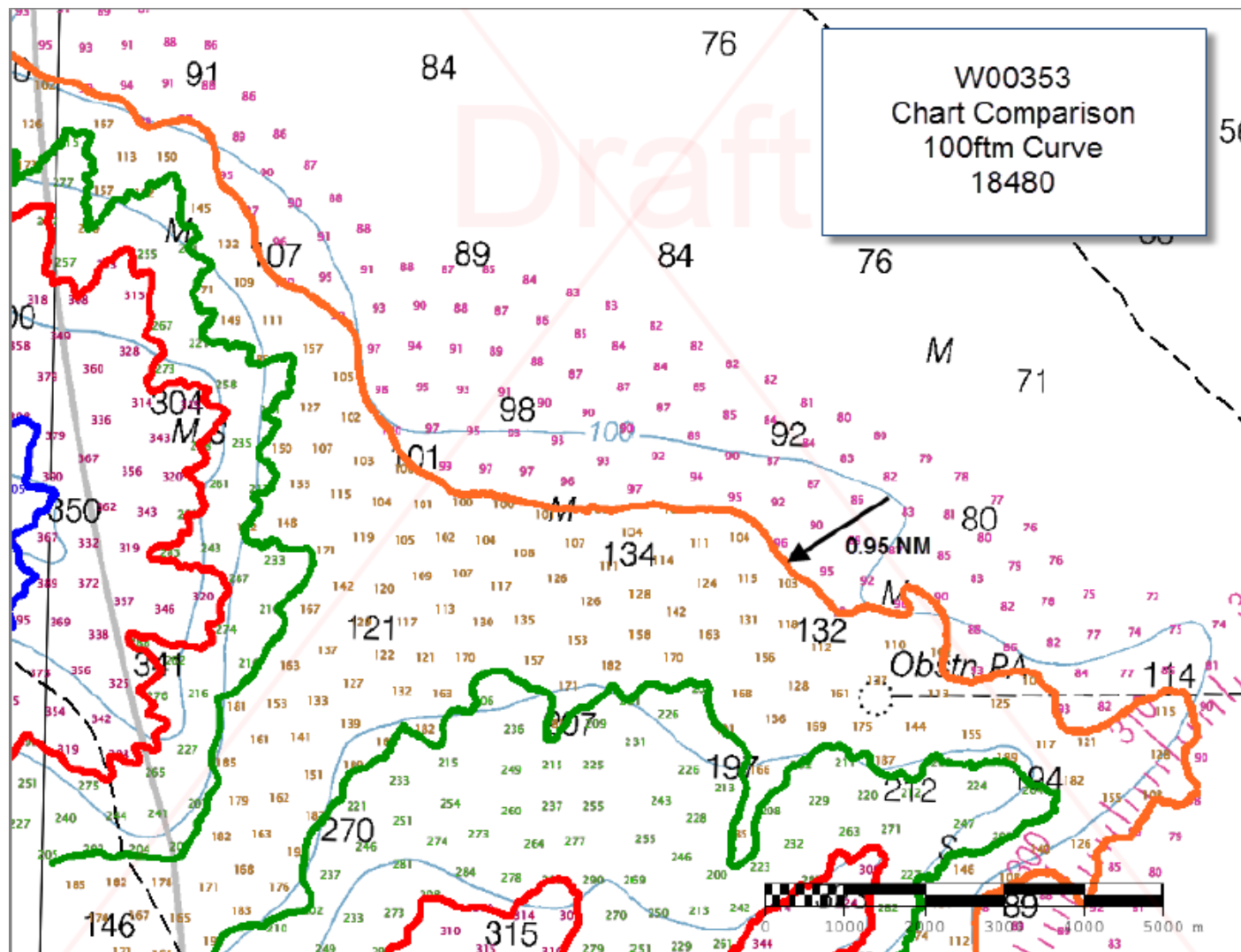


Figure 4. Surveyed 100 fathom contours compared to charted contours (RNC 18480).

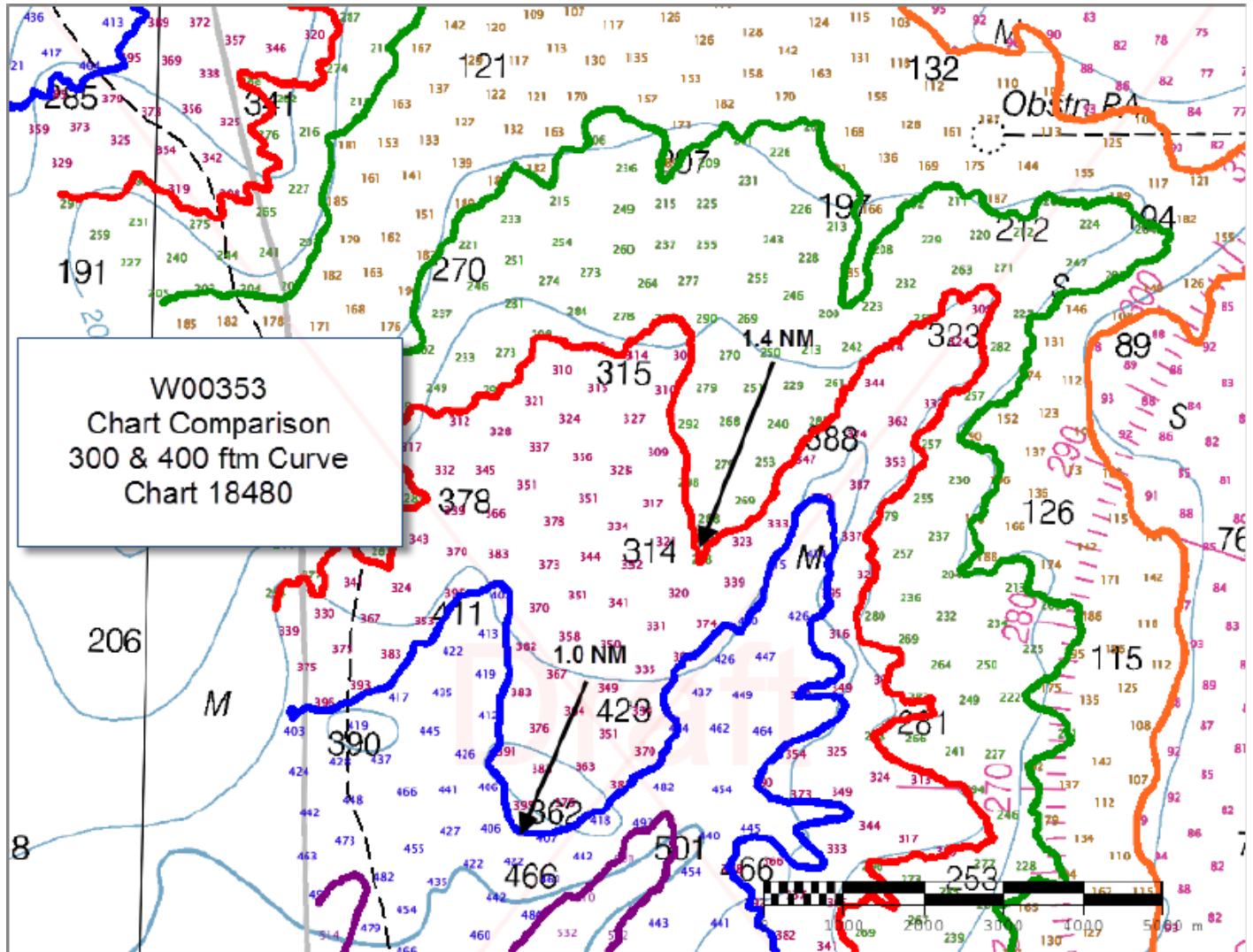


Figure 5. Surveyed 300 and 400 fathom contours compared to charted contours (RNC 18480).

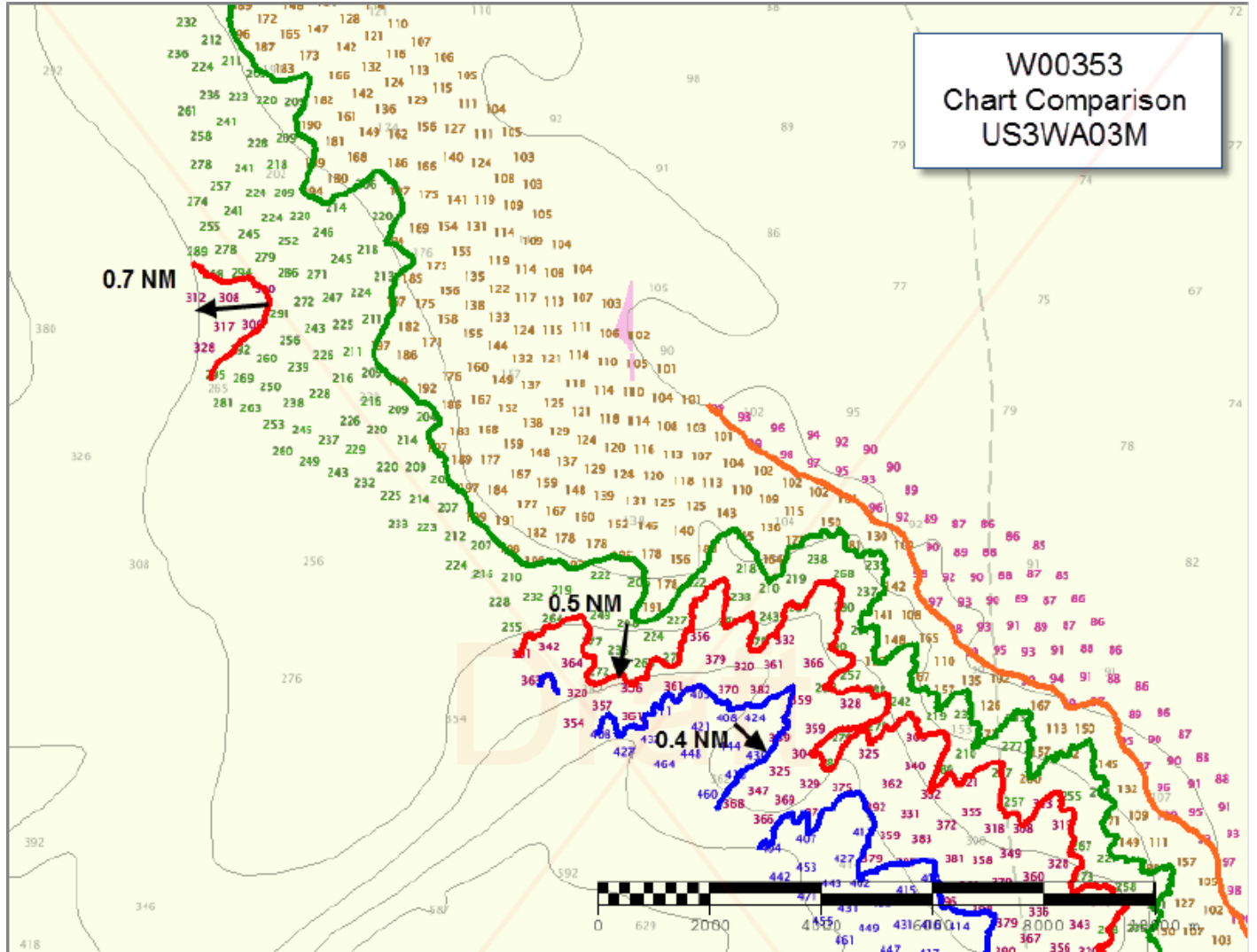


Figure 6. Surveyed contours compared to charted contours, northern portion (ENC US3WA03M).

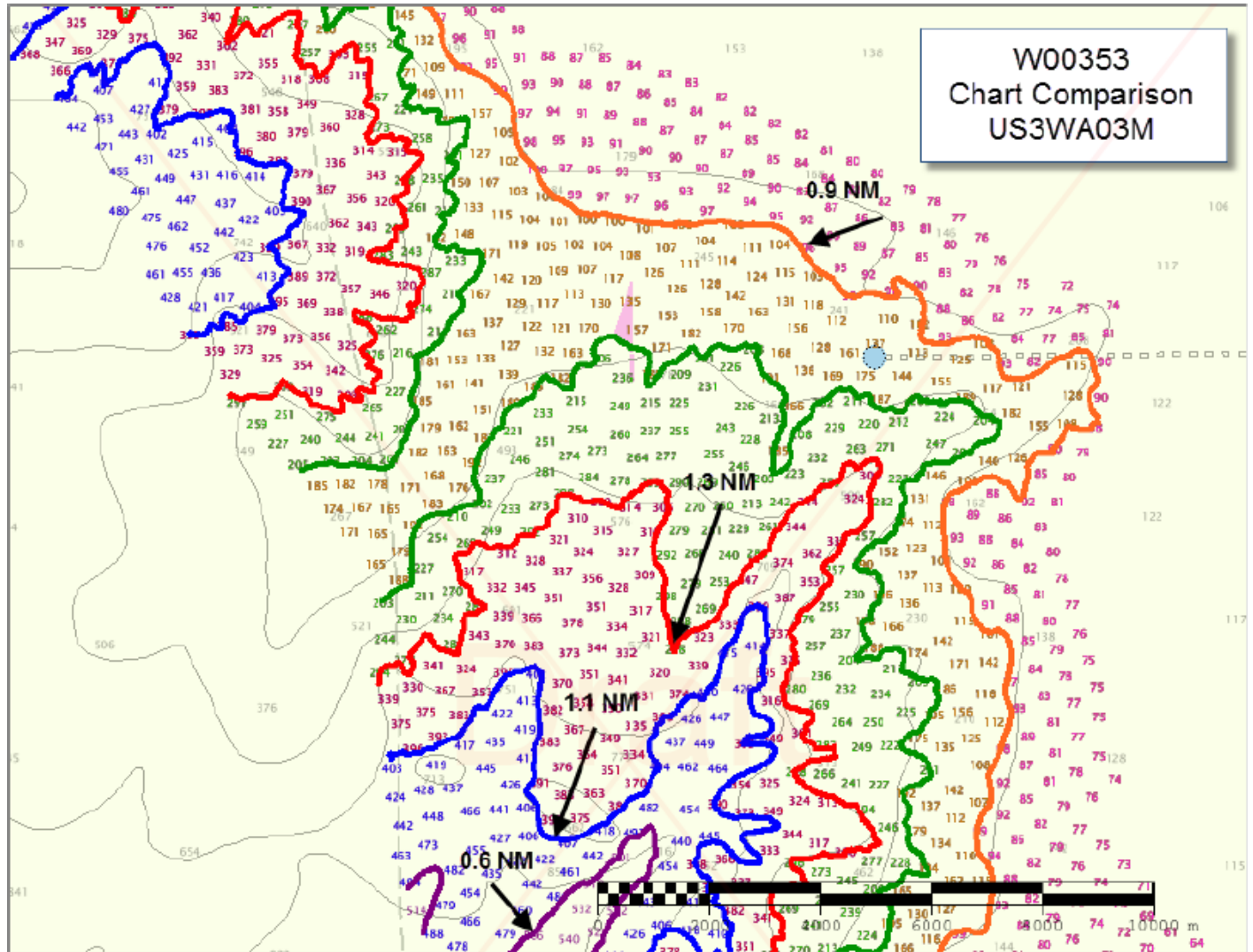


Figure 7. Surveyed contours compared to charted contours, southern portion (ENC US3WA03M).

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

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
W00353_MB_VR_MLLW	CUBE	999 m	110.5 m - 1082.2 m	NOAA_VR	Complete MBES
W00353_MB_VR_MLLW_Final	CUBE	999 m	111.7 m - 1116.4 m	NOAA_VR	Complete MBES

New VR surfaces were created during this Survey Acceptance Review. The surface depth ranges from 110.4 meters to 1084.27 meters.

G. Vertical and Horizontal Control

The vertical datum for this project is Mean Lower Low Water.

The vertical control method used for this survey was TCARIVDatum.

The following National Water Level Observation Network (NWLON) stations served as datum control for this survey:

Station Name	Station ID
Westport, WA	9441102
Toke Point, WA	9440910
La Push, WA	9442396
Cape Disappointment, WA	9440581

A request for final approved tides was sent to N/OPS1 on 10/21/2017. Final approved tides was received from NOAA Center for Operational Oceanographic Products and Services (CO-OPS) on 11/06/2017. The letter designates Preliminary TCARI file "N908RA2017.tc" as the final grid for W00353.

Surveyed depths were brought to the ellipsoid by using a VDatum separation model (file name: VDatumBoundary_4Doug_xyNAD83-MLLW_geoid12b).

The Wide Area Augmentation System (WAAS) was used for real time positioning during survey acquisition. Precise Positioning-Real Time Extended (PP-RTX) processing methods were used in Applanix POSPac MMS 8.1 software to produce SBETs for post processed horizontal correction.

The horizontal datum for this project is North American Datum - 1983. The projection used for this survey is UTM Zone 10N.

The following DGPS Stations were used for horizontal control:

DGPS Stations

No DGPS Stations were used for horizontal control.

H. Additional Results




Pydro QC Tools 2 Detect Fliers was used to find fliers in the finalized VR surface and 289 fliers were found. These flier detections were mostly found to be on the sheet edges and were investigated in CARIS Subset Editor and were found to be false positives. The results of Detect Filers tool are included as a .000 in Appendix II of this report.

I. Approval

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 Survey Summary 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 Survey Summary Report.

Approver Name	Title	Date	Signature
Benjamin K. Evans, CDR/NOAA	Commanding Officer, NOAA Ship Rainier	03/20/2018	 Digitally signed by EVANS.BENJAMIN.K.1237217094 Date: 2018.03.19 16:57:30 -07'00'
Scott E. Broo, LT/NOAA	Field Operations Officer, NOAA Ship Rainier	03/20/2018	 BROO.SCOTT.EDWARD.139 6599976 2018.03.26 09:59:12 -07'00'
James B. Jacobson	Chief Survey Technician, NOAA Ship Rainier	03/20/2018	 JACOBSON.JAMES.BRYAN.1269 664017 I have reviewed this document 2018.03.28 08:10:12 -07'00'
Jennifer S. Kraus, ENS/NOAA	Sheet Manager	03/20/2018	 Digitally signed by KRAUS.JENNIFER.SARAH.1015738 320 Date: 2018.03.26 14:35:25 -04'00'



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Silver Spring, Maryland 20910

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : November 6, 2017

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: M-N908-RA-17 OCNMS
HYDROGRAPHIC SHEET: W00353

LOCALITY: Willapa and Glide Canyon , Offshore WA Coast, WA
TIME PERIOD: September 17 to October 1, 2017

TIDE STATION USED: Cape Disappointment, WA 9440581
Lat.46° 16.8' N Long.124° 02.8' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.159 meters

TIDE STATION USED: Toke Point, WA 9440910
Lat.46° 42.5' N Long.123° 58.0' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.493 meters

TIDE STATION USED: Westport, WA 9441102
Lat.46° 54.2' N Long.124° 06.3'W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.561 meters

TIDE STATION USED: La Push, WA 9442396
Lat.47° 54.8'N Long.124° 38.2'W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 2.362 meters

REMARKS: RECOMMENDED Grid

Please use the TCARI grid "N908RA2017.tc" as the final grid for project M-N908-RA-17 OCNMS, W00353, during the time period between September 17 to October 1, 2017.

Refer to attachments for grid information.

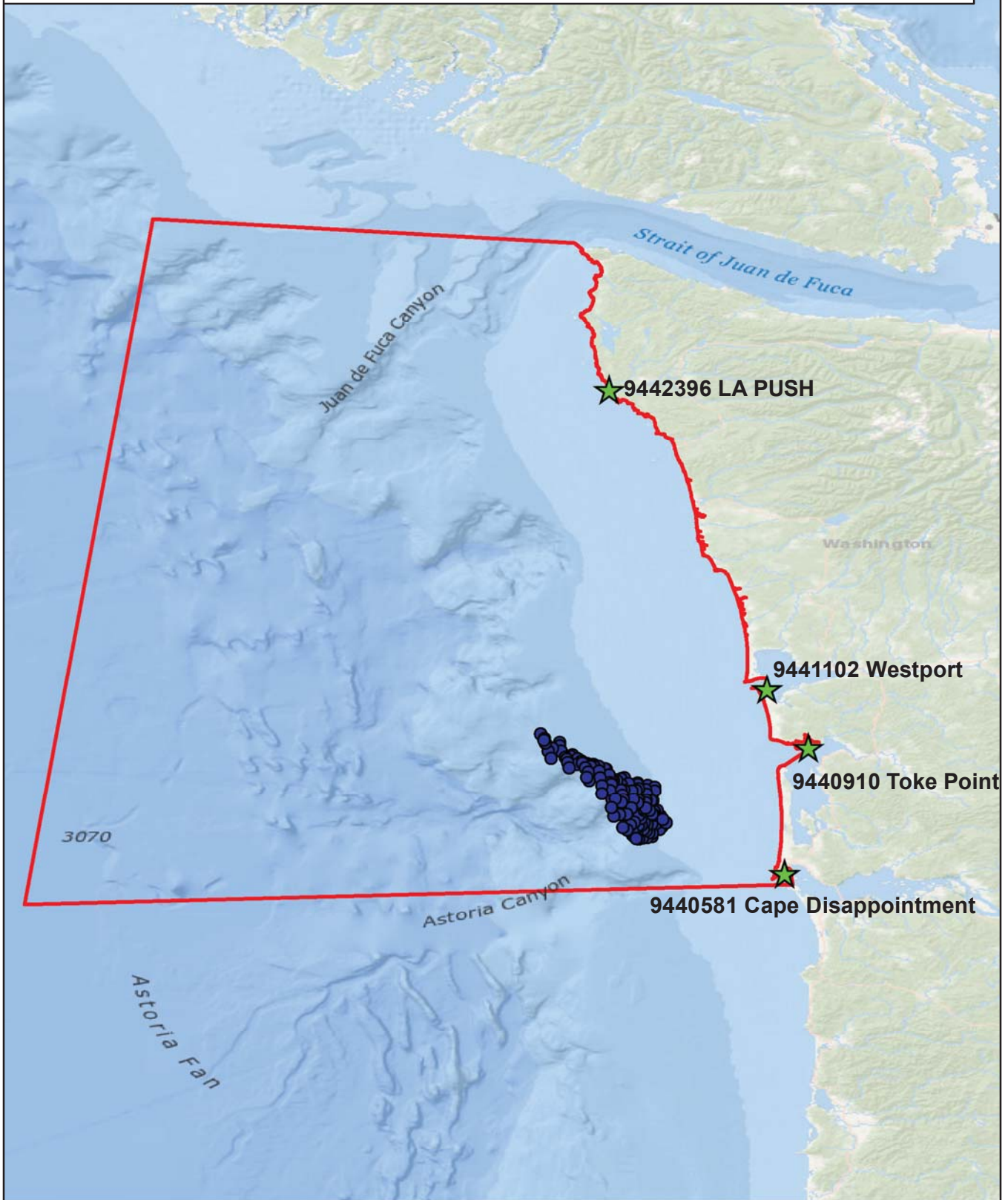
Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

HOVIS.GERALD.THOMAS.JR.1365860250 Digitally signed by
MAS.JR.1365860250 HOVIS.GERALD.THOMAS.JR.1365860250
Date: 2017.11.14 13:03:42 -05'00'

CHIEF, PRODUCTS AND SERVICES BRANCH



**Preliminary as Final TCARI Grid for
M-N908-RA-2017 OCNMS, W00353
Willapa and Glide Canyon, Offshore WA Coast, WA**



APPROVAL PAGE

W00353

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 NCEI for archive

- Descriptive Report
- One Bathymetric Attributed Grid (BAG)
- One backscatter mosaic
- Processed survey data and records
- Final Feature File
- GeoPDF of survey products

The survey evaluation and verification has been conducted according current OCS Specifications, and the survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.

Approved: _____

CDR, Olivia Hauser, NOAA
Chief, Pacific Hydrographic Branch