

W00304

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: W00304

LOCALITY

State: Washington

General Locality: Offshore - Washington Coast

Sub-locality: Quinault Canyon

2017

CHIEF OF PARTY
CDR Benjamin K. Evans

LIBRARY & ARCHIVES

Date:

HYDROGRAPHIC TITLE SHEET

W00304

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: **Quinault Canyon**

Scale: **1: 80,000**

Dates of Survey: **09/13/2017 to 09/22/2017**

Instructions Dated: **08/10/2017**

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

Field Unit: **NOAA Ship *Rainier***

Chief of Party: **CDR Benjamin K. Evans**

Soundings by: **Multibeam Echo Sounder**

Imagery by: **Multibeam Echo Sounder Acoustic 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 W00304	
Project	M-N908-RA-17 IOCM Olympic Coast NMS Mapping
Survey	W00304
State	Washington
Locality	Offshore - Washington Coast
Sub Locality	Quinault Canyon
Scale of Survey	1:80000
Sonars Used	Kongsberg EM710 MBES
Horizontal Datum	North American Datum of 1983 (NAD83)
Vertical Datum	Mean Lower Low Water
Vertical Datum Correction	TCARI
Projection	UTM Zone 10N
Field Unit	NOAA Ship Rainier
Survey Dates	09/13/2017 - 09/22/2017
Chief of Party	CDR Benjamin K. Evans, NOAA

A. Area Surveyed

This hydrographic survey was acquired in accordance with the requirements defined in the Project Instruction M-N908-RA-17 (Figure 1).

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
48° 9' 33.94" N 125° 27' 42.34" W	47° 5' 41.42" N 124° 44' 26.28" W

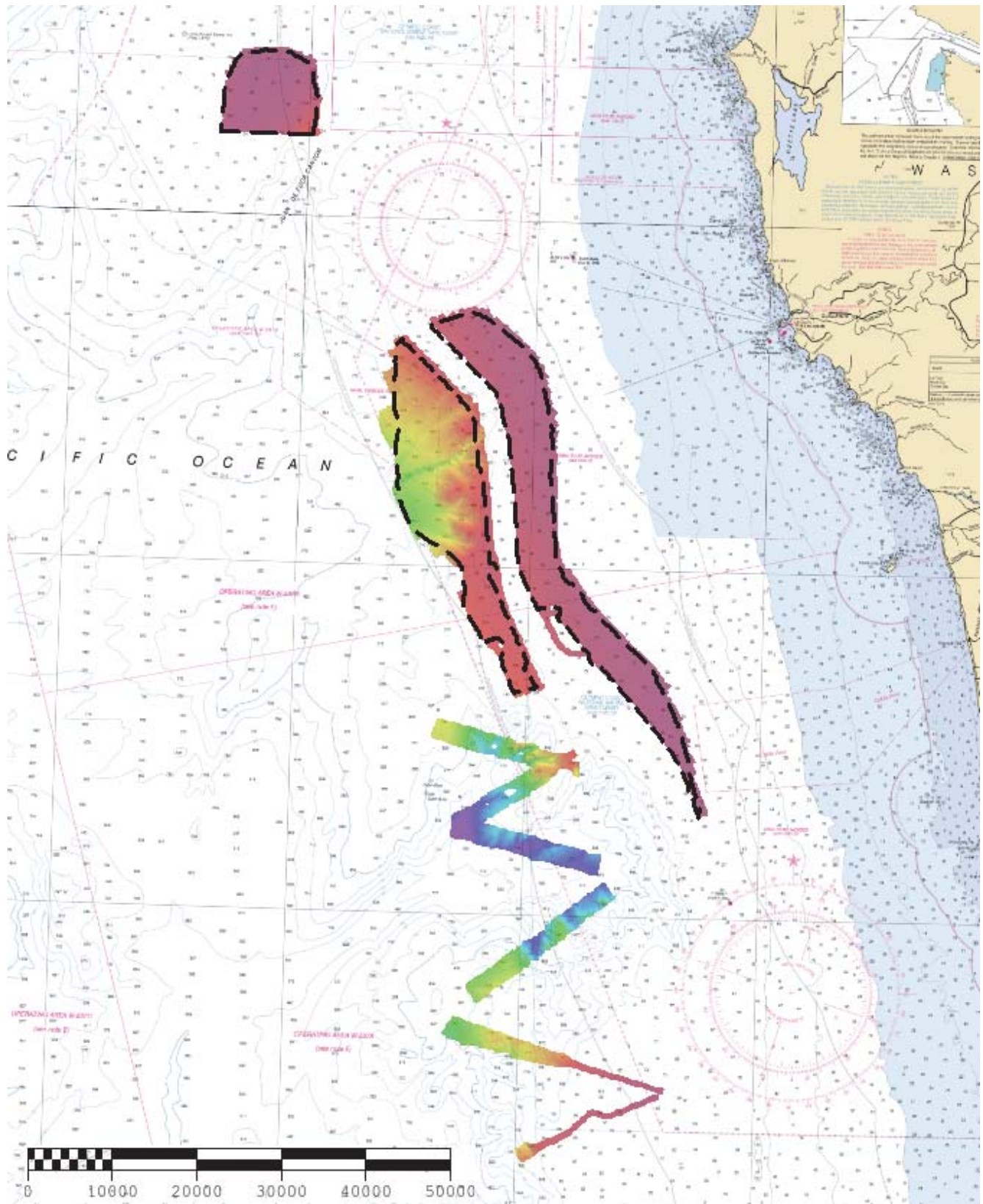


Figure 1: W00304 Assigned sheet limits overlaid on Raster charts 18480 and 18500. Coverage totaled 178.5 Square miles

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 swath bathymetry, acoustic backscatter data and water column data within high priority areas of the OCNMS. The data from this project will provide seafloor habitat information to support fishery and resource protection mandates and will be further used to update National Ocean Service nautical charting 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 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 (2017 RA-DAPR_final). Additional information to supplement survey data are discussed in the following sections.

-Sound Speed Methods

Sound Speed Cast Frequency: Sound speed profiles were acquired using a combination of MVP, CTD and Deep Blue Expendable Bathythermograph (XBT) probes at discrete locations within the survey area approximately 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 more information on MVP, CTD, and XBT processing. A total of 30 sound speed casts were applied to W00304 MBES data using the "Nearest distance within time" (4 hours) profile selection method found in Caris HIPS (Figure 2).

-Backscatter Data

Raw backscatter data were collected, processed, and sent to NOAA's Pacific Hydrographic Branch. A backscatter mosaic was created and included among the deliverables. Raw backscatter was logged as part of the Kongsberg SIS .all file. One 8-meter backscatter mosaic was produced by the field using Flaedermaus FMGT version 7.7.8 in order to create one mosaic for the project.

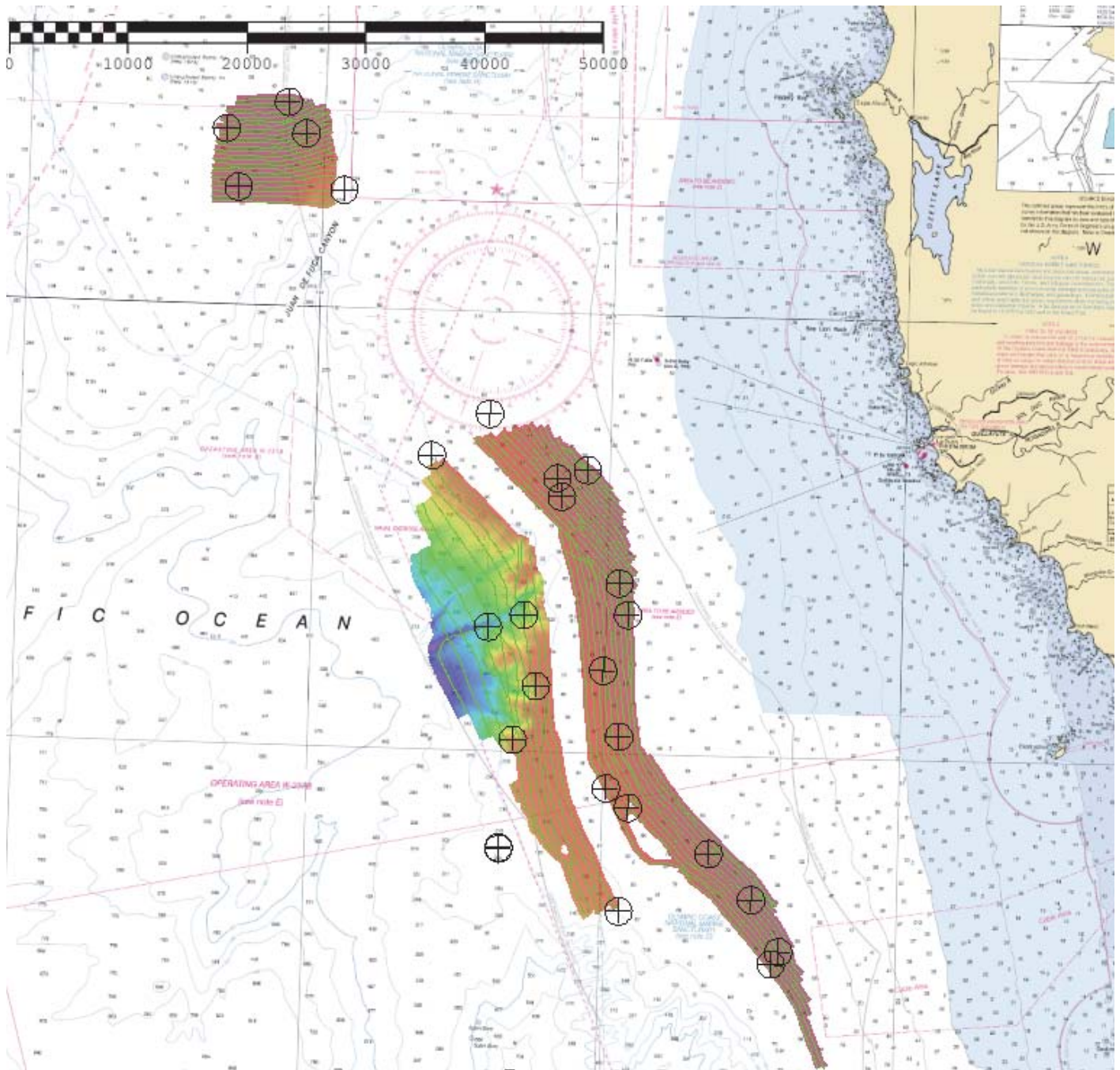


Figure 2: Sound speed cast locations for W00304

E. Uncertainty

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

Total Propagated Uncertainty (TPU) values for survey W00304 were derived from a combination of fixed values for equipment and vessel characteristics, as well as field assigned values for sound speed uncertainties. Final water

level uncertainty values were derived from the VDATUM SEP model provided (see Section G) and entered as zoning uncertainty in CARIS processing. Sound speed uncertainty of 4 meters/second was used when computing TPU for XBTs.

Uncertainty values of submitted finalized grids 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 W00304 MBES data. The results showed that 99.5% of W00304 nodes in the VR surfaces met HSSD uncertainty requirements (Figure 3).

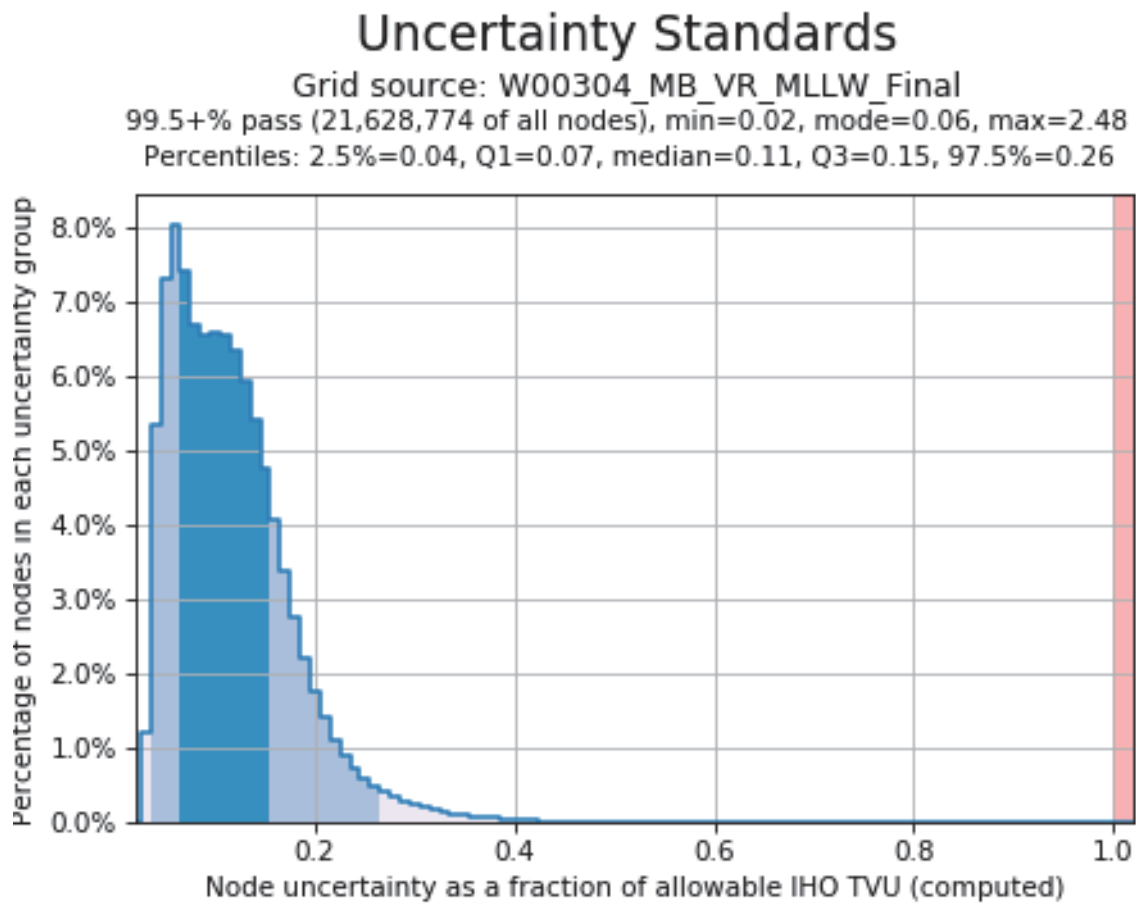


Figure 3: TVU Compliance to NOAA uncertainty standards as calculated using Pydro Finalized CSAR QA tool.

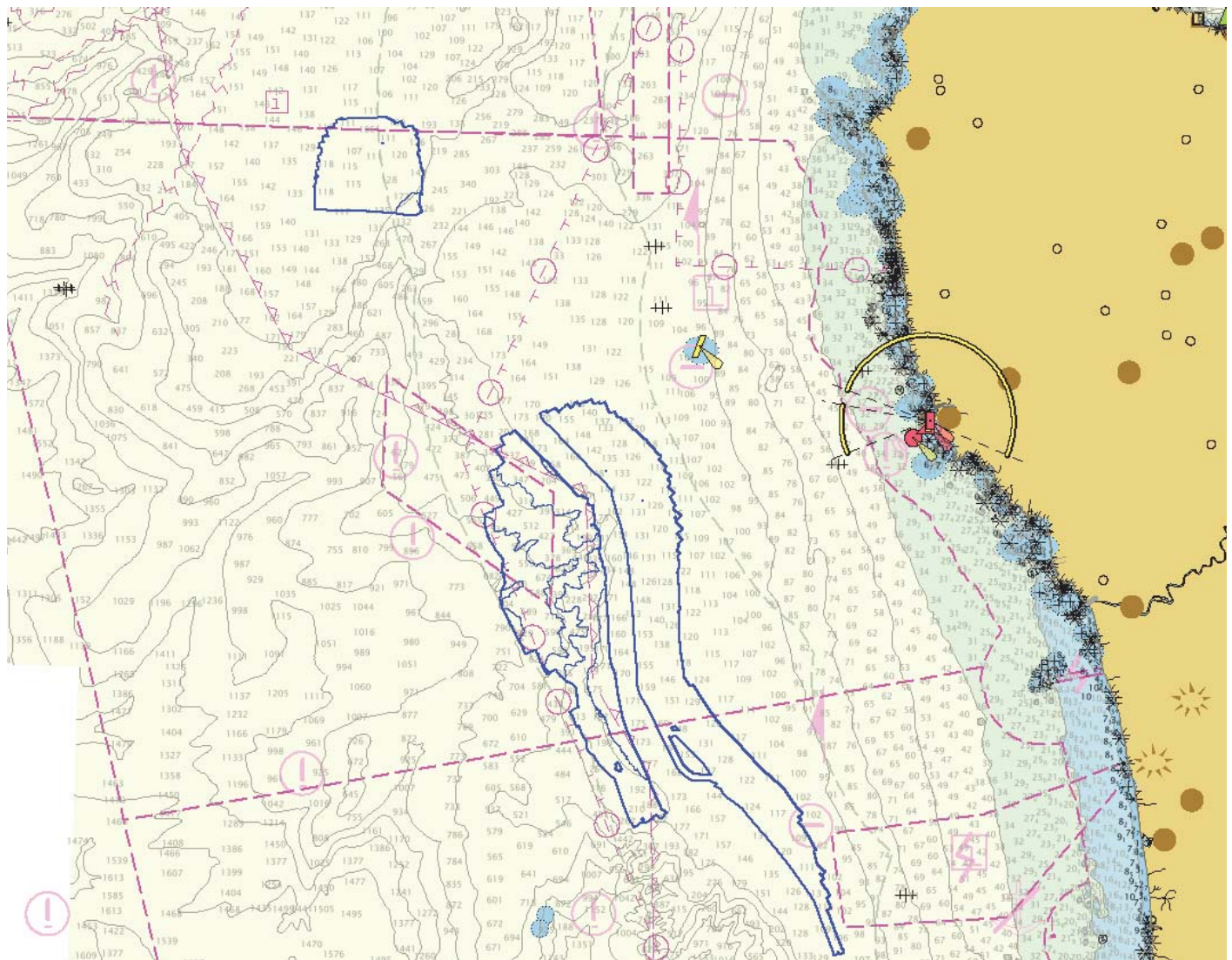
F. Results and Recommendations

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

Chart	Scale	Edition	Edition Date	LNМ Date	NM Date
18480	1:176253	32	01/2013	11/28/2017	12/02/2017
18500	1:180789	30	05/2008	11/28/2017	12/02/2017

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US3WA03M	1:180789	21	07/21/2017	07/21/2017	NO
US3WA01M	1:176253	21	01/11/2016	01/11/2016	NO

Electronic Nautical Charts (ENC) US3WA03M and US3WA01M were compared to W00304 survey data using a 16 meter resolution combined CUBE surface (Figures 4-6). In general, previously charted depths and depth curves conform to the new data with the exceptions highlighted by the differences in contour lines in figure 5. Per HSSD specifications, only ENCs were used for chart comparisons on W00304.



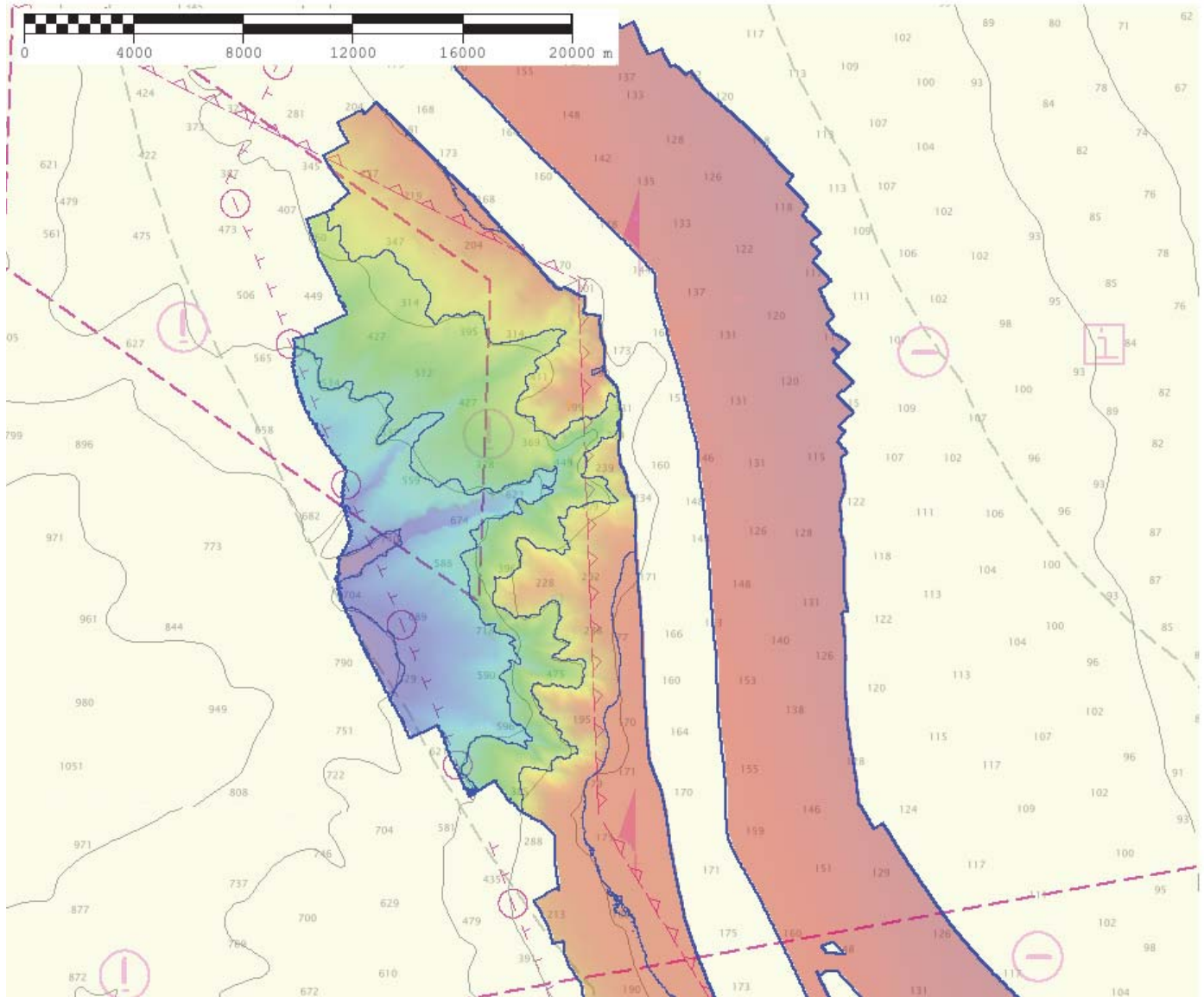


Figure 5: Survey coverage of Quinault Canyon overlaid on corresponding ENCs with contour lines every 100 fathoms. Note that ENC depths are displayed in meters.

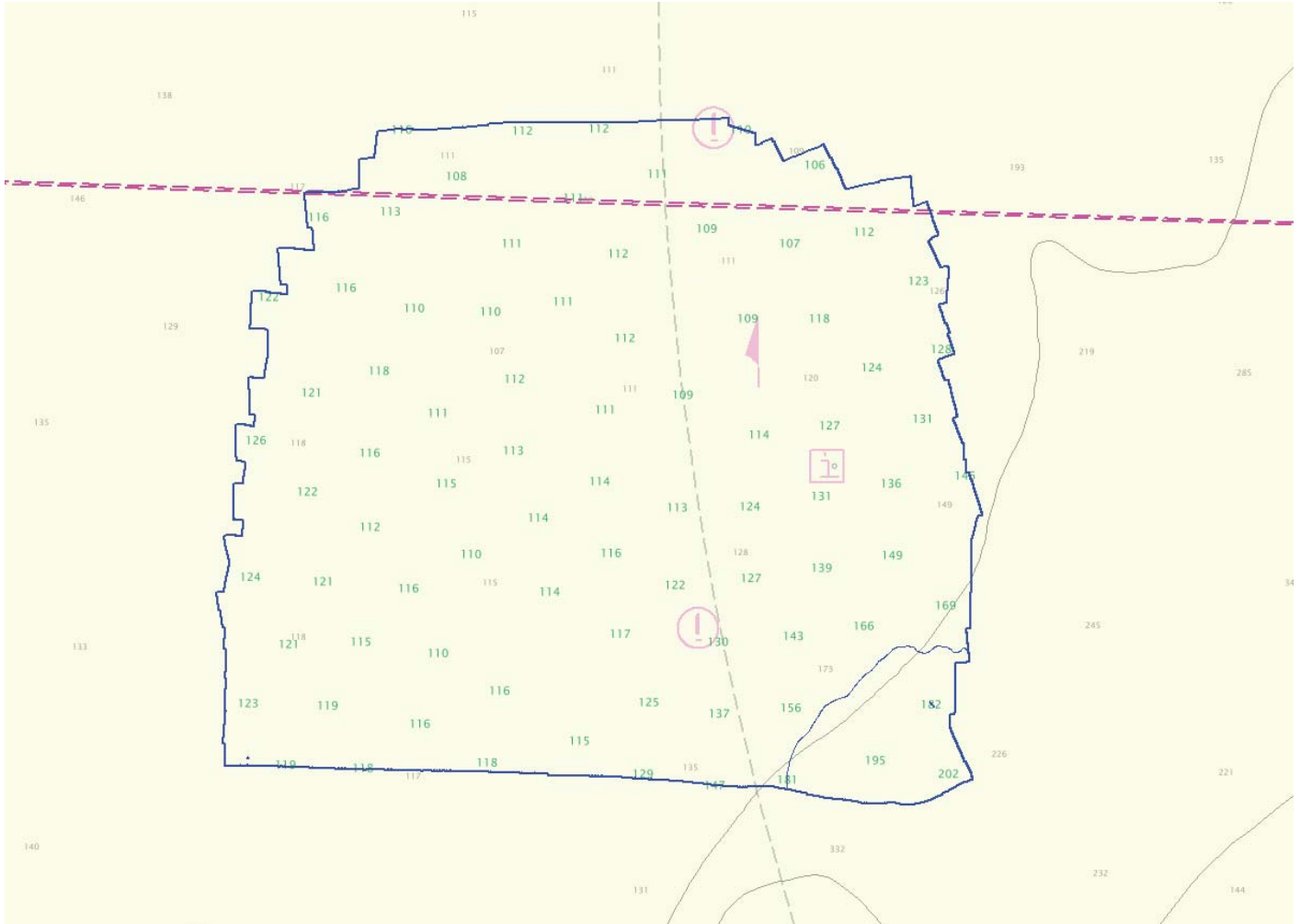


Figure 6: Northern portion of W00304 overlaid on corresponding ENC with soundings

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

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
W00304_MB_VR_MLLW	CUBE	999 m	104.5 m - 805.8 m	NOAA_VR	Complete MBES
W00304_MB_VR_MLLW_FINAL	CUBE	999 m	104.5 m - 805.8 m	NOAA_VR	Complete MBES

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 VDatum.

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

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

A request for final approved tides was sent to N/OPS on 10/3/2017. The final note was received on 10/17/2017. The letter designates Preliminary TCARI file "N908RA2017.tc" as the final grid for W00304.

The title block states that the Vertical Datum Correction for W00304 is TCARI, which is incorrectly generated by a DR Summary schema issue. VDATUM SEP model was applied to this survey (file name: VDatumBoundary_4Doug_xyNAD83-MLLW_geoid12b). W00304 is Ellipsoidally Referenced, therefore data were brought to MLLW using a VDATUM separation model.

The Wide Area Augmentation System (WAAS) was used for positioning for real time positioning of these lines. All W00304 data meets HSSD horizontal accuracy requirements.

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

Two junction analyses were conducted with prior RAINIER surveys from 2016; W00306 and W00311. The results of both analyses showed greater than 99.5% compliance of Allowable Error Fraction as a function of depth difference (Figures 7-8).

Pydro QC Tools 2 Detect Fliers was used to find fliers in the finalized VR surface and 8 fliers were found. These flier detections were all 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.

Comparison Distribution

Per Grid: W00304_MB_16m_MLLW-W00306_MB_16m_MLLW_fracAllowErr.csar

99.5+% nodes pass (112034), min=0.0, mode=0.1 mean=0.1 max=2.6

Percentiles: 2.5%=0.0, Q1=0.0, median=0.1, Q3=0.1, 97.5%=0.3

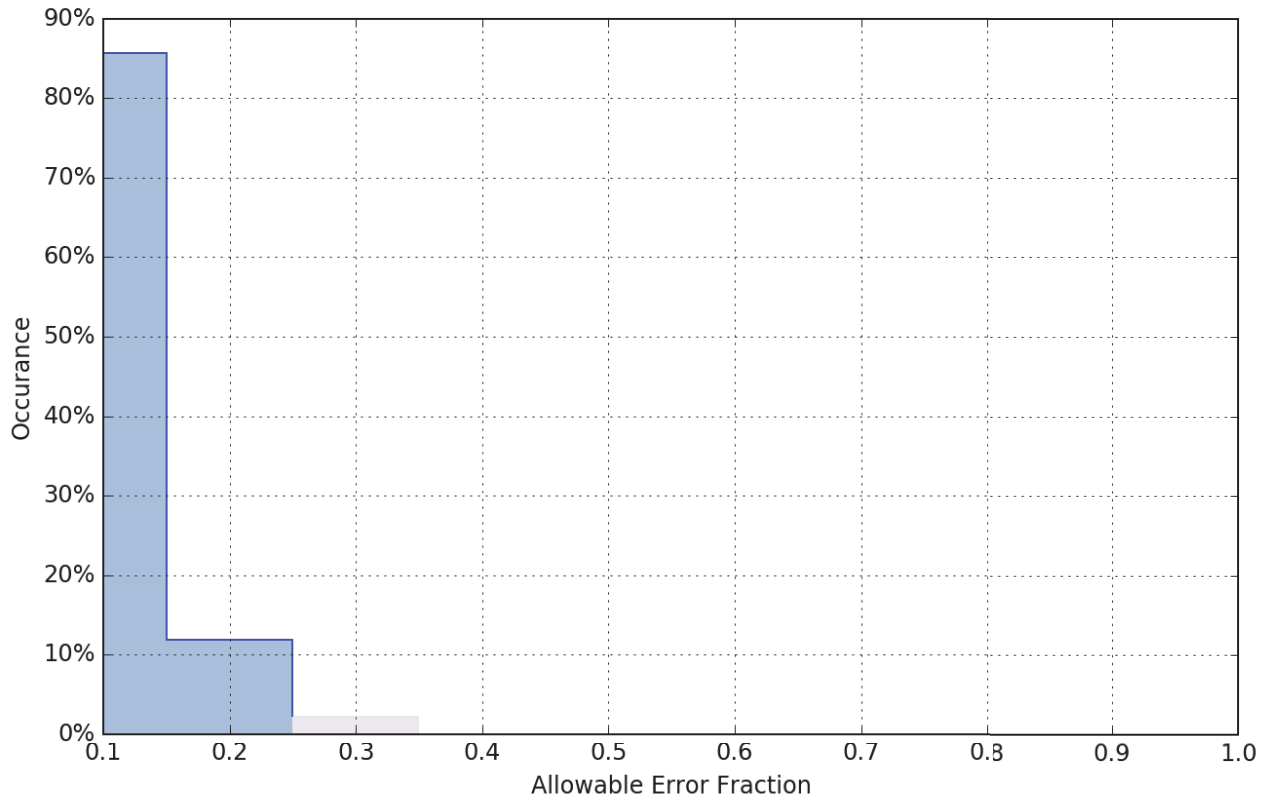


Figure 7: Comparison Distribution of Allowable Error Fraction between W00304 and W00306

Comparison Distribution

Per Grid: W00304_MB_16m_MLLW-W00311_MB_16m_MLLWL_fracAllowErr.csar

100% nodes pass (55346), min=0.0, mode=0.1 mean=0.1 max=0.3

Percentiles: 2.5%=0.0, Q1=0.0, median=0.0, Q3=0.1, 97.5%=0.2

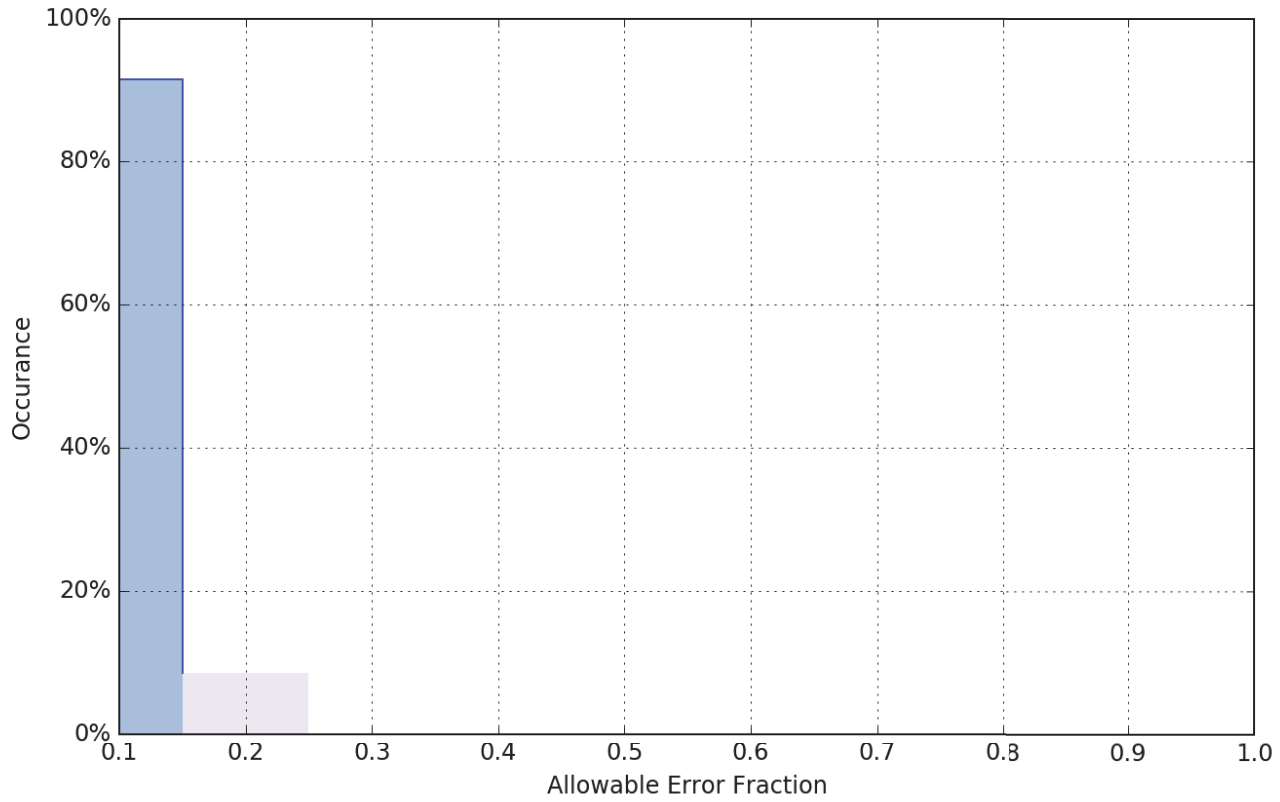





Figure 8: Comparison Distribution of Allowable Error Fraction between W00304 and W00311

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
CDR Benjamin K. Evans, NOAA	Commanding Officer	03/30/2018	 Digitally signed by EVANS.BENJAMIN.K.1237217094 Date: 2018.03.27 22:34:20 -07'00'
LT Scott Broo, NOAA	Field Operations Officer	03/30/2018	 Digitally signed by BROO.SCOTT.EDWARD.13965999 76 Date: 2018.03.29 08:55:12 -07'00'
James Jacobson	Chief Survey Technician	03/30/2018	 JACOBSON.JAMES.BRYAN.12696 64017 I have reviewed this document 2018.03.28 11:32:26 -07'00'
ENS Bethany McAcy, NOAA	Sheet Manager	03/23/2018	MCACY.BETHANY.N ICOLE.1516645900 Digitally signed by MCACY.BETHANY.NICOLE.1516645900 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=NOAA, cn=MCACY.BETHANY.NICOLE.1516645900 Date: 2018.03.26 13:47:55 -07'00'



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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : October 17, 2017

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: M-N908-RA-17 OCNMS
HYDROGRAPHIC SHEET: W00304

LOCALITY: Quinault Canyon, Offshore Washington Coast, WA
TIME PERIOD: September 13 to 21, 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, W00304, during the time period between September 13 to 21, 2017.

Refer to attachments for grid information.

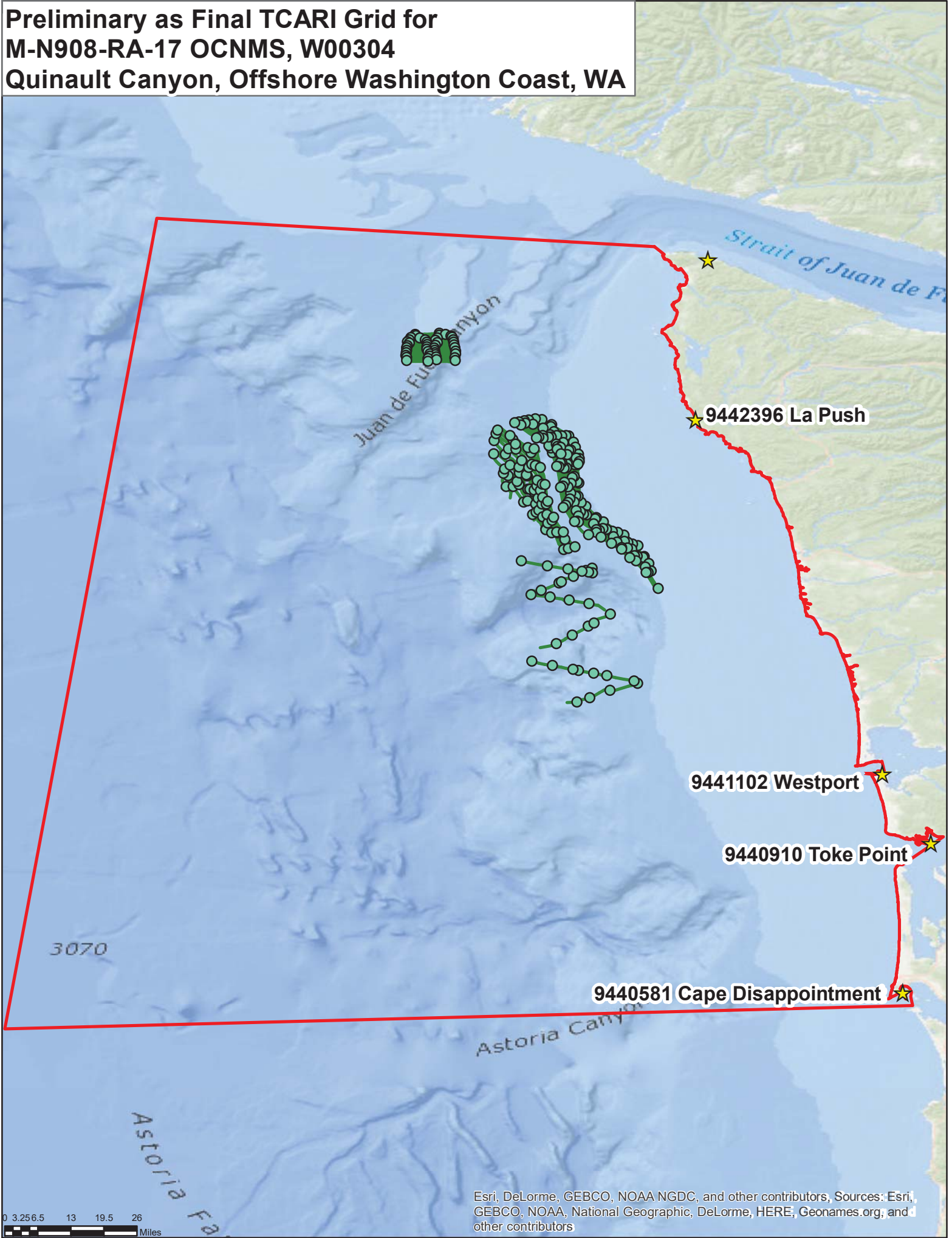
Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

HOVIS.GERALD.THOMAS.JR.1365860250 Digitally signed by
MAS.JR.1365860250 HOVIS.GERALD.THOMAS.JR.1365860250
Date: 2017.10.17 16:05:51 -04'00'

CHIEF, PRODUCTS AND SERVICES BRANCH



Preliminary as Final TCARI Grid for
M-N908-RA-17 OCNMS, W00304
Quinault Canyon, Offshore Washington Coast, WA



Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors, Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, HERE, Geonames.org, and other contributors



OPS Rainier - NOAA Service Account <ops.rainier@noaa.gov>

W00304 Survey Outline

3 messages

ops.rainier <ops.rainier@noaa.gov>

Sun, Oct 1, 2017 at 10:42 PM

To: survey.outlines@noaa.gov

Cc: ChiefST <ChiefST.Rainier@noaa.gov>, _OMAO MOP CO Rainier <co.rainier@noaa.gov>, Bethany McAcy - NOAA Federal <bethany.mcacy@noaa.gov>, Paul Turner - NOAA Federal <paul.turner@noaa.gov>

Greetings,

Please see the attached survey outline for W00304, on project M-N908-RA-17.

Regards,

LT Broo

2 attachments **W00304 Survey Outline.000**
448K **W00304 Survey Outline.hob**
458K

Brian Mohr - NOAA Federal <brian.mohr@noaa.gov>

Thu, Oct 12, 2017 at 7:00 AM

To: "ops.rainier" <ops.rainier@noaa.gov>

Got them, Thanks.

Brian Mohr
Physical Scientist - Data Manager
Hydrographic Surveys Division
brian.mohr@noaa.gov
301 713 2700

[Quoted text hidden]

Scott Broo - NOAA Federal <scott.e.broo@noaa.gov>

Thu, Oct 12, 2017 at 11:28 AM

To: _OMAO MOP ChiefST RAINIER <chiefst.rainier@noaa.gov>, Bethany McAcy - NOAA Federal <bethany.mcacy@noaa.gov>, LT Steve Loy <ops.rainier@noaa.gov>

FYI, submitted W00304 Survey Outline was received.

[Quoted text hidden]

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Very Respectfully,

Lieutenant Scott E. Broo, NOAA
Operations Officer
NOAA Ship RAINIER
[2002 SE Marine Science Drive](#)
[Newport, OR 97365](#)Ship: [541-272-9430](tel:541-272-9430)Cell: [248-302-0689](tel:248-302-0689)

APPROVAL PAGE

W00304

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: _____

Commander Olivia Hauser, NOAA
Chief, Pacific Hydrographic Branch