

**W00477**

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

**DESCRIPTIVE REPORT**

Type of Survey: Navigable Area

Registry Number: W00477

**LOCALITY**

State(s): California

General Locality: Offshore South-Central California

Sub-locality: Greater Farallones

**2019**

CHIEF OF PARTY  
CAPT Marc Moser

**LIBRARY & ARCHIVES**

Date:

**HYDROGRAPHIC TITLE SHEET**

**W00477**

**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): **California**

General Locality: **Offshore South-Central California**

Sub-Locality: **Greater Farallones**

Scale: **80000**

Dates of Survey: **09/10/2019 to 09/13/2019**

Instructions Dated: **08/23/2019**

Project Number: **OPR-L321-FA-19**

Field Unit: **NOAA Ship *Fairweather***

Chief of Party: **CAPT Marc Moser**

Soundings by: **Kongsberg Maritime EM 710 (MBES)  
 Kongsberg Maritime EM 2040 (MBES)**

Imagery by: **Kongsberg Maritime EM 710 (MBES Backscatter)  
 Kongsberg Maritime EM 2040 (MBES Backscatter)**

Verification by: **Pacific Hydrographic Branch**

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

**Remarks:**

*Any revisions to the Descriptive Report (DR) applied during office processing are shown in red italic text. The DR is maintained as a field unit product, therefore all information and recommendations within this report are considered preliminary unless otherwise noted. The final disposition of survey data is represented in the NOAA nautical chart products. All pertinent records for this survey are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via <https://www.ncei.noaa.gov/>. Products created during office processing were generated in NAD83 UTM 10N, MLLW. All references to other horizontal or vertical datums in this report are applicable to the processed hydrographic data provided by the field unit.*

## DESCRIPTIVE REPORT SUMMARY

### A. Area Surveyed

This hydrographic survey was acquired in accordance with the requirements defined in the Project Instructions OPR-L321-FA-19. Coverage acquired in W00477 is shown in Figure 1. Sheet limits were not reached in the southeast corner of one polygon (Figure 1, #2) due to the risk of approaching a charted feature, Transducer "H," within the Navy test area north of Point Reyes.

Data were acquired within the following survey limits:

<b>Northwest Limit</b>	<b>Southeast Limit</b>
39° 0' 45.22" N 124° 0' 34.36" W	37° 31' 40.27" N 122° 56' 41.18" W

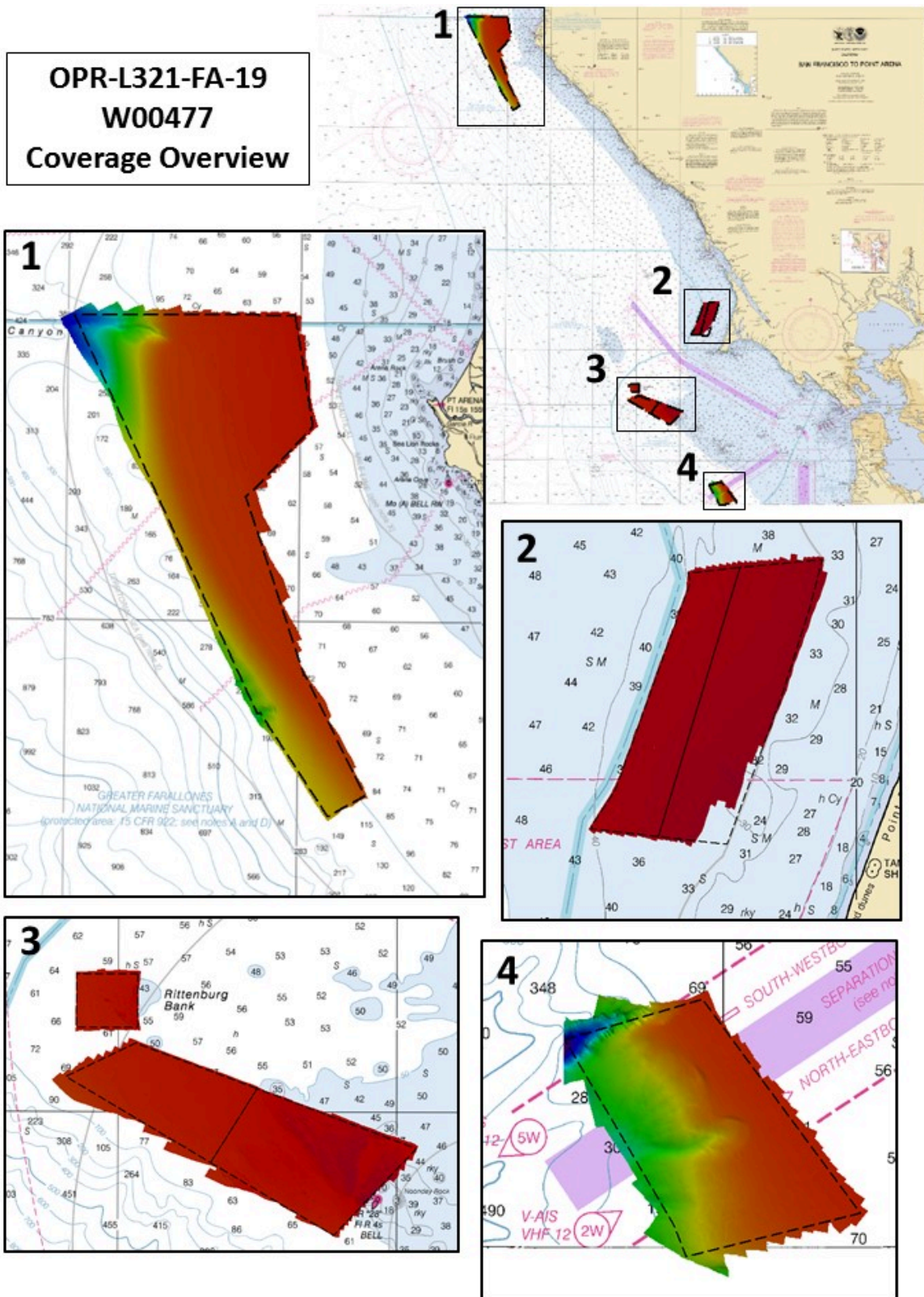


Figure 1: Figure 1. W00477 Coverage overview with sheet limits shown in black

## **B. Survey Purpose**

This project is being conducted in support of the Expanding Pacific Research and Exploration of Submerged Systems (EXPRESS) campaign which is comprised of a large and diverse team of federal and non-federal partners targeting deepwater areas off of the U.S. Pacific Coast. The primary objective of this project is to collect data for surficial geology, benthic habitats, subbottom faults, geologic hazards and sedimentary processes. Data from this project will support a variety of disciplines including offshore energy projects and infrastructure, marine spatial planning, ecosystem assessments and marine geohazards. NOAA, in collaboration with the USGS and BOEM will conduct a coordinated multibeam echo sounder survey of the project area to collect bathymetry, acoustic backscatter data and water column data. Bathymetric data from this project will be further used to update NOAA's nautical charting products within the area. This project will cover a total of 1,757 SNM and survey data from this project is intended to supersede all prior survey data in the common area.

## **C. Intended Use of Survey**

The entire survey is adequate to supersede previous data.

Data acquired in W00477 meet multibeam echo sounder (MBES) coverage requirements for complete coverage, as required by the HSSD.

## **D. Data Acquisition and Processing**

Please reference Data Acquisition and Processing Report OPR-L321-FA-19 for a complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods. Per project instructions, water column data was also collected and delivered to the constituents.

## **E. Uncertainty**

The surface was analyzed using HydrOffice QC Tools Grid QA feature to determine compliance with specifications. Overall, 99.5% of nodes within the surface meet NOAA Allowable Uncertainty specifications for W00477 (Figure 2). As required by the HSSD Section 5.2.2.4, 99.5% of nodes within the surface contain five or more soundings (Figure 3).

## Uncertainty Standards

Grid source: W00477\_MB\_VR\_MLLW

99.5+% pass (8,559,203 of 8,560,635 nodes), min=0.01, mode=0.07, max=6.96

Percentiles: 2.5%=0.03, Q1=0.05, median=0.07, Q3=0.09, 97.5%=0.15

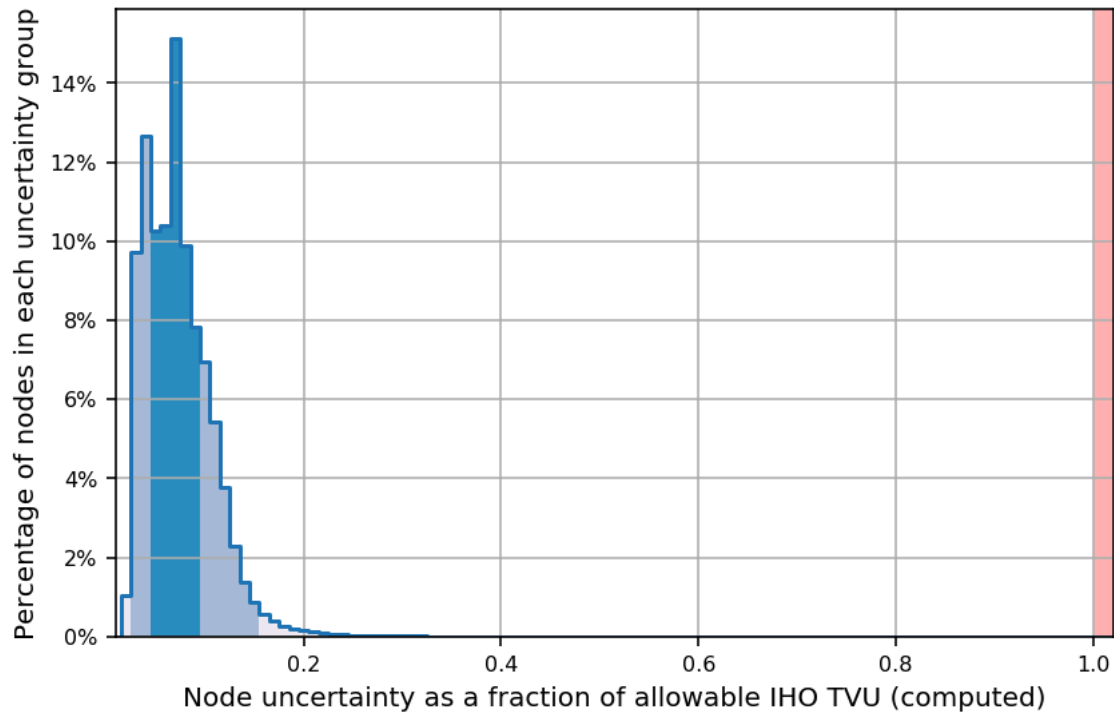


Figure 2: Figure 2. W00477 compliance with uncertainty standards

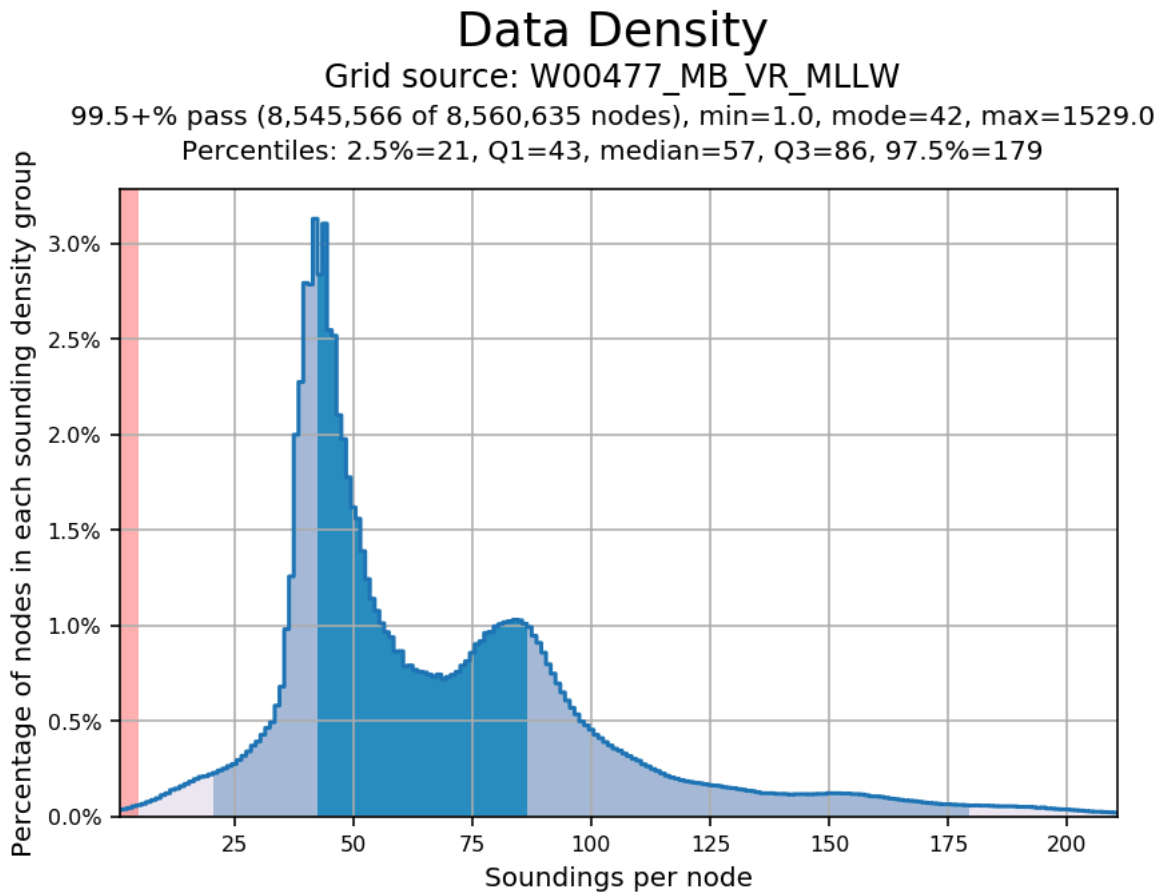


Figure 3: Figure 3. W00477 compliance with density requirements

## F. Results and Recommendations

The following are the largest scale ENC's, which cover the survey area:

ENC	Scale	Edition	Update Application Date	Issue Date
US3CA14M	1:20000	22	05/30/2018	06/20/2019

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

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
W00477_MB_VR_MLLW	CARIS VR Surface (CUBE)	Variable Resolution m	29.66 m - 796.65 m	NOAA_VR	Complete MBES
W00477_MB_VR_MLLW_Final	CARIS VR Surface (CUBE)	Variable Resolution m	29.66 m - 796.65 m	NOAA_VR	Complete MBES

The NOAA CUBE parameters defined in the HSSD were used for the creation of all CUBE surfaces for W00477. The surfaces have been reviewed where noisy data, or "fliers" are incorporated into the gridded solutions causing the surface to be shoaler or deeper than the true seafloor. Where these spurious soundings cause the gridded surface to be shoaler or deeper than the reliably measured seabed by greater than the maximum allowable Total Vertical Uncertainty at that depth, the noisy data have been rejected by the hydrographer and the surface recomputed.

Flier Finder, part of the QC Tools package within HydrOffice, was used to assist the search for spurious soundings following gross cleaning. Flier Finder was run iteratively until remaining flagged fliers were deemed to be valid aspects of the surface.

## G. Vertical and Horizontal Control

The vertical datum for this project is Mean Lower Low Water. The vertical control method used was VDatum.

Per section 5.1.2.3 of the Field Procedures Manual (2014 ed), no Horizontal and Vertical Control Report has been generated for W00477.

The horizontal datum for this project is North American Datum of 1983 (NAD 83). The projection used for this project is Universal Transverse Mercator (UTM) Zone 10.

Vessel kinematic data were post-processed using Applanix POSPac processing software and RTX positioning methods described in the DAPR. Smoothed Best Estimate of Trajectory (SBET) and associated error (RMS) data were applied to all MBES data in CARIS HIPS and SIPS.

The Wide Area Augmentation System (WAAS) was used for real-time horizontal control during data acquisition.



## **H. Additional Results**

### Holidays

W00477 data were reviewed in CARIS HIPS and SIPS for holidays in accordance with Section 5.2.2.3 of the HSSD. No holidays were identified via HydrOffice QC Tools Holiday Finder tool. This tool automatically scans the surface for holidays as defined in the HSSD and was run in conjunction with a visual inspection of the surface by the hydrographer.

### Junctions

Surface differencing in CARIS HIPS and SIPS was used to assess junction agreement between the surface from W00477 and the surface from W00478 (Figure 4). The statistical analysis of the difference surface shows a mean difference of 0.01 m with 95% of all nodes having a maximum deviation of +/- 0.27 m, as seen in Figure 5. It was found that 100% of the nodes are within NOAA allowable uncertainty.

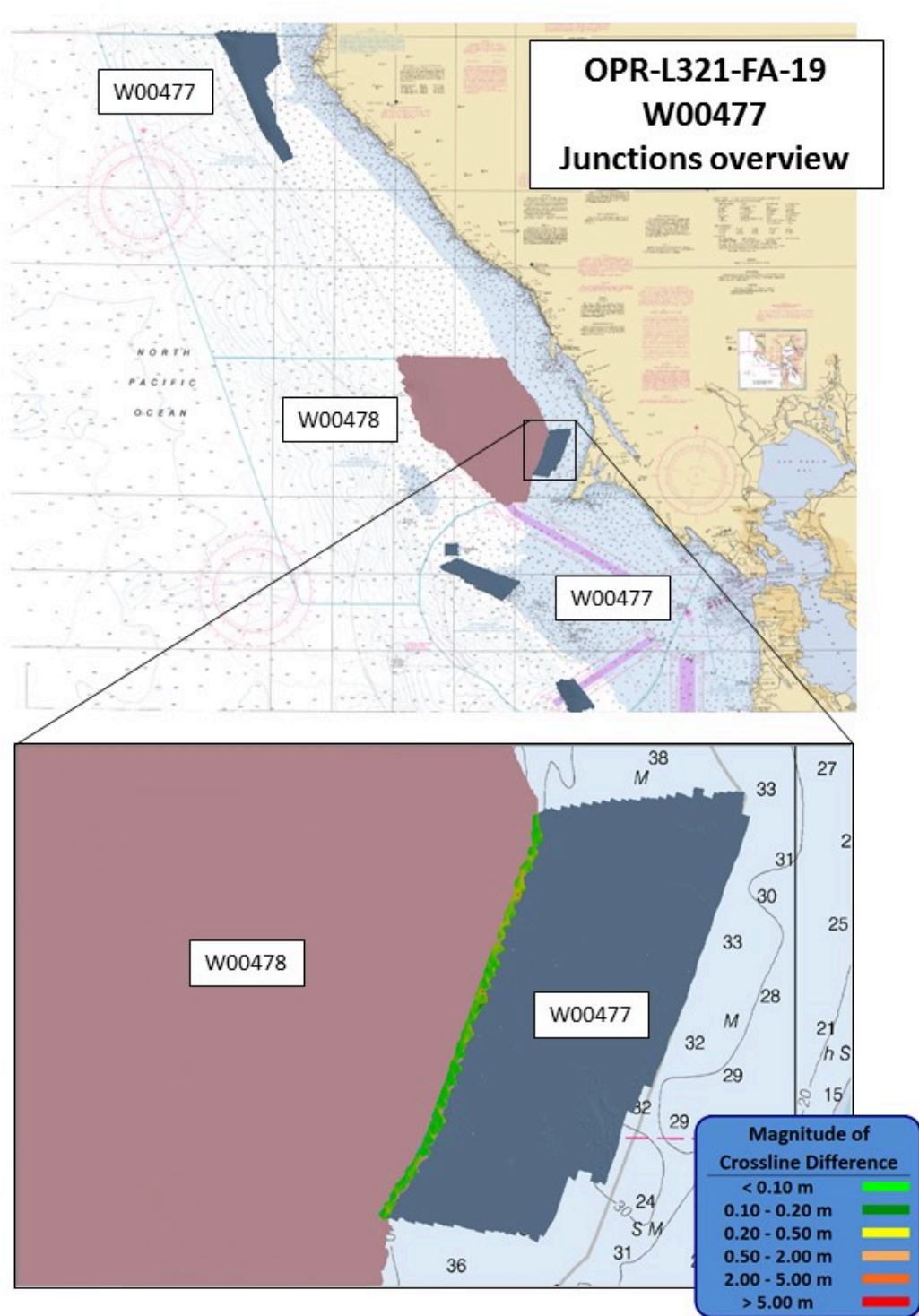


Figure 4: W00477 and W00478 junction.

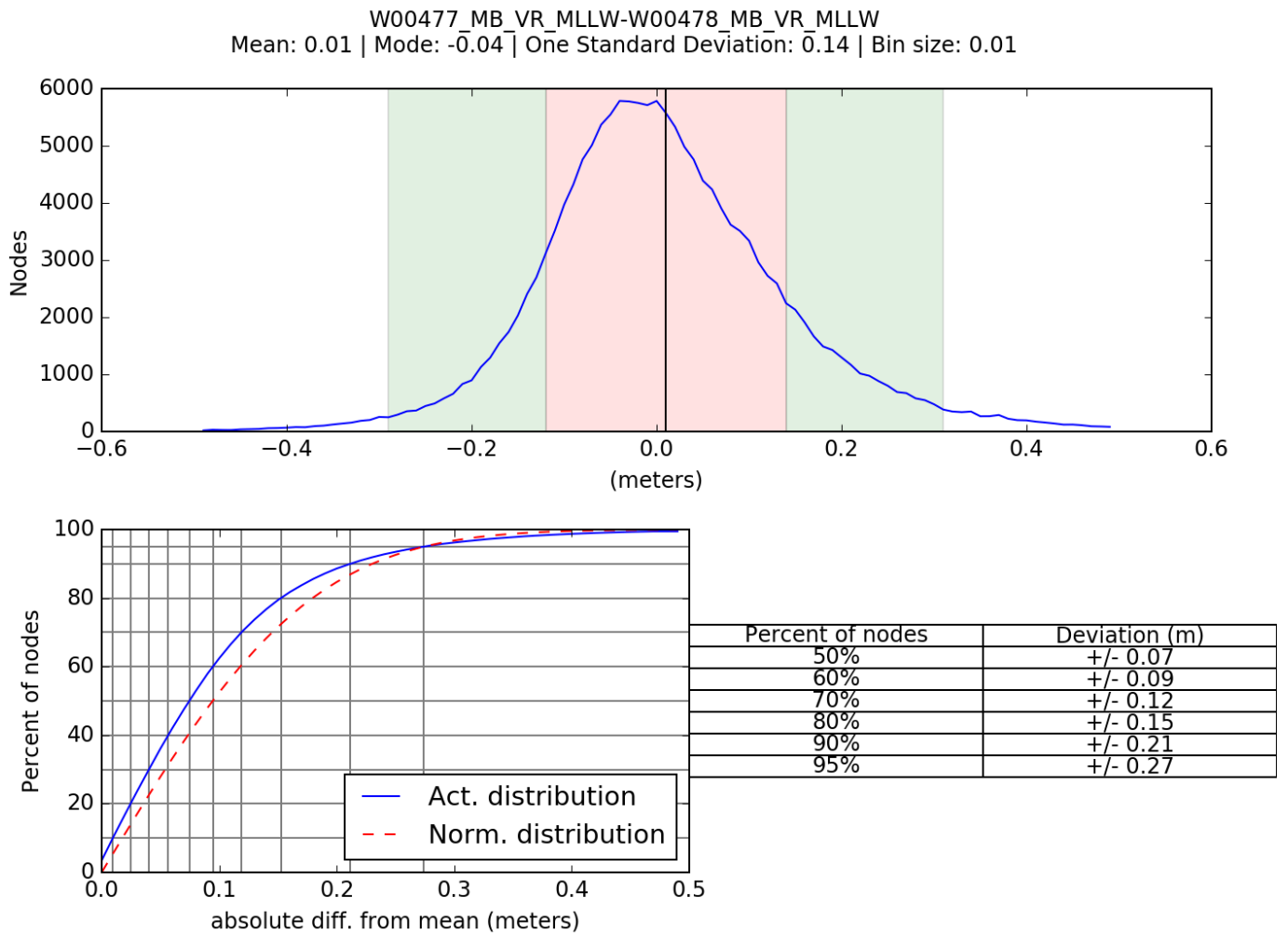


Figure 5: Difference statistics between W00477 and junctioning survey W00478.

Backscatter

Raw backscatter data were stored in the .all file for Kongsberg systems. All backscatter were processed to GSF files, and a floating point mosaic was created by the field unit via Fledermaus FMGT 7.8.10.

Crosslines

Crosslines were not required in project instructions and were not collected.

Chart Comparison

A comparison was performed between W00474 and ENC US3CA14M using CARIS HIPS and SIPS. The ENC was compared to the surface by extracting all soundings from the chart and creating an interpolated TIN surface which could be differenced with the surface from W00477 (Figure 6).

All data from W00477 should supersede charted data. In general, surveyed soundings and contours agree with charted depths and contours on ENC US3CA14M. The largest differences, which are 10-30 m in magnitude, are seen in deep areas with slopes. A sounding reported in 1974 is 30 m shoaler than W00477 surveyed depths, as seen in Figure 6.

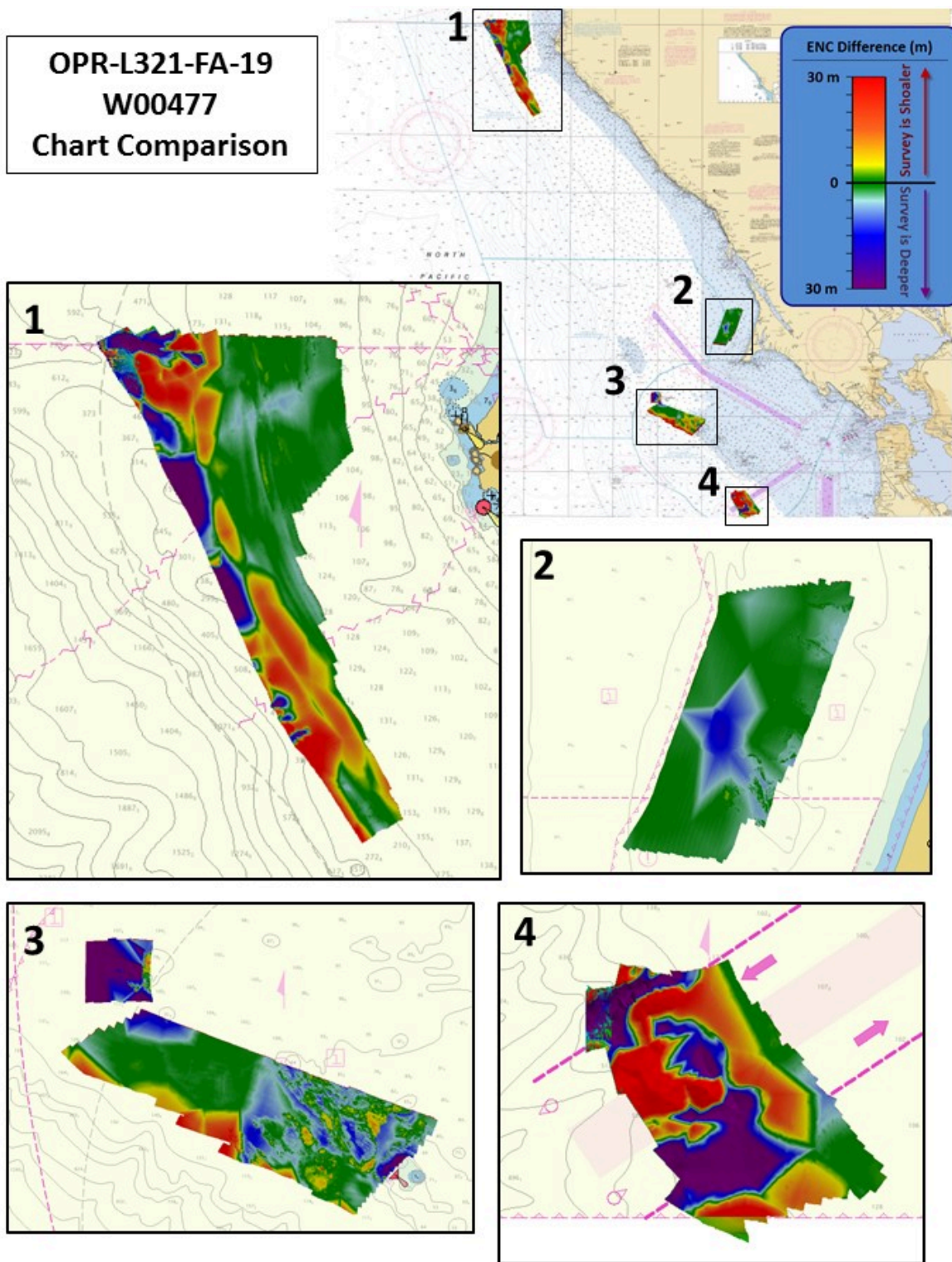


Figure 6: Difference surface between W00477 and interpolated TIN surfaces from ENC US3CA14M.

## 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 Specifications and Deliverables, 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
CAPT Marc Moser	Chief of Party	10/11/2019	MOSER.MARC.STANTON.1163193902 Digitally signed by MOSER.MARC.STANTON.1163193902 Date: 2020.01.07 06:15:30 -08'00'
LT Steve Moulton	Operations Officer	10/11/2019	MOULTON.STEPHEN.F.1282116835 Digitally signed by MOULTON.STEPHEN.F.1282116835 Date: 2020.01.07 10:53:24 -08'00'
HCST Samuel Candio	Chief Survey Technician	10/11/2019	WIEGERT.MICHELLE.LYNN.1548600975 Digitally signed by WIEGERT.MICHELLE.LYNN.1548600975 Date: 2020.01.07 10:52:42 -08'00'
LTJG Jackson Vanfleet-Brown	Sheet Manager	10/11/2019	LALLY.KEVIN.FRANCIS.1570734411 Digitally signed by LALLY.KEVIN.FRANCIS.1570734411 Date: 2020.01.07 10:41:05 -08'00'

APPROVAL PAGE

W00477

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
- Collection of Bathymetric Attributed Grids (BAGs)
- Collection of backscatter mosaics
- Processed survey data and records
- 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: \_\_\_\_\_

**Peter Holmberg**

Products Team Lead, Pacific Hydrographic Branch