H13089

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13089

LOCALITY

State(s):	California
General Locality:	Channel Islands and Vicinity
Sub-locality:	Offshore: Morro Bay to San Simeon

2017

CHIEF OF PARTY
Benjamin K. Evans, CDR/NOAA

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H13089**

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:	**Channel Islands and Vicinity**
Sub-Locality:	**Offshore: Morro Bay to San Simeon**
Scale:	**40000**
Dates of Survey:	**10/04/2017 to 10/05/2017**
Instructions Dated:	**08/25/2017**
Project Number:	**OPR-L397-RA-17**
Field Unit:	**NOAA Ship *Rainier***
Chief of Party:	**Benjamin K. Evans, CDR/NOAA**
Soundings by:	**Multibeam Echo Sounder Multibeam**
Imagery by:	**Echo Sounder Backscatter Pacific**
Verification by:	**Hydrographic Branch meters at Mean**
Soundings Acquired in:	**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/.

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Descriptive Report to Accompany Survey H13089

Project: OPR-L397-RA-17

Locality: Channel Islands and Vicinity

Sublocality: Offshore: Morro Bay to San Simeon

Scale: 1:40000

October 2017 - October 2017

NOAA Ship *Rainier*

Chief of Party: Benjamin K. Evans, CDR/NOAA

A. Area Surveyed

The survey area is referred to as "Offshore: Morro Bay to San Simeon" (sheet 8) within the Project Instructions. The area encompasses approximately 149 square nautical miles that lies about 54 kilometers northwest of Morro Bay.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
35° 32' 27.12" N 121° 38' 30.15" W	35° 19' 58.35" N 121° 14' 19.14" W

Table 1: Survey Limits

Data were acquired within survey limits as required in the Project Instructions and HSSD unless otherwise noted in this report.

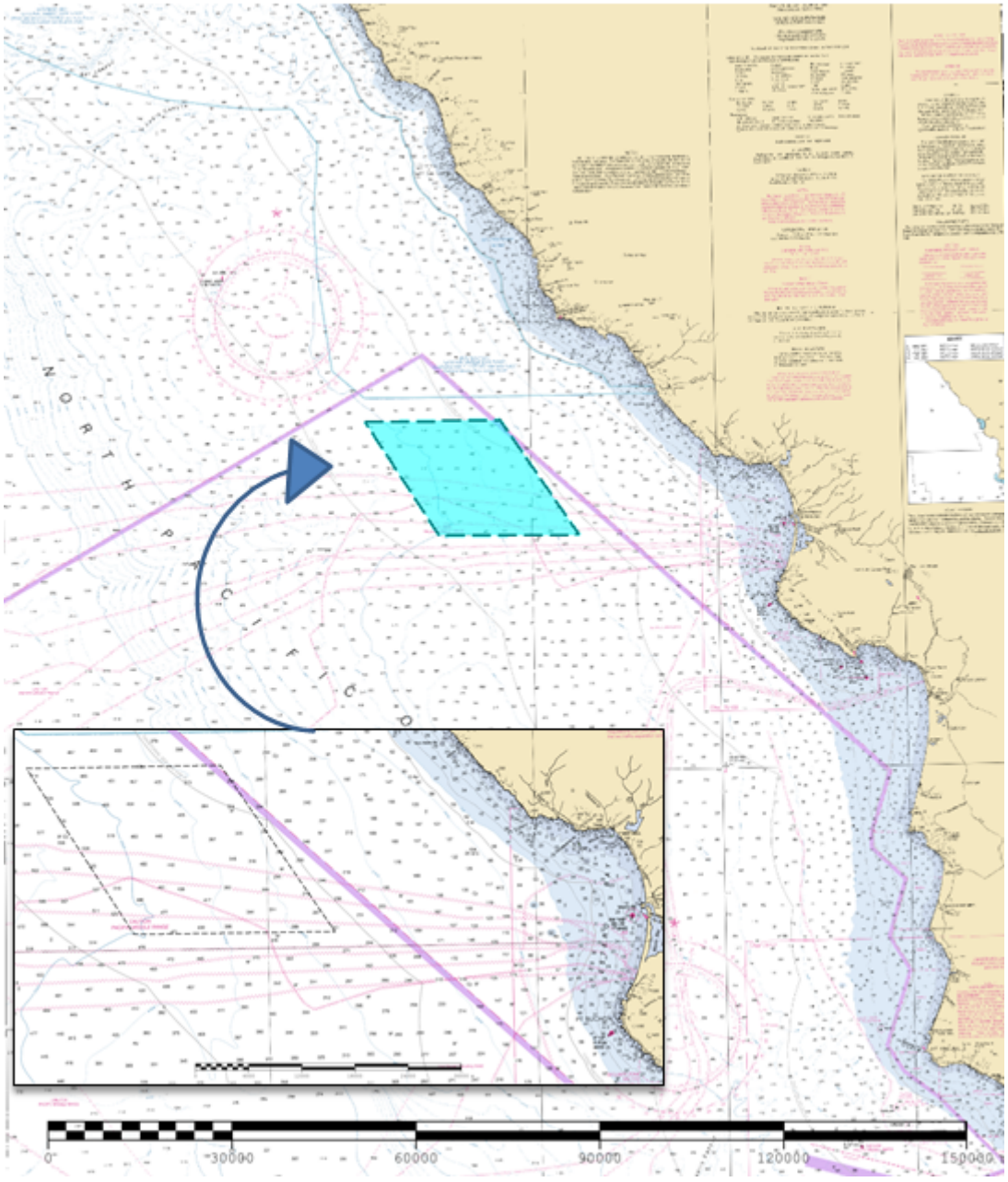


Figure 1: H13089 assigned survey area about 34 kilometers northwest of Point Buchon and Estero Bay.

A.2 Survey Purpose

Survey of the region offshore Morro Bay supports the IOCM mantra, "map once, use many times." The survey addresses multiple federal and state agency priorities. BOEM and the State of California are interested in the region for consideration of potential offshore wind energy development. USGS will use the data and products to support habitat characterization and submarine hazard investigation. The Monterey Bay Aquarium Research Institute (MBARI) is particularly interested in submarine channels, sediment transport

and implication for submerged cables. Data collection during this project is critical for support of a MBARI AUV cruise scheduled for the spring of 2018.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Data were acquired within assigned survey limits as required in the Project Instructions and HSSD unless otherwise noted in this report.
Pydro QC Tools 2 "Grid QA" was used to analyze H13089 multibeam echosounder (MBES) data density. The submitted H13089 variable-resolution (VR) surface met HSSD density requirements.

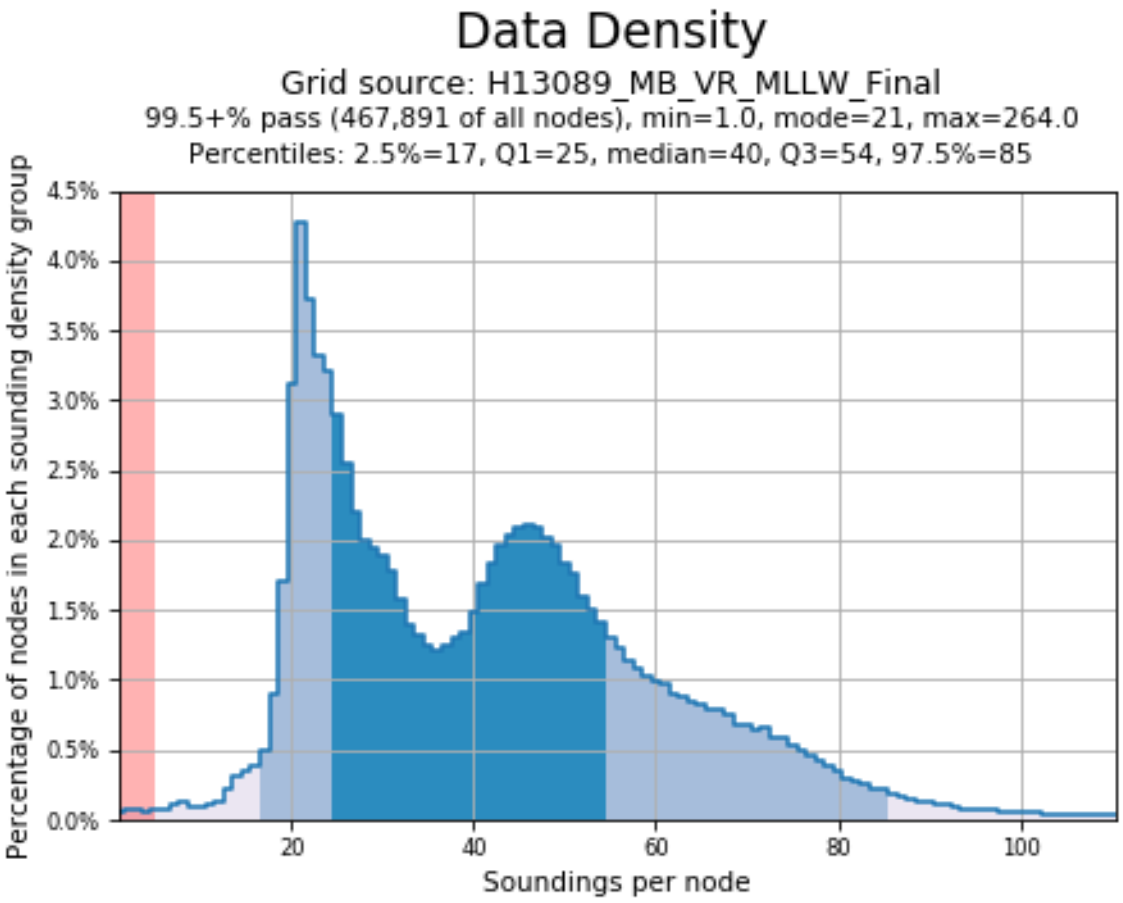


Figure 2: Pydro derived histogram plot showing HSSD density compliance of H13089 finalized variable-resolution MBES data.

A.4 Survey Coverage

The following table lists the coverage requirements for this survey as assigned in the project instructions:

Water Depth	Coverage Required
All waters in survey area.	Complete Coverage (refer to HSSD Section 5.2.2.3). Note All MBES acquisition requires backscatter acquisition (refer to HSSd Section 6.2).

Table 2: Survey Coverage

Complete multibeam echosounder (MBES) coverage was acquired to the assigned sheet limits. There is an area in the northeast survey area where a gap in data is present and is due to a malfunction with the multibeam echosounder data acquisition software. Pydro QC Tools 2 "Holiday Finder" did not find this gap to be a holiday; this gap in coverage was found visually. The results from the QC Tools checks will be included in the Appendices folder of this report.

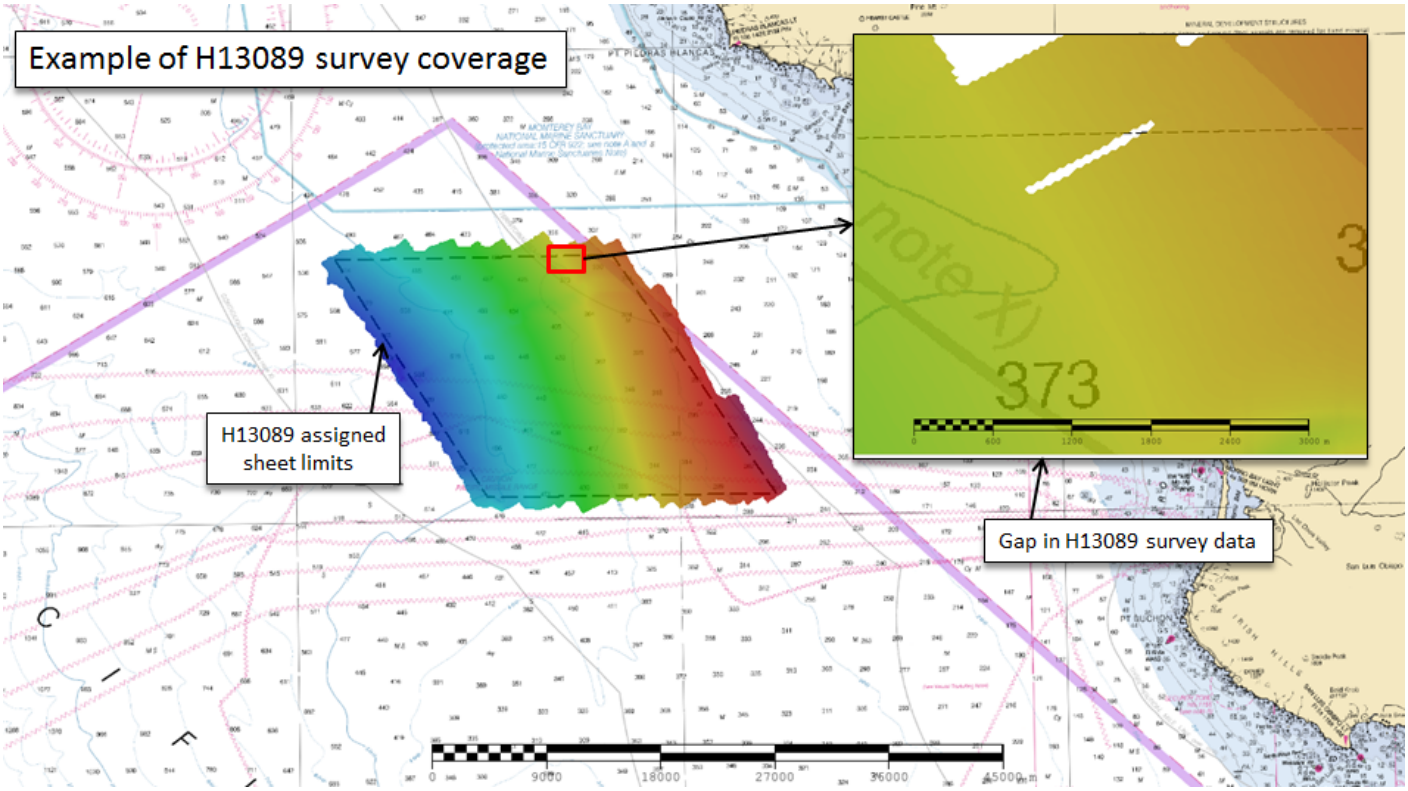


Figure 3: Graphic of H13089 survey coverage and assigned sheet limits (Chart 18700).

A.6 Survey Statistics

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

	HULL ID	*S221*	*Total*
LNM	**SBES Mainscheme**	0	0
	MBES Mainscheme	177.43	177.43
	Lidar Mainscheme	0	0
	SSS Mainscheme	0	0
	SBES/SSS Mainscheme	0	0
	MBES/SSS Mainscheme	0	0
	SBES/MBES Crosslines	47.21	47.21
	Lidar Crosslines	0	0
Number of Bottom Samples			0
Number Maritime Boundary Points Investigated			0
Number of DPs			0
Number of Items Investigated by Dive Ops			0
Total SNM			149.04

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
10/03/2017	276
10/04/2017	277
10/05/2017	278

Table 4: 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	***S221***
LOA	70.4 meters
Draft	4.7 meters

Table 5: Vessels Used

Figure 4: NOAA Ship RAINIER near Cuyler Harbor, Channel Islands, CA.

B.1.2 Equipment

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

Manufacturer	Model	Type
Kongsberg	EM 710	MBES
Applanix	POS M/V v5	Positioning and Attitude System
Reson	SVP 70	Surface Sound Speed Sensor
Lockheed Martin XBT	Sippican Deep Blue	Temperature and Depth Sensor

Table 6: Major Systems Used

B.2 Quality Control

B.2.1 Crosslines

Multibeam/single beam echo sounder/side scan sonar crosslines acquired for this survey totaled 26.61% of mainscheme acquisition.

Multibeam crosslines were acquired using the NOAA Ship RAINIER acress all depth ranges, water masses and boat days; they are adequate for verifying and evaluating the internal consistancy of survey data. A 16-meter CUBE surface was created using only mainscheme lines and a second 16-meter surface was created using only crosslines. The surfaces were used in the Pydro program "Compare Grids" from which statistics and graphics were derived. For its respective depths, the difference surface was compared to IHO allowable Total Verticle Uncertainty (TVU) standards. In total, 100% of the depth differences between H13089 maninscheme and crossline data met HSSD TVU standards. The analysis was performed on H13089 MBES data reduced to Mean Lower-Low Water (MLLW) using Vertical Datum (VDatum) separation methods. A 16-meter CUBE surface was used for this crossline analysis; this is due to Pydro's "Compare Grids" tool not having the ability to compare variable resolution grids.

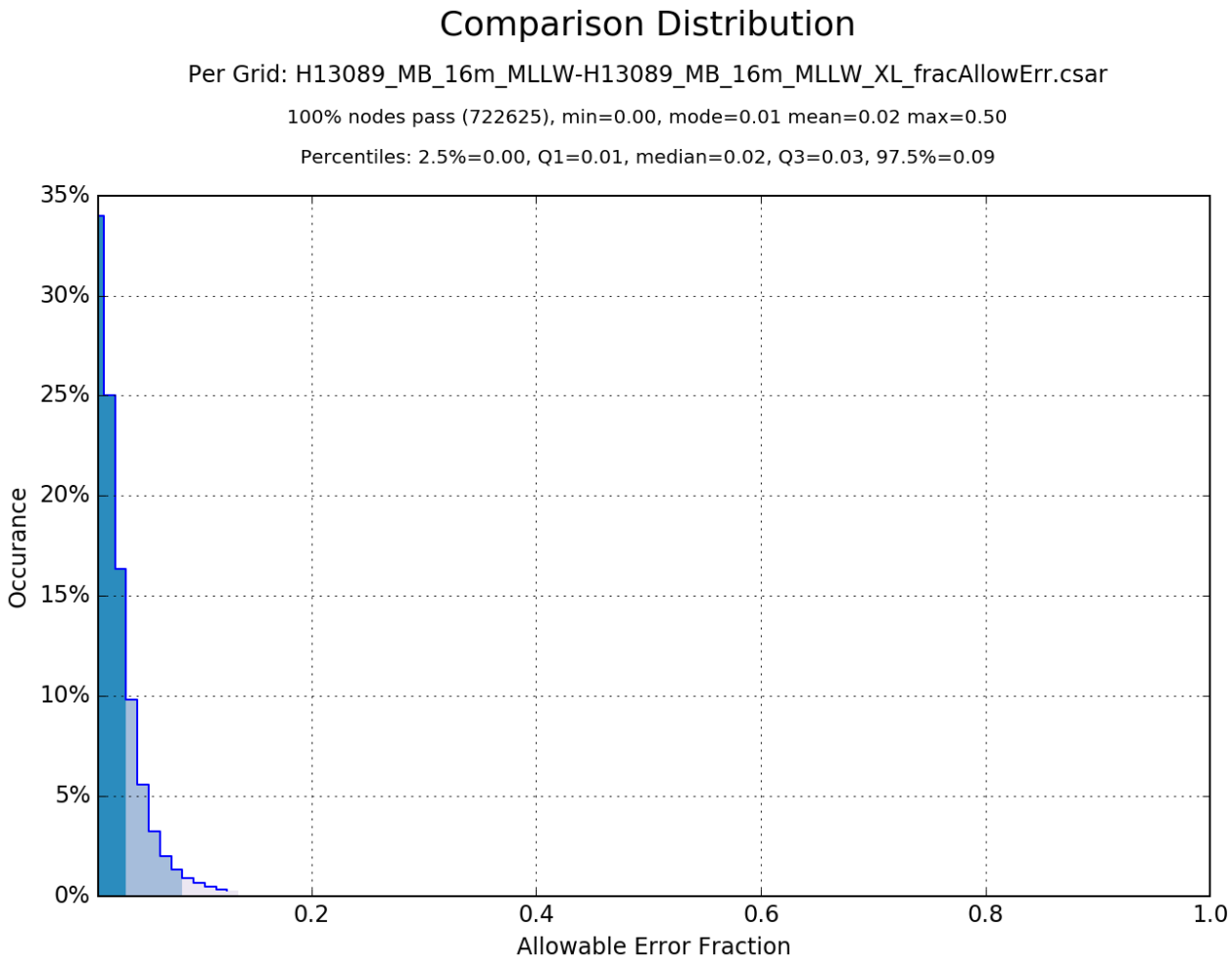
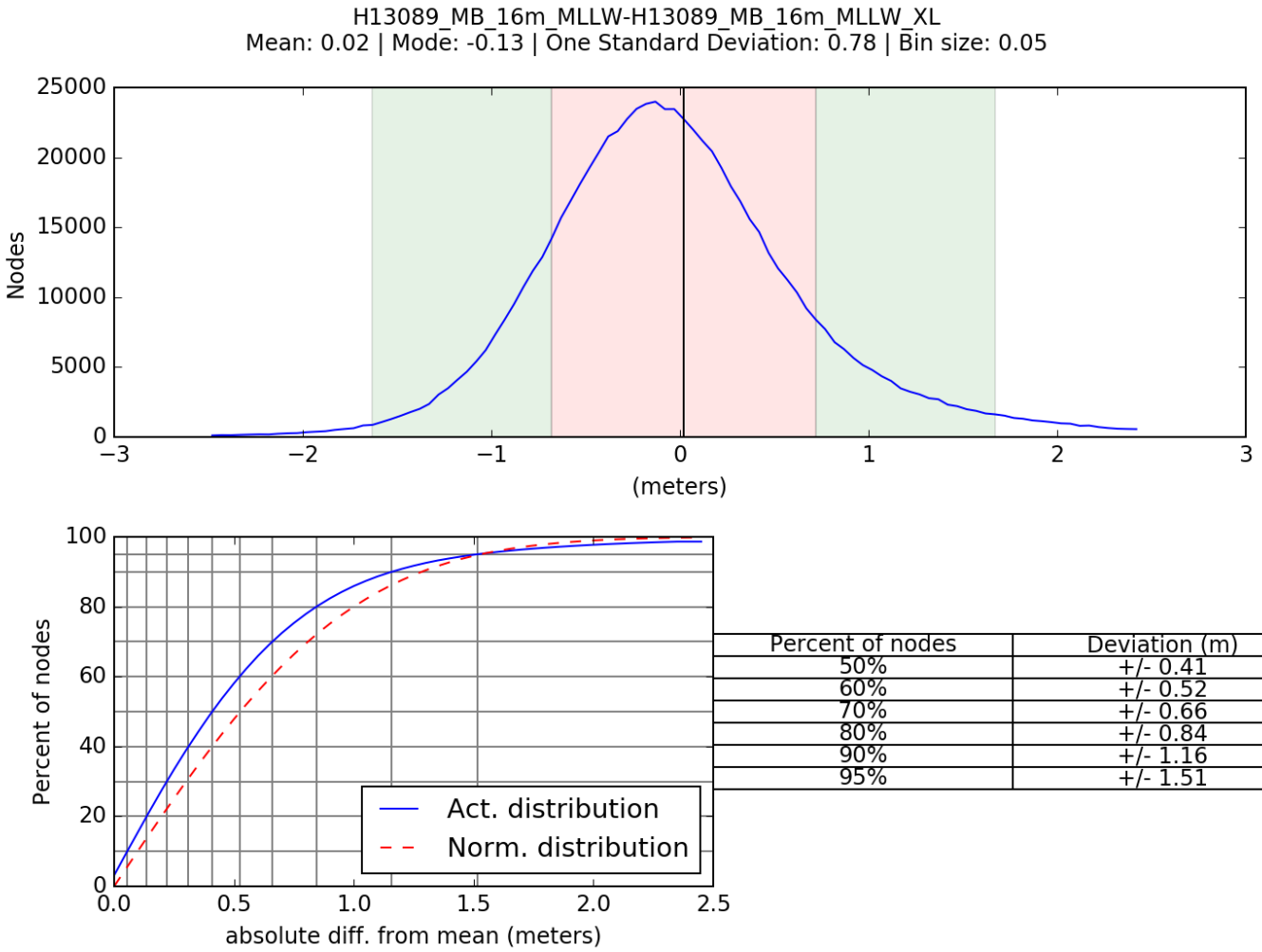


Figure 5: Pydro derived plot showing percentage-pass value of H13089 mainscheme to crossline data.



Percent of nodes	Deviation (m)
50%	+/- 0.41
60%	+/- 0.52
70%	+/- 0.66
80%	+/- 0.84
90%	+/- 1.16
95%	+/- 1.51

Figure 6: Pydro derived plot showing the One Standard deviation of H13089 mainscheme to crossline data.

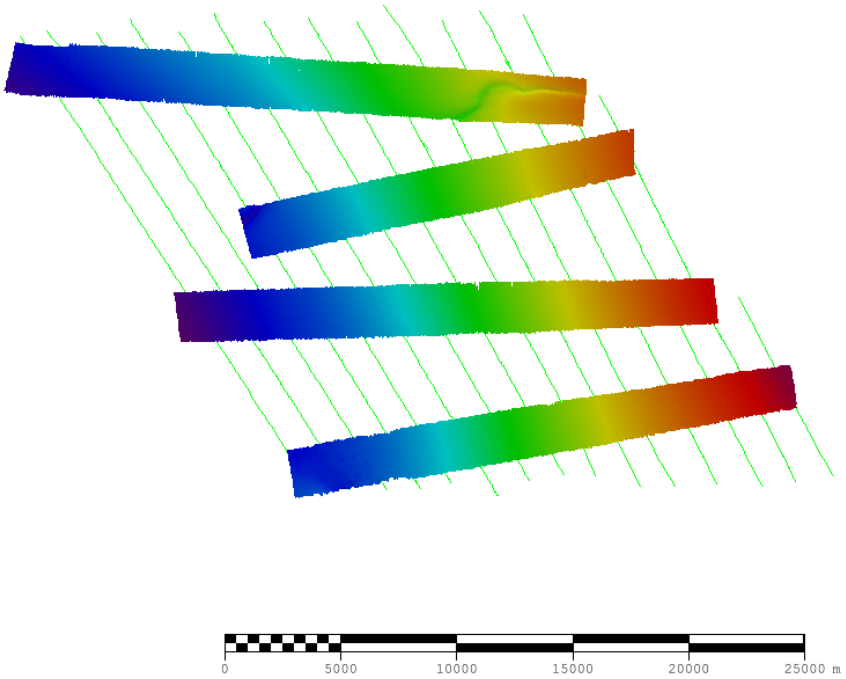


Figure 7: H13089 crossline surface overlaid on mainscheme tracklines showing good temporal and geographic distribution.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0 meters	0.083018 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Surface
S221	4 meters/second		0.05 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

Total Propagated Uncertainty (TPU) values for survey H13089 were derived from a combination of fixed values for equipment and vessel characteristics, as well as from field assigned values for sound speed uncertainties. Tidal uncertainty was accounted for by examining a provided Vertical Datum (VDatum) model. A measured uncertainty of 0.083018 meters was entered to account for VDatum processing methods. See the 2017 DAPR for further information.
In addition to the usual a priori estimate of uncertainty, some real-time and post-processed uncertainty sources were also incorporated into the depth estimates of this survey. Real-time uncertainties from Kongsberg sonars were recorded and applied during post-processing. Applainix TrueHeave (POS) files, which record estimates of heave uncertainty, were also applied during post-proecssing. Finally, the post-processed uncertainties associated with vessel roll, pitch, yaw and position were applied in CARIS HIPS using SBET/RMS files generated using POSPac software. Pydro "QC Tools 2" were used to analyze H13089 TVU compliance; a histogram plot of the results is shown below.

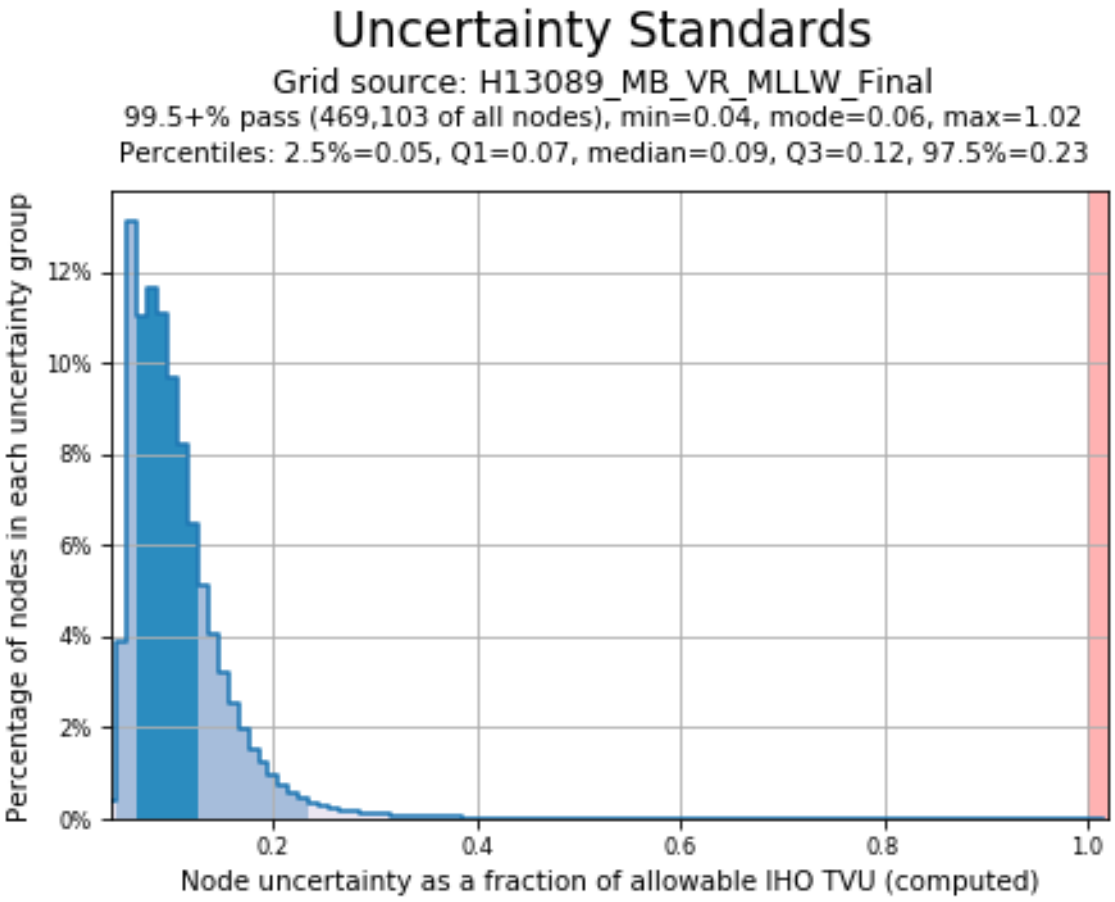


Figure 8: Pydro derived histogram plot illustrating TVU compliance of H13089 finalized multi-resolution MBES data.

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

Operating the Kongsberg EM710

There were only few instances where the Kongsberg EM710 effectiveness was diminshed. The sonar was used in different modes depending on the water depth for backscatter acquisition purposes; the modes included Very Deep for waters between 500-1000 meters and Extra Deep for water more than 1000 meters. No extra noise were captured despite the great depths.

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: Ten sound speed profiles were acquired for this survey at discrete locations within the survey area at least once every four hours, when significant changes in surface sound speed were observed, or when operating in a new area. Sound speed profiles were acquired using Lockheed Martin Sippican Deep-Blue Expendable Bathythermographs (XBTs). All casts were concatenated into a master file and applied to MBES data using the "Nearest in Distance within Time" (4 hours) profile selection method.

Sound velocity profiles were processed with the MK21 software produced by Lockheed Martin. The XBTs only measure temperature; the World Ocean Atlas (WOA) was referenced through the software to compute sound speed proflies based on information from the XBT, WOA and geographic position. The information from the WOA were recorded in 2009. There is one cast outside the survey sheet limits in the northwestern survey area. The cast was used because of its relative proximity to the survey area as well as being in open, calm water. Sound velocity profiles showed little variation throughout the project area.

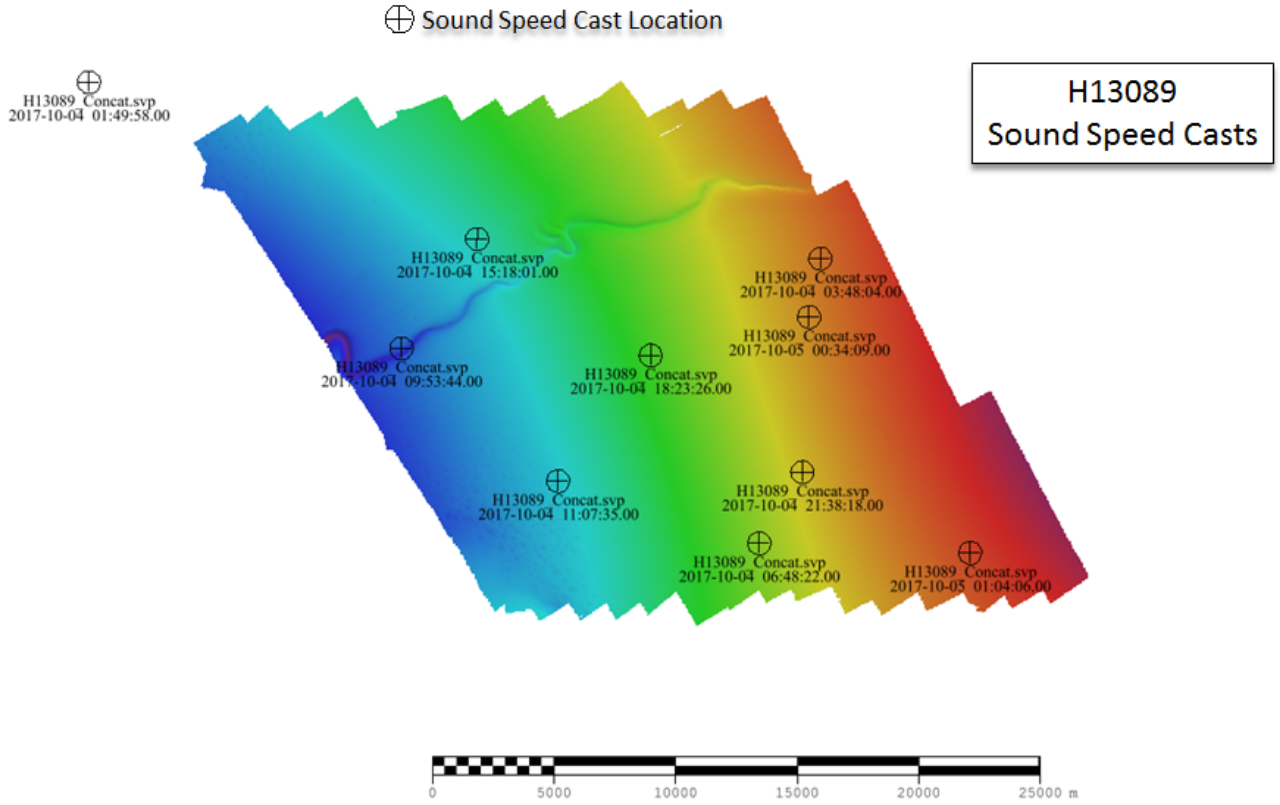


Figure 9: H13089 sound speed cast locations.

B.2.8 Coverage Equipment and Methods

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

B.2.9 Pydro QC Tools 2 "Flier Finder"

Pydro QC Tools 2 "Flier Finder" was used to further analyze H13089 survey data. The application determined 6 fliers to be
present in the MBES data; after investigation these were determined to be false positives. The results of "Flier Finder" are included in the Seperates folder of this report.

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

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

Raw Backscatter data were logged as .all files for delivery to NOAA's Pacific Hydrographic Branch. Backscatter data were processed by the field unit and mosiacs generated. Two 16-meter mosaics were generated for the H13089 survey area, one raw backscatter mosaic and one processed backscatter mosaic. The processed mosaic used methods including pairing .all files with HDCS data. Software used to process and produce backscatter mosaics were Fledermaus Geocoder Toolbox version 7.7.8.
Errors occured while processing backscatter; including an "Auto Time-Sync Algorithm failure" message due to a discrepency between GPS time and UTC time. Entering a -2.0 second merge offset option in the processing window cleared the error and made converting lines and producing backscatter mosiacs possible. Troubleshooting efforts between HSTB and the field unit resulted with this solution. An email from HSTB and the field unit is in the Correspondence folder of this report.
Also, the processing software FMGT showed more holidays in the backscatter mosiacs when pairing raw MBES .all files with processed HDCS files. The holidays measure roughly 1000 meters across-track and about 40 meters along-track. Each survey line within the assigned sheet limits measures approximately 12 nautical miles. MBES acquisition was constant throughout the survey; due to file size limitations a new survey line is required to be started every 30 minutes. This creates a small gap in backscatter coverage when the line breaks and restarts. These holidays are not present in the bathymetry data. The 30 minute line setting in the Kongsberg MBES systems can be changed but were not for consistency purposes. This error was not known prior to the start of the survey.

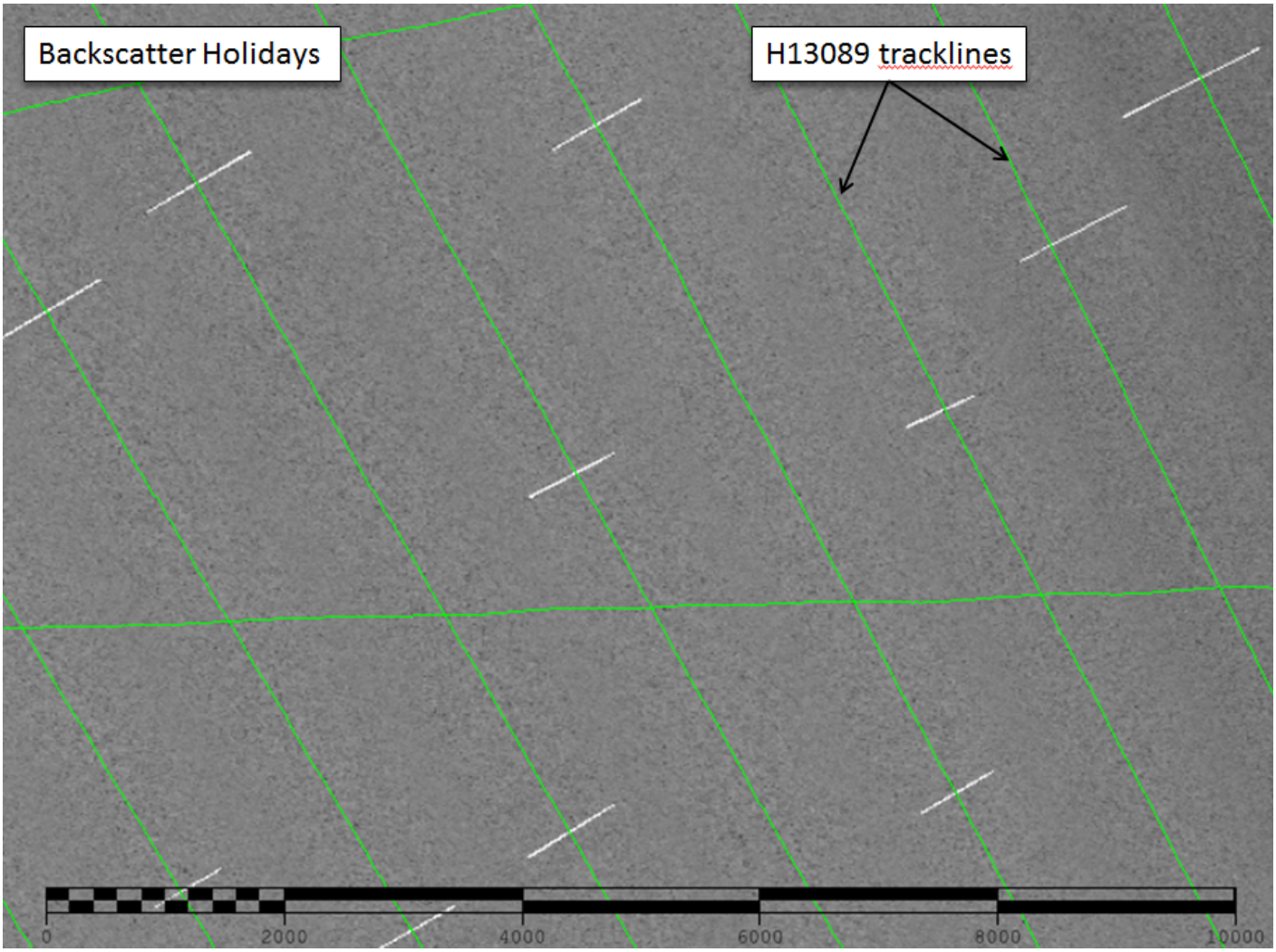


Figure 10: Examples of holidays in the processed H13089 backscatter mosaic. H13089 tracklines overlaid on the 16-meter mosaic

The Field also had submitted a 8 meter mosaic. The 8 meter mosaic is going to be used as final deliverable. H13089_MBAB_8m_S221_100kHz_1of1

B.5 Data Processing

B.5.1 Primary Data Processing Software

The following software program was the primary program used for bathymetric data processing:

Manufacturer	Name	Version
Caris	HIPS/SIPS	10.3.3

Table 9: Primary bathymetric data processing software

The following software program was the primary program used for imagery data processing:

Manufacturer	Name	Version
Fledermaus	Fledermaus Geocoder Toolbox	7.7.8

Table 10: Primary imagery data processing software

The following Feature Object Catalog was used: NOAA Profile V_5_6.

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
H13089_MB_VR_MLLW	CARIS VR Surface (CUBE)	Variable Resolution	452.2 meters - 1096.6 meters	NOAA_VR	Complete MBES
H13089_MB_VR_MLLW_Final	CARIS VR Surface (CUBE)	Variable Resolution	452.2 meters - 1096.6 meters	NOAA_VR	Complete MBES

Table 11: Submitted Surfaces

Submitted surfaces were generated using the recommended parameters for "Ranges" style variable resolution bathymetric grids as specified in HTD 2017-2. No soundings were designated in this survey and no Dangers to Navigation (DTONs) were detected throughout the survey area.

C. Vertical and Horizontal Control

There were no tide guages or base stations installed by the RAINIER crew for this project, therefore no Horizontal and Vertical Control Report was submitted.

C.1 Vertical Control

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

Traditional Methods Used:

TCARI

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

Station Name	Station ID
Los Angeles, CA	9410660
Santa Monica, CA	9411340
Santa Barbara, CA	9411340
Oil Platform Harvest, CA	9411406
Port San Luis, CA	9412110
Monterey, CA	9413450

Table 12: NWLON Tide Stations

There was no Water Level file associated with this survey.

File Name	Status
L397RA2017Rev.tc	Final

Table 13: Tide Correctors (.zdf or .tc)

A request for final approved tides was sent to N/OPS1 on 11/09/2017. The final tide note was received on 11/17/2017.

ERS Methods Used:

ERS via VDATUM

Ellipsoid to Chart Datum Separation File:

OPR-L397-RA-17_VDatumArea_xyNAD83-MLLW_Geoid12b.csar

C.2 Horizontal Control

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

The projection used for this project is Universal Transverse Mercator (UTM) Zone 10 North.

Precise Positioning-Real Time Extended (PP-RTX) processing methods were used in Applainix POSPac MMS 8.1 software to produce Smooth Best Estimates of Trajectory (SBETs) for post-processing horizontal correction.

D. Results and Recommendations

D.1 Chart Comparison

A comparison was made between H13089 survey data and Electronic Navigation Chart (ENC) US3CA85M using CUBE surfaces and contours created in Caris. The ENC used for comparison is the most recently updated version.

D.1.1 Electronic Navigational Charts

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

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US3CA85M	1:216116	20	10/17/2017	10/20/2017	NO

Table 14: Largest Scale ENCs

US3CA85M

A comparison with H13089 surveyed contours and ENC US3CA85M revealed the following: All surveyed contours generally agree with the ENC charted depth curves. However, the 400 and 500-fathom surveyed contours lie more offshore than the charted depth curves with an average distance of about 200 and 1500-meters. The 400 and 500-fathom depth curves also follow the uncharted submarine channel that is present throughout the northern portion of the survey area. Few inconsistancies are present in the southwestern

survey area due to the features present on the seafloor. Little revision is required for the H13089 survey area.

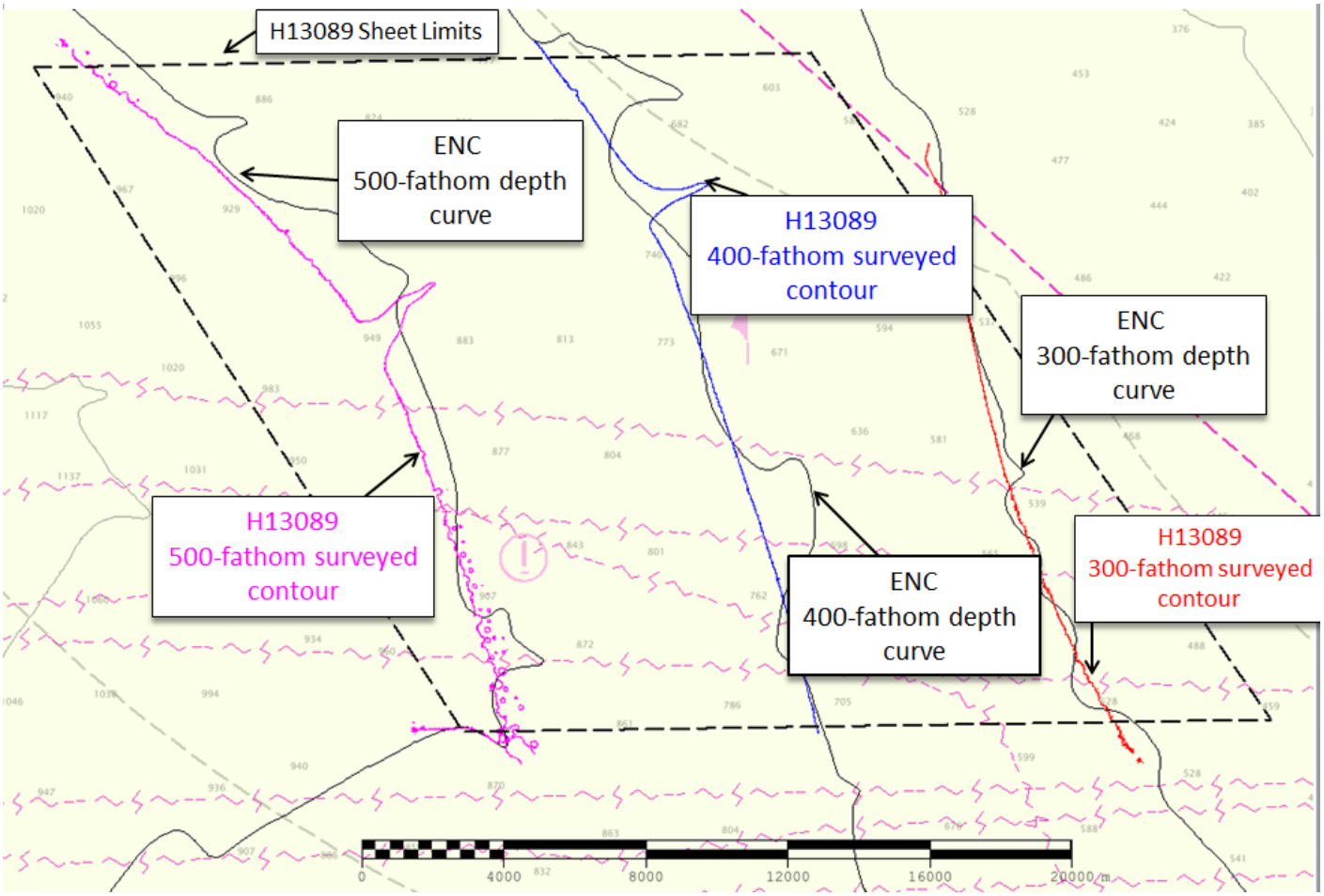


Figure 11: ENC US3CA85M overlaid with H13089 derived contours.

D.1.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.1.3 Charted Features

No charted features exist for this survey.

D.1.4 Uncharted Features

No uncharted features exist for this survey.

D.1.5 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.6 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.

D.1.7 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.

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

Submarine features exist for this survey, but no evidence of cables were identified in H13089 MBES data.

Multiple submarine cables exist in the southern portion of the H13089 survey area from west to east, depicted in the ENC and the Raster Nautical Chart (RNC).

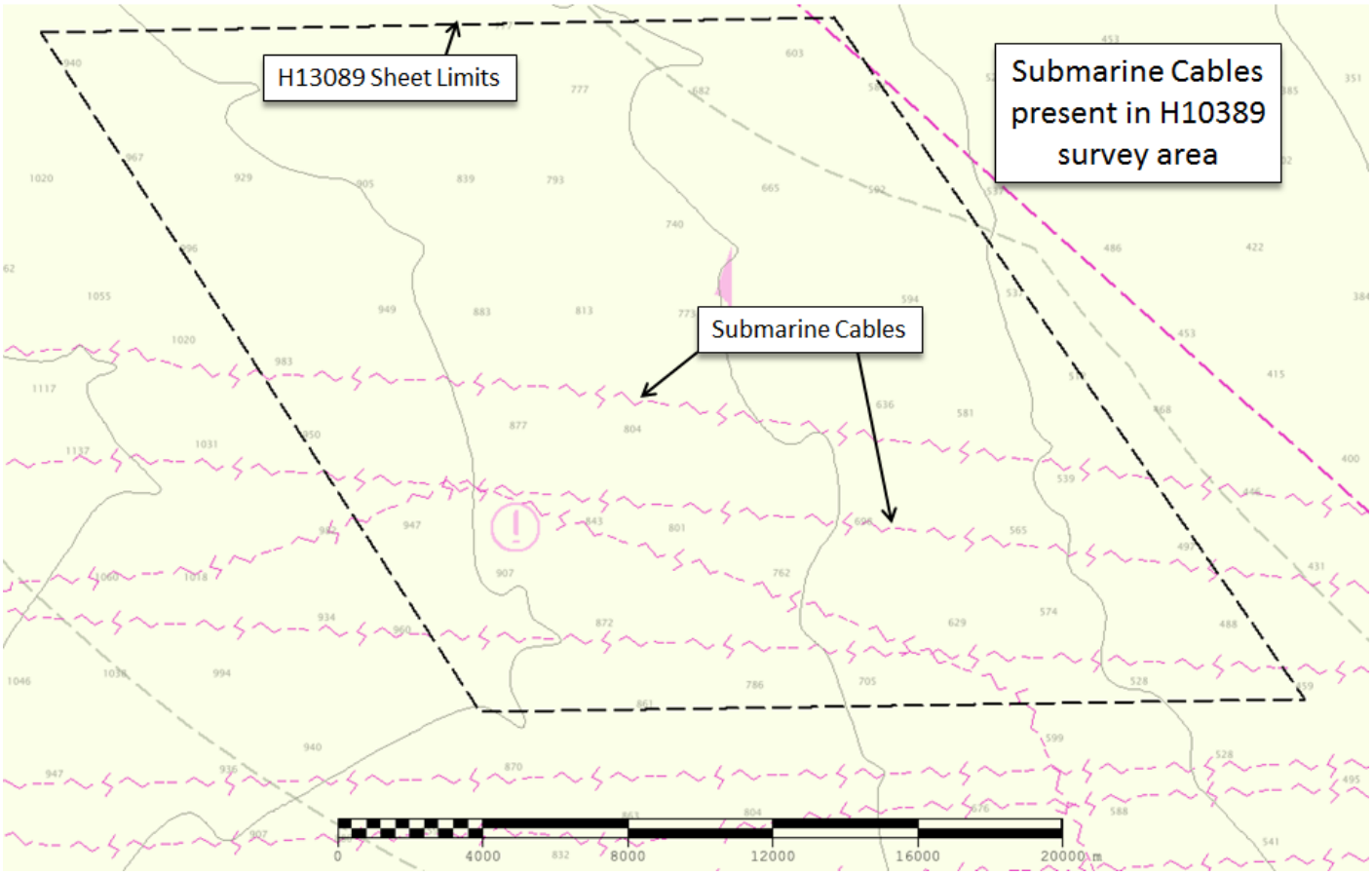


Figure 12: Submarine cables present in H13089 survey area.

D.2.6 Platforms

No platforms exist for this survey.

D.2.7 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.8 Abnormal Seafloor and/or Environmental Conditions

Abnormal seafloor and/or Environmental Conditions were observed in this survey, but were not investigated. A submarine channel is present through the northern portion of the survey area that measures about 20 kilometers in length and an average depth of about 20 to 30 meters. Also, multiple areas exhibit

characteristics of "pot-hole" like features in the northwestern and southwestern portion of the survey area with an average depth of about 3-7 meters. The images depicted below is the finalized variable resolution grid and exhibits a verticle exaggeration of 10.

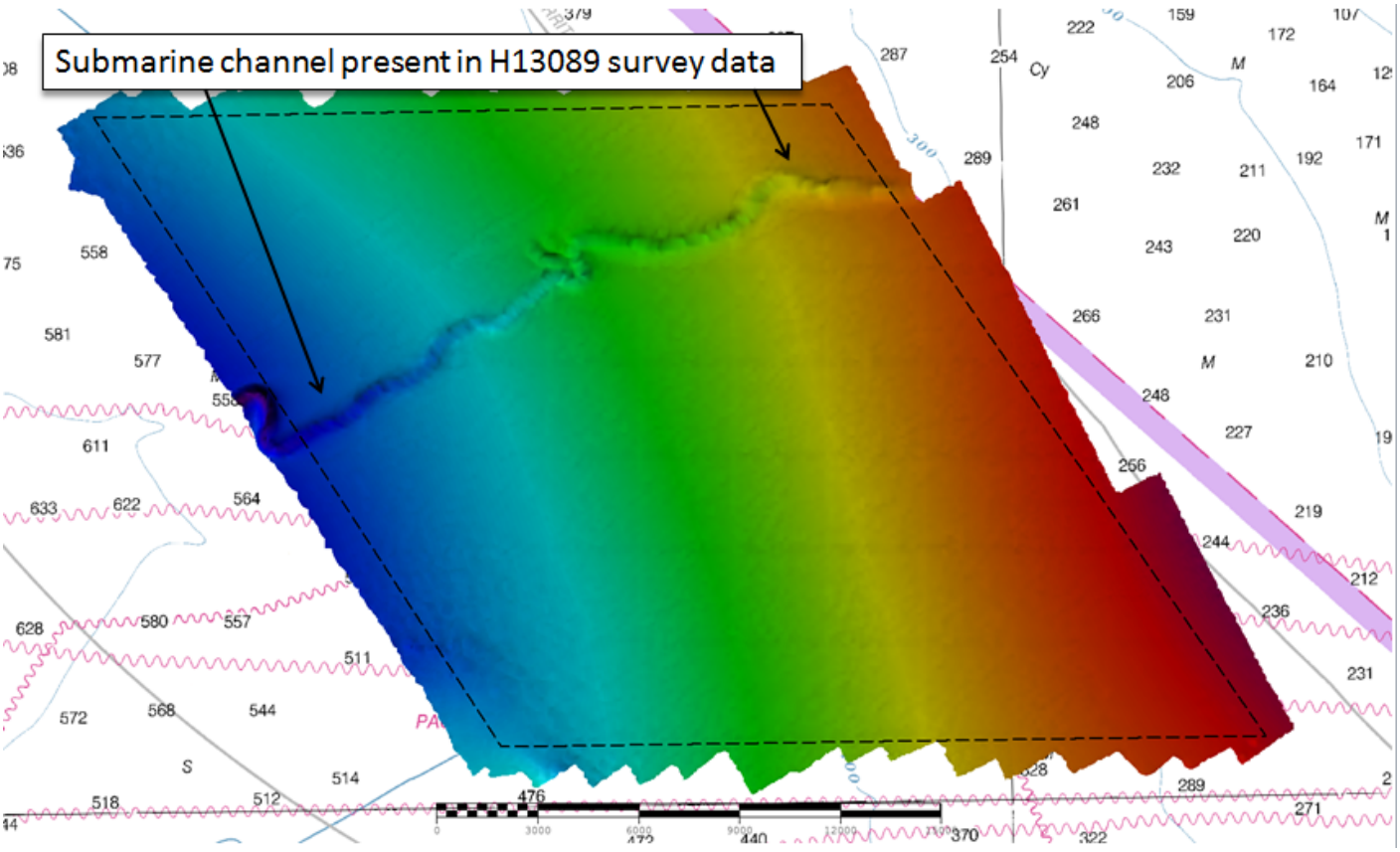


Figure 13: Submarine channel present in H13089 survey data.

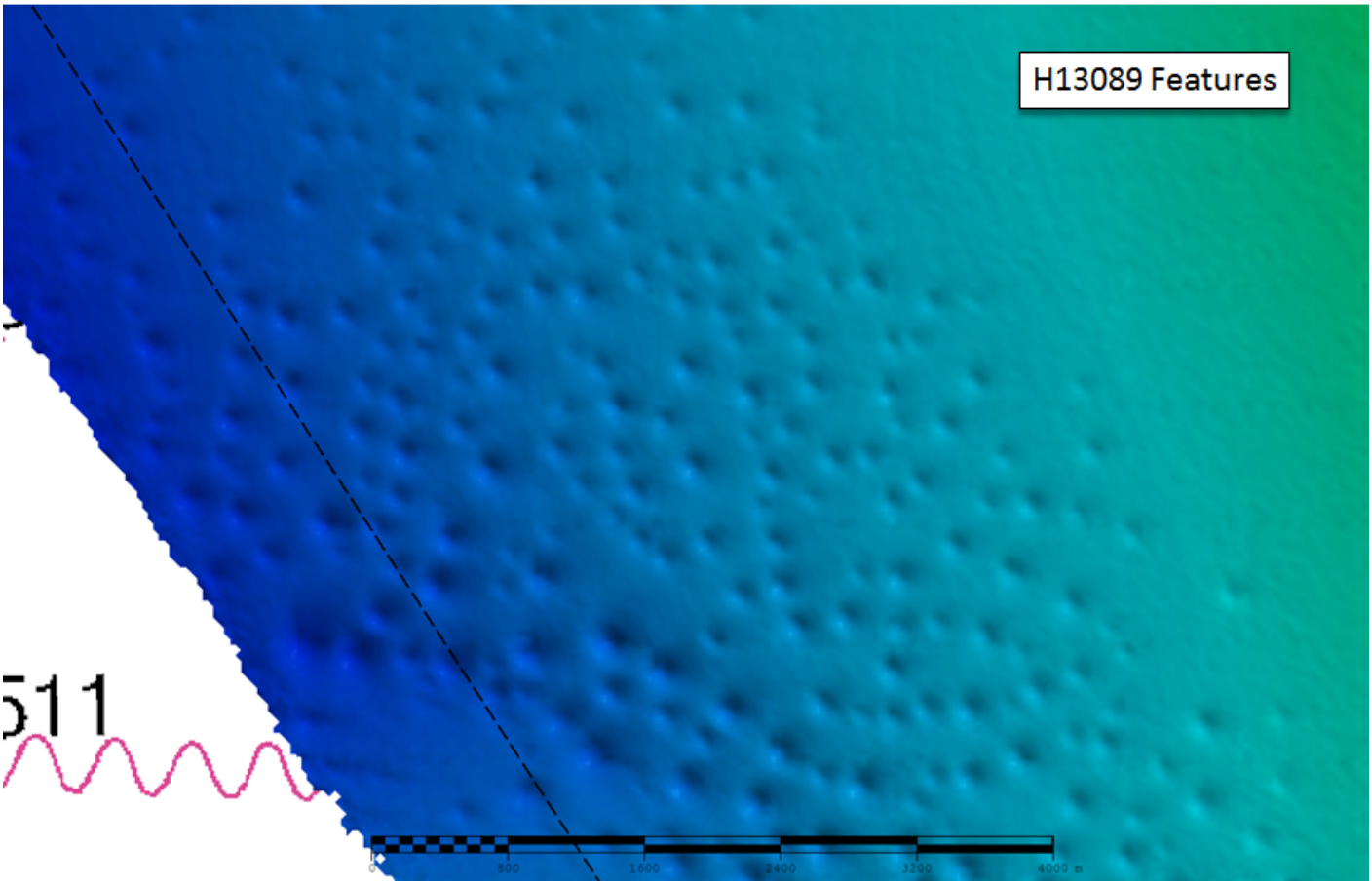


Figure 14: "Pot-hole" like features present in H13089 survey data.

D.2.9 Construction and Dredging

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

D.2.10 New Survey Recommendation

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

D.2.11 Inset Recommendation

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, Field Procedures Manual, 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
Benjamin K. Evans	Commanding Officer, NOAA Ship RAINIER	03/26/2018	Digitally signed by EVANS.BENJAMIN.K.1237217094 Date: 2018.03.27 22:26:53 -07'00'
Scott E. Broo	Field Operations Officer, NOAA Ship RAINIER	03/26/2018	BROO.SCOTT.EDWARD.1396599976 2018.03.27 08:35:41 -07'00'
James B. Jacobson	Chief Survey Technician, NOAA Ship RAINIER	03/26/2018	JACOBSON.JAMES.BRYAN.1269664017 I have reviewed this document 2018.03.27 13:09:08 -07'00'
Michael S. Hewlett	Sheet Manager, NOAA Ship RAINIER	03/26/2018	

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 Staiton
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	Linear Nautical Miles
MBAB	Multibeam Echosounder Acoustic Backscatter
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
SSSAB	Side Scan Sonar Acoustic Backscatter
ST	Survey Technician
SVP	Sound Velocity Profiler
TCARI	Tidal Constituent And Residual Interpolation
TPE	Total Propagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United Stated Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDA	Global Positiong System timing message
ZDF	Zone Definition File

APPROVAL PAGE

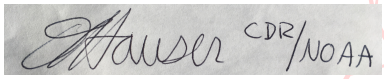
H13089

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 product

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:  HAUSER.OLIVIA.A.1275636009
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Commander Olivia Hauser, NOAA
Chief, Pacific Hydrographic Branch