H13115

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13115

LOCALITY

State(s):	Alaska
General Locality:	Southwestern Alaskan Peninsula
Sub-locality:	Main Channel Extension

2018

CHIEF OF PARTY
Andrew Orthmann

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H13115**

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):	**Alaska**
General Locality:	**Southwestern Alaskan Peninsula**
Sub-Locality:	**Main Channel Extension**
Scale:	**40000**
Dates of Survey:	**07/05/2018 to 07/21/2018**
Instructions Dated:	**04/24/2018**
Project Number:	**OPR-P377-KR-18**
Field Unit:	**Terrasond, Ltd.**
Chief of Party:	**Andrew Orthmann**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	
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/.

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Descriptive Report to Accompany Survey H13115

Project: OPR-P377-KR-18

Locality: Southwestern Alaskan Peninsula

Sublocality: Main Channel Extension

Scale: 1:40000

July 2018 - July 2018

Terrasond, Ltd.

Chief of Party: Andrew Orthmann

A. Area Surveyed

The survey area is located in the Aleutian Island region of southwest Alaska. The closest community is False Pass, population 35 (2010), located approximately 19 NM to the north on Unimak Island. The closest major hub is Dutch Harbor, population 4,376 (2010), located approximately 113 NM to the WSW.

Field work was carried out in July of 2018 under project OPR-P377-KR-18, with final processing and reporting carried out from August through December, 2018. Four additional survey areas located to the north and west, were surveyed concurrently during this project. Work was done in accordance with the Hydrographic Survey Project Instructions (dated April 24th, 2018) and the NOS Hydrographic Surveys Specifications and Deliverables (HSSD), April 2017 edition.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
54° 32' 59.19" N 163° 25' 29.07" W	54° 21' 8.31" N 163° 12' 46.4" W

Table 1: Survey Limits

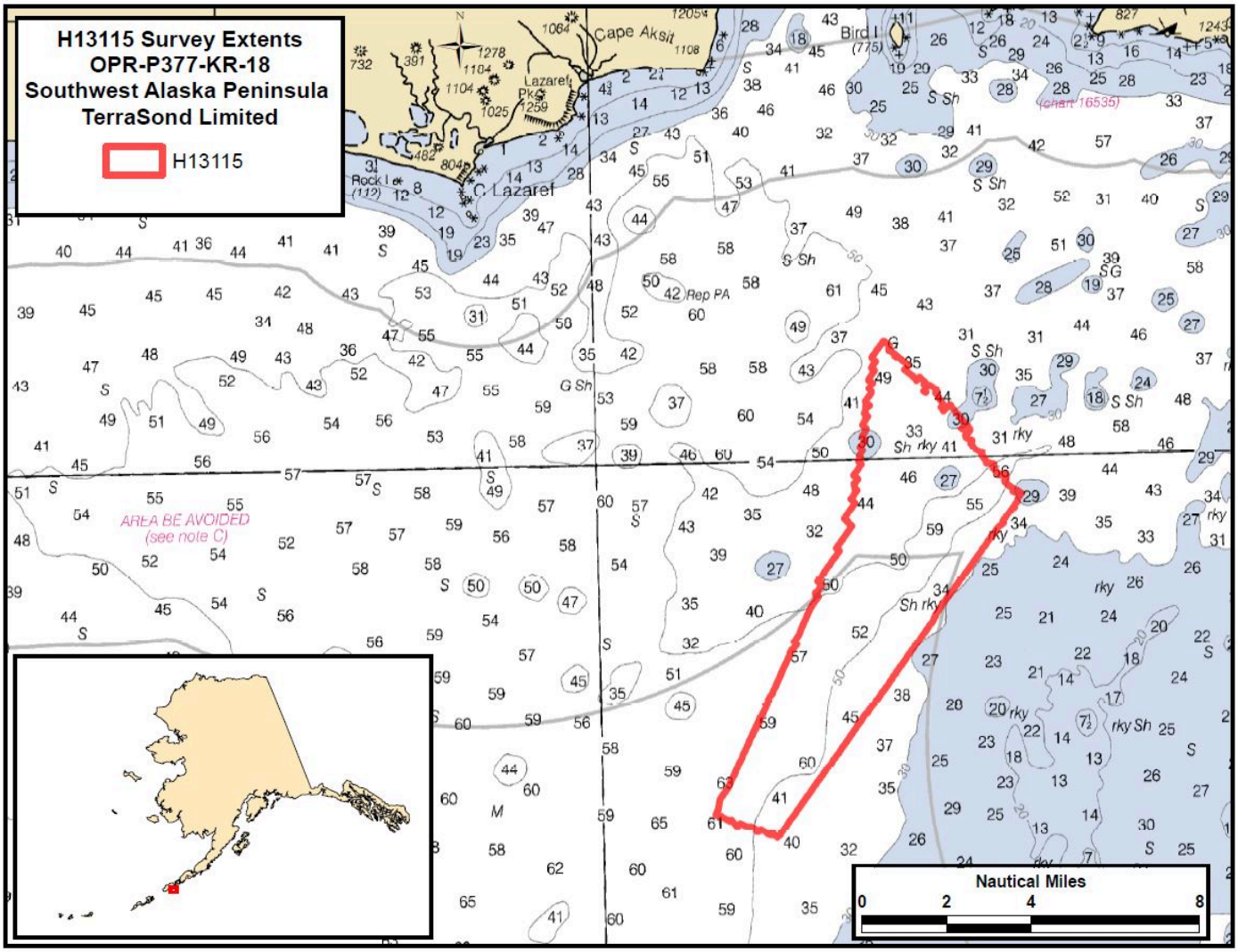


Figure 1: Survey extents and overview

Survey limits were acquired in accordance with the requirements in the Project Instructions and the HSSD.

A.2 Survey Purpose

The purpose of this project is to provide contemporary surveys to update National Ocean Service nautical charting products to support an increase in vessel traffic in Unimak Passage. Unimak Passage is the gateway to the Bering Strait utilized by cargo, fishing, and trans-Pacific vessels delivering goods to the Aleutian Islands, western Alaska, and the Arctic. This passage and area is specifically utilized by the fishing fleet in Bristol Bay and the Bering Sea and this area was specifically requested by the Alaska Marine Pilots, Alaska Fisheries Development Foundation, the 17th District of the United States Coast Guard, and the Alaska

Marine Highway. This project was last surveyed using partial bottom coverage techniques in the 1930's. Survey data from this project is intended to supersede all prior survey data in the common area.

A.3 Survey Quality

The entire survey is adequate to supersede previous 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) Acquire backscatter data during all multibeam data acquisition (Refer to HSSD Section 6.2)
All waters in survey area	LNM no less than 5715 LNM. Report significant shoaling via weekly progress report. COR may adjust survey prioritization based on observed shoaling.

Table 2: Survey Coverage

Total project-wide LNM acquired for project OPR-P377-KR-18 totaled 5,738, which exceeded the required 5,715.

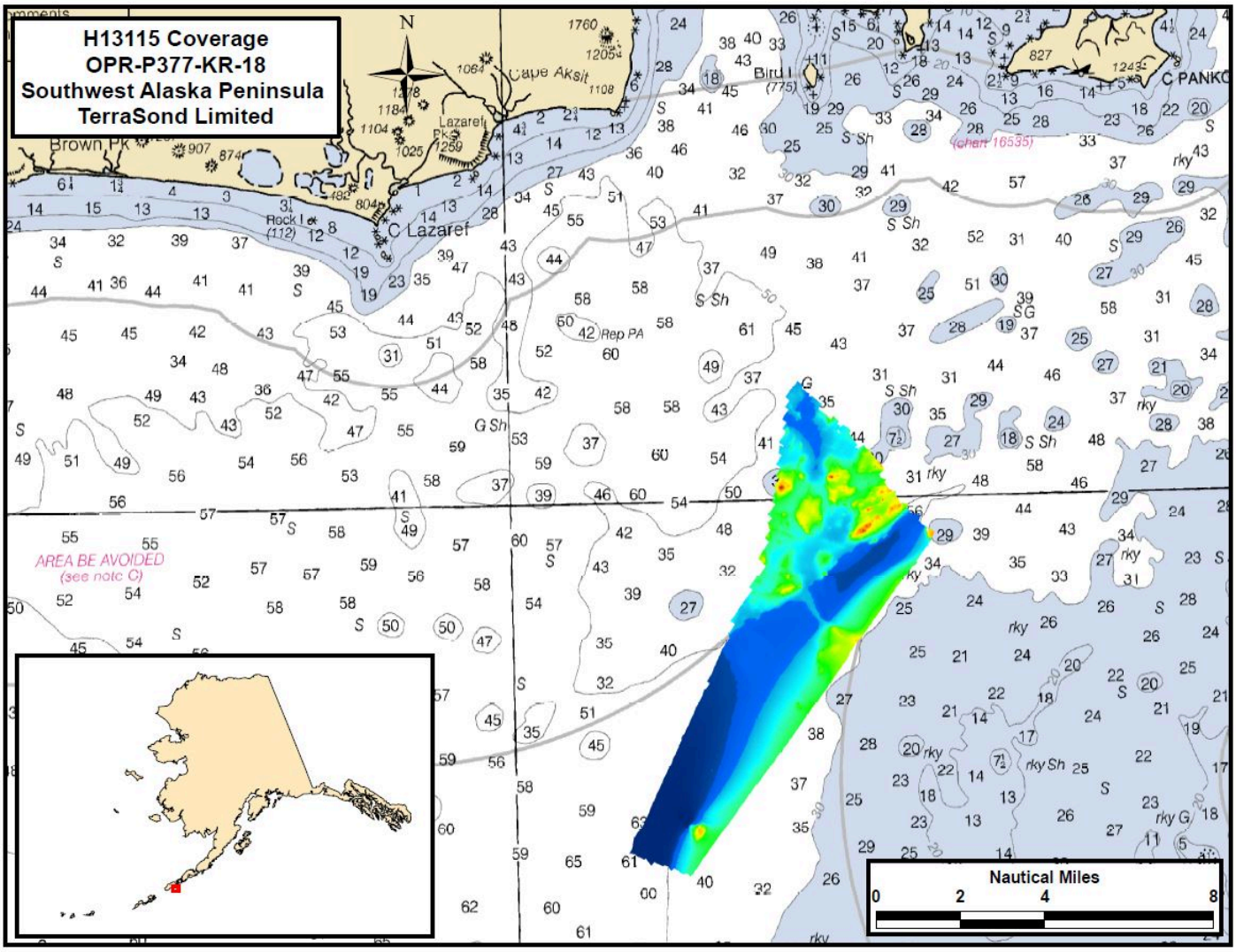


Figure 2: Survey coverage graphic

A.5 Survey Statistics

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

	HULL ID	*Qualifier 105*	*ASV-CW5*	*Total*
LNM	**SBES Mainscheme**	0	0	0
	MBES Mainscheme	145	130.9	275.9
	Lidar Mainscheme	0	0	0
	SSS Mainscheme	0	0	0
	SBES/SSS Mainscheme	0	0	0
	MBES/SSS Mainscheme	0	0	0
	SBES/MBES Crosslines	18.5	10.1	28.6
	Lidar Crosslines	0	0	0
Number of Bottom Samples				3
Number Maritime Boundary Points Investigated				0
Number of DPs				0
Number of Items Investigated by Dive Ops				0
Total SNM				29.3

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
07/21/2018	202

Survey Dates	Day of the Year
07/19/2018	200
07/18/2018	199
07/12/2018	193
07/05/2018	186

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	*ASV-CW5*	*Qualifier 105*
LOA	5.5 meters	32 meters
Draft	0.5 meters	1.8 meters

Table 5: Vessels Used

Figure 3: Survey vessels used on this project - ASV-CW5 (foreground), Q105 (background)

The Qualifier 105 (Q105) is a 32 m aluminum-hull vessel owned and operated by Support Vessels of Alaska. The Q105 acquired multibeam data and provided housing and facilities for on-site data processing. The vessel was also used to collect bottom samples, deploy/recover BMPG tide gauges, conduct sound speed casts, and deploy/recover the ASV-CW5 vessel.

The ASV-CW5 (C-Worker 5) is a 5.5 m aluminum-hull Autonomous Surface Vessel (ASV) owned and operated by ASV Global. The ASV was operated in an unmanned but monitored mode, collecting multibeam data in close proximity to the Q105.

B.1.2 Equipment

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

Manufacturer	Model	Type
Teledyne RESON	Seabat T50	MBES
Applanix	POS MV 320 v4	Positioning and Attitude System
Applanix	POS MV 320 v5	Positioning and Attitude System
Valeport	RapidSV	Sound Speed System
Teledyne Oceanscience	Rapidcast	Sound Speed Deployment System
Trimble	5700	Base Station
Sea-Bird Scientific	SBE 26 Plus	Tide Gauge, Submerged

Table 6: Major Systems Used

Details on equipment specifications, configurations, quality control, and methods of operation are available in the DAPR.

B.2 Quality Control

B.2.1 Crosslines

Multibeam/single beam echo sounder/side scan sonar crosslines acquired for this survey totaled 10.37% of mainscheme acquisition.

Effort was made to ensure crosslines had good temporal and geographic distribution and angled to enable nadir-to-nadir comparisons and that the required percent of mainscheme LNM were achieved. Crosslines were conducted with both vessels to ensure there was ample overlap for inter-vessel comparisons, with each vessel crossing the other's mainscheme lines. Since the two vessels worked in close proximity and normally ran parallel lines, crosslines were usually collected in sets when both vessels were in simultaneous operation.

The crossline analysis was conducted using CARIS HIPS “Line QC Report” process. Each crossline was selected individually and run through the process, which calculated the depth difference between each accepted crossline sounding and a "QC" BASE (CUBE-type, 8 m resolution) surface’s depth layer created from the mainscheme data. QC surfaces were created with the same parameters used for 8 m surfaces as the final surfaces, with the important distinction that the QC surfaces did not include crosslines so as to not bias the results. Differences in depth were grouped by beam number and statistics were computed, including the percentage of soundings with differences from the QC surface falling within IHO Order 1a. Note for

simplicity IHO Order 1a was used for all comparisons even though the looser IHO Order 2 standard was allowable for depths greater than 100 m.

When at least 95% of the sounding differences exceed IHO Order 1a, the crossline was considered to “pass,” but when less than 95% of the soundings compare within IHO Order 1, the crossline was considered to “fail.” A 5% (or less) failure rate was considered acceptable since this approach compares soundings to a surface (instead of a surface to a surface), allowing for the possibility that noisy crossline soundings that don't adversely affect the final surface(s) could be counted as a QC failure in this process.

Lines used as crosslines and their % of soundings passing IHO Order 1a are listed below.

2088-199-ASV-CW5-D1-XL -- 100% pass
0849-199-Q105-D1-XLSouth -- 100% pass
0910-202-Q105-D1-XL_North1 -- 100% pass
0911-202-Q105-D1-XL_North2 -- 100% pass
0871-200-Q105-D2_XL1 -- 99.6% pass
0872-200-Q105-D2_XL2 -- 98.6% pass
2116-200-ASV-CW5-D2-XL -- 99.6% pass
2117-200-ASV-CW5-D2-XL2 -- 99% pass

Results: Agreement between the mainscheme surface and crosslines soundings is excellent. At least 95% of crossline soundings compare to within IHO Order 1a.

Refer to Separate II: Digital Data for the detailed Crossline QC Reports.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via PMVD	0.098 meters	0 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Surface
Qualifier 105	0 meters/second	2 meters/second	0.025 meters/second
ASV-CW5	0 meters/second	2 meters/second	0.025 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

Real-time (dynamic) error estimates were computed and loaded for the majority of the survey data. This replaced the static error estimates for attitude and navigation during final TPU computation. Exceptions, if they exist, are listed in Section B.3 of this report. Refer to the DAPR for more information on derivation of the values used for individual sensors components for TPU estimates.

The BASE surfaces were finalized in CARIS HIPS so that the uncertainty value for each grid cell is the greater of either standard deviation or uncertainty. The uncertainty layer of each final surface was then examined for areas of uncertainty that exceeded allowable TVU for the depth (Order 1a for depths less than 100 m, and Order 2 for depths 100 m and deeper). Uncertainty for the surfaces are 0.28 m to 1.7 m for the 8 m surface and 0.24 m to 1.6 m for the 4 m surface.

Greater than 99.5% of grid cells have uncertainty values within allowable TVU. Highest uncertainties were found in areas of varying bottom topography such as slopes and near bottom features where high standard deviations are caused by the wide depth ranges of soundings contributing to each grid cell, outer edges of multibeam swathes without adjacent line overlap, and areas with unrejected noisy soundings. Despite elevated TPU values for these grid cells, the data is within specifications.

B.2.3 Junctions

This survey junctions with two contemporary surveys. Both were accomplished as part of the same overall project and surveyed concurrently.

NOAA's "Gridded Surface Comparison V18.4" utility was used to complete the junction comparisons. The utility differences the surfaces from the junctioning surveys and generates statistics, that include the percentage of grid cells that compare to within allowable TVU.

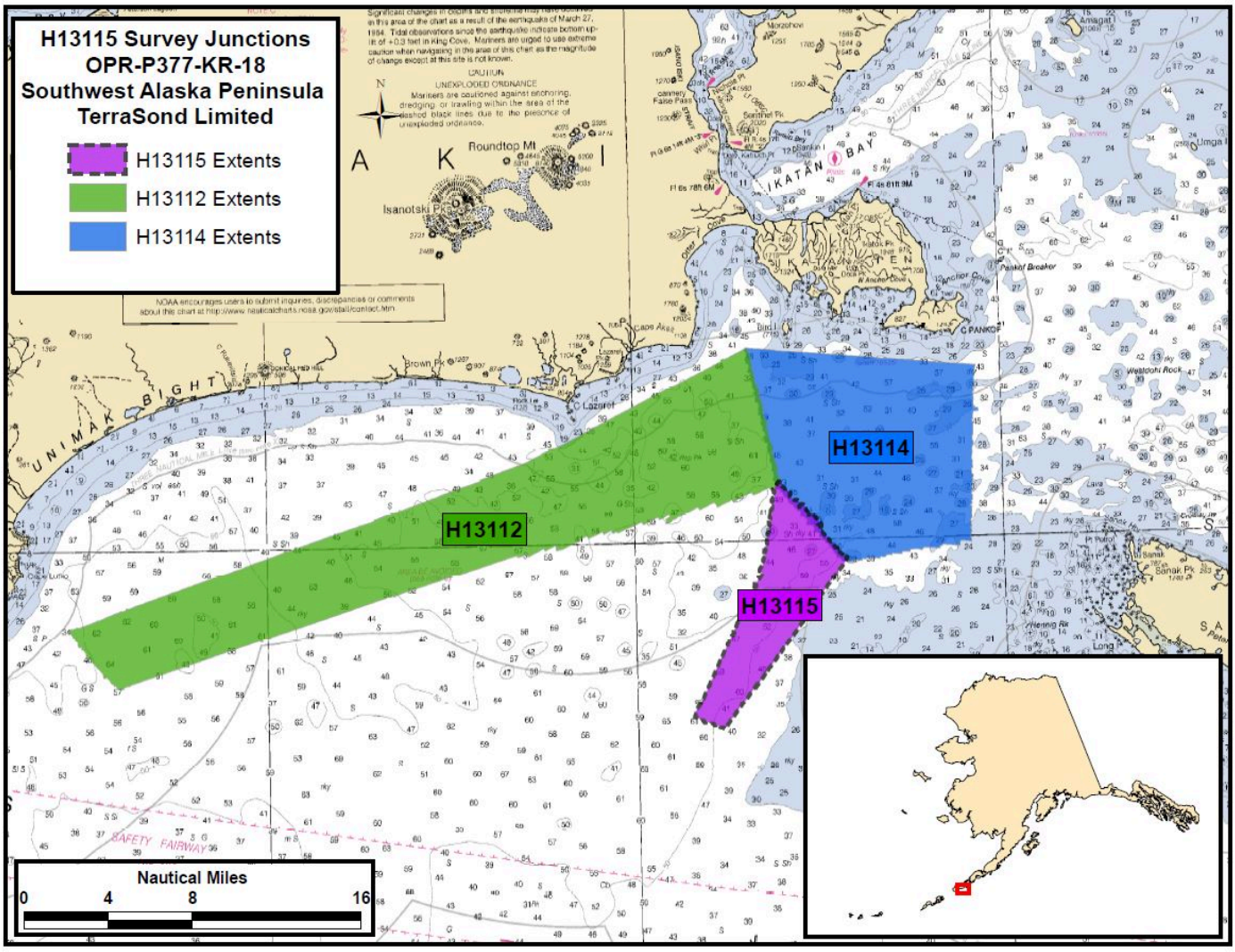


Figure 4: Image showing junctions with this survey

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H13112	1:40000	2018	Terrasond, Ltd.	NW
H13114	1:40000	2018	Terrasond, Ltd.	N

Table 9: Junctioning Surveys

H13112

H13112 was surveyed concurrently with this survey with the same vessel and equipment configurations. 4 m resolution surfaces from each survey were used in this comparison.

Agreement is excellent. The mean difference between the two surveys in their overlapping area is 0.05 m, with a standard deviation of 0.19 m. 100% of grid cells compare to within the allowable TVU.

H13114

H13114 was surveyed concurrently with this survey with the same vessel and equipment configurations. 4 m resolution surfaces from each survey were used in this comparison.

Agreement is excellent. The mean difference between the two surveys in their overlapping area is 0.02 m, with a standard deviation of 0.19 m. 99.5% of grid cells compare to within the allowable TVU.

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

Q105 Roll Alignment

It became evident during operations that a roll bias was periodically present in data collected on the Q105 vessel. This was determined to correlate to deployment and retrieval of the hydraulic multibeam arm, which was not on the same physical mount as the motion sensor IMU on this vessel. Exact cause is unknown but small fluctuations in hydraulic pressure in the arm actuator are suspected. Effect on pitch and yaw, if any, was not discernible. The issue was addressed in processing by systematically examining lines exhibiting trouble and determining new roll alignment values--which was possible due to significant overlap with adjacent survey lines--and applying them via the HVF. There may be remnants of this error remaining periodically in the Q105 data set but the effect on final surfaces is minor and well within specifications. Additional discussion is available in the DAPR.

B.2.6 Factors Affecting Soundings

Rough weather survey

The majority of this survey was completed in relatively rough sea states that were marginal for survey. This lead to above average noise in the sounding data including blow-outs, and some vessel motion artifact from heave and roll. To compensate, line spacing was tightened to provide additional overlap. Erroneous soundings that adversely affected the surface beyond the allowable TVU were rejected in processing, and any resulting holidays were rerun. Despite the adverse weather conditions, the final surfaces pass all QC checks and are within specifications.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: 2

Sound speed profiles or casts were acquired aboard the Q105 while underway with an Teledyne Oceanscience RapidCAST system, which utilized a Valeport RapidSV sound speed profiler. The interval between subsequent casts was approximately 2 hours.

Casts were taken as deep as possible. On survey lines with significant differences in depth, the deeper portion of the line was favored to ensure changes across the full water column were measured.

The cast data was used to correct the sounding data for both vessels, using the "nearest in distance within 4 hours" option within CARIS HIPS.

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

Corrections applied to echo soundings are detailed in the project DAPR. No deviations occurred except for those listed below. Note that despite exceptions, affected data is within specifications.

Applanix SmartBase:

ASV-CW5 lines with prefix 2098 through 2117 (on JD200) used Applanix SmartBase PPK methodology instead of PP-RTX for final positioning. This addressed some vertical positioning errors throughout this set of lines.

POS File Logging Issue:

On the ASV-CW5, POSMV file logging stopped early for unknown reasons late on JD199 while running line 2096. Therefore no raw POSMV data was logged from mid-line on 2096 through line 2097 on JD200, when the problem was detected. POSMV logging was restarted prior to line 2098 on JD200.

As a result, no delayed heave, SBETs, or SMRMSG data was available from mid-2096 through 2097. These lines use real-time navigation, motion, and heave, as well as vessel-based RMS error estimates. To allow computation of GPStide without PPK heights, interpreted heights were generated between the last available good GPS heights to the next available good GPS heights and loaded into these lines through CARIS' Generic Data Parser utility. Final results were good, with little to no vertical offset apparent between these lines and overlapping lines, including crosslines.

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

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

B.5 Data Processing

B.5.1 Primary Data Processing Software

The following Feature Object Catalog was used: NOAA Profile V_5_7.

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

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
H13115_MB_8m_MLLW_Final	CARIS Raster Surface (CUBE)	8 meters	72 meters - 160 meters	NOAA_8m	Complete MBES

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
H13115_MB_4m_MLLW_Final	CARIS Raster Surface (CUBE)	4 meters	36 meters - 80 meters	NOAA_4m	Complete MBES

Table 10: Submitted Surfaces

The final depth information for this survey was submitted as CARIS BASE surfaces (CSAR format) which best represented the seafloor at the time of the 2018 survey. The surfaces were created from fully processed data with all final corrections applied.

Surfaces were created using NOAA CUBE parameters and resolutions by depth range in conformance with the 2017 HSSD. Surfaces were finalized, and designated soundings were applied where applicable. Horizontal projection was selected as UTM Zone 3 North, NAD83.

Non-finalized versions of the CSAR surfaces are also included. These do not have the _Final designation in the filename.

An S-57 (.000) file was submitted with the survey deliverables as well. The final feature file (FFF) contains meta-data and other data not readily represented by the final surfaces, including bottom samples and shoreline verification results, if applicable. Each object is encoded with mandatory S-57 attributes and NOAA Extended Attributes (V#5.7).

A georeferenced multibeam backscatter mosaic (Geotif format in NAD83 UTM Zone 3N, 1 m resolution) was also produced and is provided with the survey deliverables. Note that backscatter processing and mosaic generation was not a requirement of this survey and the mosaic is provided for interest only. The mosaic may have flaws or holidays which could be addressed through further processing. However, it is of sufficient quality to show the relative changes in seafloor type across the survey area.

C. Vertical and Horizontal Control

Additional information discussing the vertical or horizontal control for this survey can be found in the accompanying HVCR.

C.1 Vertical Control

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

ERS Methods Used:

ERS via Poor Mans VDATUM

Ellipsoid to Chart Datum Separation File:

OPR-P377-KR-18_NSPMVD_EPSG6332_NAD83-MLLW_Revised.csar

All soundings were reduced to MLLW using the NSPMVD grid provided by NOAA using ERS methodology. Discrete tide zones were provided but used only for preliminary corrections in the field, as well as comparisons. See HVCR for additional information.

C.2 Horizontal Control

The horizontal datum for this project is North American Datum 1983.

The projection used for this project is UTM Zone 3 North.

The following PPK methods were used for horizontal control:

Smart Base

CORS station geometry allowed for Applanix SmartBase (ASB) processing on this project, with AB06 (False Pass) used as the the primary control station. However, ASB was only used on lines that experienced issues with PP-RTX. Lines using ASB are itemized in the Data Acquisition and Processing section of this report.

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
AB06	False Pass

Table 11: CORS Base Stations

The Trimble PP-RTX subscription-based correction service within POSPac was used for final positioning for the majority of lines. Results were good overall, usually at 0.10 m or better vertically.

WAAS was used for real-time positioning only.

D. Results and Recommendations

D.1 Chart Comparison

The chart comparison was performed by examining the best-scale Electronic Navigational Charts (ENCs) that intersect the survey area. The latest edition(s) available at the time of the review were used.

The chart comparison was accomplished by overlaying the finalized BASE surfaces with shoal-biased soundings, and final feature file on the charts in CARIS HIPS. The general agreement between charted soundings and survey soundings was then examined and a more detailed comparison was undertaken for any shoals or other dangerous features. In areas where a large scale chart overlapped with a small scale chart, only the larger scale chart was examined.

When comparing to survey data, chart scale was taken into account so that 300 m (1 mm at chart scale) was considered to be the valid radius for charted soundings and features.

Results are shown in the following sections. It is recommended that in all cases of disagreement this survey should supersede charted data.

USCG Notice to Mariners (NM) and USCG Local Notice to Mariners (LNM) were checked for updates affecting the area. No updates affecting the survey area issued subsequent to the date of the Hydrographic Survey Project Instructions and before the end of the survey were found.

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?
US3AK61M	1:300000	23	08/13/2018	08/13/2018	NO

Table 12: Largest Scale ENCs

US3AK61M

General agreement between this survey and the chart is mixed. Due to the scale of the existing chart there are relatively few soundings to compare. For each charted sounding, a survey sounding that agrees to 1 m or better can usually be found within 300 m. However, seldom does the charted sounding agree well with the surveyed soundings in the immediate vicinity of the charted sounding position.

The largest discrepancy found was a charted sounding at 54-22-52.436 N, 163-21-43.164 W with a depth of 109 m. Surveyed depths in the area range from approximately 82 to 94 m.

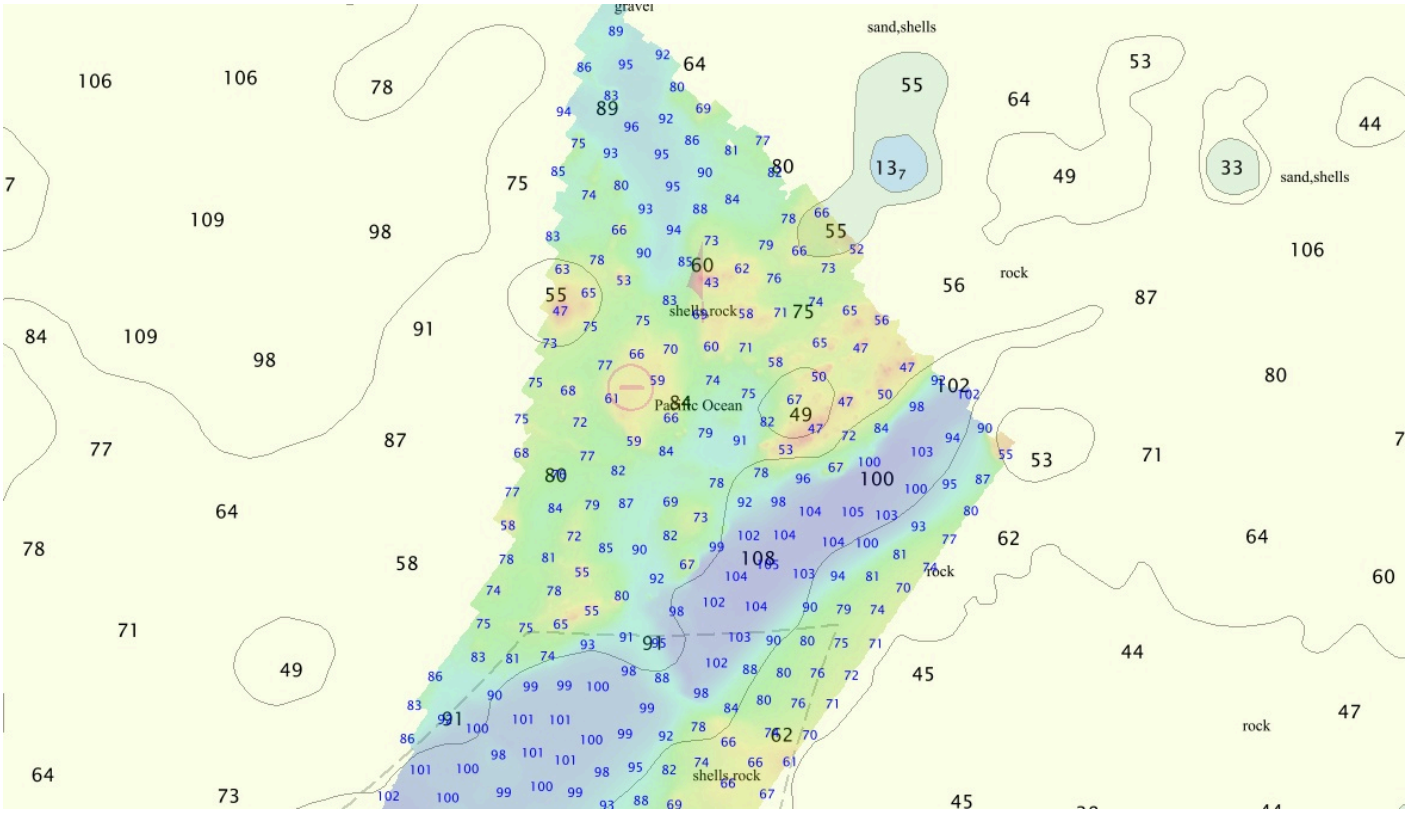


Figure 5: North part of survey area. Survey soundings (blue) are overlaid on ENC soundings (black). Units are meters.

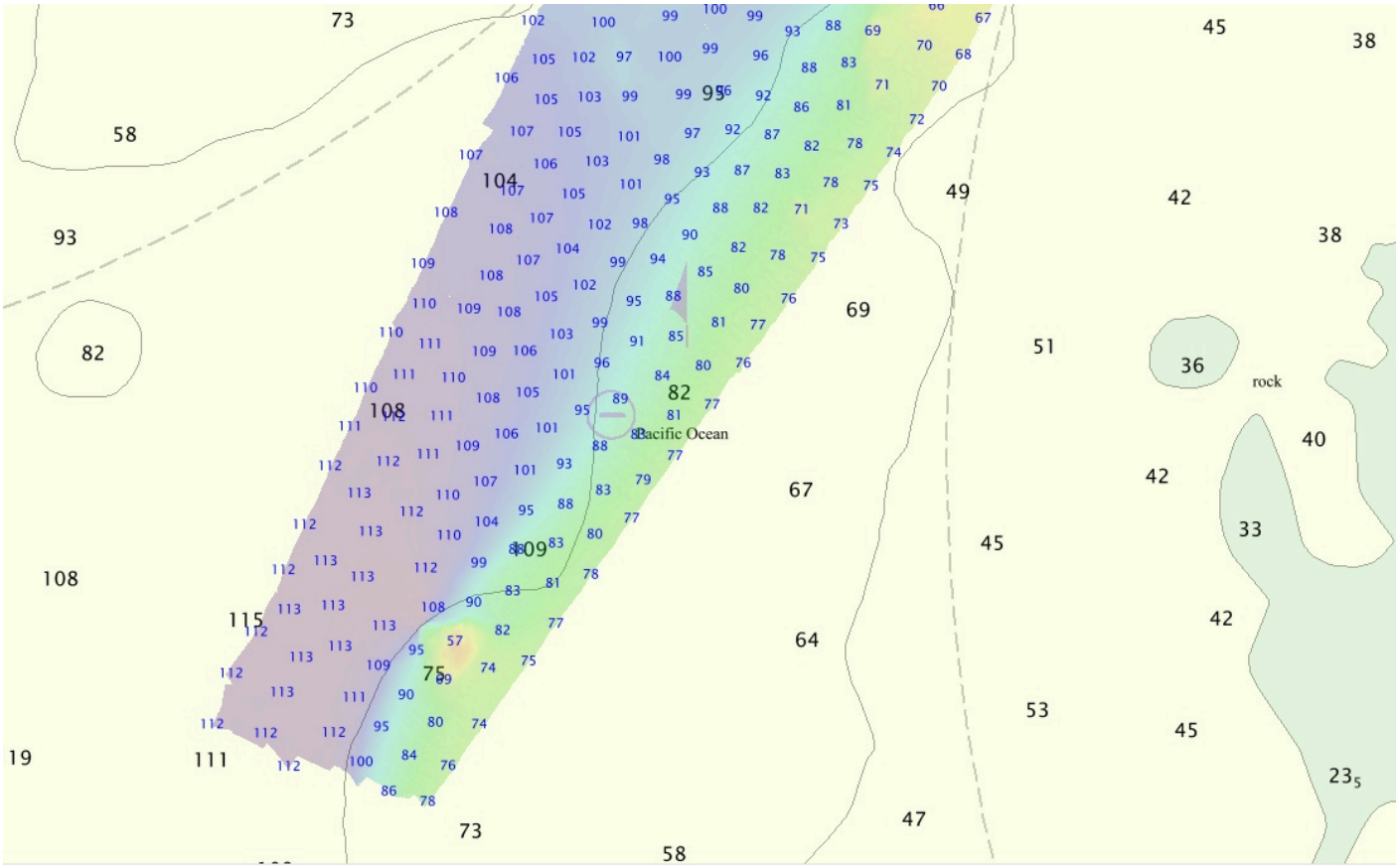


Figure 6: South part of survey area. Survey soundings (blue) are overlaid on ENC soundings (black). Units are meters.

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

Three bottom samples were assigned for this survey area. Samples were successfully obtained at all three locations.

Black sand was a significant component in all the samples, appearing as the primary constituent in two of the samples and a secondary constituent in the third.

The assigned locations did not correspond to charted samples.

Bottom sample results, including photos, are available with the FFF submitted with the survey deliverables.

D.2 Additional Results

D.2.1 Shoreline

Shoreline was not assigned in the Hydrographic Survey Project Instructions or Statement of Work. The survey area did not intersect shoreline.

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

No submarine features exist for this survey.

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

No abnormal seafloor and/or environmental conditions exist for this survey.

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

Field operations contributing to the completion of this survey were conducted under my direct supervision with frequent personal checks of progress, integrity, and adequacy.

This report, digital data, and all other accompanying records are approved. All records are respectfully submitted for final review and acceptance.

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys Specifications and Deliverables document as well as the Hydrographic Survey Project Instructions and Statement of Work. This data is adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies--if any--noted in the Descriptive Report.

Report Name	Report Date Sent
Coast Pilot Review Report	2018-12-17
NCEI Sound Speed Data Submission	2018-11-07
Marine Mammal Observers Training Logsheet and Observation Logs	2018-08-28

Approver Name	Approver Title	Approval Date	Signature
Andrew Orthmann, C.H.	TerraSond Charting Program Manager	12/29/2018	Andrew Orthmann Digitally signed by Andrew Orthmann Date: 2018.12.29 17:45:15 -09'00'

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 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

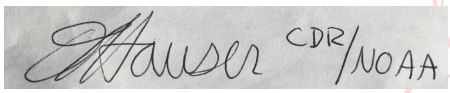
H13115

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)
- One backscatter mosaic
- Processed survey data and records
- Bottom samples
- 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.



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Approved:_____

Commander Olivia Hauser, NOAA
Chief, Pacific Hydrographic Branch