H1270

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: H12870

LOCALITY

State: Alaska

General Locality: Bering Sea

Sub-locality: North of Cape Etolin

2016

CHIEF OF PARTY
Andrew Orthmann

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Date:

NOAA FORM 77-28 (11-72)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET		**H12870**

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:	**Alaska**
General Locality:	**Bering Sea**
Sub-Locality:	**North of Cape Etolin**
Scale:	**1: 40,000**
Dates of Survey:	**07/02/2016 to 08/02/2016**
Instructions Dated:	**05/12/2016**
Project Number:	**OPR-R300-KR-16**
Field Unit:	**TerraSond Limited**
Chief of Party:	**Andrew Orthmann**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Side Scan Sonar**
Verification by:	**Pacific Hydrographic Branch**
Soundings Acquired in:	**meters at Mean Lower Low Water**
H-Cell Compilation Units:	***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 Envitronmental Information (NCEI) and can be retrieved via http://www.ncei.noaa.gov/.

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Descriptive Report to Accompany Survey H12870

Project: OPR-R300-KR-16

Locality: Bering Sea

Sublocality: North of Cape Etolin

Scale: 1:40000

July 2016 - August 2016

TerraSond Limited

Chief of Party: Andrew Orthmann

A. Area Surveyed

A navigable area survey (H12870) was conducted in the area North of Cape Etolin, Alaska, in accordance with the NOAA, National Ocean Service, Statement of Work (SOW), OPR-R300-KR-16, dated February 19th, 2016 (modifications dated July 15th, 2016) and Hydrographic Survey Project Instructions dated May 12th, 2016 (modifications dated July 20th, 2016). Hydrographic survey data was acquired from July 2nd through August 2nd, 2016. Tidal data was collected from mid-June through late September, 2016.

An additional contract modification, "Mod2", issued February 17th, 2017, extended the deliverables submission deadline to March 13th, 2017, due to delays associated with issuance of the final TCARI tide grid.

The survey area is centered on Etolin Strait, a navigable passage off of the southwest Alaska coast. Nunivak Island lies to the southwest, with Nelson Island and mainland Alaska to the east. This relatively remote region of the Arctic is covered, or heavily influenced, by sea ice for a large portion of the year, presenting a limited ice-free season with open navigable water from approximately June through October.

Vessel traffic in the region primarily consists of barges serving nearby communities or transiting through the area to other points along Alaska's west and north coasts, bringing fuel and supplies, as well as some freighter traffic. Nunivak Island provides some of the only protection available for vessels transiting Alaska's southwest coast, a region that frequently experiences inclement weather and poor sea conditions. Traffic is relatively sparse, but has been increasing in recent years along with economic and scientific interest in the Arctic.

Nearby communities are small and primarily subsistence-based. Mekoryuk (2010 population 191), located just south of the survey area on Nunivak Island, is the largest nearby community. The region is not connected to the road system and communities depend on air services for connections to Bethel and on to Anchorage. No facilities exist nearby for supporting or servicing larger vessels, with Bethel (approximately 200 NM transit) and Nome (approximately 250 NM transit) the closest port options for fueling, or limited

services. During this survey--which utilized a 105' research vessel--Bethel was used for resupply, largely due to a more protected transit route. However, larger or deeper drafted vessels may favor Nome.

TerraSond conducted multibeam echosounder (MBES) and side scan sonar (SSS) operations in the area in accordance with the project instructions, which specified areas requiring complete coverage (100% SSS with concurrent complete coverage MBES) and areas requiring set-spaced MBES-only. Other requirements included tidal data collection and bottom sampling.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
60° 32' 52.34" N 166° 25' 42" W	60° 20' 46.89" N 165° 35' 50" W

Table 1: Survey Limits

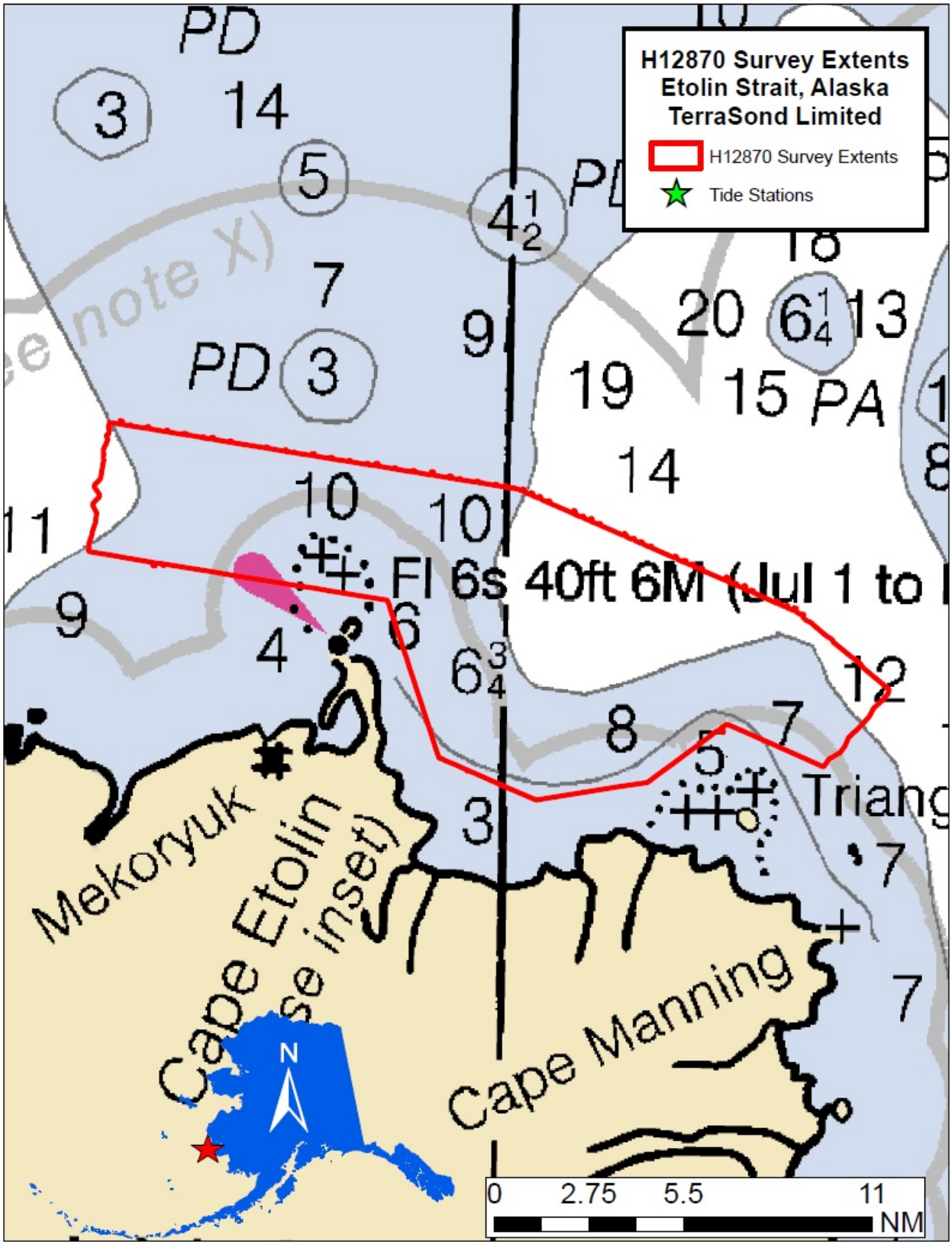


Figure 1: Survey extents and overview.

Survey limits were acquired in accordance with the requirements in the Project Instructions and the HSSD, with exceptions noted below.

1. Survey extents were modified on the SE side from the extents provided in the Project Reference File (PRF) with the Project Instructions. The assigned sheet boundary in H12870 at approximately 60-25-08 N, 165-43-54 W was shifted to the SE by about 6 km (into the planned area for junctioning survey H12869). This was done to optimize line planning prior to commencement of survey operations, so that survey lines would better follow natural seafloor contours. Note that this resulted in increased area falling within this survey and decreased area falling within H12869. The affected area received coverage to identical specifications regardless.

The inshore limit of hydrography, being the farthest offshore of either the 4 m depth contour, or a line defined by the distance seaward from the MHW line, which is equivalent to 0.8 mm at the scale of the largest scale nautical chart, was not encountered on this survey.

A.2 Survey Purpose

The purpose of this project is to provide contemporary surveys to update National Ocean Service (NOS) nautical charting products. The project (of which this survey sheet is one of eight separate, adjacent sheets) covered approximately 570 SNM of seafloor, all Priority 2 area as identified in the 2012 NOAA Hydrographic Survey Priorities document. There is an emerging need to provide modern hydrography in the Arctic to update nautical chart products.

In this project area, north of Nunivak Island, deep-draft traffic is operating in relative shoals that have not been surveyed in over 100 years. A 600' chemical tanker (Champion Ebony) grounded on an uncharted shoal at the south approaches to Etolin Strait on June 24th, 2016, just days before survey operations were scheduled to commence. Fortunately, no discharge occurred, but the incident emphasized the need for chart updates in the area.

Survey data from this project is intended to supersede all prior survey data in the common area and support larger scale nautical chart products.

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 defined survey corridor	Full coverage: 100% Side Scan Sonar with concurrent Multibeam and Backscatter
All survey areas outside of defined survey corridor	Set-spaced MBES: 500 m set line spacing Multibeam and Backscatter

Coverage requirements were met, with any exceptions noted below.

Full coverage (corridor) area:

SSS coverage requirements were met. Small along-track gaps (3 m or less) were found to exist periodically and are primarily due to layback adjustments made during SSS processing. MBES data, which was previously auto-rejected during the filtering process, was re-accepted manually to fill SSS gaps. As a result, all areas received complete coverage.

Set-spacing area:

MBES-only data was acquired at 500 m spacing in all assigned areas outside the corridor to set-spacing standards.

Splits:

Splits were acquired only in the vicinity of charted rocks that were located within the survey extents (see Section D.1.7 "Shoal and Hazardous Features" of this report for more information). In all other areas, bathymetric line splits were not acquired because charted depths shoaler than survey depths did not fall between two survey lines given the scale of the affected chart. Shoals, contours, and significant deeps were adequately defined by the mainscheme lines.

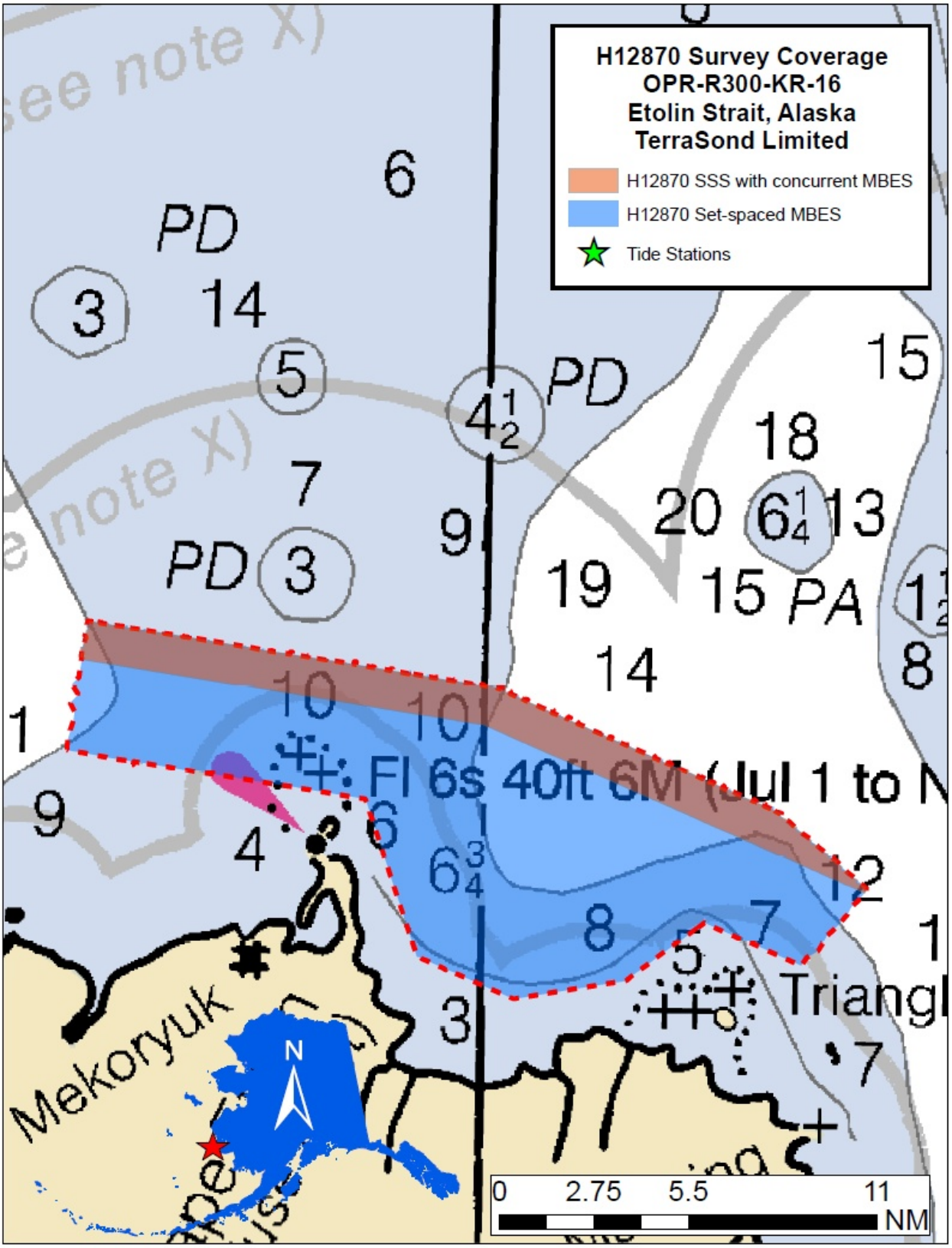


Figure 2: Survey overview showing coverage.

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	273	129	402
	Lidar Mainscheme	0	0	0
	SSS Mainscheme	0	0	0
	SBES/SSS Mainscheme	0	0	0
	MBES/SSS Mainscheme	194	104	298
	SBES/MBES Crosslines	81	9	90
	Lidar Crosslines	0	0	0
Number of Bottom Samples				10
Number Maritime Boundary Points Investigated				0
Number of DPs				0
Number of Items Investigated by Dive Ops				0
Total SNM				120

Table 2: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
07/02/2016	184
07/03/2016	185
07/12/2016	194
07/13/2016	195
07/20/2016	202
07/29/2016	211
07/30/2016	212
07/31/2016	213
08/02/2016	215

Table 3: 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	*Qualifier 105*	*ASV-CW5*
LOA	32 meters	5.5 meters
Draft	1.8 meters	0.5 meters

Table 4: Vessels Used

The Qualifier 105 (Q105) is a 32 m aluminum hull vessel owned and operated by Support Vessels of Alaska. The Q105 acquired all multibeam data and provided housing and facilities for on-site data processing. The

vessel also collected bottom samples, deployed BMPG tide gauges, and deployed/recovered 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 SSS and MBES data in close proximity to the Q105.

Refer to the DAPR for vessel photos, offset diagrams, and more information on vessel operations.

B.1.2 Equipment

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

Manufacturer	Model	Type
Teledyne Reson	Seabat 7101	MBES
Applanix	POSMV 320 V5	Positioning and Attitude
Applanix	POSMV 320 V4	Positioning and Attitude
Valeport	Rapid SVT 200Bar	Sound Speed Profiler
Teledyne Oceanscience	RapidCAST	Sound Speed Profiler Deployment System
Trimble	5700	Base Station
Sea-Bird Electronics	SBE 26+	Submerged Tide Gauge
DAA (YSI - Xylem)	WaterLOG H-350XL	Vented Tide Gauge
AML Oceanographic	MinosX with Xchange Sensors	Conductivity and Temperature Gauges
EdgeTech	4200-MP	SSS

Table 5: Major Systems Used

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

B.2 Quality Control

B.2.1 Crosslines

Crosslines acquired for this survey totaled 12.86% of mainscheme acquisition.

Crosslines were acquired in accordance with the requirements described in Section 5.2.4.3 of the 2016 HSSD. Effort was made to ensure crosslines had good temporal and geographic distribution, were run so as to enable maximal nadir-to-nadir comparisons, and percent of mainscheme LNM requirements were achieved (4% for complete coverage areas, and 8% for set-spacing coverage areas). Since the complete coverage areas utilized SSS, and therefore, had minimal MBES swath overlap in many locations, the higher standard of 8% was assumed (and achieved) sheet-wide.

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 ran parallel lines, crosslines were often collected in sets, with one vessel on each adjacent line.

The crossline analysis was conducted using CARIS HIPS “QC Report” routine. Every crossline was selected and run through the process, which calculated the depth difference between each accepted crossline sounding and a QC BASE (CUBE-type, 2 m resolution) surface’s depth layer created from the mainscheme data. QC BASE surfaces were created with the same parameters used for 2 m surfaces as the final surfaces, with the important distinction that the QC BASE surfaces did not include crosslines so as to not bias the QC report results. Differences in depth were grouped by beam number and statistics computed, which included the percentage of soundings with differences from the BASE surface falling within IHO Order 1. When at least 95% of the sounding differences exceed IHO Order 1, 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.

Results: Agreement between the BASE surfaces and crossline soundings is excellent. The vast majority of crossline comparisons pass with 95% (or more) of soundings comparing to within IHO Order 1.

Failures were investigated and revealed that the primary cause was vertical busts due to tidal error. One crossline, C5XL08, out of 55 total crosslines was found to have failing beams in the outer part of the swath. 14 of the beams failed to meet the 95% threshold, with the minimum percentage being 89%. Despite the failure, final surfaces are within specifications.

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:

Measured	Zoning	Method
0.038 meters	0.148 meters	TCARI

Table 6: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Surface
Qualifier 105	0 meters/second	1.036 meters/second	0.025 meters/second
ASV-CW5	0 meters/second	1.036 meters/second	0.025 meters/second

Table 7: Survey Specific Sound Speed TPU Values.

All soundings were assigned a horizontal and vertical value for estimated total propagated uncertainty (TPU). Refer to the DAPR for more detail concerning the parameters and methods used for computation of sounding uncertainty.

Note that fixed tide error values (0.038 m measured, 0.148 m zoning) entered during TPU computation were project-wide error averages for tide zones that were ignored by CARIS during TPU computation in favor of real-time tide error estimates loaded coincident with the TCARI model. Therefore, these static error estimates for tide zoning error did not affect final TPU computations.

Real-time error estimates for attitude, positioning, and tide were used over fixed error estimates defined in the HVF. Exceptions, if they exist, are listed in Section B.3 of this report.

The BASE surfaces were finalized in CARIS HIPS, so that the final 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 IHO Order 1. Uncertainty for the surfaces ranged from 0.24 m to 0.75 m for the 1 m surface, 0.23 m to 0.92 m for the 2 m surface, and 0.22 m to 0.57 m for the 4 m surface.

The vast majority of grid cells have uncertainty values within IHO Order 1. Few exceeded IHO Order 1. 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 exhibiting sound speed or motion artifact error, or tidal error. Despite elevated TPU values for these grid cells, the data is within specifications.

B.2.3 Junctions

This survey junctions with two contemporary surveys: H12869 and H12871. These surveys were conducted concurrently with this survey as part of the overall project, OPR-R300-KR-16.

Difference surface methodology was used for the junction comparison. The depth layer from 2 m resolution CUBE surfaces from each survey were differenced from each other in CARIS HIPS, resulting in a difference surface. Values were extracted and statistics generated to quantify agreement. Any areas of significant disagreement, generally those exceeding IHO Order 1, were investigated to determine the cause.

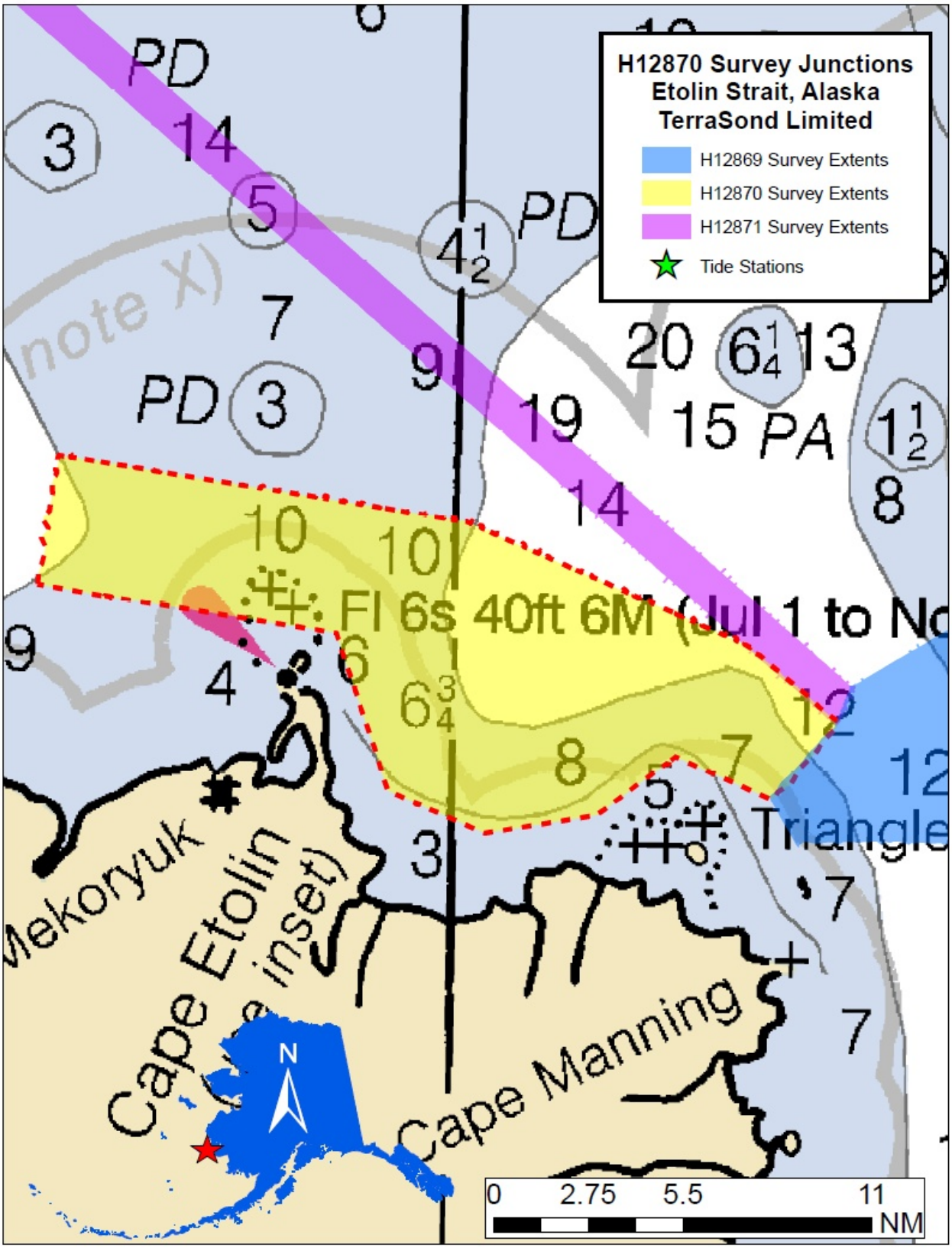


Figure 3: Survey junctions with this sheet.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H12869	1:40000	2016	TerraSond	SE
H12871	1:40000	2016	TerraSond	E

Table 8: Junctioning Surveys

H12869

Agreement is excellent, averaging 0.134 m, with a standard deviation of 0.188 m, with differences falling in a range of -0.722 to 0.526 m. Few exceed IHO Order 1. Those exceeding IHO Order 1 were examined and determined to be primarily due to tidal bust. Only isolated or small groupings of grid cells in the difference surface failed to meet specifications, rather than the entire line.

H12871

Agreement is excellent, averaging 0.082 m, with a standard deviation of 0.164 m, with differences falling in a range of -0.591 to 0.571 m. All agree within IHO Order 1.

B.2.4 Sonar QC Checks

Echosounder confidence checks consisting of bar checks, lead lines, and inter-vessel acoustic comparisons were undertaken on this project. Results were good, with agreement averaging 0.009 m for bar checks, 0.190 m for lead lines, and 0.059 m for inter-vessel acoustic comparisons . Refer to the bar check, lead line, and echosounder depth comparison logs available in Separate I: Acquisition and Processing Logs for specific results. Refer to the project DAPR for more information regarding QC checks methodology.

B.2.5 Equipment Effectiveness

7101 Beam Pattern

A distinct beam pattern was obvious in the data set in certain areas, with a fuzziness or “horn” like features on both sides of nadir on multibeam swaths, coinciding with the bottom detection shift from phase to amplitude detection. The pattern is common with Reson 8101/7101 multibeam echosounders in certain bottom types. Power and range settings were adjusted in acquisition to minimize the issue, with little effect. However, the “horns,” which can be as great as 0.20 m in height, appear to be largely ignored by the CUBE algorithm during surface creation, with minimal effect on the final surfaces.

7101 Errant Pings

Errant or bad pings is evident periodically in the multibeam swath data. This occurred regularly on both 7101 systems. The issue manifests itself as a single ping, or swath, that is skewed (or rolled) from the seafloor at an angle. The cause is unknown, but does not correlate to any spikes in attitude data. These were normally removed manually during swath edit review, resulting in small along-track gaps as viewed in swath editor plan view. However, since only single pings were affected and ping rates were high (generally 10 or more per second), there is no significant detrimental effect on data density. Unrejected errant pings in the dataset may remain, but do not have significant detrimental effect on final surface quality.

B.2.6 Factors Affecting Soundings

Sound Speed Error

A general downward or upward across-track cupping in multibeam data, indicative of sound speed error, is present sporadically in the data set. The sound speed error adversely affected outer beams by up to 0.30 m in places. To minimize the error, sound speed profiles were collected every two hours during multibeam operations, and filters were used in processing to remove the outermost beams. The effect of sound speed error on final surfaces is relatively minor, normally not exceeding 0.20 m, and is within specifications.

Motion Artifact

Motion artifact is occasionally visible in the final multibeam surfaces. This is the result of uncompensated effects of motion, particularly due to roll. The primary contributer was motion induced on the survey vessels by poor sea states (often 1.5 m or greater), a common and unavoidable condition in this highly exposed area. A survey-grade Applanix POSMV 320 was used for motion compensation, but residual error within the manufacturer specifications for the system remains nonetheless. The problem was addressed in processing by identifying lines with the greatest error and iteratively applying more aggressive outer beam filters, in some instances rejecting beams greater than 55 degrees either side of nadir. No adjustments to line spacing were made in acquisition to compensate for the rejected outer beam data because complete MBES coverage was not required. Following the additional filtering, the effect on the final surface is normally 0.25 m or less, which is within specifications.

Note that the ASV-CW5, at 3.5 m in length was a much smaller survey platform than the Q105 at 32 m in length, and therefore, experienced greater induced motion at the same sea states, resulting in more motion artifact for lines run simultaneously.

Tide Error

Periodic vertical offsets or “busts” is present sporadically in the data set. Tide busts of 0.3 m are relatively common, with some up to 0.4m. These were investigated and determined to be primarily caused by tide error. Lines run close in time showed good agreement, but lines at different tidal states showed the worse agreement. Tides are complex in this area and it is apparent the final TCARI model does not fully

compensate for tides here. Note that the vast majority of crossline comparisons pass within IHO Order 1. Final surfaces are within specifications despite tide error.

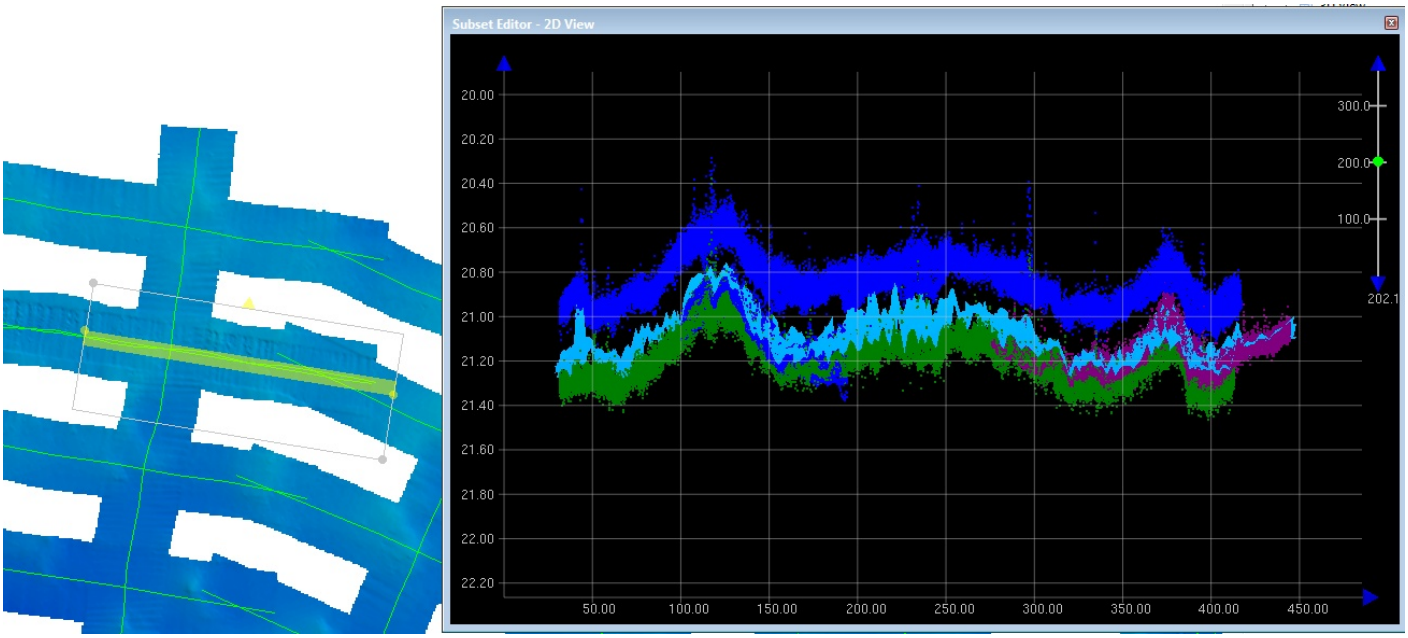


Figure 4: Example tide busts in MBES data. Separation of up to 0.4 m on lines. 2 m final surface is shown in light blue.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: 2 hours

Sound speed profiles or "casts" were acquired aboard the Q105 while underway with an Oceanscience RapidCAST system, which utilized a Valeport sound speed profiler. The interval between subsequent casts was normally 2 hours. The sound speed sensor was lowered as close as possible to the seafloor, and then retracted to the vessel and downloaded. When surveying lines covering widely varying water depths, casts were favored in the deeper portions to ensure the entire water column was captured.

The ASV-CW5 vessel was not equipped to collect sound speed profiles. Instead, the profile data collected aboard the Q105 was used to correct all ASV-CW5 data. This was possible because the ASV-CW5 worked simultaneously and in close proximity (usually within 200 to 800 m) of the Q105 at all times.

Up and down portions of the profiles were averaged and a combined profile at a standardized 0.10 m depth increment was output to CARIS SVP format with time and position. Sound speed profiles were applied with the “nearest in distance within time” method in CARIS HIPS, with time set to two hours. Exceptions, if they occurred, are listed in section B.3 of this report.

B.2.8 Coverage Equipment and Methods

Refer to the DAPR, section B.2.4 "Data Coverage and Density," for details on the equipment, software, and methodology used to meet object detection, coverage, and data density requirements.

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.

Sound speed exception: The following lines were sound speed corrected using nearest in distance within 3 hours (instead of 2 hours):

0314-ASV-202-C5FS06_-_0004
0381-Q105-202-C5FS05_-_0003
0381-Q105-202-C5FS05_-_0004

TrueHeave, SBET, and SMRMSG exception: The following line does not have post-processed products TrueHeave (Delayed Heave), SBET, or SMRMSGs applied because the raw POS file did not fully encompass it. Real-time positioning, heave, and attitude data was used instead. TPU utilized static values from the HVF since SMRMSG data was unavailable.

0178-ASV-194-C2SS20_-_0001
*Due to a regeneration of the *.hips file, real-time navigation was applied to all data instead of SBET navigation. This does not impact the application of roll, pitch, and gyro applied by the SBETs nor impact the quality of the data.*

B.3.2 Calibrations

Calibrations were undertaken as described in the DAPR. No deviations occurred.

B.4 Backscatter

Multibeam backscatter was logged at all times during this survey, but not processed. Raw DB and XTF files, submitted with the survey deliverables, contain the backscatter records.

B.5 Data Processing

B.5.1 Primary Data Processing Software

The following Feature Object Catalog was used: V5.4
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
H12870_MB_4m_MLLW_Final	CUBE	4 meters	0 meters - 80 meters	NOAA_4m	Set-spaced MBES
H12870_MB_2m_MLLW_Final	CUBE	2 meters	18 meters - 40 meters	NOAA_2m	Complete MBES
H12870_MB_1m_MLLW_Final	CUBE	1 meters	0 meters - 20 meters	NOAA_1m	Complete MBES
H12870_SSS_1m_100-C1	SSS Mosaic	1 meters	0 meters - 40 meters	N/A	100% SSS, block C1
H12870_SSS_1m_100-C2	SSS Mosaic	1 meters	0 meters - 40 meters	N/A	100% SSS, block C2
H12870_SSS_05m_100-C5	SSS Mosaic	0.5 meters	0 meters - 40 meters	N/A	100% SSS, block C5

Table 9: Submitted Surfaces

The final depth information for this survey was submitted as three CARIS BASE surfaces (CSAR format) and three georeferenced SSS mosaic images, which best represented the seafloor at the time of the 2016 survey. The surfaces and images were created from fully processed data with all final corrections applied.

MBES Data:

The MBES surfaces were created using NOAA CUBE parameters and resolutions in conformance with the 2016 HSSD. Corridor (full coverage) area surfaces were generated in accordance with section 5.2.2.3 (Complete Coverage) while the set-spacing area surface was generated in accordance with section 5.2.2.4 (Set Line Spacing). Surfaces were finalized, and designated soundings were applied, where applicable. Horizontal projection was selected as UTM Zone 3 North, WGS84.

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

File names for final surfaces was done in accordance with section 8.3.2 (Bathymetric Data) of the 2016 HSSD for MBES data.

SSS Data:

SSS mosaics were exported from SonarWiz as georeferenced TIFF images at 1 m resolution. These are projected as WGS84 UTM Zone 3N. A world file (TFW) accompanies each TIFF image to provide the georeferencing.

SSS filenames are as specified in section 8.2.1, with the addition of an area or block designation at the end of filenames. Singular SSS images for this survey was not practical due to extremely large GeoTIFF file sizes that would result from combined images. Therefore, images were created by survey block, and the block name added as a suffix to the filenames. In this survey area, block "C1" was the western part of the complete coverage corridor and "C2" was the eastern part. "C5" was an area of unplanned coverage obtained while searching for charted rocks located in the set-spacing area and is included for reference.

Supplementary Data:

A CARIS HOB file was submitted (H12870_FFF.HOB) 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.

A CARIS HOB file containing SSS contacts (H12870_SSS_Contacts.HOB) was also submitted. This file contains significant contacts, if any, found during SSS review. Significant contacts were those identified in the SSS record as having height above the seafloor of 1 m, or greater, in depths less than 20 m, and heights of 10%, or greater, of water depth in depths 20 m and deeper. The 10% allowance is an exception granted for this project by NOAA (see correspondence) to the 5% requirement described in the 2016 HSSD. In this area, contacts were more common in deep water than in shallow water, and this exception was made to limit the number of contacts requiring multibeam development in deeper water, and therefore, facilitate the survey of additional areas over performing multibeam developments. This was considered acceptable given that vessels of 20 m draft are extremely unlikely to attempt transiting this area given its shoal approaches.

Each object is encoded with mandatory S-57 attributes, additional attributes, and NOAA Extended Attributes (V#5.4).

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.

Traditional Methods Used:

TCARI

The following subordinate water level stations were established for this survey:

Station Name	Station ID
Nelson Island	9466298
Eastern Nunivak Island	9466012
Kipnuk	9465953
Offshore South Nunivak	9465683

Table 10: Subordinate Tide Stations

There was no Water Level file associated with this survey.

File Name	Status
r300kr2016_rev.tc	Final

Table 11: Tide Correctors (.zdf or .tc)

In addition to the subordinate tide station installed to support the project, submerged BMPG (bottom mounted pressure gauges) were also deployed throughout the survey area to capture zoning characteristics. These zoning gauges were used for QC purposes only. All data has been submitted to CO-OPS.

A final TCARI grid covering the survey area was issued on January 13th, 2017. However, the grid file was revised and reissued (filename "r300kr2016_rev.tc") on January 26th, 2017. This revised grid "r300kr2016_rev.tc" demonstrated better results in general and was applied to all data.

C.2 Horizontal Control

The horizontal datum for this project is WGS84.

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

The following PPK methods were used for horizontal control:

Single Base

The project base continuously logged GPS data at 1 Hz and was utilized to post-process position data in Applanix POSPac MMS software. The Continually Operating Reference Station (CORS) site at Mekoryuk, station ID "AB08," was used for preliminary post-processing in the field, quality control checks for the project base station, and for final positions in rare instances where the project base station experienced outages. All real-time positions for both vessels were replaced in processing with post-processed kinematic (PPK) solutions, with few exceptions (noted where applicable earlier in this report).

Quality control confidence checks were performed at least weekly on the survey vessels as well as the base station position. RMS error estimates for positioning results were very good, with RMS error estimated at 0.10 m (or better). Refer to the project DAPR for additional details on quality control checks and results.

WAAS was used for real-time corrections in the field, but was replaced in post-processing with the PPK solution, as described in the DAPR.

Note: Final positions are WGS84 (instead of NAD83) per Section 2.1 of the 2016 HSSD, which was the governing guidance during the time of field operations.

The following user installed stations were used for horizontal control:

HVCR Site ID	Base Station ID
0056	Toksook Bay

Table 12: User Installed Base Stations

D. Results and Recommendations

D.1 Chart Comparison

The chart comparison was performed by examining all Raster Navigational Charts (RNCs) and Electronic Navigational Charts (ENCs) that intersect the survey area. The latest editions available at the time of the review (February 10th, 2017) 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. Results are shown in the following sections.

It is recommended that in all cases of disagreement this survey supersede charted data.

USCG Notice to Mariners (NM) and USCG Local Notice to Mariners (LNM) were checked for updates affecting the area. None were found that were issued subsequent to issuance date of the project instructions, nor prior to the completion of operations that affect the survey area.

D.1.1 Raster Charts

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

Chart	Scale	Edition	Edition Date	LNM Date	NM Date
16006	1:1534076	37	12/2015	01/17/2017	01/21/2017

Table 13: Largest Scale Raster Charts

<u>16006</u>

This survey fully intersects only a small number of charted soundings. Sounding agreement is mixed. Most charted soundings agree with this survey to within 1 fathom. Those with agreement exceeding 1 fathom are itemized below.

1. Depth in the vicinity of charted 7 fathom sounding at 60-23-47 N, 165-43-06 W was found to be approximately 10.5 fathoms.

2. Depth in the vicinity of charted 6 fathom sounding at 60-26-28 N, 166-05-42 W was found to be approximately 8.5 fathoms.

Agreement was also examined for significant trends. None was noted.

See included figure that shows soundings from this survey overlaid on chart 16006.

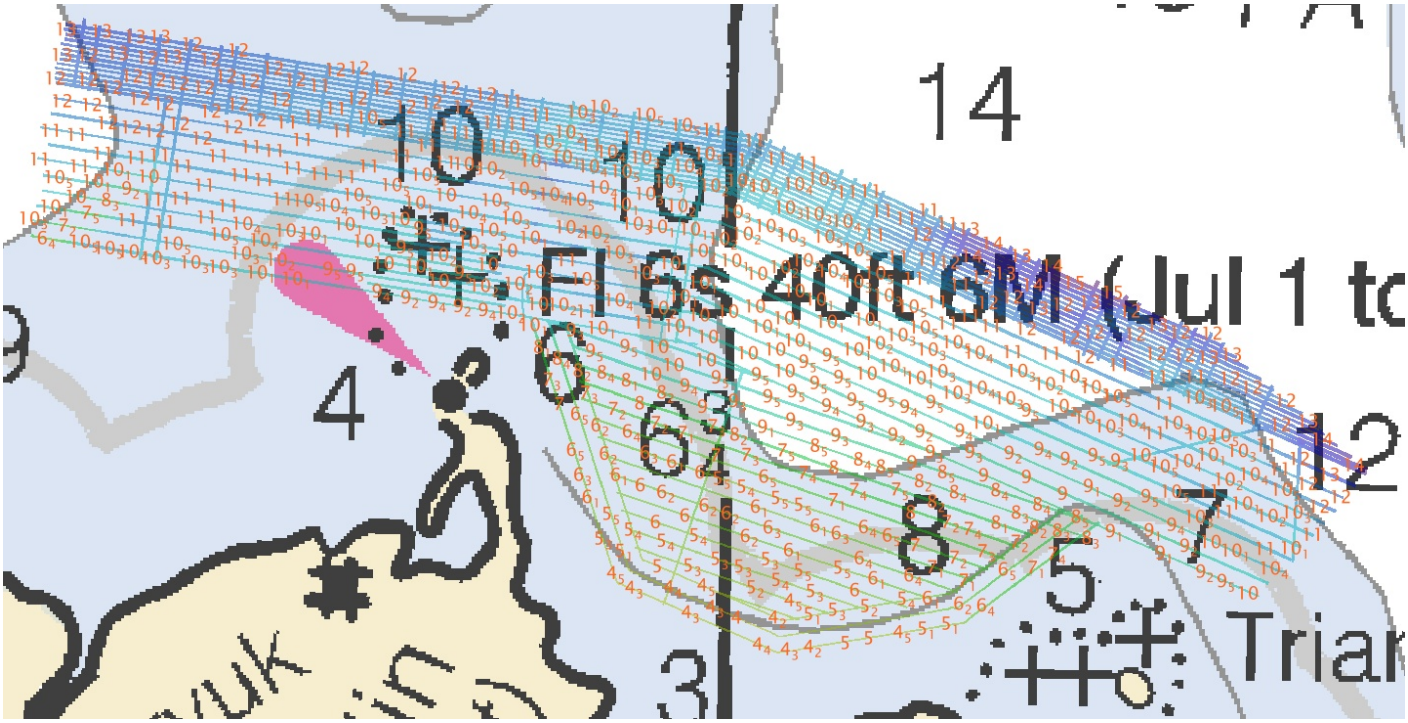


Figure 5: Soundings from this survey (orange) shown on chart 16006. Soundings are shown in fathoms and feet.

D.1.2 Electronic Navigational Charts

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

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US2AK95M	1:1534076	4	08/29/2016	08/29/2016	NO

Table 14: Largest Scale ENCs

US2AK95M

The same differences observed for the RNC apply to the ENC.

D.1.3 Maritime Boundary Points

No maritime boundary points were assigned for this survey.

D.1.4 Charted Features

There are no charted features labeled PA, ED, PD, or Rep. within the survey extents.

D.1.5 Uncharted Features

No uncharted features were found during this survey.

D.1.6 Dangers to Navigation

The following DTON reports were submitted:

DTON Report Name	Date Submitted
H12870_DTON_Sounding	2016-08-29

Table 15: DTON Reports

One DTON report was made for this survey.

A sounding was submitted as a DTON with a depth of 12.560 m (6 3/4 fathoms) at 60-25-06.027 N, 166-02-05.744 W. Previously, chart 16006 indicated a depth of 12 fathoms in the area. The DTON is now accurately reflected on the chart.

Note that the DTON sounding depth was submitted using preliminary corrections. Depth at the DTON locations may differ slightly due to the application of final correctors, including tides.

Correspondence relating to DTONs as well as DTON reports can be found in Appendix II. Submitted DTONs are included in the FFF for reference.

D.1.7 Shoal and Hazardous Features

Two charted rocks were assigned for investigation in the Composite Source File (CSF) provided with the work instructions. The charted locations lay within the extents of the set-spacing area.

The area was easily navigated by both survey vessels, finding minimum depths of 9 fathoms, and no hazardous seafloor features were observed. A search radius was not assigned, but the area was investigated using MBES line splits and SSS coverage. SSS did not fully overlap for the entire area, but covered the charted positions. Small rocks were apparent on the seafloor, but none that were hazardous to navigation.

However, during survey, rocks awash were observed closer to shore to the south, outside of the survey limits. It is probable that the observed rocks were the charted rocks, but that the rocks were cartographically adjusted to the charted position because of the small scale of chart 16006.

It is recommended that the two rocks be deleted as charted. If scale allows, they should be charted to the south, outside of the survey limits. The OBSTRN area object surrounding the rocks also requires modification.

D.1.8 Channels

No channels exist in the survey area.

D.1.9 Bottom Samples

Bottom samples were collected for this survey.

Ten samples were assigned. Nine were originally assigned in the PRF, but an additional sample was added when the eastern survey extent was adjusted eastward, as described earlier in this report. The affected sample (assigned location 60-25-37.460 N, 165-39-46.883 W) was originally assigned to the junctioning survey H12869.

Samples were successfully obtained at all ten locations. Primary constituents were a wide range of material, from silt to cobbles.

Samples were not retained. However, photos were taken of most samples prior to discarding. Bottom characteristics were encoded as SBDARE objects in the FFF, with any applicable photos in the accompanying "multimedia" directory, included with the survey deliverables.

D.2 Additional Results

D.2.1 Shoreline

Shoreline existed to the south of the survey area, but investigation was not required. Two charted rocks assigned for investigation were discussed previously in this report.

D.2.2 Prior Surveys

Comparison with prior surveys was not required. However, Junction analysis, described previously in this report, was undertaken for overlapping contemporary surveys.

D.2.3 Aids to Navigation

No ATONs were assigned, or fell within the survey extents. However, a nearby ATON was observed during field operations:

ATON light at 60-25-48.313 N, 166-09-38.013 W charted on chart 16006 with characteristics "Fl 6s 40ft 6M Jul 1 to Nov 1" was observed during this survey. It appeared to be functional and serving its intended purpose.

D.2.4 Overhead Features

No overhead features existed within the survey area.

D.2.5 Submarine Features

There are no submarine features of special note.

D.2.6 Ferry Routes and Terminals

Ferry routes and terminals do not exist within the survey area.

D.2.7 Platforms

Platforms do not exist within the survey area.

D.2.8 Significant Features

Any significant features and conditions encountered have been described previously.

D.2.9 Construction and Dredging

No construction or dredging was occurring within the survey extents, nor are there any known future plans for construction or dredging in the survey area.

D.2.10 New Survey Recommendation

No new surveys are recommended in this area.

D.2.11 Inset Recommendation

No new chart insets are recommended in this area.

E. Approval Sheet

Field operations contributing to the completion of survey H12870 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 and forwarded for final review.

The survey data was collected in accordance with the project Work Instructions and Statement of Work, and meets or exceeds the requirements set in the 2016 NOS Hydrographic Surveys and Specifications Deliverables (HSSD) document. This data is adequate to supersede charted data in common areas. This survey is complete and no additional work is required with the exception of any deficiencies, if any, noted in this Descriptive Report. The Data Acquisition and Processing Report (DAPR) and Horizontal and Vertical Control Report (HVCR) were submitted concurrently with this report and the survey deliverables. Other significant required reports or data packages submitted separately are listed below.

Report Name	Report Date Sent
Coast Pilot Review (OPR-R300-KR-16_Coast Pilot Review Report)	2017-02-13
NCEI Sound Speed Data	2016-12-20
Trained Marine Mammal Observers Logsheet	2016-11-21
Marine Mammal Observation Logs	2016-11-17
Tides and Water Levels Package and Reports (one for each project tide station)	2016-10-21

Approver Name	Approver Title	Approval Date	Signature
Andrew Orthmann, C.H.	TerraSond Charting Program Manager	03/05/2017	Andrew Orthmann Digitally signed by Andrew Orthmann Date: 2017.03.05 17:48:54 -09'00'

APPENDIX II

Supplemental Survey Records and Correspondence

Contents:

1. DTON recommendation(s) and NDB verification(s) (if any)
2. Other survey-related correspondence

See Appendix I for correspondence directly relating to tides and water levels.

Andrew Orthmann

From: OCS NDB - NOAA Service Account <ocs.ndb@noaa.gov>
Sent: Tuesday, August 30, 2016 13:46
To: Grant Froelich - NOAA Federal
Cc: Andrew Orthmann; Katrina Wyllie - NOAA Federal; _NOS OCS PBA Branch; _NOS OCS PBB Branch; _NOS OCS PBC Branch; _NOS OCS PBD Branch; _NOS OCS PBE Branch; _NOS OCS PBG Branch; Benjamin K Evans; Castle E Parker; James M Crocker; Matt Kroll; NSD Coast Pilot; Pearce Hunt; Tara Wallace
Subject: Fwd: OPR-R300-KR-16 DTON Reports
Attachments: H12870_DTON.zip; H12950_DTON.zip

DD-27604 and DD-27609 have been registered by the Nautical Data Branch and directed to Products Branch A for processing.

The DtoNs reported are two shoals in Etolin Strait, AK.

The following chart is affected:
16006 kapp 2411

The following ENC is affected:
US2AK95M

References:
DD-27604: H12870

DD-27609: H12950
OPR-R300-KR-16

This information was discovered by a NOAA contractor and was submitted by PHB.

Nautical Data Branch/Marine Chart Division/
Office of Coast Survey/National Ocean Service/
Contact: ocs.ndb@noaa.gov

---------- Forwarded message ----------
From: **Grant Froelich** <grant.froelich@noaa.gov>
Date: Tue, Aug 30, 2016 at 11:40 AM
Subject: OPR-R300-KR-16 DTON Reports
To: OCS Service Account <ocs.ndb@noaa.gov>
Cc: Andrew Orthmann <aorthmann@terrasond.com>, Katrina Wyllie <katrina.wyllie@noaa.gov>

Hello,

Please find two DTON reports attached for dangers to navigation discovered by NOAA Contractor TerraSond during survey operations for project OPR-R300-KR-16.

thanks

grant
--

Hydrographic Team Lead
NOAA's National Ocean Service
Office of Coast Survey, Hydrographic Surveys Division
Pacific Hydrographic Branch, N/CS34
7600 Sand Point Way N.E.
Seattle, WA 98115-6349

w: (206)526-4374 | grant.froelich@noaa.gov

Andrew Orthmann

From: Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
Sent: Friday, February 24, 2017 09:25
To: Andrew Orthmann
Subject: Re: FW: [TOMIS] Weekly Report

Hi Andy,

Sorry about that, I forgot to update TOMIS after the mod went through. I think it should all be fixed now and I added a March progress report slot. And yes, the transmittal letter will work.

Katrina

On Fri, Feb 24, 2017 at 12:52 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

Hi Katrina, I am getting these notices from TOMIS that deliverables are due 2/28.

Also, I am wondering what form the deliverable should have to TOMIS. Would just the submittal/transmittal letter do?

Also, it currently doesn't have a slot for a February progress report, could you add that please?

Thank you,

Andy

-----Original Message-----
From: TOMIS [mailto:Database.Mail@noaa.gov]
Sent: Friday, February 24, 2017 07:23
To: Andrew Orthmann <aorthmann@terrasond.com>
Subject: [TOMIS] Weekly Report

This is the TOMIS weekly email report for Andrew Orthmann.

The following deliverable(s) are currently delinquent or due within the next 30 days:

Deliverable: H12951
Due Date: 02/28/2017
Task Order: OPR-R300-KR-16
Submit this deliverable: https://coast.noaa.gov/tomis/_n/deliverable/submit/76778

Deliverable: H12950
Due Date: 02/28/2017

Task Order: OPR-R300-KR-16
Submit this deliverable: https://coast.noaa.gov/tomis/_n/deliverable/submit/76777

Deliverable: H12949
Due Date: 02/28/2017
Task Order: OPR-R300-KR-16
Submit this deliverable: https://coast.noaa.gov/tomis/_n/deliverable/submit/76776

Deliverable: H12948
Due Date: 02/28/2017
Task Order: OPR-R300-KR-16
Submit this deliverable: https://coast.noaa.gov/tomis/_n/deliverable/submit/76775

Deliverable: OPR-R300-KR-16 DAPR
Due Date: 02/28/2017
Task Order: OPR-R300-KR-16
Submit this deliverable: https://coast.noaa.gov/tomis/_n/deliverable/submit/75862

Deliverable: H12871
Due Date: 02/28/2017
Task Order: OPR-R300-KR-16
Submit this deliverable: https://coast.noaa.gov/tomis/_n/deliverable/submit/75861

Deliverable: H12870
Due Date: 02/28/2017
Task Order: OPR-R300-KR-16
Submit this deliverable: https://coast.noaa.gov/tomis/_n/deliverable/submit/75860

Deliverable: H12869
Due Date: 02/28/2017
Task Order: OPR-R300-KR-16
Submit this deliverable: https://coast.noaa.gov/tomis/_n/deliverable/submit/75859

Deliverable: H12868
Due Date: 02/28/2017
Task Order: OPR-R300-KR-16
Submit this deliverable: https://coast.noaa.gov/tomis/_n/deliverable/submit/75858

The following progress report(s) are delinquent:

No delinquent progress reports at this time.

You are receiving this message because you are currently enrolled to receive weekly email reports from TOMIS. You may update your settings on your profile page:
https://coast.noaa.gov/tomis/_n/profile

Andrew Orthmann

From: Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
Sent: Wednesday, February 22, 2017 13:27
To: Andrew Orthmann
Subject: Re: dton opinion

Thanks, Andy

On Wed, Feb 22, 2017 at 5:26 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

> Okay, that sounds good to me. I'll get that in. Thank you Katrina,
>
> Andy
>
> **From:** Katrina Wyllie - NOAA Federal [mailto:katrina.wyllie@noaa.gov]
> **Sent:** Wednesday, February 22, 2017 13:13
> **To:** Andrew Orthmann <aorthmann@terrasond.com>
> **Subject:** Re: dton opinion
>
> Yup, exactly.
>
> On Wed, Feb 22, 2017 at 5:02 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:
>
> > So you are thinking perhaps a DTON submission is in order, but use the 2 fathom 3 foot sounding that is on the north side of the 6 ?
> >
> > **From:** Katrina Wyllie - NOAA Federal [mailto:katrina.wyllie@noaa.gov]
> > **Sent:** Wednesday, February 22, 2017 12:58
> > **To:** Andrew Orthmann <aorthmann@terrasond.com>
> > **Subject:** Re: dton opinion
> >
> > Hi Andy,

I think submitting the single 2.3 over the charted 6 will take care of both concerns. But if you decide more than one sounding is appropriate for this area, you can definitely put that in one DtoN submission.

Katrina

On Wed, Feb 22, 2017 at 3:48 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

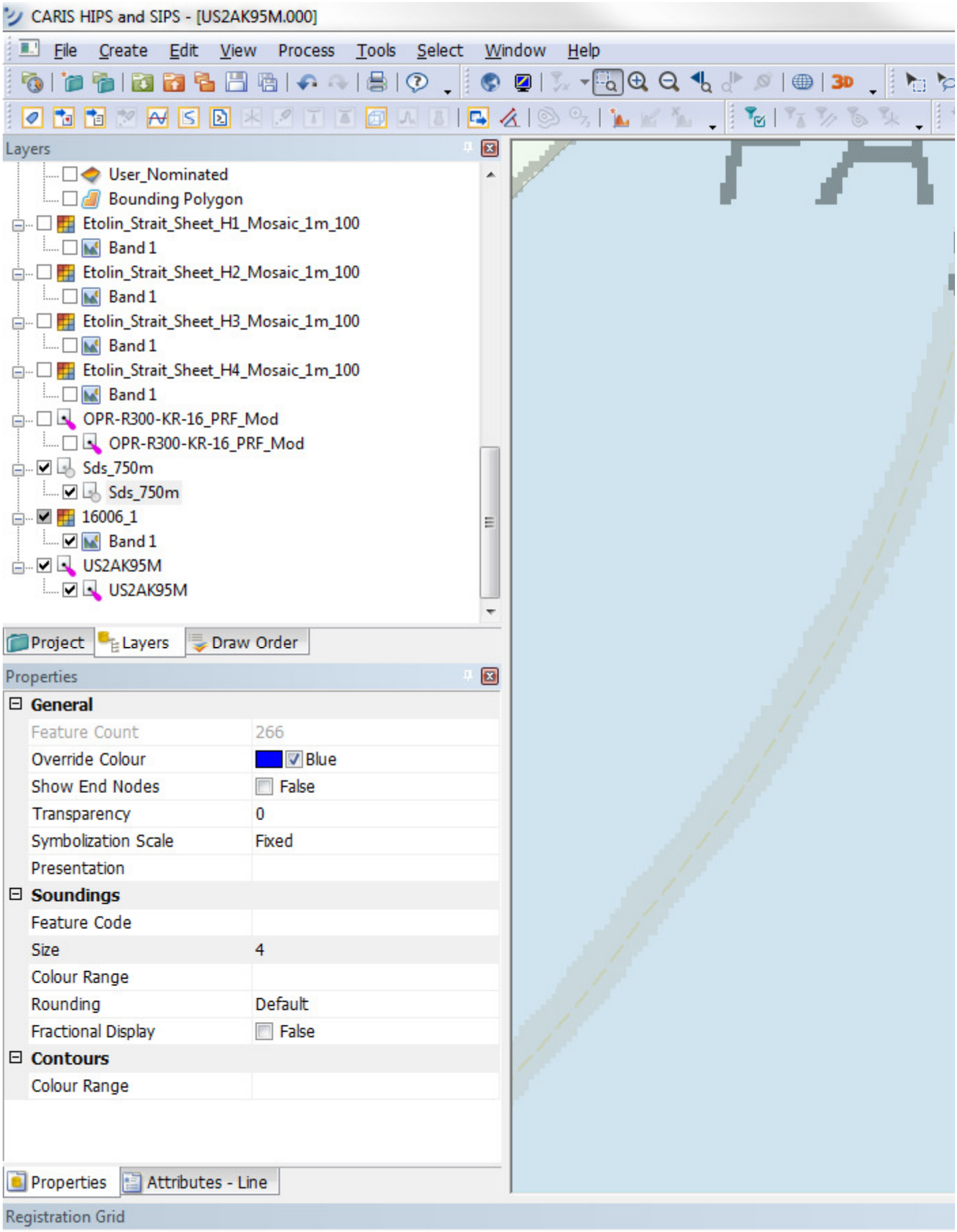
Hi Katrina,

Doing the chart compare for H12951 at the moment. I see a couple more potential DTON soundings, but I can't remember if we discussed these when you were here and perhaps decided not to submit them, or if I just haven't noticed them until now. Been so long at this point.

This is that area where the unexpected shoal was in the middle of the survey area. The charted 2 ¼ sounding is from our original DTON submission in August. But to the south of it there are charted 7 and 6 fathom soundings where actual depth is 4 and 3 ½ fathoms, respectively. Perhaps we decided not to submit on the 7 and 6 because the 2 ¼ fathom DTON was the shoalest in the area.

Your thoughts? Here is a screengrab below, soundings are in fathoms / feet. If you want me to submit these, do you know if I can put both the 7 and 6 in the same DTON submission, especially since they are right next to each other?

Andy


CARIS HIPS and SIPS - [US2AK95M.000]
File Create Edit View Process Tools Select Window Help
Layers
User_Nominated
Bounding Polygon
Etolin_Strait_Sheet_H1_Mosaic_1m_100
Band 1
Etolin_Strait_Sheet_H2_Mosaic_1m_100
Band 1
Etolin_Strait_Sheet_H3_Mosaic_1m_100
Band 1
Etolin_Strait_Sheet_H4_Mosaic_1m_100
Band 1
OPR-R300-KR-16_PRF_Mod
OPR-R300-KR-16_PRF_Mod
Sds_750m
Sds_750m
16006_1
Band 1
US2AK95M
US2AK95M
Project
Layers
Draw Order
Properties
General
Feature Count 266
Override Colour Blue
Show End Nodes False
Transparency 0
Symbolization Scale Fixed
Presentation
Soundings
Feature Code
Size 4
Colour Range
Rounding Default
Fractional Display False
Contours
Colour Range
Properties
Attributes - Line
Registration Grid

Andrew Orthmann

From: Andrew Orthmann
Sent: Tuesday, February 21, 2017 09:38
To: 'Emily Clark - NOAA Federal'
Subject: RE: EA-133C-14-CQ-0036 T-0002/0002

Received; thank you Emily.

From: Emily Clark - NOAA Federal [mailto:emily.clark@noaa.gov]
Sent: Tuesday, February 21, 2017 04:16
To: Andrew Orthmann <aorthmann@terrasond.com>
Cc: Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
Subject: Re: EA-133C-14-CQ-0036 T-0002/0002

Andrew,

Attached is the final executed signed copy.

Thanks

v/r,

Emily

On Mon, Feb 20, 2017 at 1:48 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

> Hi Emily, here you go.
>
> **From:** Emily Clark - NOAA Federal [mailto:emily.clark@noaa.gov]
> **Sent:** Friday, February 17, 2017 07:03
> **To:** Andrew Orthmann <aorthmann@terrasond.com>
> **Cc:** Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
> **Subject:** EA-133C-14-CQ-0036 T-0002/0002
>
> Andrew,
>
> Attached is modification 0002 for the subject contract task order. This extends the period of performance through March 13, 2017.

Please review, sign, and return to me at your earliest convenience.

Thanks

--

v/r,

Emily Clark

Contract Specialist, NOAA AGO

Eastern Region Acquisition Division

Supporting National Ocean Service

200 Granby Street, Suite 815

Norfolk, VA 23510

Phone: 757-441-6875

--
v/r,

Emily Clark
Contract Specialist, NOAA AGO
Eastern Region Acquisition Division
Supporting National Ocean Service
200 Granby Street, Suite 815
Norfolk, VA 23510
Phone: 757-441-6875

Andrew Orthmann

From: Andrew Orthmann
Sent: Monday, February 13, 2017 10:14
To: 'ocs.ndb@noaa.gov'; 'Coast.Pilot@noaa.gov'
Cc: Katrina Wyllie
Subject: OPR-R300-KR-16 Coast Pilot Review Report
Attachments: OPR-R300-KR-16_Coast Pilot Review Report.pdf

Please find attached the Coast Pilot Review for OPR-R300-KR-16, Etolin Strait, Alaska.

Per the 2016 HSSD, recommended text deletion is shown in strikethrough, black text denotes items not addressed, green text was verified, red is additions/modifications.

Note that many features were not addressed because they were outside of the survey limits.

Andrew Orthmann, C.H.
Charting Program Manager

TerraSond
Precision Geospatial Solutions ®
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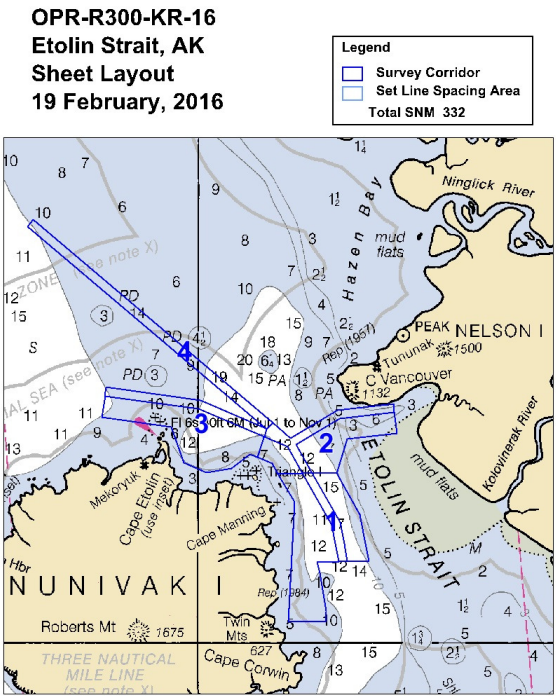

Coast Pilot Investigation Item for OPR-R300-KR-16

Etolin Strait, AK

33rd Edition of Coast Pilot 9 (26 Jun 2016)

NOS Chart 16006

Please verify the paragraphs below:

(454) Anchorage
(455) Anchorage can be found NW of Mekoryuk in 25 to 32 feet of water.

(456) In 1951, the PATHFINDER anchored on the W side of Cape Etolin, 4.5 miles NW of Mekoryuk, in 5 fathoms, sand bottom, on bearings **080°** to N tangent of Cape Etolin, **089°30'** to highest knoll on Cape Etolin, **122°** to center of schoolhouse, the largest building in Mekoryuk, and **246°** to N tangent of point 5.5 miles to the SW. From this anchorage the N tangent of Cape Etolin was open **001°30'** from the S tangent of Cape Vancouver. The anchorage was approached from W on a heading of **092°** for the highest knoll on Cape Etolin. The approach should be made with caution as the area shoals rapidly and the reference points are apt to be obscured by fog except during N winds. From the anchorage, a launch ran on a general course of **120°** toward Mekoryuk for 3 miles and obtained a minimum depth of 25 feet.

(457) Shoals covered 3 fathoms have been reported about 7.5 miles N and 15.5 miles NW from Cape Etolin, and a shoal covered 4½ fathoms has been reported 12.5 miles NNE from the cape; all with deep water surrounding them. Keeping Cape Vancouver bearing N of **086°** Cape Etolin can be rounded when coming from W in 10 fathoms. With Cape Vancouver bearing **086°** or E of this bearing, considerable shoal water and irregular depths are found.

(458) **Cape Etolin Anchorage** the bight on the E side of the cape, has fair holding ground in 2 to 5 fathoms, but is open to the NE. Near the S side, and about 0.3 mile from the head of the bight, is anchorage in 3 fathoms; the holding ground is gravel and only moderately good. Farther out, it is deeper but more exposed to the strong tidal currents and rips of **Etolin Strait** the wide passage between Nunivak Island and the mainland.

(459) Several shoals have been reported in Etolin Strait. In 1968, the U.S. Coast Guard Cutter NORTHWIND, in transiting the strait, reported that depths in some cases were found to be greater or lesser than now charted. ~~Until surveys are made of this area,~~ mariners are advised to use extreme caution.

(460) In 1971, the Coast Guard Cutter STORIS observed the following conditions on the E side of Etolin Strait: Depths of 2½ fathoms were found in 59°59.0'N., 164°56.0'W. Proceeding essentially W from that position, depths increased to 5 fathoms, then quickly shoaled to 1¾ fathoms in 60°01.0'N., 165°05.0'W. The bottom was sand and mud. The 3-fathom shoal centered in 59°49.0'N., 164°55.0'W. was found in charted position. The STORIS further reported that the depths were found to be generally as noted on chart 16006 in the area SE of the charted shoals and changes in depth were very gradual.

(461) In 1977, the NOAA Ship MILLER FREEMAN reported shoaling to 4¼ fathoms centered in about 59°49.9'N., 165°33.0'W. Caution is advised in this area. A 2016 hydrographic survey confirmed this shoal's location but found a slightly shoaler depth in the area, at 3 ½ fathoms. The 2016 survey also found other previously uncharted shoals in the region which are now shown on chart 16006, but uncharted shoals may exist outside the survey's extents.

(469) Currents

(470) On the N and SW sides of Nunivak Island the current has a large diurnal inequality. NE of Cape Mohican a 4-hour series of current observations in July 1951 showed a NE current which at strength had a velocity of 1.8 knots. Observations made in June and August 1951 W of Cape Etolin showed tidal currents setting along the shore in both directions with velocities of about 1 knot at strength of current. On the E side of the island in Etolin Strait, it is stated that tidal currents are so strong that the middle portion does not freeze over in winter. (See the Tidal Current Tables for predictions off the W coast of Nunivak Island.)

Andrew Orthmann

From: Andrew Orthmann
Sent: Tuesday, February 07, 2017 12:03
To: 'Grant Froelich'
Cc: Katrina Wyllie; Ben Evans; Brooke Maser
Subject: RE: OPR-R300-KR-16 Etolin Strait Data Volume

Hey Grant,

It breaks down to be about 5.5 TB of raw and around 1.6 TB of processed.

Andy

From: Grant Froelich [mailto:grant.froelich@noaa.gov]
Sent: Tuesday, February 07, 2017 11:56
To: Andrew Orthmann <aorthmann@terrasond.com>
Cc: Katrina Wyllie <katrina.wyllie@noaa.gov>; Ben Evans <benjamin.k.evans@noaa.gov>; Brooke Maser <brooke.maser@noaa.gov>
Subject: Re: OPR-R300-KR-16 Etolin Strait Data Volume

Hi Andy,

Thanks for the heads up. That's quite a chunk of data. I've cc'd Brooke Maser, our data manager, so she knows how much space we will need to have available. Out of curiosity how much of the 7.1 TB is raw and how much is processed?

thanks
grant
--

Hydrographic Team Lead
NOAA's National Ocean Service
Office of Coast Survey, Hydrographic Surveys Division
Pacific Hydrographic Branch, N/CS34
7600 Sand Point Way N.E.
Seattle, WA 98115-6349

w: (206)526-4374 | grant.froelich@noaa.gov

On 2/7/2017 12:51:38 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

Hi Grant,

Wanted to let you know that it won't be long until we submit OPR-R300-KR-16 (Etolin Strait). Approximately three weeks away -- our goal is to get this in your hands during the week of February 27th.

For data volume, looks like it's going to be about **7.1 TB** of data in total. Please let me know if you need a breakdown by data type or sheet.

For delivery method, one USB 8 TB USB hard drive should do it. I'm glad they are making hard drives that big for reasonable prices these days.

Will let you know once we ship. Please let me know meanwhile if you have any questions.

Thank you,

Andy

Andrew Orthmann, C.H.
Charting Program Manager

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Andrew Orthmann

From: Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
Sent: Tuesday, February 07, 2017 07:10
To: Andrew Orthmann
Cc: Christina Fandel - NOAA Federal
Subject: Re: xml DR schema validation check please

No problem, we can test them before submission.

Katrina

On Tue, Feb 7, 2017 at 11:08 AM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

Wow, that was lucky. Lot of manual chopping away on my part at that file. Really looking forward to XMLDR being available next time!

Okay thanks so much, if you don't mind I will send all 8 to you right before the actual submittal just to be sure?

Thanks again,

Andy

Sent via the Samsung Galaxy S7 edge, an AT&T 4G LTE smartphone

-------- Original message --------
From: Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
Date: 2/7/17 7:04 AM (GMT-09:00)
To: Andrew Orthmann <aorthmann@terrasond.com>
Cc: Christina Fandel - NOAA Federal <christina.fandel@noaa.gov>
Subject: Re: xml DR schema validation check please

Andy,

The xml you sent us runs through Pydro and validates successfully. You should be good to go.

Katrina

On Mon, Feb 6, 2017 at 7:40 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

Hi Christina,

I've started putting together our XML DRs for the Etolin Strait project from last summer. I'm at the point where I was wondering if you could please run one through Pydro to see if it validates, and if it doesn't validate, let me know where I need to look to make fixes?

Attached is one based on the 2016_01 schema. Please ignore the content, some is up to date and some isn't -- once I know we're on the right track with the structure then we will start populating the content properly.

Thank you very much,

Andy

Andrew Orthmann, C.H.
Charting Program Manager

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From: Christina Fandel - NOAA Federal [mailto:christina.fandel@noaa.gov]
Sent: Friday, September 09, 2016 04:02
To: _NOS OCS HSD OPS <hsd.ops@noaa.gov>
Subject: 2016_01 XML Update

All,

The updated 2016_01 XML schema to generate and validate descriptive reports has been uploaded to the OCS XML Hydrographic Reports webpage.

Attached to this email you will find a change list for the 2016_01 version of the schema.

As a reminder, any submitted XML files must validate against the most recent schema and stylesheet at the time the project instructions were issued. If you have questions about what schema version you should use, please contact your COR.

Thank you,

Christy

--

Physical Scientist

Hydrographic Surveys Division

Office of Coast Survey, NOAA

Christina.Fandel@noaa.gov

(301) 713 - 2702 x 133

Andrew Orthmann

From: Andrew Orthmann
Sent: Monday, February 06, 2017 11:05
To: 'Katrina Wyllie - NOAA Federal'
Subject: RE: Final Water Levels for Etolin

Okay great, thanks again Katrina.

Andy

From: Katrina Wyllie - NOAA Federal [mailto:katrina.wyllie@noaa.gov]
Sent: Monday, February 06, 2017 10:44
To: Andrew Orthmann <aorthmann@terrasond.com>
Subject: Re: Final Water Levels for Etolin

Hi Andy, yes, the mod is in the works for submission date of Monday March 13.

On Mon, Feb 6, 2017 at 2:41 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

> Hi Katrina,
>
> Can you confirm the new due date for Etolin Strait is 45 days from the email below, so March 12th? As mentioned we're aiming to get it submitted on the original schedule, but it's nice to have the room just in case we hit a snag.
>
> Andy
>
> **From:** Katrina Wyllie - NOAA Federal [mailto:katrina.wyllie@noaa.gov]
> **Sent:** Thursday, January 26, 2017 09:30
> **To:** Andrew Orthmann <aorthmann@terrasond.com>
> **Cc:** Russell Quintero - NOAA Federal <russell.quintero@noaa.gov>; Corey Allen <corey.allen@noaa.gov>
> **Subject:** Final Water Levels for Etolin
>
> Hi Andy,
>
> It was great to see you at FPW this year! Thank you for making the trip.

As we discussed in person at FPW, you have approval to use the JOA zoned file for the northern sheet, H12871.

That said, CO-OPS was able to adjust the TCARI file this week (revised .tc) to address the phase offset issues and they believe the TCARI model may improve on the uncertainty of a discrete product. You are not required to use this revised file but I am providing it to you as an option. I just ask that if you chose to use the revised TCARI, let me know so I can update the project information. Please let me know if you have questions or concerns that we can address.

Thank you,

Katrina

Andrew Orthmann

From: Andrew Orthmann
Sent: Wednesday, February 01, 2017 09:21
To: 'Katrina Wyllie - NOAA Federal'
Cc: Russell Quintero - NOAA Federal; Corey Allen
Subject: RE: Final Water Levels for Etolin
Attachments: TCARI vs Zone Tides.pdf

Hi Katrina,

We will go ahead and use the revised TCARI file for the entire project. The latest iteration shows significant improvement in that northern most sheet, H12871. We are beginning to apply it to the other sheets as well.

Attached is a comparison of the new TCARI versus tide zones for the northern sheet. Dark green is the data corrected with TCARI, light green is the same data corrected with tide zones. As you can see in most cases, the dark green lines (revised TCARI) agree with the crosslines better than the light green (zones). With the original TCARI grid it was the other way around (tide zones showed better agreement). Looks like there will still be tide busts, which isn't surprising given the complexity of the tides in this area, and some may still be large enough to result in QC failures when we run the crossline reports. But it should be a lot better than before.

Andy

From: Katrina Wyllie - NOAA Federal [mailto:katrina.wyllie@noaa.gov]
Sent: Thursday, January 26, 2017 09:30
To: Andrew Orthmann <aorthmann@terrasond.com>
Cc: Russell Quintero - NOAA Federal <russell.quintero@noaa.gov>; Corey Allen <corey.allen@noaa.gov>
Subject: Final Water Levels for Etolin

Hi Andy,

It was great to see you at FPW this year! Thank you for making the trip.

As we discussed in person at FPW, you have approval to use the JOA zoned file for the northern sheet, H12871.

That said, CO-OPS was able to adjust the TCARI file this week (revised .tc) to address the phase offset issues and they believe the TCARI model may improve on the uncertainty of a discrete product. You are not required to use this revised file but I am providing it to you as an option. I just ask that if you chose to use the revised TCARI, let me know so I can update the project information. Please let me know if you have questions or concerns that we can address.

Thank you,
Katrina

Andrew Orthmann

From: Andrew Orthmann
Sent: Thursday, January 12, 2017 11:44
To: 'Katrina Wyllie - NOAA Federal'
Subject: RE: TCARI delivery delay

Makes sense; Thanks Katrina.

From: Katrina Wyllie - NOAA Federal [mailto:katrina.wyllie@noaa.gov]
Sent: Thursday, January 12, 2017 11:42
To: Andrew Orthmann <aorthmann@terrasond.com>
Subject: Re: TCARI delivery delay

Good question, you can use the May date for the top sheets and the July date for the south sheets.

On Thu, Jan 12, 2017 at 3:32 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

> Okay thanks again.
>
> Side question: Should the "project instructions date" in the DRs be the original project instructions date from May, or should it be the Mod1 project instructions date (7/20/16)? Using the Mod1 date, at least for the originally assigned surveys, might look odd since the start date of work would precede the date of the instructions.
>
> **From:** Katrina Wyllie - NOAA Federal [mailto:katrina.wyllie@noaa.gov]
> **Sent:** Thursday, January 12, 2017 10:55
> **To:** Andrew Orthmann <aorthmann@terrasond.com>
> **Subject:** Re: TCARI delivery delay
>
> Andy,
>
> Yes, CO-OPS is expecting to deliver final tides tomorrow.
>
> Katrina
>
> On Thu, Jan 12, 2017 at 2:36 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

Hi again Katrina, just wondering if there have been any updates on delivery of the TCARI model?

Andy

From: Katrina Wyllie - NOAA Federal [mailto:katrina.wyllie@noaa.gov]
Sent: Friday, January 06, 2017 10:52
To: Andrew Orthmann <aorthmann@terrasond.com>
Subject: TCARI delivery delay

Andy,

I was just notified that COOPS will not be able to send out the final TCARI model today. I am working with Corey to get a firm date on the delivery but we're hoping to hear it will be next week. I apologize for the inconvenience and I'll keep you informed. I am prepared to adjust period of performance if delivery is not next week.

Thank you,

Katrina

Andrew Orthmann

From: Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
Sent: Thursday, January 12, 2017 09:50
To: Andrew Orthmann
Subject: Re: DR xml schema

Hi Andy,

Sorry about that, they switched server locations on us. Here is the link to the 2016_01 schema, https://nauticalcharts.noaa.gov/hsd/xmldr/Schemas/Version_2016_01.zip

Let me know if you still have trouble.

Katrina

On Thu, Jan 12, 2017 at 1:10 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

> Hi Katrina,
>
> Wondering if you could send me the XML DR schema and stylesheet files we should be using for the Etolin Strait DRs ? I notice the link where I used to be able to get it no longer works. (http://www.nauticalcharts.noaa.gov/hsd/xmldr/Schemas/)
>
> Thank you,
>
> Andy

Andrew Orthmann

From: Chris Paver <christopher.paver@noaa.gov>
Sent: Friday, January 06, 2017 11:56
To: Andrew Orthmann
Subject: Re: OPR-R300-KR-16 Sound Speed Data submission

That will do it. Thank you sir.

Chris

On Jan 6, 2017, at 15:52, Andrew Orthmann <aorthmann@terrasond.com> wrote:

> Okay, I reached out to the vessel owner and he supplied me an MMSI. The Qualifier 105's MMSI # is 338192000
>
> Will this work?
>
> Thank you,
>
> Andy
>
> Sent via the Samsung Galaxy S7 edge, an AT&T 4G LTE smartphone
>
> -------- Original message --------
> From: Christopher Paver - NOAA Federal <christopher.paver@noaa.gov>
> Date: 1/5/17 5:26 AM (GMT-09:00)
> To: Andrew Orthmann <aorthmann@terrasond.com>
> Subject: Re: OPR-R300-KR-16 Sound Speed Data submission
>
> Preferably an IMO/Lloyds number, MMSI, and/or ICES code. If all else fails, at least a call sign.
>
> On Wed, Jan 4, 2017 at 10:11 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:
>
> > Hey Chris, guess I need some help with that; not sure what your looking for in unique identifier. Would this be a hull number or registration number of some kind?
> >
> > Sent via the Samsung Galaxy S7 edge, an AT&T 4G LTE smartphone
> >
> > -------- Original message --------
> > From: Christopher Paver - NOAA Federal <christopher.paver@noaa.gov>
> > Date: 1/4/17 12:59 PM (GMT-09:00)
> > To: Andrew Orthmann <aorthmann@terrasond.com>
> > Subject: Re: OPR-R300-KR-16 Sound Speed Data submission

Hey Andy,
Are you able to supply a unique identifier for the ship Qualifier 105?

Thanks,
Chris

On Tue, Dec 20, 2016 at 6:55 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

Sorry, just gave it a try and realized we can include the ship name in Velocipy even though it's not in the pull down. So we should be able to include that in the metadata (as well as the submittal email).

Thanks again, will re-send this shortly.

Andy

From: Andrew Orthmann
Sent: Tuesday, December 20, 2016 09:53
To: 'Christopher Paver - NOAA Federal' <christopher.paver@noaa.gov>
Cc: NODC.submissions@noaa.gov; Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
Subject: RE: OPR-R300-KR-16 Sound Speed Data submission

Makes sense Chris.

Yes, the full name is Rapid SVT but you are right, it is less confusing to leave the T out of the sensor name since it was not outfitted with a temperature sensor.

Just to clarify for the ship attribute before we re-submit the file: If the ship name is not listed as an available option (but the name is known), we should leave the ship attribute blank, but submit the name of the ship in the submittal email – is that correct?

From: Christopher Paver - NOAA Federal [mailto:christopher.paver@noaa.gov]
Sent: Tuesday, December 20, 2016 09:16
To: Andrew Orthmann <aorthmann@terrasond.com>
Cc: NODC.submissions@noaa.gov; Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>

Subject: Re: OPR-R300-KR-16 Sound Speed Data submission

Hey Andy,

Thanks for getting back to me. Please don't conflate the company name with the ship name in the "ship" attribute; just the ship name "Qualifier 105" will be sufficient. Also as I previously stated, please include at least one of the unique identifiers for the ship in the submission email (not necessary in the files), which will allow us to uniquely identify the ship in our database.

As for the instrument, it would be a good idea to rename the instrument in the files minus the "T" in the name. The manufacture's website states that the "T" is for the optional temperature sensor.

Thanks again,

Chris

On Tue, Dec 20, 2016 at 5:40 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

> Hi Chris,
>
> First time doing this so thanks for the feedback.
>
> We used NOAAs software Velocipy for this. We are a contractor and our company name and vessel was not listed as available options so we used Zz-other, which is probably why it's showing like that. So it should be either our company name, Terrasond, or the vessel name, Qualifier 105. Perhaps "Terrasond/Qualifier 105" would be a good way to classify ship for that.
>
> The RapidSV sensor collects depth and sound velocity only, so no temperature (or conductivity) available with that.
>
> Thank you,

Andy

Sent via the Samsung Galaxy S7 edge, an AT&T 4G LTE smartphone

-------- Original message --------

From: Christopher Paver - NOAA Federal <christopher.paver@noaa.gov>

Date: 12/20/16 7:46 AM (GMT-09:00)

To: Andrew Orthmann <aorthmann@terrasond.com>

Cc: NODC.submissions@noaa.gov, Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>

Subject: Re: OPR-R300-KR-16 Sound Speed Data submission

Dear Andrew,

Thanks for submitting data to NCEI. There are a couple issues that need to be resolved before we can archive the data.

1. The reported ship for every file is "ZZ SHIP", which I'm assuming is not a ship.

* Could you please identify the name of the ship(s) used to collect the data? If the ships are not academic or government research vessels (e.g. R/V Sikuliaq or NOAA Ship Rainier), please also submit (via email) one or more of the following unique identifiers: IMO/Lloyds, MMSI, and/or ICES.

* If the names of the ship(s) are unknown, please change the ship attribute to something like "NA Not Available" (i.e. make it more explicit that the vessel is not known or available).

2. The instrument type is listed as "Valeport Rapid SVT", however only sound velocity was submitted. Do you by chance have the temperature data as well? If so, we would greatly appreciate getting this data as well.

Please address these issues as appropriate and resubmit.

Regards,

Chris

On Sat, Dec 17, 2016 at 1:22 AM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

> Hello,
>
> Please find attached the sound speed profiles collected during OPR-R300-KR-16, Etolin Strait, Alaska.
>
> Thank you,
>
> Andy
>
> Andrew Orthmann, C.H.
> Charting Program Manager
>
> **TerraSond**
> **Precision Geospatial Solutions ®**
> 1617 South Industrial Way Suite 3, Palmer, Alaska 99645
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Phone: 301-713-4910
www.ncei.noaa.gov

Andrew Orthmann

From: Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
Sent: Friday, January 06, 2017 10:52
To: Andrew Orthmann
Subject: TCARI delivery delay

Andy,

I was just notified that COOPS will not be able to send out the final TCARI model today. I am working with Corey to get a firm date on the delivery but we're hoping to hear it will be next week. I apologize for the inconvenience and I'll keep you informed. I am prepared to adjust period of performance if delivery is not next week.

Thank you,
Katrina

Andrew Orthmann

From: Toshi Wozumi - NOAA Federal <toshi.wozumi@noaa.gov>
Sent: Tuesday, December 20, 2016 14:44
To: Katrina Wyllie - NOAA Federal
Cc: Benjamin K Evans; Grant Froelich; Andrew Orthmann
Subject: Re: sonarwiz project delivery

Hi Katrina,

In theory we should be able to ingest SonarWiz data, but unfortunately we don't have any experience reviewing data in SonarWiz so it's hard to say. We might have to just try and see if it works.
I've asked Gene to give us some input since AHB has more experience with SonarWiz. I'll be interested in what Gene has to say.

Thanks,
Toshi

On Tue, Dec 20, 2016 at 2:39 PM, Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov> wrote:

Hi Toshi,

I know Grant is on leave so I wanted to make sure this got passed on to you as acting Team Lead. Andy is correct that he can submit a SonarWiz project per HSSD. Do you foresee any issues on your end regarding workflow integration?

Adding some numbers to Andy's side note: CO-OPS is still on target to deliver final TCARI by January 3. Andy's group then has 45 days from that TCARI delivery to submit these Etolin Strait surveys. There are 8 sheets in this project.

Thank you,
Katrina

---------- Forwarded message ----------
From: **Andrew Orthmann** <aorthmann@terrasond.com>
Date: Tue, Dec 20, 2016 at 5:14 PM
Subject: sonarwiz project delivery
To: "Grant.Froelich@noaa.gov" <Grant.Froelich@noaa.gov>
Cc: Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>

Hi Grant,

We’re preparing our deliverables for our project in Etolin Strait (OPR-R300-KR-16) and have a quick question regarding the sidescan deliverables.

We processed sidescan in SonarWiz. The HSSD mentions that a SonarWiz compatible submission is fine but I wanted to check with you on the best way to deliver the SonarWiz project itself. As you probably know SonarWiz can struggle with path issues, even more so than HIPS, when putting a project on a new PC. Seems like the work around is to use the SonarWiz "Project Mover" utility. It compresses the SonarWiz project into one big file, which you can then import back into SonarWiz on your end… tested it here by moving a project to a couple other PCs and it seemed to work smoothly. Will that integrate into your workflow okay?

As a side note delivery will probably be in late January at the earliest, possibly early February. We are waiting on final tides from COOPS to do some of the final tasks, including subset review, crossline reports, and some of the report components.

Thanks Grant,

Andy

Andrew Orthmann, C.H.
Charting Program Manager

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Andrew Orthmann

From: Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
Sent: Monday, December 12, 2016 14:09
To: Andrew Orthmann
Subject: Re: [TOMIS] Weekly Report

Hey Andy,

Thank you for the heads up. I'll adjust the delivery dates in TOMIS.

Katrina

On Mon, Dec 12, 2016 at 4:04 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

Hi Katrina, am starting to get this note from TOMIS about the deliverables. Also doesn't list the additional sheets. Not sure how you wanted to handle the 45 day thing within TOMIS?

Thanks,

Andy

Sent via the Samsung Galaxy S7 edge, an AT&T 4G LTE smartphone

-------- Original message --------
From: TOMIS <Database.Mail@noaa.gov>
Date: 12/9/16 7:35 AM (GMT-09:00)
To: Andrew Orthmann <aorthmann@terrasond.com>
Subject: [TOMIS] Weekly Report

This is the TOMIS weekly email report for Andrew Orthmann.

The following deliverable(s) are currently delinquent or due within the next 30 days:

Deliverable: OPR-R300-KR-16 DAPR
Due Date: 12/26/2016
Task Order: OPR-R300-KR-16
Submit this deliverable: https://coast.noaa.gov/tomis/_n/deliverable/submit/75862

Deliverable: H12871
Due Date: 12/26/2016
Task Order: OPR-R300-KR-16
Submit this deliverable: https://coast.noaa.gov/tomis/_n/deliverable/submit/75861

Deliverable: H12870
Due Date: 12/26/2016
Task Order: OPR-R300-KR-16
Submit this deliverable: https://coast.noaa.gov/tomis/_n/deliverable/submit/75860

Deliverable: H12869
Due Date: 12/26/2016
Task Order: OPR-R300-KR-16
Submit this deliverable: https://coast.noaa.gov/tomis/_n/deliverable/submit/75859

Deliverable: H12868
Due Date: 12/26/2016
Task Order: OPR-R300-KR-16
Submit this deliverable: https://coast.noaa.gov/tomis/_n/deliverable/submit/75858

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https://coast.noaa.gov/tomis/_n/profile

Andrew Orthmann

From: Andrew Orthmann
Sent: Wednesday, September 21, 2016 15:55
To: 'Katrina Wyllie - NOAA Federal'
Subject: RE: FW: Kipnuk Removal plans

Hi Katrina,

I'll be out of contact for the tide removal trip to Nunivak from 9/24 through about 10/5. I won't have good email or contact like we did before, but if you need to get a hold of me you can reach me during that time on the vessel satellite phone or vessel email. Here is that information:

Sat. Phone - 1 (206) 201-1668
qualifier105@ocens.com

I received the announcement about the FPW in January – that's great, I'll definitely be there! Thank you very much.

Andy

From: Katrina Wyllie - NOAA Federal [mailto:katrina.wyllie@noaa.gov]
Sent: Friday, September 16, 2016 04:30
To: Andrew Orthmann <aorthmann@terrasond.com>
Subject: Re: FW: Kipnuk Removal plans

Hi Andy,

No issue with that plan.

Thank you,
Katrina

On Thu, Sep 15, 2016 at 7:32 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

> Hi Katrina,
>
> Toksook Bay tide station was demob'd next week. We are going forward with our plan to demob East Nunivak and the deployed BMPGs in about two weeks.
>
> Meanwhile, I wanted to check if its okay if we demob the Kipnuk station next week? Please see below from Nathan at JOA. Thank you,

Andy

From: nathan [mailto:nathan@joasurveys.com]
Sent: Thursday, September 15, 2016 15:30
To: Andrew Orthmann <aorthmann@terrasond.com>
Subject: Kipnuk Removal plans

Andy,

You think there will be any issues if we remove the Kipnuk tide station Monday of next week? Based on Mark's email below we are contracted to provide tide support through 9/17. Monday is 9/19. I originally thought we'd remove the station on 9/26 but looking at my schedule it would be better if I got it done earlier.

Nathan

> From: Mark Lathrop - NOAA Federal [mailto:mark.t.lathrop@noaa.gov]
> Sent: Friday, May 06, 2016 09:19
> To: Andrew Orthmann <aorthmann@terrasond.com>
> Subject: Re: Hydrographic Survey; Request for Task Order Quote
>
> Andy,
> This proposal looks good. We will go forward with the tide support for Rainier and I'll put that in the final project instructions. We're going to request that you provide tide support through September 17, not September 30. If that will save us any money could you send a new cost proposal? I don't think it will be much since you'll still need to charter a vessel for JOA, but there could be some savings there based on the 13 days. AGO says that they should be able to expedite this task order in time for your scheduled vessel and tide gauge mobilization, but probably not the ASV mobilization.
> Mark

--
Nathan Wardwell
JOA Surveys, LLC
www.joasurveys.com
2000 E. Dowling Rd, #10
Anchorage, AK 99507
(907) 227-6635 cell
(907) 561-0136 office

Virus-free. www.avast.com

Andrew Orthmann

From: Grant Froelich <grant.froelich@noaa.gov>
Sent: Monday, August 29, 2016 14:44
To: Andrew Orthmann
Cc: Katrina Wyllie - NOAA Federal
Subject: RE: h12951 dton

Hi Andy,

By H# is the easiest for our bookkeeping purposes.

thanks
grant

On August 29, 2016 at 3:34:58 PM, Andrew Orthmann (aorthmann@terrasond.com) wrote:

> Hey Grant, after talking to Katrina at our office I have some more DTONs to send in. Looks like four. Can they all be in one S-57 file, or would you prefer one file per DTON? Or perhaps by H# -- they are in three separate sheets.
>
> Thank you,
>
> Andy

From: Grant Froelich [mailto:grant.froelich@noaa.gov]
Sent: Thursday, August 11, 2016 06:33
To: Andrew Orthmann <aorthmann@terrasond.com>; phb.dton@noaa.gov
Cc: Katrina Wyllie <katrina.wyllie@noaa.gov>; Patrick Keown - NOAA Federal <patrick.keown@noaa.gov>
Subject: Re: h12951 dton

Hi Andy,

.hob files work. We prefer .000 for DTONs because unlike most other feature processing it is one less step in that format. To generate the DTON reports we use Pydro, which can read .000 but not .hob files.

thanks

grant

--

Hydrographic Team Lead
NOAA's National Ocean Service
Office of Coast Survey, Hydrographic Surveys Division
Pacific Hydrographic Branch, N/CS34
7600 Sand Point Way N.E.
Seattle, WA 98115-6349

w: (206)526-4374 | grant.froelich@noaa.gov

On 8/10/2016 3:38:41 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

Hello, please find attached a recommended DTON for H12951, a 2 fathom sounding where the chart suggests depths of 5.5 to 7 fathoms in the area. The format is CARIS hob file, using NOAA extended attributes – please let me know if you require the S57 verison.

Thank you,

Andy

Andrew Orthmann, C.H.
Charting Program Manager

TerraSond

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Andrew Orthmann

From: Patrick Keown - NOAA Federal <patrick.keown@noaa.gov>
Sent: Tuesday, August 09, 2016 10:44
To: Andrew Orthmann
Subject: Back up for OPR-R300-KR-16

Andy,

I just wanted to say hey and let you know that I am the COR and back up for this project. As Katrina mentioned, she may have limited access to email during the month of August. If you can't get in touch with her, please feel free to reach out to me.

Thanks,

Patrick A. Keown
Physical Scientist
Hydrographic Surveys Division
Office of Coast Survey, NOAA
Office: 301-713-2702 x 107
"Don't taunt the alligator until you've crossed the creek"

8/8/16 Weekly Report
OPR-R300-KR-16 Etolin Strait, AK
TerraSond Limited

Highlights of Past Week's Activities:	Dates Covered: 8/2/16 – 8/8/16
• Completed all assigned tasks • Staff shots at all tide stations • Deployed South Nunivak Tide station in support of NOAA Ship Rainier work in the area • Most survey crew departed vessel on 8/7 in Bethel • Transit for Homer and demob began 8/7	

Highlights of Next Week's Activities:	Dates Covered: 8/9/16 – 8/15/16
• Vessel will transit to Homer, arriving around 8/12. Demobilization will be completed by 8/15.	

Andrew Orthmann, C.H.
Charting Program Manager

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7/25/16 Weekly Report
OPR-R300-KR-16 Etolin Strait, AK
TerraSond Limited

Highlights of Past Week's Activities:	Dates Covered: 7/19/16 – 7/25/16
• Worked in MBES/SSS corridors and MBES-set spaced areas. • Completed rotation to/from Bethel 7/21 – 7/23 • Weather downtime 7/24 – 7/25	

Highlights of Next Week's Activities:	Dates Covered: 7/26/16 – 8/1/16
• Continue survey	

Andrew Orthmann, C.H.
Charting Program Manager

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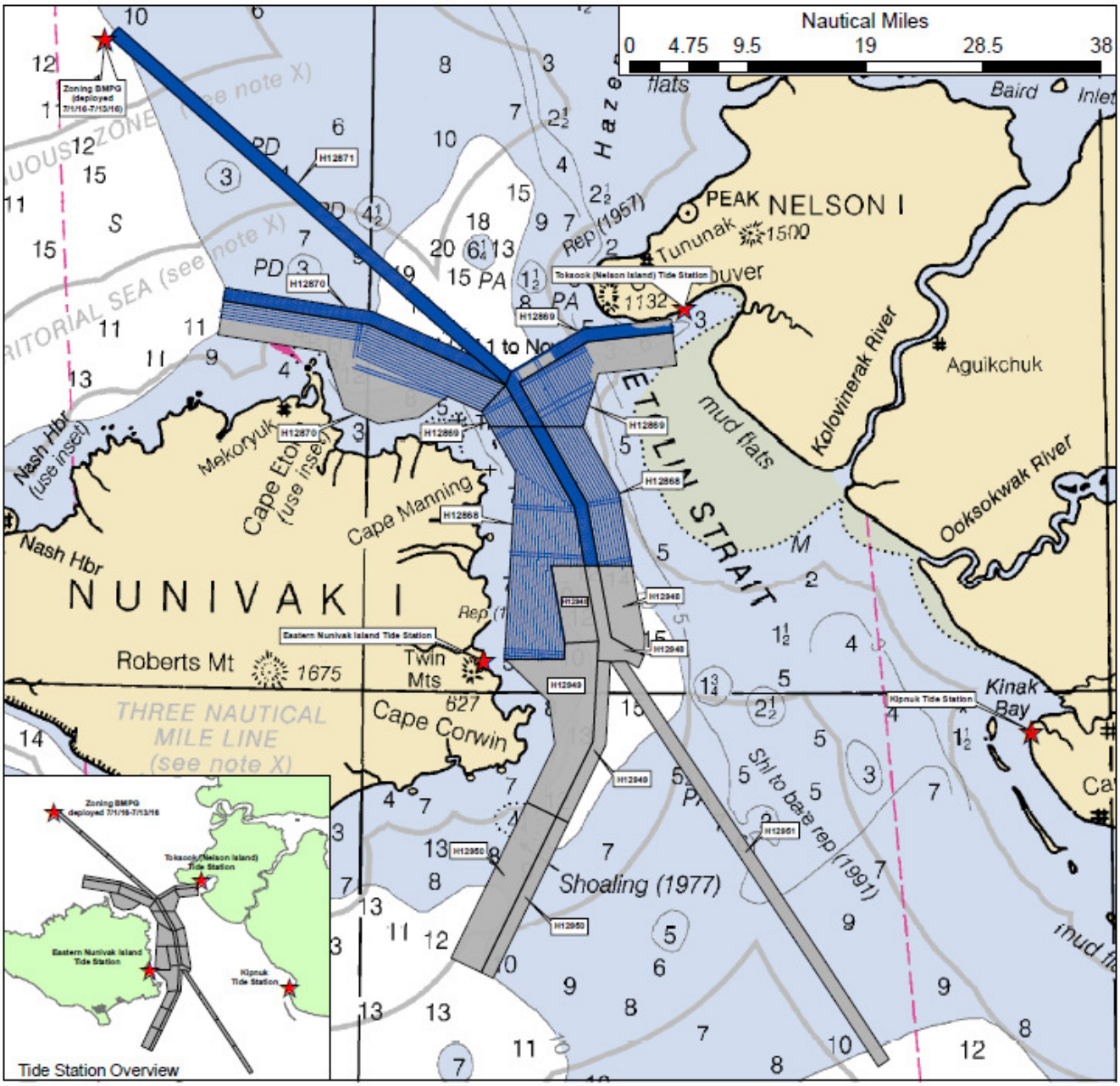

Weekly Progress Sketch
OPR-R300-KR-16
Etolin Strait, Alaska
Survey Vessels:
Q105
ASV-CW5
Coverage as of 24 July 2016
TerraSond, Ltd.
Andrew Orthmann, Lead Hydrographer
Charts 16006; 35th Ed.

TERRASOND
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Survey Coverage

Tide Stations
Completed Lines
Survey Areas

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7/18/16 Weekly Report
OPR-R300-KR-16 Etolin Strait, AK
TerraSond Limited

Highlights of Past Week's Activities:	Dates Covered: 7/12/16 – 7/18/16
• Worked in all survey sheets this past week. • East side of Sheet 12869 was especially challenging, averaging 4-6 m depth but requiring sidescan. This was completed over a course of a few high tides. • Pulled the northern BMPG (zoning purposes only) on 7/13. • Started on ex-Rainier survey areas	

Highlights of Next Week's Activities:	Dates Covered: 7/19/16 – 7/25/16
• Continue ex-Rainier survey areas until Bethel rotation. Complete the sidescan/multibeam corridor first then move into the fixed-spaced multibeam areas. • Bethel rotation scheduled for 7/22, which will take operations offline 7/21 – 7/23 • Upon return to survey area (estimate 7/24) continue ops in original (northern most) survey areas. Those sheets are nearly complete, requiring only a few days of crosslines, some infills, some multibeam developments, and bottom samples.	

Andrew Orthmann, C.H.
Charting Program Manager

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7/11/16 Weekly Report
OPR-R300-KR-16 Etolin Strait, AK
TerraSond Limited

Highlights of Past Week's Activities:	Dates Covered: 7/4/16 – 7/11/16
• Worked in sheets H12868 and H12869. Collecting in the multibeam-only (fixed spaced) areas and multibeam-only crosslines in the sidescan corridors because of sidescan winch problems with both vessels • Tide station staff shots at Toksook (Nelson Island) tide station on 7/5 • Kipnuk staff shots (JOA on shore, Terrasond GPS-static float over BMPGs) on 7/6 • Transited to and from Bethel 7/7 – 7/9 for scheduled rotation/refueling/resupply. Fixed both sidescan winches. • Back on site and recommence survey (sidescan/multibeam in corridors) 7/10	

Highlights of Next Week's Activities:	Dates Covered: 7/12/16 – 7/18/16
• Focus effort on sidescan/multibeam in corridors this next week, all sheets • Pull the zoning BMPG which is deployed at the far north end of H12871 so it will be ready to re-deploy south of Nunivak Island to support Rainier work	

Andrew Orthmann, C.H.
Charting Program Manager

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7/11/16 Weekly Report
OPR-R300-KR-16 Etolin Strait, AK
TerraSond Limited

Highlights of Past Week's Activities:	Dates Covered: 7/4/16 – 7/11/16
• Worked in sheets H12868 and H12869. Collecting in the multibeam-only (fixed spaced) areas and multibeam-only crosslines in the sidescan corridors because of sidescan winch problems with both vessels • Tide station staff shots at Toksook (Nelson Island) tide station on 7/5 • Kipnuk staff shots (JOA on shore, Terrasond GPS-static float over BMPGs) on 7/6 • Transited to and from Bethel 7/7 – 7/9 for scheduled rotation/refueling/resupply. Fixed both sidescan winches. • Back on site and recommence survey (sidescan/multibeam in corridors) 7/10	

Highlights of Next Week's Activities:	Dates Covered: 7/12/16 – 7/18/16
• Focus effort on sidescan/multibeam in corridors this next week, all sheets • Pull the zoning BMPG which is deployed at the far north end of H12871 so it will be ready to re-deploy south of Nunivak Island to support Rainier work	

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Andrew Orthmann

From: Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
Sent: Tuesday, August 02, 2016 09:09
To: Andrew Orthmann; Michael Gonsalves - NOAA Federal
Subject: Re: Etolin corridor DtoN

Yes, that is perfect. Because that shoal is now well-delineated, please use those ~40 LNM for the new area. Thank you for being flexible.

Katrina

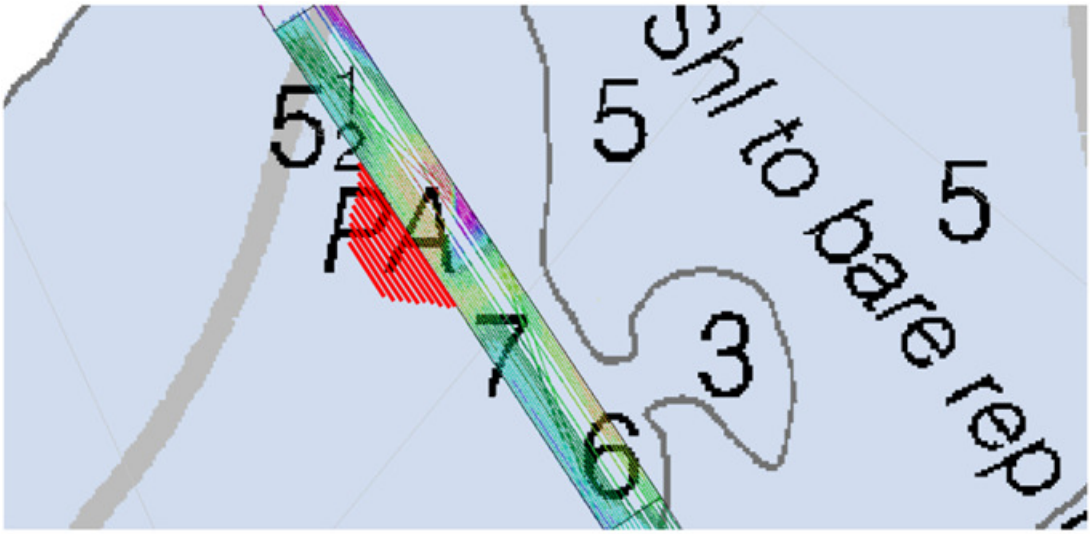
On Tue, Aug 2, 2016 at 1:02 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

> Yeah that was my thinking when we surveyed that. This nice corridor and then that shoal appears in the middle.
>
> Looking at the effort remaining, we will probably come close to the estimate for mileage if we finish what's remaining there.
>
> We separated that sheet into four survey blocks, named H1 through H4, with H1 on the north end and H4 on the south. H1 and H4 are done at 100 m range scale. H3 was done at 75 m range scale, and H2 is shallow so it took a lot of miles at 50 m range scale.
>
> H2 is the block in the image that goes over the shoal and is adjacent to the area you show.
>
> We estimate about 40 LNM to do that area you sent. That also happens to be about how many LNM remain to finish H2. Since the shoal is well delineated at this point, what about leaving those lines un-surveyed in H2 and instead using the 40 LNM to do this new area?
>
> Andy
>
> **From:** Katrina Wyllie - NOAA Federal [mailto:katrina.wyllie@noaa.gov]
> **Sent:** Tuesday, August 02, 2016 15:29
> **To:** Andrew Orthmann <aorthmann@terrasond.com>
> **Subject:** Etolin corridor DtoN

Hi Andy,

For H12951, I see there is just a small area left to acquire. It is great news that there aren't rocks to investigate but that 2-3 fathom shoal that cuts across the corridor is unfortunate. Are you expecting to come close to the 800 LNM cap for this sheet? If not, do you think some of the extra linear miles can be directed to the approximate section in red, below, to make the corridor a bit more useful for mariners? What do you think?

Katrina



Andrew Orthmann

From: Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
Sent: Monday, August 01, 2016 11:56
To: Andrew Orthmann
Subject: Re: Office Visit

Okay, great. Let's plan for an office visit on August 29. I will make my travel arrangements now.

Thank you,
Katrina

On Mon, Aug 1, 2016 at 3:38 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

> Yes, either day would work fine.
>
> **From:** Katrina Wyllie - NOAA Federal [mailto:katrina.wyllie@noaa.gov]
> **Sent:** Monday, August 01, 2016 19:36
> **To:** Andrew Orthmann <aorthmann@terrasond.com>
> **Subject:** Re: Office Visit
>
> Right now I am planning on leaving Dutch on August 28. Would you be able to meet August 29 or August 30?
>
> On Mon, Aug 1, 2016 at 3:33 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:
>
> > Well, definitely October but you wanted to plan around your Dutch Harbor trip, which ends in late August, is that right? Planning (hoping) to take a little time off after we demob from this project but should be around Palmer in late August. If you're going to be there I'll make sure I am too.
> >
> > Andy
> >
> > **From:** Katrina Wyllie - NOAA Federal [mailto:katrina.wyllie@noaa.gov]
> > **Sent:** Monday, August 01, 2016 19:29
> > **To:** Andrew Orthmann <aorthmann@terrasond.com>
> > **Subject:** Office Visit

Hi Andy,

I know schedules are in flux but I just wanted to see if you had an idea of when you plan on being back in Palmer so I can plan an office visit. August? September? October?

Thank you,

Katrina

Andrew Orthmann

From: Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
Sent: Monday, August 01, 2016 06:17
To: Andrew Orthmann
Cc: Patrick Keown - NOAA Federal (patrick.keown@noaa.gov)
Subject: Re: 3 fathom area, 2 fathom shoal

Hi Andy,

My COR II paperwork is still working its way through the system so Patrick is the official COR on this project. Please start CC'ing him on all correspondence. I am headed to Dutch Harbor next Monday for the rest of August. I should have internet connection and I should be able to answer any questions during that time but if that turns out to be not the case, Patrick is our back up point of contact on this project. I will definitely keep you updated on my communication status.

As for the 2 fathoms you found in the corridor, yes, please submit as a DtoN.

Katrina

On Fri, Jul 29, 2016 at 9:40 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

> Hi Katrina,
>
> Adding Patrick since I saw that note about him taking over as COTR?
>
> We made good progress in H12951 the last couple days. Fortunately there are no rocks, but unfortunately there is a shoal which crosses the corridor that is 2 to 3 fathoms in depth. You would expect depths of 5 ½ to 7 fathoms in the area based on chart 16006. From a charting perspective there will be a decent corridor that will sort of terminate on that 2 to 3 fathom shoal. We have a few more lines to run over that shoal when the weather allows again (it's also shallow enough we can only survey it at high tide) but have a fair number of lines over it already.
>
> It is in the vicinity of the 5 ½ fathom PA sounding on the chart – see attached chartlet.
>
> Would you consider this a danger to navigation even though it is well inside the 10 fathom curve?

Thank you,

Andy

Andrew Orthmann

From: Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
Sent: Wednesday, July 27, 2016 07:21
To: Andrew Orthmann
Subject: Fwd: Monthly Progress Report Spreadsheet
Attachments: Survey_and_Project_Statistics_Contractors.doc; Productivity Report_Template_Contractor__FY16.xlsx

Hey Andy,

To reiterate, this is an optional upgrade. In fact, the upgraded was distributed a bit early; there a few tweaks left to make. I will resend with the final version, but what you have been filling out for monthly reports is completely adequate.

Thank you,
Katrina

---------- Forwarded message ----------
From: **Christina Fandel - NOAA Federal** <christina.fandel@noaa.gov>
Date: Wed, Jul 27, 2016 at 10:27 AM
Subject: Monthly Progress Report Spreadsheet
To: "Evans, Rhodri E." <RHODRI.E.EVANS@leidos.com>, Andrew Orthmann <aorthmann@terrasond.com>, David Millar <dmillar@fugro.com>
Cc: Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>, _NOS OCS HSD OPS <hsd.ops@noaa.gov>

All,

HSD recently approved a new monthly survey progress spreadsheet which I have attached to this email along with a word document that describes each field. While you are not required to migrate your monthly reporting metrics to this new spreadsheet, if you would like to use this spreadsheet for future reporting, you may.

This revised spreadsheet includes an additional tab that tracks vessel utilization on a daily basis and will be used to directly feed a survey metrics database. As such, please refrain from adjusting the headers of the spreadsheet.

As stated in HSSD 2016, please submit your monthly progress report via TOMIS by the fifth day of the month following survey operations.

Please contact your COR with any questions,

Christy

--
Physical Scientist
Hydrographic Surveys Division
Office of Coast Survey, NOAA
Christina.Fandel@noaa.gov
(301) 713 - 2702 x 133

Andrew Orthmann

From: Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
Sent: Tuesday, July 26, 2016 07:28
To: Andrew Orthmann
Subject: Re: OPR-R300-KR-16 Etolin Strait Weekly Progress 07/25/16

Hi Andy,

No problem, I did receive the weekly report this morning. I also received the modification quote. I am adding the 800 LNM cap for H12951 into the PIs and sending to Emily so she can award ASAP. If you do reach the 800 LNM cap for that sheet, would you be able to summarize what contacts were not investigated?

Thank you,
Katrina

On Tue, Jul 26, 2016 at 11:19 AM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

> Hi Katrina, I apologize for the late weekly report – it was in my outbox ready to go yesterday but internet has been down since yesterday afternoon… we were anchored due to weather and at certain angles the mast of the boat blocks the satellite reception.
>
> Because the internet has been up and down, I wanted to confirm you received the proposal I sent this morning as well?
>
> Thank you,
>
> Andy
>
> **From:** Andrew Orthmann
> **Sent:** Tuesday, July 26, 2016 14:55
> **To:** 'Katrina Wyllie - NOAA Federal' <katrina.wyllie@noaa.gov>
> **Cc:** 'progress.sketches@noaa.gov' <progress.sketches@noaa.gov>
> **Subject:** OPR-R300-KR-16 Etolin Strait Weekly Progress 07/25/16

Please find attached the weekly progress report for OPR-R300-KR-16, Etolin Strait, AK.

Andrew Orthmann, C.H.
Charting Program Manager

TerraSond

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July 25th, 2016

Re: Proposal for OPR-R300-KR-16 Modification 1 (July 20th, 2016)

Work will be conducted in accordance with the TerraSond Technical Proposal previously submitted and approved by NOAA, titled "Etolin Strait, AK OPR-R300-KR-16 Technical Proposal and Work Plan" dated May 4th, 2016. There are no changes to the prior proposal with the exception of additional area added by NOAA, described in the Work Instructions (Change 1, signed 7/20/16) and outlined below.

The modification adds four additional sheets (5 through 8) to the four previously assigned (1 through 4), for a total of eight sheets.

The following methodology will be utilized to complete the areas assigned in this modification, sheets 5 through 8:

- The sidescan/multibeam corridor in Sheets 5, 6, and 7 will be surveyed to achieve 100% coverage at no additional cost to NOAA. This is possible by re-allocating planned LNM (linear nautical miles) of survey lines from Sheets 1 through 4 to the new sheets while still achieving the required 100% coverage in all sidescan/multibeam corridors. NOAA has provided the allowance that contacts in greater than 20 m of water only need multibeam development if they stand at least 10% proud of the seafloor, which helped free LNM that would otherwise have been used to develop small contacts in relatively deep water.

- Set-spacing multibeam-only areas are assigned in Sheets 5, 6, and 7. Per the work instructions these will be completed at 500 m spacing with multibeam sonar (with concurrent backscatter).

- Sheet 8 adds an additional sidescan/multibeam corridor, with no adjacent set-spacing multibeam-only areas. This area will be completed, depending on data quality, with a combination of 90 m spacing (50 m sidescan range scale) and 180 m spacing (100 m sidescan range scale) to achieve the required 100% coverage. Prior to beginning sidescan/multibeam collection, multibeam-only reconnaissance lines will be conducted through the area so that towed sidescan operations can be safely and efficiently conducted.

In total, the new area adds 1,307.6 LNM of survey lines and 27 bottom samples, as shown in the following table:

Sheet	5	6	7	8	Total
LNM*	144.7	208.9	156.9	797	1,307.6
Bottom Samples	3	8	5	11	27

*Note Sheet 5-7 LNM estimates are only for the set-spacing areas. LNM to survey the sidescan/multibeam corridor was re-allocated from the existing task order and not counted again here.
*LNM estimates include mainscheme, 8% crosslines, 10% multibeam developments (corridor areas only), and 5% rerun/infill/splits

The additional effort will require up to 14.2 days on site to complete. This breaks down as follows:

- 12.4 days “online” (sonar data collection), which includes weather downtime
- 0.8 days for bottom samples
- 0.5 days of multibeam reconnaissance through sheet 8
- 0.5 days of tide operations (required tide station staff shots)

An additional rotation to / from Bethel is not included as it is estimated that given the quantity of planned rotations for the original task order, the additional work will not require more rotations.

Final deliverables for the new sheets will be provided on the same timeline and in conjunction with final deliverables for the original sheets.

Costs consist primarily of on-site operations including the extension of tide support through the period, but also include the additional cost of post-field reporting/processing for the additional four sheets and the approximately 1,300 LNM of additional data.

Considerations:

- TerraSond requests a maximum line budget cap of 800 LNM for H12951 (Sheet 8). It is estimated that about 797 LNM will be required to survey this sheet based on experience with the other areas in the region. But this sheet is particularly poorly charted, very exposed to poor weather, and potentially very shallow with unknown numbers of contacts requiring development, which could lead to excess time and/or mileage requirements to survey.

- TerraSond requests this modification be approved expeditiously since the original task order assignments may be completed by the first week of August (2016).

Thank you,

Andrew Orthmann, C.H.
Charting Program Manager

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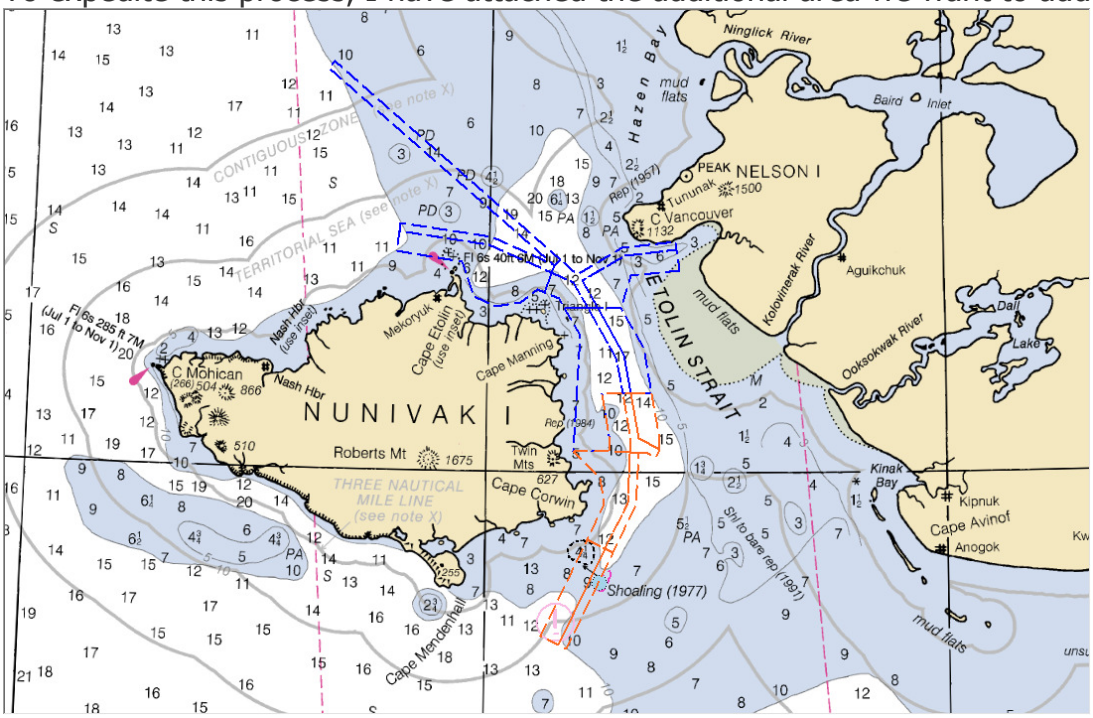
Andrew Orthmann

From: Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
Sent: Friday, July 15, 2016 07:45
To: Andrew Orthmann
Cc: Michael Gonsalves - NOAA Federal
Subject: Unofficial cost estimate request
Attachments: OPR-R300-KR-16_PRF_Mod1.000; OPR-R300-KR-16_CSF_Mod1.000

Andy,

We have AGO's approval to expand this project in area. I will submit the paperwork to AGO ASAP so they can approve and send you the official modification price request.

To expedite this process, I have attached the additional area we want to add to your current project.



The additional corridor area is based on the waiver we granted that will redirect LNM from the current sheets to the corridor in H12948, H12949, and H12950.

In the corridor, in depths >20m, SSS contacts that rise 10% of depth or greater require a SSS development. If that contact is destined to be a feature and represented on the chart, it will need to be developed as a feature to complete coverage standards (reference Section 7.3.3 of HSSD). We consider this an acceptable risk from a navigation safety perspective as deeper draft traffic should not be attempting to navigate in this area.

We would like to expand your project to include the 500m MBES spacing areas around the corridor. This new area includes 16 bottom samples and one assigned feature, an OBSTRN area shoaling reported from 1977. We would just ask for the part of that obstruction area that falls within the sheet to be surveyed to set line spacing

standards. We included the SDB shoal and location of tanker grounding in the CSF, but they are specifically unassigned.

Please let me know if you have questions. And you should see the official price request from AGO soon.

Thank you,

Katrina

Andrew Orthmann

From: Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
Sent: Wednesday, July 13, 2016 12:11
To: Andrew Orthmann
Cc: Michael Gonsalves - NOAA Federal
Subject: Re: Possible Modification?

Andy,

Sorry for the delay, I was out of the office most of today. Yes, we are okay granting this waiver. We consider this an acceptable risk from a navigation safety perspective as deeper draft traffic should not be attempting to navigate in this area.

In depths >20m, contacts that rise **10%** of depth or greater require a SSS development. If that contact is destined to be a feature and represented on the chart, it will need to be developed as a feature. Please include this email in DR Appendix II.

Katrina

On Wed, Jul 13, 2016 at 1:37 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

> Hey Katrina, just checking in; if possible it'd be good to finalize the plan today because it affects how we are running lines right now. Is the proposed 10% target height modification for multibeam developments in depths >20 m acceptable?
>
> ---
>
> **From:** Andrew Orthmann
> **Sent:** Wednesday, July 13, 2016 02:24
> **To:** 'Katrina Wyllie - NOAA Federal' <katrina.wyllie@noaa.gov>
> **Cc:** Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>
> **Subject:** RE: Possible Modification?
>
> Hi Katrina,
>
> I think what's going to happen is most of the remaining areas in our assigned area will need to have 80 m spacing in order to meet the HSSD contact development requirements because there are a lot of contacts. Luckily so far the vast majority are in deeper water (20-40 m) where we happen to be simultaneously be getting complete multibeam coverage at the planned 80 m line spacing. See the attached sidescan images of what we're seeing, one from each survey sheet (also shows that the data is nice at 100 m range scale).

However, at 160 m line spacing we will have 100% sidescan but won't have complete multibeam coverage, and there are so many contacts we will effectively need to come back between each line and end up with 80 m spacing after all.

So on our current course, even switching to 160 m spacing (which we did last night just in case), in order to meet the contact development requirements we will end up running nearly the estimated LNM anyway without a lot left over for the new corridor area. Additionally it is hard to estimate at this point what will remain until we've actually run everything at 100% since a couple blocks we haven't touched yet may or may not contain these boulder fields. At this point I'd hate to commit to LNM in the new corridor area without knowing how much of our original, estimated LNM remains.

What about this: As mentioned the boulder fields all seem to be in depths >20 m, almost 66 feet. The primary factor that will limit the available LNM for the new corridor is the requirement to develop contacts that are proud of the seafloor by 5% of the depth (in depths >20m), because these contacts seem to be right on the margin. But if that were modified to 10% of depth (for depths >20m) then most of these contacts would not need development and we could save those LNM for the new corridor. Given vessels of 66' draft shouldn't be navigating the area given all the approaches are all charted at 60' (or less) it should work out from a navigation safety stand point.

Would that work for you guys?

Still not sure there would be enough to do that entire corridor but it would give us some LNM to take a chunk out of it.

Andy

From: Katrina Wyllie - NOAA Federal [mailto:katrina.wyllie@noaa.gov]
Sent: Tuesday, July 12, 2016 22:23
To: Andrew Orthmann <aorthmann@terrasond.com>
Cc: Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>
Subject: Re: Possible Modification?

Hi Andy,

Thank you for the quick response with your estimates. We would like to move forward on expanding your corridor into RA's area, starting with Sheet H12948 (Priority 1) and moving south. We would like to achieve complete coverage in all sections of this corridor. The easiest way to do this modification and to manage your risk would be to assign a new area with a LNM cap.

Would you be able to provide how many LNM you would be willing to dedicate to a new corridor area upon completion of your remaining assigned work (assuming 100% SSS coverage)? I attached the updated corridor area, based on priority.

Thank you,

Katrina

On Mon, Jul 11, 2016 at 10:32 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

> Hi Katrina, I did a quick and dirty estimate on this to give you some numbers tonight.
>
> Indeed 100 m range scale has looked good here and we have continued to operate using it, which gives us better than 200%. We've been doing 80 m spacing which helps if we need to trim a bit off the far edge of the range.
>
> Looks like that area would require about 900 LNM to cover, including 8% XLs and 10% developments, assuming 160 m line spacing and 100 m range scale.
>
> Of estimated 2,800 LNM of combined sidescan/MBES we've collected about 1,300, leaving roughly 1,500 to collect. If we double the spacing of the remainder (to 160 m line spacing) we could have about 750 LNM to spare, which could do 83% of that area.
>
> Concerns on my end switching to 160 m spacing (for both areas) would be that if there are a lot of multibeam developments we could get bogged down developing those and have to run significantly more miles than estimated. There are a lot of targets exceeding 1 m in Etolin Strait itself, but we're getting lucky in that the areas that have a lot of targets are also just deep enough we are barely getting full MBES coverage at the 80 m spacing – which will really help

cut down the number of separate developments we need to do. If we had been running 160 m spacing then we would need to come back between a lot of lines to satisfy the MBES development requirements.

Please let me know your thoughts.

Andy

From: Katrina Wyllie - NOAA Federal [mailto:katrina.wyllie@noaa.gov]
Sent: Tuesday, July 12, 2016 00:22
To: Andrew Orthmann <aorthmann@terrasond.com>
Cc: Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>
Subject: Possible Modification?

Hi Andy,

With the Rainier now needing rather significant emergency repairs, their Etolin Strait project arrival will be delayed by perhaps one leg (2 weeks) or more.

That said, we are curious...

We have passed the AGO timeline for cost modifications, but we still have time for zero-cost modifications. You mentioned that you have been acquiring about double the complete coverage requirements in the corridor because there has been very little refraction in the SSS data. Is this still the case? Understanding we cannot do a contract modification that involves additional cost, would it be possible to acquire *only* complete coverage (i.e. 75m or 100m range scale spacing instead of 50m where the data quality is good) for the remaining corridor area in your current sheets and use those extra linears in the Rainier's assigned corridor to the south?

Please let us know your thoughts on this proposed zero-cost modification. I have attached the 2 Rainier sheets we would use for any possible Terrasond corridor expansion.

Thank you,

Katrina

Andrew Orthmann

From: Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
Sent: Tuesday, July 05, 2016 05:36
To: Andrew Orthmann
Subject: Re: TOMIS

Andy,

I set up TOMIS this morning for this task order. Please upload your monthly report at your convenience.

Thank you,
Katrina

On Sat, Jul 2, 2016 at 6:03 PM, Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov> wrote:

> Yes, sorry, I will set it up and let you know when it's ready.
>
> Katrina
>
> On Saturday, July 2, 2016, Andrew Orthmann <aorthmann@terrasond.com> wrote:
>
> > Hi Katrina, I have the monthly progress sketch ready to submit. We're supposed to do this through TOMIS. But when I log in it appears nothing is set up there yet. Is that something you could do, or should I send it to the progress.sketches@noaa.gov address?
> >
> > Thank you,
> >
> > Andy

Andrew Orthmann

From: Andrew Orthmann
Sent: Friday, July 01, 2016 10:28
To: Katrina Wyllie - NOAA Federal
Subject: RE: complete coverage

Confirmed on continuing with complete coverage. Will consider 100% as the minimum, but as mentioned it appears we may be able to get 200%.

We began at 50 m range scale on an 80 m line plan but after a few lines and examination of SVP data determined data quality supports 100 m range scale on the same line plan, which gives us slightly better than 200% most lines. We operated similarly on the Red Dog project in 2013 at similar depths, with good results.

Roger on complete coverage multibeam being acceptable. I could see doing this if we have sidescan issues or have water deep enough to get full coverage.

Yes, will be submitting the weekly report starting this coming Monday, and will continue the daily reports as well.

Speaking of reports, I did not receive a monthly progress sketch spreadsheet template from Mark. Do you have this available, or should I populate last year's with the new sheet info?

Thanks Katrina,

Andy

From: Katrina Wyllie - NOAA Federal [mailto:katrina.wyllie@noaa.gov]
Sent: Friday, July 01, 2016 17:49
To: Andrew Orthmann <aorthmann@terrasond.com>
Subject: Re: complete coverage

Hi Andy,

1. Please continue with the requirement for complete coverage in this area (at least 100% SSS). Thanks for the note regarding low refraction in the SSS data; I will pass that information along to NOAA Ship *Rainier*. Just curious, are you running at 75m range scale? 100m?

2. Yes, Complete Coverage Option A is acceptable.

Separate question for you: You will be submitting weekly progress reports, correct? (HSSD Section 8.1.1.1)?

Thank you,
Katrina

On Thu, Jun 30, 2016 at 9:08 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

Hi Katrina,

Per the work instructions, we are working to achieve the “Complete Coverage” category “Option B” as listed in the HSSD, which is 100% sidescan with concurrent multibeam bathy (with splits and MBES developments, etc.) in the full coverage area (the survey corridor).

Given that, a couple questions:

1. In instances where its possible, is 200% sidescan coverage acceptable over the 100% coverage (with the same multibeam requirements)? I would assume it would be, but want to check. On this survey it looks like 200% coverage is largely achievable due to low refraction and good data quality.

2. Similarly, is “Option A” of Complete Coverage (100% multibeam to Complete Coverage standards) acceptable? It appears there are case where it is deep enough this may be possible on this survey.

Thank you,

Andy

Andrew Orthmann

From: Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
Sent: Wednesday, June 29, 2016 11:10
To: Andrew Orthmann
Subject: Re: DFR03_062716 Etolin Strait
Attachments: OPR-R300-KR-16 (Etolin Strait, AK).doc

Okay, no problem, I completely understand. I will put the briefing slides together and email them to you in the next day or two. If you see anything that doesn't look right or if you have any questions, please let me know. If anybody in your Anchorage office would like to attend a project briefing meeting in your stead, I'd be happy to host a webex.

Also, just going over the project files, I noticed the Coast Pilot document likely didn't make it out to you. The Coast Pilot Branch pulled out specific paragraphs to address if they are applicable to your survey area. I attached it to this email.

Katrina

On Wed, Jun 29, 2016 at 2:50 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

> Hi Katrina, normally it wouldn't be a problem but I'm offshore on the project and the communications aren't that great. We could try to do a conference call but it might not be the best connection over satellite. Could give it a try.
>
> Andy
>
> **From:** Katrina Wyllie - NOAA Federal [mailto:katrina.wyllie@noaa.gov]
> **Sent:** Wednesday, June 29, 2016 18:46
> **To:** Andrew Orthmann <aorthmann@terrasond.com>
> **Subject:** Re: DFR03_062716 Etolin Strait
>
> Hi Andy,
>
> Thanks for including me on your email list.

Would you be interested in attending a ~30 min meeting? We have started doing project briefings to summarize what is in the Project Instructions and address any concerns field units may have. Since you are already started surveying, this particular project briefing would really be more for me to make sure I'm up to speed on everything since Mark is retiring tomorrow. I will happily plan it for a day and time convenient to you if you are interested; please let me know.

Thank you,

Katrina

On Wed, Jun 29, 2016 at 12:01 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

> Ah yes, right after I said I would, I forgot. Sorry about that.
>
> Andy
>
> **From:** Mark Lathrop - NOAA Federal [mailto:mark.t.lathrop@noaa.gov]
> **Sent:** Wednesday, June 29, 2016 11:21
> **To:** Andrew Orthmann <aorthmann@terrasond.com>
> **Cc:** Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>
> **Subject:** Re: DFR03_062716 Etolin Strait
>
> Andy,
>
> Don't forget to add Katrina to your mailing list!
>
> Mark
>
> On Wed, Jun 29, 2016 at 1:54 AM, Andrew Orthmann <aorthmann@terrasond.com> wrote:
>
> > Hello, please find attached the DFR (Daily Field Report) for Etolin Strait (TerraSond project 2016-026, NOAA project OPR-R300-KR-16).

Andrew Orthmann

From: Mark Lathrop - NOAA Federal <mark.t.lathrop@noaa.gov>
Sent: Wednesday, June 29, 2016 03:21
To: Andrew Orthmann
Cc: Katrina Wyllie - NOAA Federal
Subject: Re: DFR03_062716 Etolin Strait

Andy,

Don't forget to add Katrina to your mailing list!

Mark

On Wed, Jun 29, 2016 at 1:54 AM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

> Hello, please find attached the DFR (Daily Field Report) for Etolin Strait (TerraSond project 2016-026, NOAA project OPR-R300-KR-16).

Andrew Orthmann

From: Mark Lathrop <mark.t.lathrop@noaa.gov>
Sent: Saturday, June 25, 2016 09:00
To: Andrew Orthmann
Cc: Katrina Wyllie - NOAA Federal; Michael Gonsalves - NOAA Federal; _OMAO MOP CO Rainier; ops; Rachel Medley - NOAA Federal; Matt Kroll - NOAA Federal; Eric Berkowitz - NOAA Federal; Andrew Kampia - NOAA Federal; Dawn Forsythe - NOAA Federal; Gerd Glang - NOAA Federal; Peter Holmberg - NOAA Federal; timothy. m. smith
Subject: Re: Tanker Grounding off Nunivak

Andy,

Proceed with your assigned survey. The Rainier will be there in a few weeks and will be able to address the grounding area.

Mark

Sent from my iPhone

On Jun 25, 2016, at 12:11 PM, Andrew Orthmann <aorthmann@terrasond.com> wrote:

> Tim, roger on waiting for ops; wouldn't want to spend time surveying that unless if it's not of use to ops right now anyway.
>
> Mark, we'll be there tonight or early Sunday. Will plan to proceed with planned survey in northern Etolin Strait for now until we hear otherwise.
>
> Andy
>
> ---
>
> **From:** Mark Lathrop [mailto:mark.t.lathrop@noaa.gov]
> **Sent:** Saturday, June 25, 2016 03:49
> **To:** Andrew Orthmann <aorthmann@terrasond.com>
> **Cc:** Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>; Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>; _OMAO MOP CO Rainier <co.rainier@noaa.gov>; ops <OPS.Rainier@noaa.gov>; Rachel Medley - NOAA Federal <Rachel.Medley@noaa.gov>; Matt Kroll - NOAA Federal <matt.kroll@noaa.gov>; Eric Berkowitz - NOAA Federal <eric.w.berkowitz@noaa.gov>; Andrew Kampia - NOAA Federal <andrew.kampia@noaa.gov>; Dawn Forsythe - NOAA Federal <Dawn.Forsythe@noaa.gov>; Gerd Glang - NOAA Federal <gerd.glang@noaa.gov>; Peter Holmberg - NOAA Federal <peter.holmberg@noaa.gov>; timothy. m. smith <timothy.m.smith@noaa.gov>
> **Subject:** Re: Tanker Grounding off Nunivak
>
> Hi Andy,
>
> What is your ETA to Etolin Strait?
>
> Mark
>
> Sent from my iPhone

On Jun 25, 2016, at 5:19 AM, timothy.m.smith <timothy.m.smith@noaa.gov> wrote:

Andy,
I'd wait for guidamce from OPS regarding additional data collection. They should reach out if it is needed. USCG is standing down until Monday. I just wanted you to be aware since you are in area and working on an adjacent project that may yield similar shoals.
Thanks.
V/r,
Tim

Sent from my Verizon, Samsung Galaxy smartphone

-------- Original message --------
From: Andrew Orthmann <aorthmann@terrasond.com>
Date: 6/24/16 21:41 (GMT-09:00)
To: Timothy Smith - NOAA Federal <timothy.m.smith@noaa.gov>, Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>, Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>
Cc: _OMAO MOP CO Rainier <co.rainier@noaa.gov>, ops <OPS.Rainier@noaa.gov>, Rachel Medley - NOAA Federal <Rachel.Medley@noaa.gov>, Matt Kroll - NOAA Federal <matt.kroll@noaa.gov>, "'Mark.T.Lathrop@noaa.gov'" <Mark.T.Lathrop@noaa.gov>, Eric Berkowitz - NOAA Federal <eric.w.berkowitz@noaa.gov>, Andrew Kampia - NOAA Federal <andrew.kampia@noaa.gov>, Dawn Forsythe - NOAA Federal <Dawn.Forsythe@noaa.gov>, Gerd Glang - NOAA Federal <gerd.glang@noaa.gov>, Peter Holmberg - NOAA Federal <peter.holmberg@noaa.gov>
Subject: RE: Tanker Grounding off Nunivak

Hi Tim, we'll be on site in the next couple days. Would it be of use for us to collect some data at this location?

Andrew Orthmann, C.H.
Charting Program Manager

TerraSond
Precision Geospatial Solutions ®
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aorthmann@terrasond.com www.terrasond.com
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From: Timothy Smith - NOAA Federal [mailto:timothy.m.smith@noaa.gov]
Sent: Friday, June 24, 2016 11:22
To: Katrina Wyllie - NOAA Federal <katrina.wyllie@noaa.gov>; Michael Gonsalves - NOAA Federal <michael.gonsalves@noaa.gov>
Cc: _OMAO MOP CO Rainier <co.rainier@noaa.gov>; ops <OPS.Rainier@noaa.gov>; Rachel Medley - NOAA Federal <Rachel.Medley@noaa.gov>; Matt Kroll - NOAA Federal <matt.kroll@noaa.gov>; Eric Berkowitz - NOAA Federal <eric.w.berkowitz@noaa.gov>; Andrew Kampia - NOAA Federal <andrew.kampia@noaa.gov>; Andrew Orthmann <aorthmann@terrasond.com>; Dawn Forsythe - NOAA Federal <Dawn.Forsythe@noaa.gov>; Gerd Glang - NOAA Federal <gerd.glang@noaa.gov>; Peter Holmberg - NOAA Federal <peter.holmberg@noaa.gov>
Subject: Tanker Grounding off Nunivak

All; FYI,

This morning Vitus had the tanker CHAMPION EBONY run aground on a shoal ~ 10nm SE of Cape Corwin in Etolin Strait (LAT 59 degree 45.6'N / LONG 165 degree 30.1' W). This is pretty much right on the main survey corridor for OPR-R300-RA-16. I'm not sure what the loaded draft was, but vessel is listed @ 13.9m. I do not believe there was discharge from grounding as USCG has stood down and vessel has been moved offshore; I'll let folks know if I get more info from RCC.

Vitus is asking if we have any survey data that is not on current chart (preliminary etc); I told him I'd check if anything was in processing etc, but I didn't think we have anything that would have updated depths - not this season's surveys are run. Anyone have other information/updates to the contrary?

It is unfortunate they found the shoal before us, but at least we know of a shoal to further define when RA gets on scene.

V/r,

Tim

--

Timothy M. Smith LT/NOAA
Navigation Manager of Alaska Region
222 West 7th Ave., #43, Room 552
Anchorage, Alaska 99513-7577
NOAA - Office of Coast Survey
Office: 907.271.3327
Cell: 907.231.7112

Andrew Orthmann

From: Andrew Orthmann
Sent: Monday, June 20, 2016 16:29
To: 'Mark.T.Lathrop@noaa.gov'
Subject: project update

Hi Mark, just a quick update for Etolin Strait:

We finished mobilization on the Q105 yesterday (6/19) and got it on its way to Bethel. Installed the ASV in trials and that went well. It should arrive in Bethel Thursday/Friday where the rest of the crew, myself included, will join it. Then we will transit to the site and begin operations, probably starting acquisition around Sunday the 26th. JOA has completed the tide gauge installations except for three BMPGs, which we will deploy upon arrival.

The work instructions I have are labeled “draft”, do you happen to have final work instructions?

Andy

Andrew Orthmann

From: Mark Lathrop - NOAA Federal <mark.t.lathrop@noaa.gov>
Sent: Thursday, June 02, 2016 06:24
To: Evans, Rhodri E.; George Reynolds; Andrew Orthmann; Arthur Wright; David Neff; David Millar; Jon Dasler; Tara Levy
Cc: Michael Gonsalves - NOAA Federal; _NOS OCS HSD OPS
Subject: Caris support files
Attachments: Caris_Support_Files_5_4.piz

NOAA Hydrographic Contractors

Please find attached the latest version (5.4) of the Caris Support Files. The 'zip' extension was changed to 'piz' for email purposes. The updates for this version can be found in the included change list. NOAA provides these support files to all of our NOAA hydrographic contractors as a convenience, whether they are Caris users or not. Use of these files is not required, but may aid users in meeting the 2016 HSSD. Please contact your COR with any questions.

Regards,

Mark

Andrew Orthmann

From: Andrew Orthmann
Sent: Wednesday, May 25, 2016 14:34
To: 'Mark Lathrop - NOAA Federal'
Subject: RE: PoP

Hey Mark,

I put down 2/28/17 in the proposal; I think that is similar to what we discussed, based on that timeline provided by CO-OPS.

I'm in Louisiana at the moment, testing our equipment on this ASV. So far things are looking really good. It needs to ship next week to make it to Alaska in time to go on the Q105.

Andy

From: Mark Lathrop - NOAA Federal [mailto:mark.t.lathrop@noaa.gov]
Sent: Wednesday, May 25, 2016 14:56
To: Andrew Orthmann <aorthmann@terrasond.com>
Subject: PoP

Andy,

I'm working with AGO on your task order. Could you tell me again what date we discussed for deliverables?

Thanks,

Mark

Andrew Orthmann

From: Mark Lathrop - NOAA Federal <mark.t.lathrop@noaa.gov>
Sent: Tuesday, March 29, 2016 10:56
To: Tara Levy; David Neff; David Millar; Evans, Rhodri E.; Arthur Wright; George Reynolds; Andrew Orthmann; Jon Dasler
Cc: Michael Gonsalves - NOAA Federal
Subject: 2016 HSSD Updates
Attachments: HSSD_2016_Updates.ppt

NOAA Hydrographic Contractors,

The 2016 edition of the Hydrographic Survey Specifications and Deliverables (HSSD) has been published and approved for use. The document can be downloaded here: http://www.nauticalcharts.noaa.gov/hsd/specs/specs.htm. For all 2016 surveys, including those task orders currently in negotiation, you will be expected to adhere to these requirements. Please contact your COR if you need to discuss how changes in the specs will affect the scope of the contract.

Regards,

Mark Lathrop, HSD

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	Local Notice to Mariners
LNM	Linear Nautical Miles
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
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

H12870

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

- H12870_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12870_GeoImage.pdf

The survey evaluation and verification has been conducted according current OCS Specifications.

Approved: Digitally signed by Peter Holmberg
Reason: I am approving this document
Date: 2017.12.18 11:06:33 -08'00'

Peter Holmberg
Cartographic Team Lead, Pacific Hydrographic Branch

The survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.

Approved: LCDR NOAA Digitally signed by HAUSER.OLIVIA.A.1275636009
Date: 2017.12.18 09:57:57 -08'00'

LCDR Olivia Hauser, NOAA
Chief, Pacific Hydrographic Branch