U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE

Descriptive Report

Type of Survey **Hydrographic Survey**

Field No. **H12115**

Registry No. **OPR-R144-KR-09**

LOCALITY

State **Alaska**

General Locality **Central Bering Sea**

2009

CHIEF OF PARTY

Brian Busey

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DATE **November 2010**

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NOAA FORM 77-28
(11-72)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTRY No

HYDROGRAPHIC TITLE SHEET

Descriptive Report

OPR-R144-KR-09

INSTRUCTIONS – The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

FIELD No. H12115

State Alaska

General Locality Central Bering Sea

Sub-Locality Pribilof_Canyon

Scale N/A **Date of Survey** June4th-June18th,2009

Instructions dated N/A **Project No.** OPR-R144-KR-09

Vessel *R/V Mt. Mitchell*

Chief of party Brian_Busey

Surveyed by TerraSond Ltd.

Soundings by echo sounder, lead line, pole Multibeam Echosounder

Graphic record scaled by N/A

Graphic record checked by N/A **Automated Plot** N/A

Verification by *Atlantic Hydrographic Branch*

Soundings in fathoms feet at MLW MLLW Meters at MLLW

HCell depth units *Fathoms at MLLW*

REMARKS: *UTM Zone 02N*

Contractor: TerraSond Ltd. All times recorded in UTC

1617 South Industrial Way, Suite 3

Palmer, AK 99645

DESCRIPTIVE REPORT

OPR-R144-KR-09

Bering Sea sunrise from the Mt. Mitchell

Registry Number: **H12115**

Vessels*:* ***R/V Mt. Mitchell***

Survey: **A**

State: **Alaska**

General Locality: **Central Bering Sea**

Sublocality: **Pribilof Canyon**

Survey Dates: **June 4, 2009 to June 18, 2009**

Vice President of Operations: **Brian Busey**

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A. AREA SURVEYED

A navigable area survey was conducted in Pribilof Canyon, Alaska in accordance with the NOAA, National Ocean Service, Statement of Work, Pribilof Canyon Mapping, OPR- R144-KR-09,* dated April 16, 2009. *Concur.*

The purpose of this project was to provide NOAA with modern, accurate hydrographic survey data with which to update the nautical charts of the assigned area. The project was chartered in cooperation with the Marine Conservation Alliance and the Alaska Fisheries Science Center's Resource Assessment and Conservation Engineering Division to provide bathymetry for, "both habitat and charting purposes." *Concur.*

The basic project area was between the 200 and 1100 meter depth curves in Pribilof Canyon, south of the Pribilof Islands in the Central Bering Sea. An option to extend the project area to the 2000 meter depth was exercised in accordance with *Section 1.6.2: University of Alaska Fairbanks Extended Survey* of the Statement of Work*. For the region of "erroneous data", described in *Section 1.6.1: Extended Survey Area ("erroneous data region")* of the Statement of Work* two recon lines were surveyed to verify depths did not exceed 200m in the survey area polygon. The final project area was approximately 938 square nautical miles in area and 50 nautical miles in length. *Concur.*

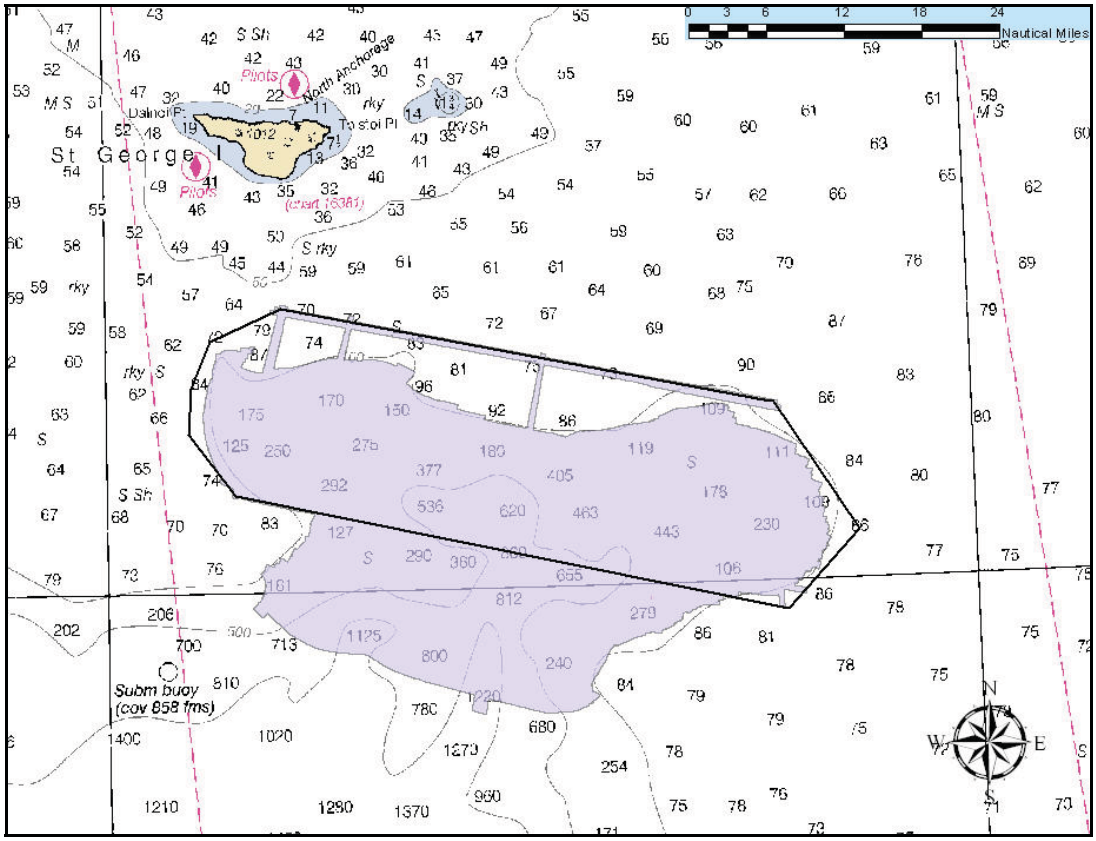

Figure 1 – Overview of H12115 with Chart 16011, 3rd Edition, July 2009. Soundings in Fathoms

** filed with original field records.*

Full bottom coverage, consisting of 100% multibeam data was achieved within the limits of hydrography for this survey. One hundred percent backscatter data was acquired and stored by TerraSond, Ltd to be processed by the client. This survey has a minimum depth of 124 meters and a maximum depth of 2304 meters corrected to Mean Lower Low Water (MLLW) tidal datum. The *R/V Mt. Mitchell* collected 2660 lineal nautical miles of mainscheme multibeam lines and 211 lineal nautical miles of crosslines between June 4, 2009 and June 18, 2009 for a total of 938 square nautical miles of coverage. Bottom samples were not required. *Concur.*

For an image of the complete survey limits, refer to Figure 1.

B. Data Acquisition and Processing *See also HCell Report*

B.1. Equipment

Bathymetry for this survey was acquired using the hydrographic survey vessel *R/V Mt. Mitchell.* *Concur.*

R/V Mt. Mitchell

The *R/V Mt. Mitchell* is a steel-hull vessel, 70 meters length overall with a 12.7 meter beam and a 3.9 meter draft. The ship was powered by two 1200 HP EMD/567C General Motors Diesel engines connected to two Bird-Johnson controllable-pitch propellers operating between 10% and 80% pitch. Electrical power was provided by two Detroit Diesel 300 kW generating plants located in the engine room and one Detroit Diesel 75 kW auxiliary generator. Major systems used on the *R/V Mt. Mitchell* are listed in Table 1. *Concur.*

***Table 1 - Major systems used aboard the* R/V Mt. Mitchell.**

VESSEL R/V Mt. Mitchell LOA: 70m, BEAM 12.7m, DRAFT: 3.9m	
Equipment	**Manufacturer & Model**
Multibeam sonar	Kongsberg EM 710, Kongsberg Simrad EM 120
Positioning	C-NAV 2050R
Sound speed	AML Smart SV&T, SV Plus v2, Lockheed Martin Sippican XBT T-5 & XCTD-2
Vessel attitude	Applanix POS MV 320 V4

Equipment performance details are provided in the Data Acquisition and Processing Report (DAPR);*Sections B: Equipment* and *C: Quality Control.*

**Included with HCell deliverables.*

B.2. Quality Control

B.2.1 Multibeam Bathymetry

A Multibeam confidence check was conducted on the *R/V Mt. Mitchell* at the end of the survey to verify proper operation of the multibeam suite by running comparison lines with the *M/V Bluefin* and *R/V Mt. Augustine*. The two vessels used in the comparison were working on a NOAA charting contract (OPR-P188-TE-09) in Unimak Pass, AK for TerraSond Ltd. The comparison lines were collected on 2009-173 in Akun Bay, AK. The altitude data for the *R/V Mt. Augustine* and *M/V Bluefin* was corrected using PPK and the Mt. Mitchell with DGPS. There was good agreement between the *R/V Mt. Mitchell* and the other vessels with 0.30m and 0.13m vertical difference from the *M/V Bluefin* and *R/V Mt. Augustine* respectively. The multibeam sonar confidence check can be found in *Separate I: Acquisition Logs and Confidence Checks** of the Descriptive Report. Concur.

Throughout the survey the data was reviewed in CARIS HIPS and SIPS subset editor using the IHO S-44 attribute to verify the quality of the data. The majority of the data was found to meet IHO Order 2 specifications, with the exception of some data along the outer beams. However, further visual inspection of the area revealed good agreement between adjacent swaths. The client was consulted and a modified survey strategy was employed narrowing the swath width and thereby improving the uncertainty of the outer swath. Concur.

Sound speed profiles were taken as deep as equipment permitted and were geographically and temporally distributed within the survey area to meet the criteria specified in NOS Hydrographic Surveys Specifications and Deliverables (HSSD) April 2009. The majority of sound speed profiles extended to >85% of the anticipated water depth with the exception of casts done in the deepest section of the survey area where a maximum depth of approximately 1200m was obtained, the functional depth limit of the Sippican XBT and XCTD probes. Concur.

In general, multibeam data quality for H12115 was good. However the following conditions were encountered which affect the data quality:

- A sound speed error is apparent through out the data set with outer beams showing separations of up to 5 meters vertically. However this is well with in specifications considering the water depth of the survey area. Additionally, in these areas, there is adequate overlap with adjacent lines so that the impact on the final BASE surface is minimal. Concur.
- All survey lines were sound speed corrected using "Nearest in distance within time, 12 hours" method in CARIS HIPS with the exception of the lines listed in *Table 2*. Due to sound speed correction issues these lines were processed using "Previous in Time" method in order to minimize sound speed error. Concur.

Table 2- List of lines sound speed corrected using "Previous in Time" method

Date	Multibeam System	Line Name

* Filed with original field records.

2009-161	EM120	0205_20090610_015836_UNITY_Mt_Mitchell_EM120
2009-161	EM120	0207_20090610_025246_UNITY_Mt_Mitchell_EM120
2009-161	EM120	0208_20090610_033100_UNITY_Mt_Mitchell_EM120
2009-161	EM120	0211_20090610_044252_UNITY_Mt_Mitchell_EM120
2009-161	EM120	0213_20090610_060614_UNITY_Mt_Mitchell_EM120
2009-161	EM120	0214_20090610_063614_UNITY_Mt_Mitchell_EM120
2009-161	EM120	0215_20090610_070614_UNITY_Mt_Mitchell_EM120
2009-161	EM120	0220_20090610_093216_UNITY_Mt_Mitchell_EM120
2009-161	EM120	0221_20090610_100216_UNITY_Mt_Mitchell_EM120
2009-161	EM710	0239_20090610_015835_ShipName
2009-161	EM710	0241_20090610_025246_ShipName
2009-161	EM710	0242_20090610_033101_ShipName
2009-161	EM710	0245_20090610_044252_ShipName
2009-161	EM710	0247_20090610_063615_ShipName
2009-161	EM710	0248_20090610_063615_ShipName
2009-161	EM710	0249_20090610_070615_ShipName
2009-161	EM710	0254_20090610_093212_ShipName
2009-161	EM710	0255_20090610_100213_ShipName

- There is an artifact present in the EM710 data that was acquired during acquisition. The artifact has to do with the model being a three sector system and can not be corrected in post processing. However when performing the data quality check, cross line analysis, all comparisons met IHO S-44 Order 2 specifications with a percentage greater then 95%. Also, for the majority of the survey area both the EM710 and EM120 systems were collecting data. The artifact being discussed is not present in the EM120 data which overlaps EM710 data allowing for minimal effect on the final BASE surface. *Concur.*

- The lines listed below in *Table 3* were collected for recon purposes in regard to the erroneous data region discussed in *Section 1.6.1*: *Extended Survey Area ("erroneous data region")* in the Statement of Work.*These lines only involve the EM710 allowing the artifact discussed in the point above to be observed in the final BASE surface along with several data gaps acquired during collection. Since the purpose of these lines were recon to verify that there is no depth structure exceeding 200 meters in the erroneous data area, no further investigation or data collection was acquired in this section of the survey area. *Concur.*

Table 3- List of recon lines for erroneous data region

Date	Multibeam System	Line Name
2009-155	EM710	0000_20090604_093500_MtMitchell
2009-155	EM710	0001_20090604_100501_MtMitchell
2009-155	EM710	0002_20090604_103501_MtMitchell
2009-155	EM710	0003_20090604_110500_MtMitchell
2009-155	EM710	0004_20090604_122117_MtMitchell
2009-155	EM710	0005_20090604_125118_MtMitchell
2009-155	EM710	0006_20090604_132118_MtMitchell
2009-155	EM710	0007_20090604_135117_MtMitchell
2009-155	EM710	0008_20090604_142118_MtMitchell
2009-155	EM710	0009_20090604_152118_MtMitchell
2009-155	EM710	0010_20090604_155657_MtMitchell
2009-155	EM710	0011_20090604_155657_MtMitchell
2009-155	EM710	0012_20090604_162657_MtMitchell
2009-155	EM710	0013_20090604_165657_MtMitchell
2009-155	EM710	0014_20090604_172657_MtMitchell
2009-155	EM710	0015_20090604_175657_MtMitchell
2009-155	EM710	0016_20090604_182657_MtMitchell
2009-155	EM710	0017_20090604_185657_MtMitchell

* *Filed with original field records.*

2009-155	EM710	0018_20090604_192658_MtMitchell
2009-155	EM710	0019_20090604_195657_MtMitchell
2009-155	EM710	0020_20090604_202151_MtMitchell

- There are a small number of data gaps present in the data set, however according to *Section 1.6.2: University of Alaska Fairbanks extended survey*, in the Statement of Work,* the depth range for the survey area is 200 to 1100m and the data gaps are generally in depths less then 200 m. Concur.
- There are a few areas where the data is sparse, especially at depths greater then 1100 m. This area pertains to *Section 1.6.2: University of Alaska Fairbanks extended survey* in the Statement of Work.* This extension was under a 5 day constraint with the purpose of extending the mapping area for fisheries habitat mapping and further research with undersea vehicles. Due to the time constraint and the purpose it was not necessary to survey further in these areas. Concur.

A detailed discussion of multibeam system calibrations, speed of sound profiling, patch tests, data acquisition and processing is provided in the DAPR.** Concur.

B.2.2 Crosslines

856 mainscheme lines totaling 2660 lineal nautical miles and 61 crosslines totaling 211 lineal nautical miles were run during the 2009 survey of H12115. The ratio of the lineal nautical miles of crosslines to the lineal nautical miles of mainscheme lines, at 8%, exceeds the 5% required by NOS Hydrographic Surveys Specifications and Deliverables, 2009, *Section 5.1.4: Quality Control.* Concur.

Crossline analysis was conducted using CARIS HIPS QC Report utility. Each crossline was selected and run through the process, which calculated the difference between each accepted crossline sounding and a BASE surface created from the mainscheme data. Due to the large depth range in H12115, two surfaces with different resolutions and depth ranges were used for the comparison. An 8m resolution surface with depth range of 103 to 350m and an 16 m resolution surface with depth range of 326 to 2500m resolution. Cross lines from both the EM120 and EM710 were compared to each surface where intersection occurred. Concur.

The differences in depth were grouped by beam number and statistics computed which included the percentage of soundings compared whose differences from the BASE surface fall within IHO S-44 Order 2. Concur.

All of the beams meet IHO S-44 Order 2 specifications at the 95 % confidence level or better. Refer to *Separate IV: Crossline Comparisons** for the QC Reports of this report. Concur.

B.2.3 Contemporary Survey Junctions

H12115 does not junction with other contemporary surveys. Concur.

* Filed with original field records.
** Included with HCell deliverables.

B.3. Corrections to Echo Soundings

Refer to the Data Acquisition and Processing Report*for a detailed description of all corrections to echo soundings. No deviations from the report occurred. *Concur.*

B.4. Data Processing

The final depth information for this survey was submitted as a collection of CARIS BASE surfaces which best represented the seafloor at the time of the 2009 survey. All possible measures were taken to ensure data flow integrity and that the data was correctly processed. *Concur.*

Because of the highly varied terrain of the survey area, line planning was not possible. Swath width and spacing was adjusted by the operator to provide 100% bottom coverage. *Concur.*

Grids of varying resolution were created for H12115 due to the wide depth range and varying bathymetry found in the survey area. Grid spacing of 8 and 16 meters were used for the BASE surfaces. *Concur.*

Table 4 – list of CUBE surfaces for H12115

Depth Range	BASE Surface Resolution	Surface Name
103-350 m	8m	103to350m_Final
326-2500m	16m	326to2500m_Final

No feature data was collected for this survey in accordance with the statement of work, however two files named H12115_Final_Features_File.hob and H12115_Final_Feature_File.000 will be submitted with this report for S57. H2115_Final_Feature_File.000 was complied with a survey scale of 1:40,000 at hydrographer's discretion since there was no survey scale provided for H12115. *Concur.*

The DAPR *Sections B.2: Data Collection*; and *C: Quality Control* contain a detailed discussion of the steps followed when acquiring and processing the 2009 survey data. *Concur.*

C. Vertical and Horizontal Control

Sounding data were tide adjusted using verified data National Water Level Observation Network (NWLON) tide station at Village Cove, Saint Paul, AK (946-4212). No tidal zoning methodology was applied as per contract. Tidal considerations are described in detail in the project wide Horizontal and Vertical Control Report.* *Concur.*

The horizontal control datum used for this survey is the North American Datum of 1983 (NAD 83). The projection used was UTM, Zone 2 North *Concur.*

Sounding position control was determined using a Global Positioning System (GPS). The primary source of navigation correctors was a C-NAV 250R (which was receiving a globally corrected GPS (GcGPS) signal) as the survey area is outside of the published

* *Included with HCell deliverables.*

range of Coast Guard correction stations. C-NAV corrected positions were compared to the GPS positions from United States Coast Guard differential GPS (DGPS) station at Cold Bay, AK broadcasting at 289 kHz when in range of the station. A summary of DGPS confidence checks is provided in *Separates I: Acquisition Logs and Confidence Checks** included with this report. Concur.

D. Results and Recommendations

D.1. Chart Comparison

The chart comparison for H12115 was performed by comparing all RNC and ENC charts that intercept the project area to the surveyed data. These charts are listed in Table 3. Concur.

Discrepancies are discussed in context of the largest scale chart available and assumed to apply to the smaller scale charts unless specifically mentioned. Concur.

Table 5 - Charts used during chart comparisons.

ENC	RNC	Scale	Edition Number	Issue Date
US3AK8CM	16380	1:200,000	15	11/01/2009
US2AK5FM	16011	1:1,023,188	37	11/01/2007
n/a	16006	1:1,534,076	35	04/01/2008
US1BS01M	513	1:3,500,000	07	06/01/2004
n/a	530	1:4,860,700	32	06/01/2007
n/a	50	1:10,000,000	06	06/01/2003

No Local Notice to Mariners (LNM) or Notice to Mariners (NTM) affected the survey area. Charts used for chart comparison were updated through November 14, 2009. No features were submitted as Dangers to Navigation (DTON) for the 2009 survey (Appendix I).** Concur.

The chart comparison was accomplished by generating shoal-biased soundings and contours then overlaying them along with the finalized BASE surfaces on the latest edition NOAA charts. The general agreement between charted soundings and H12115 soundings was then examined and a more detailed comparison was undertaken for any shoals or other dangerous features. No shoals or other dangerous features were found during this survey. Concur.

General agreement between this survey and the charts is fair. Significant differences are itemized in the sections below. Concur with clarification. See below for listing of significant discrepancies between the chart and survey data.

D.1.1. New Features

There were no new features identified during survey H12115. Concur.

* Filed with original field records.
** Appended to this report.

D.1.2. Charted Features

There were no charted features within the survey extents of H12115. *Concur.*

D.1.3. Soundings

Agreement between charted soundings and surveyed depths is fair, with most depths in general agreement. Significant discrepancies (generally those greater than +/- 10% of charted depth) are itemized in the table below. Many of the discrepancies occur on steep canyon walls where relatively small differences in horizontal positioning of the charted soundings translate into large vertical differences when compared to the surveyed depths. It is recommended that soundings from H12115 supersede previously charted soundings. *Concur.*

Table 6 – 2009 survey soundings which vary significantly from the corresponding charted soundings.

Chart	Charted Depth	Survey Depth in Vicinity	Charted Position
16380	109 fathoms	125 fathoms	56-15-41.54N, 169-44-18.58W
16380	123 fathoms	142 fathoms	56-15-15.08N, 169-36-25.76W
16380	152 fathoms	136 fathoms	56-15-26.78N, 169-42-13.62W
16011	106 fathoms	136 fathoms	56-00-58.79N, 168-34-27.89W
16011	161 fathoms	131 fathoms	56-00-36.39N, 169-36-21.62W
16011	175 fathoms	147 fathoms	56-13-56.19N, 169-39-43.89W
16011	178 fathoms	213 fathoms	56-07-00.56N, 168-35-54.33W
16011	250 fathoms	203 fathoms	56-11-04.22N, 169-36-16.96W
16011	290 fathoms	179 fathoms	56-02-44.50N, 169-17-03.56W
16011	360 fathoms	240 fathoms	56-02-04.56N, 169-11-01.31W
16011	405 fathoms	198 fathoms	56-08-36.31N, 168-57-19.83W
16011	443 fathoms	399 fathoms	56-04-03.33N, 168-42-48.12W
16011	463 fathoms	382 fathoms	56-05-41.25N, 168-53-54.89W
16011	812 fathoms	611 fathoms	55-59-08.63N, 169-04-43.15W
16011	860 fathoms	760 fathoms	56-02-48.27N, 169-03-59.40W

D.1.4. Trends and Changeable Areas

Contours were created in IVS Fledermaus and examined concurrently with the charted contours from chart 16011 (largest scale chart) in ArcMap. *Concur.*

Agreement between contours is fair. Contours along the main canyon line up well, while differences are apparent along its smaller branches. Because the survey only extended to the 200m (109fm) curve there is little data to compare to the 100 fm curve. *Concur.*

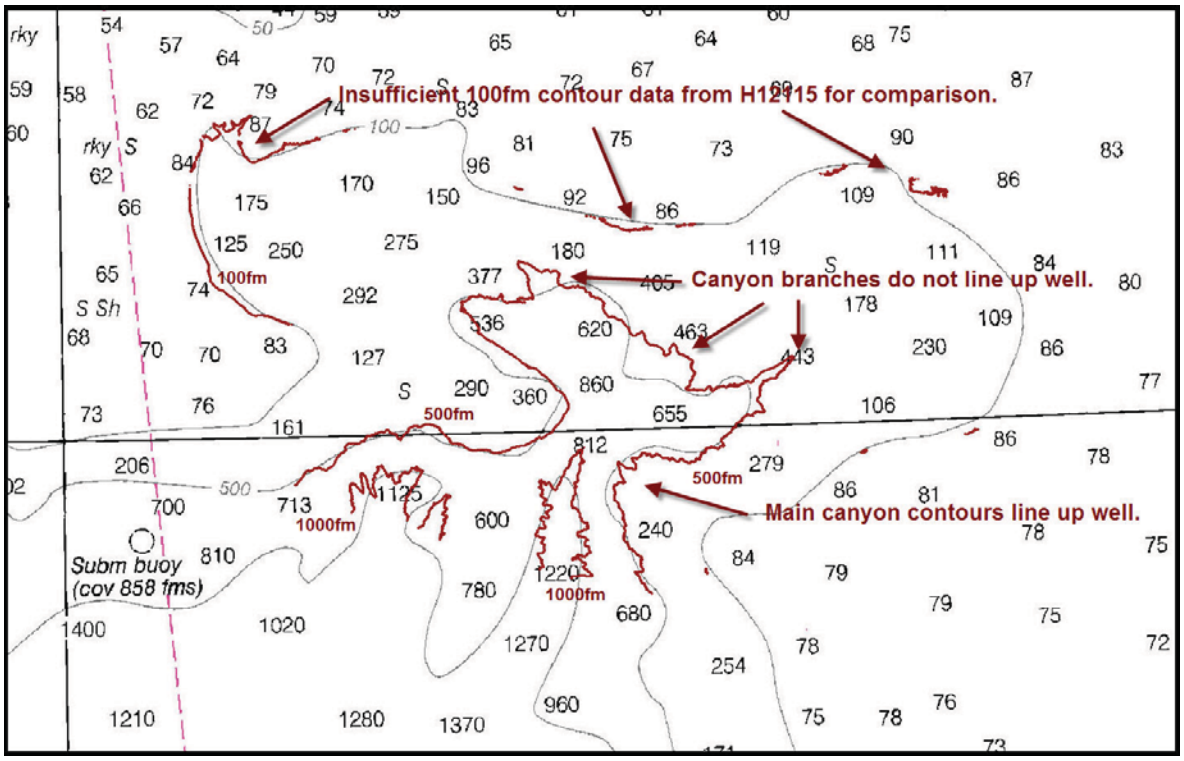

Figure 2 – 100fm, 500fm and 1000fm contours from H12115 (red) overlaid on chart 16011.

The hydrographer recommends that the charted contours be updated to reflect the 2009 survey data. *Concur.*

D.1.5. AWOIS Items Summary

There were no AWOIS items within the survey extents of H12115. *Concur.*

D.1.6. Features Labeled PA, ED, PD, or Rep.

There are no charted features labeled PA, ED, PD or Rep. within the survey extents of H12115. *Concur.*

D.2. Additional Results

D.2.1 Aids to Navigation

There were no charted or uncharted Aids to Navigation within the survey extents of H12115. *Concur.*

D.2.2. Drilling Structures

An investigation of drilling structures is not required under this task order. No charted or uncharted drilling structures exist within the survey extents of H12115. *Concur.*

D.2.3 Comparison with Prior Surveys

A comparison with prior surveys was not required under this task order. See *Section D.1-Chart Comparison* of this report for a comparison to the nautical charts. Concur.

D.2.4. Bottom Samples

Collection of bottom samples was not required under this task order. Concur.

D.2.5. Bridges and Overhead Cables

There are no bridges or overhead cables within the survey extents of H12115. Concur.

D.2.6. Submarine Cables and Pipelines

There are no submarine cables or pipelines within the survey extents of H12115. Concur.

LETTER OF APPROVAL

REGISTRY NO. H12115

This report and the accompanying digital data are respectfully submitted.

Field operations contributing to the accomplishment of survey H12115 were conducted under my direct supervision with frequent personal checks of progress and adequacy. This report, digital data and accompanying records have been closely reviewed and are considered complete and adequate as per the Statement of Work. Other reports submitted with this survey include the Data Acquisition and Processing Report and the Horizontal and Vertical Control Report.

I believe this survey is complete and adequate for its intended purpose.

Brian Busey

Digitally signed by Brian Busey
DN: CN = Brian Busey, C = US, O = TerraSond
Date: 2010.11.08 15:10:38 -09'00'

Brian Busey, Vice President of Operations

TerraSond Ltd.

Date Nov. 8/2010

TERRASOND

APPENDIX I

Danger To Navigation Reports

There were no Danger to Navigation reports submitted for investigation in survey area H-12115. ***Concur.***

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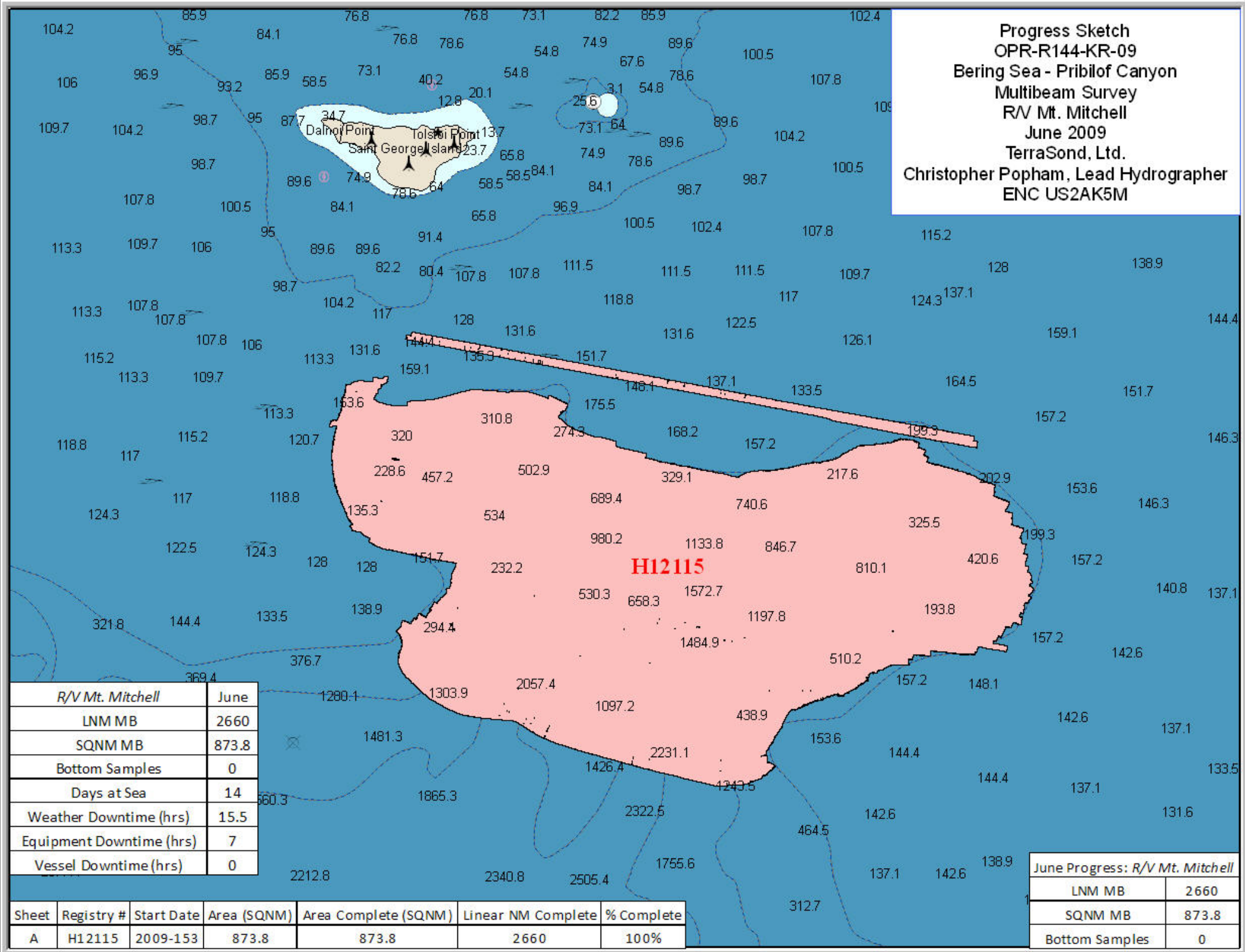
APPENDIX II

Survey Feature Report

There were no Automated Wrecks and Obstructions (AWOIS) assigned in survey area H12115. ***Concur.***

There were no charted features or uncharted survey features within the extents of H12115. ***Concur.***



R/V Mt. Mitchell	June
LNM MB	2660
SQNM MB	873.8
Bottom Samples	0
Days at Sea	14
Weather Downtime (hrs)	15.5
Equipment Downtime (hrs)	7
Vessel Downtime (hrs)	0

Sheet	Registry #	Start Date	Area (SQNM)	Area Complete (SQNM)	Linear NM Complete	% Complete
A	H12115	2009-153	873.8	873.8	2660	100%

June Progress: R/V Mt. Mitchell	
LNM MB	2660
SQNM MB	873.8
Bottom Samples	0

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APPENDIX IV

Tides and Water Levels

Abstract of Times Hydrography

Project: OPR-R144-KR-09

Registry No.: H-12115

Table 1 – Times of Hydrography: Inclusive Dates: June 2nd - June 15th 2009. This survey ran 24 hours per day.

.

START		END	
Day (Julian)	Time (UTC)	Day (Julian)	Time (UTC)
153	00:00	166	23:59

Village Cove, St. Paul Island, AK

Station ID: 9464212

Station Information

Latitude: **57° 7.5' N**
Longitude: **170° 17.1' W**
Established: **Jun 8 1977**
Present Installation: **Apr 12 2002**
NOAA Chart #: **16382**
Time Meridian: **135 W**

Mean Range: **2.11 ft.**
Diurnal Range: **3.33 ft.**

Data Types Available:

Wind
Air Temperature
Water Temperature
Barometric Pressure
Primary Water Level
Primary Water Level

EPOCH Update Information:

EPOCH Datum Comparison:	**Click HERE -**	check datum differences between the old epoch (1960-1978) and the new epoch (1983-2001)
Superceded Bench Mark Data Sheet:	**Click HERE -**	bench mark sheet on the old Tidal Datum Epoch (1960-1978)
Superceded Datums:	**Click HERE -**	datums on the old Tidal Datum Epoch (1960-1978)
Mean Sea Level Differences List:	**Click HERE -**	mean sea level differences between the two epochs for all stations.

Mean Sea Level Difference: for 9464212 Village Cove, St. Paul Is AK	**1983-2001**	**1960-1978**	**Difference:**
	ft.	ft.	ft.

Location:

To reach the tidal bench marks from the U.S. Post Office in Village Cove, proceed 0.2 km (0.1 mi) south to a stop sign, then 0.3 km (0.2 mi) west to the AC center, then 0.2 km (0.1 mi) NNW to the dry dock, then 0.3 km (0.2 mi) NW to the city dock. The bench marks are located along the road from the AC center to the city dock. The tide gauges were located in the city tool shed on the southern end of the city dock.

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APPENDIX V

Supplemental Survey Records and Correspondence

Bottom Samples

Project: OPR-R144-KR-09

Registry No.: H-12115

No bottom samples were taken for this survey per the Statement of Work.

AHB COMPILATION LOG

General Survey Information	
REGISTRY No.	H12115
PROJECT No.	OPR-R144-KR-09
FIELD UNIT	TERRASOND
DATE OF SURVEY	20090604 - 20090618
LARGEST SCALE CHART	***16380_1, edition 15, 200611, 1:200,000***
ADDITIONAL CHARTS	***16011_1, edition 37, 200711, 1:1,023,188***
SOUNDING UNITS	FATHOMS
COMPILER	Kyle S. Bates

Source Grids	**File Name** H:\Compilation\H12115_R144_TERRA\AHB_H12115\SAR Final Products\GRIDS
	H12115_103to350m_a_Final_0_8mRes.csar **H12115_103to350m_b_Final_0_8mRes** **H12115_326to2500m_Final_0_16mRes**
Surfaces	**File Name** H:\Compilation\H12115_R144_TERRA\AHB_H12115\COMPILE\Working
Combined	**H12115_16m_Combined.csar**
Interpolated TIN	\Interpolated TIN**H12115_32m_InterpTIN.csar**
Shifted Interpolated TIN	\Shifted Surface**H12115_32m_InterpTIN_Shifted.csar**
Final HOBs	**File Name** H:\Compilation\H12115_R144_TERRA\AHB_H12115\COMPILE\Final_Hobs
Survey Scale Soundings	**H12115_SS_Soundings.hob**
Chart Scale Soundings	**H12115_CS_Soundings.hob**
Contour Layer	**H12115_Contours.hob**
Feature Layer	**H12115_Features.hob**
Meta-Objects Layer	**H12115_MetaObjects.hob**
ENC Retain Soundings	**N/A**

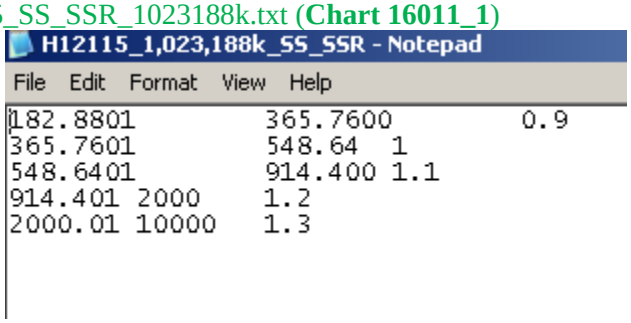
Meta-Objects Attribution	
Acronym	**Value**
M_COVR	
CATCOV	1 – coverage available
SORDAT	20090618
SORIND	US,US,graph,H12115
M_QUAL	
CATZOC	6 – zone of confidence U (data not assessed)
INFORM	Mt. Mitchell
POSACC	10.0 m
SORDAT	20090618
SORIND	US,US,graph,H12115
SUREND	20090618
SURSTA	20090604
DEPARE	
DRVALV 1	68.0 fm
DRVALV2	1245.0 fm
SORDAT	20090618
SORIND	US,US,graph,H12115

M_CSCL	
CSCALE	1023188
SORDAT	20090618
SORIND	US,US,graph,H12115

SPECIFICATIONS:

I. COMBINED SURFACE:
- a. Number of SAR Final Grids: 03
- b. Resolution of Combined (m): 16 m

II. SURVEY SCALE SOUNDINGS (SS):
- a. Attribute Name: Depth
- b. Selection criteria: Radius, Shoal bias
- c. Radius value is: mm at map scale
  - i. Use single-defined radius: 1.1 (**Chart 16380_1**)
  - ii. And use radius table file: H12115_SS_SSR_1023188k.txt (**Chart 16011_1**)



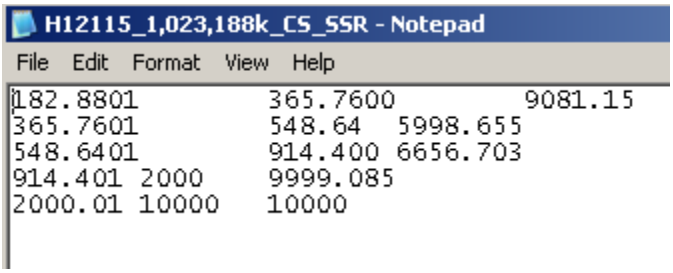
- d. Queried Depth of All Soundings
  - i. Minimum: 68.1 fm
  - ii. Maximum: 1244.8 fm

III. INTERPOLATED TIN SURFACE:
- a. Resolution (m): 32 m
- b. Interpolation method: Natural Neighbor
- c. Shift value: -0.75 fm

IV. CONTOURS:
- a. Attribute Name: Depth
- b. Use a Depth List: H12115_depth_contours.txt
- c. Output Options: Create contour lines
  - i. Line Object: DEPCNT
  - ii. Value Attribute: VALDCO

V. FEATURES:
- a. Number of Chart Features: 08

VI. CHART SURVEY SOUNDINGS (CS):
- a. Number of ENC CS Soundings: 71
- b. Attribute Name: Depth
- c. Selection criteria: Radius, Shoal bias
- d. Radius value is: Distance on the ground (m)
  - i. Use single-defined radius: 3475.37 m (Chart 16380_1)
  - ii. And use radius table file: H12115_CS_SSR_1,023,188k.txt (Chart 16011_1)



iii.

iv. Enable Filter: Interpolated !=1

e. Number Survey CS Soundings: 83

ATLANTIC HYDROGRAPHIC BRANCH
H-CELL REPORT to ACCOMPANY
SURVEY H12115 (2009)

This H-Cell Report has been written to supplement and/or clarify the original Descriptive Report (DR) and pass critical compilation information to the cartographers in the Marine Chart Division. Sections in this report refer to the corresponding sections of the Descriptive Report.

B. DATA ACQUISITION AND PROCESSING

B.2 QUALITY CONTROL

The AHB source depth grids for the survey's nautical chart update were 8m, and 16m resolution BASE surfaces (*.CSAR), which were combined at 16m resolution. The survey scale soundings were created from the combined surface at a single defined radius of 1.1mm at the largest scale chart covering the respective area of the survey (Chart 16380, 1:200,000) and a sounding spacing range (SSR) file was used for the smaller scale chart (Chart 16011, 1:1,023,188). A TIN was created from the survey scale soundings, from which an interpolated surface of 32m resolution was generated. The chart scale soundings were derived from only the non-interpolated nodes of this surface to preserve absolute continuity between the charted depths, the survey scale soundings, and the original source grid. The chart scale soundings were created from the combined surface at a single defined radius of 3475.37 m at the smaller scale chart covering the respective area of the survey (Chart 16011, 1:1,023,188) and a sounding spacing range (SSR) file was used for the largest scale chart (Chart 16380, 1:200,000). The chart scale soundings are a subset of the survey scale soundings. The surface model was referenced when selecting the chart scale soundings, to ensure that the selected soundings portray the bathymetry within the common area.

The interpolated TIN surface of 32m resolution was shifted by the NOAA sounding rounding value of -0.75 fathoms. The shifted interpolated TIN was used to generate depth contours in feet fathoms (100 fm, 500 fm, 1000 fm). The depth contours are forwarded to MCD for reference only. The contours were utilized during chart scale sounding selection and quality assurance efforts at AHB. The depth contours are incorporated into the SS H-Cell product as per 2009 H-Cell Specifications.

The compilation products (Final *.HOB files) for this survey are detailed in the H12115 AHB Compilation Log contained within this document. The Final HOB files include depth areas (DEPARE), depth contours (DEPCNT), soundings (SOUNDG), meta-objects (M_COVR, M_QUAL, and M_CSCL), and features (SNDWAV and SBDARE).

As dictated by Hydrographic Technical Directive 2008-8, the Final HOB files were combined into two separate H-Cell files in S-57 format. Both S-57 files were exported from CARIS Bathy DataBASE in meters, and then converted from metric units into feet fathoms using CARIS HOM ENC 3.3. Quality assurance and topology checks were conducted using CARIS S-57 Composer 2.1 and DKART Inspector 5.1 validation tests.

The final H-Cell products are two S-57 files, in Lat/Long NAD-83. The contents of these two H-Cell deliverables are listed in the table below:

TABLE 1 - Contents of H-Cell Files

H12115_CS.000			Scale 1:200,000
Object Class Types	**Geographic**	**Cartographic**	**Meta**
S-57 Object Acronyms	DEPARE	$CSYMB	M_COVR
	SBDARE		M_CSCL
	SOUNDG		M_QUAL
H12115_SS.000			**Scale 1:80,000**
Object Class Types	**Geographic**		
S-57 Object Acronyms	DEPCNT		
	SOUNDG		

B.2.4 Junctions and Prior Surveys

Survey H12115 (2009) does not junction with any recent or contemporary surveys. Most present survey depths compare within 2 fathoms of the charted hydrography to the east, north, west, and south.

B.4 DATA PROCESSING

The following software was used to process data at the Atlantic Hydrographic Branch:

CARIS Bathy DataBASE version 3.0/HF10
CARIS Bathy DataBASE version 2.3/HF18
CARIS S-57 Composer version 2.1/HF5
CARIS HOM ENC version 3.3/SP3/HF8
DKART Inspector version 5.1

C. HORIZONTAL AND VERTICAL CONTROL

The hydrographer makes adequate mention of horizontal and vertical control used for this survey in section C of the DR. The sounding datum for this survey is Mean Lower Low Water (MLLW), and the vertical datum is Mean High Water (MHW). Horizontal control used for this survey during data acquisition is based upon the North American Datum of 1983 (NAD83), UTM projection zone 02 North.

D. RESULTS AND RECOMMENDATIONS

D.1 CHART COMPARISON

16380_1 (15th Edition, NOV/06)
Pribilof Islands
Corrected through NM 11/04/2006
Corrected through LNM 07/10/2006
Scale 1:200,000

16011 -1 (37th Edition, NOV/07)
Alaska Peninsula and Aleutian Islands to Seguam Pass
Corrected through NM 11/10/2007
Corrected through LNM 10/30/2007
Scale 1:1,023,188

ENC COMPARISON

US3AK8CM
Pribilof Islands
Edition 6
Application Date 2007/08/01
Issue Date 2007/08/01
Chart 16380

US2AK5FM
Alaska Peninsula and Aleutian Islands to Seguam Pass
Edition 7
Application Date 2010/06/25
Issue Date 2010/06/25
Chart 16011

D.6 MISCELLANEOUS

Chart compilation was completed by Atlantic Hydrographic Branch personnel in Norfolk, Virginia. Compilation data will be forwarded to the Marine Chart Division in Silver Spring, Maryland. See section D.1 of this report for a list of the Raster Charts and Electronic Navigation Charts (ENC) used for compiling the present survey.

D.7 ADEQUACY OF SURVEY

The present survey is adequate to supersede the charted bathymetry within the common area. Any features not specifically addressed either in the H-Cell files or the Blue Notes should be retained as charted. Refer to section D and Appendix I and II of the DR for further recommendations by the hydrographer.

APPROVAL SHEET
H12115

Initial Approvals:

The completed survey has been inspected with regard to survey coverage, delineation of depth contours, disposition of critical depths, cartographic symbolization, and verification or disproval of charted data. All revisions and additions made to the H-Cell files during survey processing have been entered in the digital data for this survey. The survey records and digital data comply with National Ocean Service and Office of Coast Survey requirements except where noted in the Descriptive Report and the H-Cell Report.

All final products have undergone a comprehensive review per the Hydrographic Surveys Division Office Processing Manual and are verified to be accurate and complete except where noted.

Kyle Bates
2011.05.17
12:08:24 -04'00'

Kyle S. Bates
Hydrographic Intern
Atlantic Hydrographic Branch

I have reviewed the H-Cell files, accompanying data, and reports. This survey and accompanying Marine Chart Division deliverables meet National Ocean Service requirements and standards for products in support of nautical charting except where noted.

Richard T. Brennan
2011.05.25 00:27:12 -04'00'

Approved: _____

CDR Richard T. Brennan, NOAA
Chief, Atlantic Hydrographic Branch