NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey HYDROGRAPHIC

Field No. OPR-A366-KR-10

Registry No. H12256

LOCALITY

State Maine

General Locality Southern Penobscot Bay

Sublocality Southern Penobscot Bay

2010

CHIEF OF PARTY

Donald L. Brouillette

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NOAA FORM 77-28
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U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

REGISTRY No H12256

HYDROGRAPHIC TITLE SHEET

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.

State Maine

General Locality Southern Penebscot Bay

Sub-Locality Southern Penobscot Bay

Scale 10,000 **Date of Survey** 8-26-2010 - 9-28-2010

Instructions dated 05-20-2010 **Project No.** OPR-A366-KR-10

Vessel M/V R&R

Chief of party Donald L. Brouillette

Surveyed by Brian Bunge, Jacob Deming, Ransom White

Soundings by echo sounder, hand lead, pole Kongsberg EM3002 MBES

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

H-cell units in Feet at MLLW

REMARKS: The purpose of this work is to provide NOAA with modern and accurate hydrographic survey data for the area in Southern Penebscot Bay, ME.

All times are in UTC.

Projection is UTM (NAD83) Zone 19 N.

Bold italic red notes in the Descriptive Report were made during office processing.

NOAA FORM 77-28 SUPERSEDES FORM C&GS-537

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A. AREA SURVEYED

Williamson & Associates, Inc. conducted a hydrographic survey in the southern portions of Penobscot Bay, ME. The sub-locality of this survey is described as southern Penobscot Bay (Fig. 1). The survey encompassed an area of approximately 26.5 square nautical miles and was assigned registry number H12256. It is bound by the coordinates listed in Table 1. Project instructions required complete MBES in areas greater than 6 meters. The depth range encountered in this area was 6.4 to 117.7 meters. Total main-scheme nautical line mileage is 762.078. Total cross-line length surveyed for task order OPR-A366-KR-10 was 36.959 nautical miles or 4.85 percent of the total main scheme nautical miles. Data acquisition was conducted from the 26th of August (Julian Day 238) to the 28th of September (Julian Day 271) 2010. ***Concur.***

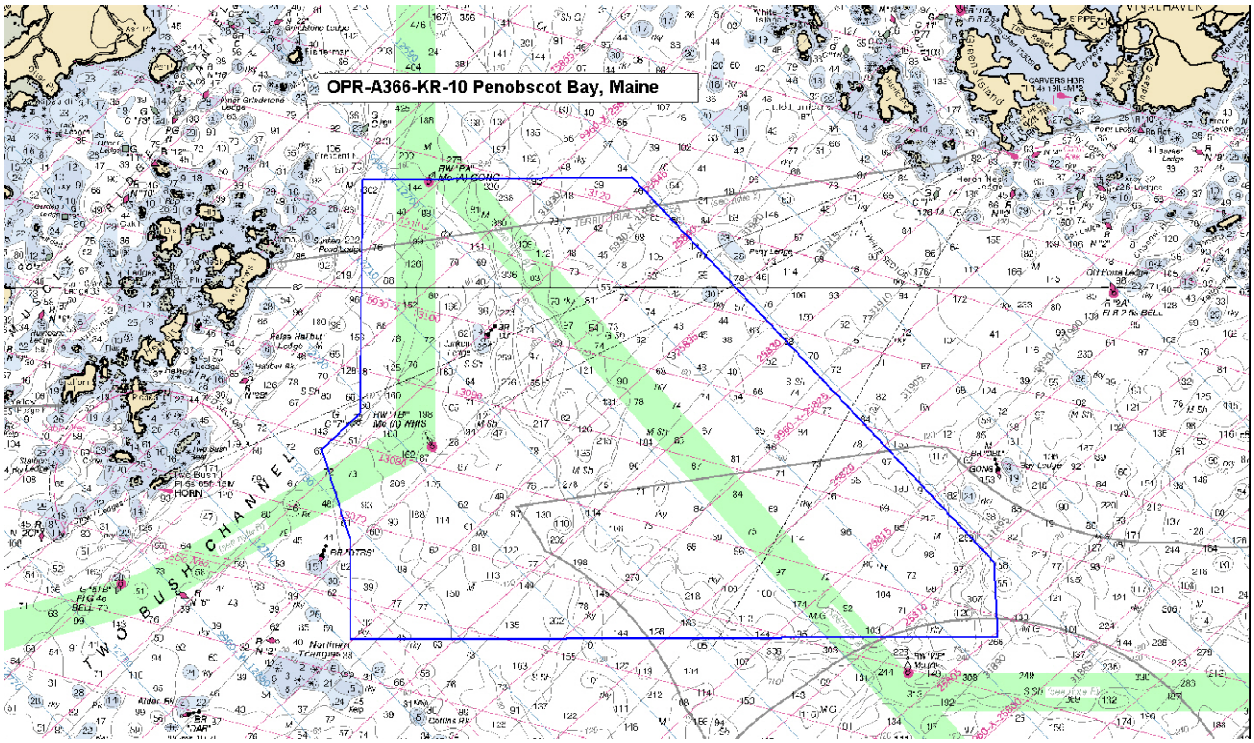


Figure 1: H12256

Table 1 – Sheet Bounds

Point	Latitude (North)	Longitude (West)
1	43° 57' 14.0436"	69° 01' 28.9164"
2	43° 58' 14.3688"	69° 01' 55.0452"
3	43° 58' 37.7760"	69° 01' 21.0396"
4	44° 01' 10.0308"	69° 01' 17.8212"
5	44° 01' 11.7732"	68° 57' 16.3080"
6	43° 57' 0.6660"	68° 51' 50.2668"
7	43° 56' 12.0984"	68° 51' 47.4516"
8	43° 56' 10.3560"	69° 01' 29.0928"

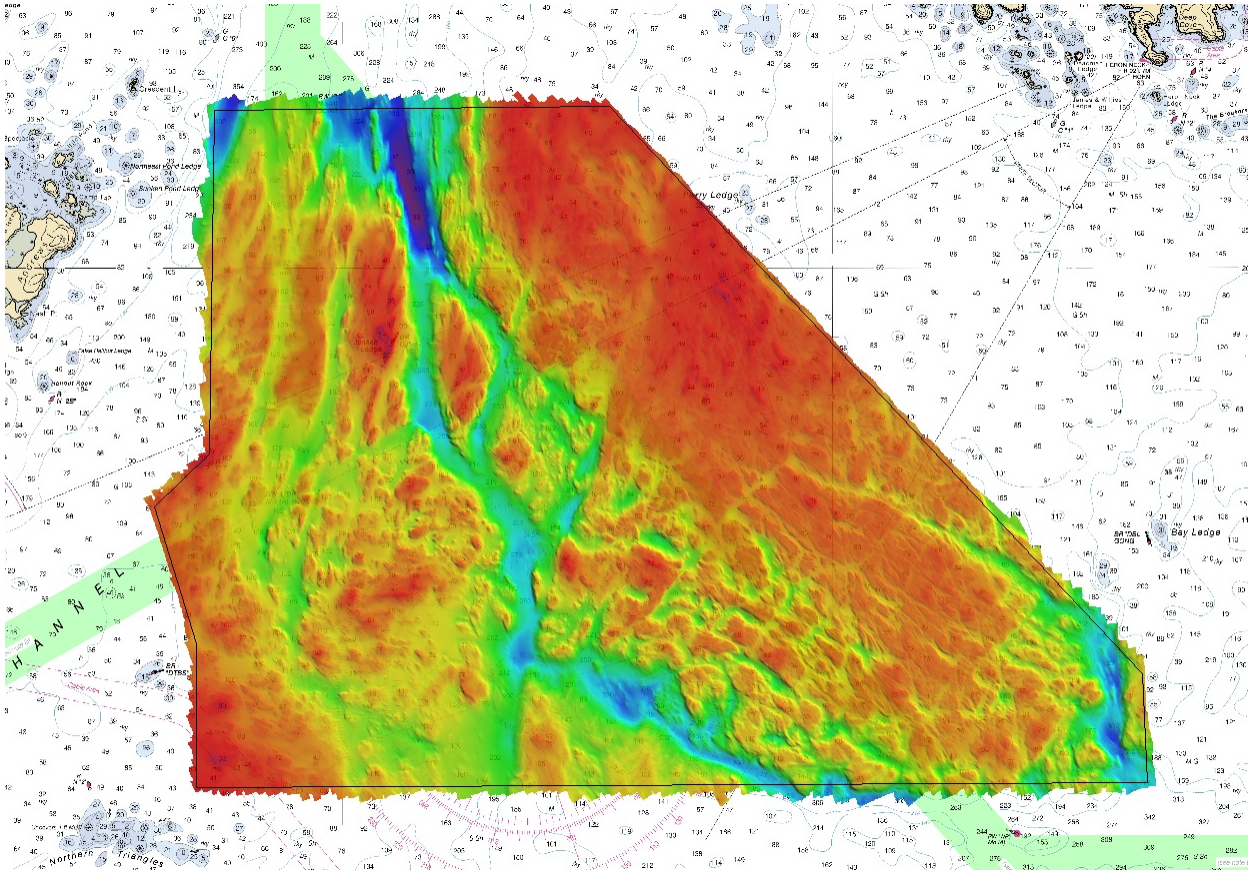


Figure 2: H12256 Surveyed Surface

B. DATA ACQUISITION AND PROCESSING

Refer to the OPR-A366-KR-10 Data Acquisition and Processing Report for a detailed description of all equipment, survey vessels, processing procedures and quality control features. Items specific to this survey and any deviations from the Data Acquisition and Processing Report are discussed in the following sections. ***Concur.***

B.1 Equipment & Vessels

The M/V R&R acquired all multibeam data for sheet H12256.

The R&R is a custom built fiberglass Chesapeake 48 feet in length with an 18 foot beam. It has a large aft deck with a davit used to deploy the CTDs. An EM3002 was pole mounted to the port side of the R&R for this project.

B.2 Quality Control

B.2.a Crosslines

Quality control cross-lines were planned so that most main scheme lines would intersect with at least one cross-line. They were well distributed geographically with total cross-line nautical miles ran totaling more than 4 % of the main scheme nautical miles (a specification set forth by the HSSD 2010).

Total cross-line length surveyed for task order OPR-A366-KR-10 was 33.979 nautical miles or 4.46% of the total main scheme distance. All cross-lines were compared to the mainline BASE surface (CUBE Edited in IVS Fledermaus), using the CARIS HIPS QC Report process for individual lines. Five degree increments were used for each confidence level calculation across the full swath (+/-60 degrees from nadir on port and starboard). The vast majority of beams passed at 95% confidence level or better with an overall confidence level average of 98.62% and a standard deviation of 1.14%.

B.2.b Uncertainty Values

The finalized BASE uncertainty surfaces were split into resolutions based on depth according to the National Ocean Surveys (NOS) *Hydrographic Surveys Specifications and Deliverables* or the HSSD (April 2010). Only soundings that have been CUBE filtered in Fledermaus within IHO order 1 specifications were used in calculating the Uncertainty BASE Surfaces. Any max uncertainty measurements exceeding IHO Order 1 specifications are due to the sound speed uncertainty and sea state conditions and are explained in section B.2.e (Data Quality). The BASE surface is still within the 95% confidence level for IHO Order 1. The calculated uncertainty values of all nodes in the finalized Uncertainty BASE surfaces are as follows:

Table 2:
Uncertainty Values for Sheet H12256

Depth Range (m)	Resolution (m)	Min Uncertainty (m)	Max Uncertainty (m)	Confidence Level Order 1
0-22	1	0.462	0.797	99.961%
20-44	2	0.467	1.011	99.932%
40-88	4	0.468	2.202	99.99%
80-176	8	0.469	1.446	99.993%

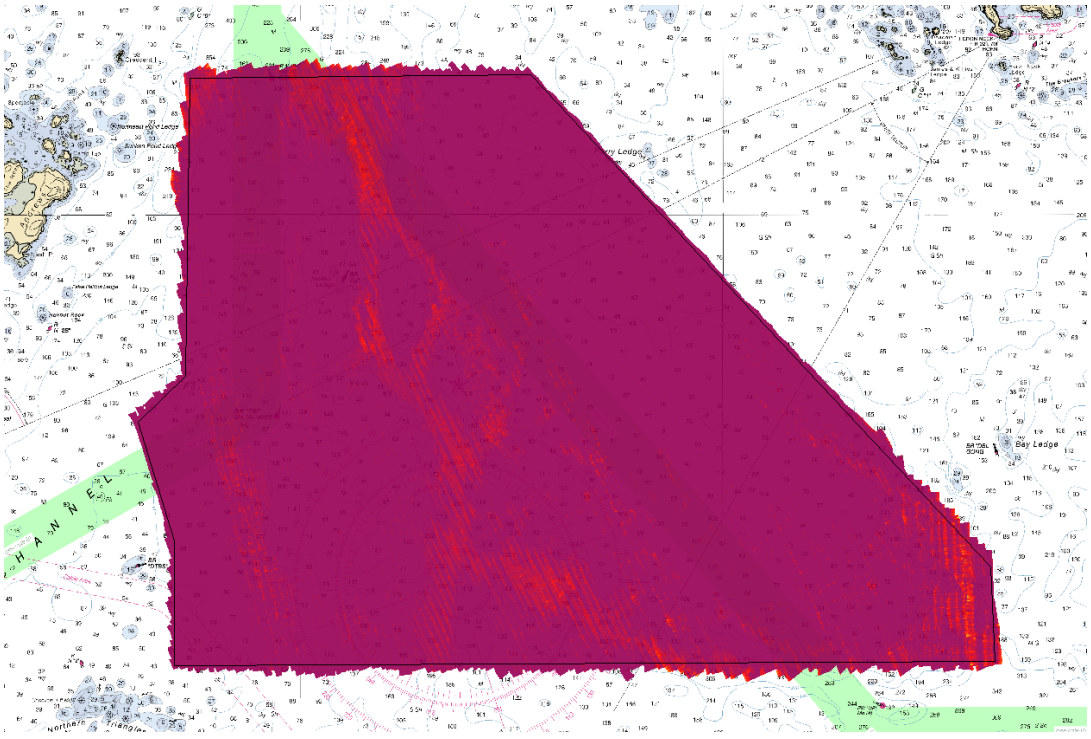


Figure 3: Uncertainty Surface H12256

B.2.c Junctions

Comparisons were made in the southern portion of H12256 to check accuracy with neighboring survey data obtained from the NOAA website. In general the data lines up within 30cm with a max of 89cm. These junction comparisons are as follows:

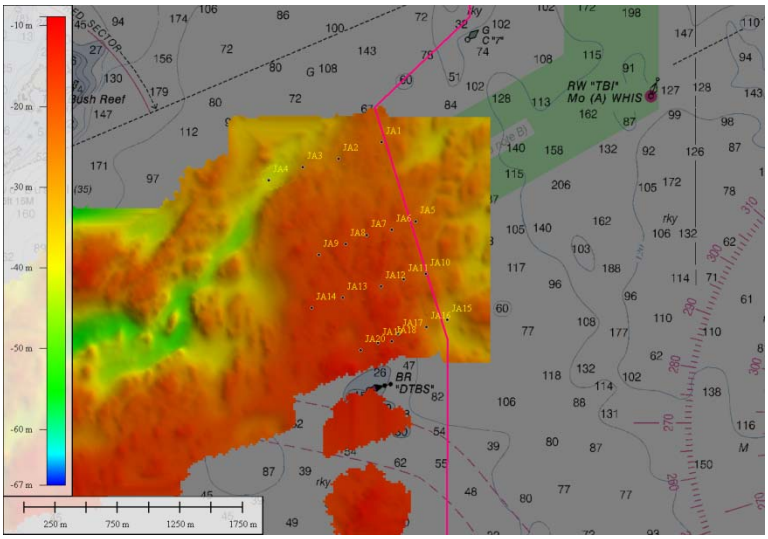


Figure 4 (above): H12256 Junction with contemporary survey data

Table 3 (below): Spot Analysis correlating with figure 4

Point ID	x (easting)	y (northing)	H12256	H10820	Difference
JA1	497492.787	4868331.097	23.761	23.358	0.403
JA2	497148.520	4868200.204	26.084	26.098	-0.014
JA3	496861.631	4868130.275	28.889	28.886	0.003
JA4	496590.881	4868026.268	40.443	40.363	0.080
JA5	497768.392	4867699.303	21.995	21.957	0.038
JA6	497573.474	4867631.805	20.104	19.893	0.211
JA7	497376.238	4867586.978	18.458	18.093	0.365
JA8	497209.484	4867518.842	17.918	17.714	0.204
JA9	496992.524	4867429.189	18.934	18.746	0.188
JA10	497848.485	4867276.705	23.648	23.390	0.258
JA11	497670.374	4867237.258	19.932	19.500	0.432
JA12	497489.873	4867177.489	18.186	17.667	0.519
JA13	497185.054	4867087.836	17.556	17.413	0.143
JA14	496937.612	4867005.356	15.872	15.296	0.576
JA15	498019.423	4866910.921	33.786	32.888	0.898
JA16	497850.875	4866854.739	26.392	26.350	0.042
JA17	497629.732	4866797.361	16.715	16.100	0.615
JA18	497573.805	4866737.712	16.394	15.858	0.536
JA19	497464.770	4866723.248	14.902	14.616	0.286
JA20	497327.303	4866667.066	16.370	16.207	0.163
				AVERAGE	0.297
				STAN DEV	0.242

B.2.d Quality Control Checks

Vertical confidence checks were completed using cross-lines and weekly bar checks. Each bar check was conclusive and within an acceptable range. The bar check measuring device was marked at 3m. The results were computed by querying the soundings in CARIS's subset editor and averaging the depths. The overall average depth for all completed bar checks was 3.039m with a standard deviation of 0.054m.

Positioning system confidence checks were conducted on a daily basis using QINSy's real time alert display. The alert display has numerous real-time parameters that were monitored throughout the survey to ensure the positional accuracies were achieved as specified in the NOS Hydrographic Surveys Specifications and Deliverables (HSSD 2010). The figure below shows the vessel's primary and secondary GPS positions, these positions were never erroneous or outside the 5 meter allowable radius from one another. There were only a few differential drop-outs with a maximum offset of one meter; these were noted in the acquisition log accordingly and corrected for in CARIS's navigation editor.

The USCG DGPS Correctional Station used was Penobscot Beacon ID# 799. This station was used for the duration of the survey.

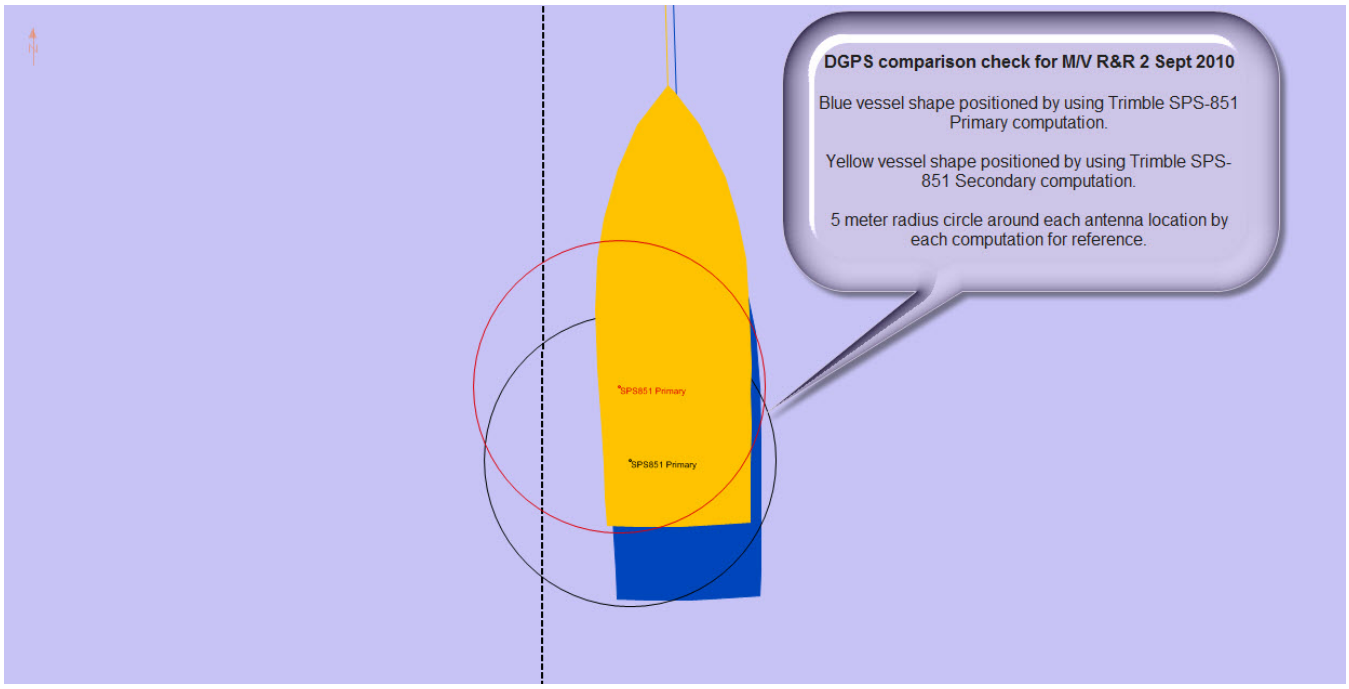


Figure 5: Position Check

B.2.e Data Quality

In general, the multibeam data quality for H12256 was good. Notable issues are described below:

Unusual conditions were observed in H12256 in the form of (1) vertical uncertainty due to heave artifacts resulting from high sea states, (2) vertical uncertainty due to highly dynamic sound speed due to mixing of fresh/salt water and thermo-clines, (3) vessel attitude induced by somewhat sharp turning to evade lobster pots, (4) MBE coverage density affected by the abundance of lobster pots, sea life and weather related issues.

1. Real time heave was used since no post processed methods were available to use with the hardware/software configuration. The troubleshooting process for this artifact is as follows:

   JD_238: Original SIS configuration – Raw IXSEA OCTANS MRU readings and all horizontal and vertical offsets in SIS minus waterline, were accounted for in Caris HIPS. This is the confirmed method of mobilization for SIS EM installations as confirmed by Kongsberg in Lynnwood, WA.

   JD_239: Entered Lever Arm offsets into IXSEA OCTANS MRU.
   - OCTANS with the Lever Arm entered appears to account for remote heave more effectively.

   JD_242: Import XTFs from QINSy.
   - Upon comparison with .ALL files, the XTFs seem to smooth the heave more effectively; however the sound speed at the sonar head is not being accounted for in QINSy.

   JD_245: Performed test lines to try a few different configurations:
   Variables:

   - Lever Arms Entered or Removed in the OCTANS Software
   - Transducer Offsets Entered or Removed from SIS.
   - OCTANS Heave Filter, Standard or Specific.

   Lines/configurations tested to compare:

   1. Lever Arms in OCTANS, No offsets in SIS, Standard Heave Filter
   2. Lever Arms in OCTANS, No offsets in SIS, Specific Heave Filter
   3. Lever Arms in OCTANS, Offsets in SIS, Specific Heave Filter
   4. Lever Arms in OCTANS, Offsets in SIS, Standard Heave Filter
   5. No Lever Arm in OCTANS, No offsets in SIS, Standard Heave Filter
   6. No Lever Arm in OCTANS, No offsets in SIS, Specific Heave Filter

   Results: Somewhat inconclusive. Each time the OCTANS filter is resent the OCTANS MRU must settle for ~ 15 minutes. Time was not allowed for it to fully settle which

introduced attitude variations, however on the lines where it did settle properly (lines 4 and 6) no differences were noticed between the standard and specific heave filters. No apparent differences between having the offsets in SIS or not. OCTANS with the Lever Arm entered still appears to account for remote heave more effectively.

JD_248: Limited Sample rate of MRU to SIS

- Upon further investigation of the comparisons between XTF and ALL files, it was decided that a major difference in the acquisition of both files types is the MRU sample rate. QINSy is receiving the MRU string at 50Hz and SIS at 100Hz. Since the Heave artifacts were smoother in the XTFs we performed the following tests:
    1. OCTANS set to 25hz into SIS, Limited Ping Rate of EM3002 at 15hz. OCTANS set to 20hz into QINSy.
- Results: XTF is still accounting for the Heave more effectively.

JD_249: After reading the EM3002 installation manual and parameters in depth, it was discovered that if using Lever Arms in the MRU software (included in the MRU data string into SIS) there is an extra MRU offset function to be filled out. It basically moves the MRU position to the Transducer Head from the reference point (which is the MRU location). Doing this improved the Heave artifacts to the point that the .ALL files matched the .XTFs. Since the sound speed at the head was not being computed in QINSy it was decided that the most appropriate course of action would be to not replace any .ALLs with the .XTF files and to continue using the .ALLs throughout the duration of the survey.

2. The sound speed was geographically highly diverse across the survey area. In a single day, JD 238 for example, the sound speed changed by 10m/s from shallow to deep areas. This was accounted for as best as possible with 5 daily casts on average; however the bathymetry is so dynamic that certain deeper areas have larger uncertainty than others. For example the southeastern portion of the survey area seemed to have a fluctuating thermocline from cold deep ocean currents mixing with warm shallow bay currents.

3. Lobster pots were virtually covering the survey area. This posed many problems including snaking survey lines and the occasional need for extra patch tests from snagging pots with the MBE pole mount.

4. There are a few areas shoaler than 30 meters where the required density could not be obtained. These areas were rerun with the same results. Along many of these shoals, large schools of fish were found to be blocking the bathymetry. In the shallow areas, lobster boats and pots prevented the vessel from being fully mobile during the initial data collection and weather prevented further infill. The density and coverage still falls within the requirements set forth by the HSSD 2010.

B.2.f Object Detection

Shallow water multibeam data were required for least depth determination on significant contacts. Junken Ledge was the only feature that required these procedures. Sounding designation was completed using a 50cm resolution and procedures followed those set forth by the National Ocean Surveys (NOS) *Hydrographic Surveys Specifications and Deliverables* (April 2008). ***Concur.***

B.3 Corrections to Echo Soundings

Refer to the OPR-A366-KR-10 Data Acquisition and Processing Report for a detailed description of all corrections to echo soundings. No deviations from the DAPR occurred.

B.3.a Additional Calibration Tests

Post of the initial MB Calibration for the M/V R&R (EM3002), daily calibration lines were run to determine the accuracy of the pitch and roll offsets due to the mounting pole configuration. These calibrations are detailed in the OPR-A366-KR-10 DAPR, submitted under a separate cover.

B.4 Data Processing

Uncertainty BASE surfaces were built with sounding data that have been CUBE filtered to IHO Order 1 specifications. This was done in IVS Fledermaus 6.7. Finalized surfaces were built with the Data Range Resolutions set forth in the National Ocean Surveys (NOS) *Hydrographic Surveys Specifications and Deliverables Manuel* (April 2010). All BASE surfaces built from CUBE edited soundings have been included with the digital data. Details on CUBE editing procedures can be found in the OPR-A366-KR-10 DAPR, submitted under a separate cover.

Note: Some gaps appear in the finalized surfaces between depth ranges where the resolutions change; these are only display errors and do not reflect the data density. When compared to full surfaces at finer resolutions these gaps do not appear.

The final S57 file for this project, “H12256.000”, contains the object and metadata S57 objects as required in the Specifications and Deliverables.

C. HORIZONTAL and VERTICAL CONTROL

C.1 Horizontal Control

The horizontal control datum for this survey was the North American Datum of 1983 (NAD83).

USCG corrections were used to correct the real-time DGPS corrections. This position was corrected for offsets to the MBES sonar by Kongsberg's Seafloor Information System (SIS) on the acquisition computer during acquisition.

Navigation data between Julian days 238-264 were in need of editing due to an intermittent gap in the 2 Hz sample rate. This was due to a problem with the primary DGPS which was replaced on day 265. Left unedited this posed no threat to data quality, but was edited to ensure this was the case.

C.2 Vertical Control

All sounding data were initially reduced to MLLW using observed tidal data from the Bar Harbor tide station (ID: 8413320). Observed tides were used only for preliminary data cleaning.

Final tidal corrections were generated using the verified tides from the Bar Harbor tide station and the tidal zones delivered by CO-Ops.

D. RESULTS AND RECOMMENDATIONS

H12050 survey data was compared to:

RNC Number	Scale	Edition	Edition Date	Corrected Through
13302	1:80,000	22nd	June 2006	10/02/2010
13303	1:40,000	12th	Sept 2002	10/02/2010

ENC Number	Edition	Update Application Date	Issue Date
US5ME22M	7	04/22/2010	04/22/2010
US5ME21M	7	03/31/2010	03/31/2010

Concur with clarification. Compiler used ENC 8th edition; Edition and Application date 02/11/2011.

D.1 Comparison of Soundings

Charted soundings were compared with the surveyed data. In general, charted soundings in areas with little relief were very similar to the surveyed depths. Charted soundings on or very near slopes may be 10 or more feet off of the surveyed depths. These differences may be due to changes in surface since the last survey or less accurate positioning and measurements during the previous survey. The Hydrographer recommends all surveyed depths supersede previously charted soundings. For more information see Appendix I. See results below:

Table 4: RNC Chart Spot Comparison correlating with figure 6

Point ID	x (easting)	y (northing)	H12256 - FEET	Charted Depth – FEET	Difference
CH1	499348.397	4873886.029	155.213	144	11.213
CH2	502409.359	4873705.973	52.563	48	4.563
CH3	499324.389	4872349.546	140.886	126	14.886
CH4	501905.201	4872565.614	169.022	172	-2.978
CH5	503465.691	4872313.535	76.625	48	28.625
CH6	498664.182	4871125.161	91.554	86	5.554
CH7	501629.114	4871005.124	81.371	74	7.371
CH8	505578.355	4870825.067	46.654	38	8.654
CH9	499528.453	4869324.595	202.992	198	4.992
CH10	503213.612	4869576.674	170.994	131	39.994
CH11	506214.556	4869012.497	71.821	65	6.821
CH12	499190.324	4868518.905	162.527	162	0.527
CH13	501705.276	4868607.817	122.605	79	43.605
CH14	505757.142	4867718.693	100.289	84	16.289
CH15	508703.954	4867451.956	82.501	69	13.501
CH16	498491.727	4866956.587	79.183	60	19.183
CH17	502175.241	4866804.165	223.387	202	21.387
CH18	505795.247	4866575.533	70.486	66	4.486
CH19	508399.111	4866321.498	100.574	80	20.574
CH20	510202.763	4866207.182	115.634	97	18.634
CH21	498936.289	4865546.690	80.371	77	3.371
CH22	501578.258	4865876.936	154.198	149	5.198
CH23	504906.123	4865673.707	219.701	218	1.701
CH24	509085.007	4865368.865	82.168	71	11.168
CH25	499037.903	4864848.092	57.758	45	12.758
CH26	504207.525	4864962.408	127.737	126	1.737
				AVERAGE	12.454
				STD DEV	11.475

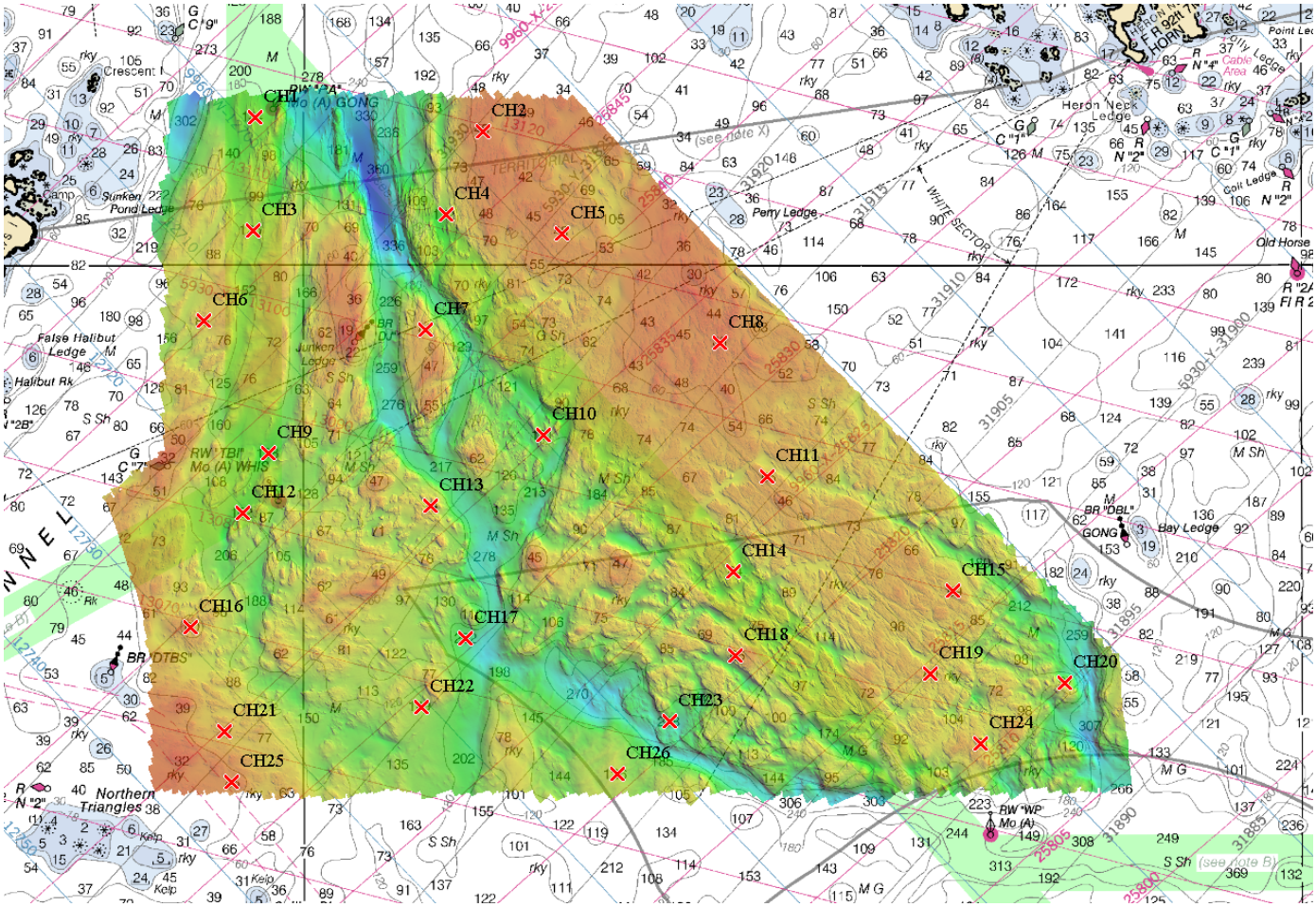


Figure 6: RNC Chart Comparison Spot Locations

Table 5: ENC Chart Spot Comparison correlating with figure 7

Point ID	x (easting)	y (northing)	H12256 -meters	Charted Depth – meters	Difference - meters	ENC
ENC1	502232.225	4866351.192	66.490	64.6	1.890	US5ME21M
ENC2	498377.321	4865183.373	10.946	9.7	1.246	US5ME21M
ENC3	498784.265	4867646.034	42.602	42.6	0.002	US5ME21M
ENC4	500686.840	4868516.262	37.588	36.5	1.088	US5ME21M
ENC5	502340.063	4868896.077	51.884	54.8	-2.916	US5ME21M
ENC6	507344.560	4868653.392	24.750	23.7	1.050	US5ME21M
ENC7	510506.245	4865621.813	90.385	93.5	-3.115	US5ME21M
ENC8	507440.659	4865508.399	41.440	36.2	5.240	US5ME21M
ENC9	505921.089	4867404.604	30.967	28.9	2.067	US5ME21M
ENC10	504798.088	4865472.710	73.843	69.7	4.143	US5ME21M
ENC11	507116.497	4870160.011	25.742	24.3	1.442	US5ME22M
ENC12	504756.363	4870266.232	16.059	13.4	2.659	US5ME22M
ENC13	502241.098	4870159.256	60.813	54.8	6.013	US5ME22M
ENC14	499868.179	4871107.513	48.615	46.6	2.015	US5ME22M
ENC15	498806.705	4869741.703	49.546	48.7	0.846	US5ME22M
ENC16	498775.678	4873697.717	49.215	47.5	1.715	US5ME22M
ENC17	500926.553	4873154.683	112.835	109.7	3.135	US5ME22M
ENC18	502060.539	4872180.723	42.189	35.9	6.289	US5ME22M
ENC19	504105.798	4872516.353	31.276	32.0	-0.724	US5ME22M
ENC20	502940.038	4873915.646	14.476	11.8	2.676	US5ME22M
				AVERAGE	1.838	
				STD DEV	2.482	

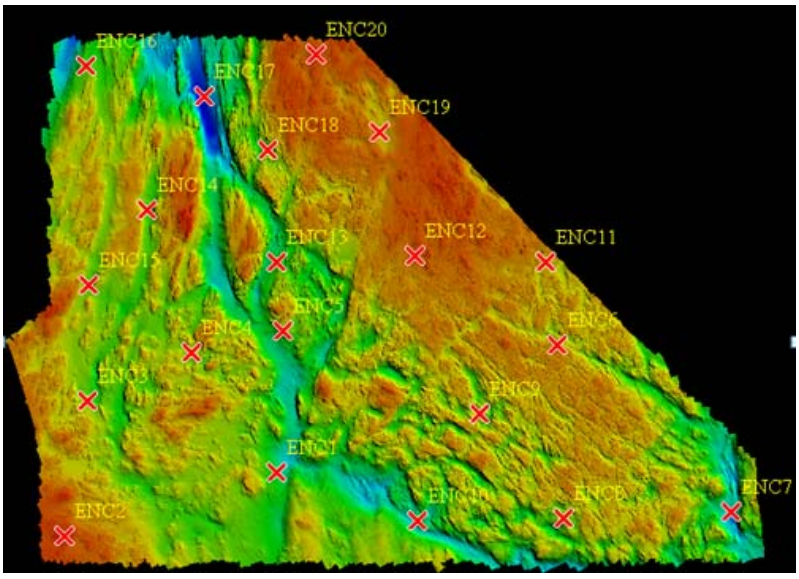


Figure 7: ENC Chart Comparison Spot Locations

D.2 AWOIS

No AWOIS items were required. ***Concur.***

D.3 Charted Features

Junken Ledge located at 500704.96 (m), 4870868.35 (m) or 43-59-26.20N, 068-59-29.19W is charted correctly. As seen in the chartlet below there are two peaks of the shoal, the northern one with a least depth of 6.2m and the southern one with a least depth of 6.7m depth. The marker for the shoal is between these peaks however the depths in this area are charted correctly. This shoal was gridded down to 0.5m resolution and procedures followed that of Object Detections.

Concur.

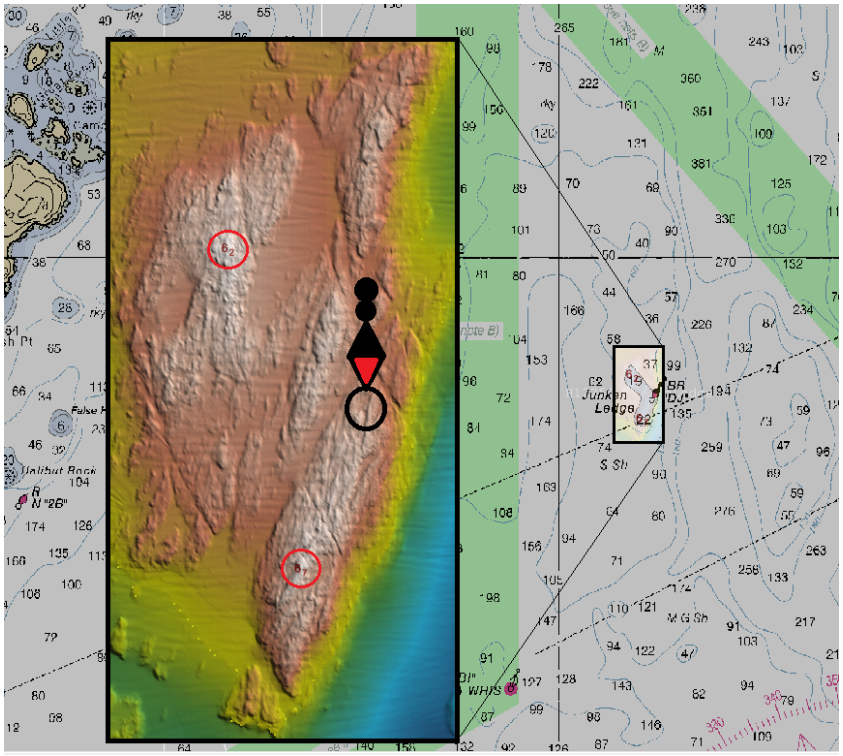


Figure 8: Junken Ledge Chartlet

D.4 Dangers to Navigation

No dangers to navigation were found during the survey H12256. ***Concur.***

D.5 Bottom Samples

No Bottom Samples were required. ***Concur.***

D.6 Aids to Navigation

The following aids to navigation were examined during this survey (refer to *Appendix II*):
Concur.

- Entrance Lighted Gong Buoy at 44-01-07.56622 N , 069-00-19.17544 W (RNC 13302, ENC US5ME22M) found to exist and to be serving its intended purpose.
- Junken Ledge Isolated Danger Buoy DJ at 43-59-25.17799 N, 068-59-30.03241 W (RNC 13302, ENC US5ME22M) found to exist and to be serving its intended purpose.
- Rockweed Shoal Buoy 7 at 43-58-31.56881 N, 069-01-22.36843 W (RNC 13302, ENC US5ME21M) found to exist and to be serving its intended purpose.
- Two Bush Island Lighted Whistle Buoy TBI at 43-58-16.68331 N, 069-00-16.71857 W (RNC 13302, ENC US5ME21M) found to exist and to be serving its intended purpose.

E APPROVAL SHEET

REGISTRY NUMBER H12256

This report and the accompanying digital data are respectfully submitted.

Field operations contributing to the accomplishment of survey H12256 were conducted under my direct supervision with frequent personal checks of progress and adequacy. This report has been closely reviewed and is considered complete and adequate as per the Statement of Work.

WILLIAMSON AND ASSOCIATES, INCORPORATED

Digitally signed by Donald L. Brouillette
DN: cn=Donald L. Brouillette, o=WASSOC, ou=Survey, email=dbrouillette@wassoc.com, c=US
Date: 2010.10.12 17:28:17 -07'00'

Donald L. Brouillette

Hydrographer

Williamson & Associates, Incorporated

12 October 2010

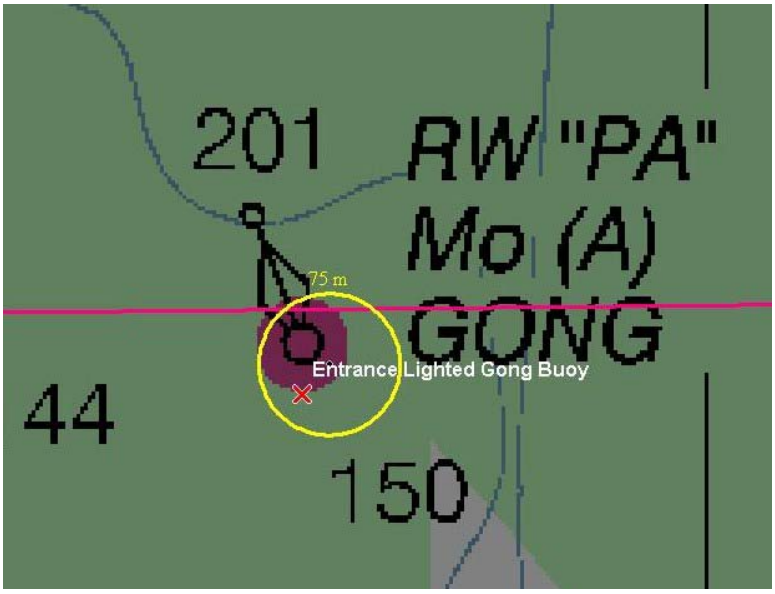
Appendix I

There were no Dangers to Navigation found during this survey.

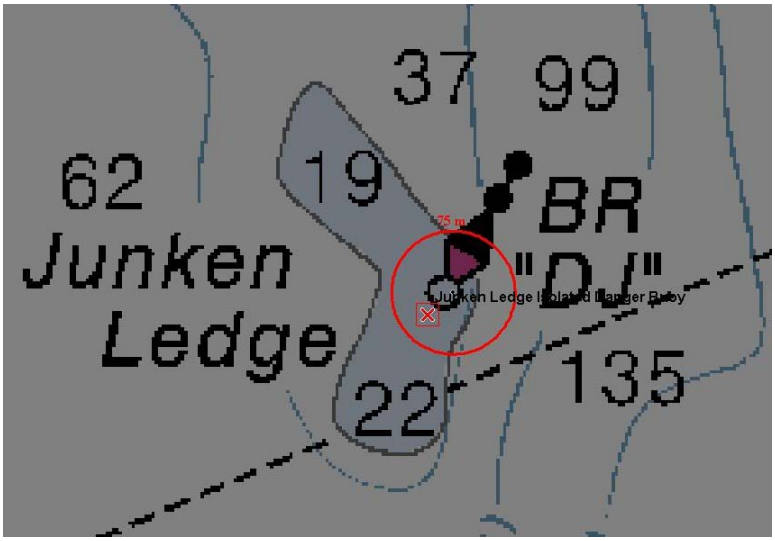
Appendix II
Survey Feature Report

*Survey H12256 did NOT have any features submitted by field unit.

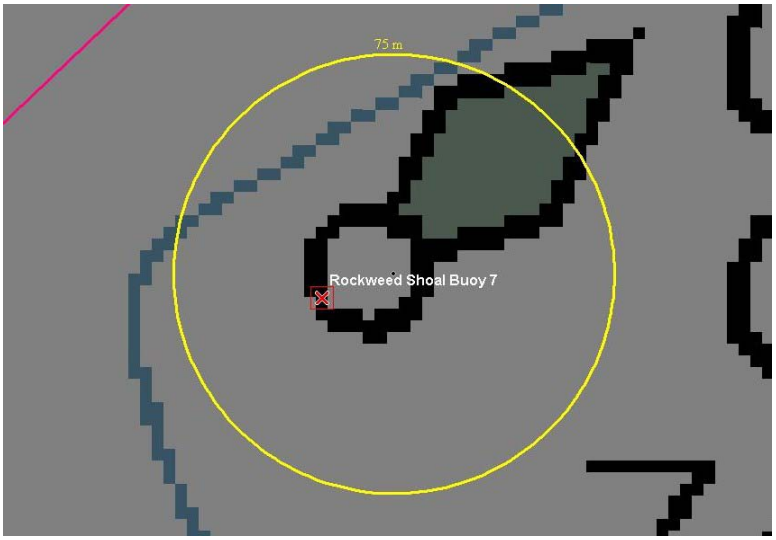
Entrance Lighted Gong Buoy at 44-01-07.56622 N , 069-00-19.17544 W (RNC 13302, ENC US5ME22M) found to exist and to be serving its intended purpose.



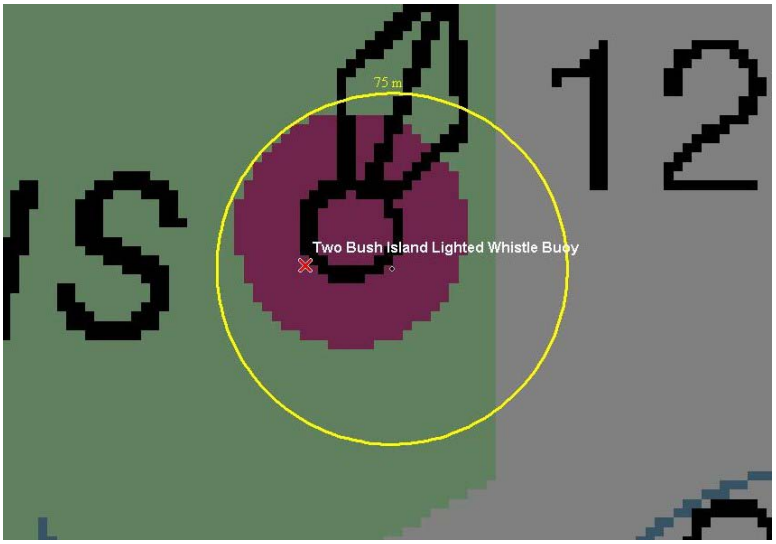
Junken Ledge Isolated Danger Buoy DJ at 43-59-25.17799 N, 068-59-30.03241 W (RNC 13302, ENC US5ME22M) found to exist and to be serving its intended purpose.



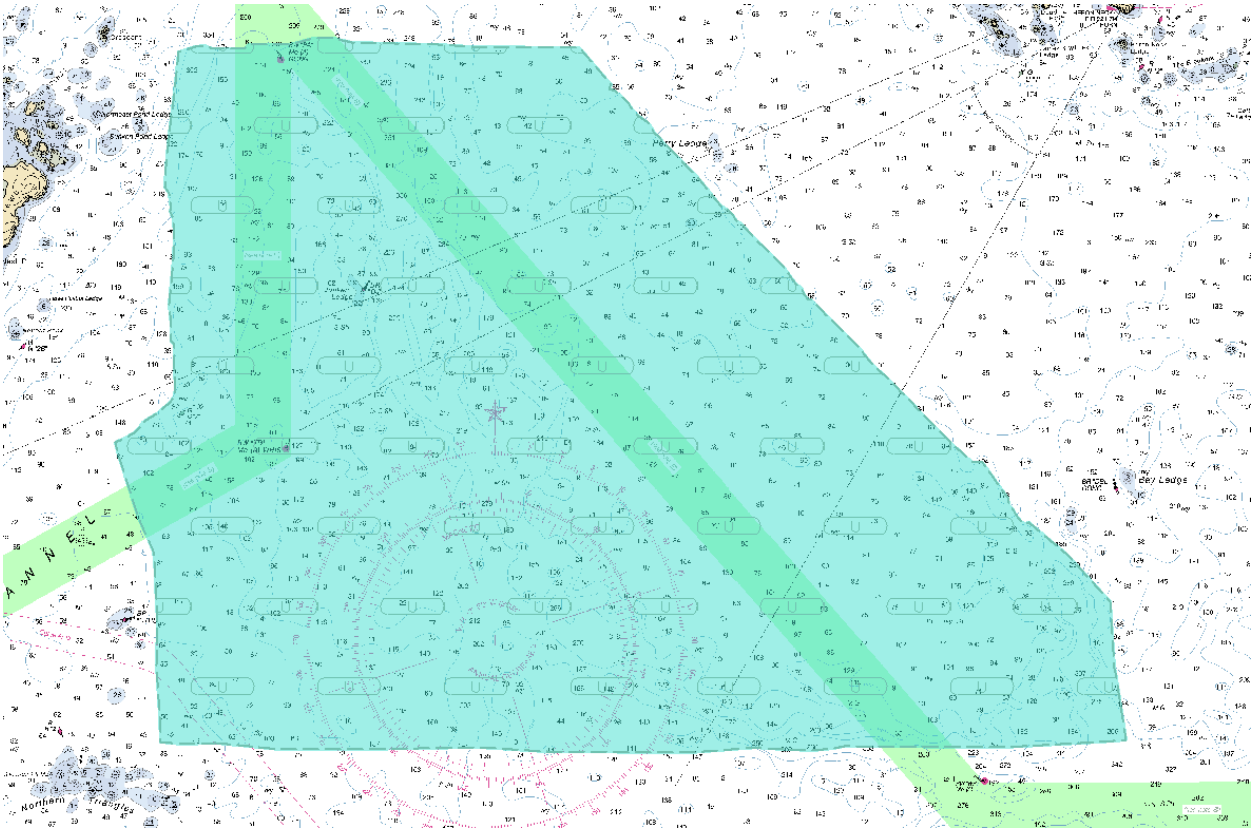
Rockweed Shoal Buoy 7 at 43-58-31.56881 N, 069-01-22.36843 W (RNC 13302, ENC US5ME21M) found to exist and to be serving its intended purpose.



Two Bush Island Lighted Whistle Buoy TBI 43-58-16.68331 N, 069-00-16.71857 W(RNC 13302, ENC US5ME21M) found to exist and to be serving its intended purpose.



Appendix III
Progress Sketch -- Survey Outline



Appendix IV
Tides & Water Levels

Appendix V

Supplemental Survey Records Correspondence

Subject: H-12256
From: Lori.Knell@noaa.gov
Date: Thu, 18 Nov 2010 08:06:24 -0500
To: 'Gene Parker' <Castle.E.Parker@noaa.gov>
CC: 'Matthew Wilson' <Matthew.Wilson@noaa.gov>

Gene,

I am sorry I didn't include you on this email conversation originally, I must have forgot to make a note to let the processing branch know of the change. We decided on this last November when we were still requesting cost proposals.

Let me know if you need anything else. Ben Evans and I sat down and decided on this, it will most likely be the same requirements for this year's project.

Thank you,
Lori

-----Original Message-----
From: Lori.Knell@noaa.gov [mailto:Lori.Knell@noaa.gov]
Sent: Monday, April 05, 2010 7:46 PM
To: Lori.Knell@noaa.gov
Cc: Colin Stewart; Art Wright; Mike Williamson; donny brouillette
Subject: Re: RE: Cost Proposal A366-KR10

Colin,
There are two more things I forgot to mention. You will not have to do any bottom samples in this area, you can eliminate that from your cost proposal. And the last thing is that the inshore limit is to the 4m curve (instead of the 18')
Thanks,
Lori

----- Original Message -----
From: <Lori.Knell@noaa.gov>
Date: Monday, April 5, 2010 6:09 am
Subject: Re: RE: Cost Proposal A366-KR10
To: Colin Stewart <cstewart@wassoc.com>
Cc: Art Wright <artw@wassoc.com>,Mike Williamson <mikew@wassoc.com>, donny brouillette <dbrouillette@wassoc.com>

> Colin,
> Thanks for getting the proposal to us last week. We looked it over and the only question we have is about the calculated survey speed of 5 knots, we calculated the speed of the survey to be at least around 6 or 7 knots with the EM3000? Please explain the reason of this.
> And we have completed the research of AWOIS items in this area and you will not have any AWOIS items.
> If you can incorporate this new information in your cost proposal that would be great.
> If you have any questions please feel free to email me or call Ben this week, I will be out of the office for training.
> Thank you,
> Lori
>
> ----- Original Message -----
> From: Colin Stewart <cstewart@wassoc.com>
> Date: Thursday, April 1, 2010 12:44 am
> Subject: RE: Cost Proposal A366-KR10
> To: "Lori.Knell" <Lori.Knell@noaa.gov>
> Cc: Art Wright <artw@wassoc.com>, Mike Williamson <mikew@wassoc.com>, donny brouillette <dbrouillette@wassoc.com>

Lori,

We did review our proposal and have changed the following:

Two days for sampling instead of 4
Total survey days to 39 from 44
Dropped a person on the survey work
Reduced equipment cost based on reduced days.
Reduced mob/calibration days to 5 from 6.
Reduced the number of processing hours from 600 to 400.

However, we are somewhat confused by your statement that "The cost proposal is about twice as much as industry standards."

I did a quick calculation on the original costs submitted for A366, it is 75% (30.503) of the square nautical miles of our project last year (41.08) based on the polygon sent by you guys. I then took 75% of our project cost last year (which we were told was close to industry standards):

75% of $1,414,463 = $1,060,847 which is right in line with our original proposal for A366 of $1,019,096. If our costs are in line with our previous task orders but they are higher compared to prior work in the New England area, we would have to ask when and where did that "prior work" occur?

As to the complexity of our prior work and this work we consider them about equal, both having more difficult terrain and higher tides and currents.

As a Seattle company, it makes sense to us that we do have higher mob costs conducting a mob in New England as opposed to Seattle.

Let us know what you think of this reduced proposal and we will go from there.

Thanks,

Colin

-----Original Message-----
From: Lori.Knell [
Sent: Wednesday, March 17, 2010 1:24 PM
To: Colin Stewart; donny brouillette
Subject: Cost Proposal A366-KR10

Donny, Colin,

After looking through the cost proposal for A366-KR10 I realize the cost is over what we estimated for this project and will not fit in our budget. The cost proposal is about twice as much as industry standards.
Based on prior surveys in this area, of this size, and of this level of complexity, there will need to be some clarifications in your proposal.
I realize the mobilization and travel will be a difference from last years project but some of these other costs I just can not justify.

I see that you have 4 days estimated for sampling in your cost proposal
but it looks like there are 2 days for sampling in your Work Plan, it

should not take 4 days. I also see that there are 5 people on this project, that is almost twice as many people as necessary, the cost for
the labor is way higher than expected, especially during demobilization.

It looks like last year the cost for demob was $5995 and this year it
is

$12,713. The total demob/mob/op in '09 was $372,974 and this year is

$444,249, the difference is almost $72,000 . I was also surprised this

project is expected to take 44 days, why do you need 6 days for calibrations/mobilization? The number of processing hours looked high
as

well, 600 hrs.

Please get back to me after looking through the cost proposal again.

If you have any questions, feel free to send an email or give me a call.

Thanks,
Lori

--
Lori Knell
Physical Scientist, Data Acquisition Control Branch
Hydrographic Surveys Division
NOAA
Lori.Knell@noaa.gov
301.713.2700 x114 >

Subject: Re: A366 - S-57
From: Gene Parker <Castle.E.Parker@noaa.gov>
Date: Tue, 12 Oct 2010 07:07:51 -0400
To: Donny Brouillette <dbrouillette@wassoc.com>
CC: Lori Knell <Lori.Knell@noaa.gov>

Good Day,
Monday was a federal holiday... thus the slow response. The ENC S57 usage would reference the scale or category of the applicable ENC (US5ME22M). In your case with A366 the usage should be #5; although this is not a harbor ENC, it's the largest scale ENC common to the survey area.
This is really a minor point; if you used 1:5k, we could change that during H-Cell processing; the compilation scale for the H-Cell would be 1:40k which would be #4 for AHB's product. There should be no complications with regard to incorrect usage. For the H-Cell, the usage is the same as the ENC compilation scale. So, a good rule of thumb would reference the ENC designation.
Below is a list of ENC scales:

Number Usage Band Scale Range
6 Berthing 1:2 000 to 1:5 000
5 Harbour 1:2 000 to 1:25 000
4 Approach 1:20 000 to 1:50 000
3 Coastal 1:50 000 to 1: 150 000
2 General 1:150 000 to 1:400 000
Overview smaller than 1:300 000

Have a great day!
Gene

Donny Brouillette wrote:

> Gene,
>
> We had a few more S-57 questions pop up. Also, will you guys be in the office on Monday or is it a NOAA holiday?
>
> 1) What is the usage? Previous years in the Puget Sound we used, 5 – Harbor. The other options are;
> 1 – Overview
> 2 – General
> **3 – Coastal**
> **4 - Approach**
> 5 – Harbor
> 6 – Berthing
>
> 2) What compilation scale to use? The previous years we used 1:5000
>
> Thanks,
>
> Donny Brouillette

From: Gene Parker [mailto:Castle.E.Parker@noaa.gov]
Sent: Friday, October 08, 2010 09:27
To: Donny Brouillette
Cc: Lori Knell; ransom.white@gmail.com
Subject: Re:

Donny,
Use the data extents; include the limits based upon the data coverage, not the prescribed survey limits.
Gene

Donny Brouillette wrote:
Thanks Gene, one last question regarding the survey bounds. Do you want the entire survey coverage, including the data outside the required limits or just the polygon of the data inside the prescribed survey limits.

Thanks,

Donny

From: Gene Parker [mailto:Castle.E.Parker@noaa.gov]
Sent: Friday, October 08, 2010 05:00
To: Donny Brouillette
Cc: Lori Knell; ransom.white@gmail.com
Subject: Re:

Good Day Donny,
Well, that's good from your end, won't have the time and effort to deal with single point features. So, bearing that in mind, the only thing that you'd need to include in the S57 feature file is the meta-objects of M_QUAL and M_COVR with attributes as detailed in NOS HSSD, chapter 8, Section 8.2.1, page 125. A polygon of coverage can be generated from the grid and through the CARIS contouring process or manually digitizing the coverage limits. The contouring process will generate a polygon; I think it would be named "perimeter" which can then be duplicated to create the meta-object polygons. If you have a polygon of coverage that was used in the progress sketch that would work.

I'll try to push the survey review up front so that we can get a response back to you with any details that you may use and reference with future surveys. This survey should be straight forward due to lack of features and will be only bathy data application to the chart.
Thanks for the update and good luck with wrapping up the deliverables.
Regards,
Gene

Donny Brouillette wrote:
Gene,

We finally made it back to Seattle to finalize our data and wrap up the reports. We are hoping for a swift completion of the last few tasks, I'll keep the questions light.

S-57 – After going through what we submitted last year for S57, we only have a few items that we feel should go into this feature file. Last year we had wrecks, outfalls, private aids, grabs etc. Due to the "open ocean" nature of our survey there is little to include in our S57 file. We have no grab samples, DTON's, underwater rocks, the

Shoal is charted correctly etc. If there is nothing to add do you want the start/end of survey, units, etc with no data? We are still going over the HIPS project to ensure we didn't miss a rock or something, this could change in the next few days.

Other than S-57, we're excited to wrap this project and get it to you ASAP.

Thanks,

Donny Brouillette
Project Manager
NOAA task order A366
Williamson and Associates
541-441-2936

Castle Eugene Parker <castle.e.parker@noaa.gov>
Physical Scientist - Hydrographic Team Lead
Atlantic Hydrographic Branch
NOAA Office of Coast Survey

Subject: RE: Williamson A366 deliverable and processing concerns
From: Donny Brouillette <dbrouillette@wassoc.com>
Date: Thu, 23 Sep 2010 16:56:42 -0400
To: Gene Parker <Castle.E.Parker@noaa.gov>, Lori Knell <Lori.Knell@noaa.gov>, Colin Stewart <cstewart@wassoc.com>, "ransom.white@gmail.com" <ransom.white@gmail.com>
CC: Richard T Brennan <Richard.T.Brennan@noaa.gov>

Gene,

Thank you for your thorough response, you answered every concern addressed in my original email. We'll take your advice and formulate our analysis accordingly.

Thanks again,

Donny Brouillette
Project Manager
NOAA task order A366
Williamson and Associates
541-441-2936

From: Gene Parker
Sent: Thu 9/23/2010 12:44 PM
To: Donny Brouillette; Lori Knell; Colin Stewart; ransom.white@gmail.com
Cc: Richard T Brennan
Subject: Re: Williamson A366 deliverable and processing concerns

Hey Donny,
Look for my blue font responses...

Donny Brouillette wrote:

> Gene,
>
> We have a few brief questions regarding crosslines and object detection boundaries.
>
> 1. Crosslines: In the HIPS line QC surface comparison, we are getting the highest variability in the outermost beams (would be expected as such), i.e. 50-60 degrees from nadir. We are expecting to see this as per our discussions with you onsite regarding the extremely dynamic bathymetry and lack of "flat" seafloor to run the appropriate analysis.
> the irregular profile in conjuction with horizontal positioning can lead to more variance between the main scheme and cross lines.
> The beams at 50-60 degrees are returning a confidence of 90-94%, with the rest of the data from 0-49 degrees being approximately 96-99% confidence. Would you suggest not using the outer beams in the calculation
> (this is your decision. Myself, I would leave it at maximum of 60° off nadir and attempt to explain the variance and where the higher varaiance is located within the swath width... but you could reduce the swath width as long as you explain what you've done. If this is all about getting to the 95% confidence level, it's not appropriate to use 60° off nadir for main scheme and then only compare to 50° off nadir of the cross lines; sort of like comparing apples to orange... it's not exactly the same comparison) or use all beams and account for the variations in our DAPR
> (not the DAPR but the results should go in the DR. The DAPR is about what hardware you used, how you acquired the data, and how you processed the data. Specific survey results should be included in the survey's DR) . Also, is there a preferred step in degrees that you want us to use or is that at our discretion? Before the idea of the best estimation of the sea floor taking into account total propagated error using CUBE and Uncertainty grids, the specification was to filter 60° off nadir with the intent of rejecting the problem areas

> within the swath (eliminates roll and SV errors). I think you could use the data you have and explain in the DR. This issue is specific to the survey rather than the DAPR. You could describe the crossline comparison process in the DAPR, but would discuss the results of the crossline analysis in the survey DR. For instance, next year you would discuss the method of cross line acquistion and processing in the DAPR, but the results could be slightly different for each survey. Another factor contribuing to your less than 94% of confidence is I think related to the heave problem.

> I would be agreeable to reducing the Crossline swath to 50° off nadir which should give you a higher confidence per centage. If you do this, just document it. The real intent of cross lines is a system check, ensuring that one doesn't have a systmatic problem. You are sort of doing this everyday when you run your quasi patch lines. Are you processing and validating the system bias referencing the patch lines daily? Normally, patch or sytem bias test is done at the beginning of the field season, then periodically checked via the cross lines. If for instance, you removed the TX head from the pole, a patch or bias test would be necessary when the TX head goes back on the pole. I'm not saying that you should drop cross lines in lieu of running your daily patch lines, or saying that you should perform the calibraion analysis of the daily patch lines, but indicating that both of those methods are a way of determining if you have a system error.

2. Object detection boundaries: We had discussed during the site visit the resolution of the shoalest data in regards to the PLI's required coverage types. We are contracted to provide a "Full Coverage" dataset from the shoalest depths to the maximum depth extent while also ensuring we have the appropriate data to fulfill all "Object detection" requirements. The PLI states that "All significant features and shoals within the survey area in less than 30 m depth" shall be worked up to Object detection standards. Half of our survey area could be considered object detection if you consider only the depth a the primary factor. The shoals are already charted with an accurate least depth with the only "significant" shoal being charted with a buoy. We planned on working up this shoal, the Junken Ledge, to object detection standards, the rest of the dataset being already charted correctly, was planned for full coverage resolutions standards. Is it the hydrographers discretion to judge what is significant or is it prudent to grid all shoaler than 30m depths to object detection standards? Yes.
Full coverage means to have a grid that is complete over the survey area. Referencing the LI. you should be following the complete MB coverage grid requirements, and then in areas less than 30m depth, all of the individual features (Wk, Rk, Obstn) and any significant shoals would require Object detection coverage and grid requirements. So, you may have small 0.5m res grids that represent the Object Detection resolutions and have the complete coverage grid that will be either 1m or 2m resolution. Later after verifying your grids, assuming nothing is wrong, then AHB would combine the grids together using combination arguments in this order:
1. depth is least
2. resolution is least
3. uncertainty is least.

What I would do is follow the grid resolution and depth standards for MB, HSSD section 5.2.2.2 (and then have 0.5m resolution grid over the shoals and significant features.

Complete coverage:

H12556 would have 1m and 2m over the entire area and the resolution is dependent upon the depths listed above, along with 0.5m resolution over the shoals and significant features (wk, rks, obstn).
This is from the H12256 LI:

What I'd do on Junken ledge is create a 0.5m grid over the shoal, look at the coverage and see if it's complete.

Then I'd look at the density child layer using two colors (CARIS' color by range), one (red) for less than 4.99 data points per node, and the other green (5 or more data points) per node. If you have all green over the shoal and the grid is completely covering the shoal with the 0.5m res, then you're good to go. If you see that grid nodes do not have 5 or more data points contributing to the node, then you have extra data to acquire; if you find grid gaps in the 0.5m res grid, then the gaps need additional data.

Have I provided you with adequate response? Not the answers that you necessarily want to hear, but that you understand my responses. Back at ya with this response, if you want to call and discuss, I'll be in tomorrow 0630 to approximately 1600-1700.

Cheers,
Gene

> If it's easier to call and conference over the phone we are available anytime.

> Thanks,
>
> Donny Brouillette
> Project Manager
> NOAA task order A366
> Williamson and Associates
> 541-441-2936

Subject: Re: H12256 Questions
From: Ransom White <ransom.white@gmail.com>
Date: Tue, 09 Nov 2010 08:51:23 -0500
To: Donny Brouillette <dbrouillette@wassoc.com>
CC: Gene Parker <Castle.E.Parker@noaa.gov>, Lori Knell <Lori.Knell@noaa.gov>, Colin Stewart <cstewart@wassoc.com>, Kyle Frankhauser <kfankhauser@wassoc.com>

Gene, Colin and Donny,

Below are my responses to your email Gene. I think the problem lies in our perspective of what we wanted to see the data look like and what you need in order to chart as accurately as possible. Any of our methods can be easily remedied to fit your needs.

Ransom's responses in red:

My question to you is ... what was exactly the filter used to reject data points? Was it the TPU error value for that depth? Yes. The CUBE surface was created using the TPU values. Fledermaus filtered soundings to IHO order 1 based on their distance from the CUBE surface. Or, was it the user defined filter? The user defined filter is not described in the DAPR nor DR, from what I review. I may be missing this point within the documentation, and if so, point me to the correct sections in either of the documents. User defined filter was basically non-existent. In some steeply sloping areas if you shrink the node size while you are building the CUBE surface it will account for the bathymetric changes more accurately (increases the resolution). Then you can filter off that surface. This method was only used in a few cases and proved not necessary.

What AHB is viewing within the submitted data is valid data points being rejected that makes a difference of meeting the chart or providing a shoaler depth within a range of 1ft to 2 ft. In many isolated locations of review, using the shoaler charted depths within H12256 limits, I found data points rejected that I consider to be valid and that substantiates the charted depths or is shoaler than the charted depths. Most of the heavy handed editing and filtering was done in CARIS. A 60deg swath filter for port and starboard was used along with a 5 deg beam to beam angle filter. The heave artifact was one of our main concerns as i am sure you'll remember. In hindsight, it is possible that by attempting to smooth the heave artifact some valid data could have been cropped out. This is a practice that will be remedied as the shoalest depth and a conservative procedure is your main concern. AHB believes that the filtering used in Fledermaus did not best represent the sea floor features. Fledermaus was used as a final filter and did not reject the majority of soundings. It is most likely that the CARIS editing was over zealous.

Can you describe the "user defined filter" for us? Described above. What do you mean by "Cube filtered?" Fledermaus filters soundings in respect to a generated surface. The CUBE Algorithm is used to generate multiple hypotheses (one per node) for a surface. I chose "predicted surface" for deeper areas because I felt it represented the data best. I used "number of samples" for shallow/rocky areas because it seems to more accurate for high resolution surfaces. Cube is just a gridding algorithm and I don't understand what value that CUBE generates that you use for a filtering limit or value. Soundings were filterd accourding to their distance from the CUBE generated surface based on IHO order 1 standards generated from the TPU. Computing TPU would assign the uncertainty error value to the data points.

Can you clarify the "required quality assurance checks?" This included periodical chart comparisons and bar checks/patch tests. (reference DAPR, page 5, second paragraph)

Another question, if CUBE was used in Fledermaus, why wouldn't one continue with the same gridding algorithm for the submitted grid? The data processing used two different gridding algorithms and unsure as to the thoughts behind that decision.
The motives behind these procedures are in how fledermaus calculates the hypothesis and builds the surface for different types of bathymetry. It is well explained on pages 3-4 in Mr. Mallace and Mr. Roberson's report. Choosing a final algorithm to continue with is somewhat trial and error and was not found to have a pronounced affect on the portrayal of the data. However "Number of Samples" seemed to be the best option in the

shallow/rocky areas because it accounts for "data density" more than "neighboring soundings". In many cases the heave artifact caused a split hypothesis in the CUBE surface. When these areas were filtered the soundings that support an unused hypothesis would have been cropped out. In many cases these were reveiwed and at the time the rejected data was considered erroneous due to the artifact. This is certainly a less conservative approach which will not be used on future surveys.

I had to do some research about using the Fledermaus CUBE and editing process. I found a document titled "Alternative use of CUBE; how to fit a square peg in a round hole" by Duncan Mallace and Paul Roberson from NetSurvey which describes their process and is similar to what I think you used with H12256. (web link: http://www.ivs3d.com/news/Alternative%20use%20of%20CUBE.pdf) Is this the same editing method used in Flederamus and philosophy that was used with H12256? Paul Roberson and his procedures are how I orignally got introduced to the CUBE filtering in Flederamaus so it is very similar if not the same.

Regarding the applied QC method, did the survey review methods entail extracting depths from a combined grid and compare to the chart? Were the shoaler extracted depths compared to the data points (subset review)? Random points were chosen for comparison.

In this charting paradigm, we assume a *conservative view point*. We strive for the shoalest depth from the data set that is interpreted as valid soundings. When AHB reviews data that is attributed as rejected, but appears as valid data points, we can't help but wonder why. The computed error value is within the error budget, the beam location within the swath is good, then why was the data point rejected? Thus is why AHB is viewing the extracted soundings from a combined grid (the source is the submitted grids) that yield depths deeper than what's charted. I can find rejected data points that can equal the charted depth or even in some cases provide a depth that is shoaler than charted. This is a problem and I need to understand if this is a difference based upon view points or generally processing with filters and accepting the statistical outcome. Or, is this just a difference of view points between accepting statistical products as opposed to the "hydrographer's/cartographer's view point? The data editing appears to be over zealous with rejecting data points that contribute to the grid solution. The editing may have been heavy handed due to my attempts to smooth the heave artifact. We most likely considered this more of an issue than it was. Much of my editing was geared toward smoothing this artifact as much as possible in order to get an overall more accurate portrayal of the bathymetry. It is obvious to me now that the editing done to smooth the heave artifact is what your are seeing as valid data that was rejected. My apologies for this along with my understanding of a conservative point of view.

Sincerely,
Ransom

Ransom C. White III
941.730.6729

AHB COMPILATION LOG

General Survey Information	
REGISTRY No.	H12256
PROJECT No.	OPR-A366-KR-10
FIELD UNIT	Williamson & Assoc.
DATE OF SURVEY	AUGUST 26, 2010 – SEPTEMBER 28, 2010
LARGEST SCALE CHART	***13303_1, edition 12, 20020901, 1:40,000***
ADDITIONAL CHARTS	
SOUNDING UNITS	**FEET**
COMPILER	Rosemary P. Abbitt

Source Grids	**File Name** H:\Compilation\H12256_A366_WILL\AHB_H12256\SAR Final Products\GRIDS
	H12256_JunkenLedge_AHB_50cm_Final H12256_JunkenLedge_AHB_1m_Final H12256_1m_Final H12256_2m_Final H12256_4m_Final H12256_8m_Final
Surfaces	**File Name** H:\Compilation\H12256_A366_WILL\AHB_H12256\COMPILE\Working
Combined	**H12256_8m_Combined.csar**
Interpolated TIN	\Interpolated TIN**H12256_16m_InterpTIN.csar**
Shifted Interpolated TIN	\Shifted Surface**H12256_16m_InterpTIN_Shifted.csar**
Final HOBs	**File Name** H:\Compilation\H12256_A366_WILL\AHB_H12256\COMPILE\Final_Hobs
Survey Scale Soundings	**H12256_SS_Soundings.hob**
Chart Scale Soundings	**H12256_CS_Soundings.hob**
Contour Layer	**H12256_Contours.hob**
Feature Layer	**H12256_Features.hob**
Meta-Objects Layer	**H12256_MetaObjects.hob**
Blue Notes	**H12256_BlueNotes.hob**
ENC Retain Soundings	**N/A**

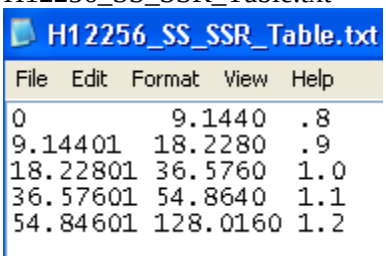
Meta-Objects Attribution	
Acronym	**Value**
M_COVR	
CATCOV	1 – coverage available
SORDAT	20100928
SORIND	US,US,graph,H12256
M_QUAL	
CATZOC	6 – zone of confidence U (data not assessed)
INFORM	M/V R&R
POSACC	10.0 m
SORDAT	20100928
SORIND	US,US,graph,H12256
SUREND	20100928
SURSTA	20100826
DEPARE	

DRVALV 1	20.39 ft
DRVALV2	383.82 ft
SORDAT	20100928
SORIND	US,US,graph,H12256
M_CSCL	
CSCALE	N/A
SORDAT	
SORIND	

SPECIFICATIONS:

I. COMBINED SURFACE:
- a. Number of ESAR Final Grids: 6
- b. Resolution of Combined (m): 8 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: N/A
  - ii. And/Or use radius table file: H12256_SS_SSR_Table.txt [*40K = chart scale*]



- d. Queried Depth of All Soundings
  - i. Minimum: 20.7539 ft
  - ii. Maximum: 380.0361 ft

III. INTERPOLATED TIN SURFACE:
- a. Resolution (m): 16 m
- b. Interpolation method: Natural Neighbor
- c. Shift value: -0.75ft

IV. CONTOURS:
- a. Attribute Name: Depth
- b. Use a Depth List: H12256_depth_contours.txt
- c. Output Options: Create contour lines
  - i. Line Object: DEPCNT
  - ii. Value Attribute: VALDCO

V. FEATURES:
- a. Number of Chart Features: 8 [*all features included in H-Cell*]
- b. Number of Non-Chart Features: N/A [*all features submitted by field & not included in H-Cell*]

VI. CHART SURVEY SOUNDINGS (CS):
- a. Number of ENC CS Soundings: 388
- b. Attribute Name: Depth
- c. Selection criteria: Radius, Shoal bias
- d. Radius value is: Distance on the ground (m)

i. Use single-defined radius: N/A

ii. And/Or use radius table file: H12256_CS_SSR_Table.txt [*40k = chart scale*]

H12256_CS_SSR_Table.txt

File Edit Format View Help

```
0           9.1440   200
9.14401   18.2280   300
18.22801  36.5760   400
36.57601  54.8640   500
54.84601 128.0160  550
```

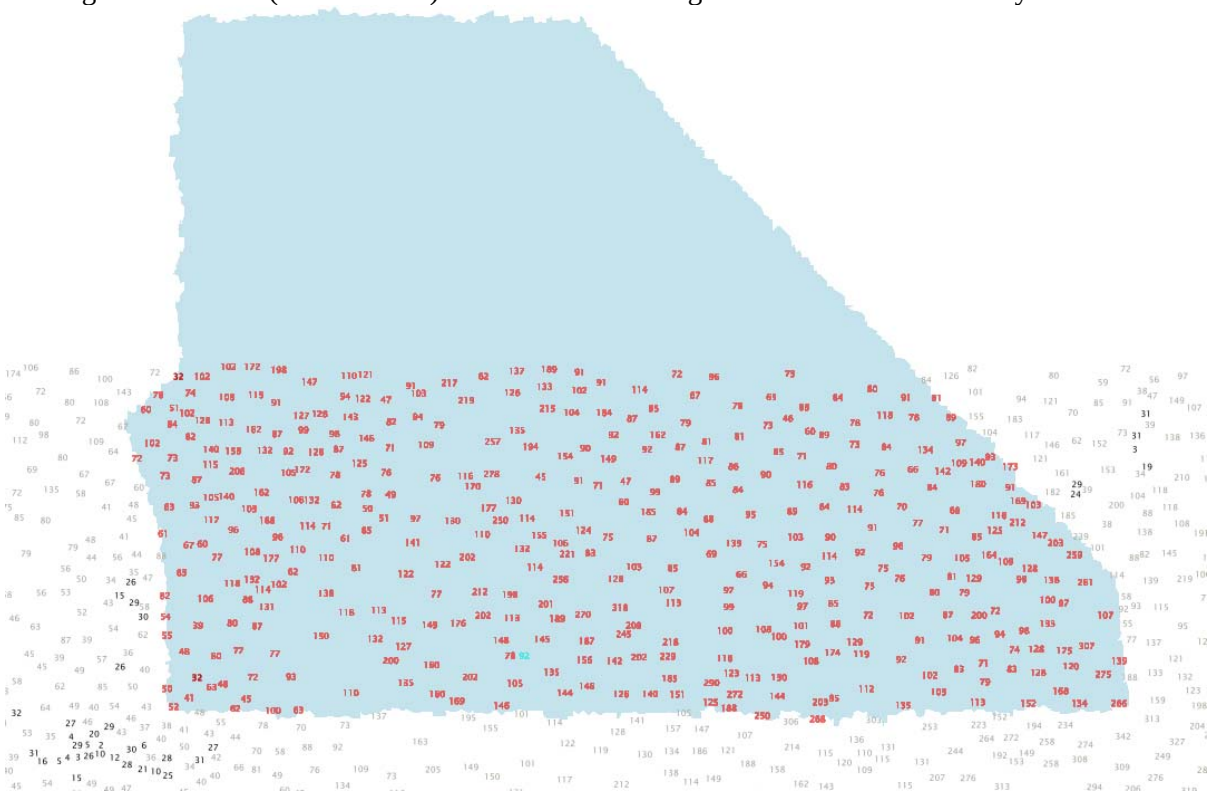
iii. Enable Filter: Interpolated !=1

e. Number Survey CS Soundings: 733

*See Note below for discussion of variation between ENC and CS sounding volume

VII. NOTES:

- No features were submitted by the field unit.
- Largest scale ENC (US5ME21M) Chart Scale Soundings did not cover all of survey sheet area.



ATLANTIC HYDROGRAPHIC BRANCH
HCELL REPORT to ACCOMPANY
SURVEY H12256 (2010)

This HCell 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.

A. AREA SURVEYED

B. DATA ACQUISITION AND PROCESSING

B.2 QUALITY CONTROL

The AHB source depth grids for the survey's nautical chart update were 50cm, 1m, 2m, 4m, and 8m resolution BASE surfaces (*.CSAR), which were combined at 8m resolution. The survey scale soundings were created from a combined surface at the largest scale chart covering the respective area of the survey (Chart 13303 - 1:40,000) using a sounding spacing range (SSR) file. A TIN was created from the survey scale soundings, from which an interpolated surface of 16m resolution was generated. The chart scale soundings were derived from only the non-interpolated nodes of this surface to preserve absolute continuity between the chart scale soundings, the survey scale soundings, and the original source grid. This also ensures that the chart scale soundings are a subset of the survey scale soundings. The chart scale soundings were selected using a sounding spacing range (SSR) file. 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 16m resolution was shifted by the NOAA sounding rounding value of -0.75 feet. The shifted interpolated TIN was used to generate depth contours in feet (30, 60, and 120, 180 and 240 ft). 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 HCell product as per 2009 HCell Specifications.

The compilation products (Final *.HOB files) for this survey are detailed in the H12256 AHB Compilation Log contained within this document. The Final HOB files include depth areas (DEPARE), depth contours (DEPCNT), soundings (SOUNDG), meta-objects (M_COVR, and M_QUAL), cartographic Blue Notes ($CSYMB), and features (SBDARE).

As dictated by Hydrographic Technical Directive 2008-8, the Final HOB files were combined into two separate HCell 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 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 HCell products are two S-57 files, in Lat/Long NAD-83. The contents of these two HCell deliverables are listed in the table below:

TABLE 1 - Contents of HCell Files

H12256_CS.000			Scale 1:40,000
Object Class Types	**Geographic**	**Cartographic**	**Meta**
S-57 Object Acronyms	DEPARE	$CSYMB	M_COVR
	SOUNDG		M_QUAL
	SBDARE		
H12256_SS.000			**Scale 1:10,000**
Object Class Types	**Geographic**		
S-57 Object Acronyms	DEPCNT		
	SOUNDG		

B.2.4 Junctions and Prior Surveys

Survey H12256 (2010) does not junction with any recent or contemporary surveys. Most present survey depths compare within 1-2 feet 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 HIPS/SIPS version 7.0/SP2/HF6
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 19 North.

D. RESULTS AND RECOMMENDATIONS

D.1 CHART COMPARISON — 13303 (12th Edition, September 2002)

Approaches to Penobscot Bay
Corrected through NM 04/23/2011
Corrected through LNM 04/12/2011
Scale 1:40,000

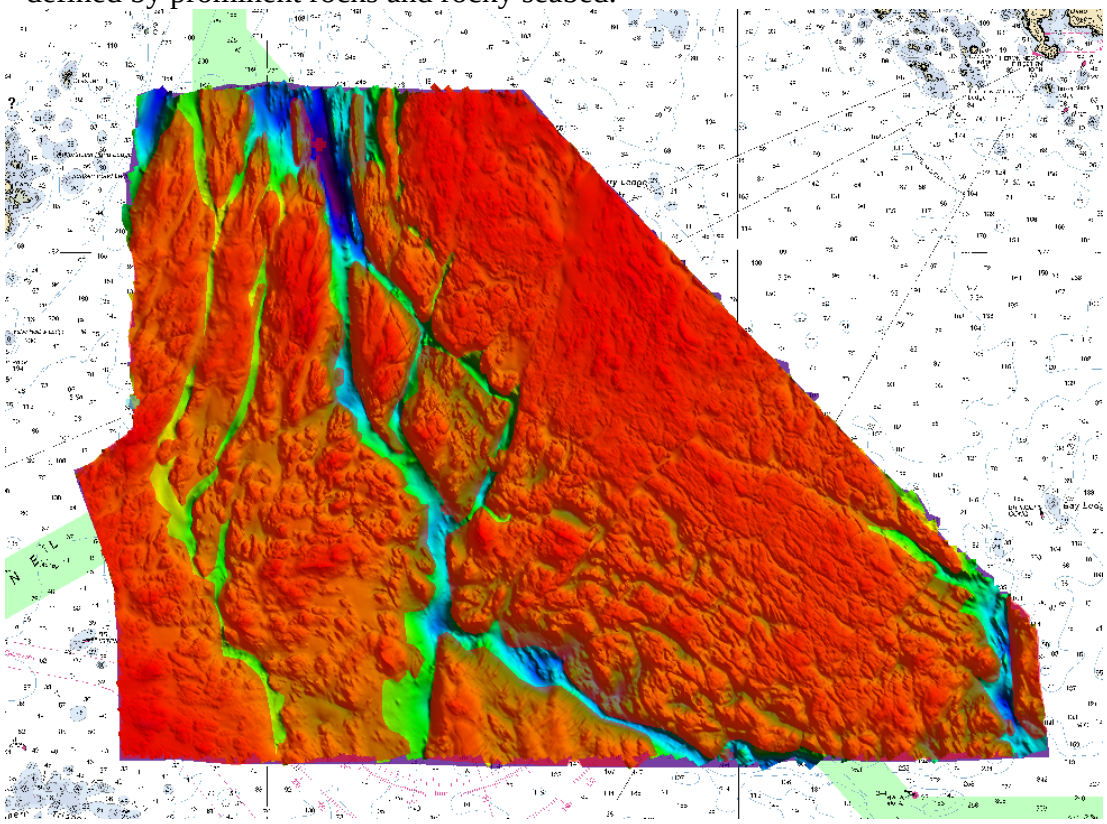
ENC COMPARISON — US5ME21M

Approaches to Penobscot Bay
Edition 8
Application Date 11/02/2011
Issue Date 11/02/2011
Chart 13303

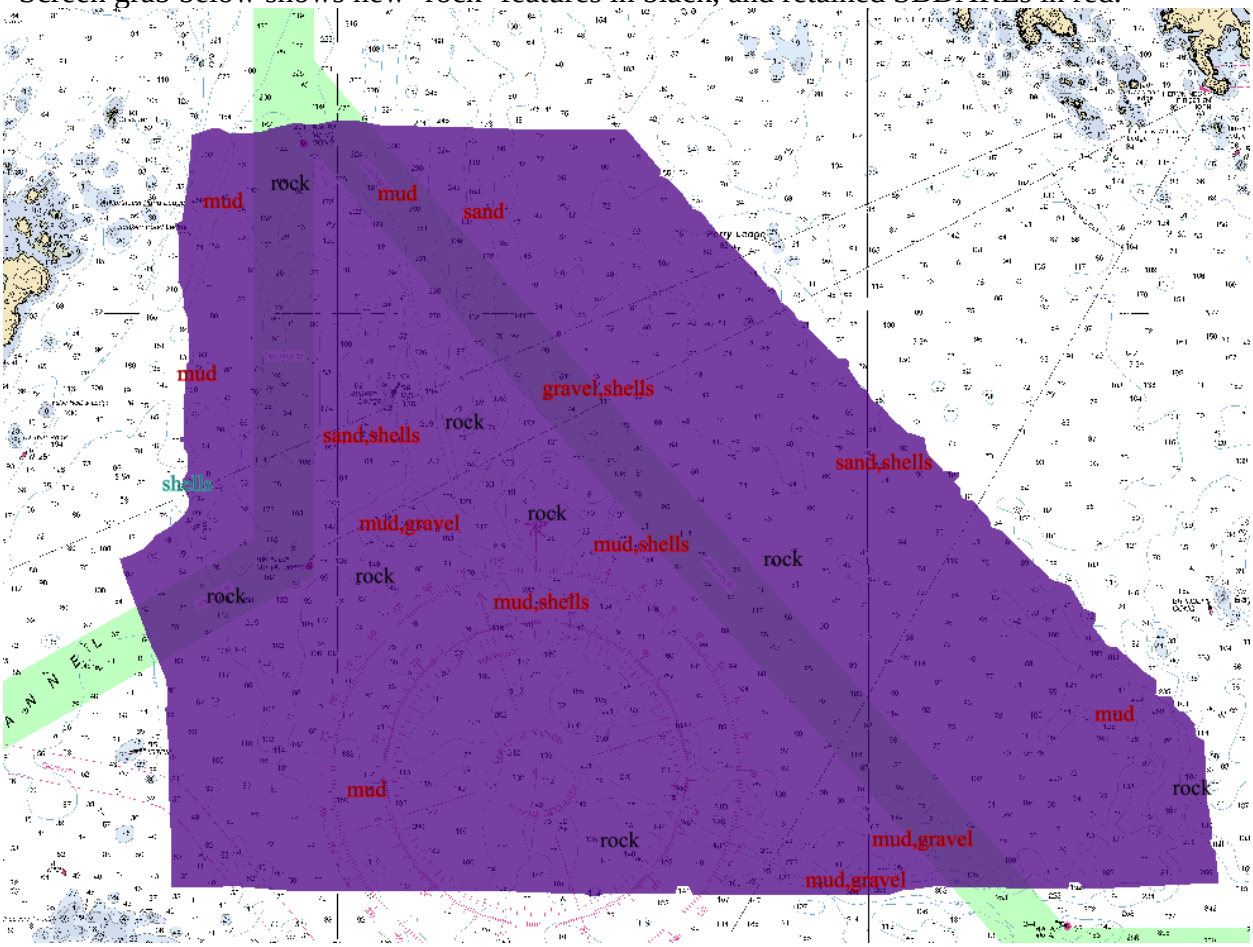
D.2 ADDITIONAL RESULTS

The charted hydrography originates with prior surveys and requires no further consideration. The hydrographer makes adequate chart comparisons in section D and Appendix I and II of the DR. The hydrographer recommends that any charted features not specifically addressed either in the HCell files or the Blue Notes should be retained as charted. The following exceptions are noted:

a. Seven rocky seabed areas (SBDARE) were included with the HCell. These areas are defined by prominent rocks and rocky seabed.



b. All currently charted “rky” seabed characteristics are being superseded by revised rocky SBDARE area features. Since bottom samples were not acquired for this survey all seabed characteristics other than “rky” are being retained as charted in the HCell. *Screen grab below shows new ‘rock’ features in black, and retained SBDAREs in red.



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 HCell 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
H12256

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 HCell 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 HCell 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.

R. Abbitt

Digitally signed by Rosemary P. Abbitt
DN: cn=Rosemary P. Abbitt, o=NOAA, ou=ERT, email=rosemary.abbitt@noaa.gov, c=US
Date: 2011.05.16 12:39:03 -04'00'

Rosemary P. Abbitt
Hydrographic Survey Intern
Atlantic Hydrographic Branch

I have reviewed the HCell 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

Richard T. Brennan
2011.05.27 01:36:25 -04'00'

Approved: _____

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