

H12478

NOAA Form 76-35A

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

**DESCRIPTIVE REPORT**

Type of Survey: Navigable Area

Registry Number: H12478

**LOCALITY**

State: Maine

General Locality: Southern Penobscot Bay

Sub-locality: Southern Triangles

**2012**

CHIEF OF PARTY  
Kyle Fankhauser

LIBRARY & ARCHIVES

Date:

**HYDROGRAPHIC TITLE SHEET**

**H12478**

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

State: **Maine**

General Locality: **Southern Penobscot Bay**

Sub-Locality: **Southern Triangles**

Scale: **1: 20,000**

Dates of Survey: **07/05/2012 to 08/20/2012**

Instructions Dated: **05/15/2012**

Project Number: **OPR-A366-KR-12**

Field Unit: **Williamson and Associates, INC.**

Chief of Party: **Kyle Fankhauser**

Soundings by: **Reson 7125 SV2 Multibeam Echosounder**

Imagery by:

Verification by: **Pacific Hydrographic Branch**

Soundings Acquired in: **meters at Mean Lower Low Water**

H-Cell Compilation Units: ***meters at Mean Lower Low Water***

**Remarks:**

*The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Notes in red were generated during office processing. The processing branch concurs with all information and recommendations in the DR unless otherwise noted. Page numbering may be interrupted or non-sequential. All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via <http://www.ngdc.noaa.gov/>.*

## **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 Triangles (Fig. 1). The survey encompassed an area of approximately 19 square nautical miles and was assigned registry number H12478. It is bound by the coordinates listed in Table 1. Project instructions required complete MBES coverage with no defined inshore limit. Two AWOIS items were located within the survey bounds to be completed using object detection standards. The depth range encountered in this area was -0.82 to 59.88 meters. Total main scheme line distance was 758.05 nautical miles. Total cross-line length surveyed for H12478 was 32.65 nautical miles or 4.31% of the total main scheme line distance. Two vessels were used to acquire the data, the M/V Nooit Volmaakt (406.68 nautical miles main scheme and 25.75 nautical miles cross-lines) using a Reson 7125 at 400kHz and the R/V Resolution (351.37 nautical miles main scheme and 6.9 nautical miles cross-lines) using a Reson 7125 at 200kHz. Data acquisition was conducted from the 5<sup>th</sup> of July (Julian Day 187) to the 20<sup>th</sup> of August (Julian Day 233) 2012.

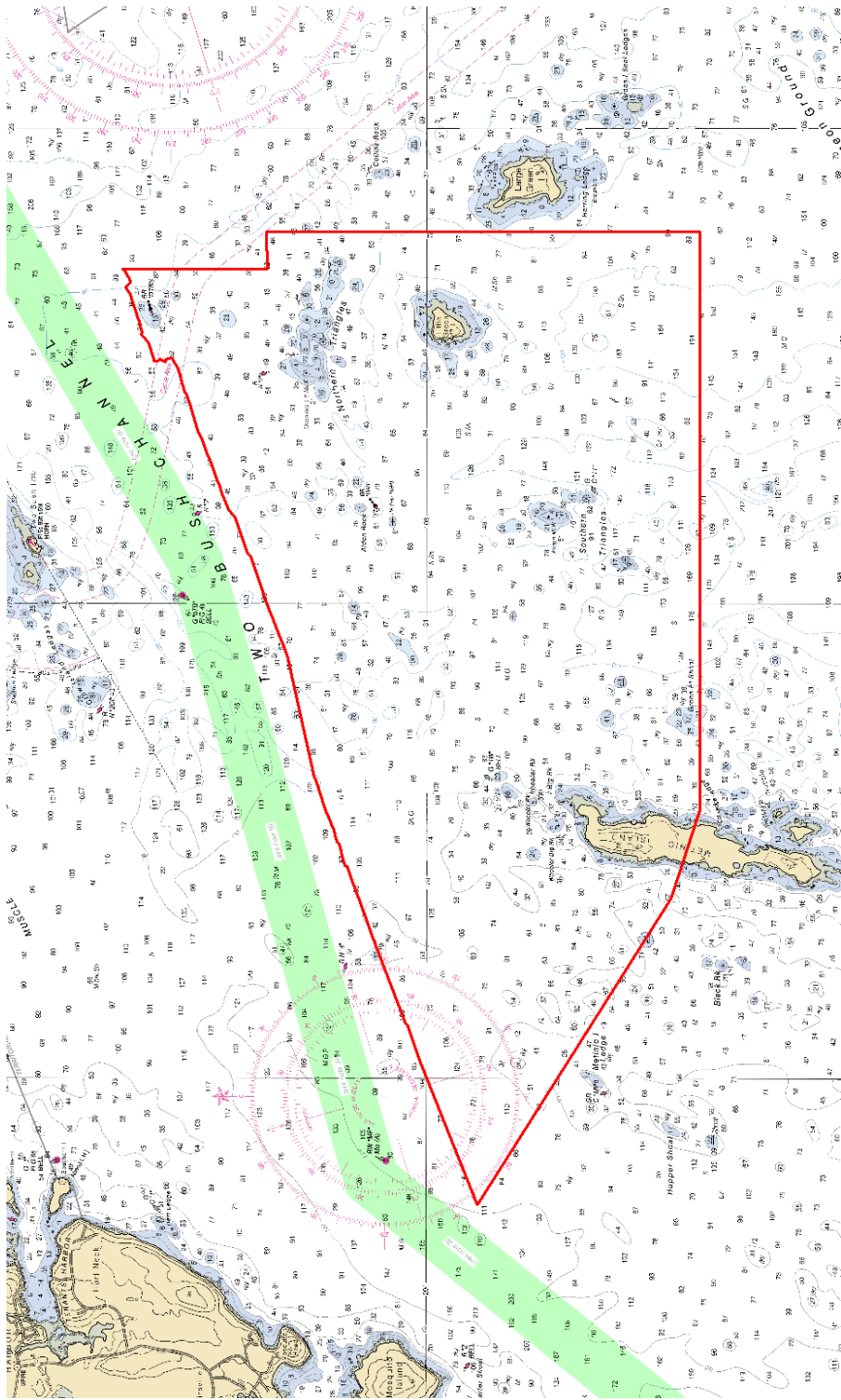
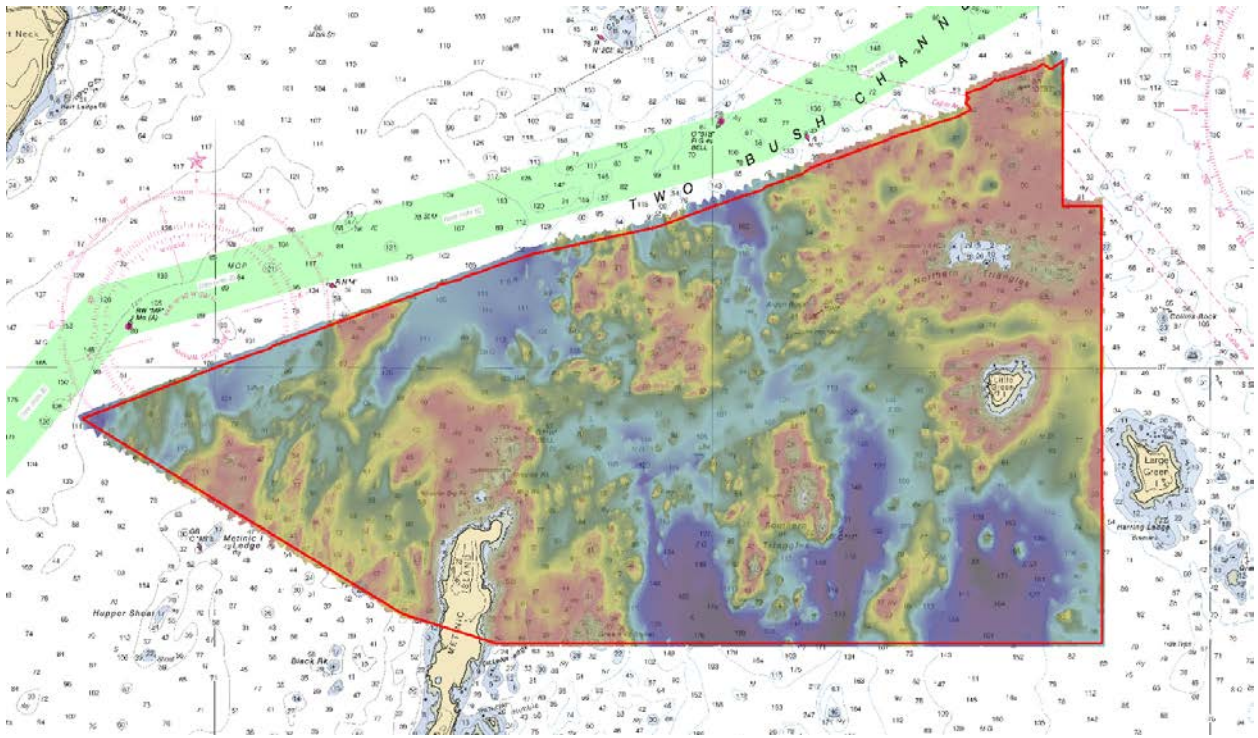


Figure 1: H12478 (East Up)

**Table 1 – Sheet Bounds (NAD83 UTM Zone 19 North)**

Point	Easting	Northing
1	498538.2	4864790
2	498545.1	4858912
3	490405.6	4858918
4	489149.7	4859305
5	484834.8	4861935
6	486806	4862689
7	487358.4	4862880
8	487398.5	4862913
9	488568	4863336
10	488961.1	4863471
11	489544.1	4863686
12	489604	4863699
13	489614	4863725
14	489704	4863755
15	489860.5	4863791
16	489913.8	4863808
17	489963.8	4863838
18	490047.1	4863864
19	490117	4863884
20	490167	4863900
21	490270.3	4863943
22	490413.5	4863996
23	490813.2	4864125
24	490866.5	4864145
25	492578.1	4864514
26	493380.7	4864815
27	493487.2	4864838
28	493550.5	4864872
29	493983.4	4865017
30	494023.4	4865050
31	494516.1	4865229
32	494632.7	4865305
33	494755.9	4865352
34	494812.5	4865388
35	494882.4	4865404
36	494929	4865424
37	494975.7	4865431
38	495025.6	4865451
39	495275.2	4865544
40	495385.1	4865590
41	495428.4	4865606

42	495465	4865610
43	495534.9	4865643
44	495604.8	4865663
45	495731.4	4865719
46	496157.4	4865848
47	496260.7	4865885
48	496294	4865905
49	496520.3	4865971
50	496610.2	4865997
51	496773.3	4866083
52	496763.4	4866130
53	496743.4	4866163
54	496713.5	4866170
55	496730.1	4866219
56	496760.1	4866243
57	496730.6	4866264
58	496730.6	4866264
59	496723.5	4866269
60	496726.9	4866322
61	496753.5	4866319
62	496853.4	4866362
63	496883.3	4866355
64	496983.1	4866402
65	497069.7	4866455
66	497099.7	4866495
67	497133	4866481
68	497206.2	4866505
69	497282.7	4866518
70	497332.6	4866541
71	497379.2	4866554
72	497465.8	4866581
73	497562.3	4866614
74	497662.1	4866644
75	497735.4	4866687
76	497765.3	4866697
77	497838.6	4866644
78	497885.1	4866650
79	497921.7	4866683
80	497991.6	4866720
81	498018.2	4866753
82	498013.7	4864788



**Figure 2: H12478 Surveyed Surface**

## **B. DATA ACQUISITION AND PROCESSING**

Refer to the OPR-A366-KR-12 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.

### **B.1. Equipment & Vessels**

The M/V Nooit Volmaakt and R/V Resolution acquired all multibeam data for sheet H12478 with a pole mounted Reson 7125 using a POSMV for position, orientation and HPR corrections. The R/V Resolution was used to collect grab samples within the survey bounds for sheet H12478. For more detailed information on equipment and vessels please refer to OPR-A366\_KR\_12 DAPR submitted under a different cover.

## 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, and such that total cross-line nautical miles ran would total more than 4 % of the main scheme nautical miles (a specification set forth by the HSSD 2012).

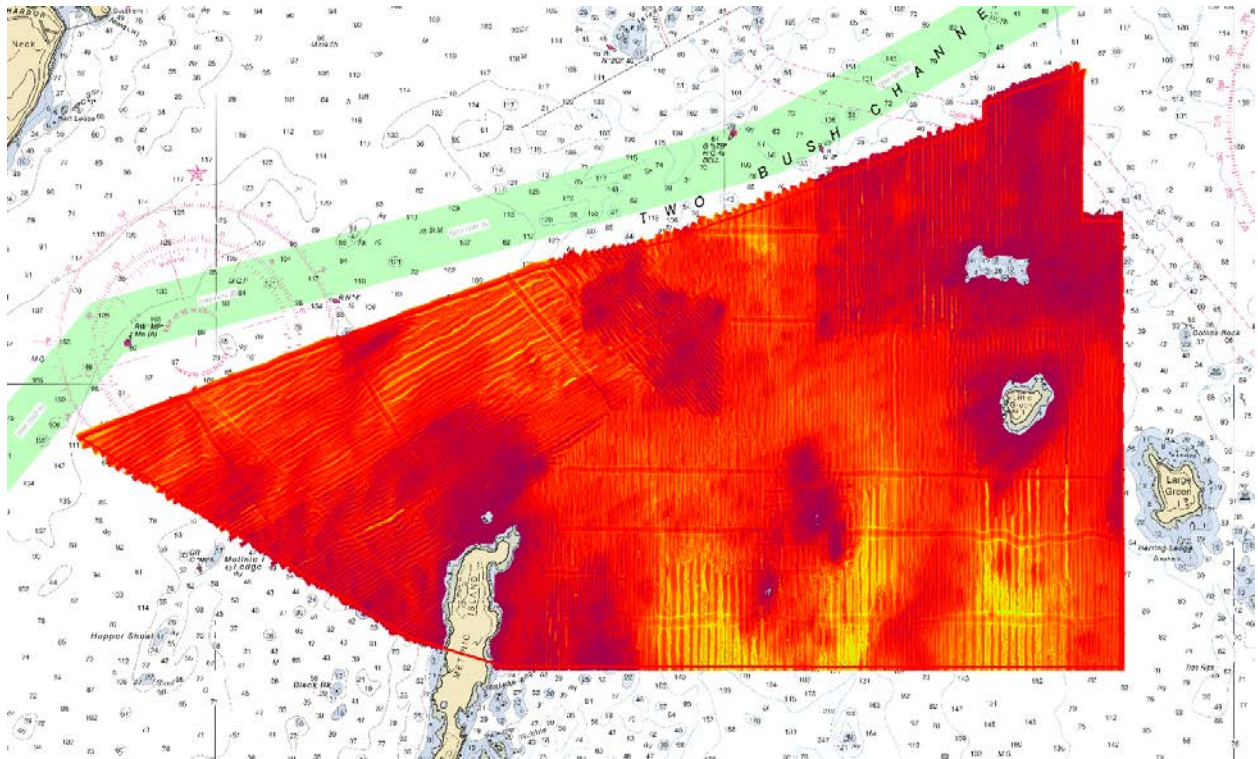
Total cross-line length surveyed for task order OPR-A366-KR-12 sheet H12478 was 32.65 nautical miles or 4.31% of the total main scheme distance (758.05 nautical miles). All cross-lines were compared to the main scheme line BASE, using the CARIS HIPS QC Report process for individual lines. The swath was split by beam number. The lines acquired by the M/V Nooit Volmaakt using the Reson 7125's 400 kHz setting was split in increments of 64 beams. The lines acquired by the R/V Resolution using the Reson 7125's 200 kHz setting was split in increments of 32 beams. The outer most beam increments were not used in the analysis since most of it was filtered out when the swath was cropped to 60° port and starboard. Increments were attempted to be made using the angle from nadir however CARIS would not complete this task. The vast majority of beams passed at 95% confidence level or better with an overall confidence level average of 98.65% and a standard deviation of 1.91%. (See *Separate II*)

### 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 HSSDM (April 2012)<sup>1</sup>. Any max uncertainty measurements exceeding IHO Order 1 specifications are due to the sound velocity uncertainty and tidal surging 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 QC reports were calculated using the 1m resolution surfaces for all depths to more accurately reflect the soundings and resulted in an average confidence level within IHO Order 1 of 99.25% and a standard deviation of 0.2% (refer to Separates II/QC reports). The calculated uncertainty values of all nodes in the finalized Uncertainty BASE surfaces are as follows:

**Table 2:  
Uncertainty Values for Sheet H12478**

Depth Range (m)	Resolution (m)	Min Uncertainty (m)	Max Uncertainty (m)
0-20	1	0.180	0.290
18-40	2	0.180	0.380
36-80	4	0.190	0.320

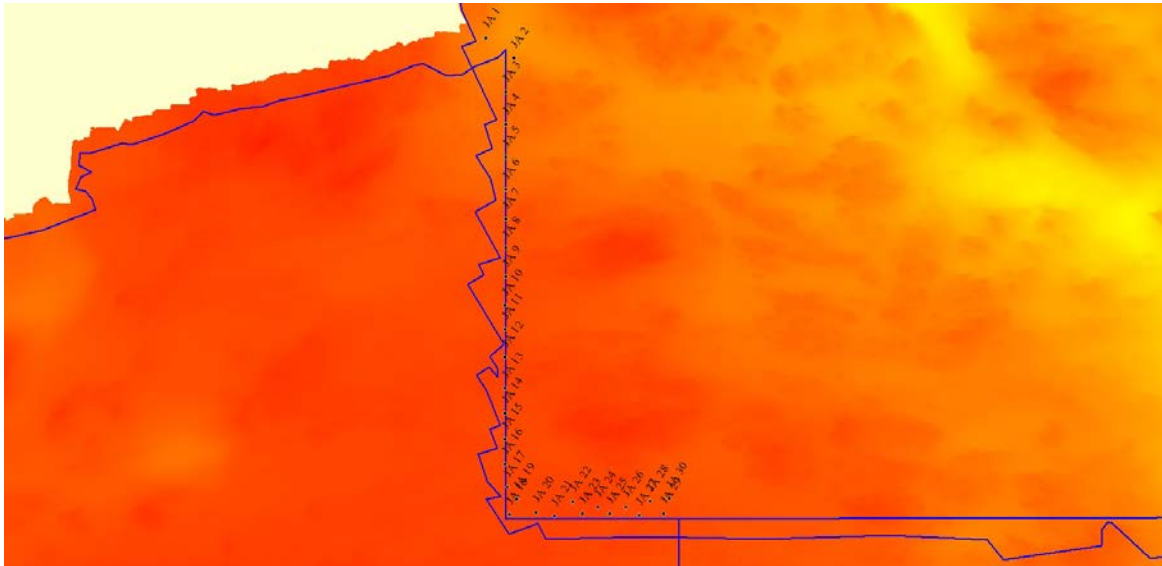


**Figure 3: Uncertainty Surface H12478 (2m Uncertainty surface with a Min range of 0.18m and a Max range of 0.38m)**

### **B.2.c Junctions**

Comparisons were made along the northeastern and eastern borders of H12478 to check accuracy with neighboring survey data, the registry number of which is H12256 and H12477 respectively. In general the data lines up within an average of 24.3cm and a standard deviation of 14.2cm. These junction spot comparisons are as follows:





**Figure 4: H12478 Junction with H12256 survey data**

**Table 3: Junction Spot Analysis correlating with figure 4**

<b>H12478 Junction Analysis</b>					
<b>Point</b>	<b>Easting</b>	<b>Northing</b>	<b>Depth (H12478)</b>	<b>Depth (H12256)</b>	<b>Difference (m)</b>
JA 1	497956.647	4866801.312	-31.002	-31.398	0.396
JA 2	498042.438	4866716.036	-32.031	-32.257	0.226
JA 3	498017.84	4866576.312	-25.357	-25.123	0.234
JA 4	498017.525	4866439.348	-25.288	-25.487	0.199
JA 5	498017.214	4866303.782	-25.878	-26.06	0.182
JA 6	498016.902	4866168.212	-22.139	-22.209	0.07
JA 7	498016.612	4866042.42	-18.919	-19.203	0.284
JA 8	498016.338	4865923.634	-18.584	-18.769	0.185
JA 9	498016.059	4865802.035	-16.835	-17.175	0.34
JA 10	498015.785	4865682.786	-17.757	-17.958	0.201
JA 11	498015.556	4865583.088	-17.28	-17.503	0.223
JA 12	498015.285	4865465.694	-15.535	-15.725	0.19
JA 13	498014.988	4865336.187	-15.389	-15.642	0.253
JA 14	498014.747	4865231.84	-16.23	-16.404	0.174
JA 15	498014.501	4865124.689	-17.08	-17.282	0.202
JA 16	498014.26	4865019.413	-16.261	-16.571	0.31
JA 17	498021.71	4864922.508	-15.665	-15.885	0.22
JA 18	498027.736	4864808.839	-15.916	-16.033	0.117
JA 19	498050.646	4864872.187	-15.774	-15.923	0.149
JA 20	498107.857	4864816.27	-15.301	-15.559	0.258
JA 21	498164.407	4864801.346	-14.514	-14.726	0.212
JA 22	498218.96	4864861.89	-15.181	-15.368	0.187

JA 23	498249.918	4864811.572	-15.207	-15.375	0.168
JA 24	498295.033	4864840.444	-14.91	-15.12	0.21
JA 25	498332.057	4864811.551	-16.482	-16.977	0.495
JA 26	498380.538	4864839.491	-16.944	-17.18	0.236
JA 27	498420.927	4864805.939	-17.151	-17.259	0.108
JA 28	498454.603	4864863.695	-17.237	-18.081	0.844
JA 29	498494.315	4864809.649	-16.58	-16.706	0.126
JA 30	498511.835	4864874.862	-18.292	-18.574	0.282
				Average	0.243
				Standard Deviation	0.142

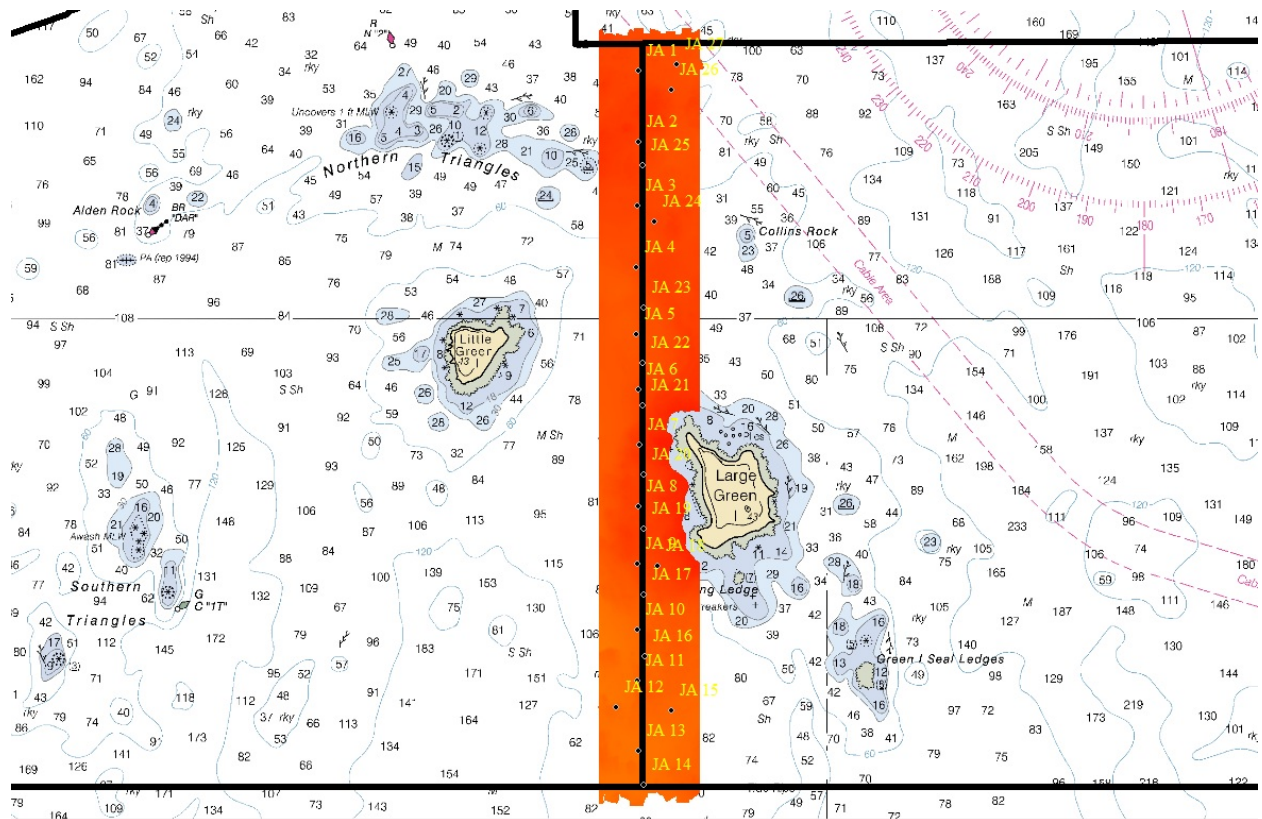


Figure 5: H12477 Junction with H12478 survey data

Table 4: Spot Analysis correlating with figure 5

<b>H12477 and H12478 Junction Analysis</b>					
<b>Point</b>	<b>Easting</b>	<b>Northing</b>	<b>Depth (H12477)</b>	<b>Depth (H12478)</b>	<b>Difference (m)</b>
JA 1	498517.619	4864579.038	-17.979	-17.819	0.16
JA 2	498517.619	4864011.588	-15.551	-15.479	0.072
JA 3	498502.861	4863506.123	-16.273	-16.209	0.064
JA 4	498496.958	4863024.27	-18.963	-18.875	0.088
JA 5	498498.434	4862489.289	-22.484	-22.375	0.109
JA 6	498511.716	4862051.711	-18.875	-18.785	0.09
JA 7	498521.309	4861614.87	-12.498	-12.403	0.095
JA 8	498516.144	4861126.377	-15.29	-15.296	0.006
JA 9	498506.551	4860675.516	-18.216	-18.187	0.029
JA 10	498502.861	4860155.293	-29.584	-29.55	0.034
JA 11	498509.502	4859747.969	-29.344	-29.313	0.031
JA 12	498334.619	4859542.093	-29.626	-29.434	0.192
JA 13	498513.192	4859193.063	-32.761	-32.72	0.041
JA 14	498555.345	4858929.423	-31.688	-31.606	0.082
JA 15	498771.551	4859518.272	-28.644	-28.91	0.266
JA 16	498564.2	4859940.354	-29.594	-29.469	0.125
JA 17	498557.005	4860435.489	-24.046	-24.046	0
JA 18	498663.264	4860659.075	-14.794	-14.967	0.173
JA 19	498554.791	4860952.023	-14.972	-15.053	0.081
JA 20	498557.743	4861378.533	-14.507	-14.696	0.189
JA 21	498551.84	4861928.273	-16.98	-17.11	0.13
JA 22	498551.84	4862266.234	-20.647	-20.789	0.142
JA 23	498556.513	4862704.14	-20.668	-20.836	0.168
JA 24	498638.421	4863383.013	-16.746	-16.695	0.051
JA 25	498548.396	4863824.281	-15.534	-15.628	0.094
JA 26	498771.982	4864424.198	-17.989	-17.985	0.004
JA 27	498814.042	4864624.909	-19.591	-19.43	0.161
<b>Average</b>					<b>0.099</b>
<b>Standard Deviation</b>					<b>0.067</b>

### **B.2.d Quality Control Checks**

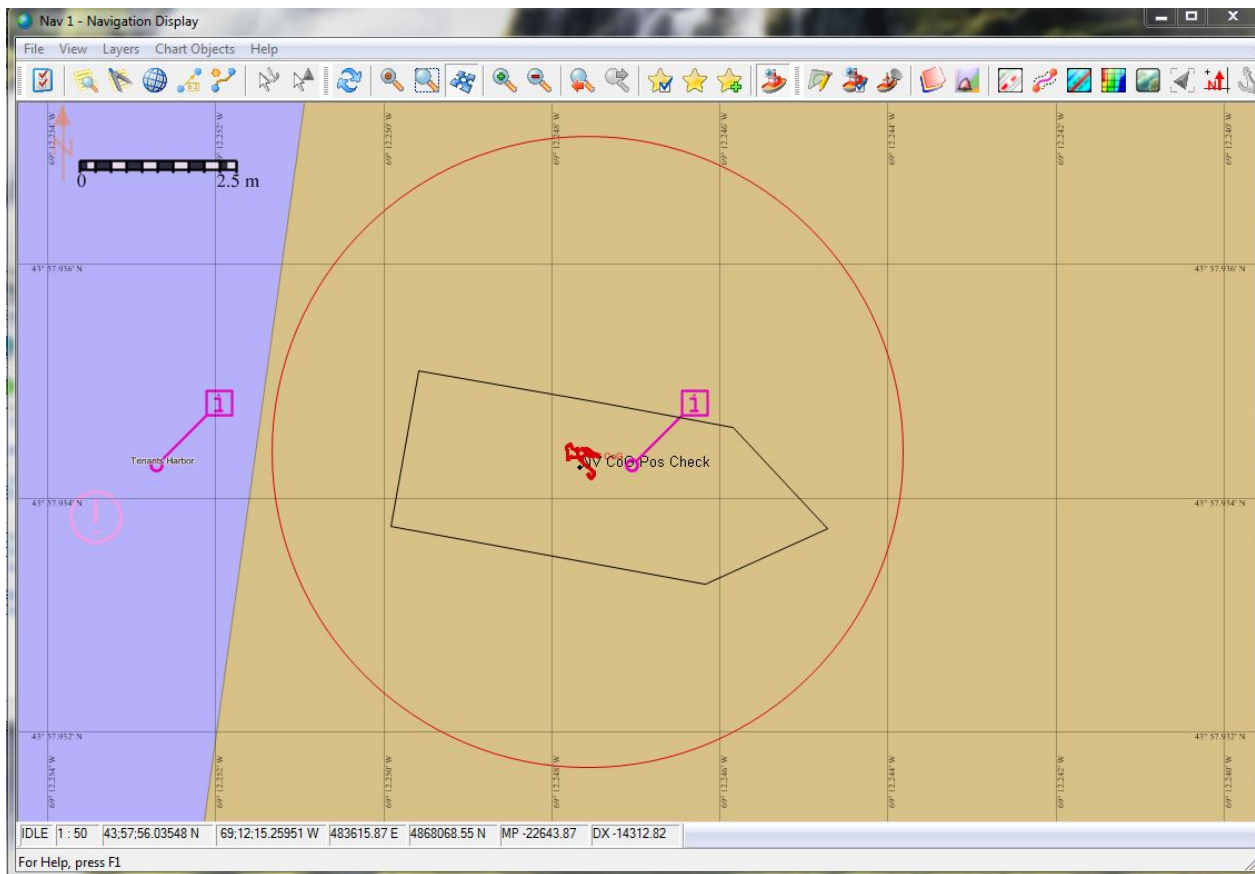
Vertical confidence checks were completed using cross-lines, tie-lines and weekly bar checks. Each bar check was conclusive and within an acceptable range. All bar check results are reported in the Navigation/Acquisition logs and the CARIS processed bar check lines are included in the digital deliverables. The results were both observed and recorded onboard the vessels and double checked by querying the soundings in CARIS's subset editor. Offsets ranged from 0cm to 4cm, with one outlier of 11cm on JD 198 which was re-acquired with a new offset of 1cm.

Tie-lines were made between both sheets tasked in this year's work order OPR-A366\_KR\_12. Two tie lines were run between the border of sheets H12477 and H12478, one on the northern

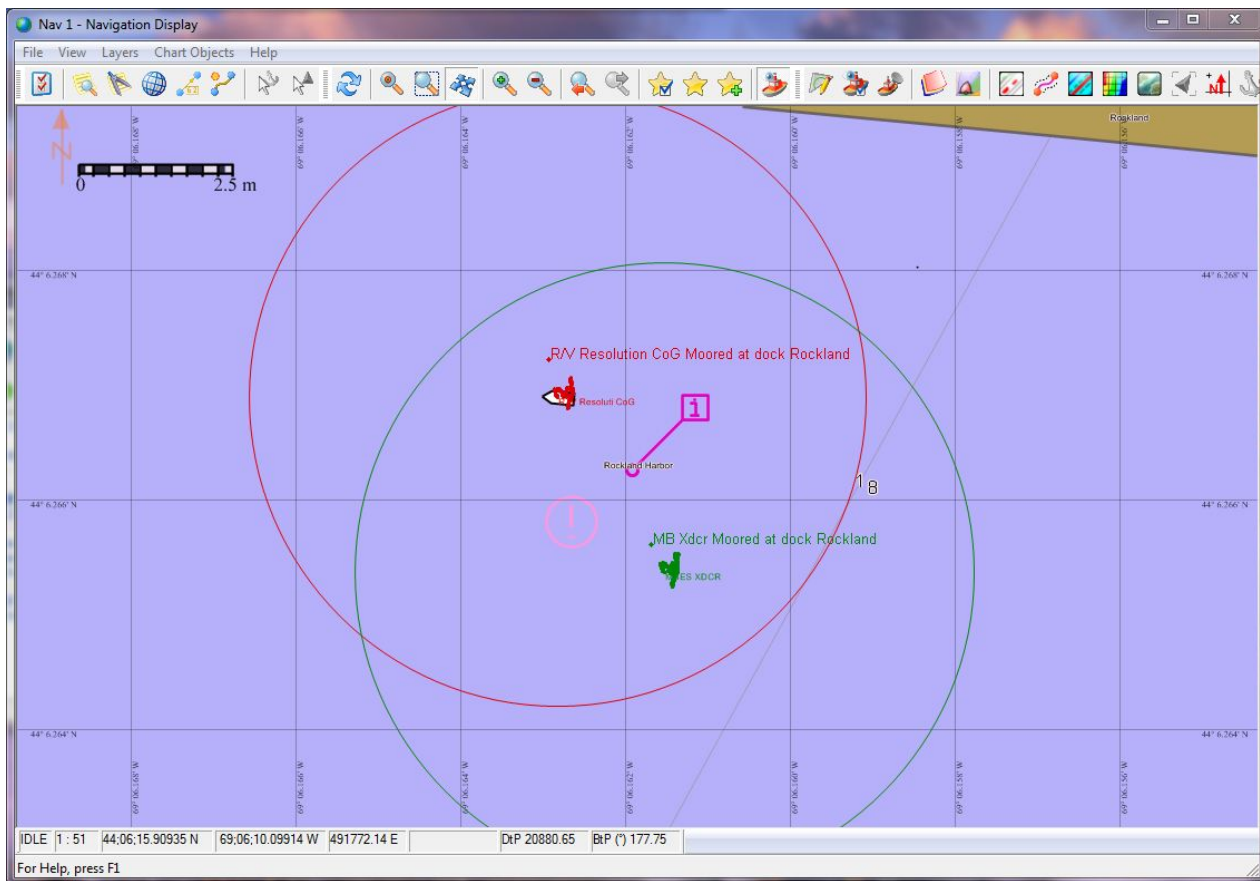
side and one on the southern side. QC reports were completed with both lines on each surface (see below for results).

Confidence Level within IHO Order 1	H12477	H12478
H12478_Xlines\RV_Resolution\2012-220\0968_-_Tie_001	98.28%	99.90%
H12478_Xlines\RV_Resolution\2012-218\0926_-_Cross_15	99.51%	99.43%

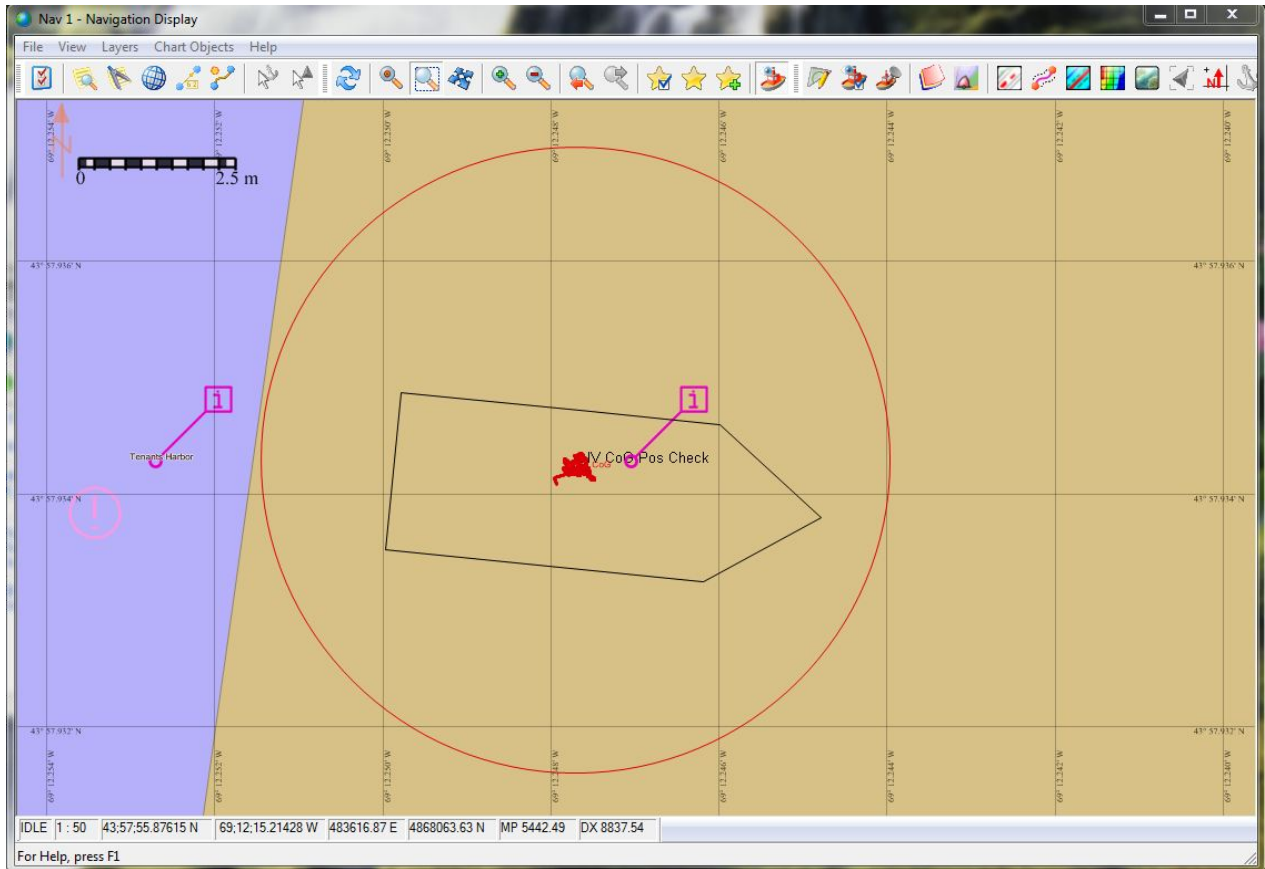
USCG DGPS Correctional Station used was Penobscot Beacon ID# 799. This station was used for the duration of the survey. Positioning system confidence checks were conducted on a daily basis using POSView along with QINSy's real time alert display. The alert display has numerous real-time displays that were monitored throughout the survey to ensure the positional accuracies as specified in the NOS Hydrographic Surveys Specifications and Deliverables, were achieved. The DGPS signal was monitored in POSView constantly throughout each survey day. The figures below show our primary GPS position relative to a waypoint on the dock that was used as a constant to check our position against. These tests show that our DGPS corrections were both accurate and precise. These position checks were done frequently while the boat was docked.



**Figure 6: Position Check within 5m radius after First M/V Nooit Volmaakt MOB**  
**Red Dots = Logged GPS positions**  
**Black Dot (NV CoG Pos Check) = Previously logged waypoint**



**Figure 7: Position Check within 5m radius after R/V Resolution MOB**  
**Red Dot (R/V Resolution CoG Moored at dock Rockland) = Previously logged GPS position**  
**Red Dots (Resolution CoG) = Current logged GPS positions**  
**Green Dot (MB Xdcr Moored at dock in Rockland) = Previously logged transducer position**  
**Green Dots (MBES XDCR) = Current logged transducer positions**



**Figure 8: Position Check within 5m radius after Second M/V Nooit Volmaakt MOB**  
**Red Dots = Logged GPS positions**  
**Black Dot (NV CoG Pos Check) = Previously logged waypoint**

### B.2.e Data Quality

In general, the multibeam data quality for H12478 was good. Coverage requirements outlined by the HSSD 2012 require 95% of nodes to be populated by at least 5 soundings. Sheet H12478 had node populations above the 99<sup>th</sup> percentile.

Notable problems follow<sup>2</sup>:

Unusual conditions were observed in H12478 in the form of (1) vertical uncertainty due to tidal surging near rapidly shoaling areas and islands, (2) vertical uncertainty due to highly dynamic sound velocity due to mixing of fresh/salt water currents and thermoclines.

1. Tidal Surge was apparent around rapidly shoaling areas such as the Southern Triangles, Little Green Island, the Northern Triangles and the north side of Metinic Island. Surging could be clearly felt on the vessel in these areas and at times the currents would churn and eddy so strongly that the vessel would be spun up to 90° off course. These areas were attempted to be surveyed at slack high tide but the timing did not always work out. To ensure that the data was in fact experiencing vertical bust due to tidal surge, some areas were processed

referenced to the ellipsoid. These lines showed greater consistency when compared to the data corrected using the Portland tide stations and tidal zones. More information can be found in the Tide section of OPR-A366-KR-12 DAPR, submitted under a separate cover.

2. The sound velocity was geographically very dynamic across the survey area. This was accounted for as best as possible with 5-6 daily casts on average; however the bathymetry is so dynamic that sound velocity errors can be observed on lines that span over a larger range of depths. Tidal currents were also very prominent, especially around the Southern Triangles, Little Green Island and the Northern Triangles. Acquisition of accurate sound velocities for these areas was made difficult due to these currents churning and mixing in various locations over the course of each survey day.

### **B.2.f Object Detection**

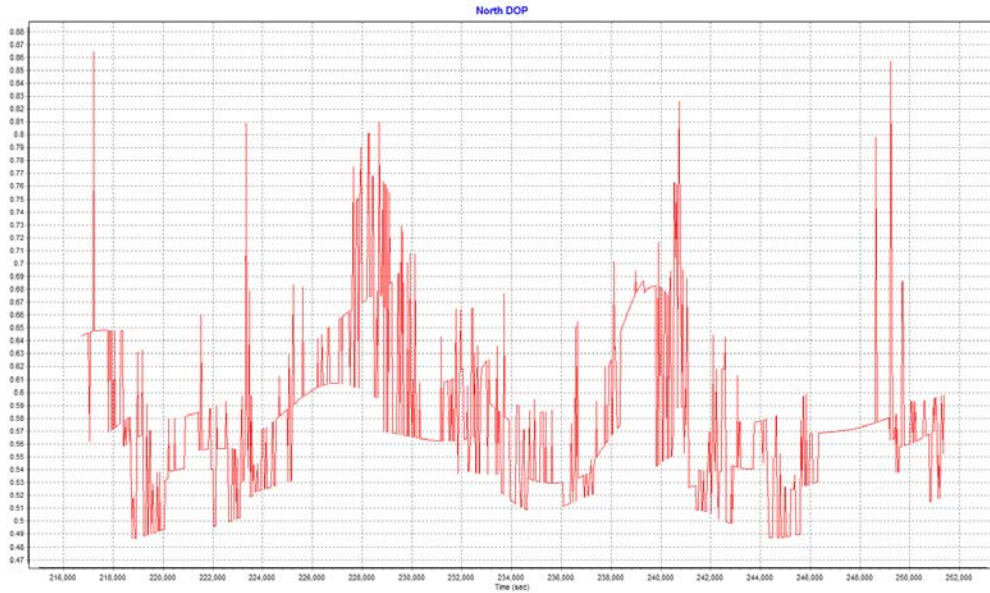
No Object Detection was required on this survey besides AWOIS items (refer to section D.1.b AWOIS). Object Detection was listed as the coverage type in our final instructions, however this was found to be an error when discussed with our COR.

### **B.3. Corrections to Echo Soundings**

Refer to the OPR-A366-KR-12 Data Acquisition and Processing Report for a detailed description of all corrections to echo soundings. No deviations from the DAPR occurred except the data collected on JD 227.

Navigation during Julian Day 227 was in need of alteration because the USGS DGPS correctional station ID# 799 was not broadcasting corrections due to maintenance. The data for JD 227 was horizontally corrected using a post processed SBET file. Correctional values were obtained from the CORS network (stations: ACU6, BRUS, PNB6 and BARH) using POSPac MMS version 5.3 to retrieve and export them to an SBET file. Left unedited, the data quality would have been acceptable since the HDOP never exceeded 2.5 (see below HDOP Graph). However, the SBET corrected data matched previously collected data better, so it was used in creation of the final surfaces.





**Figure 9: Graph showing North DOP (Identical to East DOP) for our GPS positions on JD 227**

### **B.3.a Additional Calibration Tests**

After the initial MB Calibrations for the M/V Nooit Volmaakt and R/V Resolution, daily calibration checks (and patch tests if needed) were made/run to determine the accuracy of the pitch and roll offsets due to the mounting pole configuration, which was deployed and recovered each day. Both vessels received multiple recalibrations, besides post MOB and re-MOB calibrations; however no value exceeded 1° of change, with the exception of the yaw value after the second MOB of the M/V Nooit Volmaakt (JD222). The M/V Nooit Volmaakt required more attention towards the end of the survey period due to fatigue of the pole hinge. Julian days 191, 230, and 233 had pole shifts during acquisition and were corrected for using neighboring lines to calibrate. These calibration results were deemed acceptable and posed no threat to our confidence level of IHO Order 1.

### **B.4. Data Processing**

Uncertainty BASE surfaces were built with sounding data that had been fully processed, filtered and subset edited. Finalized surfaces were built with the Data Range Resolutions set forth in the National Ocean Surveys (NOS) *Hydrographic Surveys Specifications and Deliverables Manual* (April 2010)<sup>3</sup>. All BASE surfaces have been included with the digital data. Details on editing procedures can be found in the OPR-A366-KR-12 DAPR, submitted under a separate cover.

Note: Some gaps may 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 is called “H12478.000”<sup>4</sup>. This file 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 reduced to the POSMV IMU (also the reference point) during acquisition. The POS unit output the IMU location to QINSy which in turn packaged the navigation and the MBES data using a PPS signal from the POS as well. The IMU to Reson transducer offsets were corrected by CARIS during post processing and can be found in the HVF delivered digitally.

### C.2. Vertical Control

All sounding data were initially reduced to MLLW using predicted tidal data from the Portland Tide Station (ID: 8418150). Predicted tides were used only for preliminary data cleaning.

Final tidal corrections were generated using the verified tides from the Portland Tide station. Tide zoning verification can be found in the OPR-A366-KR-12 DAPR *section C.4*, submitted under a separate cover.

## D. RESULTS AND RECOMMENDATIONS

H12478 survey data were compared to the following Raster and Electronic Charts:

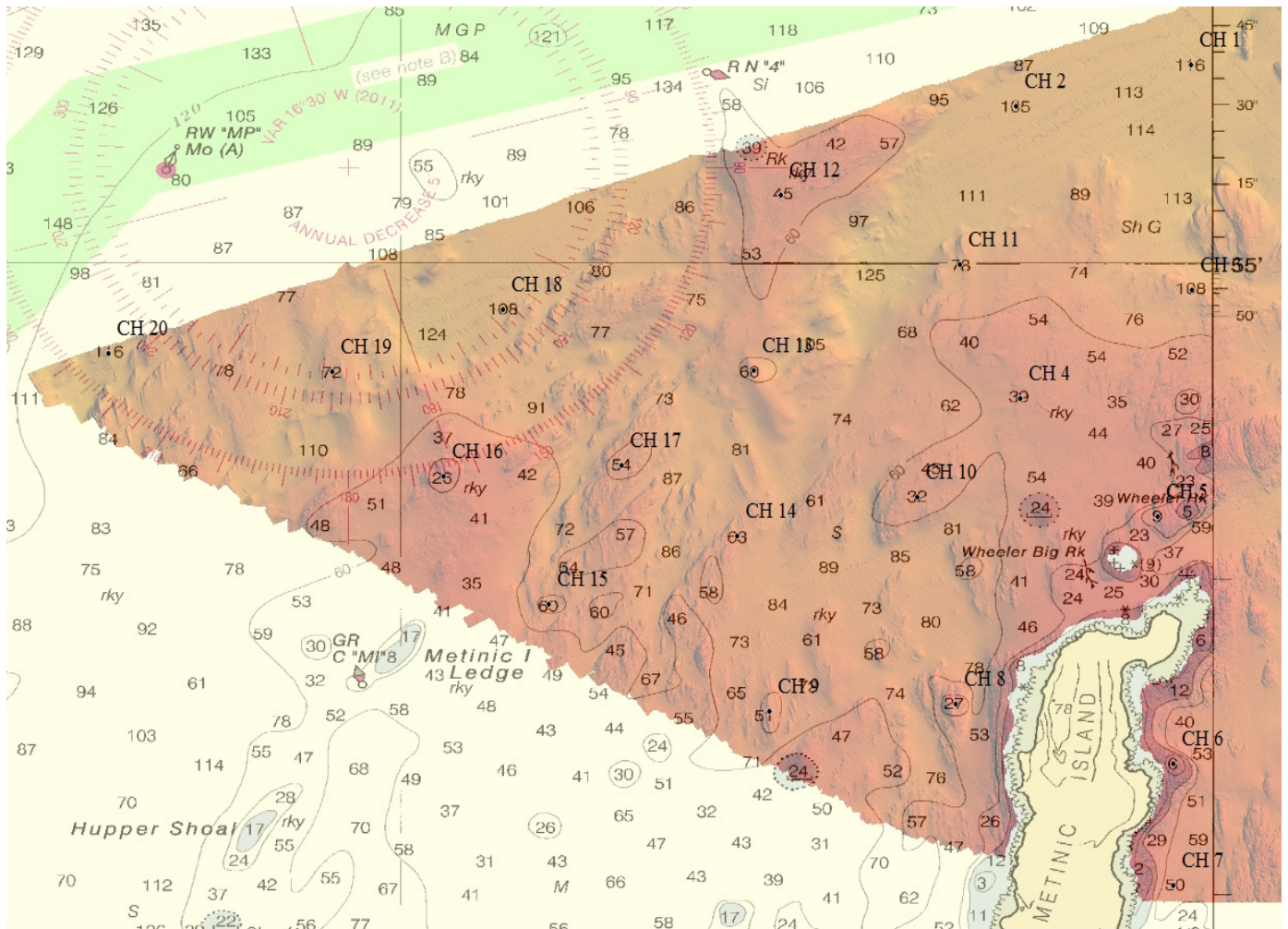
<b>Affected Raster Charts</b>					
<i>Chart Number</i>	<i>Scale</i>	<i>Edition Number</i>	<i>Edition Date</i>	<i>LNM Date</i>	<i>NM Date</i>
13301	40000	21	08/2011	02/14/2012	02/25/2012
13303	40000	13	06/2011	02/14/2012	02/25/2012
<b>Affected ENCs</b>					
<i>ENC Name</i>	<i>Scale</i>	<i>Edition</i>	<i>Update Application Date</i>	<i>Issue Date</i>	<i>Preliminary</i>
US5ME21M	40000	9	09/15/2011	09/15/2011	NO
US5ME19M	40000	2	03/02/2011	03/02/2011	NO

### D.1.a Chart Comparison

Charted soundings were compared with the surveyed data. RNCs and ENC's were placed on top of the gridded surfaces using the GIS software Global Mapper. Points were created on charted soundings, and the depth from the gridded surface was compared to the charted soundings. In general, charted soundings in areas with little relief were similar or shoaler to the surveyed depths. Nearly all the spot checked charted soundings were shoaler than the surveyed depths. Areas that were charted deeper than the actual depth were either very minimally off, or in deep areas that pose no threat to vessels. The Hydrographer recommends all surveyed depths supersede previously charted soundings. See results below:

**Table 5: RNC Chart Spot Comparison (13301) correlating with figure 10**

<b>H12478 RNC Chart 13301 Comparison</b>					
<b>Point</b>	<b>Longitude</b>	<b>Latitude</b>	<b>Surveyed Depth (ft)</b>	<b>Charted Depth (ft)</b>	<b>Difference (ft)</b>
CH 1	69° 07' 4.5998" W	43° 55' 37.2779" N	-117.512	-116	-1.512
CH 2	69° 07' 43.4153" W	43° 55' 29.4785" N	-110.026	-105	-5.026
CH 3	69° 07' 4.2371" W	43° 54' 54.4721" N	-90.215	-108	17.785
CH 4	69° 07' 42.5084" W	43° 54' 33.9761" N	-53.162	-39	-14.162
CH 5	69° 07' 12.0364" W	43° 54' 11.6663" N	-15.887	-9	-6.887
CH 6	69° 07' 8.4088" W	43° 53' 24.6887" N	-20.093	-6	-14.093
CH 7	69° 07' 8.5902" W	43° 53' 1.6534" N	-50.102	-50	-0.102
CH 8	69° 07' 56.8374" W	43° 53' 36.1157" N	-46.072	-27	-19.072
CH 9	69° 08' 38.1922" W	43° 53' 34.6647" N	-52.958	-51	-1.958
CH 10	69° 08' 5.3623" W	43° 54' 15.2939" N	-53.632	-32	-21.632
CH 11	69° 07' 55.7492" W	43° 54' 59.3694" N	-83.543	-78	-5.543
CH 12	69° 08' 35.6529" W	43° 55' 12.6101" N	-52.722	-45	-7.722
CH 13	69° 08' 41.6384" W	43° 54' 39.2361" N	-64.29	-60	-4.29
CH 14	69° 08' 45.2385" W	43° 54' 7.8250" N	-68.84	-63	-5.84
CH 15	69° 09' 27.0942" W	43° 53' 54.8900" N	-68.764	-60	-8.764
CH 16	69° 09' 10.9865" W	43° 54' 21.3701" N	-58.425	-54	-4.425
CH 17	69° 09' 50.4016" W	43° 54' 19.1736" N	-29.452	-26	-3.452
CH 18	69° 09' 37.1005" W	43° 54' 50.9010" N	-107.717	-108	0.283
CH 19	69° 10' 15.0513" W	43° 54' 39.0642" N	-83.626	-72	-11.626
CH 20	69° 11' 4.7168" W	43° 54' 42.4810" N	-110.603	-116	5.397
<b>Average</b>					<b>-5.632</b>
<b>Standard Deviation</b>					<b>8.606</b>

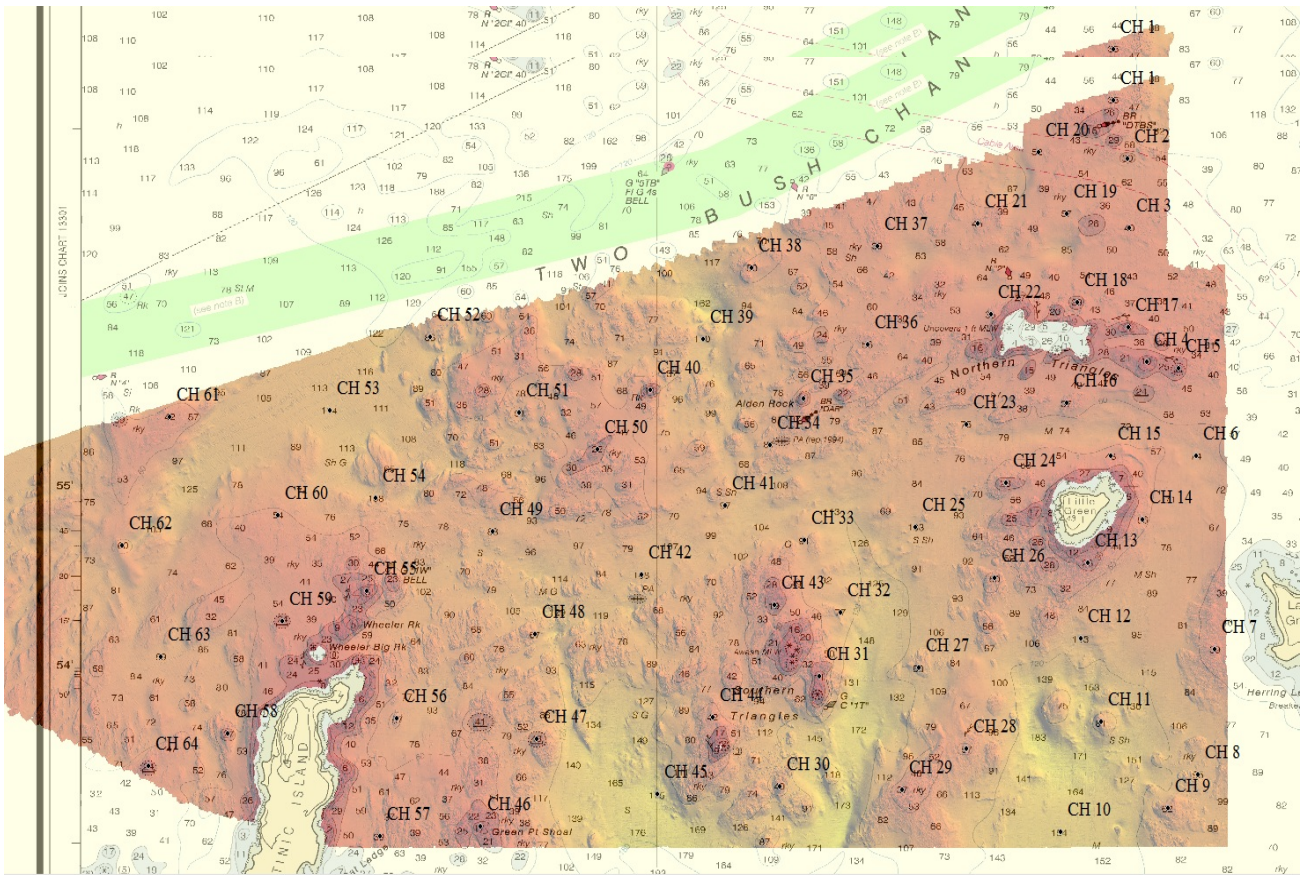


**Figure 10: RNC Chart (13301) Comparison Spot Locations**

**Table 6: RNC Chart Spot Comparison (13303) correlating with figure 11**

<b>H12478 RNC Chart 13303 Comparison</b>					
<b>Point</b>	<b>Longitude</b>	<b>Latitude</b>	<b>Surveyed Depth (ft)</b>	<b>Charted Depth (ft)</b>	<b>Difference (ft)</b>
CH 1	69° 01' 51.0758" W	43° 57' 9.3474" N	-43.903	-35	-8.903
CH 2	69° 01' 45.0961" W	43° 56' 49.9394" N	-63.578	-30	-33.578
CH 3	69° 01' 44.3617" W	43° 56' 26.4400" N	-45.643	-40	-5.643
CH 4	69° 01' 37.1231" W	43° 55' 41.4345" N	-21.294	-10	-11.294
CH 5	69° 01' 24.2194" W	43° 55' 39.1265" N	-15.185	-5	-10.185
CH 6	69° 01' 16.8758" W	43° 55' 9.6474" N	-75.771	-74	-1.771
CH 7	69° 01' 9.1127" W	43° 54' 4.7094" N	-43.178	-39	-4.178
CH 8	69° 01' 16.0366" W	43° 53' 22.6413" N	-110.354	-95	-15.354
CH 9	69° 01' 28.6255" W	43° 53' 11.2063" N	-69.066	-62	-7.066
CH 10	69° 02' 13.0016" W	43° 53' 3.1284" N	-156.433	-154	-2.433
CH 11	69° 01' 56.0065" W	43° 53' 40.1609" N	-83.694	-81	-2.694
CH 12	69° 02' 4.6090" W	43° 54' 8.1714" N	-112.188	-113	0.812
CH 13	69° 02' 1.6715" W	43° 54' 33.7689" N	-29.681	-26	-3.681
CH 14	69° 01' 39.1163" W	43° 54' 48.2462" N	-59.895	-56	-3.895
CH 15	69° 01' 52.0200" W	43° 55' 9.6474" N	-48.962	-48	-0.962
CH 16	69° 02' 10.3789" W	43° 55' 27.5342" N	-38.721	-37	-1.721
CH 17	69° 01' 44.7814" W	43° 55' 53.1318" N	-23.564	-6	-17.564
CH 18	69° 02' 6.0777" W	43° 56' 1.4195" N	-39.149	-29	-10.149
CH 19	69° 02' 10.3789" W	43° 56' 31.3182" N	-57.904	-57	-0.904
CH 20	69° 02' 21.9188" W	43° 56' 51.8802" N	-52.727	-52	-0.727
CH 21	69° 02' 47.0967" W	43° 56' 27.9612" N	-47.336	-45	-2.336
CH 22	69° 02' 41.7464" W	43° 55' 57.3281" N	-37.739	-35	-2.739
CH 23	69° 02' 51.8534" W	43° 55' 20.3346" N	-76.509	-75	-1.509
CH 24	69° 02' 35.3378" W	43° 55' 0.6429" N	-34.772	-28	-6.772
CH 25	69° 03' 12.7096" W	43° 54' 45.8212" N	-102.817	-103	0.183
CH 26	69° 02' 40.2078" W	43° 54' 28.5646" N	-55.618	-50	-5.618
CH 27	69° 03' 11.5450" W	43° 53' 58.3918" N	-90.514	-88	-2.514
CH 28	69° 02' 51.8534" W	43° 53' 31.3952" N	-61.508	-57	-4.508
CH 29	69° 03' 18.2148" W	43° 53' 17.4205" N	-52.594	-37	-15.594
CH 30	69° 04' 8.9261" W	43° 53' 18.5850" N	-44.9	-40	-4.9
CH 31	69° 03' 52.5164" W	43° 53' 55.5334" N	-22.805	-11	-11.805
CH 32	69° 03' 43.8351" W	43° 54' 17.2366" N	-92.249	-77	-15.249
CH 33	69° 03' 58.6568" W	43° 54' 41.2688" N	-89.435	-91	1.565
CH 34	69° 04' 12.9491" W	43° 55' 13.5589" N	-82.429	-81	-1.429

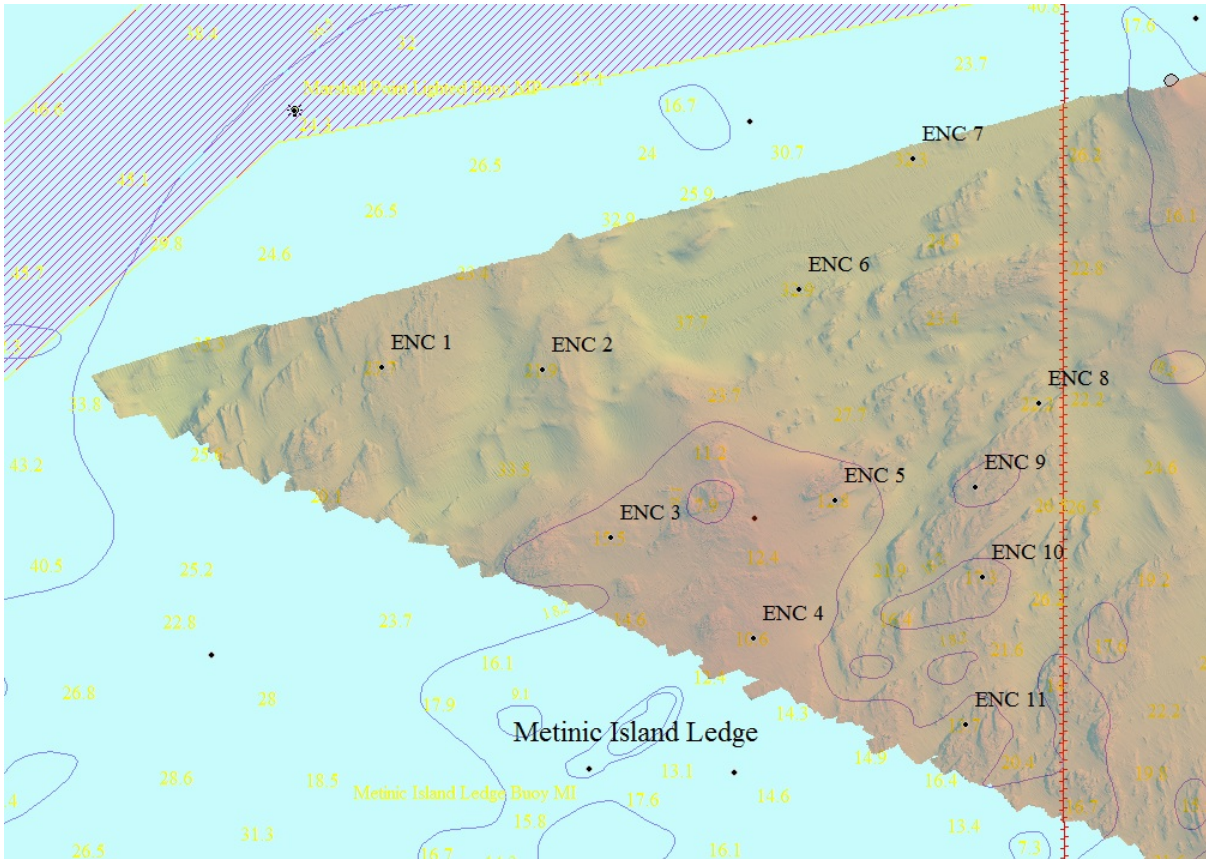
CH 35	69° 03' 59.0803" W	43° 55' 29.2276" N	-19.368	-4	-15.368
CH 36	69° 03' 32.5071" W	43° 55' 47.2253" N	-56.059	-56	-0.059
CH 37	69° 03' 28.5900" W	43° 56' 20.4682" N	-44.502	-39	-5.502
CH 38	69° 04' 20.3600" W	43° 56' 13.1633" N	-58.571	-50	-8.571
CH 39	69° 04' 40.6868" W	43° 55' 49.2368" N	-113.665	-110	-3.665
CH 40	69° 05' 2.3900" W	43° 55' 31.8743" N	-25.364	-14	-11.364
CH 41	69° 04' 31.4762" W	43° 54' 53.1262" N	-97.512	-97	-0.512
CH 42	69° 05' 6.0954" W	43° 54' 29.7291" N	-106.203	-108	1.797
CH 43	69° 04' 10.9376" W	43° 54' 19.4598" N	-33.584	-19	-14.584
CH 44	69° 04' 36.3462" W	43° 53' 41.7704" N	-45.195	-42	-3.195
CH 45	69° 04' 59.3198" W	43° 53' 15.9383" N	-172.822	-175	2.178
CH 46	69° 06' 12.6871" W	43° 53' 4.9279" N	-22.03	-17	-5.03
CH 47	69° 05' 49.1842" W	43° 53' 34.4654" N	-60.292	-43	-17.292
CH 48	69° 05' 50.0311" W	43° 54' 9.7198" N	-81.986	-67	-14.986
CH 49	69° 06' 7.2878" W	43° 54' 44.4449" N	-88.214	-88	-0.214
CH 50	69° 05' 24.1991" W	43° 55' 11.9709" N	-46.73	-22	-24.73
CH 51	69° 05' 56.4892" W	43° 55' 24.2517" N	-83.904	-51	-32.904
CH 52	69° 06' 33.2442" W	43° 55' 49.7074" N	-90.305	-86	-4.305
CH 53	69° 07' 14.6978" W	43° 55' 24.9207" N	-117.698	-114	-3.698
CH 54	69° 06' 55.7872" W	43° 54' 55.5400" N	-96.791	-108	11.209
CH 55	69° 06' 59.4198" W	43° 54' 24.3430" N	-18.074	-8	-10.074
CH 56	69° 06' 46.9196" W	43° 53' 41.2868" N	-59.424	-57	-2.424
CH 57	69° 06' 54.0778" W	43° 53' 1.8631" N	-47.248	-39	-8.248
CH 58	69° 07' 56.9062" W	43° 53' 36.4046" N	-44.453	-27	-17.453
CH 59	69° 07' 34.3723" W	43° 54' 14.1409" N	-42.605	-24	-18.605
CH 60	69° 07' 36.3130" W	43° 54' 49.7209" N	-59	-54	-5
CH 61	69° 08' 20.9496" W	43° 55' 22.8210" N	-48.984	-42	-6.984
CH 62	69° 08' 40.4647" W	43° 54' 39.6938" N	-71.297	-60	-11.297
CH 63	69° 08' 24.3998" W	43° 54' 2.1731" N	-88.488	-89	0.512
CH 64	69° 08' 29.5751" W	43° 53' 25.2994" N	-32.665	-24	-8.665
				Average	-7.096
				Standard Deviation	7.961



**Figure 11: RNC Chart (13303) Comparison Spot Locations**

**Table 7: ENC Chart Spot Comparison (US5ME19M) correlating with figure 12**

<b>H12478 ENC Chart US5ME19M Comparison</b>					
<b>Point</b>	<b>Longitude</b>	<b>Latitude</b>	<b>Surveyed Depth (m)</b>	<b>Charted Depth (m)</b>	<b>Difference (m)</b>
ENC 1	69° 10' 39.3528" W	43° 54' 39.6756" N	-24.574	-23.7	-0.874
ENC 2	69° 10' 15.4452" W	43° 54' 39.3732" N	-25.644	-21.9	-3.744
ENC 3	69° 10' 5.2212" W	43° 54' 14.3352" N	-16.684	-15.5	-1.184
ENC 4	69° 09' 44.1396" W	43° 53' 59.4528" N	-12.965	-10.6	-2.365
ENC 5	69° 09' 32.0616" W	43° 54' 19.9116" N	-15.215	-12.8	-2.415
ENC 6	69° 09' 37.3752" W	43° 54' 51.2532" N	-32.97	-32.9	-0.07
ENC 7	69° 09' 20.4300" W	43° 55' 10.7364" N	-32.619	-32.3	-0.319
ENC 8	69° 09' 1.7064" W	43° 54' 34.3476" N	-28.498	-22.2	-6.298
ENC 9	69° 09' 11.1924" W	43° 54' 21.9204" N	-17.226	-16.4	-0.826
ENC 10	69° 09' 10.1844" W	43° 54' 8.6364" N	-16.79	-17.3	0.51
ENC 11	69° 09' 12.6288" W	43° 53' 46.6116" N	-17.482	-13.7	-3.782
<b>Average</b>					<b>-1.942</b>
<b>Standard Deviation</b>					<b>2.028</b>



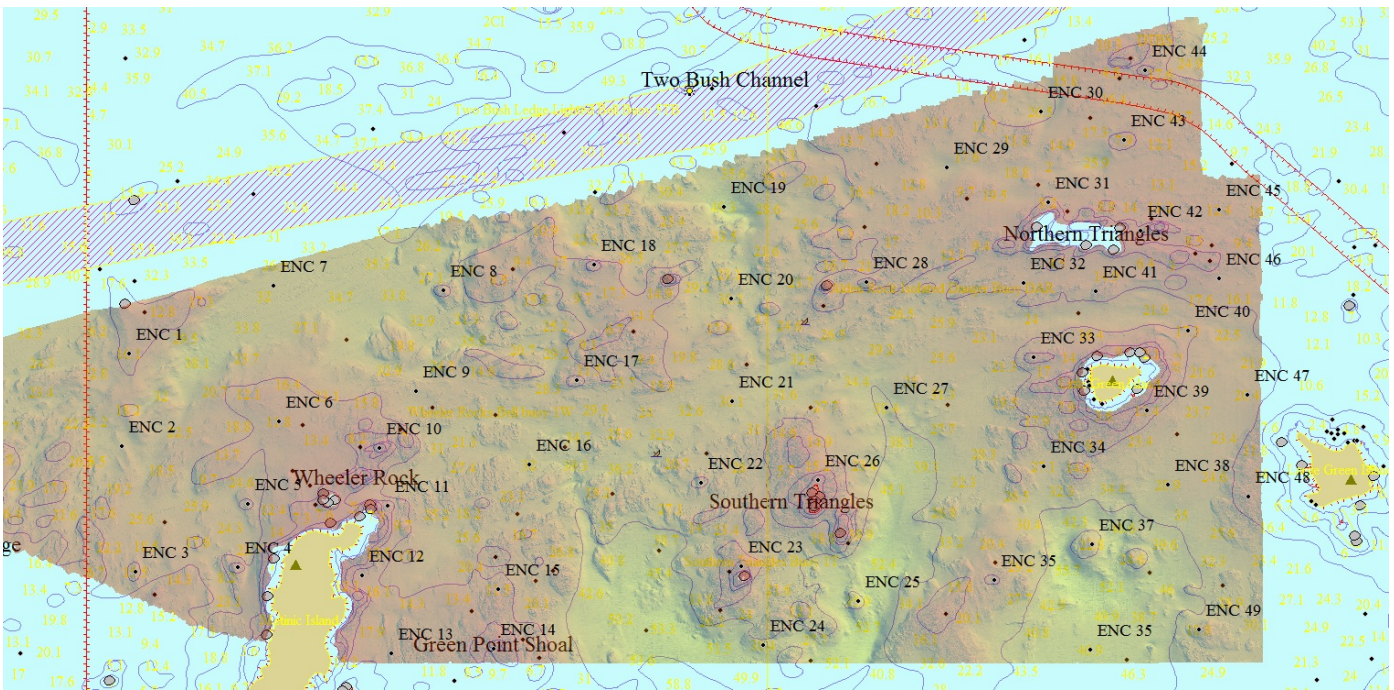
**Figure 12: ENC Chart Comparison (US5ME19M) Spot Locations**



**Table 8: ENC Chart Spot Comparison (US5ME21M) correlating with figure 13**

<b>H12478 ENC Chart US5ME21M Comparison</b>					
<b>Point</b>	<b>Longitude</b>	<b>Latitude</b>	<b>Surveyed Depth (m)</b>	<b>Charted Depth (m)</b>	<b>Difference (m)</b>
ENC 1	69° 08' 40.4336" W	43° 55' 2.3232" N	-17.357	-16.1	-1.257
ENC 2	69° 08' 43.3399" W	43° 54' 24.9300" N	-26.974	-24.6	-2.374
ENC 3	69° 08' 37.8290" W	43° 53' 34.7161" N	-15.959	-15.5	-0.459
ENC 4	69° 07' 56.8754" W	43° 53' 36.5366" N	-13.639	-8.2	-5.439
ENC 5	69° 07' 52.7124" W	43° 54' 1.9397" N	-18.629	-17.6	-1.029
ENC 6	69° 07' 40.2146" W	43° 54' 35.1875" N	-15.305	-11.8	-3.505
ENC 7	69° 07' 42.5428" W	43° 55' 29.5554" N	-33.61	-32	-1.61
ENC 8	69° 06' 33.7428" W	43° 55' 27.5664" N	-16.823	-15.5	-1.323
ENC 9	69° 06' 44.9496" W	43° 54' 47.2680" N	-24.577	-22.8	-1.777
ENC 10	69° 06' 59.5404" W	43° 54' 24.1956" N	-4.539	-2.4	-2.139
ENC 11	69° 06' 56.4984" W	43° 54' 1.0800" N	-11.823	-7.3	-4.523
ENC 12	69° 07' 6.5050" W	43° 53' 33.2848" N	-14.157	-12.1	-2.057
ENC 13	69° 06' 54.8388" W	43° 53' 1.9212" N	-13.007	-11.8	-1.207
ENC 14	69° 06' 13.7654" W	43° 53' 3.9112" N	-8.55	-5.1	-3.45
ENC 15	69° 06' 11.7036" W	43° 53' 27.5712" N	-14.103	-11.5	-2.603
ENC 16	69° 05' 59.1180" W	43° 54' 17.9136" N	-32.61	-32	-0.61
ENC 17	69° 05' 40.0272" W	43° 54' 51.5484" N	-16.965	-15.2	-1.765
ENC 18	69° 05' 33.1800" W	43° 55' 37.8948" N	-13.153	-8.5	-4.653
ENC 19	69° 04' 40.7532" W	43° 56' 1.3128" N	-49.944	-49.3	-0.644
ENC 20	69° 04' 37.7688" W	43° 55' 24.3732" N	-31.36	-30.1	-1.26
ENC 21	69° 04' 37.6752" W	43° 54' 43.2396" N	-29.856	-30.1	0.244
ENC 22	69° 04' 50.1708" W	43° 54' 10.4868" N	-18.952	-17	-1.952
ENC 23	69° 04' 33.7980" W	43° 53' 36.9240" N	-7.734	-5.1	-2.634
ENC 24	69° 04' 24.9636" W	43° 53' 5.1108" N	-37.975	-38.4	0.425
ENC 25	69° 03' 46.8360" W	43° 53' 22.8048" N	-39.392	-35.9	-3.492
ENC 26	69° 04' 2.9028" W	43° 54' 11.5380" N	-5.982	-4.8	-1.182
ENC 27	69° 03' 35.2332" W	43° 54' 40.6044" N	-38.539	-38.4	-0.139
ENC 28	69° 03' 43.3404" W	43° 55' 30.9936" N	-8.269	-6.7	-1.569
ENC 29	69° 03' 11.0808" W	43° 56' 17.1888" N	-25.237	-25.2	-0.037
ENC 30	69° 02' 33.0288" W	43° 56' 39.6672" N	-26.902	-26.5	-0.402
ENC 31	69° 02' 29.9868" W	43° 56' 3.0372" N	-14.347	-8.2	-6.147
ENC 32	69° 02' 39.9696" W	43° 55' 30.4680" N	-18.092	-17.3	-0.792
ENC 33	69° 02' 36.1068" W	43° 55' 0.6708" N	-10.677	-8.5	-2.177
ENC 34	69° 02' 32.1540" W	43° 54' 16.9920" N	-28.15	-27.1	-1.05
ENC 35	69° 02' 51.9900" W	43° 53' 31.3116" N	-18.946	-17.3	-1.646

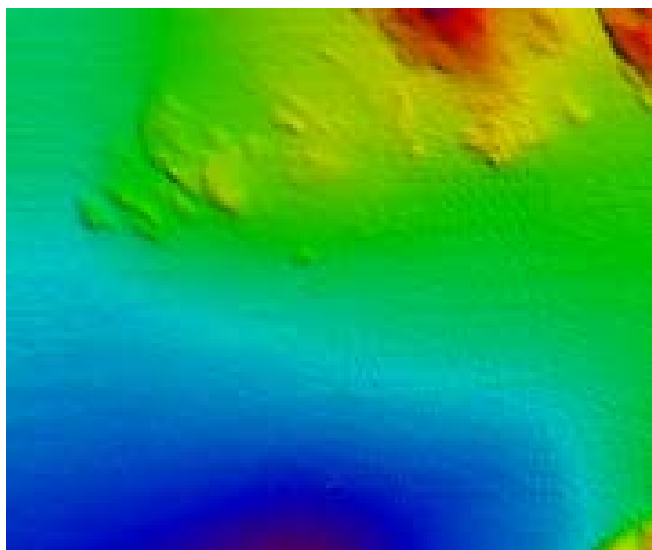
ENC 36	69° 02' 13.0632" W	43° 53' 3.1992" N	-47.6	-46.9	-0.7
ENC 37	69° 02' 12.6096" W	43° 53' 45.8700" N	-24.334	-22.8	-1.534
ENC 38	69° 01' 41.8224" W	43° 54' 9.7344" N	-29.333	-28.9	-0.433
ENC 39	69° 01' 50.2932" W	43° 54' 39.3408" N	-13.2	-13.4	0.2
ENC 40	69° 01' 33.9744" W	43° 55' 11.4168" N	-17.636	-17.3	-0.336
ENC 41	69° 02' 11.0220" W	43° 55' 27.4260" N	-12.549	-11.2	-1.349
ENC 42	69° 01' 52.8096" W	43° 55' 51.5316" N	-9.523	-9.1	-0.423
ENC 43	69° 01' 59.7468" W	43° 56' 27.9672" N	-12.253	-7.9	-4.353
ENC 44	69° 01' 51.1680" W	43° 56' 56.1840" N	-10.186	-8.8	-1.386
ENC 45	69° 01' 21.1188" W	43° 56' 0.2004" N	-13.246	-12.4	-0.846
ENC 46	69° 01' 21.1692" W	43° 55' 32.6280" N	-14.441	-13.7	-0.741
ENC 47	69° 01' 9.7824" W	43° 54' 45.8568" N	-21.352	-20.4	-0.952
ENC 48	69° 01' 9.5628" W	43° 54' 4.7700" N	-12.786	-11.8	-0.986
ENC 49	69° 01' 29.4024" W	43° 53' 11.3028" N	-20.484	-18.8	-1.684
				Average	-1.669
				Standard Deviation	1.473



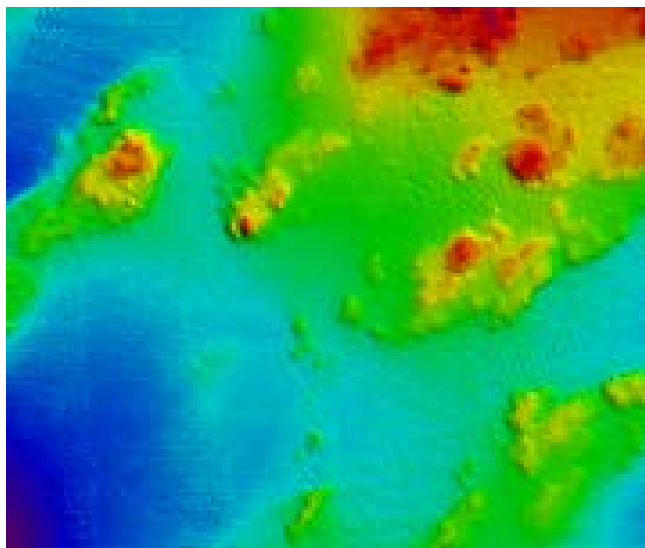
**Figure 13: ENC Chart Comparison (US5ME21M) Spot Locations**

### **D.1.b AWOIS**

Two AWOIS items were investigated using object detection multi-beam standards; AWOIS record #'s 14909 and 14910. Both assigned AWOIS items have been disproved as significant contacts were not found at either AWOIS site. The Hydrographer recommends the removal of both dangerous wreck symbols from the chart.



**Figure 14: AWOIS 14909 1m Surface**



**Figure 15: AWOIS 14910 1m Surface**

### **D.1.c Dangers to Navigation**

One danger to navigation was submitted for H12478. See DtoN report in appendix 2 for more information.<sup>5</sup>

### **D.1.d Bottom Samples**

Bottom samples were collected at 14 locations for H12478. A table of results and images can be found in appendix 2. Refer to the feature file “H12478.000” for the sample locations.<sup>6</sup>

### **D.2.a Additional Results**

H12478 was compared to the prior survey H12256 to the north east. Spot comparisons showed good correlation between the two surveys. This comparison is discussed in more detail in section B.2.c.

### **D.2.b Aids to Navigation**

There were five aids to navigation found within the survey bounds for H12478. All aids to navigation were located and a picture was taken. Their position was recorded in QINSy by pulling the vessel as close as safely possible to the buoy, and recording a position just off the bow of the vessel. The positions were then compared to the charts, and the position recorded in the Light List, Volume 1, Atlantic Coast – 2012. More information and images can be found in appendix II.

3295 - Southern Triangles Buoy 1T – Found and serving intended purpose

4530 - Shoal Isolated Danger Buoy DTBS – Found and serving intended purpose

4535 - Northern Triangles Buoy 2 – Found and serving intended purpose

4560 - Alden Rock Isolated Danger Buoy DAR – Found and serving intended purpose

4735 - Wheeler Rocks Bell Buoy 1W – Found and serving intended purpose

## E. APPROVAL SHEET

REGISTRY NUMBER H12478

This report and the accompanying digital data are respectfully submitted.

Field operations contributing to the accomplishment of survey H12478 were conducted under my direct supervision with frequent personal checks of progress and adequacy. This report and smooth sheet have been closely reviewed and are considered complete and adequate as per the Statement of Work.

WILLIAMSON AND ASSOCIATES, INCORPORATED

**Kyle Fankhauser**

Kyle A. Fankhauser

Hydrographer

Williamson & Associates, Incorporated

22 February 2013

## **Revisions and Corrections performed during office processing and certification**

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<sup>1</sup> Project Instructions specify that the Hydrographic Survey Specifications and Deliverables 2011 be used for this survey.

<sup>2</sup>The data is adequate for charting despite the problems listed in this section.

<sup>3</sup> See endnote 1.

<sup>4</sup> The S-57 file submitted was named H12478.fff.000.

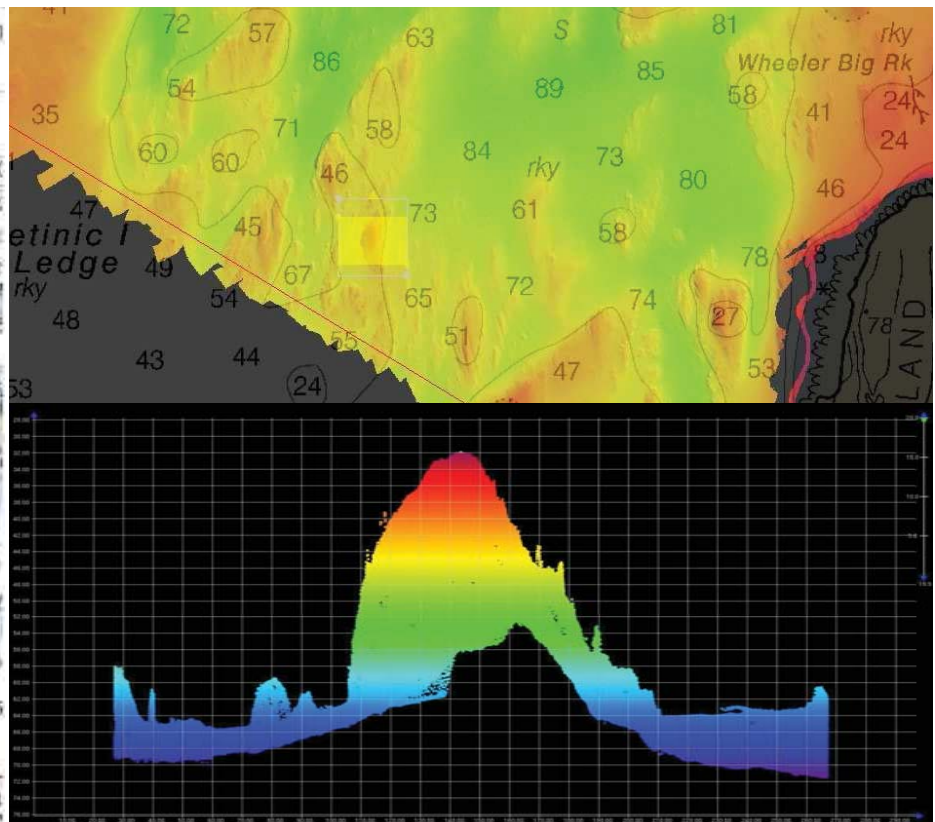
<sup>5</sup> The 32 ft. DTON has been charted. The DTON Report is attached.

<sup>6</sup> Seven bottom samples from the survey were included in the chart update product.



Latitude: 43.8961578 N


Longitude: 69.1480233 W



Uncharted shoal with 31.798ft least depth near charted 46ft sounding

This Chartlet has been corrected through  
Notice to Mariners dated July 26, 2011  
NOT FOR NAVIGATION

Chartlet 1 of 1 Sheet 2

 <p>NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION U.S. DEPARTMENT OF COMMERCE</p>	<p><b>National Oceanic and Atmospheric Administration National Ocean Service</b></p>	<p><b>Project: OPR-A366-KR-12 Survey: H12478 State: Maine Locality: Southern Penobscot Sub-locality: Southern Triangles Survey Scale: 1:20,000</b></p>	<p><b>Sounding Units: Feet Sounding Datum: MLLW Horizontal Datum: NAD83 Projection: UTM 19 N Central Meridian: -69 Scale Factor: 0.9996</b></p>	<p><b>R/V Nooit Volmaakt  August 11th 2012</b></p>
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# H12478 AWOIS Report

**Registry Number:** H12478  
**State:** Maine  
**Locality:** Southern Penobscot Bay  
**Sub-locality:** Southern Triangles  
**Project Number:** OPR-A366-KR-12  
**Survey Dates:** July 5th, 2012 - August 20th, 2012

## Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
13303	13th	06/01/2011	1:40,000 (13303_1)	USCG LNM: 8/28/2012 (10/16/2012) CHS NTM: None (9/28/2012) NGA NTM: 6/30/2001 (10/27/2012)
13302	23rd	12/01/2011	1:80,000 (13302_1)	USCG LNM: 9/25/2012 (11/20/2012) CHS NTM: None (10/26/2012) NGA NTM: 2/4/2006 (11/24/2012)
13260	40th	05/01/2007	1:378,838 (13260_1)	[L]NTM: ?
13009	33rd	05/01/2007	1:500,000 (13009_1)	[L]NTM: ?
13006	34th	05/01/2007	1:675,000 (13006_1)	[L]NTM: ?
13003	49th	04/01/2007	1:1,200,000 (13003_1)	[L]NTM: ?

\* Correction(s) - source: last correction applied (last correction reviewed--"cleared date")

## Features

Feature Type	Survey Depth	Survey Latitude	Survey Longitude
AWOIS	[no data]	[no data]	[no data]
AWOIS	[no data]	[no data]	[no data]

# **1 - Charted Features**

## 1.1) AWOIS #14909 - F/N JODEE MARIE

### No Primary Survey Feature for this AWOIS Item

**Search Position:** 43° 54' 21.6" N, 069° 05' 10.8" W  
**Historical Depth:** [None]  
**Search Radius:** 200  
**Search Technique:** MB  
**Technique Notes:** [None]

#### History Notes:

HISTORY

LN37/86 SUBMERGED WRECK (F/N JODEE MARIE)ADDED PA LAT. 435421.6, LONG.690510.8

### Survey Summary

**Charts Affected:** 13303\_1, 13302\_1, 13260\_1, 13009\_1, 13006\_1, 13003\_1

#### Remarks:

### Hydrographer Recommendations

No evidence of wreck was seen in the full coverage multibeam data. Delete charted wreck PA.

### S-57 Data

**Geo object 1:** Wreck (WRECKS)  
**Attributes:** QUASOU - 2:depth unknown  
SORDAT - 20120820  
SORIND - US,US,graph,H12478

### Office Notes

Concur. Delete charted wreck PA.

### Feature Images

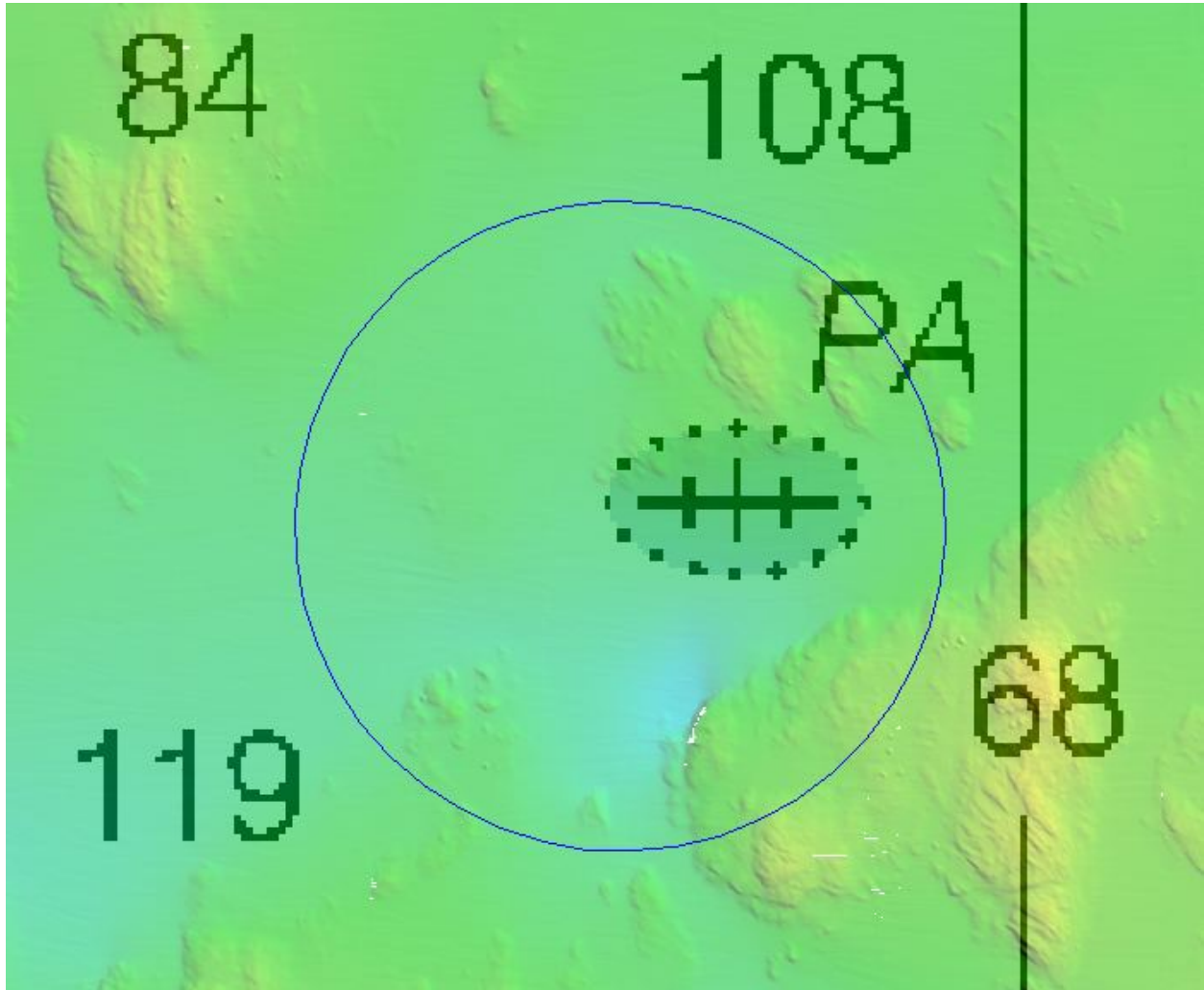


Figure 1.1.1

## 1.2) AWOIS #14910 - UNKNOWN

### No Primary Survey Feature for this AWOIS Item

**Search Position:** 43° 55' 15.0" N, 069° 04' 08.4" W  
**Historical Depth:** [None]  
**Search Radius:** 200  
**Search Technique:** MB  
**Technique Notes:** [None]

#### History Notes:

HISTORY

LN03/94-- SUBMERGED WRECK, ADDED DANGEROUS WRECK SYMBOL AND PA (REP 1994)

### Survey Summary

**Charts Affected:** 13303\_1, 13302\_1, 13260\_1, 13009\_1, 13006\_1, 13003\_1

#### Remarks:

### Hydrographer Recommendations

No evidence of the wreck was seen in the full coverage multibeam data. Delete charted wreck PA.

### S-57 Data

**Geo object 1:** Wreck (WRECKS)  
**Attributes:** QUASOU - 2:depth unknown  
SORDAT - 20120820  
SORIND - US,US,graph,H12478

### Office Notes

Concur. Delete charted wreck PA.

### Feature Images

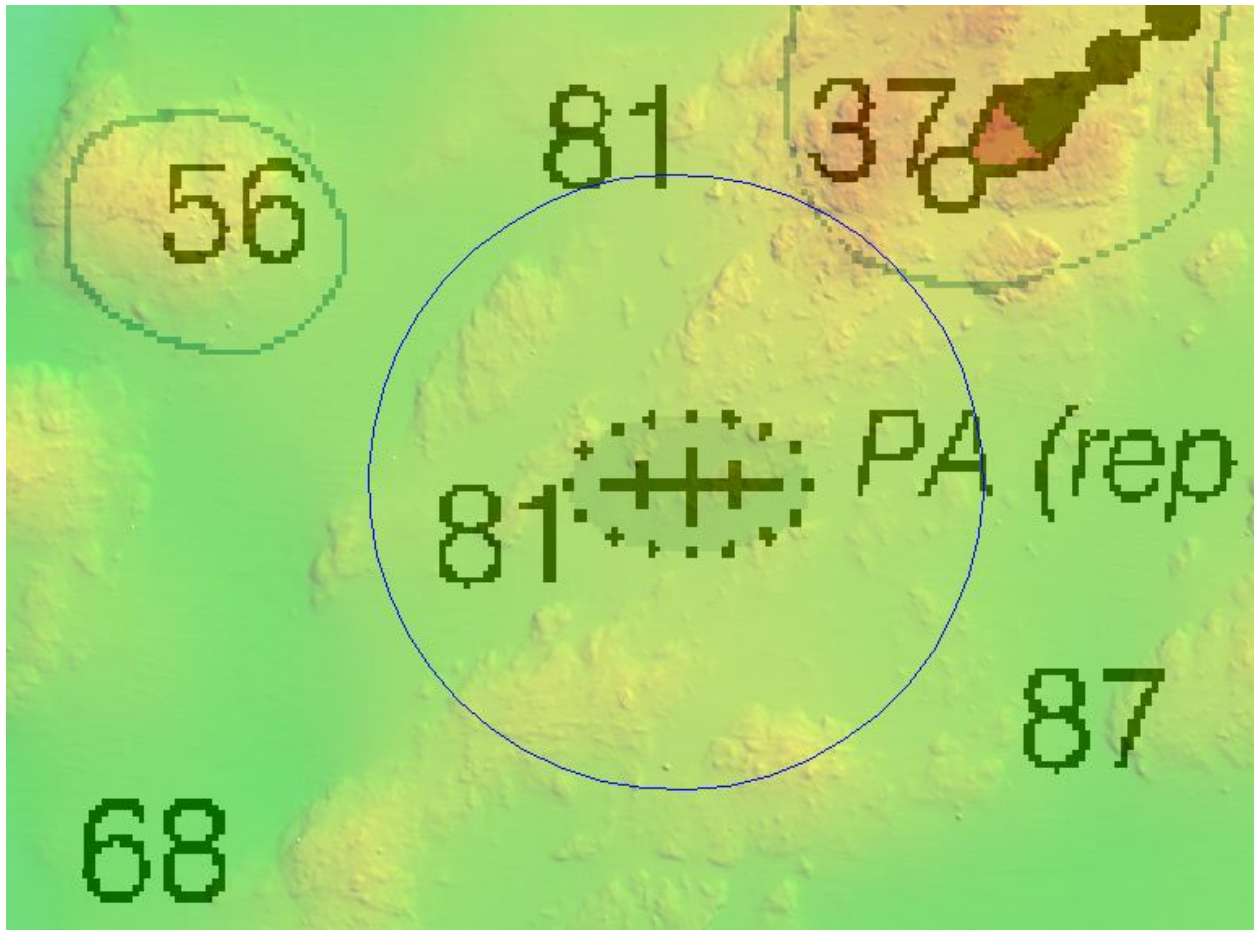


Figure 1.2.1

APPROVAL PAGE

H12478

Data meet or exceed current specifications as certified by the OCS survey acceptance review process. Descriptive Report and survey data except where noted are adequate to supersede prior surveys and nautical charts in the common area.

The following products will be sent to NGDC for archive

- H12478\_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- H12478\_GeoImage.pdf

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

Approved: \_\_\_\_\_

**Pete Holmberg**

Cartographic Team Lead, Pacific Hydrographic Branch

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

Approved: \_\_\_\_\_

**LCDR Benjamin K. Evans, NOAA**

Chief, Pacific Hydrographic Branch