

**F00683**

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: F00683

**LOCALITY**

State: Alaska

General Locality: Seward

Sub-locality: Resurrection Bay, AK

**2016**

CHIEF OF PARTY  
CDR Edward J. Van Den Ameele

LIBRARY & ARCHIVES

Date:

**HYDROGRAPHIC TITLE SHEET**

**F00683**

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

State: **Alaska**

General Locality: **Seward**

Sub-Locality: **Resurrection Bay, AK**

Scale: **1: 80,000**

Dates of Survey: **07/07/2016 to 09/01/2016**

Instructions Dated: **08/29/2016**

Project Number: **S-P936-RA-16**

Field Unit: **NOAA Ship *Rainier***

Chief of Party: **CDR Edward J. Van Den Ameele**

Soundings by: **Multibeam Echo Sounder**

Imagery by: **Multibeam Echo Sounder Backscatter**

Verification by: **Pacific Hydrographic Branch**

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

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

**Remarks:**

*The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Any revisions to the Descriptive Report (DR) generated during office processing are shown in bold red italic text. The processing branch maintains the DR as a field unit product, therefore, all information and recommendations within the body of the DR are considered preliminary unless otherwise noted. The final disposition of surveyed features is represented in the OCS nautical chart update products. All pertinent records for this survey, including the DR, are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via <http://www.ncei.noaa.gov/>.*

## A. Area Surveyed

This hydrographic survey was acquired in accordance with the requirements defined in the Project Instruction S-P936-RA-16 with one exception: the Project Instructions designate an area of 5 square nautical miles to be surveyed. The project area was expanded and now covers 21.34 square nautical miles.

Data were acquired within the following survey limits:

<b>Northwest Limit</b>	<b>Southeast Limit</b>
60° 7' 16.67" N 149° 26' 42.04" W	59° 58' 15.11" N 149° 17' 12.27" W

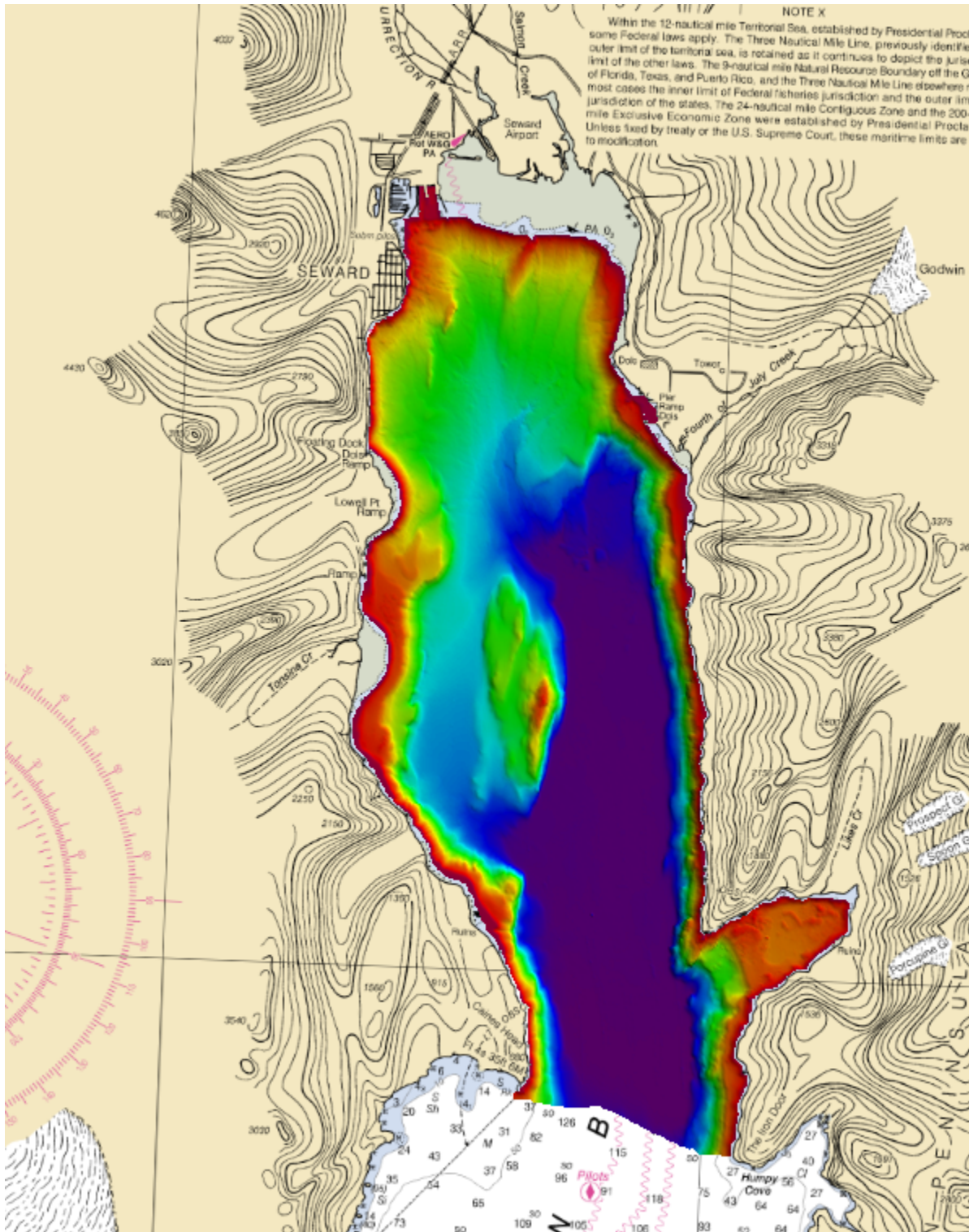


Figure 1: F00683 survey coverage

## **B. Survey Purpose**

This field examination survey is in response to a United States Coast Guard request. The purpose of the survey is to identify and locate old debris and wreckage from the 1964 earthquake. The resulting contemporary survey data is intended to update National Ocean Service nautical charting products. This project, as completed, covers approximately 21 square nautical miles.

## **C. Intended Use of Survey**

The survey is partially adequate to supersede previous data.

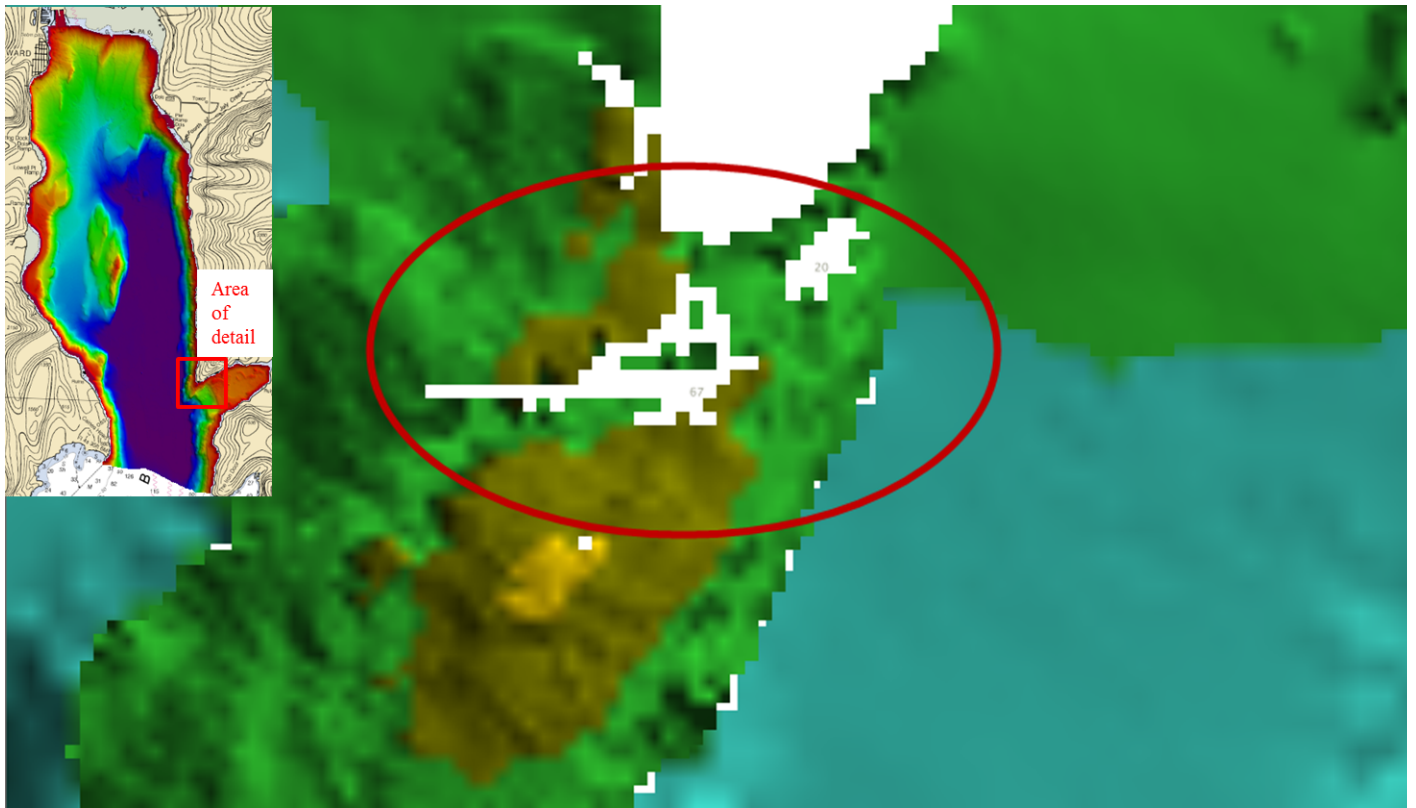
The only section of survey F00683 inadequate to supersede previous data is the MBES data collected at the site of ongoing construction of a new breakwater. See section "H" of this report for more information.

## **D. Data Acquisition and Processing**

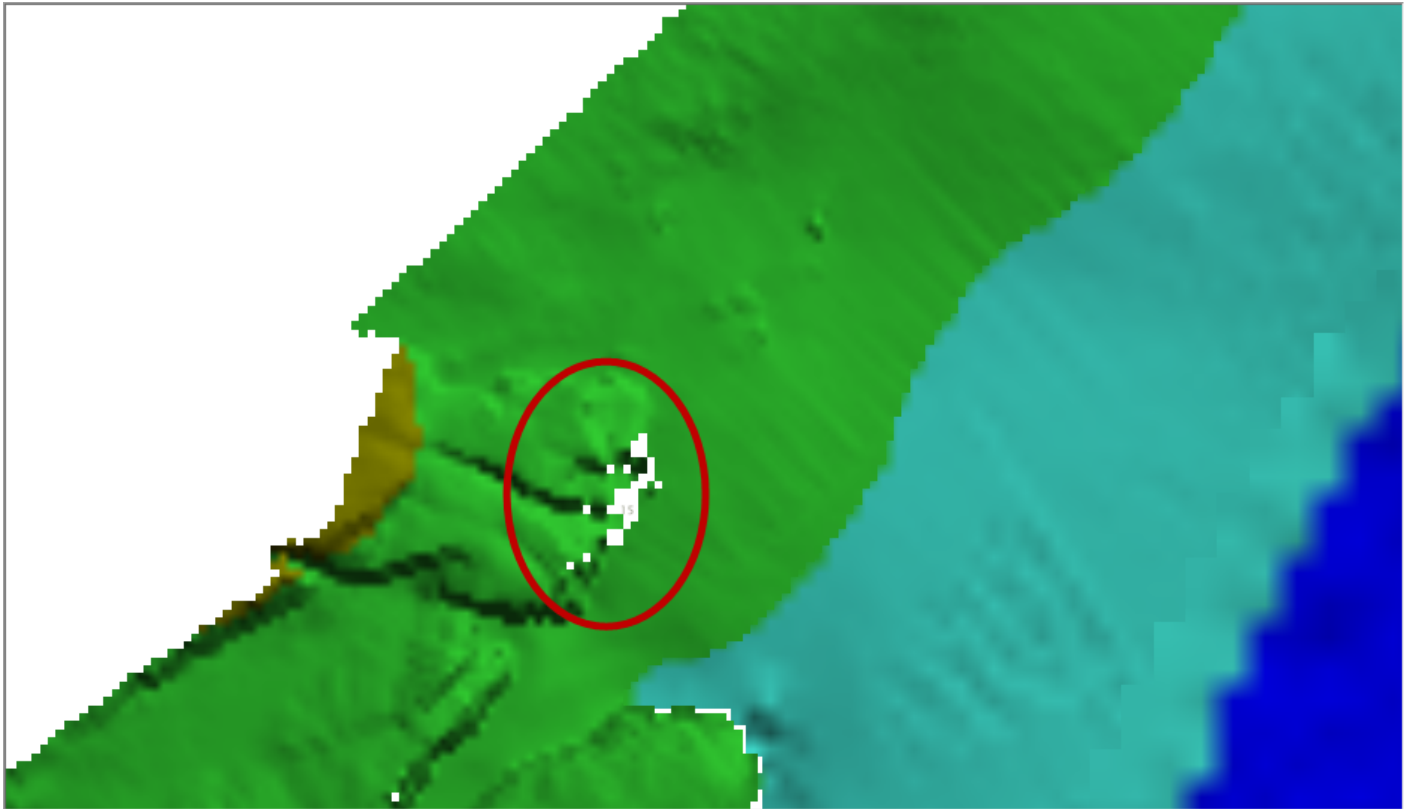
Please reference the Data Acquisition and Processing Report (DAPR) for a complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods.

Three gaps in survey coverage, "holidays," were identified on the survey. Figure 2 shows two holidays which are the result of unsafe conditions inshore of an uncharted rock. Figure 3 shows a holiday which is a small area of reduced coverage due to a steep slope and the resulting acoustic shadow. All three of these holidays are within the 1-meter finalized surface.

Due to time constraints and shifting project boundaries shoreline verification was conducted in the area south of Caines Head, however no MBES data were acquired in this area which is marked in green in Figure 4. Shoreline verification was not conducted for all areas due to time constraints and shifting project limits. An area extending from the southern shore of Thumb Cove, south to the point named "The Iron Door" were not examined for shoreline (Figure 4).



*Figure 2: Two coverage holidays in the 1-meter surface inshore of a rock.*



*Figure 3: A holiday in the 1-meter surface due to an acoustic shadow on a steep slope.*

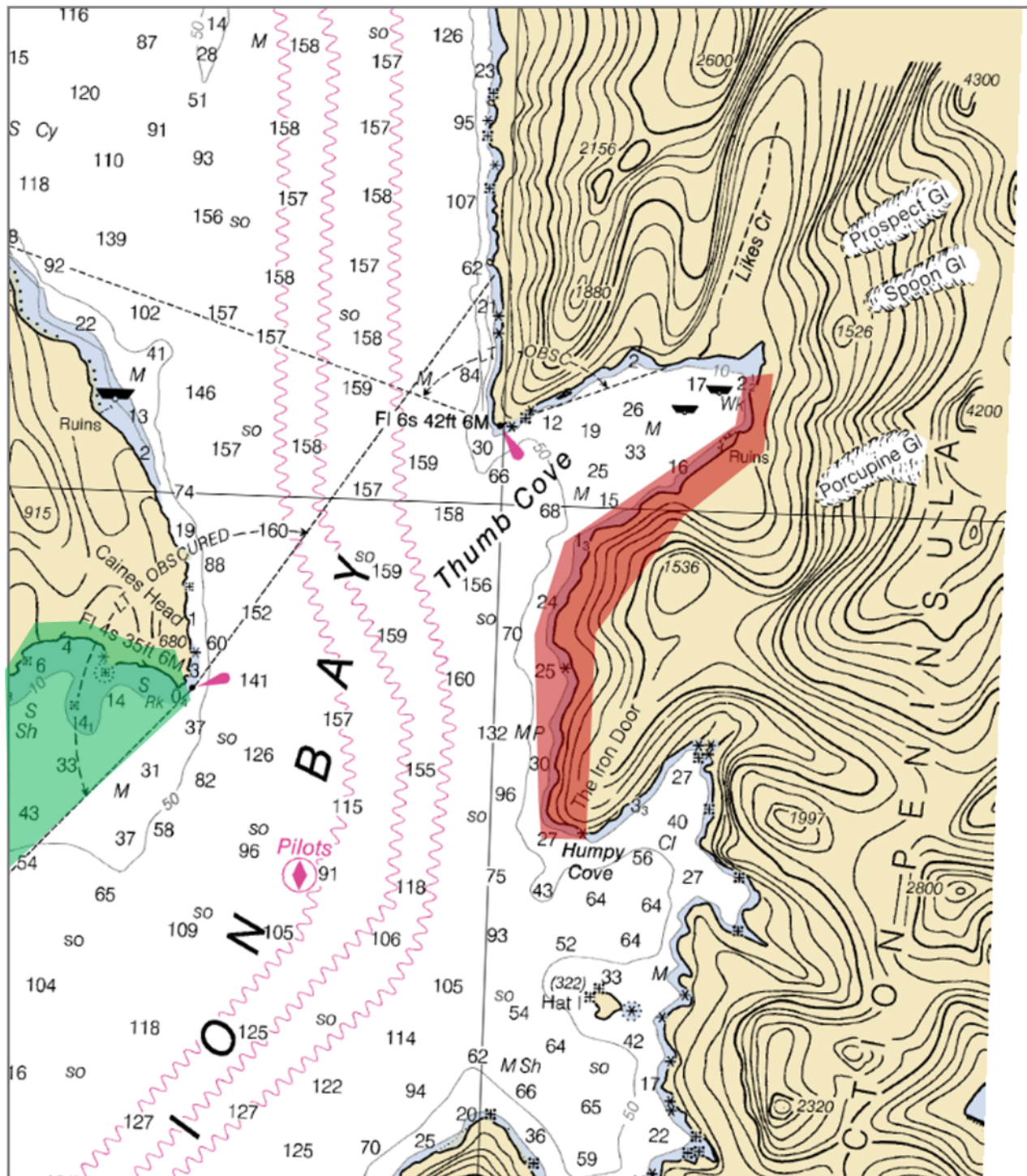


Figure 4: Shoreline verification was not conducted in the area shaded in red. Shoreline verification, without corresponding MBES data, was conducted in the area highlighted in green.

## E. Uncertainty

Uncertainty values were measured and applied in accordance with Section B.4 of the DAPR.



Uncertainty values of submitted finalized grids were calculated in CARIS using the “Greater of the Two” of uncertainty and standard deviation (scaled to 95%). To visualize where uncertainty requirements were met, for each surface a custom “HSSD Compliance” layer was created, based on the difference between the calculated uncertainty of the nodes and the allowable uncertainty defined in the HSSD. To quantify the extent to which requirements were met, the HSSD Compliance layers were queried within CARIS and examined in Excel and Pydro QC Tools. Overall, 97.80% of the nodes of survey F00683 met the uncertainty requirements specified in the HSSD.

After this survey was prepared for submission, it was discovered that the TPU offset values in the survey launch HVF files did not precisely match the measured 2016 transducer and navigation offset values located in the same file. This discrepancy, at worst ~0.15 meters on the X axis, affects only the calculation of TPU values. After these offset values were corrected, experiments with a survey still being processed on the ship showed virtually no change in the number of nodes passing the QCtools uncertainty standards. In light of these results Rainer, in consultation with PHB, made the decision to submit this survey with the TPU calculated as-is rather than re-compute the TPU for minimal gain and further submission delay. Additional information regarding these TPU offset issues can be found included with the supplemental correspondence.

Crosslines acquired for this survey totaled 10.4% of mainscheme acquisition.

Multibeam crosslines were acquired using the Reson 7125 SV2 on survey launch 2802 (RA-5). A 4-meter CUBE surface was created using only mainscheme lines, a second 4-meter CUBE surface was created using only crosslines, and a difference surface was generated in CARIS at a 4-meter resolution. This difference surface was compared to the allowable uncertainty values within the HSSD for the observed depths, and statistics were calculated in Excel. In total, 99.6% of the depth differences between F00683 mainscheme and crossline data are within the requirements of the HSSD (Table 1).

## Uncertainty Standards

Grid source: F00683\_MB\_1m\_MLLW\_FINAL.csar

99.5+% nodes pass (2029328), min=0.14, mode=0.21 mean=0.30 max=2.66

Percentiles: 2.5%=0.17, Q1=0.21, median=0.27, Q3=0.36, 97.5%=0.65

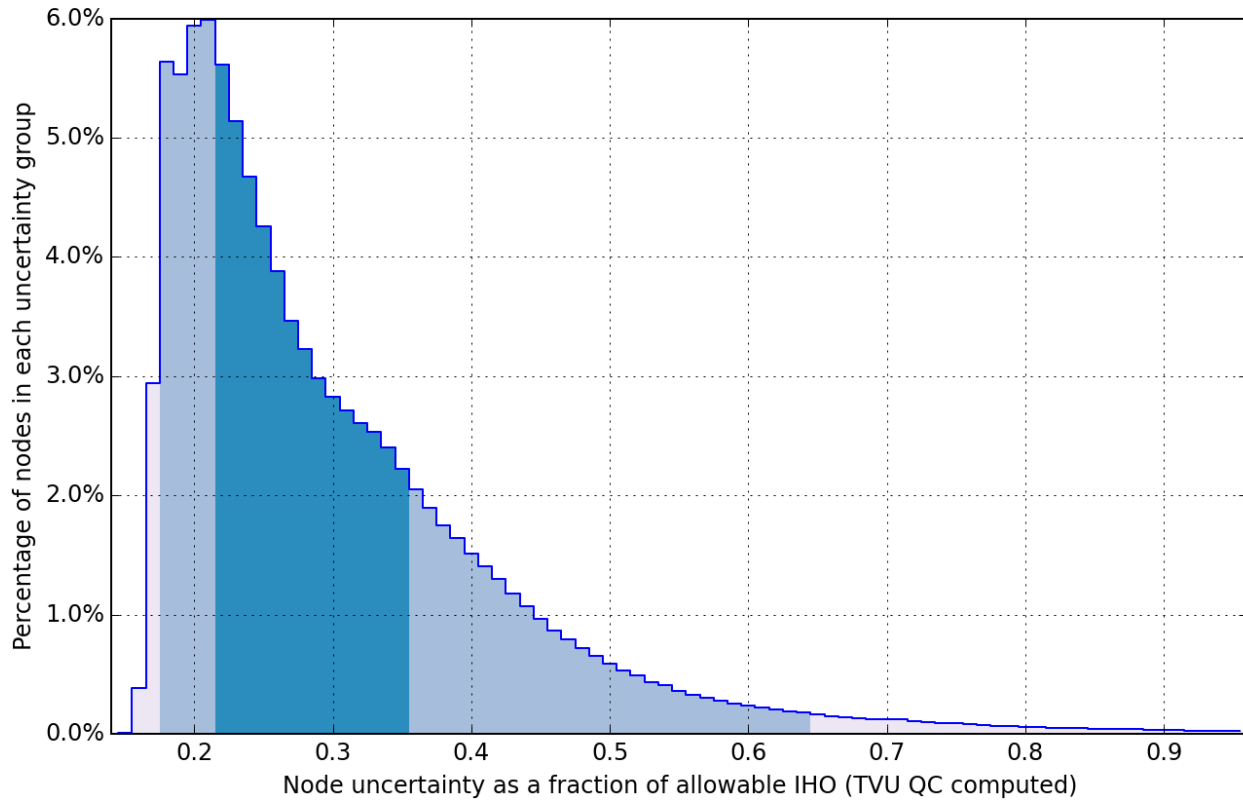


Figure 5: Pydro derived histogram plot showing TVU compliance of F00683 1-meter resolution MBES data.

### Uncertainty Standards

Grid source: F00683\_MB\_2m\_MLLW\_FINAL.csar

99% nodes pass (844915), min=0.19, mode=0.35 mean=0.46 max=2.01

Percentiles: 2.5%=0.24, Q1=0.34, median=0.44, Q3=0.55, 97.5%=0.84

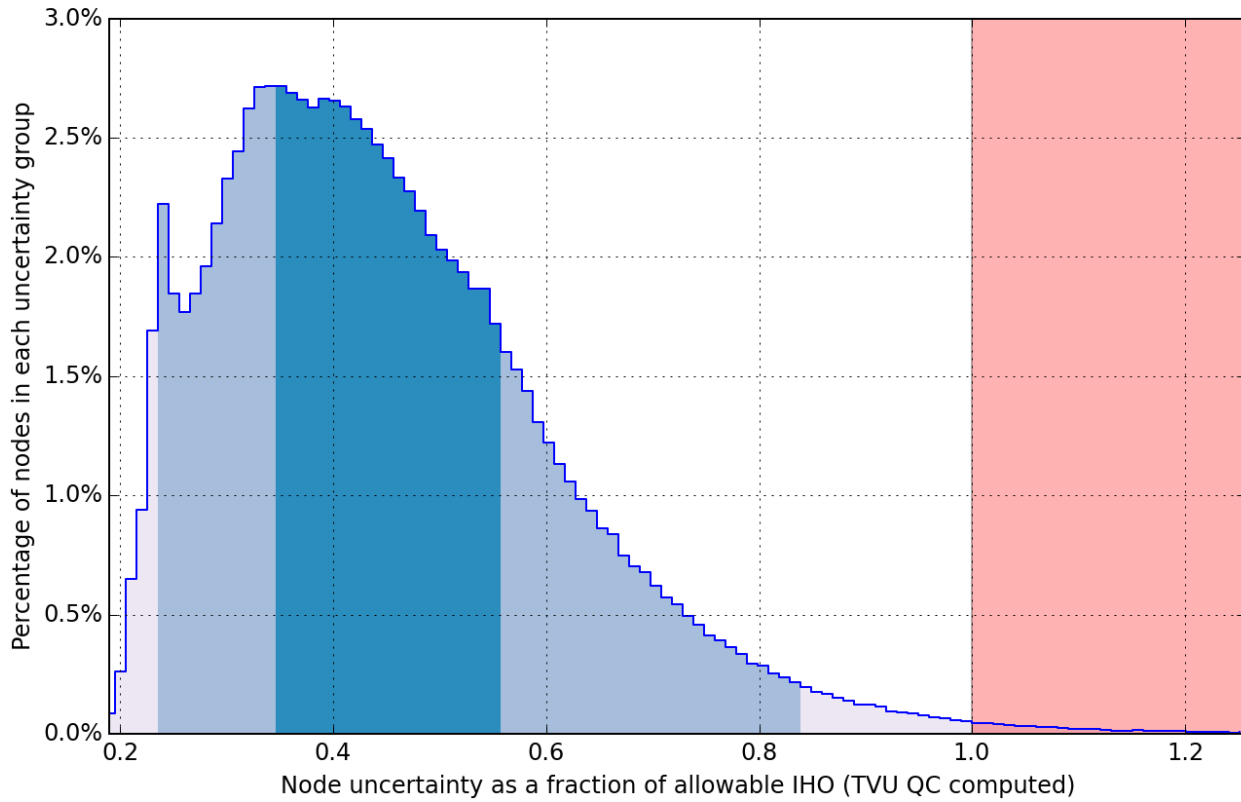


Figure 6: Pydro derived histogram plot showing TVU compliance of F00683 2-meter resolution MBES data.

## Uncertainty Standards

Grid source: F00683\_MB\_4m\_MLLW\_FINAL.csar

97% nodes pass (467720), min=0.24, mode=0.45 mean=0.56 max=2.73

Percentiles: 2.5%=0.28, Q1=0.42, median=0.54, Q3=0.67, 97.5%=1.00

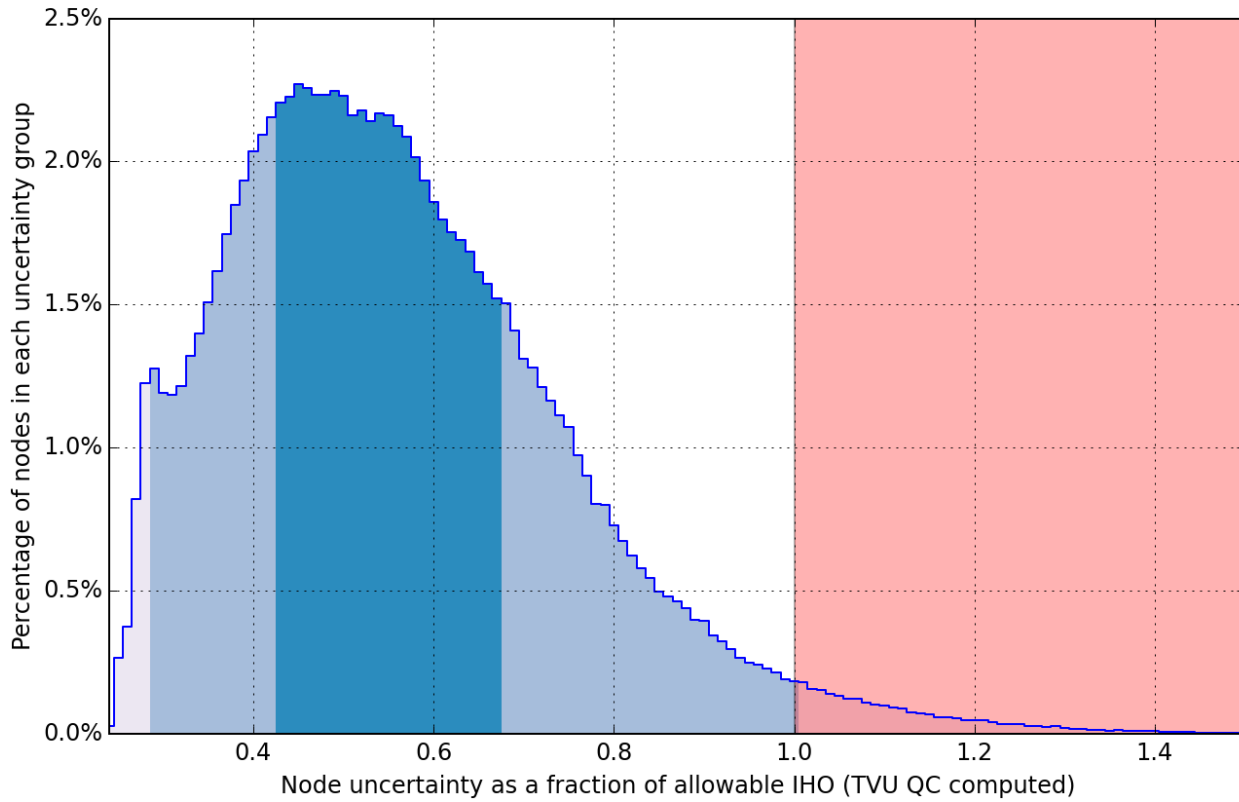


Figure 7: Pydro derived histogram plot showing TVU compliance of F00683 4-meter resolution MBES data.

### Uncertainty Standards

Grid source: F00683\_MB\_8m\_MLLW\_FINAL.csar

99% nodes pass (249166), min=0.16, mode=0.30 mean=0.38 max=1.78

Percentiles: 2.5%=0.17, Q1=0.26, median=0.33, Q3=0.45, 97.5%=0.85

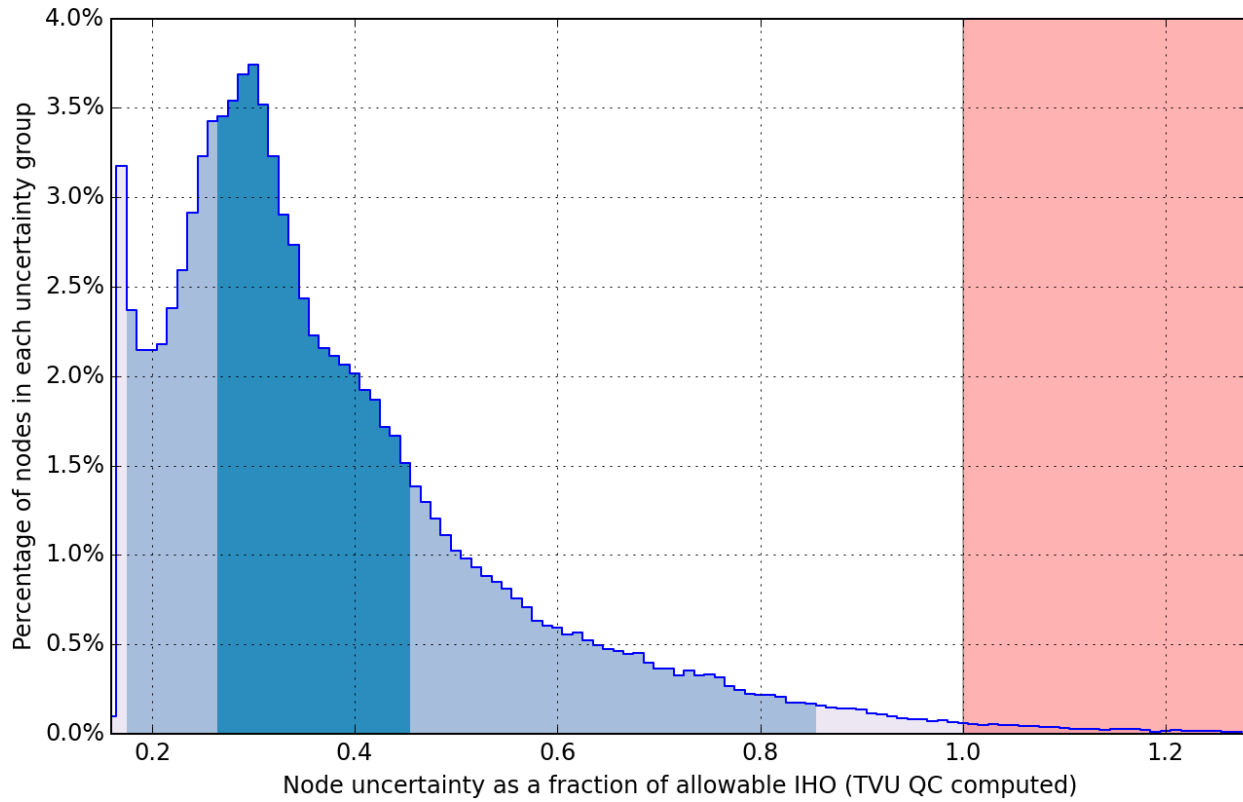


Figure 8: Pydro derived histogram plot showing TVU compliance of F00683 8-meter resolution MBES data.

### Uncertainty Standards

Grid source: F00683\_MB\_16m\_MLLW\_FINAL.csar

100% nodes pass (194083), min=0.17, mode=0.18 mean=0.24 max=0.96

Percentiles: 2.5%=0.17, Q1=0.19, median=0.23, Q3=0.28, 97.5%=0.42

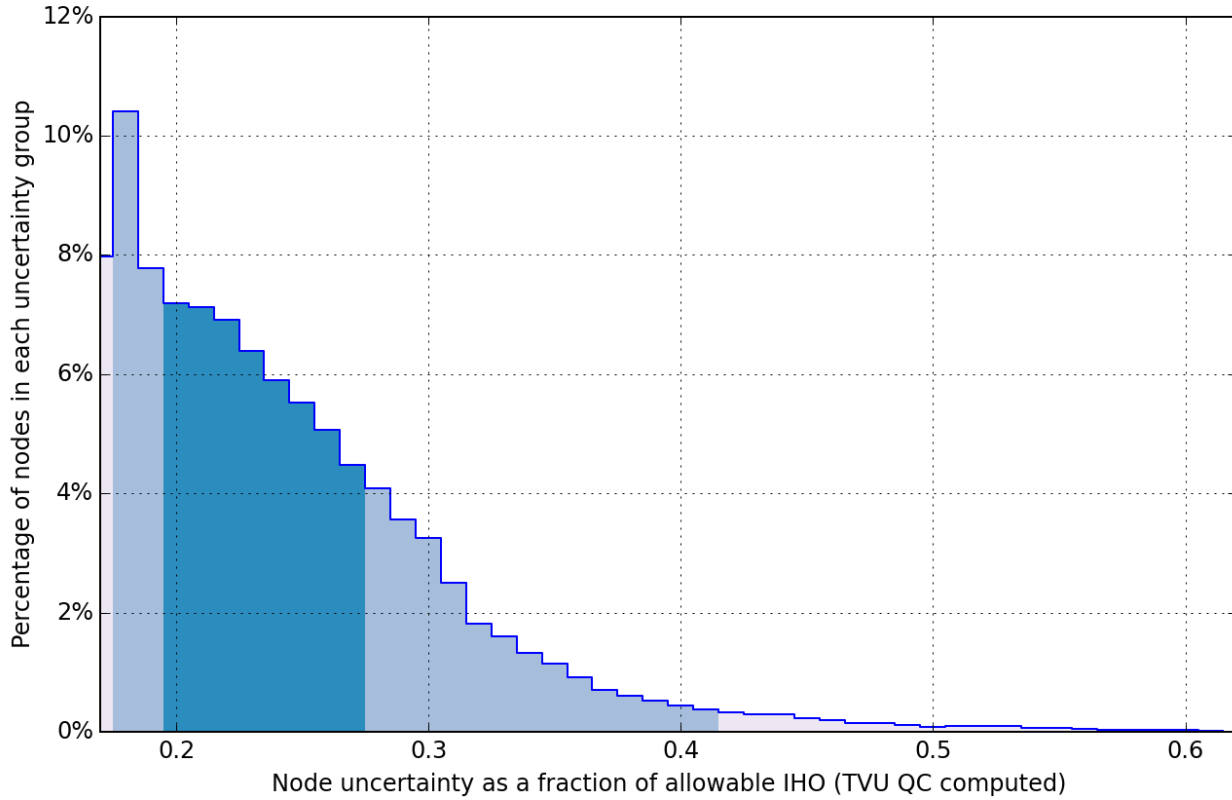


Figure 9: Pydro derived histogram plot showing TVU compliance of F00683 16-meter resolution MBES data.

Depth range	IHO Order	Number of nodes	Nodes satisfying HSSD accuracy	Percent nodes satisfying HSSD accuracy
Less than 100m	Order 1	84,819	80,984	95.5%
Greater than 100m	Order 2	961,236	960,601	99.9%
TOTAL:		1,046,055	1,041,585	99.6%

*Table 1: Results from Crossline Analysis*

## F. Results and Recommendations

The following are the largest scale RNC and ENC, which cover the survey area<sup>1</sup>:

Chart	Scale	Edition	Edition Date	LNM Date	NM Date
16682	1:81847	18	05/2015	07/12/2016	07/16/2016
16682	1:10000	18	05/2015	08/04/2016	08/04/2016

ENC	Scale	Edition	Update Application Date	Issue Date	Preliminary?
US4AK2FM	1:81847	15	05/19/2016	05/19/2016	NO
US5AK2FM	1:10000	1	10/15/2015	10/15/2015	NO

#### Object Investigation:

The USCG requested the investigation of potential man-made objects leaking oil near the north end of Resurrection Bay. Seven objects were assigned for investigation in depths of 55-65 meters. The recommended investigation methods included the use of Side Scan Sonar (SSS), Remotely Operated Vehicles (ROV), or divers. These methods were unable to be utilized by NOAA Ship *Rainier* due to equipment and operational limitations. MBES coverage was acquired over the specified area and did not yield any new or conclusive results. The collection of MBES water column data was attempted and yielded no evidence of leaking oil at the time of collection.

Upon later review of the MBES data and CSAR surfaces, an object was found approximately 0.5 kilometers north of the suggested search area. This feature resides at 25 meters of depth and resembles a rail car of the type used for transporting liquids (Figure 10). The object is 2.25 meters tall from the seafloor at the highest point, and 10 meters in length. A second object was also flagged as a potential rail car tanker although identification proved more difficult due to both the depth of 53 meters and the resultant reduction in sounding density (Figure 11). The object is 4.0 meters tall from the seafloor at the highest point, and 11 meters in length. Both of these features were designated and are included in the F00683 Final Feature File.

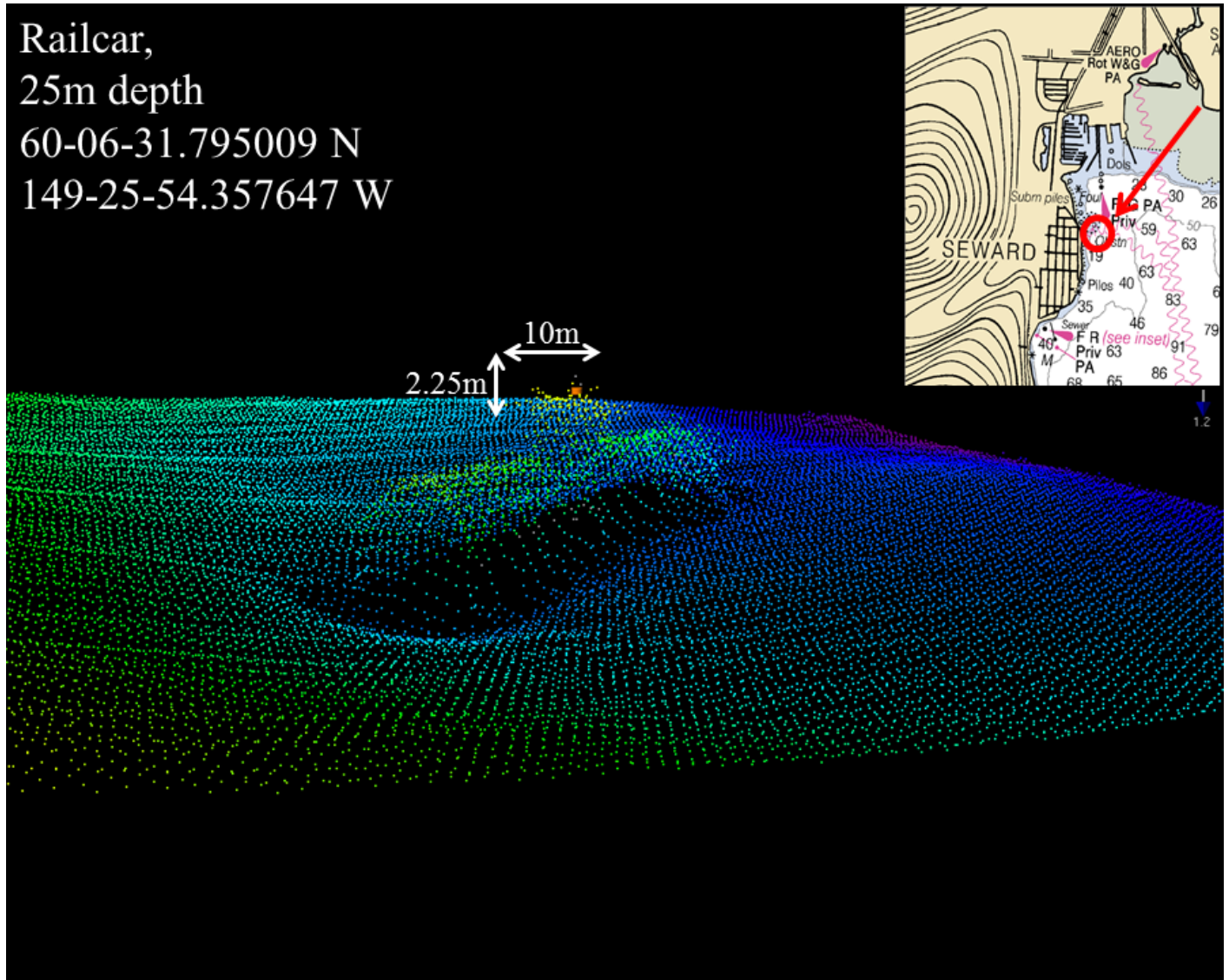
A number of apparently man-made features were identified in the MBES data, primarily in the extreme north-west section of the survey area just offshore of the town of Seward. A large number of these objects appear to be broken blocks of concrete and are well represented in the CSAR surfaces and thus were not designated in the MBES data. Any man-made features that were not well represented in the appropriate CSAR surface were designated and added to the F00683 Final Feature File as obstructions.

#### Chart Comparison<sup>2</sup>:

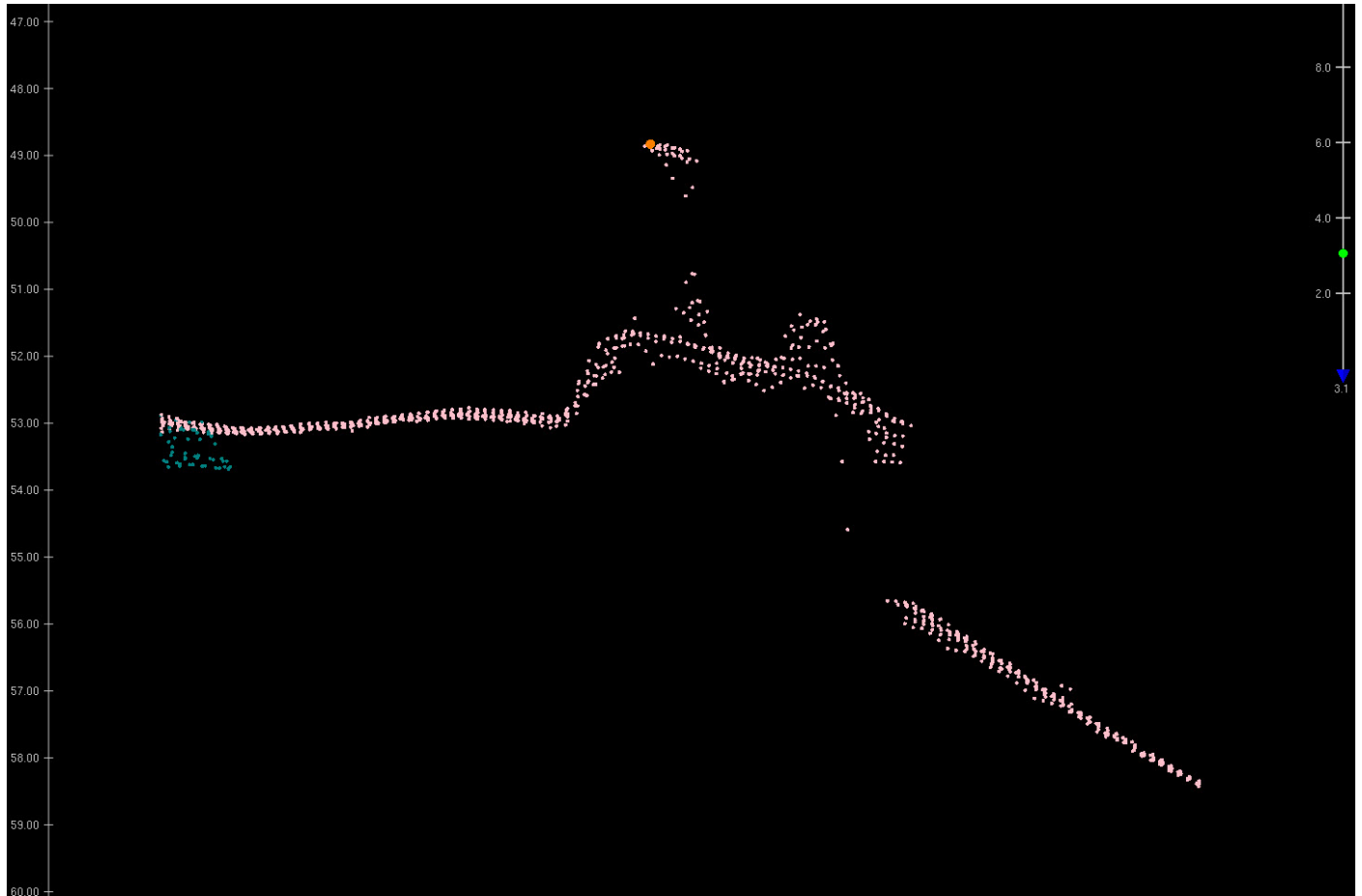
The comparison of soundings from Chart 16682 and F00683 showed a high level of agreement, with the exception of a submerged rock near the north entrance to Thumb Cove (Figure 12). Further details of this area can be found in the F00683 Danger To Navigation Report and the F00683 Final Feature File. Comparison of contours showed no navigationally significant changes (Figure 13).

Electronic Navigation Charts (ENC) US5AK2FM and ENC US4AK2FM coincide with Raster Navigational Chart (RNC) 16682, therefore a comparison between F00683 and the ENC is equivalent to the preceding comparison with Chart 16682.

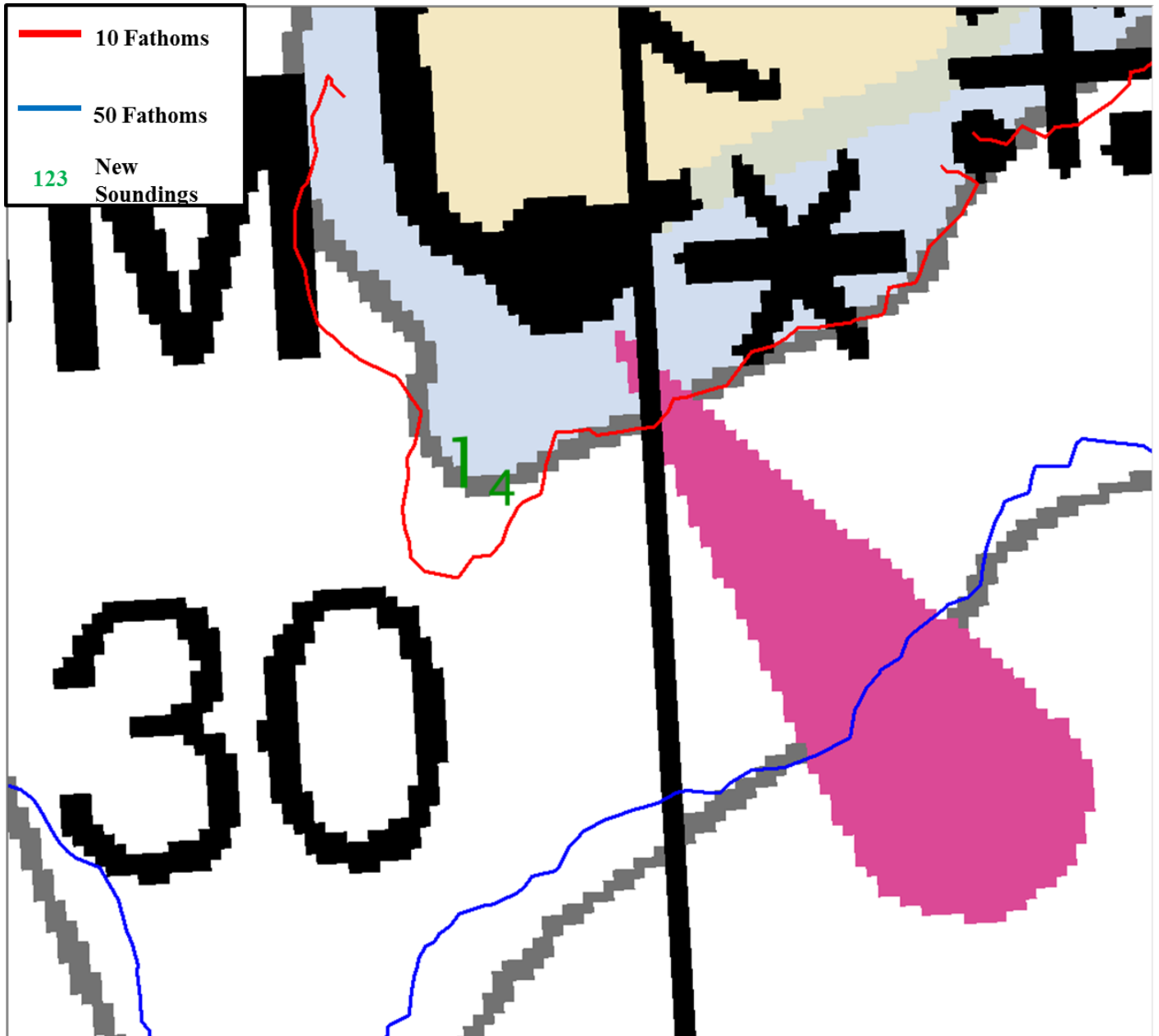




*Figure 10: A potential rail car object found in northern Resurrection Bay. The object is at 25m depth and resembles a rail car of the type used for transporting liquids.*



*Figure 11: A second potential rail car identified in northern Resurrection Bay. Sounding density is reduced on this object due to the 53 meter depth.*



*Figure 12: Shoal sounding near Thumb Cove as detailed in the F00682 DTON Report. A 1-fathom 4-foot sounding is shown inside of the existing 10 fathom contour.*

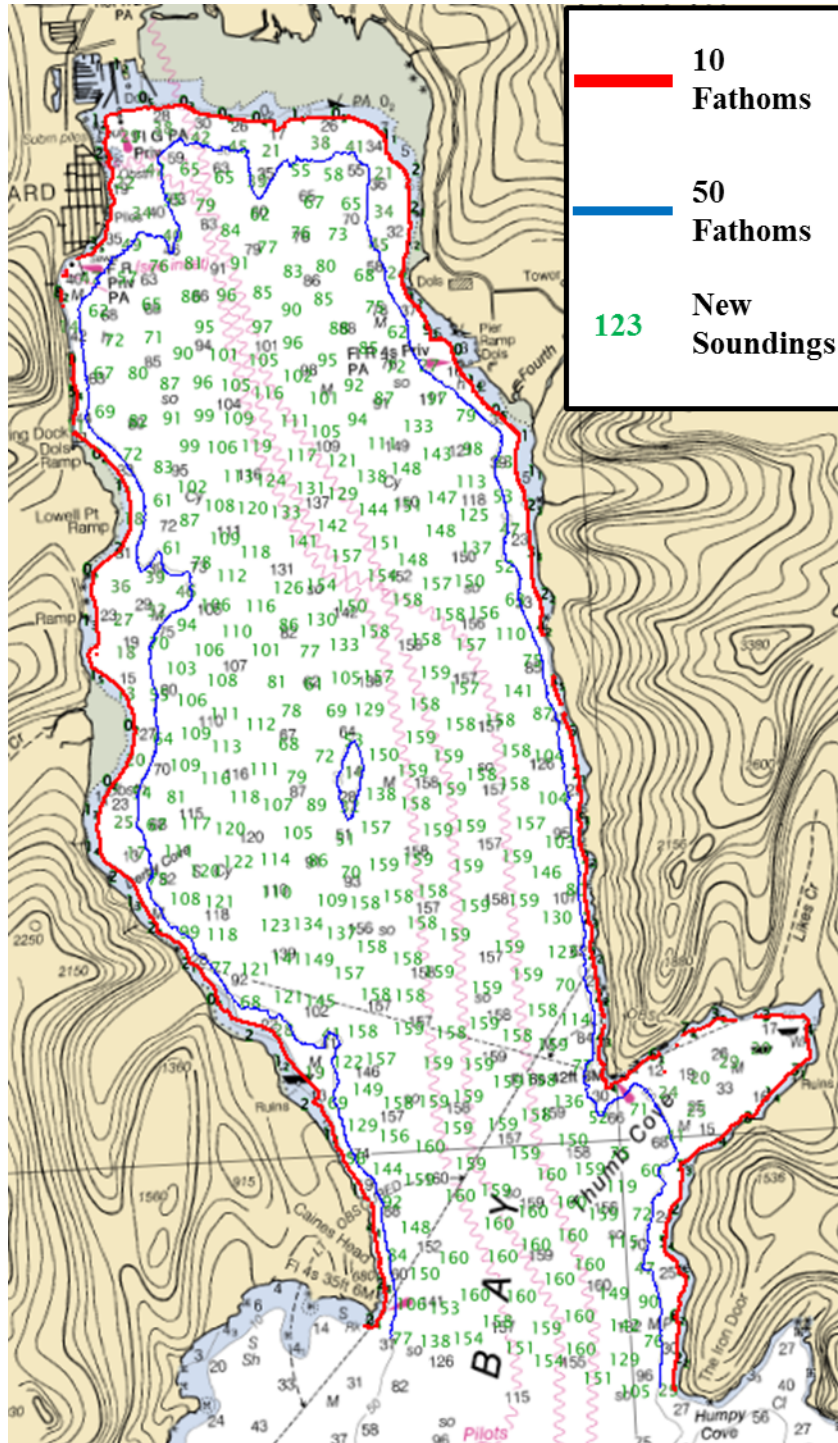


Figure 13: General agreement between F00683 and existing chart contours.

The following surfaces and/or BAGs were submitted to the Processing Branch:

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
F00683_MB_1m_MLLW	CUBE	1 m	0.04 m - 299.24 m	NOAA_1m	MBES Complete Coverage
F00683_MB_2m_MLLW	CUBE	2 m	0.06 m - 298.39 m	NOAA_2m	MBES Complete Coverage
F00683_MB_4m_MLLW	CUBE	4 m	0.63 m - 296.17 m	NOAA_4m	MBES Complete Coverage
F00683_MB_8m_MLLW	CUBE	8 m	0.61 m - 295.21 m	NOAA_8m	MBES Complete Coverage
F00683_MB_16m_MLLW	CUBE	16 m	0.67 m - 294.59 m	NOAA_16m	MBES Complete Coverage
F00683_MB_16m_MLLW_FINAL	CUBE	16 m	144 m - 320 m	NOAA_16m	MBES Complete Coverage
F00683_MB_8m_MLLW_FINAL	CUBE	8 m	72 m - 160 m	NOAA_8m	MBES Complete Coverage
F00683_MB_4m_MLLW_FINAL	CUBE	4 m	36 m - 80 m	NOAA_4m	MBES Complete Coverage
F00683_MB_2m_MLLW_FINAL	CUBE	2 m	18 m - 40 m	NOAA_2m	MBES Complete Coverage
F00683_MB_1m_MLLW_FINAL	CUBE	1 m	0 m - 20 m	NOAA_1m	MBES Complete Coverage

## G. Vertical and Horizontal Control

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

The vertical control method used for this survey was TCARI.

The following National Water Level Observation Network (NWLON) stations served as datum control for this survey:

Station Name	Station ID
Seward, Resurrection Bay, AK	9455090

A request for final approved tides was sent to N/OPS1 on 08/3/2016. The final tide note was received on 09/01/2016.

The horizontal datum for this project is World Geodetic System 1984 (WGS84). The projection used for this survey is UTM Zone 06N.

The following DGPS Stations were used for horizontal control:

DGPS Stations
n/a

The Wide Area Augmentation System (WAAS) was used as real-time horizontal control for this survey. POS PAC "Smart Base" was the PPK method used for horizontal control.

## H. Additional Results

Marine Construction:

During the course of this survey there was ongoing construction of a new breakwater at the entrance to the Vigor Marine Shipyard on the east side of Resurrection Bay. Due to the ongoing nature of the construction, the new breakwater (Figure 14) was unable to be fully addressed by the *Rainier*. Multibeam data were acquired near or over the construction area on multiple days leading to inconsistencies in depth measurements between various boat-days. The approximate limits of the constructed breakwater are included in the submitted F00683 Final Feature File.

Shoreline:

The shoreline data used for this survey was derived from the applicable ENC's and provided to the ship by Processing Branch personnel supporting the ship during survey operations.

ATONs:

There are no ATONs specifically assigned for investigation on this survey. All ATONs located within the survey were investigated to ensure that each ATON serves its intended purpose. Several private ATONS were found to be mis-charted and repositioned. See the F00683 Final Feature File for more information.

**MBP:**

There are no Maritime Boundary Point investigation requirements for this project.

**Bottom Samples:**

There are no Bottom Sample requirements for this project.







*Figure 14: An images of the break water that was under construction during the time survey F00683 was ongoing.*

## I. Approval

As Chief of Party, field operations for this hydrographic survey were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports.

All field sheets, this Survey Summary Report, and all accompanying records and data are approved. All records are forwarded for final review and processing to the Processing Branch.

The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual, Field Procedures Manual, Standing and Letter Instructions, and all HSD Technical Directives. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies noted in the Survey Summary Report.

Approver Name	Title	Date	Signature
Edward J. Van Den Aemele CAPT/NOAA	Commanding Officer NOAA ship Rainier	02/15/2017	 LOMNICKY.JOHN.JOSEPH.1257920 239 I am signing for CAPT Van Den Aemele 2017.02.16 15:24:29 -08'00'
Steven Loy, LT/NOAA	Field Operations Officer, NOAA Ship Rainier	02/15/2017	
James B. Jacobson	Chief Survey Technician NOAA Ship Rainier	02/15/2017	 James Jacobson I have reviewed this document 2017.02.14 15:08:53 -08'00'
Joseph P. Gleason	Hydrographic Assistant Survey Technician, NOAA Ship Rainier	02/15/2017	 James Jacobson I am signing for Joseph P. Gleason 2017.02.14 15:30:03 -08'00'



## **Revision Compiled During Office Processing and Certification**

<sup>1</sup> The ENC US4AK2GM; Scale 1:81,436; Edition 9; Update 1; Dated 02/10/2017 also covers the survey area.

<sup>2</sup> The field unit did not include the chart comparison for ENC US4AKGM. ENC US4AK2FM and US5AK2FM do not cover half of the survey area for F00683. Replicating the methodology used by the field unit, the reviewer compared the ENC to the RNC and found they were identical, therefore there was good agreement with the ENC and the new surveyed data.



**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
National Ocean Service  
Silver Spring, Maryland 20910

**PROVISIONAL TIDE NOTE FOR HYDROGRAPHIC SURVEY**

**DATE :** September 20, 2016

**HYDROGRAPHIC BRANCH:** Pacific

**HYDROGRAPHIC PROJECT:** S-P936-RA-2016

**HYDROGRAPHIC SHEET:** F00683

**LOCALITY:** Resurrection Bay, Seward, AK

**TIME PERIOD:** July 14 - September 01, 2016

**TIDE STATION USED:** 945-5090 Seward, AK

Lat. 60° 7.2'N Long. 149° 25.6' W

**PLANE OF REFERENCE (MEAN LOWER LOW WATER):** 0.000 meters

**HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE:** 2.960 meters

**REMARKS: RECOMMENDED GRID** Please use the TCARI grid "P936RA2016.tc" as the final grid for project S-P936-RA-2016, F00683, during the time period between July 14 - September 01, 2016.

**Refer to attachments for zoning information.**

**Note 1:** Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

**Note 2:** Annual leveling for Seward, AK(9455090) was not completed in FY15. A review of the verified leveling records from July 2004 - July 2014 shows the tide station benchmark network to be stable within an allowable 0.009 m tolerance. This Tide Note may be used as final stability verification for survey S-P936-RA-2016, F00683. CO-OPS will immediately provide a revised Tide Note should subsequent leveling records indicate any benchmark network stability movement beyond the allowable 0.009 m tolerance.

**Note 3:** Due to inaccurate shoreline, survey track lines fall outside of the TCARI grid boundaries in some areas. TCARI will extrapolate the tide corrector to cover these soundings

**HOVIS.GERALD.THOMAS.JR.1365860250**

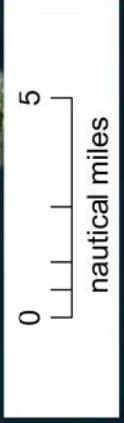
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DN: c=US, o=U.S. Government, ou=DoD, ou=PKI,  
ou=OTHER,  
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CHIEF, PRODUCTS AND SERVICES BRANCH



**Preliminary as Final TCARI Grid for  
S-P936-RA-2016, F00683  
Resurrection Bay, Seward, AK**

**9455090 Seward, AK**



APPROVAL PAGE

F00683

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

The following products will be sent to NCEI for archive

- F00683\_DR.pdf
- Collection of depth varied resolution BAGS
- Processed survey data and records
- F00683\_GeoImage.pdf

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

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

**Peter Holmberg**

Cartographic Team Lead, Pacific Hydrographic Branch

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

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

**Kurt Brown**

Physical Scientist, Pacific Hydrographic Branch