F00820

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

DESCRIPTIVE REPORT

Type of Survey:	Natural Disaster Response
Registry Number:	F00820

LOCALITY

State(s):	Louisiana
General Locality:	Calcasieu River, LA
Sub-locality:	Devils Elbow Channel and GIWW

2020

CHIEF OF PARTY
LT John Kidd

LIBRARY & ARCHIVES

Date:

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

REGISTRY NUMBER:

HYDROGRAPHIC TITLE SHEET

F00820

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(s):	**Louisiana**
General Locality:	**Calcasieu River, LA**
Sub-Locality:	**Devils Elbow Channel and GIWW**
Scale:	**25000**
Dates of Survey:	**10/10/2020 to 10/12/2020**
Instructions Dated:	**10/09/2020**
Project Number:	**S-K941-NRT1-20**
Field Unit:	**NOAA Navigation Response Team - Stennis**
Chief of Party:	**LT John Kidd**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Side Scan Sonar and Multibeam Echosounder backscatter**
Verification by:	**Pacific Hydrographic Branch**
Soundings Acquired in:	**meters at Mean Lower Low Water**

Remarks:

Any revisions to the Descriptive Report (DR) applied during office processing are shown in red italic text. The DR is maintained as a field unit product, therefore all information and recommendations within this report are considered preliminary unless otherwise noted. The final disposition of survey data is represented in the NOAA nautical chart products. All pertinent records for this survey are archived at the National Centers for Environmental Information (NCEI) and can be retrieved via https://www.ncei.noaa.gov/. Products created during office processing were generated in NAD83 UTM 15N, MLLW. All references to other horizontal or vertical datums in this report are applicable to the processed hydrographic data provided by the field unit.

Table of Contents

A. Area Surveyed....1
A.1 Survey Limits....1
A.2 Survey Purpose....3
A.3 Survey Quality....3
A.4 Survey Coverage....7
A.6 Survey Statistics....11
B. Data Acquisition and Processing....12
B.1 Equipment and Vessels....12
B.1.1 Vessels....12
B.1.2 Equipment....14
B.2 Quality Control....14
B.2.1 Crosslines....14
B.2.2 Uncertainty....18
B.2.3 Junctions....21
B.2.4 Sonar QC Checks....23
B.2.5 Equipment Effectiveness....23
B.2.6 Factors Affecting Soundings....24
B.2.7 Sound Speed Methods....30
B.2.8 Coverage Equipment and Methods....32
B.2.9 Density....32
B.3 Echo Sounding Corrections....33
B.3.1 Corrections to Echo Soundings....33
B.3.2 Calibrations....33
B.4 Backscatter....34
B.5 Data Processing....34
B.5.1 Primary Data Processing Software....34
B.5.2 Surfaces....34
C. Vertical and Horizontal Control....35
C.1 Vertical Control....35
C.2 Horizontal Control....35
D. Results and Recommendations....36
D.1 Chart Comparison....36
D.1.1 Electronic Navigational Charts....40
D.1.2 Shoal and Hazardous Features....40
D.1.3 Charted Features....40
D.1.4 Uncharted Features....40
D.1.5 Channels....40
D.2 Additional Results....40
D.2.1 Aids to Navigation....40
D.2.2 Maritime Boundary Points....42
D.2.3 Bottom Samples....42
D.2.4 Overhead Features....42
D.2.5 Submarine Features....42

D.2.6 Platforms..... 42
D.2.7 Ferry Routes and Terminals..... 42
D.2.8 Abnormal Seafloor or Environmental Conditions..... 42
D.2.9 Construction and Dredging..... 42
D.2.10 New Survey Recommendations..... 43
D.2.11 ENC Scale Recommendations..... 43
E. Approval Sheet..... 44
F. Table of Acronyms..... 45

List of Tables

Table 1: Survey Limits..... 1
Table 2: Survey Coverage..... 8
Table 3: Hydrographic Survey Statistics..... 11
Table 4: Dates of Hydrography..... 12
Table 5: Vessels Used..... 12
Table 6: Major Systems Used..... 14
Table 7: Survey Specific Tide TPU Values..... 18
Table 8: Survey Specific Sound Speed TPU Values..... 19
Table 9: Junctioning Surveys..... 21
Table 10: Submitted Surfaces..... 34
Table 11: ERS method and SEP file..... 35
Table 12: CORS Base Stations..... 36
Table 13: Largest Scale ENCs..... 40

List of Figures

Figure 1: Survey Outline..... 2
Figure 2: Survey location..... 3
Figure 3: CUBE surface uncertainty layer for GIWW and Devils Elbow..... 5
Figure 4: CUBE surface uncertainty layer: area of higher uncertainty associated with the mud layer and sediment plume in the Calcasieu Ship Channel..... 6
Figure 5: CUBE surface uncertainty layer for Cameron Bend..... 7
Figure 6: Devils Elbow and GIWW depth shown in meters..... 8
Figure 7: Calcasieu Channel depth shown in meters..... 9
Figure 8: Cameron Bend depth shown in meters..... 10
Figure 9: NRT S3005 and S3009 in SW Louisiana..... 13
Figure 10: Distribution of the differences, between the crossline multibeam CUBE depth surface and the main scheme multibeam CUBE depth surface, about the mean..... 15
Figure 11: Crossline difference surface results for Devils Elbow and GIWW..... 16
Figure 12: Crosslines difference surface results for Calcasieu Channel..... 17
Figure 13: Crosslines difference surface results for Cameron Bend..... 18
Figure 14: Measured tide uncertainty added to each affected multibeam line..... 19

Figure 15: CATZOC uncertainty standards for surface F00820_MB_50cm_MLLW_2of2_Final surface..... 20
Figure 16: CATZOC uncertainty standards for surface F00820_MB_50cm_MLLW_1of2_Final surface..... 21
Figure 17: Comparison overview difference surface.....22
Figure 18: Distribution of the differences, between the F00814 and F00820_MB_50cm_MLLW_1of2_Final multibeam CUBE depth surfaces, about the mean.....23
Figure 19: Surface depicting the multiple layers.....25
Figure 20: Subset of area depicting the two density layers.....26
Figure 21: Dense area of false fliers. Orange is TVU set to 100, and black is TVU set to 200..... 27
Figure 22: Subset of channel wall..... 28
Figure 23: Subset of barge cap that was flagged for multiple fliers..... 29
Figure 24: Sound speed cast locations.....31
Figure 25: Pydro derived plot showing percent of nodes in compliance with HSSD density standards for F00820_MB_50cm_MLLW_1of2_Final. Percentages of nodes less than 5 soundings per node fall in the red shaded region of the plot and together must be less than 5% of all nodes in order to “pass”..... 32
Figure 26: Pydro derived plot showing percent of nodes in compliance with HSSD density standards for F00820_MB_50cm_MLLW_2of2_Final. Percentages of nodes less than 5 soundings per node fall in the red shaded region of the plot and together must be less than 5% of all nodes in order to “pass”..... 33
Figure 27: CA Tools results for the GIWW, and Devils Elbow.....37
Figure 28: CA Tools results for the Calcasieu Ship Channel..... 38
Figure 29: CA Tools results for the Cameron Bend..... 39
Figure 30: Calcasieu Channel D Range Front Light.....41
Figure 31: Evidence of dredging in Devils Elbow.....43

Descriptive Report to Accompany Survey F00820

Project: S-K941-NRT1-20

Locality: Calcasieu River, LA

Sublocality: Devils Elbow Channel and GIWW

Scale: 1:25000

October 2020 - October 2020

NOAA Navigation Response Team - Stennis

Chief of Party: LT John Kidd

A. Area Surveyed

This hydrographic survey was designed and acquired in accordance with the requirements defined in the Project Instructions S-K941-NRT1-20. The F00820 survey area includes the GIWW from Calcasieu Ship Channel to LA 27 Bridge, Devils Elbow Channel, a portion of the Calcasieu Ship Channel, and Cameron Bend

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
30° 6' 52.89" N 93° 22' 2.95" W	29° 45' 54.29" N 93° 16' 24.57" W

Table 1: Survey Limits

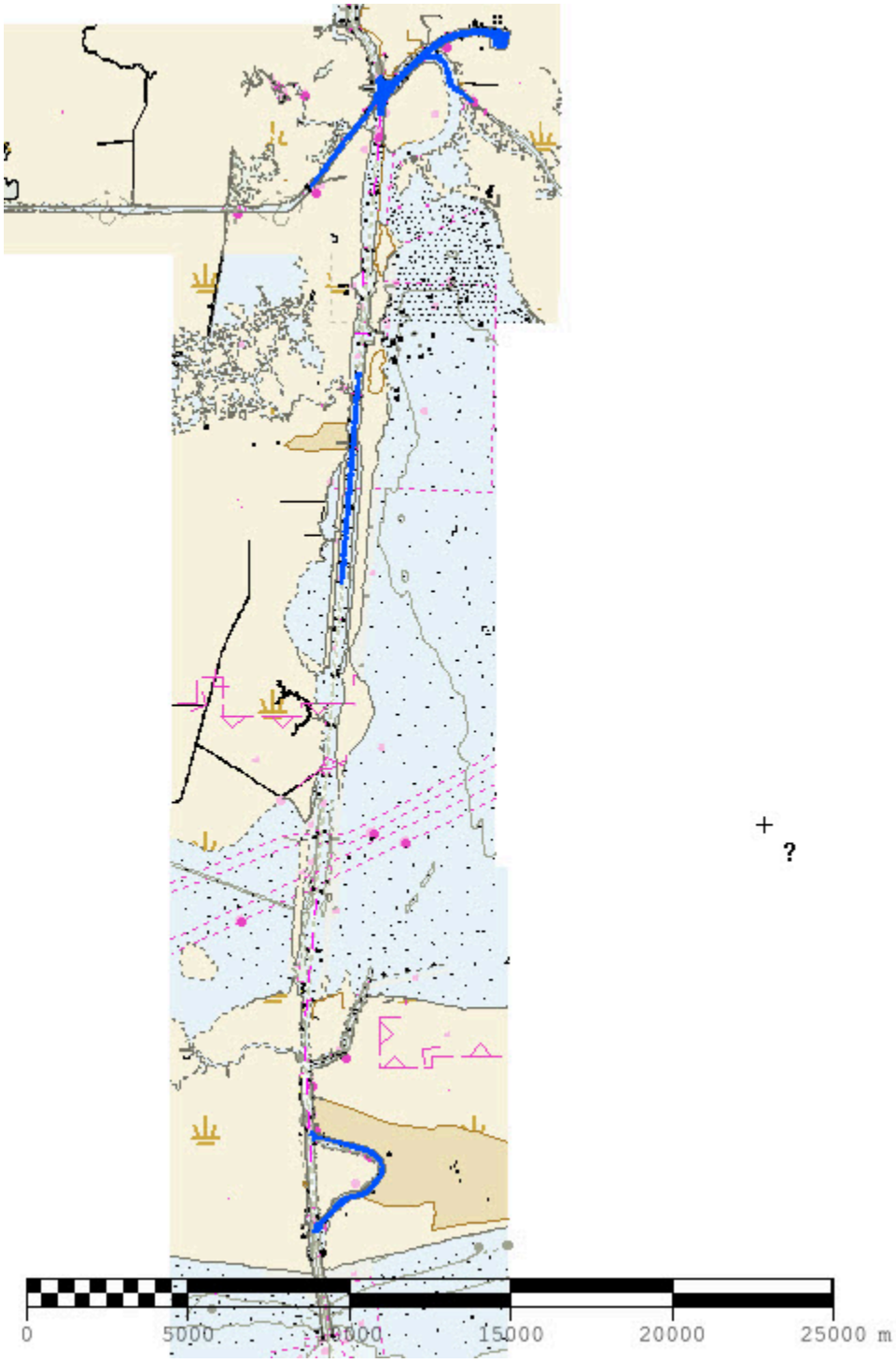


Figure 1: Survey Outline

The Calcasieu Ship Channel is the main marine transportation corridor and infrastructure for sustained economic development in Southwest Louisiana. The importance of the Channel and terminal facilities to the overall economic impact for Southwest Louisiana is evidenced by: 37,159 jobs, $5.7 billion of GPD, and $118.8 million generated in local sales and property taxes.

The survey limits and methods (i.e., sensors used) were ultimately defined by the Team Lead in consult with the NRB Chief and NOAA Navigation Manager. Data was acquired to the survey limits in accordance with the requirements of the Project Instructions and the National Ocean Service (NOS) Hydrographic Surveys Specifications and Deliverables (HSSD).

A.2 Survey Purpose

The purpose of this survey is in response to a USCG request for an emergency hydrographic survey in GIWW form Calcasieu Ship Channel to LA 27 Bridge Devils Elbow Channel, and Cameron Bend due to the effects of Hurricane Delta. Survey data from this project is intended to supersede all prior survey data in the common area.

Figure 2: Survey location

A.3 Survey Quality

The survey is partially adequate to supersede previous data.

All areas within the GIWW, Devils Elbow and Cameron Bend met (option B) Object Detection and were within CATZOC A1 TPU limits. The extents that met this criteria are represented by the multibeam CUBE surface F00820_MB_50cm_MLLW_1of2_Final.csar. However, a significant sediment plume and second density layer associated with the drainage of Hurricane Delta's storm surge resulted in multiple bottom returns. The separation of these layers resulted in significant vertical uncertainty in this area alone and only 67% of nodes meet CATZOC A1 and 100% met CATZOC A2/B TPU standards. The extents of this area are represented by the multibeam CUBE surface F00820_MB_50cm_MLLW_2of2_Final.csar. Additional compliance statistics can be found in the Uncertainty section (B.2.2) of this report.

In some places, holidays do exist within the survey coverage. These holidays do not affect the overall quality of the data or present issues of inadequacy. The holidays were not filled due to time constraints on the vessel of opportunity, or were the result in the processing of rejected soundings. Likewise, some outer swath bathymetry display data gaps, but these do not exist on the entire cross-track, over SSS water column gaps, nor do they affect the specification requirements for density.

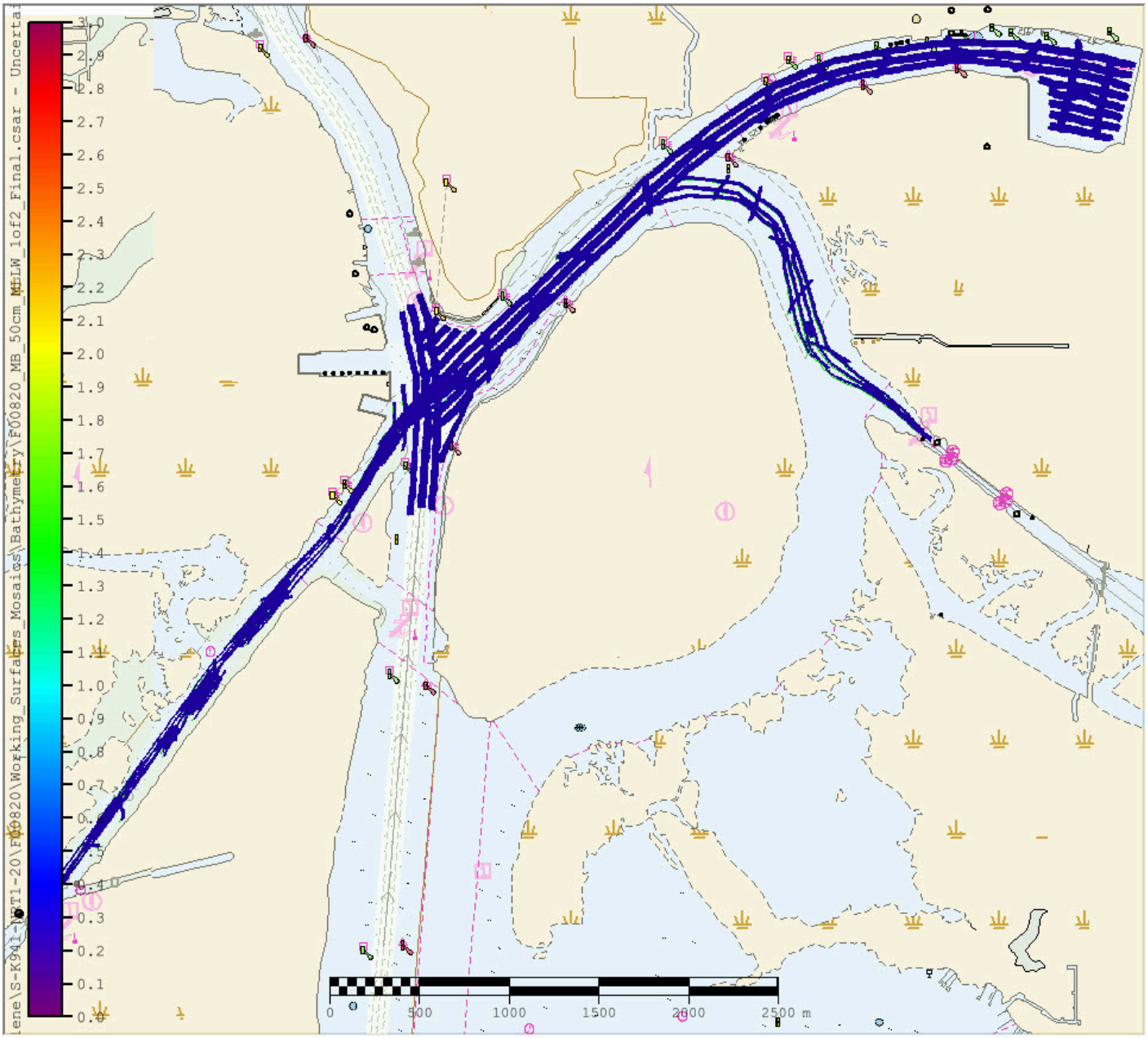


Figure 3: CUBE surface uncertainty layer for GIWW and Devils Elbow.

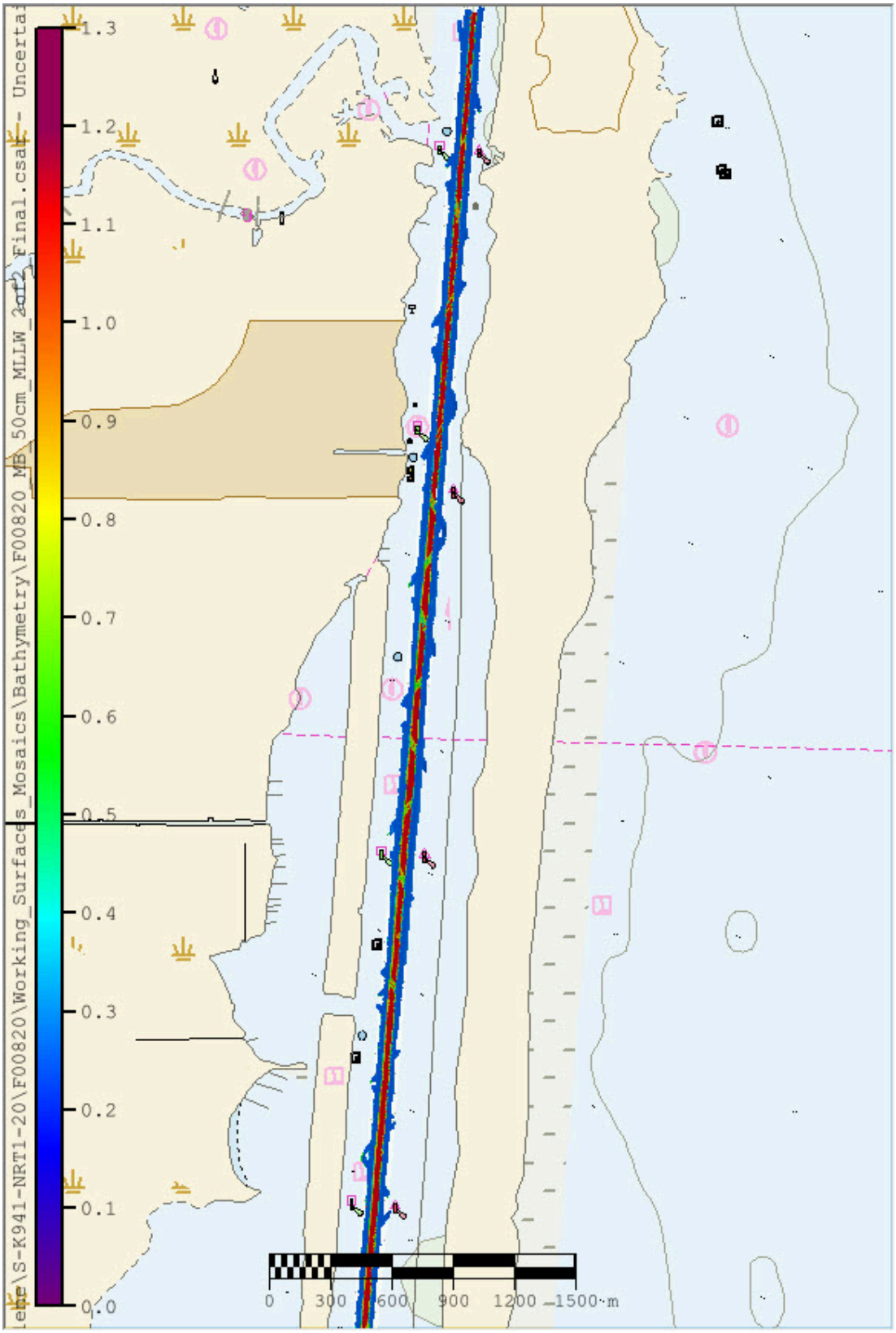


Figure 4: CUBE surface uncertainty layer: area of higher uncertainty associated with the mud layer and sediment plume in the Calcasieu Ship Channel.

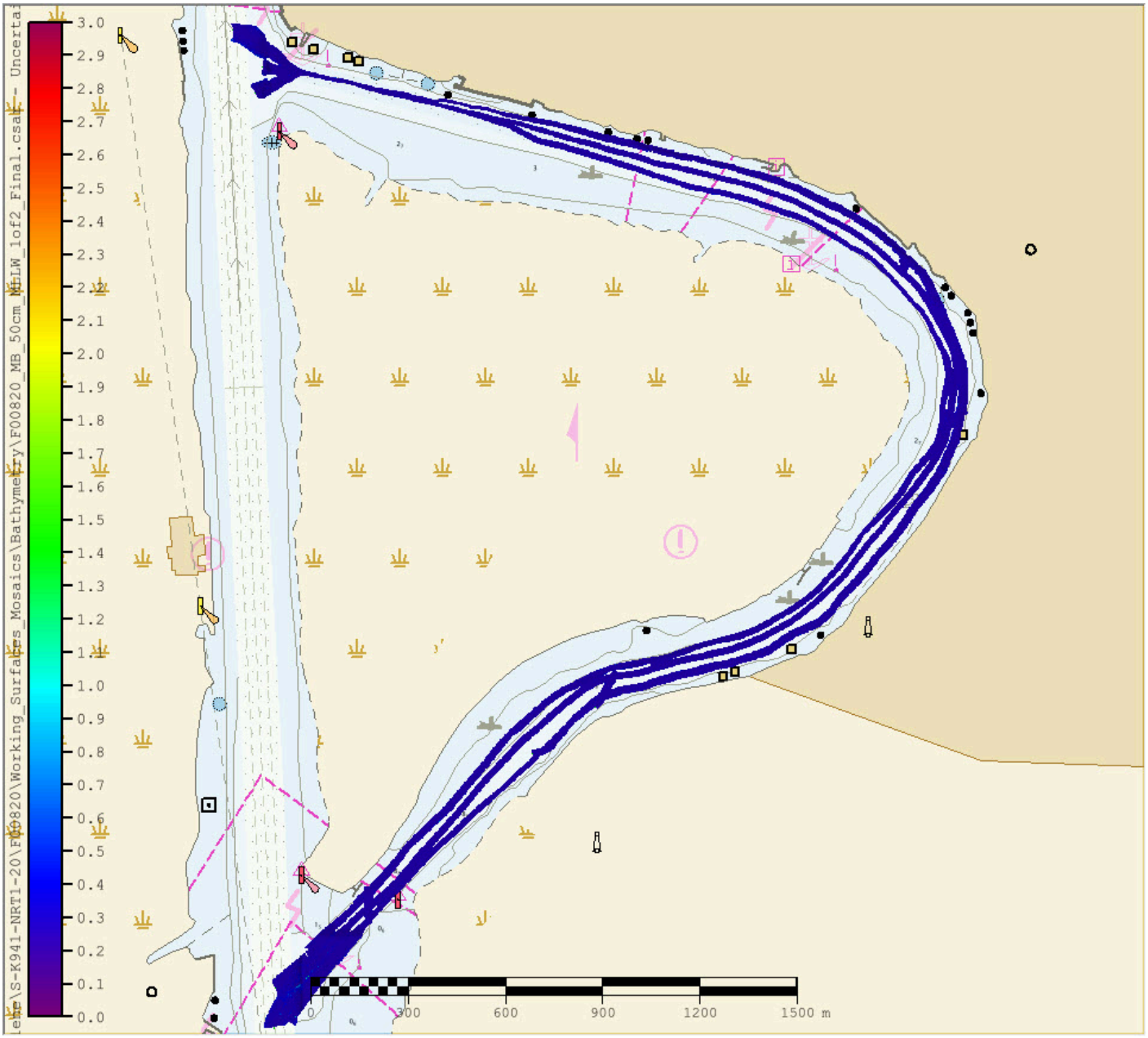


Figure 5: CUBE surface uncertainty layer for Cameron Bend.

A.4 Survey Coverage

The following table lists the coverage requirements for this survey as assigned in the project instructions:

Water Depth	Coverage Required
All waters in survey area	Object Detection Coverage (Refer to HSSD Section 5.2.2.2)

Table 2: Survey Coverage

Survey coverage was in accordance with the requirements listed above and in the HSSD.

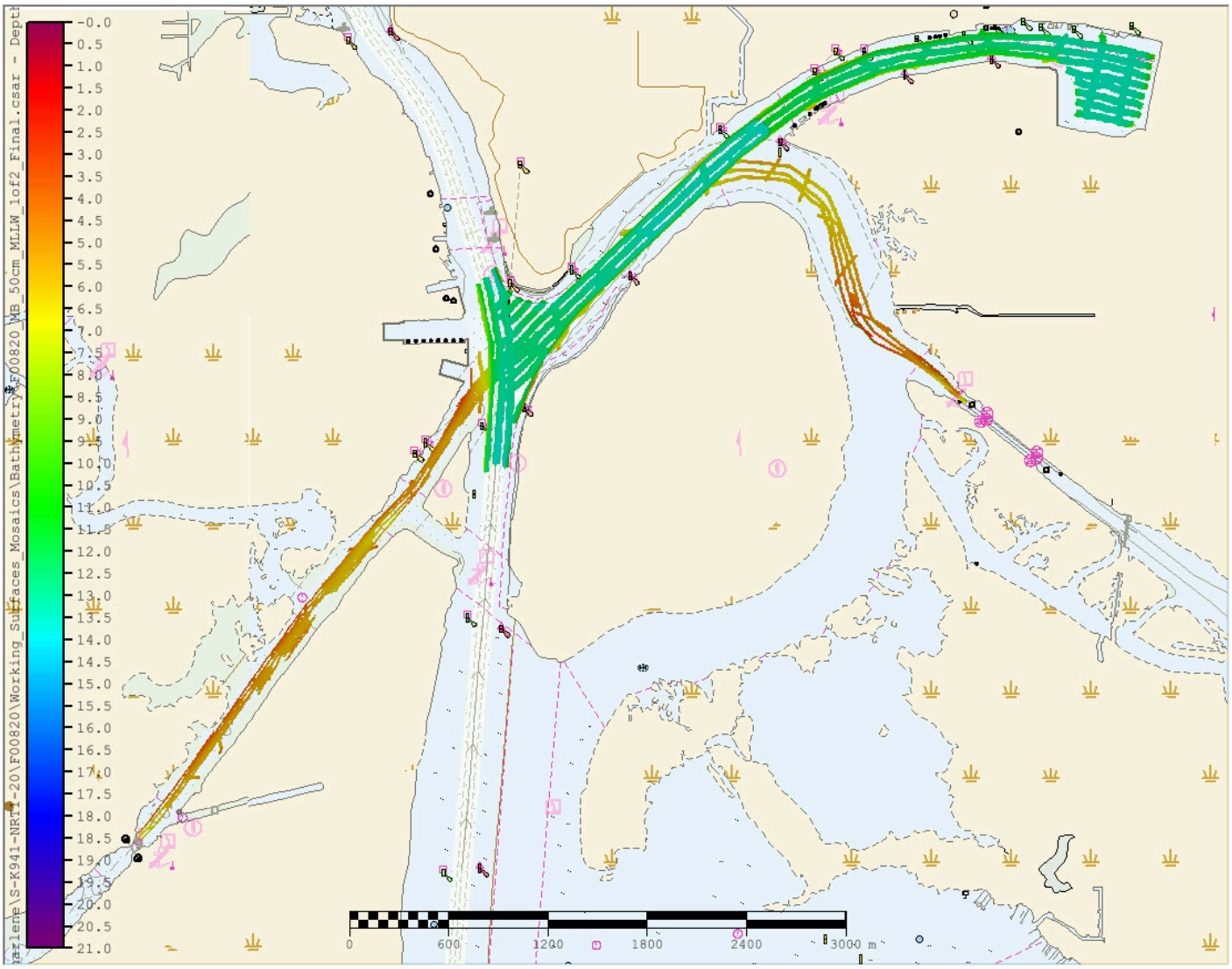


Figure 6: Devils Elbow and GIWW depth shown in meters.

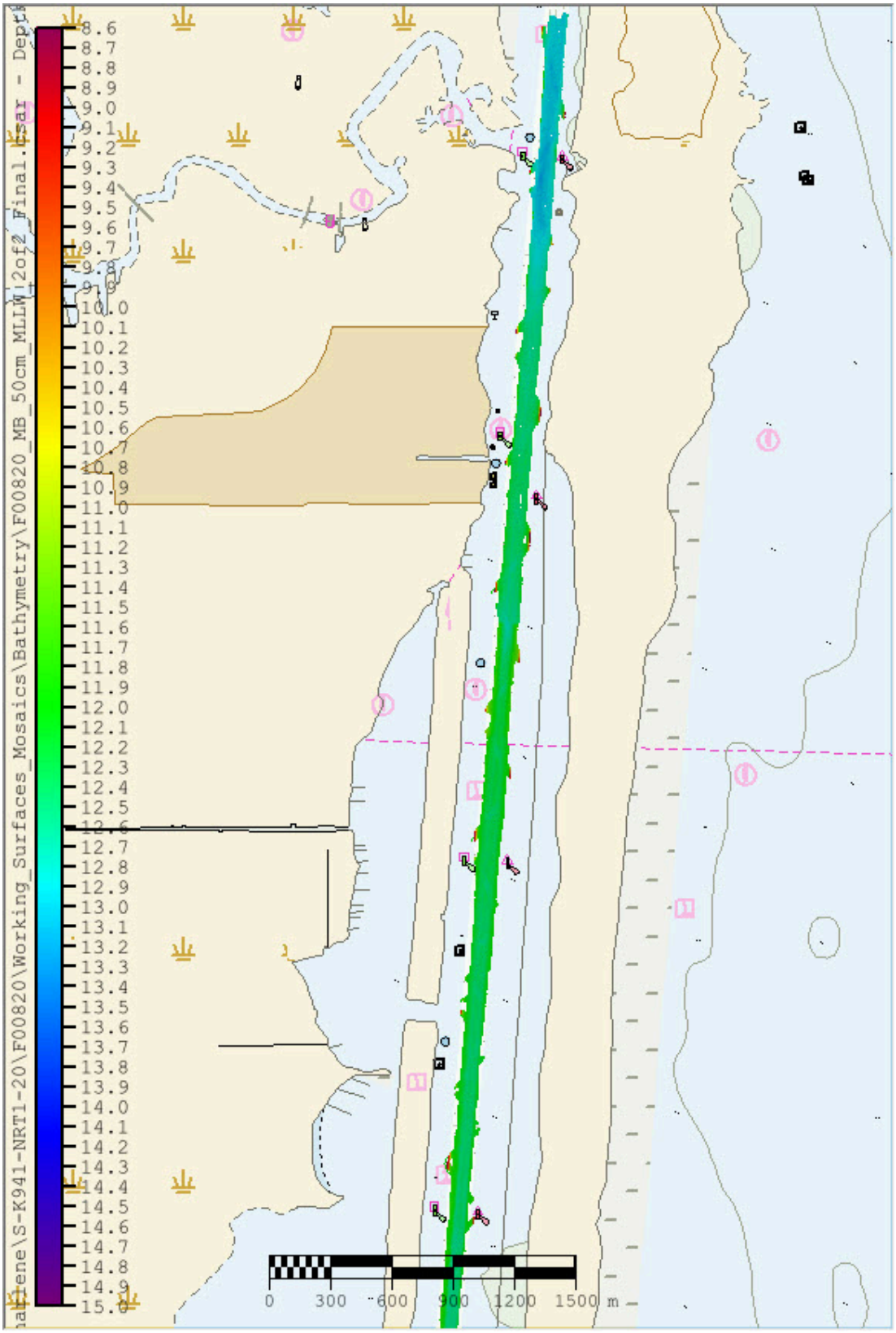


Figure 7: Calcasieu Channel depth shown in meters.

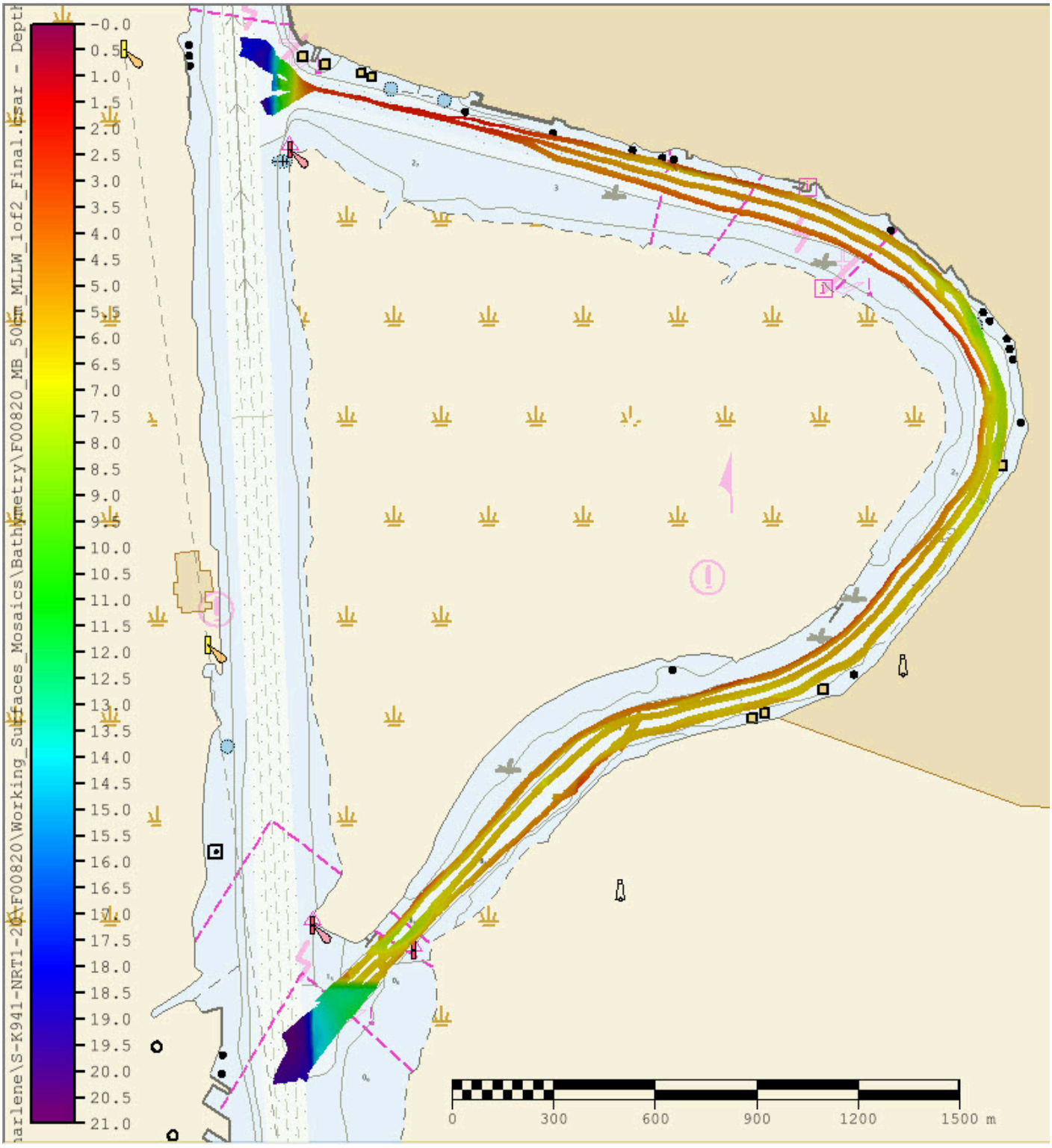


Figure 8: Cameron Bend depth shown in meters.

A.6 Survey Statistics

The following table lists the mainscheme and crossline acquisition mileage for this survey:

	HULL ID	*S3005*	*S3009*	*Total*
LNM	**SBES Mainscheme**	0	0	0
	MBES Mainscheme	0.814	9.450	10.264
	Lidar Mainscheme	0	0	0
	SSS Mainscheme	0	0	0
	SBES/SSS Mainscheme	0	0	0
	MBES/SSS Mainscheme	25.289	16.956	42.245
	SBES/MBES Crosslines	2.926	2.841	5.766
	Lidar Crosslines	0	0	0
Number of Bottom Samples				0
Number Maritime Boundary Points Investigated				0
Number of DPs				0
Number of Items Investigated by Dive Ops				0
Total SNM				0.76

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
10/10/2020	284
10/11/2020	285
10/12/2020	286

Table 4: Dates of Hydrography

B. Data Acquisition and Processing

B.1 Equipment and Vessels

Refer to the Data Acquisition and Processing Report (DAPR) for a complete description of data acquisition and processing systems, survey vessels, quality control procedures and data processing methods. Additional information to supplement sounding and survey data, and any deviations from the DAPR are discussed in the following sections.

B.1.1 Vessels

The following vessels were used for data acquisition during this survey:

Hull ID	*S3005*	*S3009*
LOA	31 feet	31 feet
Draft	1.5 feet	1.5 feet

Table 5: Vessels Used

Figure 9: NRT S3005 and S3009 in SW Louisiana

B.1.2 Equipment

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

Manufacturer	Model	Type
Kongsberg Maritime	EM 2040C	MBES
EdgeTech	4125	SSS
YSI	CastAway-CTD	Sound Speed System
AML Oceanographic	MicroX SV	Sound Speed System
Applanix	POS MV 320 v5	Positioning and Attitude System

Table 6: Major Systems Used

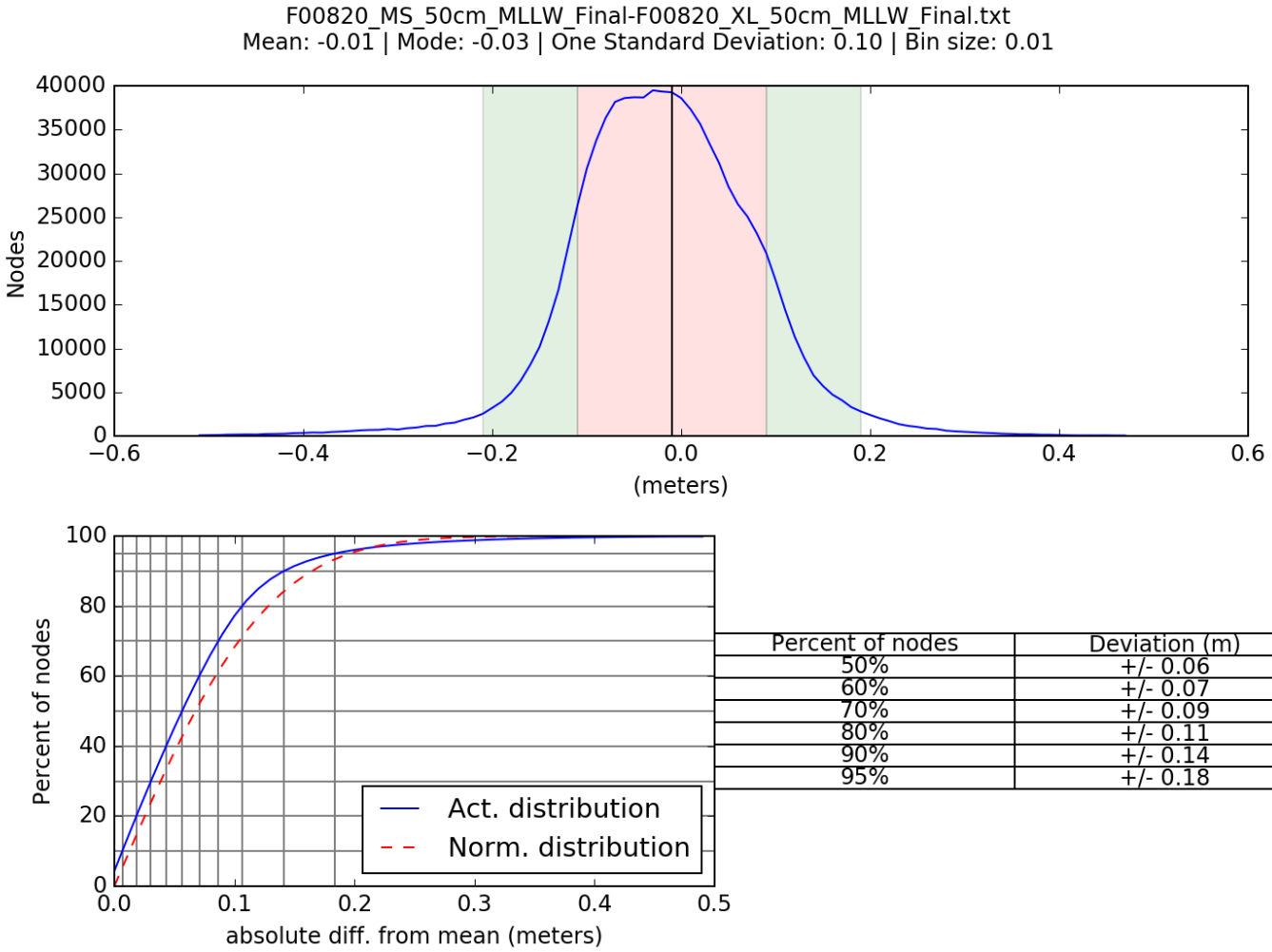
B.2 Quality Control

B.2.1 Crosslines

Multibeam/single beam echo sounder/side scan sonar crosslines acquired for this survey totaled 10.981% of mainscheme acquisition.

The crosslines were collected by S3005 and S3009 are spatially distributed across the survey area. Crosslines were collected, processed and compared in accordance with Section 5.2.4.2 of the HSSD. A depth surface was created in Caris of only mainscheme lines, and a second depth surface was created of only crosslines. A difference surface was generated and compared with the Caris HIPS and SIPS Difference Coverages tool. The mainshceme only, crossline only, and difference surface are included in the submission of this survey as Digital Data.

For F00820 respective depths, the difference surface was compared to the allowable NOAA uncertainty standards. Statistics show the standard deviation between the depths derived from mainscheme data and crossline data was 0.1 meters.



Percent of nodes	Deviation (m)
50%	+/- 0.06
60%	+/- 0.07
70%	+/- 0.09
80%	+/- 0.11
90%	+/- 0.14
95%	+/- 0.18

Figure 10: Distribution of the differences, between the crossline multibeam CUBE depth surface and the main scheme multibeam CUBE depth surface, about the mean.

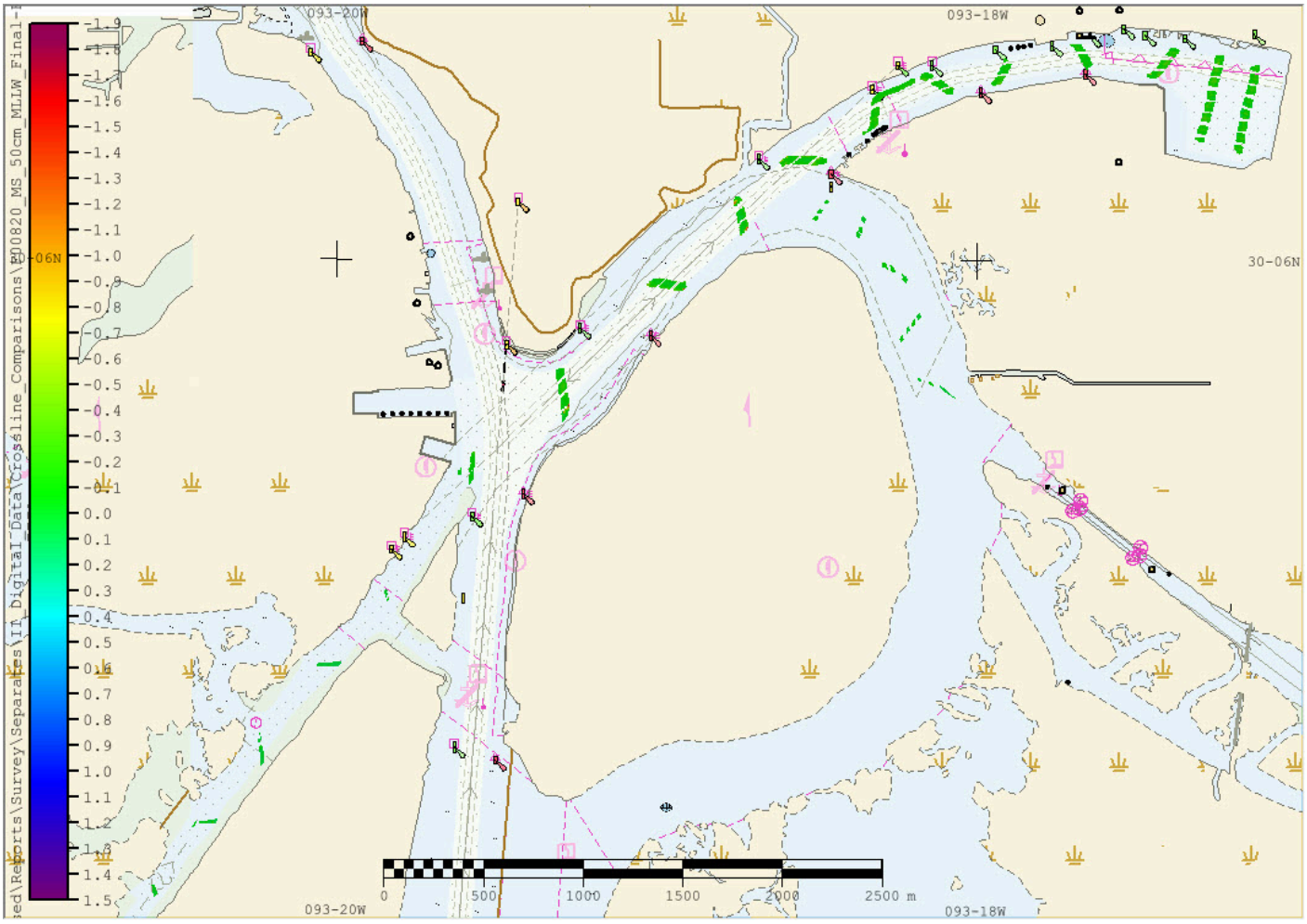


Figure 11: Crossline difference surface results for Devils Elbow and GIWW.

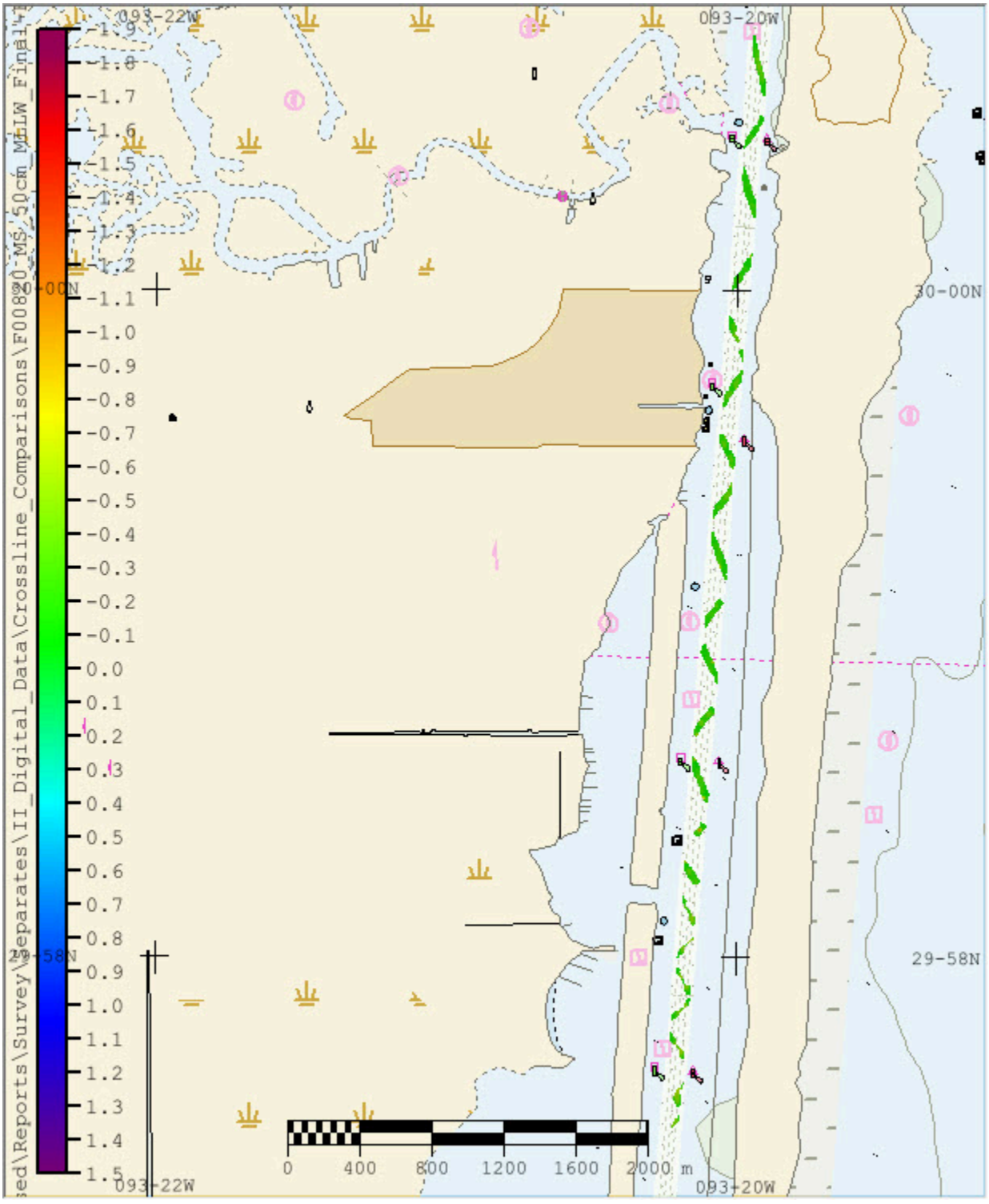


Figure 12: Crosslines difference surface results for Calcasieu Channel.

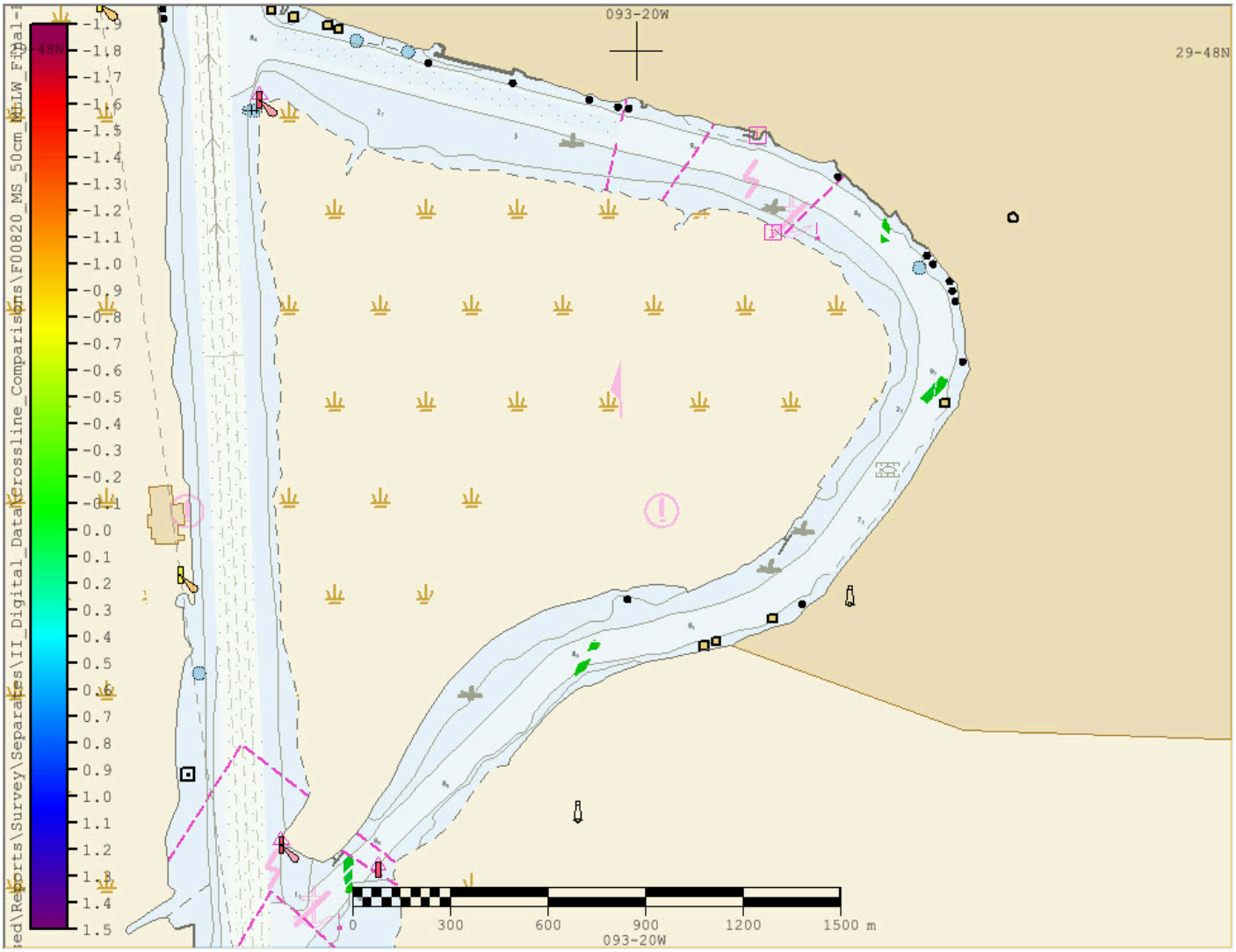


Figure 13: Crosslines difference surface results for Cameron Bend

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0.0 centimeters	12.7 centimeters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
S3005	2.00 meters/second	4.00 meters/second	0.00 meters/second	0.50 meters/second
S3009	2.00 meters/second	4.00 meters/second	0.00 meters/second	0.50 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

In addition to the usual a priori estimates of uncertainty provided via device models for vessel motion,VDatum, Poor Mans VDatum (PMVD), and real-time and post-processed uncertainty sources were also incorporated into the depth estimates of survey F00820. Real-time uncertainties were provided via MBES data and Applanix Delayed Heave RMS. Following post-processing of the real-time vessel motion, recomputed uncertainties of vessel gps height and navigation were applied in CARIS HIPS and SIPS via a Smoothed Best Estimate of Trajectory (SBET) RMS file generated in Applanix POSPac.

A Measured Tide uncertainty was added to multibeam lines that described a distinct second density layer associated with the area in the Calcasieu ship channel extent of the survey area described by the surface F00820_MB_50cm_MLLW_2of2.csar and in section A.3 Survey Quality. The values for each uncertainty was based upon an analysis of the greatest difference found in each affected line. A table of the actual value of the measured tide added to each line is described below and correspondence with PHB relating to this process may be found in the Project_Correspondence folder.

Line Name	Tide value used in meters
0566_20201010_190616	0.577
0565_20201010_183514	0.577

Figure 14: Measured tide uncertainty added to each affected multibeam line.

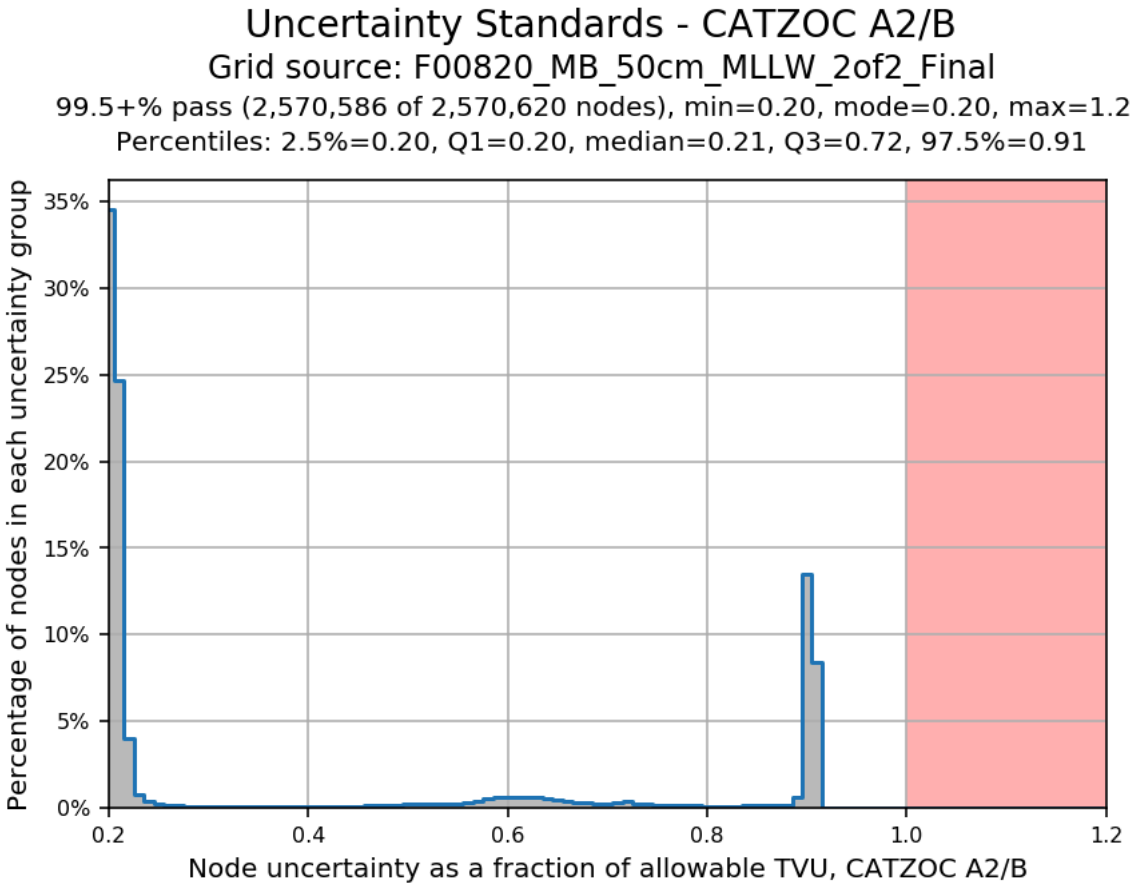


Figure 15: CATZOC uncertainty standards for surface F00820_MB_50cm_MLLW_2of2_Final surface.

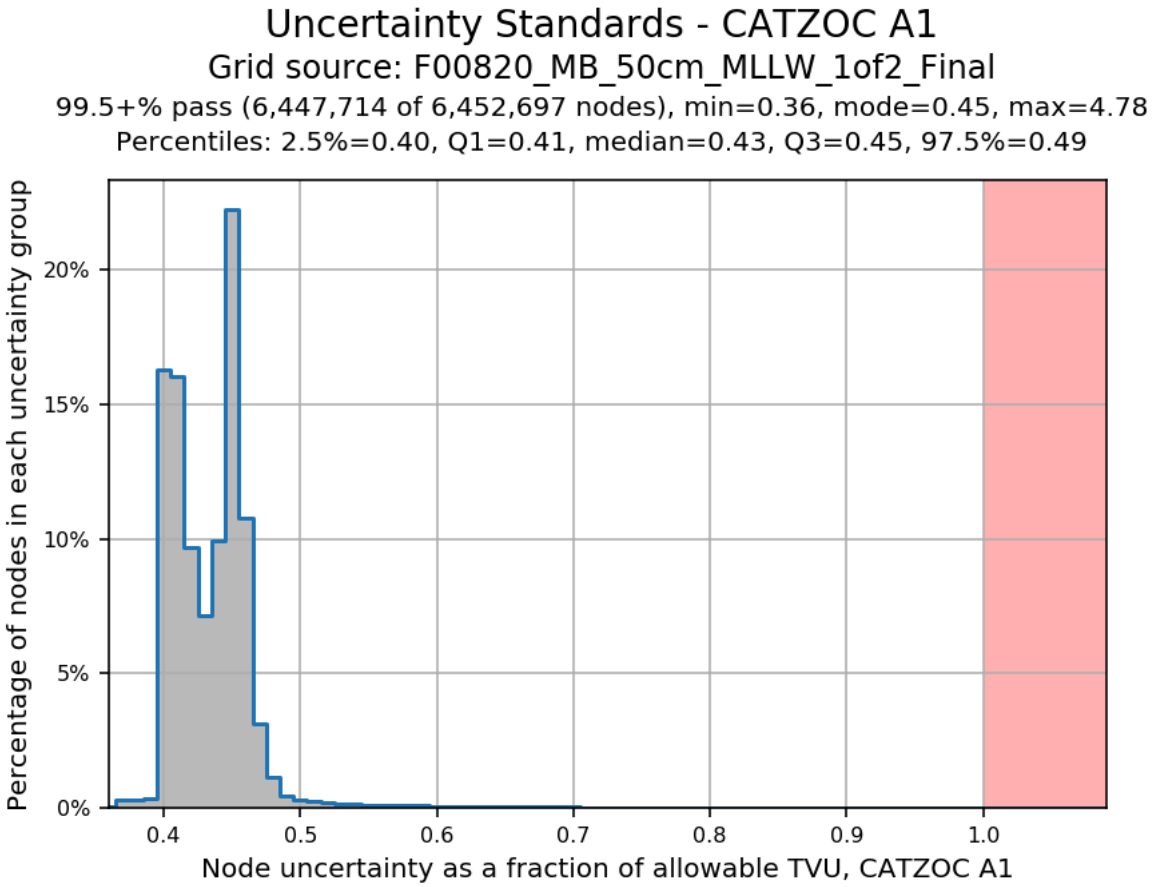


Figure 16: CATZOC uncertainty standards for surface F00820_MB_50cm_MLLW_1of2_Final surface.

B.2.3 Junctions

A Junction analysis was done with S-K937-NRT1-20.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
F00814	1:25000	2020	NRT-Stennis	S

Table 9: Junctioning Surveys

F00814

The junction with survey F00814 encompassed 0.467 square nautical miles along the GIWW and Devils Elbow. The comparison was made using the Pydro tool "Compare Grids" application. The surfaces used for this comparison were 50cm CUBE surfaces. Analysis of the difference surface indicate a standard deviation of 0.15 meters.

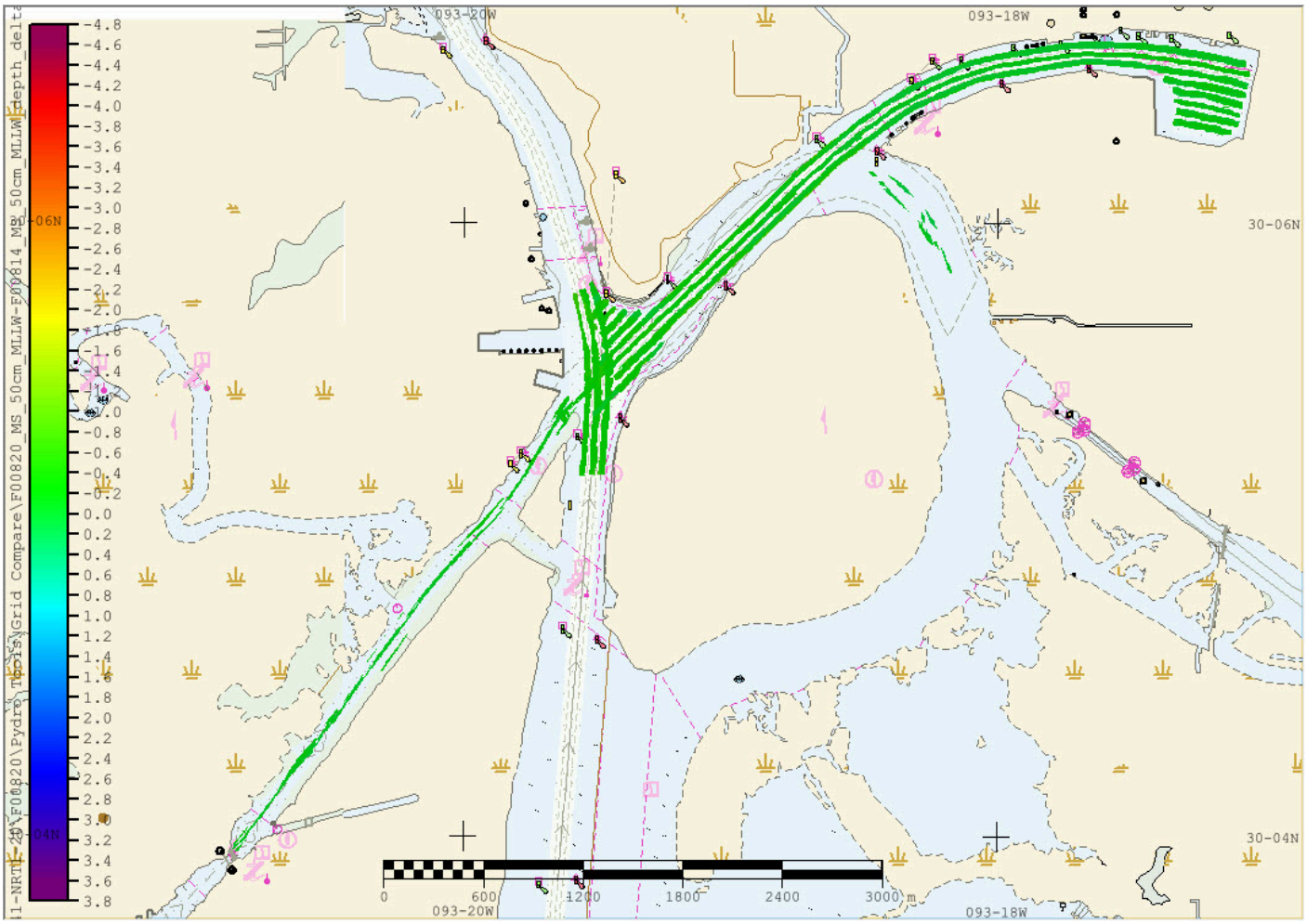
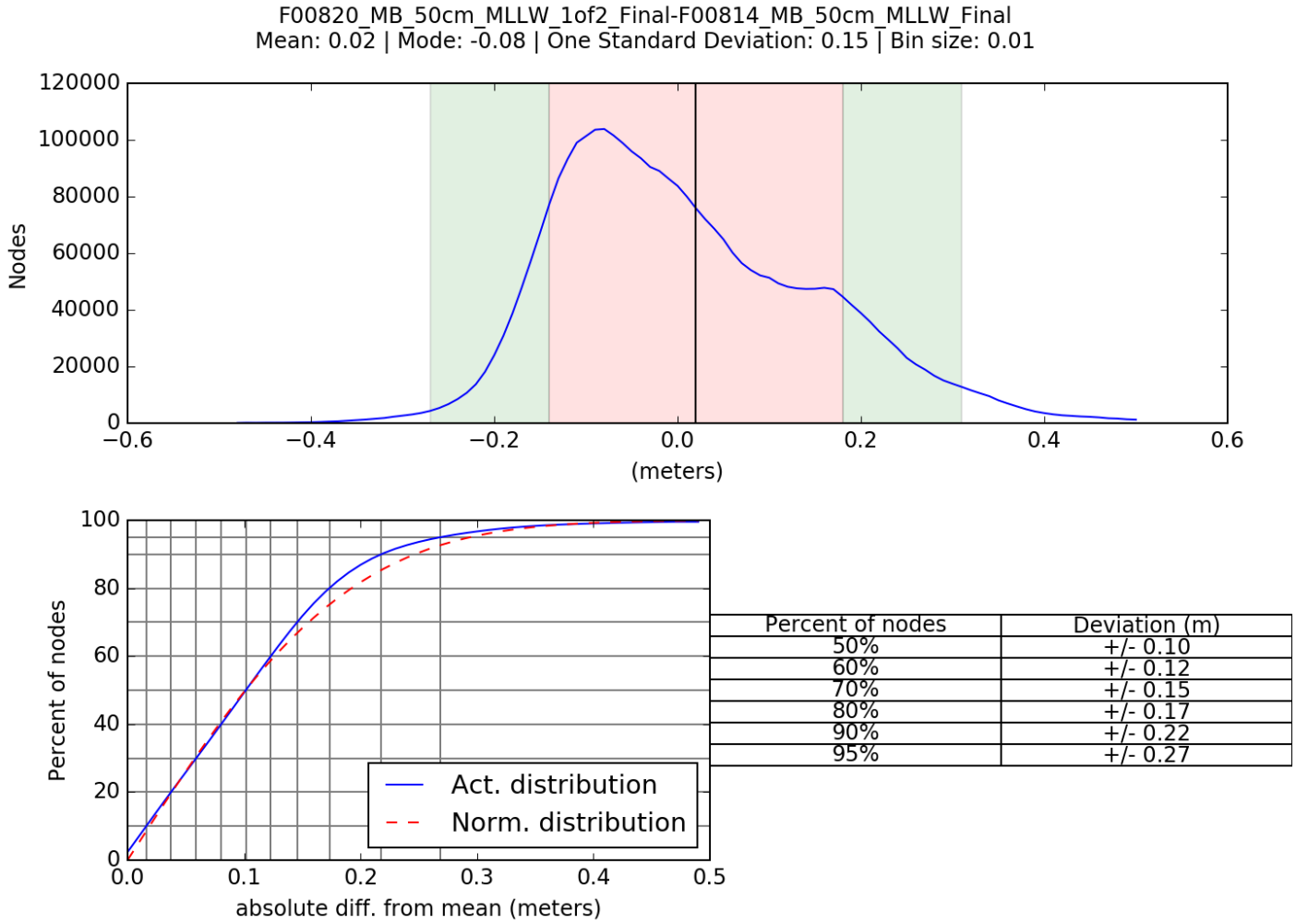


Figure 17: Comparison overview difference surface.



Percent of nodes	Deviation (m)
50%	+/- 0.10
60%	+/- 0.12
70%	+/- 0.15
80%	+/- 0.17
90%	+/- 0.22
95%	+/- 0.27

Figure 18: Distribution of the differences, between the F00814 and F00820_MB_50cm_MLLW_1of2_Final multibeam CUBE depth surfaces, about the mean.

B.2.4 Sonar QC Checks

Sonar system quality control checks were conducted as detailed in the quality control section of the DAPR.

B.2.5 Equipment Effectiveness

There were no conditions or deficiencies that affected equipment operational effectiveness.

B.2.6 Factors Affecting Soundings

Sediment from resceeding storm surge

There was extensive sediment transport associated with the drainage of Hurricane Delta's 14 foot storm surge and the 16 inches of rain within 24 hours of the survey. We believe that these conditions led to the two distinct density layers associated with depths in the Calcasieu Ship Channel. Correspondence with PHB relating to these dual layers may be found in the Project Correspondence folder.

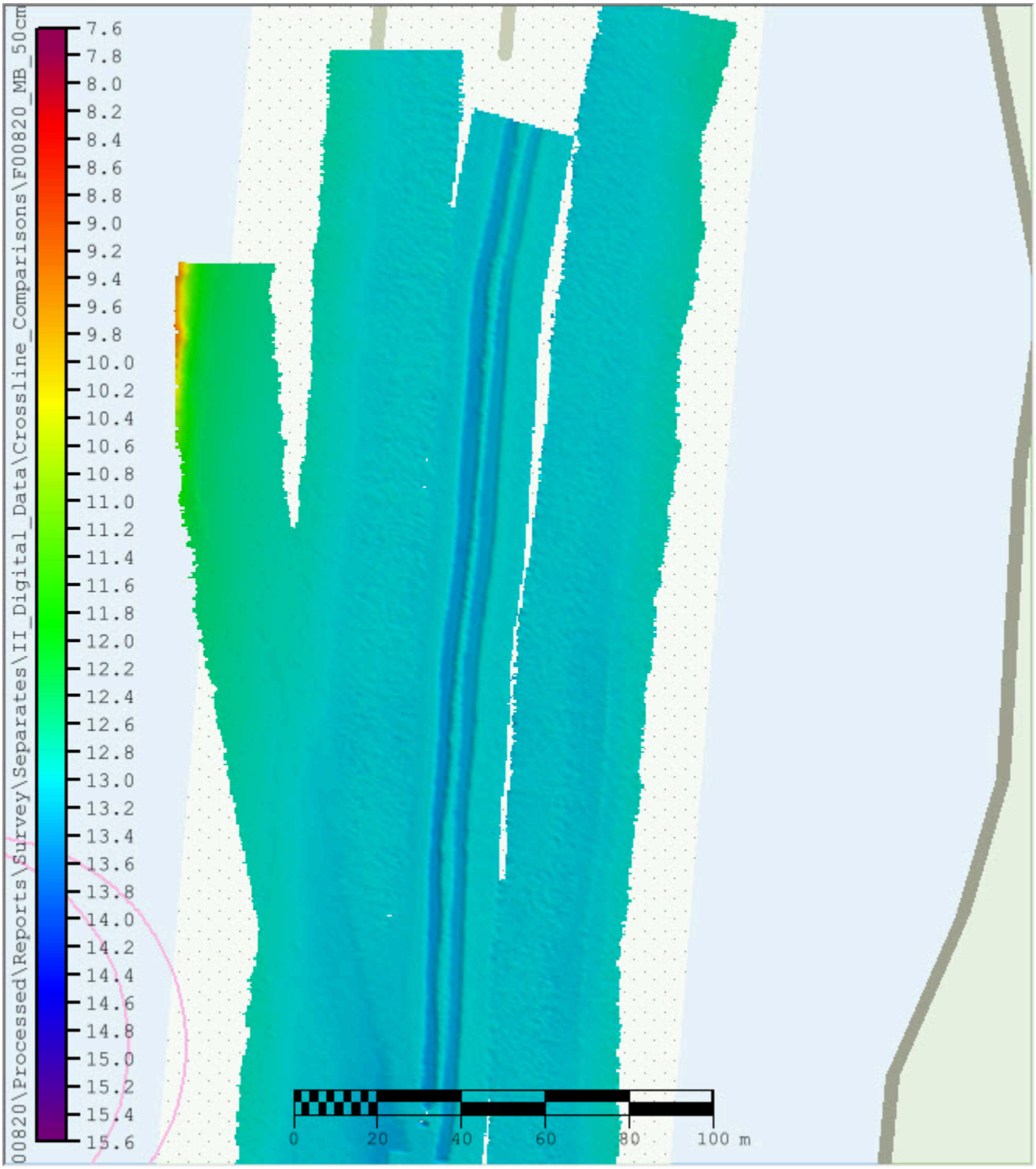


Figure 19: Surface depicting the multiple layers.

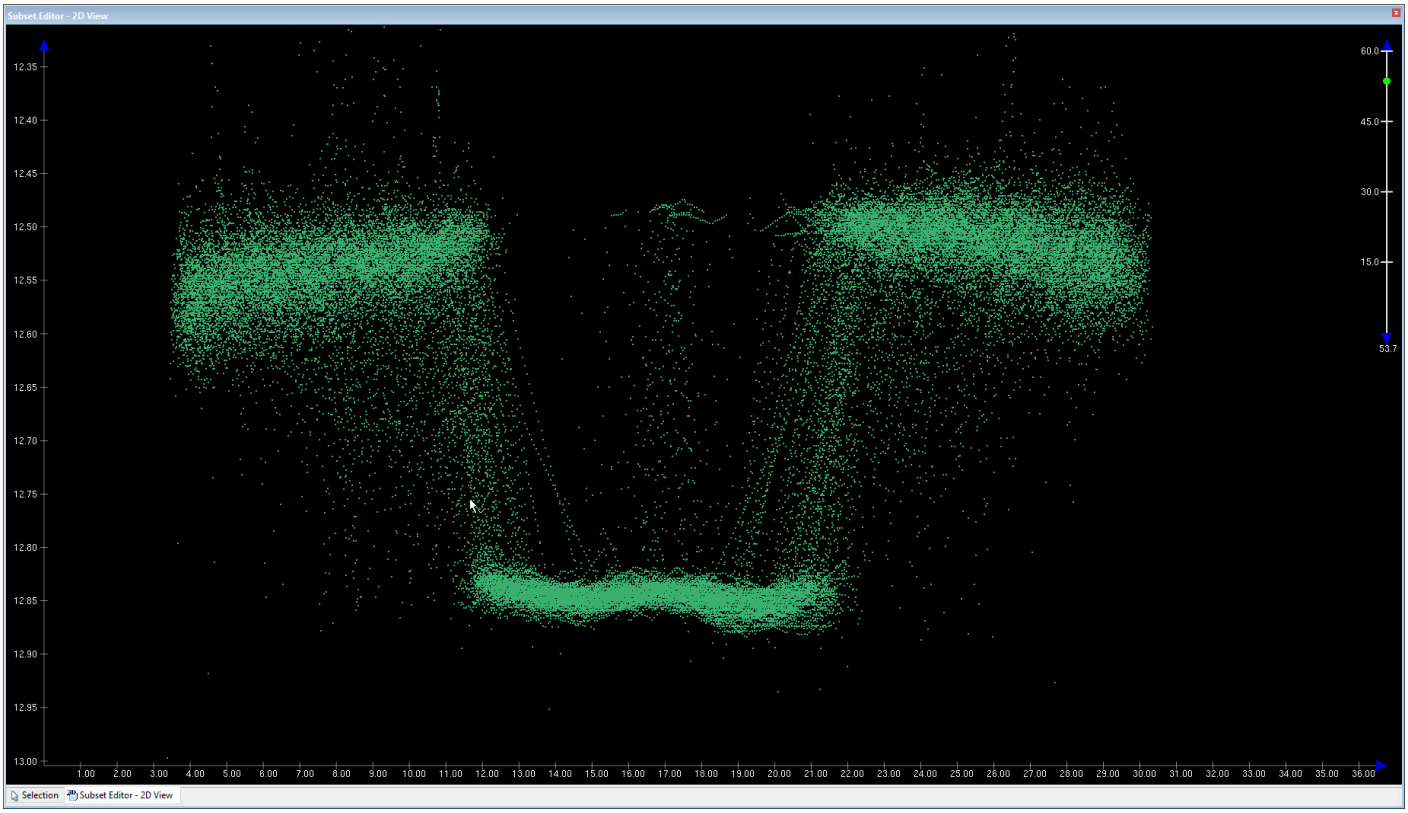


Figure 20: Subset of area depicting the two density layers.

False Fliers

A high number of false fliers are produced in the area of Devils Elbow. Flier search and verification was conducted with a combination of manual surface review and automated tools like Pydro QC Tools.

With Pydro QC Tools Flier Finder, a number of methods were used. Default options #2 through #5 were used at least twice. For thorough cleaning and verification, all options #1 through #6 were used. Finally, at the suggestion of PHB the percent TVU was raised 150. That brought the number of potential fliers from 419 down to 96, and when set to 200 the number dropped to 25. At 200 percent TVU there are no fliers on F00820_MB_50cm_MLLW_2of2_Final and 25 on F00820_MB_50cm_MLLW_1of2_Final. These have all been reviewed and verified as false fliers. Either residing on legitimate objects or high channel edges with great variation relative to adjacent sea floor. Flier finder results are in the digital data folder.

See images below for details.

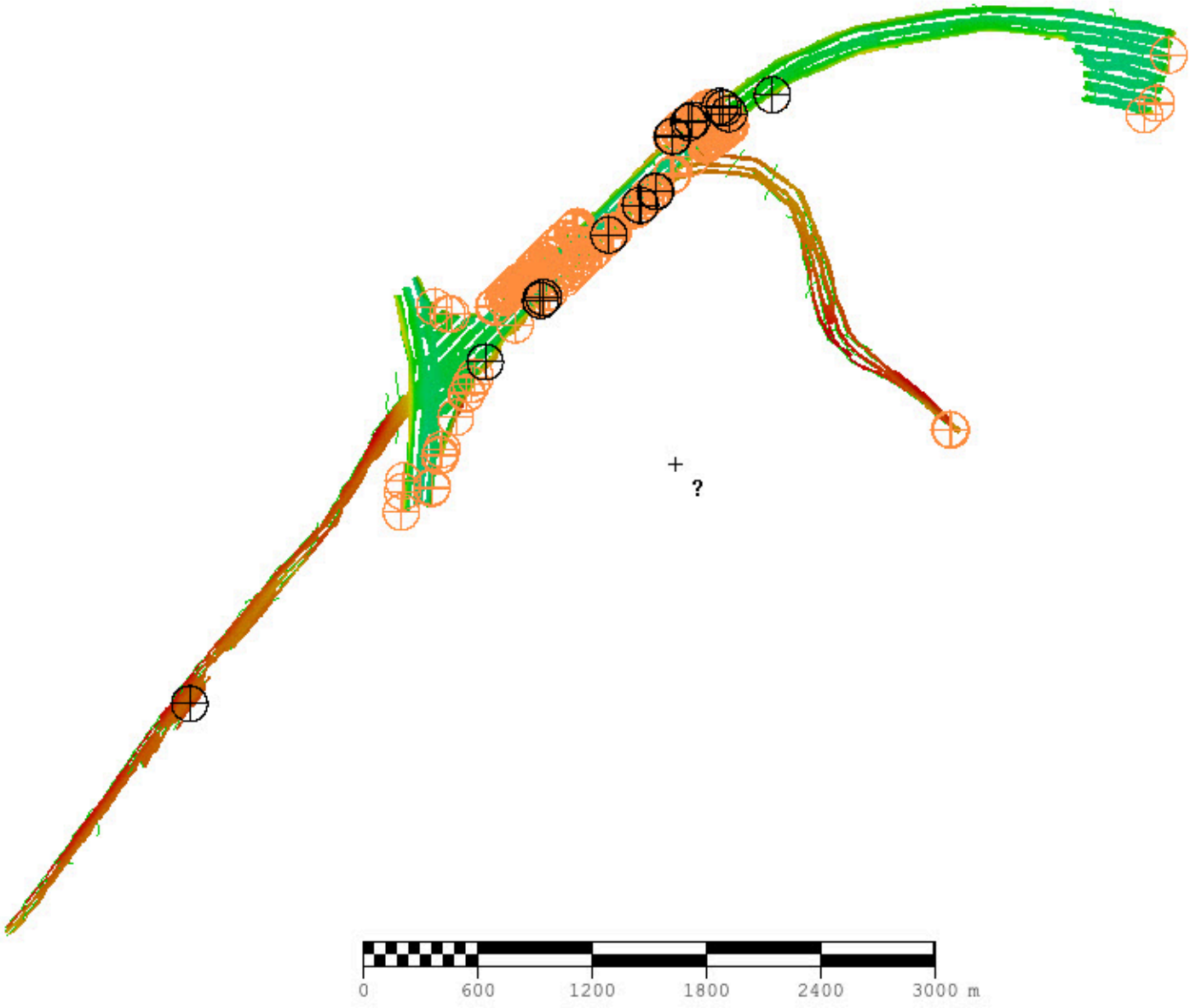


Figure 21: Dense area of false fliers. Orange is TVU set to 100, and black is TVU set to 200.

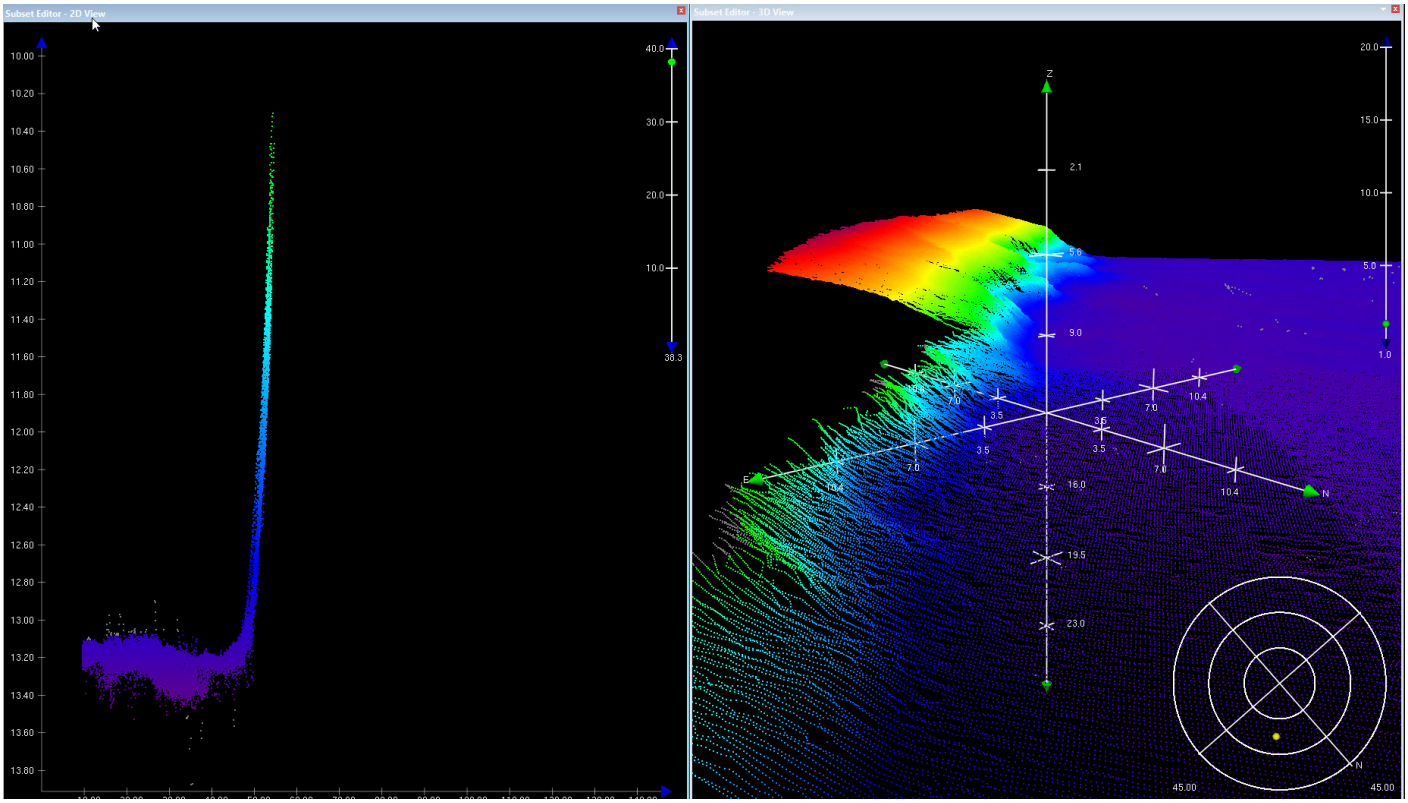


Figure 22: Subset of channel wall.

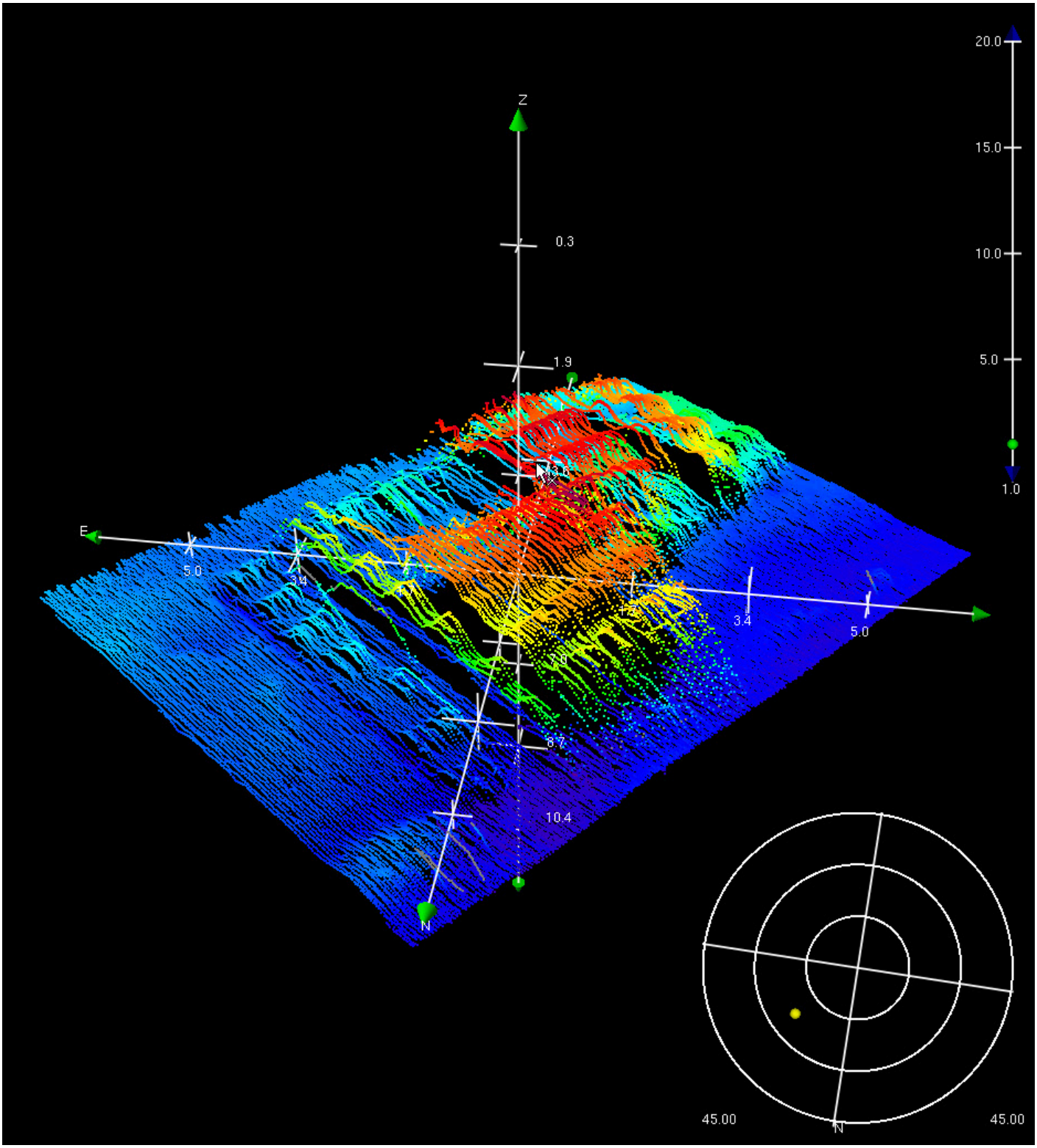


Figure 23: Subset of barge cap that was flagged for multiple fliers

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: Sound Velocity Profiles (SVP) casts were taken at least once every four hours in the deepest water nearest to the active survey area and when there was a change in sound speed values over varying depths.

The SVP casts were applied to the MBES lines in CARIS using the "nearest in distance within time of 4 hours" method.

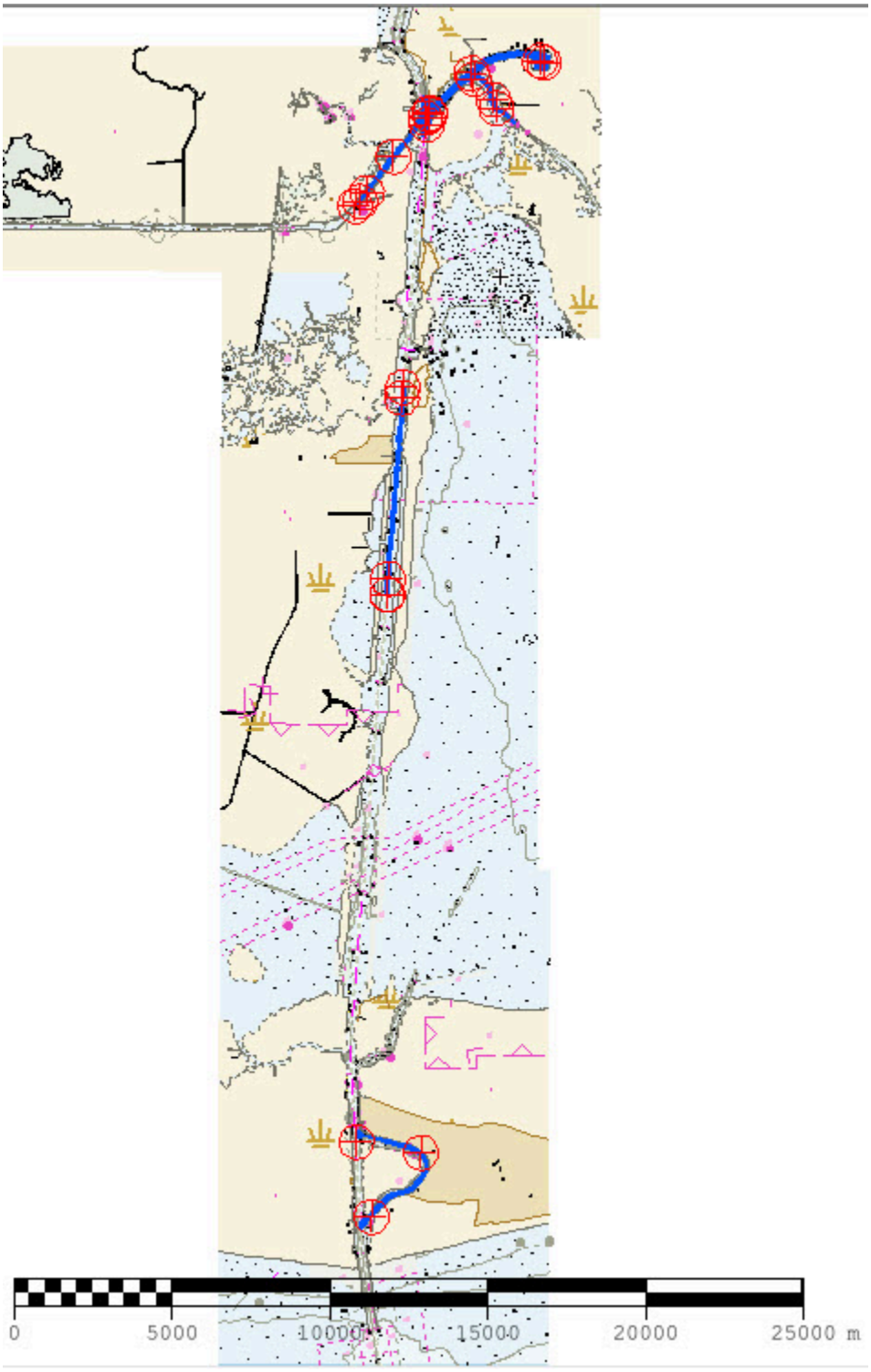


Figure 24: Sound speed cast locations

B.2.8 Coverage Equipment and Methods

All equipment and survey methods were used as detailed in the DAPR.

B.2.9 Density

The surface was analyzed using the HydrOffice QC Tools Grid QA feature and the results are shown below. Density requirements for F00820 were achieved with at least 99% surface nodes containing five or more soundings as required by HSSD Section 5.2.2.3 for both surfaces. The few nodes that did not meet density requirements are due to sparse data in the outer beams, especially near steep slopes and rocky areas where acoustic shadowing occurred, and at the edges of the survey limits. For the individual graph of density requirements, see the Standards and Compliance Review located in Appendix II.

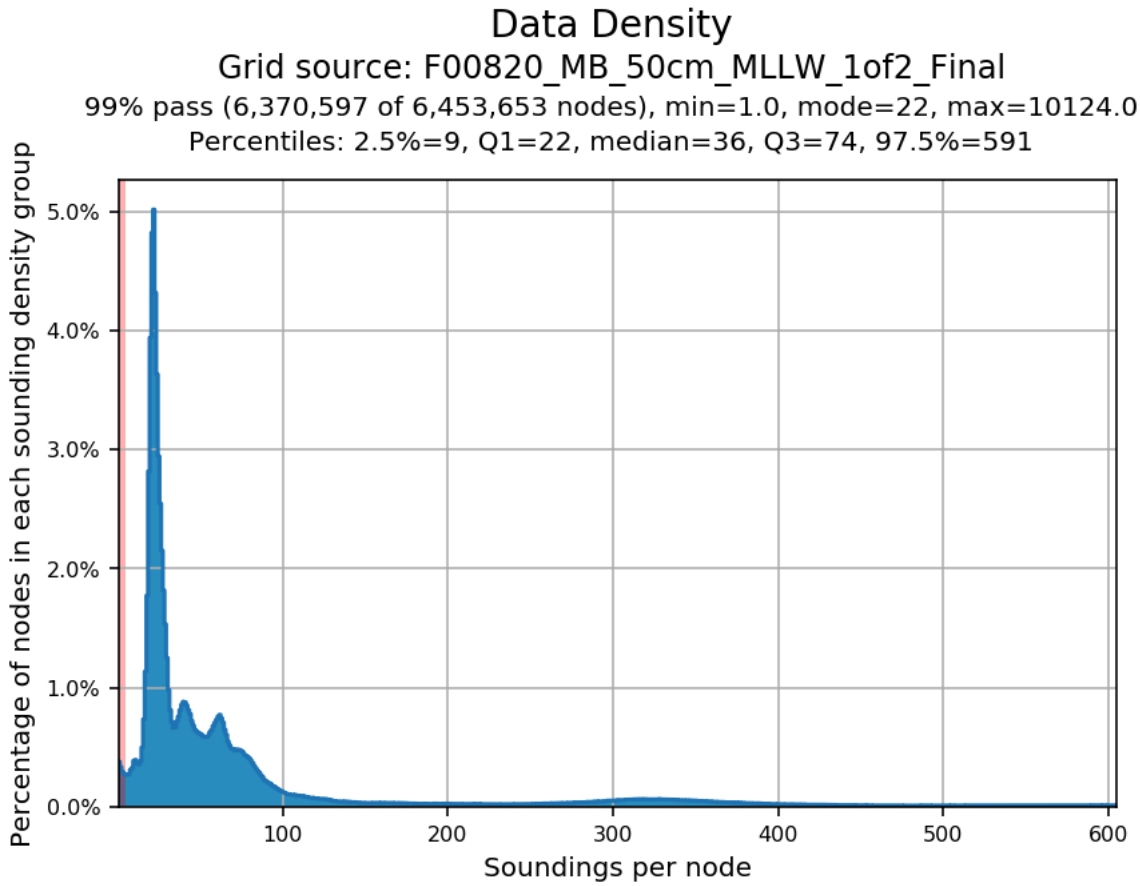


Figure 25: Pydro derived plot showing percent of nodes in compliance with HSSD density standards for F00820_MB_50cm_MLLW_1of2_Final. Percentages of nodes less than 5 soundings per node fall in the red shaded region of the plot and together must be less than 5% of all nodes in order to "pass".

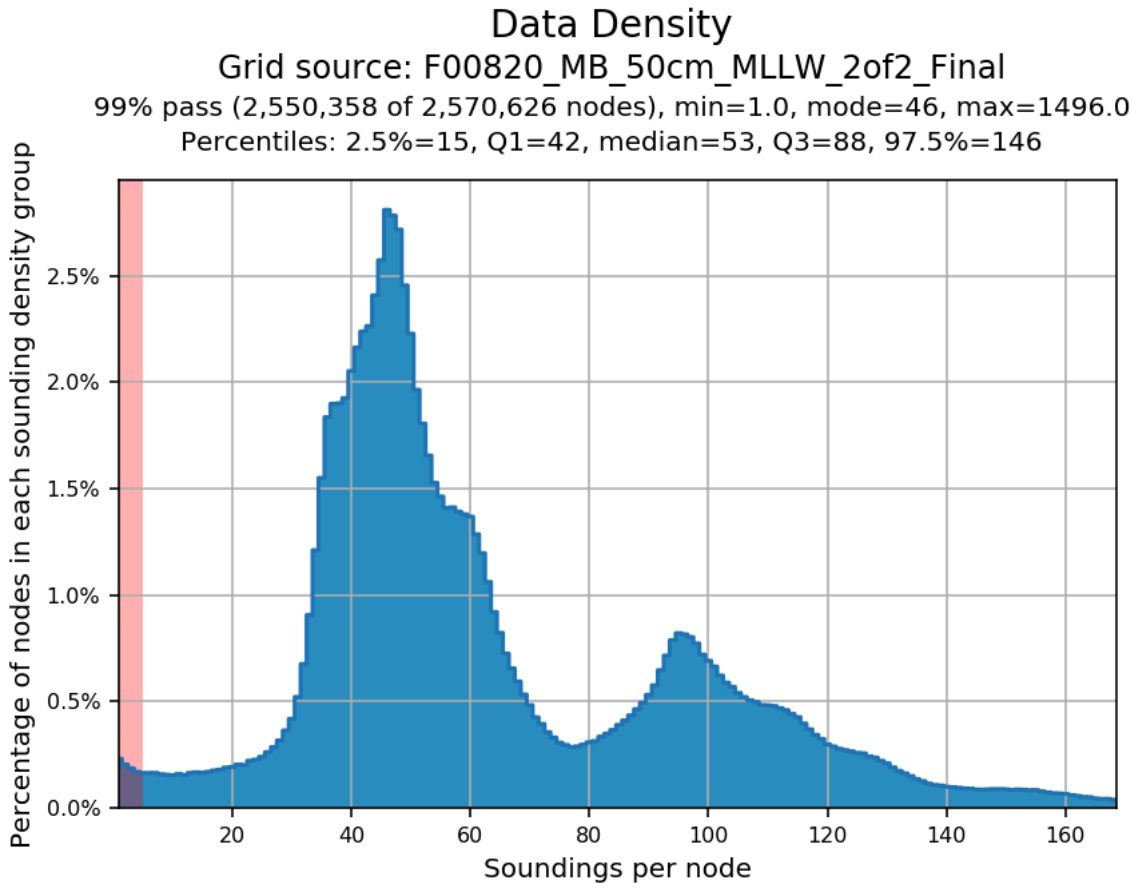


Figure 26: Pydro derived plot showing percent of nodes in compliance with HSSD density standards for F00820_MB_50cm_MLLW_2of2_Final. Percentages of nodes less than 5 soundings per node fall in the red shaded region of the plot and together must be less than 5% of all nodes in order to "pass".

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

All data reduction procedures conform to those detailed in the DAPR.

B.3.2 Calibrations

All sounding systems were calibrated as detailed in the DAPR.

B.4 Backscatter

All equipment and survey methods were used as detailed in the DAPR. Raw backscatter data is logged as .all file for delivery to NOAA's Pacific Hydrographic Branch. NOAA's Navigation Response Branch field units are waived from producing backscatter mosaics for the 2020 field season.

B.5 Data Processing

B.5.1 Primary Data Processing Software

The following Feature Object Catalog was used: NOAA Profile Version 2020.

B.5.2 Surfaces

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

Surface Name	Surface Type	Resolution	Depth Range	Surface Parameter	Purpose
F00820_MB_50cm_MLLW_1of2_Final	CARIS Raster Surface (CUBE)	0.5 meters	1.7 meters - 20.8 meters	NOAA_0.5m	Object Detection
F00820_MB_50cm_MLLW_2of2_Final	CARIS Raster Surface (CUBE)	0.5 meters	8.6 meters - 13.6 meters	NOAA_0.5m	Object Detection
F00820_SSSAB_1m_400kHz_1of2	SSS Mosaic	1 meters	0 meters - 0 meters	N/A	100% SSS
F00820_SSSAB_1m_400kHz_2of2	SSS Mosaic	1 meters	0 meters - 0 meters	N/A	200% SSS

Table 10: Submitted Surfaces

The survey was carried out to meet the Object Detection MBES Coverage requirements as defined by Section 5.2.2 of the 2020 Hydrographic Survey Specifications and Deliverables.

C. Vertical and Horizontal Control

Additional information discussing the vertical or horizontal control for this survey can be found in the accompanying HVCR.

C.1 Vertical Control

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

ERS Datum Transformation

The following ellipsoid-to-chart vertical datum transformation was used:

Method	Ellipsoid to Chart Datum Separation File
ERS via VDATUM	F00820_shpSLCONS(A)_100m_NAD83-MLLW_geoid12b

Table 11: ERS method and SEP file

Sounding elevations relative to the ellipsoid were collected through Ellipsoidal Referenced Survey (ERS) with post-processing of the daily logged POSPac data to create a statistical best estimate of trajectory (SBET) file, as detailed in the DAPR, All of F00820 meets HSSD vertical accuracy requirements.

C.2 Horizontal Control

The horizontal datum for this project is North American Datum of 1983 (NAD 83).

The projection used for this project is Universal Transverse Mercator (UTM) Zone 15.

The following PPK methods were used for horizontal control:

- Smart Base

The following CORS Stations were used for horizontal control:

HVCR Site ID	Base Station ID
Anahuac	TXAC
Franklin High Sch	FSHS
T H Harris Campus	THHR
Abdalla Hall ULL	TONY
Kountze	TXKO
Port Arthur	TXPT

Table 12: CORS Base Stations

WAAS

The Wide Area Augmentation System (WAAS) was used for real-time horizontal control during data acquisition.

D. Results and Recommendations

D.1 Chart Comparison

F00820 survey data was compared to Electronic Navigation Charts (ENC) US5LA16M and USTX61M using the CA Tools from Pydro Explorer. Throughout the GIWW, Devils Elbow and Calcasieu channel multibeam generally agreed with their charted depths. See images and discussions below for more information.

The depths in Cameron bend were approximately 2m shoaler than the charted values for the entire channel.

There are three different flags using CA Tools; a X represents a possible DTON; a Triangle represents a possible discrepancy, and a purple diamond represents an untested feature. The color of the X or Triangle represents the difference. from the ENC. All flagged soundings were investigated and were found to be either on the edges of the channel or outside or the channel with the exception of Cameron Bend.

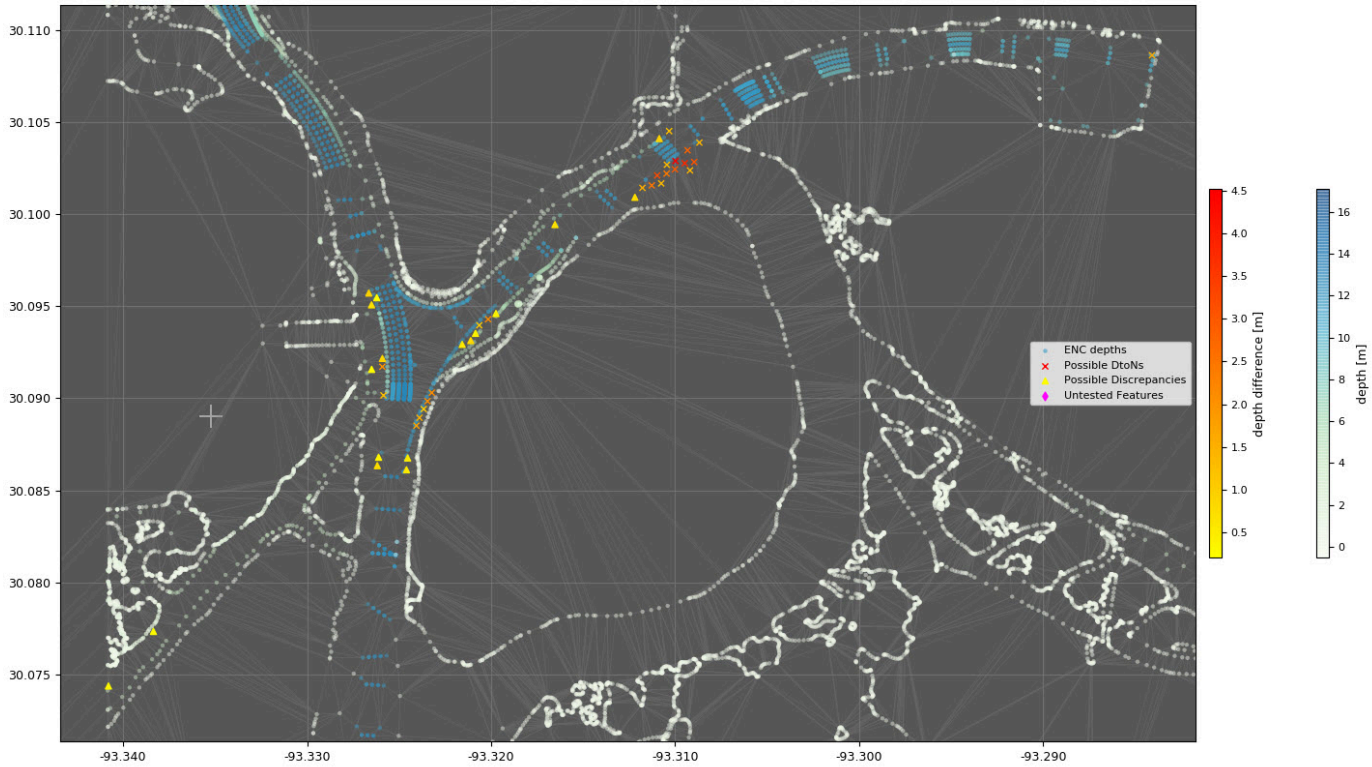


Figure 27: CA Tools results for the GIWW, and Devils Elbow

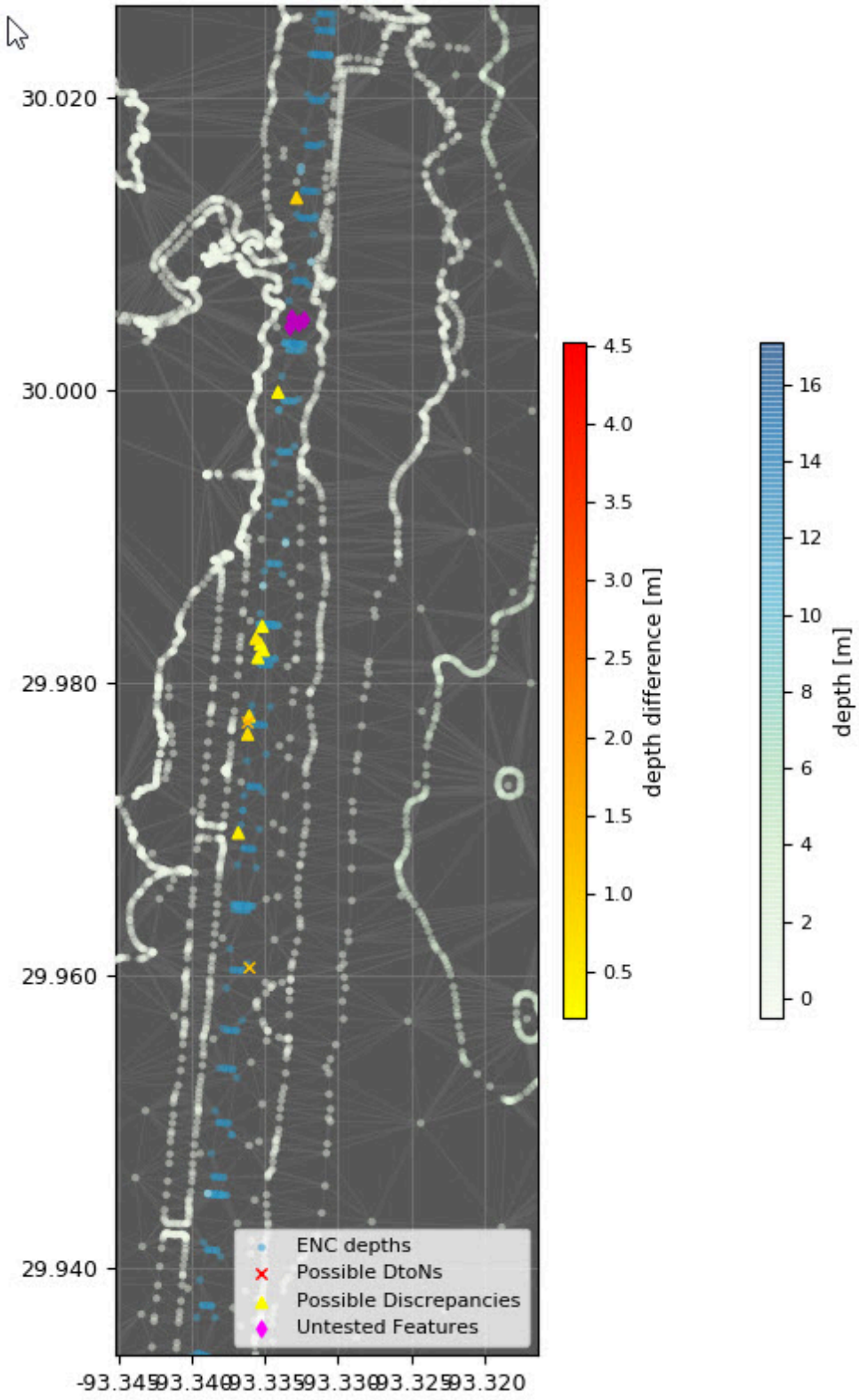


Figure 28: CA Tools results for the Calcasieu Ship Channel

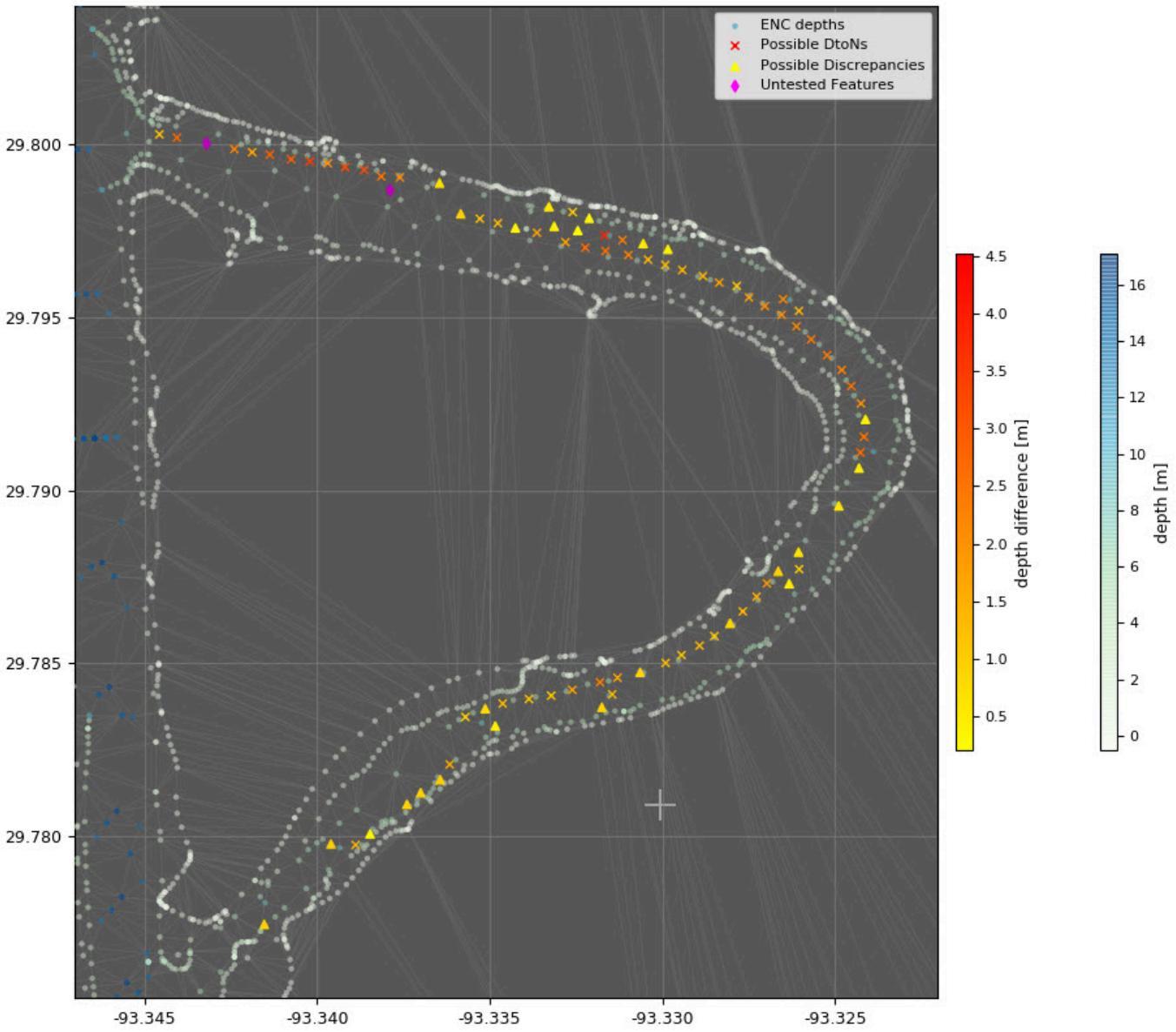


Figure 29: CA Tools results for the Cameron Bend

D.1.1 Electronic Navigational Charts

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

ENC	Scale	Edition	Update Application Date	Issue Date
US5LA16M	1:50000	15	12/30/2020	12/30/2020
US5TX61M	1:40000	25	08/25/2020	08/25/2020

Table 13: Largest Scale ENCs

D.1.2 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.3 Charted Features

No charted features exist for this survey.

D.1.4 Uncharted Features

No uncharted features exist for this survey.

D.1.5 Channels

Channels, designated anchorages, precautionary areas, safety fairways, traffic separation schemes, pilot boarding areas, and/or channel and range lines exist within the survey limits, but were not investigated.

D.2 Additional Results

D.2.1 Aids to Navigation

Aids to navigation (ATONs) exist for this survey, but were not investigated. It was noted that the Calcasieu Channel D Range Front Light was damaged in the storm. The crew also noted they could not see the Rear light from their vantage points. All AToN observations were communicated to the local USCG/USACE authorities.

Figure 30: Calcasieu Channel D Range Front Light

D.2.2 Maritime Boundary Points

No Maritime Boundary Points were assigned for this survey.

D.2.3 Bottom Samples

No bottom samples were required for this survey.

D.2.4 Overhead Features

Overhead features exist for this survey, but were not investigated.

D.2.5 Submarine Features

Submarine features exist for this survey, but were not investigated.

D.2.6 Platforms

No platforms exist for this survey.

D.2.7 Ferry Routes and Terminals

No ferry routes or terminals exist for this survey.

D.2.8 Abnormal Seafloor or Environmental Conditions

No abnormal seafloor or environmental conditions exist for this survey.

D.2.9 Construction and Dredging

Present and/or planned construction or dredging exists within the survey limits, but was not investigated.

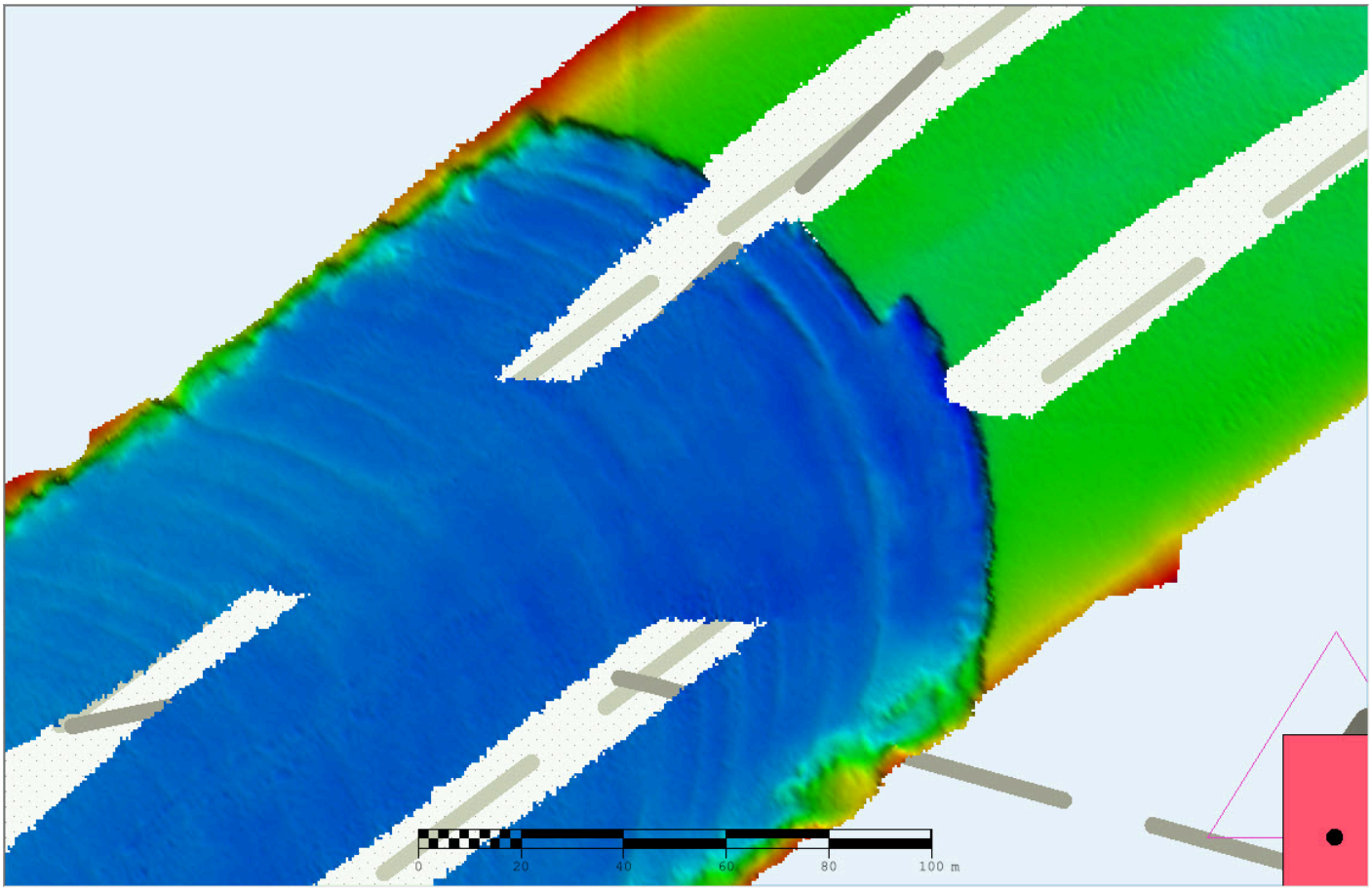


Figure 31: Evidence of dredging in Devils Elbow.

D.2.10 New Survey Recommendations

No new surveys or further investigations are recommended for this area.

D.2.11 ENC Scale Recommendations

No new ENC scales are recommended for this area.

F. Table of Acronyms

Acronym	Definition
AHB	Atlantic Hydrographic Branch
AST	Assistant Survey Technician
ATON	Aid to Navigation
AWOIS	Automated Wreck and Obstruction Information System
BAG	Bathymetric Attributed Grid
BASE	Bathymetry Associated with Statistical Error
CO	Commanding Officer
CO-OPS	Center for Operational Products and Services
CORS	Continuously Operating Reference Station
CTD	Conductivity Temperature Depth
CEF	Chart Evaluation File
CSF	Composite Source File
CST	Chief Survey Technician
CUBE	Combined Uncertainty and Bathymetry Estimator
DAPR	Data Acquisition and Processing Report
DGPS	Differential Global Positioning System
DP	Detached Position
DR	Descriptive Report
DTON	Danger to Navigation
ENC	Electronic Navigational Chart
ERS	Ellipsoidal Referenced Survey
ERTDM	Ellipsoidally Referenced Tidal Datum Model
ERZT	Ellipsoidally Referenced Zoned Tides
FFF	Final Feature File
FOO	Field Operations Officer
FPM	Field Procedures Manual
GAMS	GPS Azimuth Measurement Subsystem
GC	Geographic Cell
GPS	Global Positioning System
HIPS	Hydrographic Information Processing System
HSD	Hydrographic Surveys Division

Acronym	Definition
HSSD	Hydrographic Survey Specifications and Deliverables
HSTB	Hydrographic Systems Technology Branch
HSX	Hypack Hysweep File Format
HTD	Hydrographic Surveys Technical Directive
HVCR	Horizontal and Vertical Control Report
HVF	HIPS Vessel File
IHO	International Hydrographic Organization
IMU	Inertial Motion Unit
ITRF	International Terrestrial Reference Frame
LNM	Linear Nautical Miles
MBAB	Multibeam Echosounder Acoustic Backscatter
MCD	Marine Chart Division
MHW	Mean High Water
MLLW	Mean Lower Low Water
NAD 83	North American Datum of 1983
NALL	Navigable Area Limit Line
NTM	Notice to Mariners
NMEA	National Marine Electronics Association
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NRT	Navigation Response Team
NSD	Navigation Services Division
OCS	Office of Coast Survey
OMAO	Office of Marine and Aviation Operations (NOAA)
OPS	Operations Branch
MBES	Multibeam Echosounder
NWLON	National Water Level Observation Network
PDBS	Phase Differencing Bathymetric Sonar
PHB	Pacific Hydrographic Branch
POS/MV	Position and Orientation System for Marine Vessels
PPK	Post Processed Kinematic
PPP	Precise Point Positioning
PPS	Pulse per second

Acronym	Definition
PRF	Project Reference File
PS	Physical Scientist
RNC	Raster Navigational Chart
RTK	Real Time Kinematic
RTX	Real Time Extended
SBES	Singlebeam Echosounder
SBET	Smooth Best Estimate and Trajectory
SNM	Square Nautical Miles
SSS	Side Scan Sonar
SSSAB	Side Scan Sonar Acoustic Backscatter
ST	Survey Technician
SVP	Sound Velocity Profiler
TCARI	Tidal Constituent And Residual Interpolation
TPU	Total Propagated Uncertainty
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDF	Zone Definition File

E. Approval Sheet

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 Descriptive 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 Specifications and Deliverables, Field Procedures Manual, 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 Descriptive Report.

Approver Name	Approver Title	Approval Date	Signature
John Kidd, LT/NOAA	Chief of Party	02/09/2021	Digitally signed by KIDD.JOHN.RYAN.1401688524 Date: 2021.03.11 19:23:28 -06'00'
Collin Walker LTJG/NOAA	Sheet Manager	02/09/2021	

Alex Ligon - NOAA Federal <alex.c.ligon@noaa.gov>

2020 Filed Season - Failed RSAs

4 messages

OCS NRT1 - NOAA Service Account <ocs.nrt1@noaa.gov> Fri, Feb 26, 2021 at 2:19 PM
To: Olivia Hauser - NOAA Federal <olivia.hauser@noaa.gov>
Cc: PHB Chief - NOAA Service Account <phb.chief@noaa.gov>, Brooke Maser - NOAA Federal <brooke.maser@noaa.gov>, Christopher Hare - NOAA Federal <christopher.hare@noaa.gov>, Chief NRB OCS - NOAA Service Account <chief.nrb.ocs@noaa.gov>, Jessica Murphy - NOAA Federal <Jessica.Murphy@noaa.gov>, Colin Stewart - NOAA Federal <colin.stewart@noaa.gov>, Toshi Wozumi - NOAA Federal <toshi.wozumi@noaa.gov>, Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>, Grant Froelich - NOAA Federal <grant.froelich@noaa.gov>, Collin Walker - NOAA Federal <collin.walker@noaa.gov>, Joshua Bergeron - NOAA Federal <joshua.bergeron@noaa.gov>, Alex Ligon - NOAA Federal <alex.c.ligon@noaa.gov>

CDR Hauser,

Wanted to send a response email acknowledging the RSA results we've received over the past few days. I only have one question for PHB which is highlighted in blue so it doesn't get lost.

S-K937-NRT1-20 - F00814 Hurricane Laura

- 2.2.2 Mission SSS Line - We have been unable to find this line thus far. If not present on the acquisition machine, we will document the lack of object detection in the DR appropriately.
- 2.2.2 Understructure Bathymetry and pilings - This was a drydock that was purposefully submerged in preparation for the storm. Because it was confirmed that this drydock was refloated and moved to a new location during hurricane Delta, we will clean this feature from the data.
- 2.2.3 Default CUBE values - The checkbox next to the CUBE parameters was not checked on the machine that generated the surfaces. We will regenerate with appropriate parameters.
- 2.2.5 FFF Checks - We will add verbagle to the DR stating that the submerged floating dry dock was removed as the reason it was not reported in the FFF
- 2.2.8 Offsets - Offset discrepancies have been identified and will be corrected

S-J939-NRT1-20 - F00818 Hurricane Sally

- 2.2.5 FFF Check - We will correct issues in attribution within FFF
- 2.2.8 Offsets - Offset discrepancies have been identified and will be corrected

S-K941-NRT1-20 - F00820 Hurricane Delta

- 2.2.2 Surfaces - Will submit source surfaces.
- 2.2.4 Fliers - Reported flyers will be cleaned and surfaces recomputed
- 2.2.5 FFF Checks - The feature mentioned is assumed to be the barge cap that was noted in the DR. During a conversation between Tyanne, Grant, Collin, and myself via google hangout, we all agreed that the feature should not have been reported in a FFF because it was in the intertidal zone or 'green tint'. Please advise if a FFF is still required.
- 2.2.8 Offsets - Offset discrepancies have been identified and will be corrected

S-J943-NRT1-20 - F00826 Hurricane Zeta

While this survey passed RSA, it also has the offset discrepancies noted in the other surveys and will require to be reprocessed.

- 2.2.8 Offsets - Offset discrepancies have been identified and will be corrected

--
Very Respectfully,

LT John Kidd, NOAA

Navigation Response Team Stennis - Team Coordinator
Work: 228.688.3826
Cell: 979.676.2866
Personal Cell: 757.577.2905

Shipping Address:
NDBC Building 3202 Room 211
Stennis Space Center, MS 39529

4 attachments

F00826_SAR_Checklist.pdf
866K

F00818_SAR_Checklist.pdf
867K

F00820_SAR_Checklist.pdf
1307K

F00814_SAR_Checklist.pdf
1445K

Olivia Hauser - NOAA Federal <olivia.hauser@noaa.gov> Fri, Feb 26, 2021 at 4:07 PM
To: OCS NRT1 - NOAA Service Account <ocs.nrt1@noaa.gov>
Cc: PHB Chief - NOAA Service Account <phb.chief@noaa.gov>, Brooke Maser - NOAA Federal <brooke.maser@noaa.gov>, Christopher Hare - NOAA Federal <christopher.hare@noaa.gov>, Chief NRB OCS - NOAA Service Account <chief.nrb.ocs@noaa.gov>, Jessica Murphy - NOAA Federal <Jessica.Murphy@noaa.gov>, Colin Stewart - NOAA Federal <colin.stewart@noaa.gov>, Toshi Wozumi - NOAA Federal <toshi.wozumi@noaa.gov>, Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>, Grant Froelich - NOAA Federal <grant.froelich@noaa.gov>, Collin Walker - NOAA Federal <collin.walker@noaa.gov>, Joshua Bergeron - NOAA Federal <joshua.bergeron@noaa.gov>, Alex Ligon - NOAA Federal <alex.c.ligon@noaa.gov>

Good afternoon, LT Kidd,

Thank you for the acknowledgement and detailed follow up. It is appreciated. I apologize if ambiguous guidance was provided for the feature in question. It is my recommendation that the documentation and the digital files provide matching information. If the feature exists and is discussed in the DR, it should be represented in the FFF. If it is not a feature of significance, and not worthy of any documentation, I recommend we do not document it in either place. Please let me know if that does not make sense, or is still too ambiguous for the appropriate path forward. Thank you. Have a good weekend

V/R, Olivia
[Quoted text hidden]

--

CDR Olivia Hauser, NOAA
Chief, Pacific Hydrographic Branch
NOAA Western Regional Center: Seattle, WA
Office: ~~206-526-6835~~

Cell: 302-229-3368
NOAA/NOS/OCS/HSD/PHB
olivia.hauser@noaa.gov

OCS NRT1 - NOAA Service Account <ocs.nrt1@noaa.gov> Fri, Feb 26, 2021 at 4:14 PM
To: Olivia Hauser - NOAA Federal <olivia.hauser@noaa.gov>
Cc: Alex Ligon - NOAA Federal <alex.c.ligon@noaa.gov>, Brooke Maser - NOAA Federal <brooke.maser@noaa.gov>, Chief NRB OCS - NOAA Service Account <chief.nrb.ocs@noaa.gov>, Christopher Hare - NOAA Federal <christopher.hare@noaa.gov>, Colin Stewart - NOAA Federal <colin.stewart@noaa.gov>, Collin Walker - NOAA Federal <collin.walker@noaa.gov>, Grant Froelich - NOAA Federal <grant.froelich@noaa.gov>, Jessica Murphy - NOAA Federal <Jessica.Murphy@noaa.gov>, Joshua Bergeron - NOAA Federal <joshua.bergeron@noaa.gov>, PHB Chief - NOAA Service

Account <phb.chief@noaa.gov>, Toshi Wozumi - NOAA Federal <toshi.wozumi@noaa.gov>, Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>

That makes perfect sense, we will remove it from the DR altogether.
[Quoted text hidden]
--

--
Very Respectfully,

LT John Kidd, NOAA
Navigation Response Team 1 - Gulf Coast Regional Manager
[Quoted text hidden]

Olivia Hauser - NOAA Federal <olivia.hauser@noaa.gov> Mon, Mar 1, 2021 at 3:58 PM
To: OCS NRT1 - NOAA Service Account <ocs.nrt1@noaa.gov>
Cc: Alex Ligon - NOAA Federal <alex.c.ligon@noaa.gov>, Brooke Maser - NOAA Federal <brooke.maser@noaa.gov>, Chief NRB OCS - NOAA Service Account <chief.nrb.ocs@noaa.gov>, Christopher Hare - NOAA Federal <christopher.hare@noaa.gov>, Colin Stewart - NOAA Federal <colin.stewart@noaa.gov>, Collin Walker - NOAA Federal <collin.walker@noaa.gov>, Grant Froelich - NOAA Federal <grant.froelich@noaa.gov>, Jessica Murphy - NOAA Federal <Jessica.Murphy@noaa.gov>, Joshua Bergeron - NOAA Federal <joshua.bergeron@noaa.gov>, PHB Chief - NOAA Service Account <phb.chief@noaa.gov>, Toshi Wozumi - NOAA Federal <toshi.wozumi@noaa.gov>, Tyanne Faulkes - NOAA Federal <tyanne.faulkes@noaa.gov>

NRT 1,

If you need any of the drives that contain these surveys to be physically returned to you, please email Brooke Maser with your request. Thank you.

V/R, Olivia
[Quoted text hidden]

APPROVAL PAGE

F00820

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

- Descriptive Report
- Collection of Bathymetric Attributed Grids (BAGs)
- Collection of backscatter mosaics
- Processed survey data and records
- GeoPDF of survey products

The survey evaluation and verification has been conducted according current OCS Specifications, and the survey has been approved for dissemination and usage of updating NOAA's suite of nautical charts.

Approved: Digitally signed by HOLMBERG.PETER.SCOTT.1365886101
Reason: I am approving this document
Date: 2021.08.25 08:05:59 -07'00'

Peter Holmberg
Products Team Lead, Pacific Hydrographic Branch