H13181

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

DESCRIPTIVE REPORT

Type of Survey:	Navigable Area
Registry Number:	H13181

LOCALITY

State(s):	Texas
General Locality:	Port Lavaca, TX
Sub-locality:	Matagorda Bay Entrance

2018

CHIEF OF PARTY
Andrew Orthmann

LIBRARY & ARCHIVES

Date:

U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:
HYDROGRAPHIC TITLE SHEET	**H13181**

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):	**Texas**
General Locality:	**Port Lavaca, TX**
Sub-Locality:	**Matagorda Bay Entrance**
Scale:	**40000**
Dates of Survey:	**09/04/2018 to 12/12/2018**
Instructions Dated:	**07/18/2018**
Project Number:	**OPR-K376-KR-18**
Field Unit:	**Terrasond, Ltd.**
Chief of Party:	**Andrew Orthmann**
Soundings by:	**Multibeam Echo Sounder**
Imagery by:	**Side Scan Sonar**
Verification by:	**Atlantic 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 14N, MLLW. All references to other horizontal or vertical datums in this report are applicable to the processed hydrographic data provided by the field unit.

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Descriptive Report to Accompany Survey H13181

Project: OPR-K376-KR-18

Locality: Port Lavaca, TX

Sublocality: Matagorda Bay Entrance

Scale: 1:40000

September 2018 - December 2018

Terrasond, Ltd.

Chief of Party: Andrew Orthmann

A. Area Surveyed

The survey area is located offshore SE Texas, centered on the Matagorda Bay Entrance channel. Water depths range from approximately 8 to 17 meters. Field work was carried out between September and December, 2018. Final processing and reporting was carried out between March and May, 2019. Eight other nearby sheets were surveyed concurrently. Work was done in accordance with the Hydrographic Survey Instructions (dated July 18th, 2018) and the NOS Hydrographic Surveys Specifications and Deliverables (HSSD), April 2018 edition.

A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
28° 24' 23.76" N 96° 18' 29.09" W	28° 21' 3.82" N 96° 15' 9.86" W

Table 1: Survey Limits

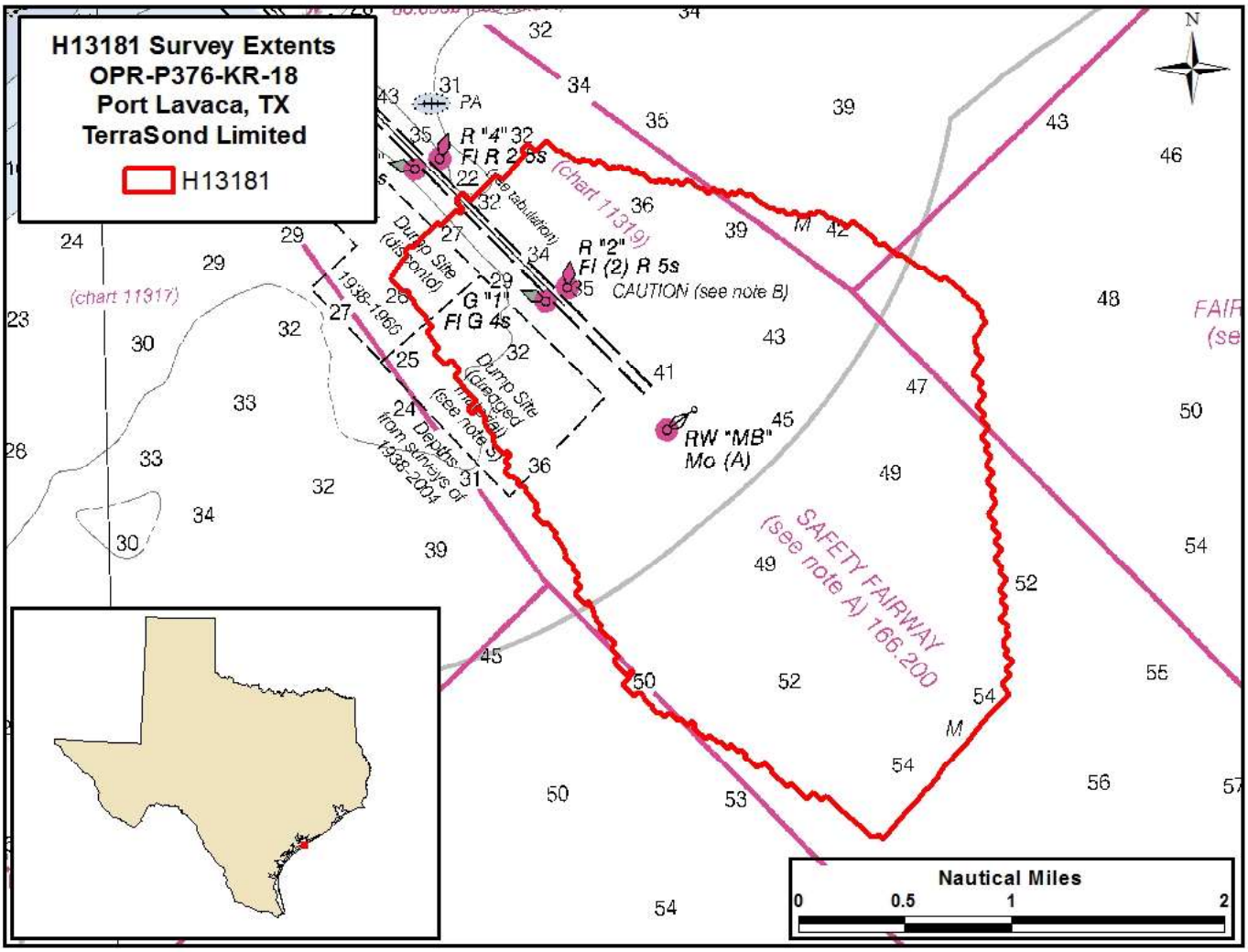

Figure 1: Graphic showing survey extents.

Survey limits were acquired in accordance with the requirements in the Project Instructions and the HSSD.

A.2 Survey Purpose

This project is located in the vicinity of Port Lavaca, which includes the Matagorda Bay Shipping Channel. Port Lavaca is a major sea port that allows shipping to support the fishing, manufacturing, agriculture, tourism, as well as the fishing industries in the state of Texas. As a leader in the shrimp processing industry, Port Lavaca allows million tons of seafood to be shipping through its port yearly. Port Lavaca also supports shipping for Matagorda Bay, which houses several large manufacturing plants and a nuclear station. The U.S. Army Corps of Engineers maintains the Matagorda Bay Shipping Channel which is dredged and there are future plans to expand this dredged channel to 44 ft. in depth and 400 ft. wide.4 The survey area covers the approaches to the shipping channel in an effort to cover all shipping traffic into the Matagorda Shipping

Channel. Recent hurricane activity in 2017 has made previous bathymetry in the area unreliable. This survey will allow shipping activities to continue into the Port of Lavaca.

A.3 Survey Quality

The entire survey is adequate to supersede previous data.

A.4 Survey Coverage

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

Water Depth	Coverage Required
F00734 and H13181	Object Detection Coverage (Refer to HSSD Section 5.2.2.2)
All waters in survey area	LNM no less than 7869 LNM. Report significant shoaling via weekly progress report. COR may adjust survey prioritization based on observed shoaling.

Table 2: Survey Coverage

Approximately 9,103 LNM were collected project-wide, which exceeds the minimum of 7,869 required in the Project Instructions. The 13.5% overage was largely due to unplanned infill/rerun work in areas of marginal data.

Except in the immediate vicinity of navigational buoys that obstructed line collection, this area was entirely completed to Object Detection standards (HSSD Section 5.2.2.2). This was primarily accomplished with "Option B: 200% SSS Coverage with Concurrent Multibeam". However, a small amount of area, usually at nadir where there wasn't sufficient SSS to achieve 200%, received "Option A: Object Detection Multibeam Coverage".

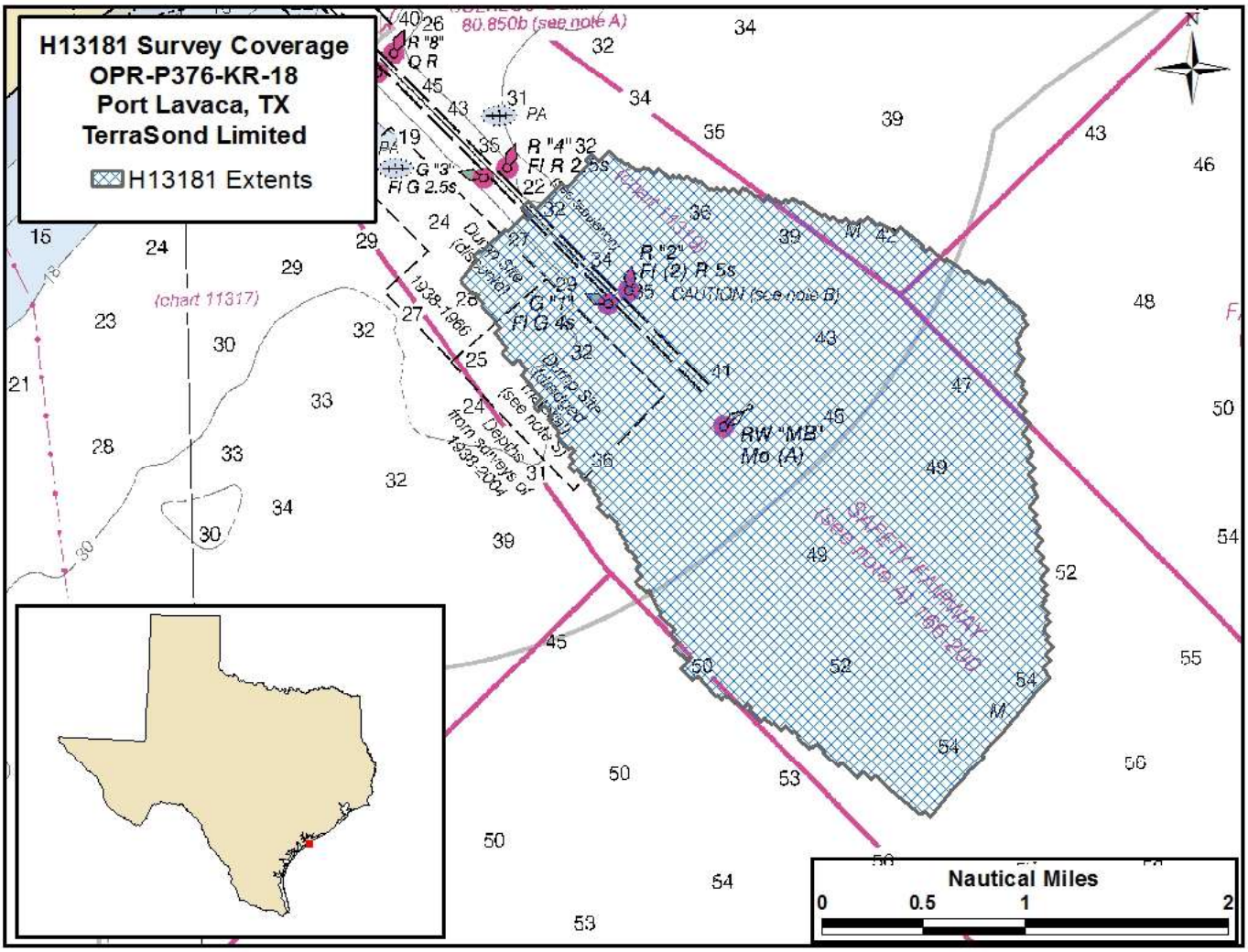

Figure 2: Graphic showing survey coverage extents.

A.5 Survey Statistics

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

	HULL ID	*Bunny Bordelon*	*Bella Marie*	*Total*
LNM	**SBES Mainscheme**	0	0	0
	MBES Mainscheme	131	0	131
	Lidar Mainscheme	0	0	0
	SSS Mainscheme	0	0	0
	SBES/SSS Mainscheme	0	0	0
	MBES/SSS Mainscheme	129.9	0	129.9
	SBES/MBES Crosslines	15.2	3.4	18.6
	Lidar Crosslines	0	0	0
Number of Bottom Samples				1
Number Maritime Boundary Points Investigated				0
Number of DPs				0
Number of Items Investigated by Dive Ops				0
Total SNM				5.9

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
09/04/2018	247

Survey Dates	Day of the Year
11/16/2018	320
11/17/2018	321
11/30/2018	334
12/10/2018	344
12/11/2018	345
12/12/2018	346

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	***Bunny Bordelon***	***Bella Marie***
LOA	45.7 meters	11 meters
Draft	3.5 meters	0.76 meters

Table 5: Vessels Used

Figure 3: Bunny Bordelon

The RV Bunny Bordelon is owned and operated by Bordelon Marine Services, LLC of Houma, Louisiana. It was outfit with a 20' conex on the back deck for working space, an A-frame and a winch for towed SSS operations, and a retractable MBES pole mid-ship on its port-side. It performed the majority of this survey.

The RV Bella Marie is owned and operated by TerraSond, based out of Corpus Christi, Texas. It was used only to collect a crossline for comparison purposes on this survey.

Other vessels described in the DAPR were not utilized on this survey.

B.1.2 Equipment

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

Manufacturer	Model	Type
Teledyne RESON	Seabat T50 IDH	MBES
EdgeTech	4200	SSS
Applanix	POS MV 320 v5	Positioning and Attitude System
AML Oceanographic	Minos-X	Sound Speed System
AML Oceanographic	MicroX SVS	Sound Speed System
Valeport	RapidSV	Sound Speed System
Valeport	SWIFT SVP	Sound Speed System
Teledyne Oceanscience	RapidCast	Underway Sound Speed Deployment 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 7.13% of mainscheme acquisition.

Effort was made to ensure crosslines had good temporal and geographic distribution, were angled to enable nadir-to-nadir as well as nadir-to-outer beam comparisons, and that the required percent of mainscheme LNM was achieved.

For good inter-vessel comparisons, crosslines were intentionally run as shallow as possible on the deep-drafted vessel (the Bunny Bordelon) to ensure significant overlap with the shallow-drafted Bella Marie mainscheme data. Likewise, Bella Marie crosslines were often extended offshore to overlap Bunny Bordelon mainscheme.

The crossline analysis was conducted using CARIS HIPS “Line QC Report” process. Each crossline was selected individually and run through the process, which calculated the depth difference between each accepted crossline sounding and a "QC" BASE (CUBE-type, 2 m resolution) surface’s depth layer created from the mainscheme data. QC surfaces were created with the same parameters used for 2 m surfaces as the final surfaces, with the important distinction that the QC surfaces did not include crosslines so as to not bias

the results. Differences in depth were grouped by beam number and statistics were computed, including the percentage of soundings with differences from the QC surface falling within IHO Order 1a.

When at least 95% of the sounding differences exceed IHO Order 1a, the crossline was considered to “pass,” but when less than 95% of the soundings compare within IHO Order 1, the crossline was considered to “fail.” A 5% (or less) failure rate was considered acceptable since this approach compares soundings to a surface (instead of a surface to a surface), allowing for the possibility that noisy crossline soundings that don't adversely affect the final surface(s) could be counted as a QC failure under this process.

Note that individual crosslines often have two or more files (or segments) in CARIS due to the automatic file splitting feature in the acquisition software (QPS QINSy). For each individual crossline, all applicable segments were selected and ran together through the QC report process so that the QC report would reflect the crossline as a whole instead of its individual file segments.

Lines used as crosslines and their % of soundings passing IHO Order 1a, sorted from highest passing to lowest, are listed below.

0890-Bunny-321-C1-236-XL -- 100.0% pass
1207-Bunny-334-C1-54 -- 100.0% pass
1208-Bunny-334-C1-165 -- 100.0% pass
1209-Bunny-334-C1-300 -- 100.0% pass
1210-Bunny-334-C1-345 -- 100.0% pass
0021-247-C1-Bella_Marie-C1-247 -- 99.9% pass (note this is the only RV Bella Marie line run in this area)

Results:

Agreement between the mainscheme-only surface and crossline soundings is excellent. Compared to the mainscheme-only surface, 5 of 6 crosslines had 100% of soundings comparing within IHO Order 1a. 1 crossline had 99.9% of its soundings compare to the mainscheme-only surface within IHO Order 1a.

Refer to Separate II: Digital Data for the detailed Crossline QC Reports.

B.2.2 Uncertainty

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	0.104 meters	0 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Surface
RV Bunny Bordelon	0 meters/second	2 meters/second	0.025 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

The surfaces were finalized in CARIS HIPS so that the uncertainty value for each grid cell is the greater of either standard deviation or uncertainty. The surfaces were then ran through NOAA's QC Tools "QA" utility to compare uncertainty values to allowable TVU by depth.

Results: Greater than 99.5% of grid cells for all final surfaces have uncertainty within the allowable TVU. The relatively few grid cells exceeding allowable TVU were found to primarily be on the edges of swaths without overlap, overlap areas exhibiting sound speed refraction error, or over features. The surfaces in these areas were examined and determined to be within specifications.

Refer to the DAPR for more information on derivation of the values used for TPU estimates.

B.2.3 Junctions

This survey junctions with one Current survey.

NOAA's "Gridded Surface Comparison V18.4" utility was used to complete the junction comparisons. The utility differences the surfaces of the junctioning surveys and generates statistics, including the percentage of grid cells that compare to within allowable TVU. 1 m-resolution CUBE surfaces were used for all comparisons.

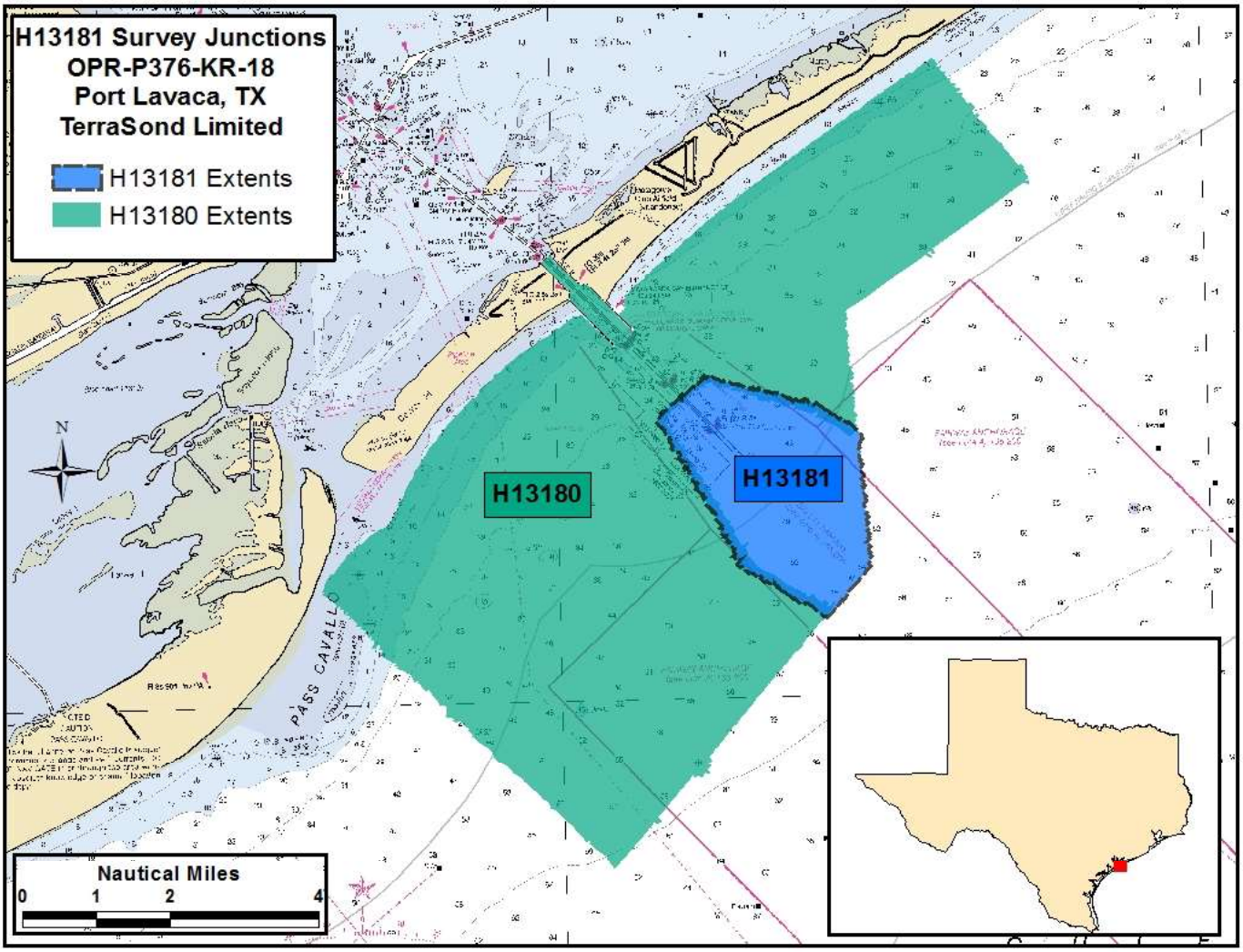

Figure 4: Graphic showing junctions with this survey.

The following junctions were made with this survey:

Registry Number	Scale	Year	Field Unit	Relative Location
H13180	1:40000	2019	Terrasond, Ltd.	NW

Table 9: Junctioning Surveys

H13180

Agreement is excellent between the two Current surveys. The mean difference is 0.01 m, and greater than 99.5% of grid cells compare to within the allowable TVU.

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

Sound Speed Error

Sound speed error or refraction is common in this data set. This is observed as a general downward or upward cupping ("frowning" or "smiling") of the seafloor MBES profiles. The issue was exacerbated by use of a dual-head MBES system, which increased swath-width in order to cover more area per LNM collected but also resulted in outer beam data that was more susceptible to induced error from variations in sound speed profiles.

Swath filters as well as manual editing in subset mode was used to reject outer beam soundings that appeared to exceed allowable TVU (considered to be greater than 0.5 m from estimated true seafloor based on nadir depth). In addition, a nadir-version of the data set was TIN'd and differenced from the final surface and inspected for areas with differences exceeding 0.5 m -- these received additional manual cleaning and rejection of erroneous soundings.

Artifact from the sound speed refraction error is readily apparent in the final surface. However, all crossline comparisons compare within IHO Order 1a, demonstrating that the final surface is within specifications.

SSS Refraction and Surface Noise

The SSS image quality is intermittently affected by thermocline refraction as well as water column noise due to waves at the surface, leading to variable artifacts in SSS data. SSS image quality was monitored continually during acquisition and SSS operations were stopped when it was determined that imagery quality had degraded to a point that significant objects were unlikely to be resolved. At this time either MBES-only

operations were carried out with a tighter line spacing to obtain Complete Coverage, or vessel downtime due to weather was commenced.

B.2.7 Sound Speed Methods

Sound Speed Cast Frequency: 2 hours

Sound speed profiles ("casts") were collected while underway. A combination of AML Minos-X, Valeport RapidSV, and Valeport SWIFT SVP profilers were used over the course of the project. Changes in sound speed at the MBES sonar head were monitored and a sound speed profile was acquired when the sound speed at the head differed from the sound speed at the depth of the sonar head in the previous profile by greater than 2 m/s. This resulted in an interval of approximately 2 hours between subsequent casts. Casts were taken as deep as possible, usually extending to the seafloor. These were normally applied nearest in distance in time within 4 hours in CARIS HIPS to exclude profiles too outdated or distant from the applicable sounding data. Refer to the DAPR for more information on SVP profiling including specific instruments used, SVP confidence checks performed, and processing methodology.

B.2.8 Coverage Equipment and Methods

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

B.2.9 MBES Data Density Re-Runs

The majority of the sheet was surveyed on JD320 and 321, when it received 200% SSS. However, it was discovered after completing the area that along-track MBES data density was insufficient to meet Object Detection standards, with 92% of grid cells having at least 5 soundings. This was due to an incorrect sonar max ping rate setting. Therefore, the lines were rerun from JD344-JD346 using the correct ping rate settings, which allowed final data density to meet Object Detection standards, with over 97% of grid cells having at least 5 soundings. SSS data was not acquired during the reruns.

B.3 Echo Sounding Corrections

B.3.1 Corrections to Echo Soundings

Although the vessel Bunny Bordelon surveyed this area, one MBES line was collected with the Bella Marie here on JD247 (line 0021-247-C1-Bella_Marie-C1-247). During this line the POSMV was not properly configured to log all POSMV records necessary for post-processing in Applanix POSPac software. Delayed Heave was available and loaded, but not post-processed SBET/SMRMSG data. This line therefore contains real-time instead of the normal PPK positioning records.

Since post-processed GPS altitudes were not available, GPS tide was not available for final reduction to MLLW via VDatum. Instead, verified tides from the nearby NWLON station Matagorda Bay Entrance (8773767) were used for this line only, and the line was merged using tides instead of GPS. The line was used as a crossline and compared against overlapping Bunny Bordelon data--which did utilize GPStide/ VDatum for reduction to MLLW, and found to agree to 0.104 m on average, which is well within allowable TVU.

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.

B.5 Data Processing

B.5.1 Primary Data Processing Software

The following Feature Object Catalog was used: NOAA Profile V_5_7.

NOAA Extended Attribute File V5.7 was used as the most current feature file version at the commencement of survey acquisition.

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
H13181_MB_50cm_MLLW_Final	CARIS Raster Surface (CUBE)	0.5 meters	0 meters - 20 meters	NOAA_0.5m	Object Detection
H13181_SSSAB_1m_400kHz_1of2	SSS Mosaic	1 meters	0 meters - 20 meters	N/A	100% SSS pass 1
H13181_SSSAB_1m_400kHz_2of2	SSS Mosaic	1 meters	0 meters - 20 meters	N/A	100% SSS pass 2

Table 10: Submitted Surfaces

The final depth information for this survey was submitted as a single-resolution CARIS BASE surface (CSAR format) which best represented the seafloor at the time of the survey. The surface was created from fully processed data with all final corrections applied. The surface was created using NOAA CUBE parameters and resolution(s) by depth range in conformance with the 2018 HSSD. The surface was finalized, and designated soundings were applied. Horizontal projection was selected as UTM Zone 14 North, NAD83. A non-finalized version of the CSAR surface is also included which does not have a depth cutoff applied--this surface does not have the "_Final" designation in the filename.

A crossline QC surface is also included with the surface deliverables ("H13181_XLQC-MS-only_2m"). This is the 2 m resolution CUBE surface in CSAR format discussed previously in the crossline section used to create the crossline QC reports. This surface excludes crosslines. It is included for reference only and should not be used for charting.

SSS mosaics were exported from Chesapeake SonarWiz 7 software at 1 m resolution using a gray scale pallet per the 2018 HSSD. Two were generated to show 100% coverage of each SSS pass, for 200% total. Note the near-nadir region of some lines may not have 200% SSS coverage but received object-detection BES coverage instead. These were also projected as UTM Zone 14 North, NAD83.

The SSS gray scale coverages are not the SonarWiz default color pallet, which is a bronze color -- as a result the gray scale images appear rougher and less visually appealing than the bronze images. Therefore, bronze color versions are also included for reference and are recommended for use over the gray scale versions.

An S-57 (.000) Final Feature File (FFF) was submitted with the survey deliverables as well. The FFF contains meta-data and other data not readily represented by the final surfaces, including bottom samples and feature investigation results. An S-57 SSS contact file is also included. Each object is encoded with mandatory S-57 attributes and NOAA Extended Attributes (V#5.7).

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 Methods Used:

ERS via VDATUM

Ellipsoid to Chart Datum Separation File:

VDATUM_Outline_Shape_xyNAD83-MLLW_geoid12b.csar

Reduction to MLLW was accomplished using ERS methodology via VDATUM. The VDATUM model was provided by NOAA prior to operations and had an uncertainty specified as 10.4 cm. The VDATUM model was validated during this survey using comparisons with NWLON gauge data and found to be acceptable for tidal reduction. See the HVCR for validation reports.

As discussed previously in this report, verified tidal data from nearby NWLON station Matagorda Bay Entrance (station 8773701) was used to correct one survey line which did not have GPS altitude data available. The line compared to 0.1 m in average to overlapping VDATUM-corrected data.

C.2 Horizontal Control

The horizontal datum for this project is North American Datum 1983.

The projection used for this project is Projected UTM 14.

The following PPK methods were used for horizontal control:

Smart Base

Applanix Smart Base (ASB) was used as a comparison against Trimble PP-RTX results, and generally compared to 0.10 m or better.

Positions were post-processed in Applanix POSPac MMS software using Trimble PP-RTX as the correction source. RMS errors were generally at 0.10 m or better, both horizontally and vertically.

WAAS was used for real-time positioning only, and was replaced in post-processing with PP-RTX solutions for final MBES data (except for one line noted earlier in this report). However SSS positions were not post-processed and are therefore based on WAAS positioning.

D. Results and Recommendations

D.1 Chart Comparison

The chart comparison was performed by examining the best-scale Electronic Navigational Charts (ENCs) that intersect the survey area. The latest edition(s) available at the time of the review were used. The chart comparison was accomplished by overlaying the finalized BASE surfaces with shoal-biased soundings, and final feature file on the charts in CARIS HIPS. The general agreement between charted soundings and survey soundings was then examined and a more detailed comparison was undertaken for any shoals or other dangerous features.

USCG LNM and NMs applicable to the survey area issued subsequent to the start of operations and prior to completion of operations were also examined. For this survey these consisted of LNM/NM 36/18 to 51/18. None were found that were applicable to this survey.

When comparing to survey data, chart scale was taken into account so that 1 mm at chart scale was considered to be the valid radius for charted soundings and features.

It is recommended that in all cases of disagreement this survey should supersede charted data. Results are shown in the following sections.

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	Preliminary?
US5TX32M	1:50000	30	07/13/2018	03/11/2019	NO
US4TX31M	1:80000	26	03/11/2019	03/19/2019	NO
US5TX33M	1:40000	40	09/28/2018	03/11/2019	NO

Table 11: Largest Scale ENCs

US5TX32M

There is a small amount of overlap between this survey and US5TX32M. Agreement is excellent, with soundings agreeing to 0.5 m or better. There are no apparent trends in shoaling or deepening.

US4TX31M

US4TX31M fully overlaps this survey.

General sounding agreement is excellent, with most soundings agreeing to 0.5 m or better. Best agreement is in the southern part of the survey area, where most soundings agree to within 0.2 m.

In the north part of the sheet near the channel there is greater disagreement, with some soundings on the west side of the channel disagreeing by up to 1.2 m. The area west of the channel appears to be slightly deeper than charted on average.

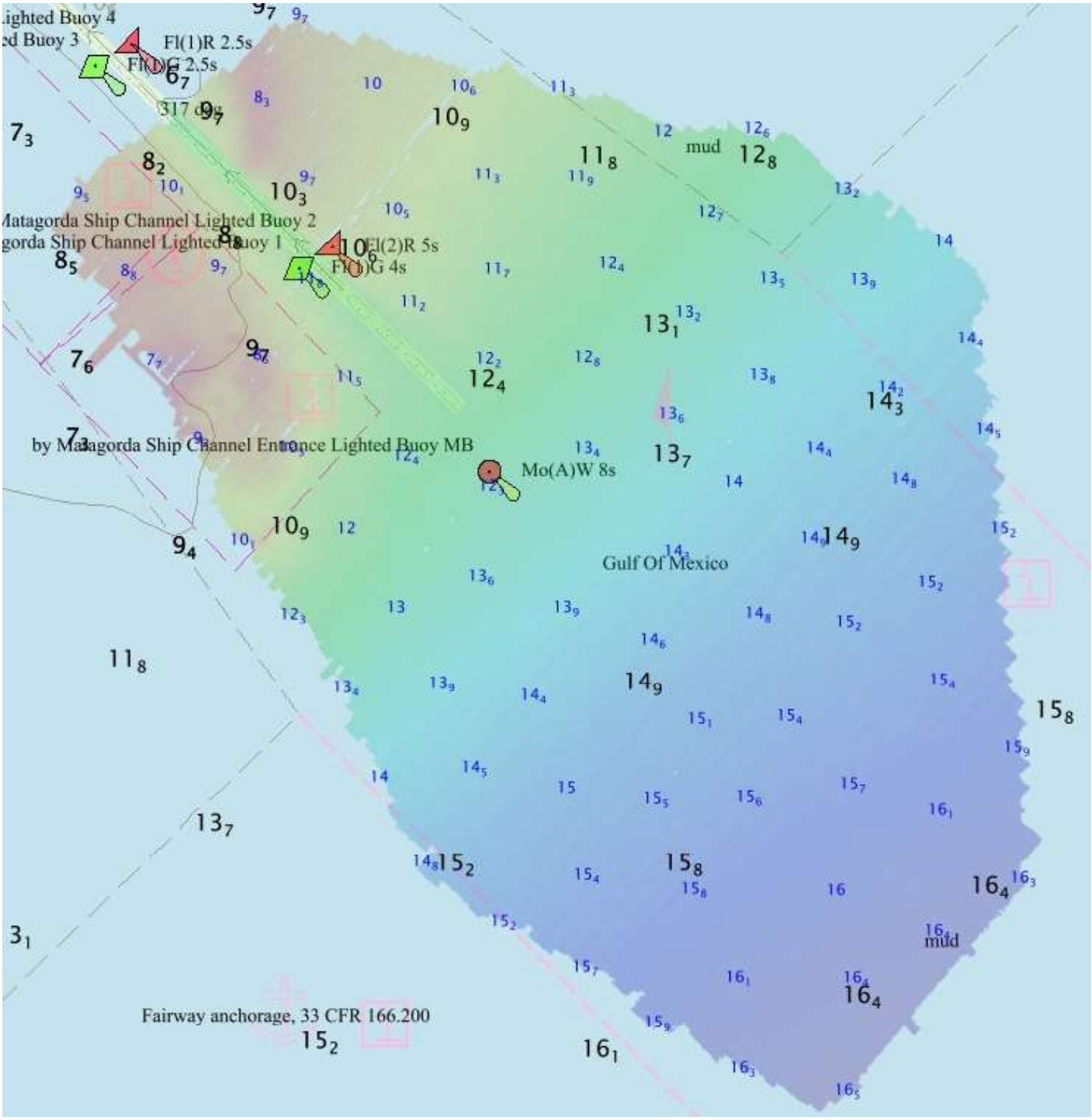

Figure 5: Soundings from this survey (blue) overlaid on soundings from US4TX31M (black). Soundings in meters.

US5TX33M

US5TX33M overlaps the northern part of this survey.

General sounding agreement is good. Most soundings agree to 0.5 m or better.

The largest differences are on the west side of the channel, where there is some disagreement by up to 1.8 m. The area west of the channel appears to be deeper on average than shown on US5TX33M.

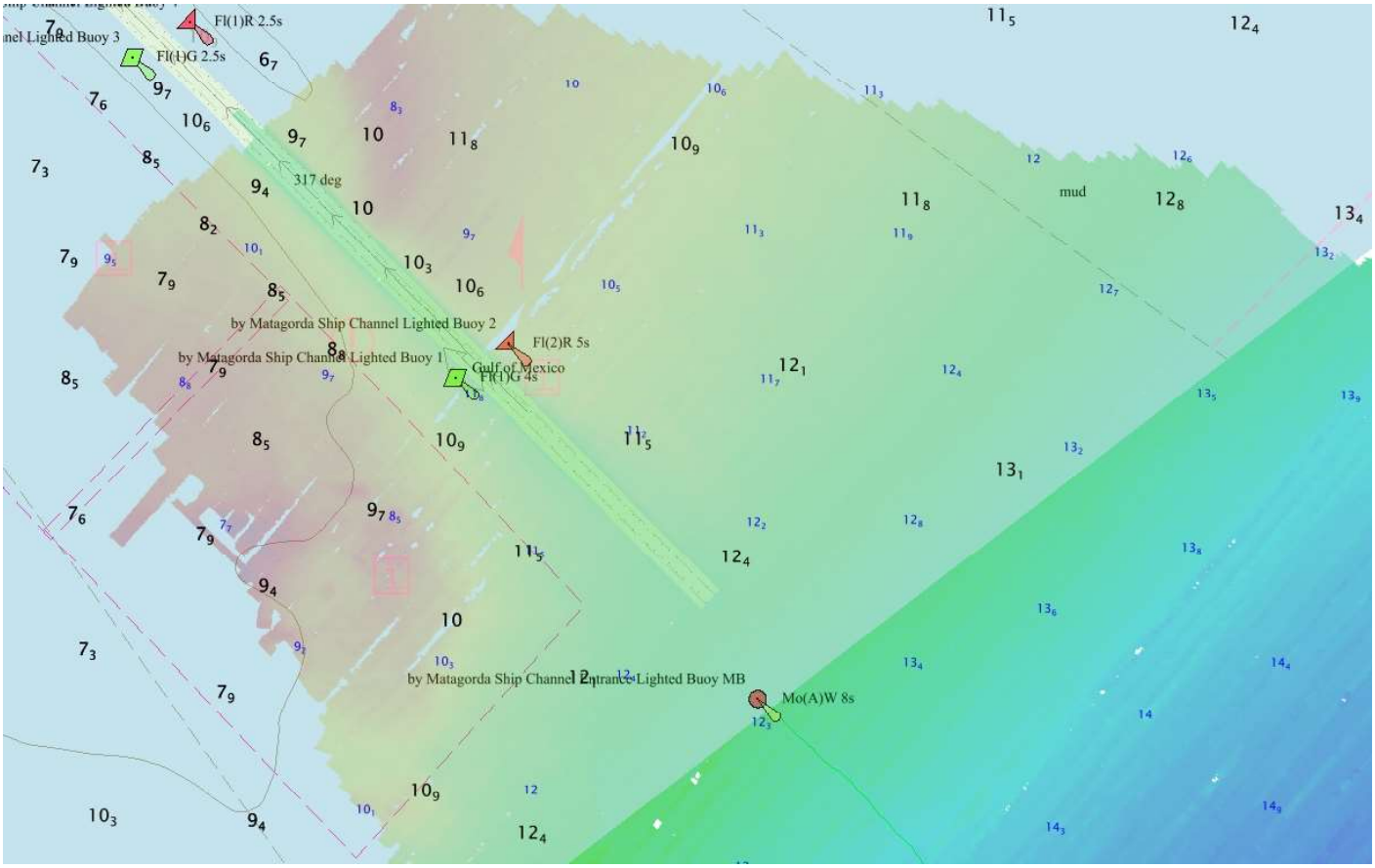

Figure 6: Soundings from this survey (blue) overlaid on soundings from US5TX33M (black). Soundings in meters.

D.1.2 Maritime Boundary Points

No Maritime Boundary Points were assigned 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 Shoal and Hazardous Features

No shoals or potentially hazardous features exist for this survey.

D.1.6 Channels

The survey area contains the southern portion and approaches to Matagorda Ship Channel. Chart 11317 lists controlling depths (dated September, 2017) for the "Sea Bar and Jetty Channel" portion of the channel as 37 to 39 feet (11.27 to 11.89 meters). This survey found depths in the channel of approximately 12.65 to 13.5 meters.

A Caution Area warning about strong currents in the Matagorda Bay Channel is charted in the channel. Strong currents were confirmed by the field crews. This warning should be retained.

A charted Navigation Line of 316.7 bearing in the channel with accompanying Recommended Track appear accurate and should be retained.

Dumping grounds for dredge spoils are charted on the west side of the channel. These were within the assigned survey area and were surveyed accordingly. Variable seafloor is confirmed in the area, likely from the material dumped. These should be retained.

Charted Dredge Areas associated with the channel appear to be correct and should be retained.

A charted Fairway associated with the channel also appears to be correct and should be retained. The overall Safety Fairway charted for the area was not investigated.

D.1.7 Bottom Samples

One sample was assigned in the project PRF. A sample was successfully obtained at the assigned location and returned primarily soft brown mud. Bottom sample results are provided in the accompanying FFF.

D.2 Additional Results

D.2.1 Shoreline

Shoreline was not assigned in the Hydrographic Survey Project Instructions or Statement of Work.

D.2.2 Prior Surveys

No prior survey comparisons were required for this survey.

D.2.3 Aids to Navigation

All charted ATONs within the survey extents were confirmed to be on station and serving their intended purpose.

D.2.4 Overhead Features

No overhead features exist for this survey.

D.2.5 Submarine Features

No submarine features exist for this survey.

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 and/or Environmental Conditions

No abnormal seafloor and/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.

The Work Instructions note there are future USACE plans to expand the dredged channel to 44' (13.41 m).

D.2.10 New Survey Recommendation

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

D.2.11 Inset Recommendation

No new insets are recommended for this area.

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 document as well as the Hydrographic Survey Project Instructions and Statement of Work. This data is adequate to supersede charted data in their common areas. This survey is complete and no additional work is required with the exception of deficiencies--if any--noted in the Descriptive Report.

Report Name	Report Date Sent
Coast Pilot Report	2019-04-25
VDatum Validation Report for Port Lavaca	2019-04-24
NCEI Sound Speed Data Submission	2019-04-09
Marine Mammal Observers Training Logsheet and Observation Logs	2019-03-22
Port Lavaca Boat Float Tide Analysis	2018-09-18

Approver Name	Approver Title	Approval Date	Signature
Andrew Orthmann, C.H.	TerraSond Charting Program Manager	05/03/2019	Andrew Orthmann Digitally signed by Andrew Orthmann Date: 2019.05.03 18:30:09 -08'00'

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	Continually Operating Reference Staiton
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
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
HSSD	Hydrographic Survey Specifications and Deliverables

Acronym	Definition
HSTP	Hydrographic Systems Technology Programs
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
NAIP	National Agriculture and Imagery Program
NALL	Navigable Area Limit Line
NM	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
PST	Physical Science Technician
RNC	Raster Navigational Chart
RTK	Real Time Kinematic
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
TPE	Total Propagated Error
TPU	Topside Processing Unit
USACE	United States Army Corps of Engineers
USCG	United Stated Coast Guard
UTM	Universal Transverse Mercator
XO	Executive Officer
ZDA	Global Positiong System timing message
ZDF	Zone Definition File

APPENDIX I

Tides and Water Levels

Appendix I contains the following documentation.

1. Abstract of Times of Hydrography
2. Correspondence directly relating to tides and/or water levels

Data was reduced to MLLW using a VDATUM grid provided by NOAA. Therefore no Tide Notes, Transmittal Letters, or Request for Approved Tides letters exist.

The VDATUM model received a validation analysis; results are available with the project HVCR.

Abstract of Times of Hydrography

Project: OPR-K376-KR-18

Registry No.: H13181

Contractor: TerraSond Limited

Inclusive Dates: September 4, 2018 – December 12, 2018

Field work is complete.

All times UTC.

Year_DOY	Min Time	Max Time
2018_247	14:17:57	14:56:41
2018_320	09:07:26	23:56:37
2018_321	00:01:29	13:18:57
2018_334	08:57:13	11:42:18
2018_344	06:30:55	18:21:52
2018_345	07:57:43	18:48:32
2018_346	01:41:40	04:38:23

Andrew Orthmann, CH

From: Andrew Orthmann, CH
Sent: Tuesday, September 18, 2018 10:35
To: 'Kathryn Pridgen - NOAA Federal'
Cc: 'nathan@joasurveys.com'
Subject: boat float analysis for Port Lavaca
Attachments: port_lavaca_boat_float_analysis.pdf

Hi Katy, please see attached an analysis that JOA Surveys completed for the PPK-boat float data completed on the Sea Ark for the Port Lavaca project. I'll likely refer questions on the analysis to Nathan Wardwell (cc'd).

Andy

Andrew Orthmann, CH

From: Andrew Orthmann, CH
Sent: Wednesday, April 24, 2019 11:21
To: 'kathryn.pridgen@noaa.gov'
Subject: VDatum Validation Report for Port Lavaca
Attachments: JOA 430 - OPR-K376-KR-18 Tide Report.pdf

Hi Katy,

The VDATUM validation report is complete for the Port Lavaca, TX project. This was the vessel waterline analysis that was proposed.

No action items here; overall it looks good. There were some outlier vessel waterlines in a figure on page 4 that I discussed with Nathan at JOA (who wrote the report) and we determined to be some bad waterline elevations, which has been addressed.

The report is FYI; it will be included with the survey deliverables attached to the HVCR as well.

Andy

APPENDIX II

Supplemental Survey Records and Correspondence

Contents:

1. DTON recommendation(s) with NDB verification(s), if any

2. Other survey-related correspondence. See Appendix I for correspondence directly relating to tides and water levels.

Andrew Orthmann, CH

From: Kathryn Pridgen - NOAA Federal <kathryn.pridgen@noaa.gov>
Sent: Wednesday, August 01, 2018 15:05
To: Andrew Orthmann, CH; Thomas Newman, PLS, CH
Cc: Stacy Fullerton - NOAA Federal; Corey Allen - NOAA Federal; Martha Herzog - NOAA Federal
Subject: Re: EA133C14CQ0036 Task Order 1305M218FNCNJ0146
Attachments: OPR-K376-KR-18_Port Lavaca.zip

Andy and Thomas
Here is the final project package for Port Lavaca. Also, I wanted to offer your staff a pre-project briefing meeting to go over details and requirements of the project. This is not a requirement and is completely optional on the part of Terrasond. Just let me know if it's desired.

Katy

Kathryn "Katy" Pridgen
Physical Scientist
NOAA-HSD OPS
240-533-0033
kathryn.pridgen@noaa.gov

On Wed, Aug 1, 2018 at 4:24 PM, Andrew Orthmann, CH <aorthmann@terrasond.com> wrote:

> Received. Thank you for the opportunity to complete this task order. We will get to work on it immediately.
>
> Andy
>
> Andrew Orthmann, C.H.
> Charting Program Manager
>
> **TerraSond**
> **Precision Geospatial Solutions ®**
> 1617 South Industrial Way Suite 3, Palmer, Alaska 99645
> (907) 745-7215 Office (907) 745-7273 FAX (907) 982-5231 Cell
> aorthmann@terrasond.com www.terrasond.com
>
>
> **From:** Stacy Fullerton - NOAA Federal <stacy.fullerton@noaa.gov>
> **Sent:** Wednesday, August 01, 2018 11:41

To: Andrew Orthmann, CH <aorthmann@terrasond.com>; Thomas Newman, PLS, CH <tnewman@terrasond.com>
Cc: Kathryn Pridgen - NOAA Federal <kathryn.pridgen@noaa.gov>; Corey Allen - NOAA Federal <corey.allen@noaa.gov>; Eastern Operations Eastern Operations - NOAA Service Account <easternoperations@noaa.gov>; Martha Herzog - NOAA Federal <martha.herzog@noaa.gov>
Subject: EA133C14CQ0036 Task Order 1305M218FNCNJ0146

Good Afternoon,

Please find the attached OF347 task order award document for hydrographic survey in the vicinity of Port Lavaca, Texas for your records/action.

Katy Pridgen is the appointed COR for this task order.

Please acknowledge receipt.

Thank you,

Stacy

--

Stacy Fullerton
Contract Specialist, NOAA, AGO
Eastern Acquisition Division
Supporting National Ocean Service
200 Granby Street, Suite 815
Norfolk, VA 23510
Phone: 757-441-3420
Fax: 757-441-3786

Andrew Orthmann, CH

From: Kathryn Pridgen - NOAA Federal <kathryn.pridgen@noaa.gov>
Sent: Tuesday, September 18, 2018 05:26
To: Andrew Orthmann, CH
Subject: Re: project visit

Andy
I do concur with the points from my site visit. The only point I wish to add a bit more clarification on was #2.
2. For the assigned features and their associated search radii area inside the bay, obvious features found in the search area (example, assigned feature is a platform and we indeed find a platform there) don't require additional survey since the feature was verified.

This all is true as long as the feature verified in the search radius was the feature it was assigned for. For example, if the search radius was assigned to find a wreck feature, and while just starting to survey the radius you find a different feature than the wreck that was assigned, like a pipeline or something, then you still need to continue to look for the wreck. If you find the wreck after searching only half of the radius, then yes you can move on without surveying the other half. As long as you find the feature that the radius was assigned for then you do not have to finish surveying the radius, you can move on after you fully survey the feature assigned.

That was the only thing that I wanted to make sure we were on the same page about. Thank you for allowing me to visit!

Katy

Kathryn "Katy" Pridgen
Physical Scientist
NOAA-HSD OPS
240-533-0033
kathryn.pridgen@noaa.gov

On Mon, Sep 17, 2018 at 8:13 PM, Andrew Orthmann, CH <aorthmann@terrasond.com> wrote:

> Hi Katy, just sent the weekly progress – as noted, the Bunny Bordelon mob is still "on" for this week, so that is pretty much on schedule. Our initial mob crew has arrived there (Houma, Louisiana) today and will be starting on the mob tomorrow. I'll travel there Wednesday to help mob and seatrial and be on that boat for at least a week to get things up and running before returning our Alaska office.
>
> Have you had a chance to look at this points from our visit? Can you confirm that you concur or not with these? And please feel free to add any clarification?
>
> Thank you,
>
> Andy

Andrew Orthmann, CH

From: Brian Mohr - NOAA Federal <brian.mohr@noaa.gov>
Sent: Thursday, January 31, 2019 03:17
To: Andrew Orthmann, CH
Subject: Re: OPR-K376-KR-18 Port Lavaca survey outlines

Got it, thank you, I'll get H13181, H13185, H13186, H13187 updated in SURDEX shortly.

Brian Mohr
Physical Scientist - Data Manager
Hydrographic Surveys Division
brian.mohr@noaa.gov

On Fri, Jan 25, 2019 at 1:38 PM Andrew Orthmann, CH <aorthmann@terrasond.com> wrote:

> Hello,
>
> Please find attached survey outlines for project OPR-K376-KR-18, Port Lavaca, TX.
>
> Please note this is for 4 of 9 sheets in the project, the remaining sheets are in still being actively surveyed but should be finished soon.
>
> Thank you,
>
> Andy
>
> Andrew Orthmann, C.H.
> Charting Program Manager
>
> **TerraSond**
> **Precision Geospatial Solutions ®**
> 1617 South Industrial Way Suite 3, Palmer, Alaska 99645
> (907) 745-7215 Office (907) 745-7273 FAX (907) 982-5231 Cell
> aorthmann@terrasond.com www.terrasond.com
>

Andrew Orthmann, CH

From: Blair Delean - NOAA Federal <blair.j.delean@noaa.gov>
Sent: Friday, March 22, 2019 14:53
To: Andrew Orthmann, CH
Cc: pop.information@noaa.gov; ocs.ecc@noaa.gov; Kathryn Pridgen - NOAA Federal
Subject: Re: OPR-K376-KR-18 marine mammal observation logs

Excellent, thank you Andrew for your submission to the marine mammal POP.

Very Respectfully,

LTJG Blair Delean, NOAA
Marine Mammal Laboratory
206.526.4048

On Fri, Mar 22, 2019 at 1:32 PM Andrew Orthmann, CH <aorthmann@terrasond.com> wrote:

> Hello,
>
> Attached are the Marine Mammal Observation logs from OPR-K376-KR-18, Port Lavaca, TX.
>
> Andy
>
> Andrew Orthmann, C.H.
> Charting Program Manager
>
> **TerraSond**
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> aorthmann@terrasond.com www.terrasond.com
>

Marine Mammal Training Video Logsheet
OPR-K376-KR-18 Port Lavaca, TX

List of those who have watched the Marine Species Awareness Training video:

Printed Name	Signature	Date
T. Marino		8/22/18
D. Maggio	David Maggio	9/21/18
P. Kelly		9/21/18
B. Hanson		9/26/18
S. Udy		10/1/18
H. Nikolis		10/1/18
LUCAS BLASS		11/15/2018
Whitney Martin	Whitney Martin	11/15/18
L. HOLLAHAN		~~1/17/19~~ LH 10/28/18

Andrew Orthmann, CH

From: Andrew Orthmann, CH
Sent: Friday, March 22, 2019 12:26
To: 'ocs.ecc@noaa.gov'
Cc: 'Kathryn Pridgen - NOAA Federal'
Subject: OPR-K376-KR-18 trained marine mammal observer logsheet
Attachments: OPR_K376_KR_18_MMO_TrainingVideoLogsheet.pdf

Hello, please find attached the marine mammal training logsheet for the OPR-K376-KR-18, Port Lavaca, TX project.

Thank you,

Andy

Andrew Orthmann, C.H.
Charting Program Manager

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Precision Geospatial Solutions ®
1617 South Industrial Way Suite 3, Palmer, Alaska 99645
(907) 745-7215 Office (907) 745-7273 FAX (907) 982-5231 Cell
aorthmann@terrasond.com www.terrasond.com

Andrew Orthmann, CH

From: Andrew Orthmann, CH
Sent: Tuesday, April 09, 2019 13:36
To: 'NODC.submissions@noaa.gov'
Cc: 'kathryn.pridgen@noaa.gov'
Subject: sound speed profile data submission for OPR-K376-KR-18
Attachments: OPR-K376-KR-18_20190409.zip

Hello,

Please find attached the sound speed profile data for nautical charting project OPR-K376-KR-18. These were taken by TerraSond near Port Lavaca, TX, during the period August 2018 to February, 2019.

Please note the .nc files are organized in the zip file by the three vessels used on the project. These were the MV Sea Ark (hull id # SOM28799I506), RV Bella Marie (hull # IAR36CATK405), and RV Bunny Bordelon (USCG official number 1113614).

Please feel free to contact me with any questions.

Thank you,

Andy

Andrew Orthmann, C.H.
Charting Program Manager

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aorthmann@terrasond.com www.terrasond.com

Andrew Orthmann, CH

From: Andrew Orthmann, CH
Sent: Thursday, April 25, 2019 09:50
To: 'ocs.ndb@noaa.gov'; 'Coast.Pilot@noaa.gov'
Cc: 'Kathryn Pridgen - NOAA Federal'
Subject: Coast Pilot Review for OPR-K376-KR-18
Attachments: OPR-K376-KR-18_Coast Pilot Review Report.pdf

Hello,

Please find attached the Coast Pilot Review for the hydrographic survey OPR-K376-KR-18, Port Lavaca, TX. This pertains to Coast Pilot 5, 46th edition.

Feel free to contact me with any questions.

Thank you,

Andy

Andrew Orthmann, C.H.
Charting Program Manager

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APPROVAL PAGE

H13181

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
- Data Acquisition and Processing Report
- Collection of Bathymetric Attributed Grids (BAGs)
- Processed survey data and records
- GeoPDF of survey products
- Collection of Backscatter mosaics

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: MCGOVERN.MEGHAN.ELIZABETH.1284020495 Digitally signed by MCGOVERN.MEGHAN.ELIZABETH.1284020495 Date: 2020.05.06 10:50:28 -04'00'

Commander Meghan McGovern, NOAA
Chief, Atlantic Hydrographic Branch