U.S. Department of Commerce National Oceanic and Atmospheric Administration National Ocean Service		
]	DESCRIPTIVE REPORT	
Type of Survey:	Navigable Area	
Registry Number:	H13207	
	LOCALITY	
State(s):	Texas	
General Locality:	Galveston Bay	
Sub-locality:	Galveston Bay-Red Fish Shoal	
	2019	
	CHIEF OF PARTY Dan Jacobs	
	LIBRARY & ARCHIVES	
Date:		

NATIONAL	U.S. DEPARTMENT OF COMMERCE OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTRY NUMBER:	
HYDROGRAPHIC TITLE SHEETH13207			
INSTRUCTIONS: The Hydrog	<b>INSTRUCTIONS:</b> 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:	Galveston Bay		
Sub-Locality:	ty: Galveston Bay-Red Fish Shoal		
Scale:	10000		
Dates of Survey:	10/03/2018 to 12/04/2019		
Instructions Dated:	04/24/2019		
Project Number:	S-K928-NRT4-19		
Field Unit:	NOAA Navigation Response Team - Galveston		
Chief of Party:	Dan Jacobs		
Soundings by:	Multibeam Echo Sounder		
Imagery by:	Side Scan Sonar		
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	
A.4 Survey Coverage	
A.6 Survey Statistics	8
B. Data Acquisition and Processing	
B.1 Equipment and Vessels	
B.1.1 Vessels	10
B.1.2 Equipment	11
B.2 Quality Control	13
B.2.1 Crosslines	13
B.2.2 Uncertainty	
B.2.3 Junctions.	16
B.2.4 Sonar QC Checks	16
B.2.5 Equipment Effectiveness	17
B.2.6 Factors Affecting Soundings	17
B.2.7 Sound Speed Methods	
B.2.8 Coverage Equipment and Methods	19
B.3 Echo Sounding Corrections	20
B.3.1 Corrections to Echo Soundings	
B.3.2 Calibrations	
B.4 Backscatter	20
B.5 Data Processing	
B.5.1 Primary Data Processing Software	
B.5.2 Surfaces	
B.5.3 CARIS HIPS File Issues	23
C. Vertical and Horizontal Control	23
C.1 Vertical Control	23
C.2 Horizontal Control	23
D. Results and Recommendations	
D.1 Chart Comparison	24
D.1.1 Electronic Navigational Charts	26
D.1.2 Shoal and Hazardous Features	26
D.1.3 Charted Features	
D.1.4 Uncharted Features	27
D.1.5 Channels	
D.2 Additional Results	
D.2.1 Aids to Navigation	
D.2.2 Maritime Boundary Points	29
D.2.3 Bottom Samples	
D.2.4 Overhead Features	
D.2.5 Submarine Features	29

## **List of Tables**

Table 1: Survey Limits	1
Table 2: Survey Coverage	4
Table 3: Hydrographic Survey Statistics	9
Table 4: Dates of Hydrography	10
Table 5: Vessels Used	10
Table 6: Major Systems Used	11
Table 7: Survey Specific Tide TPU Values	14
Table 8: Survey Specific Sound Speed TPU Values	15
Table 9: Primary imagery data processing software	
Table 10: Submitted Surfaces	
Table 11: ERS method and SEP file	
Table 12: Largest Scale ENCs	

# List of Figures

Figure 1: Assigned survey limits, H13207 (Chart 11327)	2
Figure 2: Survey Limits, Approximately 47 percent of project was completed	3
Figure 3: H13207 100 percent Side Scan Mosaic, 1m resolution	5
Figure 4: H13207 200 percent Side Scan Mosaic, 1m resolution	6
Figure 5: H13207 50cm Finalized 50cm CUBE Surface (NOAA Chart 11327)	7
Figure 6: Data Density Compliance, Finalized 50cm CUBE Surface	8
Figure 7: S3008	11
Figure 8: EM2040C Multibeam Echosounder	12
Figure 9: Edgetech 4125 Side Scan Sonar	13
Figure 10: H13207 Crossline Comparison	14
Figure 11: Finalized 50cm CUBE Surface, Passes Total Vertical Uncertainty (TVU) Object Detection	
Criteria	15
Figure 12: Data Density Compliance, Finalized 50cm CUBE Surface	16
Figure 13: Fliers of discovered invoking Pydro's Flier Finder Tool. The 50 cm grid was manually cleaned	1 in
CARIS 11.2 Subset Editor	18
Figure 14: SonTek Castaway CTD	19
Figure 15: Selected SSS Lines (partial list shown) which contributed to each 100 percent SSS Mosaic	22
Figure 16: H13207 Soundings 1 foot deeper than Charted (11327) Soundings	25

Figure 17: Charted (11327) 6 foot contours no longer exist. Charted (11327) "15" foot soundings no	longer
exist	
Figure 18: Chart 11327 Obstruction Warning, south end of project area	
Figure 19: Chart 11327 Note - Obstructions Exist - Pipes, Piles, Stakes, Platforms	28
Figure 20: Uncharted pipelines and pipe segments occurred in great numbers, H13207	
Figure 21: NEW Pipeline area polygons, pink, dashed lines. (yellow - previously digitized line	
segments)	31

## **Descriptive Report to Accompany Survey H13207**

Project: S-K928-NRT4-19 Locality: Galveston Bay Sublocality: Galveston Bay-Red Fish Shoal Scale: 1:10000 October 2018 - December 2019 **NOAA Navigation Response Team - Galveston** Chief of Party: Dan Jacobs

## A. Area Surveyed

Project S-K928-NRT4-19 is comprised of 1 sheet, H13207. Per project instructions, the purpose of the survey was to investigate chart discrepancy features in the Galveston Bay area, North of Red Fish Bar. NRT4 was assigned to disprove or confirm the existence of many "Position Approximate" or "PA" charted features with precise location and least depth. Additionally, the team was tasked with updating the hydrography in this area adhering to NOAA object detection standards set forth in the 2019 HSSD.

## A.1 Survey Limits

Data were acquired within the following survey limits:

Northwest Limit	Southeast Limit
29° 32' 38.05" N	29° 31' 18.87" N
9° 51' 48.55" W	94° 50' 8.47" W

Table 1: Survey Limits



Figure 1: Assigned survey limits, H13207 (Chart 11327).

Approximately 47 percent of the assigned survey area was completed with Object Detection Multibeam concurrent with 200 Percent Side Scan coverage. Crew and equipment safety considerations for this industrialized area made H13207 particularly challenging. S3008 experienced two propeller strikes which in turn created maintenance delays. Additionally, the team's staffing was down 1 person thus no daily shore side processing or support occurred. By late summer, it became evident that the project area was replete with new features; some posing safety concerns for the crew and equipment. As such, it was determined by leadership that the project would be "squared off" as weather dictated and the team began work on a separate survey near the Galveston Bay Entrance. Please reference the project's Correspondence Folder for all emails pertaining.



Figure 2: Survey Limits, Approximately 47 percent of project was completed.

### A.2 Survey Purpose

Project S-K928-NRT4-19 is comprised of 1 sheet, H13207. Per project instructions, the purpose of the survey was to investigate chart discrepancy features in the Galveston Bay area, North of Red Fish Bar. NRT4 was assigned to disprove or confirm the existence of many "Position Approximate" or "PA" charted features with precise location and least depth. Additionally, the team was tasked with updating the hydrography in this area adhering to NOAA object detection standards set forth in the 2019 HSSD.

## A.3 Survey Quality

The entire survey is adequate to supersede previous data.

Survey data form this project is recommended for charting. All acquired data meets the 200 percent object detection side scan coverage concurrent with multibeam per 2019 HSSD, paragraph 5.2.2. Survey coverage to the project sheet limits was not attained, however. All side scan coverage data gaps were addressed for

both 100 and 200 percent object detection side scan coverage by running additional side scan lines. Data gaps occurred due to wind, waves, and pipe obstructions.

## 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

#### Table 2: Survey Coverage

Approximately 47 percent of the assigned survey area was completed with Object Detection Multibeam coverage concurrent with 200 Percent Side Scan coverage in accordance with 2019 HSSD, paragraph 5.2.2. Object detection multibeam coverage was attained per 2019 HSSR guidelines "At least 95 percent of all nodes on the surface shall be populated with at least 5 soundings" in section 5.2.2. See each 100 percent mosaic Pydro derived Data Density Compliance histogram below.



Figure 3: H13207 100 percent Side Scan Mosaic, 1m resolution.



Figure 4: H13207 200 percent Side Scan Mosaic, 1m resolution.



Figure 5: H13207 50cm Finalized 50cm CUBE Surface (NOAA Chart 11327).



Figure 6: Data Density Compliance, Finalized 50cm CUBE Surface.

## **A.6 Survey Statistics**

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

	HULL ID	<i>S3008</i>	Total
	SBES Mainscheme	0	0
	MBES Mainscheme	0	0
	Lidar Mainscheme	0	0
TNM	SSS Mainscheme	0	0
	SBES/SSS Mainscheme	0	0
	MBES/SSS Mainscheme	255.04	255.04
	SBES/MBES Crosslines	19.14	19.14
	Lidar Crosslines	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 S	SNM		2.38

Table 3: Hydrographic Survey Statistics

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

Survey Dates	Day of the Year
10/03/2018	276
12/04/2019	338

#### Table 4: Dates of Hydrography

H13207 was originally drafted in Summer 2018 although work did not begin until October of that year as vessel maintenance, team relocation USACE Galveston's Jadwin Building and subsequent move to NOAA's Flower Garden Banks lab in Galveston was occurring during this time. Team responses to Hurricane Lane, Hurricane Michael and a USACE survey request of the Brazos River precluded finishing this project for that year. Initially, it was thought the team would continue to acquire data as weather permitted during the winter of 2019. However a 35 day government shutdown concurrent with the resignation of one crew member rendered this plan infeasible during that time frame. Data acquisition to H13207 resumed May 31, 2019 at the conclusion of a compressed training and maintenance schedule that year. The survey sheet was squared off on December 3rd, 2019 per discussion with NRB Project Manager and Chief, NRB in December 2019. Additional challenges due to resignation of second teammate in December 2019, maintenance and training interruptions in January 2020, processing other surveys, a Response in February 2020, and the COVID19 Pandemic made this project's submission late.

## **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	S3008
LOA	10 meters
Draft	0.5 meters

Table 5: Vessels Used



*Figure 7: S3008* 

NOAA Survey Vessel S3008 is a 30 foot, aluminum hulled fire boat modified for NOAA hydrographic survey operations. S3008 is powered by dual 225 horsepower Honda outboard engines. A Kohler 7.5 EKD generator supplies AC power for two workstations, 5 monitors, one POS system, one multibeam echosounder system, and one side scan sonar system.

#### **B.1.2 Equipment**

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

Manufacturer	Model	Туре
Kongsberg Maritime	EM 2040C	MBES
EdgeTech	4125	SSS
Applanix	POS MV 320 v5	Positioning and Attitude System

Table 6: Major Systems Used





Figure 8: EM2040C Multibeam Echosounder





Figure 9: Edgetech 4125 Side Scan Sonar

Please reference NRT4's 2019 DAPR accompanying this project for all equipment specifications.

## **B.2 Quality Control**

#### **B.2.1** Crosslines

Multibeam crosslines acquired for H13207 totaled 35448.97 meters or 7.51 percent of mainscheme lines (472336.15 meters) thus exceeding the 2019 HSSD object detection requirement of 4 percent. A 50 cm crossline surface was compared to a 50 cm mainscheme surface invoking the Pydro Compare Surfaces script. The two surfaces were in excellent agreement with each other as 99 percent of the nodes passed the allowable IHO error fraction. The analysis was performed on MBES data reduced to MLLW using ellipsoidally referenced RTX SBET methods. Please reference the folder named Crossline\_Comparisons for all analysis outputs. Please reference crossline comparison graphic, below.

The Pydro QC Tool/Flier Finder discovered approximately 9200 edge fliers and several hundred other fliers of varying categories. These fliers have been cleaned/remedied to the best ability of the hydrographer; 2-3 still remain.



Figure 10: H13207 Crossline Comparison

#### **B.2.2 Uncertainty**

The following survey specific parameters were used for this survey:

Method	Measured	Zoning
ERS via VDATUM	12.6 centimeters	0 meters

Table 7: Survey Specific Tide TPU Values.

Hull ID	Measured - CTD	Measured - MVP	Measured - XBT	Surface
S3008	4 meters/second	0 meters/second	0 meters/second	2 meters/second

Table 8: Survey Specific Sound Speed TPU Values.

A priori and realtime uncertainty sources were incorporated into the depth estimates of this survey. The realtime uncertainties from the Kongsberg MBES sonar and POS MMS (delayed heave) were recorded and applied during post processing. Likewise, the post-processed uncertainties associated with vessel position were applied in CARIS HIPS 11.1 using SBET/RTX files (smrmsg file) generated by POSPac software. The finalized, 50cm grid's uncertainty was calculated using "greater of the two" of uncertainty and standard deviation. Over 99 percent of processed, finalized grid nodes passed object detection Total Vertical Uncertainty (TVU) criteria. See Pydro derived histogram plot below.

Object detection multibeam coverage was attained per 2019 HSSR guidelines "At least 95 percent of all nodes on the surface shall be populated with at least 5 soundings" in section 5.2.2. See Pydro derived Data Density Compliance histogram below.



Figure 11: Finalized 50cm CUBE Surface, Passes Total Vertical Uncertainty (TVU) Object Detection Criteria.



Figure 12: Data Density Compliance, Finalized 50cm CUBE Surface.

#### **B.2.3 Junctions**

No junctions were assigned for S-K928-NRT4-19.

There are no contemporary surveys that junction with this survey.

#### **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**

#### Abundance of new features

A shallow sea, oil and gas field lies exclusively within the bounds of H13207. Object detection methods mandated careful investigation and multibeam development of more than 175 new features. The new features appear to be old pipes and broken pipeline segments situated between charted platforms.

#### **B.2.6 Factors Affecting Soundings**

#### Noisy Data, MBES Outer Beams

Multibeam data exhibited much noise, particularly in the outer quarters of the beam swath. Although Kongsberg swath width was reduced from 65 to 55 degrees in SIS (beginning on DN151\_2019), over 9000 fliers existed resulting in multiple iterations of cleaning. The majority of these fliers were of the category "6" classification - Edge Fliers. Noisy outer beams continue to plague the teams due to hull design and MBES placement.



*Figure 13: Fliers of discovered invoking Pydro's Flier Finder Tool. The 50 cm grid was manually cleaned in CARIS 11.2 Subset Editor.* 

#### 50 meter Range Scale vs 25 Meter Range Scale

The two days of side scan acquisition in 2018 were of 50 meter range scale coverage. At that time, the team believed 50 meter Range Scale was the lowest setting possible for the Edgetech 4125. The team performed splits and backfilled the 2018 side scan coverage with 25 meter range scales during the 2019 Field Season.

#### **B.2.7 Sound Speed Methods**

Sound Speed Cast Frequency: 1 cast per 4 hours of multibeam echosounder data collection.

The CastAway-CTD is a small, rugged CTD designed for profiling to depths of up to 100m. The system achieves a 5 Hz response time, fine spatial resolution, and high accuracy, with sound speed measurements accurate within ±0.15 m/s. It uses a six electrode flow-through conductivity cell with zero external field coupled with a rapid response thermistor to attain high measurement accuracies. The instrument is simple to deploy, does not require a pump and is hydrodynamically designed to free fall rate of 1 m/s. Each CastAway-CTD cast is referenced with both time and location using its built-in GPS receiver. Latitude and longitude are acquired both before and after each profile. Plots of conductivity, temperature, salinity and sound speed versus depth can be viewed immediately on the

CastAway's integrated color LCD screen. Raw data is downloaded via Bluetooth to the launch acquisition computer for analysis and to export into SIS. The survey area was not zoned to account for sound speed variations as differing water masses did not exist in this area, out in the middle of Galveston Bay.



Figure 14: SonTek Castaway CTD.

### **B.2.8** Coverage Equipment and Methods

Object Detection survey methods were attained throughout the survey area per 2019 HSSD, paragraph 5.2.2. While operating in partial coverage, the EM2040C collects data concurrently with the EdgeTech 4125 imagery, commonly referred to as "skunk striping". NRT4 operates the EM2040C at a frequency of 300kHz for normal operations, as specified in the Kongsberg operator's manual. Edgetech 4125 imagery

was collected with a 25 meter range scale for EACH 100 percent coverage as survey depths averaged 9 to 10 feet.

### **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**

Backscatter was not acquired for this survey.

Although backscatter was not a requirement, the filed unit had collected backscatter data. A backscatter mosaic was processed during office review at PHB.

### **B.5 Data Processing**

#### **B.5.1 Primary Data Processing Software**

Manufacturer	Name	Version
CARIS	HIPS and SIPS	From HIPS-SIPS Version 11.1 to HIPS-SIPS Version 11.2.3 upgraded, October 2019. See pdf named "HIPS 11.2 Release" in Project Correspondence folder. This software upgrade was an attempt to correct SS contact attribution "timing out" bug. The SSS hips file became corrucpted in early January - and SSS lines would not recompute towfish navigation. Lines were reprocessed and digitized.

The following software program was the primary program used for imagery data processing:

Table 9: Primary imagery data processing software

The following Feature Object Catalog was used: NOAA Extended Attribute Files 2019 V4..

The batch file (CARIS\_Support\_Files\_2019v3.bat) copied Version 2019v4 of the NOAA CARIS support files from the C:\CARIS\CARIS\_Support\_Files\_2019v3 folder to the correct CARIS folders on each team member's laptop.

#### **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
H13207_MB_50cm_MLLW	CARIS Raster Surface (CUBE)	0.5 meters	1.7 meters - 5.4 meters	NOAA_0.5m	Object Detection
H13207_MB_50cm_MLLW_Final	CARIS Raster Surface (CUBE)	0.5 meters	1.7 meters - 5.4 meters	NOAA_0.5m	Object Detection
H13207_SSSAB_1m_400kHz_1of2	SSS Mosaic	1 meters	1.7 meters - 5.4 meters	NOAA_1m	100% SSS
H13207_SSSAB_1m_400kHz_2of2	SSS Mosaic	1 meters	1.7 meters - 5.4 meters	NOAA_1m	200% SSS

Table 10: Submitted Surfaces

One 50cm CUBE surface and two 100 percent side scan surfaces are being submitted for project S-K922-NRT4-19. Multibeam data exhibited much noise, particularly in the outer quarters of the beam swath where edge fliers were profuse. Side scan coverage requirements were met implementing 25m range scales for depths averaging about 9 feet in accordance with 2019 HSSD, Section 6.1.2.3. Data gaps due to wind, waves and obstructions were remedied by running additional spits. A list of survey lines that contributed to each 100 percent mosaic can be found in the "SupportFiles" folder accompanying this report.

¥ 🛎 H132	207_SSS Track Lines
× ///	Frack Lines
¥ =	Vessel = 'NRT4_S3008_SSS_USM'
`	Day = '2018-276'
	0151_1018
	0152_1044
	0153_1109
	0154_1136
	0155_1203
	0156_1230
	0157_1257
	0158_1325
	Day = '2018-277'
	0150_1241
	0159_0832
	0160_0857
	0161_0924
	0161_0947
	0162_0949
	0163_1015
	0164_1038
	2 0164_1055
	2 0165_1111
	2 0166_1143
	010/_1211
	M Day = 2019-151
	220_1223 221_0257_1506
	0259_1420
	0200_1407
	20111347 2012 1327
	0263 1305
	0264 1239
	0265 1219
	0266 1156
	Ø903 1050

Figure 15: Selected SSS Lines (partial list shown) which contributed to each 100 percent SSS Mosaic.

#### **B.5.3 CARIS HIPS File Issues**

NRT4 migrated from CARIS 11.1.4 to 11.2.3 on or about November 2, 2019. It was thought at this time CARIS 11.1.4 had a bug preventing side scan contact attribution in SIPS. Another CARIS software bug in CARIS 11.2.3 was discovered in the Spring of 2020 during processing and submission of H13207. The issue seems to stem from a corrupted HIPS file and several DELETED designated soundings remain in the critical soundings layer despite being re-accepted in subset editor. A CARIS help desk ticket was submitted for the issue. Please reference the project correspondence folder for electronic communications, pertaining. At the time of submission of H13207, the corrected HIPS file had not been received by the CARIS. The CARIS Help Desk Request Number is 02001435.

## **C. Vertical and Horizontal Control**

Additional information discussing the vertical or horizontal control for this survey can be found in the accompanying HVCR. Processing methods are listed in the 2019 HSSD, Section C.1.

### **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	S-K928_Vdatum_Limits_xyNAD83-MLLW_geoid12b

Table 11: ERS method and SEP file

The vertical uncertainty for this project is 12.6 centimeters, Mean Lower Low Water (MLLW). Soundings were reduced from NAD83 to MLLW using Vdatum file "S-K928\_Vdatum\_Limits\_xyNAD83-MLLW\_geoid12b" located in the survey "Water\_Levels" folder. This value was applied in Charlene v3.1.5.

## 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.

#### <u>PPP</u>

Trimble CenterPoint RTX is the preferred method for the positioning for the Western Gulf of Mexico where horizontal accuracies of 2 cm or less may be achieved without the use of reference stations. CenterPoint RTX service was accessed via an Internet connection within one hour after field operations had concluded. Applanix POSPac MMS 8.4 software was used access Trimble RTX server infrastructure to produce a Smoothed Best Estimate of Trajectory (SBET) file implementing the Applanix proprietary "SmartBase" algorithm. The SBET file consisted of GPS position and attitude data corrected and integrated with inertial measurements and correctors which were then exported to the GRS80 reference ellipsoid. These SBET navigation and attitude files were applied to all lines in CARIS and supersede initial positioning and attitude data.

## **D. Results and Recommendations**

### **D.1 Chart Comparison**

H13207 Survey Soundings were found to be consistently 1 foot deeper compared to Charted (11327) soundings throughout the project. Charted (11327) 6 foot contours no longer exist in the southeast corner of survey coverage. Charted (11327) "15" foot soundings do not exist in the southeast portion of the survey coverage.



Figure 16: H13207 Soundings 1 foot deeper than Charted (11327) Soundings.



*Figure 17: Charted (11327) 6 foot contours no longer exist. Charted (11327) "15" foot soundings no longer exist.* 

#### **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
US5TX54M	1:25000	57	03/11/2020	03/11/2020

Table 12: Largest Scale ENCs

#### **D.1.2 Shoal and Hazardous Features**

New, submerged obstructions were discovered in great abundance throughout the H13207 survey area and exhibited highest concentrations between charted oil platforms. The objects appear to be plumbing (pipe segments and hoses) of metal or heavy rubber construction or stakes. The Field used a somewhat arbitrary object height threshold of 0.7 meters to differentiate "New" discrete point features vs generalizing various

other pipeline areas where a multitude of pipelines occurred mostly flat to the seabed. On account of such narrow diameters (often < 0.2 meters) some pipes proved challenging in their height evaluation with CARIS SIPS Side Scan Editor. Attaining least depths with MBES developments also proved challenging sometimes as safety concerns precluded direct passes over the contacts being investigated. Consequently, several features lack a true least depth but a "depth known" value derived from surrounding depths minus (-) contact shadow height. Several "rounds" of contact picking occurred but only the highest quality side scan contact images were retained for inclusion in the S57 Folder named "SSS Contacts". Other 100 and 200 percent "\$CSYM" contacts were archived in the Multimedia Folder of this project for reference purposes.

#### **D.1.3 Charted Features**

Charted features were assigned and exist for this survey. The majority of features are oil platforms, pipes and pipe "PAs." Attributions made IAW 2019 HSSD, section 7.3. and 7.5.1. guidelines. Attribution occurred in CARIS BDB version 5.3.9. implementing the NOAA Profile Version 2019 Catalog. Please reference the Final Feature File in the project folder named "S57" for all mandatory attribution information.

#### **D.1.4 Uncharted Features**

Uncharted features exist for this survey. The majority of features are oil pipes, tubing, piles and stakes with attributions made IAW 2019 HSSD, section 7.3. and 7.5.1. Where groupings of such features occurred at distances < 2mm at survey scale, the most prominent (shoal) feature was chosen for the Final Feature File and appropriately attributed.

No DTONs were selected for this project despite abundance of NEW and "PA" protruding pipes, stakes, tubes, pilings and platforms. Two chart notes (11327) explicitly and adequately warn the prudent mariner of industrial obstructions throughout this oil field. Vessel traffic in the area was observed to be rare during survey dates specified. Maintenance activities to some platforms were observed occurring via shallow draft, oil tender boats - an estimated frequency of 1 vessel every 10 days.

GAS AND OIL WELL STRUCTURES



Figure 18: Chart 11327 Obstruction Warning, south end of project area.



Figure 19: Chart 11327 Note - Obstructions Exist - Pipes, Piles, Stakes, Platforms.

#### **D.1.5** Channels

No channels exist for this survey. There are no designated anchorages, precautionary areas, safety fairways, traffic separation schemes, pilot boarding areas, or channel and range lines within the survey limits.

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

#### **D.2.1** Aids to Navigation

Aids to navigation (ATONs) exist for this survey - on the western edge of the assigned sheet limits - but were not investigated.

#### **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**

No overhead features exist for this survey.

#### **D.2.5 Submarine Features**

Uncharted pipelines or pipe segments occur in great numbers throughout the H13207 survey area. At the Hydrographer's discretion only pipelines which appeared to be main trunks and/or interconnecting pipes between platforms were digitized to delineate and generalize pipeline areas (vs discrete pipeline "Line" features). Both side scan line imagery and mosaics were consulted in the assessment. Individual pipelines segments "Pipsol" were not fully attributed in CARIS SIPS or BDB, nor was this a requirement. Please reference electronic communications between Chief, PHB and NRT4 regarding "PIPARE" digitizing in the project correspondence folder. The line features were exported as as "CSYM\_pisol" and archived in a folder entitled "SSS\_First\_Round" of the S57/Side Scan Sonar Contacts folder for the Reviewer's appraisal and readjustments to the derived pipeline area polygons.



Figure 20: Uncharted pipelines and pipe segments occurred in great numbers, H13207.



Figure 21: NEW Pipeline area polygons, pink, dashed lines. (yellow - previously digitized line segments)

#### **D.2.6 Platforms**

Several Assigned, Charted (11327) Platforms PA required re-positioning as object detection survey methods placed their position > 2 mm from survey scale (10000). In such instances, the field recommended DELETE on the platform original position and NEW for the platforms new position. Please refer to the final feature file in the projects S57 Folder.

#### **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 and/or environmental conditions exist for this survey.

#### **D.2.9** Construction and Dredging

No present or planned construction or dredging exist within the survey limits.

#### **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 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, 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
Dan Jacobs	Chief of Party	06/12/2020	JACOBS.DAN, Digitally signed by JACOBS.DANL.1151633478 L.1151633478

# 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
СО	Commanding Officer
CO-OPS	Center for Operational Products and Services
CORS	Continuously Operating Reference Station
СТД	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
РНВ	Pacific Hydrographic Branch
POS/MV	Position and Orientation System for Marine Vessels
РРК	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

#### APPROVAL PAGE

#### H13207

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)
- 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:

Peter Holmberg Products Team Lead