Cover Sheet (NOAA Form 76-35A)

NOAA FORM 76-35A

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

Horizontal and Vertical Control Report

Type of Survey Navigable Area Survey

Project No. OPR-J359-KR-20

Registry No. F00803, H13290, H13291, H13357, H13358, H13359, H13360

LOCALITY

State: Florida

General Locality: Northwest Gulf of Mexico

Sublocality: Indian Pass to East Pass, including St. George Sound

2020

CHIEF OF PARTY
Allison Stone

LIBRARY & ARCHIVES

DATE.....

☆U.S. GOV. PRINTING OFFICE: 1985—566-054

Title Sheet (NOAA Form 77-28)

NOAA FORM 77-28 (11-72) U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	REGISTER NO.
HYDROGRAPHIC TITLE SHEET	F00803, H13290, H13291, H13357, H13358, H13359, H13360
INSTRUCTIONS – The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office	FIELD NO. Fugro USA Marine, Inc.

State: Florida

General Locality: Northwest Gulf of Mexico

Locality: Indian Pass to East Pass, including St. George Sound
Scale: 1:5000 & 1:20:000 Date of Survey 04/17/2020 – 10/16/2020 Instructions dated: March 25, 2020 Project No. OPR-J359-KR-20

Vessels: M/V Pelagos (N893565), M/V GO Freedom (8998100), M/V Koach Kline (SAMA1083J999), Blue Shadow 1 (GB-ASV 30A01 E1918)

Chief of party: Allison Stone

Surveyed by: Rokyta, Stone, Walker, Minton, Careen, Byas, Green, Burch, Munene

Soundings taken by: FR Dual Head Reson 7125 (M/V Pelagos, Stern Mount), FR Dual Head Reson 7125 (GO Freedom, Over the Side Mount), Single Head Reson 7125 (M/V Koach Kline, Bow Mount), Dual Rx EM2040-4 (Blue Shadow 1, retractable gondola)

Graphic record scaled by: Fugro Personnel

Graphic record checked by Fugro Personnel

Protracted by N/A Automated plot by N/A

Verification by Atlantic Hydrographic Branch

Soundings in METERS at MLLW

REMARKS: The purpose of this survey is to provide contemporary surveys to update National Ocean Service (NOS) nautical charting products.

ALL TIMES ARE RECORDED IN UTC.

FUGRO USA Marine, Inc.
6100 HILLCROFT STREET
HOUSTON, TX 77081

NOAA FORM 77-28 SUPERSEDES FORM C & GS-537 U.S. GOVERNMENT PRINTING OFFICE: 1986 -652-007/41215

A – Vertical Control

Multibeam vertical control for OPR-J359-KR-20 was provided by way of an Ellipsoidal Reference System which was reduced to MLLW using a separation model created with NOAA's VDatum v3.9 (Figure 1 and Table 1).

During field operations, soundings data collected M/V Pelagos, M/V Koach Kline, M/V GO Freedom and Blue Shadow 1 were initially reduced to MLLW using a zero-tide file and merged in CARIS HIPS.

Vessel GPS data was post-processed using either the Applanix POSPac PP-RTX, and essentially analogous Novatel's Waypoint GPS 8.9.0 and Waypoint Inertial Explorer 8.9.0 routine to create an SBET file. Following the computation, SBETs were then applied to sounding data in CARIS HIPS, replacing the real-time GPS navigation position with a post-processed GPS position. The separation model was created with NOAA's VDatum v3.9 and applied in CARIS HIPS using the GPS tide function to reduce the post processed ellipsoidal heights to MLLW.

VDatum reduced tidal data were used for all final CUBE Surfaces, soundings, and S-57 feature files.

There were no unusual tidal conditions to note during the OPR-J359-KR-20 survey.

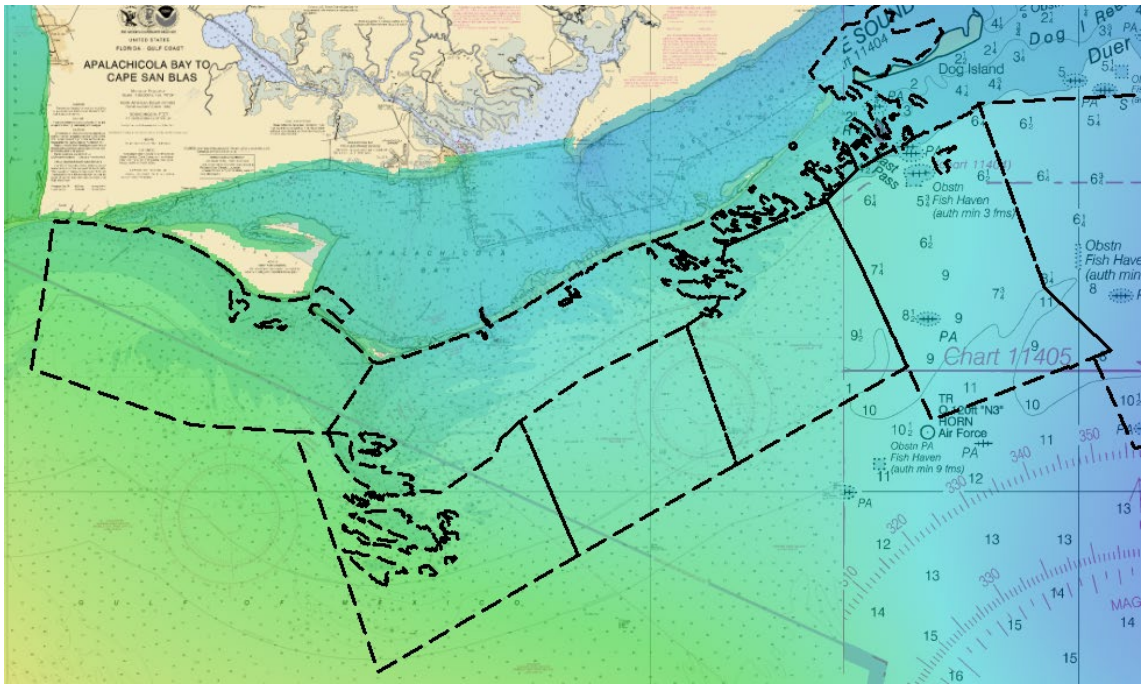

Figure 1: VDatum grid NAD83 to MLLW covering OPR-J359-KR-20 extents

VDatum Software Version	VDatum v3.9
Geoid	2012
Regional Area	FL apalach01, ALFL gom02, FL joseph03
Regional Area Version	8301
Separation Uncertainty	9.7cm

Table 1: VDatum Model

B – Horizontal Control

The horizontal control datum for this survey is NAD83. Horizontal data for all vessels was collected in the ITRF00 coordinate system and exported to NAD83 in post-processing.

For real-time data collection, POS/MV units were utilized on M/V Pelagos, M/V GO Freedom and M/V Koach Kline. POS/MV units v.4 and v.5 were configured to accept Fugro's Marinestar G2 corrections. Marinestar G2 service is a real-time GPS and GLONASS Precise Point Positioning (PPP) service providing refined satellite 'clock and orbit' data to any GNSS receiver with a valid subscription. Signals on the L-band with corrections are broadcasted by geo-stationary satellites and are received by the integrated GNSS/L-band antenna. The unit outputs corrected positions at 1 Hz to the POS units where they are integrated with inertial data. A position for the top-center of the IMU is generated, providing a horizontal accuracy of 10cm and a vertical accuracy of 15cm.

This positioning data was logged concurrently with the bathymetry from WinFrog and the POS file using Fugro Pelagos PosMvLogger for the M/V Pelagos, M/V GO Freedom and M/V Koach Kline. For multibeam data, the real-time solution was later replaced with a POSPac PP-RTX post-processed solution that was applied in CARIS HIPS as an SBET.

PP-RTX is a GNSS aided-inertial module built into POSPac MMS 8.3 that provides centimeter level post processed positioning accuracies without the use of a local reference station. It uses a global network of roughly 100 stations tracking multiple positioning satellites to provide the raw data necessary to resolve ambiguities and provide ephemeris corrections which are available within 1 hour of data collection over the internet.

To ensure solution accuracy, each SBET was reviewed for quality before being applied to the data. Ideally, solutions had a separation difference under ten centimeters and were in a fixed solution for the period of acquisition. Additionally, PDOP values were confirmed to be under 3.0 and the number of satellites tracked more than five. If a solution was found to fail one or more checks, the processing project would undergo greater scrutiny and additional reprocessing until it was of sufficient quality to be applied to the data.

To calculate position and attitude of the vessel, Blue Shadow1 was equipped with Kongsberg Seapath 380-R3 inertial navigation system. A Seapath system consists of GNNS receiver and a 5th generation Kongsberg Seatex MRU. Seatex MRU provides attitude data up to 0.008° RMS roll and pitch accuracy. Seapath 380-R3 system outputs highly accurate combination of GNNS signals and inertial measurements with zero delay at frequency up to 200 Hz for a real-time data collection. Real time GNNS data were recorded on PC housed onboard of ASV.

Similar to Applanix POS Pac for POS M/V data, real time GNSS data from the Seapath system were postprocessed using Novatel software. Waypoint GPS 8.9.0 and Waypoint Inertial Explorer 8.9.0 were used to process data and SBETs were calculated. Postprocessed solutions were reviewed for quality and applied to MBES data in CARIS in order to replace real time records.

Refer to the Data Acquisition and Processing Report for additional information on system calibrations and confidence checks.

Approval Sheet

For

F00803, H13290, H13291, H13357, H13358, H13359, H13360

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 Horizontal and Vertical Report, and all accompanying records and data are approved. All records are forwarded for final review and processing to the Processing Branch.

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

Approved and forwarded,

Allison C Stone

Digitally signed by Allison C Stone
Date: 2020.12.16 09:46:30 -05'00'

Allison Stone,
Hydrographer
Fugro USA
Marine, Inc.
Dec. 14, 2020

Appendix I -Tides and Water Levels

No Tides were applied to survey data.

PP-RTX

POSPac MMS™ (Mobile Mapping Suite) was used for Post Processing of all vessel horizontal and vertical positioning data. POSPac includes a post-processed implementation of Trimble's CenterPoint RTX service (Trimble's approach to PPP), which has been integrated with Applanix's IN-Fusion GNSS Aided inertial processing algorithm. PP-RTX provides centimeter level positioning worldwide, without reference stations. This proves particularly valuable in remote areas as it does not require access to CORS stations, or installation and maintenance of a local base station. Using real-time data from a global reference station infrastructure of approximately 100 stations to provide the raw data necessary for analyses and processing, it provides ephemeris corrections within 1 hour which can be used to post process navigation data.

Appendix II – Horizontal Control

No ground control stations were used.