
C. VERTICAL AND HORIZONTAL CONTROL

Refer to the Horizontal and Vertical Control Report for a detailed description of the horizontal and vertical control used during this survey. Refer to Appendix IV for specific times and dates of relevant tide data. A summary of horizontal and vertical control used for the survey follows.

C.1 VERTICAL CONTROL

Vertical control for this survey was based on MLLW at the National Water Level Observation Network (NWLON) stations at Naples, FL (872-5110) and Key West, FL (872-4580), as well as the subordinate station at Smith Shoal Light, FL (872-4671).

The Naples station (872-5110) served as datum control for this project. Data observed at the Naples station was used to conduct a MLLW datum transfer to the short-term subordinate station installed by JOA at Smith Shoal Light. Naples observations were not used for the reduction of soundings. The Key West station (872-4580) was used for preliminary and final reduction of depth soundings and to derive preliminary and final tidal zoning for the project area. The subordinate station at Smith Shoal Light (872-4671) was established in late August, 2011 by JOA and was used for final reduction of depth soundings and to derive final tidal zoning for the project area. The USCG approved JOA's application to temporarily occupy the Smith Shoal Light with the subordinate tide station.

All tide stations recorded continuously during data collection periods and were used for the duration of the survey.

In order to define the most accurate final discrete tide zoning model possible it was proposed, and approved by the NOAA COTR, that short-term deployments of a bottom mounted tide gauge be conducted by JOA at two locations within the project area. The bottom-mounted gauge was deployed in the Quicksands area just prior to the JOA mobilization of the subordinate station at Smith Shoal Light and then moved to the vicinity of Boca Grande Key following install. The bottom mounted tide gauge remained at the Boca Grande Key location throughout the data collection period and was removed during the Smith Shoal Light demobilization. Approval was sought and provided by the Florida Keys National Marine Sanctuary to conduct these deployments.

The data acquired at the Quicksands and Boca Grande Key was not used in the final reduction of soundings. The data was specifically used to analyze the tidal processes between Key West, Smith Shoal Light, Boca Grande Key and the Quicksands. The resultant final discrete zoning provided by JOA models these processes more accurately with utilization of the Boca Grande and Quicksands bottom mounted tide gauge data.

Station details are as follows:

Gauge	Location	NAD83	
		Latitude (N)	Longitude (W)
872-5110	Naples, FL	26° 07.9'	81° 48.4'
872-4580	Key West, FL	24° 33.3'	81° 48.4'
872-4671	Smith Shoal Light	24° 43.1'	81° 55.3'
BMTG	The Quicksands	24° 36.6'	82° 27.3'
BMTG	Boca Grande Key	24° 33.7'	81° 59.7'

Table 8: Tide Station Locations

C.2 ZONING

Fugro Pelagos, Inc. acquires and reviews all preliminary data relative to the ellipsoid. This enables a rapid approach to data quality review shortly after acquisition and automated processing. Verification of ellipsoid referenced data is also more efficient in the FPI workflow. The preliminary tide zoning supplied by NOAA CO-OPS was used only for the manual tide reduction of raw depths over significant features observed during, and just following, the data acquisition period. The reduced depths of these significant features were reported to the NOAA Atlantic Hydrographic Branch as Dangers to Navigation (DTONs).

The final tide zone model was developed and provided to FPI by JOA. This tide model was based on observations at Key West and Smith Shoal Light, the bottom mounted gauge deployments at the Quicksands and Boca Grande Key and the COOPS tide station datum points at West Jetty, Sand Key Lighthouse, Boca Grande Key, Garden Key (Dry Tortugas), Loggerhead Key, Fleming Key, White Street Pier and Snipe Point. Further details are provided at Appendix II of the Horizontal and Vertical Control Report.

Each of the discrete tide zones use time and range correctors relative to the Key West NWLON tide station and the subordinate tide station installed by JOA at Smith Shoal Light. For final tide application, the time and range correctors were applied to NOAA verified and JOA quality controlled tide data, smoothed by JOA. Raw depth soundings were then reduced to MLLW using these final tides. An analysis of depth benchmark and crossline comparisons, and overlaps of the main lines of sounding concluded that final tide zoning was adequate.

The value for the difference between MLLW and MHW at the Key West NWLON tide station is 0.463m. From the final zoning, only Key West data was applicable to Sheet 2.