

# **Passive Acoustic Monitoring for Marine Mammals at Site B in Jacksonville, FL, August 2010 – February 2011**

A Summary of Work Performed by Amanda J. Debich, Simone Baumann-Pickering, Ana Širović, Sara M. Kerosky, Lauren K. Roche, Sarah C. Johnson, Rachel S. Gottlieb, Zoe E. Gentes, Sean M. Wiggins, and John A. Hildebrand

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## **Abstract**

A High-frequency Acoustic Recording Package (HARP; Wiggins and Hildebrand 2007) was deployed between August 2010 and February 2011 in the Jacksonville, FL, survey area at Site B in 35 m. This HARP sampled at 200 kHz for 5 minutes of every 15 minutes and recorded for 160 days between 26 August 2010 and 1 February 2011. Long-Term Spectral Averages (LTSAs) were created for three frequency bands (10 Hz – 1000 Hz, 500 Hz – 5000 Hz, and 1 kHz – 100 kHz). Segments of data that did not allow for further analysis due to disk malfunctions or strumming noise were identified. The usable data were then scanned for marine mammal vocalizations. Vocalizations of unidentified delphinids were detected in the data. All of the low- and mid-frequency data for this deployment were unusable, thus preventing detection of mysticete calls and mid-frequency active sonar.

## Methods

The August 2010 – February 2011 Jacksonville Site B HARP (Jacksonville 05B) was deployed at  $30.25708^{\circ}$  N,  $80.43269^{\circ}$  W on 26 August 2010 (recording started on 27 August 2010) and recovered on 1 February 2011 (recording ended on 1 February 2011). The instrument location is shown in Figure 1. Bottom depth at the deployment site was approximately 35 m. A schematic diagram of the Jacksonville 05B HARP is shown in Figure 2.

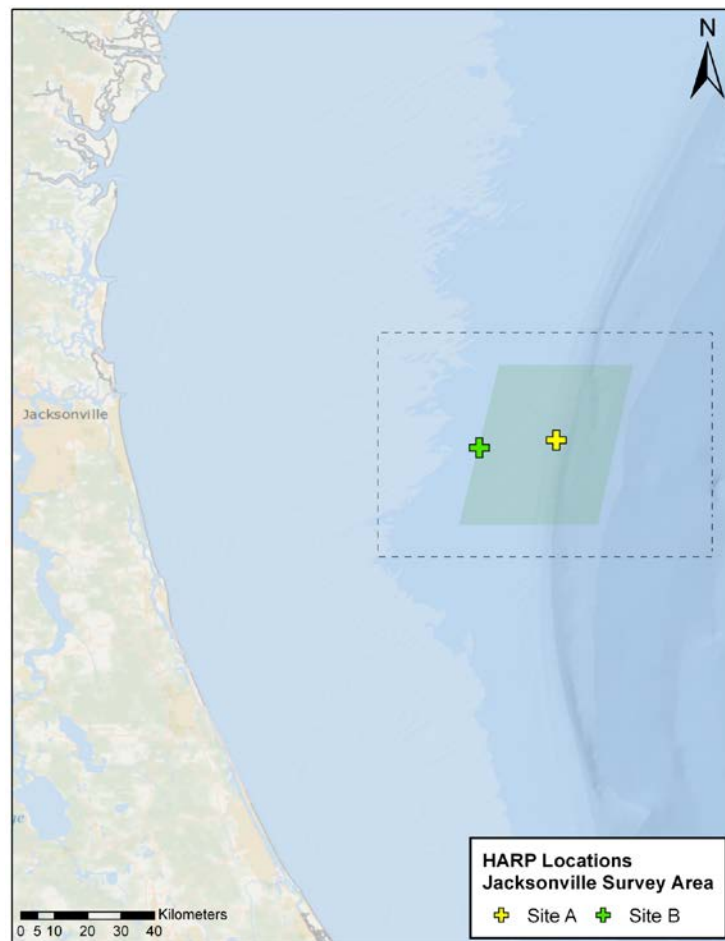


Figure 1. Location of HARP deployment sites in the Jacksonville survey area. The location of the Jacksonville 05B HARP is shown in green.

### JAX 05B HARP as deployed

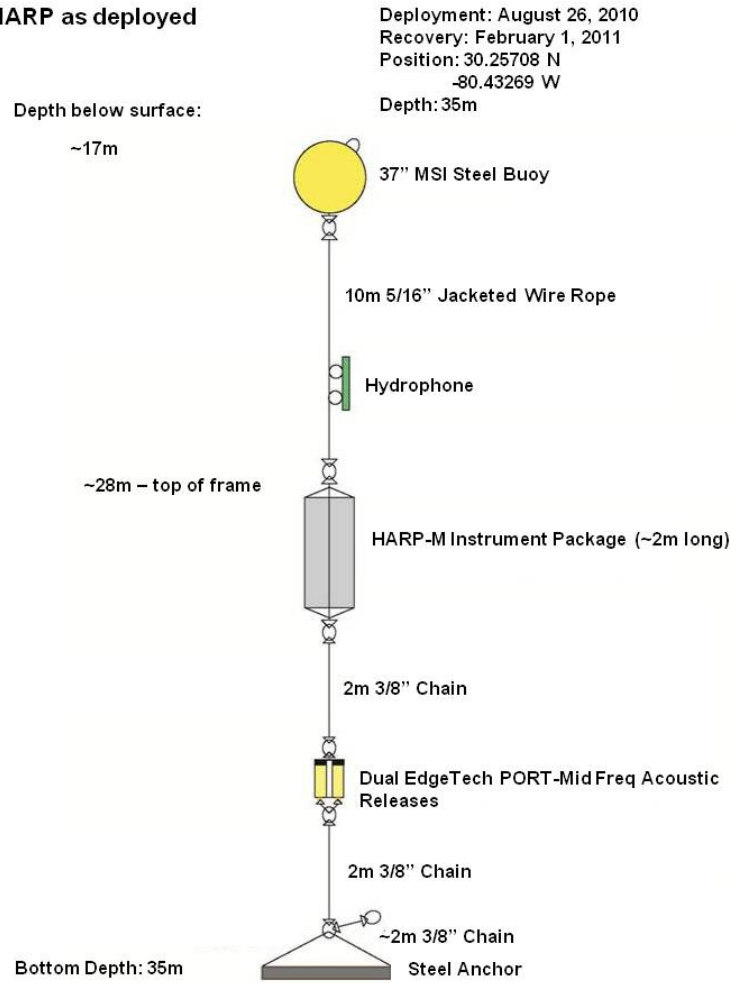


Figure 2. Schematic diagram showing details of the Jacksonville 05B HARP. Note that diagram is not drawn to scale.

Data were acquired at a 200 kHz sampling rate for 5 minutes every 15 minutes during the Jacksonville 05B deployment. This deployment provided a total of 1353.9 hours of data over the 160 days of recording.

The following methods are a summary of Debich *et al.* (2013). Members of the Scripps Whale Acoustics Lab manually scanned the data from the Jacksonville 05B HARP deployment for marine mammal vocalizations and anthropogenic sounds (sonar, explosions, and shipping) using

LTSAs. As a first pass for data analysis, segments of data that did not allow for further analysis due to disk malfunctions or strumming noise were identified. For Jacksonville 05B, the following high-frequency data could not be analyzed due to high amounts of noise present in the higher frequency bands: 1 September 2010 23:49 – 3 September 2010 05:49, 17 September 2010 20:17 – 21 September 2010 17:17, 30 September 2010 18:30 – 1 October 2010 12:30, and 12 November 2010 17:15 – 15 November 2010 11:15. Also for Jacksonville 05B, none of the low- and mid-frequency data could be analyzed. Although typically for effective analysis of marine mammal and anthropogenic sounds, the usable data are divided into three frequency bands ((1) low frequencies, between 10 – 1000 Hz, (2) mid frequencies, between 500 – 5000 Hz, and (3) high frequencies, between 1 – 100 kHz), only the high-frequency band was analyzed for this deployment as stated previously. The resulting LTSAs for the data not decimated (1-100 kHz) had resolutions of 5 s in time and 100 Hz in frequency. The high-frequency LTSAs were analyzed for the sounds of an appropriate subset of species or sources. Odontocete sounds were considered high-frequency and were analyzed in one-minute bins. Vocalizations were assigned to species when possible.

## **Results**

Table 1 summarizes the detected and identified marine mammal vocalizations for the Jacksonville 05B HARP deployment.

Detected odontocete vocalizations included clicks and whistles (see Figure 3 for daily occurrence patterns). All of these detections were assigned to the unidentified odontocete category (Figure

3), with clicks being divided into five main groups based on spectral patterns (see Debich *et al.* 2013 for more details). In comparison to the Jacksonville 05A deployment which occurred during the same time period, rates of unidentified odontocete detections were lower during the Jacksonville 05B deployment.

Table 1. Summary of detections of marine mammal vocalizations at Jacksonville Site B for August 2010 – February 2011 (Jacksonville 05B).

<b>Species</b>	<b>Call type</b>	<b>Total duration of vocalizations (hours)</b>	<b>Percent of recording duration</b>	<b>Days with vocalizations</b>	<b>Percent of recording days</b>
Unidentified odontocete	clicks, whistles, burst-pulses	338.92	25.03	148	93.08

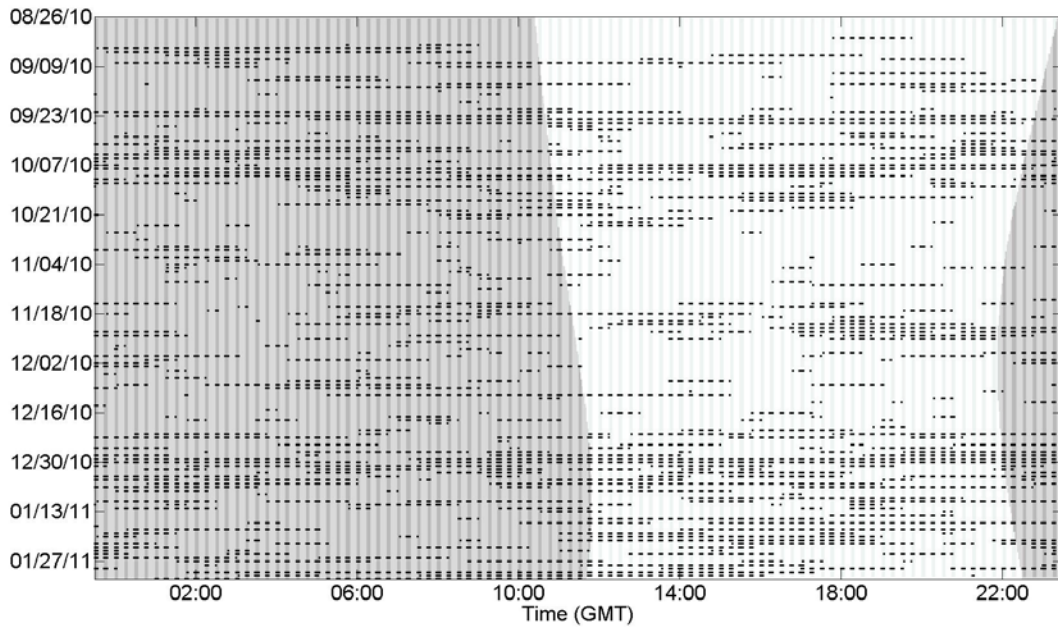


Figure 3. Unidentified odontocete vocalization detections (black bars) in one-minute bins for the Jacksonville 05B deployment. Dark gray shading indicates periods of darkness, determined from the U.S. Naval Observatory (<http://aa.usno.navy.mil>). Lighter shading indicates recording/analysis effort.

## References

Debich, A.J., S. Baumann-Pickering, A. Širović, S.M. Kerosky, L.K. Roche, S.C. Johnson, R.S. Gottlieb, Z.E. Gentes, S.M. Wiggins and J.A. Hildebrand. 2013. Passive acoustic monitoring for marine mammals in the Jacksonville range complex 2010-2011. MPL Technical Memorandum #541.

Wiggins, S.M. and J.A. Hildebrand. 2007. High-frequency Acoustic Recording Package (HARP) for broad-band, long-term marine mammal monitoring. In: *International Symposium on Underwater Technology 2007 and International Workshop on Scientific Use of Submarine Cables & Related Technologies 2007*: 551-557. Tokyo, Japan: Institute of Electrical and Electronics Engineers.