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Rice's Whale (*Balaenoptera ricei*) Passive Acoustic Detections Report: August 2024 – July 2025

Amanda J. Debich[1,2], Kaitlin E. Frasier[3], Lance P. Garrison[1], Adolfo Gracia[4], John A. Hildebrand[3], Arturo Serrano-Solis[5], Melissa S. Soldevilla[1*]

[1] NOAA Fisheries, Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL33149
[2] Cooperative Institute for Marine and Atmospheric Studies, University of Miami, Miami, FL
[3] Scripps Institution of Oceanography, University of California San Diego, La Jolla, CA
[4] Universidad Nacional Autónoma de México, Mexico City, Mexico
[5] Universidad Veracruzana, Xalapa, Veracruz, Mexico
[*] Corresponding Author

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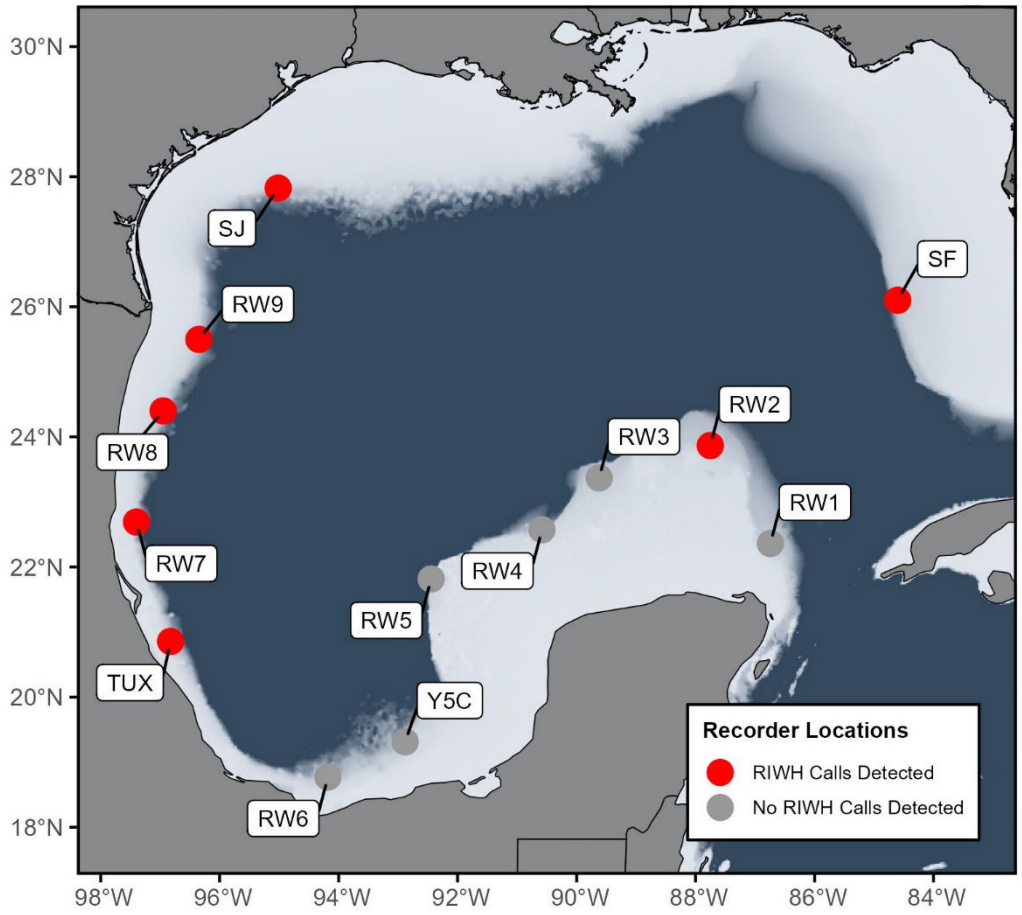


Figure 1. Map of acoustic recorder locations.

INTRODUCTION

The Rice's whale (*Balaenoptera ricei*) is the only year-round baleen whale found in the Gulf of America (formerly Gulf of Mexico), and has a population size of fewer than 100 individuals (Garrison et al., 2020). The majority of visual and acoustic detections of this endangered species occur along the northeastern shelf break near the De Soto Canyon, and some visual detections and passive acoustic recordings indicate some whales persistently occur over a broader range in the Gulf than previously thought (Debich et al., 2025a; Debich et al., 2025b; Debich et al., 2025c; Soldevilla et al., 2022a; Soldevilla et al., 2024). Rice's whales produce stereotyped, species-specific calls that are distinct

from the calls of all other baleen whales, including pulsed downsweep sequence calls, tonal long-moan calls, and constant tonal calls (Rice et al., 2014; Širović et al., 2014; Soldevilla et al., 2022b). Numerous variants of the long-moan call have been detected, with an eastern variant and multiple western variants (Soldevilla et al., 2022a). To further explore the extent of their distribution and better understand the spatio-temporal occurrence patterns of Rice's whales, we deployed long-term passive acoustic recordings at thirteen shelf-break sites around the Gulf over one year.

METHODS

Thirteen High-frequency Acoustic Recording Packages (HARPs) were deployed along the shelf break from south Florida clockwise around to Texas from August 11, 2024 to July 4, 2025 (Figure 1, Table 1). HARPs are moored to the seafloor and consist of a calibrated hydrophone tethered ~10 m above a data logger, batteries, floatation, acoustic release, and weight system (Wiggins et al., 2007). Each HARP had a sensitivity of about -200 dB re V/µPa ± 3 dB over the 10 Hz to 8 kHz range. Each HARP recorded continuously at a sample rate of 200 kHz. Upon recovery, the broadband recordings were decimated by a factor of 100 to provide an effective frequency bandwidth of 10 Hz – 2 kHz.

Spectrogram cross-correlation detectors were developed and tested in Ishmael 3.0 (Mellinger et al., 2000) for Rice's whale long-moan and downsweep sequence calls. A constant tonal call detector was not developed, as this relatively rare call type always follows long-moan calls when produced. The cross-correlation contour kernel for the long-moan call focused on the 150 Hz start tone and upper slope of the call, and was defined by a 1.1 s tone from 146 Hz to 145 Hz followed by a 3.7 s downsweep from 145 Hz to 112 Hz, each with a 14 Hz contour bandwidth (Soldevilla et al., 2022a). The cross-correlation contour kernel for the downsweep sequence was defined as a single 4 s downsweep from 120 Hz to 80 Hz, with a 20 Hz contour bandwidth. A regular sequence algorithm was applied, with the minimum and maximum repetition period between individual pulse detections set to 0.9 s and 1.1 s, respectively, and an 11 s window with 75% overlap used. Both detectors were run on the decimated recordings from the thirteen HARPs, and detections were manually verified to remove false detections.

RESULTS

While the HARPs generally recorded good quality data throughout the 1-year deployment period, a few equipment-related issues occurred. Notably, an issue potentially related to hydrophone potting led to salt-water intrusion that reduced hydrophone sensitivity over time, starting around January, for twelve of the HARPs (all except Y5C), which may have led to reduced detections from January to July, 2025. Additionally, the HARP at site RW9 ended recording early (March 27, 2025) while the HARP at site TUX experienced some disk corruption issues that resulted in a data gap from December 31, 2024 to January 19, 2025.

Rice's whale daily presence by month is summarized for the thirteen sites over the year (Table 1). Rice's whale calls were detected on seven of the thirteen recording sites, with days present ranging from 1 to 98 days. The highest percentage of days present was at site RW9, followed by sites SJ and

RW8. Rice's whale calls are highly distinctive (Soldevilla, Ternus, et al., 2022), therefore the verified detection of either the downsweep sequence or long-moan call is indicative of Rice's whale presence. Rice's whales are considered present at a site if at least one downsweep sequence or long-moan call is found in one day. These results indicate minimum Rice's whale presence. A specific date range may contain few or no detections; this does not mean Rice's whales were not present. Passive acoustic monitoring can only determine presence of vocally-active individuals calling within detection range of a recorder. Silent animals, or those calling beyond the range of the recorders, are not represented.

The results presented here represent preliminary analyses. More detailed analyses of call types and total calls per day are in progress. Call detections of low-frequency calls such as those from baleen whales are highly dependent on sound propagation conditions and noise. Additional analyses are in progress to characterize soundscapes and transmission loss to better understand detection ranges. The data used for this study will be archived at NOAA National Centers for Environmental Information (NCEI).

Table 1. Deployment details and number of days with Rice's whale acoustic presence/number of total recording days for the given month.

Site	Recording Dates	Aug 2024	Sep 2024	Oct 2024	Nov 2024	Dec 2024	Jan 2025	Feb 2025	Mar 2025	Apr 2025	May 2025	Jun 2025	Jul 2025	Days Present/ Effort
SF	08/08/24 - 06/19/25	0/24	0/30	0/31	0/30	0/31	1/31	0/28	0/31	0/30	0/31	0/19	--	1/316
RW1	08/11/24 - 06/23/25	0/21	0/30	0/31	0/30	0/31	0/31	0/28	0/31	0/30	0/31	0/23	--	0/317
RW2	08/12/24 - 06/24/25	0/20	0/30	0/31	0/30	0/31	1/31	0/28	0/31	0/30	0/31	0/24	--	1/317
RW3	08/13/24 - 06/26/25	0/19	0/30	0/31	0/30	0/31	0/31	0/28	0/31	0/30	0/31	0/26	--	0/317
RW4	08/14/24 - 06/26/25	0/18	0/30	0/31	0/30	0/31	0/31	0/28	0/31	0/30	0/31	0/26		0/317
RW5	08/15/24 - 06/27/25	0/17	0/30	0/31	0/30	0/31	0/31	0/28	0/31	0/30	0/31	0/27	--	0/317
Y5C	08/16/24 - 06/28/25	0/16	0/30	0/31	0/30	0/31	0/31	0/28	0/31	0/30	0/31	0/28	--	0/317
RW6	08/16/24 - 06/28/25	0/16	0/30	0/31	0/30	0/31	0/31	0/28	0/31	0/30	0/31	0/28	--	0/317
TUX	08/17/24 - 06/29/25*	0/15	2/30	0/31	0/30	0/30	0/14	0/28	0/31	0/30	0/31	0/29	--	2/299
RW7	08/18/24 -06/30/25	0/14	3/30	6/31	0/30	2/31	1/31	0/28	0/31	0/30	1/31	0/30	--	13/317
RW8	08/18/24 - 07/01/25	4/14	2/30	11/31	14/30	7/31	2/31	1/28	0/31	0/30	2/31	0/30	0/1	43/317
RW9	8/20/24 - 3/27/25	9/12	25/30	12/31	21/30	14/31	8/31	9/28	0/27	--	--	--	--	98/220
SJ	08/21/24 - 07/04/25	0/11	0/30	2/31	4/30	2/31	5/31	7/28	7/31	19/30	9/31	0/30	0/4	55/318

* *Disc corruption resulted in a data gap from December 31, 2024 – January 18, 2025.*

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