

Floating LiDAR Metocean Data Collection Services

E05 Hudson South 2 Hydrophone Analysis and Results Final Report

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Marine Mammal Acoustic Analysis Process and Results Summary

This report summarizes the marine mammal hydrophone acoustic data associated with the new buoy location E05 Hudson South 2 in the New York Bight. Data in this report cover a period from 27 January 2022 through 31 July 2022.

Data Collection

Hydrophones were planned for two consecutive six-month deployments at the E05 Hudson South 2 buoy location. The first hydrophone was deployed on 27 January 2022 and, after an initial attempt to retrieve this hydrophone failed in June 2022, it was retrieved on 19 August 2022. The device recorded until its batteries died on 31 July 2022. A second hydrophone was deployed on 02 June 2022 and is considered unrecoverable at the time of this reporting. The first hydrophone was operational and data recoverable for a total of 186 days (including deployment day) (Table 1, Figure 1).

Table 1. Deployment and Operation Information Associated with Hydrophones at Buoy Location E05 Hudson South 2

Station	Deployment Date	Recovery Date	Operational Dates	Comments
E05 Hudson South 2	01/27/2022	08/19/2022	01/27/2022 – 07/31/2022	
	06/02/2022	–	Unrecoverable	Unable to retrieve device and data

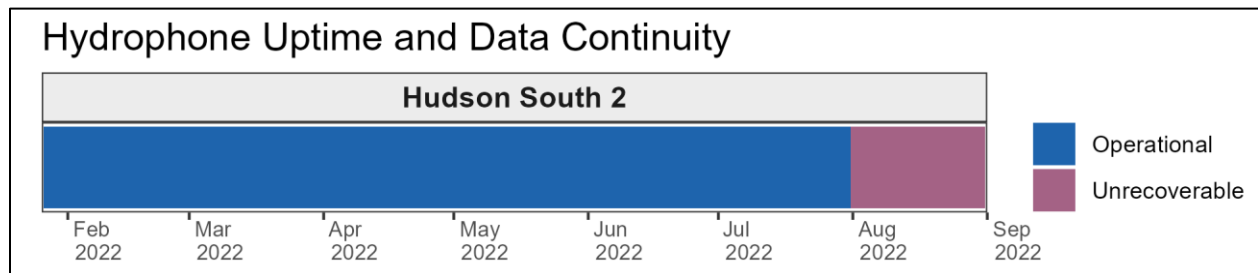


Figure 1. Hydrophone uptime and data continuity at buoy location E05 Hudson South 2.

Data were retrieved by Ocean Tech Services (Ocean Tech) and analyzed by Normandeau Associates Inc. (Normandeau). The hydrophone was set to collect data in a repeated cycle of 5 minutes on/10 minutes off (33% duty cycle).

Data Analysis Methods

All acoustic data were processed with the acoustic analysis software Raven Pro (Cornell Lab of Ornithology, Center for Conservation Acoustics, Ithaca NY, USA). For every recording file, a 4-panel spectrogram was generated to display different frequency ranges and facilitate species identification via visual inspection (Figure 2). Panels C and D of Figure 2 made it possible to view species such as sei and fin whales that would have otherwise not been detected with a standard single panel view.

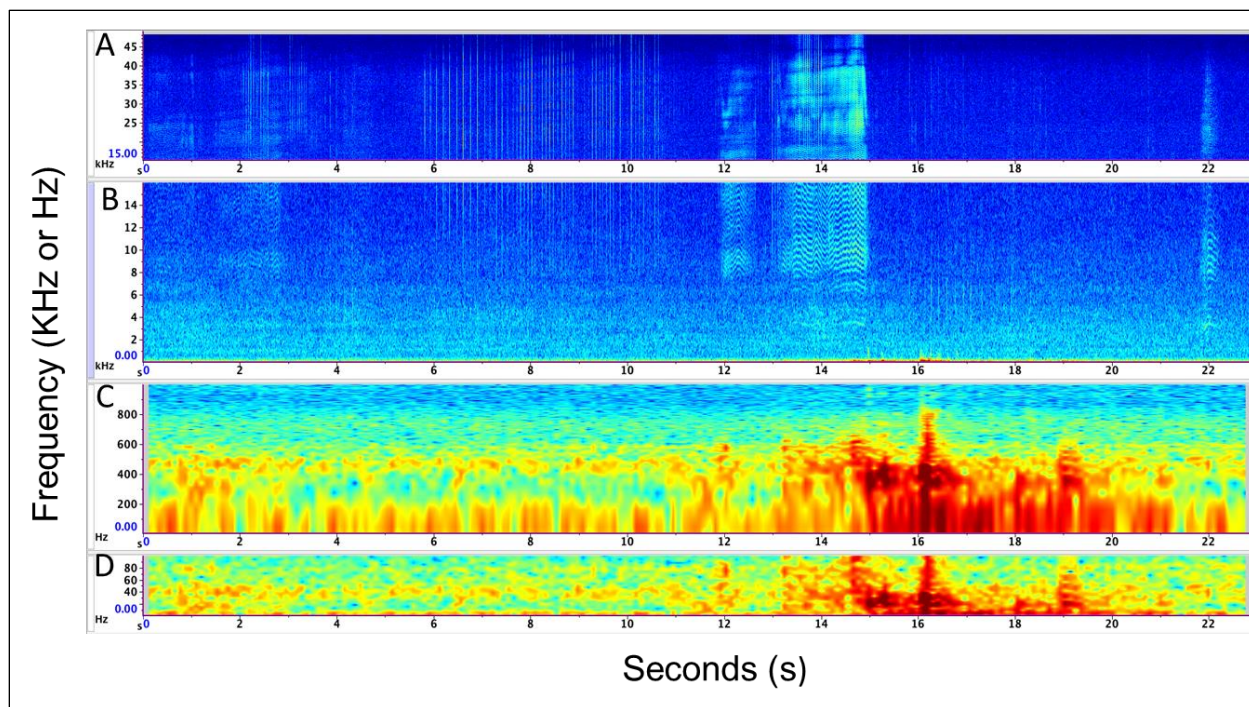


Figure 2. Four-panel spectrogram used by analysts when viewing hydrophone data collected at E05 Hudson South 2.

Panel C displays a spectrogram on a logarithmic y-scale from 0 to 1 kHz. This scale visually “enlarges” lower frequency calls, such as fin or sei whales so that they are easier to detect. Numeric tick mark values are inaccurate for this scale in the current version of Raven Pro. Panel D displays the same frequency ranges as Panel C on a non-logarithmic scale.

Data analyzed at the previous locations Hudson North and Hudson South were subsampled by University of Rhode Island personnel at a rate of five minutes of audio every two hours. Data at Hudson South 2 were reviewed by Normandeau acousticians, and are summarized and presented in this report as both a standalone dataset at 100% review (“full data”) in addition to the subsampling method (“subsample”) to remain comparable with data from the other locations and periods.

Results

Analysts reviewed each of the five-minute audio files and identified species’ vocalization sequences. These vocalizations are counted as detections which indicate general activity and species composition rather than number of individuals. The hydrophone was operational continuously from its deployment on 27 January 2022 until it stopped recording on 31 July 2022. The full dataset resulted in 3,890 acoustic vocalization sequences identified, and the subsampled dataset resulted in 478 acoustic vocalization sequences identified (Table 2, Table 3). The same 8 species/species groups were identified in both the full and subsampled datasets (Table 2). The monthly distribution of detections is similar among the full dataset and subsampled dataset (Figure 3).

Table 2. Species/Species Groups Identified and Number of 5-min Recording Periods Containing a Vocalization Sequence (Detections)

Buoy	Species/Species Group	Vocalization Sequences	
		full data	subsampled
E05 Hudson South 2	Common Minke Whale	13	1
	Dolphin spp.	1,447	174
	Fin Whale	1,160	147
	Humpback Whale	894	110
	North Atlantic Right Whale	151	19
	Pilot Whale (unid.)	4	1
	Sei Whale	216	25
	Sperm Whale	5	1

Table 3. Number of Species and Detections Identified per Month at E05 Hudson South 2

Month	Number of Operational Days	Number of Species/Species Groups		Number of Detections		Number of 5-minute Files Analyzed		Number Detections / Number Files Analyzed	
		full data	subsampled	full data	subsampled	full data	subsampled	full data	subsampled
Jan	5	5	3	70	8	407	51	0.17	0.16
Feb	28	6	6	1,312	157	2,688	336	0.49	0.47
Mar	31	6	5	960	118	2,976	372	0.32	0.32
Apr	30	5	5	820	108	2,880	360	0.28	0.3
May	31	3	3	205	23	2,976	372	0.07	0.06
Jun	30	3	1	83	11	2,880	360	0.03	0.03
Jul	31	2	2	440	53	2,945	368	0.15	0.14
All Months	186	8	8	3,890	478	17,752	2219	0.22	0.22

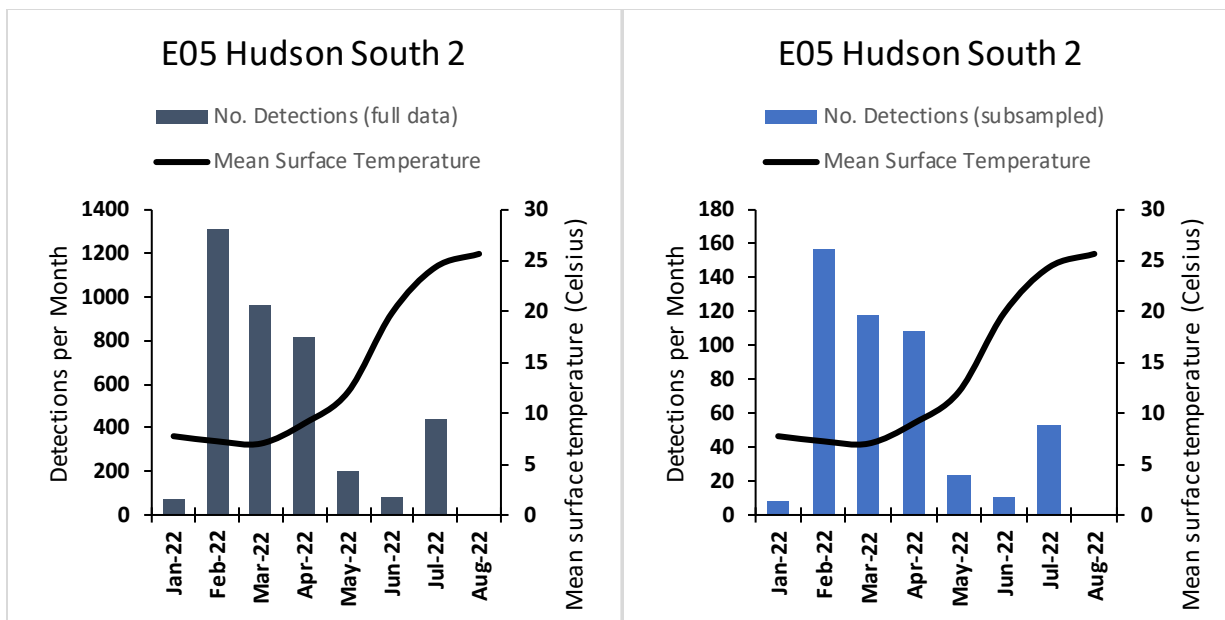


Figure 3. Number of mammal detections recorded per month at E05 Hudson South 2 full dataset and subsampled dataset.

Dolphin spp. were the most prevalent species group followed closely by fin whale and humpback whale, with these three species/groups altogether representing 90% of total detections in both the full dataset and subsampled dataset. Vocalization sequences from all other species/groups comprised less than 10% of total detections. See Figure 4 for species composition of each species/species group.

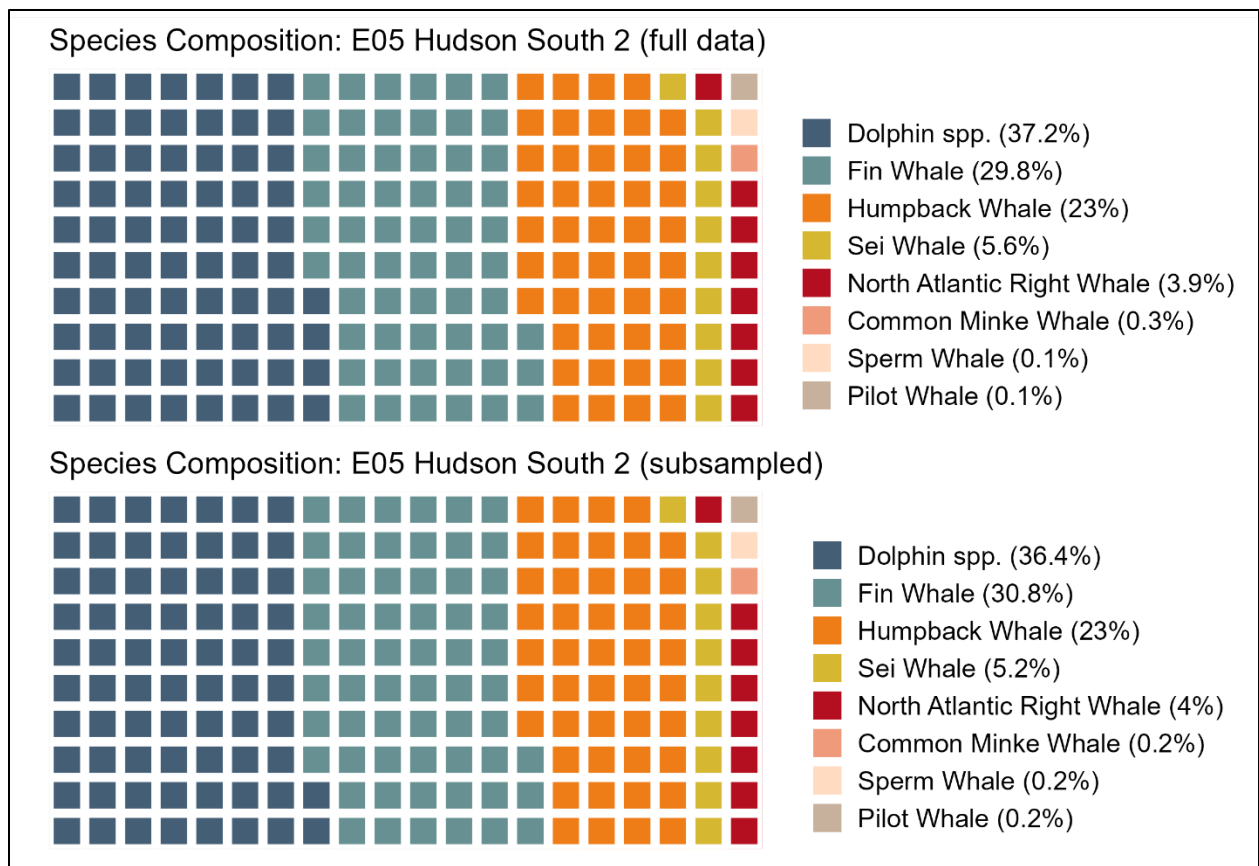


Figure 4. Species and species group composition for E05 Hudson South 2 full dataset and subsampled dataset.

Each block represents 0.5% and all blocks add up to account for 100% of the identifications. Percentages are adjusted to conform to 0.5% increments (actual percentages are in parentheses).

Overall, activity measured in detections per day was greatest during the months of February, March, and April compared to May, June, and July (Figure 5). However, it is important to note that January was under sampled, and August through December had no sampling effort.

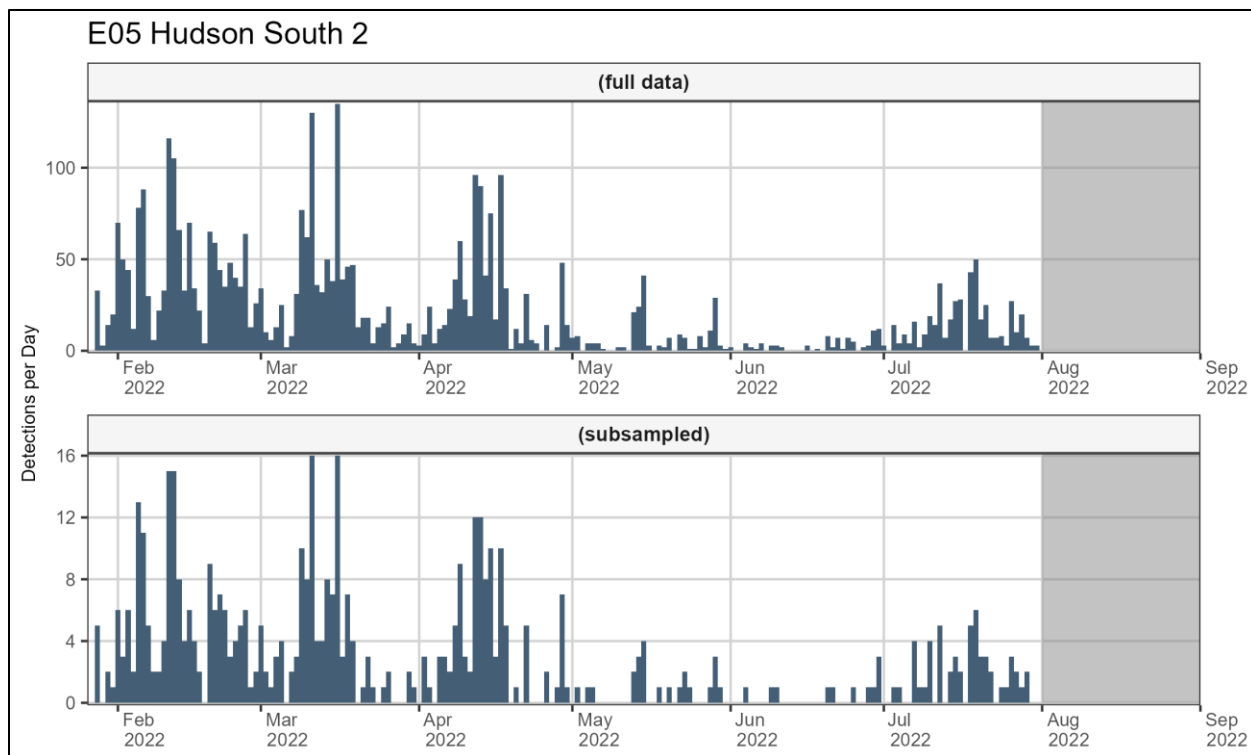


Figure 5. Marine mammal acoustic detections recorded per day at E05 Hudson South 2 full dataset and subsampled dataset. Greyed areas represent periods when the hydrophone was non-operational.

North Atlantic right whales were detected 151 times in the full dataset and 19 times in the subsampled dataset with the majority of detections occurring in February (Table 4).

Table 4. North Atlantic Right Whale Detections at E05 Hudson South 2

Month	Number of Operational Days	Number of North Atlantic Right Whale Detections		Number of 5-minute Files Analyzed		Number Detections / Number Files Analyzed	
		full data	subsampled	full data	subsampled	full data	subsampled
Jan	5	2	1	407	51	0.005	0.020
Feb	28	146	18	2,688	336	0.054	0.054
Mar	31	3		2,976	372	0.001	0.000
Apr	30			2,880	360		
May	31			2,976	372		
Jun	30			2,880	360		
Jul	31			2,945	368		
All Months	186	151	19	17,752	2,219	0.009	0.009