

Marco? Polo! - An exploration of repeated call types and their role in enabling matriline-specific dialects to occur within the Short-finned pilot whale population of Tenerife's South West coast

POSTER ID NO.



BACKGROUND



The south-west coast of Tenerife is a biodiversity hotspot in that it is home to 23 species of cetacean. Of particular interest are Short-finned pilot whales – nocturnal, deep diving odontocetes often nicknamed cheetahs of the deep for the speed at which they hunt for cephalopods (i.e. giant squid).

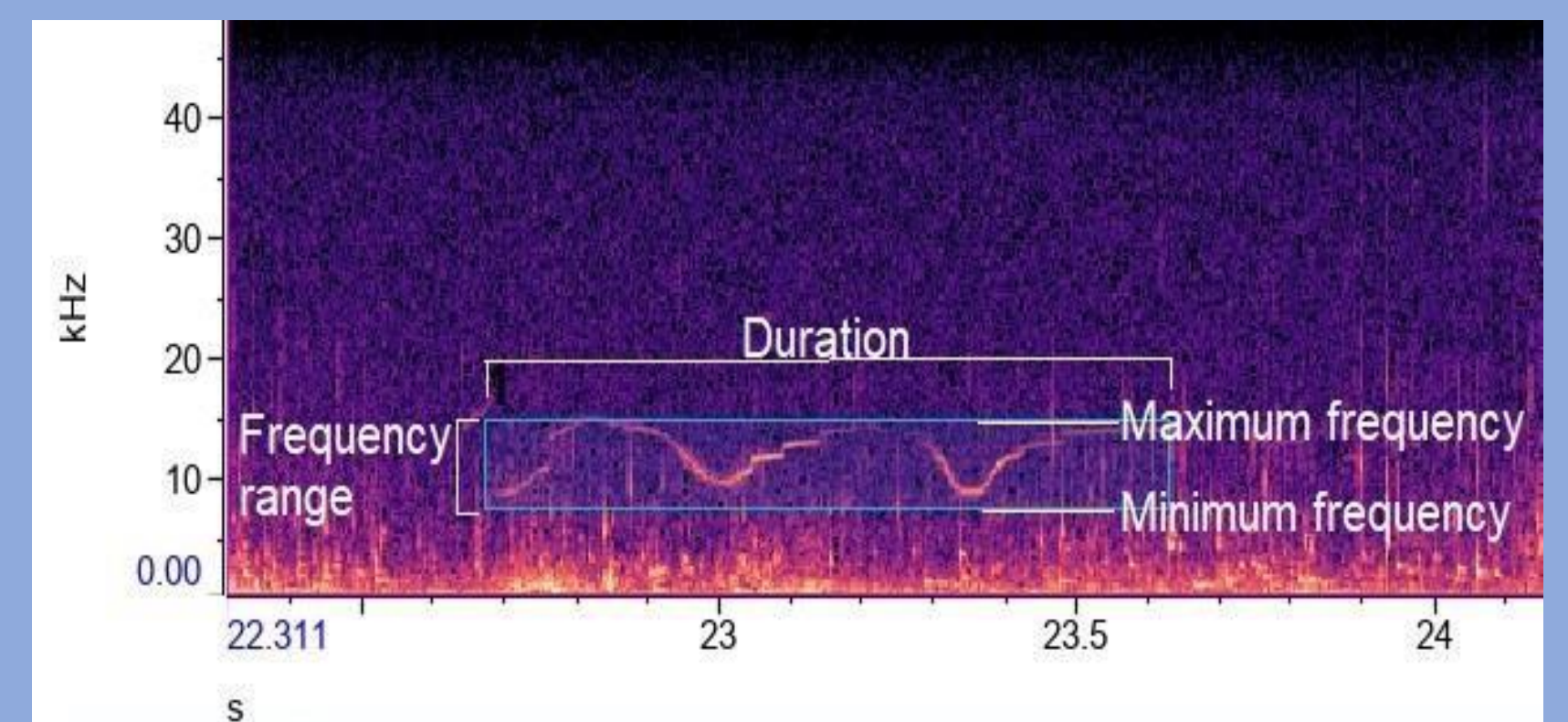
Their matrilineal social structure enables for vocal learning to take place. This is defined as the horizontal or vertical transmission of culture, such as that exhibited through dialect. In coordination with long-term fin identification research, this study focussed on four resident matriline (as displayed by the map) with the aim of deciphering differences in dialect between these groups.

RESEARCH QUESTION

Do dialect differences occur between Short-finned pilot whale matriline with overlapping distribution?

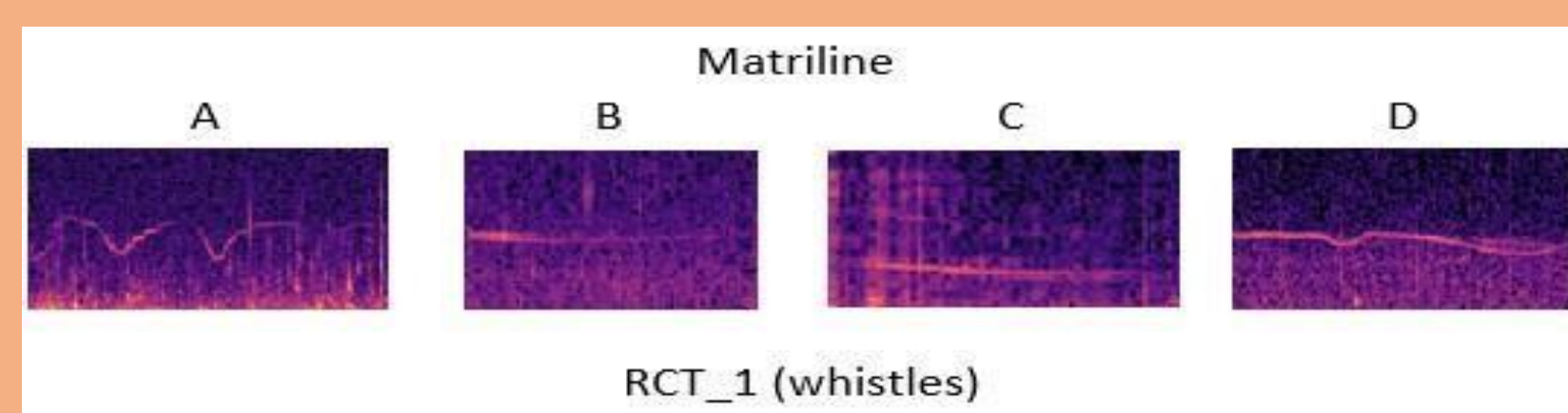
METHODS

- Between the hours of 8 and 11am, research vessels departed from either of the map-specified harbours with the sole purpose of taking behavioural data, fin shots and hydrophone recordings
- 136 recordings were collected from 06/21 to 03/22, of which twelve were taken forward for analyses
- Individual vocalisations were manually extracted using RavenPro acoustic analyses software and later categorised (based loosely on methodologies from Cise et al., 2018) into ten groups of repeated call type (RCT). The number of repetitions for each was calculated, resulting in a bar plot being produced
- Following removal of uncommon call types (i.e. those unique to specific matriline), a chi-squared test was performed on the data in order to observe disparities between the four recorded matriline
- Acoustic parameters of RCTs which were shared across all 4 matriline were then measured as shown
- As these were numerous, principal component analysis was selected as the most appropriate statistical test and was performed on 3 shared call types – whistles (RCT 1), falling pulsed calls (RCT 4) and vocalisations containing an abrupt frequency shift (RCT 7). This resulted in the production of biplots as displayed below.

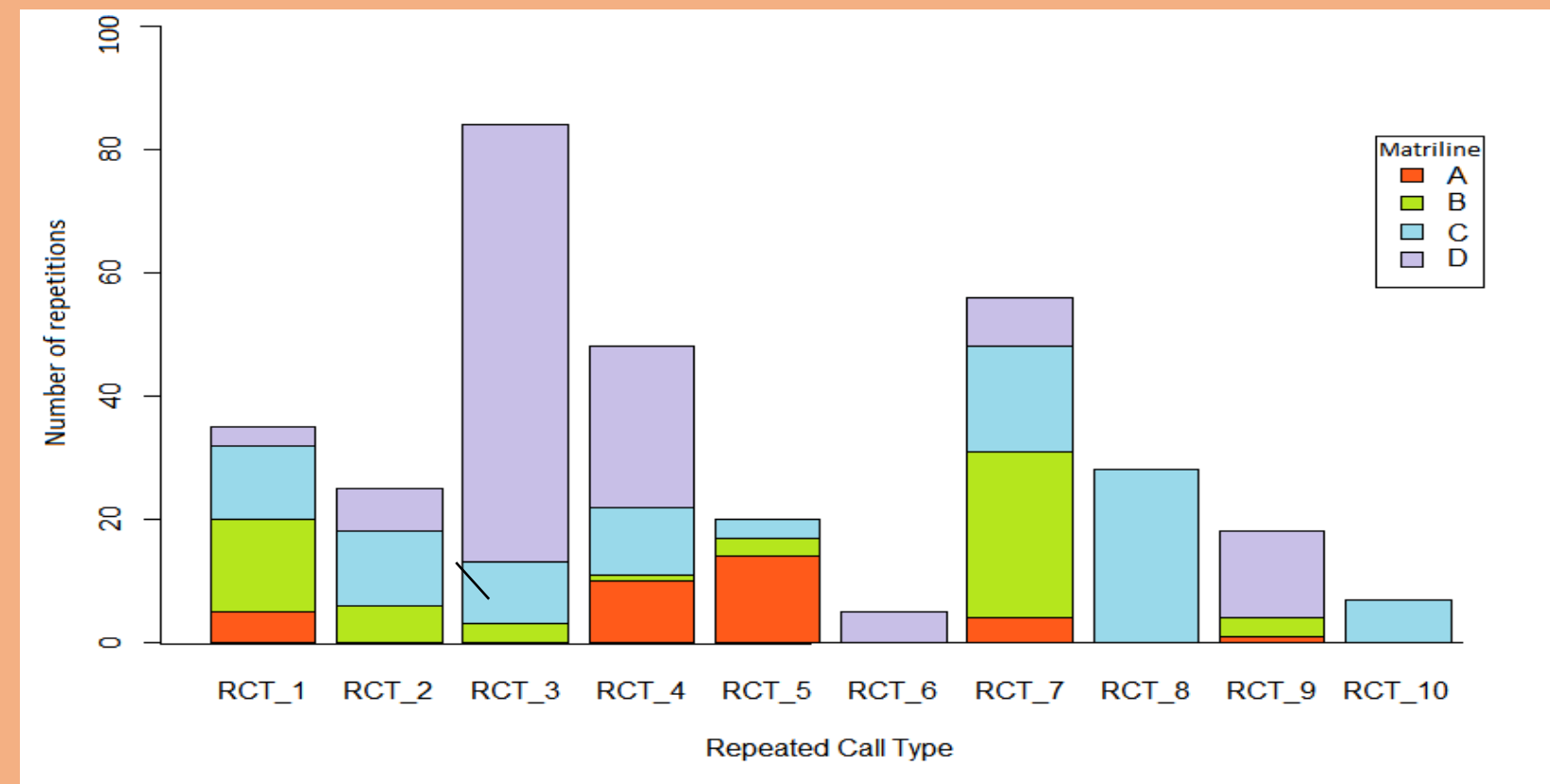
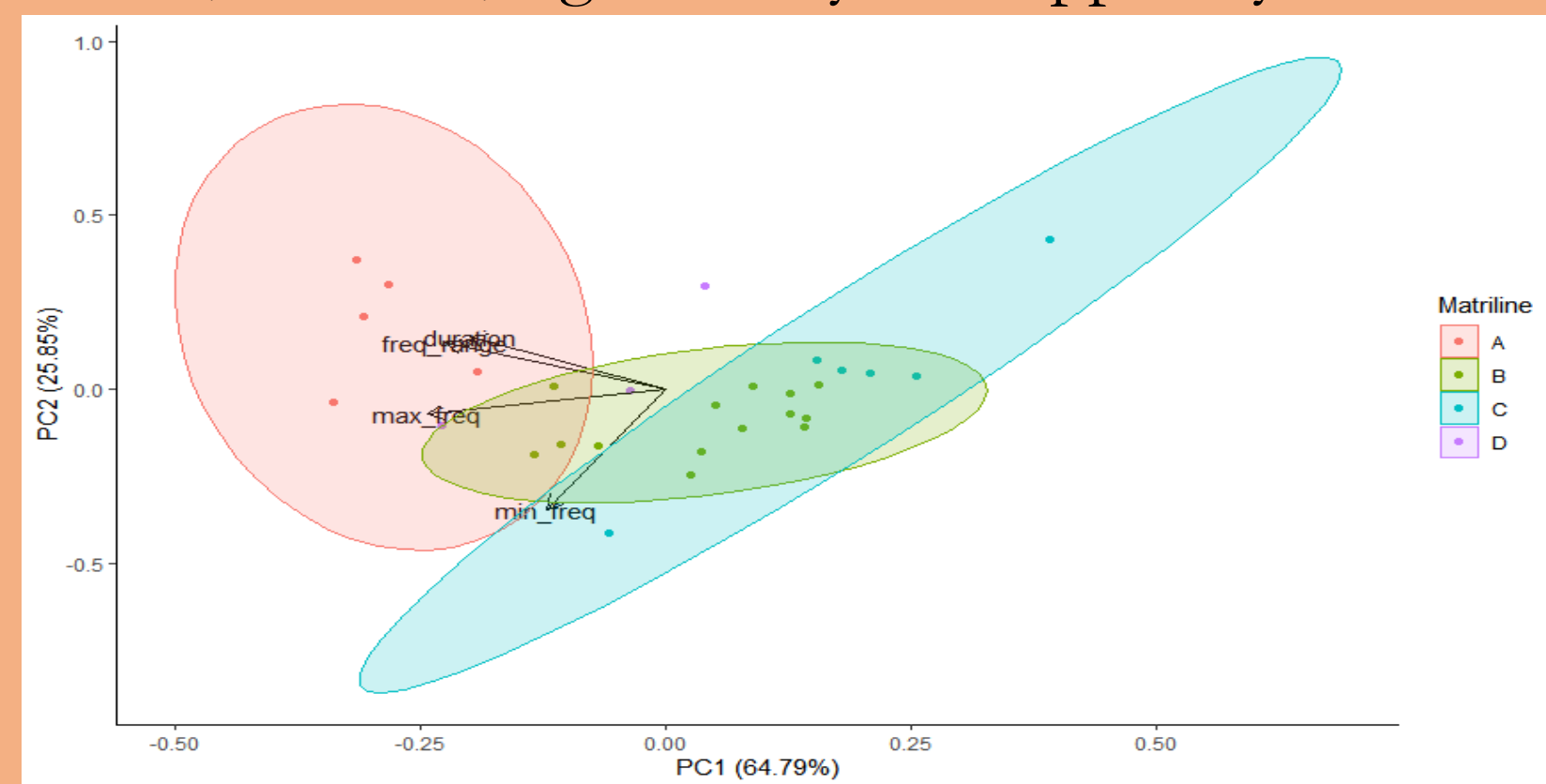


A spectrogram (display of frequency over time) with labels explaining what the measured acoustic parameters are, using a whistle (RCT1) from matriline A as an example

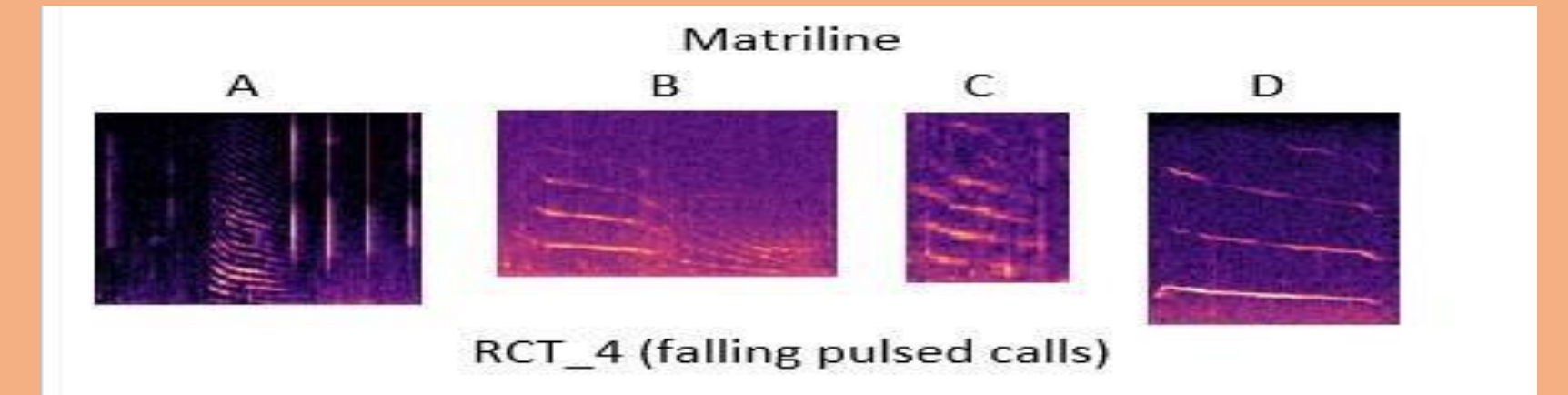
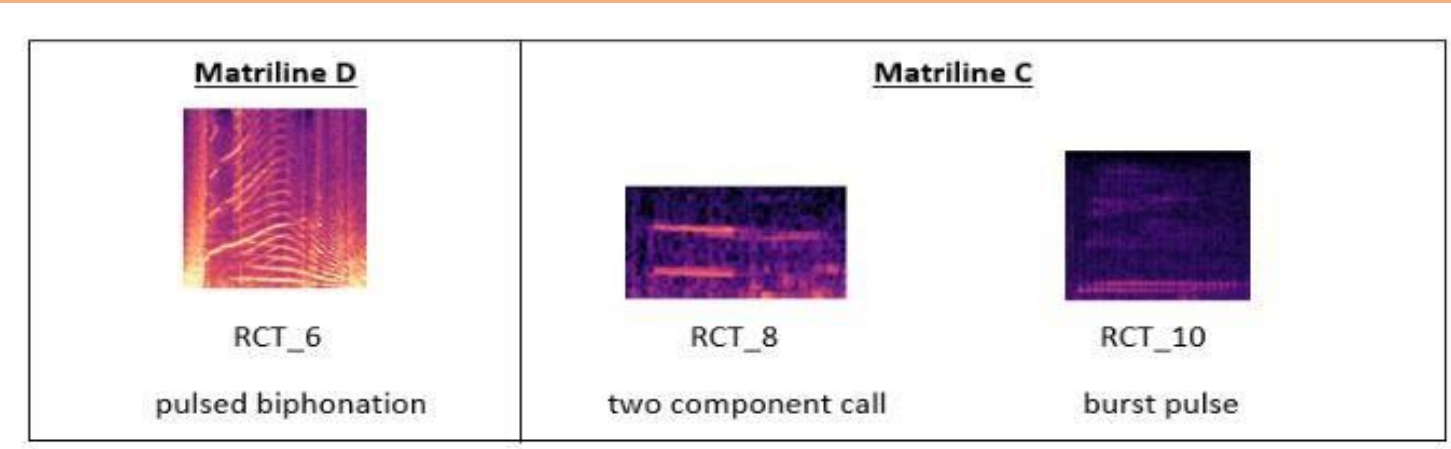
FINDINGS



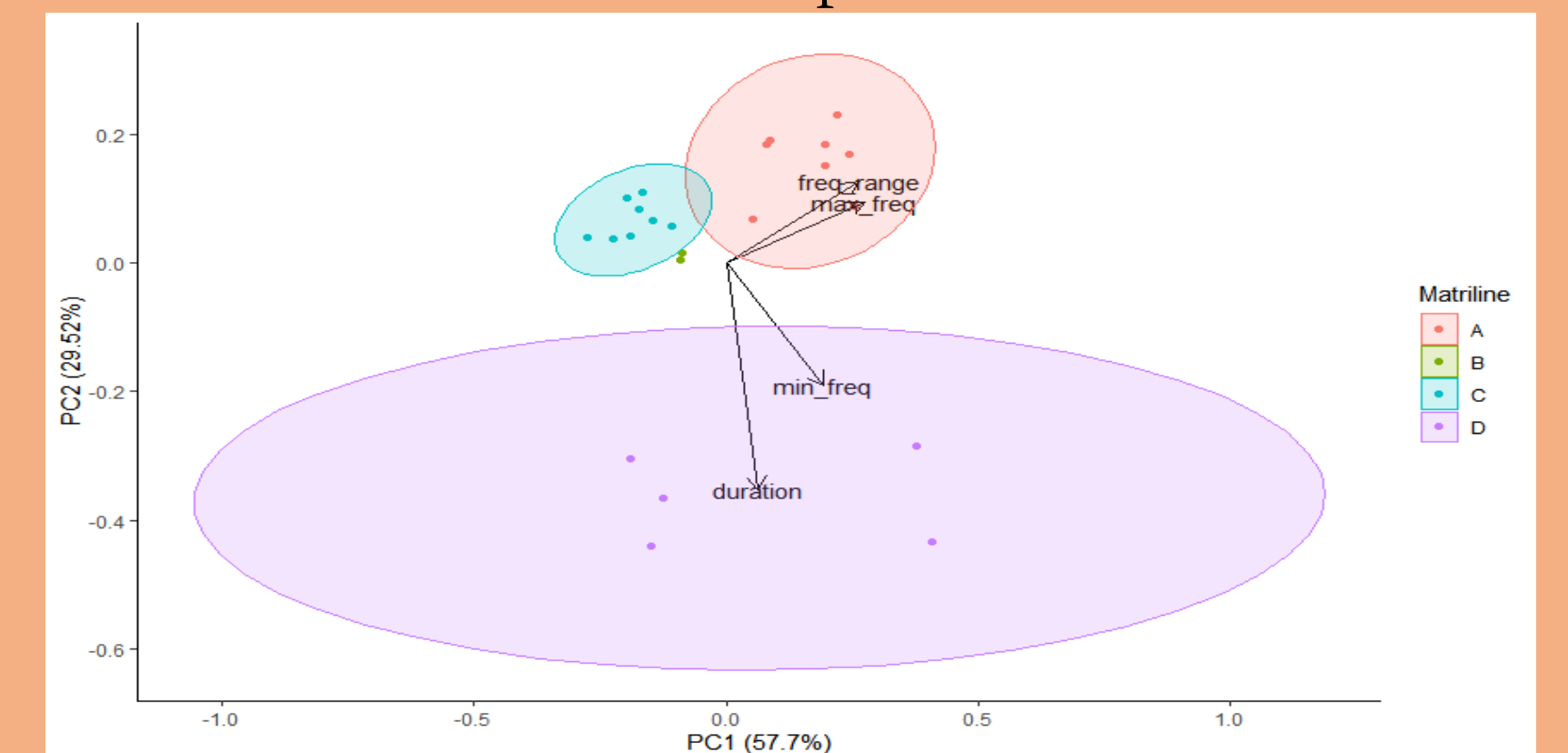
In a principal component analysis of the acoustic parameters for RCT 1 (whistles), matriline A separated very clearly from matriline C which was, however, significantly overlapped by matriline B.



The above barplot helps to visualise how frequently each of the repeated call types categorised in this study were emitted. RCTs 1 (left), 4 (right) and 7 (not pictured) were the only calls produced by all four matriline. RCT 6 was unique to matriline D. RCTs 8 and 10 were unique to matriline C (see below)

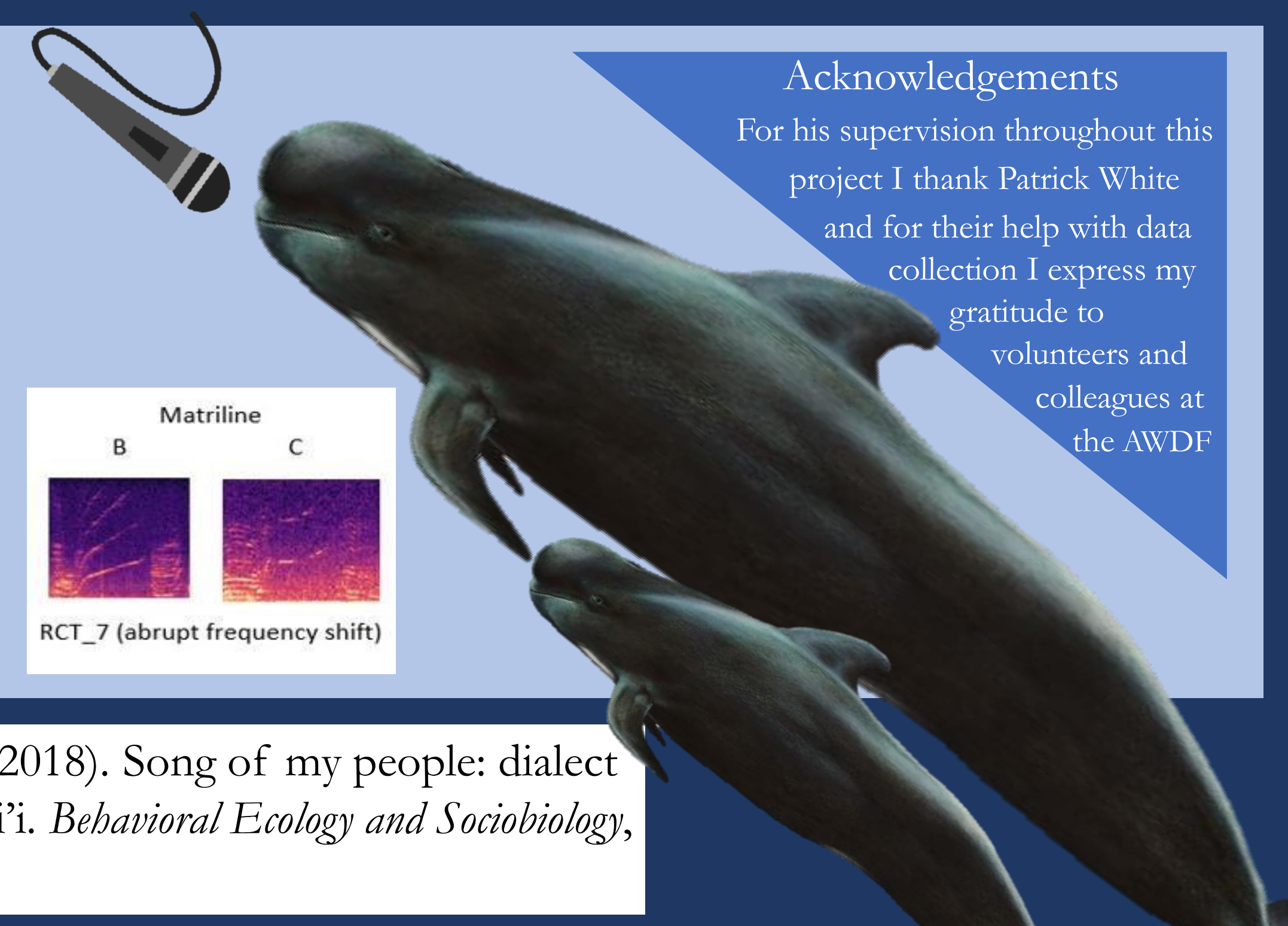


In the PCA of the acoustic parameters measured for RCT 4, matriline D separated very clearly from the other matriline. Matriline A and C exhibited slight overlap, with matriline B again showing a close relationship with C



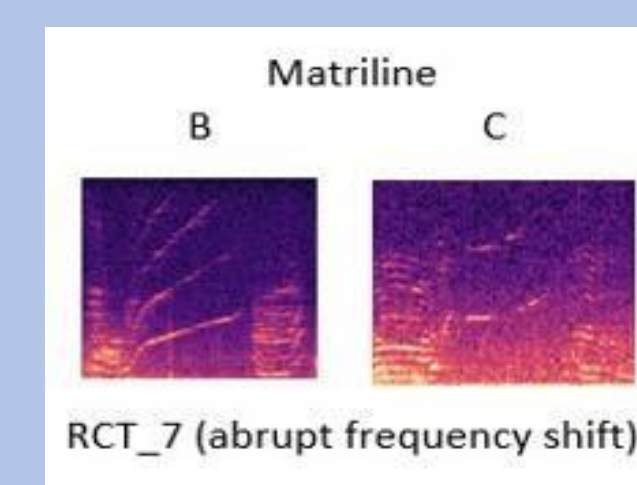
CONCLUSIONS

- Due to significant overlap in acoustic parameters of whistles (RCT 1), falling pulsed calls (RCT 4) and abrupt frequency shift calls (pictured) between matriline C and B, it is suggested that they are in fact two co-foraging subgroups of the same matriline despite previously being thought of as genetically segregated groups.
- 11 of the 12 plotted GPS coordinates lie along the “1,000m line” which is defined by captains and skippers as the area Short-finned pilot whales occupy due to the abundance of their prey - deep-dwelling giant squid. Thus, legislation should be updated so that inter-island passenger ferries are required to depart directly from the harbour south of Puerto Colón by at least 15km before turning onto their desired route (see map).
- **In other cetacean species with similar social structures, anthropogenic stressors have precipitated rapid declines with slow or non-existent recovery. Dialect differentiation means genetic variation, warranting increased conservation.**



Acknowledgements

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Reference- Cise, A. M., Mahaffy, S. D., Baird, R. W., Mooney, T. A., & Barlow, J. (2018). Song of my people: dialect differences among sympatric social groups of short-finned pilot whales in Hawai'i. *Behavioral Ecology and Sociobiology*, 72(12).