SMALL GRANT IN AID OF RESEARCH: PROJECT REPORT

Award recipient: Loraine Shuttleworth

Project title: Evaluating quality of lactation of South Africa's female southern right whales to inform population health and growth rates

Project region: South Africa

Project Summary: It is strongly suspected that a decrease in prey availability and/or quality in the Southern Ocean, linked to climate variability, is causing nutritional stress on southern right whales (SRWs). This research is for my PhD and aims to conduct a more in-depth study into the bioenergetic response of adult female SRWs to a decreased prey availability, and how this translates into calf survival probabilities. The project makes use of photogrammetry and biochemical markers (stable isotopes, fatty acids and hormones) from biopsy samples for its assessment and is critical for assessing the resilience of the South African SRW population in light of climate change.

Project progress: Throughout the project, there have been some unforeseen challenges that have been out of our control (detailed below). While this has required some adjustments to be made to the project timeline, the overall deadline of the project will still be met and all samples will be analysed by the end of 2024 as stated in my initial funding proposal. This project is for my PhD with the planned completion date to be late 2025.

1. Although multiple bad weather days and damage to our drone definitely impacted fieldwork in 2023, overall, successful fieldwork seasons were carried out in 2022 and 2023. All is in order for a final fieldwork season to commence in July 2024.
2. Drone footage from 144 encounters was taken in 2022 and 44 encounters in 2023.
3. A total of 85 biopsy samples were taken in 2022 and 37 were taken in 2023
4. All drone footage from 2022 and 2023 has been processed for body condition analysis. The footage collected in 2024 will be processed on bad weather days during fieldwork.
5. Blubber cores from stranded animals were collected.
6. Unfortunately due to the loadshedding crisis experienced in South Africa, lab work at the end of 2023 (as per the project's original planning) was not possible. The available laboratories were not equipped to handle the extended periods without electricity and were either completely non-operational or working with a very limited capacity. Significant backlogs are currently still being experienced as a result. Additionally, our stable isotope lab has been undergoing renovations since June 2023 and following substantial delays will only be open again later this year (2024).
7. Thus far due to the above-mentioned complications, only results from analysis on the full blubber core are available. Fatty acids of full blubber core were assessed to provide insight into the differences in fatty acid composition at varying depths of blubber since deeper blubber layers are said to be more metabolically active than the superficial blubber that is collected during biopsy sampling. Four different layers of blubber were analysed with layer 1 being closest to the skin (similar to a biopsy) and layer 4 being the deep hypodermis before the superficial fascia. In total, 20 fatty acids were present in the blubber (table 1). Of the identified fatty acids, 3 [(C18:1, trans), (C20:3) and (C20:4)] were not present in the most superficial blubber but were present in small quantities in deeper layers. Notable variation between the blubber layers was detected, particularly with the polyunsaturated fatty acids.
8. While important to take note of the variation at different depths, fatty acid analysis of blubber from biopsy samples from southern right whales has been completed for other southern right whale populations and comparable data for the South African population is necessary. All blubber biopsy samples will be analysed together for fatty acids, stable isotopes and hormones (thyroid and glucocorticoids) following the 2024 fieldwork period to ensure completion of the

project by the originally proposed deadline (end 2025). An update on these results will be sent to the SMM committee as soon as they become available.

Table 1. A table showing all identified fatty acids in southern right whale blubber.

List of Fatty Acids Identified in Southern Right Whale Blubber	
(C14:0)	(C20:0)
(C14:1)	(C20:1)
(C16:0)	(C20:2)
(C16:1)	(C22:1)
(C17:0)	(C20:3)
(C17:1)	(C20:4)
(C18:0)	(C22:2)
(C18:1, Trans)	(C20:5)
(C18:1, Cis)	(C24:1)
(C18:2, Cis)	(C22:6)

Research output plans: Each section of the project (body condition through photogrammetry, stable isotope offset, fatty acid profiles of cow-calf pairs, and endocrine assessments) is planned to be submitted for individual publications as early as possible in 2025.

Acknowledgements: I would like to thank the SMM for their generous funding and for their patience with my results. I am looking forward to sharing the final outcome of the project as soon as I can!