Project Update: January 2023

My MSc dissertation has been written up and reviewed by examiners. Please see the abstract for my dissertation below. The analyses associated with this project included generating microsatellite markers and mtDNA sequences for the collected samples in 2021-2022. These were then used to estimate population statistics which informed on aspects of the inshore Bryde's whale viability and levels of genetic diversity. After receiving feedback on the dissertation was edited accordingly and submitted to the University of Pretoria. In addition to this, I presented this work at the Department of Zoology and Entomology AGM in 2022. The presentation is attached and The Rufford Foundation acknowledged for their contribution to this work.

In 2023, I am going to begin my PhD project which further builds on this work by expanding on the genetic analyses using the samples collected through 2021-2022. But, in addition to this, more samples will be collected this year and used for these analyses. Recently additional funding for collection of these samples have been received from the IUCN (Kate Sanderson Bequest to IUCN SSC - project title: "Bryde's whale foraging and trophic ecology in coastal South Africa"). One of the main objectives of this project was to investigate genetic structure in relation to the different oceanographic influences, which links to my PhD work. The final report on this grant (under grant number 35677-1) will be sent through in late 2023.

Abstract of my MSc dissertation:

South Africa's inshore Bryde's whale (*Balaenoptera edeni brydei*) is the largest, resident baleen whale species occurring in our coastal waters. However, due to being one of the most elusive and shy marine mammals, there are significant gaps in knowledge relating to their phylogeny, ecology, and demography. The few studies done on this population provided important, broadscale information but also highlighted the more detailed research needed to improve and develop the understanding of South Africa's inshore Bryde's whales. It is generally accepted that these whales form a small population (< 1,000 mature individuals) that shows a restricted coastal distribution along the coastline of South Africa. Their movements along the coast are largely dictated by the movements of their main food sources, sardine (*Sardinops sagax)* and anchovy (*Engraulis capensis*). However, their population structure, movement patterns, and habitat use across the diverse oceanic system surrounding South Africa, as well as the level of genetic diversity remained unclear. Within the broader, evolutionary perspective the connectivity of the inshore population to other Bryde's whale populations worldwide is unknown.

This dissertation uses conservation genetic approaches combined with photo-identification methods to build our understanding of South Africa's inshore Bryde's whale population in two main areas. Microsatellite and mitochondrial DNA (mtDNA) markers were used to detect any evidence of population structure and connectivity while assessing current levels of genetic diversity on both local and global scales. Photo-identification data was then used to assess the movement patterns of individuals and formalise a national catalogue for the population. Genetic results show that these whales form one population with low, but significant, levels of genetic differentiation between the west and south coast of South Africa. Neutral nuclear genetic diversity

was high which may be indicative of a larger effective population size whereas mtDNA diversity was low, suggesting potential sex-biased dispersal. Results also indicated genetic distinction between South African, Namibian, and Madagascan individuals but highlighted the need for stronger sampling within these regions. The lack of a stronger population structure was also reflected in photo-identification data, with identified individuals moving across different coastal regions, seemingly forming one population. However, many individuals were also re-sighted in the same general area which may relate to the low levels of genetic differentiation still evident within the population. On a global scale, mtDNA results indicated that South Africa's offshore and inshore populations show connections to different oceanic regions. In addition, inshore individuals share a haplotype with an individual from the East Indian Ocean. These results provide preliminary insight into the origins of the South African Bryde's whale populations and highlight the overall need for more representative sampling globally. Overall, the results of this study provide important insights into the demography and ecology of the South African inshore population which is key in the formulation of effective conservation strategies for the species.