

2020 SMALL GRANTS IN AID OF RESEARCH FINAL SUMMARY REPORT

Project title: Using Bryde's whale foraging behavior, habitat use, and acoustic patterns as a living platform to understand anthropogenic impacts on marine wildlife in Southeastern Brazil

Awardee: Rodrigo Tardin

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ECoMAR - Laboratório de Ecologia e Conservação Marinha

Project region: Cabo Frio, Rio de Janeiro, Brazil

Amount awarded: US 2,000

Project summary

Brazilian Bryde's whales in Cabo Frio coast are resident and seen year-round, but individual information about their foraging and acoustic behaviour is largely unknown. We aim to deploy multi-sensors camera tags on individual whales to understand biomechanics, energetics of foraging, and identify feeding hotspots and acoustic behaviour. This new set of findings will 1) contribute to the growing knowledge of Bryde's whales biology worldwide; 2) form the basis to understand whether anthropogenic impact may affect the biology of these predators; 3) increase conservation action towards the management of the whale's habitat and local human activities.

Project research questions:

1. How do Brazilian bryde's whales perform underwater lunge feeding, and how costly is this behaviour?
2. Where do whales feed in Cabo Frio, at which depth and how much does this overlap with human activities?
3. Can we identify previously unknown prey items of this population?
4. Do Brazilian Bryde's whales use acoustics when foraging? Is their acoustic behaviour potentially altered by boat traffic?

Project progress and outcomes

Due to COVID-19 pandemic, the expected months (April and/or May) to collect data were not possible. To avoid delays that could compromise the project, we collected data in December 2020. We used the SMM grant, combined with other grants, to pay for three days of survey onboard of a 7.5 m rigid-hulled inflatable boat within a 14-day fieldwork. From these, in 7 days there were good weather conditions to conduct the sampling. In 2020, we found three Bryde's whales in three different days. Due to whales travelling behavior and low-visibility waters in these days, we could perform 6 attempts to deploy the CATS (Customized Animal Tracking Solutions <https://cats.is/>). However, none were successful.

A fundamental aspect of the grant was the beginning of an international partnership between the Brazilian University (UFRJ) and the Danish universities (the University of Copenhagen, Aarhus University and University of Southern Denmark). That enabled us to conduct another campaign in April 2021, where new attempts and lessons were learned.

Between 25th April and 5th May 2022, we conducted a third campaign and in April 29th we successfully deployed the first-ever Brazilian Bryde's whale tagged with non-invasive CATS tag. Identification photographs of the individual encountered and tagged were collected.

The length of tag deployment lasted 7 hours, continuously collecting data on speed, depth, acceleration, and underwater maneuvers. Continuous video footage for the duration of

the deployment was also recorded on the tag cameras, allowing for visual confirmation of feeding behaviour at various depths, prey types, and the movement of control surfaces.

While full data analysis is ongoing, preliminary data showed that we were able to detect around 20 feeding lunges at depth range 25-40 m. This represents the first ever detected underwater feeding from this population. In the video recorded by the camera, there is evidence that whales feed simultaneously on diverse species of fish, and the prey item specific of the Bryde's whale is under determination. This may lead to new exciting discovery on what this population target.

The full data analysis, under supervision by all universities members of the project, will proceed by clustering all the metrics detected by the tag to determine a kinematic description of how a Brazilian Bryde's whale feeds. Linked to this, the cost of these lunges will be calculated to model the energetic needs of the population. Sounds associated to feeding activities will be described.

At the current stage of analysis, the results of this project seem to challenge current knowledge we have to date on the foraging ecology of non-migratory whales. Our project on Brazilian Bryde's whale is therefore opening the stage for similar studies that could allow completing the picture of how Balaenopteridae feed and infer ecological consequences to the ecosystem they live in.

On behalf of the team, I thank the Society of Marine Mammalogy for awarding this funding, which contributed to a very successful project and has not only enabled us to ensure the future continuation of the project, but also showed the feasibility of our methods. We hope that we can count on the future support of SMM to pursue this line of scientific research by reproducing similar project on species never studied before. By supporting our work, SMM is contributing enormously to the conservation of marine top predators and the ecosystem they regulate.