

Preliminary report on research conducted from MY Arctic Sunrise in Seychelles Exclusive Economic Zone, Indian Ocean, 2021

2nd – 30th March 2021

Summary

During early 2021, Greenpeace International conducted a research and investigation cruise with the vessel MY Arctic Sunrise in the Indian Ocean as part of the Protect the Oceans campaign. As part of this campaign, on March 2nd 2021, a research expedition departed from Victoria, Mahe Island, Seychelles to the Saya de Malha Bank region of the Mascarene Plateau. A total of four transits between Seychelles and Saya de Malha Bank took place in the course of the expedition (Fig. 1). During these transits, both opportunistic and systematic surveys for marine megafauna took place by means of visual observation, passive acoustic monitoring, and photo identification where possible, under a permit issued by the Seychelles Bureau of Standards (reference number A0157). The primary aim of the research was to contribute much needed data on marine megafauna distributions within the Western Indian Ocean region, and specifically to build knowledge on sperm whale populations.

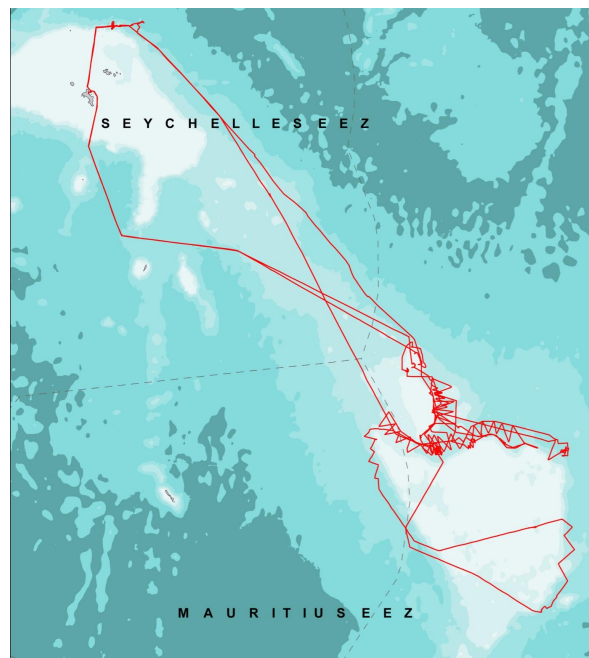


Figure 1. Map of tracks of the Arctic Sunrise during the Greenpeace International research expedition.

1. Systematic visual survey

A systematic vessel-based visual survey was conducted during daylight hours (0700-1800) on the transits within Seychelles Exclusive Economic Zone (EEZ) on route to the Saya de Malha region.

A total of five different species in 16 encounters were observed during transits through Seychelles EEZ: sperm whales (*Physeter macrocephalus*); pilot whales (*Globicephala macrorhynchus*), pygmy killer whales (*Feresa attenuata*), bottlenose dolphin (*Tursiops truncatus*) and Bryde's whales (*Balaenoptera edeni*) (Table 1). In addition, four dolphin observations were noted where animals could not be identified to species level due to distance from the ship, likely pantropical spotted (*Stenella attenuata*) or spinner dolphins (*Stenella longirostris*). Four unidentified baleen whales were also encountered, one of which was sighted as upright blow, bluish colour and tail fluke consistent with a blue whale (*Balaenoptera musculus*) but no photographs were obtained for species verification. From other baleen whales observed in other areas of the transit, the remaining unidentified baleen whales were likely Bryde's whales.

In addition to documenting cetaceans, the survey also noted all bird sightings to species level, where possible, resulting in 167 observations in Seychelles waters. Two observers were experienced bird biologists and were able to confirm species identity with high confidence, either by visual observation or by subsequent inspection on photographs. All other sightings were confirmed to the best of the observers ability and are noted as low or medium confidence unless specifically common, or easy to identify. A total of 91 birds were noted within Seychelles EEZ at high confidence. Species included: masked booby (*Sula dactylatra*), red-footed booby (*Sula sula*), lesser noddy (*Anous tenuirostris*), white-tailed tropic bird (*Phaethon lepturus*), bridled tern (*Onychoprion anaethetus*), Mascarene shearwater (*Puffinus lherminieri*), Persian shearwater (*Puffinus persicus*), wedge-tailed shearwater (*Puffinus pacificus*), sooty tern (*Onychoprion fuscatus*), Bulwer's petrel (*Bulweria bulwerii*), white tern (*Gygis alba*), frigate bird, black tern (*Puffinus persicus*), brown booby (*Sula leucogaster*) and storm petrel (*Hydrobates pelagicus*). A further 46 bird sightings were noted where the species' identity was deemed to be of medium or low confidence.

Table 1. Cetaceans observed during visual surveys through Seychelles EEZ during four transits between Victoria, Mahe Island, and the Saya de Malha region of the Mascarene Plateau.

Common name	Scientific name	Number of encounters	Comments
Sperm whale	<i>Physeter macrocephalus</i>	2	Feeding groups, photoidentification of four individuals in total.
Bryde's whale	<i>Balaenoptera edeni</i>	3	
Short-finned pilot whale	<i>Globicephala macrorhynchus</i>	1	
Pygmy killer whale	<i>Feresa attenuata</i>	1	
Bottlenose dolphin	<i>Tursiops truncatus</i>	1	Photograph verified by Violaine Dulau (Globice) and most likely <i>T.truncatus</i> but <i>T.aduncus</i> cannot be entirely eliminated.
Unidentified balaenopterid	-	4	One encounter showed large fluke and possible blue, other more likely Bryde's whale.
Unidentified dolphin	-	4	Likely spotted or spinner dolphins but not close enough to the ship to verify.
	Total	16	

2. Passive acoustic monitoring

Apex predators, such as cetaceans, are invaluable indicator species that highlight areas of the open ocean and coastal regions that are important hotspots for biodiversity. Many species are highly vocal. Passive acoustic monitoring, using a towed hydrophone, provides a robust, cost effective and automated method for determining cetacean occurrence and distribution as well as the location of ocean biodiversity hotspots. Standard protocols for surveying for cetaceans were used whilst transiting and during areas of opportunistic survey

work. The system involves a 350 m towed hydrophone array deployed from the stern of the vessel and cabled to a laptop on the bridge with PAMguard software¹.

The Greenpeace expedition used passive acoustic monitoring throughout the transits and research at the Saya de Malha region, whenever possible. Further analyses of the 8TB of recordings is ongoing and will be available in due course on release of peer reviewed publications.

3. Photo identification of sperm whales

Photographs of the tail flukes of four individual sperm whales were obtained during two separate encounters within Seychelles EEZ. Photo ID catalogues of cetacean tail flukes or fins will facilitate research into the movements of the individuals and groups in the broader region.

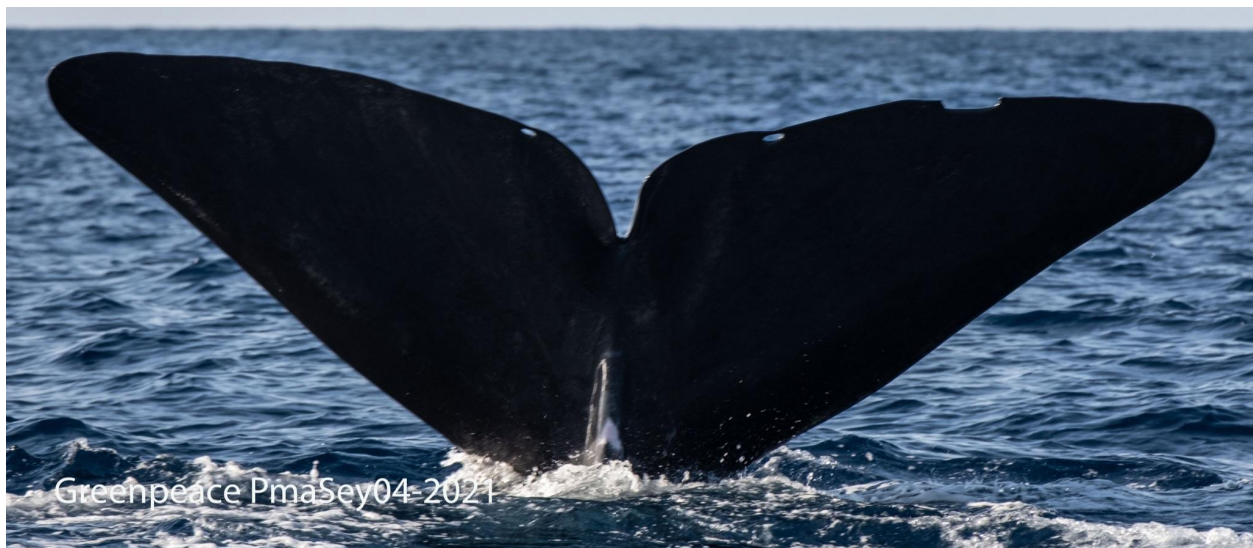
Table 2. Sperm whale groups were encountered at the following locations in Seychelles EEZ.

Date	Latitude	Longitude	Group size	Identified individuals
14th March 2021	-4.61833333	56.41333333	8	PmaSey01; PmaSey02; PmaSey03
29th March 2021	-3.65315	55.827183	6	PmaSey04

¹ <https://www.pamguard.org>

Sperm whale individuals identified as part of the Greenpeace International expedition within Seychelles waters:





4. Aerial footage

Work included collecting behavioral data for marine megafauna encountered, where practical, with a DJI Mavic 2 Pro drone. All work was conducted by an experienced, qualified drone pilot. Again, all encounters took place in accordance with the highest marine mammal protection protocols, for example the US Marine Mammal Protection Act 1972 and Marine Mammals Protection Act 1978.

Aerial footage can be obtained through the [Greenpeace Media Library](#).

5. Data processing and sharing

The research team on board was led by marine scientist Dr Kirsten Thompson, Greenpeace Research Laboratories and University of Exeter, and assisted by Dr Tim Lewis, independent research scientist. The participation of Sheena Talma from Seychelles and Shaama Sandooyea from Mauritius was essential in providing insights into the region's biodiversity and environment

as well as research networks. Dr Thompson and Dr Lewis designed the visual survey with assistance from specialists from the Harry Butler Institute at Murdoch University (Perth, Australia) with support from GLOBICE and the Indian Ocean Cetacean Research Network on whales and dolphins in the Mascarene Plateau and additional guidance from Seychelles Bird Records Committee on seabird observations.

Through this expedition, and on publication of peer reviewed articles we hope to help fill a gap in global knowledge on the distribution marine megafauna in the western Indian Ocean region, adding to available open access data through OBIS Seemap² as generated by surveys such as REMMOA^{3, 4}. By sharing our data, online and with the Seychelles at the earliest opportunity, we can provide a baseline for monitoring change in unsurveyed regions.

The megafauna observations can be viewed on an interactive map online at:

http://maps.greenpeace.org/maps/su/indian_ocean_2021/

Please note that the above map was primarily designed for real time communication and the data on which it was based has been checked and cleaned to provide the excel spreadsheets associated with this report.

The recordings from the acoustic monitoring will be analysed in collaboration with University of St Andrews, UK. On completing the more detailed acoustic analyses, we will make the results available on publication of the peer reviewed article that will be shared with the Seychelles government and uploaded to OBIS-Seamaps repository.

All photoidentification images of sperm whales will be shared with the Réunion-based organisation GLOBICE in order to contribute to the database of marine mammals in the Western Indian Ocean region maintained by GLOBICE and the Indian Ocean Network for Cetacean Research IndoCet. We also hope that researchers and organisations in Seychelles can use these images as a basis for a new Seychelles sperm whale catalogue.

Acknowledgements

We thank the Government of Seychelles for welcoming this research as well as their advice for obtaining relevant permits during the Greenpeace International expedition in March 2021.

² <http://seamap.env.duke.edu>

³ Laran et al. 2017, <https://www.frontiersin.org/articles/10.3389/fmars.2017.00139/full>

⁴ <http://seamap.env.duke.edu/dataset/1404/html>

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