Indian Ocean Seabird Group

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EDITO

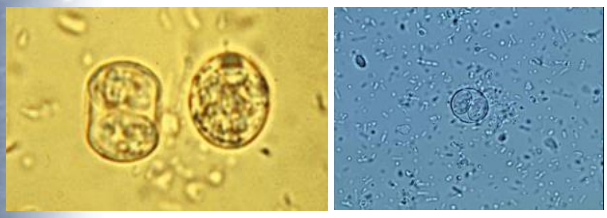
Here is the tenth issue of the Indian Ocean Seabird Group Newsletter. A very diverse and interesting set of contributions ranging from parasitology to chumming observations and acoustic survey, and from Aldabra atoll to as far as Kanowna Island, Southern Australia!
Many thanks for all the contributors and enjoy the reading.
We look forward to receiving your next contributions.

We wish you a merry Christmas and a happy new year!

1°) Exposure of pelagic seabirds to *Toxoplasma gondii* in the Western Indian Ocean

Marie-Lazarine Poulle

Toxoplasma gondii is a protozoan parasite that reproduces in the intestine of felids to produce oocysts infectious for all the warm-blooded animals. Oocysts are deposited on the ground with the faeces of excreting felines, but freshwater can carry them from terrestrial to aquatic habitats. While the dispersal of *T. gondii* infectious oocysts from land to coastal waters has been well documented, transmission routes to pelagic species remain puzzling.



Toxoplasma gondii (©Laboratoire de parasitologie de Reims).

We tested for sera of 1014 pelagic seabirds the presence of antibodies against *T. gondii.* These seabirds belonged to 10 species and were sampled on Reunion and Juan de Nova (colonized by cats), Cousin, Cousine, Aride, Bird, Europa and Tromelin islands (felid-free). Antibodies were found in all islands and all species but the Great Frigatebird. The overall seroprevalence was 16.8% [95% CI: 14.5%-19.1%] but significantly varied according to species, islands and age-classes.

Masked Booby (© C. Lebarbenchon).

The low antibody levels detected in one shearwater chick and three Red-footed Booby chicks most likely resulted from maternal antibody transfer. In adults, exposure to soils contaminated by locally deposited oocysts may explain the detection of antibodies in both Wedge-tailed Shearwaters on Reunion Island and Sooty Terns on Juan de Nova. However, 144 adults breeding on felid-free islands also tested positive.

Red-footed Booby (© ML. Poulle).

In the Seychelles, there was a significant decrease in *T. gondii* prevalence associated with greater distances to cat populations for species that sometimes rest on the shore, *i.e.* terns and noddies. This suggests that oocysts carried by marine currents could be deposited on shore tens of kilometers from their initial deposition point and that the number of deposited oocysts decreases with distance from the nearest cat population. The consumption of fishes from the families *Mullidae*, *Carangidae*, *Clupeidae* and *Engraulidae*, previously described as *T. gondii* oocyst-carriers, could also explain the exposure of terns, noddies, boobies and tropicbirds to this parasite. Our detection of antibodies against *T. gondii* in seabirds that forage in the high sea, have no contact with locally contaminated soils but frequent the shores and/or consume paratenic hosts supports the hypothesis of an open-sea dispersal of *T. gondii* oocysts by oceanic currents and/or fish.

This research was published as:
Marie-Lazarine Poulle, Matthieu Le Corre, Matthieu Bastien, Elsa Gedda, Chris Feare, Audrey Jaeger, Christine Larose C, Nirmal Shah, Nina Voogt, Byron Göpper, Erwan Lagadec, Gérard Rocamora, Régine Geers, Dominique Aubert, Isabelle Villena, Camille Lebarbenchon (2021) Exposure of pelagic seabirds to *Toxoplasma gondii* in the Western Indian Ocean points to an open sea dispersal of this terrestrial parasite. PLoS ONE16(8): e0255664. https://doi.org/10.1371/journal.pone.0255664

2°) First steps towards red-footed booby census on Aldabra Atoll

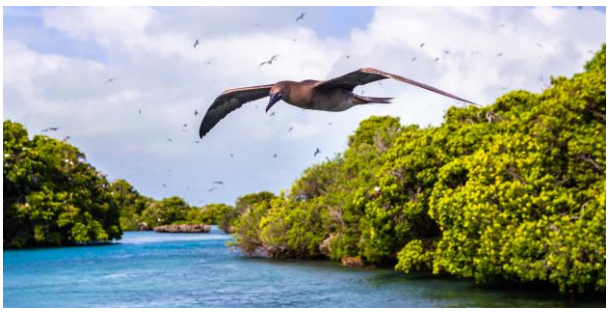
Brian Souyana & Luke A'Bear

Aldabra holds the second largest Red-footed Booby colony in the Seychelles. The last survey, completed over 20 years ago, estimated around 10,000 breeding pairs (Burger & Betts 2001) and there has been no monitoring or re-survey of the breeding population since then. However, to decide on the best time for an atoll-wide survey for a species that breeds year-round, we need a better understanding of the breeding peaks and phases across the atoll. Therefore, over the last year, a protocol has been developed to monitor Red-footed Booby breeding at several colonies around Aldabra on a monthly basis. The method involves counting the number of boobies on nests, plus noting the presence of chicks in three categories depending on their growth stage. The resulting data will indicate peak breeding times and guide the optimal time for an atoll-wide census, as well as providing new insights into the breeding ecology of the boobies.

The Red-footed Booby colony of Aldabra Atoll (© M. van Rooyen).

In August 2021, a preliminary survey was conducted across all of Aldabra's colonies. The team recorded the densities of nesting birds to select the sub-sections for breeding cycle monitoring. As well as needing to contain a high density of nests to represent the larger colony, the chosen section should also be easily accessible (due to tide restrictions) and possible to complete in an hour or less.

During this pre-survey the team discovered that what was thought to be several booby colonies along lagoon coast of Malabar Island are actually one giant colony with hotspots of high-density nesting. This suggests that the boobies have expanded their nesting range, as this was not observed during the last two population surveys in the 1960s and early 2000s (Diamond, 1974; Burger and Betts, 2001). Furthermore, a previously unrecorded and unmonitored nesting frigatebird colony was discovered on the south coast of Malabar.



A Red-footed Booby juvenile (© M. van Rooyen).

The next steps for the Aldabra research team are to repeat the preliminary survey in early 2022, to capture the breeding peaks of the various

colonies, and then finalise the sub-sections of the colonies to be monitored. Once this is confirmed, the monthly breeding cycle monitoring will begin and in the next 1–2 years we will determine the optimal time for a full census and an updated Red-footed Booby population estimate for Aldabra.

Reference

- Burger, A. E, and Betts, M. 2001. Monitoring populations of Red-footed Boobies *Sula sula* and frigatebirds *Fregata spp*. breeding on Aldabra Atoll, Indian Ocean. Smithsonian Libraries, Bulletin of the British Ornithologists' Club. Page 236-246.
- Diamond, A. W 1974. The red-footed booby on Aldabra Atoll, Indian Ocean. Department of Zoology, Edward Grey Institute of Field Ornithology, South Parks Road, Oxford OXI 3PS, Great Britain, Page 196 – 218.

3°) First breeding success of the Lesser Noddy (*Anous tenuirostris*) and updates on the Wedge-tailed Shearwater (*Ardenna pacifica*) population on Tromelin island

Audrey Cartraud, Florian Falaise, Antoine Goguelat & Maxime Amy

Tromelin is a small tropical island of about 1 km² located 435 km East of Madagascar and is managed by the Terres Australes et Antarctiques Francaises since 2005. Only two seabird species and a few hundred pairs were breeding on Tromelin before the Brown Rat (*Rattus norvegicus*) eradication in 2005 (Le Corre *et al.,* 2015). Since then, the seabird community keeps increasing and with the recent breeding success of the Lesser Noddy, the number of breeding species on Tromelin is now up to 7 with over 3,500 pairs breeding on the island.

Since 2016, hundreds of Lesser Noddies were roosting on Tromelin Island and the first breeding attempts were observed in March 2020 but were unsuccessful due to strong winds (D'Orchymont *et al.,* 2020, IOSG Newsletter n°8) and/or potentially competition for territory with Red-footed Boobies (*Sula sula*) with droppings recorded close to the Lesser Noddy nests. Between April and August 2021, eleven nests were discovered, of which eight were unsuccessful. Of the remaining three nests, we observed the two first chicks that fledged early September. The egg of last nest we discovered has recently hatched and we are currently monitoring closely the (hopefully) third breeding success of the Lesser Noddy on Tromelin.

One of the two first chicks of Lesser Noddy that flew away early September 2021 (© A. Cartraud).

The second last species colonizing Tromelin island following the rat eradication is the Wedge-tailed Shearwater (*Ardenna pacifica*), with the first breeding success recorded in 2020 after several attempts failed from 2017 to 2019.

Wedge-tailed Shearwaters at their nest in June 2021 (© A. Cartraud).

Earlier this year, we recorded two chicks fledging out of three nests occupied by Wedge-tailed Shearwaters, giving us a breeding success of 66.6% for 2021. This number is only considering rearranged nests, not the potential natural nests on the island.

This year, the Wedge-tailed Shearwaters are back in action and are breeding again in three out of the twelve natural shelters made of coralline stones that we rearranged to accommodate the nests. Three nests out of twelve are currently used by shearwaters and those nests are the three wider ones so we decided to rearrange the nine nests remaining, making them wider and more attractive. The camera trap set up in front of the first rearranged nest showed a success with an individual going inside only a week later!

A Wedge-tailed Shearwater coming out of the first rearranged nest in September 2021 (© TAAF).

High hopes are on these two species to keep breeding on Tromelin island and increase their numbers over the next few years. The next species on the Tromelin's recolonization list is, let's hope so, the White-tailed Tropicbird (*Phaethon lepturus*), that is observed almost daily on the island!

4°) The potential for chumming expeditions in Seychelles waters

Hadoram Shirihai & Adrian Skerrett

In November 2014, we conducted a pelagic trip to the northern edge of the Seychelles Bank and spent two days using chum to attract seabirds. The presence of a total of fourteen Matsudaira's Storm-petrels (*Oceanodroma matsudairae*) at four of five chumming sites was of particular interest. There had been just one previous record of this species in the Seychelles EEZ: two birds observed between Providence and Alphonse in August 2000. This was the only previous fully documented record from anywhere in the western Indian Ocean, although there are various other published reports that lack descriptions, making them impossible to verify.

Matsudaira's Storm-petrel (Tubenoses Project © H. Shirihai).

Matsudaira's Storm-petrel is known to breed only on the Volcano Islands in southern Japan. Outside the breeding season it apparently migrates to the Timor Sea off northwest Australia, and then west into the Indian Ocean. There has been a widely held assumption that it winters mostly in the equatorial belt around the Seychelles to East Africa, but proof is lacking. This offers a tantalising clue into a possible undiscovered wintering ground above the Seychelles Bank.

The sightings of 25 Wilson's and a single Black-bellied Storm-petrel at the chumming sites are also significant given the paucity of authenticated sightings of these species in the western Indian Ocean. Both may occur more frequently than the number of previous records suggests, particularly Wilson's, which has been reported more frequently in the western Indian Ocean than any other storm-petrel, but most sightings lack supporting documentation or specimens.

Wilson's Storm-petrel (Tubenoses Project © H. Shirihai).

Black-bellied Storm-petrel (Tubenoses Project © H. Shirihai).

This expedition provided a brief glimpse into what may be occurring in the western Indian Ocean. It produced intriguing results and considerably increased the number of storm-petrels recorded in the western Indian Ocean in just two days. Further chumming trips are needed at different

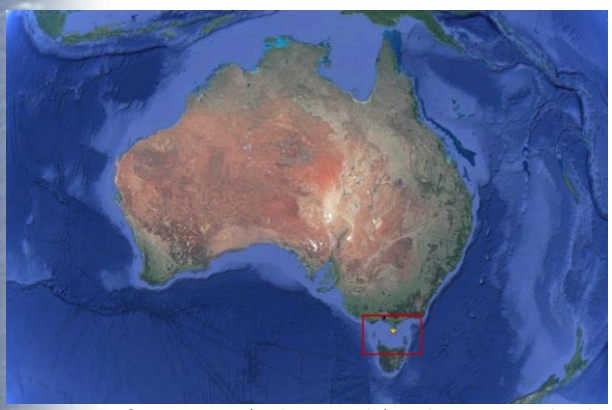
times of year to assess seasonality; they may be present throughout the austral winter or perhaps some non-breeders may remain here year-round. A future assessment of pelagic seabird distribution should take into consideration other locations around the Seychelles Bank and other banks of the region.

5°) Impact of marine heatwaves on a small diving seabird, the common diving petrel

Aymeric Fromant, Yonina Eizenberg & John Arnould

The reproductive success of birds is strongly driven by environmental conditions at different time scales. Thus, during periods of low food availability, breeding success is constrained by the ability of adults to adapt their foraging effort and feeding behaviour to maintain regular incubation shifts and chick provisioning. However, while large seabirds can buffer disruptions in prey availability, the ecophysiological constraints of smaller species may limit their behavioural flexibility.

In two different studies, combining information on at-sea movements, foraging habitat, trophic niche, and breeding biology (breeding phenology, chick growth rates and breeding success), we evaluated the effects of marine heatwaves on common diving petrels (*Pelecanoides urinatrix*) at the northern extent of their range in south-eastern Australia during four consecutive breeding seasons.



Location of Bass Strait (red rectangle) and Kanowna Island (yellow star).

Unusually low chick growth rates and breeding success (6 and 0%) were observed during two years with intense heatwave events, which were associated with higher foraging effort (foraging trips twice longer) and a substantial shift in trophic niche (lower blood δ^{15}N values). Due to their high wing-loading, the limited capacity of small diving seabird species to extend their foraging range during years of poor prey availability may impede their ability to adapt to more extreme environmental variations. Additionally, unlike all other procellariiform species, the absence of stomach oil for diving petrels compels adults to deliver meals to their chick at high frequency.

As central place foragers, the high energetic demands during the breeding season sets a physiological threshold that determines the effects of environmental variation on reproductive success. The present studies suggest that common diving petrels in Bass Strait may have reached this critical threshold, above which buffering the effects of environmental variability on their reproductive output is not possible. With more intense marine heatwaves predicted, these constraints may affect diving petrel capacity to adapt to more frequent extreme events, and ultimately impact colony recruitment and drive local population/species declines.

Adult common diving petrel, on Kanowna Island, August 2019 (© B. Gardener).

This work is now available online in Progress in Oceanography (Fromant et al. 2021: https://doi.org/10.1016/j.pocean.2021.102676) and PLoS ONE (Eizenberg et al. 2021: https://doi.org/10.1371/journal.pone.0250916).

6°) Seabird and landbird automated acoustic survey at Europa Island

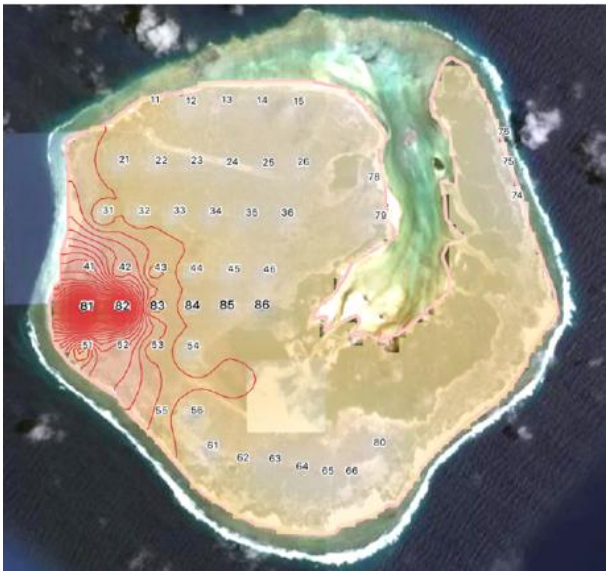
Matthieu Le Corre, Alice Beaujoin, Merlène Saunier & Patrick Pinet

Bioacoustic is a powerful tool to make a rapid assessment of the presence and abundance of birds, especially of nocturnal and cryptic species.

We deployed automated recording units (ARU, SM4 from WildLife Acoustics) at Europa Island (southern Mozambique Channel) to estimate the distribution and relative abundance of seabirds and land birds of the island. We deployed the ARU at 71 different points at all terrestrial habitats except the mangrove. Each ARU was set to record acoustic landscape during the last part of the night and in the very early morning. ARU were deployed during 3 to 15 days. Some ARU were also set to record all night long and during two successive lunar cycles to investigate temporal changes in vocal activity of one species, the Tropical Shearwater.

The tropical shearwater of Europa Island (© Q. d'Orchymont).

The survey was conducted in April-May 2019 and July – August 2019, 2020 and 2021. We identified 12 species including 7 of the 8 breeding seabirds (the season was not appropriate for the 8th species), 3 breeding land birds (out of 5 species, the two undetected species breeding only in the mangrove) and 2 non-breeding migrant species.



Distribution and abundance of the Tropical Shearwater of Europa Island, based on automated acoustic survey (from Beaujoin 2021 MSc Dissertation).

The method was particularly useful for investigating the distribution and abundance of the rare, endangered and mostly nocturnal Tropical Shearwater (*Puffinus bailloni*). The method allowed us to calculate accurate acoustic indices of abundance (number of vocalizations per minute) that we used to investigate temporal changes of vocal activity during the night, during a lunar cycle and during the breeding season. We also used these indices to compare the relative abundance of the species in various habitats.
The acoustic indices, coupled with banding operations will be also very useful to implement long term monitoring of this small, remote and endangered population.

Breeding habitat of the tropical shearwater at Europa Island (© M. Le Corre).

This study is part of the ECOMIE program (leaded by UMR ENTROPIE) and the RECI program (leaded by the TAAF). The Master internship of Alice Beaujoin was funded by the RECI program. We thank Gabrielle Dicque, Jade Lopez, Arthur Choeur, Lucie Gauchet, Mickaël Baumann and Quentin d'Orchymont for help in deploying and recovering the SM4.

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Call for contributions: This is the tenth newsletter of the Group. We plan to prepare the next issue for April 2022, so please send your articles to Sabine, Matthieu or Aurélie (see above) from now! ☺

Guidelines: articles sent should be around 300 words, written in English, with at least one photo or figure (with credits and legend) to illustrate. Please indicate the author(s) and affiliation(s). If your article is linked to a scientific publication, you can also include a reference of the paper at the end of the article.