Indian Ocean Seabird Group

Newsletter n°13

IOSG NEWSLETTER n° 13

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EDITO

This is the thirteenth newsletter of the Indian Ocean Seabird Group!

After more than 3 years and 6 newsletters, I am flying towards new horizons, so it is time for me to pass the torch and welcome our new seabird lover editor: Merlène Saunier! A big thank to her to take over this responsibility for the next years! ☺

Enjoy the reading and have a nice day!
Sabine

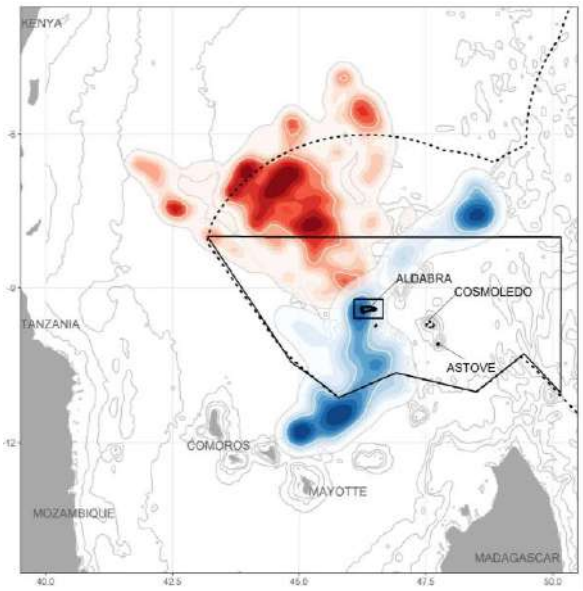
MEMBERS CONTRIBUTIONS

1°) New findings on Tropicbird foraging ecology in Seychelles

Annette Fayet, Orphéo Ensanyar-Volle, Jennifer Appoo, Nancy Bunbury, Gemma Clucas, Jessica Constance, Nasreen Khan, Gérard Rocamora, Cheryl Sanchez & Linsday Turnbull

Two recently published studies have shed light on the foraging ecology of Tropicbirds in Seychelles. The work was led by Annette Fayet and realized in collaboration with the Seychelles Islands Foundation (SIF), the Island Conservation Society (ICS) and the Island Biodiversity and Conservation center of the University of Seychelles (IBC-UniSey).

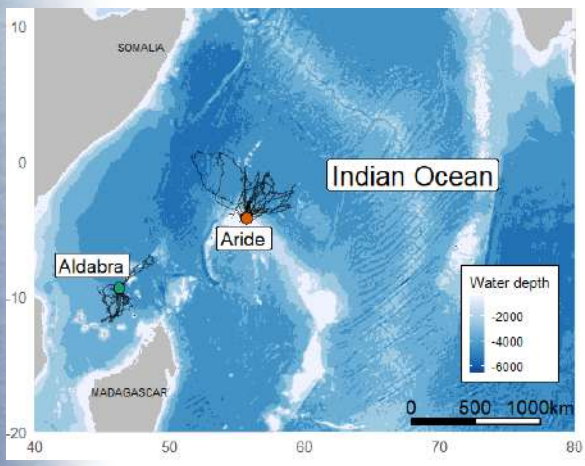
The first study, conducted on Aldabra Atoll, tracked the foraging movements of White-tailed and Red-tailed Tropicbirds during incubation and chick-rearing with miniature GPS devices and showed that the two species are completely segregated in their foraging distributions, with Red-tailed Tropicbirds foraging further from the colony and visiting mainly waters North-West of Aldabra, while the smaller White-tailed Tropicbirds fed and mostly South, and to a lesser extent, North-East of the island. The foraging ranges of both species are extensive, especially during incubation, with White-tailed and Red-tailed Tropicbirds feeding on average 240 km and 380 km away from the colony, respectively. Around 30% of the foraging range identified was beyond the Seychelles EEZ.



Foraging distribution of Red-tailed Tropicbirds (red) and White-tailed Tropicbirds (blue) breeding on Aldabra. Darker colours represent a higher density. Core feeding areas (50% density kernels) are represented with a white line. From Fayet et al. 2023, Oecologia.

The study also investigated causes of low breeding success for both species on Aldabra using camera traps near nests. Results showed that nest predation is a major driver of nest failure for both species (causing 65% of nest failures), and revealed that the two species are targeted by different predators. White-tailed Tropicbird nests are more sensitive to rats because these birds regularly leave their egg unattended. In contrast, no rats were seen depredating Red-tailed Tropicbird nests, but those were instead targeted by native avian predators, primarily Grey Herons, but also Pied Crows, to a lesser extent.

The second study, led by MSc student Orphéo Ensanyar-Volle, compared the foraging range of White-tailed Tropicbirds on outer (Aldabra) and inner (Aride) Seychelles islands. The Tropicbirds on Aride were found to feed mostly North of the island and much further than those on Aldabra (at least twice as far). Using habitat models, the study shows that this difference is likely driven by the birds' preference for deep waters, which are more easily accessible from Aldabra than from inner Seychelles islands.



Foraging trips of White-tailed Tropicbirds breeding on Aride and Aldabra. Adapted from Ensanyar-Volle et al. 2023, Marine Ecology Progress Series.

Both studies shed light on the wide foraging range of Tropicbirds in Seychelles, which has implications for their conservation at sea. Additionally, the susceptibility of the two species to different predators shows the complexity of implementing effective protection measures but also provide strong evidence in support of rat eradication on Aldabra. The lead authors thank SIF, ICS and IBC-UniSey for the fruitful collaborations and for their valuable support conducting the research. The two papers are available Open Access.

Fayet, A. L., Sanchez, C., Appoo, J., Constance, J., Clucas, G., Turnbull, L. A., & Bunbury, N. (2023). Marked differences in foraging area use and susceptibility to predation between two closely-related tropical seabirds. *Oecologia*, 203(1), 167–179. https://doi.org/10.1007/s00442-023-05459-x

Ensanyar-Volle, O., Appoo, J., Bunbury, N., Clucas, G., Khan, N., Rocamora, G., Sanchez, C., & Fayet, A. L. (2023). Differences in foraging range between white-tailed tropicbirds breeding on inner and outer Seychelles islands. *Marine Ecology Progress Series*, 724, 141–154. https://doi.org/10.3354/meps14454

2°) A previously undescribed feeding association of Greater Crested Terns with Grey Herons

Chris J Feare & Christine S Larose

Greater Crested Terns *Thalasseus bergii* are commonly seen, usually in small numbers, around the coasts of Seychelles Islands, feeding close inshore in shallow lagoons inside coral reefs, and roosting on beaches and rocks within the lagoons. They generally feed by diving to the water surface or, less frequently, by contact-dipping (Gochfeld *et al*. 2020).

A few breeds on some of Seychelles' outer islands (Skerrett & Disley 2011) but, largely due to human predation and disturbance, breeding has ceased on many islands, especially those more frequently visited by fishermen. On the inner island small numbers of non-breeding birds are commonly seen. These birds include adults, mainly in non-breeding plumage but occasionally in breeding plumage, and juveniles, of which some still beg for food from a parent (Feare 1975).

Adult Greater Crested Tern in breeding plumage, Bird Island, Seychelles, June 2015 (© Chris Feare).

Baie Ternay is a large bay at the northwest of Mahe, the main and most densely populated (by humans) island in Seychelles. The bay is shallow, in many parts < 1 m deep at low tide. The substrate is sandy; in places fine sand gives way to mud, especially where small streams enter the bay from the rocky hinterland and from an extensive marsh behind the southern beach. During the south-east trade wind season between May and October, the water in the bay is generally calm and shoals of small fish are commonly seen in the bay and where outlets of

fresh water enter it. The bay is protected as a Marine National Park.

During a visit on 5 July 2023, three Grey Herons *Ardea cinerea* were foraging in shallow (< 30 cm) water close to a small stream outlet. Most of the time they waded in water close to the beach or rocks, but two of the birds were also seen to stand on a small rock and plunge into the water. These foraging movements led shoals of small fish (unidentified) to swim in dense groups away from the herons, with many fish leaping out of the water.

During about two hours that we spent in the area, two adult Greater Crested Terns in non-breeding plumage capitalised on the herons' disturbance of the fish by diving into the shoals of escaping fish, where they successfully captured some. To our knowledge this foraging association between Greater Crested Terns and other species has not been previously recorded.

Feare, C J. 1975. Post-fledging parental care in Crested and Sooty terns. Condor 77: 368-370.

Gochfeld, M., Burger, J., Kirwan, G.M., Christie, D., and Garcia, E. 2020. Greater Crested Tern *Thalasseus bergii*. In Birds of the World (J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie, and E. de Juana, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.grcter1.01

Skerrett, A., Bullock, I. & Disley, T. 2001. Birds of Seychelles, Helm, London.

3°) Let's tern things around - New Western Australian seabird group aims to improve outcomes for seabirds

Aurelie Labbe

The Western Australian Seabird Conservation Network (WASCN) has been recently formed to better coordinate research on seabirds and to advocate for their protection along the coast of Western Australia.

Its founding members include marine ornithologists with various backgrounds in seabird research ranging from Terns, Penguins, Petrels and Pelicans, but also highly trained seabird rescuers with animal husbandry and veterinary backgrounds. The objectives of the group are:

1. To undertake research and conservation activities within (or impacting) seabirds in the eastern Indian Ocean region.
2. To provide and coordinate expertise to support collaborative seabird research projects in Western Australia.
3. To advocate for seabird conservation and management measures within the eastern Indian Ocean region (including Christmas Island).

To date the group has focused on:

- a Fairy Tern conservation project, led by Dr Claire Greenwell and funded by the Australian federal government,
- a population demographic survey of Procellarriformes in the South-West of Western Australia, led by Dr Erin Clitheroe,
- an ongoing population monitoring of Noddies on Lancelin Island, and Crested Tern diet study on Penguin Island, led by Dr Nic Dunlop,
- ongoing revegetation and an associated research project to help Bridled Terns and Little Penguins survive the heat during the moulting season and breeding on Penguin Island, led by Dr Aurelie Labbe and Dr Erin Clitheroe,
- ongoing curtailing of research to assist the Department of Biodiversity, Conservation and Attractions in preparing its response to an outbreak of avian influenza in Western Australia, led by Dr Aurelie Labbe.

A Storm Petrel in hand (© Nic Dunlop).

WASCN's focus in 2024 will remain on those above-projects and strengthening stakeholder relationships by engaging with government agencies, not-for-profit groups and citizen scientists.

Please contact the group by emailing yours-truly at waseabirds@iinet.net.au and look out for articles in this newsletter on our work.

4°) The role of seabirds in nutrient transport and its influence on mangrove forests of Aldabra Atoll

Jennifer Appoo, Nancy Bunbury, Sébastien Jaquemet & Nick Graham

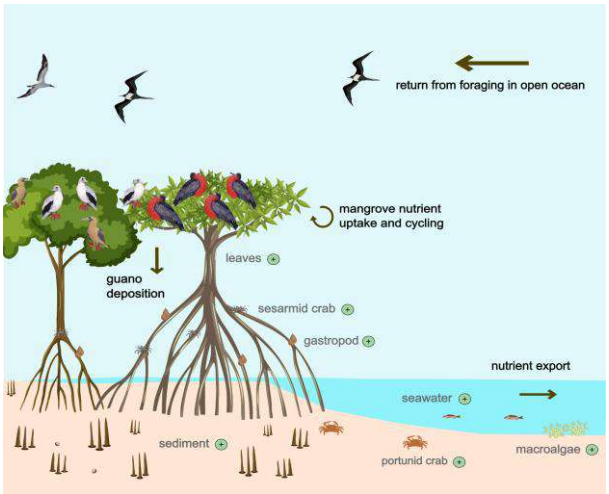
Seabirds play a unique role in connecting the sea and land. Seabirds feed across large areas of the ocean, sometimes far from the islands where they roost and nest. At their breeding colonies, seabirds bring back nutrients from the ocean, which are deposited mainly as guano. Seabird guano is rich in nutrients like nitrogen and phosphorus, which are natural fertilizers.

Aldabra Atoll is home to the world's largest breeding population of Great and Lesser Frigatebirds, along with one of the largest breeding populations of Red-footed Boobies in the Indian Ocean. On Aldabra, these seabirds build their nests in mangrove trees, where they deposit most of their guano. We set out to investigate the effects of seabird guano on Aldabra's mangrove forests. The study involved comparing mangroves with and without nesting seabirds, looking at nutrient levels and tracing the flow of nutrients in mangrove trees, in invertebrate communities found in the mangroves, and in seawater.

Frigatebirds nesting in Aldabra's mangroves (© Seychelles Islands Foundation).

We estimated that seabirds deliver around 40 tons of nitrogen and 40 tons of phosphorus to Aldabra's mangroves annually. Moreover, we found that mangroves leaves at seabird sites had 39% and 28% higher nitrogen and phosphorus levels, respectively, than non-seabird sites, and this nutrient uptake alleviated mangrove nutrient deficiencies.

Another key result was that nutrients from seabird guano were also transferred in the mangrove food web. Molluscs and crabs living in mangroves with seabirds were enriched compared to those livings in mangroves without seabirds. We also found that nutrients from seabird guano were exported to habitats adjacent to mangroves by tidal flushing with rising and outgoing tides, demonstrating the scale and extent of connectivity maintained by seabirds between the oceanic environment and coastal ecosystems.



Summary figure showing seabird nutrient enrichment of mangrove ecosystems (Appoo et al., 2024).

By showing that seabird nutrients promote positive nutrient status of mangrove habitats, the

research demonstrates the role of seabirds in nutrient transport and their importance in maintaining healthy mangrove ecosystems. The research strongly suggests that conservation management actions to boost and support seabird populations, such as protection, invasive mammal eradications or seabird reintroduction programmes, in mangrove areas, are likely to be highly beneficial for mangrove health.

Seabird populations on Aldabra are heavily impacted by introduced rats and cats. A planned rat and cat eradication is being prioritized on Aldabra because of the positive ecosystem impacts that will follow; the research suggests that mangrove forest health can now be added to the list of expected positive impacts of the eradication project.

Appoo, J., Bunbury, N., Jaquemet, S., and Graham, N. A. J. 2024. Seabird Nutrient Subsidies Enrich Mangrove Ecosystems and Are Exported to Nearby Coastal Habitats. *iScience* 27 (4): 109404. https://doi.org/10.1016/j.isci.2024.109404

5°) Population census of Procellariiformes in the South-West of Western Australia

Erin Clitheroe

Seabirds are essential to both marine and terrestrial ecosystems, yet in South-West Western Australia, many of these vital species remain poorly understood and under-monitored. This is particularly true for cryptic burrow-nesting species with outdated, or entirely absent population estimates. This has led to increasing concern that populations might be declining unnoticed, with some species already lost from several islands. To address this critical gap, the *Southwest Seabird Monitoring Project* is on a mission to establish a comprehensive monitoring program, gathering essential and updated population and demographic data for key seabird species breeding on South-West islands, including Little Penguins, Little Shearwaters, Flesh-footed Shearwaters, White-faced Storm Petrels, and Great-winged Petrels.

Since our inaugural banding sessions on key nearshore islands in 2023, our project has gained momentum. Notable revelations, include the new demographic data on previously unmonitored populations of Little Shearwaters, and White-faced Storm Petrels, including the apparent increase in White-faced Storm Petrel population in Western Australia. The project has also been noting critical differences in morphometric measurements of the Little Shearwaters found on islands in South Western Australia and those reported in the literature. The project also includes a component to investigate the diet of White-faced Storm Petrels which will be commencing in the near future.

Little Shearwater on Lancelin Island (© Claire Greenwell).

Through our efforts, we aim not only to safeguard the future of these feathered denizens but also to protect the unique landscapes they call home. Yet, navigating the realm of nocturnal, burrow-nesting birds presents its share of challenges with ornithologists often stumbling through rugged island terrain under the cloak of night, where dedication reigns supreme, and caffeine becomes the elixir of choice.

6°) Seabird conservation and atoll restoration in the Maldives

Sebastian Steibl, Yoosuf Rilwan, Ahmed Leevan, Guy MW Stevens & James C Russell

The Maldivian archipelago stretches from the southern tip of the Indian subcontinent ca. 900 km to just below the equator. With over 1200 islands, the majority uninhabited, the Maldives offer a vast network of suitable breeding sites for seabirds: from sparsely vegetated sandbanks (locally 'finolhu'), which are widely used by Black-naped Terns, Roseate Terns, and Great Crested Terns for nesting, to broadleaf-forested (*Pisonia grandis*) islands, which provide breeding habitat for White-tailed Tropicbirds and Tropical Shearwaters. Additionally, large numbers of seabirds migrate annually to the Maldives during non-breeding season, including Frigatebirds, Brown and Lesser Noddies. Despite seabirds widely breeding across the Maldivian atolls, little work has focused on them until recently.

B. Olhugiri, a seabird island protected under the Protected Area Regulation and the EPA's research vessel 'Thimaaveshi' (Dhivehi for 'environment') that we used for a joint seabird scoping expedition in May 2024 (© Umar Ibrahim).

The University of Auckland has partnered with the Environmental Protection Agency Maldives and the NGOs Maldives Manta Conservation Programme and Manta Trust to undertake seabird monitoring and island restoration within the Maldives. As invasive predators (Black Rat *Rattus rattus*, and Asian House Shrew *Suncus murinus*) are widespread, the goal is to establish predator-free seabird sanctuary islands across the Maldives and develop local capacity in seabird conservation and invasive species eradications.

Over the last year, we began identifying relevant seabird nesting islands and determine the presence of invasive species, including population genetics studies on rats and shrews. Traditional knowledge on seabirds is impressive and engaging with local communities to understand past and current distribution patterns has already become a key element in our studies. In January 2024, we started a White-tailed Tropicbird ringing/banding programme of a colony that has established on a private resort island, where it benefits from the resort's ongoing pest control. We estimated the total colony size at around 800 breeding birds – the largest known tropicbird colony in the central Indian Ocean Lakshadweep-Maldives-Chagos island chain. This work is forthcoming in *Marine Ornithology*.

White-tailed Tropicbirds are widely nesting across the Maldivian atolls (© Sebastian Steibl).

We intend to launch tracking studies within the next year and run a workshop for local capacity building. We also began collecting genetic samples from Tropical Shearwater and White-tailed Tropicbird colonies to understand the population connectivity of Maldivian seabirds within the wider Indian Ocean region.

A special thanks to the contributors:

Cover page photo:

Sabine Orlowski – A Brown Noddy at Tromelin island

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Call for contributions: You can send your articles for the next issue of the newsletter to Merlène or Matthieu from now! ☺
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Guidelines: articles sent should be around 300-400 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), and the e-mail address of the contact author. If your article is linked to a scientific publication, you can also include a reference of the paper at the end of the article.