

Introduction

This report provides an update on the progress of Rufford Small Grant 32649-2, which aims to gather comprehensive data on manta ray hotspots, population dynamics, and feeding behaviours in South Africa. Our approach combines observational data collection, and photo-identification to understand spatial-temporal habitat use patterns of manta rays in the study area. Additionally, we strive for community involvement, public engagement, and education, which are integral to marine conservation. By raising awareness about species such as manta rays and their habitats, our educational activities empower individuals to contribute to marine conservation. Engaging with the youth has been particularly important, as their voices are crucial within the community. This report covers activities conducted within the first quarter, since the funding allocation in February 2024, up to May 2024.

Field Research Activity

The iSimangaliso Wetland Park (IWP):

Fieldwork in the iSimangaliso Wetland Park (IWP) contributes to research objectives one, two, and four as outlined in the proposal and updated in the request for budget changes approved by the Trustees on 5 December 2023.

In March, three days were spent researching reef manta rays, *Mobula alfredi*, in the IWP (Figure 1). A total of 18 sightings of manta rays and 13 new identifications were recorded. The area's protected status for over 50 years has led to prolific fish abundance, making it a favorable habitat for manta rays, which were observed surface feeding and unharmed by fishing and dive boats (Figure 2). Additionally, four days of fieldwork in May yielded 25 sightings and 16 identifications.

Significant findings include the identification of the IWP as an aggregation site for *M. alfredi* and the Ballito/Aliwal Shoal area for *M. birostris*. 27 new transboundary records of *M. alfredi* were identified, indicating substantial connectivity to the Inhambane Province, specifically Závora (n=26), with *M. birostris* also having two transboundary records. Moreover, 20% of identified individuals were documented moving between countries. Key findings in the IWP include the identification of important feeding sites and the marking of hotspots, with four sites identified within the 40 km coastal area.

Collaboration with tagging studies has allowed us to maximize efforts with minimal spending. While such an operation would typically cost thousands of pounds, by sharing costs and research activities, we have only spent 17% of the research budget so far on research in the IWP (see Table 1 in the Annex).

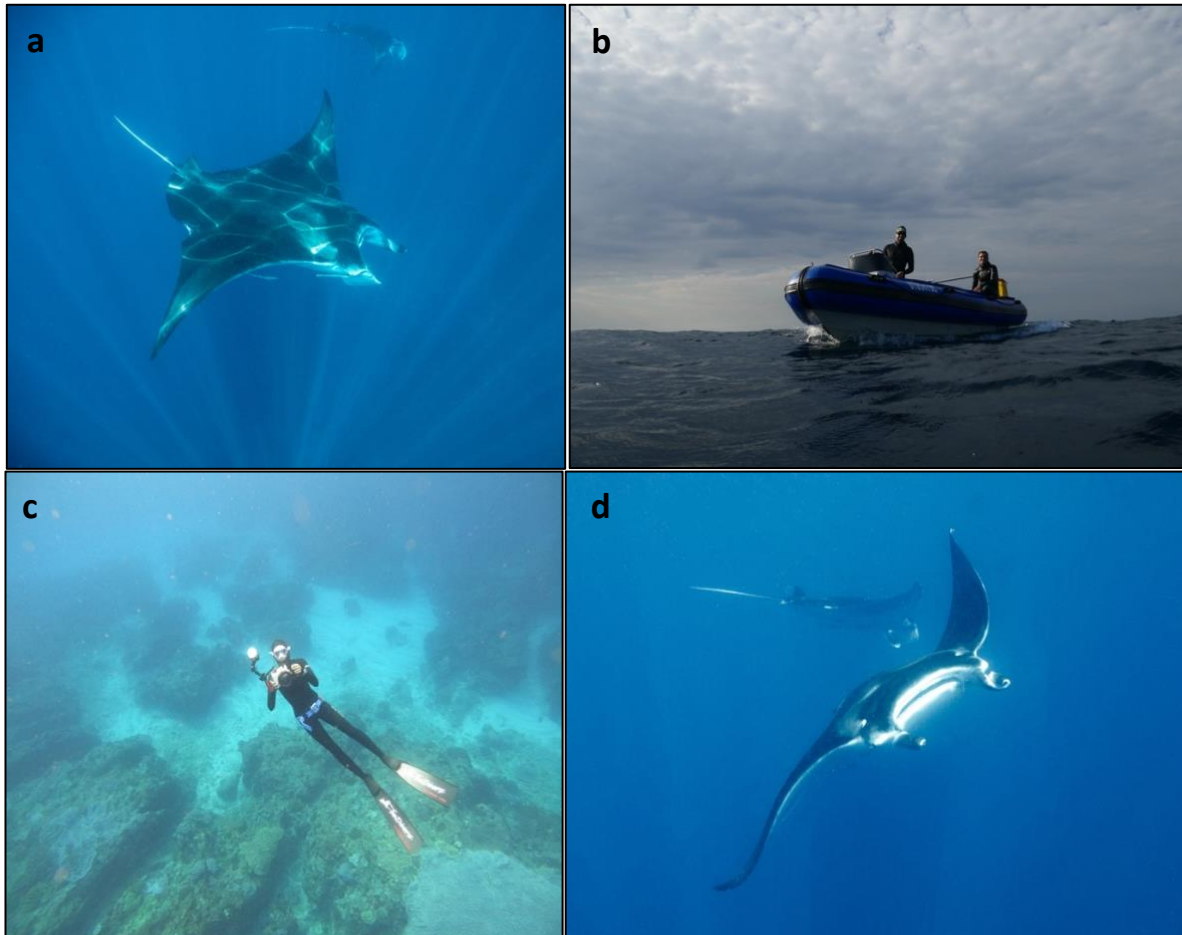


Figure 1. In the field: (a) reef manta rays feeding in the iSimangaliso Wetland Park, (b) Dr Ryan Daly, research assistant, and vessel kitted for research, (c) Dr Michelle Carpenter (me) with underwater photography equipment, and (d) additional surface feeding manta rays feeding in the IWP.

The specific research activities included:

- 1) Seven full water days surveying the marine sanctuary in the IWP which gathered crucial data on this new discovery, including 43 sightings, and 29 identifications.
- 2) Filming extensive footage of feeding behaviour, some courtship behaviour, feeding behaviour of manta rays while snorkelling/freediving at the study site.
- 3) Deployment of Remote Underwater Video (RUV) (1 in March 2024), enabling us to record ray cleaning and social behaviour in the absence of human divers for a total of one out of five hours of footage of the cleaning station.

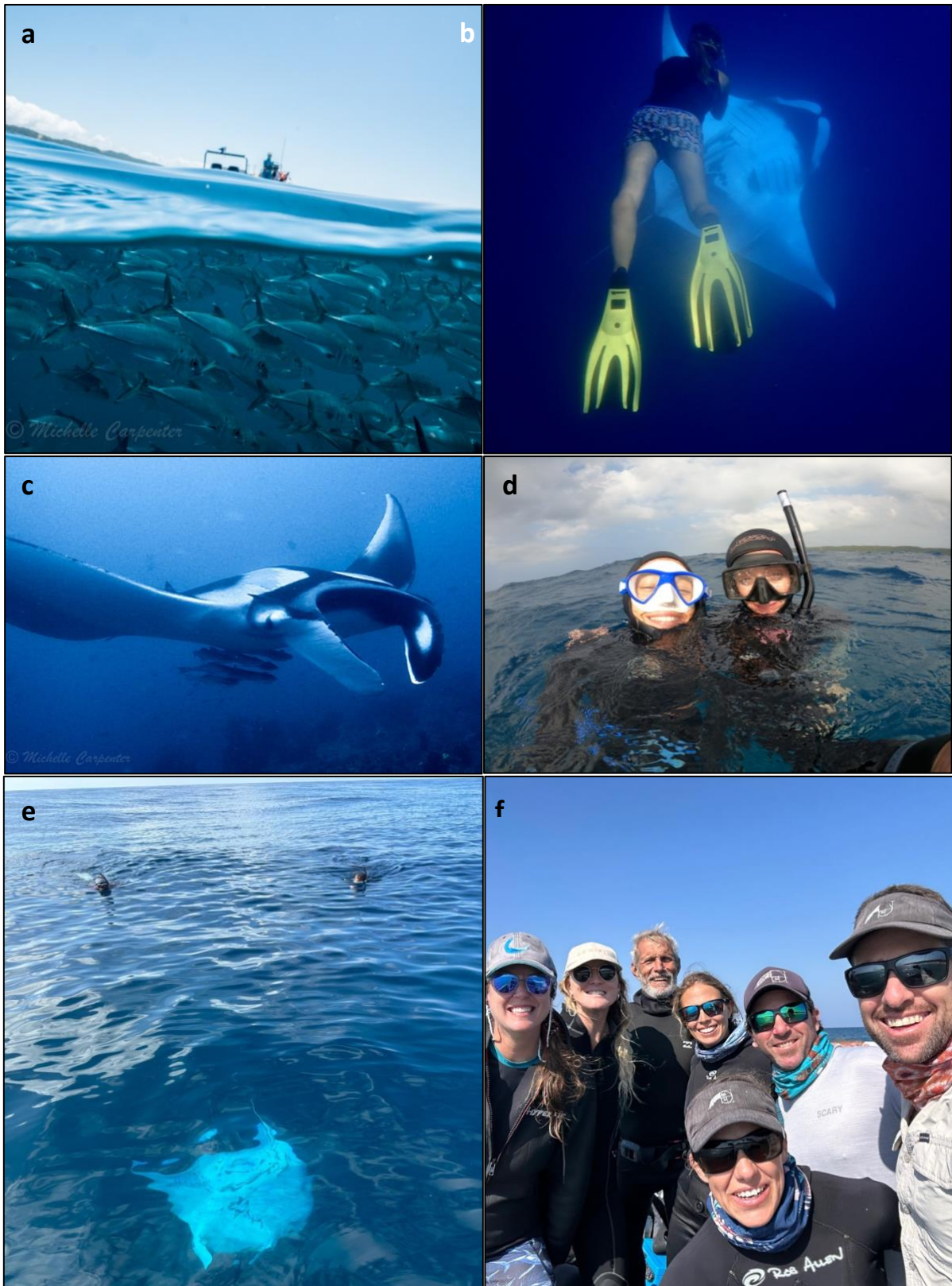


Figure 2. In the field: (a) bigeye trevally schools in the iSimangaliso Wetland Park, (b) Dr Michelle Carpenter photographing an oceanic manta ray, *Mobula birostris*, (c) Oceanic manta ray, (d) Dr Michelle Carpenter and research assistant in the IWP, (e) Nakia Cullain and Michelle Carpenter photographing a reef manta ray, *Mobula alfredi*, and (f) a group photo of the research team at the IWP.

Aliwal Shoal/Ballito areas:

Oceanic manta rays, *Mobula birostris*, are more transient and periodically seen. Currently, there have been no recent sightings of this species along the coast. Historically, there have been good sightings of this species in KZN towards the end of the year (Figure 2c).

Fieldwork in Port Elizabeth, Eastern Cape:

Research activities in Port Elizabeth have been significantly delayed due to the lack of sightings reports of *Mobula alfredi* in the expected seasonal timeframe (January-March). A researcher is stationed there to monitor all sharks and rays in the Port Ngqura, Port Elizabeth. Thanks to the extension granted by the Trustees, we will attempt research activities again in January 2025.

Dissemination of results:

Our efforts contribute to the dissemination of results objective. Current research findings have been shared through various social media platforms including Instagram (personal accounts @mobulidmich, @african_shark_diaries, @natureakk) and Facebook (personal account: Michelle Carpenter, and through dive center ScubaXcursion Dive Centre), reaching approximately 9,000-10,000 followers. Relevant stakeholders eagerly anticipate project updates and find the information useful in their work, sharing it informally with their clients and local communities to demonstrate their commitment to conservation.

A manuscript detailing the initial findings of this research, specifically hotspots for manta rays, *M. alfredi*, and *M. birostris* along the South African coast, has been submitted for publication to the Environmental Biology of Fishes journal. Given the significance of the special issue specifically on elasmobranchs (sharks and rays), it is expected to receive substantial viewership in the scientific community and associated press (Figure 3).

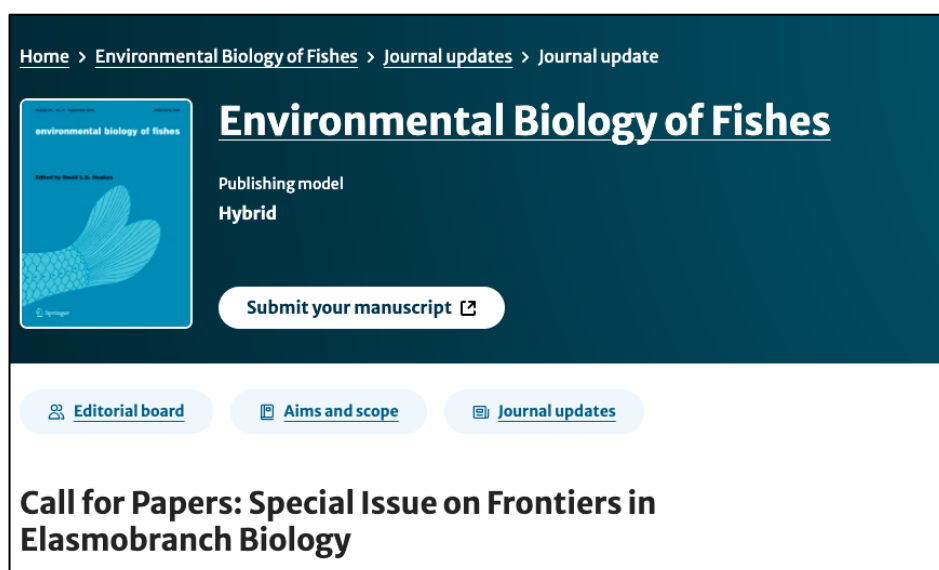


Figure 3. Environmental Biology of Fishes Journal; Special Issue on Elasmobranchs (sharks and rays).

Education

Distribution of donated Harry the Hammerhead Shark Books:

Contributes to conservation management and education objectives. In February 2024, 120 books were distributed to 120 local children across three schools: Widenham, Freeland Park, and Mbulula community (Figure 4). At one school in Freeland Park, called WildEd, a 13-year-old student named Eden Westerdale expressed interest in gaining additional volunteer experience in marine biology. She completed 5 hours of volunteering and assisted in creating an educational video called Aliwal TV, which will be published on YouTube.



Figure 4. Harry the Hammerhead Shark books donated to schools in KwaZulu-Natal, South Africa, including (a) WildEd, (b) Widenham, (c) Mbulula, and (d) WildEd. These were contributed by a national charity called WildOceans.

Educational lessons given to schools prior to snorkel trip:

Educational lessons were given to schools prior to the snorkel trip, contributing to conservation management and education objectives (Figure 5). Following the Harry the Hammerhead session plans, we provided both the introduction to oceans lesson and marine protected areas lesson.

These lessons included watching the Mamnzi Video, which celebrates South Africa’s oceans and new marine protected areas, and leading a discussion around 10 benefits of MPAs using the presentation to guide.

At the Widenham School, we asked the pupils, “Who has been to the seaside before?” and encouraged them to share their experiences. We asked them what they think of when people mention the ocean, if they know the name of their local beach, and who has been there. As a closing activity, we demonstrated how the Earth is 71% ocean. For the Blank Canvas activity, each child was given a blank piece of paper and crayons and asked to draw what they think of when they think of the ocean, sea, or beach. This was not a competition but rather an opportunity for them to express their interpretation of the ocean. Some pupils shared what they had drawn, providing insight into their current understanding of the oceans and their place in their lives.



Figure 5. Delivering session plans to WildEd (top) and Mbulula (bottom) schools.

Snorkel tours:

Taking local children snorkeling at Aliwal Shoal for the first time has been an exciting and successful endeavor thus far. To date, 32 children have participated, with only 10 of them having ever been to Aliwal Shoal, and if so, only once before.

Widenham, a school where most children are from poor backgrounds, and WildEd, a school with students from higher income families, have already completed trips. Almost all of the children that had been to Aliwal Shoal before were from WildEd. The Mbulula school has not yet been on a snorkeling trip, as we are awaiting approval from the parents. However, the principal is fully supportive of the idea. This school will require more preparation as we will need to teach the children how to use masks and snorkels, as well as ensure careful water safety since many of them don't know how to swim. Trips with Mbulula are scheduled to start in January 2025.

On each completed trip, children were assessed for their level of fear or discomfort about the ocean through discussions before and after the trip. For example, on the first trip with Widenham school, 6 out of 8 children were scared to get in the water initially, but after snorkeling, all of them wanted to do it again, and 5 out of 8 wanted to pursue their open water scuba diving course. On the second trip with Widenham school, although most kids were initially scared, after snorkeling, they all wanted to do it again except for one, who decided not to. Four of them also wanted to do their open water diver course.

During each snorkel session, marine species were identified, including longfin batfish, different species of reef fish such as Moorish idol, bluestreak cleaner wrasse, bannerfish, sea goldies, and fusiliers. Children were asked to remember some of the fish to try and identify them in the identification book once back on land. They also encountered a sea turtle and successfully identified the species, as well as a honeycomb whip ray using laminated guides from previous Rufford Small Grant.

Four of the trips were even lucky enough to encounter wild bottlenose dolphins, which swam around the children. This, along with the beautiful colors of the reef, was an experience they will never forget.

The specific education activities included:

- 1) 120 Harry the Hammerhead Shark books donated across three schools.
- 2) Session plans given to all schools including the Intro to Oceans lesson (Widenham, Mbulula) and Importance of Marine Protected Areas lesson (WildEd).
- 3) Snorkel trips so far included 32 children across 5 boat trips, and two schools completed.
- 4) Marine species identification practice with the children during all snorkel trips.
- 5) Photographs and videos disseminated to teachers and parents.

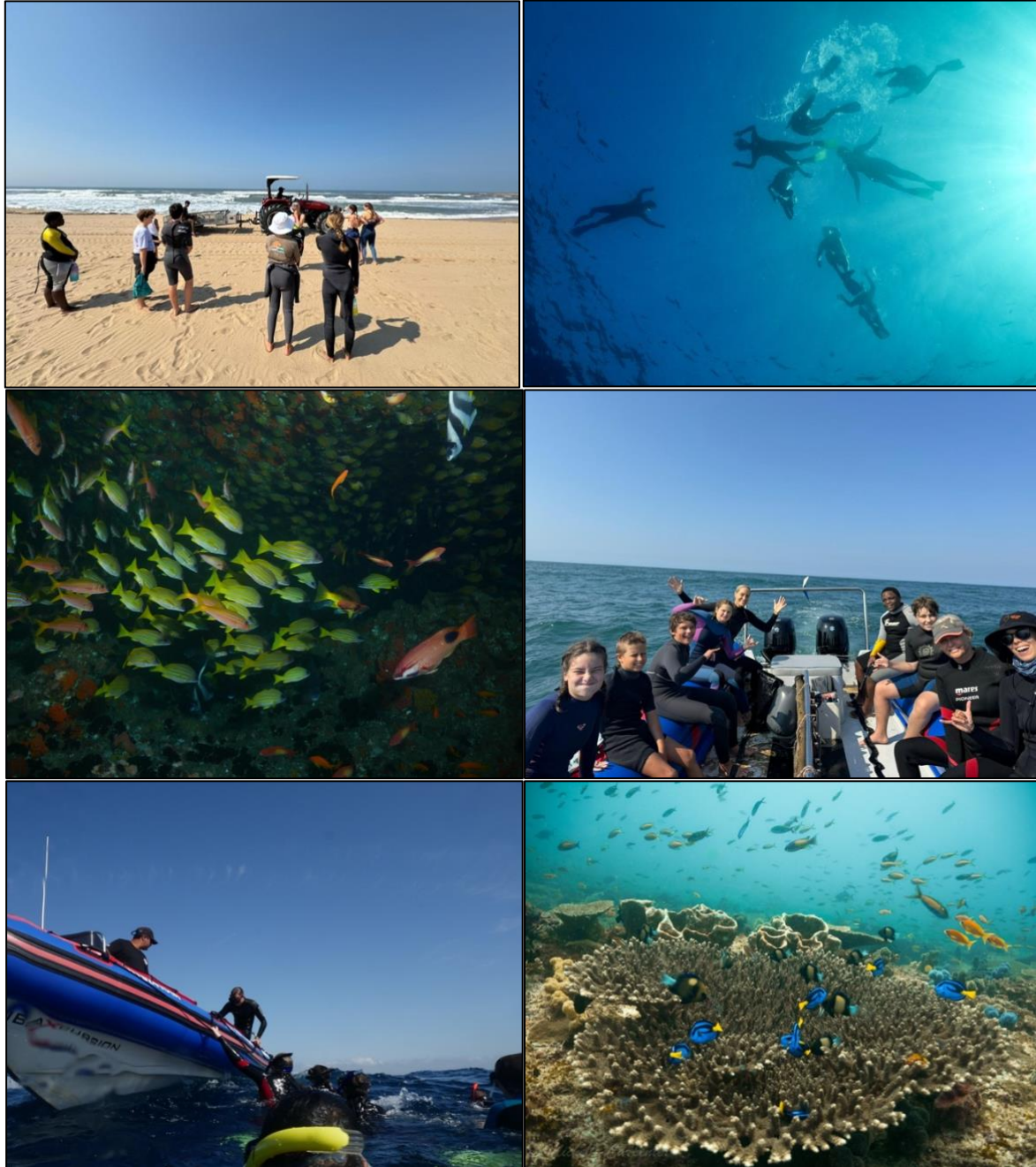


Figure 6. Local children from KwaZulu-Natal, South Africa snorkelling Aliwal Shoal Marine Protected Area for the first time, including WildEd and Widenham schools, and some of the marine fish they encountered.



Figure 7. Local children from KwaZulu-Natal, South Africa snorkelling Aliwal Shoal Marine Protected Area for the first time, including WildEd and Widenham schools, and some of the marine fish they encountered.

Conclusions

The progress made in our research and education efforts has been significant and promising. Through fieldwork in the iSimangaliso Wetland Park and other areas along the South African

coast, we have gained valuable insights into the habitat use patterns of manta rays, as well as identified important feeding sites and transboundary movements. Our collaboration with tagging studies has enabled us to maximize our efforts while minimizing costs, allowing us to make substantial progress within the allocated budget.

In addition, our education activities have successfully engaged local children in learning about marine conservation and experiencing the wonders of the ocean firsthand. By distributing Harry the Hammerhead Shark books and conducting educational lessons, we have not only raised awareness but also inspired young minds to become stewards of the marine environment. The snorkeling trips to Aliwal Shoal have provided unforgettable experiences for these children, creating a deeper connection to the ocean and its inhabitants.

Moving forward, we will continue our research and education efforts, with plans to expand our outreach to more schools and communities. We are grateful for the support of the Rufford Small Grant and the Trustees, which has allowed us to carry out this important work. Further, we appreciate the timeline extension given which will benefit both research and education activities. By sharing our findings through publications, social media, and other channels, we aim to further contribute to the conservation of manta rays and marine biodiversity in South Africa and beyond.

Annex: Current Budget

It's important to address the unexpected costs that have arisen regarding snorkel equipment rental, which were not initially budgeted for. So far, this additional expense has totaled 4,400 South African rand, equivalent to almost the cost of a whole day's boat rental. Each child's equipment rental costs R150, resulting in a reduction of available funds for snorkel trips. Originally, we had budgeted for 12 snorkel trips, but due to the additional costs, we can now only afford approximately 10 trips in total. Consequently, we anticipate completing 5 trips with the Mbulula school.

Table 1 below illustrates the current budget and the remaining budget for fieldwork and education outreach activities, presented in South African rand.

Category	Budget spent February-May 2024	Budget remaining as of May 2024
Fieldwork – IWP	11,752.48	40,247.52
Fieldwork – Port Elizabeth	0.00	17,000.00
Snorkel Trips	27,400.00	27,800.00

Thank you to the Rufford Foundation for their unwavering support throughout this project. Without their generous funding, none of this work would have been possible. Their commitment to conservation and education has made a significant impact on our efforts to study and protect marine life in South Africa.