

Final Evaluation Report

Your Details	
Full Name	Janis Khansa Putri Argeswara
Project Title	Conservation of threatened manta rays in a key reproductive habitat - Nusa Penida MPA, Indonesia
Application ID	40026-2
Date of this Report	29 August 2024

1. Indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Provide complete and most updated local population demographics				From October 2023 to August 2024, we conducted 71 dives, where 67 of them were to Manta Point, the identified manta ray cleaning station; and 4 to Manta Bay, the identified manta ray feeding ground. Within 622 encounters, we saw 250 individual manta rays.
Establish baselines for monitoring growth rates of immature life stages				We were able to measure manta rays in Manta Bay, the potential manta ray nursery ground, and see the sizes of the smaller manta rays. We have only measured 21 individuals multiple times, but there is not enough yet to establish growth rates.
Establish local population's reproductive cycles and rates				We were able to see the seasonality of pregnancies and mating behaviour based on the data we collected. Data from the past ~12 years have shown 'mating season' observed mainly between April - May, and September - October. This can be seen from the number of reproductive activities observed by month, and when reproductive behaviour

				was compared to overall behaviour. We updated our data of the top 15 most sighted adult female manta rays in Manta Point in the past 12 years (Figure 1).
Evaluate the influence of the local environment				Due to unforeseen challenges of broken and missing instruments, we weren't able to finish this analysis. However, we plan on finishing data collection by the beginning of next year, and the target is to finish all data analysis by mid-next year.
Capacity building				In this grant period, we were able to hire two Indonesian research assistants.

2. Describe the three most important outcomes of your project.

a). Increased knowledge of reproductive trends and demographics for the manta ray population in Nusa Penida. From September 2023 up to August 2024, we have conducted 71 dives, where 67 of them were to Manta Point, the identified manta ray cleaning station; and 4 to Manta Bay, the identified manta ray feeding ground. During 622 encounters, we saw 250 individual manta rays.

b). Evidence of mating season. A previous study by Germanov et al., 2019 noted that the reproductive season of manta rays in Nusa Penida peaked mainly between April - May. The most recent analysis showed that while the number of reproductive behaviours still peaks in May, followed by October, the rate of reproductive behaviour when compared to the overall observed behaviour is highest in October (Figure 2). Meanwhile, pregnancies are observed highest in April, followed by June. With the manta ray gestation period of approximately 12 months, the highest pregnancy sighting based on visual cues fits the reproductive behaviour peaking in May. Further analyses should be conducted to test whether various external factors influence the seasonality of reproductive behaviour.

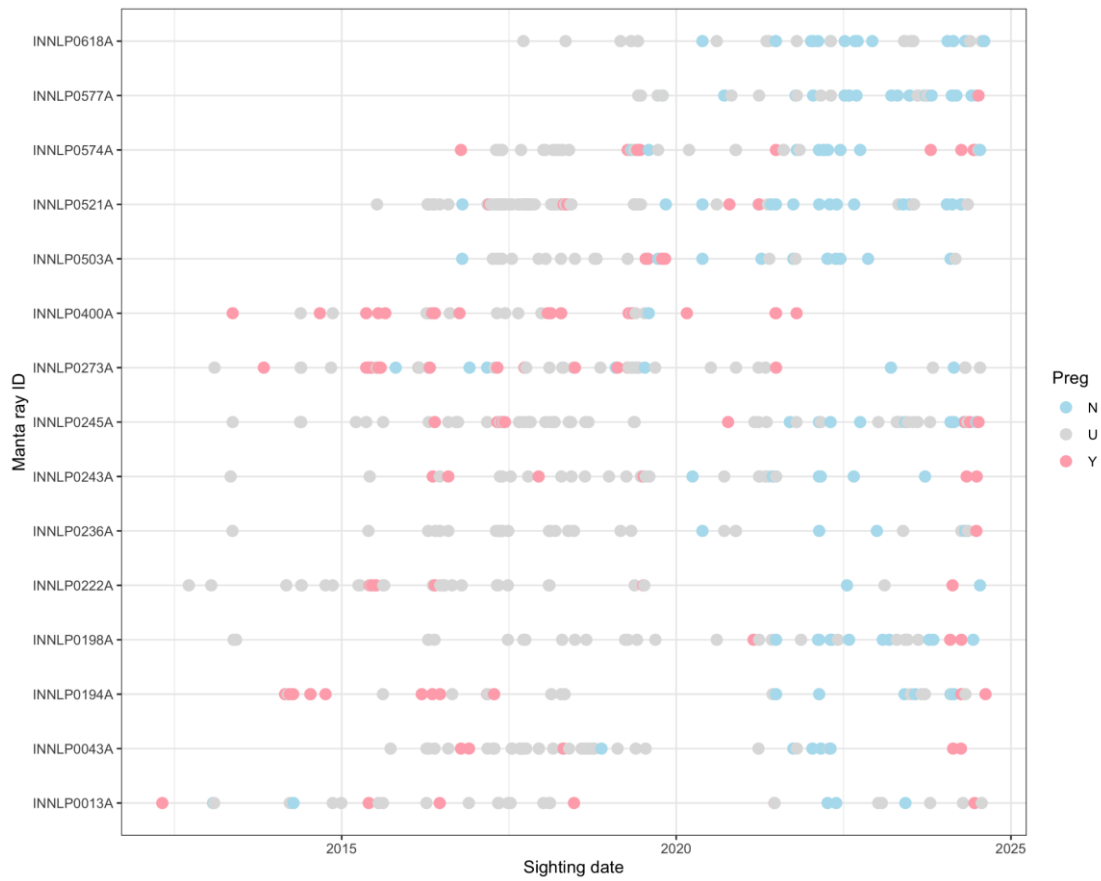


Figure 1. Updated pregnancy plot of our top 15 most sighted female manta rays in Manta Point

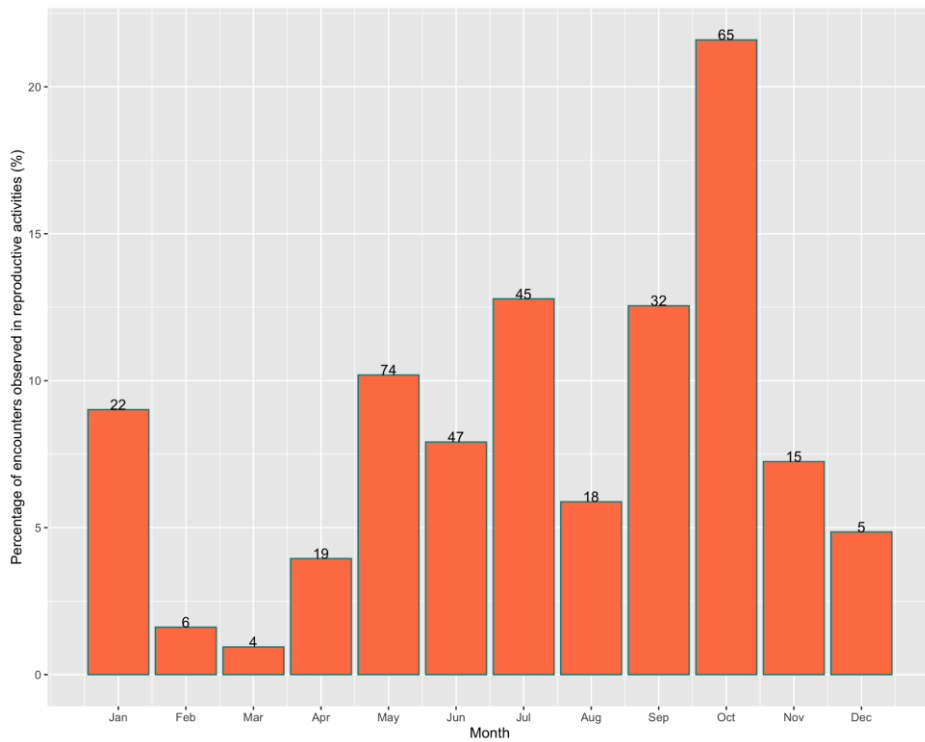


Figure 2. Percentage of reproductive behaviour encounters over all encounters by month from January 2012 - August 2024

c). We managed to train one new research assistant and one research assistant who used to be an intern in the previous Rufford Grant Phase 1. All personnel were in their early 20s, with less than five years of experience in research and conservation. They were all trained in SCUBA diving and given an introductory course to free-diving, and one personnel had their SCUBA diving licence upgraded from Open Water Diver to Rescue Diver. Both research assistants were trained in giving scientific presentations to the public in English and in Bahasa Indonesia, as well as to create scientific communication instruments, such as posters and infographics (Figure 3 - 5).



Figure 3. Nathania grabbed a photo identification of a manta ray while maintaining a respectful distance from the animal



Figure 4. Ariq doing his Emergency First Responder course before continuing his PADI Rescue Diver course



Figure 5. Nathania giving a presentation on manta ray research and conservation in Bahasa Indonesia to the local dive community in Nusa Penida

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

The instruments we use to measure environmental factors are either broken for no reason or went missing underwater. We will send the broken instruments back to the company for them to investigate the items. The Nusa Penida waters are famous for their currents, and therefore is challenging to secure the instruments in an area where it is exposed to currents. We will try again next time, using different approaches, to set the instruments safe and secure underwater. With the increasing tourism, dive centres and snorkel operators will only go to certain sites where manta rays are more predictable (e.g., Manta Point) than sites where manta rays are less observed (e.g., Manta Bay). This makes our data collection skewed, as we have been collecting more data in Manta Point than in Manta Bay. We will collect more data solely in Manta Bay in the next couple of months.

4. Describe the involvement of local communities and how they have benefitted from the project.

Sustainable tourism practices outreach to local communities:

We conducted a manta ray and tourism presentation in Bahasa Indonesia to the local community. The local community expressed their concerns and feedback regarding how tourism is practised within the MPA.

Ocean literacy outreach to local schools:

Our research assistants have provided presentations in Bahasa Indonesia in schools, dive centres, and snorkel operators within the MPA. Their presentations were focused on the biological, ecological and conservation importance of marine megafauna in general and on the island, and the actions the public can take to participate in marine megafauna research and conservation.

Scientific capacity building for two entry-level scientists:

We hired two early-career Indonesian research assistants in September and November 2023. The funding helped them sharpen their SCUBA and free-diving skills, and experience fieldwork with manta rays and the challenging work of obtaining

data from free-swimming animals. It also helped them with their public speaking in English and in Bahasa Indonesia.

5. Are there any plans to continue this work?

On-going manta ray measurements: We will continue measuring manta rays, particularly in Manta Bay, until the data collected is sufficient to confirm the hypothesis of Manta Bay as a manta ray nursery ground. We aim to finish data collection in the first quarter of 2025.

Environmental data influence: While our instruments are currently broken, we will focus on analysing the influence of environmental factors through satellite data on the reproductive seasons of manta rays.

Capacity building: We aim to recruit two early-career interns in the first quarter of 2025, funding dependent.

Reporting study findings: We are planning to report our project findings to the government entity that manages the MPA after all analyses have been sorted. We also aim to publish the results of this project in a peer-reviewed journal, starting by mid-2025.

6. How do you plan to share the results of your work with others?

Send survey results and report to the local ministry office: We will report our findings and recommendations to the local ministry office through our reports.

Social media posts: We will share our activities and findings through the Marine Megafauna Foundation and the annual report of Yayasan Megafauna Laut.

Online and in-person presentations: We share the results of our project during manta ray presentations with the public (usually tourists and guests). However, we have also been doing more online presentations recently, and we mention our project and the results during our online presentations.

Scientific conferences: We participate in scientific conferences and create a poster and/or presentation about the project results and recommendations.

Peer-reviewed publications: We will publish the results of our project in a peer-reviewed journal, which will be useful to the public, particularly the scientific community.

7. Looking ahead, what do you feel are the important next steps?

We feel our last approach to the local government during our one-on-one discussions with the local tourism operators could be done better by collaborating with larger and more established conservation organisations. Therefore, we think more collaboration with the government or more prominent conservation organisations is important to implement sustainable tourism practices. To do this, we would all have to make sustainable tourism practices a priority, which can be challenging as other organisations and/or the government might have other agendas. However, we are keen to continue highlighting the importance of sustainable tourism to local stakeholders, tourism operators, and conservation organisations.

8. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

Yes, we used the Rufford Foundation logo in our work. The foundation was mentioned and received publicity during our in-person and online presentations.

9. Provide a full list of all the members of your team and their role in the project.

Janis Argeswara: Project leader (project design; methodology trials; data collection, processing, and analysis; grant and report writing; permit administration; documentation; outreach)

Aulia Zeintrinanda: Senior Research Assistant (manta ray data collection and processing; methodology trials; outreach; reporting; documentation)

Gabriela Nathania Harywanto: Research Assistant (manta ray data collection, processing, and analysis; written reporting; documentation)

Ariq Trisarjono: Research Assistant (manta ray data collection, processing, and analysis; written reporting; documentation)

10. Any other comments?

This project would like to thank the regency governance for the research permits that allowed the study to be commenced. We would also like to give our gratitude for the support of the local tourism operators for accepting our input on better tourism practices and for sharing their views during the discussions, and for our amazing volunteers who have come to help with data collection.