TAMATAROA 1

Interim mission report

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The new GOMBESSA expedition led by Andromède Océanologie, in partnership with the Mokarran Protection Society

ANDROMEDE OCEANOLOGIE

GOMBESSA EXPEDITIONS

MOKARRAN PROTECTION SOCIETY

Interim report for the AP Diving project partner

ap diving
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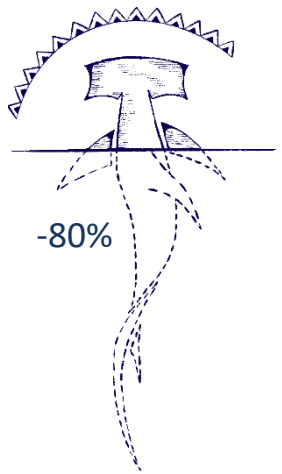
Tiputa pass, Rangiroa atoll.

It is here, in the heart of the Polynesian archipelago of the Tuamotu, that a large part of the TAMATAROA 1 mission took place, from December 1, 2022 to March 20, 2023.The Tuheiava pass on the Tikehau atoll was also the site of scientific operations carried out as part of this project.

Passe de Tuheiava, atoll de Tikehau © Y. Gentil TAMATAROA



TAMATAROA, the great hammerhead shark of the Tuamotu.

As impressive as it is discreet, this super predator, harmless to humans, is a migratory species that is now classified as Critically Endangered (IUCN, 2019). Overfishing and habitat degradation have led to its near extinction worldwide, with an 80% loss over the past 70 years.

The implementation of targeted conservation measures for this emblematic species then seems obvious. French Polynesia took a first initiative in this direction, by creating the first shark sanctuary in the Central Pacific ten years ago. Although essential for the conservation of this species, this measure cannot, on its own, stem the decline of populations because it does not take into account the degradation or loss of environments and resources essential to their survival.

And for good reason, scientists and managers are faced with a cruel lack of knowledge on the ecology of this species in the world and particularly in the Central Pacific, considered “data-deficient” by the IUCN.

Three years of preliminary study, carried out by the association Mokarran Protection Society, have identified the Tuamotu as one of the last refuges in the world for the great hammerhead shark. Following these initial results, Polynesia decided to register the great hammerhead shark as an "Emblematic Marine Species of the Pacific", making the in-depth study of this species a priority for the territory.

TAMATAROA 1, a mission with multiple challenges.

Overcoming the cruel lack of scientific knowledge in order to ensure the sustainable conservation of great hammerhead sharks in the Central Pacific is the guiding thread of the TAMATAROA project.

Characterizing its population, estimating its size, understanding its ecology, defining its migratory routes and its key habitats are all elements that will guide decision-makers and managers in the pursuit of effective measures to fight against its extinction.

To optimize the prospects for the implementation of these measures, the program is built in close collaboration with the actors and managers of the marine environment of the Polynesian territory.

The first part of this major program, the TAMATAROA 1 mission aims to:

- Set up a network of 60 acoustic receivers in Rangiroa, as well as in Tikehau;
- At the same time, carry out the first tagging campaign (acoustic transmitters) of great hammerhead sharks in the passes of Rangiroa and Tikehau;
- Continue the campaign to observe the behavior of the great hammerheads and the associated biodiversity;
- Consolidate collaboration with the institutions of the Territory and the State, the municipalities, the local and international partners, and the population;
- Animate a participatory science network and launch the cooperation and training of local collaborators and technical partners in the various protocols deployed;
- Multiply awareness-raising actions at the local level;
- Launch the shooting of a documentary film.

Technological innovations for a more animal-friendly approach.

If the great hammerhead shark, yet emblematic of Polynesian waters, has never been studied in this region of the world, it is because the scientific and technical challenges to achieve it are great.

The animal with its discreet and fearful behavior is encountered at great depths in complex areas with strong currents. Its extreme vulnerability to stress and capture makes conventional scientific protocols unsuitable.

To overcome these constraints, the GOMBESSA team implemented experimental scientific protocols based on an ambitious ethical approach. It no longer consists in attracting the animal towards the scientist, but in going to meet it, in-situ, without using any method of attraction to carry out all the scientific monitoring protocols in the least invasive way possible and without constraining the animal.

The lack of a method of attraction makes opportunities to meet the animal rarer and more ephemeral. It is then necessary to optimize the process of approach and data collection. Two new tools have been developed to meet these constraints while maintaining optimal efficiency and safety:

- A silent underwater thruster developed with the partner SUEX, which makes it easier for the diver to move around in strong current conditions, while limiting noise pollution likely to scare sharks away;
- An "all-in-one" scientific tool capable of being used in-situ for the collection of a wide range of data in a very short time. This system, used by a diver, is based on an underwater crossbow specially designed for scientific use. It is equipped with a laser photogrammetry system for the identification and measurement of individuals and a dual-purpose arrow system allowing in a single shot to perform a biopsy and to fix a tag to follow the movements.

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A successful scientific mission, promise of unprecedented results.

The first TAMATAROA field mission was a great success. The many human, technical, scientific, ethical and political challenges were met and even exceeded the objectives set.

On the technical side, more than 270 deep dives were carried out, representing nearly a thousand hours spent underwater to install the scientific tools and set up the shark monitoring protocols.

From a scientific point of view, the 60 acoustic receivers that will enable the tracking of great hammerhead sharks have been deployed in the lagoon and the Rangiroa and Tikehau passes. These receiver stations now form the first large acoustic network in the central Pacific. Essential for local studies, this network also fills in one of the missing links in the global network for monitoring migratory species.

The use of the silent propeller and the "all-in-one" tool developed especially for in situ data collection on great hammerhead sharks made it possible to mark 12 individuals with acoustic tags and 1 individual with a "data archiving" tag, while taking 7 tissue samples and allowing the identification and measurement of most of the individuals monitored. In addition to the effectiveness of the tools, the success of these operations carried out without capture or feeding opens the way to a new methodology for monitoring marine species, which is more ethical and respectful of the animal.

At the same time, continued observation and laser photogrammetry work has enabled the number of great hammerhead sharks identified to exceed 140 individuals.

This non-exhaustive and provisional scientific assessment of the first TAMATAROA expedition promises new results on the understanding of the ecology of this super predator. It opens up real prospects for better management of the species, its habitats and its resources in French Polynesia and more widely in the central Pacific.


SHARK SURVEY

© K. Kebaili TAMATAROA

Awareness raising at the heart of the conservation process.

Raising awareness was also an integral part of the project. It represented a colossal task, the results of which can be measured by the enthusiasm of Polynesians for the protection of this species and the environments in which it evolves.

Communication is a major tool for raising awareness. Information panels, events, conferences, school talks, science drinks or simple informal conversations have made it possible to reach a very large audience at the local level.

The construction of communication tools at the national and international levels is underway with, among other things, the editing of a 12-minute film that will be broadcast in September 2023.

On the film production side, hours of land and underwater images have begun to accumulate on the hard disks. All of the scientific protocols were illustrated and very beautiful images of great hammerhead sharks were produced, sometimes even with some unseen behaviors.

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An adventure that goes on.

The fruits of this first scientific campaign will not be reaped for several months, when the data collected will be analyzed and processed.

The tissue samples will be subjected to genetic analysis, which will allow us to understand the relationship between the individuals, but above all to estimate the size and health of the great hammerhead shark population in Polynesia.

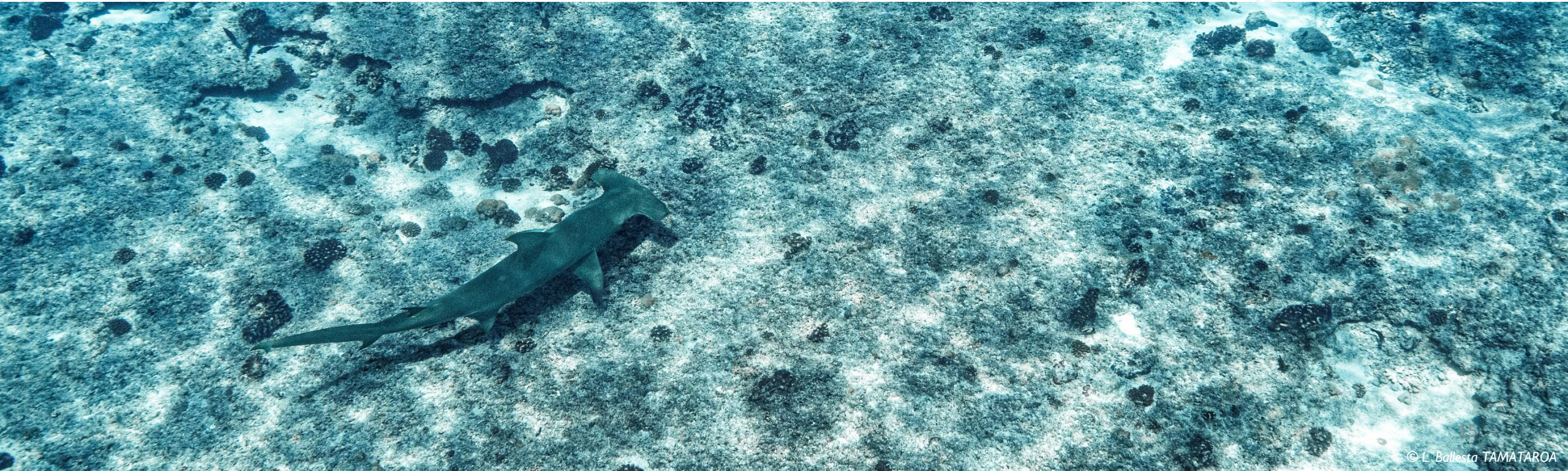
Stable isotope analysis will also be used to characterize their diet and identify the habitats in which they feed.

The acoustic receivers, which will remain in place for several years, automatically record data on the passage of tagged great hammerhead sharks. These data will be collected every six months and will gradually shed light on the movements of this shark on the Rangiroa and Tikehau atolls.

The "data archiving" tag will be automatically detached from the animal in December and will then transmit all the data it contains by satellite. This data will make it possible to trace the animal's migratory route on a very large scale over a period of 9 months.

The complementarity of all these data will make it possible to identify the key habitats for the ecology of this shark. These data will be refined over the next few years by continuing the tagging campaigns and extending the network of acoustic receivers to other Tuamotu atolls.

In parallel with the scientific study, an international documentary film will be produced in the tradition of the "Gombessa" films, featuring the scientific and participatory project, based on previously unseen underwater images, in order to illustrate the cultural and ecological wealth of the Tuamotu atolls.



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The GOMBESSA team warmly thanks

AP Diving

for its support and commitment to the preservation of marine biodiversity

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