Date 21 May 2025
Rufford ID 43562-1

Update Report on activities conducted for the project "Bull Shark in the Maldives: insights on their population genetic and movements in the archipelago."

Background

This technical report summarizes the field activities carried out under permit NRP2024/13, as part of a broader study on the spatial ecology of bull sharks (*Carcharhinus leucas*) in the Maldivian Archipelago. The primary objective of the research is to gather telemetry data over a 210-day period following the successful tagging to better understand the movement patterns within and outside the archipelago. Additionally, the study seeks to provide insights into the genetic composition of the bull shark individuals surveyed, aiming to clarify the extent of population isolation or connectivity with neighboring regions, such as India and Sri Lanka.

Report of the Tagging Activities

The work has been conducted in two phases:

1. **Kooddoo Tagging Expedition (6-16 February 2025), Huvadhoo Atoll.**

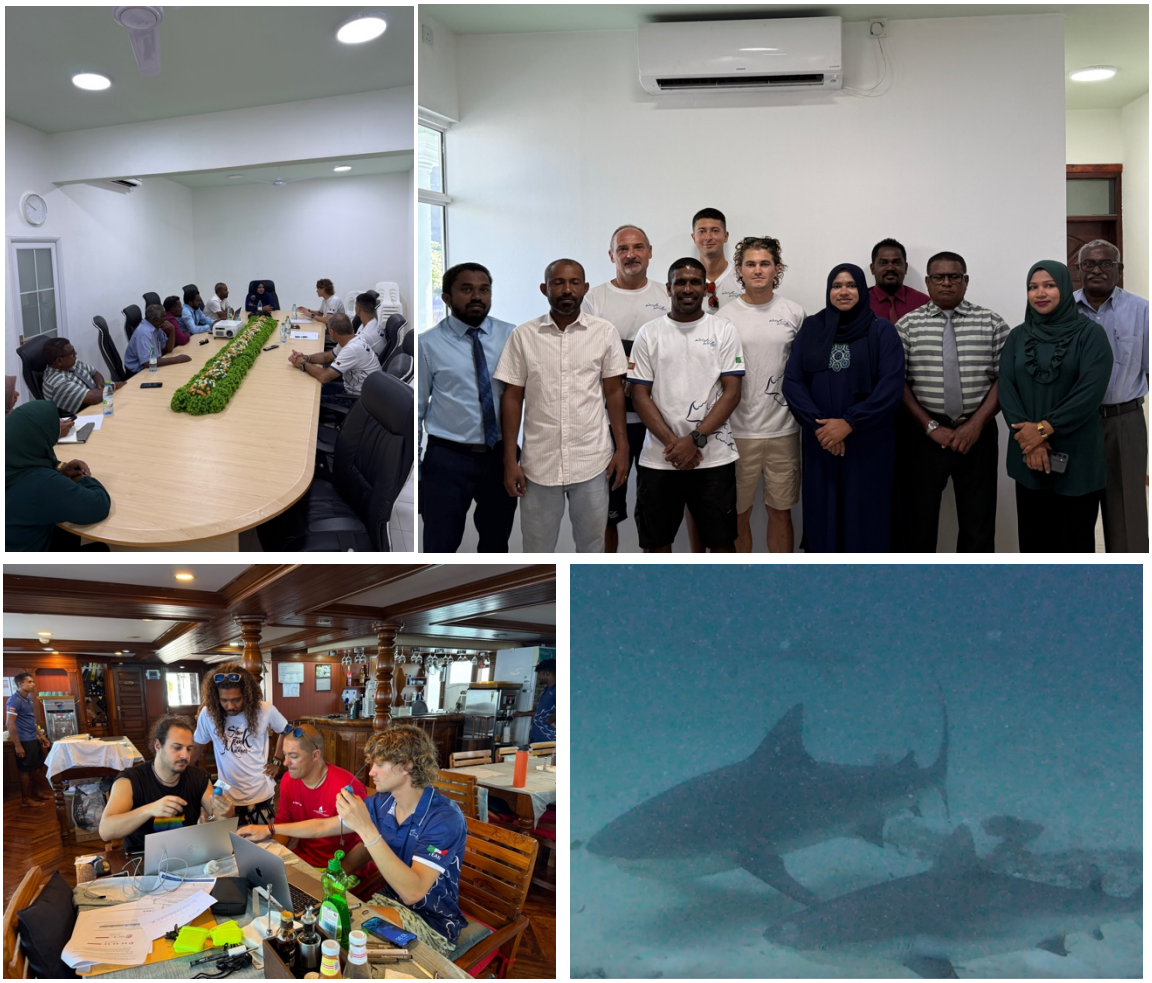
The first phase of the research activities was conducted in collaboration with researchers from the MaRHE Center (University of Milano-Bicocca), White Wave Maldives Pvt. Ltd., and a local Maldivian trainee from the Miyaru NGO, from the 6th to the 16th of February. All activities were carried out under the direct supervision of Dr. Darren Andrew Whitehead from Shark Research Mexico, an expert with extensive experience in shark tagging and related survey methodologies.

Research efforts were concentrated on the house reef adjacent to the Kooddoo Fish Factory, with the objective of tagging two bull sharks (*Carcharhinus leucas*) individuals. The expedition also included activities under a separate permit (Permit NRP2024/97), issued by the Maldivian Ministry of Fisheries, which aimed to gather data on shark abundance and biodiversity in the Huvadhoo Atoll. These activities included laser photogrammetry, baited remote underwater video stations (BRUVS), and the collection of genetic samples from ten different shark species.

Prior to the expedition, White Wave Maldives and the MaRHE Center held a preparatory meeting and outreach session with the Villingili Council and local representatives. The objective was to present the research goals, promote community awareness and support, and provide material that could later be used by the Council for promoting local tourism and diving initiatives.

Tagging activities were conducted on the 7th, 8th, 9th, 14th, 15th, and 16th of February, with the team spending over 10 hours underwater. Although one male bull shark was sighted, it was not within tagging range. Additionally, no bull sharks were observed during the 20 hours of BRUVS deployments conducted in the Kooddoo area and Huvadhoo Atoll.

White Wave Maldives continued to provide logistical support for extended tagging operations until the 8th of March. Despite the dedicated efforts of the onboard team and two tagging project members, no further bull shark sightings occurred. Nonetheless, the expedition was considered successful, having yielded over 20 hours of BRUVS footage, 13 tissue samples from five different shark species, and the establishment of valuable collaborations with the local council.



From top left: Figure a-b: meeting with Villingili City Council for the presentation of the activities. Figure c: reparation and settings of the satellite tags. Figure d: Male Bull shark sighted during the tagging activities

2. Hulhumalè Tagging Expedition (April 2025), Kaafu Atoll.

Since the unsuccessful tagging during the first phase, a second phase was organized and carried out in another target area, Hulumalè Neru Mathi. Despite the sensitivity of the area due to the high number of divers present in the area, after consultation and after the issue of an additional permit from the Male City Council, team members on White Wave Maldives proceeded with the tagging of two individuals. This expedition resulted in the successful deployment of two Pop-up Satellite Tags (PSATs) on two individuals of bull sharks.
Details of the tagged specimens are provided in Table 1.

Date	Time	Estimated depth	Sex	Method	Size
5 April 2025	5.50 AM	30 mts	Male	Spear pole	2 mts
11 April 2025	6:00 AM	30 mts	Female	Spear pole	2.5 mts

Both individuals tagged have already been re-sighted and filmed in the days after tagging. The observations confirmed the stable attachment of the tag and, more importantly, the good health of the individuals, showing the absence of signs of infection or scars at the entry point of the tag anchor. Moreover, the tags are not impacting the sharks' swimming behavior and are securely anchored to their bodies, functioning as designed.
The satellite tags are programmed to release after 210 days from the deployment. Upon surfacing, all data will be transmitted via satellite; however, no intermediate data will be available until the scheduled release. We will provide a final report to the authorities once we receive the data. The information gained from the two sharks will provide innovative insights into shark ecology and highlight the Maldives as a key contributor to worldwide shark conservation.

Visual Records

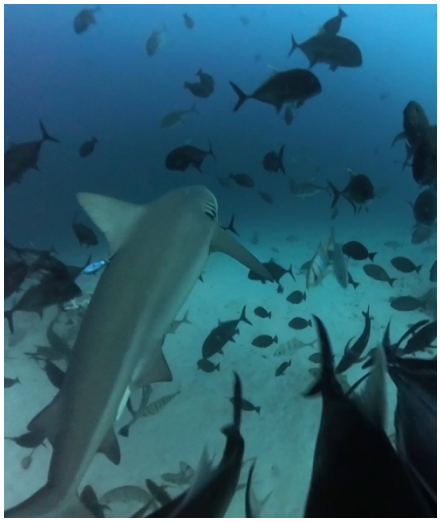


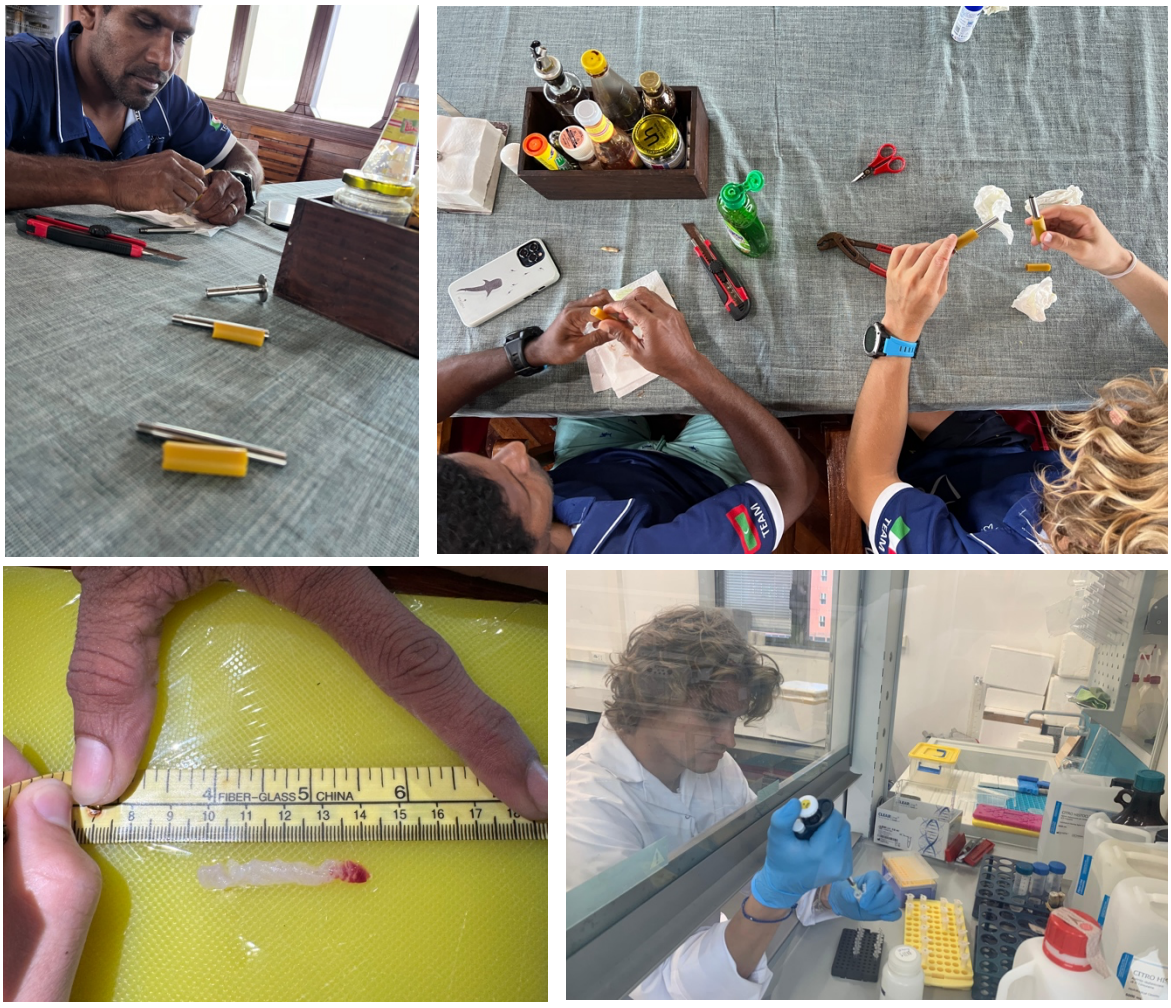
Figure 1 Male bull shark sighted on 9th of April

Figure 2 Female bull shark sighted on 13th of April

Figure 3 Female bull shark sighted on 16th of May

Tissue sampling and analyses

To date, no tissue samples of the Bull shark (*Carcharhinus leucas*) have been collected in the Maldives. The presence of the morphologically similar Java shark (*Carcharhinus amboinensis*) in neighboring countries such as India and Sri Lanka raises the potential for species misidentification. To address this, tissue samples are currently being analyzed to confirm species identity through genetic analysis. Moreover, population analysis will be conducted to determine whether the bull shark population in the Maldives is genetically isolated or if there is evidence of gene flow with adjacent regions.
In addition, ecotoxicological analyses will be performed on the collected tissue samples to assess the overall health status of the individuals and to identify any environmental contaminants that the sharks may have metabolized.



From top left: Figure a-b, Preparation of the biopsy dart. Figure c, Tissue sample from bull shark specimen. Figure d, DNA extraction in University of Milano-Bicocca, MaRHE lab.

Acknowledgements
We extend our gratitude to the Rufford Foundation, the Maldivian Ministry of Fisheries, Marine Resources and Agriculture, local councils, and authorities who facilitated and supported this research. Our team remains fully committed to transparent collaboration and data sharing with the local authorities to enhance knowledge and conservation efforts concerning this significant shark population in the Maldives.

On behalf of all the team member,
Sincerely.