

MAFIA ISLAND WHALE SHARK RESEARCH 2025



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MEGAFUNA
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WHALE SHARKS AT MAFIA ISLAND

Whale sharks are the world's largest fish, and an iconic species for marine tourism. They aggregate at a small number of coastal locations around the world. Mafia Island is perhaps the most reliable spot to see whale sharks in Africa. The Marine Megafauna Foundation, together with the Tanzania Fisheries Research Institute and other Tanzanian and international collaborators, has been conducting research studies of whale sharks at Mafia Island since 2012.

Here, we present the results from our latest field season in November–December 2025, and discuss these in relation to previous results from Mafia Island and work from elsewhere in the world.

Left: We saw an average of 6.6 whale sharks per survey trip in 2025, which is above our overall average of 5.6 (2012–2025).

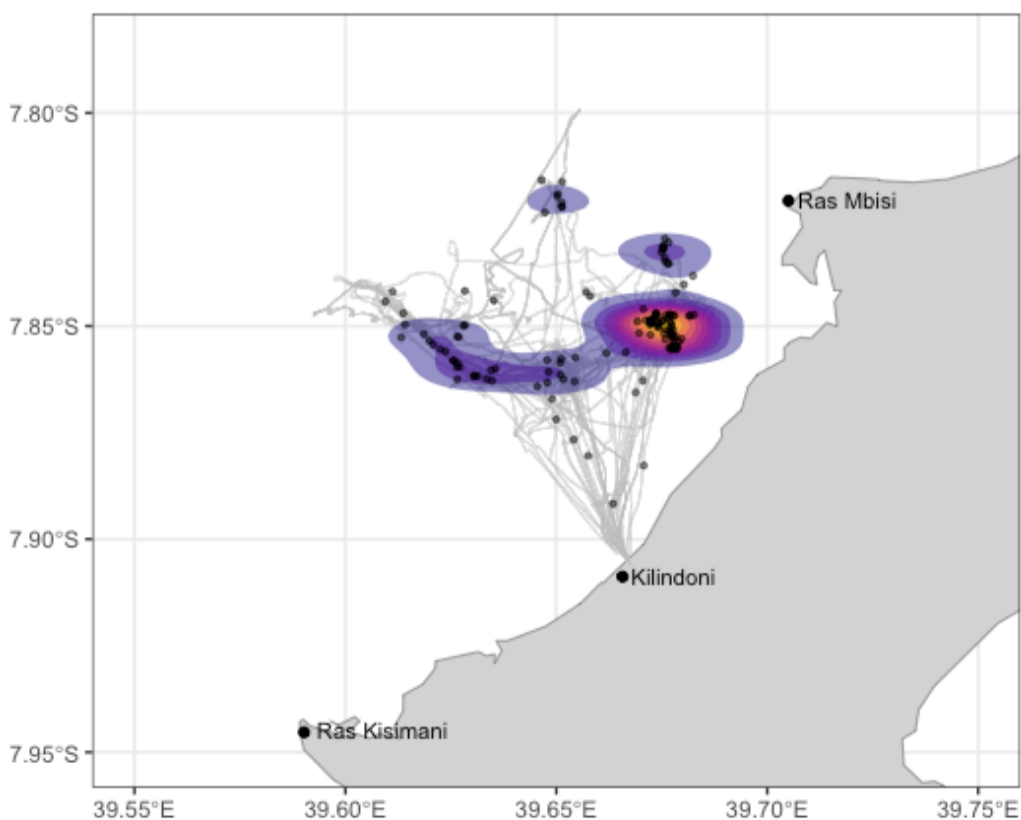
We conducted 26 boat-based surveys during November and December 2025. Average trip length was 34 km, and trips lasted 4.3 h on average. We recorded 171 encounters with uniquely identified whale sharks in 2025, an average of 6.6 sharks sighted per trip, with a maximum of 16 sharks identified on a single trip on 20 November 2025. This is a substantial increase from the 2024 season, which was shorter in duration (18 trips, 3.0 sharks per trip), and is closer to our long-term average.

Over the length of our entire study (2012–2025) we have now completed 461 survey trips and had approximately 2,600 encounters with identified sharks; an average of 5.6 unique individual sharks per trip.

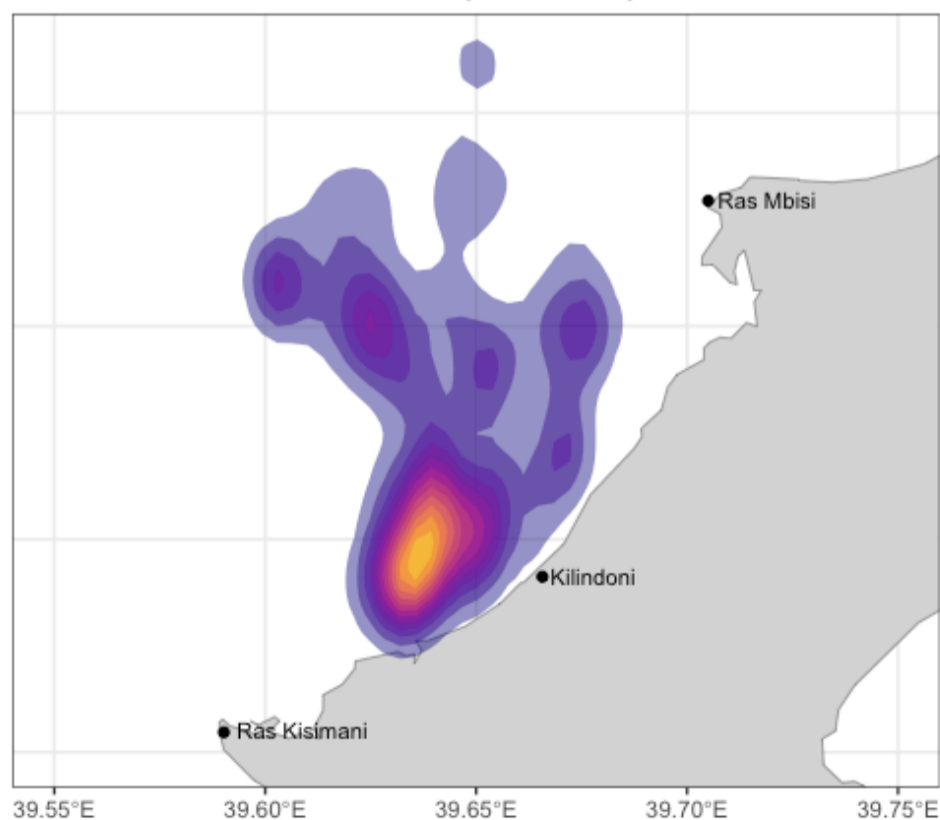
In 2025, most individuals with a GPS location recorded (n=135) were seen in shallow coastal waters off Mfuruni in the east of our survey area. Earlier in the season we also saw whale sharks along Sefu sandbank and off Tirene Reef, in the centre of the bay. All areas with whale shark sightings in 2025 are also areas where we made high numbers of sightings in previous years. The overall whale shark hotspot for 2012–2025 is southwest of Kilindoni Harbour.

Below: Left: Survey effort (grey lines), whale shark sightings (grey dots), and the hotspot analysis for 2025. Right: Overall hotspot analysis for all whale shark sightings 2012–2025. Yellow indicates the hotspot for sightings.

**Whale Shark Encounters
2025 season**

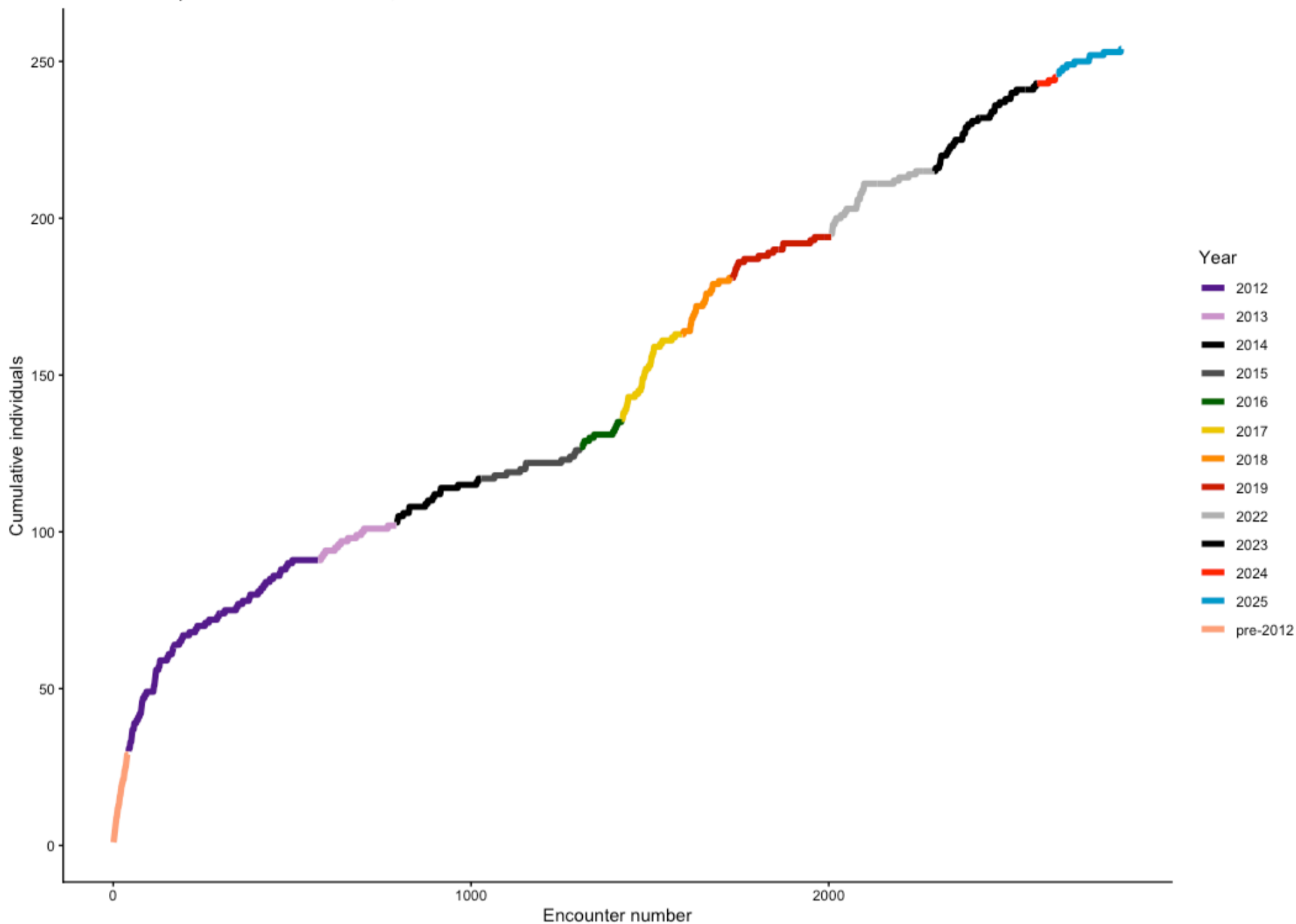


**Whale Shark Encounters
2012-2025 (all seasons)**



Discovery curve

Total: 254 unique whale sharks identified, 2006–2025



HIGH RESIDENCY

We identified 62 different sharks from 171 encounters in 2025. We saw 9 new individuals that had not previously been identified. After an initial jump when the project started in 2012, the discovery curve has been fairly flat, with a small number of new individuals identified each season. The effort-corrected discovery rate was 0.35 new individuals per trip in 2025. This is lower than the peaks seen in 2017/18 (~0.9 new/trip) and 2022/23 (~0.8 new/trip). 2017/18 likely represented a higher than usual influx event of new animals into the area, while 2022/23 was the post-COVID-19 boost after missing surveys in 2020/21. Compared to other whale shark aggregations nearby and globally, the sharks at Mafia Island are unusually resident with high re-sighting rates of individuals over time.

Mafia Island hosts a relatively small group of whale sharks. Combining our logbook data with community sightings submitted to the online ID database at www.sharkbook.ai, there are now 268 individual whale sharks identified from Mafia Island. Our logbook surveys alone have documented 248 individuals, with a further 20 identified through citizen science photos.

Left: Discovery curve of whale sharks at Mafia Island, colour-coded by season.

We saw many old friends in 2025, sharks that were re-identified from the past 13 years of dedicated research. Seven sharks have now been seen in 11 out of our 12 survey seasons. Five of those were present in 2025: TZ-026, TZ-053, TZ-065, TZ-087, and TZ-088. Additionally, TZ-031 and TZ-086, also seen in 11 seasons, were not recorded this year. Another 10 sharks seen in 2025 have been recorded in at least 6 different seasons, underscoring the exceptional site fidelity of Mafia Island's whale sharks.

We also routinely saw the same sharks within the 2025 season, highlighting the high residency and the importance of Mafia Island to these sharks. We saw each shark 2.8 times on average during Nov–Dec 2025, with one shark (TZ-254) seen on 8 separate days.

Almost all sharks identified during the 2025 season were males (98% of those with known sex) and most were immature. All sharks in 2025 ranged from 4–8 m in total length, with an average length of 6.3 m. This biased population structure is similar to what we have seen at Mafia Island across our study years. Overall, the average length is 6.1 m and 88% are males.

This population structure is similar to most other coastal aggregations elsewhere in the world. Small juveniles (<4 m) and large adults (>8 m) rarely visit these coastal feeding sites, and there are few females.

Below: TZ-065

“Chambo” is one of the whale sharks seen in 2025 that has also been seen in 11 of the 12 survey seasons to date. This is a mature male of ~8 m in length.





FEEDING

We recorded some feeding at the start of the 2025 season, but whale sharks then went through a week-long period with no feeding observed from 25–30 November. Feeding picked up again from early December, and feeding was observed on almost every trip for the remainder of the season. Overall, whale sharks were seen feeding in 58% of all observations in 2025. This is higher than the 39% recorded in 2024, but still below the overall average from 2012–2025 of 72%.

Feeding events led to more sharks being sighted. When sharks were feeding, we identified an average of 8.4 sharks per trip ($n = 16$ trips), compared to 3.7 sharks on average when they were not feeding ($n = 10$ trips). This pattern is consistent across all our data: overall, we see 8.5 sharks per trip on feeding days versus 1.7 on non-feeding days. Feeding events tend to concentrate sharks in predictable locations where they are easier to find.

Whale sharks are solitary, and when they are searching for food (but not feeding) it is common to see one at a time. Food, however, brings them together, because the zooplankton patches are relatively small and often isolated.

Left: Whale shark TZ-286 feeding among a school of Indian mackerel off Mafia Island. These smaller fishes are the target of local ringnet fishers.

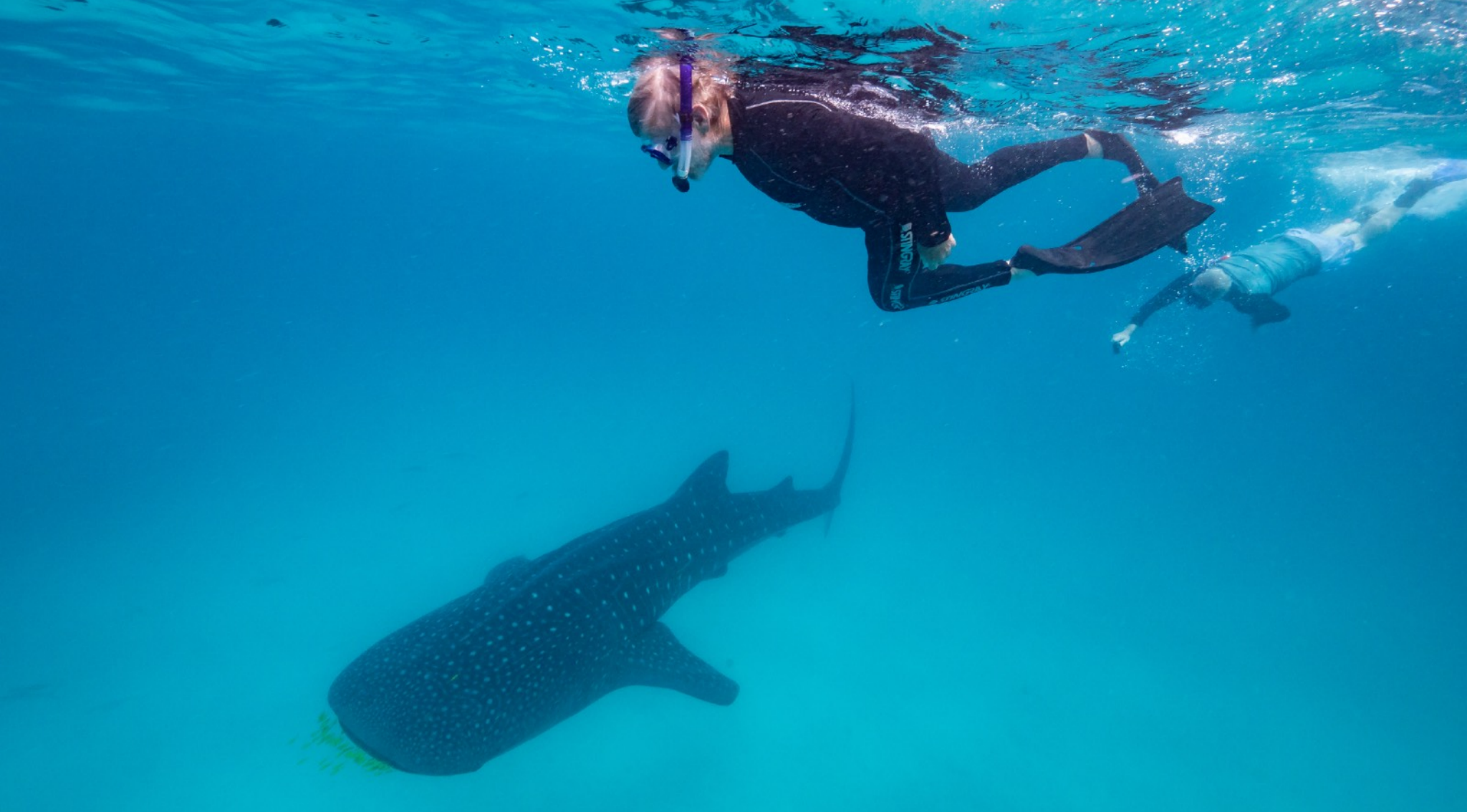
We have previously identified the main whale shark prey item at Mafia Island as sergestid shrimps *Belzebub hansenii* (previously called *Lucifer hansenii*). These shrimp form dense aggregations, with an average of 25 mg of dry plankton per m³ of filtered water in Mafia Island 2012/13. Whale sharks fed on the same sergestid species again this year.

Mafia Island is a hugely important feeding site for these whale sharks, at least during the November-December period each year. We have not yet investigated the drivers of sergestid shrimp abundance in Kilindoni Bay. However, seasonal winds and currents seem to aggregate and concentrate them in shallow waters near the coast close to the harbour. Nutrients supporting the food web off Mafia likely come into the bay from the Rufiji River. The dam upstream may impact river discharge and thus the availability of nutrients and zooplankton, affecting whale sharks, and the fish species targeted by local fishers. It could be useful to monitor nutrient input at the Rufiji delta over time to examine this in more detail.

Planktivorous bony fishes, such as Indian mackerel, feed on the same zooplankton as whale sharks and are often seen together with whale sharks. These smaller fishes are the target for local ringnet fishers. We recorded an average of 3.7 ringnet fishing boats per trip in 2025, below the overall average of 5.7 since 2012. This also indicates that there was not as much whale shark food around as in some previous years. Although not quantified, we observed that night-time fishing activity was high during this 2025 season.

Below: The whale sharks' main prey are sergestid shrimps.





WHALE SHARK TOURISM

In collaboration with WATONET, we conducted a tourist survey during the 2025 whale shark season, collecting responses from 200 tourists who went on whale shark tours. This is a replication of the surveys we conducted in 2013 (n=68) and 2023 (n=274), allowing us to track changes in the whale shark tourism industry over time.

Whale sharks are an important drawcard for tourists to come to Mafia Island. Almost three quarters (73%) of respondents had decided to go on a whale shark tour before they arrived on the island. For more than half of all respondents (58%), seeing whale sharks was 'extremely important' in their decision to visit Mafia Island, and for 90% it was at least 'slightly important'. Almost half (46%) said that they would not have visited Mafia Island at all if whale shark tours were not offered here. An additional 19% said they would still have visited but spent fewer days. These results underline that whale shark tours entice tourists to visit Mafia Island. The proportion of tourists who said they would not have visited without whale sharks has increased from 29% in 2023 to 46% in 2025, further highlighting the growing economic importance of this industry to the island.

The economic footprint of whale shark tourism goes beyond the tour itself. Respondents stayed on Mafia Island for a mean of 5.4 days. During that time, they usually went on one to two whale shark tours (mean = 1.5 tours). Combined with other costs, respondents spent an

Left: Tourists swim with a whale shark on Mafia Island. Almost half of respondents in our survey said they would not have visited Mafia Island if whale shark tours were not offered here.

estimated US\$1,142 per person on Mafia Island. This includes other activities, domestic travel, accommodation, meals, and souvenirs, i.e. expenditure that is spent on local businesses. A total of 3,139 whale shark tour fees were paid between September 2025 and February 2026. Assuming a range of 1 to 1.5 tours per person (high to low estimate respectively), the economic footprint was approximately US\$2.4–3.6 million for the season. Note that the 2023 report mistakenly overestimated the expenditure, which is roughly the same in 2023 and 2025.

We asked the respondents how they think the whale shark tour fee collected by the Mafia DC should be used. Broadly, they thought that 59% should be used for whale shark conservation, 25% should go into a local community fund, and 19% should be revenue for the Mafia Island District Commission. At present, 100% is revenue for Mafia Island DC. A goal could be to use some of the revenue to support WATONET in monitoring whale shark tourism and ensure recommended guidelines are followed.

Below: Whale shark tour boats on Mafia Island.





TOURIST SATISFACTION

The same survey also examined how happy tourists are with the whale shark tours. Overall, almost all respondents (93%) were satisfied with the whale shark tour experience and would recommend the tour to others (99%). Few people were not satisfied with the number of whale sharks found on the tour (5%) or the proximity they had to whale sharks in the water (5%). This shows that the natural aspect of the tour, i.e. natural whale shark behaviour and abundance, was not a common problem.

However, many respondents were not happy with the organisation of the tours. The main concerns were the number of snorkellers in the water and the number of boats congregating around a whale shark. Around 19% of respondents were unsatisfied with the number of other snorkellers, and 22% were unsatisfied with the number of boats around whale sharks. Additionally, 47% of respondents said that there were 'too many other boats' around the shark, and 55% said that there were 'too many other swimmers'. These crowding concerns have worsened compared to the 2023 survey, where 31% said there were too many boats and 45% said there were too many swimmers.

On average, the maximum number of snorkellers swimming with a single whale shark at any one time reported by respondents was 16.3 people (median=15). Nearly two thirds (64%) reported more than 10 snorkellers were swimming with a whale shark, even though the recommended code of conduct is a maximum of 10 people. Respondents generally agreed with the code of conduct and reported that a maximum of 8.4 people (median = 7) should be swimming with a whale shark at any one time. This mismatch between the experienced and suggested number of people swimming with a whale shark further highlights that tourists are not happy with this aspect of the whale shark tour. Crowding appears to be worsening: in the 2023 survey, the mean maximum observed was 15.3 snorkellers, 52% reported more than 10, and the suggested maximum was 8.9.

Left: A tourist swims with a whale shark on Mafia Island.

Tourist boat activity was notably high during the 2025 season. We recorded an average of 6.0 tourist boats per trip during our whale shark survey work, the highest in our time series and well above the overall average of 3.6 boats per trip since 2012. Our observations indicate that there are few problems when many whale sharks are in the area, as the tour boats can spread out and snorkellers do not crowd individual whale sharks. However, when few or a single whale shark is present, all boats crowd around it which usually results in the shark diving deep to avoid the crowd. This means that the tourists do not get a good view of the shark, and the whale shark is avoiding the interaction and having to modify its natural behaviour.

All respondents reported that they were informed about the code of conduct during their whale shark tour. The code of conduct addresses two aspects: boats and snorkellers. Boats should drive slowly around whale sharks and not drop their snorkellers in the water with a shark that already has a group of people swimming with it. Snorkellers should not touch the whale shark or block its path, keep a safe distance from the whale shark, and swim calmly without excessive splashing.

Around one third (30%) of respondents indicated that swimmers did not follow the guidelines, with the most common breaches being relatively minor: jumping or flipping into the water (39%) and excessive splashing (35%). By contrast, 36% indicated that boat operators did not observe the code of conduct, with more severe impacts. By far the most frequent reported breach was that too many snorkellers were in the water with a single shark (82% of breach reports). This breach is directly controlled by the tour operators, as they can decide to either drop the snorkellers in the water or wait their turn.

The easiest way to improve tourist satisfaction and ensure whale sharks are not disturbed by tourists is to follow the code of conduct, particularly to avoid overcrowding.

Below: A good example of a small group of tourists swimming with a whale shark in Mafia Island.



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Bottom: A whale shark swimming over a shallow sandbank on Mafia Island.

