

Blue lines indicate the area meeting the ISRA Criteria; dashed lines indicate the suggested buffer for use in the development of appropriate place-based conservation measures

TUMAKOHUA PASS ISRA

New Zealand & Pacific Islands Region

SUMMARY

Tumakohua Pass is located on the southern end of the Fakarava Atoll in the Tuamotu Archipelago in French Polynesia. The area is characterised by high coral cover inside the pass due to moderate current strength and tidal rhythmicity, with incoming and outgoing currents shifting every six hours. The area overlaps with the Commune de Fakarava World Heritage Biosphere Reserve and the Kauehi Marine Key Biodiversity Area. Within this area there are: **threatened species, reproductive areas, feeding areas, and resting areas** (Grey Reef Shark *Carcharhinus amblyrhynchos*).

CRITERIA

Criterion A - Vulnerability; Sub-criterion C1 - Reproductive Areas; Sub-criterion C2 - Feeding Areas; Sub-criterion C5 - Resting Areas

FRENCH
POLYNESIA

0-60 metres

1.36 km²





DESCRIPTION OF HABITAT

Tumakohua Pass is located at the southern end of the Fakarava Atoll in the Tuamotu Archipelago in French Polynesia. Fakarava Atoll is 1,246 km² large and is located in the northwestern part of the Tuamotu Archipelago. The atoll has a rectangular shape and is ~55 km long from northwest to southeast (Duvat et al. 2020), featuring a lagoon with a maximum depth of 60 m (Rougerie 1994). It is connected to the open ocean in the north through the Garuae Pass and in the south through the Tumakohua Pass. The area encompasses a 35 m deep pass, with the channel width ranging from 350 m at the mouth to 120 m at its narrowest point (Robbins & Renaud 2015). The area is characterised by high coral cover inside the pass due to moderate current strength and tidal rhythmicity, with incoming and outgoing currents shifting every six hours (J Mourier pers. obs. 2024).

During the incoming tide, updrafts form along the northern region of the channel as tidal currents collide with the slope. Updrafts also form at the southern entrance of the channel at the drop-off. When the tides switch direction, outgoing currents switch the location of updraft zones to the smaller (and deeper) slope within the southern section of the channel (Papastamatiou et al. 2021). During the austral winter (April-October) the area is influenced by strong trade winds and distant-source swells originating from the south and southwest, while during summer (November-March) waves originate mainly from tropical cyclones (during El Niño phases) or from distant storms in northern latitudes (Duvat et al. 2020).

Within the area, spawning aggregations of several reef fish species occur in June and July, including Camouflage Grouper *Epinephelus polyphekadion* during full moons (Robbins & Renaud, 2015; Mourier et al. 2016) and Convict Surgeon Fish *Acanthurus triostegus* every ~ 15 days (at sunset for 1-2 days) (J Mourier pers. obs. 2024).

This area overlaps with the Commune de Fakarava World Heritage Biosphere Reserve (UNEP-WCMC & IUCN 2024), and the Kauehi Marine Key Biodiversity Area (KBA; KBA 2024).

This Important Shark and Ray Area is benthopelagic and is delineated from inshore and surface waters (0 m) to 60 m depth based on the bathymetry of the area.

ISRA CRITERIA

CRITERION A - VULNERABILITY

One Qualifying Species considered threatened with extinction according to the IUCN Red List of Threatened Species regularly occurs in the area. This is the Endangered Grey Reef Shark (Simpfendorfer et al. 2020).

SUB-CRITERION C1 - REPRODUCTIVE AREAS

Tumakohua Pass is an important reproductive area for one shark species.

Between May-July in 2017 and 2018 Grey Reef Sharks were observed engaging in three courtship events in the area during underwater visual surveys (J Mourier pers. obs. 2024). Two dives per day were performed for three weeks in 2017 and 2018. Reproductive behaviour was observed during May and early June and fresh mating scars were recorded in several females. Animal borne cameras (CAT) deployed on Grey Reef Sharks (n = 7) between 2017-2018 recorded one courtship event in the area (Papastamatiou et al. 2021). Additionally, during the summer in 2024 an event of a female Grey Reef Shark giving birth in the area was recorded (G Funkrock pers. comm. 2024).

SUB-CRITERION C₂ – FEEDING AREAS

Tumakohua Pass is an important feeding area for one shark species.

Between June 2014 and July 2018, ~3,000 hours of video-assisted underwater visual surveys were conducted in the area and recorded 406 feeding attempts by Grey Reef Shark on fishes (Mourier et al. 2016). Grey Reef Sharks have been recorded feeding on at least 14 fish species in the area (Mourier et al. 2016) using different feeding strategies, such as opportunistic predation on daytime spawning aggregations and nocturnal hunting of reef fishes (Robbins & Renaud 2015; Mourier et al. 2016; Labourgade et al. 2020).

Between 2011–2018, acoustic telemetry was used to monitor the residency and movements of Grey Reef Sharks at Tumakohua Pass (Robbins & Renaud 2015; Mourier et al. 2016; Laurioux et al. 2024). Acoustic tags were deployed on 13 Grey Reef Sharks in June 2011 and were monitored by an acoustic array encompassing six hydrophones in the Tumakohua Pass until March 2013 (Mourier et al. 2016). In addition, 38 sharks were acoustically tagged with depth and accelerometer sensors and tracked from July 2017 to June 2018, monitored by a network of 24 receivers within the channel (Papastamatiou et al. 2021, Laurioux et al. 2024). A higher presence was described during May–October between 2011–2013 encompassing the spawning aggregations months (June and July) of Camouflage Grouper (Robbins & Renaud, 2015; Mourier et al. 2016), which were a main prey identified in the video surveys (Mourier et al. 2016). Most sharks were resident year-round, with a residency index of 0.85 ± 0.23 (mean \pm SD) and 29 sharks (76%) had a residency index >0.9 between 2017–2018 (Laurioux et al. 2024). Sharks used a larger space during nighttime being more active and shallower (16.09 ± 5.38 m, mean \pm SD) than during the day (18.56 ± 5.94 m, mean \pm SD), and their activity peaked during full and new moons (Laurioux et al. 2024). Also, it was observed that hunting areas were mostly located to the south of the channel, where turbulence from the outgoing tides were less pronounced (Papastamatiou et al. 2021, Laurioux et al. 2024).

These fish spawning aggregations occur regularly in the area and serve as a vital component of the diet, and residence patterns of Grey Reef Sharks at Tumakohua Pass (Robbins & Renaud 2015; Mourier et al. 2016; Mourier et al. 2019). According to the trophic structure of the fish assemblage in the area analysed in 2014, spawning aggregations helped cover the metabolic needs of the sharks aggregating (Mourier et al. 2016). The spawning events during June and July provided an additional 775 kg of fish per day which more than meets the sharks' dietary needs during this period (Mourier et al. 2016). These aggregations lead to increases in Grey Reef Shark abundance and residency durations, persisting for weeks following these events (Mourier et al. 2016).

SUB-CRITERION C₃ – RESTING AREAS

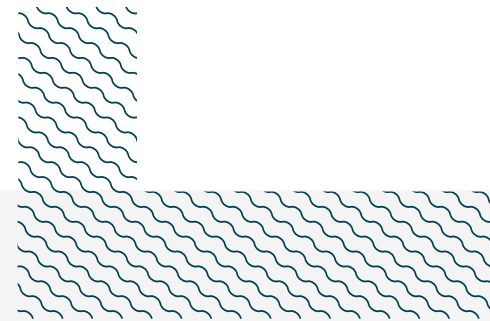
Tumakohua Pass is an important resting area for one shark species.

Between June–December 2014, 13 video-assisted underwater visual censuses using towed diver methodology were conducted to count Grey Reef Shark individuals using the Tumakohua Pass as a resting area (Mourier et al. 2016). During these months, animal numbers in the area fluctuated between 251–705, with higher abundances during June and July (Mourier et al. 2016). Thirteen acoustically tagged individuals showed a significantly higher residency index at the resting aggregations area at daytime during June–October for the years tracked (between July 2011 and March 2013) (Mourier et al. 2016).

Between April–June 2018, 38 Grey Reef Shark (34 females and 4 males) of 141.0 ± 9.9 cm (mean \pm SD) total length (TL) were acoustically tracked by a network of 25 receivers within the channel and one

station northeast of the channel (Papastamatiou et al. 2021). Shark locations within the channel over ten-minute intervals were estimated using kernel utilisation distributions (Papastamatiou et al. 2021). In addition, to study group kinematics between May–June 2017 and 2018, observations and video surveys of the sharks’ swimming behaviour were made during incoming tides and animal mounted cameras with data-loggers (CATS) were placed on seven sharks (148.0 ± 8.9 cm TL) for durations of 2–24 hours (Papastamatiou et al. 2021). Grey Reef Sharks in the area used regions of predicted updrafts during incoming tides to rest and switched their core area of space use based on tidal state (incoming versus outgoing) (Papastamatiou et al. 2021). During incoming tides, sharks formed tight groups and displayed shuttling behaviour (moving to the front of the group and letting the current move them to the back) to maintain themselves in these potential updraft zones. During outgoing tides, group dispersion increased, swimming depths decreased, and shuttling behaviours ceased. These changes were likely due to shifts in the nature and location of the updraft zones, as well as turbulence during outgoing tides (Papastamatiou et al. 2021).

The area is well known among the diver community for hosting regular aggregations of resting individuals during the day. The strong current flows prevalent in reef passes in the region (Dumas et al. 2012) provide an ideal environment for Grey Reef Sharks to conserve energy during daylight hours (up to 10%–15% routine metabolic rates may be reduced) as they can effortlessly drift without the necessity of constant swimming (Robbins & Renaud 2015; Mourier et al. 2016; Papastamatiou et al. 2021).



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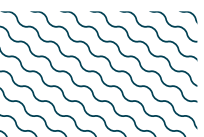
QUALIFYING SPECIES

Scientific Name	Common Name	IUCN Red List Category	Global Depth Range (m)	ISRA Criteria/Sub-criteria Met									
				A	B	C1	C2	C3	C4	C5	D1	D2	
SHARKS													
<i>Carcharhinus amblyrhynchos</i>	Grey Reef Shark	EN	0-280	X		X	X	X					

SUPPORTING SPECIES

Scientific Name	Common Name	IUCN Red List Category
SHARKS		
<i>Carcharhinus albimarginatus</i>	Silvertip Shark	VU
<i>Carcharhinus limbatus</i>	Blacktip Shark	VU
<i>Carcharhinus melanopterus</i>	Blacktip Reef Shark	VU
<i>Negaprion acutidens</i>	Sharptooth Lemon Shark	EN
<i>Sphyrna mokarran</i>	Great Hammerhead	CR
<i>Triaenodon obesus</i>	Whitetip Reef Shark	VU
RAYS		
<i>Aetobatus ocellatus</i>	Spotted Eagle Ray	EN
<i>Mobula alfredi</i>	Reef Manta Ray	VU

IUCN Red List of Threatened Species Categories are available by searching species names at www.iucnredlist.org. Abbreviations refer to: CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern; DD, Data Deficient.





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