Social grouping behaviour in early juvenile Blacktip Reef Sharks around Milman Island in the far north of the Great Barrier Reef, Queensland

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Abstract

This note details multiple observations of grouping behaviour in small juvenile Blacktip Reef Shark (*Carcharhinus melanopterus*) around Milman Island in the northern Great Barrier Reef. We conclude that this is social grouping behaviour and is suggestive that the waters around Milman are a pupping area for this species.

Handling editor: Peter Valentine

Citation: Freeman A, Wright A. 2021. Social grouping behaviour in early juvenile Blacktip Reef Sharks around Milman Island in the far north of the Great Barrier Reef, Queensland. *North Queensland Naturalist* 51: 12-15.

Introduction

The Blacktip Reef Shark (*Carcharhinus melanopterus*) is a small whaler shark that is one of the most commonly observed sharks on coral reefs of the Indo-Pacific (Fig. 1) (Last & Stevens 2009). Internationally it is considered Vulnerable (Simpfendorfer *et al.* 2020) while the Australian population is thought to be of Least Concern. The reproduction and life history of the species is reasonably well understood (Lyle 1987; Chin *et al*. 2013a,b; George *et al*. 2019) however, there has been negligible records of the behaviour of early life history phase behaviour.

Figure 1. Juvenile Blacktip Reef Shark, Milman Island. All photos by Alastair Freeman.

Milman Island is an uninhabited, densely wooded sand cay located about 112 km south-east of Thursday Island (Torres Strait) and about 45 km east-north-east of Orford Ness on Cape York Peninsula, Queensland. The island is approximately 2.4 km in circumference. A large reef flat (area = 560 ha) (Fig. 2) fringed with a rubble reef crest extends around most of the island and dries during low tide, restricting boat access to the island at that time to the northernmost tip. This reef flat connects to a small coral rubble island called Aplin Islet, located 3 km south-east of Milman Island. Milman Island is internationally important as a nesting rookery for the Critically Endangered Hawksbill Turtle (*Eretmochelys imbricata)*, and is visited regularly by researchers as part of an ongoing monitoring program for this species, facilitating opportunistic observations of other aquatic species.

Observations

Observations of grouping behaviour in both adult and juvenile sharks is well documented (Jacoby *et. al*. 2012). Such behaviour can be divided into aggregations that do not involve social behaviour and those that do (Jacoby *et al*. 2012). Here we provide an example of social behaviour in early juvenile Blacktip Reef Sharks around Milman Island on the far northern Great Barrier Reef.

Over four weeks between the 12th January and the 10th February 2020, five to ten early juvenile Blacktip Reef Sharks were observed circling and trailing each other nose to tail on at least nine occasions in very shallow water adjacent to a sandy beach (Figs. 3, 4). They were identified as early juvenile based on size; all were approximately 50 cm in length which is similar to the at birth size for this shark of 51–54 cm recorded by Chin *et. al*. (2013a). This behaviour was observed during daytime high tides along the same stretch of beach on each occasion in shallow water that was less than 0.5 m and frequently less than 0.3 m in depth. The shark "trains" would break up if disturbed by our presence but would then reform once we got out of the water or once they had moved beyond us. Never would they approach to within less than two metres of an observer kneeled, seated, or lying in the water. These "trains" would pass observers on multiple occasions over 10–20 minute periods.

Figure 2. Shallow near-shore habitat in which the juvenile Blacktip Reef Sharks were observed, Milman Island.

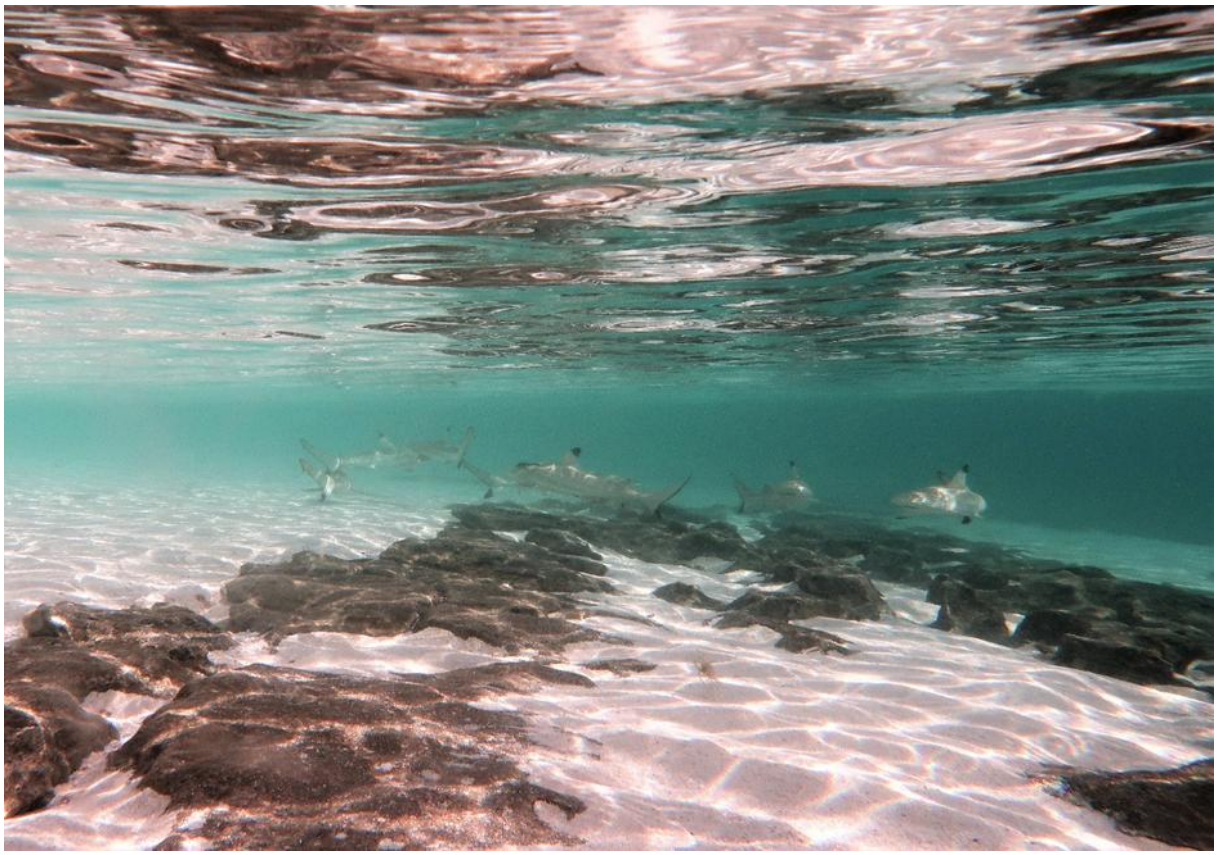

Figure 3. Circling behaviour of young juvenile blacktip reef shark observed on Milman Island in 2020 and 2021.

Figure 4. Trailing behaviour of blacktip reef sharks, observed on Milman Island in 2020 and 2021.

Social grouping behaviour has also been observed in Grey Reef Sharks (*Carcharhinus amblyrhynchos*) (McKibben & Nelson 1986), and in juvenile Lemon Sharks (*Negaprion brevirostris*) with individuals' position in the group sorted by size but not sex and tending to be formed with relatives (Gruber *et al.* 1988). In contrast, size sorting was not apparent in the Blacktip Reef Shark schools during our observations as all group members were the same size. It is assumed that social grouping behaviour in

juvenile sharks confers some advantage for those individuals involved that enhances fitness such as predator avoidance, food detection or sexual behaviour (Guttridge *et al.* 2009). We believe the most likely explanation is that these sharks are avoiding predation as there was no indication that any foraging behaviour was taking place and sharks this young would not have been sexually mature. Furthermore, all observations were made on high tide the time when large predators could gain access to the reef flat.

Blacktip Reef Sharks are born in continental waters at around 50-54 cm total length (Last & Stevens 2009; Chin *et al*. 2013a). In northern Australia they are thought to give birth from December to March (Chin *et al.* 2013a) to clutches varying from 3–4 pups (Last & Stevens 2009). Based on this, the individuals we observed were recently pupped with the number indicating they were from multiple litters.

No signs of aggressive behaviour between these young juveniles were observed, in contrast to observations made of agitated and aggressive behaviour between larger, subadult to small adult sized Blacktip Reef Sharks. On multiple occasions agonistic behaviour has been observed at night on Milman Island amongst Blacktip Reef Sharks greater than 80 cm in length when congregating in very shallow water where hatchling turtles were entering the water. We assume this is an example of the individual sharks reacting to the presence of prey in the water.

Adult and juvenile Blacktip Reef Sharks are regularly observed in the waters surrounding Milman Island during the height of the Hawksbill nesting season (A.B. Freeman unpublished data). The waters around the island have already been identified as a likely nursery area for Giant Shovel-nosed Rays (*Glaucostegus typus*) (Freeman 2019). These observations indicate that it might also be a nursery, perhaps even a pupping area, for Blacktip Reef Sharks.

Acknowledgements

This manuscript was greatly improved through the editorial input of Amanda Freeman, Brendan Ebner and Colin Simpfendorfer.

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