



Whale sharks (*Rhincodon typus*) feed on baitfish with other predators at Ningaloo Reef

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Fig. 1. A whale shark (*Rhincodon typus*) feeding on baitfish in the presence of other predators, including whaler sharks (*Carcharhinus albimarginatus*, *Carcharhinus obscurus*, *Carcharhinus limbatus*), trevally (*Caranx* spp.), mackerel tuna (*Euthynnus affinis*) and wedge-tailed shearwaters (*Ardenna pacifica*). Photograph credit: Tom Canon.

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Baitballs attract large numbers of predators from a wide range of species that aim to capitalise on these dense patches of energy-rich prey. Whale sharks are a slow moving, filter feeding species that have been observed feeding on baitballs, and may use the herding behaviour of other predators to capture baitfishes and fulfil their large energetic demands (Fox *et al.* 2013; Boldrocchi and Bettinetti 2019). At Ningaloo, Western Australia (−23.144722, 113.776390), eye-witnesses have reported whale sharks feeding on baitballs for >20 years (Andrewartha 1993), however, there is a lack of in-water photographic evidence to support these reports. This limits our understanding of both the importance of baitballs to whale shark diets and the feeding behaviours employed by whale sharks to capitalise on this food source in this region. Over 20 000 tourists participate in whale shark tours at Ningaloo every year (Huvneers *et al.* 2017), and this large amount of time spent in the field increases the likelihood of recording cryptic behaviours. Such opportunistic in-water records can provide a critical insight into ephemeral events that are hard to predict.

Here we present in-water evidence of whale sharks feeding on baitballs during four separate occasions at Coral Bay, Ningaloo (Fig. 1). These events were recorded opportunistically by tourism operators on 23 April 2016, 14 March 2020, 20 March

2020 and 2 May 2020. The baitfishes were not identified *in situ* and it was not possible to identify the species from photographs or video. During all four events, whale sharks exhibited ram feeding and vertical feeding, where the shark remained stationary, positioned its body in a vertical orientation and fed on baitfishes using a suction technique.

In one observation, whale sharks and other predators made repeated predation attempts on a baitball (Supplementary Video S1). These other predators included whaler sharks (*Carcharhinus albimarginatus*, *Carcharhinus obscurus*, *Carcharhinus limbatus*), trevally (*Caranx* spp.), mackerel tuna (*Euthynnus affinis*) and wedge-tailed shearwaters (*Ardenna pacifica*). Tuna and trevally were observed herding the baitball into a tight formation from below, thus trapping it against the surface. At this time, whale sharks and whaler sharks swam through the centre and made predation attempts through the dense patches. In contrast, wedge-tailed shearwaters, trevally and mackerel tuna concentrated their foraging attempts on the edge of the baitball, targeting smaller groups of isolated fish. Our observations provide evidence of the complexity of whale shark feeding behaviour and provides a compelling insight into the interactions of this species with other predatory taxa in the region. While

more research is required to further investigate the importance of baitfishes as a prey item to whale sharks at Ningaloo, our results highlight the value of citizen science to collect data that advances our understanding of the ecology of cryptic and elusive species.

Supplementary material

Supplementary material is available [online](#).

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