

An assessment of dolphin behaviour and
bycatch mitigation techniques in the
Pilbara Fish Trawl Fishery,
Western Australia



A thesis presented in partial fulfilment of the degree of
Bachelor of Science Honours

School of Biological Sciences and Biotechnology
Murdoch University, Western Australia

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Declaration

I declare that this thesis is my own account of my research and contains as its main content work which has not previously been submitted for a degree at any other tertiary institution.

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Vanessa Flora Jaiteh

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Thesis Title: An assessment of dolphin behaviour and bycatch mitigation techniques in the Pilbara Fish Trawl Fishery, Western Australia

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Abstract

The incidental capture of unwanted species along with target species is a common and wasteful aspect of many fisheries. Trawl fisheries in particular have a high rate of incidental capture, or bycatch, due to the low selectivity of their nets. The bycatch of protected, endangered and threatened species is of particular concern and poses significant challenges for the ecologically sustainable management of wild capture fisheries. In the Pilbara Fish Trawl Interim Managed Fishery (PFTIMF), approximately 50 common bottlenose dolphins (*Tursiops truncatus*) are reportedly caught incidentally every year. Failure to adequately address the bycatch of this protected species has prevented the PFTIMF from attaining ‘Managed Fishery’ status. In this study, I analysed 195 hours of underwater video footage recorded inside active trawl nets in the PFTIMF to address the following aims:

Chapter 2: a) examine and describe fine-scale dolphin behaviour in and around the trawl nets, and b) discuss the implications of these interactions for the reduction of dolphin bycatch in the fishery; and

Chapter 3: a) assess the efficacy of two bycatch reduction devices (BRDs) at reducing the catch of dolphins and five other taxonomic groups of concern, and b) provide an estimate of the number of wildlife species caught annually in the PFTIMF.

Dolphins frequently interacted with active trawl nets, and were recorded inside and outside the net for up to 98% and 99% of the trawl duration, respectively. Inside the net, dolphins exhibited a significantly higher proportion of foraging behaviours than outside the net, which may indicate that dolphins enter trawl nets because they provide a concentrated food source. Outside the net, dolphins most frequently engaged in ‘trampolining’, whereby they bounced on the upper surface of the net, often rubbing different body parts on the mesh. It thus appears that dolphins are motivated by several factors to approach and interact with active trawl nets. Most of the 29 individually identified dolphins returned to the net numerous times throughout

a trawl, and seven individuals were re-sighted repeatedly in different trawls and on separate fishing trips. Entering trawl nets may thus be a specialisation exhibited only by a subset of the dolphin population in the region. Compared to the high interaction rates, bycatch events occur infrequently. This suggests that the majority of dolphin bycatch events in the fishery result from dysfunctional fishing gear, or when young or otherwise naïve dolphins enter the net.

Results from the second part of this study indicate that the PFTIMF may capture in the order of 10,320 individuals of vulnerable wildlife species annually. Dolphins, large sharks and rays appear to be expelled most effectively (67%, 46% and 39% of all captured individuals respectively), but most sea snakes and pipefish are able to swim through the BRD grid's bars into the codend. The high exclusion rate of dolphins suggests that the number of non-landed bycaught dolphins may be significant. The older grid model, which had a shallower decline and a centrally placed horizontal bar across the vertical bars, excluded a significantly larger proportion of wildlife bycatch than the newer grid model, which lacked a horizontal bar and was placed at a steeper angle. Some sea snakes, sharks, a dolphin and a turtle reacted to an interaction with the new grid by swimming upward, indicating that 1) a shallower decline guides animals toward the downward-opening escape hatch, and 2) BRDs should include an upward-opening escape hatch, for air-breathing animals in particular.

Direct (post-capture) and indirect (post-release) fishing mortality is high in the PFTIMF; observer reports suggest that of all bycatch landed during 44 analysed trawls, 77% were discarded dead. This stresses the need for improved BRD designs, particularly the introduction of upward-opening escape hatches and BRDs for smaller bycatch, such as sea snakes and pipefish. In order to establish the threat to stocks and populations resulting from incidental capture in the fishery, further investigation of the population size and the levels of removal of bycaught species is required. Continuous bycatch monitoring, particularly of dolphins and other vulnerable species, must be an important management objective of this fishery if it is to attain 'Managed Fishery' status.

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