

Is fish habitat adequately protected by sanctuary zones at Ningaloo Marine Park?

Researchers are working to determine if the sanctuary zones in Ningaloo Marine Park are of the right size and in the right places to achieve desired conservation outcomes for key fish species.

Background

Sanctuary zones are a key strategy used in marine protected area management with a specific objective to preserve comprehensive and representative areas of relatively undisturbed environment for the conservation of marine biodiversity. While designing representative sanctuary zones for stationary communities, such as corals and seagrasses, is relatively straightforward, it is more difficult for mobile species such as fish. Understanding fish behaviour and movement patterns at different stages of their lives is critical for effective marine reserve design as the size and location of sanctuary zones, along with the mobility of various species, will influence the degree of protection offered to these species.

For mobile species like fish, movement is of particular interest as it has important implications for whether they move between sanctuary areas and recreational zones and where they spend the majority of their time. Without this information, the effectiveness of the size and spacing of existing sanctuary areas, in terms of protecting these species from exploitation, is uncertain.

To date there has been limited information on how fish use different parts of the Ningaloo Reef, their movement patterns and how they use their habitat at scales relevant to the marine park zoning design. This is true for commercially and recreationally important fish species such as Spangled Emperor as well as the many other species that are not commonly fished within Ningaloo Marine Park.



This project sought to gain a better understanding of the movement patterns of key target fish species in the lagoon and reef areas of Ningaloo by using acoustic tracking. Acoustic tags, which are surgically implanted in fish, send out a unique series of sonic pings that can be picked up and identified through a number of acoustic receivers deployed at strategic places along the reef as part of a national system, the Ningaloo Reef Ecosystem Tracking Array (NRETA), to detect fish locations and movement over a period of time.



Key findings

During this project 300 individuals from 17 species of finfish, sharks, and rays were tagged and their movements monitored for up to 12 months via the 50+ receivers deployed at Mangrove Bay in Ningaloo Marine Park. We found that:

- the acoustic tag and receiver system worked very well in locating tagged fish; altogether locations were recorded on 2,200,000 occasions
- there was a great deal of individual variability in movement and the size of the area over which individuals ranged. For example some fish were only detected once while others were recorded up to 247,691 times. Similarly, some fish were only recorded by one receiver while others were recorded by as many as 46
- while many of the Spangled Emperor, the species most heavily targeted by recreational fishers, that were tagged in Mangrove Bay had an area of activity smaller than the majority of sanctuary zones within Ningaloo Marine Park, there were still a number of this species which moved out of Mangrove Bay. Thus, there are fish that show residency to a small area and others that are more transient with a broader range
- high proportions of fish were found to spend time close to shore, where they may be vulnerable to fishing from special use coastal fishing zones within some sanctuary areas
- there are clear indications that Spangled Emperor moved out of the lagoon during spawning season though spawning sites have not yet been fully characterised.

Outcomes

Researchers are beginning to build up several insights into the habitat used by Spangled Emperor and these observations have important implications for management, potentially allowing managers to ensure adequate levels of protection, such as through sanctuary zones, for fish in spawning areas, or for other important habitat areas.

As part of the Australian Integrated Marine Observing System (IMOS) the NRETA represents a commitment to sustained observation of the movements and migrations of marine life which is a valuable research tool to improve our understanding of the mobile marine life at Ningaloo.

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