



## Habitat associations of juvenile coral reef fish

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### Background

Most coral reef fish have a larval phase which typically spends a month or more in the open ocean. Settlement of larval fish from this pelagic environment and recruitment into benthic populations are key processes in determining the structure of fish communities. At large spatial scales many juvenile fish species settle and reside within seagrass meadows, mangroves or coral reefs, whilst at smaller scales some juveniles shelter within particular coral species. The availability of suitable habitat can be an important determinant of adult populations, particularly among species that are habitat specialists. Understanding the reliance of fish on specific habitats and the spatial scale at which these relationships operate are therefore important for understanding drivers of community composition.



Coral reefs and algal meadows where juvenile fish reside (photos Thomas Holmes and Shaun Wilson)

Algal meadows are a prominent feature of coastal systems along the tropical coast of Western Australia and the close proximity of these meadows to coral reefs suggest they could act as nursery habitat for reef fish. Coral is also recognised as an important habitat for many juvenile fish although there is a need to identify the type of corals fish prefer. It is also unclear if fish associate with live coral or the structure provided by coral skeletons. This study quantified habitat specificity of juvenile coral reef fish along the Ningaloo reef at three ecological levels; algal meadows vs. coral reefs, live vs. dead coral and among different coral growth forms.



*Chaetodon trifascialis*



*Zebrasoma veliferum*



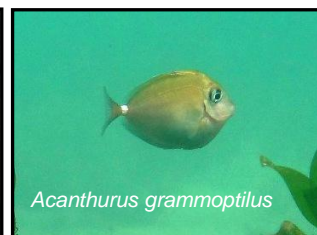
*Coris aygula*



*Chlorurus microrhinos*



*Coris caudimacula*



*Acanthurus grammoptilus*

Some of the juvenile fish species encountered during surveys. (Photos Thomas Holmes and Shaun Wilson)

## Findings

- Habitat associations of ~7000 fish, representing 11 families and 56 species were recorded.
- Juveniles of 25 (45 per cent) species were only found within coral reef habitats, whilst seven species were only observed in algal meadows. Species unique to algal meadows included some emperors (Family Lethrinidae), which are highly prized by recreational fishers.



Juvenile damselfish, *Chromis viridis*, sheltering among the branches of a corymbose coral. Photo (Thomas Holmes)

- Juvenile parrotfish (Family Scaridae) were found predominantly on the skeletons of dead coral, whereas many damsel (Family Pomacentridae) and butterfly fishes (Family Chaetodontidae) were closely associated with live coral habitat.
- Among the coral dependent species, most showed a preference for coral with corymbose morphology, whereas less complex coral shapes (i.e. massive and encrusting) were rarely used by juvenile fish.

## Management Implications

Identifying drivers of abundance improves manager's ability to distinguish between natural and anthropogenic stressors and thereby determine when intervention is appropriate. This study emphasises the importance of live coral as habitat for many juvenile fish. Most reef fish associate with corals that are highly susceptible to naturally occurring disturbances such as bleaching, disease and predation by invertebrates. As a consequence abundance of fish that rely on coral as juveniles can be regulated by temporal trends in coral availability.

The study also demonstrates the importance of algal meadows as nursery grounds for some fish, including species of importance to recreational fisheries. Thus, algal meadows can be defined as essential juvenile habitat and should be considered in spatial planning for conservation purposes.



A juvenile emperor fish in an algal meadow. (Photo Thomas Holmes)

For more information see - Wilson SK, Depczynski M, Fisher R, Holmes TH, O'Leary RA, Tinkler P (2010) Habitat Associations of Juvenile Fish at Ningaloo Reef, Western Australia: The Importance of Coral and Algae. PLoS ONE 5: e15185.