

# Ecological traps in the marine environment: implications for the design of artificial reefs

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Humans are altering coastal ecosystems at an unprecedented rate. One such change is the proliferation of artificial reefs (ARs), which have become a common management tool for stock enhancement of recreational fisheries and habitat restoration. The benefits of ARs, however, depend on their suitability as habitat for marine species. ARs could result in the provision of seemingly suitable habitat that provides lower fitness advantages. If animals preferentially colonize such structures, this could result in an ecological trap. Here we investigate whether ARs can act as ecological traps for fish populations and present a new artificial reef design that takes into consideration the specific shelter needs of a large array of fish species. We assessed fish recruitment, diversity, and abundance, as well as individual fitness components (recent growth, condition, survival) at three locations in Port Phillip Bay, each containing replicate Reef Balls (the most common AR design in Australia), an alternative AR design and natural reef. New ARs and natural reef displayed higher recruitment and survival rates for several fish species in comparison to Reef Balls, indicating they likely do not suitably mimic the complexity of natural reefs. Two of the study species, *Trinorfolkia clarkei* & *Vincentia conspersa*, in general displayed higher fitness on artificial reefs compared to natural reef for most of the fitness measures, however these results may be density dependent and require further investigation. Understanding the effects of human caused habitat modifications on marine ecosystems, particularly the design and placement of artificial reefs, is vital for developing successful conservation and management strategies.