

Juvenile fish-habitat dynamics across a diverse seascape

Molly Moustaka^{1, 2, 3}, Tahlia J Bassett⁴, Michael VW Cuttler^{2, 5}, Richard D Evans^{2, 3}, Christopher J Fulton^{2, 6}, Michael J O'Leary^{2, 7}, Ben Radford⁶, Shaun K Wilson^{2, 6}

1. School of Biological Sciences, University of Western Australia, Perth, Western Australia, Australia

2. The Oceans Institute, University of Western Australia, Perth, Western Australia, Australia

3. Marine Science Program, Biodiversity and Conservation Science, The Department of Biodiversity, Conservation and Attractions, Kensington, Western Australia, Australia

4. School of Molecular and Life Sciences, Curtin University, Perth, Western Australia, Australia

5. Oceans Graduate School, The University of Western Australia, Perth, Western Australia, Australia

6. Australian Institute of Marine Science, Perth, Western Australia, Australia

7. Centre for Energy Geoscience, School of Earth Sciences, The University of Western Australia, Perth, Western Australia, Australia

Landscape characteristics can influence the structure and functioning of faunal assemblages, yet our understanding of seascape effects on juvenile fish remains limited. This study investigated the role of seascape configuration in structuring juvenile fish assemblages (abundance, stability, and taxonomic distinctness) across the tropical seascape of the Dampier Archipelago, Western Australia. A combination of multivariate randomForest and full subsets modelling approaches were used to explore the importance of seascape, habitat, environmental, and biotic variables in explaining variation in structure of fish communities and the distributions of common taxa. Over half of the observed species were only recorded in a single habitat and thus each habitat contributed uniquely to the replenishment of the overall fish diversity within the seascape. Hydrodynamic conditions and seascape configuration strongly influenced community structure in both coral and macroalgal habitats. However, the conditions that maximised total abundance differed from, or opposed, those that optimised taxonomic distinctness. Individual species exhibited diverse responses to biophysical variables, and responses differed between coral and macroalgal habitats. These findings underscore the challenge of simultaneously managing for multiple ecological and economic goals coastal seascapes and support the use of conservation networks that encompass multiple habitats and areas that best support specific goals.