

Assessing and managing ecological impacts of marine anthropogenic noise

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Project description

Noise-generating human activities, such as urbanisation, transportation and the exploitation of resources, have increased since the Industrial Revolution and have changed the acoustic landscape of terrestrial and aquatic ecosystems. Anthropogenic (man-made) noise is now recognised as a major component of environmental change and a pollutant of international concern; for example inclusion in the European Commission Marine Strategy Framework Directive and the US National Environment Policy Act, and as a permanent item on the environmental agenda of the International Maritime Organization.

Fish can use natural sounds for communication, orientation and habitat selection, but we know that anthropogenic noise can raise their stress levels and affect communication, foraging and territorial behaviour. However, it is difficult to predict what this might mean for individual fitness or for communities. Our recent work has identified that boat noise can affect fish anti-predator behaviour (Simpson *et al.* (2015) *Global Change Biology*), but as yet we don't know how noise affects key life-history processes such as reproduction, development and survival.

The aim of this PhD is to conduct experiments with coral reef fish at Lizard Island Research Station to assess direct impacts of motorboat noise. We will assess the performance of parents guarding eggs in nests, the development of their offspring, habitat selection by older fish returning after a planktonic larval stage, and the

ability of fish to survive predation upon arrival on the reef. Focussing on coral reef fish is especially important in the 21st century as reefs are among the most globally threatened marine ecosystems, yet they provide habitat for 25% of all fish species, and support fisheries that feed 0.5 billion people and provide livelihoods for 100s millions, often in the worlds poorest countries. Additionally, using reef fish as a model system allows observation, manipulation and replication in natural conditions, We will test impacts of noise generated by motorboats, because coastal regions are experiencing unprecedented human population growth, with a significant rise in coastal recreation and tourism, including boating (e.g. 0.5 million boats predicted for the Great Barrier Reef by 2040), and because we can drive boats near to natural and manipulated habitats on coral reefs allowing carefully controlled experiments.

We will work in partnership with the Australian Institute of Marine Science and Cefas (UK Government Scientists) to assess the consequences of boat noise disturbance on fish, and develop management plans for the Great Barrier Reef and for European waters based on our findings.

