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Effects of local and global stressors on the energy budgets and condition of inshore reef-building corals

Melissa completed her BSc in Marine Biology at the College of Charleston, South Carolina. She went on to gain her Graduate Diploma of Research Methods in Marine Biology at JCU and upgraded her research to a PhD.

Coral reefs continue to deteriorate through stressors associated with human activities, both global such as global warming and ocean acidification and local such as agricultural runoff. The potential for acclimatization and adaptation in corals has important implications for how reefs will respond to these stressors in the future. This in turn is determined on the genetic basis of the coral. The development of early warning sub-lethal biomarkers would allow early detection of overtly stressful conditions, providing a tool for managers in protection and conservation decision-making.

Melissa's project aims to investigate how changes in water quality affect physiological performance of corals, and their ability to respond to other stressors such as increased temperature. To achieve this, Melissa will be using in situ water quality gradients found on inshore reefs as a model system. Here, she will combine physiological measurements of growth and energetic condition with gene expression studies of lipid metabolism and calcification of the coral species *Acropora tenuis*.

The most exciting and novel part of the research so far, has been the development and employment of an innovative molecular technique using fluid dynamics and nanotechnology to quantify expression of 48 genes associated with metabolism and calcification in CO_2 and temperature challenged corals.

Publications

Rocker, M.M., Willis, B.L. & Bay, L.K., 2012. Oxidative stress-related gene expression in juveniles of the coral Acropora millepora. In *12th International Coral Reef Symposium. Poster*. Cairns, Australia.

Rocker, M.M., Willis, B.L. & Bay, L.K., 2012. Thermal stress-related gene expression in corals with different Symbiodinium types. In *12th International Coral Reef Symposium*. pp. 9–13.