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**PARROTFISH FISHERIES AND POPULATION DYNAMICS;
A CASE-STUDY FROM SOLOMON ISLANDS**

Thesis submitted by

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MSc (Otago)

For the degree of

Doctor of Philosophy
In the

School of Marine & Tropical Biology
James Cook University

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STATEMENT OF CONTRIBUTIONS

The collaborative nature of this work has meant that several people need to be acknowledged for contributing to the success of this work. As part of a larger investigation on parrotfish Biology, Professor J H Choat has been the main contributor of demographic field samples. Alec Hughes, as part of this investigation with professor Choat, has provided me with demographic and life-history data which allowed for comparative analysis with data collected as part of this work. Collaboration with Simon Albert on the Roviana and Vonavona Marine Protected Areas project has meant that an extra dimension has been added to this research project and I thank him for his complimentary data. Finally, and most importantly, funding acquired from Professor S Aswani as part of the Roviana and Vonavona Marine Protected Areas project must be acknowledged as significantly contributing to the overall success of this work.

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ABSTRACT

There is unanimous agreement that the functional role of parrotfish as lower trophic level herbivores is a key component in the structural integrity and resiliency of shallow water coral reef ecosystems. The premise for carrying out a comprehensive fishery, biological and ecological investigation of parrotfishes here was based on the recognition that more concerted research is needed in order to help address management and conservation challenges related to parrotfish fisheries. More importantly, it was decided from the outset that urbanized fisheries posed the greatest threat to coral reef fish assemblages, which prompted me to place the investigation of parrotfish ecology within the context of a typical artisanal fishery case study in the South Pacific (i.e. Solomon Islands).

I feel some vindication for the research theme adopted for this PhD given the recognition of both parrotfish assemblage decline and open-access urban fisheries by the 11th International Coral Reef Symposium, held in the international year of the reef (2008), as critical factors to the survival of coral reefs around the globe.

The fishery component of this research looked into artisanal catch landings, supported by independent creel and abundance surveys. The various types of data collected provided an effective form of triangulation. This study has described the first comprehensive investigation of an urbanised parrotfish artisanal fishery in Western Solomon Islands. Records of catch landings over a two-year period showed a transition from larger excavating parrotfish to smaller scrapping parrotfish. Although creel data did not validate the exact species-specific decline depicted in catch landings, the overall transitional shift of larger to smaller parrotfish was the same. Triangulation of catch, creel and abundance data showed that parrotfish density, large bodied fish numbers, and mean body size had all declined.

Having quantified fishing effort and assessed possible reactionary declines in density and size structure, I proceeded to investigate age-based demographic and reproductive parameters in order to discuss parrotfish resiliency to fishing pressure, but also to gain a comparative perspective with regards to age and growth plasticity from other ocean systems. There was considerable variation in demographic parameters, even within same ocean systems. Parrotfish from Solomon Islands have shorter life span, grow fast, and are very young at first female maturity. However, their regenerative capacity from fast growth and high fecundity appears to provide insufficient resiliency against quantified fishing pressure.

The issue of parrotfish conservation was studied through the analysis of abundance data and herbivory rates within and outside of a marine protected area. Algal tile and fish surveys demonstrated higher grazing activity and parrotfish abundance within the reserve, which appear to suggest that parrotfish do benefit from protection.

This study provides important biological, ecological and fishery information of an urbanized parrotfish fishery, while also conducting a comparative demographic and life-history analysis. Information gathered as part of this research program not only contribute to the knowledge-base of parrotfish fishery management and conservation, but can also be used a base-line for future research initiatives.

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