

ABSTRACT

An Assessment of Grazing Potential in Herbivorous Fishes on Macroalgae-Dominated Coral Reefs

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As a result of prolonged multiple stresses the north coast Jamaican reefs of Discovery Bay have low coral cover (2% back-reef, 11.5% fore-reef) and are macroalgae-dominated (59% back-reef, 48% fore-reef). These reefs have been in decline since Hurricane Allen (1980) and show little sign of recovery twenty years later. This study examines the trophic balance between producers and consumers, and investigates the relative and potential grazing impacts of three herbivorous fish species (*Sparisoma chrysopteron*, *Scarus iserti*, and *Acanthurus bahianus*). Laboratory experiments were conducted where fish were presented with a selection of twelve discrete choices of macroalgae to assess grazing potential in terms of consumption (amount consumed per unit time) and preference (selectivity of algal species). Results show significant differences in grazing potential between fish species, along with strong and consistent algal preferences; *S. chrysopteron* exhibited a wider macroalgal diet

than *S. iserti* and *A. bahianus*, and consumed considerably larger quantities of algal material at faster rates. Consistent algal preferences were exhibited by all fish. Further experiments with *S. chrysopteron* using field enclosures investigated this species' grazing potential on mixed assemblages of macroalgae, and the effects of a) food availability, b) spatial constraint, and c) gregariousness. *S. chrysopteron* is capable of having a significant grazing impact on macroalgae. Optimum grazing rates were recorded between 50-60 grams of total algal biomass, per fish, per day. Grazing rate was not affected by spatial constraint or gregariousness, but was affected by food availability. Rates of algal growth ($23.0 \text{ g.m}^{-2}.\text{d}^{-1}$) and consumption ($13.0 \text{ g.m}^{-2}.\text{d}^{-1}$) at Discovery Bay indicate that whilst current levels of grazing may provide some stability to the system's standing crop, they remain inadequate to effect a shift back from algal to coral dominance. It is suggested however that a selective increase in the abundance of *S. chrysopteron* up to 0.25 fish.m^{-2} may contribute positively towards this aim by reducing macroalgal abundance.

Keywords: macroalgae; coral reef; parrotfish; herbivory; grazing; recovery; Discovery Bay; Jamaica; West Indies.