

# The utility of simple fish community metrics for evaluating the relative influence of fishing vs. other environmental drivers on Caribbean reef fish communities

Henri Valles<sup>1</sup> & Hazel A Oxenford<sup>2</sup>

<sup>1</sup>Department of Biological and Chemical Sciences, The University of the West Indies, Cave Hill Campus, Barbados;

<sup>2</sup>Centre for Resource Management and Environmental Studies (CERMES), The University of the West Indies, Cave Hill Campus, Barbados

## Abstract

Fish community metrics have been extensively investigated as indicators of fishing effects for ecosystem-based fisheries management (EBFM) in temperate systems. Little similar work has been performed in the coral reefs of the Caribbean, where simple indicators are urgently needed. Here, we use 415 coral reef surveys throughout the Caribbean to assess the potential of four simple and intuitive fish community metrics, namely, fish biomass, fish density, average fish weight and species richness, to separate fishing effects from those of other environmental factors at both local (tens of kilometres) and broad (hundreds to thousands of kilometres) spatial scales. We found that these fish metrics differed considerably in environmental correlates and the spatial scales underlying fish metric – environment associations. Average fish weight and fish biomass were most sensitive to fishing indices at both spatial scales, although average fish weight responded more sensitively and specifically to fishing than fish biomass. Fish density and species richness were most sensitive to temperature over broad scales and to macroalgae and relief height over local ones. All fish metrics were negatively correlated with macroalgae over broad scales, supporting the utility of macroalgae to inform about the integrity of entire reef ecosystems. Most of the fish metric variance associated with fishing pressure operated over broad scales, highlighting the need for a Caribbean-wide view of fish community status to establish local management objectives and avoid shifting baselines. Our study clarifies the utility of simple fish community metrics as indicators of fishing effects for EBFM in the Caribbean.