

Length-Based Risk Analysis of Management Options for the Southern Florida USA Multispecies Coral Reef Fish Fishery

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Exploitation impacts and management options for 15 coral reef fish species central to the commercial and recreational fisheries of the southern Florida USA coral reef ecosystem were evaluated using a length-based risk analysis (LBRA) framework. Population abundance-at-length composition data were obtained from several regional federal-state sampling programs. These updated life history demographic data were integrated into a length-based numerical cohort model to generate LBRA fishery sustainability metrics from a probabilistic perspective. Three of five groupers, eight of eight snappers, and two of two grunts were below the 40% spawning potential ratio (SPR) stock sustainability minimum; ten of these stocks are at < 20% of their historical spawning biomass, some as low as 5%. Therefore, to ameliorate overfishing for the 13 stocks with sustainability risks $\geq 98\%$, fisheries management requires increased minimum sizes of first capture (L_c) and significant reductions in fishing mortality (F). To achieve sustainability and reduce sustainability risks, area-time protections are also needed. While lack of data often limits the evaluation of management options, this paper establishes benchmarks from which data-limited approaches can move forward. In addition, the approach can be used to cross-check other data-rich analyses. A goal of this work is to effectively balance sustainability risks with fishery production to mitigate overfishing likelihoods and to increase the probability of sustainable fisheries.