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Simulated response to harvesting strategies in an exploited ecosystem in the southwestern Gulf of Mexico

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The impact of some optimized harvesting strategies on ecosystem structure was investigated using a mass-balanced model of the ecosystem in the southwestern Gulf of Mexico, where there are four types of artisanal fisheries and a shrimp fishery that has collapsed. The Ecopath with Ecosim software was used to simulate harvesting strategies aimed at optimizing economic (profit), social (jobs), ecological (conservation of ecosystem structure) and shrimp-recovery criteria. As expected, the ecosystem changes that would ensue vary according to the combination of optimization goals. We found that for some scenarios, the extraction of biomass from a discrete trophic-level changes impacting ecosystem and catch structure. This was clearly observed through the tendency of the mean trophic level of the ecosystem and catch, as well as the fishing-in-balance index (FBI). A particular discussion was made about the collapsed shrimp fishery, where the impact of a specific shrimp-recovery strategy was evaluated. Collapse is strongly associated to physical variables and recovery based on trophic relationships is plausible but with a high ecosystem structure cost.

Palabras clave: Gulf of Mexico, Ecosystem response, Harvesting strategies, Shrimp collapse

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