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## Ecosystem models for management advice: An analysis of recreational and commercial fisheries policies in Baja California Sur, Mexico

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Recreational fishing is a vital component of the tourism economy in Baja California Sur (BCS), Mexico, although several artisanal and industrial fisheries continue to operate in the region. The commercial long-liner fleet in particular is widely held to be responsible both for diminishing shark populations and declines in billfish through bycatch. Using available fisheries and ecosystem data, we develop an Ecopath with Ecosim (EwE) model to represent current ecosystem and fishing dynamics in BCS and explore the ecological and economic effects of specific fisheries policy measures. Results suggest that currently mandated bycatch limits for the longlining fleet will have little effect on marlin abundance in the area. In an overfished ecosystem, decreasing fishing effort can result in higher overall catches through population rebuilding. While perhaps ecologically justified, increases in the abundance of sharks, a top predator, can have negative effects on other valued species in the ecosystem. The effects of these trophic dynamics must not be overlooked, as they can negate or even reverse desired outcomes from fisheries management.

Palabras clave: Recreational fishing, Longlining, Baja California Sur Ecosystem model, Scenario analysis

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