

Accounting for habitat damage increases the economic optimality of marine reserves

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Marine reserves — areas closed to fishing — are often touted for their conservation benefits (e.g. protection of essential fish habitat, increases in fish population and biomass). However, reserves are frequently viewed as economically costly because closures deny fishermen access to potentially valuable fishing grounds. To address this issue, we explore a spatially-explicit bioeconomic model that accounts for habitat damage from fishing gear. We solve the model for the profit-maximizing distribution and intensity of fishing effort without designating reserves *a priori*, and show the emergence of reserve networks. These results suggest that reserves may in fact be economically beneficial, especially when fishing gear damages habitat. We also explore alternative management schemes in which the regulatory body has varying degrees of spatial knowledge about fishing activities, and find an explicit value for spatial knowledge.

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