

Effects of trophic and technical interactions on the definition of MSY reference points in a mixed-fisheries ecosystem

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While reference points such as maximum sustainable yield (MSY) have been estimated for decades in a single stock framework, this methodology can be questionable when trying to reach these sustainable levels for all stocks simultaneously. On the one hand, technical interactions can prevent attaining F_{MSY} for several stocks caught together in a mixed fisheries context. On the other hand, predation interactions can dampen or exacerbate stock dynamics, and thus modify the fishing mortality level allowing MSY. Here we investigate the effects of both interaction types using the multi-species trophic model OSMOSE applied to the eastern English Channel, an ecosystem characterized by mixed fisheries. First, we estimated the classical F_{MSY} for several species, by varying the fishing mortality of each species independently in order to maximize their yield. Current stock status compared to the resulting reference points are discussed and put in parallel with outputs from classic stock assessment. Second, we explored how variation of fleets' effort, i.e. varying the partial fishing mortality of a set of species together, would affect the MSY levels obtained previously. Results show that single stock MSY cannot be reached for all species together, and that moving to ecosystem-based fisheries management implies refining the methodology underlying reference points such as MSY, in order to be suitable for use in a multi-species context.

Keywords: F_{MSY} ; mixed fisheries ; trophic interactions ; ecosystem model

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