# Providing Integrated Total Catch Advice for the Management of Mixed Fisheries with an Eco-viability Approach

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**Résumé**

Well-established single-species approaches are not adapted to the management of mixed fisheries where multiple species are simultaneously caught in unselective fishing operations. In particular, ignoring joint production when setting total allowable catches (TACs) for individual species is likely to lead to over-quota discards or, when discards are not allowed, to lost fishing opportunities. Furthermore, economic and social objectives have been poorly addressed in the design of fisheries harvest strategies, despite being an explicit objective of ecosystem-based fisheries management in many jurisdictions worldwide. We introduce the notion of operating space as the ensemble of reachable single-species fishing mortality targets, given joint production in a mixed fishery. We then use the concept of eco-viability to identify TAC combinations which simultaneously account for multiple objectives, namely: guarantee the stocks' biological viability, ensure the short- and long-term economic viability of the fleets, and maintain fishing crews in the fishery. The approach is applied to the joint management of hake and sole in the Bay of Biscay, also accounting for catches of Norway lobster, European seabass and anglerfish.

**Mots-Clés:** eco, viability, multi, objective management, mixed fisheries, bio, economic modelling

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