Trade-offs for data-limited fisheries when using harvest strategies based on catch-only models - DTU Orbit (12/11/2019)

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Many of the world's fisheries are unassessed, with little information about population status or risk of overfishing. Unassessed fisheries are particularly predominant in developing countries and in small-scale fisheries, where they are important for food security. Several catch-only methods based on time series of fishery catch and commonly available life-history traits have been developed to estimate stock status (defined as biomass relative to biomass at maximum sustainable yield: B/BMSY). While their stock status performance has been extensively studied, performance of catch-only models as a management tool is unknown. We evaluated the extent to which a superensemble of three prominent catch-only models can provide a reliable basis for fisheries management and how performance compares across management strategies that control catch or fishing effort. We used a management strategy evaluation framework to determine whether a superensemble of catch-only models can reliably inform harvest control rules (HCRs). Across five simulated fish life histories and two harvest-dynamic types, catch-only models and HCR combinations reduced the risk of overfishing and increased the proportion of stocks above BMSY compared to business as usual, though often resulted in poor yields. Precautionary HCRs based on fishing effort were robust and insensitive to error in catch-only models, while catch-based HCRs caused high probabilities of overfishing and more overfished populations. Catch-only methods tended to overestimate B/BMSY for our simulated data sets. The catch-only superensemble combined with precautionary effort-based HCRs could be part of a stepping stone approach for managing some data-limited stocks while working towards more data-moderate assessment methods.

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