Likely status and changes in the main economic and fishery indicators under the various discards policies

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Summary

The reform of the Common Fisheries Policy (CFP) has introduced a landings obligation to end the practice of discarding at sea. The ecological and economic effects of these landings obligations are unknown for many mixed fisheries. It seems likely, though, that fishing fleets will adaptively respond to the new policy, trying to sustain viable fisheries under the new policy constraints. Here, we present a methodology to project the effects of the landings obligation on the sustainability and profitability of mixed fisheries under quota management using a management strategy evaluation (MSE). The adaptive response of the fleets to different implementation scenarios will be mimicked using a dynamic state variable model. The scenarios we evaluate include: (i) a complete discards ban, and (ii) a combination of de minimis and inter-species flexibility in quota use. These scenarios will be compared with the results of maintaining a policy permitting all discards. The final comparison across alternative discard management regimes will look at both the ecological and economic indicators. The Basque trawl mixed fishery on the Bay of Biscay is used as case study.

Introduction

The reform of the CFP (EEC, 2013), has introduced a landings obligation to end the practice of discarding at sea. The main objective of any catch quota management system with landing obligations is to create economic incentives for the industry to move towards more selective gears and to improve accuracy in recording catches and preventing wastage of food. However, this objective is difficult to achieve for mixed fisheries, where there is a potential mismatch between the current allocated TACs and the catch distribution. Here, we present the methodology to project the effects of the landings obligation on the sustainability and profitability of mixed fisheries under quota management.

Materials and methods

Management strategy evaluation allows us to evaluate the consequences and risks associated with alternative implementations of a policy limiting or eliminating discards at sea. In such modelling framework, advice and management systems can be quantitatively evaluated through simulation testing (Kell *et al*., 2007). This involves creating simulation models that best represent current knowledge and uncertainty on the dynamics of fish stocks under fishing pressure, the effect on fishers of variations in stock status and availability, and their responses to those changes and those in management regimes. The main data sources available for constructing the operating models are those assembled for the stock assessment conducted by the various ICES Working Groups. To characterize the fleet dynamics on the operating model, data from the Basque trawl fishing fleets were made available from 2003 to 2012 on trip by trip basis, gear class (bottom otter trawlers and bottom pair trawlers) and fishing ground. Data include catches of all species landed; fishing effort; landings length distributions and discard estimations (data source: AZTI- Tecnalia).

Several discard scenarios will be mimicked into the management procedure for the estimation of appropriate levels of fishing mortality and the corresponding TAC.

The management strategies that will fit into the MSE correspond to:

(i) a complete discards ban, and

(ii) a combination of de minimis and inter-species flexibility in quota use.

These scenarios will be compared with the results of maintaining a policy permitting all discards.

Furthermore, a dynamic state variable model will be implemented to understand the effect of the adoption of any of those alternative scenarios (Houston & McNamara 1999, Clark & Mangel 2000). The model will be an expanded version of Poos *et al*. (2010), in which each individual vessel in the model has a set of choices, allowing it to respond to different quota and discards constrains and economic opportunities. Then, costs and benefits, both economic and in terms of risks to both stock and livelihoods, can be computed and compared across scenarios and management regimes.

Results and Discussion

Five different stocks have been selected to characterize the spatial and temporal removals from the Basque trawl mixed fishery: mackerel, western horse mackerel, megrim, anglerfish and northern hake. They represent around the 68% of the total landings, are managed under TAC constrains and in some cases, show evidence of high discard rates. They are thus most likely to be affected by the landings obligations regulation. Then, individual models of the biology of the various stocks have been coupled with those representing the fleets operating on them. The majority of these operating models assume there are no discards for the stocks, because no age-disaggregated data on discards were available in the stock assessments. Therefore, catches were considered equal to landings. Furthermore, other assumptions have been done in growth parameters when converting the Basque fleet catch length data to age data, because no detailed information was found.

Regarding the dynamic state variable model, we are expanding the model of Poos *et al*. (2010) in which each individual vessel will evaluate its optimal annual strategy in terms of seasonal behavioural choices, based on a utility function. The target of the utility is to optimize the fisher net revenue at the end of the year. The annual net revenue consists on the total quantity of landings for the five species weighted by each species price minus the variable fishing costs (fuel costs of fishing in different areas) and a fine. The fine will take into account the total fines for a vessel overshooting each species quota and each species discards limitations.

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