

The bioeconomic consequences of fisheries-induced adaptive changes

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Many fish stocks face severe harvest pressure. The consequences are not limited to reduced stock size and productivity, as the increased mortality may set up new selection gradients that can lead to evolutionary change. But what are the potential economic impacts of fishery-induced adaptive changes? To study this, we used a simplified evolutionary life-history model focused on age at maturation as basis for the stock dynamics, coupled with a fishing module that describes costs, harvest, and economic yield. Size-dependent natural mortality and fishing mortality are the driving forces of selection, and life history evolution is modelled as a quantitative trait. In the analysis, we vary the size-selectivity of the fishing gear and the level of fishing mortality or effort. Together these determine fishery yield and hence the economic yield. This allows for an impact analysis of harvest strategies on life history evolution as well as the long-run influence on revenue. The goal is to assess if and under what levels of discounting rates fishery-induced evolutionary effects may be economically relevant.

Keywords: bioeconomic model, discounting, economic yield, fishery-induced evolution, reproductive investment.

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