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Fishing through fish communities: a simple bio-economic model

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ABSTRACT

Recent work in the domain of fisheries ecology has shown that major changes occur in fish communities exploited by commercial fisheries. Selective fishing pressure on the more highly valued components of fish communities is amongst the key factors proposed to explain these changes. Under de facto open access conditions, it is suggested that sequential over harvesting of higher valued fish and/or fish species leads to modifications in the structure of both fish communities, and fisheries landings. This poses the question of the economic drivers of such sequential over-harvesting, and the implications of this process in terms of the total value of landings from a given fish community.

The aim of this paper is to present an analysis of this question using a simple bio-economic model of an open access fishery targeting different species. The model is used to analyse the process by which harvesting of the set of species develops, given differences in the economic and biological characteristics of these species. Sensitivity to these differences of both development paths and steady state equilibrium of the fishery are analysed. Simulation results show that, where total effort is controlled but its allocation between alternative species may occur freely (a case of “regulated open access”), there may be significant consequences in terms of the biological status of stocks, and in terms of potential maximum rents. This work is carried out as part of the “CHALOUPE” research project, funded by the French National Research Agency