

Title: **Fishery-Based indicators of Management Impact : Assessing Relevance and Robustness Using A Bio-Economic Simulation Model**

Authors: Sigrid Lehuta, Ifremer (France)
Stéphanie Mahévas (France)
Pascal Le Floc'h, UMR AMURE, Université de Bretagne Occidentale (France)
Dominique Pelletier (France)
Youen Vermard (France)
Paul Marchal (France)
Etienne Rivot (France)

Abstract: Indicators are widely used in fisheries management decision process as measures for monitoring ecosystem status or management performance. In the current context, the shift to an ecosystem-based approach to fisheries management requires to complete usual population or community indicators with indicators reflecting state and dynamics of fishing activity as well as economic viability. However, it is difficult for decision makers to select relevant indicators among the numerous existing ones. In addition, the complexity of the mechanisms involved makes the unequivocal interpretation of indicator variations seldom possible using only statistical models. We propose to resort to the ISIS-Fish fishery dynamics model to select robust and relevant fishery indicators. ISIS-Fish population sub-model was set up to reproduce major processes of anchovy population dynamics in space and time and surplus production models were used for the other target species of the fishery. To take fishermen behavior into account while modeling fleet dynamics, we considered a discrete choice model using economical interest in the different possible métiers, fishers habits and management constraints within a random utility modeling framework. Applying sensitivity analysis methods, simulation designs were built crossing a variety of management scenarios and uncertainty hypotheses. Consequently, a list of resulting candidate metrics referring both to population and fishing activities were computed and statistically analyzed. Metrics that were the most sensitive to management and the most robust to uncertainties were considered to be relevant and selected for assessing management impact on the fishery.