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Coupling commercial fisheries and survey data: a practical solution to boost the amount of information in data-poor context

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Quantitative fish stock assessment methods have become increasingly complex. However, the quality of available data may still restrict their applicability, being a particular concern in data-poor situations and where management decisions rely on either commercial fisheries or scientific survey data. In this study we address this issue by proposing a flexible statistical tool that can compare and integrate both datasets simultaneously, and hence boost the amount of information. Because of different sampling designs and procedures, distinct levels of biases arise between datatypes (e.g., different spatio-temporal coverages and size spectra of fish), which are accounted for in our model framework. The model is developed in Template Model Builder, alternatively applied to (i) commercial data, (ii) survey data and (iii) coupled datasets, and tested on cod, plaice and sprat stocks in the western Baltic Sea (2005-2016). We find that each data type supply different, yet complementary, information on the species spatio-temporal dynamics. Though the overall spatial pattern in both datatypes shows similar trends, the variability was clearly higher when evaluating the datasets separately, while the coupled dataset were most informative. This confirms that the predictive modelling was greatly improved by joining the datasets and will likely enhance future stock evaluation and management advice in both data-poor and data-rich contexts. Moreover, the current tool represent a valuable benchmark for fishery-based bio-economic management evaluation tools, provided that ecological-economic systems can be reliably mocked at a spatio-temporal scale that our model support and which indeed matters for robust management and policy makers.