Validating a data-limited stock assessment method using data-rich stocks

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Abstract: The sustainable harvesting of fish stocks depends on the estimation of their status, i.e. their exploitation level. In practice, stock assessment is often hindered by data limitations. For example, age readings are not always available or of poor quality. Further, time series of data are not always available. Those limitations make commonly used age-based approaches not applicable. As an alternative, a theoretical single-species, size-structured model (Andersen and Beyer, 2013) is used to estimate the stock status, quantified by the ratio (F/F_{MSY}) between the fishing mortality (F) and the fishing mortality leading to the maximum sustainable yield (F_{MSY}). The model describes the growth, mortality and recruitment of the population combining the theory of Beverton-Holt life history invariants with metabolic theory. The parameters of the model are estimated using maximum likelihood. Minimum data requirement of the method is the size distribution of commercial catches. If more information is available, e.g. survey data, or life history parameters, they can be used to improve the estimation. The method is validated using only size-specific data from different stocks of Atlantic cod, *Gadus morhua*, (e.g. North Sea cod, Eastern Baltic cod). The results are compared with the official data-rich age-based assessment.

References Andersen, K. H. and Beyer, J. E. (2013) Size structure, not metabolic scaling rules, determines fisheries reference points. Fish and Fisheries. doi:10.1111/faf.12042