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The challenges for ICES raised by conducting full MSEs for some jointly-managed stocks in the North Sea

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Abstract

ICES were requested by EU-Norway in 2018 to evaluate management strategies for a number of jointly-managed North Sea stocks (cod, haddock, whiting, saithe and autumn-spawning herring). The request specified particular harvest control rules coupled with stability mechanisms, but with the flexibility of finding the combination of control parameters that maximised long-term catch while meeting the ICES precautionary criterion (no more than a 5% risk of SSB dropping below B_{lim}). We conducted a full management strategy evaluation (MSE) in order to explore these management trade-offs, meaning that the assessment and forecasting procedures ICES uses to provide advice were included in the simulation loop. This posed significant challenges to time-scales (a single combination of control parameters could take up to 40 hours on a single core computer), required the use of parallelisation with high-performance computing, and highlighted the need to find computational and statistical methods to improve search techniques. A key outcome was that established fishing mortality reference points for some stocks were no longer considered precautionary, and in one case (whiting), the ICES MSY approach itself was not considered precautionary. The approach also considered alternative operating models, and for cod, even though all management strategies evaluated were precautionary under the baseline operating model, all but the current MSY approach failed the precautionary criterion under an alternative operating model that included the possibility of year effects in the IBTS survey data that the ICES assessment currently ignores.

Keywords:
management strategy evaluation, parallelised computing, reference points, operating models, harvest control rules, management trade-offs

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