

A comparison of different assessment models for the Namibian hake stock.

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Abstract

A state-space fish stock assessment model was compared to the commonly used full parameterized statistical models. The two models are based on basic population abundance dynamic equations and are fitted to the same data sets. The aim of this study is to compare the outputs of a fully parametric statistical model (age structured production model) with a state-space stock assessment model to ascertain the uncertainties in model output if any and to assess which model gives an acceptable assessment. The age structure production model presents different underlying assumptions, e.g. recruitments is assumed deterministically exactly by a stock – recruitment relationship. A state-space assessment model has a number of appealing properties: It is a full statistical model and as such quantification of uncertainties is an integrated part of the model. It treats all parameters as stochastic variables in a software framework that simplify model structure, and parameter estimation. The model avoids overparametrization and numeric difficulties in parameter estimation that would be consequence of a fully parameterized stochastic model. It assumes that time series variables (fish abundance (N) and fisheries mortality (F) develop as a random walk process with a constant variance. It allows selectivity to evolve gradually in the data period. It is able to handle missing data (e.g. missing catches in a year). The state-space assessment model is capable of reconstructing the time-series of spawning-stock biomass (SSB) and average fishing mortality and quantifying their uncertainties. It is able to separate observation noise from process error.