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Ecosystem dynamics and the development of stock-specific scientific advice for fisheries management in the USA

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Abstract

There is a strong scientific basis for fisheries management in USA, and stock assessments serve as the primary scientific tool upon which management advice is based. Overall, the science-to-management process is effective and USA fisheries are sustainable and productive. Despite relatively sophisticated observing systems and modeling capability, the majority of USA stock assessment models assume that ecosystem drivers are at equilibrium, and only a small percentage explicitly account for changes in the ecosystem. There are even fewer instances where simulation has been used to evaluate the robustness of management strategies to ecosystem variability. As phenomena such as climate change alter marine systems at unprecedented rates, stock-specific productivity may be affected, causing sustainable harvest levels to scale accordingly. Conducting management strategy evaluations to analyze the robustness of management measures to ecosystem change and/or incorporating ecosystem variability directly into stock assessment models may ensure sustainability over the long term. Here, we review stock assessments for USA fisheries with a focus on those that incorporated ecosystem features directly into the assessment models. We present the variability of approaches used by assessment analysts, the relative benefits associated with these methods, and the challenges faced when attempting to account for dynamic features of an ecosystem.

Keywords: Stock assessment, ecosystem dynamics, climate change

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