



Adapting Fisheries Management to a Changing Ecosystem
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The Fisheries Integrated Modeling System, comparing a new modular paradigm for fisheries stock assessment software to existing platforms

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ABSTRACT

Fisheries stock assessment models are applied throughout the world and range from data-limited models that estimate stock status from catch and/or life history-parameters, to integrated single-species models incorporating survey and composition data, to multispecies models. However, there is a growing understanding that model misspecification can lead to biased analyses, and exogenous factors not captured in common modeling platforms can lead to underestimated uncertainty of estimates. The current generation of assessment models has limited ability to readily incorporate factors, such as climate change, interspecies interactions, and socioeconomic pressures, into fisheries stock assessment models. Furthermore, current models are largely built using aging software tools that are not always well-equipped to model these factors using random effects. A next generation of stock assessment software presents an opportunity to develop an integrated framework for new models that are more comprehensive, more interoperable, and more modular. To facilitate this, NOAA Fisheries is investing in a Fisheries Integrated Modeling System (FIMS) that allows for a more modular and collaborative stock assessment software system. FIMS is being developed by a team of regional experts working with dedicated programming staff to ensure the system meets regional needs while remaining interoperable with other frameworks and modules. FIMS is also guided by a Steering Committee that includes representatives from outside NOAA Fisheries, including domestic and international partners as well as Regional Fishery Management Organizations. The team has completed a benchmark simulation of FIMS to compare against tactical assessment models used in other regions to show we can accurately replicate existing assessment configurations. This assessment serves as the start of a bridge to a more modular, integrated, and modern assessment models needed to manage fisheries in a changing climate.