COMPARING PERFORMANCE AMONG ALTERNATIVE ABC CONTROL RULES

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SUBTHEME: Evaluating existing ABC control rules: issues, challenges and solutions

BIO

Dr. Mike Wilberg is an Associate Professor of fisheries science at the University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory. He has served on the Mid-Atlantic Fishery Management Council's (MAFMC) Scientific and Statistical Committee since 2009, and has chaired the subcommittee charged with developing the MAFMC Acceptable Biological Catch control rule and evaluating its effectiveness. His main research interests are in applying quantitative fisheries approaches to improve management. He has conducted a variety of work on stock assessment methods development, management strategy evaluation, and effectiveness of regulations for species throughout North America including American eel, paddlefish, eastern oysters, blue crabs, and yellow perch. He is also active in international and regional fishery management and serves as a technical advisor to NOAA for ICCAT, and has been invited to provide advice on a variety of management questions for the Atlantic States Marine Fisheries Commission, Maryland Department of Natural Resources, Mississippi Interstate Cooperative Resource Association, and Great Lakes Fishery Commission. Dr. Wilberg also teaches a range of courses and workshops on population dynamics, fisheries management, stock assessment methods, statistics, and computer programming for graduate students and fishery professionals.

ABSTRACT

The 2006 revision of the Magnusson-Stevens Act ushered in a suite of changes for U.S. fisheries management including the use of Acceptable Biological Catch (ABC) control rules to limit harvest. Each of the eight regional fishery management councils developed their own approaches for setting ABCs, but little information was available to compare alternative methods for ABC determination. We developed a management strategy evaluation (MSE) that allows us to test the performance of alternative methods for setting ABCs. The primary objectives were to determine the effects of assessment frequency, amount of time between the last year of data included in the stock assessment and implementation of the ABC (data lag), and alternative ABC control rules on important fishery metrics such as population biomass, catch, and probability of overfishing.

Assessment frequency, data lag, data quality, and the stock's life history had important effects on control rule performance. Longer times between assessments led to lower catch, lower biomass, lower inter-annual variability in catch (AAV), and higher probability of overfishing. Generally, increased data lag tended to decrease average catch and average biomass, while increasing the probability of overfishing. The effect of data lag on AAV depended on the life history, with little effect of data lag for the slow life history and a decrease in AAV with data lag for the fast life history. On average, data lag effects were greater than those of assessment interval for biomass, catch, and AAV.

The ABC control rule scenarios included eight control rules, eight methods for setting ABCs (projected or fixed ABC, phasing in of the ABC, using alternative assumptions when doing projections), three exploitation histories, two assessment intervals, two productivity scenarios (recruitment variability and autocorrelation) and multiple levels of assessment error. Exploitation history affected control rule performance with stocks that had previously experienced overfishing doing better under the control rules than those that had a history of light fishing. State-dependent control rules resulted in similar long-term yield, but with a higher AAV and a lower probability of overfishing compared to fixed control rules. Long-term average yield was comparable across state-dependent and constant fishing mortality control rules. Increasing the assumed CV of the OFL distribution resulted in comparable catches, but with a lower probability of overfishing for both fixed and state-dependent control rules. The different methods for setting the ABC did not have a large impact on population size or average catch, but they did have an effect on the AAV of the catch, with fixed ABCs and phasing in the ABC having a lower AAV compared to runs using projections. Variability and autocorrelation in recruitment had relatively little effect on control rule performance.