Buffering Uncertainty: Assessing Annual Catch Limit Setting under the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006.

Kate Semmens

How much of a buffer is needed between a catch limit and target to ensure no overfishing? This question is key to setting Annual Catch Limits (ACLs) under the recently updated Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (MSRA). The MSRA's new provisions dictate that Regional Fishery Management Councils establish ACLs and accountability measures at levels that prevent overfishing and aim for sustainable optimum yield in each fishery management plan. While the relationship between ACLs, optimum yield, and overfishing limits has yet to be clearly delineated, the MSRA requires Councils to adopt ACLs at or below the catch levels recommended by their Scientific and Statistical Committees (SSC).

Due to uncertainty in many aspects of stock assessments, including natural and fishing mortality rates and recruitment, it is necessary to develop buffers that account for uncertainty and risk to prevent overfishing. For instance, in data poor fisheries or stocks whose life history characteristics make them highly vulnerable to overfishing, the amount of buffer between the limit and target catch levels should be increased to reduce the risk of overfishing and meet an acceptable probability level of success. Similarly, in fisheries with a history of catch overages, often reflecting problems in adequate management implementation, the target will have to be reduced further from the limit level in order to improve the probability that the limit will not be exceeded.

Ideally, the ACL setting process begins with an assessment and review of each species or stock. The SSC makes a fishing level recommendation (FLR) based on these stock assessments while accounting for biological and data uncertainties. Each Regional Council then sets the ACL at or below the FLR, accounting for implementation uncertainties and risks, as well as other socio-economic considerations. This process serves to separate science from management decisions in an attempt to reduce political influence in the purely biological and scientific part of the process, while leaving allocation decisions to the policy makers best poised to represent and understand their constituencies.

To simulate the potential application of an ACL policy, I am assessing two fisheries (the Gulf of Mexico Red Grouper and Red Snapper) using age structured models and Monte Carlo simulations. Specifically here, I am looking at how to evaluate the use of buffers through an analysis of an overfished stock that is 14% below its target stock size. The analysis entails:

1) Using an age structured model to find the fishing mortality rate and harvest path that result in the stock growing to its target size assuming a deterministic environment.
2) Introducing known uncertainty and variability in recruitment and enforcement through the use of a Monte Carlo simulation. This results in a range and probability of expected stock sizes and catch levels over time.
3) Evaluating how different levels of buffers, which lower target harvest, can affect the expected stock size range over the near term and improve the probability of meeting the target stock size.

The ultimate question I hope to address is how the use of buffers can be evaluated to better inform fisheries policy and the setting of ACLs to improve the likelihood that US fisheries are not overfished.