Reducing uncertainty in stock-recruitment relationships and fishery reference points using Bayesian meta-analysis - R/6010-0011

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Research Summary

Stock-recruitment relationships (SRRs) describe the link between the abundance of mature adults (the spawning stock) in a fish population and the abundance of surviving offspring (the recruits) that these adults produce. These relationships are far from simple since many complex factors other than spawner abundance play a role in determining recruitment. But knowledge of the SRR is critical to the calculation of biological reference points based on maximum sustainable yield (MSY). Reliable estimates of MSY-based reference points, such as the fishing mortality rate and biomass that result in MSY, allow for greater use of fishery resources and lower the risk of overfishing. Without such reference points, fishery managers are forced to use proxies that do not explicitly depend on knowledge of

Juvenile weakfish   *- Kevin Stierhoff*

an SRR. Despite the fact that these proxies are inconsistent in their effectiveness, they are still widely used for management of many species in the mid-Atlantic and elsewhere. Uncertainty in the SRR is the key barrier to adoption of MSY-based reference points. By reducing and quantifying uncertainty in the SRR, fishery management can be improved through better estimates of biological reference points.

While individual SRRs are not simple to discern, there's strength in numbers. Analyzing SRRs from multiple species together has proven to be an effective method of reducing uncertainty. We will use a new global stock-recruitment database, regional trawl surveys, and fishery-dependent data (commercial catch and catch-per-unit-of-effort) to improve our understanding of SRRs for summer flounder, black sea bass, winter flounder, weakfish, scup, and tautog. Analysis methods include hierarchical Bayesian models and linear mixed-effects models. This research will be conducted in collaboration with scientists at the New Jersey Department of Environmental Protection and the National Marine Fisheries Service Northeast Fisheries Science Center.

- Janet Nye