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Length-based methods for assessing data-limited stocks

15 October / Anf. Verde / 10:30am

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It has been known since the pioneering work of Baranov, and of Beverton and Holt, that the mean size of fish in a population reflects the mortality rate (as well as the somatic growth rate) of the population. Beverton and Holt developed a simple estimator for the total mortality rate, Z, determined from the mean size above a length of first capture and the growth parameters. Their estimator was based on the assumption of equilibrium conditions – i.e., constant mortality rate and recruitment over time, and constant, knife-edge selectivity, - and this obviously limited the
applicability and usefulness of the estimator. The method has since given rise to a surprisingly rich suite of methods with the intention to:

1) Incorporate additional types of data, such as catch, effort, catch rate, and an index of recruitment
2) Provide diagnostic procedures for checking key assumptions such as knife-edge selectivity and constant recruitment
3) Relax the necessary assumptions, such as constant recruitment
4) Allow additional parameters to be estimated, such as natural mortality rate and catchability coefficient
5) Form bridges between data limited and data-rich methods.

In this seminar, we will review the rich suite of methods now available based on mean length data.

Short CV

John M. Hoenig is a Professor of Marine Science at the Virginia Institute of Marine Science (USA). He has a MSc in Statistics and a MSc and a PhD in Biological Oceanography from the University of Rhode Island. A quantitative fisheries scientist, his research interests include developing methods for studying population dynamics and assessing fisheries and determining appropriate management options. He uses statistical theory, mathematical modeling, and computer simulation to develop methods for interpreting tagging, survey, catch, effort, and age data, and just about any other type of data available. Specific interests include sport fisheries, commercial fisheries for invertebrates, elasmobranch life history and fisheries, tropical fisheries, Indian treaty rights to fish, and conflict resolution through technical analysis. His research has led him to: estimate which river stocks of American shad are being caught in pound nets that catch a mixed stock assemblage, determine the survival rate of discarded fish (sharks), estimate the efficiency of a scallop dredge in order to determine the biomass of scallops and set a catch quota, evaluate the effectiveness of a marine sanctuary for blue crabs, estimate actual and potential rates of population growth of barndoor skates and lemon sharks, estimate survival rates and break the total mortality rate into its components (fishing mortality and "other mortality"), with applications to lake trout, red drum, rock lobster, blue crab and striped bass.

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