

Length based Stock Reduction Analysis

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Abstract

Last thing to be written

1 Introduction

(old intro written by Carl Walters) Modern stock assessments typically attempt to fit population dynamics models to catch at age and catch at length data, in hopes of extracting information from these data about age-size vulnerability and fishing mortality patterns (ref). In cases where age data are lacking, software like MULTIFAN attempt to obtain estimates only from size distribution data while assuming information about variability in length at age, while perhaps also attempting to recover information about changes in body growth patterns. Some older assessment methods attempt to put aside the length frequency data, by converting these data to age compositions using age-from-length tables, perhaps using iterative methods to estimate proportions of fish at age for each length interval (e.g. Shirippa and Goodyear, ref.). It is typical for assessment results from assessment models to show substantial deviations between predicted and observed length distributions of catches, reflecting both sampling variation in the length composition data and incorrect assumptions about stability of both growth and vulnerability patterns.

Here we suggest an alternative approach to assessment modeling that begins by assuming that the assessment model should exactly reproduce the observed catch at length distribution. This is similar to the classical assumption in virtual population analysis that reconstructed numbers at age should exactly match observed catch at age data, or the suggestion by Schnute (ref) that statistical catch at age models might best be run in a conditioned on catch format by subtracting observed catches at age from modeled numbers at age in estimation of numbers at age over time. The suggested approach may have two key advantages over statistical catch at age and/or catch at length models: (1) it does not require estimation of age or size vulnerability schedules, and (2)

25 catch at length data are commonly available for every year, even when age composition sampling has not been
26 conducted.

27 **2 Materials and methods**

28 equations and data description go here

29 **3 Results**

30 show figures with real and simulated data

31 **4 Discussion**

32 Does the model work