Schnute models

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Model aspects in more detail

In this vignette we will go into a little more detail into certain aspects of the Schnute models implemented within `sbar`. To demonstrate these aspects we'll run through an assessment with the more complex Schnute adapted observation error model of black-bellied anglerfish stock introduced in the **introsbar** vignette

If information on growth is available and weights-at-age are available these can be used (as is common for delay-difference models) to estimate growth parameters with a linear model. This should be experimented with but we found with testing that the,

where $\bar{w}_a$ is the estimated weight-at-age and $\bar{w}_{a+1}$ is the weight-at-age a year older from sampling.

Another option,the (potentially) biased mean weight/ growth configuration, suggested as a check by Schnute (1987), can be used to estimate growth parameters through estimation of a linear model on overall mean weights and previously-exploited stage mean weights from catch sampling:

$$\bar{w}_{a+1} = W + \rho \bar{w}_a$$

$$X_t^{'} = W + \rho \bar{X}_t = \bar{Z}_{t+1}$$

This equation states that the entire population sampled mean weight ($\bar{X}$) in time t, after a year of growth, will be equivalent to the sampled mean weight of the previously-exploited population ($\bar{Z}$) in time $t+1$. This relationship enables the estimation of the parameters W and ρ prior to assessment model by fitting a simple linear model where $\bar{X}_t$ and $\bar{Z}_{t+1}$ are generally calculated from the chosen weight intervals applied to the catch data. When fitting these linear models prior to running the assessments, residuals were assumed to be normally distributed.

```
library(sbar)
library(FLCore)
library(TMBhelper)
```

```
data("ank78")
data("ank78.indices")
years<-as.character(2003:2020)
no.years<-length(years)
```

Schnute, Jon. 1987. "A General Fishery Model for a Size-Structured Fish Population." *Canadian Journal of Fisheries and Aquatic Sciences* 44 (5): 924–40.