

A sex-age-length based fisheries stock assessment analysis with application to summer flounder (*Paralichthys dentatus*) in the Mid-Atlantic

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Model

The annual stepwise dynamics of population abundance by sex s , age a , length l and time t may be represented in matrix notation as:

$$\mathbf{N}_{t+1} = \mathbf{P}_t \mathbf{S}_t \mathbf{N}_t + \mathbf{R}_t \tag{1}$$

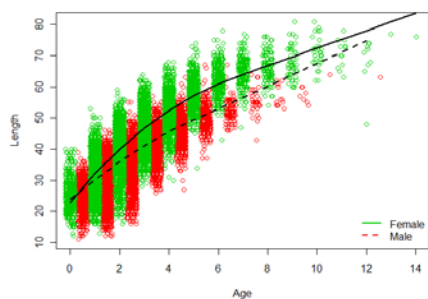
which projects the vector of the number of individuals at time $t+1$ \mathbf{N}_{t+1} as a product of survivorship \mathbf{S}_t and growth \mathbf{P}_t transition matrices times number at time t \mathbf{N}_t , with the addition of recruitment \mathbf{R}_t .

Results

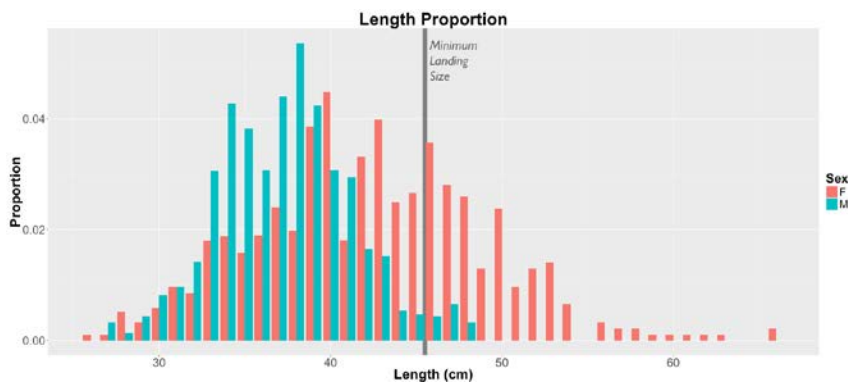
We've created this model and have applied it to simulated data that closely represents the actual data for the summer flounder fishery. The NEFSC survey and the state data are already in the proper data format for use. The next step is to put the fishery landings and discard data into the proper format.

Why consider such a model?

A sex-age-length based assessment will allow the option of exploring and implementing alternative management strategies, for example slot limits, which can may allow more efficient use of the resource while potentially reducing the risk to the stock.



NEFSC survey landings data by sex, age and length for all years.



Data collected by Rutgers University's Haskin Shellfish Research Laboratory during the first half of the 2016 fishing season (May through July) show that landings are composed primarily of female fish (the bars to the right of the grey line in the figure above) while males make up a significant portion (~60%) of the discards.