

# **Beverton and Holt's Relative yield per recruit model**

# Introduction

- Fishing effort plays a major role in all fisheries management purposes.
- If the  $F$  is increased concomitantly yield will decrease. Hence calculation of  $Y/R$  in grams per recruit will not serve the purpose.
- Hence Beverton and Holt developed a model as Beverton and Holt Relative yield per recruit model  $(Y/R)'$ . This model will serve as good tool for providing information needed for management. With the help of few parameters and optimal prediction of mesh size regulations, relative yield per recruit could be calculated. Further this model requires only length of fish rather than ages.

## Equation

The relative yield per recruit is defined by

$$(Y/R)' = E * U^{M/K} * \left[ 1 - \frac{3U}{1+M} + \frac{3U^2}{1+2M} - \frac{3U^3}{1+3M} \right]$$

Where

$$M = \frac{1-E}{M/K} = K/Z$$

$$U = 1 - \frac{Lc}{L\infty}$$

$$E = F/Z$$

The  $(Y/R)'$  is mainly attributed to  $U$  and  $E$ . The needed parameters are  $M/K$ . The values  $(Y/R)'$  could be plotted with values of  $E$  ranging from 0 to 1, with corresponding  $F$  values from 0 to  $\infty$ .

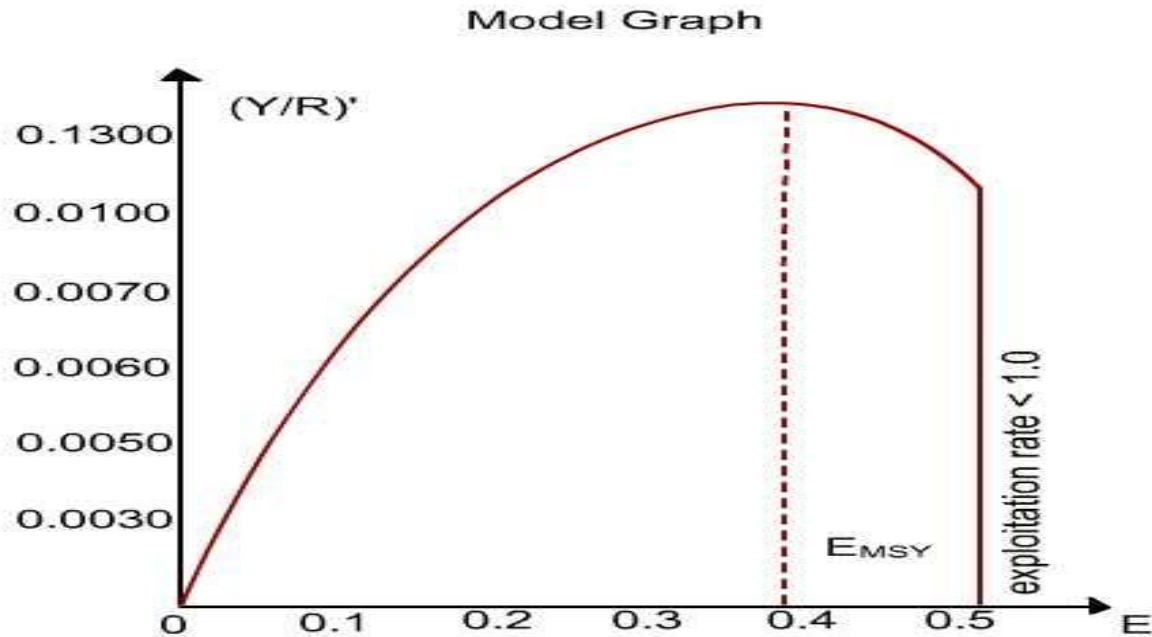
## Equation

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- A curve thus obtained gives a maximum value of EMSY for a given value of  $L_c$ .
- Thus knowing  $L_c$ ,  $L_\infty$  and  $M/K$  for a certain fishery, the  $E$  exploitation rate can be compared with EMSY level. Accordingly, better management strategies could be proposed.

# Equation

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Yield per recruit from length data when  $L_{\infty}$ ,  $L_r$  are known instead of  $L_c$ , and  $L_c$ , the  $Y/R$  from length data could be obtained

$$Y/R = F * A * W_{\infty} \left[ 1 - \frac{1}{Z} - \frac{3U}{Z+K} - \frac{3U^2}{Z+2K} - \frac{3U^3}{Z+3K} \right]$$

Where  $U = 1 - L_c/L_{\infty}$

$$A = [ L_{\infty} - L_c/L_{\infty} - L_r ]^{M/K}$$

**END**