

Yield Per Recruit Analysis for Summer

Flounder (Paralichthys dentatus)

by

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The Beverton and Holt yield per recruit model (as described by Gulland 1969) was applied to the summer flounder (Paralichthys dentatus). Yield calculations were made using Gales's (Fisheries Research Institute of the University of Washington) computer program based on the incomplete Beta function. The program description and definition of the notation used below is given by Clark et al. (1978).

Estimates of parameters of the model were based on Henderson (1979). Natural mortality was assumed to be .2. The length-weight equation $W=aL^b$ was used to determine W_{∞} . Using a maximum length of 92.24 cm, $a = 5.4427 \times 10^{-6}$, and $b = 3.1170$ (Henderson, 1979), W_{∞} is calculated as 9.494 kg. Summer flounder become vulnerable to exploitation at age 1 (t_p). Their maximum life span is 20 years (t_{λ}). The initial limit of integration (calculated from the equation $S=e^{-k(t_{\lambda}-t_0)}$) is .01513. The hypothetical age at zero length (t_0) is -.01556, the growth coefficient (k) is .20939 (Henderson, 1979). The number of recruits was arbitrarily set at 100.

Figure 1 shows the yield isopleth per 100 recruits (at age 1) of summer flounder. The maximum yield is 1.2 kg/recruit with a F of .5 or higher and a corresponding age of first exploitation (t_p) ranging from 5 to 8 years. Some results from Figure 2 are summarized in the following table for ages 2 to 5.

	F_{max}	Maximum Y/R(kg)
T_2	.25	.85
3	.35	.99
4	.50	1.11
5	.85-.90	1.20

For t_p of 4 or 5 particularly, a sharp reduction in F would only mean a slight loss in yield. For example, $t_p = 5$ years old at an F equal to .85 would produce a yield of 1.20 kg but a reduction of F to .55 would result in only a 10% loss in yield.

References

- Clark, S., O. Jackson, and M. Sissenwine. 1978. Computer programs for fish stock assessments. Northeast Fisheries Center, Woods Hole Laboratory, Lab. Ref. No. 76-04, 94 p.
- Henderson, E. M. 1979. Summer flounder (Paralichthys dentatus) in the Northwest Atlantic. NMFS, NEFC, Woods Hole Laboratory Reference No. 79-31.
- Ricker, W. E. 1975. Computation and interpretation of biological statistics of fish populations. Bulletin of Fisheries Research Board of Canada, No. 191.

Figure 1.

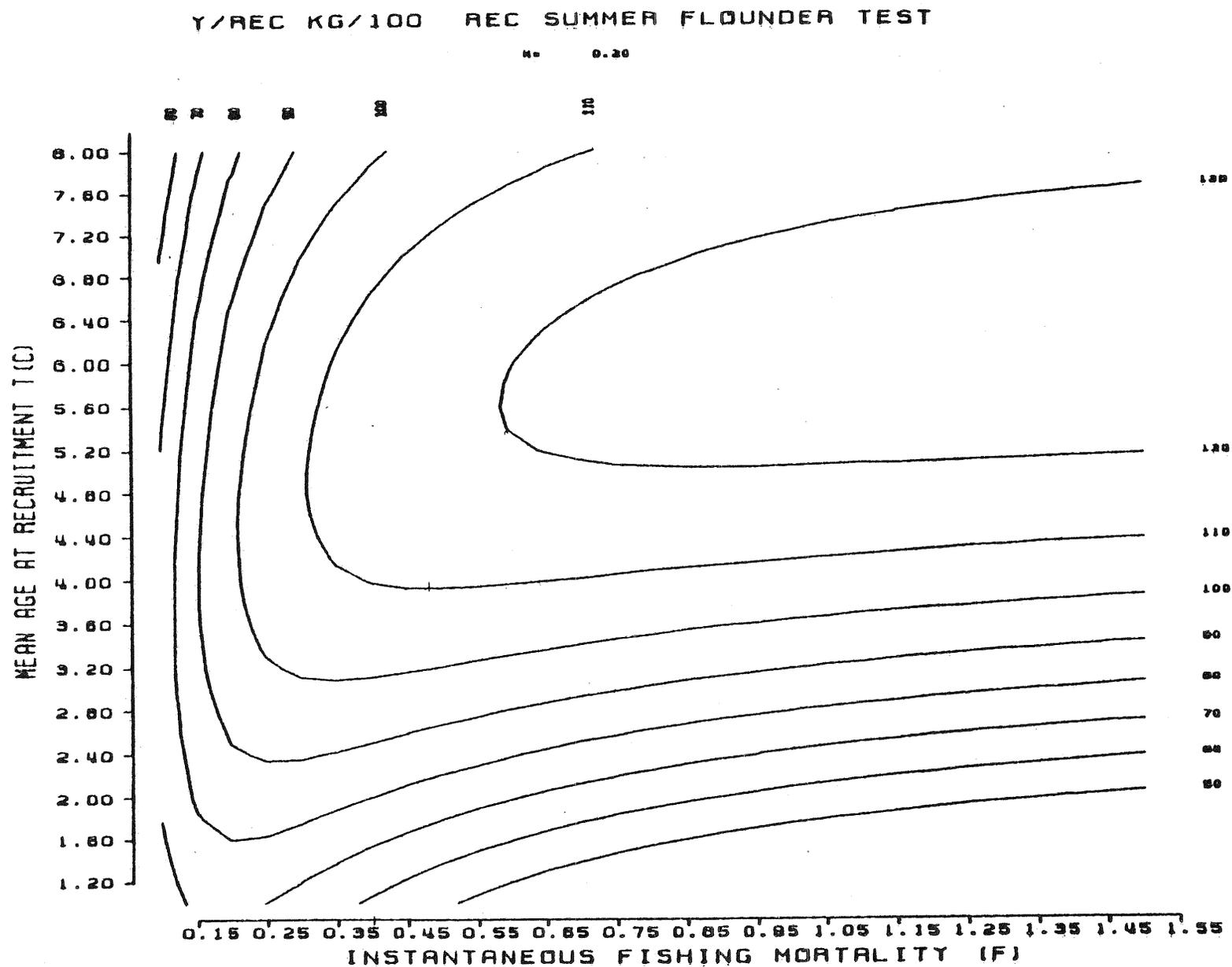


Figure 2.

