A life-history evaluation of the impact of maternal effects on recruitment and fisheries reference points

Fishing causes dramatic changes in the age and size structure of fish stocks. In particular, the targeting of the largest and oldest individuals in a stock changes the age and size distribution of that stock. A large female produces a higher quantity of eggs than a young female because of its larger size, but recent laboratory evidence further indicates that large females also produce eggs of higher quality, a phenomenon known as maternal effects. However, most traditional management models assume that all female fish contribute equally per unit biomass to future recruitment. Here we investigate whether this assumption is valid by calculating the impact of maternal effects both before and after accounting for density-dependent effects. We find that the contribution of large individuals to reproduction is much more pronounced for unfished than for fished stocks. Fisheries reference points are largely unaffected by maternal effects. Our results indicate that the incorporation of maternal effects into impact assessments of fisheries is not expected to change advice substantially. Important exceptions are stocks whose demography is very vulnerable to fishing (and which therefore have low fishing reference points) for which maternal effects are relevant and necessary to consider.

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