

Valentinsson, Daniel (2002). Fisheries biology of the whelk (*Buccinum undatum*): population biology, estimation uncertainty and consequences of management alternatives.

Abstract

As the majority of contemporary fisheries are mature or senescent, an increased interest in new species is seen worldwide. One species in the latter category that has been subject to increased landings during the last decade is the common whelk (*Buccinum undatum*). The biological information required to provide scientific recommendations for future management consists of population structure, habitat requirements, reproduction, growth and mortality. To provide this information, field sampling and experiments at various sites in the Kattegatt and the Skagerrak was done.

We found that large females generally produce more juveniles than do small females. Estimated growth rates and size/age at sexual maturity varies substantially among populations in the study area. Similarly, both fisheries depletion experiments and studies of genetic population structure among whelk populations along the Swedish west coast indicates that exchange between adjacent populations is small, thus suggesting the presence of many isolated sub-populations in the Skagerrak-Kattegatt area. Further, we studied parasite prevalence and the occurrence of imposex (male genitalia expressed by female whelks) in two areas. Although both castrating trematodes and the imposex phenomenon are present in the study area, effects on population dynamics are probably fairly small.

The biological information obtained was used to evaluate possible management options for a future Swedish whelk fishery. This was done by explicitly incorporating uncertainty when modelling different fisheries scenarios, including the possible effects of various size limits and exploitation rates on fisheries yield and stock reproductive potential. Modelling results indicate that appropriate minimum size limits may increase long-term catches and possibly safeguard recruitment. However, the biology of *B. undatum* suggests that a fishery should not be managed on a coast-wide basis but should be adjusted to the productivity characteristics of local populations. In addition, given the uncertainty in age determination, model predictions, model assumptions and that the relationship between parental stock size and subsequent recruitment is not known, I recommend a precautionary approach to management of *B. undatum*. This could be achieved by carefully designed management experiments. By adopting such a strategy, the knowledge basis may expand faster. Experimental management also provides a buffer against uncertainties in fisheries data, implementation of rules, ecosystem functioning and provides a geographical spreading of risks so that the outcome will not be disastrous even if predictions proves to be incorrect.

Key words: *Buccinum undatum*, Gastropod, Invertebrate, Sweden, Fisheries, Stock Assessment, Reproduction, Fecundity, Growth, Age, Population structure, Genetic structure, Monte Carlo methods, Management

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