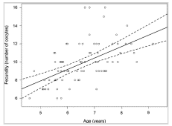

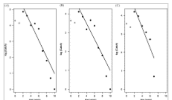

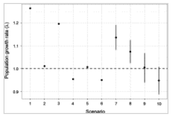

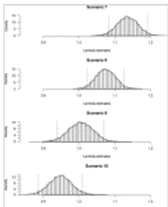

Deep Sea Research Part II: Topical Studies in Oceanography

Volume 115, May 2015, Pages 64–72

Biology of Deep-Water Chondrichthyans

Demography of a deep-sea lantern shark (*Etmopterus spinax*) caught in trawl fisheries of the northeastern Atlantic: Application of Leslie matrices with incorporated uncertainties

Rui Coelho[a], , Russell Alpizar-Jara[b], Karim Erzini[a]

Show more

doi:10.1016/j.dsr2.2014.01.012

Abstract

The deep-sea lantern shark *Etmopterus spinax* occurs in the northeast Atlantic on or near the bottoms of the outer continental shelves and slopes, and is regularly captured as bycatch in deep-water commercial fisheries. Given the lack of knowledge on the impacts of fisheries on this species, a demographic analysis using age-based Leslie matrices was carried out. Given the uncertainties in the mortality estimates and in the available life history parameters, several different scenarios, some incorporating stochasticity in the life history parameters (using Monte Carlo simulation), were analyzed. If only natural mortality were considered, even after introducing uncertainties in all parameters, the estimated population growth rate (λ) suggested an increasing population. However, if fishing mortality from trawl fisheries is considered, the estimates of λ either indicated increasing or declining populations. In these latter cases, the uncertainties in the species reproductive cycle seemed to be particularly relevant, as a 2-year reproductive cycle indicated a stable population, while a longer (3-year cycle) indicated a declining population. The estimated matrix elasticities were in general higher for the survivorship parameters of the younger age classes and tended to decrease for the older ages. This highlights the susceptibility of this deep-sea squaloid to increasing fishing mortality, emphasizing that even though this is a small-sized species, it shows population dynamics patterns more typical of the larger-sized and in general more vulnerable species.

Keywords

Bottom trawling; Deep-sea sharks; Deep-sea fisheries; Demographic analysis; Fishing mortality; Population dynamics

1. Introduction

Elasmobranch fishes are generally considered to be highly vulnerable to fishing mortality, mainly because of their life history characteristics that include slow growth rates, late maturities and low fecundities (Cortés, 2000 and Hoenig and Gruber, 1990). Overexploitation in these animals may occur even with relatively low levels of fishing mortality (Stevens et al., 2000). Deep water elasmobranchs seem to be even less resilient to fishing mortality than most of the coastal species (Gordon, 1999), and are currently amongst the groups that present the highest risks of population declines (Fowler et al., 2005).