POPULATION DYNAMICS OF DEEP-WATER PINK SHRIMP *PARAPENAEUS LONGIROSTRIS* (LUCAS, 1846) AT MONTENEGRIN SHELF (SOUTH ADRIATIC)

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Abstract

The deep-weater pink shrimp *Parapenaeus longirostris* (Lucas, 1846) presents an economically significant species in Montenegrin trawling fishery. The objectives of this work were to investigate population dynamics. Population of this species on the shelf of Montenegrin coast is not threatened by high rate of trawler fishing.

Keywords: Adriatic Sea, Continental Shelf, Decapoda, Population Dynamics

Introduction

Parapenaeus longirostris (Lucas, 1846) is a decapod species that is widely distributed on the Montenegrin shelf, and since late 1990-ties it is an object of especially big commercial importance. As for the Montenegrin coast there were no data that could be used to follow up the population dynamics of this species', the task was to study the population structure in this area for the first time, to determine the main population parameters (length-weight relationships, growth parameters, mortality rates), estimate of biomass (relative and absolute) as well as maximal biological sustainable yield (MSY).

Materials and Methods

The material was collected by commercial trawlers in period March 2003 - June 2004, at depths of 20 - 120 m, including one quarter of the total area of shelf. Data include catch from 13 trawling hauls, duration of which was from 1.17 to 4 hours. The weight of the total catch and the weight of deep-water pink shrimp catch was measured on the ships, while statistical analysis was performed in Institute of Marine biology in Kotor. The parameters of the length - weight relationship were determined. The growth parameters were obtained using the Von Bertalanffy growth equation and the Bhattacharya method [1] using FISAT computer program [2]. Two methods were used for the estimation of total mortality (Z): length converted catch curve method [3] and method which is based on the relationship between Z and the mean total length [4]. Natural mortality M was estimated using Pauly's formula [3]. Fishing mortality F was calculated as: $F = Z - M$ and exploitation rate E as: $E = F / Z$. Yield per recruit was estimated using the Beverton-Holt model [5]. For estimating MSY we used Cadima's formula ($MSY = 0.5 * Z * B$) [6]. Beddington and Cooke [7] concluded that formula generally overestimates MSY 2 to 3 times, so we used 0.2 instead 0.5. to get better estimate of MSY.

Results and Discussion

Values of powers of length-weight relationships is $b = 2.37$ for the total sample, $b = 2.41$ for males and $b = 2.33$ for females; while values for total length (TL) are $b = 2.9$ for total sample, $b = 2.84$ for males and $b = 2.89$ for females. The estimated growth parameters are $L_\infty = 47$ mm and $K = 0.7$ for carapace length (CL), while for total length (TL) $L_\infty = 146$ mm and $K = 0.9$. The calculated mean value of rate of total immediate mortality (Z) is 3.48, while mean value of rate of natural mortality (M) is 1.5. Value of the fishing mortality is 1.98. The estimated mean value of relative biomass (B_r) is 69.3 kg/km^2, while the total relative biomass of whole studied area is 67.6 tons. The calculated total relative biomass and coefficient of vulnerability $q = 0.6455$ were used to estimate the absolute biomass, which yields (B_a) 112.63 tons, while MSY of the studied area is 78.39 tons per year. As the value of maximal allowed exploitation rate is $E_{max} = 0.564$, and the real exploitation rate is $E = 0.3$, we may conclude that the population of *Parapenaeus longirostris* on the Montenegrin shelf is not yet threatened by the present fishing effort of the trawl fishery.

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