ESTIMATION OF MORTALITY COEFFICIENTS OF Otolithes ruber (PERCIFORMES) IN KHOOZESTAN PROVINCE OF SOUTH IRAN

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ABSTRACT

The Mortality Coefficients of Otolithes ruber locally known as Shoorideh were estimated in one year period. Monthly sampling was carried out from April 2005 to March 2006 of the main landings in the area. A total number of 16662 samples of O.ruber were caught. The von Bertalanffy growth parameters were computed and then total mortality (Z), natural mortality (M) and fishing mortality (F) were estimated. The results presented in this study reveal that the fishery is harvested at a higher level than the optimum fishing pressure.

Key Words: Otolithes ruber, Mortality coefficients, Persian gulf, Iran, Pauly’s empirical equation

INTRODUCTION

Sciaenids (Family Sciaenidae), commonly called croakers and grunters have a wide range of sizes. For example, Johnius coitor attains a maximum size of 20 cm and Otolithoides biauritus up to 195 cm. Their major food items are teleost fishes (Stolephorus spp., Saurida spp., etc.) and crustaceans (mainly Acetes spp.).

Otolithes ruber (Schneider, 1801) is a species from the family Sciaenidae, and is known as the snapper kob in South Africa, corvina dentuça in Mozambique, jew fish in India and the Malindi herring in Kenya. The family Sciaenidae is widely distributed in shelf waters of tropical and subtropical Indian, Pacific and Atlantic oceans. O. ruber is widely distributed in the Indo-West Pacific and along the east coast of Africa where it occurs in tropical and subtropical shelf waters, south to at least Durban, South Africa (29°51’S; 31°02’E) and north to the Red Sea (43°38’N; 12°57’E).
The important commercial species of croakers occurring in Indian waters are *Johnieops dussumieri* (Sharptooth hammer croaker), *Johnius macrorhynus* (Big-snout croaker), *J. glaucus* (Pale spotfin croaker), *J. coitor* (Coitor croaker), *J. belangrii* (Belanger's croaker), *J. borneensis* (Sharpnose hammer croaker), *Pseudotolithus elongatus* (Bobo croaker), *Otolithes cuvieri* (Lesser tiger toothed croaker), *Otolithoides biauritus* (Bronze croaker), *O. pama* (Pama croaker), *Protonibea diacanthus* (Spotted croaker), *Nibea maculata* (Blotched croaker), *Kathala axillaris* (Kathala croaker), *Pennahia anea* (Greyfin croaker), *Daysciaena albida* (Bengal corvine) and *Dendrophysa russelii* (Goatee croaker).

The most important commercial species of Scianidae in Persian gulf is *Otolithes ruber* (local name is Shorideh). 1700.4 tones was landed in Khoozestan province.

Aspects of the biology of this species have been investigated by several authors. *O. ruber* are sluggish carnivores, that are found over sandy and muddy substrata but do not inhabit rocky areas.

In the Persian gulf several authors have studied *O. ruber*. Emami studied the population dynamics and stock assessment of this species. According to Eskandari and Niamimandi Shorideh feed on shrimp and fish. Also, they reported that Shorideh started spawning early in the spring.

**MATERIAL AND METHODS**

The fish specimens were sampled from the commercial catch for length frequencies monthly at the main fish landing stations in Khoozestan province in the north of Persian gulf (Fig. 1). A total number of 16662 *Otolithes ruber* length datas were recorded. Standard gillnet (9.5 cm mesh size) were used to collect samples for analysis of growth and mortality of *O.ruber*. The length frequencies were used as input for FiSAT II software package for estimating growth parameters of generalized von Bertalanffy growth function (VBGF) for length (*L*) at age (*t*) which is 15:

\[ L_t = L_\infty \{1 - e^{-[K (t - t_0)]}\} \]

Where, *L*\(\infty\) is the asymptotic length of fish and *K* is a curvature parameter.

Asymptotic length was estimated according to powell-wetherall plot and the curvature parameter (*K*) was computed by use of Elefan I routine. For estimating natural mortality (*M*) we used the Pauly’s empirical equation:

\[ \log(M) = -0.0066 - 0.279 \log(L_\infty) + 0.6543 \log(K) + 0.463 \log(T) \]

Where *M* is natural mortality, *K* and *L*\(\infty\) are growth parameters of VBGF and *T* is the annual mean temperature and we put 23°C for temperature that is needed in this equation.

Total mortality (*Z*) was calculated from a linearized length-converted catch-curve analysis using:

\[ \ln \left( \frac{C_i}{\Delta t_i} \right) = a + b \cdot t_i \]

Where *C*\(_i\) is the number of fish in various length classes *i*; *Δt*\(_i\) is the time needed to grow through length class *i*.
\[ \Delta t_i = \left( \frac{1}{K} \right) \ln \left[ \frac{L_{i+1} - L_i}{L_i - L_{i-1}} \right] \]

and

\[ t_i' = \left( \frac{1}{K} \right) \ln \left[ 1 - \left( \frac{L_i}{L_\infty} \right) \right] \]

$L_i$ is the midpoint of length class $I$; the value of $b$ with the sign changed provides an estimate of $Z$. And finally we compute fishing mortality ($F$) from:

\[ F = Z - M \]

Fig. 1: Khoozestan province water, North of Persian gulf (Iran)
RESULTS AND DISCUSSION

For 16662 *Otolithes ruber* sampled from April 2005 to March 2006, the total lengths varied from 15.0 cm to 59.0 cm. Fig. 2 shows the length frequencies distribution for this species in the research area.

The growth parameters of VBGF were estimated as $L_\infty = 64.58$ cm, $K = 0.4$ y$^{-1}$ in northern waters of Persian gulf. The total mortality ($Z$) computed as 1.95 y$^{-1}$ by use of catch curve Fig. 3. The natural mortality and fishing mortality computed were $M = 0.7$ y$^{-1}$ and $F = 1.25$ y$^{-1}$.

![Fig. 2: The length frequency distribution for *Otolithes ruber* in Persian gulf](image)

![Length-converted catch-curve for *Otolithes ruber* in northern Persian gulf](image)
Fischer et al. suggest that the maximum length for this species is 70.0 cm. The maximum length group in this study was 59.0 cm group that shows the full coverage of samples in the ecosystem.

Many authors have mentioned that the Mortality Coefficients are very important as they show the rate of population decay. As direct estimation of natural mortality is impossible, the Pauly’s empirical equation has been used extensively in tropical and temperate fisheries.

The natural mortality estimated for this species in this study is similar to the other estimated at the same area( Parsamanesh et al). But we know that the natural mortality estimation is only exact in virgin stocks and it is related to temperature differences and predator-prey densities. The Z value has computed by catch curve by assuming that mortality is uniform with age and that the sample is representative of the age groups considered. If these assumptions are satisfied, the right limb of the catch curve is then assumed to be a curve of survivorship, which is both age and time specific. When fishing mortality equals natural mortality the species is assumed to be fished at the optimal level of exploitation.

CONCLUSION

The Fishing mortality for Otolithes ruber in the northern parts of Persian gulf is higher than natural mortality for this species in the same area. The results presented here reveals that the fishery is harvested at a higher level than the optimum fishing pressure on this species. The high F for Otolithes ruber is not surprising, because this species is a valuable target for the fishermen according to its high market price.

REFERENCES

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