

BIOLOGY AND FISHERIES ASSESSMENT OF THE ARABIAN

PANDORA (*Pagellus affinis*) (Boulenger, 1887)

IN THE ARABIAN SEA, SULTANATE OF OMAN

By

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Abstract

Samples of Arabian pandora *Pagellus affinis* (Boulenger, 1887) were collected between April 2005 and March 2007, and from April 2008 to March 2009 from two landing sites (Al-Lakbi and Raysut) along the Arabian Sea coast of Oman. The samples were analysed to evaluate the biology and population dynamics of this species.

The marginal increment analysis of otoliths showed the formation of one opaque zone and one translucent zone every year. The timing of formation of translucent ring was approximately 4 months (June–September) and the opaque ring formed with the cycle depending on the annual changes in seawater temperature in the Arabian Sea. The fishery targeted the individuals ranging in ages from 2 to 6 years; while, the maximum age estimated was about 9 years.

The von Bertalanffy growth (VBG) constants calculated for males and females were not significantly different, so the suggesting common equation for both sexes' *P. affinis* was

$$L_t = 36.09 (1 - e^{-0.264(t + 0.525)})$$

As aging of fish using sectioned otoliths was time consuming, use of linear relationship between otolith weight (OWT) and age of fish to rapidly assess age was examined. This approach could be used to derive VBG curve, although there was significant difference from the curve obtained using sectioned otoliths. Thus, OWT–age relationships would be useful to age the fish.

The species *P. affinis* is a multiple spawner with males and females reaching maturity and spawning at almost same time. Seasonal changes in gonadosomatic index (GSI), hepatosomatic index (HSI) and relative condition factor (K_n) indicated the fish spawned from April to October with peak of spawning activity during August and September. The size-at-50% maturity was calculated at 22.1 and 23.53 cm TL and age-at-first maturity at 3.15 and 3.53 years for females and males, respectively. Four types of ova were observed: immature (0.03–0.176 mm), maturing (0.25–0.35 mm), mature (0.57–0.75 mm), and ripe (0.81–0.99 mm). Average fecundity was calculated at 199,524 eggs per female. Relationship of fecundity-to-ovary weight, body weight, and total length of fish exhibited a linear trend.

Food and feeding habits showed that *P. affinis* is a carnivorous feeder and the major part of its diet is sardines and other fish (primary item). The minor presence of algae may be an accidental inclusion during capture of benthic prey. A higher percentage of empty stomachs were observed during June and September.

Length–weight relationships of males and females showed no significant difference between sexes. *P. affinis* displayed a negative allometric growth for both sex as well as for sexes combined ($a= 0.0173$ & $b=2.954$).

Total mortality (Z) was estimated as 0.9363 y^{-1} , and the natural mortality (M) stood at to 0.488 y^{-1} . Length at 50% capture (L_c) of Arabian pandora was calculated as 19.8 cm TL. The yield and spawning biomass-per-recruit analyses indicated that the current fishing mortality rate (F_{curr}) is almost same as the target one ($F_{0.1}$), which suggest that it is exploited at optimum and should be maintained. This conclusion was supported by the following points: (1) estimated rate of fishing mortality ($F = 0.448 \text{ y}^{-1}$) was relatively close

to $F_{0.1}$ (0.572); (2) selective fishing gears targeting the species provide the bulk of the landing. However, further rise in the fishing effort may cause overfishing. The management models proposed for *P. affinis* in the Arabian Sea could be reflect the fishery status in the region. Finally, –10% decrease in natural mortality will be associated with an increase in the total yield-per-recruit and consequently the proportion of spawning stock biomass (SSB) will be more than its value (59.453 g) at current fishing mortality. In conclusion, the present study indicates that the current exploitation pattern needs to be sustained.

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