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Some Biological Aspect of Southern Meagre (*Argyrosomus hololepidotus*) in Northwest of Persian Gulf (Khuzestan Coastal Waters, Iran)

[1]Majid Shekari, [2]Seyed Ahmad Reza Hashemi and [3]Mohammad Yooneszadeh

[1]Department of Fisheries, University of Marine Sciences, Khoramshahr, Iran
[2]Department Fisheries, Gorgan University of Agricultural Sciences and Natural Resources, Iran
[3]South of Iran Aquaculture Fishery Research Center, Ahvaz, Iran

Abstract: In this study, investigation on some of biological parameters of Southern Meagre (*Argyrosomus hololepidotus*) was carried out from October 2009 to September 2010 in coastal of water Khuzestan. Length values for this species were 1150±18 and maximum and minimum total length was 810 mm and 1430 mm respectively. Weight values were 16025±480gr and maximum and minimum weight were 5700 gr and 27500 gr respectively. The length-weight relationship were calculated as $W=0.042\ FL^{2.70}$ (n=74, R^2=0.86) for males, $W=0.061FL^{2.61}$ (n=70, R^2= 0.85) for females and $W=0.059FL^{2.61}$ (n=144, R^2=0.86) for total fishes. Verifying calculated b with 3, using Students t-test there was significant difference between calculated b and 3 ($P<0.05$), growth pattern is negative allometric. The mean values of Condition Factor (K) and Hepatosomatic Index (HIS) was 1.05±0.1, 1.22±0.5 in male specimens and 1±0.1, 1.27±0.5 for female specimens. The mean value of Gonadosomatic Index (GSI) for the male and female were 0.77±0.5 and 2.78±2 respectively. For both sexes, the highest GSI value were observed in August and the lowest GSI value in April were observed. Mean GSI value and maturity stages indicated that spawning time were occurred during August to September.

Key words: *Argyrosomus hololepidotus* · Gonadosomatic Index · Persian Gulf

INTRODUCTION

Persian Gulf is one the most important gulf in the world from fishing industries point of view. Iran, Iraq, Saudi Arabia, Kuwait, Oman, Qatar, Emirates are located in the coast of this gulf. The Persian Gulf is a semi enclosed sea that laying almost between the latitudes of 25° 32° N and longitudes of 48° 56° E. This water basin is shallow continental shelf and average of depth was 35 m, which is increasing from Arvend estuary and reach to maximum in strait of Hormuz Strata. This local is considered one of the richest areas in fishery resources where large quantities of fish and shrimps are concentrated in different locations, particularly in the territorial waters of the State of Iran [1].

Sciaenids family contains approximately 70 genera and up to 270 species worldwide, with 28 species restricted to freshwater [2]. The southern meagre (*Argyrosomus hololepidotus*) is a large sciaenid (maximum size 75 kg) [3].

A. hololepidotus was observed in south Africa, Madagascar, Namibia, Australia and India, but In fact is Madagascar coastal endemic and lived in semi tropical waters in 21 degrees worth latitude and 29 degree south and was be benthic and was found fresh waters, Brackish and seawater to 400 m depth [4-7]. This species in young stages was lived Mangrove forests, estuaries and the mature in estuaries and shallow water for spawning they immigrate collectively. This species was migratory and April to Number takes over in Khuzestan coastal, Iran [8]. Max of length, growth coefficient, Max weight, double time of population, max age were 200 cm, 0.03 (k), 71 kg, 14 years and 30 year, respectively.

Parsamanesh [9] studied *Argyrosomus hololepidotus* population dynamics in Khuzestan coast. Smale [10] and Beckley [11] studied *A. hololepidotus* biology in southeast of Africa. Stephan and Battaglene [12] carried out hormone effect on spawning in artificial condition. Capture condition was showed in coast of Khuzestan province as 1997-2009 that maximum and minimum capture

Corresponding Author: Seyed Ahmadreza Hashemi, Gorgan University of Agricultural Sciences and Natural Resources, Gorgan Iran. Tel: +98-9177055568.

amount were 1963 tons (in 2000) and 586 tons (in 2001) respectively. The capture amount was 808 tons in 2009 [13].

In Iran, biological aspects of *Argyrosomus hololepidotus* have no enough studies and no available information about reproduction and feeding of the mentioned fish in this area. The objectives of this study is to provided information pertaining to reproductive biology of this species in northwest of Persian Gulf (Khuzestan Coastal Waters, Iran) and is the first to present complete of reproductive characteristics based on observation and information analysis. These data can be used to better fisheries stock management for this valuable fish.

MATERIALS AND METHODS

The main fishing areas of *A. hololepidotus* in the northwest of Persian Gulf are located in Liphe-Busafe and Bahrekan fishing area between 29° 44' to 07 'N and 48° 45' to 49° 50' (Fig. 1). A total number of 469 individuals of *A. hololepidotus* were captured during 2009 to 2010 using gill net. Also, this collected from recreational fishermen and then transferred in ice box to the laboratory. In the laboratory, Fork length (±1.0 mm), sex and weight (±0.001 g wet weight) were recorded for each fish. Parameters of the length-weight relationship were obtained by fitting the power function $W= a \times FL^b$ to length and weight data where: W is the total wet weight, a is constant determined empirically, FL is the fork length [14]. In order to verify if calculated b was significantly different from 3, the Students t-test was employed [15].

The Condition Factor (K) equation $K=W\times10^2 /L^3$ was used to find fish status changes in which w= weight and L= total length [14], Hepatosomatic Index (HIS) were calculated as follows [14]: $HSI =LW\times10^2/BW$; where LW= liver weight (g); BW = body weight (g).

The maturity stage for males and females was determined macroscopically using a 7-stage maturity key [14]. These stages included: Virgin (I), Maturing Virgin (II), developing (III), late developing (IV), Gravid (V), Spawning (VI) and Spent (VII).

Gonadosomatic Index (GSI), calculated by expressing the Mean gonad weight as a proportion of the total body weight [14]. Comparison of GSI values during reproductive period, HIS and K between sexes and its temporal variation in each sex carried out by analysis of variance (ANOVA). Statistical analyses were performed with SPSS 14 software package and a significance level of 0.05 was adopted.

RESULTS

The total lengths of 144 fish in the size range 89 to 145 cm were measured. Major and minor range length fishery supporting in the 117-124 and 96-103 cm range respectively. Length frequency Percentage groups of this species during period 2009-10 are presented in Fig. 2.

In this study, because of migratory this species 4 months of the year (December, January, February and March) was no found sample in Khuzestan coastal. From the total number of caught fishes, 74 were males and the remaining were females. According to Table 1, mean ±SD length values for this species were 1150±18 and maximum and minimum total length was 810mm and 1430mm respectively. Mean ±SD weight values were 16025±480 gr and maximum and minimum weight were 5700gr and 27500 gr respectively (Table 1). During other months 144 specimens that 51.7 % male and 48.3 % female were collected. The max frequent males was in July (65.4%) and min frequent males was in November (25.0%). Also, max and min frequent female was in November (75.0%) and in July (34.6%), respectively.

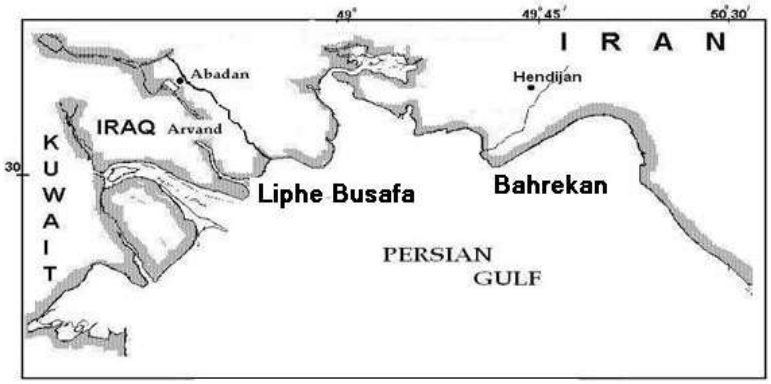

Fig. 1: Location of two landing sites where *A. hololepidotus* were sampled

Table 1: Average values (±SD) of size corresponding of Madagascar meagre in Khuzestan Coastal Waters (2009-10)

	Length characteristics (mm)				Weight characteristics (g)		
Sex	N	Min	Max	Mean± SD	Min	Max	Mean± SD
Males	74	890	1390	1120±11	8300	27000	15222±440
Females	70	810	1430	1180±13	5700	27500	16942±509
Total	-	-	-	1150±12	5700	27500	16052±480

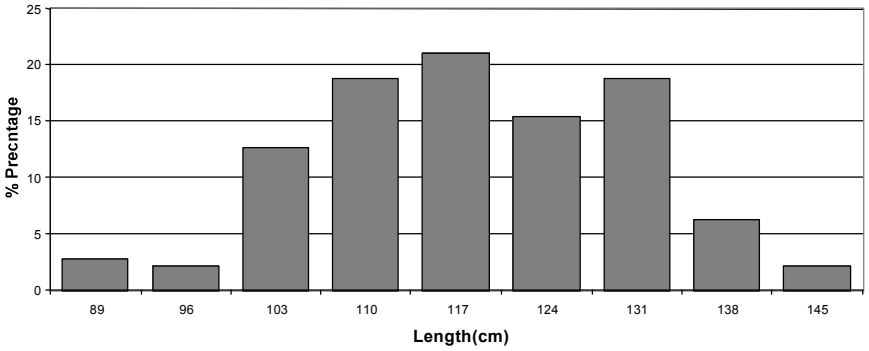

Fig. 2: Percentage frequency of length *A. hololepidotus* in Coastal Waters of Iran during 2009-10

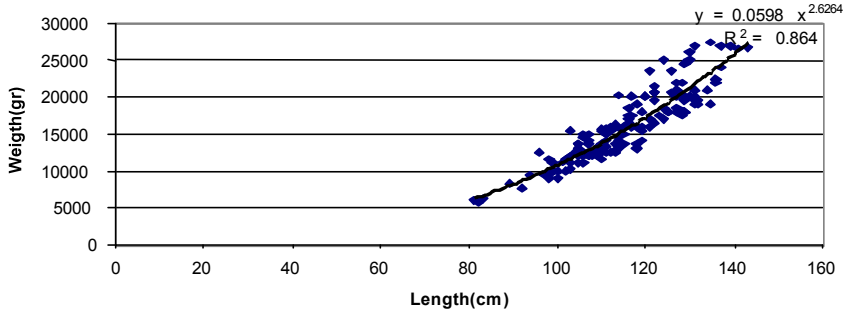

Fig. 3: The length-weight relationship curve for total fish of Madagascar meagre in Khuzestan Coastal Waters (Iran, 2009-10)

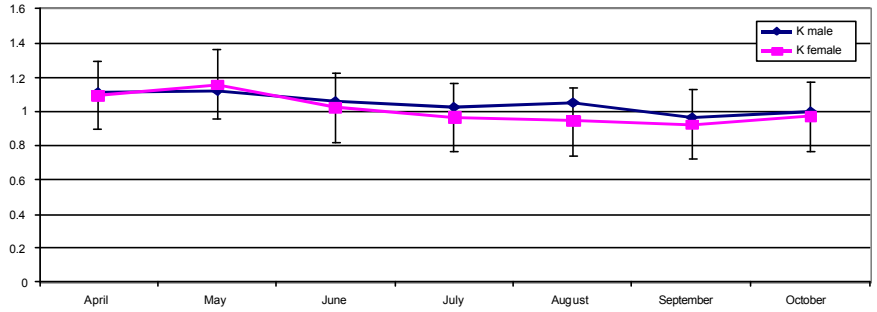

Fig. 4: Monthly variation of K (male and female) of Madagascar meagre in Khuzestan Coastal Waters (2009-10). Error bars indicate SD

Average length and weight in females were higher than in males. The length-weight relationship were calculated as $W=0.042\ FL^{2.70}$ (n=74, R^2=0.86) for males, $W=0.061FL^{2.61}$ (n=70, R^2= 0.85) for females and $W=0.059FL^{2.61}$ (n=144, R^2=0.86) for total fishes (Fig. 3). Verifying calculated b with 3, using Students t-test there was significant difference between calculated b and 3 ($P<0.05$), growth pattern is negative allometric.

The mean Values of condition factor (K) and Hepatosomatic Index (HIS) was 1.05±0.1, 1.22±0.5 in male specimens and 1±0.1, 1.27±0.5 for female specimens (Fig. 3). A comparison of fish condition between sexes in

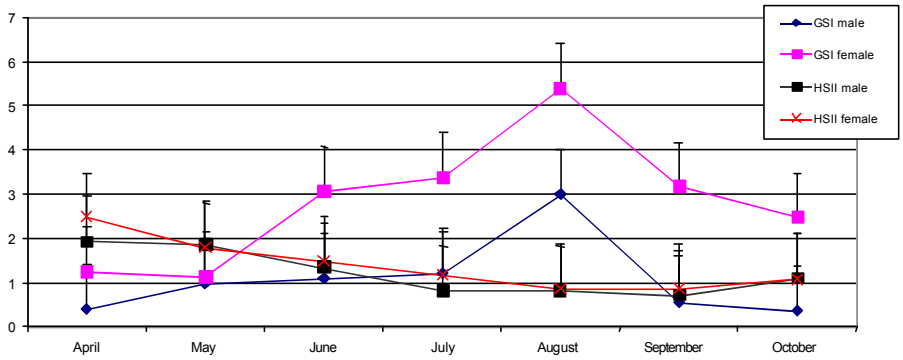

Fig. 5: Monthly variation of GSI (male and female) and HIS (male and female) of Madagascar meagre in Khuzestan Coastal Waters (2009-10). Error bars indicate SD

each of different phase pointed, that there is significant differences between them (ANOVA, F=6.7, P<0.05) and also HIS results were observed a no significant difference between sexes (ANOVA, F=0.2, P>0.05). The mean value of Gonadosomatic Index (GSI) for the male and female were 0.77±0.5 and 2.78±2 respectively. For both sexes, the highest GSI value were observed in August and the lowest GSI value in April were observed. Mean GSI value and maturity stages indicated that spawning time were occurred during August to September (Fig. 4). Moreover, there was a significant difference in the Mean GSI indices between males and females (ANOVA, F=4.8, P<0.05).

Gonadosomatic index (GSI) in male had an ascending trend from April to August, so that its rate in August reached highest value and after decreased. In case of female sex, this process was similar. Hepatosomatic index (HIS) in male has decrease trends from April to September and again has increased in October and number (Fig. 3).

DISCUSSION

Shortage of sample in 4 months was due to migratory on coastal of Khuzestan province simultaneous with low temperature to be on this Coastal Waters [8, 9].

The length-weight relationship in fish is of great importance in fishery assessments [16]. Length and weigh relationship in conjunction with age data can give information on the stock composite, age at maturity, life span, mortality, growth and production. The relative robustness or degree of well-being of a fish expressed as the coefficient of condition (condition factor) is an important tool for the study of fish biology, mainly when the species lies at the base of the higher food web [17].

The b values in the weight-length model were measured close to 3 for *A. hololepidotus* fishes that indicating that weight increased allometrically with length [18].

The variation of b in the different regions could be by seasonal fluctuations in environmental parameters, physiological conditions of the fish at the time of collection, sex, gonad development and nutritive conditions in the environment of fish [14]. Length-weight relationship is a practical index of the condition of fish and may vary over the year according to several exogenous and endogenous factors such as food availability, feeding rate, health, sex, gonad development, spawning period and preservation techniques [19, 20]. According to Tesch [19] "b=3 in fish with isometric growth" and Marthin [20] believed the range of "b" could be from 2.5 to 4.

The highest amount of (k) was observed in spring (May) after a full feeding season and decreased after spawning time in September which shows the effect of ovary weight on fatness. K value decreased after spawning time due to use of energy in spawning time. Low value of k could be explained with ripe season [21, 22]. Condition factor is a well-being value and its increasing coincides with fish weight increasing [18]. Seasonal growth amount can be measured by status factor and growth changes may be related to fish food or reproduction stage [18].

HIS in *A. hololepidotus* were relatively low from May to November. HIS may decrease 3-4 months before spawning. Most ovaries were in the recovery phase. Changes in HSI followed a similar pattern during gametogenesis. This finding is similar to that reported for other species [21, 22].

The spawning time this species during September supports the view that seasonal reproductive cycles are common among tropical fishes [23]. Hashemi *et al*. [1] found that Spotfin flathead spawned in northwest of Persian Gulf (Khuzestan Coastal Waters, Iran) during April. This could be related to the geographical and ecological differences between the stocks of this genus.

The single spawning period during spring in Khuzestan waters was mentioned by Hashemi *et al*. [1].

GSI patterns was shows, this species reproductive cycles are similar other tropical fishes [23]. According to Bianchi [24], the spawning of this species occurred during March to April and July to August in Southern African waters and Papan *etal*. [25], found that *protonibea dicantus* spawned in Khuzestan Coastal Waters (Iran) during March-April and September - November. Spawning season of *A. japonicus* during August- November [7] and in Australia during October - April and November - July were reported [26].

Regarding differences between mean value of GSI for males and females, in reviewing the reproductive biology of the most fish it is noted that values of males are commonly lower than those of females. Buxton [27] pointed out that the cost of producing sperm is thought to be less than for producing eggs. The difference in male and female gondosomatic indices suggests that energy invested in gamete production by male is probably less than that invested by females. During the ripping season, temperature increased. It has been observed that warm water induced later maturity stages. This pattern is similar to that reported by other authors [21, 22].

Further research as population dynamics and stock assessment, is needed in order to obtain an adequate and comprehensive understanding of biology and ecology in this important order in future.

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REFERENCES

1. Hashemi, S.A.R., S.A. Taghavimotlagh and G.R. Eskandary, 2011. To determine the ecological relationship amongst economic fishes within the Persian Gulf waters. South of Iran aquaculture fishery research center, Ahwaz. Iran, pp: 33. In Farsi.
2. Froese, R. and D. Pauly, 2010. FishBase. World Wide Web electronic publication. http://www.fishbase.org, version 16 June 2010.
3. Hecht, T. and A. Mperdempes, 2001. Screening of *Argyrosomus japonicus* (Sciaenidae) and *Pomadasys commersonnii* (Haemulidea) as candidates for aquaculture in South Africa, Aquaculture: Book of abstracts. World Aquaculture Society, Lake Buena Vista, pp: 286.
4. Griffiths, M.H., 1997a. Influence of prey availability on the distribution of dusky knob *Argyrosomus japonicus* (Sciaenidae) in the great river estuary, with note on the diet of early juveniles from three other estuarine systems. S. Afr. J. Mar. Sci., 18: 137-145.
5. Griffiths, M.H. and P.C. Heemstra, 1995. A contribution to the taxonomy of the marine fish Genus *Argyrosomus* (Perciformes: Sciaenidae), with descriptions of two new species from southern Africa. Ichthyol. Bull., 65: 1-34.
6. Griffiths, M.H., 1996. Life history of the dusky kob *Argyrosomus japonicus* (Sciaenidae) off the east coast of South Africa. S. Afr. J. Mar. Sci., 17: 135-154.
7. Griffiths, M.H., 1997b. Feeding ecology of South African *Argyrosomus japonicus* (Pisces: Sciaenidae), with emphasis on the Eastern Cape surf zone. S. Afr. J. Mar. Sci., 18: 249-264.
8. Parsamanesh, A., M.T. Kashi and G.H. Eskandari, 2000. Stock assessment of commercial fish in coastal waters of Khuzestan province. Fishery Research Institute, pp: 70.
9. Parsamanesh, A., M. Shalbaf and M.T. Kashi, 1996. The assessment fish stocks of Khuzestan province. South Iran Aquaculture Research Center, pp: 69.
10. Smale, M.J., 1985. Aspect of the biology of *Argyrosomus hololepidotus* and *Atractoscion aequidens* (Osteichthyes: Sciaenidae) in water of the south-eastern cape, South African. South African Journal of Marine Science, 3: 63-75.
11. Beckley, L.E., 1990. A description of the early life history stages of kob, Argyrosomus hololepidoti (Pisces: Sciaenidae), from southern Africa. South Afr. I. Zool., 25: 224-228.
12. Stephan, C. and R. Battaglene, 1994. Hormone induction and larval rearing of mulloway, *Argyrosomus hololepidotus*, Aquaculture, 126: 73-81.
13. Anonymous, 2010. Annual Khuzestan Fishery Report. Iranian Fishery Organization Press, pp: 235. Bangenal T., 1978. Method for assessment or fish production in freshwater. Blackwell scientific pub, oxf, Lon., pp: 365.
14. Biswas, S.P., 1993. Manuel of methods in fish biology, fish biology and Ecology laboratory, Dibruyarh university, Dibrugarh, pp: 157.

15. Zar, J.H., 1996. Biostatistical analysis. 3rd edition. Prentice-Hall Inc., New Jersey, USA, pp: 662.
16. Haimovici, M. and G. Velasco, 2000. Length -weight relationship of marine from southern Brazil NAGA, 23(1): 14-16.
17. Diaz, L.S., A. Roa, C.B. Garcia, A. Acero and G. Navas, 2000. Length-weight relationship of demersal fishes from the upper continental slope of Columbia. NAGA, 23(3): 23-25.
18. King, M., 2007. Fisheries biology AND assessment and management. Fishing News Press, pp: 340.
19. Tesch, F.W., 1968. Age and growth in methods for assessment of fish production in fresh water. Ed. W.E. Ricker. IBP Handbook No. 3.
20. Martine, W.R., 1949. The Mechanics of environmental control of body form in fishes. Univ. Toronto Stud. Biol., 58: 1-91.
21. Eskandary, G.R., 1999. The biology of *Barbus xanthopterus* in Karkhe river and hour-Al- Azim area (Khuzestan Province). The Scientific Research Results of the Iranian fisheries Org., Tehran Iran, pp: 91. (In Persian).
22. Hashemi, S.A.R., S.A. Taghavi Motlagh and G.H. Eskandary, 2012. Some biological aspect of bartail flathead (*platycephalus indicus* Linnaeus, 1758) in northwest of Persian Gulf (Khuzestan Coastal Waters, Iran). World Journal of Fish and Marine Sciences, 4(2): 185-190.
23. Sadovy, Y.J., 1996. Reproduction of reef fishery species. In Reef fisheries (N.V.C. Polunin and C. Roberts, eds.), pp: 15-59. Chapman and Hall, London.
24. Bianchi, G., 1985. FAO Species Identification Sheets for Fisheries Purposes, Field Guide to Commercial Marine and Brackish Species of Pakistan, FAO, Rome, Italy, pp: 200.
25. Papan, F., A. Mahmodeian and M. Ronagh, 2004. Survey biology of *Protoniba dicantus* on Khuzestan Provence. Fisheries Research Institute of Iran, pp: 254.
26. Farmer, B.M., D.J. French and I.C. Potter, 2005. Determination of biological Parameter for managing the fisheries for mulloway and silver trevally in western australia final Report on the Fisheries Research and Development corporation proj. No. 2002/004, pp: 149.
27. Buxton, C.D., 1990. The reproductive biology of *Chrysoblephus laticeps* and *C. cristiceps* (Teleostei: Sparidae). Journal of Zoology, 220: 497-511.