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The Management of Silver Pomfret (*Pampus argenteus*) Fishing in the Persian Gulf

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Abstract: Pomfret is one of the valuable and economic fishes in the Persian Gulf. The present study in line with observations in the last 10 years obtained exploitation coefficient of 0.1296, which indicates damage to its crowd as a result of irregular fishing and mismanagement. The results of biologic, nutrition and morphometric studies, which were conducted during 2007-2011, show that to remake the reserve of pomfret fish, a great help can be done using the following steps: 1) execution of fishing management on the basis of withdrawable size with standard length above 270 mm, 2) fishing prohibition at the months of June to August, 3) prohibition of tools like trawl in this fish living area, 4) using the gillnet with the mesh size of 7.6cm, 5) safeguarding estuary areas in the north and north-west of Persian Gulf and 6) applying difficult and executive levying.

Key words: Management · Fishing · Pomfret (*Pampus argenteus*) · Persian Gulf

INTRODUCTION

Persian Gulf is one of the important gulfs in the world in which fishing is important from an economic and aquatic kinds point of view in the society around it. Iran, Iraq, Kuwait, Saudi, Qatar, Oman, Emirates, are scattered around this gulf [1]. Pomfret is one of the valuable and more demanded fishes in the countries around gulf [2]. However, fishing amounts are diminished the recent years [3]. For example, the maximum fishing in the gulf is 1.7 thousand tons (1668.7 ton) that has decreased gradually until reach to 114.8 ton in the year 2000 [4]. To provide the market demand, Fishers started fishing pomfret using nonstandard tools in small sizes ($\overline{FL}$ = 130mm), this causes aggravation in the declining resources [5].

On the other hand, the declining of this fish resources consist of decreasing soft water entrance in the sea from 2377 $m^3.s^{-1}$ to 594.25 $m^3.s^{-1}$ and industry implication in the Estuary sources of Iran shores that have important role in providing food and increasing Pomfret (reproduction) [6, 7]. Therefore, a correct management must exist for controlling Pomfret reserves in the Gulf. For this reason, extensive studies have been carried out on feeding [7], biology [8], morphometric [3], fish age and evaluated resources and schematization for fishing correct management in the Persian Gulf during 2007-2011. Important arts of this study are related to fishing management of Pomfret are presented.

MATERIALS AND METHODS

Sampling of fishes are done in four stations. The selection of the stations has been on the basis of the existence of maximum quantity of Pomfret fish in comparison with other places that are located in the bound of longitude 48°,45′ and latitude 29°,30′ - longitude 50°,15′ and latitude 29°,30′ - longitude 50°,42′ and latitude 28°,23′ - longitude 51°,21′ and latitude 25°,28′ [9].

Sampling and evaluation of fish crowd are done in the station by trawl from kind of otter with form of swept area and drift mid and surface gill net.

In this project the number of studying samples was 7100. Their total length, fork length, standard length and their age in the SPSS, FISAT-II, ELFAN programs [10-13] were studied. This is done by obtaining smallest fish length, oldest length, average length, growth coefficient (K), average temperature of area; is accounted natural death coefficient amount (M) with Pauly formula [14, 15], total death coefficient amount (Z) with Seentongo and larkin formula [16, 17], fishing coefficient amount (F) with F=Z-M formula and exploitation coefficient (E) with E=F/Z formula [18, 19].

The study of Gonadosomatic Index (proportion of sex-ovary weight to total weight of fish) [8], is accomplished and is compared in the different lengths for obtaining fish length proportion to sex-productivity and then most sex-activity in the considered length is

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determined. Also puberty stages of female and male fishes in the different months in 821 samples are studied and worst of spawning at those months for distinguishing spawning time and distance between its beginnings and finishing is determined.

The formula a=k*L is used for calculation of Net-mesh size, k is coefficient of proportion width to length of fish that indentified with morphometric studies and L (total length) is suitable size for fishing to centimeter [3].

RESULTS

After studies and accounts that accomplished about Pomfret fish crowd and with obtaining growth coefficient (K) 0.4, sample's average fork length ($\overline{FL}$) 174.7 millimeter, fork length of smallest fish (FL´) 57 millimeter, fork length of oldest fish (FL∞) 414millimeter, yearly average temperature 25.06°C the amount of natural death coefficient (M) 0.87 was calculated.

Total death coefficient (Z) was calculated 0.999 and then with having natural death coefficient, the amount of fishing death (F) 0.1295 was obtained and finally exploitation coefficient (E) 0.1296 with of (F) division (z) was revealed.

The amount of gonadosomatic index that was obtained from male and female fishes in the different months and lengths are shown in the Tables 1 and 2.

As the tables show, GSI amount is superior in the female fishes in two months of May and August and in the male in April-September months. The greatest GSI in the female fishes with standard length 25.5centimeter is about 4.5% that after this size, strong subsidence is observed about 1.1% in the 27.5centimeter and greatest GSI in the male fishes with standard length 21.5centimeter 4.2%.

Puberty and spawning stages of male and female fishes at the different months of year is shown in the Table 3 and 4.

Table 1: GSI levels in female and male Pomfret fishes at different months

	Sings			
	Males		Females	
Months	n	GSI	n	GSI
January	19	0.2	33	0.3
February	12	0.2	42	0.4
March	42	0.2	19	0.5
April	16	0.3	29	1.1
May	44	0.4	26	4.0
June	16	0.5	68	1.6
July	13	0.4	71	1.6
August	18	0.5	58	3.2
September	25	0.3	64	0.3
October	20	0.2	43	0.3
November	22	0.1	47	0.3
December	12	0.1	62	0.2

Table 2: GSI levels in male and female Pomfret fishes in different lengths

	Sexual			
	Males		Females	
Length (cm)	n	GSI	n	GSI
13.5	10	2.2	7	0.2
15.5	36	2.7	50	0.3
17.5	67	2.5	128	0.6
19.5	45	2.8	156	1.2
21.5	38	4.2	110	1.4
23.5	9	3.3	47	2.5
25.5	-	-	29	4.5
27.5	-	-	25	1.1

Table 3: Sexual puberty grade Pomfret female fishes in different months

	Sings							
	Puberty stage (%)							
Months	I	II	III	IV	V	VI	VII	n
January	32.3	48.4	19.3	-	-	-	-	33
February	-	20.0	60.0	15.0	5.0	-	-	42
March	-	-	100.0	-	-	-	-	19
April	8.0	-	55.0	20.0	17.0	-	-	29
May	3.0	7.0	9.0	27.0	48.0	6.0	-	26
June	2.9	20.9	19.4	16.4	11.9	8.9	19.6	68
July	10.0	18.6	21.4	10.0	12.8	14.3	12.9	71
August	5.2	6.9	3.4	3.4	29.3	31.0	20.8	58
September	20.0	66.2	1.5	1.5	3.1	-	7.7	64
October	17.8	71.1	6.7	2.2	-	-	2.2	43
November	26.7	48.9	12.2	10.0	-	-	2.2	47
December	41.7	55.0	3.3	-	-	-	-	62

Table 4: Sexual puberty grade Pomfret male fishes in different months

	Sings						
	Puberty stage (%)						
Months	I	II	III	IV	V	VI	n
January	15.8	10.5	73.7	-	-	-	19
February	33.3	50.0	16.7	-	-	-	12
March	-	40.0	55.0	5.0	-	-	42
April	-	-	38.0	62.0	-	-	16
May	-	-	16.0	37.0	30.0	17.0	44
June	-	-	-	36.0	50.0	14.0	16
July	-	-	-	62.0	25.0	13.0	13
August	-	12.5	-	26.0	43.5	18.0	18
September	-	-	13.0	20.0	50.4	16.6	25
October	-	-	30.0	45.0	20.0	5.0	20
November	-	-	40.0	50.9	5.6	3.5	22
December	15.0	50.0	25.0	10.0	-	-	12

As it was observed, the beginning of female fish spawning continued from May until November and most spawning is in June and August months and male have sexual readiness from May to November with greatest readiness in June and September.

DISCUSSION

It is concluded that by obtaining exploitation coefficient (E) 0.12 (which is decreasing from 0.5 and it's near zero), the position of stores Pomfret fish crowd is not good in the Persian Gulf and needs supporting and remaking.

Therefore until removing this crisis and making E close to 0.5, it is suggested that fish with standard length of 27 centimeter and higher are caught. This is because of the most spawning in the fishes of 24 centimeter [8] and falling GSI after 25.5 centimeter in the females, So the mesh size of 7.6 centimeter is suggested for this fish by the Gillnet for fishing with standard length of 27 centimeters, which is equal to the total length of 38 centimeters on the basis of morphometric studies and considering length coefficient to depth with (0.2) [3].

Considering the results of the study which, show the sexual puberty stages and GSI in pomfret fish (that is, its relatively long spawning period and its different intensity), it is suggested that controlling and fishing limitation between April and September and prohibition between June and August be taken into serious account.

Also due to the fact that these fishes are not sortable to different sizes by fishing tools like trawl (many reports of this have been made), prohibition of using this way in this fish living area is suggested.

Based on the results of this study, it is concluded that Pomfret fish feeds relatively on sexual conditions from herbaceous and animal sources during year that is shown in its food diet. The most herbaceous source is related to *Bacillariophyceae* in the September about 60% and animal sources related *Copepod* from *Crustacea* family in the February about 80% [7]. Also, the crowd of this food sources depends on Estuary area's ecology and limnology conditions in the north and north-western of Persian Gulf. Therefore, each negative change in those areas could have negative effect on the pomfret fish crowd. It is observed that water stream changes and industrial implications in this area [5], are threatening this ecology. Therefore, prohibiting any water change and industrial pollution is suggested.

Finally, for the results of the present study to be practical and effective, the need to institutionalize rules is felt which requires the cooperation of all Persian Gulf countries.

The collection of results that was obtained during this project is fundamental to fishing management of pomfret fish in the Persian Gulf. Considerations of these findings could reconstruct sources of this valuable fish crowd which is in diminishing.

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