Study at the reproductive cycle, GSI and Maturation of *Liza Klunzingeri* in Khuzestan coastal waters

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ABSTRACT: This study was carried out in serimeh and Bahrekan from April 2009 to March 2010. A among total 1880 measured fish specimens, 947 specimens were analyzed. The mean value of length for the male and female were calculated as 17.97±1.15, 19.11±1.49 and mean value of Weight for the male and female was as73.43±13.71, 85.91±20.95 respectively. The mean value of Gonad somatic Index (GSI) for the male and female were calculated as 0.96 ± 1.39 and 3.25 ± 3.26 respectively. The highest GSI was observed in December for both sexes and the lowest GSI value for females was observed in May and in males it was observed in August and September. Length at maturity was 14.5 cm for bon length at maturity was identified in December and January. Catch closure in recommended in this period in Bahrekan area.

*Keywords***:** Liza klunzingeri **,** Gonad somatic Index (GSI) **,** Khuzestan coastal.

INTRODUCTION

The family Mugilidae plays an important role in commercial fisheries and aquaculture worldwide. Liza klunzingeri (Day 1888), formerly known as L. carinata (Carpenter et al., 1997), is one of the valuable fish with high catches in Khuzestan province coastal waters(Hendijan- Bahrakan). It is found in Indian Ocean from the Red Sea to Bombay and also been reported from coast of Japan and China (Fisher and Bianchi, 1984). The abundance of grey mullets in estuarine and coastal areas of all tropical and subtropical regions may be related to their food and feeding habits, as they occupy a relatively low position in the food web (Wright, 1988). It's mostly caught by purse seine and trammels net.

By studying sexual maturity and GSI it will be possible to protect the fish in reproduction season and introduce closed seasons (Biswas, 1993).There for this study was carried out to study the reproduction, GSI and length of maturity. Some studies have been carried out on its feeding and distribution (Biswas, 1993). Despite its worldwide commercial importance, only very limited and disparate information exists on any aspect of the biology of the Mugilidae species in the Coastal of Khuzestan (Javadzade, 1994) and Kuwait waters (Abou-Seedo and Al-Khatib, 1995; Abou-Seedo et al., 2002). Bauchot et al., (2004) has also studied L. klunzingeri ecosystem. We need to provide much-needed scientific data for the management and rational exploitation of this valuable resource, that the present study was undertaken to evaluate the growth characteristics, length-weight relationship and fish condition factor of this species in the Coastal of Khuzestan.

MATERIALS AND METHODS

Monthly sampling was carried out in serimeh (49º 36' N 30º 02' E) and Bahrekan (49 º 55' N and 30 º 10' E) using purse seine samples were measured to the nearest mm below and subsamples were transferred to the lab for detailed examination.

Figure 1. sampling sites in Khuzestan coastal waters

Gonad and body weight was measured to the nearest 0.01 and 0.001 respectively. Maturation stages were determined using a microscope and 7 stage key (Kesteven, 1960).GSI was calculated as GSI = (GW/TW) × 100 GW represents gonad weight and TW represents total weight (Biswas, 1993).
Length at first maturation was determined using logistic model as

Y= 1/1+exp (-a-bX), In which y is the proportion of the number of all mature male and females to all immature males and females in the same length class, X in total length in cm and a and b are correlation constants (King, 2007).

RESULTS AND DISCUSSION

A total of 1880 samples were examined. Figure2 shows the length frequency at the samples. A total of 947 fish were examined in the lab including 336 males, 596 females and 15 immature fish were found.
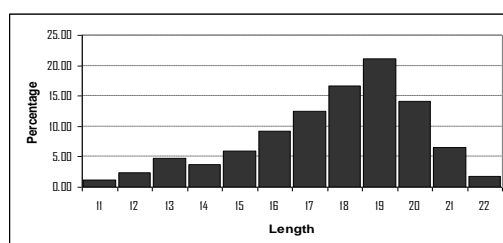

Figure 2. length frequency distributed at L. klunzingerim Khuzestan coastal water

Total length range for males was 13 to 21 cm and that of females were 13 to 23 cm. Average lengths of males was 17.97 ± 1.15 and that of females was 19.11± 1.49. Weigh of males 28 to 109 g and that of females was 25 to 157 g. average weight in males was 73.43± 13.71 and that of females was 85.91± 20.95 (Table1).

Table 1. Average length and weight and condition factor of *L. klunzigerin* in Khuzestan waters

Month	GSI (male)	GSI (female)	Mean W (male)	Mean W (female)	Mean L(male)	Mean L(female)
May	0.12±0.19	0.26±0.28	8.27±71.8	13.46±69.66	1.11±17.66	1.40±17.25
June	0.03±0.05	0.11±0.58	10.75±79.96	20.73±105.36	0.8±18.03	1.27±19.72
July	0.08±0.07	0.11±0.37	11.63±71.41	13.91±89.27	1. 1±17.91	0.99±19.21
August	0.02±0.03	0.11±0.47	10.37±70.08	18.60±99.53	0.89±17.25	1.36±19.70
September	0.01±0.03	0.10±0.43	9.78±74.66	17.21±93.22	1.12±18.04	1.07±19.11
October	1.32±1.10	1.15±1.54	10.37±80.58	18.07±97.34	0.72±18.45	1.10±19.53
November	1.53±2.41	2.02±5.18	10.47±78.3	12.44±92.94	0.85±18.4	0.81±19.49
Desember	0.73±3.65	3.26±6.71	17.65±69.28	14.31±87.20	1.99±17.85	1.17±19.51
January	0.33±2.73	3.26±5.74	2.30±54	18.09±73.31	0.57±16.5	1.76±18.81
Februry	1.29±2.31	2.31±3.51	4.96±71	17.09±62.91	0.57±18.5	1.73±18.04
March	0.56±1	2.40±2.27	14.19±49.31	19.77±59.93	1.82±17	2.11±18.13
Mean	1.39±0.96	3.26±3.25	13.71±73.43	20.95±85.91	1.15±17.97	1.49±19.11

Number of specimens of both male and female varied in different months and significant difference was observed (P<0.05).Number of female in autumn and winter were high comparing to male specimens (Tabel, 2).

Table 2. Sex ratio and significant difference male and female of L. klunzigerin in Khuzestan waters

Month	Total	Immature	Female number	Male number	Poropation Femal to Male	Mean	X2
May	46	4	26	16	1.62	21	1.19
June	91	5	34	52	0.65	43	1.88
July	57	-	33	24	1.37	28.5	0.71
August	120	-	78	42	1.85	60	5.40
September	91	-	45	41	1.09	43	0.09
October	174	-	96	77	1.24	86.5	1.04
November	110	-	79	31	2.54	55	10.47
Desember	103	5	89	14	6.35	51.5	27.31
January	26	1	22	4	5.5	13	6.23
Februry	29	-	25	4	6.25	14.5	7.60
March	-	-	69	31	2.22	50	7.22
mean	91	-	54.18	30.54	1.77	42.36	-

GSI values are plotted in figure3. In males GSI averaged 0.46± 1.39 and in females it averaged 3.25 ± 3.26. The highest GSI values for both sexes were observed in December. In females, the lowest values were found in May and in males it was found in August and September.
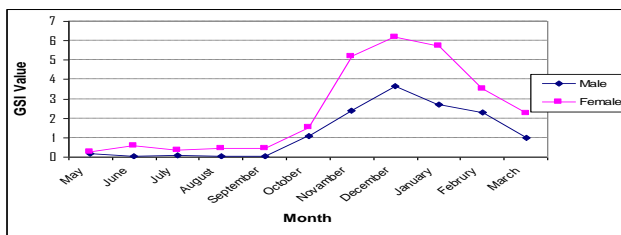

Figure 3. GSI for L. klunzingeri in Khuzestan coastal waters

LM_{50} was plotted for each length class (figure4). This value was calculated as 14.5 for both sexes.
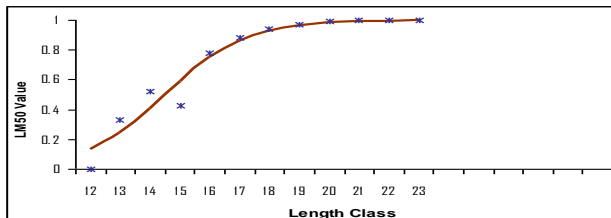

Figure 4. LM 50 values for L.klunzingeri in Khuzestan coastal waters

7 stage key in presented in figure 8. In May to October, all sampled were in stages I to IV and in November to March were in stage V to VII. It was concluded that in autumn and early winter, the highest level of maturity is observed. The lowest maturity level was observed in summer.
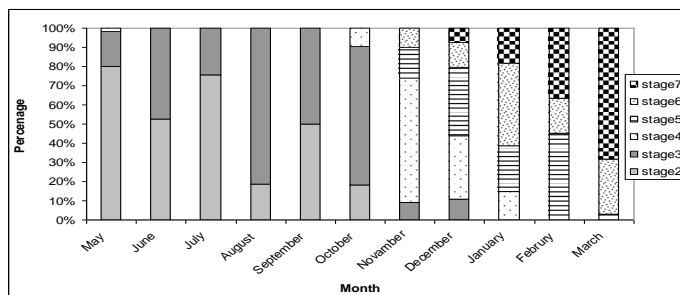

Figure 5. Sexual maturity stages for L. klunzingeri in Khuzestan coastal waters

CONCULSION

L. klunzingri in native to Pakistan, India, Iran and Kuwait waters (Javadzade, 1994). Maximum length in this study was found to be 23 cm. In the previous studies this length, 20 and 30cm has been reported in Persian Gulf (Carpenter et al., 1997 ;Golani, 2002).The maximum and minimum length respectively were found 19.5 and 18.5cm for male and 22.5 and 15.90 for female in Khuzestan coastal waters (Javadzadeh, 2004).

With decreasing water temperature in fall and early winter, GSI increases gradually. It can be concluded that temperature decrease is a stimulus for the increase in GSI and reproduction. In females GSI was relatively higher than males, Based on ovary maturation, it is concluded that spawning is peaked in December and January (Javadzadeh, 2004).Showed that the highest GSI was observed in December and the Lowest GSI value was observed in June. GSI can be used for determination of spawning season (Abou-Seedo et al., 2002).Synchronization of maturation in males and females in creases spawning success (Bauchot etal., 2004). A sharp drop in GSI is indication at short spawning period (King, 2007). Seasonal fluctuation in Gonad weight of females in more pronounced in females (Bauchot etal., 2004).

Length at maturity in Kuwait waters was 15.1 for males and 15.6 for females. Males mature earlier therefore their growth in slower that females. As a result of the high energy they need in earlier years for their growth and reproduction (Rajaguru, 1992). Javadzadeh (2004) reported the length maturity for males and females as 15.5 and 16 cm respectively. Sexual maturity is a critical life stage and length at first maturity may be different in various populations (Moyle, 1988).

Sex ratio (males to females) was found to be 1 to 1.77. Javadzadeh (2004) reported the ratio at females to males to be 5 to 1. Sex ratio varies in different species were 1: 1 ratio is observed in most species (Nikolusky, 2004). In general variation in sex ratio is a result of out migration, difference in behavior catchbility and different mortality rates (Sadovy and Roman, 1994).

Spawning season begin in December and continues until March. L.Klunzingeri spawning season in Khuzestan coastal waters reported in January (Javadzadeh, 2004) and Ismail et al (1992) determined the spawning season in Kuwait waters in December and February. In Kuwait, spawning has been reported in fall and winter (Abou-Seedo et al., 2002).Existence at 5 sexual stage in December and January shows a short spawning season. Species with short spawning season are total spawners (Moyle, 1988).Variation in the spawning season for L.Klunzingeri may be a result of environmental or population related factors (Stoumbound etal., 1993)..Environmental (physical) factors may impact spawning season (Jain and Mitva, 1994). Reproduction is limited to a short period of the year. Seasonality of reproduction is significant in higher latitudes in lower latitudes seasonality is observed in some fresh water and marine species (Wotton etal, 1995).In tropical and subtropical areas, seasonal fluctuations in photoperiod is minimal However, some species respond to stage minimal fluctuations (Milton etal., 1993).

In tropical and sub tropical areas, the optimal temperature for vetilogenesis in 17 to 21 c and 25 to 27 c for spawning (Hoar et al., 1983).In fisheries studied, spawning season is an important factor (King, 2007).Based on this results, it is recommended that L.klunzingeri catch in Bahrakan area would be closed to protect the spawning.

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