Al-Azhar Bulletin of Science

Volume 29 | Issue 2 Article 38

12-1-2018
Section: Botany, Microbiology and Zoology

SOME ASPECTS OF THE REPRODUCTIVE BIOLOGY OF THE SADDLED SEA BREAM OBLADA MELANURA (LINNAEUS, 1758) IN BENGHAZI COAST –EASTERN LIBYA

Fatma Rafalah
Zoology Department, Faculty of Science, Omar Almokhtar University, P.O. box 919 Al-Qubba , Libya

Mohammad El-Mor
Marine Science Department, Faculty of Science, Suez Canal University, Egypt. tatarafalah@gmail. Com

How to Cite This Article

Rafalah, Fatma and El-Mor, Mohammad (2018) "SOME ASPECTS OF THE REPRODUCTIVE BIOLOGY OF THE SADDLED SEA BREAM OBLADA MELANURA (LINNAEUS, 1758) IN BENGHAZI COAST –EASTERN LIBYA," *Al-Azhar Bulletin of Science*: Vol. 29: Iss. 2, Article 38.
DOI: https://doi.org/10.21608/absb.2018.33819

Al Azhar Bulletin of Science Vol. 29, No. 2 (December), 2018, pp. 61-68

SOME ASPECTS OF THE REPRODUCTIVE BIOLOGY OF THE SADDLED SEA BREAM *OBLADA MELANURA* (LINNAEUS, 1758) IN BENGHAZI COAST – EASTERN LIBYA

Fatma Rafalah[1] and Mohammad El-Mor[2]

1, Zoology Department, Faculty of Science, Omar Almokhtar University, P.O. box 919 Al-Qubba , Libya.
2, Marine Science Department, Faculty of Science, Suez Canal University, Egypt.
tatarafalah@gmail. Com.

ABSTRACT

*The reproductive biology of 400 specimens of **Oblada melanura** (Family: Sparidae) collected by gill and trammel nets in Benghazi coast, Eastern Libya, Mediterranean Sea from artisanal fishing was studied. There were monthly variations in sex ratio between females (242 fish = 60.5%) and males (158 fish = 39.5%). Sex ratio was (1: 1.53) for males to females respectively. Length at first maturity, L_{50}, for O. melanura was found to be 17.5 cm for males and 18.6 for females. The breeding season extends from March to June. Oocyte diameters increase from January (345 ± 27.4 µm), until the maximum value in June (1112 ± 487.8 µm). The average absolute fecundity ranged was from 22278 ± 181.8 to 366780 ± 611.1 for fish with the average total length ranging from 16.5 to 32.4 cm, whereas relative fecundity ranged from 1350.2 eggs/cm to 11320.4 eggs/cm.*

Key Words: Sparidae, *Oblada melanura*, Reproductive Biology.

INTRODUCTION

Sparid fishes inhabit tropical and temperate coastal water. Fish individuals are swimming near the shore in shallow inlet and bays at moderate depth. Family Sparidae comprise about 22 genera in four subfamilies containing 41 species (Bauchot and Smith, 1983). Fourteen species were recorded in the Libyan coast, such as *Diplodus annularis, Pagrus pagrus, Dentex dentex, Diplodus vulgaris, Lithognathus mormyrus, Oblada melanura, Sarpa salpa* and *Boops boops* (**Al-Hassan and El-Silini, 1999).**

The saddled bream *Oblada melanura* (Linnaeus, 1758) is common throughout the Mediterranean and eastern Atlantic, inhabiting littoral waters above rocky bottoms and Posidonia beds, up to 30 m depth (Bauchot and Hureau, 1986). Family Sparidae was studied by various authors as: Erzini et al., (2001), Morato (2001), Morato et al., (2003), Abd Elbarr (2004) and Heemstra & Heemstra (2004). While few authors studied O. melanura such as: Zaki et al., (1995) who studied the reproductive biology. Pallaoro et al., (1998) studied some biological parameters of this species, while the feeding habits were studied by Pallaoro et al., (2003). The target species feed almost exclusively on crustaceans and zooplanktonic animals, which they graze from the substrata when juveniles, but when become adults they feed mainly on vegetable matter as algae and hydrophytes (Froese and Pauly, 2009). In spite of the wide distribution and commercial importance of *O. melanura*; information on their biology and ecology in the Libyan waters is limited. The present study aims to shed some light on the basic information required for fisheries management and aquaculture of such fish species especially their sex ratio, first sexual maturity, spawning season, egg diameter and fecundity of *Oblada melanura* inhabiting Benghazi coast on eastern Libyan Mediterranean Sea.

MATERIAL AND METHODS.

Monthly samples of *Oblada melanura* were collected during the period from January to December 2015 by using gill and trammel nets from artisanal fishing in Benghazi fishing harbor 32°36' N and 20°03' E on the Mediterranean (Fig. 1). A total of 400 specimens of O. melanura were sampled for studying the reproductive biology of the fish. Each fish was wet weighed in grams and its

total length was measured in cm, then it was dissected to determine sex then the gonads were removed and wet weighed to the nearest mg. The monthly Gonado-somatic indces (G.S.I.) was calculated according to the following formula:

G.S.I. = wet weight of gonad (g) / wet weight of fish (g) X 100 (Buxton, 1989).

Such indices were expressed as the monthly averages and plotted against months. Length at First Maturity (L50) at which 50% of individuals were mature, was obtained by plotting the percentage mature fish in each length class of the whole population versus length. From the curve, L50 was the length corresponding to 50% mature. Oocytes diameters were measured to the nearest 0.01 mm by using an eyepiece micrometer. Oocytes were separated from the ovarian tissue and put in saline solution (0.9% NaCl) for 24 hours and then they were measured under the microscope at 40 X, then 20 oocytes were taken randomly and their diameters were measured. The average oocyte diameters for mature specimens were calculated. Fecundity was estimated by counting all ripe eggs found in the female ovary just prior to spawning season. Fish ovary was put in a small divided Petri- dish; ova were separated from the ovarian tissue with the aid of a dissecting needle, and all ripe ova were counted under a binocular microscope.

RESULTS

Sex ratio

Generally, there is a tendency for more females (242 fish, 60.5%) than males (158 fish, 39.5%) of the collected population. Overall sex ratio was 1: 1.53 for males to females (Table 1). The sex ratio was not constant throughout different months. The numbers of females exceeded males in all months especially during the spawning season.

Gonado-Somatic Indices (G.S.I.)

The monthly changes in G.S.I. are represented in Fig. (3). *Oblada melanura* showed a definite breeding season, which extends from March till June in the Libyan eastern coast. In males the average G.S.I. increased from January (4.44) and February (5.28), then increased sharply in March (9.66), April (11.17), May (12.66) and June (14.87). In females the average G.S.I. increased from January (6.12) and February (7.08), then increased sharply in March (13.92), April (19.77), May (21.16) and June (21.90) (Fig. 4).

Length at first maturity (L_{50})

Length at first maturity $\mathbf{L_{50}}$ is the length at which half the population is mature and the other half is not. For *O. melanura* $\mathbf{L_{50}}$ was found to be 17.5 cm for males and 18.6 for females (Figs. 5&6).

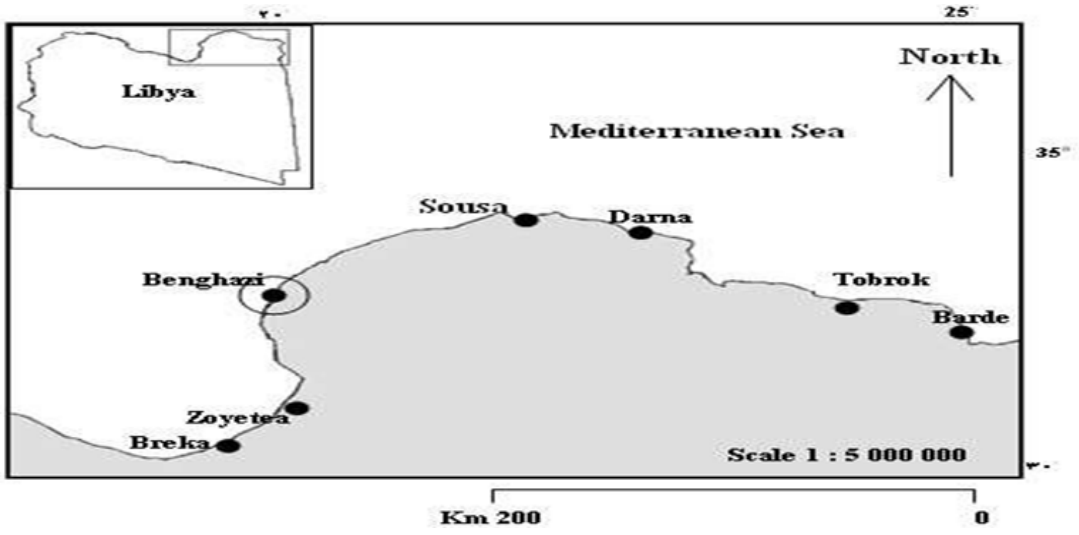
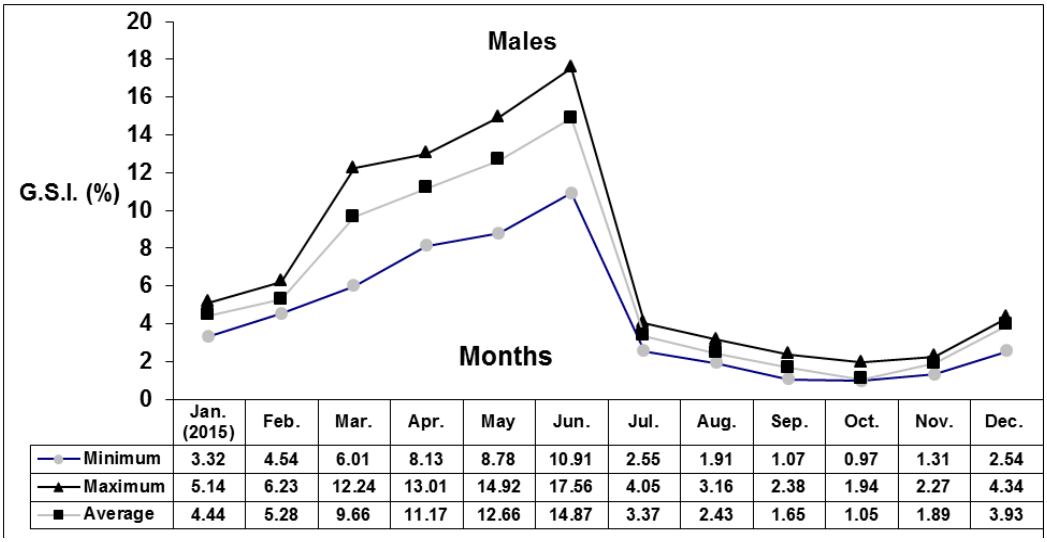


Figure 1: Map showing Benghazi coast, on the Mediterranean Sea, eastern Libya.

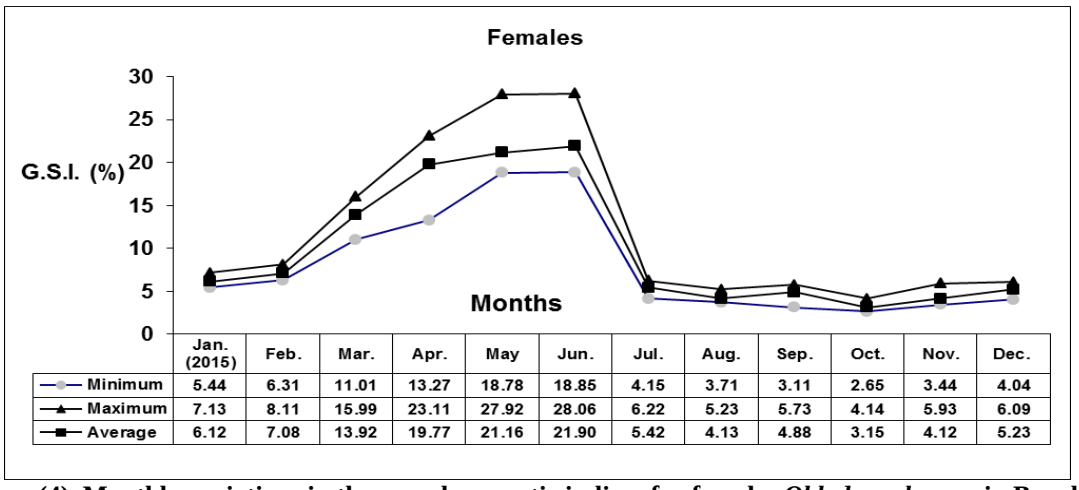
Table (1). Monthly variations in sex ratio of *Oblada melanura* in Benghazi Coast, eastern Libya during the period from January till December 2015.

Months	No. of fish	Males		Females		Sex ratio
		No.	%	No.	%	
Jan. (2015)	26	12	46.2	14	53.8	1 : 1.17
Feb.	38	15	39.5	23	60.5	1 : 1.53
Mar.	54	20	37.0	34	63.0	1 : 1.70
Apr.	50	21	42.0	29	58.0	1 : 1.38
May	39	12	30.8	27	69.2	1 : 2.25
Jun.	33	13	39.4	20	60.6	1 : 1.54
Jul.	32	13	40.6	19	59.4	1 : 1.46
Aug.	19	7	36.8	12	63.2	1 : 1.71
Sep.	27	10	37.0	17	63.0	1 : 1.70
Oct.	33	13	39.4	20	60.6	1 : 1.54
Nov.	26	12	46.2	14	53.8	1 : 1.17
Dec.	23	10	43.5	13	56.5	1 : 1.30
Total	400	158	39.5	242	60.5	1 : 1.53



	Jan. (2015)	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Minimum	3.32	4.54	6.01	8.13	8.78	10.91	2.55	1.91	1.07	0.97	1.31	2.54
Maximum	5.14	6.23	12.24	13.01	14.92	17.56	4.05	3.16	2.38	1.94	2.27	4.34
Average	4.44	5.28	9.66	11.17	12.66	14.87	3.37	2.43	1.65	1.05	1.89	3.93

Figure (3). Monthly variations in the gonado-somatic indices for males *Oblada melanura* in Benghazi coast, eastern Libya during the period from January till December 2015.



	Jan. (2015)	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Minimum	5.44	6.31	11.01	13.27	18.78	18.85	4.15	3.71	3.11	2.65	3.44	4.04
Maximum	7.13	8.11	15.99	23.11	27.92	28.06	6.22	5.23	5.73	4.14	5.93	6.09
Average	6.12	7.08	13.92	19.77	21.16	21.90	5.42	4.13	4.88	3.15	4.12	5.23

Figure (4). Monthly variations in the gonado-somatic indices for females *Oblada melanura* in Benghazi coast, eastern Libya during the period from January till December 2015.

The Oocyte Diameter

The average oocyte diameter for 144 female's *O. melanura* was represented in table 2. In January was 345 ± 27.4 **µ**, then increased in February (391 ± 48.5 **µ**) and increased sharply in March (845 ± 118.3 µ), April (916 ± 208.9 µ), May (1019±422.1), then the egg diameters recorded the maximum in June (1112±487.8). In July spent females have egg diameters 744±258.2. During the period from August till December the oocytes were either not present or too very small to be measured.

Absolute and relative fecundity

The absolute fecundity increased with increasing fish length from 22278 ± 181.8 egg per fish at the average total fish length of 16.5 cm to 366780 ± 611.1 egg per fish at the average total length of 32.4cm. The same trend was observed for the relative fecundity. It ranged from 1350.2 eggs per centimeter to 11320.4 eggs per centimeter (table, 3).

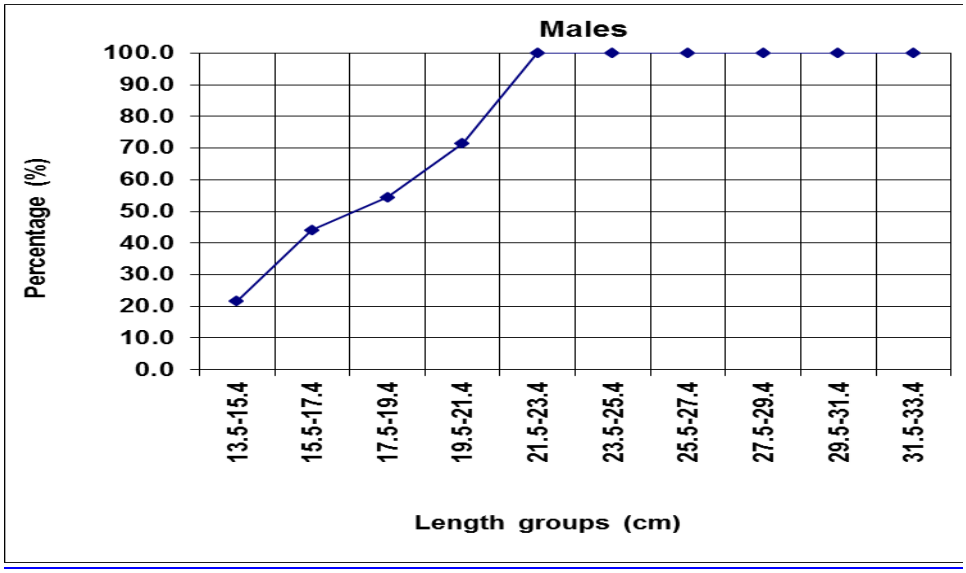


Figure (5). Length at first maturity for males *Oblada melanura* in Benghazi coast, eastern Libya during the period from January till December 2015.

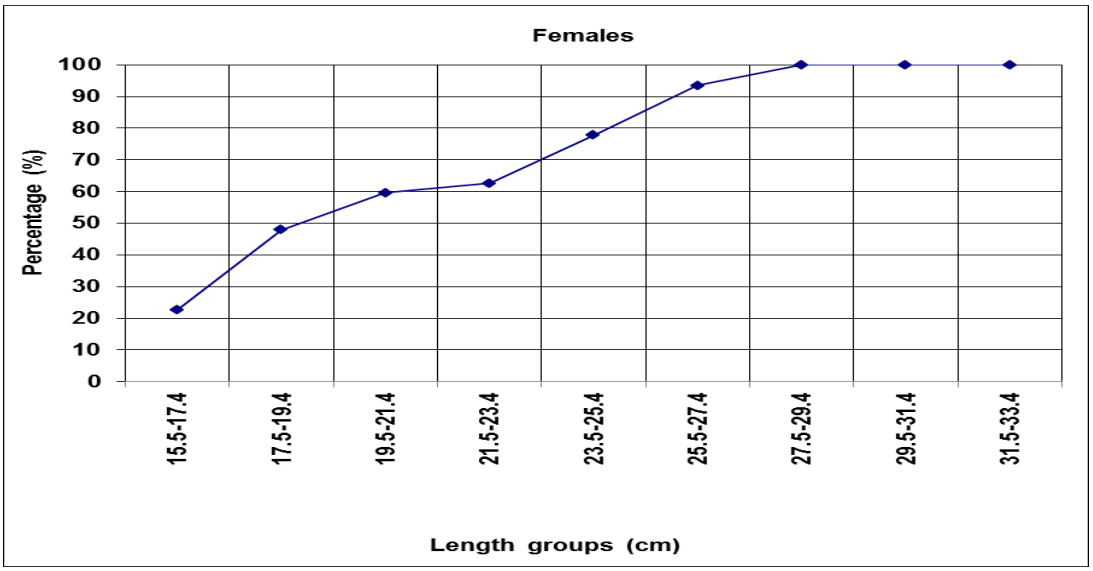


Figure (6). Length at first maturity for females *Oblada melanura* in Benghazi coast, eastern Libya during the period from January till December 2015.

Table (2). Monthly variations of oocyte diameters of *females Oblada melanura* in Benghazi coast, eastern Libya during the period from January till December 2015.

Months	Number of fish	Egg-Diameters (µ)		
		Minimum	Maximum	Average
Jan. (2015)	5	311	381	345± 27.4
Feb.	11	374	411	391± 48.5
Mar.	20	733	914	845± 118.3
Apr.	17	759	1013	916± 208.9
May	19	814	1232	1019±422.1
Jun.	9	822	1290	1112± 487.8
Jul.	9	629	811	744± 258.2
Aug.	4	M	M	M
Sep.	3	M	M	M
Oct.	20	M	M	M
Nov.	14	M	M	M
Dec.	13	M	M	M
Average	144			839±347.5

M = The egg diameters were very minute and difficult to measure

Table 3: The average absolute and relative fecundity of *Oblada melanura* in Benghazi coast, eastern Libya during the period from January till December 2015.

Total length (cm)			Average absolute fecundity	Relative fecundity F/T.L. (cm)
Length groups (cm)	Average	No.		
15.5 - 17.4	16.5	6	22278 ± 181.8	1350.2
17.5 - 19.4	18.6	11	35102± 225.3	1887.2
19.5 - 21.4	20.4	24	43321 ± 311.5	2123.6
21.5 - 23.4	22.5	20	74578 ± 414.7	3314.6
23.5 - 25.4	24.7	19	112245 ± 488.8	4544.3
25.5 - 27.4	26.7	21	178654± 471.3	6691.2
27.5 - 29.4	28.4	12	222413±513.2	7831.4
29.5 - 31.4	30.5	13	287487 ± 541.7	9425.8
31.5 - 33.4	32.4	14	366780 ±611.1	11320.4

DISCUSSION

The saddled bream *Oblada melanura* is common throughout the Mediterranean and eastern Atlantic, inhabiting littoral waters above rocky bottoms and Posidonia beds, up to 30 m depth and it can grow to a maximum length of about 36.6 cm (Akyolo and Saglam, 2014). In the present study, the overall sex ratio was 1: 1.53 for males and females of *Oblada melanura* and these results are nearly similar with sex ratio of other species of family Sparidae in the Mediterranean Sea (Mounie *et al*., 2007 and Sabor and Lahlh, 2017). In the present work, the numbers of females exceeded males in all months especially during the spawning season since the males might migrate for spawning elsewhere, generally of each fish species number of female usually higher than number of males (Oren, 1975). The same result has been also obtained for other fish species such as mullet species (El-Mor, 1993). The ripe females were heavier than males during the spawning season, thus, the females get caught in the gear in large numbers, resulting in an unbalanced sex ratio (Cavallaro *et al*., 1985). In the present study, the males and females of *Oblada melanura* showed a definite breeding season, which extends from March till June, with maximal G.S.I. of 9.66 for ♂, 13.92 for ♀; 11.17♂, 19.77♀; 12.66♂, 21.16♀; and 14.87♂, 21.90♀ in March, April, May and June respectively. The increase of G.S.I. during the breeding season is mainly due to the deposition of large amounts of proteins and lipids in the developing eggs and spermatozoa. A part of these materials comes directly from ingested food but a major proportion comes from the reserve of food deposits, during the active season, in organs such as liver, muscles and fat bodies (Larson, 1974). The spawning season of the target species consistent with that in other sites on the Mediterranean Sea which extends from March till July (Sabor and Lahlh, 2017 in Tartous, Syria), and from February till June in the Eastern Adriatic Sea (Pallaora,*et al.*, 1998), from April to July in Mediterranean coasts of Egypt (Zaki *et al*., 1995). The time of spawning season in the present study coincided with the appearance of the juveniles and fry of the fish in the eastern Libyan Mediterranean Sea (Ekwelha, 2008). In the current study the length at first maturity $\mathbf{L_{50}}$ was found to be 17.5 cm for males and 18.6 for females these results nearly coincide with the results of Sabor and Lahlh, 2017 for the same species in Tartous, Syria. The average oocyte diameter for 144 female's *O. melanura* in the present study increased sharply in March (845 ± 118.3 µ), April (916 ± 208.9 µ) and May (1019±422.1) and then the egg diameters recorded the maximum in June (1112±487.8). These results nearly similarly with those recorded by Sabor and Lahlh, (2017) who stated that the egg diameters for the same species in Tartous, Syrias reached 811 µ, 934 µ ,1011 µ, 1233 µ and 1253 µ in spawning season (March to July). The number of eggs produced by females varies greatly according to species, size, age, region, period and techniques used, thus a considerable variability has been shown in different populations (Oren, 1975). Mouine *et al*., (2007) found that the absolute fecundity for *Oblada melanura* in eastern Adriatic ranged from 27000 to 400000 eggs per fish at the average total fish length of 15.5 – 36.4 cm, these results nearly similar to those of the data of present study which stated that, the average absolute fecundity ranged from 22278 ± 181.8 to 366780 ± 611.1 eggs per fish at the average total length of 16.5-32.4cm.

REFERENCES

Al-Hassan, L. A. and El-Silini, O.A. 1999. Check-list of bony fishes collected from the Mediterranean coast of Benghazi, Libya. Revista de Biologia Marina Oceanografia, 34: 291-301.

Akyolo, O. and Saglam, **C.** 2014. Maximum size of saddled bream, *Oblada melanura* (Linnaeus, 1758) (Osteichthyes: Sparidae), in the southern Aegean Sea, Turkey. J. Black Sea/Medit. Environ. 20(3):270-273.

Bauchot, M. L. and Hureau, J. C. 1986. Sparidae. p. 883-907. In P.J.P. Whitehead, M.-L. Bauchot, J.-C. Hureau, J. Nielsen and E. Tortonese (eds.) Fishes of the north-eastern Atlantic and the Mediterranean. volume 2. UNESCO, ParisAbu-Madena, H. M. (2008).

Libyan Ports – study on economic Geography. Dar El-Koteb, Benghazi, Libya. First Press.

Bauchot, M. L. and Smith, J. L. B. 1983. "Sparidae in FAO Species Identification Sheets from Fishery Purposes." Western Indian Ocean Fishing Area 51 (4) (Fisher, W. and Bainchi, G.) eds. FAO. Rome.

Buxton, C, D. 1989. Protogynous hermaphroditism in *Chrisoblephus laticeps* (Cuvier) and *C. cristiceps* (Cuvier) (Teleosti: Sparidae) S. Afr. J. Zool., 24:212-216.

Cavallaro, G.; Cefali, A. and Sotiriadis, **S.** 1985. Aspects of *Oblada melanura* (L. 1758) biology (Pisces: Sparidae). Mem. Biol. Mar. Oceanogr. 15:129-140.

Ekwelha , S. A. 2008 . Environmental and biological studies on juvenile commercial fishes in EL- Hamamh coast (EL- Gabal EL-Akadar) , Libya.

El-Mor, M. 1993. Fisheries and biological studies on some species of family Mugilidae inhabiting the Suez Canal. M.Sc. Thesis, Faculty of Sci., Suez Canal Univ., ARE, pp.100.

Erzini, K.; Bentes, L.; Lino, P. G.; Riberio, J.; Coelho, R.; Monteiro, P.; Correia, C. and Goncalves, J. M. S. 2001. Reproductive Aspects of Seven Sparid Species of the Southern Coast of Portugal (Algarve). Tenth European Congress on Ichthyology ECI X, Prague, Czech Republic.

Froese, R. and Pauly, D. 2009**.** World Wide Web electronic publication, www.fishbase.org version (02/2014). (Accessed date: 05 May 2009).

Heemstra, P. and Heemstra, E. 2004.Coastal fishes of Southern Africa. NISC and SAIAB, Grahamstown (South Africa). 488 pp.

Larson, G. L. 1974. Liver weight of brook trout in a high mountain lake in Washington State. Prog. Fish. Cult., 35:234-236.

Mounie, N. ; Francour, P. ; Ktari, M. and Chakrounmarzouk, N. 2007 The reproductive biology of Diplodus sargus sargus in the Gulf of Tunis (central Mediterranean), Scientia Marina, Vol.71, No.3, 461-469.

Morato, T. 2001. Length weight relationship for 21 coastal fish species of Azores North Eastern Atlantic. Fisheries Research. Vol. 50: 297 - 302.

Morato, T.; Afonso, P.; Lourinho, P.; Nash, R.D.M. and Santos, R.S. 2003, Reproductive biology and recruitment of the white sea bream in the Azores. Journal of Fish Biology, Vol. 63: 59 – 72.

Abd El-Barr, A.M. 2004, Biological studies on fisheries of family Sparidae in Alexandria waters. Ph.D. Thesis, Alexandria University, Faculty of Science.

Oren, O. H. 1975. Opening address IBP/PM international symposium on the grey mullet and their culture. Aqua., 5:3-8.

Pallaora, A.; Cetinic, P.; Dulcic, J.; Jardas, I. and Kraljevic, M. 1998. Biological parameters of the saddled bream *Oblada melanura* in the eastern Adriatic, Fisheries Research, Vol.38, 199-205.

Pallaoro, A.; Santic, M. and Jardas, I. 2003**.** Feeding habits of the saddled bream, *Oblada melanura* (Sparide), in the Adriatic Sea, Cybium, Vol.27, No.4, 261-268.

Sobar, R. and Lallh, M. 2017. Study of morphometric gonads maturity stages and determination reproductive period for Saddled bream (*Oblada melanura* L.) in the coastal waters of Tartous. J. of El-bass University. 39(28): 157-186.

Zaki, M.I.; Abu Shabana, M.B. and Assem, S.S. 1995. The reproductive biology of the saddled bream (*Oblada melanura* , L. 1758) from the Mediterranean coasts of Egypt, OEBALIA, Vol. XXI, 17-26.

بعض جوانب بيولوجيا التكاثر لسمكة اوبلادا ملينيورا (الكحلة) فى ساحل بنغازى - شرق ليبيا

فاطمة راف الله [١] – محمد المر [٢]

قسم علم الحيوان – كلية العلوم – جامعة عمر المختار ص ب: ٩١٩ القبة- ليبيا [١]

قسم علوم البحار – كلية العلوم – جامعة قناة السويس – الاسماعيلية - مصر [2]

تم دراسة عدد ٤٠٠ عينه من اسماك الكحلة من عائلة المورجانيات فى ساحل بنغازى – شرق ليبيا قد تم تجميعها بواسطة الشباك الاحادية والثلاثية الطبقات من المصيد التقليدى فى ميناء بنغازى شرق ليبيا. وبدراسة الشق الجنسى للسمكة وجد انه تم تجميع ٢٤٢ انثى بنسبة ٦٠,٥٪ وعدد ١٥٨ سمكة ذكر بنسبة ٣٩,٥٪ بنسبة شق جنسى عام ١ : ١,٥٣ للذكور والاناث.

والسمكة محل الدراسة وجد انها لها بداية نضج جنسى عند L_{50} = ١٧,٥ سم للذكور و١٨,٦ سم للاناث والدراسة اثبتت ان للسمكة موسم تكاثر محدد يمتد من مارس وحتى يونيو . والسمكة لها قطر بيوض سجل ٢٧,٤ ± ٣٤٥ ميكرومتر فى شهر يناير تزداد هذه القيمه فى الشهور التاليه وصولا لموسم التكاثر والتى تصل فيها السمكة لاقصى قيمه ٤٨٧,٨± ١١١٢ ميكرومتر فى يونيو.

والسمكة سجلت خصوبة مطلقة تتراوح بين ١٨١,٨± ٢٢٢٧٨ الى ٦١١,١± ٣٦٦٧٨٠ بويضة للاسماك ذات متوسط طول يتراوح بين ١٦,٥ سم الى ٣٢,٤سم اما الخصوبة النسبية فكانت تتراوح بين ١٣٥٠,٢ الى ١١٣٢٠,٤ بويضة لكل سم.