

Composition and abundance of fish assemblage in Khor Al-Zubair lagoon, North West of Arabian Gulf

K.H. Younis and A.Ch. Al-Shamary*

Marine Science Center, University of Basrah, Basrah-Iraq

*e-mail: a_kaseb@yahoo.com

(Received: 21 June 2015 - Accepted: 22 December 2015)

Abstract - The present study describes the fish assemblages in Khor Al-Zubair lagoon which was located in North West region of Arabian Gulf. The present research was carried out from August 2012 to July 2013 by using various nets. Two environmental factors *viz.*, temperature and salinity were measured during the study period. The total number of individuals collected was 2964. The highest number (513) was recorded in August month and the lowest number (31) was observed in January. Thirty eight species belonging to 28 families of Osteichthyes and two species of Chondrichthyes (*Aetobatus narinari* and *Chiloseyllium grisum*) were collected in the region, *Mastacemblus mastacembelus* and *Tilapia zillii* were recorded for the first time. The highest number of species (19) was recorded in September while the lowest (8) was noticed in the February month. Three species *viz.*, *Thryssa whiteheadi*, *Liza klunzingeri* and *L. subviridis* formed 43.65 % of the total fish catch. The overall value of diversity index (H), Evenness (D) and Richness (J) were 2.5, 3.4 and 0.8 respectively.

Key words: Khor Al-Zubair lagoon, Species Composition and Biodiversity index.

Introduction

The northern part of the Arabian Gulf was characterized by extensive mudflats which were described by Jones (1985). This is an important area which was used by many species of fishes as feeding and nursery ground at high tide (Hussain *et al.*, 1999a). The coasted line of Iraq was characterized by extensive mudflats and several deep water channels locally called as Khores e.g. Khor Al-Kafka, Khor Al-Amaya, Khor Abdullah, Khor Shetana and Khor Al-Zubair, the Iraqi marine water include shallow zones of 8 m or less depth in Khor Abdullah, Khor Shetana and Khor Al-Zubair and may reach an excess of 26 m in Khor Al-Kafka towards the open Gulf (Hussain *et al.*, 1999b), and that the water tidal rate in Khor Abdullah and Khor Al-Zubair up to 3.5 - 4.6 m (Mahdi, 1962).

Few previous fish survey were conducted in Khor Al-Zubair, Hussain and Naama (1989) recorded 73 species belong to 20 families Ali and Hussain (1990) recorded 34 species belong to 26 families and Hussain *et al.* (1994) recorded 32, 37 fish species in first and second station respectively. General studies reviewed some biological aspects like age and growth, food for some fish species Jabir *et al.* (1980) (*Thryssa mystax* and *T. hamiltonii*), Naama and Hussain (1989) (*Arius thalassinus*), Yousif and Naama (1992) (*Johnieops sina* and *Johinus belangerii*), Hussain *et al.* (1995) (*Nematolosa nasus*), Hussain *et al.* (1999) (*Bathygobius*

fuscus) and Hussain *et al.* (2001) (*Acanthopagrus latus*). The present study was aimed to study the composition of fish communities in the Khor Al-Zubair lagoon which was located in the North West region of Arabian Gulf.

Study Area:

The Khor Al-Zubair lagoon is located at 12 nautical miles from North of Umm Qasr and 15 nautical miles from South of Basrah. It is situated between Lat 30° 11' N and Long 47° 54' E. Khor Al-Zubair lagoon area (Fig. 1) is a Northwest extension of the Arabian Gulf towards lower Mesopotamia, it becomes from southwest of Basrah city and recently Shatt Al-Basrah canal. The length of Khor Al-Zubair lagoon is about 32 km with a width ranging between 100-800 m and depth is ranging between 10-15 m (Hussain and Naama, 1989).

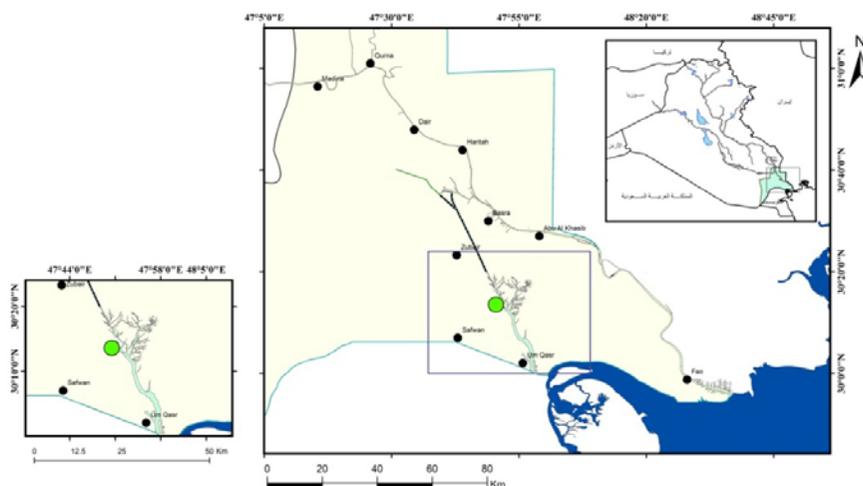


Figure 1. Map of Khor Al-Zubair lagoon.

Materials and Methods

The present study was conducted from August 2012 to July 2013 in Khor Al-Zubair lagoon Location: 30°13' 32.97" N 47°50' 28.21" E using two seine nets of total length of 100 m and 1.5 m depth with 20 and 25 mm mesh size and uses gill net of the total length 20 m and 1.5 cm mesh size. Fish specimens were identified according to Fischer and Bianchi (1984), and Kuronuma and Abe (1986) Mutlak and Al-Faisal (2009). Temperature and salinity were measured by using a (Yasi model 57, USA, from Kalbuneh company).

Relative Abundance:

The Relative Abundance was determined by following the formula proposed by Krebs (1974):

$$\% = (n_i / N) * 100$$

Where; n_i = Number of individuals for species in the sample.

N = Total number of individuals for all species and collected.

Diversity Index (H):

The Diversity Index (H) was studied by following the method proposed by Shanon and Weaver (1949):

$$H = -\sum P_i \ln P_i$$

Where; P_i = The proportion of individuals in the (i) the species of the whole sample.

Richness Index (D):

The Richness Index (D) was determined by following the formula given by Margalef (1968):

$$D = S - 1 / \ln N$$

Where; S= the number of species in the sample.

N= the number of individuals in the sample.

Evenness Index (J)

The Evenness Index (J) was calculated by the formula proposed by Pielou (1977):

$$J = H / \ln S$$

Where; H= Diversity Index.

S= The total number of species.

Jaccard Similarity Index (Ss%):

The Jaccard Similarity Index (Ss %) was determined by using the formula suggested by Boesch (1977):

$$Ss\% = [a / (a + b + c)] \times 100$$

Where; a= Sum of species occurred in sample A and B.

b= Sum of species occurred in sample A not in B.

c= Sum of species occurred in sample B not in A.

Occurrence of species was classified according to the method of Hussain and Naama (1989):

1-Common species (> 50), 2-Rare species (6-50) and 3-Very rare species (< 6).

Results

Catch Composition:

Number of Species:

A total of 40 species were collected during the study period in Khor Al-Zubair lagoon. Among them, two belongs to the Chondrichthyes: *Chilocyllium griseum* and *Aetobatus narinari*, and the rest of 38 species belongs to Osteichthyes. Two species viz., *Tilapia zillii* and *Mastacembelus mastacembelus* were recorded for the first time in the Khor Al-Zubair lagoon. The largest number of species (19) which formed 44.1 % were collected during the month of September, while the lowest number of species (8) was in the February month which formed 18.6 % of the total fish catch (Fig. 2, Table 1).

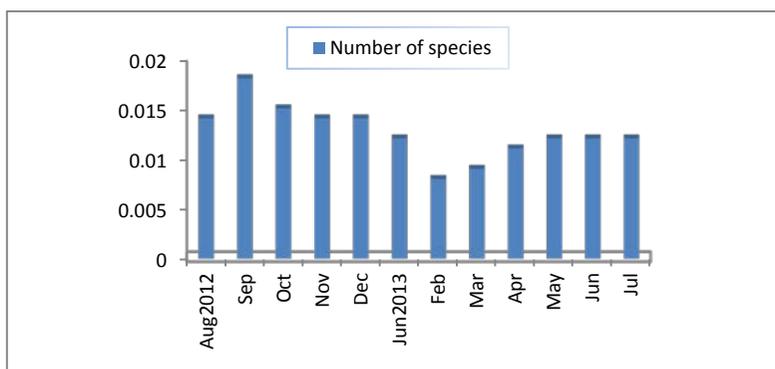


Figure 2. Number of species in Khor Al-Zubair lagoon.

Table 1. Check list of fish fauna collected from Khor Al-Zubair lagoon from August 2012 - July 2013.

Species	Family	Order
<i>Strongylura strongylura</i> (van Hasselt, 1823)	Belonidae	Beloniformes
<i>Chirocentrus dorab</i> (Forsskal, 1775)	Chirocentridae	Clupeiformes
<i>Nematalosa nasus</i> (Bloch, 1795)	Clupeidae	
<i>Sardinella albella</i> (Valenciennes, 1847)		
<i>Tenualosa ilisha</i> (Hamilton-Buchanan, 1822)		
<i>Thryssa hamiltonii</i> (Gray, 1853)	Engraulidae	
<i>Thryssa whiteheadi</i> (Bloch and Schneider, 1801)	Hemiramphidae	
<i>Rhynchorhamphus georgii</i> (Valenciennes, 1847)		
<i>Ilisha compressa</i> (Randall, 1994)	Pristigasteridae	
<i>Chiloscyllium griseum</i> (Muller & Henle, 1838)	Hemiscylliidae	Orectolobiformes
<i>Alepes djedaba</i> (Forsskal, 1775)	Carangidae	Perciformes
<i>Carangoides atula</i> (Forsskal, 1775)		
<i>Scomberoides commersonianus</i> (Lacepede, 1802)		
<i>Tilapia zillii</i> (Gervais, 1848)	Cichlidae	
<i>Cynoglossus arel</i> (Bloch & Schneider, 1801)	Cynoglossidae	
<i>Bathygobius fuscus</i> (Ruppell, 1830)	Gobiidae	
<i>Periophthalmus waltonii</i> (Koumans, 1941)		
<i>Leiognathus bindus</i> (Valenciennes, 1835)	Leiognathidae	
<i>Liza klunzingeri</i> (Day, 1888)	Mugilidae	
<i>Liza subviridis</i> (Valenciennes, 1836)		
<i>Upeneus sulphureus</i> (Cuvier, 1829)	Mullidae	
<i>Platycephalus indicus</i> (Linnaeus, 1758)	Platycephalidae	
<i>Eleutheronema tetradactylum</i> (Shaw, 1804)	Polynemidae	
<i>Polydactylus sextarius</i> (Bloch & Schneider, 1801)		
<i>Scatophagus argus</i> (Bloch, 1788)	Scatophagidae	
<i>Johnius belangerii</i> (Cuvier, 1830)	Sciaenidae	
<i>Johnius sina</i> (Cuvier, 1830)		
<i>Otolithes ruber</i> (Bloch & Schneider, 1801)		
<i>Epinephelus coioides</i> (Hamilton, 1822)	Serranidae	
<i>Sillago sihama</i> (Forsskal, 1775)	Sillaginidae	
<i>Acanthopagrus arabicus</i> (Houttuyn, 1782)	Sparidae	
<i>Sparidentex hasta</i> (Valenciennes, 1830)		
<i>Pampus argentatus</i> (Euphrasen, 1788)	Stromnidae	
<i>Trichiurus lepturus</i> (Linnaeus, 1758)	Trichiuridae	
<i>Pseudorhombus arsius</i> (Hamilton, 1822)	Psettodidae	Pleuronectiformes
<i>Aetobatus narinari</i> (Euphrasen, 1790)	Myliobatidae	Rajiformes
<i>Euryglossa orientalis</i> (Bloch & Schneider, 1801)	Scorpaenidae	Scorpaeniformes
<i>Pseudosynanceia melanostigma</i> (Day, 1875)		
<i>Arius bilineatus</i> (Valenciennes, 1840)	Ariidae	Siluriformes
<i>Mastacembelus mastacembelus</i> (Banks & Solander in Russell, 1794)	Mastacembelidae	Synbranchiformes

The Relative abundance of species collected in Khor Al-Zubair lagoon was studied and the results were furnished in Table (2). The majority of the caught species were belonged to the family Mugillidae and formed 28.1% with two species viz., *L. subviridis* and *L. klunzingeri* in Khor Al-Zubair lagoon. While, five families recorded lowest number of caught species which belongs to the families like Pestodidae, Sciaenidae, Belonidae, Serranidae and Mastacembelidae. The number and percentage of other families and species were listed below in the Table (2).

Table 2. Relative abundance of species collected in Khor Al-Zubair lagoon during the study period.

Family	Number	%	Species	R. A %
Ariidae	6	0.20	<i>A. bilineatus</i>	0.20
Belonidae	2	0.06	<i>S. strongylura</i>	0.06
Carangidae	263	8.86	<i>A. djedaba</i>	0.60
			<i>A. mata</i>	1.34
			<i>S. commersonianus</i>	6.91
Chirocentridae	14	0.47	<i>C. dorab</i>	0.47
Clupeidae	215	7.24	<i>N. nasus</i>	0.70
			<i>S. albella</i>	0.47
			<i>T. ilisha</i>	6.06
Cynoglossidae	173	5.83	<i>C. arel</i>	5.83
Engraulidae	467	15.74	<i>T. hamiltonii</i>	0.57
			<i>T. whiteheadi</i>	15.17
Gobiidae	238	8.02	<i>B. fuscus</i>	3.64
			<i>P. waltoni</i>	4.38
Hemiramphidae	30	1.01	<i>R. georgii</i>	1.01
Leiognathidae	71	2.39	<i>L. bindus</i>	2.39
Mastacembelidae	2	0.06	<i>M. mastacembelus</i>	0.06
Mugilidae	834	28.1	<i>L. klunzingeri</i>	14.56
			<i>L. subviridis</i>	13.55
Mullidae	4	0.13	<i>U. sulphureus</i>	0.13
Platycephalidae	27	0.91	<i>P. indicus</i>	0.91
Polynemidae	40	1.34	<i>E. tetradactylum</i>	0.67
			<i>P. sextarius</i>	0.67
Pristigasteridae	9	0.30	<i>I. compressa</i>	0.30
Psettodidae	2	0.06	<i>P. arsius</i>	0.06
Scatophagidae	21	0.70	<i>S. argus</i>	0.70
			<i>J. belangerii</i>	3.30
			<i>J. sina</i>	9.13
Scorpaenidae	47	1.58	<i>O. ruber</i>	0.06
			<i>E. orientalis</i>	1.34
Serranidae	2	0.06	<i>E. coioides</i>	0.06
Sillaginidae	62	2.09	<i>S. sihama</i>	2.09
			<i>A. arabicus</i>	1.75
Sparidae	79	2.66	<i>Argyrop sp.</i>	0.23
			<i>S. hasta</i>	0.67
			<i>P. argentetus</i>	0.06
Stromnteidae	14	0.47	<i>T. lepturus</i>	1.55
			<i>T. zillii</i>	0.40
Trichiuridae	46	1.55		

The species occurred in the present study from Khor Al-Zubair lagoon was compared with the previous studies of Ali (1985), Hussain *et al.* (1988), Hussain and Naama (1989) and the results were given in Table (3). Two new species *viz.*, *M. mastacembelus*, *T. zillii* were recorded in the Khor Al-Zubair lagoon during the present study. The highest similarity (58.62%) was found between the research of

Table 3. Comparison of species occurred in Khor Al-Zubair lagoon with previous studies.

Species	Ali (1985)	Hussain <i>et al.</i> (1988)	Hussain and Naama (1989)	Present study
<i>Acanthopagrus arabicas</i>	*		*	*
<i>Acanthopagrus berda</i>			*	*
<i>Alburnus capito</i>		*		
<i>Alepes djedaba</i>			*	*
<i>Anodontostoma chacunda</i>		*		
<i>Argyrops spinifer</i>				*
<i>Arius bilineatus</i> (Previously recorded as <i>Arius thalassinus</i>)	*	*	*	*
<i>Atule mata</i>			*	*
<i>Bathygobius fuscus</i>			*	*
<i>Boleophthalmus dussumieri</i>	*		*	
<i>Bregmaceros maccliettandii</i>		*	*	
<i>Carchahinus dussumieri</i>		*	*	
<i>Carcharhinus leucas</i>			*	
<i>Chiloscyllium grisem</i>			*	
<i>Chirocentrus dorab</i>		*	*	*
<i>Chirocentrus nudus</i>	*			
<i>Cynoglossus arel</i>	*		*	*
<i>Dasyatic gerrardi</i>		*		
<i>Dasyatic imbricatus</i>		*		
<i>Eluotheronmema tetradactylum</i>	*		*	*
<i>Epinephelus coides</i>	*			*
<i>Eupleurogrammus glossodon</i>	*			*
<i>Euryglossa orientalius</i>			*	*
<i>Hemiramphus marginatus</i>			*	
<i>Hypolophus sephen</i>		*	*	
<i>Ilisha compressa</i>			*	*
<i>Ilisha megaloptera</i>		*	*	
<i>Ilisha melastoma</i>		*	*	
<i>Jenius carutta</i>	*			
<i>Johnuis belangerii</i>			*	*
<i>Johnuis sina</i>			*	*
<i>Leiognathus bindus</i>	*		*	*
<i>Lethrinus netulosus</i>	*			
<i>Liza abu</i>			*	
<i>Liza klunzingeri</i>			*	*
<i>Liza lacrolepis</i>	*			
<i>Liza subviridis</i>			*	*
<i>Maraenosex cinereus</i>	*	*	*	
<i>Mastacemblus mastacemblus</i>				*
<i>Nematalosa Arabica</i>		*		
<i>Nematlosa nasus</i>	*	*	*	*
<i>Otolithes ruber</i>	*		*	*

Table 3. Continued...

Species	Ali (1985)	Hussain <i>et al.</i> (1988)	Hussain and Naama (1989)	Present study
<i>Pampus argenteus</i>			*	*
<i>Periophthalmus waltoni</i>			*	
<i>Platycephalus indicus</i>	*	*	*	*
<i>Polydactylus sextarius</i>	*		*	*
<i>Pomadasys argenteus</i>	*		*	
<i>Pristis cuspidatus</i>			*	
<i>Psettodes erumei</i>			*	*
<i>Pseudorhombus arsius</i>			*	
<i>Pseudosynanceia melanostigma</i>	*		*	*
<i>Rhinobatus granulatus</i>	*	*	*	
<i>Rhynchorhamphus georgii</i>			*	*
<i>Sardenella albella</i>		*	*	*
<i>Saurida undosquamis</i>		*	*	
<i>Scatophagus argus</i>	*		*	*
<i>Scomberomorus commerson</i>			*	*
<i>Sillago sihama</i>	*		*	*
<i>Sparidentex hasta</i>			*	*
<i>Strongylura strongylura</i>		*	*	*
<i>Tenualosa ilisha</i>	*	*	*	*
<i>Therapon puta</i>		*	*	
<i>Thryssa hamiltonii</i>		*	*	*
<i>Thryssa purava</i>	*			
<i>Thryssa whiteheadi</i>	*	*	*	*
<i>Tilapia zillii</i>				*
<i>Trichiurus haumele</i>	*		*	
<i>Trichiurus lepturus</i>			*	
<i>Upeneus sulphureus</i>		*	*	*

Hussain and Naama (1989) and present study. The lowest similarity (14.28%) was observed between the studies of Ali (1985) and Hussain *et al.* (1988).

Result of cluster analysis showed the similarity degree in fish assemblage of Khor Al-Zubair lagoon which indicated the existence of two main groups include the first two secondary group. The first secondary group includes April, June, February, March and January month and the second secondary group includes July month only. The second main group includes two secondary groups. The first includes September, November and August, and the second includes October, December and May (Fig. 3).

Diversity Index:

Monthly values of the richness index (D) was fluctuated between 1.90 (in February) to 3.4 (in September). While, the highest values (2.4) of diversity index (H) was obtained in September and June 2013 and the lowest (1.4) was noticed in October month. The evenness index (J) was fluctuated from 0.4 (in October) to 0.8 (in June 2013) (Fig. 4). A total number of 2964 individuals were collected in Khor Al-Zubair lagoon during the study period. The highest number of individual (513)

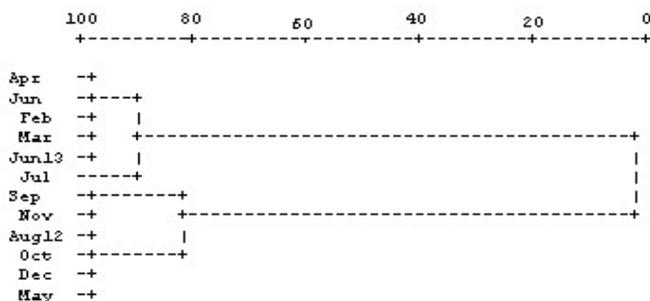


Figure 3. Cluster analysis for similarity degree in composition fishes in Khor Al-Zubair lagoon.

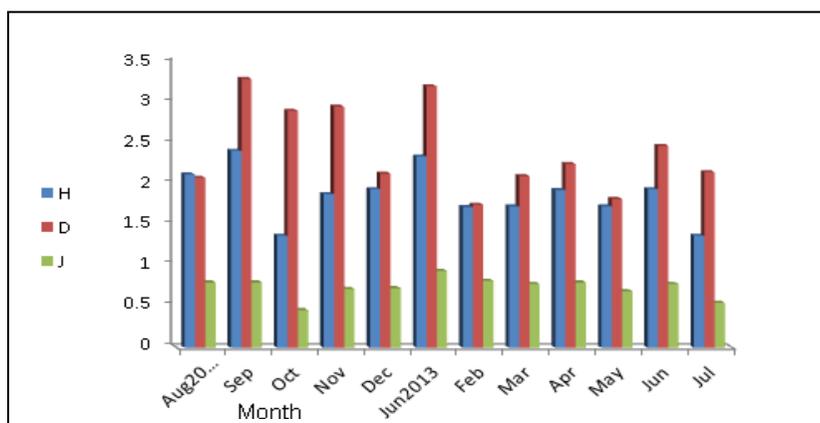


Figure 4. Diversity (H) Evenness (J) and Richness (D) value.

specimen was obtained in August forming 17.3 % of the total fish catch and the lowest (31) specimens 1.04 % were recorded in January.

Three species formed 43.05% of the total fish catch in Khor Al-Zubair. The *T. whiteheadi* (450) formed 15.2 % of the total catch, the second *L. klunzingeri* (425) formed 14.3 % and the great numerical abundance for the species in October which formed 60.8 % of the total fish catch in this month and the third. The *L. subviridis* (402) accounted for 13.6 % of the total fish collected in Khor Al-Zubair lagoon. *L. subviridis* was dominant species in November, which formed 38 % from the total fish catch in this month. Some species appeared in high numerical abundance in some month like *C. arel* in December which formed about 24.4 % of the total fish catch in this month (Fig. 5).

Ecological Factors:

Two environmental factors were used to measure the temperature and salinity. The highest temperature recorded was 32 °C in September and the lowest was observed as 12.8 °C in January while the highest concentration of salinity was found in September (58.24 ppt) and the lowest concentration of salinity was noticed in January (21.6 ppt) (Fig. 6). The relationship of temperature and salinity with number of species and total fish individuals were reflected as correlation coefficient $r =$ values. Positive correlation was obtained between salinity and number of species

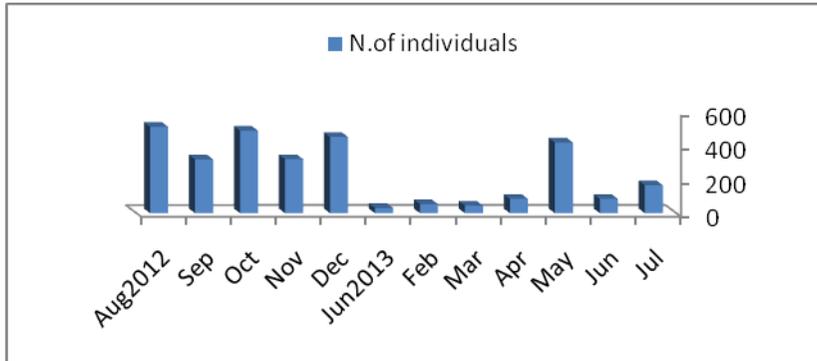


Figure 5. Number of individuals catch in Khor Al-Zubair lagoon.

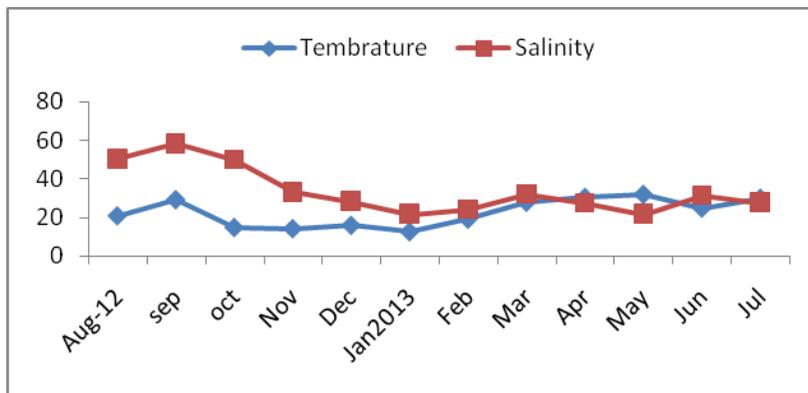


Figure 6. The temperature and salinity in the study area.

$r = 0.83$ and number of fish individuals $r = 0.096$, however temperature exhibited positive correlation with number of species $r = 0.51$ and individuals $r = 0.22$.

The Abundance of Fish:

The abundance of fish in Khor Al-Zubiar lagoon was studied and the results were presented in Table (4). The Table (4) showed the occurrence of species collected in Khor Al-Zabair lagoon according to their relative abundance during the study period.

Table 4. Fish abundance in Khor Al-Zubiar lagoon.

Species	Number	Group
<i>U. sulphureus</i> , <i>P. rhombus</i> , <i>O. ruber</i> , <i>A. bilienatus</i> , <i>S. strongylura</i> , <i>M. mastacembelus</i> , <i>E. coioides</i> , <i>A. narinari</i> and <i>C. griseum</i> .	<6	Very rare
<i>P. melanostigma</i> , <i>E. tetradactylum</i> , <i>C. dorab</i> , <i>A. mata</i> , <i>T. hamiltoni</i> , <i>S. orintalis</i> , <i>P. indicus</i> , <i>N. nasus</i> , <i>A. diedaba</i> , <i>S. hasta</i> , <i>P. sixtarius</i> , <i>S. albella</i> , <i>P.georgii</i> , <i>I. megaloptera</i> , <i>T. zillii</i> , <i>A. spinifer</i> and <i>L. klunzingeri</i> .	6 - 50	Rare
<i>T. ilisha</i> , <i>T. whiteheadi</i> , <i>J. sina</i> , <i>A. arabicus</i> , <i>L. subviridis</i> , <i>B. fuscus</i> , <i>S. argus</i> , <i>L. bindus</i> , <i>C. arel</i> , <i>S. anus</i> , <i>S. sihama</i> and <i>J. belangerii</i> .	More than 50	Common

1-Common Species (More than 50): This group includes 12 species which formed 30.7 % of the total species collected (2551) fishes were collected from this group amounted to 86 % of the total number of fish collected.

2-Rare Species (6-50): Seventeen rare species were collected formed 43.5% of the total catch and 393 individual were collected comprising 13.2% of the total catch

3-Very Rare Species (<6): This group includes ten species accounted for 25.6 % of the total sample collect 16 individual from this group were captured which formed 0.53 % of the total fish collected.

Discussion

The present study indicated that the fish population of Khor Al-Zabiar lagoon related to coast all species in not contain any species pelagic, and that total of 40 species were collected from two of them to the condrichthyes, the rest 38 species to the osteichthyes, this number was higher than that obtained from previous studies which was performed on the same area (Ali and Hussain, 1990; Hussain *et al.*, 1994). This may be due to the increase of salinity which encouraged the entry of euryhaline marine species which reflects the correlation coefficient between salinity and number of species which amounted to 0.83. As from the point of view of the obtained results, it was showed that the highest number of species (18) was obtained during the September month and the lowest (8) was recorded in the February month and this was due to winter migration to the deep-water Arabian Gulf Winter migration which was previously reported by Wright (1988). Many studies in Iraqi marine reported that the fishes were move out from the Sulaibkhat Bay to (Ali and Hussain, 1990; Younis, 1990; Hussain *et al.*, 1999; Ali, 1993). While, the highest number of species which was recorded in September may be attributed to consistent with the second phytoplankton bloom (Al-Shaban, 1996). *T. ilisha* occurrences in Khor Al-Zubiar could be belonged to non my greatly population as that one agressed in Khor Al-Zubiar. Most of the Indus were collected during the hot summer season and the lower was during winter and early spring. This could be to all migration to deep water spawning season and indicated that the three species accounted for 43.05 % of fish collected. The dominanc of the species belonging to the family Mugilidae (*L. subviridis* and *L. klunzingeri*) and Engraulidae (*T. whiteheadi*) was also recorded in the previous studies by Ali (1985) in Khor Al-Zubair, where it registered the three species (*L. macrolepis*, *T. whiteheadi* and *T. hamiltonii*) and dominant in the fish assemblage of Khor Al-Zubair lagoon and the same results were obtained by Younis (1990) in the North of Khor Abdullah where three species *L. subviridis* (32.55 %), *T. whiteheadi* (14.24 %) and *T. hamiltonii* (11.30%) was formed as 56.54 % of the total fish catch and this was agreed with the findings of Horn and Allen (1985) who proposed that the coastal area (bay and estuaries) was characterized by few species with high numerical abundance. The results of the present research indicates that the dominant of Mugilidae family in fish catch of Khor Al-Zubair lagoon was 28.1% among the total fish. It seems that the species belonged to Mugilidae family was the dominant catch when compared to other families. Family in the coastal region from the north of Arabian Gulf recorded the dominant of this family in several studies. Mugilidae family was considered as an important family in the coastal area in the north west Arabian Gulf and the species of this family formed a high percentage from a fish assemblage like *L. macrolepis* (27.04 %) in Khor Al-Zubair lagoon (Ali, 1985); *L. subviridis* (67 %) in the same region (Al-Hassnawi, 1990); *L. subviridis* (31 %) in north of Khor Abdullah

(Younis, 1990); *L. Carinata* (61.2 %) in Sulaibkhat Bay (Wright, 1988) and *L. subviridis* (59.59 %) and (44.3 %) in Shatt Al-Basrah (Yousife, 1986; Younis and Al-Shammary 2012).

The occurrence of two species *viz.*, *T. zillii* and *M. mastacembelus* were accident species proof with water consent from Shatt Al-Basrah and recorded for first time in Khor Al-Zubair lagoon *T. zillii* consider as wide spread species and the most resistance to diseases and hard environmental conditions such as high salinity and low levels of oxygen values (Altun *et al.*, 2006). This species was recorded for the first time in Basrah in the southern part of main outfall drain by Mutlak and Al-Faisal (2009), this species by Stenohalin marine species. The species composition in Khor Al-Zubair with the same was reported by breve studies with Marian alteration but the major are the same by Ali (1985); Younis (1990) and Hussain *et al.* (1999b), and the assurances in *T. zillii* which showed that the Khor Al-Zubair could be considered others feeding for them or important aggregation area before sending to the plain water of south region (Hussain *et al.*, 1999b).

References

- Al-Hassnawi, F.M.J. 1990. Biological *Liza subviridis* fish in Khor Al-Zubair South of Iraq. M.Sc. thesis, Marin Science Center, Basrah University, 106pp (In Arabic).
- Ali, T.S. 1985. First study round assemblage Osteichthyes in Khor Al-Zubair. M.Sc. thesis, College of Science, University of Basrah, 108pp (In Arabic).
- Ali, T.S. 1993. Composition and seasonal fluctuations of fish assemblage in the Northwest Arabian Gulf, Iraq. *Marina Mesopotamica*, 8(1): 119-135.
- Ali, T.S. and Hussain, N.A. 1990. Composition and seasonal fluctuations of intertidal fish assemblage in Khor Al-Zubair, Northwest Arabian Gulf. *J. Appl. Ichthyol.*, 6: 24-36.
- Al-Shaban, A.A. 1996. Primary production of the benthic microalgae in Shatt Al-Arab River. Ph.D. thesis, University of Basrah, 127pp.
- Altun, T., Tekelioglu, N. and Danabas, D. 2006. Tilapia culture and its Problems in Turkey. *J. Fish. and Aquat. Sci.*, 23(3-4): 473-478.
- Boesch, D.F. 1977. Application of numerical classification in ecological investigation of water pollution U.S. Environmental Protection Agency, ecological series EPA 600-13-77-033, Corvallis, Oregon, 60pp.
- Fischer, W. and Bianchi, G. 1984. FAO species identification for fishery purpose western Indian Ocean (Fishing Area 51) Vol. 3, 594pp.
- Horn, M.H. and Allen, L.G. 1985. Fish community ecology in southern California Bays and estuaries. In: Ayanez-Aroncibia (Ed.) *Fish community ecology in estuaries and coastal lagoon towards an ecosystem Integration*, 645pp.
- Hussain, N.A., Ali, T.S. and Younis, K.H. 1999a. Temporal and spatial movements of common fishes of the mudflats of Iraq west Arabian Gulf. *J. Mar. (Mar. Res.)*: 5(2): 99-112.
- Hussain, N.A., Faris, A.A. and Majeed, S.A.I 1995. Age and growth of jaffoot *Nematlosa nasus* in Khor Al-Zabair estuary North West Arabian Gulf, Iraq. *Marina Mesopotamica*, 10(1): 49-60.
- Hussain, N.A., Mohamed, A.R.M., Younis, K.H. and Mutlak, F.M 1999b. The biology of *Bathygobius fuscus* at the intertidal mudflats of Khor Al-Zubair lagoon North West Arabian Gulf. *Marina Mesopotamica*, 14(1): 132-147.
- Hussain, N.A. and Naama, A.K. 1989. Survey of fish fauna of Khor Al-Zubair. NW Arabian Gulf. *Marina Mesopotamica*, 4(2): 161-197.

- Hussein, S.A., Al-Shawi, I.J.M. and Al-Nasir, A.M. 2001. Impact of Al-Najebia thermal energy power plant on aquatic ecosystem of Garmat Ali canal, physico-chemical characteristics. *Marina Mesopotamica*, 16(2): 517-525.
- Jabar, M.K., Naama, A.K. and Hussain, N.A. 1980. Age and Growth of anchovies *Thryssa mystax* and *Thryssa hamiltoni* in Khor Al-Zubair, North West Arabian Gulf. *Marina Mesopotamica*, 3(2): 157-172.
- Jones, D.A. 1985. The biological characteristic of the marine habitats ROPME sea area. Proceeding of ROPM symposium on Regional Marine pollution Monitoring and Research Programs (ROPME/GC-4/2), pp: 71-89.
- Krebs, C.J.K. 1974. *Ecological Methodology*. Harper and Row, USA, 521pp.
- Kuronuma, K. and Abe, Y. 1986. *Fishes of the Arabian Gulf*, Kuwait Institute for Scientific Research by the International Academic Printing Co. Ltd, Tokyo, Japan, pp: 1-35.
- Mahdi, N. 1962. *Fishes of Iraq*. Ministry of Education, Baghdad, 82pp.
- Margalef, R. 1968. *Perspectives in ecology*. University of Chicago, Chicago, 111pp.
- Mutlak, F.M and Al-Faisal, A.J. 2009. A new record of two exotic cichlids fish *Oreochromis aureus* (Steindacher, 1864) and *Tilapia zillii* (Gervais, 1848) from south of the main outfall drain in Basrah city. *Mesop. J. Mar. Sci.*, 24(2): 160-170.
- Pielou, E.C. 1977. *Mathematical Ecology*. John Wiley, New York, 365pp.
- Wright, J.M. 1988. Recruitment patterns and tropic relationship of fish in Sulaibikhat Bay, Kuwait. *J. Fish. Biol.*, 33: 671-687.
- Younis, K.H. 1990. A study of fish assemblages in the North of Khor Abdulla, M.Sc. thesis, Marine Science Center, University of Basrah, 95pp (in Arabic).
- Younis, K.H. and Al-Shamary, A.CH. 2011. Species composition of fishes assemblage in Shatt Al-Basrah canal, South of Iraq. *J. Aquaculture*, 8(2): 137-156 (In Arabic).
- Yousif, A.Y. 1986. Species structure of fishes in the Shatt Al-Basrah canal and their feeding relationships. M.Sc. thesis, Agriculture College, Basrah University, 118pp.
- Yousif, U.H. and Naama, A.K. 1992. Biological study of *Johnnieops sina* and *Johnnieops belangerii* from Khor Al-Zubair, North West Arabian Gulf. *Marina Mesopotamica*, 7(2): 323-329.

دراسة التركيب النوعي لتجمع الأسماك في خور الزبير شمال غرب الخليج العربي

كاظم حسن يونس و أحمد جاسب الشمري

مركز علوم البحار، جامعة البصرة، البصرة - العراق

المستخلص - تضمنت الدراسة وصف للتركيب النوعي للأسماك للفترة من آب 2012 إلى تموز 2013 استعملت شبكات مختلفة لصيد الأسماك. قيست درجة الحرارة وتركيز الملوحة، وصيد 2964 فرد خلال مدة الدراسة وظهر شهر آب أكثر وفرة عددية من بقية الأشهر وبلغ 513 سمكة وأقل عدد 31 سمكة في شهر كانون الثاني. اصطيد 38 نوعاً تعود إلى 28 عائلة من الأسماك العظمية وسجل نوعان من الأسماك الغضروفية هما القوبع *Aetobatus narinari* والكوسج *Chiloseyllium griseum* كما سجل النوعين البلطي النيلي *Tilapia zillii* والمرمريج و *Mastacemblus mastacemblus* لأول مرة في خور الزبير. ظهر أكبر عدد من الأنواع (19) نوعاً في شهر أيلول بينما ظهر أقل عدد في شهر شباط. شكلت ثلاثة أنواع *Liza klunzingeri* و *Liza subviridis* و *Thryssa whiteheadi* 43.65% من العدد الكلي للأسماك المصادة من خور الزبير، وحسبت أدلة التنوع (H) والتساوي (D) والغنى (J) وكانت القيمة الكلية لها (2.5 و 3.4 و 0.8) على التوالي.