Marsh Bulletin *9(1)(2014) :79-87*

MARSH BULLETIN

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Spatial and Temporal distribution of fish eggs and larvae abundance at Shatt Al-Arab estuary in the northwest Arabian Gulf

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Abstract

Ichthyoplankton sampling was conducted at two stations in the northwestern part of Arabian Gulf (Shatt Al-Arab estuary A1 and Khor Abdulla A2), during June 2012 to May 2013. A total of 1426 fish eggs and 2118 fish larvae were collected using conical plankton net (mesh size 300µm). Three families (Sciaenidae, Soleidae and Clupeidae) of fish eggs and eight families (Gobiidae, Engreaulidae, Sciaenidae, Soleidae, Clupeidae, Polynemidae, Bothidae and Cynoglossidae) of fish larvae were identified. Sciaenid fish egg comprised 50.49% of all eggs collected and peak of abundance (45.2 egg/10m²) at station in June. Three fish families (Gobiidae, Engreaulidae and Clupeidae) comprised 85.5% of all larvae collected. Maximum abundance of gobiid larvae at station A1 in May (25.8 larvae/10m²), Engraulid larvae (48.3 larvae/10m²) at station A2 in May. Clupid larvae (20.4 larvae/10m²) at station A2 in June. Fish larvae abundance were significant positively correlated with surface temperature and surface salinity at both stations. This study showed the importance of northwestern part of Arabian Gulf as spawning sites and nursery for many fishes.

Introduction

The northwestern part of Arabian Gulf is one of the most productive areas of the Arabian Gulf (Al-Zu
of turbulence, and a reduced risk of predation (Beck *et al*., 2001, McLusky and Elliott 2004).

Studies of abundance and distribution of fish eggs and larvae in northwest part of Arabian Gulf are limited to that of Ahmed (1990) who studied the abundance, diversity, and seasonality of fish larvae in Khor Al-Zubair estuary in northwestern part of Arabian Gulf, Ahmed and Hussain (2000a) identified the eggs of commercial families occurred in Shatt Al-Arab estuary, and Al-Okailee (2001) recorded the abundance and distribution of fish eggs and larvae in Shatt Al-Arab estuary in northwest Arabian Gulf.

This study investigated the fish egg and larvae community which provides information on their seasonal and spatial abundance and distribution in Northwest of Arabian Gulf.

Material and methods

The study area:

The present study carried out in northwestern part of Arabian Gulf. This part differs physic-oceanographically from other Arabian Gulf region due to the sediments transported by Shat Al-Arab river. Al-badran (1995) found that these sediment were composed of 48.2 % sand, 28.3% clay and 23.5% silt.

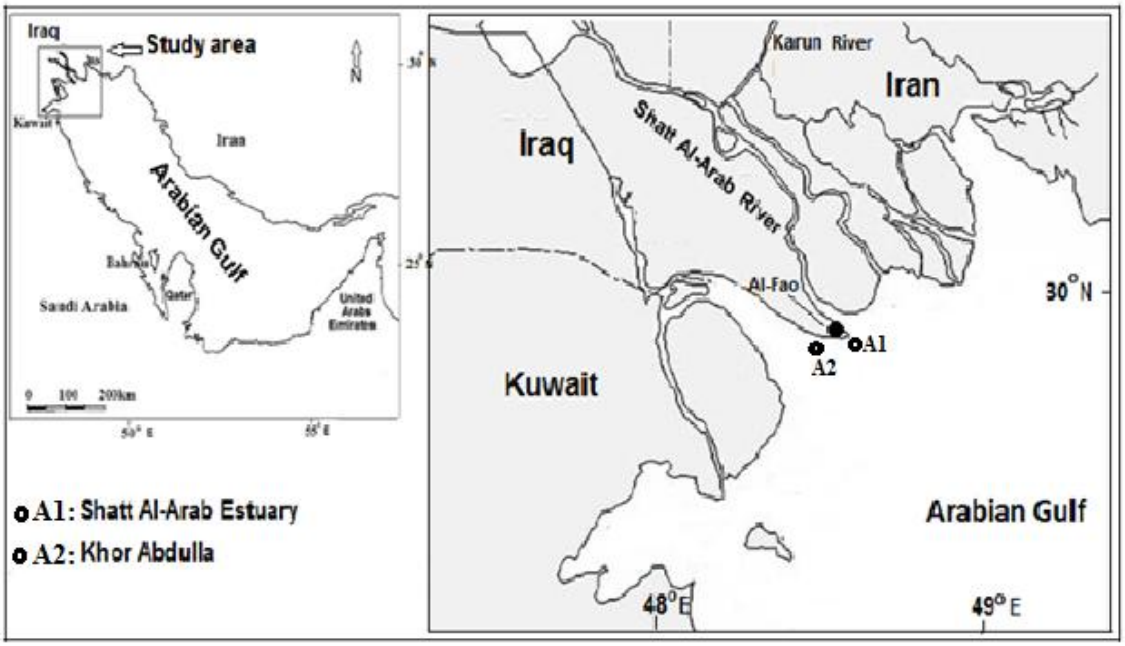

Fig. (1): Study area in the Iraqi marine water, northwest Arabian Gulf.

Collection of sample:

Twenty four ichthyoplankton samples were collected monthly during the period between June 2012 to
Station A1: Shatt Al-Arab estuary (29 51.0 N, 48 47.0 E) depth 5m.
Station A2: Khor Abdulla (29 46.0 N, 48 48.0 E) depth 15 m (Fig. 1).

The sampling was conducted using conical plankton net (1 meter length, upper opening of the net is preserved in 10% formalin solution. After each sampling, water temperature and salinity were measured.

The specimens were examined under binoculars microscope and identified according to Okiyama (1988). Abundance of eggs and larvae was calculated according to the formula of Smith and Richardson (1977):

$$A=N\times D\times 10/ V$$

Where A is abundance under $10m^2$ of sea surface, N number of eggs or larvae, D depth of tow (m), V volume of water filtered (m^3).

Results

Water temperature and salinity:

Water temperature were similar at the two stations (fig. 2) ranging from 13°C in February to 33°C in July. Salinities in the station A1 varied from 32‰ in April to 39‰ in July while at station A2 33‰ in April to 41‰ in July (fig. 2).

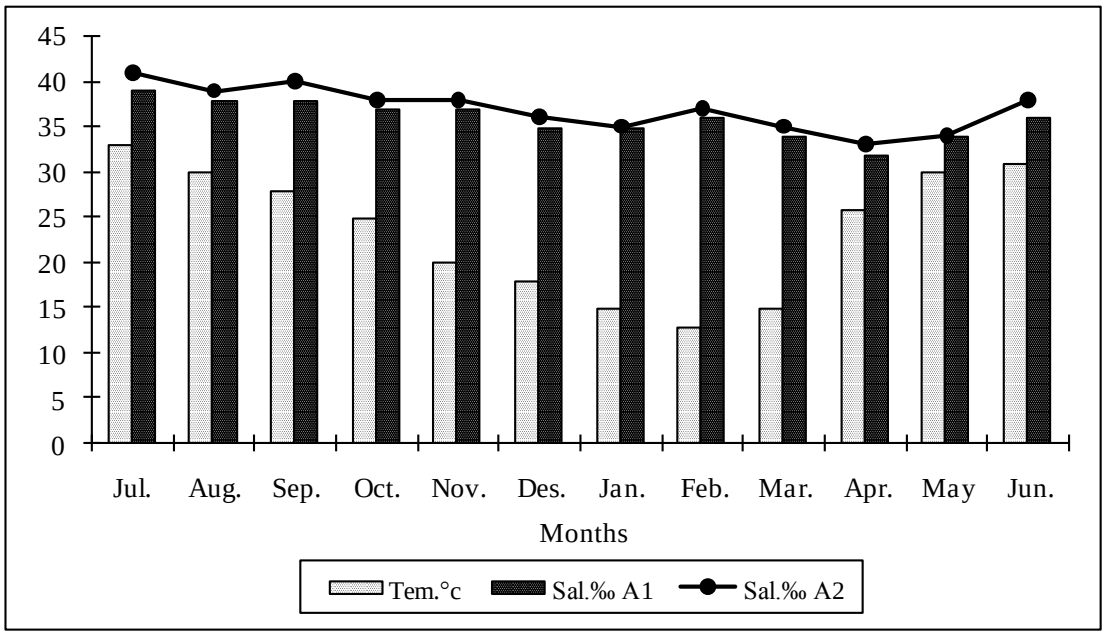

Fig. (2): Monthly variations in the water temperature and salinity in the sampling station.

Composition of ichthyoplankton:

During the present survey, a total of 1426 fish eggs and 2118 fish larvae were collected. Table (1) shows the total number of fish eggs of fish families. These families include Sciaenidae,

Soleidae and Clupidae. The eggs of Sciaenidae comprised 50.49% of total fish eggs collected during this survey.

Table (1): Total number and percent composition of fish eggs collected in the northwest Arabian Gulf.

Family	Total number	percentage for Composition %
Clupidae	306	21.45
Soleidae	400	28.05
Sciaenidae	720	50.49
Total	1426	

Number of fish larvae collected from stations A1, A2 are shown in table 2. The larvae of three families (Gobiidae, Engraulidae and Clupidae) constituted 85.65% of the total number of larvae.

Table (2): Total number and percent composition of fish larvae collected in the northwest Arabian Gulf.

family	Total number	percentage for Composition %
Gobiidae	805	37.9
Engraulidae	678	31.49
Clupidae	363	16.9
Sciaenidae	204	9.9
Soleidae	30	1.39
Cynoglossidae	7	0.29
Polynemidae	27	1.25
Bothidae	4	0.19
	2118	

Abundance of eggs and larval families:

Abundance of eggs taken from two stations and during twelve months are given in table 3 and 4. The clupid eggs were recorded in the stations A1 and A2 with peak of abundance (23 egg/10m²) at station A1 in June (Table 3). Soleid eggs were most abundant at station A2 (27 egg/10m²) in February, while sciaenid eggs were more abundant (45.2 egg/10m²) at station A1 in June (Table 3, 4).

Table (3): Abundance (egg/10m²) of fish eggs at station A1 in northwest Arabian Gulf.

Family	**Jul.**	**Aug.**	**Sep.**	**Oct.**	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**Jun.**
Clupidae	10.8										19	23
Soleidae							11.2	23	11.8	1.1	0.6	
Sciaenidae	22	1.8									2.6	45.2

Table (4): Abundance (egg/10m²) of fish eggs at station A2 in northwest Arabian Gulf**.**

Family	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.
Clupidae	12.7										18.7	21
Soleidae							16	27	13.4	2.9	1.3	
Sciaenidae	17	2.3									3.3	44.8

Table (5, 6) shows abundance of larval fish families in the northwest Arabian Gulf at the two stations A1,A2. Maximum abundance of gobiid larvae at station A1 in May (25.8 larvae/10m²). Engraulid larvae shows higher abundance (48.3 larvae/10m²) at station A2 in May. Clupid larvae were present at almost all station. The greatest abundance of Clupid larvae (20.4 larvae/10m²) was observed at station A2 in June.

Table (5): Abundance (larvae/10m²) of fish larvae at station A1 in northwest Arabian Gulf.

Family	**Jul.**	**Aug.**	**Sep.**	**Oct.**	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**Jun.**
Gobiidae	7.7	2.7	2.7	0.85	0.5				22.16	25.6	25.8	22.86
Engraulidae	24	1	0.35								44.5	24.06
Sciaenidae	4.5	0.65	0.5	0.2							5.4	24
Clupidae	12.9	11					0.2	0.5			11.6	15
Soleidae			0.18			0.13	0.14	0.3	1.9	0.17	0.17	0.2
Cynoglossidae		0.3	0.32									
Polynemidae	2.8	2										0.5
Bothidae											0.28	

Fish larvae abundance were significant positively correlated with surface temperature (A1: r = 0.72, A2: r =0.74, $p < 0.05$) and surface salinity at both stations (A1: r = 0.56, A2: r =0.54, $p < 0.05$).

Table (6): Abundance (larvae/10m²) of fish larvae at station A2 in northwest Arabian Gulf.

Family	**Jul.**	**Aug.**	**Sep.**	**Oct.**	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**Jun.**
Gobiidae	3.9	0.8	0.7	0.1	0.19				8.3	12.0	11.4	
Engraulidae	23	5.2	2.7								48.3	
Sciaenidae	8.4	1.7	0.9	0.24							5.8	
Clupidae	12.7	9.8					2.5	2.2			15.8	
Soleidae	0.1	0.1	0.18				0.16	0.2	0.3	0.21	2.7	
Cynoglossidae		0.3	0.32									
Polynemidae	2.9	4										

Discussion:

Many marine fishes, including non-resident species, spawn in or near productive coastal bays and estuaries (Chute and Turner, 2001), and many fish species utilize estuaries as nurseries feeding and growth grounds during their planktonic phase (Joyeux *et al*., 2004).

Distribution of larval fishes in northwest Arabian Gulf may reflect a response to predation, prey resources or drift because of wind-generated water currents (Johnston *et al*., 1995). The abundance and location of larvae may reflect the behavior and spawning habitat requirements of adults (Pope and Willis 1998).

The survey showed that eight families are dominate the ichthyoplankton populationof the study area. These fish families were considered as a very common in all its life stage during the year (Ali, 1993) Such families are known as a resident species in the north west Arabian Gulf (Hussain *et al*., 1999). The highest abundance and types of ichthyoplankton during March to September and its lowest abundance and types was observed in October to February were agreed with Al-Okailee (2001).

The temperature influences the distribution and abundance of flora and fauna (Brinda *et al*., 2010). During the summer season, the air temperature was high due to clear sky with more solar radiation. The surface water temperature was high during summer months and was low during winter season.

Salinity is one of the prime factors, that influence the abundance and distribution of fish larvae which is

influenced by freshwater inflow and air temperature. The higher salinity was observed during summer months increase the level of seawater, low rainfall, lack of freshwater inflow and high water evaporation due to solar radiation. The abundance of fish eggs and larvae are governed more directly by temperature, due to its influence on spawning, than by salinity (Charnov and Gillooly, 2004).

All ichthyoplankton were belong to neritic species (Hussain and Naama, 1989). Fish eggs and larvae were collected at stations A1 and A2 indicates that this area is a spawning ground for these families, just Ali (1993) recorded the spawners from the same area.

Larvae of some fishes such as Mugilidae, Cynoglossidae and Bothidae whose adults are important constituents of northwestern part of Arabian Gulf were rare or absent in the collections. These fishes and others may migrate to areas more favorable for spawning. Ahmed and Hussain (2000c) determined the spawning areas of Mugilidae include offshore and costal waters in northwestern Arabian Gulf.

Members of the family Gobiidae were the most abundant group in this study. According to published information(Hussain and Naama, 1989), many species of this family are very abundant. Gobiidae larvae were present in the northwest Arabian Gulf most of the year, and peaked during late spring and summer were agreed with Al-Okailee (2001).

Engraulidae are also commonly found in northwest Arabian Gulf (Ali ,1993). Engraulidae larvae were present during the greater part of the sampling period with variations in abundance.

The spawning season of Clupeidae in north west Arabin Gulf which was in April to October. Clupeidae egg abundance was high in May to July. Ahmed and Hussain (2000b) noticed that eggs of Clupeidae occur in April to July. The occurrence of clupid eggs agreed with Younis (2000) pointed that *Ilisha megaloptera* spawners during May and July in Shat Al-Arab Estuary.

The seasonal distribution of Sciaenidae eggs indicates that this fish family spawns predominantly during April to October. The occurrence of eggs coincides with the adult fish maturation cycle as determined by gonad examination of *Johienops sina*, *Johius belangerii* in Shat Al-Arab Estuary (AL-Mahidi, 1996).

Soleid eggs and larvae were most common in the northwest Arabian Gulf, which is in accordance with the results obtained by Al-Okailee (2001), also Ahmed and Hussain (1998) found soleid eggs and larvae during February and April. In conclusion the study area, appears to be important spawning and nursery ground for many fishes.

References

Abaychi, J. K.; Darmoian, S. A. and Douabul, A. A. (1988). The Shatt Al-Arab: A nutrient salts and organic matter source to the Arabian Gulf. Hydrobiologia, 166: 217-224.

Ahmed, S. M. (1990). Abundance and diversity of fish larvae in Khor Al-Zubair, Northwest Arabian Gulf. M. Sc. Thesis, Coll. Agric., Univ. Basrah. 90P.

Ahmed, S. M. and Hussain, N. A. (1998). Abundance and distribution of flat fish eggs and larvae in the estuarine parts of the Arabian Gulf. Mar. Mesopot., 13(2): 307-315.

Ahmed, S. M .and Hussain, N. A. (2000a). Abundance and distribution of fish eggs in the

Shatt Al-Arab estuary. Mar. Mesopot ., 16 (2): 201 -207.

Ahmed, S. M .and Hussain, N. A. (2000b). Abundance and distribution of eggs and larvae of Clupeformes in the north western Arabian Gulf. Basrah J. Sci., 18 (1): 159-164 .

Ahmed, S. M .and Hussain, N. A. (2000c). Egg and larvae of mullets (Mugilidae) in Northwestern Arabian Gulf. Pak. J. Mar. Biol, 6 (1): 1-7.

Al- bdran, B. (1995). Lithofacies of recent sedimens of Khor Abdullah and Shat Al-Arab delta, northwest Arabian Gulf. Iraqi J. Sci. 36(4): 1133-1147.

Ali, T. S. (1993). Composition seasonal fluctuation in fish assemblage of the north west Arabian Gulf, Iraq. Mar. Mesopot., 8 (1): 119-135.

AL-Mahidi, A. A. (1996).The Biology of two Sciaenidae *Johniepus sina* (cuvier,1830) and *Johnius belangerii* (cuvier, 1830) in the Shatt Al- Arab Estuary, southern Iraq. M.Sc. Thesis. College of Agri. Uni. Basrah. 91p. (in Arabic).

Al-Okailee, M. T. K. (2001). Abundance and distribution of fish eggs and larvae in Shatt Al-Arab Estuary in North West Arabian Gulf. M.Sc. Thesis. College of Agri. Univ. Basrah. 72p. (in Arabic).

AL-Zubaidi, A. M .H. (1998). Distribution and abundance of zooplankton In the Shatt Al-Arab Estuary. Ph.D. thesis. College of Sci., Uni. of Basrah, 135p. (in Arabic).

Beck, M. W.; Heck, K. L.; Able, K. W.; Childers, D. L.; Eggleston, D. B.; Gillanders, B. M.; Halpern, B.; Hays, C. G.; Hoshino, K.; Minello,T. J.; Orth, R. J.; Sheridan, P. F. and Weinstein, M.P. (2001). Theidentifica-tion, conservation, and management of estuarine and marine nurseries for fish and invertebrates. Biol. Sci., 51: 633-641.

Brinda, S.; Srinivasan, M. and Balakrishnan, S. (2010). Studies on diversity of fin fish larvae in Vellar Estuary, Southeast Coast of India .World J. Fish and Mar. Sci., 2 (1): 44-50.

Charnov, E. L. and Gillooly, J. F. (2004). Size and temperature in the evolution of fish life histories. Integrative and Comparative Biology, 44: 494-497.

Chute, A. S. and Turner, J. T. (2001). Plankton studies. In the Buzzards Bay, Massachusetts, USA.V. Ichthyoplankton, Series 224. pp. 45-54.

Hussain, N. A. and Naama, A. K. (1989). Survey of fish fauna of Khor Al-Zubair, northwest Arabian Gulf, Mar. Mesopot., 4:161-194.

Hussain, N. A.; Younis, K. H. and Yousif, U. H. (1999). Seasonal fluctuat-ion of fish assemblage of inertial mudflat of the Satt AL-Arab estuary, Iraq north western Arabian Gulf. Mar. Mesopot., 14 (1): 33-53.

Johnston, T. A.; Gaboury, M. N.; Janusz, R. A. and Janusz, L. R. (1995). Larval fish drift in the Valley River, Manitoba: influence of a biotic and biotic factors, and relationships with future year-class strengths. Canadian. J. of Fishe. and Aquat. Sci., 52: 2423-2431.

Joyeux, J. C.; Pereira, B. B. and Almeida, H. G. (2004). The flood-tide icthyoplanktonic community at the entrance into a Brazilian tropical estuary. Journal of Plankton Research, 26 (11): 1277-1287.

Kopoulo, K. and Lacroix, N. (1992). Distribution and abundance of Sole (*Sole sole*) eggs and larvae in the bay of Biscay between 1986 and 1988. Netherland J. Sea Res., 29(1-3): 81-91.

McLusky, D. S. and Elliott, M. (2004). The Estuarine Ecosystem. Oxford University Press, Oxford. 214p.

Okiyama, M. (ed). 1988. An atlas of the early stages of fishes in Japan. Tokai Univ.Press.115p.

Pope, K. L. and Willis, D. W. (1998). Larval black crappie distribution: implications for sampling impoundments and natural lakes. North American Journal of Fisheries Management. 18, 470-474.

Smith, P. E. and Richardson S. L. 1977. Standard techniques forpelagic fish eggs and larvae survey. FAO Fish.Tech. Pap. No. A5. 100pp.

Younis, K. H. (2000). The biology of *Ilisha megaloptera* (Bennet) in Shatt AL-Arab Estuary, North West Arabian Gulf. Mar. Mesopot., 15 (1): 169-181.

التغيرات المكانية والزمانية في وفرة وانتشار اليرقات السمكية في مصب شط العرب شمال غرب الخليج العربي

منى طه خضير العكيلي وفلاح معروف مطلك

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تم مسح الهائمات السمكية شهرياً من محطتين في الجزء الشمالي الغربي من الخليج العربي (مصب شط العرب A1 وخور عبدالله A2) خلال المُدة من تموز 2012 ولغاية حزيران 2013. جمعت 1526 بيضة اسماك و2118 يرقة باستخدام شباك الهائمات حجم فتحاتها 300 مايكرون. صُنفت البيوض إلى ثلاث عوائل هي اسماك النعاب Sciaenidae والخوفعة Soleidae والصابوغيات Clupidae، إذ تعود اليرقات إلى ثمانِ عوائل سمكية شَمَلَت القوبيون Gobiidae والبلم Engraulidae والنعاب Sciaenidae والخوفعة Soleidae والصابوغيات Clupidae والغزال Polynemidae والـ Bothidae واللسان Cynoglossidae. شكلت بيوض اسماك عائلة النعاب Sciaenidae 50.4% من المجموع الكلي لبيوض الأسماك، وسجلت أعلى وفرة 42.2 بيضة/10م² في محطةA1 في حزيران. شكلت ثلاث عوائل القوبيون Gobiidae والبلم Engraulidae والصابوغيات Clupidae 85.5% من المجموع الكلي لليرقات. بلغت أعلى وفرة ليرقات القوبيون 25.8 يرقة/ 10م² في محطة A1 في أيار، وكانت أعلى وفرة ليرقات البلم 48.3 يرقة/10م² في محطة A2 خلال آيار، وبلغت أعلى وفرة ليرقات الصابوغيات 20.4 يرقة/ 10م² في محطة A2 في حزيران. بينت الدراسة أهمية الجزء الشمالي الغربي من الخليج العربي كمنطقة تكاثر وحضانة للعديد من العوائل السمكية.