Middle-East Journal of Scientific Research 8 (3): 616-619, 2011
ISSN 1990-9233

Stock Assessment of Juvenile Fishes of Khuzestan Shallow Waters (North Persian Gulf), Iran

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Abstract: This study provides a contribution to the knowledge on biomass of Juvenile fishes from Khuzestan north Persian Gulf inshore waters. During one year sampling from January to December 2007, 24mm mesh size experimental bottom trawl where used to operate 77 hauls based on random sampling. Fishes abundance was expressed as catch per tow. Total Juvenile biomass of 1394363 Kg was estimated .The greatest biomass values were recorded during late summer and autumn. Highest CPUA(Catch Per Unit Area)value (629 kg/ km^2) was calculated in October and the lowest was estimated in December (76 kg/ km^2). The results of this study providing basic data for environmental and fisheries management purposes

Key words: Juvenile fish · Biomass · Distribution · CPUA · Persian Gulf · Iran

INTRODUCTION

Shallow waters provide an essential habitat for many marine fishes [1]. Many of them are from basis of commercial fisheries and are an important source of food in Persian Gulf region. Tropical inshore ecosystems are different in many respects from those of higher latitudes; in particular they have been noted for more uniform temperatures [2].

Production is very high in the shallow waters due to high nutrients input from land [3]. Biomass of fish communities is a key parameter of many studies like modeling, bioenergetics, ecological models and food web researches [4]. Anthropogenic impacts as a distributing factor is high especially in the shallow habitats. Growth and recruitment of juvenile fishes which are limited to the coastal and shallow habitats may affect by pollution and extranutrients. Vulnerability of fish communities, their recruitment ability led Scientifics to study fish communities and their trend over the time [5]. Therefore study of juvenile biomass is in high importance in fisheries and biological aspects.

In spite of prior studies on fishes of north west Persian Gulf [6,7] information on the juvenile fishes is particularly scarce in north Persian Gulf region were fish are exploited as main target or by catch . This fish study was performed to our knowledge about overall biomass and density of juvenile fishes of Khuzestan (north Persian Gulf), Iran, which provides useful data for management purposes.

MATERIALS AND METHODS

Study Area: Khuzestan inshore waters is located in the North of Persian Gulf , lies between latitudes 29°53'-30°05' and longitudes 48°44'-49°43' .The depth of the study area is between 3-20 and substrate is mainly muddy and sandy in some parts. Rains occur mainly from November to May and climate of the region is subtropical. The study area was divided to western and eastern part considering the Musa Creek canal as center (Fig. 1).

Sampling Design: During one year sampling from January to December 2007, 77 hauls was operated using 24mm mesh size experimental bottom trawl, towed by 360HP vessel. Mean duration time of half an hour was determined for trawling. Sampling was based on random sampling to cover the wide area of the study area (about 5500 km^2). Trawling data (beginning and end point, duration, depth, etc.) was righted down precisely. Catch weights was measured on the board. Biomass was calculated using swept area method [8]:

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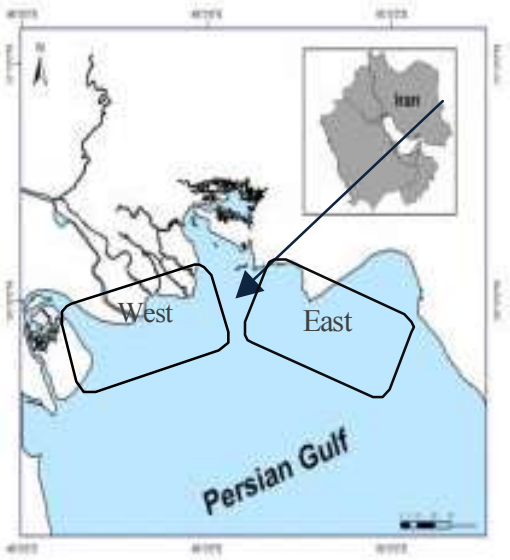

Fig. 1: Khuzestan inshore waters (North of Persian Gulf)

$$\alpha = t.V.h.X_2$$

Where a is the swept area, t is the time of trawling, V speed of vessel (mile/hr), h length of upper rope of trawl and X_2 is constant coefficient of net spreading (0.6)

Catch per Unit Area (CPUA):

$$CPUA = \frac{CW}{a}$$

$$b = \frac{CPUA}{v}$$

$$B = b.A$$

Where CW is mean catch per tow, b is biomass in the tow path, B is biomass in the whole area, v is fish vulnerability (0.5 in this study) and A total area occupied by the species.

RESULTS

A total of 77 hauls was conducted to estimate the total biomass of the juvenile fishes during sampling period. The total area of the study area was 2525.4 M^2 with the depth of 3-20m. During the investigation a total of 1663 kg (an average of 21kg per tow) juvenile fish was caught. The CPUA values were estimated Using Swept Area Method. Mean CPUA of 286.4 kg/km^2 was calculated. Maximum CPUA of 629 kg/km^2 was estimated

Table 1: Monthly mean CPUA values of Khuzestan shallow waters 2007

December	November	October	September	August	July	June	May	April	March	February	January	
76	579	629	317	304	326	243	208	147	337	129	142	CPUA(Kg/Km^2)

Table 2: Catch from 77 stations Khuzestan shallow waters 2007

	Beginning point (UTM Zone 38)		End point(UTM Zone 38)				
No	N	E	N	E	Mean depth m	Distance m	Total catch Kg
1	3320258	346756	3321168	346673	8	913	50
2	3311255	342705	3313157	348412	17	6015	10
3	3312092	337768	3310414	342820	13	5323	25
4	3313567	331426	3313126	335326	20	3925	12
5	3333385	304459	3336778	303691	7	3479	2.5
6	3329607	306250	3332348	304794	5	3103	10
7	3325689	306181	3327760	305809	6	2103	50
8	3338885	303719	3331419	305083	8	7589	9
9	3326380	306798	3321276	307118	12	5114	3
10	3319443	306710	3323259	306146	8	3858	20
11	3333771	304371	3335912	303683	7.5	2248	15
12	3315677	310887	3311958	313649	7	4631	4
13	3310642	315351	3306189	315868	6.5	4482	4
14	3315761	308327	3311528	306098	7.5	4784	12
15	3307664	308002	3309834	305518	8	3298	15
16	3306820	309897	3307914	314515	8	4745	7
17	3307342	318370	3310395	316217	7	3735	30
18	3312614	316959	3315700	314872	8.5	3725	7
19	3306192	349418	3305646	353603	15.5	4220	2

Table 2: Continue

	Beginning point (UTM Zone 38)		End point(UTM Zone 38)				
No	N	E	N	E	Mean depth m	Distance m	Total catch Kg
20	3307002	357144	3308773	361467	15	4672	30
21	3311225	359184	3312214	354591	12	4697	6
22	3313886	351667	3311507	347271	16.5	4998	6
23	3310810	345299	3310071	341721	13	3654	3.5
24	3312347	354173	3316998	353338	4	15882	25
25	3317172	368203	3316227	364726	2.5	3603	20
26	3313038	361364	3310751	360122	8.5	2601	21
27	3309355	359643	3307573	358435	14.5	2152	9
28	3307776	354361	3308868	352741	18.5	1953	0
29	3319807	371404	3323012	374431	3	4408	20
30	3321986	375474	3322412	379558	4	4106	30
31	3320954	383433	3323380	385787	7.5	3381	8.5
32	3326707	384865	3330684	384367	4.5	4007	16
33	3302691	325842	3302136	320084	13	5784	9
34	3304172	317309	3305597	312165	9.5	5338	7.5
35	3309356	312917	3313568	311999	6.5	4311	25
36	3324038	306834	3331425	305654	12.5	7480	20
37	3331695	305359	3335471	304657	14	3841	50
38	3319804	309325	3322447	308025	8	2945	20
39	3311692	316435	3311496	318225	9	1800	18
40	3311226	319943	3310848	323008	10	3088	15
41	3310088	327468	3310066	328918	7.5	1450	12
42	3313038	361364	3310751	360122	10	2601	21
43	3306192	349418	3305644	353603	10.5	4220	30
44	3311631	350065	3310257	348380	15	2173	18
45	3307776	354361	3308847	354351	14	1071	15
46	3314309	352192	3311148	355879	11	4856	20
47	3305420	323962	3305373	319069	9.5	4893	25
48	3305529	318615	3310337	315790	7	4476	30
49	3311120	314814	3315084	310660	7.5	5742	20
50	3317492	308798	3323020	307668	11	5642	15
51	3304172	317309	3305597	312165	9.5	5338	21
52	3313709	348716	3312675	353540	12	4934	20
53	3313518	354747	3310666	357382	10.5	3883	25
54	3311573	354528	3313739	349963	12.5	5052	10
55	3314104	349472	3317111	343760	13	6455	15
56	3311631	350065	3310257	348380	14	2173	18
57	3305763	323581	3307058	319310	8.5	4462	12
58	3307581	319324	3305938	315293	6	4352	30
59	3308175	312923	3312856	310512	5	5265	100
60	3318895	309292	3324607	306003	7.5	6591	20
61	3324890	305504	3331216	305166	2.5	6335	100
62	3312250	347862	3315104	352536	13.5	5476	30
63	3315140	352237	3310518	353745	12.5	4861	20
64	3310503	354002	3312002	358247	11	4502	30
65	3321845	349320	3325360	347719	5.5	3863	50
66	3325730	347215	3328481	347038	4	2757	70
67	3329682	346728	3331250	347487	2.5	1742	70
68	3326895	346289	3324989	346909	6	2004	15
69	3320954	383433	3323380	385787	7.5	3381	30
70	3330440	304940	3326923	304097	2.5	3616	20
71	3324038	306834	3331425	305654	5.5	7480	30
72	3331695	305359	3335471	304657	6.5	3841	30
73	3331599	304975	3334819	304120	7	3331	4
74	3334624	303993	3330421	305258	2.5	4388	2.5
75	3329635	305397	3326989	305403	3	2646	5
76	3326229	305854	3324438	305886	5	1791	6
77	3326178	307897	3327918	306698	9.5	2112	6

Table 3: Results of Khuzestan biomass assessment by Swept Area Method

Total catch	1663	Kg
Total area	2525.4	Km^2
Average catch per hour	21.32	Kg
STDEV.	19.04	
Average distance	4178	m
Estimated biomass	1394363	Kg
Mean CPUA	286.4	Kg/Km^2

during October and the minimum of 76 kg/km^2 was calculated during December. Total Juvenile biomass of 1394363 Kg was estimated (Tables 1-3).

DISCUSSION

Shallow waters are the main habitats for most species of juvenile fish. They serve as feeding grounds and provide protection from predators [9]. Because of optimum environmental factors of these regions high density of juvenile fishes live in the shallow waters [9,10].

Increasing trend of CPUA was observed from July to October. Nikoo (2006) was reported analogous trend in Mahshahr creeks [11]. This analogy may be due to climatologic, geomorphologic and hydrologic similarities of these adjacent areas. Increase in CPUA value during warm season of the study area may be related to immigration of juvenile fishes to shallow waters in addition to growth of spring fish larva which add on the juvenile populations, however for decisive conclusion further studies is needed.

The results of this study providing basic data for environmental and fisheries management purposes and can be used for protection of this valuable resources. Continued monitoring of these populations will help us to obtain precise understanding of their changes in many years and will provide possibility of more accurate decisions for managers.

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