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A STUDY ON TRASH CATCH OF THE BOTTOM TRAWL IN ABU-QIR BAY (EGYPT)

By

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Key words: Bottom Trawling net, Trash catch, Abu-Qir Bay, Mediterranean.

ABSTRACT

Trash catch was sampled monthly from trawlers operating in Abu-Qir Bay (Egypt) during the period from November 1996 to October 1997. The amount of trash catch constituted about 18% of the total trawling landing. It was identified into 88 species representing 48 families. The main components of trash catch were Gobiidae (10.9%), Siganidae (8.4%), Congridae (8.3%), Sparidae (6.4%), Citharidae (5.8%), Centracanthidae (5.2%), Sphyraenidae (4.6%) Moronidae (4.6%), Callionymidae (4.6%), and Trichiuridae (4.0%), together comprising about 63% by weight of the total trash catch sampled. The trash catch was divided into three categories: juveniles of commercially important species (47.4 %), low-valued species (49.1%) and unaccepted species for human consumption (3.5%). The size analysis of important species showed that they were too small to be exploited. Capture of juveniles seems to be mainly due to the small mesh sizes of trawling cod-end.

INTRODUCTION

Trawl fishing is the most prevailing one in the Egyptian Mediterranean waters resulting in a considerable increase in the landing of trash fish. Rizkalla (1995) reported that trash fish of trawlers in the Egyptian Mediterranean waters, off Alexandria represented 26.6% of their total catch.

Although juveniles of commercially important species are included in the trawl trash catch, no information about its species and size composition is available with exception of Rizkalla (1995) who gave a detailed account for trawl trash fish. So, there is an urgent need to investigate species and size composition of this catch. The present study deals with catch statistics, species and size composition beside abundance of trash catch of small trawlers operating in Abu-Qir Bay to contribute in fisheries management.

MATERIALS AND METHODS

Random samples of about 5-8 kg as well as landing statistics were collected twice a month from small bottom trawlers (40-80H.P) operating in Abu-Qir Bay landed at Abu-Qir fishing center during the period from November 1996 to October 1997. The specimens were identified to species level according to Whitehead ***et al.*** (1986) and Fischer ***et al*** (1987). Total lengths of the abundant individuals were measured forming groups of different sizes and the total weight of each one was taken. Specimens in small numbers were measured and weighed individually.

RESULTS

I- Abundance of trash catch:

The amount of trash catch landed at Abu-Qir fishing center constitutes about 18% of the total trawl landings. There is a fluctuation in seasonal percentage abundance of trash catch with the highest landing in winter (29.3%) as shown in Table (1).

Table (1): Seasonal abundance of trash catch of trawlers operating in Abu-Qir Bay during the period from November 1996 to October 1997.

Season	*Number of trawling trips sampled*	*Average trawling catch/trip (Kg)*	*Average trash catch/trip (Kg)*	*% of trash catch*
Autumn	40	585	74	12.65
Winter	18	434	127	29.26
Spring	28	378	63	16.67
Summer	50	636	124	19.50
Total	136	541	97	17.93

II- Species composition:

A total of 88 species representing 48 families are identified in the trash catch. The main components of trash catch are Gobiidae (10.9%), Siganidae (8.4%), Congridae (8.3%), Sparidae (6.4%), Citharidae (5.8%), Centracanthidae (5.2%), Sphyraenidae (4.6%), Moronidae (4.6%), Callionymidae (4.6%) and Trichiuridae (4.0%), together comprising about 63% by weight of the total trash catch sampled. ***Echiodon pyramodon*** (Family: Carapidae) and ***Chlorophthalmus agassizi*** (Family: Chlorophthalmidae) were recorded for the first time in the Egyptian Mediterranean waters. The Red Sea immigrants (16 species) constituted 24.44% of the trawl trash catch.

The trash catch can be divided into three categories: juveniles of commercially important species, low-valued species and unaccepted species for human consumption (Table 2).

a- Juveniles of commercially important species:

This category constitutes 47.4% of the total trash catch including 46 species (23 families). ***Siganus rivulatus*** (8.30%), ***Dicentrarchus punctatus*** (4.64%), ***Trichiurus lepturus*** (4.02%), ***Sphyraena sphyraena*** (3.95%), ***Trigla lucerna*** (2.53%), ***Plectorhinchus mediterraneus*** (2.31%), ***Merluccius merluccius*** (2.14%), ***Solea vulgaris*** (1.93%), ***Boops boops*** (1.69%), ***Pegellus erythrinus*** (1.19%),

Table (2): Species and size composition of trash catch of small trawlers in Abu-Qir Bay during the period from November 1996 to October 1997.

Families / Species	% No.	% Weight	Total length (cm) Mean	Total length (cm) Range	Average weight (gm)
	a- Juveniles of commercially important species				
Pisces					
Siganidae	**6.22**	**8.36**			
*Siganus rivulatus**	6.19	8.30	12.1	5-17	20.2
*Siganus luridus**	0.03	0.06	14.0	14	34.0
Sparidae	**7.25**	**6.38**			
Boops boops	1.26	1.69	13.1	11-15	20.1
Pagellus erythrinus	1.53	1.19	9.4	7-15	11.7
Pagellus acarne	0.21	0.13	9.5	9-10	8.9
Pagrus pagrus	1.40	1.11	8.9	6-13	11.9
Pagrus auriga	0.30	0.34	10.0	10	17.2
Lithognathus mormyrus	1.93	1.11	8.3	6-12	8.6
Diplodus vulgaris	0.24	0.33	11.2	9-14	20.4
Diplodus annularis	0.05	0.07	11.0	10-12	18.5
Oblada melanura	0.30	0.31	12.1	10-15	15.7
Sparus aurata	0.03	0.10	17.0	17	56.0
Moronidae	**4.08**	**4.64**			
Dicentrarchus punctatus	4.08	4.64	12.4	10-16	17.1
Sphyraenidae	**1.83**	**4.58**			
Sphyraena sphyraena	1.59	3.95	21.4	18-24	39.0
*Sphyraena chrysotaenia**	0.24	0.63	20.0	18-24	41.1
Trichiuridae	**2.20**	**4.02**			
Trichiurus lepturus	2.20	4.02	33.7	15-46	27.5
Triglidae	**2.26**	**2.64**			
Trigla lucerna	2.07	2.53	12.4	9-21	18.4
Trigloporus lastoviza	0.19	0.11	9.6	8-12	8.9
Haemulidae	**2.04**	**2.31**			
Plectorhinchus mediterraneus	2.04	2.31	10.6	7-16	17.0
Merlucciidae	**0.89**	**2.14**			

Cont.

Families / Species	% No.	% Weight	Total length (cm) Mean	Total length (cm) Range	Average weight (gm)
Merluccius merluccius	0.89	2.14	17.2	10-22	36.2
Soleidae	**1.29**	**2.09**			
Solea vulgaris	1.18	1.93	15.2	12-17	24.5
Solea impar	0.11	0.16	14.8	14-17	22.3
Serranidae	**2.44**	**2.10**			
Serranus hepatus	1.72	1.05	8.2	6-10	9.2
Serranus cabrilla	0.67	1.01	12.8	10-17	22.5
Callanthias ruber	0.05	0.04	10.5	10-11	11.5
Sciaenidae	**1.07**	**1.74**			
Umbrina cirrosa	0.59	0.95	13.5	11-16	24.1
Argyrosomus regius	0.48	0.79	13.6	12-17	24.8
Carangidae	**1.20**	**1.55**			
Trachurus trachurus	0.51	0.53	12.5	11-14	15.7
Trachurus mediterraneus	0.32	0.34	12.3	9-16	15.9
*Alepes djedaba**	0.24	0.38	14.0	14	23.4
Seriola dumerili	0.13	0.30	14.3	12-16	34.0
Mullidae	**1.45**	**1.35**			
Mullus barbatus	0.59	0.78	12.1	9-16	19.9
Mullus surmuletus	0.35	0.30	10.6	9-12	12.9
*Upeneus moluccensis**	0.35	0.21	9.9	9-11	8.8
*Upeneus asymmetricus**	0.16	0.06	8.2	7-14	5.5
Mugilidae	**0.69**	**0.97**			
Liza aurata	0.56	0.83	14.7	12-17	22.1
Liza ramada	0.13	0.14	13.0	13	16.2
Anguillidae	**0.13**	**0.50**			
Anguilla anguilla	0.13	0.50	43.0	36-50	55.4
Scombridae	**0.21**	**0.43**			
*Scomberomorus commerson**	0.21	0.43	15.9	14-17	30
Synodontidae	**0.24**	**0.12**			
*Saurida undosquamis**	0.24	0.12	12.0	12	7.2
Clupeidae	**0.03**	**0.09**			
Sardinella aurita	0.03	0.09	19.0	19	48.0

Cont.

Families / Species	% No.	% Weight	Total length (cm) Mean	Total length (cm) Range	Average weight (gm)
Pomatomidae	**0.03**	**0.02**			
Pomatomus saltatrix	0.03	0.02	11.0	11	12.0
Crustacea					
Portunidae	**0.46**	**0.53**			
*Portunus pelagicus**	0.46	.53	4.4	3-6	17.4
Penaeidae	**0.78**	**0.09**			
Penaeus karathurus	0.78	0.09	7.2	6-8	1.7
Mollusca					
Cephalopoda					
Sepiidae	**0.86**	**0.57**			
Sepia officianalis	0.86	0.57	4.5	3-10	10.0
Loligindae	**0.21**	**0.22**			
Loligo vulgaris	0.21	0.22	9.4	9-11	15.5
	b- Low valued species				
Pisces					
Gobiidae	**20.20**	**10.87**			
Gobius niger	20.20	10.87	8.9	5-12	8.2
Congridae	4.14	8.31			
Conger conger	1.10	4.84	35.0	27-41	66.0
Ariosoma balearicum	3.04	3.47	23.7	16-39	17.2
Citharidae	**6.45**	**5.84**			
Citharus linguatula	6.45	5.84	11.7	3-22	13.6
Centracanthidae	**8.00**	**5.17**			
Spicara smaris	5.08	3.18	10.8	8-17	9.4
Spicara flexuosa	1.93	1.23	9.3	8-14	9.5
Centracanthus cirrus	0.99	0.76	11.8	11-14	11.6
Callionymidae	**4.70**	**4.61**			
*Callionymus filamentosus**	4.70	4.61	13.0	7-20	26.3
Trachinidae	**0.83**	**2.00**			
Trachinus radiatus	0.48	1.20	16.7	16-19	37.3
Trachinus draco	0.35	0.80	17.0	12-23	34.6

Cont.

Families / Species	% No.	% Weight	Total length (cm) Mean	Total length (cm) Range	Average weight (gm)
Bothidae	**1.82**	**2.11**			
Bothus podas	1.82	2.11	11.9	7-15	17.3
Clupeidae	**2.90**	**1.87**			
Sardina pilchardus	2.90	1.87	10.9	9-17	9.7
Monacanthidae	**0.75**	**1.65**			
Stephanolips hispidus	0.54	0.95	11.0	9-13	26.5
*Stephanolips diaspros**	0.21	0.70	13.5	11-15	48.6
Teraponidae	**2.63**	**2.28**			
*Terapon puta**	2.63	2.28	10.4	8-14	13.0
Ophidiidae	**0.32**	**0.68**			
Ophidion barbatum	0.32	0.68	19.5	15-23	31.5
Scorpaenidae	**0.35**	**0.56**			
Scorpaena notata	0.24	0.27	9.3	7-13	16.7
Scorpaena elongata	0.03	0.20	18.0	18	113.0
Scorpaena porcus	0.05	0.01	6.0	6	3.0
Helicolenus dactylopterus	0.03	0.08	14.0	14	42.0
Labridae	**0.32**	**0.79**			
Xyrichthys novacula	0.32	0.79	15.6	15-17	36.9
Soleidae	**0.35**	**0.32**			
Microchirus ocellatus	0.27	0.29	11.8	9-14	16.0
Microchirus variegatus	0.08	0.03	9.0	9	4.7
Balistidae	**0.11**	**0.23**			
Balistes carolinensis	0.11	0.23	11.0	11	32.3
Rajidae	**0.08**	**0.17**			
Raja miraletus	0.08	0.17	17.0	17	32.3
Uranoscopidae	**0.03**	**0.09**			
Uranoscopus scaber	0.03	0.09	15.0	15	53
Engraulidae	**0.38**	**0.05**			
Engraulis encrasicholus	0.38	0.05	6.7	6-9	2.1
Cynoglossidae	**0.08**	**0.02**			
Symphurus nigrescens	0.08	0.02	7.7	7-8	4.0
Crustacea					

Cont.

Families Species	% No.	% Weight	Total length (cm) Mean	Total length (cm) Range	Average weight (gm)
Squillidae	**1.10**	**1.35**			
*Oratosquilla massavensis**	1.10	1.35	12.2	10-14	18.5
Penaeidae	**1.10**	**0.14**			
*Trachypenaeus curvirostris**	0.40	0.09	7.8	7-10	3.3
Metapenaeus stebbingi	0.70	0.05	4.9	3-8	1.1
	C- Unaccepted species for human consumption				
Pisces					
Triglidae	**3.14**	**1.94**			
Lepidotrigla cavillone	3.14	1.94	9.4	6-11	9.3
Apogonidae	**0.94**	**0.66**			
*Apogon taeniatus**	0.94	0.66	8.0	8	10.6
Leiognathidae	**0.62**	**0.17**			
*Leiognathus klunzingeri**	0.62	0.17	6.7	5-9	4.2
Blenniidae	**0.13**	**0.10**			
Blennius ocellaris	0.13	0.10	9.4	9-10	10.8
Macroramphosidae	**0.13**	**0.03**			
Macroramphosus scolopax	0.13	0.03	9.0	9	3.2
Chlorophthalmidae	**0.05**	**0.03**			
Chlorophthalmus agassizi	0.05	0.03	10.0	10	9.0
Carapidae	**0.03**	**0.02**			
Echiodon pyramodon	0.03	0.02	23.0	23	11.0
Crustacea					
Portunidae	**0.43**	**0.48**			
Carcinus aestuarii	0.11	0.26	5.0	5	36.3
Carcinus maenas	0.11	0.17	4.0	4	23.3
Liocarcinus vernalis	0.21	0.05	2.1	2-3	3.0
Leucosiidae	**0.03**	**0.02**			
Ilia nucleus	0.03	0.02	4.0	4	7.0

* Red Sea immigrants

Pagrus pagrus (1.11%), ***Lithognathus mormyrus*** (1.11%), ***Serranus hepatus*** (1.05%) and ***Serranus cabrilla*** (1.01%) are the main species, together representing 37% of total trash catch by weight. Other juveniles (32 species), each comprises less than 1% of the total trash weight amounting together only 10%.

b- Low-valued species:

They constitute 49.1% of the total trash catch weight representing 31 species (21 families). The main species of this category are ***Gobius niger*** (10.87%), ***Citharus linguatula*** (5.84%), ***Conger conger*** (4.84%), ***Collionymus filamentosus*** (4.61%), ***Ariosoma balearicum*** (3.47%), ***Spicara smaris*** (3.18%), ***Terapon puta*** (2.28%), ***Bothus podas*** (2.11%), ***Sardina pilchardus*** (1.87%), ***Oratosquilla massavensis*** (1.35%), ***and Spicara flexuosa*** (1.23%). and ***Trachinus radiatus*** (1.20%). Others (19 species) are of minor importance; each contributes less than 1% of the total trash catch.

C- Unaccepted species for human consumption:

This category contributes a smaller portion of trash catch (3.5%) representing 11 species (9 families). The species of this group are small-sized fish and/or with hard skeleton. Only ***Lepidotrigla cavillone*** contributes 1.94 % of the total trash catch, followed by ***Apogon taeniatus*** (0.66%). Others (9 species) are of negligible importance (0.02-0.26%).

III- Monthly abundance of juveniles:

From Table (3), it is found that the abundant juveniles of the most important fishes captured are ***S. rivulatus, P. erythrinus, L. mormyrus & A. regius*** in winter, ***M. merluccius, S. vulgaris, U. cirrosa, M. barbatus, S. commerson & P. saltatrix*** in autumn; ***P. pagrus, T. lucerna, T. lastoviza & T. mediterraneus*** in spring and ***L. aurata*** in summer.

IV- Size composition:

As shown in Table (2), the majority of important fish species have minimum total lengths of 5-10cm or less, most of them have average lengths less than 12cm. Concerning the size composition of most economic species, the majority of fish have lengths of 10-15cm for ***S. rivulatus***, 13cm for ***B. boops***, 8-9cm for ***P. erythrinus***, & ***P. pagrus***, 7-9cm for ***L. mormyrus***, 10-12cm for T. ***lucerna***, 12-13cm for ***A. regius***, 10-12cm for ***M. barbatus*** and 12-13 cm for ***T. trachurus*** (Fig. (1).

Table (3): Seasonal abundance (Number percentage) of important fish juveniles caught by small trawlers in Abu-Qir Bay (Total length range (cm) between parentheses).

Species	*Number percentage*			
	Autumn	**Winter**	**Spring**	**Summer**
S. rivulatus	11.7 (5-12	88.3 (7-12)		
P. erythrinus		76.6 (8-11)		23.4 (9-11
P. pagrus	10.2 (6)	24.5 (8-9)	55.1 (8-10)	10.2 (9-10)
L. mormyrus	14.1(8-10)	85.9 (6-10)		
D. punctatus	28.1 (10-16)	60.1 (11-15)	11.8 (11-13)	
T. lucerna	3.9 (9-12)		64.7 (9-12)	31.4 (11-12)
P. mediterraneus		68.7 (8-12)		31.3 (12-13)
M. merluccius	50.0 (10-14)		42.8 (12-16)	7.2 (16)
S. vulgaris	60.5 (15-16)	20.9 (15-16)	14.0 (12-15)	4.7 (15)
S. hepatus			100.0 (6-10)	
A. regius	5.6 (12)	77.8 (12-17)		16.7 (12-15)
U. cirrosa	61.9 (11-15)	38.1 (15-16)		
T. trachurus	47.4 (11-14)			52.6 (11-14)
T. mediterraneus			100.0 (9-12)	
M. barbatus	63.6 (9-12)			36.4 (11-12)
M. surmuletus	50.0 (10-11)			50.0 (9-12)
L. aurata	9.5 (14-17)			90.5 (12-16)
S. commerson	100 (14-17)			
P. saltator	100.0 (11)			
G. niger	63.0 (5-7)	37.0 (7)		
C. linguatula	100.0(3-7)			
T. lastoviza			100.0 (8-9)	
S. smaris			100.0 (8-9)	
S. flexuosa			100.0 (8-9)	
C. filamentosus	25.6 (9-10)	74.4 (7-10)		
B. podus			100 (7-9)	
S. pilchardus	13.7 (9-10)	86.3 (10)		
T. puta	37.0 (9-10)	63.0 (8-10)		

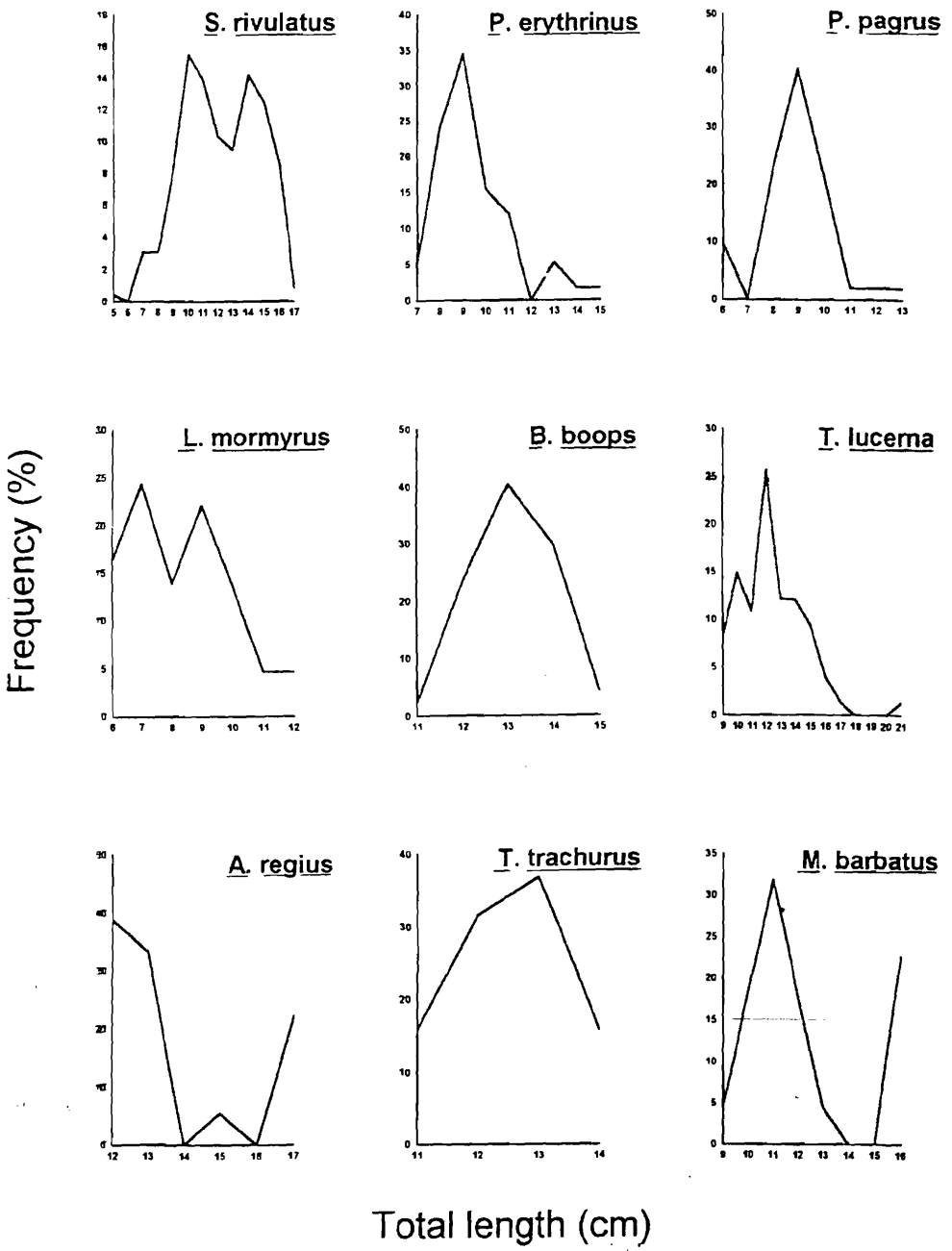

Fig. (1): Size composition of important trawl trash species in Abu-Qir Bay.

DISCUSSION

The families, which could be considered suitable for human consumption, constituted 96.5% of the total trash catch. Nearly half of them are considered as low-grade. Others form the main resources for commercial trawl fisheries. The capture of juveniles of such families like Siganiidae, Sparidae, Moronidae, Trichiuridae, Triglidae, Merluccidae, Soleidae, Serranidae, Sciaenidae, Carangidae and Mullidae could be a problem with intensification of trawl activities in Abu-Qir Bay as they were captured before attaining their first sexual maturation.

Abu-Qir Bay is one of the most richest areas in species number including 88 ones belonging to 48 families comparing to 118 species (50 families) in the whole Egyptian Mediterranean waters (Al-Kholy & El-Wakeel, 1975) and 62 species (42 families), off Alexandria (Rizkalla, 1995). In the present study the latter author mentioned only 45 species. Further, the update list of bony fish species in the Egyptian Mediterranean waters given by Ibrahim & Soliman (1996) includes all fish species recorded in the present work except ***E. pyramodon*** and ***C. agassizi*** which were recorded for the first time particularly the former species which is not mentioned by Fischer ***et al.*** (1987) while Whitehead ***et al.*** (1986) reported that it is restricted in the western basin of the Mediterranean.

In the present study, the Red Sea immigrants constitute 24.4% of the trawl trash catch as compared to 1.9% of trawl trash catch (Rizkalla, 1995) and 12.24% of beach-seine trash catch (Faltas, 1997).

Although Rizkalla (1995) reported that picarels were found in large quantities forming about 71% of the trash catch of the Egyptian Mediterranean trawlers, off Alexandria, they constitute only 5.2% of the trash catch in the present study. It is in agreement with the finding of Hashem (1972) that picarel (***S. smaris***) was present in small amount in Abu-Qir- Rosetta region indicating that this region is unfavorable for the life of this species.

As shown from Table (4), the present study shows that trawling trash catch shares many species with the beach seine trash catch of Abu-Qir Bay (Faltas, 1997). This share (33 species) is often associated with the fish movement to deeper waters at times of relatively high water temperatures. It is also noticed

Table (4): Comparison between the relative abundance (W %) and mean length (cm) of species in the trash catch of the present study with their corresponding values of the beach seine trash catch as given by Faltas (1997).

Species	*Faltas (1997)*		*Present study*	
	Weight (%)	Mean length (cm)	Weight (%)	Mean length (cm)
S. rivulatus	2.79	5.4	8.35	12.1
S. luridus	0.05	6.8	0.06	14.0
L. mormyrus	1.27	6.5	1.20	8.3
D. vulgaris	0.03	6.0	0.33	11.2
D. annularis	0.09	4.3	0.07	11.0
O. melanura	<0.01	3.5	0.31	12.1
S. aurata	0.11	8.7	0.10	17.0
D. punctatus	0.02	6.3	4.67	12.4
T. lucerna	0.12	5.2	2.55	12.4
P. mediterraneus	0.11	6.1	2.82	10.6
S. vulgaris	<0.01	5.0	1.94	15.2
A. regius	0.01	6.7	0.79	13.6
T. mediterraneus	<0.01	4.0	0.34	12.3
A. djedaba	0.58	10.0	0.38	14.0
M. surmuletus	0.02	5.8	0.30	10.6
L. ramada	3.90	6.7	0.15	13.0
P. saltatrix	0.07	7.5	0.02	11.0
G. niger	61.81	6.6	10.99	8.9
C. linguatula	0.07	6.3	5.88	11.7
S. pilchardus	0.21	8.9	1.88	10.9
S. diaspros	0.24	5.0	0.70	13.5
T. puta	0.10	6.2	2.30	10.4
E. encrasicholus	11.24	7.4	0.05	6.7
L. cavillone	0.01	5.5	1.95	9.4
A. taeniatus	0.07	4.9	0.67	8.0
L. klunzingeri	0.13	6.1	0.17	6.7
P. pelagicus	0.26	2.1	0.57	4.4
P. karathurus	0.06	8.0	0.22	7.2
O. massavensis	7.30	10.5	0.72	12.8
T. curvirostris	0.03	4.9	0.09	7.8
M. stebbingi	0.06	5.8	0.05	4.9
C. aestuarii	0.86	3.4	0.26	5.0
L. vernalis	0.76	2.0	0.05	2.1

that black goby (***G. niger***) dominated the trash catch of both trawlers and beach seiners. This indicates that Abu-Qir Bay is favorable for such species. The fishes as ***D. punctatus, P. mediterraneus, S. vulgaris, C. linguatula, T. puta and L. cavillone*** prefer comparatively deeper waters as they are well represented in trawling trash catch comparing to that of beach seine. The reverse is true for ***L. ramada, G. niger*** and ***O. massavensis***. These results go parallel with the findings of species abundance according to the water depths given by Hashem (1972), Al-Kholy & El-Wakeel (1975), Al-Sayes ***et al.*** (1981), Whitehead ***et al*** (1986) and Fischer ***et al.*** (1987).

The damage caused by trawling as reflected by large quantities of commercially important juveniles resulted in drastic deterioration of the stock resources since Abu-Qir Bay could be considered as nurseries where small individuals are found abundantly. So, it is recommended to regulate fishing effort of trawlers in Abu-Qir Bay, beside the mesh size of cod-end trawling net should be regulated as mentioned before by Hashem (1972), Al-Kholy & El-Wakeel (1975), Shaheen & Al-Sayes (1981), Charbonnier & Caddy (1986) and Rizkalla (1995).

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