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A STUDY ON THE TRASH FISH OBTAINED BY THE EGYPTIAN MEDITERRANEAN TRAWLERS.

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Composition.

ABSTRACT

*The analysis of the commercial catch of the Egyptian Mediterranean trawlers obtained by 132 trawling trips during the period from December 1993 to November 1994 showed that it was formed of two main categories: valuable species (economic species) and non valuable species (trash fish). The latter was divided into: juveniles of economic, sorted non economic and unsorted non economic species. The average catch per trip of trash fish through the period of investigation was 331 kg representing 26.57% of the total commercial catch. Juveniles of the economic species constituted about 90.03% of the total trash catch. Species composition of the trash fish revealed the presence of 36 economic species belonging to 18 families and 26 non economic belonging to 24 families. Picarels (**Spicara flexuosa** and **Spicara smaris**) were the most abundant species of trash fish constituting 71.31% of the total catch. This was followed by gurnards: **Trigla lucerna** & **Trigloporous lastoviza** (7.30%); groupers: **Serranus cabrilla** & **Serranus hepatus** (7.27%) and sea breams: **Pagellus erythrinus** & **Pagellus acarne** (2.42%). The present study indicates that the majority of the economic species in the trash fish were too small in size and were captured before reaching their first sexual maturity. This could be attributed to the use of trawl nets having cod ends with small mesh sizes that retained most of species with small sizes.*

INTRODUCTION

The commercial catch of the Egyptian Mediterranean trawlers is usually composed of two main categories: species of high marketing values (economic species) and species of low marketing values (trash fish). Data concerning the composition of trash fish catch in Egypt is still lacking.

The present work is directed to study in details the landing statistics, species and size composition of trash fish obtained by trawlers aiming to manage the fisheries of the important economic species in the Egyptian Mediterranean waters.

MATERIAL AND METHODS

The catch of 132 fishing trips carried out by the Egyptian Mediterranean trawlers during the period from December 1993 to November 1994 was analyzed by recording the total number of fish boxes containing both economic species and trash fish. Fish boxes containing trash fish have been divided into three types: the first have juveniles of economic species, the second of sorted non economic species and the third of unsorted non economic species. Random samples were monthly taken from each category of trash fish for species composition and size distribution analysis. Identification of various species constituting the trash fish was carried out in the laboratory. Fish were measured to the nearest millimeter from the tip of snout to the end of caudal fin and weighed to the nearest gram.

RESULTS

1- Abundance of trash fish in the commercial catch :

It is well known that the catch per unit effort would serve as an index of abundance of any species (Ricker, 1975). In the present study the catch per trip is calculated from the recorded statistical data (total catch and number of trawling trips). Table (1) shows the monthly variations in the abundance of trash fish and economic species through 132 trawling operations carried out in the Egyptian Mediterranean waters. It was found that the abundance of trash fish reached minimum value in October (14.52%) then gradually increased .

Table (1): Monthly variations in the abundance of trash fish and economic species obtained by 132 trawling trips in the Egyptian Mediterranean waters during the period from December 1993 to November 1994.

Month	**Number of trawling trips**	***Trawling catch***			
		Abundance of economic species		Abundance of trash fish	
		Average catch/trip (kg)	%	Average catch/trip (kg)	%
December, 1993	10	383	73.80	136	26.20
January, 1994	15	724	75.49	235	24.51
February	9	609	70.81	251	29.19
March	10	1096	55.19	890	44.81
April	6	1015	60.60	660	39.40
May	8	1062	66.38	538	33.62
June	14	864	71.17	350	28.83
July	10	1215	80.20	300	19.80
August	15	1141	78.15	319	21.85
September	11	1318	82.38	282	17.62
October	9	1254	85.48	213	14.52
November	15	524	82.13	114	17.87
Total	132	915	73.43	331	26.57

during the next months reaching its maximum value in March (44.81%). Generally the average catch per trip for trash fish throughout the period of investigation was 331.0 kg representing 26.57% of the total commercial catch. From Table (2), it is clear that juveniles of economic species dominated the catch of trash fish in all months ranging from 82.46% in November to 97.87% in September with lowest value in January 47.66% .

2- Species composition of trash fish :

Monthly species composition of trash fish is given in Table (3). From the table, it can be found that:

Picarels (***Spicara flexuosa*** & ***Spicara smaris***) dominated the catch of trash fish forming 71.31% of the total production. Their highest production were obtained during three successive months February (84.96%), March (93.92%) and April (85.86%).

Juveniles of gurnards (***Trigla lucerna*** and ***Trigloporus lastoviza***) came next in importance constituting 7.30% of the total trash catch. Their maximum production was observed during October (29.17%) and January (27.19%).

Juveniles of groupers (***Serranus cabrilla*** and ***Serranus hepatus***) are considered as another important constituent of trash fish. They constituted 7.27% of the total trash catch and their highest production was found during three successive months April (10.10%), May (12.09%) and June (18.77%).

Juveniles of sea breams (***Pagellus erythrinus*** and ***Pagellus acarne***) took part in the composition of trash fish. Their percentage represented 2.42% in the catch and their maximum abundance was observed during September (10.97%), October (6.25%) and November (7.02%).

Wide eye flounder (***Bothus podas***) and stargazers (***Uranoscopus scaber***) together with cartilagenous fishes are non economic constituting 1.85%, 1.82% and 2.04% respectively of the total trash catch.

Table (2): Monthly variations in the abundance of juveniles of economic species and non economic species forming the trash fish obtained by 132 trawling trips in the Egyptian Mediterranean waters during the period from December 1993 to November 1994.

Month	**Number of trawling trips**	***Trash fish***			
		Juveniles of economic species		Non economic species	
		Average catch/trip (kg)	%	Average catch/trip (kg)	%
December 1993	10	126	92.65	10	7.35
January 1994	15	112	47.66	123	52.34
February	9	242	96.41	9	3.59
March	10	865	97.18	25	2.81
April	6	637	96.52	23	3.48
May	8	483	89.78	55	10.22
June	14	304	86.86	46	13.14
July	10	278	92.67	22	7.33
August	15	310	97.18	9	2.82
September	11	276	97.87	6	2.13
October	9	195	91.55	18	8.45
November	15	94	82.46	20	17.54
Total	132	298	90.03	33	9.97

Table (3): Monthly species composition of trash fish (a- Juveniles of economic species, b- Sorted and unsorted non economic species) obtained by 132 trawling trips in the Egyptian Mediterranean waters (December 1993 - November 1994).

a- Juveniles of economic species.

Fish species	*Month*											
	Dec.1993		Jan.1994		Feb.		Mar.		Apr.		May	
	kg	*%*	*kg*	*%*	*kg*	*%*	*kg*	*%*	*kg*	*%*	*kg*	*%*
Spicara sp.	969	71.25	248	7.04	1920	84.96	8359	93.92	3400	85.86	3220	74.88
Trigla sp.	182	13.38	957	27.19	60	2.65	111	1.25	20	0.51	60	1.39
Serranus sp.	64	4.71	273	7.76	120	5.31	83	0.93	400	10.10	520	12.09
Boops boops	14	1.03	20	0.57			20	0.22				
Pagellus sp.	35	2.57	74	2.10	80	3.54	49	0.55				
Pagrus pagrus											60	1.39
Argyrosomus regius												
Solea aegyptiaca			37	1.05								
Mullus sp.			30	0.85								
Merluccius merluccius			33	0.94								
Ttichiurus lepturus							24	0.27				

(continued).

Fish species	*Month*													
	June		July		Aug.		Sep.		Oct.		Nov.		Total	
	kg	*%*	*kg*	*%*	*kg*	*%*	*kg*	*%*	*kg*	*%*	*kg*	*%*	*kg*	*%*
Spicara sp.	2840	57.96	2080	69.33	3560	74.32	2400	77.42	1040	54.17	1140	66.67	31176	71.31
Trigla sp.	290	5.92	380	12.67	460	9.60			560	29.17	110	6.43	3190	7.30
Serranus sp.	920	18.77	200	6.67	260	5.43	280	9.03	20	1.04	40	2.34	3180	7.27
Boops boops					140	2.92							194	0.44
Pagellus sp.	120	2.45			120	2.51	340	10.97	120	6.25	120	7.02	1058	2.42
Pagrus pagrus													60	0.14
Argyrosomus regius	80	1.63	120	4.00	20	0.42	20	0.64	20	1.04			260	0.59
Solea aegyptiaca													37	0.08
Mullus sp.					100	2.09							130	0.30
Merluccius merluccius													33	0.08
Trichiurus lepturus													24	0.05

b- Sorted and unsorted non economic species

Fish species	Month											
	Dec.1993		Jan.1994		Feb.		Mar.		Apr.		May	
	kg	%	kg	%	kg	%	kg	%	kg	%	kg	%
Citharus linguatula	17	1.25	212	6.02			55	0.62				
Bothus podas	29	2.13	780	22.16								
Microchirus ocellatus			91	2.59								
Conger conger			67	1.90								
Ariosoma balearicum			121	3.44								
Echelus myrus			54	1.53								
Uranoscopus scaber			27	0.77					80	2.02	220	5.12
Gobius niger			60	1.70			161	1.81				
Xyrichtys bimaculatus			60	1.70								
Stephanolepis hispidus			145	4.12								
Balistes punctatus			77	2.19								
Trachinus sp.			118	3.35							20	0.47
Cartilagenous fishes					80	3.54			60	1.51	200	4.65
Unsorted species	50	3.68	36	1.02			38	0.43				

(Continuted)

Fish species	Month													
	June		July		Aug.		Sep.		Oct.		Nov.		Total	
	kg	%	kg	%	kg	%	kg	%	kg	%	kg	%	kg	%
Citharus linguatula													284	0.65
Bothus podas													809	1.85
Microchirus ocellatus													91	0.21
Conger conger													67	0.15
Ariosoma balearicum													121	0.28
Echelus myrus													54	0.12
Uranoscopus scaber	350	7.15	20	0.67	40	0.83	40	1.29			20	1.16	797	1.82
Gobius niger													221	0.51
Xyrichtys bimaculatus					20	0.42	20	0.65					100	0.23
Stephanolepis hispidus													145	0.33
Balistes punctatus											120	7.02	197	0.45
Trachinus sp.	120	2.45	80	2.67									338	0.77
Cartilagenous fishes	160	3.26	120	4.00	30	0.63			160	8.33	80	4.68	890	2.04
Unsorted species	20	0.41			40	0.83					80	4.68	264	0.60

3- Size composition of trash fish species :

From Table (4), it was observed that the majority of economic species were captured with lengths between 7.0 - 16.0 cm and about half number of these species were captured at lengths below 11.0 cm. This indicates that juveniles of most economic species were too small for exploitation.

DISCUSSION

Analysis of the commercial catch obtained by 132 fishing trips by the Egyptian Mediterranean trawlers revealed the presence of trash fish in large quantities representing 26.57% of the total catch. This high percentage could be attributed to the small mesh size of cod end of the trawl net which retained most of species captured even those of smaller sizes. The present results coincide with that of Shaheen and Al-Sayes (1981) who stated that the average stretched mesh size of the cod end of the Egyptian Mediterranean trawlers not exceeds than 2.5 cm which seems to be very small for best fishery exploitation. Also Charbonnier and Caddy (1986) declared that the mesh size of the cod end of the Egyptian trawlers has no regulation as compared with those given in other areas of the eastern Mediterranean (stretched mesh size in Cyprus 34 mm, Greece 28 mm, Israel 48 mm and Turkey 40 mm).

Analysis of species composition of trash fish showed the presence of 36 economic species belonging to 18 families and 26 non economic species belonging to 24 families. Juveniles of economic species formed 90.03% of the total trash catch. Picarels (***Spicara flexuosa*** and ***Spicara smaris***) were found in large quantities forming not less than 71.31% followed by ***Trigla lucerna*** & ***Trigloporous lastoviza*** 7.30%, ***Serranus cabrilla*** & ***Serranus hepatus*** 7.27% and ***Pagellus erythrinus*** & ***Pagellus acarne*** 2.42%. It is worthily to mention that as Hashem (1972) recorded the presence of ***Spicara smaris*** in negligible amount in the region between Abu-Kir - Rosetta (Egypt), while the present study declared the presence of picarels in high percentage in the trash catch. This indicates, that the hydrographic conditions of the surrounding fishing ground became more favourable for the life of these species.

The comparison between the mean lengths of most economic species and their lengths at first sexual maturity given by other authors showed that the

Table (4): Size composition of trash fish species (a- Juveniles of economic species and b- non economic species) obtained by 132 trawling trips in the Egyptian Mediterranean waters (Dec.1993 - Nov.1994).

a- Juveniles of economic species

Family / species	% Weight	Trash fish length (cm) Range	Trash fish length (cm) Mean	Body length (cm) * Common	Body length (cm) * Maximum
Family *Sparidae*					
Pagrus pagrus	1.26	4.0-12.0	8.52	30.0-35.0	75.0
Pagellus erythrinus	6.37	5.0-13.0	9.49	20.0-25.0	60.0
Pagellus acarne	0.15	10.0-14.0	10.0	20.0-25.0	36.0
Lithognathus mormyrus	0.98	7.0-15.0	9.72	25.0	55.0
Boops boops	3.99	7.0-16.0	10.45	15.0-20.0	36.0
Diplodus annularis	1.07	8.0-11.0	9.6	12.0-15.0	24.0
Diplodus sargus	0.14	11.0	11.0	15.0-30.0	45.0
Sparus aurata	0.40	12.0-14.0	12.8	30.0-35.0	70.0
Crenidens crenidens	0.11	14.0	14.0	20.0	30.0
Family ***Haemulidae***					
Parapristipoma mediterraneum	0.37	9.0-17.0	12.0		
Family ***Synodontidae***					
Synodus saurus	0.27	12.0-19.0	14.82	15.0-20.0	43.0
Saurida undosquamis	0.03	13.3	13.3	20.0-30.0	50.0
Family ***Trichiuridae***					
Trichiurus lepturus	0.88	30.0-46.0	39.0		150.0
Family ***Mullidae***					
Mullus barbatus	0.12	12.0-14.0	12.0	10.0-20.0	30.0
Mullus surmuletus	2.23	7.0-12.0	9.14	20.0-25.0	40.0
Family ***Moronidae***					
Dicentrarchus punctatus	1.89	8.0-14.0	10.45		70.0
Family ***Siganidae***					
Siganus rivulatus	0.92	10.0-16.0	13.56	10.0-20.0	40.0
Family ***Triglidae***					
Trigla lucerna	9.91	10.0-18.0	14.06	35.0	75.0
Trigloporus lastoviza	15.33	6.0-13.0	10.15		40.0
Family ***Sciaenidae***					
Argyrosomus regius	0.05	12.0	12.0	50.0	140.0
Umbrina cirrosa	0.46	8.0-13.0	10.21	40.0	70.0

continued

a- Juveniles of economic species (continued)

Family species	% Weight	Trash fish length (cm) Range	Trash fish length (cm) Mean	Body length (cm) * Common	Body length (cm) * Maximum
Family *Centracanthidae*					
Spicara flexuosa	12.82	6.0-17.0	9.80		21.0
Spicara smaris	10.46	7.0-15.0	11.39		20.0
Family *Sphyraenidae*					
Sphyraena chrysotaenia	0.53	15.0-23.0	20.8		40.0
Family *Carangidae*					
Seriolina nigrofasciata	0.11	15.0	15.0		
Trachurus mediterraneus	0.59	13.0-16.0	14.13	10.0-50.0	60.0
Trachinotus ovatus	0.04	11.0	11.0	35.0	70.0
Family *Serranidae*					
Epinephelus haifensis	0.10	14.0	14.0		40.0
Serranus cabrilla	0.92	6.0-16.0	10.29	20.0	40.0
Serranus hepatus	2.06	5.0-10.0	8.38	10.0-12.0	15.0
Family *Merlucciidae*					
Merluccius merluccius	0.08	16.0	16.0	30.0-70.0	120.0
Family *Pomatomidae*					
Pomatomus saltator	0.08	15.0	15.0	40.0-60.0	110.0
Family *Clupeidae*					
Sardina pilchardus	0.32	9.0-16.0	11.3	15.0-20.0	25.0
Sardinella aurita	0.41	9.0-12.0	10.28	15.0-25.0	33.0
Family *Engraulididae*					
Engraulis encrasicholus	0.11	7.0-9.0	7.17	7.0-15.0	20.0
Family *Soleidae*					
Solea aegyptiaca	0.12	6.0-18.0	10.03		25.0

* Quoted from Whitehead *et al.* (1986).

continued

b- non economic species

Family species	% Weight	Trash fish length (cm) Range	Mean
Family *Gobiidae*			
Gobius niger	3.18	5.0-11.0	9.89
Family *Citharidae*			
Citharus linguatula	3.39	6.0-18.0	12.97
Family *Trachinidae*			
Trachinus draco	2.31	13.0-20.0	16.31
Trachinus araneus	0.59	15.0-20.0	17.0
Family *Bothidae*			
Bothus podas	3.53	8.0-17.0	12.89
Family *Soleidae*			
Microchirus ocellatus	0.73	8.0-13.0	10.63
Family *Congridae*			
Conger conger	1.01	22.0-39.0	30.43
Ariosoma balearicum	0.22	20.0-30.0	23.33
Family *Ophichthidae*			
Echelus myrus	0.22	46.0	46.0
Family *Gadidae*			
Phycis phycis	0.18	19.5	19.5
Family *Monacanthidae*			
Stephanolips hispidus	1.82	7.0-16.0	12.0
Family *Balistidae*			
Balistes punctatus	0.82	14.0-16.0	15.0
Family *Blennidae*			
Parablennius tentacularis	0.11	13.5	13.5
Family *Caproidae*			
Capros asper	0.21	9.0-10.0	9.5
Family *Labridae*			
Xyrichtys bimaculatus	1.86	13.0-17.0	15.0

continued

b- non economic species (continued)

Family species	% Weight	Trash fish length (cm)	
		Range	Mean
Family *Teraponidae*			
Terapon puta	0.37	8.0-10.0	9.53
Family *Apogonidae*			
Apogon taeniatus	0.04	8.3	8.3
Family *Leiognathidae*			
Leiognathus klunzingeri	0.01	3.0-4.0	3.5
Family *Rajidae*			
Raja radula	2.03	26.0-33.0	29.2
Family *Exocoetidae*			
Cheilopogon exsiliens	0.03	11.0	11.0
Family *Uranoscopidae*			
Uranoscopus scaber	0.75	20.0	20.0
Family *Macrouridae*			
Macrourus berglax	0.28	15.0-23.0	
Family *Ophidiidae*			
Ophidon barbatum	0.05	17.0	17.0
Family *Lolignidae*			
Loligo sp.	0.10	17.0	17.0
Family *Sepiidae*			
Sepia sp.	0.06	10.0	10.0
Family *Squillidae*			
Squilla mantis	0.41	4.0-19.0	13.75

Table (5) : Comparison between the mean lengths of most important economic species present in the trash fish with their lengths at first sexual maturity.

Species	Mean length (cm) Present study	*Length at first sexual maturity (cm)*			
		Male	Female	Combined sexes	Author
Pagrus pagrus	8.52			24.0	Whitehead *et al.*, 1986
Pagellus erythrinus	9.49	14.0	13.0		Rizkalla, 1992
Pagellus acarne	10.0	13.0	14.0		Rizkalla, 1992
Lithognathus mormyrus	9.72			14.0	Whitehead *et al.*, 1986
Boops boops	10.45			13.0	Hassan, 1990
Diplodus annularis	9.6			10.0	Whitehead *et al.*, 1986
Diplodus sargus	11.0			17.0	El-Maghraby *et al.*, 1982
Sparus aurata	12.8	20.0	23.0		Wassef, 1978
Synodus saurus	14.82	14.3	17.2		Faltas, 1993
Saurida undosquamis	13.3	14.9	18.3		Faltas, 1993
Merluccius merluccius	16.0	21.0	24.0		Mugahid & Hashem, 1982
Siganus rivulatus	13.56			14.8	Whitehead *et al.*, 1986
Trachurus mediterraneus	14.13			16.0	Allam, 1973
Sardinella aurita	10.28			11.0	Faltas, 1983
Mullus surmuletus	9.14	11.0-12.0	13.0-14.0		Hashem, 1973 a
Mullus barbatus	12.0	10.0	12.0		Hashem, 1973 b

majority of economic species in the trash catch were captured before attaining their first sexual maturity (Table 5). This phenomenon will certainly affect the production of economic fishes obtained from the Egyptian Mediterranean waters as the percentage of economic species will be gradually decreased due to the continuous loss of new recruits.

From the present study, it is recommended to carry out more investigations on the landed trash catch. Trawl nets with different mesh sizes must be experimented to select the best mesh which minimizes the high catch of juveniles of economic species aiming to give the opportunity for these species to spawn at least one time before capture.

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