

## **STATUS OF THE TRAWL-FISHERY IN THE FOUL BAY, RED SEA**

*By*

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### **ABSTRACT**

*The annual trawl catch from the Foul Bay in the Egyptian Red Sea Waters has been increased gradually from 115 tons to 14164 tons during the period 1985 - 1994 with an annual average of 5785 tons. Lizardfish and Threadfin bream's are amongst the most important fish groups in the catch (amounting to about 36% each). Based on the horsepower of the trawler as a unit of fishing effort; the annual catch per unit effort (CPUE) of the trawlers showed an increase in the annual catch per trip. The exploitation rate of the encountered species ranged between 0.44 and 0.48; meaning that the fish stock in the area will be soon subjected to over-fishing problem (if the fishing effort keeps on increasing). Hence, more elaborate fisheries research work on the Foul Bay should be continued.*

### **INTRODUCTION**

The fishing grounds of the Egyptian Red Sea waters can be divided according to the type of fishing and the state of exploitation into four sectors. These sectors are namely the Gulf of Aqaba (deep and completely unsuitable for trawling), the Gulf of Suez (rather shallow and with many banks suitable for trawling), the northern section of the Red Sea proper (mostly deep and not good for trawling) and finally the southern Red Sea which is expected to be fairly rich in fish groups and has extensive banks for trawling.

The Gulf of Suez was considered as the most productive sector in the Egyptian Red Sea. Recently the rapid decline in the fish yield from the Gulf - due to the increasing pressure of exploitation- forced the fishermen to move out from the Gulf to work in the Foul Bay which is considered as under exploited fishing area.

The Foul Bay is the second largest fishing area in the Egyptian Red Sea. It is located close to the border between Egypt and Sudan with an area of 7355 km<sup>2</sup>. Although a large percentage of this area (4025 km<sup>2</sup>) is considered suitable only for reef fishing methods such as long and hand lines, gill and trammel nets; there exist some grounds suitable for trawling (1491 km<sup>2</sup>). Purse seining is taking place in an area of about 1839 km<sup>2</sup> which contributes 81% of the catch (mostly *Sardinella* and mackerel), trawling contributes 16% (mostly lizardfish, snappers and breams), and reef fishing 2.6% (mostly jacks, sharks and groupers) Sanders et. al. (1984, A & B).

## **MATERIALS AND METHODS**

About 70 fishing vessels are actually engaged in the fishing operations in the Foul Bay. Most of the vessels are about 25 to 35 meters in length, and are equipped with main engines ranging between 425 to 1150 horsepower. Winches are used to haul the trawl nets, which are about 25 meter in head- line length. The nets are of the type typically used in the Mediterranean Sea. The crew number varies from 17 to 25 fishermen on each fishing vessel. Generally, most of the vessels are supported by echo sounders.

The duration of the fishing trips ranges between 20 to 30 days. About half of this duration is consumed in sailing to and back from the fishing grounds and in the search for fish. The rest is consumed for actual trawling operations. Trawling operations take place continuously throughout the 24 hour of the fishing day. The number of trawl shots ranges between 5 and 8 shots per day, each shot lasts for about 1.5 to 2 hours in duration.

Skippers of the mentioned vessels were regularly interviewed at the Ataka fishing harbor which is about 15 km. south of Suez City to obtain information about date of landing, name of fishing vessel, crew number, the length of vessel horse power of main engine, duration of the fishing trip and the actual number

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of fishing days, the average number of trawl shots per day, the average number of hours trawling per shot, total catch and catch of each species or fish group. In addition, the catch statistics were monthly collected from the office of the Egyptian General Authority for the Development of the Fish Resources at the port.

To standardize the statistical treatment of the obtained data; the "Horse power (HP)" of the fishing vessel was used to represent the fixed effort exerted by the fishing vessel during the fishing trip. Hence, the catch per unit of effort for that fishing vessel "CPUE" is expressed as (kg/HP/Vessel/Trip). This is obtained by dividing the vessel total catch (kg) obtained during the fishing trip by the HP of the vessel. The statistical analysis of the data was built on Snedecor and Cochran (1982).

## *RESULTS AND DISCUSSION*

### **Trawl catch and species composition:**

According to the records of the Egyptian General Authority for the Development of the Fish Resources; the trawl catch from the Foul bay area has increased from 115 tons in 1985-86 to about 14164 tons in 1993-94. Limited number of economically importance fish species represents the catch, which is comprised mainly by lizardfish (37%); threadfin breams (36%) of the total fish catch from the area. Table (1) represents the trawl catch for the main encountered fish groups and landed in the fishing harbor of Ataka during the fishing seasons from 1988 to 1994.

The "others" category includes the fish species which appear accidentally in the catch in significant quantities and/or those with little economic importance. It yields an average annual catch of 1648 tons. Thus contributing an average percentage (23.3%) of the total trawl catch. This category includes the following species: Jacks (Carangidae), Barracuda (Sphyraenidae), Sea chups (Kyphosidae), Cat fish (Synodidae), Mojarrs (Gerridae), Buffer fish (Tetradontidae), Rabbit fish (Siganidae), Needle fish (Belonidae), Parrot fish (Scaridae), Wolf herring (Chirocentridae), the shrimps *Penaeus japonicus* and *P. semisulcatus* (Penaeidae) and the cuttle fish which contributes about 0.4 % of the total trawl catch. Thus, they were included in the "others" category because of their little catch.

Table (1): Trawl catch (tons) of fish groups from the Foul Bay during the seasons of 1988 to 1994. (Number in parenthesis represents % to the total catch).

Season & Species group	1988 - 89	1989 - 90	1990 - 91	1991 - 92	1992 - 93	1993 - 94	Total catch	Average Catch
Lizard fishes	195 (32.0)	919 (34.8)	2078 (32.8)	4117 (41.1)	3886 (42.4)	4693 (33.1)	15888 (37.0)	2648
Thread-fin bream	236 (38.7)	805 (30.5)	2507 (39.5)	3549 (35.4)	3985 (43.5)	44023 (1.1)	15483 (36.1)	2580
Red Mulletts	62 (10.1)	118 (4.4)	294 (4.6)	146 (1.5)	201 (2.2)	426 (3.0)	1246 (2.9)	208
Snappers <i>Pomadasys tridens</i>	25 (4.1)	69 (2.6)	26 (0.4)	70 (0.7)	29 (0.3)	48 (0.4)	267 (0.6)	44
Horse Mackerel <i>Trachurus</i> & <i>Decapterus spp.</i>	15 (2.5)	38 (1.4)	18 (0.3)	39 (0.4)	24 (0.3)	19 (0.1)	154 (0.4)	26
Others	76 (12.6)	694 (26.3)	1419 (22.4)	2093 (20.9)	1029 (11.2)	4575 (32.3)	9886 (23.3)	1648
Total catch (tons) & (%)	609 (100)	2642 (100)	6342 (100)	10013 (100)	9154 (100)	14164 (100)	42923 (100)	7154

The Horse power (HP) and the number of landings were chosen as units to express the fishing effort performed by the vessel during the monthly fishing trip in the Foul Bay. The number of vessels licensed to operate in Foul Bay increased gradually from 3 vessels during the fishing season 1985/86 to 160 during the fishing season of 1993/94.

#### Statistical Analysis of Fishery Parameters:

ANOVA was applied between: total catch and total effort, CPUE and cumulative month number (MN), average Horse Power (HP) and (MN), number of vessels (VN) and (MN), average CPUE and (MN), average CPUE and average (HP) and average catch and average (HP). The constants of these regressions and the outputs of the analysis are given in Table (2). The table shows that the highest positive correlation exists between the catch and the HP of the vessel, and the CPUE is increasing through out the successive months as a result of increasing the HP of the trawlers. It is obvious also from the table that the total catch is positively correlated with total effort.

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Table (2): Regression analysis and ANOVA of trawl fishery parameters in the Foul Bay, Red Sea.

Variables	Regression analysis			ANOVA table					
	reg. coeff.	S.E	corr. coeff.	Regression				Residual	
				sum sq.	mean sq.	F-ratio	Prob.	sum sq.	mean sq.
Tot.cat and total effort	0.00704	5.7	0.6	804.7	804.7	24.45	7.80E-06	1777.5	32.9
CPUE & Month No.	0.1986	5.27	0.5889	945.2	945.2	33.98	1.98E-07	1780.4	27.8
Avg Hp & Month No.	3.0286	198.84	0.2826	219699	219699	5.56	0.0215	2530500	39539
No. Boats & Month No.	0.3860	16.41	0.4141	3567.9	3567.9	13.25	5.47E-04	17238.3	269.3
Avg CPUE & Month No.	0.091	4.83	0.29	113.8	113.8	4.88	0.0315	1236.2	23.3
Avg CPUE & Avg Hp	0.0051	4.92	0.2219	66.5	66.5	2.75	0.1034	1283.6	24.2
Avg Cat & Avg Hp	54.0213	2493.28	0.9784	738843.7	738843.7	1188.5	0	32947.2	6216.5

A cluster analysis computer program based on Bray and Curtis (1957) similarity method using (square root) transformation factor was used to study the similarity in the trends of the different parameters relative to the elapsed time from October 1985 and extending for 67 months period. The program was applied on the overall means of the monthly-obtained data Table (3). The parameters analyzed were namely: Time (Month No), Catch\Vessel\Month, (HP)\Vessel\Month, Number of Vessels/Month, and CPUE\Vessel\Month. The output of the cluster analysis is presented in Figure (1). Results of the analysis revealed the existence of close similarity (> 90%) between the CPUE and the elapsed time. This indicates an increase in the catch rate with time spent for the whole fishing trip. It also indicates that the mean Catch\Vessel is dependant on the HP of the vessel it self than on other parameters as shown in Figure (1).

Table (3): Monthly Fishery parameters of trawlers operating in Foul Bay during October 1985 to November 1995.

Cumulative Month #	Catch/Trip (Kg/Vessel)	Mean Effort (HP/Vessel)	No. of Vessels	Mean CPUE (Kg/HP/Trip)
1 (Oct. 1985)	19000	438	4	42.9
2	0	0	0	46.6
3	24103	469	9	50.4
4	22913	510	10	46.4
5	23502	444	13	52.8
6	20122	449	32	44.8
7	17047	429	21	39.8
8	16488	436	20	37.8
9	16752	433	16	39.4
10	23607	512	8	50.3
11	15969	438	4	36.7
12	20045	459	5	43.9
13	30566	497	16	62.4
14	23940	499	23	49.2
15	21017	430	19	48.6
16	21277	450	46	46.8
17	0	0	0	47.7
18	0	0	0	48.6
19	22114	454	30	49.5
20	0	0	0	51.2
21	0	0	0	52.9
22	35300	634	4	54.7
23	21433	501	33	43.7
24	24628	487	30	51
25	26704	492	35	55.6
26	29758	515	31	58.4
27	30006	488	40	61.8
28	30048	520	41	58.6
29	32201	529	50	62.2
30	31213	572	41	57.1
31	30692	628	24	51.4
32	30838	603	12	55.2
33	0	0	0	49.2
34	25898	630	15	43.3
35	28595	553	36	52.6
36	31373	544	42	59.8
37	32078	555	43	58.8
38	33304	579	41	59.2
39	31655	584	46	56.1

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Table (3 cont.): Monthly Fishery parameters of trawlers operating in Foul Bay during October 1985 to November 1995.

Cumulative Month #	Catch/Trip (Kg/Vessel)	Mean Effort (HP/Vessel)	No. of Vessels	Mean CPUE (Kg/HP/Trip)
40	34915	605	43	59.3
41	28121	576	38	51.2
42	32015	603	34	53.9
43	29368	576	28	51.4
44	0	0	0	54.2
45	0	0	0	57
46	33020	560	47	59.7
47	0	0	0	58.7
48	31137	582	41	57.7
49	30424	573	53	54.4
50	29771	580	39	54.5
51	32680	605	52	56
52	31157	581	47	54.1
53	32994	585	47	58.2
54	29714	527	25	56.4
55	35266	651	14	55.7
56	32835	630	13	54.7
57	38900	593	3	69.5
58	37590	610	43	63.8
59	34826	596	40	60.7
60	34938	646	31	56.7
61	30982	588	53	54.2
62	0	0	0	54.9
63	34655	632	35	55.6
64	32008	587	63	55.2
65	30231	599	39	51.3
66	29970	582	19	51
67	27591	561	8	49.4

Fishery Status at Foul Bay "Red Sea" 1990 - 1995

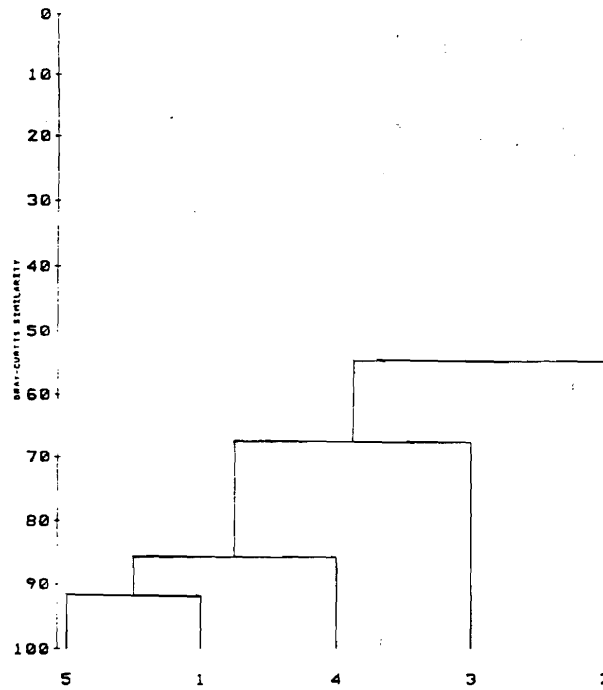


Fig. (1): Cluster analysis of some fishery parameters in the Foul Bay, Red Sea. 1= Month number starting from Jan 1990, 2= Catch/Vessel/Month, 3= HP/vessel, 4= No. Of Vessels and 5= CPUE (Kg/HP).



### **CONCLUSION**

The number of fishing vessels operating in the Foul Bay showed conspicuous increase since 1985. It was 3 during the fishing season 1985/86 and gradually increased to be 160 licensed vessels in the fishing season 1993/94. About 70 of these vessels were actually working in the Bay and performed 477 fishing trips from the Bay to Ataka harbor. Meanwhile, the trawl catch has increased from 115 tons in 1985-86 to about 14164 tons in 1993-94. This trend reflects an intensive pressure of fishing effort in the Foul Bay during the last few years.

Using the HP/vessel as a unit of effort in calculating the CPUE provides a measure of the fish density in the Red Sea. The present study shows that there is an increase in the annual catch per fishing trip throughout the study period. This is presumed to reflect the abundance of demersal fishes in the area. This conclusion may be attributed to the fact that the Foul Bay fisheries resource is considered as a virgin stock, since the really exploitation of this stock started only in 1985. As based on the variation in the horsepower of the vessels from 1985 to 1994; cluster analysis was used to study the similarity in the trends of the different fishing parameters relative to the time sequence from October 1985 and extending for 67 month period. The main results revealed by the analysis is the existence of close similarity (> 90%) between the CPUE and the time sequence which indicates an increase in the catch rate with time associated with increasing the number of fishing vessels in the area from 1990 and on.

The extensive study on the dominant species in the trawl catch from the area -namely the lizard fish *Saurida tumble* which is being published elsewhere - as based on Pauly (1987), and Ricker (1975) revealed that the exploitation rate of the mentioned species ranges between 0.44 and 0.48. This range means that the fish stock in the area will be soon subjected to over-fishing problem if the fishing effort keeps on increasing. Hence, more elaborate fisheries research work on the Foul Bay should commence at once.

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