BOTTOM TRAWLING SURVEYS FOR ABUKIR-ROSETTA REGION DURING 1969-1970

By

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INTRODUCTION

The Mediterranean Sea is considered to be one of the major sources of fish production in Egypt. From 1930 to 1960 the commercial production had increased from 13708 to 51484 tons. This progressive increase was mainly due to the increased fishing intensity during these years (El-Zarka & Koura, 1965). In the last years (after 1960) the commercial production of fish and shrimp from the Egyptian waters of the Mediterranean Sea have been subjected to serious changes. The total yield decreased from 51484 tons in 1960 to 13587 tons in 1968. Such big decline in fish production is not only due to the huge drop in the Sardine fishery, whose catch decreased from 18166 tons in 1962 to 463 tons in 1968, but also due to the continuous decrease in the catches of shrimp and some other fishes (Fishery Statistics, 1962–1968).

For the management of our sea fisheries, exploratory bottom trawling surveys were carried out in Abukir-Rosetta Region, within 30°-00' to 30°-30' E. longitude and 31°-20' to 32°-00' N. Latitude, during 1969-1970. The main objective of these trawling surveys was to gain information on the biology, distribution and relative abundance of the economically important fish and shrimp species inhabiting this area. The collected data would allow for the rational exploitation and development of the trawl fishery in the Egyptian waters of the Mediterranean Sea.

The work has actually been divided into two main parts ; the first part consists of catch and effort study, while the second part is planned to study the biology of the fish and shrimp, in various months and at different depths. This last part will be prepared and published in subsequent papers.

MATERIALS AND METHODS

The trawling surveys were carried out by the research vessel "Faras el-Bahr" of the Alexandria Institute of Oceanography and Fisheries. The ship is a stern trawler of 21.5 meters overall length 5 0 m breadth and 160 H.P. with a maximum speed of 10 knots. The fishing gears used were two Italian trawls having nearly similar dimensions (Table 1) and the trawling speed was between 2.5 and 3.0 miles per hour.

The fishing operations were carried out in the period from May, 1969 to April, 1970. During this period five cruises were made, representing the Spring, Summer and Autumn of 1969 and the Winter and Spring of 1970. In the whole period a total number of 112 successful fishing operations were conducted in the area at different depths, ranging from 10 to 200 m in the first and second cruises and from 10 to 100 m only in the rest of the cruises. The depths were determined by the echo-sounding. Actual fishing was usually between 7 a.m. and 10 p.m. each day when calm sea prevailed. Most of the hauls had the duration of either one or two hours each. The whole time taken in successful trawling was 143 hours and 50 minutes. A total catch of 1099 kg of fish and shrimp were obtained during the five cruises. The details of all these data are given in table (2).

TABLE 1.– DIMENSIONS OF THE TWO ITALIAN TRAWLS USED IN THE SURVEYS OF ABUKIR-ROSETTA REGION DURING THE YEARS 1969-1970.

Item	Trawl No. 1		Trawl No. 2	
	Length (m)	Stretched mesh-size (mm)	Length (m)	Stretched mesh-size (mm)
Head rope	26	—	27.5	—
Foot rope	30	—	31.5	—
Wing	9.5	90	8.5	115
Belly	15	55	14	60
Throat.	5.5	40	5.5	40
Cod-end	4.5	25	4.5	28
Upper Wedge	2	95	4	90
Lower Wedge	2.5	100	3.5	95
Lower Body	15	50	14	48

The catch from each haul was sorted on deck into species. The total weight of each species was recorded and random samples of the important species was measured for length frequency distribution. The weights of these measured fish were taken in order to estimate the average weight of the individual as well as the total number of the species in the catch. The body length was measured to the nearest centimeter and fish weighing was carried out by two spring balances with the capacity of 2 and 15 kg. for the small and big amounts of the catch respectively.

Treatment of Data

In order to evaluate the catches in Abukir-Rosetta Region the trawling stations in each month was grouped according to depth ranges of 10–25, 26–50, 51–100, 101–150 and 151-200 meters. The depth of each haul was determined as the average of the starting and ending depths.

The relative abundance of the species encountered was examined by comparing their catch rates in kg. per hour. Average catches in kg. per hour of trawling were computed by dividing the sum of the catches by the total time of trawling for individual depth ranges.

TABLE 2.—THE TRAWLING OPERATIONS CARRIED OUT BY "FARAS-EL-BAHR" IN ABUKIR - ROSETTA REGION DURING 1969 - 1970.

Cruise Number	Date	Number of successful hauls	Time of successful trawling (hr)	Total catch (kg)	Average catch (kg/hr)	Investigated depth (m)
1	15-20 May, 1969	33	49.00	369,835	7.548	10–200
2	15–19, 29–31 August, 1969	37	30.33	309,940	10.219	10–200
3	25–30 November, 1969	20	33.50	191,095	5.704	10–100
4	13–16 January, 1970	13	14.17	108,550	7.663	10–100
5	16–20 April, 1970	9	16.83	119,620	7.070	10–100

Fishes of family *Leiognathidae* were most abundant in shallow waters and their amount decreased with the increase of depth till they disappeared totally from the catch at about 100 m. depth. Sometimes Leiognathids were caught in large amounts. In a preliminary estimation, its amount at 10-50 m. depth was found to be about 33% and 58% of the total catch in the second (summer) and third (autumn) cruises respectively. In the other cruises (winter and spring) these fishes consitituted a negligibly small percentage of the total catch. These fishes were usually too small (about 5 cm. in length) to be of commercial importance and so their amounts were not included in the catch analysis.

Apart from shrimps some invertebrates like Sepia, Squids, Octopus and Crabs were usually caught, but in small amounts. An exceptionally big amount (about 42% of the total catch) was obtained during the third cruise at 51-100 m. depth. Being of non-economic importance the catches of these invertebrates lso were not included in the catch analysis.

RESULTS

Cruise No. 1 :

The survey on the first cruise was made for six days in May, 1969. Thirty-three successful trawling operations were conducted in waters ranging in depth from 10 to 200 meters. Some trawl damages occured especially in deep waters and only one net was lost at about 160 m. depth. The largest catch (23, 265 kg/hr.) was obtained from station No. 19 at 135 m. depth. Catch rates of fish and shrimp for the different depth ranges are shown in table (3). The most productive depth range surveyed was at 101-150 m. followed by that at 51-100, 26-50, 151-200, and 10-25 m. respectively.

Fishes of family Sparidae provided the highest catch rate in this month. These fishes were dominant at 51-100 m. followed by those at 26-50, 151-200 and 101-150 m. respectively. Family Triglidae and Gadidae were the next most important fish groups. Fishes of family Triglidae were dominant at 26-50 m. followed by those at 10-25 and 51-100 m. respectively. While Gadidae were dominating at 101-150 m. followed by those at 151-200 m. The catches of cartilagenous fishes and those of family Mullidae were also important. Cartilagenous fishes predominated at 51-100 and 151-200 m. followed by those at 101-150 and then 10-25 m. respectively. The catches of family Mullidae predominated at 101–150 m., followed by those at 151–200, 51–100 and 26–50 m. respectively. The shrimp catches were next in importance. They were constricted to small depths. The best catches of shrimp were made at 10–25 m. Other important fishes were those of families Synodontidae, Serranidae, Clupeidae and Soleidae.

TABLE 3.—AVERAGE CATCH AND INDIVIDUAL CATCH RATES IN Kg/hr. FOR ABUKIR - ROSETTA REGION ACCORDING TO DEPTH-RANGE IN MAY, 1969.

Depth (m)	10–25	26–50	51–100	101–150	151–200
No. of hauls	13	6	6	5	3
Time of Trawling (hr.)	22.5	9.5	5.5	9.0	2.5
Cartilagenous fishes	0.922	0.137	1.455	1.200	1.441
Mullidae	0.123	0.706	0.929	2.444	1.201
Sparidae	0.421	2.939	4.171	2.795	2.843
Synodontidae	0.160	0.965	0.563	—	—
Gadidae	0.058	0.627	0.327	3.944	1.601
Triglidae	1.126	1.924	0.975	0.226	0.120
Soleidae	0.308	0.205	0.187	—	—
Serranidae	0.453	—	0.284	0.003	—
Carangidae	0.049	0.444	—	0.058	—
Clupeidae	0.309	0.321	0.005	0.022	—
Other Fishes	0.359	0.105	0.014	0.155	—
Shrimp species	1.285	0.017	—	—	—
Av. Catch (kg/hr)	5.573	8.390	8.913	10.857	7.200

Cruise No. 2 :

The survey on the second cruise was made for 8 days in August, 1969. The trawling operations were conducted in waters ranging in depth from 10 to 200 m. Of 44 hauls made in this month, 7 were not used in the catch analysis because the trawl was either badly torn or failed to perform satisfactorily. The catch rate from successful hauls ranged from 2.300 to 37. 000 kg/hr. Catch rates of fish and shrimp for the different depth ranges are shown in table (4). The highest average catch in kg/hr was obtained in the 51-100 m., followed by that at 101-150, 26-50, 151–200 and 10-25 m. depth range respectively.

Fishes of family Mullidae were the most abundant. Their catch rate was high at 51–100 m., followed by those at 26–50, 10-25 and 101–150 m. respectively. Family Triglidae and Sparidae were next in importance. The highest catch rate of Triglidae was obtained at 51–100 m., followed by that at 101-150 m. The highest catch rate of Sparidae was found at 151–200 m. followed by 101-150, 51–100 and 26–50 m. respectively. Next in abundance were fishes of family Synodontidae and the shrimp species. The highest catch rate of Synodontidae was obtained at 51–100 m., followed by that at 26–50 m. The shrimp catches were taken from the shallow depths, where it was concentrated at 10–25 m. Other important fishes caught were those of families Serranidae, Soleidae and Clupeidae.

TABLE 4.—AVERAGE CATCH AND INDIVIDUAL CATCH RATES IN Kg/hr. FOR ABUKIR - ROSETTA REGION ACCORDING TO DEPTH-RANGE IN AUGUST, 1969.

Depth (m)	10–25	26–50	51–100	101–150	151–200
No. of hauls	18	8	7	2	2
Time of Trawling (hr.)	19.0	7.33	7.0	2.0	2.0
Cartilagenous Fishes	0.116	0.238	1.105	0.660	0.600
Mullidae	1.671	3.434	4.123	0.700	0.337
Sparidae	0.086	1.383	1.394	3.199	3.475
Synodontidae	0.010	1.201	3.215	—	—
Gadidae	—	—	0.071	2.000	1.700
Triglidae	0.354	0.567	2.786	1.825	0.425
Soleidae	0.209	0.515	0.979	0.125	—
Serranidae	0.005	2.751	0.214	—	—
Carangidae	0.121	0.251	0.329	0.025	—
Clupeidae	0.499	0.011	0.004	2.528	—
Other Fishes	0.389	0.109	0.224	—	—
Shrimp species	1.611	0.092	—	—	—
Av. Catch (kg/hr)	5.069	10.550	14.442	11.065	6.538

Cruise No. 3:

The third cruise was carried out for 6 days in November, 1969. Because of the unfavourable climatic conditions prevailing during that month, trawling was only conducted at depths from 10 to 100 m. Out of 23 hauls made in this month, 20 were accpeted as satisfactory and were used in the catch analysis. Catch rates of fish and shrimp for the different depth ranges are shown in table (5). The highest average catch in kg/hr was obtained at 26-50 m., followed by that at 51-100 and 10-25 m. depth range respectively.

Fishes of family mullidae provided the highest catch rate in this month. Good catches were obtained from the 26–50 m., followed by 10–25 and 51–100m. respectively. Family Synodontidae was the next most important group and also good catches were taken from the 51–100 m., followed by 26–50 and 10–25 m. respectively. The shrimp followed the Synodontidae in abundance, and was taken from all the investigated depths (10-100 m.). The catch rate of Shrimp was high at 51–100 m., and decreased with the decrease in depth, (this was an exceptional case which did not appear in other months). Other important fishes were those of families Sparidae, Triglidae, cartilagenous and Flatfishes.

TABLE 5.—AVERAGE CATCH AND INDIVIDUAL CATCH RATES IN Kg/hr. FOR ABUKIR-ROSETTA REGION ACCORDING TO DEPTH-RANGE IN NOVEMBER, 1969.

Depth (m.)	10–25	26–50	51–100
No. of Hauls	9	6	5
Time of trawling (hr)	16.0	10.83	6.66
Cartilagenous Fishes	—	0.679	0.899
Mullidae	2.211	3.654	0.675
Sparidae	0.100	0.751	0.646
Synodontidae	0.469	0.675	1.874
Gadidae	0.009	—	0.154
Triglidae	0.604	0.008	0.612
Soleidae	0.365	0.125	0.265
Serranidae	—	0.212	0.002
Carangidae	0.018	0.086	—
Clupeidae	0.127	0.203	0.007
Other Fishes	0.469	0.049	—
Shrimp Species	0.486	0.509	0.605
Av. Catch (Kg/hr)	4.856	6.942	5.739

Cruise No. 4:

The fourth cruise was made for 4 days in January, 1970. Due to the unfavourable climatic conditions the trawling survey was also carried out at depths from 10 to 100 m. Out of 14 trawling operations performed, only one was unsatisfactory. Catch rates of fish and shrimp for the different depth ranges are shown in table (6). The most productive depth range surveyed was 26-50 m., followed by 51-100 and 10-25 m. respectively.

Family Sparidae provided the highest catch rate. Fishes of this family predominated at 26–50 m., followed by those at 51-100 m. Cartilagenous fishes represented the next dominant group with a high catch rate at 10-25 m. The third abundant fish group was those of family Serranidae. The fact that both Cartilagenous and fishes of family Serranidae yielded high catch rates was entirely due to the capture of one or more large individuals of these fishes. Other important fishes were those of families Mullidae, Triglidae and Synodontidae. The catch rates of these fishes were high at 50–100 m, and decreased in shallow waters. Small quantities of Shrimp (0.294 kg/hr.) were only caught in shallow depths (10-25 m).

TABLE 6.—AVERAGE CATCH AND INDIVIDUAL CATCH RATES IN Kg/hr. FOR ABUKIR-ROSSETTA REGION, ACCORDING TO DEPTH-RANGE, IN JANUARY, 1969.

Depth (m.)	10–25	26–50	51–100
No. of Hauls	6	3	2
Time of trawling (hr)	6.5	3.0	4.66
Cartilagenous Fishes	2.308	—	0.642
Mullidae	0.577	0.333	0.964
Sparidae	—	5.666	4.978
Synodontidae	—	0.450	0.964
Gadidae	0.192	—	0.321
Triglidae	0.162	0.500	1.124
Soleidae	0.462	0.167	—
Serranidae	—	5.000	—
Carangidae	—	—	—
Clupeidae	0.046	—	—
Other Fishes	0.146	0.500	0.193
Shrimp Species	0.385	—	—
Av. Catch (Kg/hr)	4.277	12.616	9.186

Cruise No. 5:

The fifth cruise was conducted for 4 days in April 1970. The depth trawled ranged from 10 to 100 m. Out of 10 trawling operations performed, only one was unsatisfactory. The catch rates of fish and shrimp for the different depth ranges are shown in table (7). The most productive depth surveyed was 51–100 m, followed by 26–50 and 10–25 m. respectively. The highest average catch (14.0 kg/hr.) was obtained from station No. 1 in the 51–100 m. depth, where fishes of family Sparidae were the most important fish group.

The shrimp provided the highest catch rate in this month. But we have to say that a big quantity (10 kg/hr) of the shrimp catch consisted of non-commercial species. Among fishes, family Sparidae provided the highest catch rate, followed by those of family Synodontidae. Fishes of both families predominated in the 51–100 m., followed by those in 26–50 m. depth. Families Triglidae, Gadidae and Mullidae were the next most important fish groups. The dominating catches of Triglidae were at 10–25 m. and those of Mullidae at 51–100 m., while Gadidae predominated at 26–50 m., followed by those at 51–100 m. depth.

TABLE 7.—AVERAGE CATCH AND INDIVIDUAL CATCH RATES IN Kg/hr. FOR ABUKIR-ROSETTA REGION, ACCORDING TO DEPTH-RANGE, IN APRIL, 1970.

Depth (m.)	10–25	26–50	51–100
No. of Hauls	2	4	3
Time of trawling (hr)	3.83	8.0	5.0
Cartilagenous Fishes	—	—	—
Mullidae	—	0.094	1.310
Sparidae	—	0.356	5.280
Synodontidae	—	1.069	3 400
Gadidae	—	0.625	0.650
Triglidae	0.783	0.188	0.330
Soleidae	0.653	0.119	0.310
Serranidae	—	0.219	—
Carangidae	—	0.028	—
Clupeidae	—	—	—
Other Fishes	0.444	0.081	—
Shrimp Species	3.133	3.165	—
Av. Catch (kg/hr)	5.013	5.931	11.190

Abundance of Different Catch Components

The relative abundance of the different catch components are well illustrated by the catch rates in kg/hr. These values for the different months and various depths are shown in tables (8), (9) and (10).

Cartilagenous Fishes : These fishes at 10-50 m. depth, were abundant in January (1.579 kg/hr) and to a less extent in May (0.689 kg/hr.), while insignificantly represented in other months. At 51-100 m., these fishes were abundant in all months except in April, when they were absent from the catches. At 101–200 m., these fishes were abundant in May (1.252 kg/hr.), while of less importance in August (0.630 kg/hr.).

Among the Elasmobranchs, the commonest and most abundant was the Trygon sp., followed by the Raja and the Mustelus sps. The Rhinobatus and the Squalus sps. were only represented by few specimens.

TABLE 8. – AVERAGE CATCH AND INDIVIDUAL CATCH RATES IN Kg/hr. FOR ABUKIR-ROSETTA REGION, AT 10–50 M. DEPTH, IN THE DIFFERENT MONTHS OF 1969-1970.

Month	May 1969	August 1969	November 1969	January 1970	April 1970
No. of hauls	19	25	15	9	6
Time of trawling (hr)	33 0	26.33	26.83	9.5	11.83
Cartil. Fishes	0.689	0 150	0.270	1.579	—
Mullidae	0.296	2 162	2.792	0.500	0.063
Sparidae	1.169	0.447	0.362	1.790	0.241
Synodontidae	0.399	0.341	0.552	0.142	0.723
Gadidae	0 227	—	0.006	0.132	0.423
Triglidae	1.363	0.412	0.363	0.268	0.380
Soleidae	0.278	0.294	0.268	0.368	0.292
Serranidae	0.318	0.770	0.086	1.579	0.148
Carangidae	0.166	0 157	0.046	—	0.018
Clupeidae	0.313	0.363	0.157	0.032	—
Other Fishes	0.284	0.311	0.299	0.258	0.199
Shrimp Species	0.909	1.188	0.495	0.263	3.149
Av. Catch (Kg/hr)	6.409	6.595	5.693	6.911	5.635

TABLE 9. AVERAGE CATCH AND INDIVIDUAL CATCH RATES IN Kg/hr. FOR ABUKIR-ROSETTA REGION, AT 51–100 M. DEPTH, IN THE DIFFERENT MONTHS OF 1969 1970.

Month	May 1969	August 1969	November 1969	January 1970	April 1970
No. of hauls	6	7	5	2	3
Time of trawling (hr)	5.5	7.0	6.66	4.66	5.0
Cartil. Fishes	1.455	1.105	0.899	0.642	—
Mullidae	0.929	4.123	0.675	0.964	1.310
Sparidae	4.171	1.394	0.646	4.978	5.280
Synodontidae	0.563	3.215	1.874	0.964	3.400
Gadidae	0 327	0.071	0.154	0.321	0.560
Triglidae	0.975	2.786	0.612	1.124	0.330
Soleidae	0.187	0.979	0.265	—	0.310
Serranidae	0.284	0.214	0.002	—	—
Carangidae	—	0 329	—	—	—
Clupeidae	0.005	0 004	0.007	—	—
Other Fishes	0.014	0.224	—	0.193	—
Shrimp Species	—	—	0.605	—	—
Av. Catch (Kg/hr)	8 913	14.442	5.739	9.186	11.190

TABLE 10. - AVERAGE CATCH AND INDIVIDUAL CATCH RATES IN Kg/hr. FOR ABUKIR-ROSETTA REGION, AT 101-200 M. DEPTH, IN MAY AND AUGUST, 1969.

Month	May 1969	August 1969
Number of Hauls	8	4
Time of trawling (hr)	11.5	4.0
Cartilagenous Fishes	1.252	0.630
Mullidae	2.173	0.519
Sparidae	2.804	3.338
Synodontidae	—	—
Gadidae	3.434	1.850
Triglidae	0.210	1.125
Soleidae	—	0.062
Serranidae	0.002	—
Carangidae	0.045	0.012
Clupeidae	0.017	1.264
Other Fishes	0.122	—
Shrimp Species	—	—
Av. Catch (kg/hr)	10.062	8.800

Mullidae : Fishes of this family were abundant in most of the catches. At 10-50m. they were abundant in November (2.792 kg/hr.), while of less importance in other months. At 51-100 m., these fishes were dominant in August (4.123 kg/hr.), while abundant in all other months (from 1.130 to 0.675 kg/hr.). At 101-200m, these fishes were abundant in May (2.175 kg/hr) and of less importance in August (0.519 kg/hr).

Among Mullidae, the most abundant was Mullus barbatus. The Upeneus molleccinces was second in abundance. The Mullus surmuletus was usually found together with M. barbatus, but in few numbers, while the upeneus tragula was only represented by few specimens in some hauls.

Sparidae : Fishes of this family were also abundant in most of the catches. At 10-50 m, they were dominant in May and January (1.169 and 1.790 kg/hr respectively) while of less importance in other months. At 51-100 m they were dominant in May, January and April (4.171, 4.978 and 5.280 kg/hr respectively), while only abundant in August (1.394 kg/hr.) and of less importance in November (0.646 kg/hr). At 101-200 m, these fishes were dominant in both May and August (2.804 and 3.338 kg/hr. respectively).

Among Sparidae, the most abundant species were Pagrus vulgaris, Pagellus erythrinus and Box boops, while Chrysophrys aurata was exceptionally well represented in some hauls. Dentex dentex and Sargus annularis were sometimes represented, but in few numbers.

Synodontidae : Saurida undosquamus was the only representative of this family. This fish, at 10-50 m, was somewhat abundant in November and April (0.552 and 0.723 kg/hr respectively), while of less importance in other months At 51-100 m this fish was dominant in August and April (3.215 and 3.400 kg/hr respectively) while abundant in other months. At 101-200 m these fishes were totally absent from the catches.

Gadidae : Merluccius merluccius was the only representative of this family. This species was insignificantly represented in all months at both 10-50 and 51-100 m. depth while at 101-200 m, it was the most dominant fish in May (3.434 kg/hr) and only abundant in August (1.363 kg/hr).

Triglidae : Trigla lyra and Trigla lineata were the most abundant species of this family. These fishes at 10-50 m, were abundant in the catches of May (1.363 kg/hr) while of less importance in other months. At 51-100 m these fishes were also abundant in most of the months especially in August (2.786 kg/hr). At 101-200 m, these fishes were somewhat abundant in August (1.125 kg/hr) while inisgnificantly represented in May.

Soleidae: Solea vulgaris was the most dominant species of this family. The Flat-Fishes were generally of little importance in the catches of all months at 10-50 m. At 51-100 m, these fishes had some importance only in the catches of August (0.979 kg/hr), while at 101-200 m, they were insignificantly represented.

Serranidae : Fishes of this family, at 10-50 m, were abundant in the catches of January (1.579 kg/hr) and to a less extent in August (0.770 kg/hr), while in other months they were of less importance. At 51-100 m, these fishes were insignificantly represented in some months and totally absent in others. At 101-200 m, these fishes were nearly absent from the catches.

Epinephelus gigas was the most abundant species of this family. Morone punctata and Serranus scriba were also found but in less amounts.

Carangidae and Clupeidae: Fishes of these families are pelagic and so they were of little importance in the trawl catches. Only fishes of family Clupeidae were exceptionally abundant in catches of August (1.264 kg/hr.) at 101-200 m depth.

Trachurus mediterraneus was the only representative of family Carangidae, while Sardina pilchardus was the most dominant species of family Clupeidae Sardinella eba and S. aurita were only represented by few specimens in some. hauls.

Other Fishes: Under the category of other fishes, the following species were recorded in the catches of different months; sphyraena (Sphyraenidae), Temnodon saltator (Pomatomidae), Engraulis enchrasicholus (Engraulidae), Sciaena aquila and Umbrina cirrosa (Sciaenidae), Trichiurus lepturus (Trichiuridae), Spicara smaris (Centracanthidae), Parapristipoma mediterraneus (pomadasydae), Mugil saliens (Mugilidae), Uranoscopus scaber (Uranoscopidae) and some other non-economically important species.

Shrimp Spesies: In shallow waters (10-50 m), the different shrimp species constituted a considerable part in the catches of different months. The largest catch was obtained in April (3.149 kg/hr), while the smallest catch was found in January (0.263 kg/hr). At 51-100 m. depth, the shrimps were absent from the catches of all months, except in November, when it was significantly represented (0.605 kg/hr). In deeper waters the shrimp catches were totally absent from all the investigated months.

Among shrimps, the commonest and most abundant species were the Metapenaeids (M. monoceros and M. stebbingii). Reasonably large quantities of these species were caught at 10-50 m. depth. The Pennaeids (P. japonicus and P. trisulcatus) were also abundant, while P. semisulcatus was much less in number. The Parapenaeus longirostris and Trachypenaeus curvirostris, though of little commercial importance because of their small sizes, but by number they sometimes comprised more than the other 5 species combined.

Variations of Average Catches

The average catch in kg/hr for the different months and at various depths are also found in tables (8), (9) and (10). At 10-50 m depth, the variation of the average catches in all the investingated months was small. This value varied from 5.635 kg/hr in April to 6.911 kg/hr in January. At 51-100 m depth, the variation was great. The average catch varied from 5.739 kg/hr in November to 14.442 kg/hr in August. At 101-200 m depth, the average catch in May (10.062 kg/hr) was larger than in August (8.800 kg/hr).

When taking the mean of each depth range for all the investigated months, we find that the average catch was small (6.248 kg/hr) at 10-50 m depth, while in deeper waters it reached a mean of 9.894 and 9.431 kg/hr at 51-100 and 101-200 m respectively. In other words, the average catch in deep waters was about 1.5 times greater than in shallow depths.

Previous Investigations

Previous bottom trawling surveys in Abukir-Rosetta region have actually been initiated since 1960. In October 1960 and for six months, the Alexandria Institute of Oceanography and Fisheries started trawling survey between Alexandria and Port-Said (Gorgy, S. 1966). The research vessel "Fras-el-Bahr" and

a standard Mediterranean bottom trawl having nearly similar dimensions as that used in our survey, were used in the survey of 1960-1961. The investigatoins were conducted in waters ranging in depth from 15 to 200 m. Fishes and other catch components are found in tables (11) (12) and (13), which represent the catch rates of the different components in Kg/hr according to different months and at various depth ranges.

At 15-50 m depth the shrimp was the most dominant component of the catch followed by Cephalopoda. Fishes of family Mullidae and Soleidae as well as Cartilagenous fishes were also abundant. Family Sparidae was insignificantly represented while Triglidae and Synodontidae were absent.

At 50-100 m depth fishes of family Sparidae were the most dominant group of the catch followed by Cephalopoda. Family Mullidae and Gadida e were also abundant while Synodontidae was totally absent.

TABLE 11.—AVERAGE CATCH AND INDIVIDUAL CATCH RATES IN Kg/hr. FOR ABUKIR-ROSETTA, AT 15–50 M. DEPTH, ACCORDIG TO DIFFERENT MONTHS OF 1960-1961.

Month	October–November	December–January	February–March	April–May	Average
Season	Autumn	Winter		Spring	
Cartilagenous Fishes	2.6	4.8	3.3	2.8	3.4
Mullidae	8.5	6.7	2.2	—	4.3
Sparidae	—	—	1.1	—	0.3
Sphyraenidae	—	—	—	—	—
Gadidae	—	—	—	—	—
Triglidae	0.7	3.4	1.5	0.4	1.5
Soleidae	1.7	4.3	5.5	2.8	3.6
Sciaenidae	1.4	1.9	0.6	0.4	1.1
Carangidae	—	—	—	—	—
Other Fishes	1.1	5.3	3.6	0.9	2.7
Cephalopoda	10.9	13.9	5.9	2.8	8.4
Pennaeidae	7.1	7.7	13.3	24.9	13.3
Av. Catch (kg/hr)	34	48	37	35	38.7

TABLE 12.—AVERAGE CATCH AND INDIVIDUAL CATCH RATES IN Kg/hr. FOR ABUKIR-ROSETTA, AT 50-100 M. DEPTH, ACCORDING TO DIFFERENT MONTHS OF 1960-1961.

Month	October–November	December–January	February–March	April–May	Average
Season	Autumn	Winter		Spring	
Cartilagenous Fishes	6.5	6.7	2.9	1.8	4.4
Mullidae	7.0	9.1	4.0	2.9	5.6
Sparidae	5.4	5.8	10.0	6.8	7.0
Sphyraenidae	—	—	—	—	—
Gadidae	1.6	3.8	6.5	2.3	5.5
Triglidae	4.3	2.4	—	—	1.7
Soleidae	1.6	2.9	2.9	1.5	2.2
Sciaenidae	1.0	0.5	—	—	0.4
Carangidae	4.3	1.0	3.7	4.1	3.3
Other Fishes	5.5	5.3	2.2	3.2	2.3
Cephalopoda	13.0	9.1	3.3	1.3	6.7
Pennaeidae	3.8	1.4	1.5	2.1	2.2
Av. Catch (kg/hr.)	54	48	37	26	41.2

TABLE 13. AVERAGE CATCH AND INDIVIDUAL CATCH RATES IN Kg/hr. FOR ABUKIR-ROSETTA REGION AT 100-200 M. DEPTH ACCORDING TO DIFFERENT MONTHS OF 1960-1961.

Month	October–November	December–January	February–March	April–May	Average
Season	Autumn	Winter		Spring	
Cartilagenous Fish	2.9	3.0	1.6	1.4	2.2
Mullidae	3.2	4.9	11.0	19.2	9.5
Sparidae	—	—	—	—	—
Sphyraenidae	5.8	5.3	9.9	19.9	10.2
Gadidae	2.5	3.8	15.9	21.7	11.0
Triglidae	3.8	4.1	2.7	—	2.6
Soleidae	—	—	—	—	—
Sciaenidae	1.3	1.9	1.6	—	1.2
Carangidae	3.2	4.2	6.0	8.5	5.5
Other Fishes	3.9	4.0	1.3	0.3	2.3
Cephalopoda	5.4	6.8	5.0	—	4.3
Penaeidae	—	—	—	—	—
Av. Catch (Kg/hr.)	32	38	35	71	49

At 100-200 m depth, fishes of family Gadiae were the most dominant species of the catch, followed by Sphyraenidae and Mullidae. Carangidae and Cephalopoda were also abundant, while sparidae, Soleidae, as well as Synodontidae were absent.

A Soviet–Egyptian Cooperative bottom trawling survey was conducted in the South Eastern part of the Mediterranean Sea (Drobisheva, S.S. 1970, and Pavlovskaya, R.M: and Budnichenko, B.A. 1970). During the period from December. 1965 to December, 1966, four seasonal trawling surveys were carried out by the Russian Research Side Trawler "Ichtiolog". The principal gear used was the russian type fishing trawl (20 meters bottom trawl).

Intensive fishing operations were conducted in Abukir-Rosetta Region, in waters ranging in depth from 10 to 100 m depth, with the most of trawling being done between 10 and 50 m. Fish and Shrimp obtained are found in table (14), which represents the catch rates in kg/hr during the four seasons of 1966.

TABLE 14.– AVERAGE CATCH AND INDIVIDUAL CATCH RATES IN Kg/hr. FOR ABUKIR-ROSETTA REGION AT 10–50 M. DEPTH, ACCORDING TO DIFFERENT SEASONS DURING 1966.

Date	17/1—12/2	30/3—4/5	5/8—23/8	27/10—30/11	
Season	Winter	Spring	Summer	Autumn	Average
Time of Trawling (hr)	22	50	16	22	
Cartilagenous Fishes	0.3	0.6	0.9	0.4	0.55
Mullidae	0.1	+	1.3	1.5	0.97
Sparidae	–	0.4	0.1	0.7	0.40
Synodontidae	+	+	0.8	0.7	0.75
Sardina pilchardus	5.0	0.3	0.6	1.5	1.85
Sardinella eba	–	+	0.1	+	0.10
Sardinella aurita	–	+	0.1	0.4	0.20
Dussumieria acuta	0.6	+	0.2	–	0.25
Engraulidae	0.1	0.5	0.1	0.2	0.23
Soleidae	–	–	0.6	0.4	0.50
Serranidae	0.6	0.1	0.1	0.2	0.25
Sciaenidae	0.1	0.3	0.2	0.3	0.23
Pomatomidae	+	+	0.6	0.6	0.35
Other Fishes	3.8	0.9	2.0	1.6	2.07
Shrimp Species	2.0	3.0	3.7	2.4	2.80
Av. Catch (kg/hr)	12.6	6.2	11.4	10.9	10.27

+ designate catches of less than 0.1 kg/hr.

At 10-50 m depth, the Shrimp was the most dominant component of the catch, followed by Sardina pilchardus. Fishes of Family Mullidae and Synodontidae were also abundant, followed by Cartilagenous and Flat fishes, as well as Sardinella species (S. eba and S. aurata) and Sparidae, while Triglidae was totally abestant.

At 50-100 m depth (February-March), cartilagenous fishes and Serranidae gave the largest part of the catch, followed by Sparidae, Sardina pilchardus and Dussumieria acuta were also abundant, while fishes of Family Mullidae, Synodontidae and Engraulidae were insignificantly represented. Family Soleidae and Triglidae were totally absent.

The pelagic fishes (Clupeidae, Engraulidae and Dussumierdae) were abundant in the catches of 1966 survey because of the use of the Russian type of trawl having a heigh vertical mouth opening.

Another Soviet-Egyptian Cooperative bottom trawling survey is now going on, in the area from Alexandria to Damietta. From September, 1970 to September 1971, four seasonal trawling surveys have to be carried out by the same research vessel "Ichtiolog" and the same fishing gear as in the survey of 1966.

The preliminary results obtained for the average catches and catch rates of the different catch components in Abukir-Rosetta Region during the last survey, 1970–1971, (unpublished data), are more or less similar to that proviously obtained in the survey of 1966.

DISCUSSION AND CONCLUSION

For the purpose of fishery development the catch rates obtained for the investigated region must be compared with those obtained in previous investigations. Such comparisons are difficult to make because of the considerable differences in trawling boats, equipments and general techniques, which may cause profound differences in catching power. However the data of the catch per hour collected by 'Faras-el-Bahr" in 1969-1970, when compared with those previously collected by the same vessel in 1960-1961 or by 'Ichtyolog' in 1966, give an understanding of the present state of the demersal fish and Shrimp stocks in Abukir-Rosetta Region

Table (15) shows the average catch rates (kg/hr) for Abukir-Rosetta Region in different years according to seasons and depths. It is clear that at 10-50 m depth, the average catch rates in the different seasons of 1960-1961 are very high when compared with the corresponding catch rates in 1966 and this last is still higher than that obtained for 1969-1970. In other words, the average catch rate in 1960-1961 was about 2 9 times larger than that of 1966 and about 4.7 times larger than that of 1969-1970.

The same picture is also found for the other depth ranges. That is, the average catch rates of 1960-1961 are about 3.5 and 4.8 times larger than that of 1969–1970 for the 50-100 and 100-200 m depth range respectively.

TABLE 15.—AVERAGE CATCH RATES (Kg/hr.) FOR ABUKIR-ROSETTA REGION, ACCORDING TO DIFFERENT SEASONS AND VARIOUS DEPTHS, IN THE DIFFERENT YEARS OF INVESTIGATIONS

Season / Depth & Year	Spring	Summer	Autumn	Winter	Average
10-50 m.					
1960-1961*	33.2	—	23.1	32.6	29.6
1966	6.2	11.4	10.9	12.6	10 3
1969-1970	6.0	6.6	5.7	6.9	6.3
50-100 m.					
1960-1961*	24.7	—	41.0	35.8	33.8
1966	—	—	—	9.1	9.1
1969-1970	10.0	14.4	5.7	9.2	9.8
100-200 m.					
1960-1961*	71.0	—	26.6	40.6	46.1
1966	—	—	—	—	—
1969-1970	10.1	8.8	—	—	9.5

* For comparison, the Cephalopods are excluded from the data of 1960-1961 as it is not included in the other two analysis (1966 and 1969-1970).

In addition to the sharp decrease in the catch rates of 1966 and 1969-1970 as compared with those of 1960-1961, a fair change in the species composition of the catch took place at different depths. Variations in the species composition are well noticed when comparing data of tables (8), (9) and (10) with the corresponding data of the proveius investigations, mainly that of tables (11), (12), (13) and (14).

At 10-50 m *depth*: apart from Shrimp, the Cephalopoda was the dominant group in the catches of 1960-1961 while insignificantly represented in 1966 and 1969-1970. Fishes of family Sparidae were insignificantly represented in the catches of 1960-1961 while abundant in 1966 and even dominant in the catches of 1969 - 1970. Family Triglidae and Synodontidae were either absent from the catches of 1960-1961 or included in the category of other fishes. These two families, although insignificantly represneted in 1966, were found to be abundant in 1969-1970.

At 50-100 *m depth*: The Cephalopods were also abundant in the catches of 1960-1961, while insignificantly represented in 1969-1970. Family Gadidae was abundant in the catches of 1960-1961, while insignificantly represented in the catches of 1969-1970. Family Triglidae was insignificant in the catches of 1960-1961, while abundant in 1969-1970. Family Synodontidae was either totally absent in the catches of 1960-1961 or included in the category of other fishes. This family was abundant and even dominant in the catches of 1969-1970.

At 100-200 *m depth*: the Merluccius merluccius (Gadidae) was the most dominant species in the catches of 1960-1961, while fishes of family Sparidae were found in the category of other fishes. In 1969-1970, the Sparidae were the most dominant fishes, followed by Gadidae. Also family Sphyraenidae was dominant in the catches of 1960-1961, while included in the category of other fishes in 1969-1970.

The statistical data in the period 1960-1968 have recorded a serious decline in fish landing from the Egyptian waters of the Mediterranean Sea. Our analysis have also showed a big drop in the catch rates, as well as a variation in the species composition of the catches in the different surveys. All these changes are mostly due to the following reasons:

(1) The regulation of the Nile flood by the construction of the Aswan High Dam (1964-1966), resulted in a serious change of the ecological conditions in the South-Eastern part of the Mediterranean Sea. This affected too much the Sardine fishery, as well as the fishery of Shrimp and some other fishes.

(2) The increased fishing intensity and the progressive development of motorized boats. The number of licensed motorized boats (Trawlers) working in the Egyption waters of the Mediterranean Sea increased from 269 in 1950 to 559 in 1960. In 1966 the number increased to 569 boats, while in 1968 it decreased to 406 boats (Fishery Statistics, 1950-1968). This last decrease in the number of trawlers is due to the war condition with Israel.

(3) The concentration of trawling for several years in the shallow water areas of the continental shalf.

The first reason has a very bad effect on the Sardine fishery, while the last two reasons resulted in an over-fishing condition specially in shallow waters. The shrimp fishery as well as the fishery of some other fishes are also affected by all these reasons combined. So, certain regulations and protection measures have to be imposed to control the exploitation of our sea fisheries. The following recommendations have to be taken in consideration:

1.— A detailed bottom survey have to be carried out for our Mediterranean coast, especially in deep waters (between 100 and 500 m) infront of the Delta, to know the suitable grounds for trawling.

2.— The number of motorized boats working in our waters have to be regulated. The big boats of our fishing floot had to be directed for trawling in deep waters, where the average catch is more profitable in most of the year. The small boats have to be directed for long line fishery, which have to be intensively used especially in the Western part of our coast between alexandria and Salloum, where the bottom (in most of its areas) is not suitable for trawling.

3.— The design and mesh size of our trawls have to be carefully studied, and specialized trawls for selective fishing of shrimp have to be introduced in the shallow water areas.

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