

BY-CATCH OF COMMERCIAL BOTTOM TRAWL FISHERY FROM QATAR WATERS, ARABIAN GULF

By

MOHAMED A. IBRAHIM,* KAMAL A. EL-BARY**
and JASSIM A. AL-KHAYAT*

*Marine Sciences Department, Faculty of Science, University of Qatar
Doha, Qatar

**Department of Fisheries, Ministry of Industry and Agriculture, State of Qatar.

Key words: Marine Fisheries, By-Catch, Bottom Trawl, Arabian Gulf.

ABSTRACT

The by-catch of the bottom trawl fishery from Qatar water, Arabian Gulf was analysed during the year (1987) on bimonthly basis. It was estimated that 496-635 tons were discarded as by-catch which included a lot of commercially marketable fish (a check list of them is presented) of these fish 260 tons were longer in length than 15cm, and 130 ton longer than 20cm.

The study recommended enforcing the sorting out (on board the fishing vessels) of fish greater in length than 20cm, exploring the international market for exporting such fish and exploring the possibility of utilizing such fish as processed food.

INTRODUCTION

Bottom trawl fishery in Qatar is mainly commercial, and is carried out by the fleet of Qatar National Fishing Company (QNFC) which owns three bottom trawlers. In addition, the artisanal sector performs only seasonal bottom trawling for shrimping during the open season for shrimp from July to February.

Based on observations and samples of fish discarded; at sea by the trawl fishery, at the fishing locations by inshore gillnets and intertidal trap fishery, at the landing points and at the fish market, from offshore drift-net and trap catches; it was estimated that upto 50% of the commercial finfish fishery is being discarded overboard as by-catch. Ibrahim *et al*, (in press) estimated an amount of 496-635 tons was discarded as by-catch by QNFC fleet from Qatar waters alone during (1987). Siva and Ibrahim, (1984) reported that, about 58% was discarded during 1980-81 from the same fishery. On the other hand, the artisanal sector in Qatar discards only about 4-5% as by-catch.

Field observations revealed that an appreciable amount of the discarded fish of the commercial sector contains not only youngs and juveniles of popular varieties in Qatar, but also commercial sizes of such varieties. This situation represents an unharvested resource and a lost opportunity for increasing both the company and the national income.

Previous studies by Ibrahim *et al.*, (in press) pointed out that the comparatively large biomass taken by the trawl net in-use affects not only the fish species caught through 'recruit over-fishing', but also affects organisms that interact with them and alters the balance between them. They also concluded that among the fourteen fish families tested, only four of them showed a trend of increased annual rate in landing, seven other families showed decreased trends and the other two showed no specific trend. They also predicted that 90% of the expected landing in the 1990 by QNFC fleet will be contributed to by only four families.

The aim of the present study is to evaluate the by-catch varieties of QNFC and to propose measures for optimising the use of the resource.

MATERIALS AND METHODS

Samples of by-catch were taken bi-monthly during the whole year of (1987) using the trawler 'F/V GAZELLE' of QNFC during her regular fishing trips that each extends between 3-4 days on the eastern side of Qatar waters. Two to four baskets (ca. 40kg each) of by-catch were shoveled at random from any one haul of a particular trip for detailed analysis in the laboratory. A total of 15 hauls were analysed during this study. Meanwhile, estimates of the by-catch weights encountered by each haul were given by the captain (Master Fisherman).

Data for landing composition, fishing effort (days) of the QNFC fleet as well as whole-sale and retail prices of the landing varieties were obtained monthly from the operation and accounting records of QNFC. Data of trawling shoot time, trawl duration, fishing area, estimated landing and their general composition were obtained from the skippers' log books.

The detailed analysis of the by-catch included: species composition, length and girth to the nearest mm, weight to the nearest one gm in case of small size fish or to the nearest 5 gm for larger ones. It included also; age determination, sex, maturity and stomach content. In the mean time, parallel detailed analysis were performed likewise on samples pooled from the QNFC fleet. The results of the biological findings are being published elsewhere. The standard statistical methods used were those described by Snedecor, (1956) at 0.05P level.

The terms used in the text are identified as follows:

CATCH: Weight of all fish caught including the discarded fish.

LANDING: Weight of the undiscarded fish.

%CATCH COMPOSITION: (Family catch/Total Landing) X (100)

%LANDING COMPOSITION: (Family Landing/Total Landing) X (100)

%BY-CATCH COMPOSITION: (Family-by-Catch/Total By-Catch) X (100)

%FAMILY-BY-CATCH: (Family By-Catch/Family Catch) X (100)

%RECOVERY: Area under the standardised normaly distributed curve between specific length limits.

RESULTS AND DISCUSSION

The type of net used by 'Gazelle' is described by Ibrahim (1989). The trawl was being tawed for 2-3 hours at a trawling speed of 3-4 knots, Field observations indicated that the net has a rather small mesh which causes the catch to include a lot of by-catch. As a result, a considerable time is consumed in sorting out the fish on-board the vessels, and a considerable percentage of commercial-size fish get intermingled with the by-catch thrown over-board.

Preliminary results revealed a high degree of variability in the percentage species composition between hauls of the same vessel or between the different vessels, both in time and place. The same finding was reported by Siva and Ibrahim, (1982a); This made it difficult to represent seasonal variations or some kind of correlation between species. Hence, the data of the 15 different hauls analysed were pooled together and analysed as one sample, and species were grouped together into families. The species encountered in the by-catch were identified according to Siva and Ibrahim, (1982b) and are presented together with their price index in Table (1). In general, the number of species appearing in a single haul varied between 13-41 with an average of 19 species.

For each family, the catch, the landing and the by-catch-together with their percentages are presented in Table (2), and shown in Fig. (1). The families ARIIDAE, BELONIDAE, CLUPIDAE, GERREIDAE and LEIOGNATHIDAE were represented each by 100% of their respective family catch; MULLIDAE, NEMIPTERIDAE, SYNODONTIDAE and THERAPONIDAE were represented each by more than 90%; LETHRINIDAE, POMADASYIDAE, RACHYCENTRIDAE, SCARIDAE, SCOMBRIDAE, SERRANIDAE, SIGANIDAE and SPHRAENIDAE were represented by 28, 25, 20, 33, 12, 6, 6 and 6% respectively; CARANGIDAE and SPARIDAE were represented by 75 and 55% respectively.

The traditional fish consumption habits have resulted in many of the edible varieties being unmarketable in Qatar. Consequently, a large amount of the fish produced in Qatar is classified as by-catch and is discarded with other non-edible varieties. In view of this situation, the fish varieties caught are classified here into three categories:

- (1) Non-commercial or very limited market varieties.
- (2) Commercially or marketable varieties.
- (3) Commercially valuable or super-marketable varieties.

ARIIDAE, BELONIDAE, LEIOGNATHIDAE and THERAPONIDAE fall in the first category hence, they were left behind in the by-catch. GERREIDAE is related to the third category yet, it was represented by 100% in the by-catch because of small un-marketable size of the fish. The size range caught from this family was between 76-136mm with an average total length of 111mm. It may be that the larger sizes are inhabiting areas other than the trawling grounds.

Table 1

Fish species encountered in the by-catch of the bottom trawl fishery in Qatar waters during 1987 and their whole sale price index.

Scientific Name	Common Name	Qatari Name	Index (I)
<i>ARIIDAE</i>			
<i>Arius thalassinus</i>	Giant Sea Catfish	Chem	0
<i>BELONIDAE</i>			
<i>Ablennes hians</i>	Needle Fish	Hakool	0
<i>Tylosurus leirurus</i>	Sq. Tail N.F.	Hakool	0
<i>CARANGIDAE</i>			
<i>Alepes mate</i>	Cravalle	Yannisah	1
<i>Alepes melanoptera</i>	Blackfin Cravalla	Qerfah	3
<i>Carangoides bajad</i>	Yellow Spot Cav.	Jush	2
<i>C. chrysophrys</i>	Longnose Cavalla	Ozayni	3
<i>C. malabaricus</i>	Malabar Cavalla	Zobaidy	5
<i>Decapterus kiliche</i>	Scad Mackerel	Sadah	0
<i>Gnathanodon speciosus</i>	Gold Trevally	Rabeeb	5
<i>Selar crumenophthalmus</i>	Bigeye Scad	Dordoman	1
<i>Selaroides leptolepis</i>	Yellow stripe Trev.	Yannisah	0
<i>Seriola dumerili</i>	Greater Amber Jack	Hamam	5
<i>Seriolina nigrofasciata</i>	Black Banded Trev.	Hamamah	5
<i>Trachurus indicus</i>	Horse mackerel	Khodrah	0
<i>CLUPEIDAE</i>			
<i>Sardinella fimbriata</i>	Fringescale Sardine	Omah	1
<i>S. gibbosa</i>	Goldstripe Sard.	Omah	1

PRICE INDEX: I (in Q.R./Kg., whole sale):

I;0=0 I;1=1-2 I;2=2-3 I;3=3-4 I;4=4-6 I;5=More than 6 QR.

Table 1: Cont.

Scientific Name	Common Name	Qatari Name	Index (I)
<i>GERREIDAE</i>			
<i>Gerres filamentosus</i>	Wipfin Mojarra	Badh Rayyashi	5
<i>G. oyena</i>	Common Mojarra	Badh	5
<i>LEIOGNATHIDAE</i>			
<i>Leiognathus bindus</i>	Orangfin Ponyfish	Badh Sawayah	0
<i>L. fasciatus</i>	Striped Ponyfish	Sini	2
<i>L. sp.</i>	Pony Fish	Sawayah	0
<i>LETHRINIDAE</i>			
<i>Lethrinus kallopterus</i>	Orangespot Emperor	Shery	2
<i>L. lentjan</i>	Redspot Emperor	S. Bakhshinab	2
<i>L. miniatius</i>	Longface Emperor	Shery Soly	2
<i>L. nebulosus</i>	Starry Pigface Bream	Shery	2
<i>LUTJANIDAE</i>			
<i>Caesio caeruleus</i>	Blue, Gold Fusilier	Aywafa	0
<i>Lutjanus fulviflamma</i>	Blackspot Snapper	Naiser	3
<i>L. johni</i>	Johni's Snapper	Naiser	3
<i>L. kasmira</i>	Blue and Yellow S.	Naiser	3
<i>L. lineolatus</i>	Bigeye Snapper	Naiser	1
<i>L. malabaricus</i>	Malabar Red Snapper	Hamrah	2
<i>L. russelli</i>	Russel's Snapper	Naiser	3
<i>L. sanguineus</i>	Blood Snapper	Hamrah	2
<i>Pinjalo pinjalo</i>	Pinjalo Snapper	Naqroor	2
<i>MULLIDAE</i>			
<i>Parupeneus pleurotaenia</i>	White Spot Goatfish	Hamer	3
<i>Upeneus asymmetricus</i>	Goatfish	Hamer	3
<i>U. sulphureus</i>	Yellow Goatfish	Hamer	3
<i>U. tragula</i>	Dark Band Goatfish	Hamer	3
<i>NEMIPTERIDAE</i>			
<i>Nemipterus delagoae</i>	Threadfin Bream	Basy	1
<i>N. tolu</i>	Notched T.B.	Basy	1
<i>Scolopsis bimaculatus</i>	Monocle Bream	Ebzymi	1
<i>Scolopsis ghanam</i>	Monocle Bream	Zerraa	0
<i>S. ruppelli</i>	Monocle Bream	Ebzymi	1
<i>S. vosmeri</i>	White cheeked M.B.	Batanah	1

Table 1: Cont.

Scientific Name	Common Name	Qatari Name	Index (I)
POMADASYIDAE			
<i>Plectorhynchus schotaf</i>	Grey Sweetlip	Yanam	3
<i>P. sordidus</i>	Brown Sweetlip	Yanam	3
<i>Rhonciscus strident</i>	Banded Grunter	Yemyam	0
RACHYCENTRIDAE			
<i>Rachycentron canadus</i>	Cobia	Sakan	4
SCARIDAE			
<i>Scarus ghobban</i>	Flame Parrotfish	Jeen	1
SCOMRIDAE			
<i>Rastrelliger kanagurta</i>	Indian Mackerel	Jarfah	3
SERRANIDAE			
<i>Aethaloperca rogae</i>	Dusky Seabass	Shninwah	3
<i>Cephalopholis miniatus</i>	Vermilion Seabass	Shninwah	3
<i>Epinephelus chlorostigma</i>	Brown Spot. Grouper	Bortamah	3
SIGANIDAE			
<i>Siganus canaliculatus</i>	Whitespotted Spinefoot	Safi Arabi	6
<i>S. javus</i>	Streaked Spinefoot	Safi	6
SPARIDAE			
<i>Argyrops spinifer</i>	Longspine Seabream	Kofer	2
<i>Diplodus kotschyi</i>	Onespot Seabream	Magwah	2
<i>Mylio berda</i>	Picnic Seabream	Sheym	3
<i>Mylio bifasciatus</i>	Porgy	Fuskur	4
<i>Rhabdosargus sarba</i>	Goldlined Seabream	Qorqofan	6
SPHYRAENIDAE			
<i>Sphyraena jello</i>	Banded Barracuda	Jed	2
<i>S. obtusata</i>	Obtuse Barracuda	Jed	2
SYNODONTIDAE			
<i>Saurida tumbil</i>	Greater Lizardfish	Hasoom	1
<i>S. undosquamis</i>	Brushtooth L.	Hasoom	1
THERAPONIDAE			
<i>Pelates quadrilineatus</i>	Fourlined Therapon	Zamroor	0
<i>Therapon jarbua</i>	Jarbua Therapon	Zeebah	0

Table 2

Catch, by-catch and landing of the fish families encountered by the bottom trawl fishery from Qatar waters during the years 1986-87.

	F. ARIIDAE	F. BELONIDAE	F. CARANGIDAE	F. CLUPEIDAE	F. GERREIDAE	F. LETHRINIDAE	F. LEIOGNATHIDAE	F. LUTJANIDAE	F. MULLIDAE	F. NEMIPTERIDAE	F. POMADASYIDAE	F. RACHYCENTRIDAE	F. SCARIDAE	F. SCOMBRIDAE	F. SERRANIDAE	F. SIGANIDAE	F. SPARIDAE	F. SPHRAENIDAE	F. SYNODONTIDAE	F. THERAPONIDAE	OTHERS	TOTAL
LANDING (ton)			99.9			469.9		42.7	2.5	5.6	6.2	7.6	4.2	15.1	98.8	32.4	36.9	33.1	7.4		7.4	870
(%)			11.5			54.0		4.9	0.3	0.6	0.7	0.9	0.5	1.7	11.4	3.7	4.2	3.8	0.9		0.9	100.0
BY-CATCH (ton)	24	12	105	12	14	63	2	13	30	24	1	1	1	1	2	1	16	1	131	32	84	570
(%)	4.2	2.1	18.4	2.1	2.5	11.1	0.4	2.3	5.3	4.2	0.2	0.2	0.2	0.2	0.4	0.2	2.8	0.2	23.0	5.6	14.7	100.3
CATCH (ton)	24	12	205	12	14	533	2	56	33	30	7	8	5	16	101	33	53	34	138	32	91	1440
Total (%)	1.7	0.8	14.2	0.8	1.0	37.0	0.1	3.9	2.3	2.1	0.5	0.6	0.3	1.1	7.0	2.3	3.7	2.4	9.6	2.2	6.3	100.0

RACHYCENTRIDAE, SCOMBRIDAE, SERRANIDAE, SIGANIDAE and SPHRAENIDAE belong to the third category. So, they were represented in the by-catch by less than 20%, MULLIDAE, NEMIPTERIDAE and SYNODONTIDAE are related to the second category-as indicated from the price index of table (1), and they contributed about 2.3, 2.1 and 9.6% of the total trawl catch respectively. Yet, they were represented in the by-catch by more than 90%, probably due to size factor. As mentioned before; fish size is one of the factors categorizing its marketable value, where fish of a size 15-20cm are not marketable in Qatar.

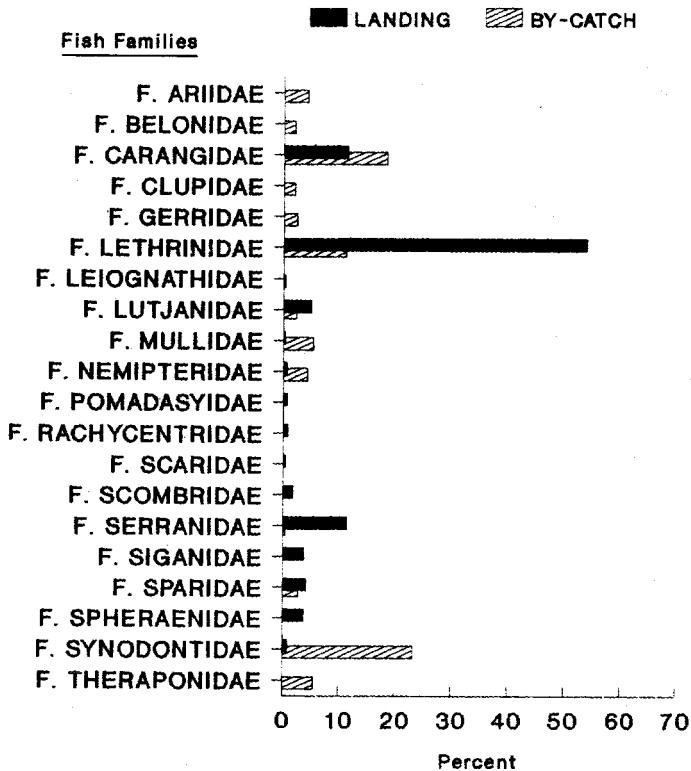


Fig. 1: Relative landing and By-Catch (to total) of fish families by bottom trawl from Qatar waters during 1986-87.

The concept of normal distribution was applied to the length statistics obtained for each family; to calculate the % recovery of the fish longer than(LT) 150 and/or 200mm. The percentage obtained was then multiplied by the corresponding family-by-catch of table (2) to obtain the expected recovery. The results are shown in Table (3). At LT 150mm recovery of MULLIDAE, NEMIPTERIDAE and

Table 3

Statistics of length, weight and recovery levels of commercial fish families comprising the by-catch of the bottom trawl fishery in Qatar waters during the years 1986-87.

	CARANGIDAE	CLUPEIDAE	LETHRINIDAE	LUTJANIDAE	MULLIDAE	NEMIPTERIDAE	SPARIDAE	SYNODONTIDAE	TOTAL
Length mm:									
Mean	133	125	194	165	133	156	159	217	
ST.D.	39	13	25	19	21	30	28	36	
Max.	215	165	245	216	178	270	195	399	
Min.	80	102	95	109	58	80	124	130	
Weight gm:									
Mean	34	18	115	74	29	50	71	81	
ST.D.	21	6	47	26	15	24	38	58	
Max	100	45	190	170	67	133	125	345	
Min.	9	10	15	18	6	8	30	15	
recovery at T.L. more than 150mm:									
%	0.33	0.03	0.96	0.79	0.21	0.58	0.63	0.97	
Weight (ton)	35	0.4	60	10	6	14	10	127	262
recovery At T.L. more than 200mm:									
%	0.04	0.0	0.41	0.03	0.0	0.07	0.32	0.68	
Weight (ton)	4	0.0	26	0.0	0.0	2	5	89	126

SYNODONTIDAE were 21, 58 and 97% respectively. At LT 200mm they were 0.0, 7.0 and 68% respectively. MULLIDAE attains about 250mm as a maximum length in the Gulf. This fish is marketable and fetches high prices either in Qatar-by the expatriates- or abroad at lengths around 150mm. So their size is not the limiting factor. NEMIPTERIDAE and SYNODONTIDAE were represented by 5 and 97% recovery at LT 150mm and by 7 and 68% at LT 200mm. So, size is not limiting factor in this case also. LETHRINIDAE and LUTJANIDAE were represented at LT 150mm by 96 and 79% recovery. At LT 200mm recovery of LETHRINIDAE represents 41%. Hence, size is not a factor either.

Field observations revealed that; because of the huge amount of fish caught per trawl (ca. two tons), the crew give most of their attention to picking up only those fish of super commercial value and of biggest size, and they give the lowest attention to smaller sizes even if they were of marketable value. Hence, 40-60% of

the catch is thrown over board as by-catch that ranged in quantity from 496-635 tons during the year 1987.

CONCLUSIONS AND RECOMMENDATIONS

It was estimated that the amount of by-catch by the bottom trawl of QNFC during the year 1987 ranged between 496-635 tons, while its total landing of marketable fish varieties was 870 tons. This by-catch included not only non-edible and non-marketable size fish, but it also included commercially marketable varieties. It was estimated that about 262 tons of the discarded fish were greater in length than 15cm and suitable for human consumption; and 126 tons of them were greater in length than 20cm and of commercial marketable value in Qatar. These fish if properly sorted out (recovered), could increase the QNFC annual income by more than 15-30%. The postulated reason for discarding these fish are that; the crew give most of their attention, while sorting the fish on board the vessel, to the big-size and super commercial fish varieties only. Also; the trawl, being hauled for 3-4 hours at 3-4 knots, catches a large amount of fish that may exceed 2 tons per haul. This causes heaping up the catch and obscuring proper sighting of some of the commercially valuable individual fish.

It could be recommended in this regard that; in addition to what had been recommended by Ibrahim, *et al* (in press) that; for the mesh size to be increased to 60mm, both trawling duration and speed be reduced and to undertake a feasibility study about establishing a mini pilot plant for by-catch processing. Depending on the local market needs; the QNFC should find a way to enforce the crew to collect all commercial size fish varieties that are of 20mm or longer in total length. The QNFC should also explore the international market for exporting about 200 tons of fish of 15-20 cm in total length.

REFERENCES

- Ibrahim, M.A., 1989.** Studies on bottom trawling and demersal fishes of Qatar waters, Arabian Gulf. Qatar Univ. Sci. Bull. 9: 291-308.
- Sivasubramaniam, K., and Mohamed A. Ibrahim, 1982a.** Demersal Fish Resources Around Qatar. Qatar Univ. Sci. Bull 2: 305-352.
- Sivasubramaniam, K., and Mohamed A. Ibrahim, 1982b.** Common Fishes of Qatar. Scientific Atlas of Qatar, 1: PP. 174.
- Snedecor, G.W., 1956.** Statistical Methods, 5th edn, Iowa State College Press.

المصيد الجانبي لحرفة الصيد بالجر في المياه القطرية (الخليج العربي)

محمد أمين إبراهيم - كمال عبد الباري مصطفى

و جاسم عبد الله الخياط

تم في هذا البحث جمع بيانات دورية كل شهرين من نهاية عام ١٩٨٦م وحتى نهاية عام ١٩٨٧م من أسطول شركة قطر الوطنية لصيد الأسماك حيث أنها المستخدم الرئيسي لحرفة الصيد بالجر في قطر ، إذ أن المصايد الحرفية تزاوّل هذه الحرفة فقط أثناء موسم صيد الربيان . وقد إتضح من تحليل بيانات الصيد الجانبي من حيث النوعيات والكميات أن ٥٠٪ من جملة المصيد يتخلص منه في عرض البحر . وقدرت الكمية التي تم التخلص منها في عام ١٩٨٧م بحوالي ٧٥٠ طن . كذلك إتضح أن بعض عائلات الأسماك كانت ممثلة في الصيد المتخلص منه بنسبة وصلت إلى ١٠٠٪ من جملة المصيد من تلك العائلات بالرغم من كون بعض هذه الأسماك مرغوبة من الناحية الاستهلاكية في قطر والتي من أمثلتها أسماك الحامر والحاسوم (المكرونة) .

وقد أثبتت التحليلات الاحصائية أنه لو أمكن التدقيق في عملية فرز الأسماك على ظهر السفن فإنه يمكن الحصول من المصيد الجانبي المفروض التخلص منه على ما يزيد عن ٢٦٢ طن من الأسماك الاقتصادية التي تزيد في الطول عن ١٥ سم ، أو ١٢٦ طن تزيد في الطول عن ٢٠ سم . هذه الزيادة في الانتاج تمثل أكثر من ٢٠ - ٢٠٪ زيادة في الدخل السنوي لشركة قطر الوطنية لصيد الأسماك .