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ANALYSIS OF LOSSES IN BIOMASS AND INCOME FROM THE TRAWL Gear NETS IN THE EASTERN MEDITERRANEAN, NORTH SINAI, EGYPT

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ABSTRACT

The average production of one trawl boat operating off the coast of Sinai was calculated, during fishing season 2021 were 34.9 tons. The negative impact of the trawl net on the Mediterranean catch on the Sinai coast was studied by taking monthly samples of 20 kg of each type during 2021. Fish were divided into small fish and mature fish according to length at first maturity recorded by the previous studies of these species in the same area or adjacent areas. The results showed that the percentage of small fish 47.4% of the production of the trawl net. The negative impact on the biomass from juvenile and discards (ELafsha) were 3.16; 5.04; 6.25; 9.21; 1.41; 4.51; 9.13; 5.84; 1.37; 0.59; 2.52; 7.35; 6.39; 1.23; 0.26 and 3.73 ton (total 68 tons) and losses income were 0.789; 0.605; 1.563; 2.302; 0.311; 0.451; 0.467; 0.356; 0.913; 0.147; 0.328; 2.557; 0.098; 0.037; and 0.521 (total 12.04 million L.E.) from shrimp; Crabs; Cattle fish; Squids; Bogue; Med. Horse ; Common Sole; Atlantic Lizard Fish; Red mullet; Grey gurnard; Common pandora; Grouper; *Gobius niger*; European eel and Merluccius respectively for one trawl net during fishing season 2021 in the Mediterranean coast Sinai.

INTRODUCTION

Fisheries (which includes the management, catching, processing and marketing of fish stocks) and aquaculture (the fish farming) provide an important source of food, employment, income and recreation for people throughout the world. Millions of people depend upon fish for their livelihoods. Artisanal or small-scale fisheries are important worldwide contributing more than 25% of the global marine landings (**FAO, 2016).**

Fishing is fundamental to coastal societies, an ancient activity that predates agriculture by thousands of years. Human hunted fish to supply food for him and others, using many kinds of fishing gear such as nets and hooks. The increased fishing activity in recent years has adverse impact on aquatic environments worldwide affecting the life-history processes such as reproduction, growth, mortality and community structure (**Beverton and Holt, 1957; Sainsbury *et al*., 1993).**

The most dominant fish species in the Trawel catch were Soles, Lizard fish, Snappers, Sparid fish and red mullet. Invertebrates were represented by large Shrimp, Cattle fish, squid, crab, bivalves and small shrimp. The dominant fish species in the purse-seine catch were sardines and herring, horse mackerel, scads and jacks, mackerels and tunas and blue fish, while the dominant fish species in the lining fishery were Sparid fish, mackerels,

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rabbit fish, Sea basses, groupers, meager and silver scabbard fish (**Mehanna and Haggag, 2010**).

By-catch issues that have been highly prominent include discards from prawn trawls; cetacean catch in gill nets and trawls; high sea drift nets; seabirds on long lines; and coastal gill nets; While sea turtles and sharks on long lines; besides the pinnipeds in trawls (**Alverson *et al.*, 1994; Hall *et al.*, 2000).**

This work aims to shed light on the structure of fishing by trawling in the Mediterranean coast of North Sinai, and to know the percentage of returned fish as well as small fish within each species. Calculating losses in biomass as well as losses in income resulting from fishing by trawling.

MATERIALS AND METHODS

The total monthly production of three random fishing trawl boats operating off the coast of North Sinai during the period from January to December 2021 was recorded, then the following was calculated:

1. The monthly average production of each one trawl boat
2. Fish species identification were done using field identification guide to the living marine resources of the Eastern and Southern Mediterranean **(FAO, 2012**) and calculate the average of the species in the total monthly production.
3. Calculating the total production of one trawl boat per year
4. Calculating the total production of each specie in the year
5. A monthly sample of 20 kg were taken from each species of fish and according to **Matsuoka (2008),** this study defines bycatch as is the irrational catch rather than the catch of, sizes acceptable in resource conservation and management. This approach was used in this study, where the landing was classed into products (adult fish) and by-products (juveniles) according to length at first maturity (Lm). In the laboratory, (a) total fish caught were weighed in kilogram using a balance scale. (b) The total lengths of the specimens were measured with fish measuring board to the nearest 0.1 cm and the weight was measured with an upper top loading balance. (c) Catches were sorting and identification were done as juveniles and adult based on length at first maturity (Lm) that recorded from the previous studies for each species. In the same area or areas nearby, hence, marketable importance as economic and non-economic according to fish size and prices with a market size of each grade. Table 1 illustrates the length at first maturity, length weight relationship and prices of different species.

To determine the loss of biomass in live biomass as a result of fishing for small fish, and Total income losses million LE by using the equation of **Najmudeen and Sathiadas (2008).**

Adult quantity corresponding to 1 kg of juveniles landed was worked out by the formula given by **Najmudeen and Sathiadas (2008).**

$$Q_A = \left(\frac{(1000/w)W}{1000}\right)(1-M)$$

QA = adult fish quantity corresponding to 1 kilogram of juvenile fish after a period of t years

W= weight of the individual adult fish after a period of t years

ω= individual weight of juvenile species of the gram.

M= Natural mortality

Natural mortality was calculated from the mean fish weights by **Ursin (1967).**

LOSSES OF BIOMASS = output of the equation X, the product from the small fish of each species.

Table 1. Length at first maturity stages, length weight relation and average annual prices

Fish species	Length at first maturity L_m cm	length -weight relationship	Reference	Price (1000 LE/ton)		
				Juvenile		Adult
				Trawl net	El afsha	
Crab,	10.3	$W= 0.0475 CW^{3.1866}$	**Merihan *et al*. (2022)**	20	20	120
Cattle fish	13	$W=0.1821336L^{2.8011}$	**Manmeet *et al*. (2005**)	70	30	250
Octopus	20	$W= 0.562L^{2.563}$	**Quetglas *et al*. (2001)**	70	30	250
Squids	14.8	$W=0.164 L^{2.213}$	**Ahmed Gewida (2017)**	70	30	220
Med. Horse Mackerel	20	$W=0.010 L^{2.93}$	**Samsun *et al.* (2017)**	40	30	80
Common Sole	20	$W= 0.0045L^{3.2215}$	**El- Aiatt *et al*. (2019)**	60	50	260
Gobius niger	11.4	$W= 0.0092L^{3.0831}$	**Ilkyaz *et al*. (2008)**	20		80
Merluccius	21.5	$W= 0.005L^{3.11}$	**Soykan *et al*. (2015)**	40	40	140
European eel	55	W=0.0006TL3.266	**Acarli *et al.* (2014)**	50		150
Atlantic Lizard fish	14.5	$W= 0.006 L^{3.7}$	**Mehanna (2014)**	40	30	100
Common pandora	17.29	W=0.0094TLL3.0797	**Coelho *et al*. (2010)**	40	30	80
Red mullte	12.43	$W= 0.0058L^{3.188}$	**Rasha (2016)**	60	40	230
Shrimp	5.8	$W= 0.16CL^{2.6723}$	**Ameran (2004)**	80		250
groper	47.1	$W= 0.00692TL^{3.222}$	**Rafail *et al*. (1969)**	100	70	400
Bogue	11.5	$W= 0.05L^{2.90066}$	**Mostafa *et al.* (2015)**	40	30	100
Grey Gurnard	17	$W = 0.0095L^{2.99}$	**Ali and Pýnar (2004**)	40	30	130

RESULTS

Monthly samples were taken from the three trawlers operating in the Mediterranean Sea, which catch fish off the coast of North Sinai during fishing season 2021. The average production per boat was in Table 2.

Adult and Juvenile Fish of Trawl Net

240 kg Samples were taken during the period from January until December 2021 for each specie from the production trawl net (20 kg/monthly) and according to size valuation, average juvenile and adult catches weighting from total monthly samples and the average production of the trawl boat of adult fish and juvenile fish during the fishing season 2021(Table 3)**.** Fig. 1 shown that the average percentage of adult fish and trash fish consisting of small fish and Discard fish (El Afsha) during 2021.

Analysis of Losses in Biomass and Income of Trawl Net

From the total production of small fish of each species from one trawl boat during the fishing season 2021 .We also find the average weight of one fish and the average price of a ton of these fish, and by applying the Najmudeen and Sathiadas (2008) equation to determine the loss in biomass as a result of catching small fish that are not sexually mature, (total 25.19 ton) (Fig. 2) as well as the loss income as a result of this fishing (total 4.27 mill Fig. 3).

The Catch Composition of Discards (Elafsha)

El-Afsha is a mashed fish resulting from the process of pressing it into the net as a result of the long period of tension in the trawl. These fish are sorted and sold at low prices, and El Afsha fish are also very small. Fig. 4 shows that the total catch composition from one trawl gear during fishing season 2021 on the Mediterranean coast of Sinai**.**

Table 2. The average production per one trawlers during fishing season 2021

	January kg	February kg	Marsh kg	April kg	May kg	June kg	July kg	Augustes kg	SEPTEMBER kg	OCTOBER kg	NOVEMBER kg	DECEMBER kg	TOTAL (ton)	%
Shrimp	300	340	420	520	630	740	750	820	800	820	810	440	7.39	21.2
Gambaro rosso	30	30	40	70	120	40	180	90	90	40	30	60	0.82	2.3
Crabs	100	100	80	60	320	180	100	180	180	120	160	180	1.76	5.0
Cattle fish	240	220	240	240	240	140	230	280	370	280	260	320	3.06	8.8
Octopus	60	50	60	30	30	80	80	50	60	70	80	80	0.73	2.1
Squid	110	100	110	100	100	80	60	60	50	50	40	120	0.98	2.8
Bogue	120	100	120	140	200	180	180	160	140	220	120	160	1.84	5.3
Cartilaginous fish nei	150	60	120	80	80	100	170	80	110	90	130	100	1.27	3.6
Med. Horse Mackerel	70	100	80	140	140	240	190	190	280	200	90	120	1.84	5.3
Common Sole	60	20	20	40	60	10	20	20	30	10	10	60	0.36	1.1
Atlantic Lizard fish	140	110	100	160	120	180	120	130	200	160	180	220	1.82	5.2
Red mullet	120	80	80	120	60	70	60	60	100	90	100	70	1.01	2.9
Grey Gurnard	70	50	60	120	80	80	80	80	120	100	150	80	1.07	3.1
Common pandora	100	140	80	140	110	130	140	180	220	230	140	180	1.79	5.1
groper	40	30	40	40	30	30	50	40	50	40	50	70	0.51	1.5
European eel	40	30	30	30	0	0	0	0	40	60	50	60	0.32	1.0
Merluccius	100	60	80	80	90	100	90	100	110	110	140	100	1.16	3.3
E Afsha	540	520	620	540	500	620	680	610	720	690	590	520	7.15	20.5
TOTAL ton	2.39	2.14	2.38	2.65	2.91	3.0	3.18	3.13	3.67	3.39	3.14	2.94	34.9	
%	6.8	6.1	6.8	7.6	8.3	8.6	9.1	9.0	10.5	9.7	9.0	8.4		

Table 3. The average production of the trawl boat of adult fish and juvenile fish during 2021

Sample	Adult /Juvenile	Shrimp spp	Gambaro rosso	Crabs	Cattlefish	Octopus	Squids	Bogue	Cartilaginous fish nei	Med. Horse Mackerel	Common Sole	Atlantic Lizard Fish	Red mullet	Grey gurnard	Common pandora	Grouper	European eel	Merluccius
Total 240	**Ad.**	155	240	140	166	190	168	139	196	146	166	137	190	141	137	194	147	145
	Juv.	85	0	100	74	50	72	101	44	94	74	103	50	99	103	46	33	95
%	**Ad.**	64.6	100.0	58.3	69.2	79.2	70.0	57.9	81.7	60.8	69.2	57.1	79.2	58.8	57.1	80.8	81.7	60.4
	Juvenile	35.4	0.0	41.7	30.8	20.8	30.0	42.1	18.3	39.2	30.8	42.9	20.8	41.3	42.9	19.2	18.3	39.6
Total catch		7390	820	1760	3060	730	980	1840	1270	1840	400	1800	1010	1070	1790	510	320	1160
TOTAL ADULT		4772.7	820.0	1026.7	2116.5	577.9	686.0	1065.7	1037.2	1119.3	276.7	1027.5	799.6	628.6	1021.8	412.3	261.3	700.8
TOTAL JUVENILE		2617.3	0.0	733.3	943.5	152.1	294.0	774.3	232.8	720.7	123.3	772.5	210.4	441.4	768.2	97.8	58.7	459.2
Total catch		27750																
Total adult		18350.6																
Total juvenile		9399.4																
EL AFSHA		7150																
Total catch + EL AFSHA=		27750+7150 =34900																
% total trash fish		(7150+9399.5) =16549.5/34900 =47.42%																

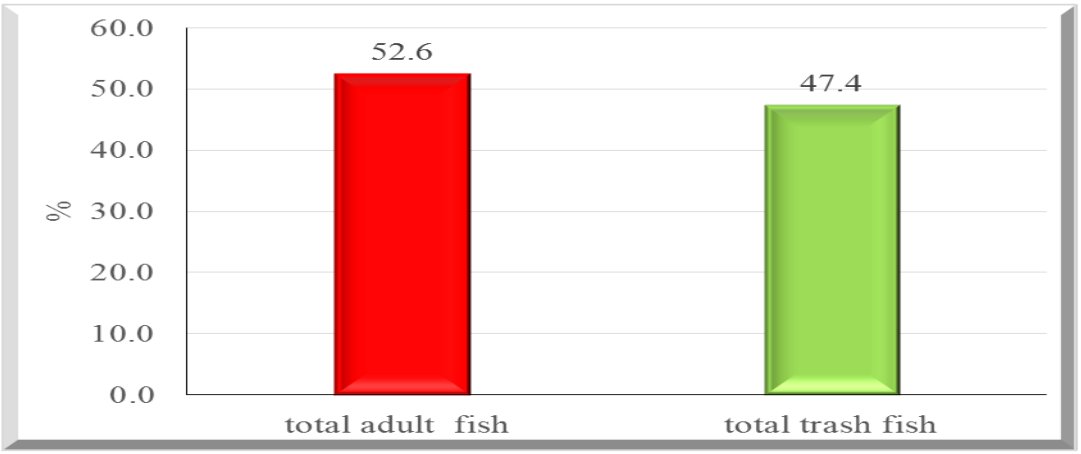

Fig. 1. The average percentage of adult fish and trash fish consisting of small fish and Discard fish (El Afsha) during 2021

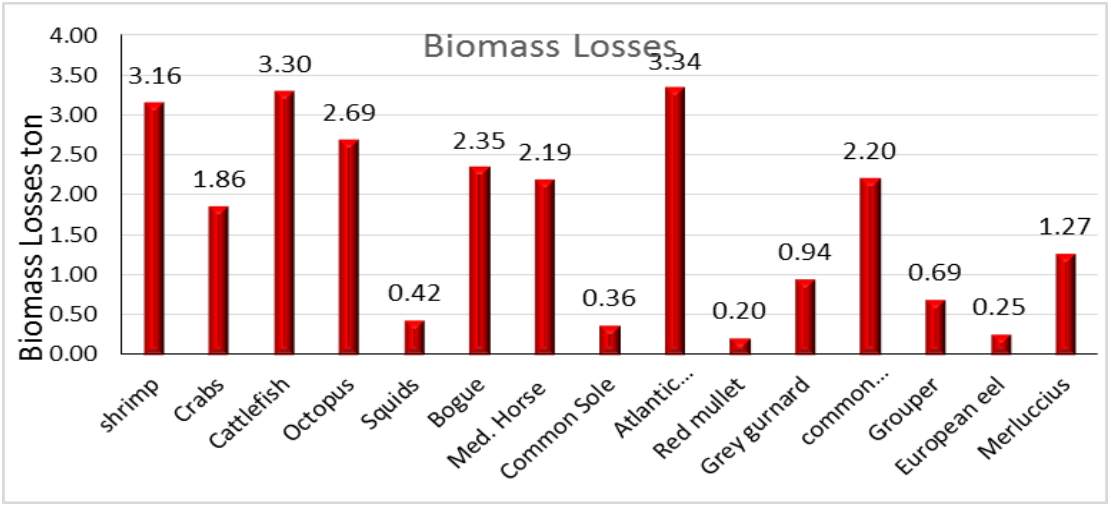

Fig. 2. Total biomass losses (ton) of juvenile

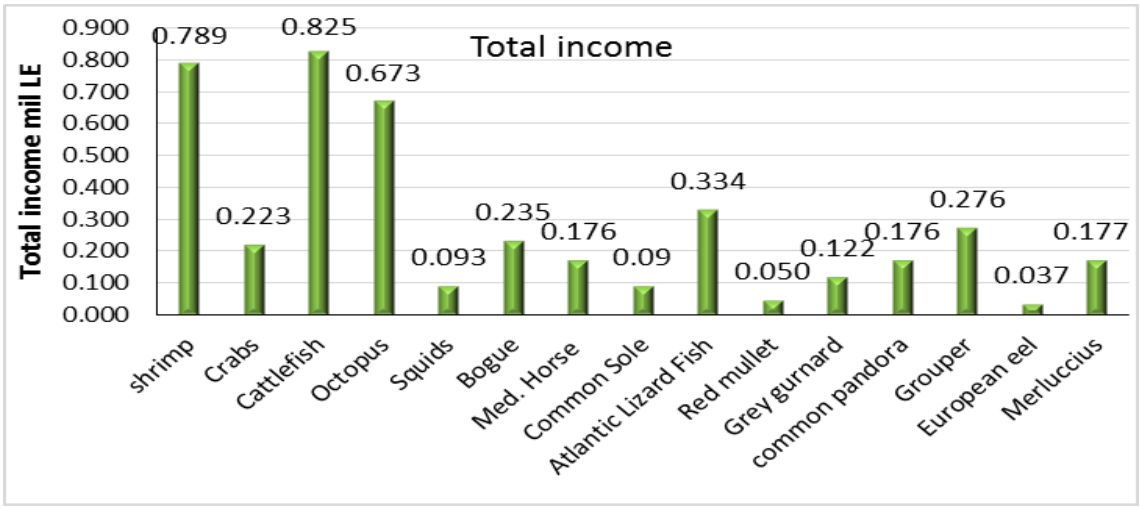

Fig. 3. Total income mil. LE of juvenile

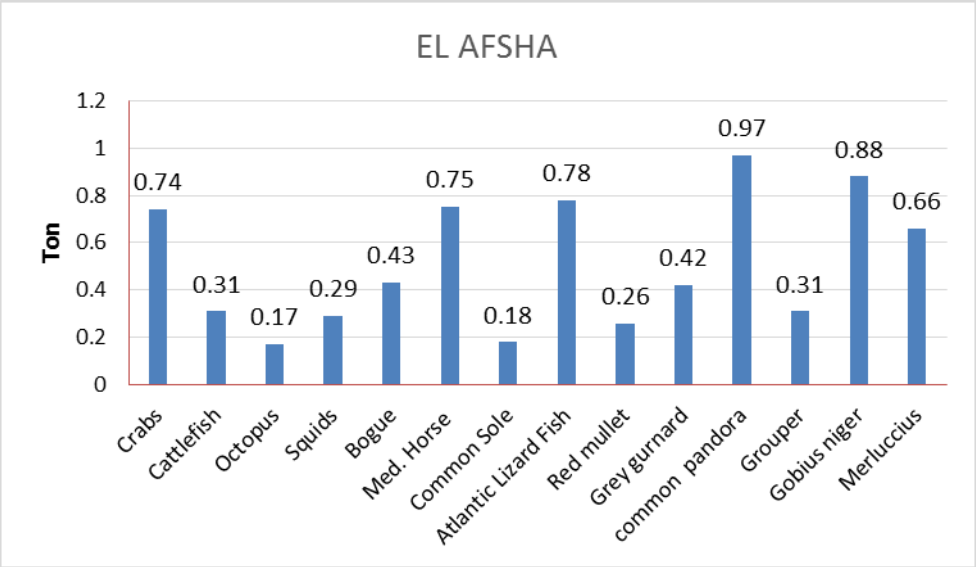

Fig. 4. The catch composition from Elafsha by one trawl gear during 2021

Table 4 shows the negative impact of the presence of Elafsha of trawl boats as a result of poor handling of fish on the boat after fishing or illegal fishing nets and find that this effect up to losses biomass 3.2, 2.9, 6.5, 1.0, 2.2, 3.6, 1.0, 5.8, 0.4, 1.6, 5.2, 5.7, 1.2, and 2.5 ton of Crabs, Cattlefish, Octopus, Squids, Bogue, Med. Horse Mackerel, Common Sole, Atlantic Lizard Fish, Red mullet, Grey gurnard, Common pandora, Grouper, Gobius niger. and Merluccius. Respectively (total 42.8 ton) and the negative income mil. LE 0.38, 0.74, 1.63, 0.22, 0.22, 0.29, 0.26, 0.58, 0.10, 0.21, 0.41, 2.28, 0.1 and 0.34 of Crabs, Cattlefish, Octopus, Squids, Bogue, Med. Horse Mackerel, Common Sole, Atlantic Lizard Fish, Red mullet, Grey gurnard, Common pandora, Grouper, *Gobius niger*.. and Merluccius. Respectively (total 7.76 mill LE)**.**

Total Losses

Results indicated that the average landing of juvenile and Elafsha of one trawl boat a result of poor handling of fish on the boat after fishing or illegal fishing nets leads to more losses of stock biomass (68 ton) and losses income (12.04 mil. LE) (Table 5).

DISCUSSION

By-catch and discards present many dilemmas for fisheries management but nevertheless until and unless we are able to manage all significant sources of fishing induced mortality associated with fishing, we will not be in a position to ensure that fisheries are exploited in a responsible and long-term sustainable manner consistent with an ecosystem approach to fisheries**" (FAO, 2010)**.

The Egyptian marine fisheries are suffering from many problems such as decline in marine fish production as a result of many reasons; over-fishing, some illegal fishing methods, small mesh sizes of nets which used to catch small species, establishment of new factories on the coasts, increasing in the rate of tourism from year to year and increase the percent of pollution from land-depend on sources of this pollution **(El Ganainy *et al*., 2005).**

In the present study the average catch composition from one trawl gear off Mediterranean sea coast Sinai during the period 2021 are Shrimp (21.2%), Cattle fish (8.8%), Horse Mackerel (5.3%), Bogue (5.3%), Atlantic Lizard fish (5.2%), Common

Table 4. Negative impact of the presence of El afsha

	Crabs	Cattlefish	Octopus	Squids	Bogue	Med. Horse	Common Sole	Atlantic Lizard Fish	Red mullet	Grey gurnard	Common pandora	Grouper	Gobius niger	Merluccius
Total EL Afsha ton	**0.74**	**0.31**	**0.17**	**0.29**	**0.43**	**0.75**	**0.18**	**0.78**	**0.26**	**0.42**	**0.97**	**0.31**	**0.88**	**0.66**
Av.weight	10	15	20	10	5.0	6.0	6.0	7.0	5.0	5.0	5.0	70	5.0	10
LM	**10.3**	**13.0**	**20.0**	**14.8**	**11.5**	**20.0**	**20.0**	**14.5**	**12.4**	**17.0**	**17.6**	**47.1**	**11.4**	**21.5**
a	0.048	0.182	0.562	0.164	0.050	0.010	0.005	0.006	0.006	0.010	0.009	0.007	0.0092	0.005
b	3.1866	2.8011	2.563	2.213	2.9066	2.93	3.2215	3.7	3.188	2.99	3.011	3.222	3.0831	3.11
Weight at mature	80.2	240.1	1214.2	63.8	60.5	64.9	74.6	109.0	17.9	45.4	67.3	1700.5	16.8	69.5
M	0.46	0.41	0.37	0.46	0.58	0.55	0.55	0.52	0.58	0.58	0.58	0.24	0.58	0.46
{(1000/w) (w))/1000}*(1-m)	**4.3**	**9.5**	**38.3**	**3.4**	**5.0**	**4.9**	**5.6**	**7.4**	**1.5**	**3.8**	**5.6**	**18.4**	**1.4**	**3.7**
Biomass losses (ton)	3.2	2.9	6.5	1.0	2.2	3.6	1.0	5.8	0.4	1.6	5.4	5.7	1.2	2.5
Mean price (1000LE/ton)	120	250	250	220	100	80	260	100	250	130	80	400	80	140
Total price mil LE	**0.38**	**0.74**	**1.63**	**0.22**	**0.22**	**0.29**	**0.26**	**0.58**	**0.10**	**0.21**	**0.41**	**2.28**	**0.10**	**0.34**
Total biomass losses (ton)		42.8												
Total income mil. LE		7.76												

Table 5. The negative impact of the presence of trawl boats

	Shrimp	Crabs	Cattlefish	Octopus	Squids	Bogue	Med. Horse	Common Sole	Atlantic Lizard Fish	Red mullet	Grey gurnard	Common pandora	Grouper	Gobius niger	European eel	Merluccius	Total
Biomass losses (ton) from juveniles	3.16	1.86	3.30	2.69	0.42	2.35	2.19	0.36	3.34	0.20	0.94	2.18	0.69		0.25	1.27	**25.2**
Biomass losses (ton) from EL Afsha	0.00	3.18	2.95	6.52	0.99	2.16	3.65	1.01	5.80	0.39	1.58	5.17	5.70	1.23	0	2.46	**42.8**
Total losses of biomass (ton)	**3.16**	**5.04**	**6.25**	**9.21**	**1.41**	**4.51**	**5.84**	**1.37**	**9.13**	**0.59**	**2.52**	**7.35**	**6.39**	**1.23**	**0.25**	**3.73**	**68.0**
Income mil LE from juveniles	0.789	0.223	0.825	0.673	0.093	0.235	0.176	0.095	0.334	0.050	0.122	0.174	0.276		0.037	0.177	**4.28**
Income mil LE from EL Afsha	0	0.38	0.74	1.63	0.22	0.22	0.29	0.26	0.58	0.10	0.21	0.41	2.28	0.10	0	0.34	**7.76**
Total income mil LE	**0.789**	**0.605**	**1.563**	**2.302**	**0.311**	**0.451**	**0.467**	**0.356**	**0.913**	**0.147**	**0.328**	**0.588**	**2.557**	**0.098**	**0.037**	**0.521**	**12.04**

pandora (5.1%), Crabs (5.0%), Cartilaginous fish nei (3.6%), Merluccius (3.3%), Grey Gurnard (3.1%), Red mullet (2.9%), Squid. (2.8), Gambaro rosso (2.3%), Octopus (2.1%), Med. groper (1.5%), Common Sole (1.1%), European eel (1.0%) and E Afsha (20.5%).

Hitanshi *et al*. (2021) found that the Trawl net catch was composed of highly diversified fish, crustaceans and cephalopods, Cuttle fish, squid, Ribbon fish, tuna, mackerel, thread fin bream were the major caught by trawl gear and they were non-selective. **Fitriya *et al* (2021)** found that during determine the composition, of demersal fish caught using mini bottom trawl at the north coast of Demak Regency. The result showed that 38 species consist of 31 fishes, four mollusks, and three crustaceans. The fish captured dominated by pony fish (*Leiognathus equulus*) as much as 31.23% and largehead hairtail (*Trichiurus lepturus*) of 23.52%. Mini bottom trawl catches many types of fish and small size; therefore, mini bottom trawl is classified as a type of fishing gear with a very low selectivity level. **Myo *et al*. (2018)** reported from the surveys, in Tanintharyi Region, Myanmar in 2017 a catch composition of 39.16% trash fish, 60.34% marketable fish and 0.50% shrimp was found at the landing site. The organisms with the highest percentage were fish as much as 32%, while in TPI Asemdoyong Pemalang the catch of mini bottom trawl was dominated by lizardfish and pony fish, 16% and 9.1%, respectively. The difference in dominance results might be caused by the season and fishing location **(Septianna *et al* 2019)**.

In the present study the percentage of by catch in Mediterranean cost of Sinai were 35.4; 41.7; 30.8; 20.8; 30.0; 42.1; 18.3; 39.2; 30.8; 42.9; 20.8; 41.3; 42.9; 19.2; 18.3 and 39.6% of Shrimp spp; Crabs; Cattlefish; Octopus; Squids; Bogue; Cartilaginous fish nei; Med. Horse Mackerel; Common Sole; Atlantic Lizard Fish; Red mullet; Grey gurnard; Common pandora; Grouper; European eel and Merluccius respectively the percentage average of by catch from total catch 26.9%.

By-catch and discards are major problems in the world fisheries. Some incidentally caught organisms are protected species such as marine mammals, marine turtles, and seabirds **(Diamond, 2003)**. Detailed information on the historic dimensions of by-catch is lacking for many fisheries **(Saila, 1983; Alverson *et al*., 1994)** continued monitoring is thus necessary to assess trends and the effectiveness of new technologies to minimize by-catch. **Gaber *et al*. (2018)** reported that the percentage of the catch from trawl net during season 2016 of Mediterranean coast of Sinai as follows crabs (58.2%) followed by Others (18.1%), Shrimp (11.4%), cattle fish (8.3%), Red porgy (3.1%), Atlantic lizardfish (0.6%), and Red mullte (0.3%) from total catch.

According to size valuation, average juvenile and adult catch weight from total monthly samples crabs 75.0% and 24.0% adult and juvenile (Smaller than Lm) respectively. Cattle fish 54.2% and 45.8% adult and juvenile respectively, shrimp 66.7% and 33.3% adult and juvenile respectively. Red mullte 47.9% and 52.1% adult and juvenile respectively and Red porgy 52.1% and 47.9% adult and juvenile respectively and Atlantic Lizardfish 54.2% and 45.8% adult and juvenile respectively adding to Others fish all of which trash fish. Also, **Gaber *et al*. (2018)** found that, the landing of juvenile leads to more losses of stock biomass which formed 1061.7 tons and 145.4 million LE losses in one fishing season, 2016 of Mediterranean coast of Sinai.

El-Haweet (2001) reported that increasing attention has been paid over recent years to the economic performance of fisheries. Inshore seine fishery should be controlled. Increasing juvenile catches in the inshore seine fishery will lower the total catch and intensify the effect of the trawl fisheries.

Gaber (2010) showing that the presence of fish waste in the production of Trawl net of Mediterranean coast of Sinai estimated at about 45.2% of the total production of these vessels and the losses of stock biomass which formed 1269.9 tons and 93.3 million LE losses in one fishing season, 2009.

In this study, the trawl net methods in the Mediterranean coast of Sinai may lead to loss of a large amount of fish stock in the form of juvenile. The biological losses were estimated at least 68.0 tons annually from using one trawl gear. These fish will become marketable in size after one year. In total catch, if these juveniles were not caught and allowed to grow up to Lm, will addition the biological losses with revenue addition of 12.04 million LE also from one trawl gear during one year.

FAO (2006) found that in order to protect fish stock and to enable it to share at least for one time in reproduction, an urgent increasing in mesh size of used nets as well as the evaluation of all fishing techniques in the lagoon and prohibiting the dangerous ones must be done. Also, **FAO (2006)** reported that the by-catches impact on the ecosystem by increasing the mortality of the incidentally captured species and having an economic impact when consist of the juveniles of commercially valuable species and food fish and hence constitute a threat to food security and sustainable fisheries.

Gray *et al.* (2003) reported that the solution to discard problems in multi species fisheries elsewhere include the development of more selective fishing gear and practices that minimize the capture of non-target species and undersize individuals of the target species.

Most fishers of African lakes would not follow the recommendations for increasing the mesh sizes of their gears beyond the fish's size at first maturity. This often caused strong conflicts between fishers and the fisheries authorities. (**Kolding and van Zwieten 2011**).

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الملخص العربي

تحليل الخسائر في الكتلة الحيوية والدخل من معدات الصيد (شباك الجر) في شرق البحر الأبيض المتوسط، شمال سيناء، مصر

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تم حساب متوسط إنتاج مركب الصيد بالجر الواحد العامل قبالة سواحل سيناء خلال موسم الصيد 2021 بواقع 34.9 طن، وتم دراسة التأثير السلبي لشبكة الجر على صيد البحر المتوسط على سواحل سيناء من خلال أخذ عينات شهرية بواقع 20 كجم من كل نوع خلال عام 2021، وتم توزيع الأسماك إلى أسماك صغيرة وأسماك ناضجة حسب الطول عند بداية النضج طبقاً للدراسات السابقة لهذه الأنواع في نفس المنطقة أو المناطق المجاورة، وأظهرت النتائج أن نسبة الأسماك الصغيرة 47.4% من إنتاج شبكة الجر، أما التأثير السلبي على الكتلة الحيوية من صغار الأسماك والأسماك المفلطحة فكان 3.16؛ 5.04؛ 6.25؛ 9,21؛ 1.41؛ 4.51؛ 5,84؛1,37؛ 9.13؛ 0.59؛ 2.52؛ 7.35؛ 6.39؛ 1.23؛ 0.26؛ 3.73 طن (إجمالي 68 طنًا) وكانت خسائر الدخل 0.789؛ 0.605؛ 1.563؛ 2.302؛ 0.311؛ 0.451؛ 0.467؛ 0.356؛ 0.913؛ 0.147؛ 0.328؛ 2.557؛ 0.098؛ 0.037؛ و0.521 مليون جنيه (إجمالي 12.04 مليون جنيه) من الجمبرى والكابوريا والسبيط والاخطبوط والكاليميرى والموزه والباغة والموسى والمكرونه والبربونى والفراخ والمرجان والوقار وابوكرش والحنشان وابوحنك على التوالي لمركب صيد جر واحدة خلال موسم الصيد 2021 في ساحل البحر الأبيض المتوسط في سيناء.

الكلمات الاسترشادية: شبكة الجر، الطول عند بداية النضج الجنسى ؛ الأثر السلبي؛ الكتلة الحيوية؛ الدخل و الخسائر.

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