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ORIGINAL ARTICLE

STATUS OF COMMERCIAL FISH CATCH IN THE IRAQI MARINE WATERS, ARABIAN GULF

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ABSTRACT

Commercial fish catch in the Iraqi marine waters from December 2018 to December 2019 was investigated. The study is based on three stations: the first station is located at the Shatt Al-Arab estuary, the second represents the area between the Shatt Al-Arab Estuary and open marine waters, and the third is associated with the Iraqi territorial marine waters. The total weight of the catch was 1881 kg, represented by 500, 654, and 727 kg in the first, second and third stations respectively. The third station was the highest with a majority of the family Sciaenidae by 464 kg, while the lowest was the family Scombridae by 0.5 kg. The total number of species included 37 species, belonging to 27 genera, 19 families, and 6 orders, the largest order represented by a high number of species was the Perciformes and the lowest versatile orders were Oreclotiformes, Nemipterideaformes and Scombridaeformes; while the order Scorpaeniformes was found by only one species.

Keywords: Arabian Gulf, Commercial catch, Marine water, Sciaenidae, Scombridae.

INTRODUCTION

Many species' abundance and distribution are subjected to significant fluctuations in the marine ecosystem which consider one of the most important responsibilities (Laevastu and Larkins, 1981).The Iraqi coastal waters occupy the northwest region of the Arabian Gulf, which comprises the estuary area of the Gulf. Iraq has a short coastal territory, with a coastline of 105 km², a continental shelf of 1034 km², and territorial waters of 716 km² (Al-Shamary, 2021).

The Iraqi marine environments in Iraqi waters are quite different from those in other parts of the Arabian Gulf; the confluence of the Euphrates and Tigris Rivers forms the Shatt Al-Arab River, representing the major freshwater discharge into the Northwest Arabian Gulf. Shatt Al- Arab River and its associated marshes are potential sources of nutrients and organics in the northwestern Arabian Gulf (Al-Yamani *et al*., 2007; Al-Mudaffar and Mahdi, 2014). Seas and oceans are important sources of protein food, with fish accounting for roughly 20% of global protein consumption (Kuronuma and Abe, 1986; Al-Mansy, 1999). In the Arabian

Gulf, more than 465 species of fish have been identified, all of which belong to the Chondrichthyes and Osteichthyes. (Eagderi *et al.*, 2019), Previously studies on the composition of fish catch, particularly commercial ones, had been conducted by Mohamed (1993) concerning the composition of fish in marine waters, where the percentage of commercial fish was found to be 28.3%. Mohamed *et al*. (1995) collected 86 marine fish species belonging to 46 families. Resen (2006) reported that commercial fish accounted for 48% of the total catch. Younis and Al-Shamary (2015) estimated the commercial catch by 71.6%. On the other hand a total of 214 species in 75 families was identified by Al-Faisal and Mutlak (2018). Abood (2018) investigated the structure and the fish community's distribution in the Shatt Al-Arab estuary, indicating that the commercial catch constituted 96.2%. Ali *et al.* (2018) compiled a list of 322 species belonging to 94 families recorded in the Iraqi marine waters from 1874 to 2018, Mohamed and Abood (2020) collected 35 species representing 18 families of the artisanal catch. While Al-Shamary *et al.* (2021) pointed out that the commercial catch in the Iraqi marine waters formed approximately 33.74% of the total catch. The present paper aims to determine the spatial variation of the total catch and the commercial catch along the Shatt Al-Arab Estuary and the Iraqi marine waters.

MATERIALS AND METHODS

Study area

Iraq's marine waters are located in the Arabian Gulf's far northwest corner. Three study stations with a distance of 15-20 km between them were chosen; station one represents Shatt Al-Arab Estuary and is constrained by location. (29 ° 54'15.93 "N; 48 ° 41'15.62" E), (29 ° 54'15.84 "N; 48 ° 37'24.24" E), (29 ° 50' 44.04 "N; 48 ° 41'15.51" E), (29 ° 50'44.12 "N; 48 ° 37'24.38" E), and (29 ° 50'44.12 "N; 48 ° 37'24.38; this station has a 15-meter depth and an alluvial mud deposit on the bottom. Station two, which is located at (29 ° 50'17.98 "N; 48 ° 43'53.28" E), (29 °; 48 ° 43'53.16 "E), includes the area between the impacts of the Shatt Al-Arab estuary and open marine waters. The bottom of this station is rocky, with dept. The station three coordinates (29 ° 43'33.41 "N; 48 ° 43'43.46 "E), (29 ° 43'33.38 "N; 48 ° 49'34.85 "E), (29 ° 40'04.13 "N; 48 ° 43'43.39 "E), and (29 ° 40'04.02 "N; 48 ° 49'34.96 "E) define the marine waters, it has a depth of over 20 m (Map 1).

Fish collection and identification

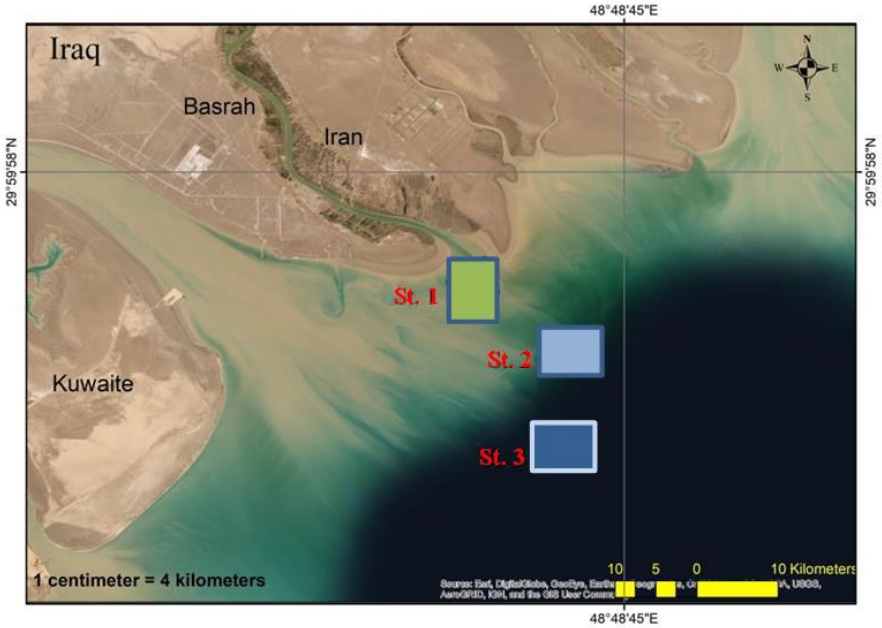
As a part of a general fish survey of the region, fishing-survey boats Anwar 2 (16 m length, 4.5 m width, and 2 m draft) with a horsepower of 150 horses were used to collect fish from the three study stations; each boat is equipped with a 5x5 cm mesh trawl net and a 3x3 cm mesh bag. The net pull rope is 75-100 meters in length. The net was pulled for three hours. Fish were caught monthly for a year from December 2018 to December 2019, and identified according to Kuronuma and Abe (1986), Carpenter *et al*. (1997), and Froese and Pauly (2018).

Data analyses

The abundance of fauna raw data, represented by a sum of triplicates for each species at each station, was used to calculate several diversity indices, the following indices were calculated:

A number of species {S}: The total number of species in each replicate specimen, which indicates the number of species in an ecosystem. Relative abundances are not used in this index. Number of individuals {N}: Total number of individuals in each replicate specimen. Each fish species' numerical relative abundance was calculated using the formula developed by Odum (1970):

(ni / N) * 100 = relative abundance (percentage)
ni = The number of species found in each month's sample
N = Total number of individuals in the monthly sample.



Map (1): The sampling sites of the study area.

RESULTS AND DISCUSSION

The collected from Iraqi marine waters in the present study amounted to 2152 tons, including 564 kg in the first station, 700 kg in the second station, and 888 kg in the third station, while the total commercial catch was 1881tons, equivalent to 87.4% of the total catch, including 500 kg in the first station, 654 kg in the second station and 727 kg in the third station, Diagram (1) shows the monthly changes in the total and commercial catch, which amounted to 90, 100, and 94 kg in December in the first station and March in the second and third stations respectively. The lowest total catch was (15) kg in February at the first station and 10 kg in January for the second and third stations respectively, while the highest commercial catch was 67 kg in December at the first station, 77 kg in March at the second station, and 71 kg in June at the third station and the lowest commercial catch (7, 8 and 4) kg in January in the three stations respectively.

Status of commercial fish catch

Seasonal changes have an impact on fishing rates and fish stocks, and the scarcity of water entering the mouth of the Shatt al-Arab estuary has resulted in a change in the marine environment as a result of climatic changes, resulting in a lack of fish stocks for some species, according to Eaqderi *et al*. (2019). While, the annual fishing quantities from 2014 to 2017 totaled (5553, 3391, 3992, and 3399) tons respectively. Qasim's study in (2021) disagrees with the present study in that an annual catch of 2152 tons was recorded in 2019.

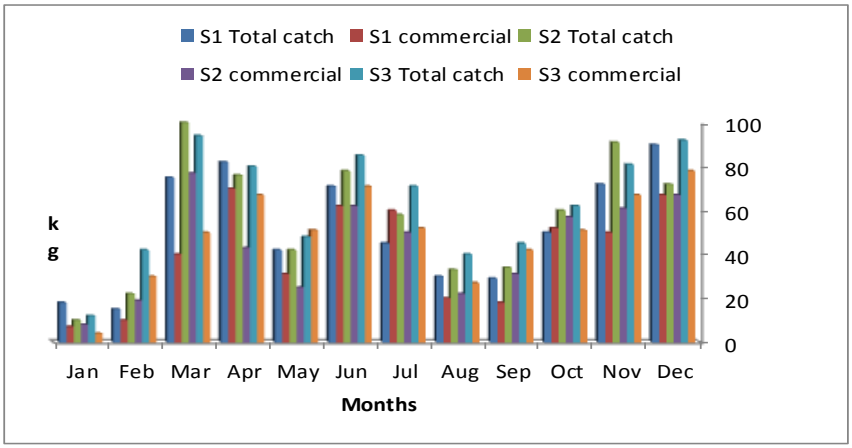


Diagram (1): Total and commercial catches of the Iraqi marine waters on a monthly basis.

There are also 37 commercial species belonging to 27 genera, 19 families, and 6 orders, with the Sciaenidae family having the most commercial species (6 species), followed by the Sparidae and Mugilidae families with four species, as shown in (Tab.1).

Table (1): Species, genera, families, and orders of commercial marine fishes of the present study.

Species	Genera	Families	Orders
Argyrosomus hololepidotus (Lacepède, 1801)	*Argyrosomus*	Sciaenidae	Perciformes
Otolithes ruber (Bloch & Schneider, 1801)	*Otolithes*		
Protonibea diacanthus (Lacepède, 1802)	*Protonibae*		
Johnius belangerii (Cuvier, 1830)	*Johnius*		
Johnius dussumieri (Cuvier, 1830)			
Johnius maculatus Bloch & Schneider, 1801			
Acanthopagrus arabicus Iwatsuki, 2013	*Acanthopagrus*	Sparidae	
Acanthopagrus berda (Forsskål, 1775)			
Acanthopagrus bifasciatus(Forsskål, 1775)			
Crenidens crenidens (Forsskål, 1775)	*Crenidens*		Perciformes
Pampus argenteus (Euphrasen, 1788)	*Pampus*	Stromateidae	
Scomberoides commersonianus Lacepède, 1801	*Scombreoides*	Carangidae	
Epinephelus tauvina (Forsskål, 1775)	*Epinephelus*	Serranidae	
Epinephelus areolatus (Forsskål, 1775)			

Pomadasys kaakan (Cuvier, 1830)	*Pomadasys*	Haemulidae	
Diagramma pictum (Thunberg, 1792)	*Diagramma*		
Lethrinus borbonicus Valenciennes, 1830	*Lethrinus*	Lethrinidae	
Scomberomorus guttatus (Bloch & Schneider,1801)	*Scomberomorus*	Scombridae	
Nemipterus japonicus (Bloch, 1791)	*Nemipterus*	Nemipteridae	
Scomberomorus commerson (Lacepède, 1800)	*Scomberomorus*	Scombridae	
Anodontostoma chacunda (Hamilton, 1822)	*Anodontostoma*	Clupeidae	Anguliformes
Nematalosa nasus (Bloch, 1795)	*Nematalosa*		
Tenualosa ilisha (Hamilton, 1822)	*Tenualosa*		
Planiliza klunzingeri (Day, 1888)	*Planiliza*	Mugilidae	Mugiliformes
planiliza carinata (Valenciennes, 1836)			
Mugil cephalus Linnaeus, 1758	*Mugil*		
Ilisha melastoma (Bloch & Schneider, 1801)	*Ilisha*	Pristigasteridae	Clupeiformes
Ilisha compressa Randall, 1994			
Thryssa whiteheadi Wongratana, 1983	*Thryssa*	Engraulidae	
Thryssa dussumieri (Valenciennes, 1848)			
Chirocentrus dorab (Forsskål, 1775)	*Chirocentrus*	Chirocentridae	
Cynoglossus arel (Bloch & Schneider, 1801)	*Cynoglossus*	Cynoglossidae	Pleuronectiformes
Cynoglossus kopsii (Bleeker, 1851)			
Solea elongata Day, 1877	*Solea*	Soleidae	
Solea stanalandi Randall & McCarthy, 1989			
Arnoglossus aspilos (Bleeker,1851)	*Arnoglossus*	Bothidae	
*Platycephalus indicus (*Linnaeus, 1758)	*Platycephalus*	Platycephalidae	Scorpaeniformes

This result differs from that of Al-Shamary *et al*. (2020) who obtained 20 commercial species in the year 2018. The present study also shows that the Sciaenidae family has a total weight of 464 kg divided into (186, 156, and 122) kg in the three stations respectively, and is the largest commercial family in terms of the number of species and the largest weights. Diagram (2) shows the monthly changes of the family, the highest weight was 40 kg in November at the second station, and the lowest weight was 7 kg in October at the third station. Out of the important commercial families, Sciaenidae family accounted for 21.5 %, of the total catch the lowest catch of the same family was discovered in October at 7 kg, which is comparable with the study of Mohamed (1993), when it was measured at 6.8 kg. However Mohamed's study (1993) disagrees with the current study and found that the same family in

November was it 4.2 kg. This family is constantly expanding, especially in the first station, Shatt Al- Arab estuary, due to the significance of the incubation, feeding, and reproduction environment for the youngest of many fish, including the young of this family. In contrast to Al-Shamary *et al*. study in (2020), the family's share of the overall catch was measured at 66 percent, which amounted to 11.5 percent, and the Resaen study in (2006), which amounted to 10.39 percent. Furthermore the current study points out that the peak fishing season runs from March to November, which coincides with Most studies dealing with monthly fluctuations in the formation of species, and that the fish resources in the Iraqi marine waters decrease during the cold months (Mohamed,1993; Mohamed and Qasim, 2014). Sciaenidae considers the most prevalent in the Iraqi marine waters and is mainly found in it and can adapt on a large scale. This family is found to increase in the months of the year due to the abundance of crustaceans in the study area and coincides with the high temperature (Lagler, 1977). As for the increase of this family in December, it reached 40 kg due to the availability of environmental conditions and the increase in water releases coming from the river in that period and the increase in the spawning status of some species of this family in the second station, which is near to the Shatt Al-Arab estuary.

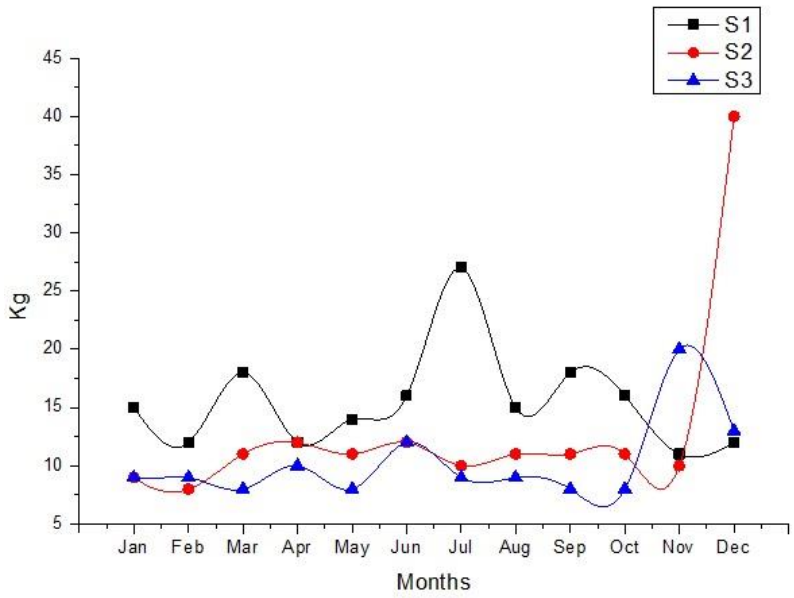


Diagram (2): Monthly catch of the family Sciaenidae.

The formed Clupeidae accounted for 10% of the total catch, and the weights of this family varied (56, 105, and 65) kg in the study stations respectively, the highest weight was reached in Jun with 21 kg in the second station and decreased in the cold months, and most of the species spend and live in the coastal areas and enters estuaries for breeding, the percentage is slightly more than the record of Mohamed (1993) as it was recorded 8.2% of the total catch. This percentage disagrees with the study by Ali, (1993) formed 21% and the study of Mohamed and Abood (2020) which formed 11.2%. We note that the increase in the Clupeidae

family resulted from the availability of environmental conditions for it and during the breeding season, and it is consistent with the study of Qasim (2014) as shown in Diagram (3). In 2017, this family constituted 15.89% of the total catch. During the progression of the years, we note that there are few stocks of this family, and the reason may be due to the exposure of the fish stock to random, unscientific exploitation and this is confirmed by Qasim (2021).

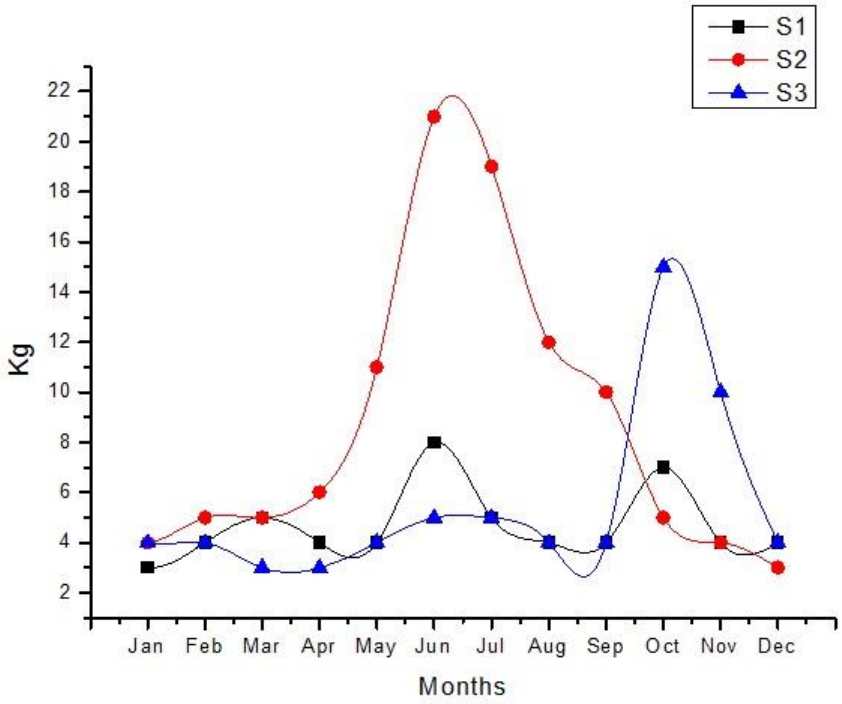


Diagram (3): Monthly catch of the family Clupeidae.

The family Cynoglossidae was found responsible for 7.7% of the total catch, the highest weight at the first station was 25 kg in July, and the lowest weight at the third station was 1.4 kg in March. The weights of fishes of this family were (89.5, 44 and 33.5) kg in the three study stations respectively. These family species are found in sandy bottoms, and the percentage of this family does not match Mohamed's results (1993) we found 0.4% of this family, and Resen (2006) study who found a higher rate of 11.72 % of the total catch, indicating that the commercial catch has been declining in recent years.

Diagram (4) shows the changes in the weights of fishes belonging to the family Cynoglossidae during the study period Many factors, including a large number of fishing boats and overfishing of the young fish in the area, have contributed to the decline, and this was confirmed by Qasim, (2021) during his study of Iraqi marine waters, who found that fish stocks were rapidly depleting.

Status of commercial fish catch

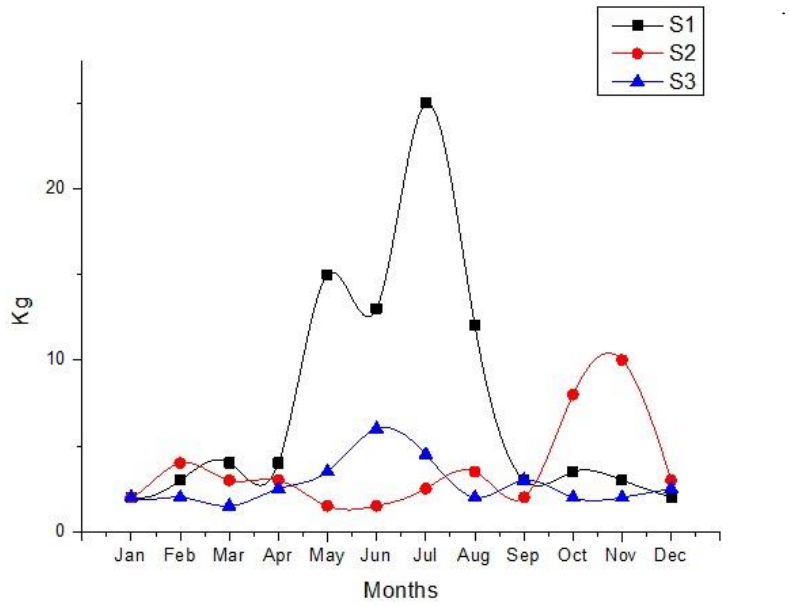


Diagram (4): Monthly catch of the family Cynoglossidae.

Diagram (5) explains that the proportions of fish families were very different as a result of the fishermen's irregular fishing efforts, as they hunted fish at all hours of the day and night, putting a lot of pressure on the fish product and affecting fish stocks (Qasim, 2021).

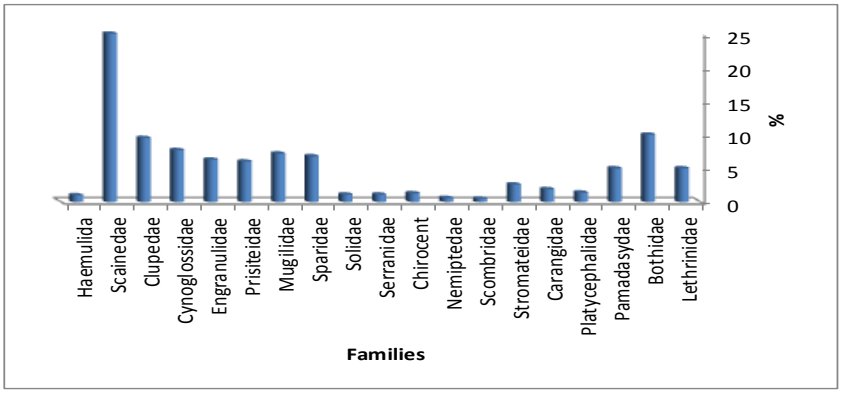


Diagram (5): The percentage of commercial fish families caught.

It has been noted in the study by Ali *et al*. (1998) commercial fishing increased from May to August and during the years from 1991 to 1994 in those months. The reasons for the increase in fishing are related to the rise in temperatures and the adaptation of fish. It supplies a lot of nutrients to the region. This study disagrees with a present study we note an increase in fishing in the third station during June in marine waters.

Given that there is a significant difference in fishing operations between decline and growth, Table (2) compares commercial fishing in the early 1990s of the previous century with succeeding studies, and the present study when the rise and fall of fishing boats can be ascribed to the cause as a result of the varying fishing effort, and this increase may be attributed to the development of infrastructure the upgrading of navigation technology, and increasing the mechanized power of fishing boats (Mohamed and Abood, 2020).

Table (2): Ratios and rates of commercial fishing for previous studies and the present study in Iraqi marine waters.

Study	Commercial catch%	Period
Ali (1993)	27	1989-1990
Mohamed (1993)	19.3	1989-1990
Ali *et al*. (1998)	9.3	1990 according to Al-Naser association
	16.5	1991
	27.9	1992
	21.5	1993
	37.9	1994
Rasen (2006)	6-17.25	2004
Mohamed and Qasim (2014)	33.7	2007 January 2007 to December 2011
	12	2008
	22.8	2009
	14.1	2010
	17.4	2011
Mohamed and Abood (2020)	69.54	2017
	71.57	2019 2018January 2017 to December 2019
	72.15	
Present study	85	December 2018 to December 2019

This means that the lack of fishing effort in the present study, as compared to previous studies as shown in the Diagram (6) due to the numbers of boats taken in previous years and included in figure 8 from the Al-Nasr Association for Fishermen in Al-Faw, has resulted in a decrease in catching commercial fish especially in the coming years, as confirmed by Qasim (2021) during his study on marine waters, and the small number of fishing boats in the present study has resulted in a decrease in catching commercial fish. Fishing boats, climatic changes, and fishermen's overfishing all contributed to a decrease in catching fish compared to previous years as Al-Shamary *et al*. (2021) discovered during their study of Iraqi marine waters.

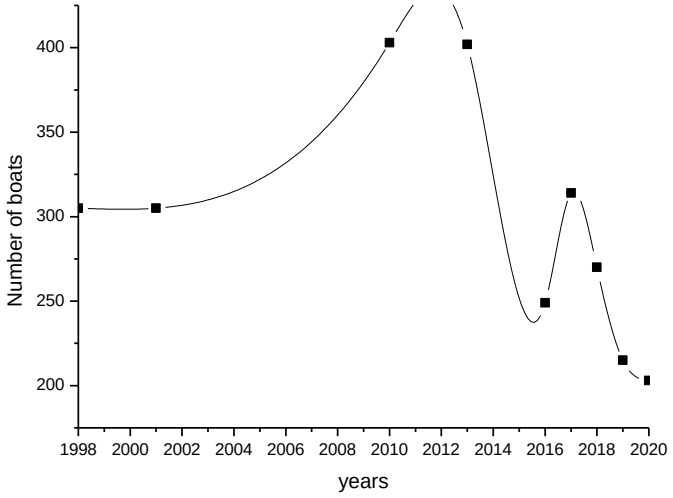


Diagram (6): Number of fishing boats during 1998-2020.

CONCLUSIONS

Reducing overfishing relieves pressure on fishing effort, allowing fish to reproduce and increasing the number of commercial fish needed to sustain the economic fish stock**,** we can see from this study that commercial fish production has started to decline in comparison to the previous years.

ACKNOWLEDGMENTS

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CONFLICT OF INTEREST STATEMENT

"The authors have no conflicts of interest to declare".

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Al-Shamary and Younis

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حالة الصيد السمكي التجاري في المياه البحرية العراقية، الخليج العربي

احمد جاسب الشمري و كاظم حسن يونس

مركز علوم البحار، جامعة البصرة، البصرة، العراق

تأريخ الاستلام: 2022/04/06، تأريخ القبول: 2022/08/15، تأريخ النشر: 2022/12/20

الخلاصة

درست حالة الأسماك التجارية المصطادة في المياه البحرية العراقية للفترة كانون الأول 2018 - كانون الاول 2019. اذ اختيرت ثلاثة محطات كانت المحطة الاولى مصب شط العرب والمحطة الثانية تشمل المنطقة الواقعة بين مصب شط العرب والمياه البحرية المفتوحة والمحطة الثالثة المياه البحرية، ظهر الوزن الكلي للأسماك المصادة 1881 كغم ، بواقع 500 كغم في المحطة الأولى، و 654 كغم في المحطة الثانية ، و 727 كغم في المحطة الثالثة. كانت المحطة الثالثة هي الاعلى وحصلت فيها اسماك عائلة Sciaenidae على أعلى وزن الذي بلغ 464 كغم، بينما كان أقل وزن حصلت عليه عائلة Scombridae 0.5 كغم.

بلغ العدد الكلي للأنواع 37 نوعا" تنتمي الى 27 جنس و19 عائلة و6 رتب، فيما كانت الرتبة التي ضمت العدد الاكبر من الانواع هي Perciformes والرتب الاقل عددا" هي Nemipterideaformes, Scombridaeformes Oreclotiformes ، بينما تضمنت الرتبة scorpaeniformes نوعا واحدا فقط..