

# A Statistic Survey of Marine and Freshwater Fish Catch in Basrah, Iraq 1990 – 2011

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## ABSTRACT

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This study is an attempt to study the fishery resources and fisheries in Basra province in Iraq, during 1990 to 2011. The declared catches by fishermen and fish market were used in this study. The total commercial catch peaked in 2009 at 4,390,775 and 152,445 ton for Marine and Freshwater fishes respectively. Species composition of catches was studied during the above period. About twenty nine marine and thirteen freshwater fish species were recorded. The total catch of the marine fishes was dominated by *Tenualosa illisha*. It accounted for about 45 % of the total catch during whole period. The freshwater fishes was mainly represented by (*Silurus triostegus*) which accounted for 32% of the total during whole period. Gill net's fishing method was employed mainly for catching pelagic fish, trawling is single largest technology being practiced in the region for harvesting the demersal fishes. Overfishing was perceived as a serious problem and needs to, be taken into account in considering risks to the stock of the fishes. The weather patterns, market prices and environmental conditions (natural or human-made) have a significant effect on fish stock. Moreover, increases in water salinity and pollution level has also a significant impact on fish stock and therefore, the enforcement of the new standards for Environment Pollution Control in the province is required.

## KEYWORDS

Iraq, Basrah, artisanal fisheries, marine fishes, freshwater fishes, catch, Species composition, Tigris-Euphrates Rivers

## المسح الاحصائي لأسماك المياه البحرية والغذبة المصطادة في البصرة للفترة 1990- 2011

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## المُستخلص

تهدف هذه الورقة محاولة لدراسة الثروة السمكية ومصادرها في محافظة البصرة خلال الفترة 1990- 2011، إذ تمت دراسة كميات الصيد المعلنة من قبل صيادي الاسماك ومناطق بيع وتسويق الاسماك إلى جانب بيانات مديرية الزراعة العامة في البصرة. وعلى هذه البيانات بلغت أقصى كمية للصيد التجاري الكلية في عام 2000 بين 4,390,775 و 152,445 طناً من الاسماك البحرية واسماك المياه العذبة على التوالي. تم دراسة التركيب النوعي لكميات الصيد خلال الفترة المذكورة وتم تسجيل ثلاثين نوعاً من الاسماك البحرية واحد عشر نوعاً من اسماك المياه العذبة وتشكل نوعية (*ilisha*) *Tenualosa* النسبة الغالبة (45 %) من الصيد الكلي للأسماك البحرية كما يشكل النوع (*Silurus triostegus*) النسبة الأعلى (32 %) من الصيد الكلي لأسماك المياه العذبة. هذا وقد استخدمت طريقة الصيد بالشباك الخيشومية بشكل رئيس في صيد الاسماك العائمة وطريقة الصيد بالشباك الجر للأسماك القاعية. استخلصت الدراسة ان الصيد الجائر يشكل خطراً على الثروة السمكية عموماً، ولذلك يجب الإنتباه لخطورته على المخزون السمكي. كما وأن التغيرات الجوية واسعار السوق والظروف البيئية ( الطبيعية وغير الطبيعية ) لها تأثير عام على المخزون السمكي أيضاً وعلاوة على ذلك فالزيادة في ملوحة الماء ومستوى التلوث لهما كذلك تأثيراً هاماً على الثروة السمكية، لذا يستوجب ابراز ذلك والتأكيد على الحاجة الى تنفيذ المعايير الجديدة الخاصة بالسيطرة على التلوث البيئي في مياه وسواحل المحافظة.

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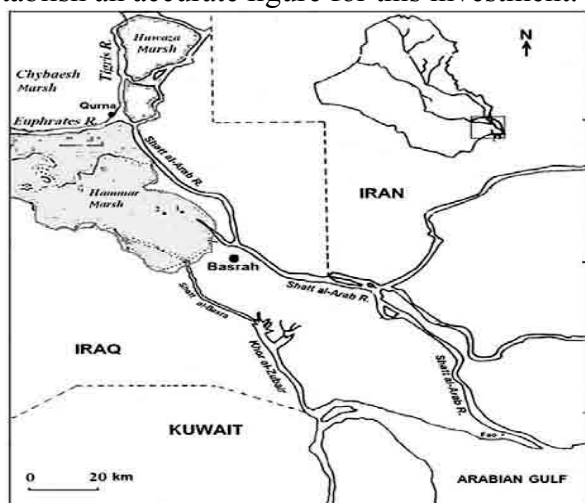
## الكلمات الدالة

العراق، البصرة، المصيد الداخلي، ثروة سمكية، جُهد صيد، تركيب نوعي، انهار، دجلة والفرات

## Introduction

Catch and effort data are the basis upon which fish stocks are assessed. These data increase knowledge of fishery activities, indicate the scale of fisheries in terms of size and value, both within and between sectors, and can be used to assess the species and populations upon which fisheries depend (Watson *et al.*, 2000). However, financial and human resource limitations create a challenge, in particular for developing countries, even for the gathering of the basic information. Policy decisions were therefore often made in the absence of such information. The aim of the fisheries management is to regulate fishing effort, fish catches or both, depending on future predictions assessment studies, social, economic and political situation. Without basic estimates of the status of fish stocks, and time series data on catches, it is not easy to determine the success of the management strategies employed.

Iraq (Figure 1) has a limited coastal zone that borders the Gulf with length of coast line about 50 km approximately. As known, the Tigris and Euphrates rivers with their branches, marshes and lakes (Figure 1) are the main sources of inland fresh water in Iraq. But, unfortunately, the flow of the major river systems have been affected in recent years as a result of extensive damming in their upper reaches. This caused some changes in the total investment of this sector and creates a problem which preventing the scientists to establish an accurate figure for this investment.



**Figure 1:** Basrah Provenance and Surrounding Water, Iraq

The fisheries industry was important in this region for many years. Details on fisheries management of Iraq, description of established fisheries management frameworks for this country and overall strategies, policy and legal issues, and other measures are given by the National Fishery Sector Overview (NFSO) (Regional Commission for Fisheries RCF, 2011). However, some biological studies on some important marine and freshwater fishes of Iraqi water have been done by several workers (Nasir *et al.*, 1988); (Mohamed, 1993); (Mohamed *et al.*, 1998); (Nasir Nasir, 2000 & 2006); and (Al-Dubakel, 2011). There are also several studies which dealt with the taxonomy of Iraqi marine and freshwater fishes (Khalaf 1961); (Mahdi 1962); (Al-Nasiri, & Shamsul Houda 1975); (Banister 1980); (Al-Daham 1982); and (Coad 1991).

It has been reported that about 58 freshwater fish species found in Iraqi inland waters and about 53 marine species penetrating estuarine and fresh water (Coad, 1991). (Mohamed, *et al.*, 2002) assessed the marine fisheries from 1995 to 1999 and recorded 116 fish species belong to 58 families. The commercial fishes were 18.4%, a non-commercial fish was 61.6% and a shrimp was 20%.

Iraq is a member of the Regional Commission for Fisheries (RECOFI) which addresses regional fisheries research and management issues. The specific research resources of Iraq are limited. This present study, however, is an attempt to study and evaluate fish catches for marine and freshwater fishes from Basrah during the last twenty one years and to suggest recommendations for future development of the fishing in this area. The study is to contribute objectives of communicating Iraqi fisheries monitoring programme.

## Material and Methods

### Data Collection

Total marine and freshwater fish catches data and species composition were collected by Department of Fisheries, Agricultural affairs of Basrah Directorate, from six fish markets (Al-Faw, Al-Siibah, Abi Alkhasib, Shatt Al-Arab Al-Deir and Al-Quarnah) in Basrah Providence, for

the period between 1990 to 2011 and 2005 – 2011 respectively. Furthermore, this study also utilized a series of interviews with fishermen focusing on: demographics, fishing information, and biological information.

## Results

### (1) Marine Fishes

Twenty nine marine fish species belonging to twenty two families (Table 1) were caught during 1990 to 2011 using gill nets, beach seines, gargoors (metal traps), trawlers and hand line. The total catch was in the region of 145570 ton.

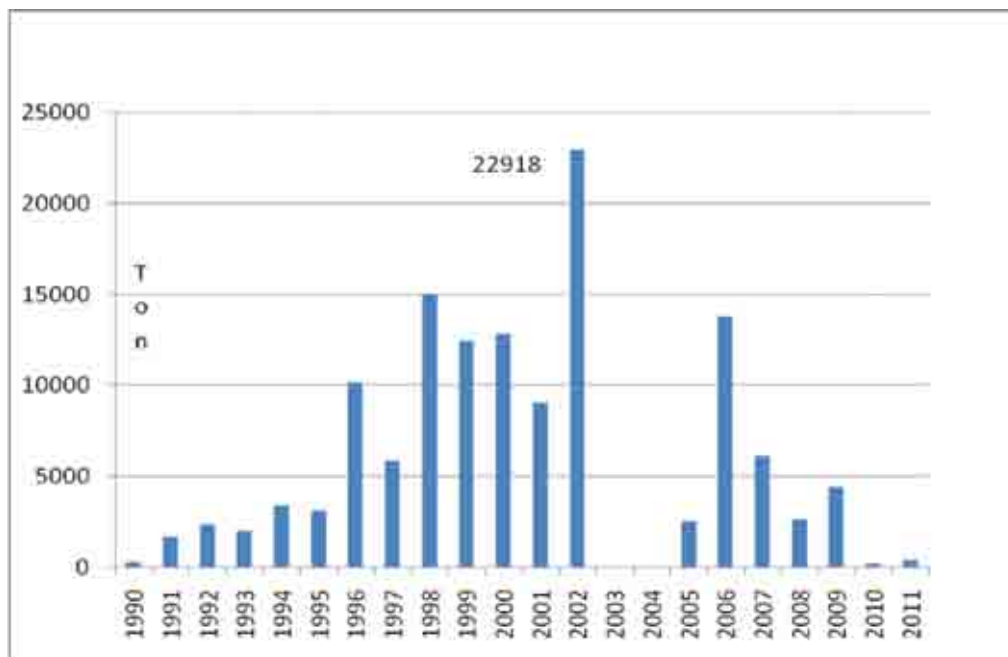
**Table 1:** Recorded List of Marine Fish Species in Basrah, Iraq, During 1990 - 2011.

<b>Fish</b>	<b>Family</b>	<b>% Total Catch</b>
<i>Tenualosa ilisha</i>	<i>Chupeidae</i>	45.00
<i>Liza subviridis</i>	<i>Mugilidae</i>	17.48
<i>Chirocentrus dorab</i>	<i>Chirocentridae</i>	3.96
<i>Johnius spp</i>	<i>Sciaenidae</i>	2.08
<i>Nematalosa nasus</i>	<i>Clupeidae</i>	2.71
<i>Johnius sina</i>	<i>ciaenidae</i>	2.70
<i>Scomberoides commersonnianus</i>	<i>Carangidae</i>	1.42
<i>Pampus argenteus</i>	<i>Stromateidae</i>	0.71
<i>Lethpinus nebulosus</i>	<i>Letherinidae</i>	0.51
<i>Acanthopagrus latus</i>	<i>Sparidae</i>	0.47
<i>Scomberomorus commerson</i>	<i>Scombridae</i>	0.39
<i>Synoptura orientalis</i>	<i>Soleidae</i>	0.38
<i>Ilisha compressa</i>	<i>Pristigasteridae</i>	0.23
<i>Epinephelus coioides</i>	<i>Serranidae</i>	0.18
<i>Johnius maculatus</i>	<i>Sciaenidae</i>	0.11
<i>Platycephalus indicus</i>	<i>Platycephalidae</i>	0.09
<i>Pomadasyd argentens</i>	<i>Haemulidae</i>	0.06
<i>Nemrpterus sp.</i>	<i>Nemipteridae</i>	0.03
<i>Saurida tumbil</i>	<i>Synodontidae</i>	*
<i>Otolithes ruber</i>	<i>Sciaenidae</i>	*
<i>Alepes djedaba</i>	<i>Carangidae</i>	*
<i>Scomberomorus argenteus</i>	<i>Scombridae</i>	*
<i>S. Gattatus</i>	<i>Scombridae</i>	*
<i>P. Stridens</i>	<i>Haemulidae</i>	*
<i>Eleutheronema tetradactylum</i>	<i>Polynemidae</i>	*
<i>Rachycenton canadum</i>	<i>Rachycentridae</i>	*
<i>Strongylura strongylurus</i>	<i>Belonidae</i>	*
<i>Tylosurus crocodiles</i>	<i>Belonidae</i>	*
<i>Trichiurus lepturus</i>	<i>Trichiuridae</i>	*

\* Un marketable size (<15 cm length)

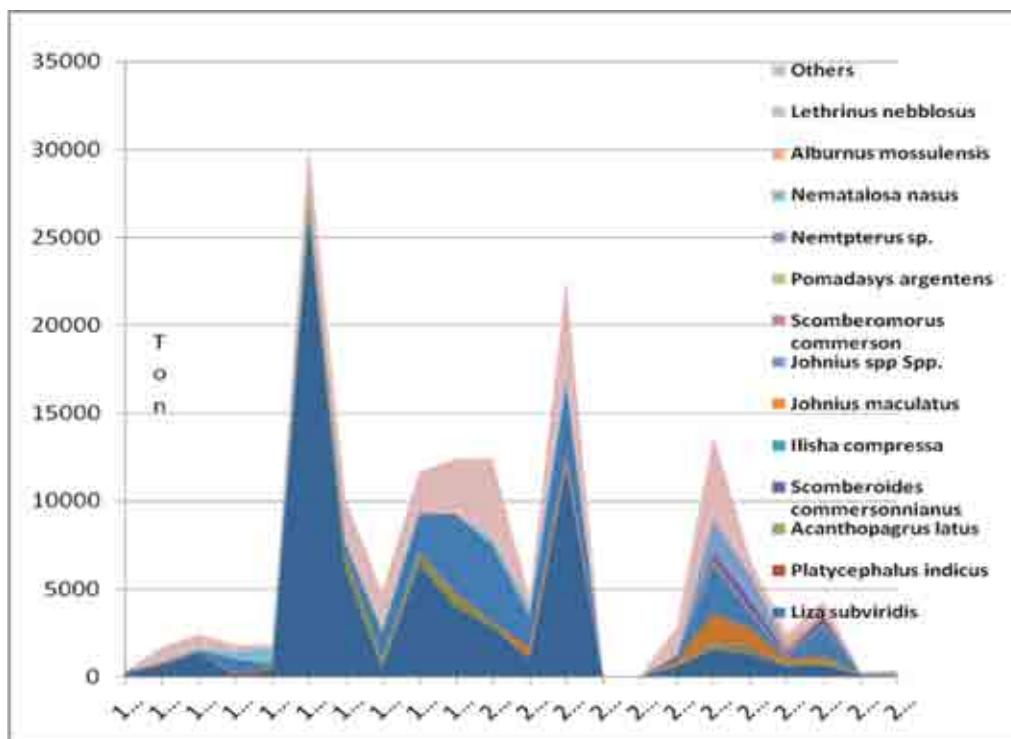
Marine fish production has ranged from around 315 to 22198 ton during 1990 and 2002 respectively (Figure 2) with the principal species being Hilsa shad (*Tenualosa illisha*) with 65963 ton (45% of total catch of the whole period) and mullet (*Liza*

*subviridis*) with 25746 ton (18% of total catch of the whole period). These two species made up to 63% of the total marine fish catch during the whole period (see, table 1).



**Figure 2:** Marine Fishes Caught /ton in Basrah, Iraq, During 2009- 2011.

The annual catches of the marine fishes were shown in Figure 3.



**Figure 3:** Marine Fish Species Caught in Basrah, Iraq, During 1990- 2011

The highest quantity of fish landed was recorded during year of 1995 (30202 ton) which was mainly composed of *T. illisha* species. There was no fishing activities at all during 2003 due to the war of 2003. Very small quantity of fish was landed during 2004 (4 ton). However, the total catch of fishes was much lower from 2003 to 2011 (30161 ton) comparing with the quantity of the fishes which landed during the period between 1994 to 2002 ( 94803 ton) (Figure 3). The quantity of other fish (<15 cm length) was 32661 ton . They made around 22% of the total catch.

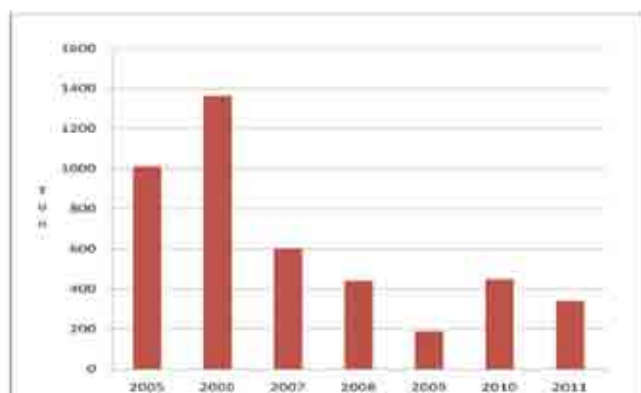
## (2) Freshwater Fishes

Thirteen fresh water fish species belonging to four families were caught using gill net and beach seines during the period between 2005 to 2011 (Table 2). The total catch was about 4132.35 ton. This Inland fisheries during this period are based mainly on *Silurus triostegus* with 1405 ton (34% of total) , *Barbus luteus* with 593 ton (14% of total) and *L. abu* with 574 ton ( 13% of total) (Table 2). These three species made up to 59% of the total freshwater caught during 2005 to 2011.

**Table 2:** Recorded List of Freshwater Fish Species in Basrah, Iraq, During 2005- 2011.

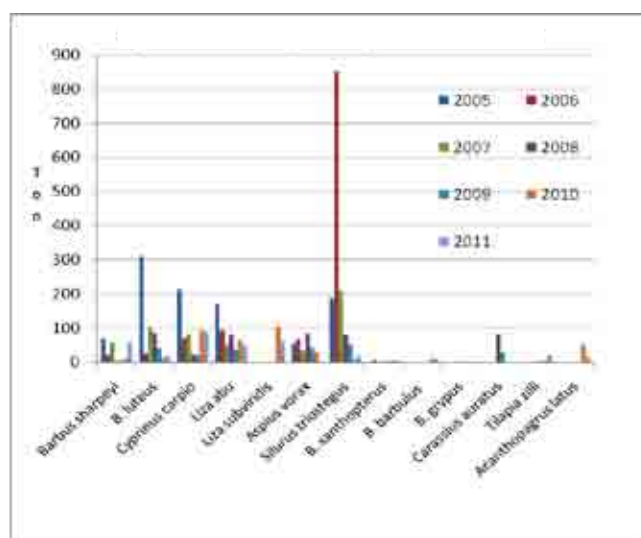
Fish Species	Family	%, Total Catch
<i>Silurus triostegus</i>	<i>Siluridae</i>	34.43
<i>Cyprinus carpio</i>	<i>Cyprinidae</i>	14.49
<i>Barbus luteus</i>	<i>Cyprinidae</i>	14.53
<i>Liza abu</i>	<i>Mugilidae</i>	13.48
<i>Aspius vorax</i>	<i>Cyprinidae</i>	7.55
<i>B. sharpeyi</i>	<i>Cyprinidae</i>	5.47
<i>Liza subviridis</i>	<i>Mugilidae</i>	4.06
<i>Carassius auratus</i>	<i>Cyprinidae</i>	2.70
<i>Alburnus mossulensis</i>	<i>Cyprinidae</i>	1.64
<i>Tilapia zilli</i>	<i>Cichlidae</i>	0.69
<i>B. xanthopterus</i>	<i>Cyprinidae</i>	0.50
<i>B. barbulus</i>	<i>Cyprinidae</i>	0.42
<i>B. grypus</i>	<i>Cyprinidae</i>	0.12

Most of these fish are of economical importance and marketable value. All production is consumed locally, mostly in a fresh state. Thus there is no significant fish processing industry. Unfortunately, there is no data hold by Department of Fisheries, Agricultural affairs Directorate for the period between 1990 to 2005. Annual catch of the freshwater fishes during the period from 2005 to 2011 are presented in Figure 4. It ranged from 189 ton (2009) to 1563 ton (2006).



**Figure 4:** Freshwater Fish Caught in Basrah, Iraq, During 2005- 2011.

As shown from Figure 5, *S. triostegus* are dominated the yearly catch. The highest quantity of this fish was recorded during 2006. Cyprinidae members dominated the freshwater fishes during 2005 but their catch quantity were reduced gradually toward the end of the 2011 (Figure 5).



**Figure 5:** Freshwater Species Caught in Basrah, Iraq, During 2005- 2011.

The fishing communities in the province are mainly composed of small-scale fishermen whose fishing activities are focused within an area of 10 -30 m from the shore. The others fishermen use larger wooden boat to fish within Iraqi marine water territories. However, the total number of fishermen registrar at fisheries Department was about 1140 during 2011.

## Discussion

Fish catching data used in this study represents declared catches only. Therefore, this paper is not an entirely accurate record of the total numbers of fish landed. Furthermore, the relationship between catch and stock size is not always straight forward, regardless of the accuracy of the catch data. Accordingly, attention must be taken in interpreting these data.

It is evident that the data collected is extremely useful in estimating the present status of the fishery in Basrah Governance. What is required is an opinion of the past condition of the stocks against which the existing status can be compared, and impacts of increased fishing over the investigating period quantified. It is only when long-termed trends are documented and analyzed that an evaluation of whether further increases in fishing effort would be productive or not is possible.

Iraq has a limited coastal area bordering the Arabian Gulf. Access to this area and particularly to the wider Gulf waters has been severely limited since the Gulf War of 1991 (Regional Commission for Fisheries RCF, 2011). There are also some environmental changes to Iraq's coastal habitat as a result of, long term trend of damming of the Tigris and Euphrates rivers, with a consequent reduction in the downstream flows, and the draining of the extensive marshes in Southern region of Iraq by diversion of main rivers around the marsh areas. These marshes, which have been reduced in extent by over 90% to an marsh area of about 1700 km<sup>2</sup>, give significant role in the fisheries caught in the past (up to 60% of catch) as well as providing a nursery area for some commercial species that are landed in the Arabian Gulf (Regional Commission for Fisheries RCF, 2011). Effect of these major changes has been investigated

and deduced significant decline in marine fish landings (probably more than 50%). Although these changes are yet to be reflected in national statistics. 2003 war has another effect on dropping of fishing operation in the Gulf region and the Shatt al-Arab waterway and pollutes the area (Regional Commission for Fisheries RCF, 2011). No doubt those circumstances caused reducing in the fish catch which increasing their prices (FAO, 1993); (Regional Commission for Fisheries RCF, 2011).

The dominant species were found during this study as Hilsa shad (*T. ilisha*) followed by mullet (*L. subviridis*) (see, figure 3 ). *T. illisha* accounted for about 45% of the total catch during 1990 to 2011. (Al-Dubakel 2011) reported that *T. illisha* accounted for 48% of the total production during 1965 to 1974 with price between 1.5 to \$2 per fish and 4- \$6 per fish (total length of 30-35 cm). (Regional Commission for Fisheries RCF, 2011) reported that annual marine fish production has declined from around 12 000 - 13 000 ton per annum in the 1980s to an estimated 5000 ton in 2002 with the principal species being shad (*Tenuolosa spp*), pomphret (*Pampus spp*) and mullet (*Liza spp*). As seen from Figure 3, the quantity of other fish (<15 cm length) was 32661 ton. (22% of total catch during 1990 to 2011). These fish do not have any economic value for human consumption therefore this type of fish has been used as protein in manufacturing the fish farming food. However, this study demanded from the authority to inform the fishermen to return such fish sizes back into water.

Marine fishing industry in Basrah is now entirely artisanal in nature and fishing techniques used by fishermen are trawl, gill, surrounding, cast, and trap nets (Regional Commission for Fisheries RCF, 2011). However, fishermen go to the deeper water around the Fao town to increase their marine fishes catches (Jawad, 2006). Indeed, this study concluded that there are no changes in fishing gears which had been used by fishermen in the past and at the present time (Al-Khayat, 1978); (Salman, 1983); (Jawad, 2006), and (Al-Dubakel, 2011).

Fish production from Inland fisheries seems to decline over the period between 2006 to 2011 (see,

figure 5). This is because of flows in the main river systems of inland freshwater which have been reduced in recent years as a result of extensive damming in their upper reaches (Regional Commission for Fisheries RCF, 2011). The present study found that the *S. triostegus*, *B. luteus*, and *L. abu* respectively, are the main fish species of the Inland catch. (Mohamed *et al.*, 2008) also reported that *S. triostegus* was the main species of the total catches. *B. sharpeyi* and *L. abu* ranked second and third respectively. However, *S. triostegus* does not have an economical importance and it uses mainly for animal food purposes. There are over 58 freshwater fish species recorded in Iraqi inland waters, about a further 53 marine species penetrating estuarine and fresh water (Coad, 1991) and 125 fish species and five species of shrimps in the Iraqi marine waters (Mohamed, *et al.*, 2001). (Mohamed *et al.*, 2009) reported that, total of 4715 fishes of 15 species were caught in Al-Hawizeh marsh during October 2005 to September 2006. The fish species divided into resident, seasonal and occasional groups. *L. abu* was the most abundant species followed by *B. luteus*, *Carassius auratus*, *Alburnus mossulensis*, and *Aspius vorax* respectively (Mohamed *et al.*, 2009). (Al-Noor *et al.*, 2009) studied the structure of the fishery of the lower Euphrates and found that shrimps and 23 fish species were occurred, of which eight marine species were recorded. Previously reported that total inland catch of fish in Iraq was 23600 ton, with over 60% of this coming from the Mesopotamian marshes (Partow 2001). As mentioned above those marshes were suffering from different problems which resulted from the wars which led to loss of their native aquatic flora and fauna.

NFSO reported on 2001 that Fish for direct human consumption in Iraq was 23028 ton (This include production as 22800 ton and imports as 228 ton). Gross value of fisheries output 2001, was estimated about \$US 11.9 million and Value of imports was \$US337000. Total catch for human consumption during 2003 (updated 26/07/2005) was about 25373 ton (production 23100 ton, 2290 ton imported and 17 ton exported). Gross value of fisheries import (2003) was estimated \$US 2660000 and export about US\$ 97 000 (Regional Commission

for Fisheries RCF, 2011).

Number of registered full time fishermen with Basrah Fisheries Department according to this study is less than the number previously reported by (Al-Dubakel, 2011) who stated that about 750 boats registered with the Fao Association and 215 boats registered with the Sindbad Association and 10-12 fishermen worked in each boat. Therefore, the total number of fishermen work within this sector ranged from 9650 to 11580. Furthermore, (Al-Dubakel, 2011) reported also, there are about additional 1200-1800 fishermen working in 600 small boats with 2-3 fishermen in Basrah. This high increasement in the number of fishermen led also to decrease their fish catches which caused the fish prices to increase. However, (Al-Dubakel, 2011) reviewed the previous publications of (Al-Khayat, 1978) and (Salman, 1983), discussed differences in the cost of the trip and the income of the fishermen at the present time and the past. The review indicated that the fishermen had tried to increase their fish activities which start to affect the fish stock (Ali *et al.*, 2001).

Infact, Fishermen licenince holders are by law required to daily reporting up complete and accurate catch return to the fisheries department. Commercial net and fixed engine licence holders must submit their returns within seven days of the end of each month during the fishing season. In order to improve reporting rates, the fisheries department should also routinely issues reminding notice to fishermen who delay to complete a return in response to the first reminder. (Jawad, 2006) mentioned that the most fishermen in both marine and freshwater sites are working without any legal regulation. (Al-Khayat, 1978) also stated that the number licences was 345 in Basrah during 1965 to 1974. (Sulman, 1983) reported that the number of fishermen reached more than 1000 person using 73 large ship and 283 using small boats in 1983. However, (Al-Dubakel, 2011) found also that Al-Fao fishing Society did not provide any services in return for the fees which paid by them to this society. Recently, NFSO confirmed that only 70% of the total of the marine fishermen in Basrah Governorate, have been registrar with marine fishing societies in Basrah (Regional Commission for Fisheries RCF, 2011).

The fisheries industry of Basrah provenance is of insignificant value to the national economy of Iraq at the current time, because of absence of export and import activities (Ali, 1998), (Mohamed, *et al.*, 2002), (Al-Dubakel, 2011). Economic sanctions (1991-2003) against Iraq stopped exports of fish and duly affected imports and investments in this sector. Lifting of these sanctions during 2003 gives future opportunities for investment in the industry. Fish and shrimp aquaculture becomes a good opportunity for investors since this sector has great importance value. Currently, the catches, fish farming and marketing of the fish industry are mostly hands of private sector of this province (Regional Commission for Fisheries RCF, 2011). However, a comprehensive rehabilitation program and development strategy for the aquaculture sector is required. With rising the demand for fishes, The fisheries sector provides investors a clear business case for consideration.

## Recommendations

- (1) Minimizing undersize mortality, possibly by requiring grading of the catch and the live undersized fishes being returned to the water.
- (2) All actions should be taken to stop overfishing. Periods of none allowable fishing which adopt by Department of Fisheries, should be kept in force.
- (3) No information is available on the recreational harvest patterns of catch and effort for this resource. Research should be directed to gaining a better perspective of quantifying this harvest is recommended to help future fishery assessments.
- (4) Commercial fishery catch per unit effort in hours fished, instead of days should be obtained, in order to maximize precision of estimates and to assess the relationship between harvest and effort.
- (5) Additional research and development effort should be considered to add value to the landed catch. Obtaining more accurate data on the location (site) of the daily fishing operation is necessary.
- (6) Consideration should be given to include an indication on the commercial catch whether

the fishes catch is for human consumption or other animal consumption.

- (7) Estimating the spatial distribution of commercial fishing should be done. Investigating the size distribution of fishes including collecting spatial information on the size/age composition of the stock should be used.
- (8) In the longer term, as our knowledge of the population dynamics of fish increases, approaches should be considered as rotation of harvesting areas and creation of spawning stock refuges.
- (9) Determining the factors that influence rerecruitment strength should be considered, quantity and quality of water flow regimes and surf diatom production should be studied.

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