Mesopo. Environ. j, Vol:3, No:4, pp(15-24), 2017
ISSN 2410-2598
Mesopotemia Environmental journal
journal homepage:www.bumej.com

Fluctuations in the freshwater fish catch of the Basrah province, Iraq during the period from 2005 to 2016

Noori A. Nasir[1] & Shaker A. Khalid[2]

[1]Department of Invertebrates, Marine Science Center, Basrah University, Iraq.

[2]Department of Fisheries, Agricultural affairs Directorate, Basrah, Iraq.

To cite this article:

Nasir A.Noori & Khalid.A. Shaker. Fluctuations in the freshwater fish catch of the Basrah province, Iraq during the period from 2005 to 2016 . *Mesop. environ. j*., 2017, Vol. 3, No.4, pp. 15-24.

Abstracts:

The current investigation is an attempt to assess the situation of the fishery resources and fisheries in the freshwater of Basrah province during the period from 2005 to 2016. The declared catches by the fishermen and fish market were used to in the present study. Surface Gill, Drift, seine and Cast net's fishing method was employed mainly for catching the fish, The total of freshwater fishes landed in the province during the above mentioned period was about 11,094.940 Tons. The total landed peaked of the fishes in 2015 at 1978.395 ton which accounted about 18% of total catch. About fourteen freshwater fish species were caught and the total landed was dominated by the less economically fishes such as *Silurus triostegus* which accounted for 20 % of the total catch. On the other hand, the highly economically fishes were landed in a less quantity during the period studied. If present trends continue, much of the unique basrah inland fish fauna will disappear and will be replaced by alien fishes, such as *Cyprinus carpio, Tilapia zillii, Carassius auratus, Hypophthalmiehthys molitrix* and *Ctenopharyngodon idella* . Overfishing, market prices, weather patterns, and environmental conditions (natural or human-made) have an important effect on fish stock. The increase in water salinity, pollution level and declining water levels has also a major impact on fish stock.Therefore, the enforcement of the new standards for the environment pollution and for the water level control in the region are essential.

Key words: Iraq, Basrah, freshwater fishes, commercial catch, alien fishes**.**

Introduction

Fishing is an important industry for Basrah's community and Basrah's freshwater fishing industry is one of the largest in the Iraq. The industry supplies employment to almost 1976 fishermen, working on 1283 vessels, most of whom are located in Shatt Al-arab and Marshes. Fishing is one of the traditional livelihoods of the people in basrah and thus it plays a considerable role for the improvement and protection of Socio-economic condition of this providence.

But due to the increase of unscientific fishing, freshwater ecosystem is hampered and numerous endangered species are invading the area. practically all commercially valuable freshwater populations are now overexploited. Overexploitation reduces species population and decreases economic return. While the majority important species are overfished, they are suddenly replaced by catches of less enviable ones. It is seen a large share of today's global catch consists of previously unused, less valuable species. This type of phenomenon has been described [1] .The fishing will affect the fish biodiversity with a alter in composition and relative abundance of collected species.

NFSO reported on 2001 that Fish for direct human consumption in Iraq was 23028 ton (This include production as 22 800 ton and imports as 228 ton). Gross Value of Fisheries Output (2001) was estimated about $US 11.9 million and Value of imports , was $US 337 000. Total catch for human consumption during 2003 **(**updated 26/07/2005) was about 25 373 ton (production 23 100 ton , 2 290 ton imported and 17 ton exported.). Gross Value of Fisheries import (2003) was estimated $US 2 660 000 and export about US$ 97 000 [2]. In the long-term, overfishing can have a serious impact on inland water communities as it undermines the food chain and demolishes the natural habitats of a lot of aquatic species.

The Mesopotamian marshes, covering area more than 15,000 square km, were described by their high productivity [3] and believed as natural refuge for many aquatic organisms and main resource of inland fisheries in Iraq [4]. 3% of the Chybaish marsh, 14.5% of the Hammar marsh and 35% of the Huwazah marsh were covered by the water during 2002 [5]. The marshlands were resorted and recovered during 2007 up to the level about 58% of their former area in 1972[6] .The purpose of this study is to provide a summary of the status of Basrah's fish and identify relevant research requirements. The major anxiety relates to the untenable levels of using fishes with such practices that lead to the weakening of fish stocks, disruption of ecological balance and decrease in diversity. Overexploitation reduces species population and decrease economic return, because the most costly species are overfished, they are rapidly re place by catches of fewer enviable ones

Data collection

Total freshwater fish catches data and species composition were collected 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 2005 to 2016 by Department of Fisheries, Agricultural affairs of Basrah Directorate. Furthermore, this study also interviewed many fishermen to obtain fishing information. Hilsa shad (*T. ilisha*) was recorded during this study but listed with marine fish and not used in this study due the their landed occurred mainly in the water around Faw place. Fish were landed using seine net (20 m long with a 2.5 cm mesh), fixed gill nets (500 to 100 m long with 25 mm to 100 mm mesh size) and electro-fishing gear were used by the fisher men.

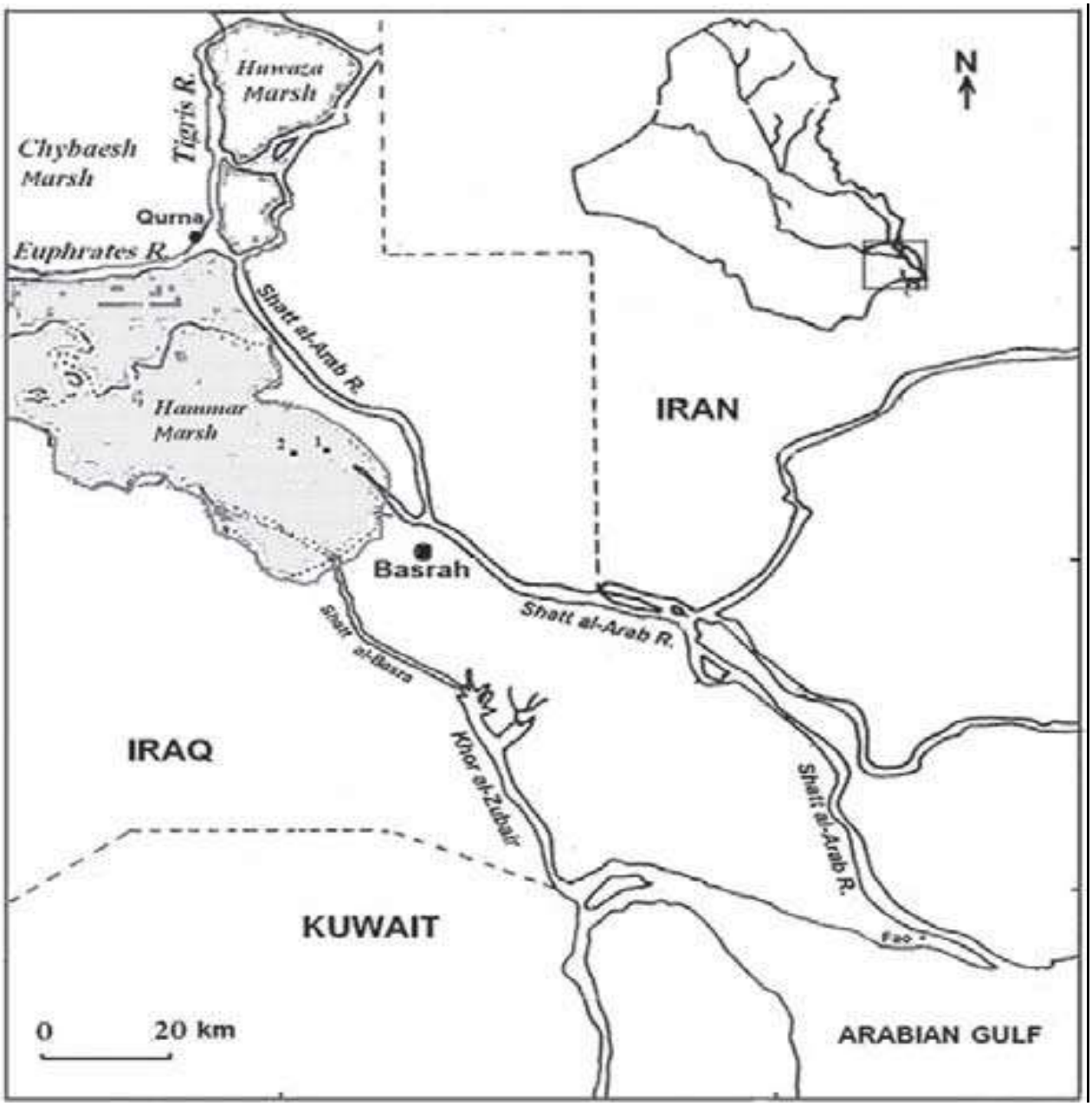


Figure 1. Map showing Basrah provenance and their internal water.

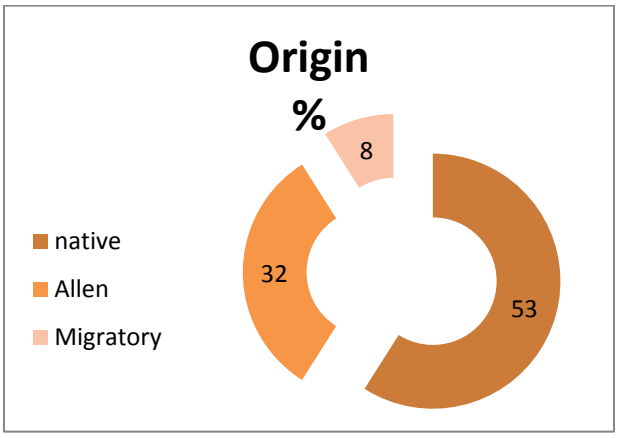
Results

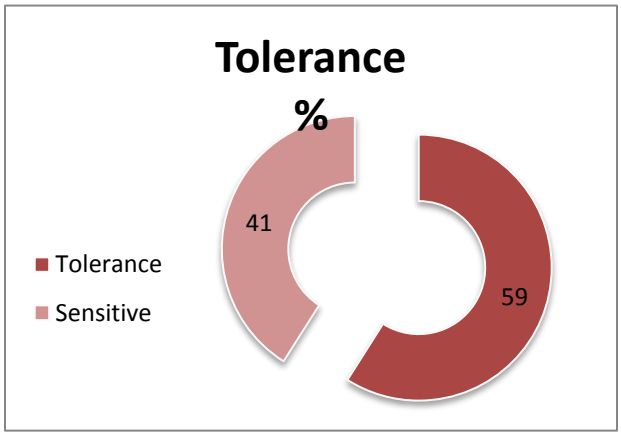
The fish species belonging to four families were caught in inland water of Basrah using fixed gill net and beach seines net and electro-fishing gear during the period between2005 to 2016 (Table 1). As a result, fourteen fish species were recorded during this study. Seven native fish species was recorded during the study , represented about 53% of the total number of species. The alien species was five, made about 32% of the total catch (Figure 2). Migratory species were occurred the lowest number and was about 8% of the total. Eight tolerant species (Palaniza abu , *Cyprinus carpio, Tilapia zillii, Liza subviridis, Carassius auratus*, *Acanthopagrus latus*, *Hypophthalmiehthys molitrix*, *Ctenopharyngodon idella*) formed 58% of the total catch (Figure 2). The percentage of sensitive species was 42% (Figure 2) which represented by *Silurus triostegus, Barbus luteus, Tilapia zillii, Aspius vorax, B. sharpeyi*, *B. xanthopterus, B. grypus* (Table 1)

Table1. Geographic origin, tolerance and trophic group of fish landed in Basrah providence during the period from 2005 to 2015.

Fish Species	Local name	Family	Origin	Salinity tolerance	Trophic Guild
Silurus triostegus (Heckel)	Jerry	Siluridae	Native	Tolerance	Piscivore
Palaniza abu (Heckel)	Khishni	Mugulidae	Native	Tolerance	Detrivore
Cyprinus carpio (Linnaeus)	Samti	Cyprinidae	Alien	Tolerance	Omnivore
Barbus luteus (Heckel)	Hemri	Cyprinidae	Native	Sensitive	Herbivore
B. sharpeyi (Gunther)	Bunni	Cyprinidae	Native	Sensitive	Herbivore
B. xanthopterus (Heckel)	Gattan	Cyprinidae	Native	Sensitive	Omnivore
B. grypus (Heckel)	shaboot	Cyprinidae	Native	Sensitive	Omniivore
Aspius vorax (Heckel)	Shalik	Cyprinidae	Native	Sensitive	Piscivore
Carassius auratus (Linnaeus)	kaezmeh	Cyprinidae	Alien	Tolerance	Herbivore
Hypophthalmiehthys molitrix (Valenciennes)	Silver carp	Cyprinidae	Alien	Tolerance	Filter feeder
Ctenopharyngodon idella (Valenciennes)	Grass carp	Cyprinidae	Alien	Tolerance	Herbivore
Acanthopagrus latus (Houttuyn)	shaneg	Sparidae	Migratory	Tolerance	Carnivore
Tilapia zillii (Gervais)	*Bultee*	Cichlidae	Alien	Tolerance	Herbivore
Liza subviridis (Valenciennes)	Biah	Mugilidae	Migratory	Tolerance	Herbivore

The trophic guilds metrics consisted almost entirely of herbivorous, piscivorous, omnivorous and detrivorous species. Their percentages were 37%, 25%, 18% and 18% respectively. carnivorous species were recorded in low level in the catch (2%). Filter feeder species were rarely occurred in the catch (< 1%) which represented only by *H. molitrix* (Table 1). Herbivorous represented mainly by Cyprinidae species. B.luteus was the main species which formed about 13% of total catch. Piscivorous were represented in the fish catch by un economically species such as *Silurus triostegus* and *Aspius vorax*. Their percentages were about 22% and 8% respectively (Table 1). Omnivorous consisted almost entirely of *Cyprinus carpio*, *B. xanthopterus* and *B. grypus*. They accounted for about 18%, 1% and < 1 respectively (Table 1). Detrivorous represented in the fish landed by Palaniza abu only Table 1). It formed about 17% of total catch (Figure2). *Acanthopagrus latu*s was only Carnivorus species occurring in the fish landed, their percentage of total catch being about 1% (Figure 2).





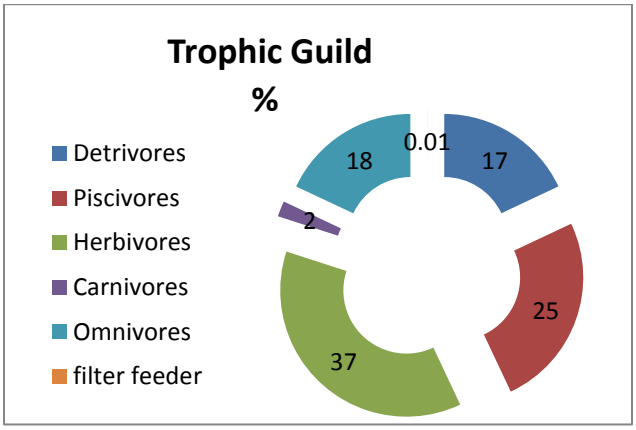


Figure 2. Perentage (%) of the Geographic origin, tolerance and trophic group of fish landed in Basrah providence during the period from 2005 to 2016.

The annual catch of *the* fishes landed in Basrah inland water for the period 2005 – 2016 shown in Figures 3 & 4 respectively. The annual catch fluctuated between 256.290 t in 2009 and 1978.395 t in 2015 which contributed about 2% and 18% to the total catches at Basrah inland waters. The effort in terms of operated fishing gear exhibited a decrease during the period between 2007 to 2012 which made about 22% of the total catch), before increasing sharply from 2013 t0 2015. The percentage contribution of each year catch to the total landed during the period of this study are shown in figure 4.

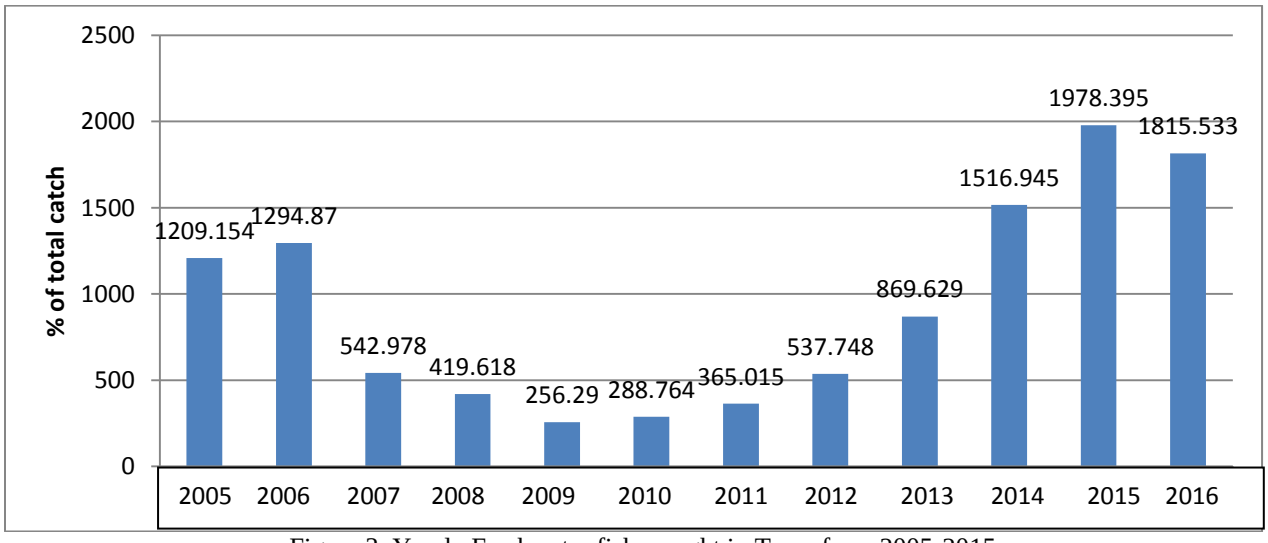


Figure 3. Yearly Freshwater fish caught in Tons from 2005-2015.

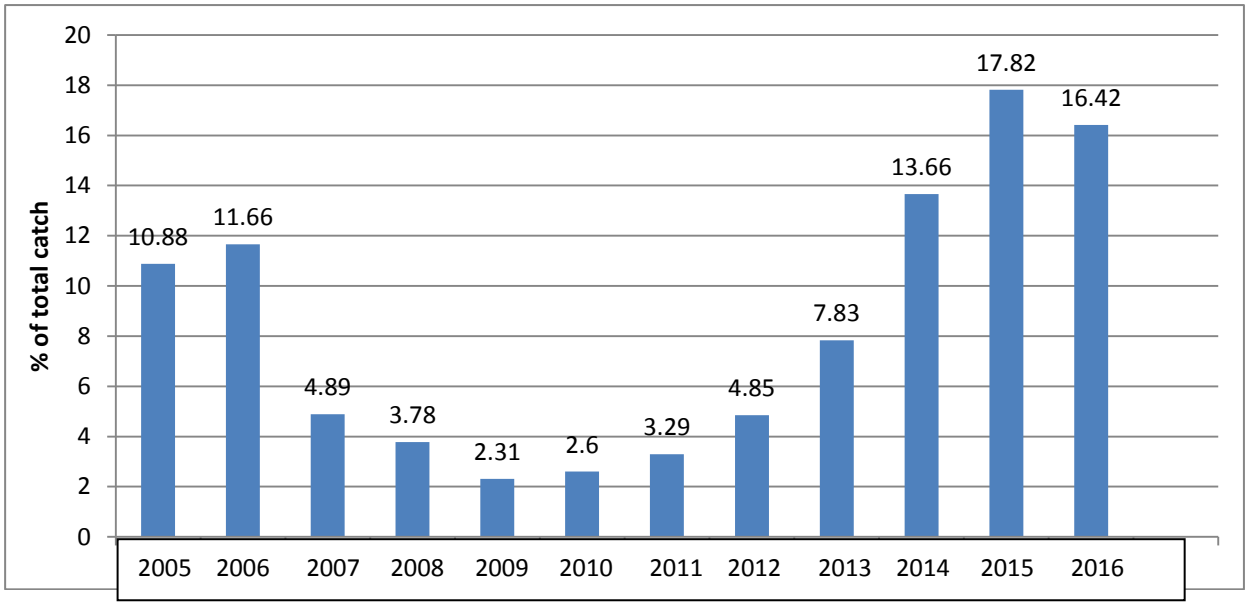


Figure 4.Percentage (%) of yearly Freshwater fish caught from 2005-2016.

Trend in fishery of total fish landed

The total catch during the period of the study was in the region of 11,094.940 ton. This Inland fisheries during the period of the study are based mainly on *Silurus triostegus* with 1740.206 ton (20% of total) , *C. carpio* with 1508.732 ton (18% of total), *Palaniza abu* (previously known *Liza abu*) with 1400.804 ton (17% of total) and *B.luteus* with 978.190 ton (12% 0f total (Figures 4&5)). It is obvious from Figure 5 that five species comprised by far the most important part of the total catch (64%) during the period from 2005 to 2016. A.vorax, T. zilli , L. subvirdis, *C. auratus* and B.sharpeyi formed about 34% of total catch. Other fish such as *B. xanthopterus, A. Latus, B. grypus, H. molitrix* and *C. idella* were only a minor impotance of the total catch (2%) (Figures 4 & 5). The analysis data of this work showed that 57% of the total fish landed (*C. carpio*, P. abu ,, *T. zillii L. subviridis, B. sharpeyi, B. xanthopterus, A. Latus and B. grypus)* was only consumed by the local people in Basrah. Some of these fish are of economical importance and marketable value. All of these fish is consumed locally, mostly in a fresh state. Thus there is no significant fish processing industry. On other hand, the remaining of the fish with low marketable value (43%) and used for manufacturing animal feed.

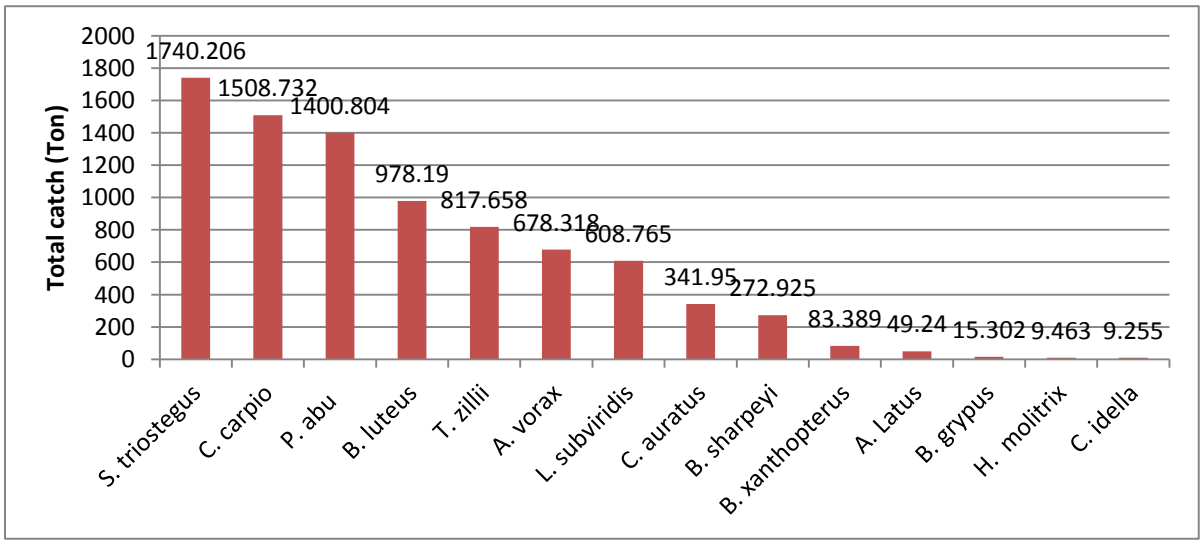


Figure 4. Freshwater species caught in Tons from 2005 to 2016

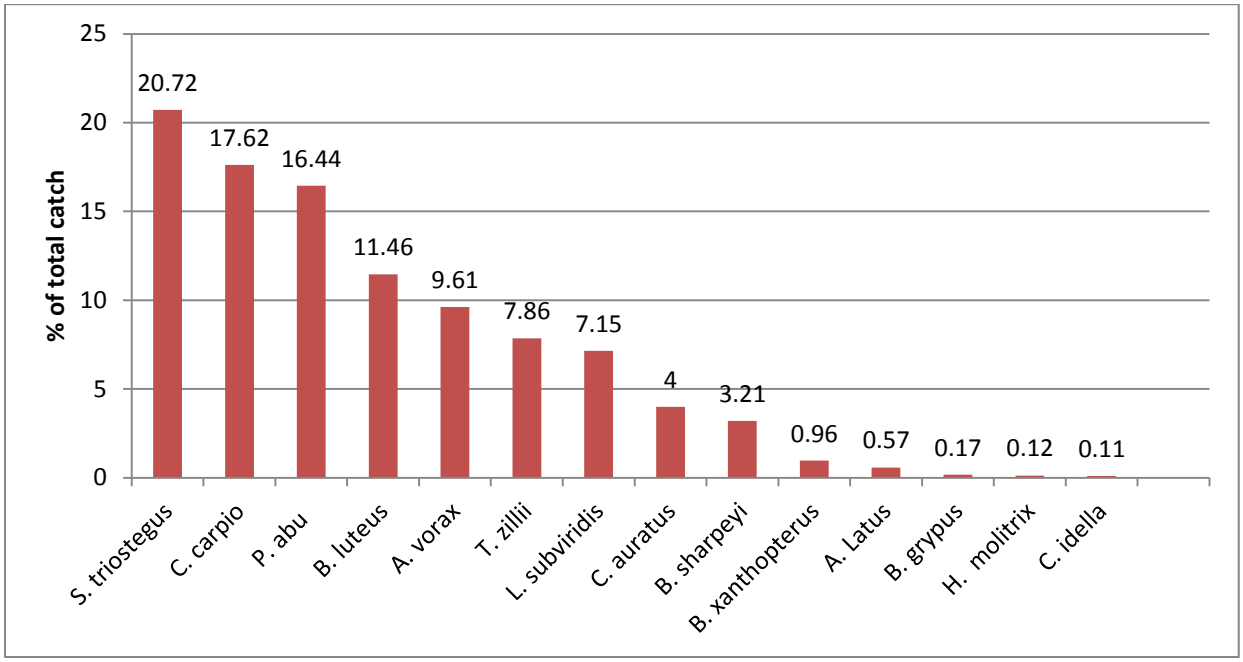


Figure 5. Percentage of the Freshwater species caught from 2005 to 2016

Discussion

One of the most significant strategy in fisheries management is to determine the influences of fishing (commercial or recreational) on populations. The fishery managers should balance conservation and sustainable exploitation. This study reported the yearly catch of the freshwater fishes during the period from 2005 to 2016 (Figures 3 & 4). These data develop information of fishery activities, show the degree of fisheries in terms of quantity, and can be used to assess the species and populations upon which fisheries depend [7]. However, the aim of the fisheries management is to regulate fishing effort, fish catches or both, depending on future calculation evaluation studies, social, economic and political situation. Therefore, necessary estimates of the status of fish stocks, and time series data on catches will determine the achievement of the management strategies used.

The fisheries industry was important in Basrah providence 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) [2]. However, some biological studies on some important freshwater fishes of Iraqi water have been done by several workers [8] ; [9] ; [10] ; [11] ; [12] . There are also several studies which dealt with the taxonomy of freshwater fishes [13]; [14] ; [15], the main sources of inland fresh water in Iraq are Tigris and Euphrates rivers with their branches, marshes and lakes (Figure 1). Regrettably, the flow of the main river systems have been affected in current years as a result of extensive damming in their upper reaches. This caused several changes in the whole investment of this sector and produces a trouble which preventing the scientists to create correct figure for this investment.

The commercial inland fishing of this study excludes recreational fishing and aquaculture activities. Inland fisheries are located on Shatt Al-Arab and Marshes. They catch fish freshwater fish species, which spend their entire life cycle in fresh water, and diadromous species, which are migratory, spending part of their life cycle in sea water and part in freshwater such as Hilas, *Liza subviridis* and *Acanthopagrus latus* . These diadromous species are among the most valuable species targeted by commercial inland fisheries. Hilsa is targeted mainly in the water arund Faw region. Information on Basrah inland fisheries is scarce, with information not routinely gathered at the standard level.
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. The current study, however, is an effort to

investigate and assess the fish catches for freshwater fishes from Basrah during the last sixteen years and to suggest recommendations for future development of the fishing in this area. This study, however, will supply to our objectives of communicating our fisheries monitoring programme.

Fish landed from Inland fisheries, in this study, appears to decline during the period from 2007 to 2013 (Figure 3). This is because of the flows in major River systems of inland freshwater which have been reduced in current years as a outcome of extensive damming in their upper reaches [2]. Marshes were suffering from different matters caused by the wars which led to loss of their native aquatic flora and fauna.

The present study found that the *S. triostegus, C. carpio, P abu* and *B. luteus* respectively, are the major fish species of the Inland water catch while Mohamed *et al*., 2008 reported that *S. triostegus* was the main species of the total catches . *B. sharpeyi* and *L. abu* ranked second and third respectively. However, [16] stated that *L. abu* was the most abundant species followed by *B. luteus*, *Carassius auratus* , *Alburnus mossulensis* and *Aspius vorax* respectively. Due to fact that *S. triostegus* does not have an economical importance and mainly use for animal food in Basrah. However, L. abu is considered as one of the important species for artisanal fisheries and is widely consumed. [17] reported that total landing of L. abu at Basrah fish markets during 1975-1977 was about 212,850 kg. [18] stated that this species formed about 6.3 and 8.1% of the whole fish landing during 2005 in the lower parts of the Tigris and Euphrates Rivers, at Quran town respectively. Fish catch changes on a yearly basis due to changing weather patterns, other natural conditions, and market demand for fish. Some popular fish species, such as *S. triostegus*, *Carassius auratus* , *Alburnus mossulensis* and *Aspius vorax* have had a steady increase in the catch over the past 10 years. However, other species, such as *B. Sharpeyi*, *B. luteus and B. xanthopterus* have seen a steady decline in catch. Water temperature regulate behavior attitude of fish migration and distribution [19]. Salinity might also affect the composition. Furthermore, the population structure, distribution and movement are influenced directly or indirectly by overlapping of living and non-living factors. This phenomenon is largely due to high pressure on fishermen to meet the increasing demand for *Barbus* species. However, due to continuous over fishing, low reproduction rates, and environmental conditions, the stock has not been able to recover fast enough to keep up with demand [20]. The authorities have prepared efforts to significantly reduce the amount to lower pressure on the natural stock, but it has not been enough to notice an increase in *Barbus* species population. Fishermen have to look for other fish species to carry on earning an income from fishing. Overfishing was alleged as a serious problem and requests to, be taken into account in considering threats to the stock of the fishes. However, overfishing is also to be considered the greatest threat to freshwater ecosystems today. The weather patterns, environmental conditions (natural or human-made) and market prices have an important effect on fish stock. Furthermore, an increase in water salinity and pollution level has also an important impact on fish stock and therefore, the enforcement of the new standards for Environment Pollution Control in the province is necessary. Inland fisheries are generally exploited using passive gear, often using traditional fishing methods that have been experienced for decades and sometimes centuries. There are about 1283 fishing boats operating in the Basrah inland waters, and an estimated 1490 fishermen. Most of these boats are less than 10 m in length with small outboard motors. It emerges that inland commercial fisheries suffer from a lack of institutional representation. lacking coordination between fishermen and the short of resources do not let fishermen to place collective integrated strategies in place, either for fisheries management or marketing. Many studies were done to assess the fish population structure in the area . [21] stated that about 58 freshwater fish species found in Iraqi inland waters and thereafter, [16] reported that the total of 4715 fishes of 15 species were recorded in Al-Hawizeh marsh from October 2005 to September 2006 and described that the fish species divided into resident, seasonal and occasional groups. [22] described that 23 fish species were recorded in the lower Euphrates, of which eight marine species were occurred. The total inland catch of fish in Iraq was 23600 ton , with more 60% of this catch noticed from the Mesopotamian marshes [23]. On the other hand, about 23 fish species were found during 2005, eight of them were marine in the artisan fisheries of the lower achieves of Euphrates and Tigris rivers, at Al-Qurna, north of Basrah [18]. Mohamed *et al.* listed 40 species, 25 of them were marine fish and 6 are alien species [24]. However, [25] reported 32 species of marine fishes and 10 of alien species were found in shatt Al- Arab River. Some fish species migrate in response to the changes in the water salinity salinity and moving up and down the estuary [26]. Fish assemblage structure and composition were distinctly varied which correspond to hydrological differences. However, fish distributions found to be closely corresponding to habitat features [27].

Recommendations

- Commercial fishermen must return back all undersized fish to waters without injury.
- Commercial fishermen, wholesale and other fish dealers, shops shall not sell, buy, deal or exchange undersized fish.
- A Commercial Fishing License is required for any one when fish are caught for purpose of sale.

- Freshwater fisheries Management, biodiversity conservation organisations, freshwater fisheries management institutions, other sectoral institutions, and business should work closely.
- Freshwater fishery is conducted in a manner that does not lead to over-fishing, development of the legislative, management, economic and educational tools should be taken to consideration.
- Irreversible risks of changes to the freshwater ecosystems should be minimized such as building of passages for migratory species at dams
- Depleted fish populations should be restored.
- Minimize the impact of freshwater fishery on the structure, function and biological productivity of the freshwater ecosystem
- Revision of the legislation on closed seasons and closed areas, quota and size of fish for catch, number and size of fishing gear is to be exercised to meet the recommendation should be ensured .

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