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EVALUATION OF FRESHWATER FISHERIES BASED ON LANDING STATISTICS, TURKEY

ABTRACT
The aim is evaluation of landing freshwater fish, economics, and some assessment on future situation. By using with fishery statistics, economic values of the captured based freshwater fishes were investigated covering period 2008-2017. 21 commercial species were indicated such as; chub (*Leuciscus cephalus*), trout (*Salmo* spp.), bream (*Abramis brama*), Beysehir bleak (*Alburnus akili*), sand smelt (*Atherina boyeri*), tarek (*Chalcalburnus tarichi*), tench (*Tinca tinca*), catfish (*Clarias gariepinus*), bighand goby (*Neogobius* spp.), mullet (*Mugil* spp.), rudd (*Scardinius erythrophthalmus*), frog (*Rana* spp.), pike perch (*Perca fluviatilis*), snail (*Helix* sp.), common carp (*Cyprinus carpio*), transcaucasian carp, wels (*Silurus glanis*), eel (*Anguilla anguilla*), pike (*Esox lucius*), crayfish (*Astacus leptodactylus*) gibel carp (*Carrasius* sp.). They are generally captured with gill nets, trammel nets, pots and cast nets. Total production amount was 31768 tonnes in 2017 and tarek was the leading species with 9830 tonnes and followed by gibel carp (7035 tonnes) and sand smelt (4892 tonnes). Total economic value of captured freshwater species was 95.2 million TL representing 4% of the Turkish fisheries economy. Results showed a gradual decline in the last decade. The decrease in the yearly catch amounts are attributable to some reasons such as pollution, hydro-electric power plant construction, mis-management of freshwaters.
Keywords: Freshwater, Capture, Landing, Economy, Fish

1. INTRODUCTION
Turkey has a rich potential in terms of inland waters. Total surface area of natural, artificial and dam lakes are reported to be 1.4 hectares [1]. And total length of rivers and streams are 300 Km [2]. The southern, western and north-western regions of Anatolia have abundant fresh water resources in the form of rivers, lakes and lagoons [2]. Majority of the fisheries production of Turkey belonged to marine capture fisheries and only a small fraction has been obtained from the inland fishery (Figure 1).
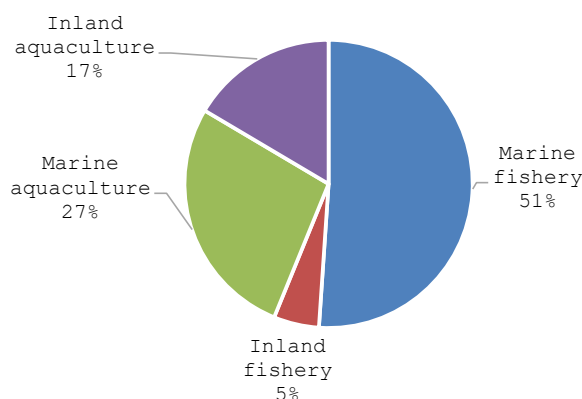
Figure 1. Distribution of Turkish fishery production in 2017
(TÜİK, 2018)

Legislative act no: 1380, public act no: 22223, 4/1 communique on commercial fishery (2016/35) (4/1 communique about regulation of commercial purposed fishery) and 4/2 communique on amateur fishery (2016/36) (4/2 communique about regulation of amateur purposed fishery) are the regulative tools of capture fisheries in Turkey including freshwater fish and fisheries. Main gears used in the freshwater capture fishery are gill nets, trammel nets, pots and cast nets and a total of 18024 fishing vessels were reported in 2017 from Turkey and 2618 of those which are smaller than 20 m in length have been operating on inland waters [1, 2 and 3]. While there are a lot of studies focusing on the biology of freshwater fish in Turkey, fishery and catch statistics on freshwater species are not well documented.

2. RESEARCH SIGNIFICANCE
Goal of the present study is to evaluate the landings of freshwater fishes and economic conditions in Turkey from past to present. It is also aimed to give some suggestions on the sustainability of commercial freshwater fishes in Turkey.

3. EXPERIMENTAL METHOD-PROCESS
Study was based on the fishery statistics of the Turkish Statistical Institute. Data on landings, import-export situations and economic values of the captured based freshwater fishes were investigated covering the period from 2008 to 2017. Trend analysis was applied on the ten years data by using least squares method in order to estimate the further situation of landing amounts and economic aspects. Data were analyzed by MS Excel software.

4. RESULTS AND DISCUSSION
A total of 21 freshwater species are of commercial importance in the capture fisheries of Turkey. Eighteen of those belonged to fish, 1 amphibian, 1 crustacean and 1 mollusc. Yearly production amounts of each species were given in Table 1. Gradual decrease was found in yearly capture based production amounts (R^2=0.85) (Figure 2). Total production amount was 31768 tonnes in 2017 and tarek was the leading species with 9830 tonnes and followed by gibel carp (7035 tonnes) and sand smelt (4892 tonnes). Total economic value of captured freshwater species was 95.2 million TL representing 4% of the Turkish fisheries economy [3, 4, 5, and 6].

Table 1. Yearly landing statistics of captured fresh-water species from 2008 to 2017 (TÜİK, 2018)

Common Name	Scientific name	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Chub	*Leuciscus cephalus*	71	63	92	131	91	54	59	48	40	38	686
Trout	*Salmo* spp.	630	557	738	519	444	438	431	371	374	309	4810
Bream	*Abramis brama*	170	148	151	180	142	106	91	73	74	64	1199
Beysehir bleak	*Alburnus akili*	47	42	37	113	85	75	60	50	27	38	574
Sand smelt	*Atherina boyeri*	6630	6184	4438	6705	3609	5012	6471	4930	4640	4892	53511
Tarek	*Chalcalburnus tarichi*	11758	10685	11382	9168	9621	8600	8310	8850	9950	9830	98154
Tench	*Tinca tinca*	1632	1482	1162	624	63	65	68	61	50	38	5245
Catfish	*Clarias gariepinus*	339	310	341	362	299	345	351	303	262	216	3128
Bighand goby	*Neogobius* spp.	57	51	47	70	61	37	35	36	37	38	469
Mullet	*Mugil* spp.	1023	970	1512	1325	1138	1094	1192	1161	1136	1424	11976
Rudd	*Scardinius erythrophthalmus*	261	239	251	270	242	161	170	141	137	106	1978
Frog	*Rana esculanta*	668	622	780	750	648	831	742	535	486	547	6608
Pike perch	*Perca fluviatilis*	1346	1234	1476	737	593	491	521	465	461	405	7729
Snail	*Helix lucorum*	1007	2227	1991	1410	1193	1431	1547	733	1317	1156	14012
Common carp	*Cyprinus carpio*	11625	10964	12058	9998	9973	8277	8036	7223	4736	3543	86433
Transcaucasian carp	*Cyprinus carpio carpio*	993	891	962	924	813	736	706	695	708	757	8184
Wels	*Silurus glanis*	1275	1193	1178	946	816	618	629	549	512	387	8103
Eel	*Anguilla anguilla*	171	158	182	28	38	48	56	71	75	81	909
Pike	*Esox lucius*	213	197	228	238	215	213	240	203	226	195	2168
Cray fish	*Astacus leptodactylus*	783	734	1030	610	492	532	582	532	544	669	6508
Gibel carp	*Carrasius* sp.	0	0	0	0	5090	5495	5408	6745	7652	7035	37425
Total		**40699**	**38951**	**40036**	**35108**	**35663**	**34658**	**35705**	**33775**	**33444**	**31768**	

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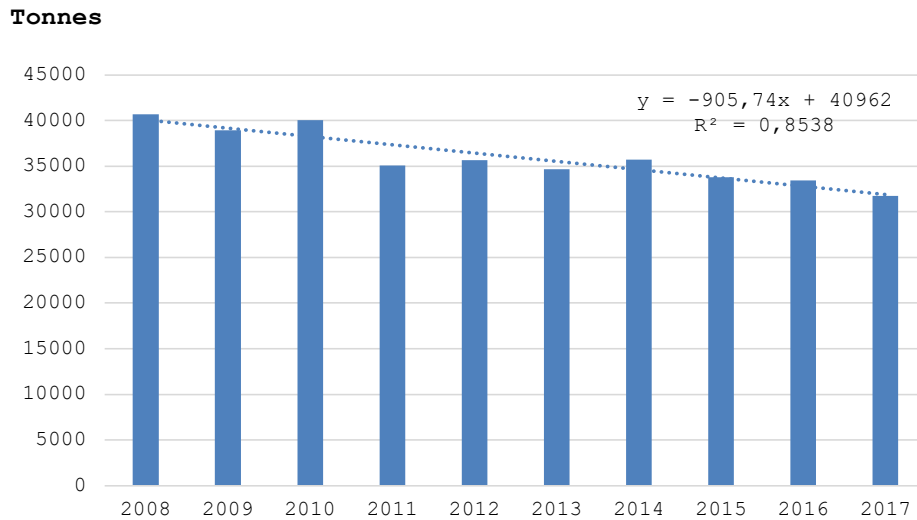$y = -905{,}74x + 40962$
$R^2 = 0{,}8538$

Figure 2. Annual capture based production amounts of freshwater species in Turkey from 2008 to 2017

5. CONCLUSION AND RECOMMENDATIONS

As a result of the large numbers of major towns and various types of factories, some species have been particularly affected by industrial pollution and generally the fish populations living in these habitats have greatly diminished in recent years [6 and 7]. The decrease in the yearly catch amounts are attributable to some reasons such as pollution, hydro-electric power plant construction on rivers and streams and mis-management of freshwaters in general. On the other hand traditional feeding habbits of inland Turkish population limits the consumer demand on fish. Stock assessment and monitoring studies must be carried out at least in big reservoirs in order to provide the

sustainability of freshwater species [7 and 8]. Furthermore, it is important to create awareness on the beneficial sides of freshwater fish and promote freshwater fish consumption. Alternative use of freshwater species can also be considered as a tool in order to attract attention to freshwater species. More scientific interest is needed by fishery biologists.

NOTICE

This work is organized 05-08 September 2018 Pristina-Kosovo Third International Science Symposium (ISS2018-NWSA) ISS New Horizons in Science-was presented as an oral presentation at the conference. The NWSA publication and writing basics has been rearranged according to the rules of writing.

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