Scientific Papers. Series D. Animal Science. Vol. LXIII, No. 2, 2020
ISSN 2285-5750; ISSN CD-ROM 2285-5769; ISSN Online 2393-2260; ISSN-L 2285-5750

AN ANALYSIS OF THE DYNAMICS OF FISHING CATCHES IN THE ROMANIAN DANUBE SECTOR

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Abstract

In this paper it analyzed the dynamics of fishing catches in the waters of Romania where commercial fishing is allowed and regulated, in the period 2008 - 2018. Data on fishing catches are taken from the official website of the National Agency of Fisheries and Aquaculture and processed. These data come from the commercial fishing reports, drawn up annually. From a quantitative point of view, in the period 2008 - 2018 the situation of recorded catches varied between a minimum of 2457 tons recorded in 2010 and a maximum of 3868.51 tons recorded in 2016. The main species caught in the inland waters of Romania in 2008 - 2018 were the following: Prussian carp (41.74%), Freshwater bream (11.66%), Pontic shad (10.53%), Roach (6.77%), Carp (5.46%), Wels catfish (5.01%), Pikeperch (4.29%), Northern pike (3.89%). The results of the paper are intended to be an overview of the dynamics of freshwater fisheries in Romania in the period 2008 – 2018.

Key words*: catch, Danube, fish.*

INTRODUCTION

Fisheries are an integral part of most societies and make a significant contribution to economic and social health and economic development in many countries and areas.

Despite this importance and the enormous value, or more correctly, due to this aspect, the world's fish resources are affected by the combined consequences of overexploitation and, in most cases, environmental degradation.

Freshwater fisheries supply only about one-fifth of the world's total fish catches. The global economic importance of freshwater fisheries is decreasing.

Fishery has a long tradition in Romania and is an important activity especially for riparian populations. The freshwater commercial fishery is allowed on the Danube River but also rivers such as: Prut River, accumulation lakes on the Siret River and Olt River. In Romania, commercial fishing is regulated and the right to fish resources is directly attributed to professional fishermen organized in professional associations based on commercial fishing permits, licenses and authorizations.

The Danube is, undoubtedly, the most important running water on the territory of our country not only from an economic point of view but also from a faunal point of view (Bacalbașa, 2002).

The Danube river basin included the richest ichthyofauna of all European rivers.

Antipa (1909) scientist rightly said, that the key ichthyological the whole of Europe is the Danube River and the Danube Delta. Due to the richness of fish species with economic value, the Danube fishery has always been varied and rich.

The ichthyofauna of the Danube is very diverse, containing over 100 species of fish, which represents about 20% of the freshwater ichthyofauna of Europe (Bănăduc et al., 2016 from Bănărescu, 1964; Balon, 1964; Kottelat and Freyhof, 2007; Freyhof and Brooks, 2011).

This diversity of fisheries resources is increasingly threatened in recent decades.

Pollution, increased commercial transport on the river, alien species introduced into the basin, illegal fishing and overfishing are some of the threats not only to ecosystems but also to the well-being of fishing communities.

Maintaining the diversity of the Danube fishery resource, through efficient fisheries management, is necessary to ensure living aquatic resources for both current and future generations.

MATERIALS AND METHODS

The analysis of the fish catches' dynamics in 2008 - 2018 was made using the official records of the National Agency for Fisheries and Aquaculture from Romania. These data come from the reports of economic operators authorized to engage in commercial fishing.
The tools and methods used to legally catch fish species depend on several factors, such as:
• extremely diverse type of ecosystems (running water and stagnant water ecosystem);
• varied size of fish species;
• the degree of their mobility;
• the water horizon in which the species carries out its main stages of life and therefore from where it can be captured.

RESULTS AND DISCUSSIONS

Between 2008 and 2018, a number of 21 species appear in the reported commercial catches (Table 1).
It should also be noted that in these official statistics there are two categories of catches "other species" and "other cyprinids" where have been registered the species caught accidentally, species with low economic value were recorded, whose percentage in multiannual catches varied between 0.29% and 0.52%.
In the period 2008 - 2018 the recorded commercial catches varied between a minimum of 2457 t (2010) and a maximum of 3868.51 t (2016) (Figure 1).

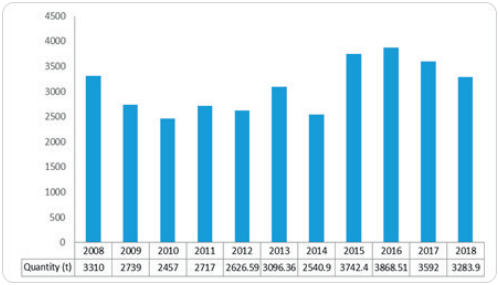

Figure 1. Fisheries catch dynamics (2008 – 2018)

Among freshwater species, the Prusian carp was the most abundant species in catches holding 41.74% of the total amount, followed by freshwater bream (11.66%), and among migratory species the Pontic shad held a percentage of 10.53% in catches multiannual (Figure 2).

Table 1. The commercial catch structure in Romania (2008 – 2018)

No.crt.	*Systematic group/species*	*English name*	*Commerial capture reported (t) (2008 – 2018)*	*Percentage of multiannual catches (%)*
	Clupeidae family			
1	*Alosa immaculata* (Bennett, 1835)	Pontic shad	3580	10.54
	Cyprinidae family			
2	*Cyprinus carpio* (Linnaeus, 1758)	Common carp	1857.14	5.466
3	*Carassius gibelio* (Bloch, 1782)	Prussian carp	14181.05	41.74
4	*Rutilus rutilus* (Linnaeus, 1758)	Roach	2298.79	6.767
5	*Tinca tinca* (Linnaeus, 1758)	Tench	216.92	0.638
6	*Scardinius erythrophthalmus* (Linnaeus, 1758)	Rudd	222.15	0.654
7	*Aspius aspius* (Linnaeus, 1758)	Asp	265.57	0.782
8	*Alburnus alburnus* (Linnaeus, 1758)	Bleak	131.23	0.386
9	*Blicca björkna* (Linnaeus, 1758)	White bream	352.23	1.036
10	*Abramis brama* (Linnaeus, 1758)	Freshwater bream	3962.58	11.66
11	*Vimba vimba (Linnaeus, 1758)*	Vimba bream	206.39	0.607
12	*Carassius carassius* (Linnaeus, 1758)	Crucian carp	49	0.144
13	*Barbus barbus* (Linnaeus, 1758)	Barbel	289.21	0.85
14	*Ctenopharyngodon idella* (Valenciennes, 1844)	Grass carp	53.2	0.15
15	*Hypophthalmichthys molitrix* (Valenciennes, 1844)	Silver carp	709.53	2.08
16	*Chondrostoma nasus* (Linnaeus, 1758)	Common nase	45.43	0.134
17	*Aristichthys nobilis* (Richardson, 1845)	Bighead carp	332.12	0.98
	Siluridae family			
18	*Silurus glanis (Linnaeus,1758)*	Wels catfish	1702.32	5.01
	Percidae family			
19	*Sander lucioperca (Linnaeus,1758)*	Pike perch	1456.38	4.29
20	*Perca fluviatilis (Linnaeus,1758)*	European perch	467.36	1.38
	Esocidae family			
21	*Esox lucius* (Linnaeus,1758)	Northern pike	1319.96	3.89

To make a more detailed analysis of industrial catches we will divide the ichthyofauna of economic importance into 5 groups as follows:

- Native cyprinids: Common carp, Prussian carp, Freshwater bream, Vimba bream, Barbel, Roach, Rudd, White bream, Tench, Bleak;
- Asian cyprinids: Grass carp, Silver carp, Bighead carp;
- Predatory species: Wels catfish, Pikeperch, Northern pike, European perch, Asp.
- Other species: Common nase;
- The Pontic shad.

The structure of multi-annual catches is dominated by native cyprinids 70.61% followed by predatory species 15.34% and the Pontic shad 10.54%.

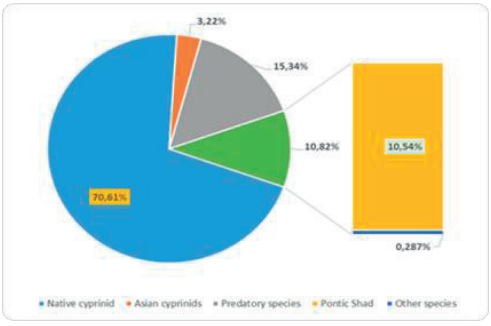

Figure 2. The structure of multiannual catches (2008 - 2018) by economic groups

Among the native cyprinids, the Prussian carp is the dominant species holding 59.11% of catches followed by Freshwater bream 16.52%, Roach 9.58% and Common carp 7.74%. The least abundant species are represented by Crucian carp 0.204%, Vimba bream 0.86%, Tench 0.904% and Rudd 0.92% (Figure 3).

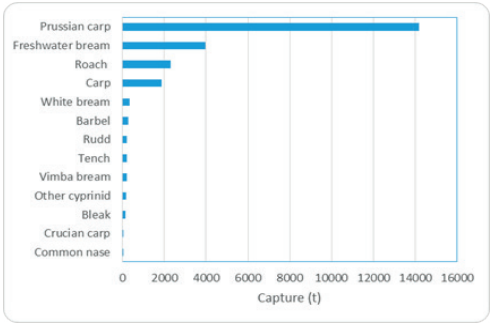

Figure 3. Evolution of native cyprinids

Multiannual commercial catches of Asian cyprinids are dominated by silver carp 64.8%, bighead carp 30.33% and the grass carp has the lowest percentages, only 4.86% (Figure 4).

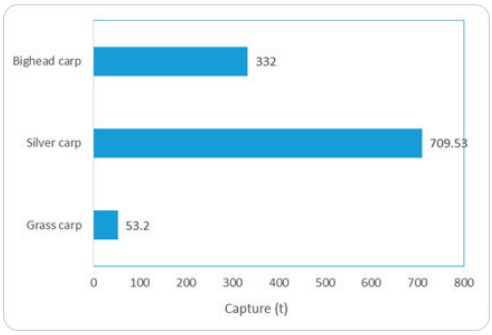

Figure 4. Dynamics of Asian cyprinids in multiannual catches

In the multi-annual commercial catches of predator species, the Wels catfish holds the highest percentages (32.66%) followed by the Pikeperch (27.95%) and on the third place is the Northern pike with 25.32% of the catches (Figure 5).

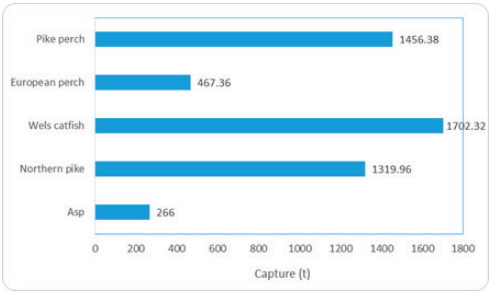

Figure 5. Evolution of multiannual catches of predator species

Due to its nutritional value, its gustatory qualities, the Pontic shad is a species highly appreciated by the population of the lower Danube area, which greatly increases its economic value. This can also be seen from the value it holds in multi-annual commercial catches of 10.54%.

The analysis between the annual data of the reported catches and those established by annual orders shows that there are significant differences between the reported and established data (Table 2).

Table 2. Situation of catches (reported and established) and fishing effort in 2008-2018

Year	The reported catch (t)	The catches established by TACs	Fishing effort (number of boats)	Reported percentage (%)
2008	3310	5523.632	1470	69.43
2009	2739	-		
2010	2457	4452.042	1497	55.2
2011	2717	3646.9	1647	74.5
2012	2626.59	3260.902	1589	80.54
2013	3096.36	6982.529	1714	44.34
2014	2540.9	5767.623	1602	44.05
2015	3742.4	5266.979	1560	71.05
2016	3868.51	5671.038	1602	68.21
2017	3592	5286.807	1549	67.94
2018	3283.9	5978.72	1854	54.92

It is noted that sometimes less than 50% of the quantity regulated by TAC (2013, 2014) was reported, which makes us believe that this is underreporting.

Regarding the regulated fishing effort, quantified only by the number of boats (according to the annual regulatory orders) it is observed that the differences are not significant in the analyzed period (Figure 6).

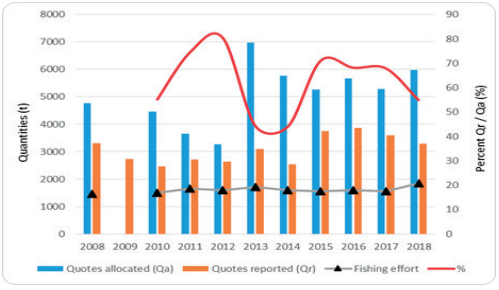

Figure 6. Evolution of TACs, reported catches and fishing effort (2008 - 2018)

CONCLUSIONS

This paper presents an analysis of commercial catches made between 2008 and 2018.

The processed data are statistical reports on the total catches of commercial fishing realized by economic agents authorized to practice commercial fishing in the waters under the jurisdiction of Romania, in the period 2008 - 2018, published on the official website of National Agency for Fisheries and Aquaculture from Romania.

The analysis of the dynamics of these catches in terms of qualitative and quantitative structure allows us to conclude:

The species structure of the catches only partially reflects the composition of the river's ichthyofauna because the type of gear conditions the report between the different species of fish caught. Thus, the number of species present in commercial catches is 21 species. These are the main species of great economic importance, because in these reports there are also 2 groups called “other cyprinids” and “other species”, which include non-important species that have accidentally appeared in catches.

Among the cyprinids (including the Asian ones), the best represented were: Prussian carp 41.74% and Freshwater bream (11.66%), and among the migratory species, the Pontic shad held a percentage of 10.54%.

The lowest percentages in the multiannual catches were held by: Crucian carp 0.144%, Vimba bream 0.607%, Tench 0.638% and Rudd 0.654%.

Among the dominant predatory species is the Wels catfish with 5.01% in the multi-annual catches, followed by the Pikeperch (4.29%) and in third place is the Northern pike with 3.89% of the catches.

In the period 2008 - 2018 the reported commercial catches varied between a minimum of 2457 t (2010) and a maximum of 3868.51 t (2016).

Also, according to the annual regulatory orders, the total quantity of fish allocated through TACs varied between a minimum of 3260.9 t in 2012 and 6982,529 t in 2013.

We consider that there are significant differences between the allocated and reported quotas, which indicate that there are under-reports.

The fishing effort quantified by the number of boats (allocated by annual orders) does not differ significantly between 2008 and 2018. We do not have data about the real fishing effort.

ACKNOWLEDGEMENTS

This work was supported by Center for Scientific Research “Romania Center for Modeling of Recirculating Aquaculture Systems” (MoRAS), from “Dunărea de Jos” University of Galați which was established as a result of the implementation of the POSCCE project 622/11.03.2014.

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