

STATUS OF PEACEFUL AND PREDATORY FRESHWATER FISH STOCKS IN THE DANUBE SECTOR KM 1020 - KM 1071 IN CORRELATION WITH THE VARIATION OF RIVER LEVELS AND TEMPERATURES IN AUGUST-NOVEMBER 2019

Maria-Cristina Chioveanu^{1*}, Maria-Desimira Stroe¹, Magdalena Tenciu¹,
Liliana Athanasopoulos¹, N. Patriche¹

¹*Institute of Research and Development for Aquatic Ecology, Fishing and Aquaculture, Galati, Romania*

Abstract

*This present paper has the purpose to analyze the influence of environmental factors on catches and family structures of fish in the Danube River, sector km 1020 - km 1071. The biological material was collected from the autumn fishing between August and November 2019. During the four months, following the scientific fishing, 1.250 fish specimens belonging to 7 species were collected. The dominant family, Cyprinidae with a percentage of 74%, is represented by four species, namely *Cyprinus caprio* (carp), *Carassius gibelio* (crucian), *Abramis brama* (bream), *Ctenopharyngodon idella* (grass carp), followed by the family Percidae with a percentage of 23% represented by two species *Sander lucioperca* (pikeperch) and *Exos lucius* (pike), and the family Siluridae with a percentage of 3% represented by *Silurus glanis* (catfish). Both temperature and water levels were raised in correlation with total catches.*

Key words: danube, captures, stocks, levels, temperatures

INTRODUCTION

The Danube River, with its length of 2860 km is the second largest in Europe after the Volga and is a true aquatic ecosystem that hosts a number of 37 species of fish, which are currently subject to fishing and are systematically included in 7 families. and 29 genres. Due to the geographical location within the continent of the Danube river basin, at the contact between the temperate-oceanic climate in the west, temperate-continental in the east and the Baltic influences in the north, the hydrological regime of the Danube is characterized by significant variations in level and flow. during the year and over time. The temperature of the Danube waters is under the direct influence of air temperature and to a lesser extent under that of local factors. Water heating begins in March and lasts until

August, followed by the cooling process. The present study aims to evaluate the state of fresh, peaceful and predatory fish stocks, on the Danube sector km 1020 – km 1071, in correlation with the variation of river temperatures and levels.

MATERIAL AND METHODS

The monitoring took place between August-November 2019 on the Danube sector km 1020 -km 1071, where the water levels and temperatures were monitored in two stations as follows: S1 Baziaş (GPS coordinates 44.822760,21.387634) and S2 Orşova (GPS coordinates 44.723320, 22.398376). The water temperature was measured using the Hach lange HQ40D portable two-channel digital multipara meter while the water levels were measured according to the reference level for stations S1 and S2. The biological material analyzed was scientifically fished on the Danube sector km 1020 - km 1071 from August to November 2019 inclusive.

*Corresponding author:
chioveanumariacristina@yahoo.com
The manuscript was received: 21.07.2020
Accepted for publication: 18.08.2020

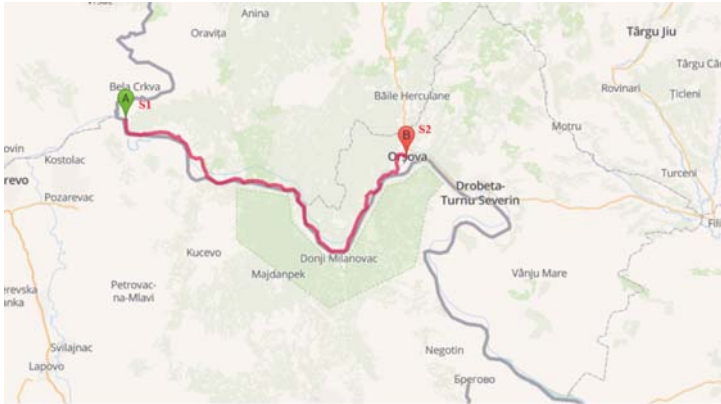


Fig. 1 Study area and sampling sites (maps.google.com)

The scientific fishing was performed with fishing gear appropriate to the studied area. The species of fish caught were taxonomically identified as follows: *Cyprinus caprio* (Linnaeus, 1758), *Carassius gibelio* (Linnaeus, 1758), *Abramis brama* (Linnaeus, 1758), *Ctenopharyngodon idella* (Valenciennes, 1844), *Sander lucioperca* (Linnaeus, 1758), *Exos lucius* (Linnaeus, 1758), *Silurus glanis* (Linnaeus, 1758). Following the ithylological analysis, the fish specimens were separated into two categories depending on the feeding regime as follows: : peaceful species - *Cyprinus caprio* (carp), *Carassius gibelio* (crucian), *Abramis brama* (bream), *Ctenopharyngodon idella* (grass carp) and predatory species - *Sander lucioperca* (pikeperch), *Exos lucius* (pike) and *Silurus glanis* (catfish). The obtained data were processed by the researchers of ¹Intitute

of Research and Development for Aquatic Ecology, Fishing and Aquaculture in Galați.

RESULTS AND DISCUSSIONS

From numerous historical studies the fauna of the Danube river is very well known (Marsilius 1726; Heckel and Kner 1858). The total number of fish species along the whole Danube river course is in the order of 100 species. The generally high diversity is due to the zoogeographical significance of the Danube as a major migration route for a diverse Central Asian and Ponto-Caspian fauna (Balon, Crawford and Lelek 1986). The quantitative and qualitative structure of the fish populations is closely related to the dynamics of the river, so the levels and the temperatures of the Danube river water influences the abundance of fish species.

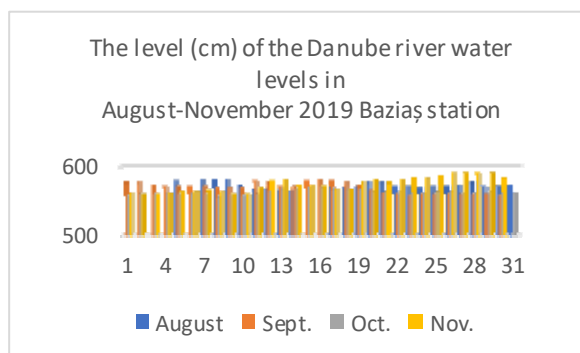


Fig. 2 Graphic of water levels (cm) dynamics in August-November 2019 in Baziaș station

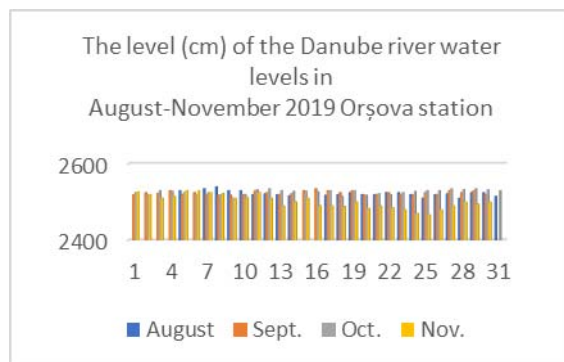


Fig. 3 Graphic of water levels (cm) dynamics in August-November 2019 in Baziaș station

From the figures above we can see that in graph number 1, in Baziaș station in November was an increase in water levels instead of in figure number 2 in Orșova station where it was notice a constancy of them.

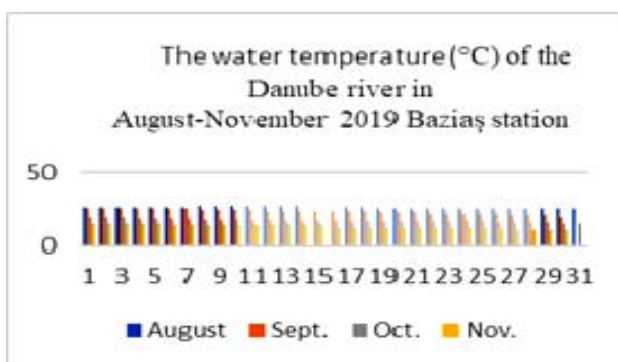


Fig. 4 Graphic of water temperature (°C) dynamics in August-November 2019 in Baziaș station

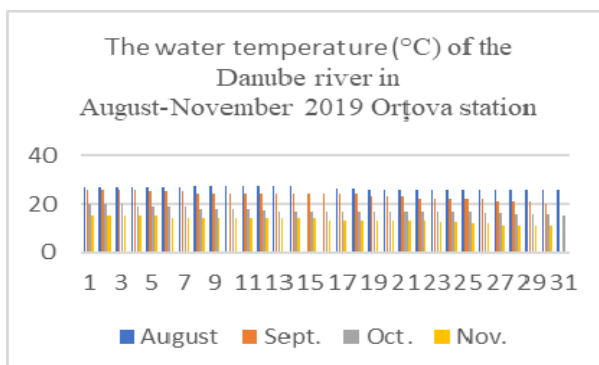


Fig. 5 Graphic of water temperature (°C) dynamics in August-November 2019 in Orșova station

Analyzing figures no. 4 and 5 we can see from the graphs that the average temperature in August-November 2019 was relatively constant in both stations where the samples were taken.

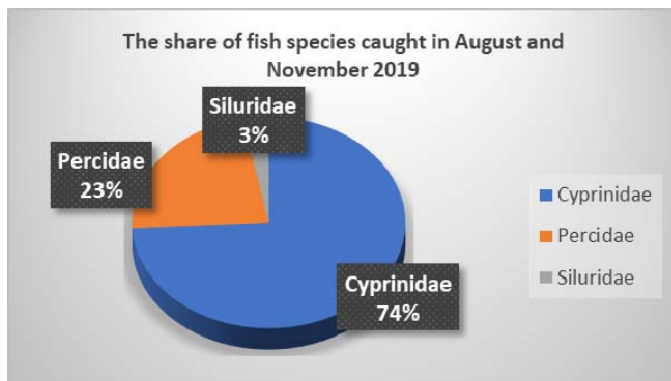


Fig. 6 Breakdown by species of catches on scientific fishing on Danube section km 1020 - km 1071 during August-November 2019

Analyzing figure no. 6 we note that in the period August-November 2019 when fishing was performed for scientific purposes between km 1020 - km 1071 the predominant species were Cyprinidae with a value of 73%

of the total, followed by Percidae with a percentage of 23% and Siluridae with a percentage of 3 %, which results in a good distribution of species.

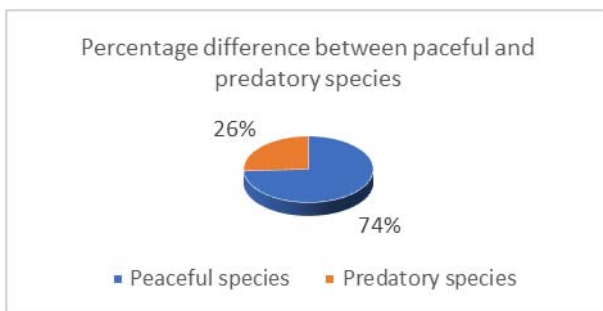


Fig. 7 The difference between peaceful and predatory species in percentage

Analyzing the figure above we can see that the difference in percentages between peaceful species (74%) and raptors (26%) we can see that there is a balance between these two which leads to the fact that the aquatic ecosystem is balanced.

As a general conclusion, analyzing the graphs of temperatures and water levels of the Danube we can say that between August and November 2019 their limits were in a normal range, without major variations and fluctuations and the distribution of fish species caught for scientific fishing it was appropriate between peaceful and predatory species, which indicates that the aquatic ecosystem is a balanced one.

REFERENCES

- [1] Bandini F., Jakobsen J., Olesen D., Reyna-Gutierrez J.S., Bauer-Gottwein P., Measuring water level in rivers and lakes from lightweight Unmanned Aerial Vehicles, *Journal of Hydrology*, 548, 237-250, 2017.
- [2] Bisselink B., Bernhard J., Gelati E., Jacobs C., Adamovic M., Mentaschi L., Lavallo C., JRC Technical Reports, Impact of a changing climate, land use, and water usage on water resources in the Danube river basin, 2018.
- [3] Petronela Georgiana (Călin) Sandu*, Lucian Oprea The Influence of Environmental Abiotic Factors on the Qualitative and Quantitative Structure of Ichthyofauna from Predeltaic Danube area.
- [4] Limnology of the Romanian Danube sector monographic study, 1967.

- [5] Vasile Oțel, Atlas of fish from the Danube Delta Biosphere Reserve, Tulcea 2007.
- [6] Balon E.K., Crawford, S.S. & Lelek A. 1986. Fish communities of the upper Danube Germany, Austria prior to the new Rhein-Main-Donau connection. *Env. Biol. Fish.*, 15: 243-71.
- [7] Heckel R. & Kner R. 1858. Die Süßwasserfische der Österreichischen Monarchie mit Rücksicht an die angrenzenden Länder. Leipzig, W. Engelmann. 338 pp.
- [8] Marsilius A.F. 1726. *Danubius pannonicomyusicus, observationibus geographicis, astronomicis, hydrographicis, historicis, physicis perlustratus et in sex Tomos digestus. Tomus IV. De piscibus in aquis Danubii viventibus.* Hagae Comitum, Amstelodami. 89 pp.
- [9] Schiemer, F. (2006): Ecological status and problems of the Danube and its fish fauna. Proc. 36th Int. Conf. of. IAD [.http://www.oeniad.org/conference/docs/1_introduction/schiemer.pdf](http://www.oeniad.org/conference/docs/1_introduction/schiemer.pdf)