

First observation of fish condition from Sava river in Bosnia and Herzegovina

Ridanovic S.^{1*}; Nedic Z.²; Ridanovic L.³

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Abstract

Condition factor of fish species is very important parameter for understanding fish biology and pathology. For that purpose, we sampled 120 fish individuals from the Sava River at four locations (Posavina region), where most of them belongs to the Cyprinidae family while the others belonging to the families: Percidae, Siluridae, Ameiuridae, Esocidae and Gobiidae. In total fish sample we found that 49 fish individuals were infected by different types of skin ectoparasitic protozoa species (*Ichtyobodo necator*, *Chilodonella cyprini*, *Trichodina* sp., *Ichthyophthirius multifiliis* and *Apiosoma* sp.). The values of condition factor were in interval of 0,520 to 1,834.

Keywords: Condition factor, Sava river, Fish biology and pathology , Ectoparasitic protozoa species.

1-University Džemal Bijedić, Head of department of Biology, Faculty of Education, Department of Biology Mostar - Bosnia and Herzegovina

2- University of Tuzla, Faculty of Science, Department of Biology Tuzla - Bosnia and Herzegovina

3- University Džemal Bijedić, Faculty of Education Department of Biology Mostar - Bosnia and Herzegovina

*Corresponding author's email: sanel.ridjanovic@unmo.ba

Introduction

If we can accept the fact that the fishery is one of the most important branches for food production globally, we need to understand fish biology and their health status. Fish represents an important resource which can be used as food for the human populations worldwide. Based on fish biology we can understand ecological relationships and general condition of the water ecosystem. The condition factor of fish is a parameter which is used widely in order to understand survival, reproduction, maturity and health of fish (Le Cren, 1951), and often, it can be used as a good indicator of water quality or general health of fish populations which are inhabiting specific habitat or ecosystem (Tsoumani *et al.*, 2006). There are not a lot of published articles which study fish condition and only few of them can be found in the Balkan countries. Consequently, this type of research has never been done in this region. We point out that there is much more data about fish length and weight, but less about condition factor, and these two parameters are basic for measuring condition factor (Prpa *et al.*, 2007). This fact outlines importance of our research on fish biology, ecology and relationship between infection and condition factor .

Our hypothesis is that condition factor of fish from Sava river is very low and it can show real state of the condition of the fish populations which inhabit Sava river.

Materials and Methods

For research purposes sampling was conducted at four locations in northern Bosnia and Herzegovina (Posavina region), near border with Republic of Croatia (Fig. 1). 120 fish individuals were sampled, and it was determined presence of 15 fish species: Common bream (*Abramis brama* Linneus, 1758), Common carp (*Cyprinus carpio* Linneus, 1758), Wels catfish (*Silurus glanis* Linneus, 1758), Chub (*Leuciscus cephalus* , Linneus, 1758), Brown bullhead (*Ameiurus nebulosus* , Lesueur, 1819), Pike –perch (*Sander lucioperca* Linneus, 1758), Prussian carp (*Carassius gibelio* Bloch, 1782), Northern pike (*Esox lucius* Linneus, 1758), Grass carp (*Ctenopharyngodon idella* Steindachner, 1866), Monkey goby (*Neogobius fluviatilis* Pallas, 1814), Common rudd (*Scardinius erythrophthalmus* Linneus, 1758), Common bleak (*Alburnus alburnus* Linneus, 1758), Vimba (*Vimba vimba* Fitzinger, 1873), Bolen (*Aspius aspius* Linneus, 1758), European perch (*Perca fluviatilis* Linneus, 1758). (Table 1).

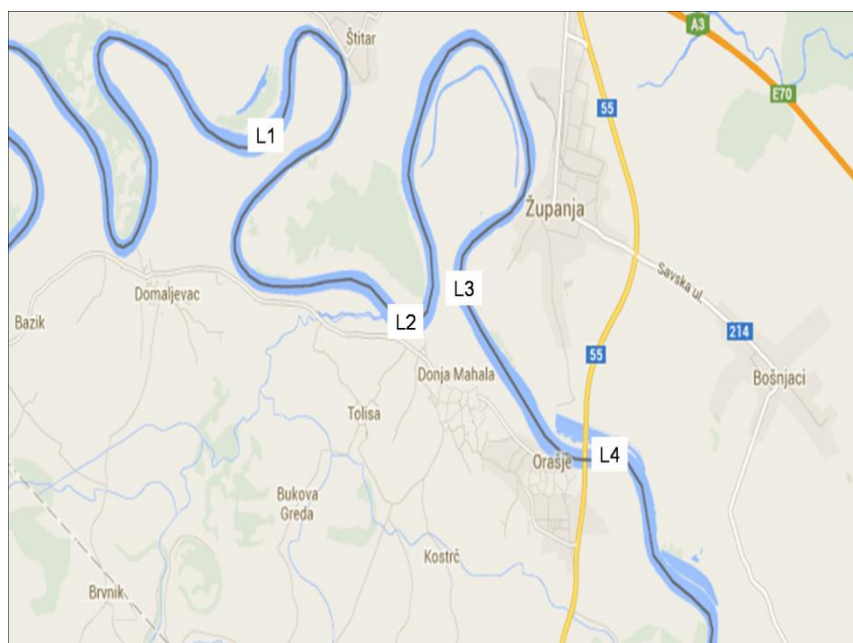


Figure 1: Sampling locations on the lower flow of the Sava River near city Orašje.

Fig 1. Shows northern Bosnia and Herzegovina which borders with Republic of Croatia. This area is situated in

continental climate. Points which are labelled as : L1, L2, L3 and L4 show a sampling locations from the west to the east.

Table 1. Biodiversity of the total fish sample

Fish species	No of fish	Percentage
<i>Abramis brama</i>	5	4,16
<i>Alburnus alburnus</i>	26	21,66
<i>Aspius aspius</i>	2	1,66
<i>Carassius gibelio</i>	14	11,66
<i>Ctenopharyngodon idella</i>	1	0,83
<i>Cyprinus carpio</i>	7	5,83
<i>Esox lucius</i>	6	5,00
<i>Ameiurus nebulosus</i>	3	2,50
<i>Neogobius fluviatilis</i>	36	30,00
<i>Perca fluviatilis</i>	5	4,16
<i>Sander lucioperca</i>	2	1,66
<i>Scardinius erythrophthalmus</i>	5	4,16
<i>Silurus glanis</i>	3	2,50
<i>Squalius cephalus</i>	4	3,33
<i>Vimba vimba</i>	1	0,83
Total sample	120	100

Sampling was carried out in the period between summer and autumn of 2013., and fish was caught in cooperation with local fishermen. After systematic determination of the fish species by identification keys for freshwater fish species (Vukovic, 1973), all fish samples were examined for the presence of ectoparasitic protozoa that live on the skin of the fish. For parasitological examinations samples were taken directly from the fish skin. Native preparations were microscopically analyzed using an electrical microscope (Olympus) under 10x and 40x magnification. Ectoparasitic protozoa were identified and determined (Fijan, 2006). Furthermore, fish species were identified and then fish individuals were measured and then it was calculated a condition factor (CF) using following formula:

$$CF = (W/L^3) \times 100$$

W – weight of fish body in grams;

L – length of fish in centimeters.

Statistical analysis was performed using a non-parametric statistical tests (t- test).

Results

In present study, 49 fish individuals were infected with different type of ectoparasitic protozoa species. Total number of non infected fish individuals was 71. (fig. 2). For research purposes condition factor was tested and counted on the infected fish individuals (infected with mentioned protozoa species) which was approximately in interval of 0,520 to 1,659 with average value 0,922. The same factor for non infected fish individuals was approximately in interval of 0,520 to 1,834 with average value 0,967 (fig. 3). By statistical measuring statistical significance between number of infected and non infected fish individuals was not found ($\chi^2=8,840000$; $df=1$; $p<0,05$). There was no statistical significance in condition factor parameter in two investigated groups ($t=0,78$; $p>0,05$).

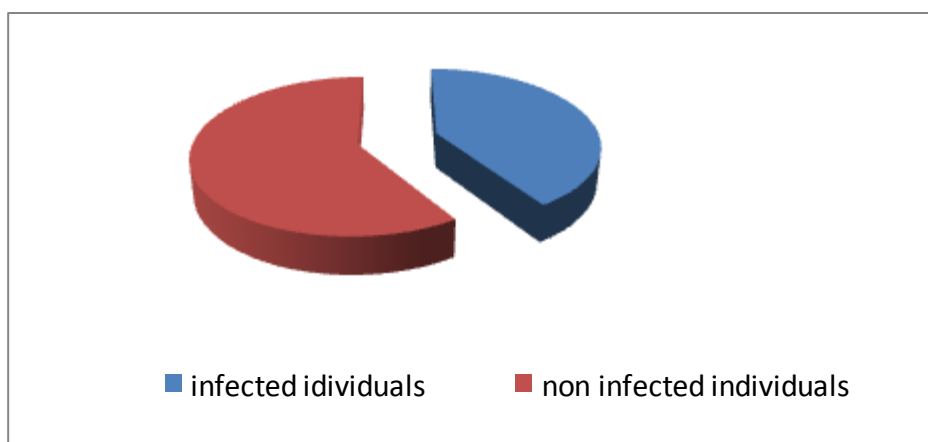


Figure 2: Number of infected and non infected fish individuals from total sample

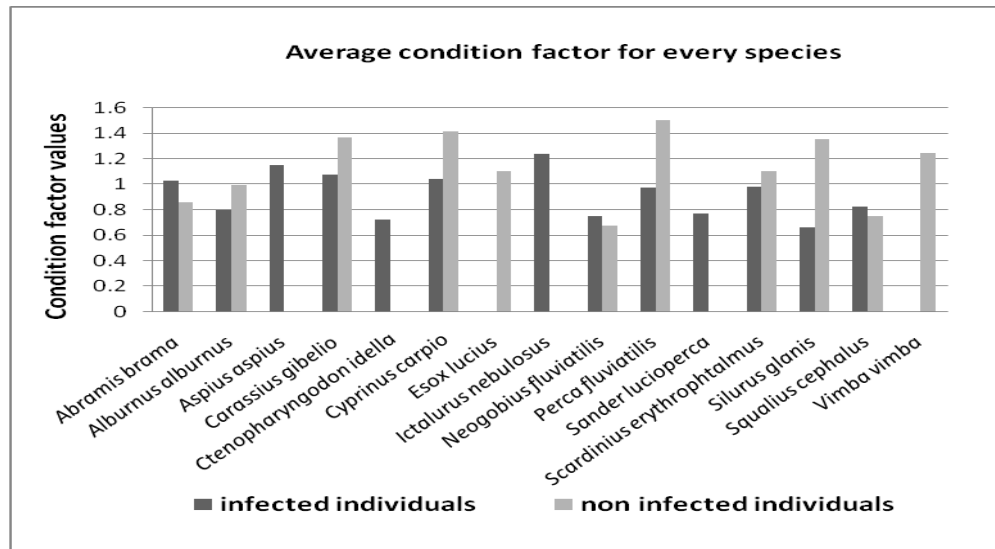


Figure 3: Average condition factor for every infected and non infected fish individuals

Discussion

Main conclusion is that there is no statistically significant difference between condition factor value of infected and non infected fish individuals that shows small impact of protozoa ectoparasitic species on fish condition (Domitrović *et al.*, 2007; Prpa *et al.*, 2007). Some authors state that condition factor of fish populations and health state of the mentioned populations represents basic parameters for measuring impact of humans on ecosystems and biotops (Biro, 1990; Blahak and Prokeš, 1988; Treer *et al.*, 2000; Šprem *et al.*, 2001). Certainly at this stage of research antopogenic influence cannot be measured, however, it can be argued that it exists and it has a big impact on fish populations weight of fish body. Generally, it can be emphasized that our hypothesis is correct.

in biological sense. Statistical analysis shows that infection with different types of protozoa is not primarily responsible for low fish condition and it was assumed that degradation of water ecosystems and river water quality are primary factors for such condition (Bakota *et al.*, 2003). In comparison with other published data it is suggested that lower flow of the Sava River does not have a big production of organic substances, and as the result of that condition of factor value of the fish is not so high (Treer *et al.*, 2000). Therefore it is assumed that amount of fish food which is necessary for normal fish development and maintenance of homeostasis in Sava is very limited or not sufficient. This can change relationship between length and

Conclusion

This study indicates that biodiversity of fish species is high, however average

condition factor of fish from Sava River is very low. One of the plausible explanations is small amount of organic substance production, which is essential for fish feeding. The second reason can be infection with specific type of ectoparasitic protozoa species, as it was found in more than 40% of fish individuals that are sampled and were infected with protozoa. Given the fact that large number of fish caught in this study were infected with different species of protozoa, obtained results were expected. Although, statistical analysis did not show high correlation between infection and condition values of infected and non infected fish species, further studies should be conducted to elucidate findings of this research.

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