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SOME BIOLOGICAL FEATURES OF EUROPEAN CATFISH (*SILURUS GLANIS*) IN THE UVAC RESERVOIR

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NEKE BIOLOŠKE ODLIKE SOMA (*SILURUS GLANIS*) IZ AKUMULACIJE „UVAC”

Apstrakt

Som je najveća primarno slatkovodna vrsta ihtiofaune Srbije i u staništima koja naseľjava predstavlja vrhunskog predatora. Ova vrsta ne spada u nativnu ihtiofaunu u vodama Rezervata Uvac, a vreme introdukcije, količina i uzrasni sastav unetih riba su nepoznati. Generalno, podaci o biologiji prirodnih populacija soma u otvorenim vodama u Srbiji su siromašni i do sada ne postoje studije o populaciji u akumulaciji Uvac. Ciljevi ovog istraživanja su određivanje starosne i polne strukture populacije somova i njegove distribucije u akumulaciji. Definisane su tri zone akumulacije u kojima je vršeno uzorkovanje, i to: zona I (gornji kanjonski deo akumulacije), zona II (srednji deo akumulacije sa ulivima dve pritoke) i zona III (donji deo akumulacije u oblasti brane). Mrežarskim alatima ulovljeno je ukupno 20 somova. Među ulovljenim jedinkama 7 je bilo mužjaka, 9 ženki i kod 4 jedinke nije bilo moguće makroskopski odrediti pol. Dužina je varirala od 60-86 cm kod mužjaka; 66-113 cm kod ženki i 51-57.5 cm kod polno nezrelih jedinki. Težina ulovljenih primeraka kretala se u opsegu 993-4 000 g kod mužjaka; 1 520-9 000 g kod ženki; i 652-984 g kod polno nezrelih jedinki. Među mužjacima su dominirale jedinke starosti 3⁺, dok su kod ženki sve starosne klase bile jednako zastupljene (2⁺-7⁺). Sve polno nezrele jedinke su bile starosti 2⁺. Som u akumulaciji Uvac dominantno naseljava gornji (kanjonski) deo, a na osnovu starosne structure populacije pretpostavlja se da je som u akumulaciju introdukovan pre više od 10 godina.

Ključne reči: som, distribucija, polna struktura

Keywords: wells, distribution, sex composition

INTRODUCTION

Due to intentional and unauthorized introductions, the fish fauna of the Uvac Reservoir has changed from the native state to current fish community representing combination of native cold-water and alien warm-water species. It is supposed that anglers conducted unauthorized introduction of European catfish (*Silurus glanis*), and origin, quantity and size composition of introduced fish are unknown. Since then, species has acclimatized and established self-sustaining population, becoming important fishery resource. The European catfish is the largest freshwater fish in Europe and in the waters that inhabits represents top predator species feeding on wide spectrum of food items (Ristić, 1977; Bora and Gül, 2004; Carol et al., 2009). Generally, information on biology of natural populations of European catfish in the Serbian waters is poor and, until now, the studies on population in the Uvac Reservoir do not exist. Therefore, having in view its strong predatory behavior, data on biological features of European catfish from the Uvac Reservoir are of vital importance to understand its ecological status and impacts on fish community, especially those concerning native species. The purpose of this paper is to present some results of first studies of an ongoing investigation on biology features of European catfish in the studied water body. The objectives are to record longitudinal distribution and age and sex structure of European catfish population in the Uvac Reservoir.

MATERIAL AND METHODS

The Uvac Reservoir occupies the highest position (985 m.a.s.l.) in the row of three river impoundments built on the middle course of the Uvac River. It is the youngest among three reservoirs (1979 year of formation) with following morphometric features: length up to 25 km, surface area 6.1 km², volume 212 x 10⁶ m³, maximal depth 108 m. The reservoir has a pronounced canyon-shaped morphometry with two small tributaries (Kladnica and Veljušnica). Fish sampling was performed on four occasions during the middle summer-early autumn 2017 period (02-04. 08; 22-24. 08; 12-14. 09; 10-12. 10); using benthic and pelagic trammel nets (inner mesh sizes 45-80 mm). Three zones were recognized (Fig. 1): zone I (upper canyon zone), zone II (middle part of reservoir with two bays), and zone III (lower part of reservoir in the dam area). Samplings were performed on 26 sampling sites, of which 9, 12 and 5, were within zone I, zone II and zone III, respectively. Nets were set overnight and 20 specimens were caught; at field fish were measured (± 1 mm), weighed (individuals up to 3 kg ± 1 g; individuals > 3 kg ± 50 g) and dissected for sex determination and diet analyses. Pectoral spines were used for age determination. Pectoral spines were sectioned using a jeweler's saw. Sections for each spine were ground with sandpaper to make the annuli more distinct for age reading, and read under dissecting microscope.



Figure 1. The Uvac Reservoir and its zonation: I- upper canyon zone; II- middle zone of reservoir; III- lower zone in the dam area.

RESULTS AND DISCUSSION

During the studied period 31 trammel nets totaling 5 961 m² were set, and 20 specimens of European catfish were caught (Tab. 1). Obviously, there are big differences, both in terms of number and biomass of captured fish, in catches between the investigated zones of reservoir. In relation to total catch, catch from zone I (upper canyon part of reservoir) comprised 80% and 82.1% in number and biomass respectively, while in the zone III (dam area) none individual of European catfish was caught. Compared to data for zone II (middle part of reservoir), the catch of European catfish in zone I outnumber and overweigh by 4 and almost 5 times, respectively.

Table 1. Catch data on European catfish for the investigated zones of Uvac Reservoir: FE – fishing effort; N – number of caught individuals; ΣW – total biomass of caught fish; CPUE – catch per unit effort.

| Parameter | Zone of reservoir | | |
|-----------------------------|-------------------|--------|------|
| | I | II | III |
| FE (m ²) | 2580 | 2121 | 1260 |
| N | 16 | 4 | 0 |
| ΣW (g) | 51 152 | 11 123 | 0 |
| CPUE (ind./m ²) | 0.006 | 0.002 | 0 |
| CPUE (g/m ²) | 19.8 | 5.2 | 0 |

Despite a relatively high fishing effort the amount of caught fish could be considered as low, reflecting difficulties in sampling such a large species by conventional fishing techniques in large water ecosystems (Carol et al., 2007; Benejam et al., 2007). Obtained results clearly demonstrate longitudinal distribution pattern of population of European catfish in the Uvac Reservoir. Homogenous or random pattern of distribution of fishes within their environments is seldom found, and their distribution is usually determined by numerous factors including physical, chemical and historical constrains of environmental conditions, biotic interaction and the intensity of human use of a water body (Benson and Magnuson, 1992; Mehner et al., 2003; Prchalova et al., 2008). The European catfish pre-dominantly inhabits upper part of the reservoir what is most probably related to suitable environmental and forage conditions in this section of water body. Further studies are needed, in order to detect factors that influence recorded distribution pattern and to assess habitat use of catfish.

Table 2 contains data on age and sex structure of sampled fish. The age of captured fish ranged from 2⁺ to 7⁺ years. Obtained results indicate that introduction of this species in the reservoir occurred at least 10 years ago.

Table 2. Number of males, females and sex ratio of the European catfish in the Uvac Reservoir: TL – total length; W – biomass.

| <i>Sex</i> | <i>n</i> | <i>TL (cm)</i> | <i>W (g)</i> | <i>Age (years)</i> | | | | |
|------------------|----------|----------------|--------------|--------------------|----------------|----------------|----------------|----------------|
| | | min-max | min-max | 2 ⁺ | 3 ⁺ | 4 ⁺ | 6 ⁺ | 7 ⁺ |
| Males | 9 | 60-86 | 993-4000 | 2 | 6 | 1 | | |
| Females | 7 | 66-113 | 1520-9000 | 1 | 2 | 2 | 1 | 1 |
| Juveniles | 4 | 51-57.5 | 652-984 | 4 | | | | |
| Sex ratio | | | | 1♂ : 0.78♀ | | | | |

Out of the 20 specimens of *S. glanis* sampled from the reservoir during present study, 9, 7 and 4 were males, females and specimens of unidentified sex, respectively (Tab. 2). Total length and biomass of collected fish varied from 60-86 cm and 993-4 000 g; 66-113 cm and 1 520-9 000 g; 51-57.5 cm and 652-984 g, for males, females and unsexed fish, respectively. Age class 3⁺ dominated in males, while all recorded ages were equally distributed among females. All unsexed fish were 2⁺ years old. Alp et al. (2004) reported, based on information from various waters that European catfish reach maturity at ages of 2-3 and 3-4 years, for males and females, respectively. Therefore, in accordance with this 55% of sampled fish were sexually mature. Males dominated in relation to females, but the overall sex ratio did not differ from 1 : 1 ratio statistically ($\chi^2 = 0.87$, $df = 1$, $P > 0.05$). The sex ratio of population from Menzelet Reservoir also was not different from the 1:1 ratio, but in this case, it was slightly in favor of females (Alp et al., 2004). Recorded sex ratio was expected, due to fact that most natural populations of fish have a sex ratio of 1:1 (Reay, 1984). The present study provides first information on European catfish population in the Uvac reservoir and can be useful for proper fishery management of this water body.

CONCLUSION

The European catfish pre-dominantly inhabits upper part of the Uvac Reservoir. According to the age structure of the population, it was introduced in the reservoir at least 10 years ago. Expected sex ratio of 1:1 was found, the ratio that is characteristic for most natural population of fishes.

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