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POST–SPAWNING CONDITION OF ENDEMIC SOFT–MUZZLED TROUT *SALMOTHYMUS OBTUSIROSTRIS* IN THE ŽRNOVNICA RIVER

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SUMMARY

The condition of endemic soft–muzzled trout *Salmothymus obtusirostris* from the Dalmatian river Žrnovnica was studied. The sampling results of the length–weight relationship in the post–spawning period showed as expected negative allometric growth with a low b–value of 2.26 ($W=0.16 \cdot L^{2.26}$) and also negative relationship between condition factor and standard length (CF = 2.775 — 0.051 SL; r = –0.767, $p<0.01$). Drop in condition occurs between 20 and 27 cm of standard length. These results indicate that the fish from this population partially start spawning in the third year, while most of them spawn from the fourth year on.

Key words: *condition, Dalmatia, endemic, trout,* Salmothymus

INTRODUCTION

The Dalmatian division, as part of the Euro–Mediterranean subregion, is well known for its several endemic fish species (Economidis and Banarescu, 1991). One among them is soft–muzzled (soft–mouth) or Adriatic trout (*Salmothymus obtusirostris*). According to Stearly and Smith (1993) genus *Salmothymus* belongs to one of the seven genera of the *Salmoninae* subfamily, while the recent phylogenetic analysis on combined data set of mitochondrial and nuclear DNA by Snoj *et al.* (2002a) indicated that *S. obtusirostris* represents intermediate taxon between *Salmo salar* and *Salmo trutta*, closer to *S. trutta*. Hence, they suggest the reclassification of this species at the species level as *Salmo obtusirostris*.

While the morphology and growth of the population of soft–muzzled trout from the river Buna was previously studied (Janković, 1961), it was not

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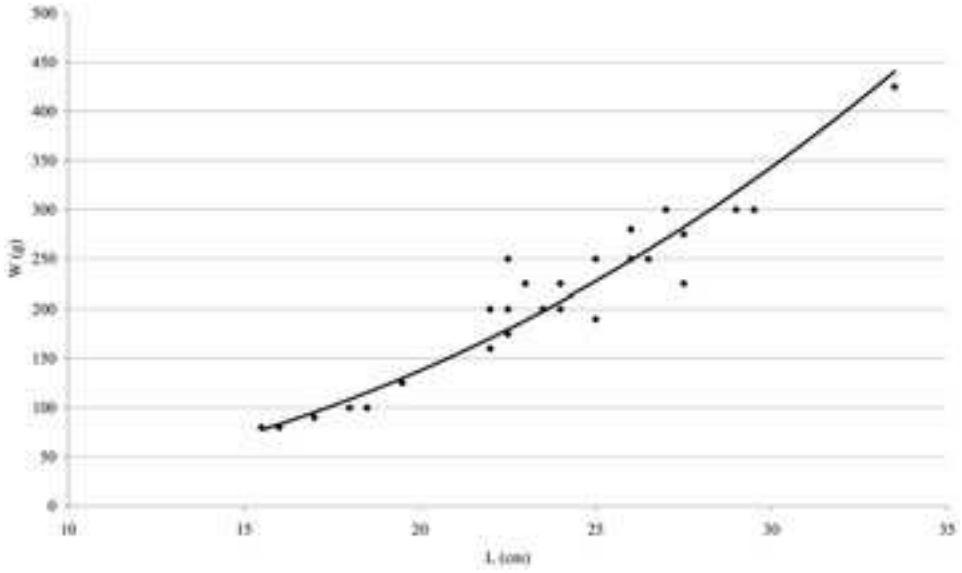

Fig. 1. The length–weight relationship of soft–muzzled trout in Žrnovnica river

Slika 1. Dužinsko–maseni odnos mekousnih pastrva iz rijeke Žrnovnice

the case with the one from the small rivers Jadro and Žrnovnica around Split, until recently (Treer *et al.*, 2003). The fish from these rivers have been considering as a subspecies (Vuković and Ivanović, 1971). As the result of the very limited distribution and endangerments in its native river Jadro (Povž *et al.*, 1990; Mrakovčić *et al.*, 1995), which flows through the suburb of the biggest Dalmatian city, this subspecies was sometimes considered extinct (Crivelli, 1995). However, the remains of the population are still present in the upper part of the river. Even more, about 25 years ago, when a dam was built at the other side of the mountain, nearby Žrnovnica river became permanent. That allowed translocation of the part of this population into the new and less endangered environment. This river has high flows and water quality so that it is used for drinking water (Bonacci *et al.*, 1998).

The study of fish condition can give many valuable information about the environment (e. g. Treer *et al.*, 1998, 1999; Vila — Gispert *et al.*, 2000) and about the important events in fish life, as the maturation (e. g. Prokeš, 1995). So, the aim of this paper was to study the post–spawning condition of soft–muzzled trout in the river Žrnovnica in order to determine its physical state and maturation.

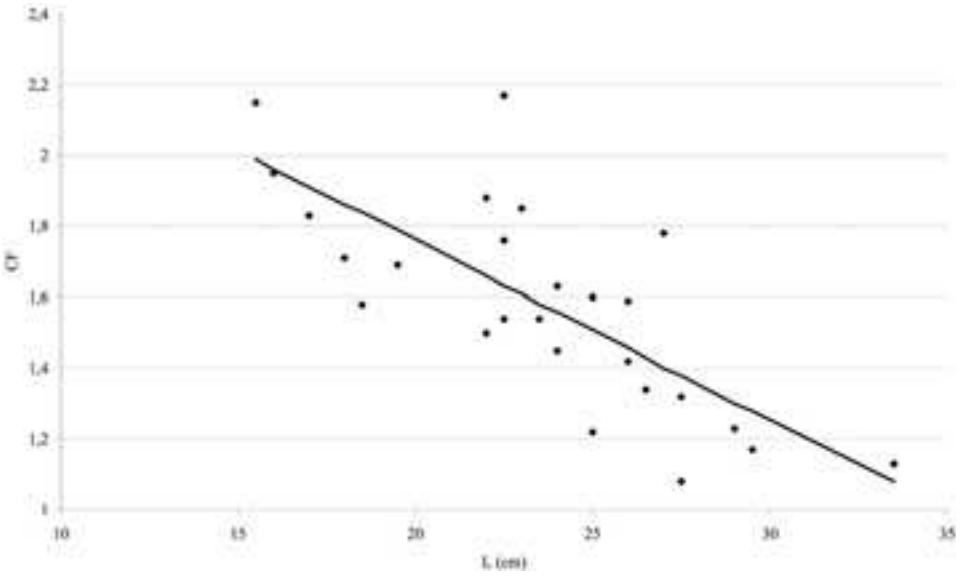

Fig. 2. The relationship between length and CF of soft–muzzled trout in Žrnovnica river
Slika 2. Odnos dužine i CF mekousnih pastrva iz rijeke Žrnovnice

MATERIAL AND METHODS

Altogether 29 specimens of *S. obtusirostris* were caught by electric gear on 26th March 2002. They were immediately measured for standard, fork and total length to the nearest mm and for weight in g. After taking the scales and cutting the tip of the anal fin for DNA analysis (Snoj *et al.*, 2002b), fish were gently released back into the water, as this is rare and not numerous population. Therefore, it was not possible to identify sex of all specimens, so our calculations took into consideration both sexes.

Scales for age determination were taken from above the lateral line below anterior part of the dorsal fin. Scale growth rings were read by microscope, with a video camera connected to the computer screen (Scion Image program).

All the lengths in this paper refer to standard lengths (L). To establish length–weight relationship the commonly used $W=aL^b$ was applied (Ricker, 1975), where W= weight in grams, L= standard length in cm, and a and b are constants. The condition factor (CF) was calculated as: $CF = W \cdot L^{-3} \cdot 100$

RESULTS AND DISCUSSION

The specimens of *S. obtusirostris* were caught by the end of the spawning season. It was possible to obtain milt from some males by pressing the

abdomen, while all mature females were already spawned. Recently, Hamzić (2002) in his two–year–experiment on the artificially propagated soft–muzzled trout from the river Neretva confirmed its spawning occurs during March. Besides *S. obtusirostris* the electric gear catch confirmed of 35 specimens of rainbow trout (*Oncorhynchus mykiss*), also introduced into the Žrnovnica river, and 7 eels (*Anguilla anguilla*), which came from the sea. Brown trout (*Salmo trutta*) has never been introduced into this river. *S. obtusirostris* concentrated more upstream and rainbow trout downstream. Similar spatial distribution of soft–muzzled trout was registered by Mikavica *et al.* (2002) in the river Neretva.

The specimens of *S. obtusirostris* caught ranged from 15.5 to 33.5 cm in standard length and from 80 to 425 g in weight. The length–weight relationship (Fig. 1) showed negative allometric growth with a low b–value of 2.26 ($W=0.16 \cdot L^{2.26}$; $r= 0.970$; $p<0.01$). Consequently, the relation between CF and standard length was negative and highly significant (CF = 2.775 — 0.051 L; $r=–0.767$, $p<0.01$). As the result of the post–spawning period, most of the larger specimens caught upstream (being females) were of poorer condition. On the other hand, immature specimens retained high CF (Prokeš, 1995). It is evident (Fig. 2) that specimens up to 20 cm standard length (two years of age) all had CF over 1.50. Those longer than 27 cm (four years of age) were below this value, while intermediate fish (three years of age) had very variable value of CF — from 1.22 to 2.19. These results indicate that the fish from this population partially start spawning in the third year, while most of them spawn from the fourth year on. This corresponds with the data by Janković (1961) who found out that the population from the river Buna fully spawn from the fourth year (some males from the third) while the fork length is from 20 cm on (about 18 cm standard length).

Sažetak

KONDICIJA ENDEMSKIH MEKOUSNIH PASTRVA *SALMOTHYMUS OBTUSIROSTRIS* NAKON MRIJESTA IZ RIJEKE ŽRNOVNICE

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Istraživali smo kondiciju endemske mekousne pastrve *Salmothymus obtusirostris* iz dalmatinske rijeke Žrnovnice. Rezultati dužinsko–masenih odnosa u razdoblju nakon mriješćenja pokazuju očekivani negativni alometrijski rast i

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nisku b vrijednost od 2,26 ($W=0,16 \cdot L^{2,26}$), kao i negativni odnos izmedu faktora kondicije i standardne dužine (CF = 2,775 — 0,051 SL; r = –0,767, $p<0,01$). Pad kondicije zamjećuje se izmedu dvadesetog i dvadeset i sedmog centimetra standardne dužine. Ovi rezultati upućuju na djelomično mriješćenje riba ove populacije u trećoj godini života, a većina se njih mrijesti tek u četvrtoj godini života i poslije.

Ključne riječi: *kondicija, Dalmacija, endemska, pastrva,* Salmothymus

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