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NEW RECORDS OF NATIVE CRAYFISH *AUSTROPOTAMOBIOUS TORRENTIUM* (SCHRANK, 1803) IN SERBIA

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NOVI NALAZI AUTOHTONE VRSTE *AUSTROPOTAMOBIOUS TORRENTIUM* (SCHRANK, 1803) ZA SRBIJU

Apstrakt

Potočni rak *Austropotamobius torrentium* (Schrank, 1803) je autohtona vrsta Evrope koja naseljava čiste brdsko-planinske potoke sa kamenito-šljunkovitom podlogom. Zbog opadajućeg trenda brojnosti populacija i ugroženosti staništa *A. torrentium* je zaštićen u većini zemalja. Za bolju ocenu statusa ugroženosti u Srbiji, neophodno je prikupiti što više podataka o ovoj autohtonoj vrsti, što je i cilj rada. Detaljna terenska istraživanja sprovedena su tokom 2017. godine od juna do oktobra i obuhvatila su 45 vodotokova u Srbiji. Rakovi su hvatani ručno ili uz pomoć zamki primenom standardizovanog protokola. Prisustvo vrste prvi put je zabeleženo na ukupno 8 vodotokova. Kao najinteresantniji nalaz može se izdvojiti populacija zabeležena na Fruškoj gori (Rakovački potok) koja predstavlja najseverniji nalaz vrste kod nas. Možemo izdvojiti nalaz sa Divčibara, gde je u reci Kamenici pored potočnog raka zabeleženo i prisutvo druge native vrste *Astacus astacus* Fabricius, 1775. Prema novijim istraživanjima, zagađenje vodenih staništa se ne smatra faktorom ugrožavanja ove vrste u Srbiji, ali je potrebno ukazati na rizik koji predstavljaju mini hidrocentrale, čija izgradnja je u ekspanziji u poslednjoj deceniji. Fragmentacija i degradacija staništa predstavljaju ozbiljan rizik za opstanak populacija ove zaštićene vrste, te je stoga neophodan nastavak istraživanja i sprovođenje standardizovanog monitoring radi bolje ocene statusa i nivoa ugroženosti.

Ključne reči: *Austropotamobius torrentium*, Srbija, novi nalazi, faktori ugrožavanja.

Keywords: *Austropotamobius torrentium*, Serbia, new record, endangering factors

INTRODUCTION

The stone crayfish *Austropotamobius torrentium* (Schrank, 1803) is one of a few native European crayfish species distributed throughout Central and Southeastern Europe (Laurent, 1988; Souty-Grosset et al., 2006; Longshaw & Stebbing, 2016). Due to decreasing populations trends caused by habitat destruction and crayfish plague this species is listed in the Red List of Threatened Species of the IUCN, categorized as «Data Deficient» according to IUCN criteria (Version 3.1) (Füreder et al., 2010).

Austropotamobius torrentium preferably inhabits relatively unpolluted cold-water headwaters, springs, brooks and streams with stony substrate and often turbulent flow (Streissl & Hödl, 2002; Huber & Schubart, 2005; Füreder et al., 2006). In Serbia the species is found dominantly at higher altitudes of the western, southern and eastern part of the country, where it was recorded at 48 localities (Simić et al., 2008, 2015; Petrović et al., 2013; Markovic et al., 2017).

Having in mind that detailed and continuous study on distribution and population status of stone crayfish in Serbia have not been done since 1960's (Karaman 1961, 1962, 1963), arises a need to conduct more detailed survey, checking and compiling literature data, with recent field investigation, in order to update our knowledge regarding this species and to better assess its current status, which is necessary for conservation and protection.

Here we present new findings of stone crayfish in Serbia, as a result of recent extensive field survey.

MATERIAL AND METHODS

The field survey was conducted from June to October 2017 including 45 watercourses from all main drainages in Serbia. In order to efficiently cover as many habitats of stone crayfish as possible, a selection of watercourses was done based on literature data and our knowledge. Some of selected watercourses were uninvestigated before, while regarding others our intention was to check (confirm or deny) presence of *A. torrentium*. The period of survey (June-October) was chosen not only because of better hydrological conditions, but also in order to minimize disturbance of hatching females with fertilized eggs (which occurs in Winter-Spring period).

Stone crayfish specimens were collected by hand or by LiNi traps placed in a stream along transect of 100 m and left over night. The caught crayfish were sexed, measured and released back into the water unharmed. If present, damage, physical defects and visible symptoms of the disease and the presence of parasites were recorded.

RESULTS AND DISCUSSION

Based on extensive field investigation covering 45 watercourses in Serbia, the presence of *A. torrentium* was confirmed at total of eight watercourses with no previous findings of this species. The main data of these localities are provided in Table 1.

Majority of these newly recorded populations were found at typical habitats for *A. torrentium* (Streissl & Hödl, 2002; Huber & Schubart, 2005; Füreder et al., 2006) – i.e. small cold-water streams at a higher altitude, situated in a forest or surrounded by dense vegetation, with a strong water current and hard-bottom substrate. Of particular interest could be finding of presumably isolated stone crayfish population in the Pannonian (i.e. northern) part of country at the Fruška gora Mountain (Fruška Gora National Park).

Another remarks that should be noted was possibility of population overlapping between *A. torrentium* and another native crayfish species *Astacus astacus* Fabricius, 1775 in the river Kamenica on Divčibare mountain. The locality where *A. astacus* was found is located few kilometers downstream, in the populated area with anthropogenic influence.

Regarding sex-ratio in most populations approximately the same proportion of males and females was recorded. Found domination of males in populations from streams Župska reka and Rakovački potok may occurred due to seasonal differences in male and female activity (Aleknovich et al., 1999) as the investigation at this localities was done late (October).

The absence of *A. torrentium* in the tributaries of the Drina River (Trešnjica, Rača, Ljuboviđa and Rogačica) should be mentioned. All localities at these rivers meet the habitats requirements of *A. torrentium*. We could only speculate that devastating floods occurred in the Spring of 2014 might had some influence on crayfish populations in these watercourses, meaning that populations probably were not yet recovered from this event. The reason for rare findings of stone crayfish in numerous watercourses belonging to Aegean Sea drainage in south-eastern Serbia the Dragovištica (Božica, Lisina, Ljubata, Dukatska reka) and Pčinja (Tripušnica, Kozjedolska reka) catchments could be the same as above. Moreover, the presence of stone crayfish at all mentioned watercourses was confirmed relatively recently (Simić et al., 2008).

Table 1. New findings of *Austropotamobius torrentium* (Schrank, 1803).

river/stream (river basin)	coordinates	elevation (m)	number of caught female/male
Kamenica/Divčibare (Drina)	N 44.097891° E 20.022914°	799	8F/12M
Sovljak/Tara (Drina)	N 43.898973° E 19.523992°	940	3F/5M
Jarevac/Tara (Drina)	N 43.900670° E 19.528571°	944	6F/6M
Užički potok/Tara (Drina)	N 43.860123° E 19.585959°	750	9F/11M
Uvac (Drina)	N 43.292452° E 19.926834°	1059	8F/12M
Pesača/Đerdap (Danube)	N 44.573582° E 21.987418°	402	9F/11M
Rukjavica (Danube)	N 44.041467° E 22.147816°	269	8F/12M
Zupska reka/Stara planina (Timok)	N 43.406761° E 22.590512°	820	7M
Rakovački potok/Fruška gora (Danube)	N 45.176626° E 19.772833°	222	4M

Throughout *A. torrentium* areal the declining populations' trend was noted (Füreder et al., 2010). Negative anthropogenic impact on its habitats, either as water pollution, habitat degradation, damming or introducing of invasive species and diseases (plague), were signed out as the main cause (Maguire et al., 2011). In Serbia, according to previous studies (Simić et al., 2008), water pollution was probably not being a limiting factor for this species

(i.e. cause of populations decline) due to very good water quality status of hilly-mountainous streams as its preferred habitat. Construction of numerous small hydropower plants could play important role in presumably declining of *A. torrentium* populations. Importance of spatial continuity for natural dispersion of crayfish has already been proven and habitat fragmentation and isolation due to damming is recognized as one of key factors causing populations declines (Bohl, 1997). Without natural dispersion populations could become isolated from one another resulting in genetic decline (reduced heterogeneity) which linked with some other negative factors (such as low number of individuals, etc.) eventually could lead to extinction.

Having in mind sharp increase of other negative factors in last decade, a prolonged detailed study of *A. torrentium* in the region is necessarily in order to adequately assess its ecological status, diversity and vulnerability. The reports of new findings, as presented in this paper, should contribute to our knowledge by providing new data of its distribution as a foundation for more comprehensive research.

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