Arch. Biol. Sci., Belgrade, 65 (4), 1469-1472, 2013 DOI:10.2298/ABS1304469D

NEW RECORD OF *NEOGOBIUS FLUVIATILIS* (PALLAS, 1814) (GOBIIDAE) IN THE DANUBE RIVER BASIN (SERBIA)

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Abstract - Recently, the growing colonization of allochthonous organisms in the Serbian section of the Danube River and interconnected ecosystems was observed. Hydro-morphological changes, such as regulations of the watercourse, have made this sector suitable for bio-invasions. Two specimens of *Neogobius fluviatilis* (Pallas, 1814) (Piscea: Gobidae) were collected on 10 August 2012 from the Zapadna Morava River, below the first dam on the river course. This is the first record of the sand goby in the watercourse in the central part of Serbia, as a tributary of the Danube River. Our findings show that the sand goby has thus far reached not only the main course of the Danube River but its tributary as well. This freshwater fish was observed for the first time in the Serbian part of the Danube River in 1986 in Begej locality (1.276 km). There are five Ponto-Caspian goby species in the waters of Serbia.

*Key words***:** *Neogobius fluviatilis*, allochthonous fish, first record, Zapadna Morava River, Danube River Basin; Serbia.

INTRODUCTION

Gobies are generally small benthic fish, mostly marine worldwide-distributed species, which are most diverse in tropical coastal waters. A few are found in freshwaters. In European waters, freshwater gobies are most diverse in the Mediterranean, the Black and Caspian Sea Basins. They are distinguished from other European freshwater fish by their fused pelvic fins that form a suction organ with an anterior transverse membrane. They also have two dorsal fins and the pelvic fins are located beneath the base of the pectoral. Invasions of gobies are reported to be facilitated by the construction of dams, river pollution with salt and by the canalization of the main river (Kottelat and Freyhof, 2007).

Neogobius fluviatilis is distinguished from other species of *Neogobius* entering the freshwater in the Black Sea basin in that the first branched ray of the second dorsal fin is about twice as long as the penultimate ray; the nape is completely scaled; there is no black spot on posterior part of first dorsal. It mostly inhabits brackish- and freshwater-lagoons and lakes, large-to-medium sized rivers and streams, on sand or mud beds. It is one of the most abundant fish species in lowland rivers (Kottelat and Freyhof, 2007).

The Zapadna Morava River (308 km long) rises from the Moravica and Djetinja rivers (a tributary of the Velika Morava River, Danube River Basin). The river bed in its upper and middle course is rocky and pebbly, while muddy substrate dominates in the

Fig. 1. Map of distribution of *Neogobius fluviatilis* in Serbia
Green area – distribution area of *N. fluviatilis* in Serbia, according to Simonovic (2006); red spot – locality of new record of *N. fluviatilis* in Serbia

Medjuvršje reservoir and downstream course (Markovic and Simovic, 1994).

The ichthyofauna of the Zapadna Morava River in the period 1996-1999 comprised 25 fish species from 8 families, 20 native and 5 allochthonous species – *Carassius gibelio, Ctenopharyngodon idella, Pseudorasbora parva, Ameiurus nebulosus and Lepomis gibbosus* (Markovic and Veljovic, 2005). Later investigations showed the presence of another two alien species – *Gymnocephalus cernuus* (Markovic, 2011) and *Hypophthalmichthys molitrix* (Vicentijevic-Markovic et al., 2013).

This paper presents the first record of *Neogobius fluviatilis* in the fish fauna of the Zapadna Morava River (Danube River Basin), contributing to the knowledge of the spreading distribution area of this alien fish in Serbian open waters.

MATERIALS AND METHODS

At a locality 172 km of the Zapadna Morava River, from the left bank below the first dam on the river course, near the town of Čačak (N 43^0 90$^{'}$, E 20^0 34$^{'}$; 233 m.a.s.l.), two specimens of *Neogobius fluviatilis* (Pallas, 1814) were caught by fishermen. The substrate was rocky-pebble-sand, covered with the macrophyte, *Potamogeton fluvitans*, and the depth was 110 cm.

The observed specimens were determined according identification keys (Simonovic, 2006; Kottelat and Freyhof, 2007). During laboratory analyses, the total (TL, mm) and standard (SL, mm) body length and body weight (W, g) of the two specimens were taken. Their dimensions were: weight – 28.8 g; TL – 13.5 cm; SL – 12.7 cm; D1 VI, D2 I+16, A I+16 and weight – 19 g; TL – 12.6; SL – 10.8 cm; D1 VI, D2 I+16, A I+16, respectively.

Both captured specimens were males.

RESULTS AND DISCUSSION

The introduction of non-native and invasive species, has received heightened recognition since the anthropogenic contribution to the spread of organisms was recognized as one of the major threats to ecosystem health (Povž and Šumer, 2005). Aquatic habitats are, due to their unique features, among the most disposed ecosystems to this kind of disturbance. The consequences of biotic invasions are diverse and interconnected. Recently, the growing colonization of allochthonous organisms within the Serbian reach of the Danube River and interconnected ecosystems was observed (Lenhardt et al., 2011). Non-native fish species have a great impact on the qualitative and quantitative composition of ichthyofauna in many inland waters in Serbia.

Many gobiids have extended their geographical distribution well beyond their native range (Black and Caspian Seas and the lower most reaches of some tributary rivers). Jankovic et al. (1987) reported this fish for the first time in the Serbian part of the Danube River in 1986. It spread along the whole Serbian section of the Danube River up to the area of the village of Bezdan (rkm 1426), near the mouth of the Sava River at the area of Novi Beograd and in the Sava River at the area of the city of Šabac (rkm 121). During the 1970s, the sand goby was distributed only downstream of the Danube rkm 988 (Lenhardt et al. 2011). At the locality of Tekija (956 rkm) four specimens of *N. fluviatilis* (Smederevac et al., 2001) were captured. Simonovic et al. (1996) recorded the sand goby in the Velika Morava River at the area of the city of Velika Plana. According to BAES (2008), the sand goby was found even more upstream, in the area of the city of Svilajnac. Sand goby is completely naturalized in the Danube River drainage area in Serbia.

One of the significant environmental consequences of allochthonous fish spreading is related to the introduction of nonindigenous parasite fauna. Sand goby is a host to a range of parasites (Molnar and Szekely, 1995; Ondračkova et al., 2005). A massive increase in its abundance in a new habitat can lead to an increased degree of parasite infestation of representatives of the native ichthyofauna, thereby contributing to the deterioration of environmental conditions in the ecosystem.

Our findings show that the sand goby has thus far reached not only the main course of the Danube River but also its tributaries.

Acknowledgments - The present work was supported by the Ministry of Education, Science and Technological Development of the Republic Serbia, Projects 173045, 37009 and 31011.

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