

## Distribution of species of the genus *Gobio* in the Tisza River drainage area, Slovakia

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**Abstract.** The following species of the genus *Gobio* occur in the Tisza River drainage area in Slovakia: *G. gobio*, *G. kesslerii*, *G. albipinnatus* and *G. uranoscopus*. *G. gobio* is the commonly distributed species. It occurs in streams of various sizes, attaining the largest numbers in streams populated by the barbel type fish communities. It occurs together with other *Gobio* spp., with which it can produce hybrids. The present occurrence of *G. gobio* has not changed basically from that in the past. *G. albipinnatus* occurs primarily in lowland streams, both in large rivers and canalised minor streams and channels. The distribution of this species in the Tisza River drainage area in Slovakia has not, appreciably changed from that in the previous period. According to earlier data, *G. kesslerii* was relatively abundant in the middle and upper reaches of a number of streams. At present the occurrence of this species has been confirmed in just a few localities so that its range has been markedly restricted. In some cases, however, the species may have been mistaken for *G. albipinnatus*. According to literary data, *G. uranoscopus* occurred in the past mainly in the upper reaches of rivers Torysa (the Hornád River drainage area), Topľ'a, Ondava, Laborec, and Uh (the Bodrog River drainage area). This species shows the most marked decrease in range, compared to that in the past. In recent times its presence has been confirmed only in a few localities. The devastating factors that have affected the distribution of the particular *Gobio* spp. include water pollution, stream and bed canalisation, decreased river bottom diversity, extraction of gravel materials, and hydro-energetic constructions (steps, weirs and dams). Of the above gudgeon species, *G. uranoscopus* and *G. kesslerii* are protected by the national legislation in Slovakia. In accordance with the EU legislation (Council Directive 92/43/EEC), special protection regions (NATURA 2000) are being defined for *G. uranoscopus*, *G. albipinnatus*, and *G. kesslerii*.

**Key words:** common gudgeon, stone gudgeon, sand gudgeon, whitefin gudgeon, distribution, negative impacts

### Introduction

Except of trout zones, gudgeon species are an important component of fish communities inhabiting the streams of central Europe. In central Europe they include *G. gobio*, *G. albipinnatus*, *G. kesslerii*, and *G. uranoscopus*. Data on the distribution of some of these species have only recently been supplemented (Blachuta et al. 1994, Honsig – Erlenburg & Povž 1999, Freyhof et al. 2000, Scholten 2000, Lusk et al. 2005). Except for *G. gobio*, the remaining species are protected by the EU legislation, Council Directive 92/43/EEC. Hence, increased attention has been paid to the research on gudgeons in recent years. All the above gudgeon species occur in the Tisza River drainage area in eastern Slovakia. The

basic prerequisite of their protection is the knowledge of their actual occurrence. The most complete review of the distribution of gudgeon species over the Tisza River drainage area in Slovakia, based on investigations carried out in 1957–1962, has been presented in the papers by K u x & W e i s z (1958, 1964) and W e i s z & K u x (1959, 1962). The ichthyofauna of parts of the drainage area or of particular streams in the same period has been described by Ž i t ň a n & K a š ť á k (1960), H o l č í k & M i š í k (1962) and D o r k o (1963).

Additional items of information, mostly confirming or supplementing the earlier observations on the distribution of the particular gudgeon species, date from 1976–1979

(K i r k a et al. 1981, 1984). In 1960–1980 the ichthyofauna of most streams in the Tisza River drainage area were heavily stressed by various impacts of human activities (water pollution, stream canalisation, extraction of gravel and sand, weirs). As a result, fish communities were considerably reduced to devastated, and some fish species vanished from some of the stream sections affected (K u x & W e i s z 1964, H o l č í k 1966). Therefore, it is most appropriate to assess the present status of the particular fish species, including gudgeon, which are the subjects of protection.

## Study Area and Methods

Belonging to the great drainage area of the Tisza River, the hydrological system of streams in eastern Slovakia consists of three basic parts. The first one is the catchment of the River Slaná which, in Slovakia, divides into three parts, viz, the Slaná River drainage area, the smaller one of the Bodva River, and the largest one of the Hornád River with its important tributaries, the Torysa and Olšava rivers. The second basic part comprises the catchment of the Bodrog River, consisting of the Latorica River system with its major tributaries, the Laborec, Uh and Čierna Voda rivers, and the Ondava River system including its important tributary, the Topľa River. A short section of the Tisza River is the state boundary in the SE corner of the eastern part of Slovakia (Fig. 1).

The occurrence of the particular gudgeon species was recorded during ichthyological investigations by means of electro-fishing in 1995–2003. The data obtained are confronted with those on the occurrence of gudgeon species dating from 1955–1980. Due to the large number of papers from which data were adopted, only those are quoted here which cover a wider area or at least a whole stream or its large part (K u x & W e i s z 1958, 1964, W e i s z & K u x 1959, 1962, H o l č í k & M i š í k 1962, D o r k o 1963, K i r k a et al. 1981). The preliminary data on the present occurrence of particular gudgeon species, given in this paper, have not been published, except for K o š č o & K o š u t h (1995) and K o š č o & H o s p o d á r o v á (1997).

## Results and Discussion

The most complete review of the distribution of gudgeon species over most major streams in the Tisza River drainage area in Slovakia was obtained from investigations carried out by K u x & W e i s z in 1957–1962 (K u x & W e i s z 1958, 1964, W e i s z & K u x 1959, 1962, K u x 1964). We have evaluated their data on the occurrence of gudgeon. Of the 70 localities (= 100%) in which the gudgeon occurred, *G. gobio* was absent from two, which were populated solely by *G. albipinnatus*. *G. gobio* was the sole species present in 22 localities (31.43%) on largely small streams, such as tributaries or headwaters of big rivers,

and localities stressed by pollution. Forty-six localities were populated by two to four gudgeon species. Most frequent (28.57%) was the combination of three species, viz. *G. gobio*, *G. kesslerii*, and *G. uranoscopus*. Seven localities were jointly populated by *G. gobio* and *G. uranoscopus*. A combination of three species, viz. *G. gobio* + *G. albipinnatus* + *G. kesslerii*, was found in three localities. Combinations of two gudgeon species, viz. *G. kesslerii* + *G. uranoscopus*, *G. kesslerii* + *G. albipinnatus*, and *G. gobio* + *G. albipinnatus*, occurred in two or three localities. All four gudgeon species occurred jointly in only two cases (the Topľa River, locality Brezov; and the Torysa River, locality Ploské). As regards the sequence of the species downstream from the headwaters, *G. gobio* was the uppermost species, followed by *G. kesslerii* and *G. uranoscopus*. *G. albipinnatus* occurred in the lowest lowland sections, locally together with *G. gobio*.

The localities jointly populated by *G. gobio*, *G. kesslerii* and *G. uranoscopus* were populated by a *Barbus* type community, usually consisting of 10 to 14 species. In addition to the gudgeon, its major species included *Barbus barbus*, *Barbus* sp., *Leuciscus cephalus*, *Chondrostoma nasus*, *Alburnoides bipunctatus*, and *Barbatula barbatula*. Very often also *Sabanejewia balcanica* was present. *Alburnus alburnus*, *Vimba vimba*, and *Zingel streber* occurred rather frequently.

### *Gobio gobio* (Linnaeus, 1758)

The species occurs in all suitable habitats, from small rivulets to big rivers. Its occurrence reaches high up to the headwaters of the Laborec and Topľa rivers (Weisz & Kux 1959). It is only absent from mountain rapids and spring waters bearing a distinctly salmonid character. It is most abundant in middle stream sections bearing the characters of the so-called barbel zone. In localities of joint occurrence, *G. gobio* can produce hybrids with other gudgeon species. Earlier studies report the occurrence of such hybrids as *G. gobio* x *G. albipinnatus* in the Laborec River (Weisz & Kux 1959), *G. gobio* x *G. kesslerii* in the Ondava River (Kux & Weisz 1962), in the Blh rivulet, a tributary to the Slaná River (Kux & Weisz 1964) and in the Torysa River (locality Ploské) (Kux 1964).

### *Gobio albipinnatus* Lukasch, 1933

The data on the occurrence of whitefin gudgeon in the catchment of the Tisza River, eastern Slovakia, prior to 1990, are shown in Fig. 1. At present, whitefin gudgeon occur mainly in the southern regions of eastern Slovakia. There they are even found in minor streams (Ida) that have been canalised, or in drainage channels. Whitefin gudgeon usually occur with common gudgeon and, in places, also with sand gudgeon (Olšava). So far no records are available on the occurrence of this species in the Slaná River drainage area in Slovakia. Whitefin gudgeon populate lowland regions. In the Bodva River drainage area, this is the so-called Moldava Lowland; the lower reaches of the Hornád, Torysa and Olšava rivers lie in the so-called Košice Basin. The whitefin gudgeon in the Bodrog River drainage area essentially occur all over the so-called East Slovakian Lowland. The occurrence of this species is continuous in most streams including their tributaries: in the Topľa River from its mouth into the Ondava R. up to r.km 80; in that of the Ondava R., from its confluence with the Latorica R. up to r.km 97 upstream of the Domaša Reservoir; in the Laborec R. from its mouth into the Latorica R. up to r.km 63; in the Uh R. with the dense network of its tributaries; and the Latorica R. all along its length in the territory of Slovakia. The present distribution of this species is shown in Fig. 2.

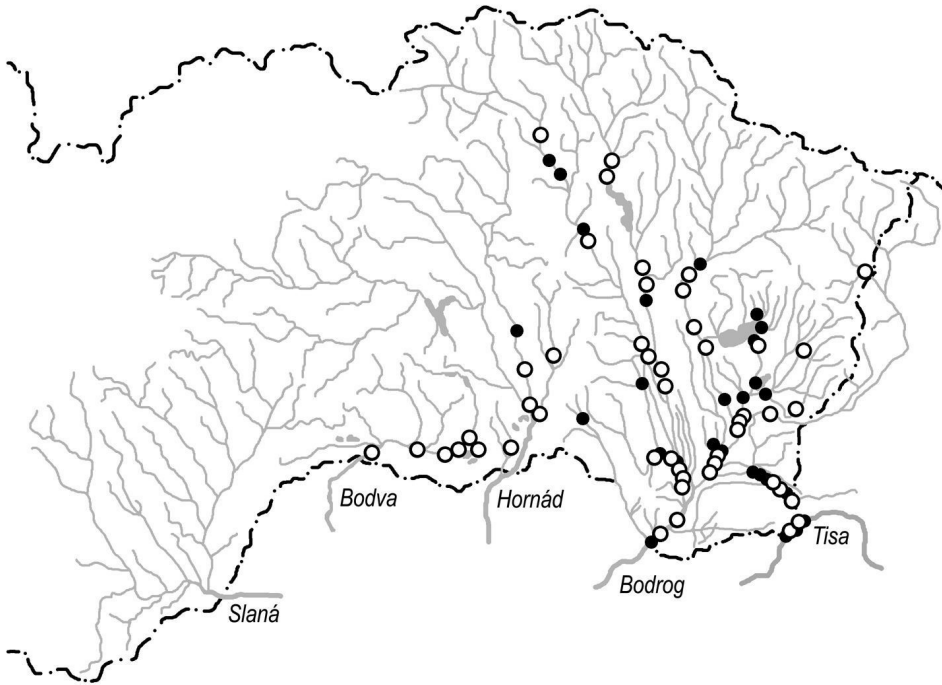


Fig. 1. Occurrence of *Gobio albipinnatus* in the Tisza River drainage area, eastern Slovakia.  
 ● – prior to 1980; ○–1995–2003.

From a comparison with the literary data on the occurrence of whitefin gudgeon with our recent data it appears that no marked changes have occurred in the range of this species in the Tisza River drainage area in eastern Slovakia.

#### *Gobio kesslerii* Dybowski, 1862

Earlier records on the occurrence of sand gudgeon in the western part of the hydrological network of the Tisza River in Slovakia (Slaná, Bodva, and Hornád rivers) are not very numerous (Fig. 2). In 1961–1962 the species was found in the Slaná River drainage area in its tributaries Rimava and Blh (K u x & W e i s z 1964). Its present occurrence has only been recorded in the Bodva River, locality Peder (E-25.56.36, N-48.34.30). In the past, this species occurred continuously in the middle and upper reaches of the Topľa River as well as all along the Ondava River (Fig. 3). The present occurrence of this species has been documented in the Topľa River upstream of its mouth into the Ondava R., locality Božčice, and in the upper parts of the stream in localities Giraltovce, Brezov, Nemcovce, and Poliakovce. Its occurrence in these localities was not numerous. In the Ondava River, stone gudgeon occur in localities Brzenica and Kladzany; in the Laborec River, in localities Strážské, Petrovce, and Kochanovce. Numerous earlier data on the occurrence of *G. kesslerii* come from smaller streams in the environs of the present Zemplínská Šírava Reservoir; most of them lie in the drainage area of the Čierná Voda stream (H o l č í k & M i š í k 1962). Subsequent examinations have shown, however, that in those cases *G. albipinnatus* was mistaken for *G. kesslerii* (K u x & W e i s z 1964). In the Uh River drainage area the occurrence of *G. kesslerii* has been confirmed in the Ublianka stream, locality Ubl'a.

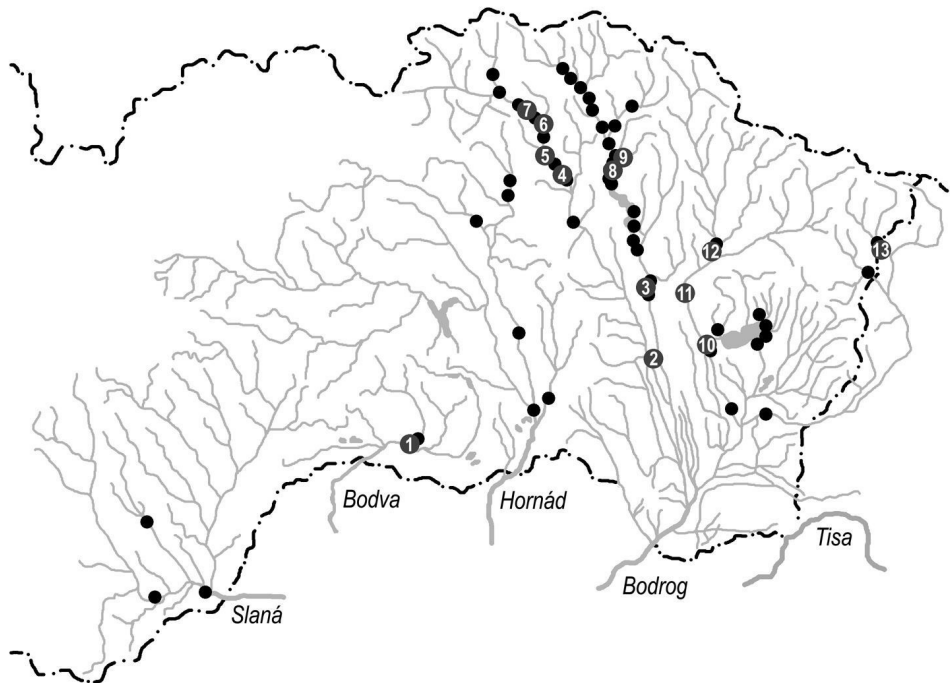


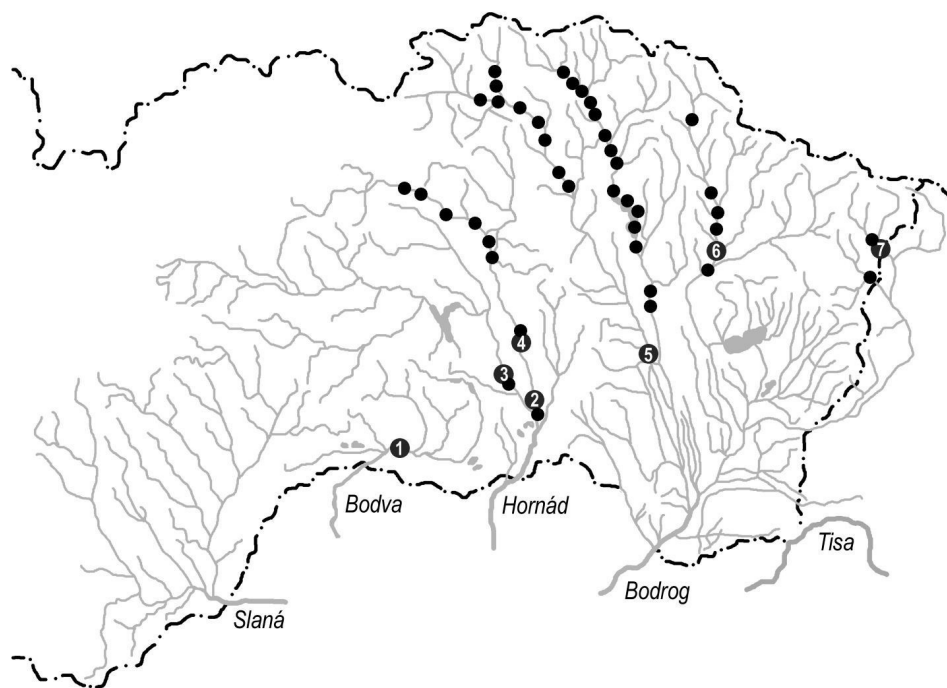
Fig. 2. Occurrence of *Gobio kesslerii* in the Tisza River drainage area, eastern Slovakia.  
 ● – prior to 1980; ○ No.1-13,1995–2003.

Comparing the actual occurrence with the earlier distribution of sand gudgeon, a marked restriction of range becomes apparent. In most localities where the recent occurrence of sand gudgeon has been recorded, its population numbers are very low (Topľa River). The situation is much the same as that of stone gudgeon. Both species show very similar environmental requirements, as indicated by their frequent joint occurrence (e.g. Weisz & Kux 1962). The low population numbers are chiefly due to devastating influences and, in some localities, also probable misidentification, the species being confused with *G. albipinnatus*.

#### *Gobio uranoscopus* (Agassiz, 1828)

Already in the past, stone gudgeon showed the least distribution over eastern Slovakia. They were completely absent from the Slaná River drainage area, and have not been discovered there even by more recent investigations. Earlier data on the occurrence of stone gudgeon are largely localised in the upper parts of the Torysa, Topľa, Ondava, and Hornád rivers (Kux & Weisz 1958, 1964, Weisz & Kux 1959, 1962). The finds plotted in the map in Fig. 3 show that their occurrence was continuous. Their present occurrence, however, has not been demonstrated. The occurrence of this species has recently been ascertained in the Bodva River, locality Hostovce (E-20.86.31, N-48.57.35, Fig. 3-No.1). Furthermore, it occurs at the confluence of the Torysa and Hornád Rivers (E-21.35.83, N-48.64.11, Fig. 3-No.2) and in suitable sections of the Hornád R. itself down to Košice, incl. the section inside the town (E-21.27.79, N-48.76.16, Fig. 3-No. 3). In the Torysa River it has been found in locality Ploská (E-21.31.76, N-48.81.54, Fig. 3-No.4). Earlier data reporting its occurrence in the lower reaches of the

Hornád and Torysa rivers have been confirmed (Weisz & Kux 1962). A further locality in which stone gudgeon occur lies in the lower section of the Topľa River, locality Božčice (E-21.72.33, N-48.77.78, Fig. 3-No.5), lying beyond the initial range of this species. Its occurrence in the Laborec River, locality Kochanovce (E-21.93.79, N-48.93.99) lies in the lower part of its initial range in the Laborec R. (Fig. 3-No.6). We have also confirmed its occurrence on the Uličky stream, locality Ulič (E-22.42.72, N-48.95.88, Fig. 3-No.7) downstream to the state boundary. Compared to its occurrence in the past, the species has vanished from upper stream sections characteristic of its occurrence. Their disappearance was locally due to pollution in the past. However, we believe to see the main cause in the canalisation of these stream parts and in the permanent extraction of sand and gravel, devastating the typical habitats of this species, the rapid sections flowing over dunes of sand, gravel and stones. Canalised sections lack such materials. Thus, as in the Tisza River drainage area in the Carpathian Ukraine, with untouched streams whose river beds, several tens to hundreds metres wide, are full of gravel even in spite of the local extraction of these materials. This species, as indicated by our unpublished observations, is among the one most widely distributed.



**Fig. 3.** Occurrence of *Gobio uranoscopus* in the Tisza River drainage area, eastern Slovakia.  
 ● – prior to 1980; ○ No.1-7,1995–2003.

### Devastating influences

In the course of the second half of the 20th century, a number of negative influences took place in eastern Slovakia, which negatively affected the occurrence and population numbers of the particular gudgeon species. In the past, above all in 1960–1970, water pollution devastated fish populations in a number of river sections. Kux & Weisz (1964) report the

effects of water pollution in the lower section of the Torysa River; Weisz & Kux (1959) report cases of fish poisoning in the lower reaches of the Laborec River. Kírka et al. (1981) found the fish populations having been devastated in the middle and lower reaches of the Laborec River and a part of the Ondava River. Water pollution devastated even the fish community inhabiting the Slaná River and caused *G. kesslerii* to vanish from that river (Kux & Weisz 1964). Holčík (1966) demonstrated the devastation effects of water pollution on the ichthyofauna of the upper reaches of the Hornád River. Construction of dams and weirs is a permanent destructive factor, as long river sections are flooded and their character altered as a consequence. Thus, the Domaša Reservoir has distinctly altered the conditions in the middle and lower sections of the Ondava River, which, together with stream modification, has markedly altered the previous species diversity of their ichthyofauna (Kírka et al. 1982). Stream modifications, resulting in their straightening, uniform longitudinal slope and transverse profile of their river bed, also exert a devastation impact on gudgeon species, which prefer high bottom diversity. Nor can one overlook the present extraction of sand and gravel from streams (e.g. the Ondava River, among others), which causes devastation and destruction of microhabitats suitable, above all, for the occurrence of *G. kesslerii* and *G. uranoscopus*.

With the present condition of streams (modified to canalised river beds; weirs, dams), major protection efforts should be aimed at protecting and conserving suitable microhabitats. It is necessary to prevent the extraction of sand-gravel dunes and to protect the existence of rapid stream sections.

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