

## Abstract

### FISH SPECIES MICROHABITAT PREFERENCES IN SMALL STREAMS

This study assesses microhabitat preferences of selected fish species in the environment of small watercourses. The research was carried out at three localities in the Křivoklátsko Protected Landscape Area (the upper and lower part of the Úpoř stream and the Klíčava stream) between 2004 and 2006. Parameters including average water flow, average depth, presence of shelters, width of the watercourse and cover of individual substrate types were monitored in permanent profiles. These sections were then repeatedly electrofished over a course of three years (from April to October of each year). Over 10,000 fish were caught altogether. Relationships between fish species and the environment were analysed at two levels of detail. In all species, preferences towards different 60 m long sections of the watercourse were tested. In small benthic species, namely the common bullhead (*Cottus gobio*) and the stone loach (*Barbatula barbatula*), which did not exhibit conspicuous habitat shifts during electrofishing, preferences to three-metre sections of the watercourse were also assessed. Relationships among individual species and between species and their habitats were analysed using both indirect and direct multidimensional linear methods (PCA, RDA) in Canoco for Windows 4.5. Also explored was the effect of the season on the abundance of individual species, changes in their abundance in single years as well as the effect of predation by large brown trout (*Salmo trutta m. fario*). The volume of data made it possible to compare habitat preferences among individual size groups of common bullhead, brown trout and common minnow (*Phoxinus phoxinus*); in common bullhead and stone loach, it was possible to examine differences in habitat preferences between seasons.

Time turned out to have a considerable effect the abundances of individual fish species. An effect of predation by larger trout could be confirmed only in the case of common minnow under 55 mm. Trout longer than 90 mm seek deeper sections with slower water flow and with numerous tree roots. Chub (*Squalius cephalus*), perch (*Perca fluviatilis*) and common dace (*Leuciscus leuciscus*) behave similarly. The presence of trout under 90 mm is not too correlated with the occurrence of older individuals over 90 mm; at one of the localities, preference for sections with shallower average depth and fewer tree roots was apparent. Minnows preferentially occurred in narrower sections of the watercourse; other parameters were unimportant. Loaches preferred sections with faster flowing water, with shallower average depth and with fewer roots. Microhabitat preferences of bullheads were studied in the most detail. This species exhibited an increase in abundance towards downstream parts of localities, which among other things can be caused by the unfavourable effect of fishponds located upstream. Small bullhead individuals (up to 55 mm) were more often found in shallower sections than adult fish; all size groups inhabited faster flowing sections. At a locality with a lot of stones, microhabitat preferences did not differ too much in different seasons. All size groups at this locality preferred narrow sections of the stream; the largest bullheads (over 75 mm) sought out rocky substrates. At another locality where the stony substrate was rarer, a marked difference in habitat preferences was observed between the spring period and the rest of the year. In summer and autumn, preferences for a particular microhabitat are relatively limited; in spring, however, bullheads seek out stony substrates in connection with spawning. Due to intraspecific competition, the largest individuals are the most successful at taking these microhabitats for themselves. It appears that fish migrate within this locality even over longer distances before the spawning period.