Migrations, home range and seasonal habitat use of adult Barbel in the Border Meuse.

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Introduction

The River Meuse still accommodates populations of rheophilic fish species such as barbel, nase and chub. The last century the population of barbel has declined due to gravel extraction, bank stabiilization, water pollution and artificial water regime. For the population present, little is known about the way the fishes use this modified part of the river. For river restoration, knowledge habitat use of this part of the Meuse is important. At the start we were puzzled by the following questions (among others of course):

1. Where do the barbel stay by high discharge in winter?
2. Does and where does barbel spawn in the Border Meuse?
3. Which areas are chosen by barbel as residence area in different seasons and how big is the home range of barbel?
4. Are tributaries suitable spawning or residence habitats for barbel?

Material and methods

Fifteen adult (FL 47.5 - 57 cm) barbel (Barbus barbus) were caught by electrofishing and radio tagged (ATS 40 MHz) in the Border Meuse (Borgharen - Maaseik). 5 in May 2001, 3 in October 2001 and 6 in April 2002 (figures 1, figure 2). From May 2001 to August 2002, barbel were tracked weekly throughout the year and daily in April and May in order to localize spawning grounds and investigate seasonal migrations and habitat use (figure 3).

Results and Conclusions

1. Four barbel radio tagged during winter (November-April) remained in the main channel (area shown in figure 4), in periods with high discharge (up to 2,500 m³/s) barbel maintain their positions near obstacles in the riverbed.
2. No distinct upstream spawning migrations occurred. Near Maaseik, three barbel migrated downstream and two upstream to a potential spawning ground on April 25th and May 2nd, when water temperature reached 13.5 °C in the morning (figure 4). One of the three barbel in the Geul migrated to the mouth of the Geul in the Meuse when daily minimum temperature reached 13.5 °C and moved back in the Geul three days later. Spawning grounds for barbel in the Border Meuse are sparse (~100 m²), bottleneck for successful spawning are the availability of gravel (2-6 cm) and low water velocity (<0.5 m/s).
3. In summer barbel moved individually from the Geul into the Meuse (figure 5). Habitat shifts in spring and summer are determined by water level or discharge (Q) (figure 6). The radio tagged barbel have an individual knowledge habitats within their home range of barbel. Home ranges of adult barbel in a highly structured part of the river are significantly smaller than those from other parts of river (figure 7).
4. Barbel captured in the Geul showed distinct individual differences in habitat use, as well in selection of a spawning habitat as in selection of a summer residence (figure 5). The mouth of the Geul is not a permanent habitat for barbel.

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