

## **Selective predation by fish: a further reason for the decline of native gammarids in the presence of invasives?**

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### *ABSTRACT*

*Predation by fish (rainbow trout and perch) on the invasive gammarids Dikerogammarus villosus and Echinogammarus ischnus and the natives Gammarus fossarum, Gammarus roeseli and Gammarus pulex was investigated under different substrate conditions (gravel, large stones, fine sand) in laboratory experiments. Gravel and stones (coarse substrates) should provide refuge for gammarids while sand (fine substrate) should offer little refuge. One additional set of experiments was run without any substrate to investigate the risk of gammarids to fish predation in the absence of any refuge. When, in mixed-prey experiments, combinations of native and invasive species were exposed to fish predation, fish (both trout and perch) ate many more native gammarids than invasives under conditions of coarse substrate. However, fish (trout) ate the same quantity of native and invasive gammarids under conditions of fine substrate but relatively more of the invasive D. villosus when no substrate was present. Single-prey experiments, which were conducted under conditions of stony substrate, supported the results of the mixed prey experiments in that the native G. pulex was eaten by fish somewhat more frequently than the invasives D. villosus and E. ischnus. However, the native G. roeseli was eaten as frequently by fish as were the invasives. Further experiments, where substrate affinity and activity of gammarids was tested, showed that invasive species were less active than natives and that invasives (in particular D. villosus) displayed a high affinity to coarse substrate. The results suggest that when native and invasive gammarids co-exist in rivers where gravelly or stony bottom sediments prevail, native species suffer higher losses due to fish predation than the invasives. In rivers with sandy sediment the advantage of low predation risk for the invaders vanishes. The results further suggest that the high predation risk of natives originates from their high activity and that differences in predation risk between native and invasive gammarids during their co-existence may have contributed to the decline of natives in large rivers of Southern Germany.*

*Key words: invasive / native gammarids, fish predation, substrate, activity, substrate affinity*

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