

Syntope Habitatnutzung von *Bufo calamita*, *B. viridis* und *B. bufo* in einem rheinischen Auskiesungsgebiet

ULRICH SINSCH, STEFAN HÖFER & MAIKE KELTSCH

Syntopic habitat use of *Bufo calamita*, *B. viridis* and *B. bufo* in a gravel pit area of the Rhinelands

In 1997 and 1998 we studied large syntopic populations of the three native toad species (*Bufo bufo*, *B. calamita*, *B. viridis*) in the Koblenz-Neuwieder Bassin (Rhine-land-Palatinate). The study area of about 5 km² consists of human settlements, agricultural and industrial areas and rural sites — a typical secondary habitat of amphibians in the Rhinelands. Breeding assemblages of at least one toad species were recorded in 32 permanent or temporary water bodies. The aims of this study were to investigate the local population ecology of natterjacks and green toads and to look for effects of interspecific competition in a pond with tadpoles of all three species and its surroundings after metamorphosis. In *B. calamita* and *B. viridis* the individuals of the local populations interact as parts of the same metapopulation, and offspring of the few source populations contributes to the maintenance of the many sink populations by the continuous immigration of first breeders. The breeding period of the natterjacks lasted from the end of March to mid-July with three discrete peaks of spawning activity, whereas that of the green toads was limited to one month in spring. Minimum estimates of metapopulation size were about 3 000 *B. calamita* and 1 000 *B. viridis*. Most breeding assemblages of *B. bufo* were located in the large lakes during March, but in spring of 1998 some common toads spawned in a shallow eutrophic lake (600–1 200 m² surface area) which was also used by natterjacks and green toads for reproduction. We counted 4 spawn strings of *B. bufo*, 27 of *B. calamita* and 17 of *B. viridis*. Despite of the presence of up to 200 000 tadpoles in this lake, competitive growth inhibition was not observed in any of the species. However, the state of nutrition of *B. viridis* toadlets were significantly worse than that of syntopic *B. calamita* toadlets, probably due to their presence in microhabitats with high population density and consequently, high competition. Common toad and natterjack toadlets reduced competition by an early dispersal to distant habitats with low population density. At its westernmost geographical range, environmental conditions are apparently suboptimal for green toads, as suggested by a reduction of the breeding period to 1/3 of usual duration and by the exceptionally high winter mortality of juveniles. Although the study site is subject to frequent human modifications as every secondary habitat, none of the metapopulations appears to be endangered. With respect to natterjacks and green toads, the human impact on landscape dynamics is even necessary for the persistence of suitable habitats because it counteracts the natural succession which would render habitats progressively unsuitable.

Key words: Amphibia, Anura, *Bufo bufo*, *B. calamita*, *B. viridis*, phenology, condition index, competition, metapopulation structure, limit of geographical range.