

# Terrestrial habitat use by frogs and toads, *Rana temporaria* L. and *Bufo bufo* (L.), in West Norway

Karl Frafjord & Ingvar Byrkjedal

Frafjord, K. & Byrkjedal, I. Terrestrial habitat use by frogs and toads, *Rana temporaria* L. and *Bufo bufo* (L.), in West Norway. Fauna norv. Ser. A 15: 25-28

Frogs and toads, *Rana temporaria* and *Bufo bufo*, are the most common amphibians in Norway, but little information is available on their distribution and numbers. We studied their habitat use during the terrestrial phase in West Norway (Rogaland to Møre and Romsdal counties) by examining all specimens in the collections of the Museum of Zoology, University of Bergen and by analyzing questionnaires. Frogs and toads were generally found at different sites, and both species were located together in only 10 sites (9.9 %). Differences in habitat use between the two species were mainly due to toads occupying coniferous forest or cultivated land below 200 m a.s.l. More frogs were found in deciduous forests and humid regions, at varying altitudes to above 1 000 m a.s.l.

Karl Frafjord<sup>1)</sup> & I. Byrkjedal. Museum of Zoology, University of Bergen, Muséclass 3, N-5007 Bergen, Norway.

<sup>1)</sup> Present address: University of Tromsø, Tromsø Museum, Lars Thøringsv. 10, N-9006 Tromsø, Norway.

## Introduction

Most studies on habitat selection in amphibians with an aquatic phase have focused on the ponds and water bodies where reproduction takes place (Strijbosch 1980). Several physical and chemical factors may influence selection of breeding sites in amphibians, including the terrestrial habitat surrounding the site, and some species are more influenced by ecological factors than others (Pavignano et al. 1990). The significance of interspecific competition or interference seems to be little explored, but this may be an additional factor influencing habitat use in amphibians.

Two anuran species are found in western Norway (Kauri 1970, Dolmen 1978). Common frogs *Rana temporaria* are general-

ly believed to live throughout this region (from 0 m to above 1 000 m a.s.l., Kauri 1970, Dolmen 1986), while common toads *Bufo bufo* may be restricted to lowland regions, but no detailed study has been made. In this paper we examine habitat use by the two anurans in West Norway during their terrestrial phase.

## Materials and methods

Data came from two sources. 1) Specimens trapped in pit-fall traps during a diversity of investigations of invertebrate fauna and a few specimens collected by other methods. The site of capture was known, but details about habitat were sometimes missing. A total of 40 frogs and 57 toads from West Norway (from the northern part of Rogaland county to the

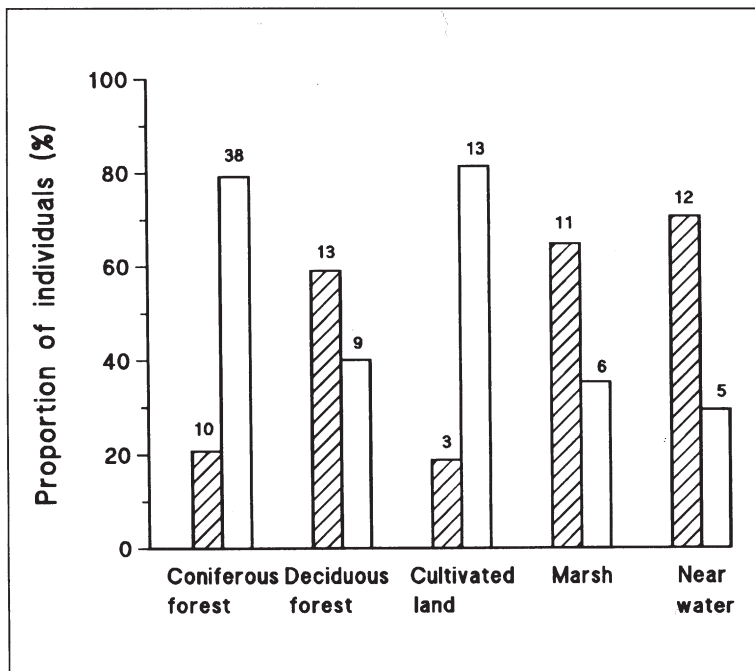
southern part of Møre and Romsdal county) are preserved in the Museum collections, most of these were from Hordaland county. 2) Questionnaires about fauna and habitat in West Norway, filled in opportunistically by reliable persons upon sightings of frogs and toads. The questionnaires gave observations of frogs from altogether 41 sites in Hordaland county and 21 sites in Møre and Romsdal county. The figures for toads in the two counties were 44 and 1, respectively.

Habitats were classified into four categories according to the major habitat of the area where the specimen was found: coniferous forest, deciduous forest, cultivated land (for example pastures, fields), and marsh. The size of the marshes was not known, and for small marshes located in forests the forest could have been more important as habitat than the marsh. We excluded specimens located in water, but for completion included a category "near water" for specimens found at the edge

of the water and when no details about the terrestrial habitat were given.

## Results

No difference in the occurrence of frogs and toads as revealed by pit-fall sampling or by observations was found ( $\chi^2 = 0.06$ , d.f. = 1,  $p > 0.05$ ), so the data were combined (see Strijbosch 1980 for a discussion about methods). Frogs were reported from 64 sites and toads from 47 sites. Only 10 (9.9 %) of the sites had both species. Toads were found significantly more often in coniferous forests ( $\chi^2 = 16.3$ , d.f. = 1,  $p < 0.001$ ) and in cultivated land ( $\chi^2 = 6.3$ , d.f. = 1,  $p < 0.05$ ) than frogs (Figure 1). In addition to the habitats given in Figure 1, 8 frogs were found in subalpine birch forest or marsh, 1 frog and 5 toads were found in coastal heather, and 1 frog was found on coastal shore. Also, 10 frogs and 5 toads were found in an area where fire had



**Figure 1**  
Proportion of *Rana temporaria* (hatched) and *Bufo bufo* found in different habitats of West Norway. Sample size is given above each column.

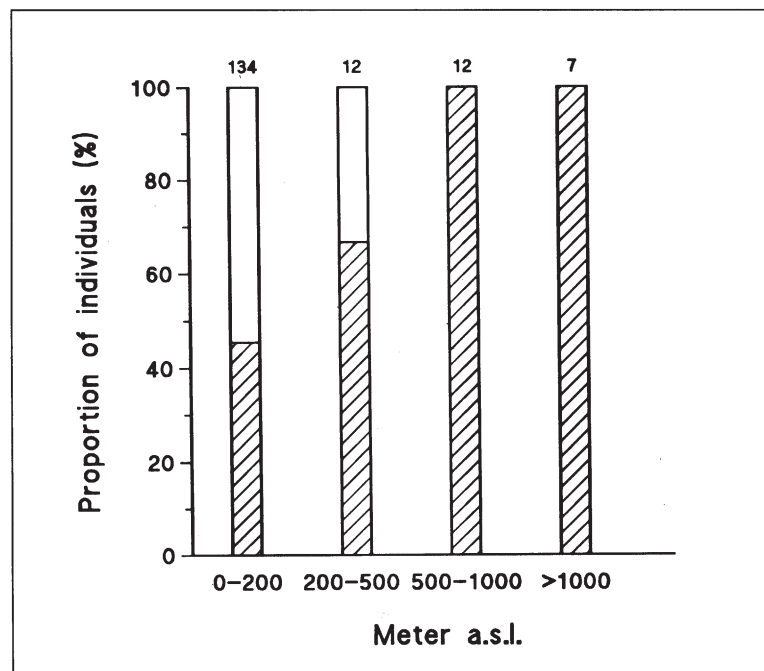
eradicated the coniferous forest a few years earlier. The distribution of frogs and toads below and above 200 m a.s.l. was significantly different from a random distribution ( $\chi^2 = 17.6$ , d.f. = 1,  $p < 0.001$ ). Toads constituted 54.5 % of the material below 200 m a.s.l. and 12.9 % above 200 m (Figure 2). No toads were found above 500 m a.s.l. About 95 % of the toads and 69 % of the frogs were found below 200 m.

## Discussion

The results indicate a large degree of habitat segregation by the two amphibians. Only a few sites housed both species, and the two species differed in habitat use and in their altitudinal distribution. Toads were restricted to lowland regions and were found most frequently in coniferous forests and in cultivated land. Frogs were found in a wide range of altitudes and were most frequent in deciduous

forests and humid habitats. It is not known whether such differences are due to differences in climate tolerance limits, food preferences or habitat requirements (for example shelter), or to interspecific competition. Also, the distance the two species walk from the breeding pond may differ. Because sampling of the material used in our study was opportunistic, the various regions and habitats were not equally sampled. Thus, our results only give the proportion of the two species, and not their density.

Amphibians may occupy a variety of habitats, but some preferences seem to exist. Strijbosch (1980) found that *Rana temporaria* in the Netherlands preferred cultivated and humid regions during the terrestrial phase, and Heusser (1968, cited in Strijbosch 1980) found that this species in Switzerland preferred woods and humid grassland. Toads preferred habitats influenced by man in the Netherlands (Strijbosch 1980), and woods in



**Figure 2**  
Proportion of *Rana temporaria* (hatched) and *Bufo bufo* found at different altitudes in West Norway. Total sample size above each column.

Switzerland (Heusser 1968, cited in Strijbosch 1980). Regional differences in within-species habitat selection may occur, or the woods in the Netherlands may have been less suitable for amphibians than those in Switzerland. Kauri (1970) suggested that the frog in Norway prefers cultivated land or grassland and evade coniferous forests, while the toad is more of a generalist but evades larger marshes (see also Curry-Lindahl 1946, Ravkin 1976, Pavignano et al. 1990). These conclusions are supported by our results from West Norway. We encourage further investigations on the biogeography of these two species, which are vulnerable to environmental degradation and pollution (Dolmen 1986).

## Acknowledgements

We are very grateful to all the persons who submitted information about frog and toad sightings. Two reviewers gave helpful comments on the manuscript.

## Sammendrag

### Habitat-bruk hos frosk og padde i Vest-Norge i den terrestre fasen.

Karl Frafjord & Ingvar Byrkjedal

Frosk og padde, *Rana temporaria* og *Bufo bufo*, er de vanligste amfibiene i Norge, men det finnes lite kunnskap om deres utbredelse og forekomst. Vi undersøkte valg av terrestrisk habitat i Vest-Norge (fra Rogaland til Møre og Romsdal) ved å undersøke individer i samlingene ved Zoologisk Museum i Bergen, samt ved å analysere spørreskjemaer utfylt av pålitelige personer. Frosk og padde ble for det meste funnet på forskjellige lokaliteter, og begge artene ble funnet sammen på kun 10% av lokalitetene. Padde foretrakk i større grad barskog og kulturlandskap enn

frosk, mens flest frosker ble funnet i løvskog og mer fuktige omgivelser. Kun frosk ble funnet høyere enn 500 m.o.h. på Vestlandet.

## References

- Curry-Lindahl, K. 1946. Något om den vanliga paddans, *Bufo b. bufo* (L.), den vanliga grodans *Rana t. temporaria* L., och åkergrodans, *R. a. arvalis* Nils., biologi. Svensk Faunistisk Revy 7-8: 41-55.
- Dolmen, D. 1978. Norsk herpetologisk oversikt. K. norske Vidensk. Selsk. Mus. Rapport Zool. Ser. 1978-10.
- Dolmen, D. 1986. Norwegian amphibians and reptiles: Current situation 1985. Pp. 743-746 in Roček, Z. (ed.). Studies in Herpetology. Prague.
- Kauri, H. 1970. Amfibiene. Pp. 314-333 in Frislid, R. & Semb-Johansson, A. (eds.). Norges dyr. Bind 3: Fisker, amfibier, krybdyr. J.W. Cappelen's Forlag, Oslo.
- Pavignano, I., Giacoma, C. & Castellano, S. 1990. A multivariate analysis of amphibian habitat determinants in north western Italy. Amphibia-Reptilia 11: 311-324.
- Ravkin, Yu.S. 1976. Numbers and distribution of amphibians in the forest zone of western and central Siberia. Soviet J. Ecol. (Ekologiya) 7: 430-438.
- Semb-Johansson, A. 1989. Padden (*Bufo bufo*) - Et stebarn i norsk zoologi. Fauna 42: 174-179.
- Strijbosch, H. 1980. Habitat selection by amphibians during their terrestrial phase. Brit. J. Herpet. 6: 93-98.