

Review of Namibian Anuran Diversity

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ABSTRACT

Namibia is the most arid country south of the Sahara, yet 45 species of anurans are known, and a further 15 are expected to be found there. The northern assemblage consists of highly water-dependent species in the Caprivi that originate from rich faunas in Angola, Zambia, Zimbabwe, Malawi, Mozambique and Zaire. The southern assemblage which is partially arid-adapted originates from the rich Namaqualand fauna as well as from the Orange river watershed. A third assemblage is made up of broad-ranging terrestrial *Bufo* and *Tomopterna* species. Namibia's endemic fauna consists of fossorial dwarf bufonids. Although many Namibian frogs are arid-adapted, the influence of perennial rivers as conduits for species is probably the most important factor determining the present distribution patterns.

INTRODUCTION

Namibia is the most arid country south of the Sahara (Seely & Jacobson 1994). Water is habitually scarce and is the primary limiting resource in most agricultural schemes and many development and industrial initiatives. Perennial rivers occur only on the northern and southern borders, and wetlands make up approximately 5% of the entire country. Since the country is generally bordered by more mesic regions, a sizable proportion of Namibia's biodiversity is either wetlands-associated or wetlands-dependent (Griffin & Grobler 1991; Griffin & Channing 1991; Williams 1991), and due to their dependence on this scarce and vulnerable resource, a large proportion of these species are of high national conservation concern (Brown *et al* in press). As a group, anurans are second only to fish in this regard. Anurans are well known as indicators of environmental health, and due to the demand for fresh water in Namibia, wetlands themselves, along with associated fauna, are extremely vulnerable. Wetlands and wetland-associated species have thus received a disproportionate (but not unwarranted) amount of concern and research in Namibia. This is a review - a more detailed report will be published later.

METHODS

As part of the national long term programme to define the conservation status of all Namibian species, species-locality records are continuously collected, both opportunistically and systematically. This data base was most recently presented by Channing & Griffin (1993), and an updated version was used for this report.

The values presented in Figure 1 were determined by the number of species known to occur within each block, plus those which are expected to occur. This includes river-associated species which may be very restricted within the block and therefore may not be characteristic of the region in general. Records of non-breeding vagrants have not been included.

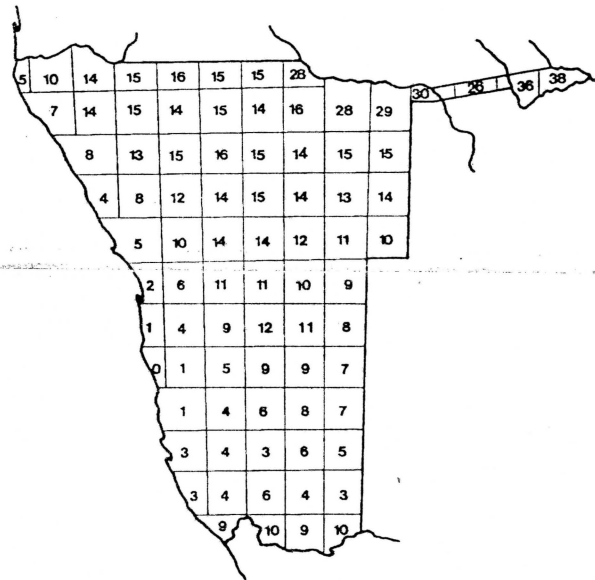


FIGURE 1: The numbers in each block represent the number of frog species known to occur plus those expected to be there.

RESULTS

Forty-five species of anurans are known to occur in Namibia: Bufonidae (11 species), Hemisotidae (1 species), Pipidae (3 species), Ranidae (20 species), and Rhacophoridae (1 species). Another 10 to 15 species are expected to occur in the country. See Channing & Griffin (1993) for detailed accounts of each species.

Figure 1 illustrates the expected species richness for each of 81 artificial blocks.

DISCUSSION

Although many anurans have developed life cycles minimizing the need for water, none have broken away entirely, and at the very least soil moisture is required. Namibian rainfall increases from west to east, and from south to north. Namibian anuran diversity increases along with rainfall (Figure 1).

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However, even in the hyper-arid desert on the west coast, where it often does not rain for several years in succession, water is not the limiting factor; the only areas where frogs do not occur in Namibia are the sand seas of the northern and southern-central Namib Desert, and here the windblown sand dune substrate appears to be the limiting factor. Standing water is rare, but moisture is abundant due to the Benguella current-induced fogs (Olivier 1992). The Desert Rain Frog (*Breviceps macrops*) occurs in sandy habitats (but not wind-active high dunes) throughout the extreme southern Namib, but appears to be limited by high dunes and the winter rainfall regime. Thus far none have been found north of Lüderitz, in the predominantly summer rainfall dune area. This species, like others in the genus, is not dependent on free water to complete the breeding cycle.

Due to unpredictable rainfall, frogs in arid areas have developed strategies for breeding (Channing 1976) and species normally associated with permanent water sources have successfully colonized ephemeral wetlands (Dudley 1978; Loveridge 1976).

Besides the Namib sand seas, the lowest species diversity is in the Kalahari-Karoo region. This is probably due to a combination of lack of habitat variety and permanent wetlands, with a very high evaporation rate, exceeding 3800 mm per year in some places (Anon 1988).

Perennial rivers act as linear oases, by introducing uncharacteristic habitat into otherwise dry areas. In this way rivers act as conduits for species dispersion. The frog faunas of the Caprivi for example are a subset of frog faunas further upstream in Angola and Zambia.

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