The reappearance of *Taudactylus* (Anura: Myobatrachidae) in north Queensland streams

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Seven species of frog are currently considered to be missing from the eastern seaboard of Queensland, Australia. Two species of these missing frogs were rediscovered in streams in the wet tropics of north Queensland in November 1996. One individual of *Taudactylus acutirostris* was observed calling in a small tributary of the South Johnstone River, five individuals of *T. rheophilus* were heard calling in a small, high altitude tributary of the Mulgrave River, and a further seven individuals of *T. rheophilus* were heard calling and one captured, in a small, high altitude tributary of the Mitchell River. Implications for the declining frog phenomenon are raised and the need for continued monitoring is emphasized.

Key words: Frogs, Extinction, *Taudactylus*, North Queensland.

INTRODUCTION

SEVEN species of frog from the eastern seaboard of Queensland, Australia are believed to have undergone rapid population declines and are currently considered to be "missing" (McDonald *et al.* 1991; Ingram and McDonald 1993; Richards *et al.* 1993; Trenerry *et al.* 1994; Laurance *et al.* 1996). Various factors have been proposed as the cause of these declines, including climate change, irregular weather patterns, pollution and epidemic disease (Czechura and Ingram 1990; Richards *et al.* 1993; Laurance *et al.* 1996). Natural population fluctuation may also explain the observed patterns and is acknowledged as a possible cause by some authors (Czechura and Ingram 1990; Richards *et al.* 1993). Difficulties arise in attempting to determine whether catastrophic events or natural fluctuations lead to population declines when long-term demographic data for each species are not available (Pechmann and Wilbur 1994). These data have not been collected for any of Australia's "missing" frogs, yet the assumption appears to have been made that a catastrophic mechanism must be responsible (Ingram and McDonald 1993; Richards *et al.* 1993; Trenerry *et al.* 1994; Laurance *et al.* 1996).

Four of the six species within the genus *Taudactylus* Straughan and Lee, were not recorded in recent surveys of their known habitats (McDonald *et al.* 1991; Ingram and McDonald 1993; Trenerry *et al.* 1994). One of these species, *T. eungellensis* Liem and Hosmer, was rediscovered in 1992, six years after going "missing" (Couper 1992) and has since been recorded several times (Hero 1996, pers. obs.). Three species of *Taudactylus* which are currently considered to be "missing" are *T. acutirostris* (Andersson), *T. diurnus* Straughan and Lee, and *T. rheophilus* Liem and Hosmer. The respective dates on which these species were last recorded in the wild are November 1994 (M. Ponniah and L. Roberts, pers. comm.), January 1979 (Czechura and Ingram 1990), and October 1991 (Richards *et al.* 1993). In this paper new records of two of the "missing" *Taudactylus* species are presented.

STUDY AREA AND METHODS

Rainforest streams in the wet tropics of north Queensland were surveyed for aquatic fauna between 28 October and 4 December 1996. The study area included the Bellenden Ker Range in the south, the Lamb Range in the centre, and the Carbine Tableland and Mount Pieter Botte in the north. All areas were within the Wet Tropics World Heritage Area and were Crown land, being either State Forests or National Parks. Nine upland tributaries of the South Johnstone River, Mulgrave River, Barron River, Mitchell River, McLeod River, Mossman River and Roaring Meg Creek catchments were included in the study. Streams were typically high gradient (>33%) and fast flowing with a substrate of coarse sand, cobbles and large boulders. Adult anurans were incidentally sampled by sight and sound while collecting aquatic organisms. Individuals were identified in the field using recognized taxonomic references (Cogger 1992; Barker *et al.* 1995). Calls were compared with published descriptions and recordings (Hero 1995). Sampling was conducted between 0800 h and 2200 h at each location with most effort before 1800 h.

RESULTS AND DISCUSSION

Two species of frogs currently considered "missing" were located during the sampling period including one individual of *T. acutirostris*

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Table 1. Details of *Taudactylus* records from north Queensland.

Species	Location	Altitude/ Latitude/ Longitude	Date/Time	Weather conditions	Number heard	Calling position	Other species present
Taudactylus acutirostris	Order 2 tributary of the South Johnstone River, 7 km S of Millaa Millaa township	800 m 17°36'01" S 145°38'00" E	7/11/1996 2130 hr	Raining, sporadic showers for previous 3 days	1	Under low vegetation at side of stream	*Cophixalus ornatus* *Sphenophryne robusta*
Taudactylus rheophilus	Order 1 tributary of the Mulgrave River, 600 m SE of Mt Bellenden Ker Centre Peak	1 250 m 17°16'03" S 145°51'42" E	11/11/1996 1600–1800 hr	Fine and clear, fine since 8/11/1996	5 along 150 m of stream	Between or under boulders in stream bed	None heard or seen
	Order 1 tributary of the Mitchell River, 15 km E of Mt Carbine township	1 100 m 16°30'41" S 145°16'00" E	23/11/1996 1400–1800 hr	Fine and overcast, fine since 8/11/1996, brief storms on 17/11/1996 and 19/11/1996	7 along 50 m of stream	Between or under boulders in stream bed	*Mixophyes schevilli* *C. ornatus* *C. concinnus* *C. hosmeri* *S. fryi*

on 7 November, 1996, five *T. rheophilus* on 11 November, 1996 and a further seven *T. rheophilus* on 23 November, 1996. The location of sites where the frogs were found fell within the known distribution of both species (McDonald *et al.* 1991; Cogger 1992; Hero and Fickling 1994; Barker *et al.* 1995) (Table 1).

The male *T. acutirostris* was calling from a relatively exposed position on a rock under overhanging vegetation beside the wetted area of the swiftly flowing stream (Table 1). The nature of the habitat and position of the calling frog were typical for this species (Hero and Fickling 1994; Barker *et al.* 1995). This site was revisited on 26 November, 1996 and on this occasion no frogs were observed or heard.

All *T. rheophilus* were hidden from view and called from small gaps between or beneath boulders which were at least 1 m in diameter. Boulders such as these comprised approximately 75% of the stream beds. One of the calling *T. rheophilus* was captured from a small tributary of the Mitchell River 15 km east of Mt Carbine township (Table 1). It was immediately photographed and released at the place of capture (Fig. 1). The small tributary of the Mitchell River was revisited on 24, 29 and 30 November, 1996 and on these occasions no *T. rheophilus* were observed or heard.

Fig. 1. Taudactylus rheophilus male from a small tributary of the Mitchell River.

The observations documented herein did not result from an intensive search of the streams of the Wet Tropics in a deliberate attempt to locate the "missing" frogs. They are incidental records made while conducting field work to collect stream invertebrates and would probably not have been made had the streams been visited on different days. This was demonstrated by the apparent absence of *Taudactylus* from the same location in the streams on subsequent visits. It would be unwise to assume that a chorus of frogs heard one afternoon had vanished in less than 24 hours. The cryptic nature of these species and the habitats where they occur make assessing the status of populations extremely difficult. If males were not calling, it would be virtually impossible to know whether or not they were present. One of the fundamental problems with conducting a census of adult anuran populations in these habitats is the dependence upon the detection of calling males or encountering actively moving individuals. This problem becomes much greater when densities of target species become very low as is the case with the seven species of "missing" frog in Queensland.

Implications of the rediscoveries for the declining frog phenomenon within Australia should be considered. Firstly, if a scenario of catastrophic decline is accepted then these findings may represent either: a) small remnant populations that have not yet been exposed to the factor/s causing declines; b) populations exposed to the factor/s and are about to

disappear; or c) populations that have survived exposure and are recovering from catastrophic declines.

Secondly, if the observed declines were in fact the result of natural population fluctuations (see Pechman and Wilbur 1994), it would be expected that the reappearance of individuals indicates that the population is now increasing. Contrary to the usual presumption that populations have crashed to unusually low levels (e.g., Czechura and Ingram 1990; Richards *et al.* 1993; Laurance *et al.* 1996), perhaps in these species we have observed falls to a normally low abundance after an extended period of high abundance.

In light of the reappearance and subsequent recovery of populations of *T. eungellensis* there must be optimism that these species will similarly increase in number. This would present an invaluable opportunity, no matter what the cause of decline, to examine the fundamental ecological processes affecting population dynamics. To continue monitoring populations and collecting long-term demographic data is the first step in this process.

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