

## 8. Abundance of *Rana curtipes* around Luckunda Estate, Coorg

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Casual observations on several aspects of the ecology of *Rana curtipes* suggested that different survey techniques were required to estimate its abundance. Although common and widespread in the estate, it was absent from most of the water bodies surveyed in this study and most often observed in grass or leaf litter. Males were widely spaced, began calling in late afternoon, appeared much earlier than other members of the community, and observations suggested that they ceased activity earlier in the evening (although this was not supported by pitfall data - see chapter 5). This animal is probably the coolest amphibian in Coorg. Frogs with a very similar pattern and colouration are encountered on forest floors in many parts of the world, but *R. curtipes* is noteworthy for its particularly beautiful appearance, its tolerance of observers and gentle, complex and harmonious call. The frog is endemic to Kerala and south Karnataka (Dutta 1997)

### Methods

300m<sup>2</sup> transects (150 X 2 m) were searched for *R. curtipes* at four sites in the estate. Transects were searched at least four times a day for two days, at the same times in the late afternoon and early evening wherever possible. Specimens found were marked by toe clipping and any recaptures noted. Total population size was estimated using the Schumaker and Eschelmeyer method. Sites were: sacred grove, “pipes”, pond Site 2 and the elephant trench between the estate and Nagarhole National Park. Locations are given in Map 2.

### Results

At the sacred grove a total of 23 individuals were recorded, with a total of 16 recaptures. Total Schumaker population estimate is 30 (95% confidence limits 19-67). There were no differences in numbers captured at different times of the day. At the elephant trench 27 frogs were captured a total of 58 times. Schumaker population estimate was 28 (22-41). There was no difference in numbers captures at different time of the day. At the pipes 82 frogs were caught a total of 147 times. Schumaker population estimate was 155 (132-187). Number of captures rose later in the afternoon (Fig. 1). At Lake 2 thirty one frogs were caught with no recaptures. Number of frogs caught increased with time of day, but the data set is small. There was no evidence of clustering within transects at any site.

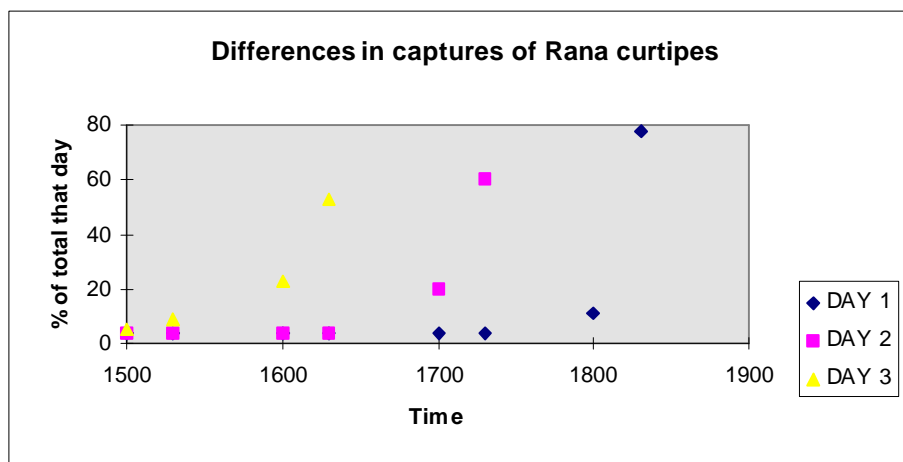


Fig 1. For “Pipes” site

### Discussion

The results confirm casual observations that *R. curtipes* is a common frog in some areas and that, at sites close to water, activity increases towards early evening. These sites tended to be open and the

frogs probably shelter in boggy vegetation close to streams or underneath objects and migrate towards still water bodies towards evening. The high density of frogs at the pipes site (estimated at 517 individuals per ha) may have been due in part to daytime clustering under the concrete pipes. Away from water bodies, where vegetation formed canopies, the frogs were also present, but at lower densities (97 per ha) and in equal numbers at all times surveyed.

However the species was absent from most parts of the estate, and was not recorded at any pond site other than lake 2. Possibly the large tadpoles require deep water. The lack of clustering within transects supports our observations that males of *R.curtipes* are territorial. On one occasion we observed what appear to be highly ritualised behaviours between two males and it seems likely that rivals actively defend territory from one another.

Given the limited distribution of this frog, its unusual habits and considerable aesthetic appeal, it would make an ideal subject for behavioural studies.

## 9. Remarks on marking frogs

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Inflicting permanent or temporary marks on animals is a prerequisite of any method of determining abundance where animals may be encountered more than once. Marking amphibians presents particular problems on account of their sensitive, permeable skins and general fragility, which demands that handling be kept to an absolute minimum. In the present study toe-clipping, tagging and individual differences in pattern were used to prevent pseudoreplication in various parts of the study. Each method was initially tested by applying it to animals held in captivity for at least two days and noting any changes in their behaviour or appearance. No problems were encountered, but with the exception of toe-clipping for the very large frog *Hoplobatrachus tigerinus*, none were entirely satisfactory in the field and one was disastrous. Eight rhacophorid frogs marked with an elastic band around the waist disappeared the following night and only one was subsequently recaptured, several weeks later and showing evidence of rubbing wounds around the band. It is certain that the other animals perished as a result of marking. Several *Rana curtipes* marked by toe clipping were later observed to have developed swelling in the sumps of amputated fingers. Other individuals that had lost digits naturally were encountered and appeared in generally poor condition. Toe clipping is almost certainly a painful procedure, but anaesthetising animals in the field is not practical, in my experience. Identification based on individual appearance must refer only to pattern, not colouration, and is tenuous when populations are large or lack distinctive patterns. Furthermore it is time consuming and admits a large opportunity for error.

Conversations with other field workers support my belief that behavioural changes and detrimental effects of marking are under represented in the literature. Rigorous controls are required to demonstrate no effect when marking or attaching devices to animals, and the assumption that the manipulations are neutral because no adverse effects are noted is rarely justified in populations of wild animals.

The ideal method of marking would be applicable to all individuals in the community, regardless of size or habit. Of the variety of methods described in Heyer *et al.* (1994), those involving marking with dye seem most promising.