

3. RESULTS, DISCUSSION AND MAPS

3.1. SPECIES DISTRIBUTION MAPS

The main value in this report is the species distribution maps presented in Appendix B. These maps are my best estimation of the distribution of these species at the time of going to print. They are constantly being updated as new records are obtained. Any records with accurate spatial details and taxonomic identification can improve the maps, so feedback from anyone who has additional records is always welcome.

The maps are an amalgamation of a bioclimatic species distribution model that is then corrected by the combination of my knowledge of habitat preferences and the best-known biogeographic limits (e.g. I am highly confident that the Prickly Forest Skink, *Gnypetoscincus queenslandiae*, does not occur in the Mount Spec range even though there is suitable habitat and climate in that subregion). The maps are a mixture of an objective, quantitative model and expert knowledge. Obviously, there is still plenty of room for improvement through the discovery of extensions in distributions, especially in cryptic fauna like many reptiles, and through new knowledge on their degree of habitat specificity. Again, feedback on these aspects is welcome and will continue to improve our knowledge.

Another variable that affects the interpretation of the maps is the quantity of data for a particular species and the spatial spread of the records. Species with few records or many records that are clumped produce models that have poor resolution of the differences between the core, marginal and total range of a species. In these cases, the estimate of total range may be reasonable but the definition of the core area can be poor.

In general, the maps for the rainforest species (RF>3, see Key to Abbreviations and Codes Used in Table 4, Appendix A) are much better than forest generalist species because most of the latter have distributions outside the region and the model is much less accurate. Distributions in the uplands are better than the lowland predictions because there have been more field surveys conducted in the uplands. I am currently conducting standardised surveys across the available elevational gradient and this work will continue to improve the accuracy of the lowland mapping. However, I feel that the distributions of many species are underestimated in the lowlands and, as a result, species richness in the lowlands are also likely to have been underestimated. The overall relative pattern is realistic but the difference between upland and lowland is not quite as dramatic as the species richness maps suggest. Detailed, accurate elevational analyses are currently underway (e.g. bird diversity and abundance across altitude, Williams *et al.* in review).

There are minor errors associated with the spatial mapping of vegetation that is used to clip the bioclimatic models and a further source of variance in the estimates of habitat specificity of each species. When there was some uncertainty about the habitat preferences of a species or its biogeographic limits, the bioclimatic maps were not adjusted by habitat. Another problem is the scale of the maps, very small patches of rainforest are impossible to see at this scale and many species may still exist in tiny refugial patches or narrow riparian strips within these largely cleared areas, such as the Atherton Tablelands. However, any patches this small are not likely to be major populations when considering the overall distribution and conservation status of a species in the region. Some species, such as the cassowary, are capable of crossing non-rainforest habitats, so records will sometimes occur outside the shown distribution of rainforest habitat, even though that species' distribution has been clipped by the extent of closed forest. Although there are many sources of error, I believe that these maps are as accurate as possible given current knowledge and therefore provide the best representation to date of the fine-scale distribution of these species. I have

provided a subjective guide, based on my knowledge, to the reliability of each map as follows:

*	A useful guide, however delineation of core, marginal and range estimates is unreliable.
**	A reasonable map, with some delineation of core, marginal and range limits.
***	A good map, with lots of records, that is probably reliable in most aspects.

I have included species richness maps for each separate taxa, regional endemics, species that are listed on the *Nature Conservation Act 2001* and combined totals (Appendix B). These biodiversity maps should be treated as a spatial pattern rather than absolute numbers of species as they are compilations of the species maps, and since not all species could be mapped the numbers of species are not entirely accurate. However, I believe the patterns to be relatively robust and realistic. They are very useful in visualising the spatial distribution of biodiversity in the region and the hotspots of endemism, species richness and rare species. I hope they provide a useful management tool.

3.2. SPECIES RICHNESS

Tables 1 to 3 are simply descriptive statistics of the rainforest vertebrate fauna and are an updated version of the figures presented in Williams *et al.* (1996). The spatial patterns of species richness are shown in Maps 1-12 in Appendix B.

Table 1: Summary of terrestrial vertebrate species richness in the Wet Tropics by taxonomic class. Figures shown in parentheses indicate the percentage of the total number of species in Australia. Levels of endemism are expressed as the number of species endemic to the Wet Tropics biogeographic region, and regional endemism is the proportion of species that are restricted to the Wet Tropics. Edge species are those that primarily occur in adjacent regions and which only occur on the edge of the Wet Tropics.

Taxa	Number of Species (Percentage of Australian Total)	Number of Introduced Species	Number of Edge Species	Number of Families	Number of Endemic Species (Percentage of Regionally Endemic Species)
Mammals	117 (48%)	10	9	23	14 (12%)
Birds	338 (46%)	4	16	66	12 (4%)
Reptiles	161 (26%)	1	35	12	30 (19%)
Frogs	60 (30%)	1	5	5	27 (45%)
Total	676	16	65	106	83 (12%)

Table 2: Summary of the number of species by conservation status. Very Important Species (VIS) are those species or subspecies that are either endemic to the Wet Tropics and/or have a rare and threatened status (see Appendix A). Restricted endemics are Wet Tropics endemics that have very small distributions within the Wet Tropics, usually confined to a single subregion. Numbers of rare and threatened species follow the *Nature Conservation Act 2001* (E = Endangered; V = Vulnerable; R = Rare). Figures shown in parentheses in the VIS column represent the percentage of all species in each group within the region.

Taxa	VIS	Endemics	Restricted Endemics	E	V	R
Mammals	45 (39%)	14	1	3	14	7
Birds	46 (14%)	12	-	3	11	7
Reptiles	43 (27%)	30	9	-	20	3
Frogs	28 (46%)	27	8	7	13	1
Total	163	83	18	13	58	18

Table 3: Number of species that utilise rainforest to varying degrees in the Wet Tropics (refer Appendix A for species-specific specialisation rankings). Key: 0 = does not occur in rainforest; 1 = occasionally recorded in rainforest; 2 = use rainforest as sub-optimal/marginal habitat; 3 = commonly recorded in rainforest but not the species' core habitat; 4 = rainforest is a main habitat however also common in other forest environments; 5 = rainforest is core habitat however also occur in wet sclerophyll forests; 6 = rainforest obligate.

Taxa	Degree of Rainforest Specialisation						
	0	1	2	3	4	5	6
Mammals	47	13	9	14	4	7	13
Birds	185	34	23	28	22	37	9
Reptiles	69	8	13	37	11	11	12
Frogs	18	5	5	5	2	13	12
Total	317	60	50	84	39	68	46