Habitat preferences of the terrestrial vertebrate fauna of Weipa, Cape York Peninsula

Thesis submitted by
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in Oct 2004

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I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

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Preface

This detailed study of the terrestrial vertebrate fauna of an Australian tropical savanna woodland highlights the counter-intuitive biodiversity values of the open forest habitats of Weipa, and more generally the savanna habitats of Cape York Peninsula and Northern Australia.

The study is something of a rarity, in that across the full seasonal cycle it simultaneously, quantitatively and systematically recorded the observed distribution and abundance of almost two hundred terrestrial vertebrates.

Apart from the technical insights that the survey has provided, this surveying experience has introduced me to an ecology I had not previously appreciated, and many new ways of seeing. It was made possible by the staff of Comalco Aluminium Limited, and I particularly want to thank them and the traditional custodians for their support.

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Abstract

The mining of bauxite ore at Weipa on Cape York Peninsula in Australia requires total extinguishment of overlying native *Eucalyptus tetrodonta* open forest habitat, and its effect on biodiversity and ecological services is unknown. The remnant landscape consists of a mosaic of regenerating habitats, and a network of remnant and mostly protected habitat patches of rainforests, swamps and corridors of riparian habitats. Fringing these remnants is a halo (also referred to as ecotone) of otherwise extinguished woodland habitats which are located above bauxite ore that it is mostly uneconomic to recover. For some of these habitats this study compared patterns of incidence and abundance of one hundred and ninety-five species of small to medium terrestrial vertebrates - fourteen mammals, one-hundred and thirty-two birds, thirty-two reptiles and seventeen frogs. The study sampled thirty-two sites, and employed a sampling design stratified into two bauxite ore values (economic and uneconomic), three landscape positions (woodland, ecotone and riparian), three riparian habitat types (creek, swamp and marine) and two geographic regions (the operational areas to the north and south of Mission River).

On the question of the relationship of the fauna of *Eucalyptus tetrodonta* open forest habitat to underlying ore value, the results showed no significant difference in the incidence, richness, diversity or composition of the systematically surveyed fauna above economic and uneconomic bauxite. At the more detailed species-specific level, significant differences in abundance were observed for an uncommon gekko (*Heteronotia binoei*) found exclusively in open forest habitat, and a common dragon (*Diporiphora bilineata*) found in all surveyed habitats. Both of these species were more abundantly recorded in woodland habitat

above economic ore. The gekko *H. binoei* is widespread throughout the Australian continent, and is not considered threatened or vulnerable. The findings suggest that for the overwhelming proportion of the native terrestrial vertebrate fauna surveyed, in a variegated landscape the open forest habitat above uneconomic ore is most probably an effective substitute for open forest habitat above economic ore.

Unexpectedly, the survey found very strong evidence that the overall biodiversity of the fauna of the open forest habitat was as quantitatively rich as the terrestrial component of the vertebrate fauna of riparian habitats within the landscape, although overall abundances were higher in riparian habitats. The findings thus affirmed the importance of specifically and independently conserving woodland habitats in addition to riparian habitats, as part of any conservation strategy.

When analysed by class, the results confirmed that the bird, reptile and frog faunas of open forest and riparian habitats were significantly different, and that patterns of biodiversity between the classes did not coincide.

The survey further demonstrated that the vertebrate fauna of open forest habitat (ecotone) immediately adjacent to riparian habitats had a distinguishable and significantly different composition to that of woodland habitats (principally due to preferences amongst birds and the presence of mostly riparian frogs), and so it cannot simply be considered a substitute for woodland habitat being lost.

What was suggested from the detail of the survey was the particular affinity of the arboreal gekkos to open woodland habitats, which may be related to the presence of mature trees with their hollows and extensive bark sheeting. This raises concerns about the usefulness of treating areas of young regeneration as an effective

habitat replacement for these species, and to what extent the degree of landscape alteration will risk the viability of existing populations.

Although no richer in species, the survey found strong evidence that swamp faunas had significantly more individuals, and a distinctive bird and reptile composition, when compared to creek or marine faunas. The observation that many species were seen significantly more frequently in particular riparian habitats reinforces the significance of independently conserving all types of riparian habitats surveyed, which is the existing policy of the minesite operator.

The two regions that were being mined - Andoom and Weipa - had no significant difference in their total species richness, abundance or composition of their terrestrial fauna, despite the Andoom region having more swamp habitat than Weipa.

The most frequently recorded species was - sadly - the introduced Cane Toad *Bufo marinus*. The ascendancy of this species to its present level of abundance almost certainly explains the only conspicuously absent mammal from this study relative to earlier studies - the Northern Quoll *Dasyurus hallucatus*. The invasion of the Cane Toad is also the most likely explanation for an anecdotal record of a significant decline in varanid abundance by a traditional custodian.

Despite intensive and extensive mining disturbance, the native terrestrial vertebrate fauna at the time of the survey was substantially present when compared to earlier surveys, and the work has provided a solid basis for identifying and measuring threatening changes in distribution and abundance in future surveys.