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MAMMALS OF AUSTRALIA'S TROPICAL SAVANNAS: A CONCEPTUAL MODEL OF ASSEMBLAGE STRUCTURE AND REGULATORY FACTORS IN THE KIMBERLEY REGION

Dr Ian Radford[1], Professor Christopher Dickman [2]
[1]Department of Parks and Wildlife, [2]The University of Sydney

We construct a state-and-transition model for tropical savanna mammals in northern Australia to synthesize ecological knowledge and understand mammalian declines. We aimed to validate the existence of alternative mammal assemblage states similar to those in arid Australian grasslands, and to speculate on transition triggers. Based on the arid grassland model, we hypothesized that assemblages are partitioned across rainfall gradients and substrates. We also predicted that assemblages typical of arid regions in boom periods would be prevalent due to regular rainfall. Data from eight Kimberley WA mammal surveys (1994-2011) were collated. Survey sites were partitioned across rainfall zones and habitats. Three assemblage states were identified: State 0:-few mammals, State II:- rodent dominated and State III:- dominated by rodents and larger marsupials. Unlike arid grasslands, assemblage dominance by small dasyurids (State I) did not occur. Mammal assemblages were partitioned across rainfall zones and between substrates as predicted, but were not strongly related to yearly rainfall. Mammal assemblage composition showed high regional stability, probably related to predictable wet season resource pulses. As a consequence, we speculate that perpetually booming assemblages in savannas allow top-down control of the ecosystem, with suppression of introduced cats by the dingo resulting. Under conditions of low or erratic productivity, imposed increasingly by intense fire regimes and introduced herbivore grazing, dingoes may not limit impacts of cats on native mammals. These interacting factors may explain contemporary declines of savanna mammals as well as historical declines in arid Australia. We suggest approaches for explicit testing of transition triggers.

Most of Dr Ian Radford's career has been research on invasive plants. This includes work on rubbervine, prickly acacia and fireweed ecology or plant functional comparisons in Australia and New Zealand. Current research is on savanna fire ecology in Northern Australia, particularly mammals.