THE ECOLOGY OF SMALL MAMMALS IN PATCHES OF BANKSIA WOODLAND, WITH PARTICULAR REFERENCE TO FIRE.

M.J. Bamford and J.N. Dunlop
W.A. Institute of Technology

The effect of fire on small mammals is a subject which has only recently begun to receive attention in Mediterranean-type ecosystems, including the Banksia Woodland of the Swan Coastal Plain. The purpose of this paper is to describe a study which is currently in progress in this area and, with reference to the little data available, comment on problems of fire in management of small bush areas for the conservation of mammal species.

The study under consideration is being carried out on private property near Gingin, in Banksia Woodland similar to that once found through most of the metropolitan area. It is particularly suitable for a study on the effect of fire on small mammals because it has a comparatively full small mammal fauna of five native and one introduced species, and there are several areas of Woodland from which fire has been excluded for a long period. This fire exclusion has resulted from patchy clearing for agriculture which left small (75 to 150 ha) areas of woodland surrounded by unimproved pasture. Bush fire policy in the metropolitan region leads to burning at least every seven years nearer Perth.

The study is being carried out using pitfall traps and mark-release-recapture with the same effort, five nights per month, at each site. The post-fire periods of the four sites in the study at April, 1983 (when work began) were 0, 3, 11 and 20 years. Vegetation at the most recently burnt site was only just beginning to regenerate in August, so floristic comparisons can only be carried out between the three other sites. All sites have a similarly developed tree stratum dominated by Slender Banksia (Banksia attenuata), but they differ in the characteristics of their understorey strata. The three year post-fire areas have a low (under half a metre for the most part), dense understorey containing a wide range of species, while the twenty year post-fire area has a very dense, much taller understorey, up to two metres high in places, and this is dominated by Rough Honey Myrtle (Melaleuca scabra). The eleven year post-fire area is intermediate.

Trapping over the past five months has revealed that most of the small

mammal species are present in the three older areas, with no strong preferences as yet apparent (Table 1). However, Ash-Grey Mouse (Pseudomys albocinereus) seems to favour the floristically rich three year post-fire area and, to a lesser extent, the floristically poor twenty year post-fire area. Further work may shed some light on this aparent bimodality and may reveal habitat preferences in some of the other small mammal species.

Table 1. Numbers of small mammals caught at each of the Gingin sites from April to August, 1983.

Species	Site and Number of Trap-nights			
	20 Year (1250)	11 Year (1250)	3 Year (1250)	0 Year (1250)
Western Pygmy-possum (Cercatetus concinnus)	1	1	-	-
Honey Possum (Tarsipes rostratus)	3	3	4	-
Ash-grey Mouse (Pseudomys albocinereus)	4	1	7	-
Grey-bellied Dunnart Sminthopsis grisioventer	12	10	12	-
White-bellied Dunnart S. dolichura	-	-	-	1
House Mouse (Mus musculus)	2	2	1	1
No. of Species	5	5	4	2
Total Individuals	22	17	24	2

Mammal species richness and abundance between the Gingin sites and an area near Jandakot, where work was carried out some years ago by Davidge (1979), are compared in Table 2. The Jandakot site has lost its native rodents and Dasyurids, while the introduced House Mouse (Mus musculus) has greatly increased.

Table 2. Comparison of richness and diversity of small mammal species at Gingin and Jandakot.

Species	Capture per 1 000 Trap-night	
	Jandakot	Gingin
Western Pygmy-possum (*Cercatetus concinnus*)	-	0.47
Honey Possum (*Tarsipes rostratus*)	0.27	2.35
Ash-grey Mouse (*Pseudomys albocinereus*)	-	2.80
Grey-bellied Dunnart *Sminthopsis grisioventer*	-	8.00
White-bellied Dunnart *S. dolichura*	-	0.23
House Mouse (*Mus musculus*)	5.20	1.40
Total	5.47	15.29

The vegetation at the Jandakot site differs in some ways from that in the Gingin locality. Although it is diverse and relatively undisturbed, with little invasion by exotics, it has been subject to more frequent fires, having been burnt about six years before the study and subject to burns of that frequency for some time. Land surrounding the Jandakot study site had been subject to a similar fire regime, and most has been burnt in the last six years. Possibly, the periodicity of fires in the Jandakot area, while allowing for regeneration of vegetation, has been too frequent for mammal recovery, even with the existence of a mosaic of different aged vegetation.

In summary, the Gingin work shows the potential for small bush areas to support native small mammals, but the earlier Jandakot study suggests a problem with the use of fire in the management of such areas. It may not be sufficient just to maintain a mosaic of burn ages; it may be necessary to have mature or even (by examination of the vegetation) senescent areas to act as reservoirs from which recruitment can occur. It would seem that while mammals are able quickly to recolonize an area after fire, doing so

in under three years, their populations will be depleted and ultimately become extinct under fire regimes which advocate frequent burning.