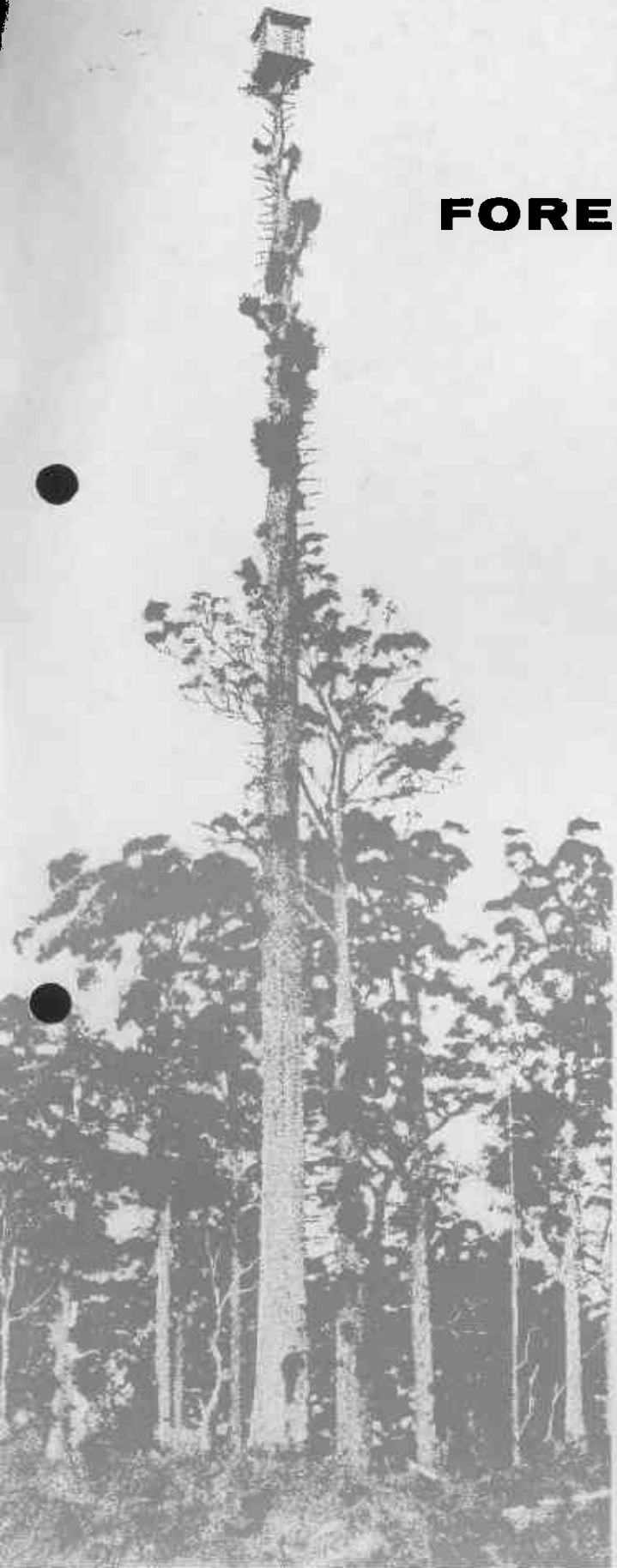

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FORESTS DEPARTMENT
OF WESTERN AUSTRALIA
54 BARRACK ST., PERTH

THE EFFECT OF PRESCRIBED BURNING ON THE FAUNA OF THE JARRAH FOREST

by

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SUMMARY

Preliminary studies in the northern jarrah forest of Western Australia indicate that the smaller mammals are concentrated in dense vegetation along drainage lines. The smallest animals, such as mardo, ship-rat, house-mouse and bandicoot can be caught most readily by box and Elliott traps. For the larger animals, in particular quokka, snares appear to be most effective. Certain rarer animals, such as numbat and phascogale, known to occur within the area, have not been trapped so far. Trapping in a valley prior to and after a prescribed burn revealed that the main effect of the fire is a relative increase in the number of indigenous mardos in relation to the introduced ship-rat.

INTRODUCTION

In Australia, prescribed burning is commonly used to reduce the risk of wildfires. This practice of fuel reduction produces certain unknown side effects, particularly on fauna. For instance, Hodgson (1970) has documented that fire plays a major role in the occurrence, distribution and conservation of acacias and heaths and the animal populations associated with them. He also points out that it is rare to see fire being deliberately used to conserve these ecosystems. According to Komarek (1966), "While the techniques developed by forestry and range management may well be useful in the management of the wildlife landscape, the needs of wildlife differ and experimentation in developing other techniques can be visualized. The forester seeks clean burns and complete coverage; wildlife burning may be less intense with incomplete coverage to provide sufficient cover until new growth appears. Season of burning, frequency of burning, purpose and size of burn for wildlife purposes do not necessarily coincide with needs of other land uses and, accordingly, will vary with species, habitat and region".

Since April 1971, the Dwellingup Research Section has been engaged in a study of the distribution and ecology of small mammals in the northern jarrah forest. The major objective of this research is to investigate the effect of prescribed burning on the forest fauna.

METHODS

The study has been set up in two stages. Stage 1 is an extensive trapping program to determine which mammals occur locally and what vegetation types they prefer. Part of this work includes a field evaluation of the effectiveness of a number of trapping techniques, namely noose and spring snares, box, pit and wire funnel traps, and collapsible Elliott traps. Several trapping techniques have been used in various vegetation types throughout the Dwellingup Division. To determine the effects of a wildfire that swept the area in 1961 on animal numbers and distribution, areas within and outside the burn are being trapped.

Stage 2 of the study is a periodic detailed survey of selected areas to assess the effects of prescribed burning and fire exclusion on the population patterns of the study species. Seven study areas have been selected: three of these were within the 1971 spring burn and the other four are scheduled for burning in spring 1972.

All study areas have been systematically live-trapped at regular intervals, both before and after burning, and captured mammals marked with metal ear tags for future identification. Vegetation assessments (see list (a)) by point density sampling have been periodically carried out on the areas to ascertain the effects of vegetation change on animal populations.

RESULTS AND DISCUSSION

Stage 1

Preliminary results for the first stage of the study, shown in Table 1, indicate that swamps and the denser vegetation associated with water courses are the preferred habitat of many of the small mammals and reptiles of the northern jarrah forest. Upland sites, in contrast, have been very unproductive during the survey, though some small mammals and larger macropods do frequent these areas. Failure to trap a species in a given area does not necessarily mean it is absent. If further investigation supports these results, then some system of deferred rotational burning for swamps could prove desirable to ensure adequate food and cover over a given area.

The effectiveness of various trapping techniques is still being tested. Box, Elliott and breakback traps have been satisfactory for trapping most small mammals, though the breakback trap is not being used in Stage 2. Snares appear to be the most effective for capturing larger mammals such as the quokka. Different pit trap designs are also being field tested, though they have not as yet been successful in trapping mammals.

Certain mammals that have not been trapped are thought or known to occur in the region. These include the brushtailed phascogale (*Phascogale tapoatafa*), brushtailed possum (*Trichosurus vulpecula*), south western pigmy possum (*Cercartetus concinnus*), numbat (*Myrmecobius fasciatus*) and an unidentified species of hopping mouse. The lack of success in trapping these species may be due to their low numbers on the ground, their shyness of traps, or both.

Stage 2

Stage 2 of the study is envisaged as a long term project covering a complete burning cycle of 4-6 years. Work on this phase of the study began in September, 1971 and short term results are available from the three study areas that were burnt in October, 1971.

Prior to burning, periodic trapping of the three areas along swamp edges produced relatively low numbers of mardos (*Antechinus flavipes* leucogaster) in comparison with the number of the introduced ship, or black, rat (*Rattus rattus*). After burning, a noticeable change occurred in the population numbers of both species, as Table 2 shows. (See list (b), for species names).

TABLE 1

Trapping Results: April 1971 – May 1972

SPECIES CAPTURED (New Individuals Only)		HABITAT					TOTALS
		SWAMP AND SWAMP EDGE	JARRAH UPLAND	UPLAND BLACKBOY FLATS	MURRAY RIVER BASIN	DARLING SCARP EDGE	
Mammals–							
Mardo	Male	40	1			1	42
	Female	33	6				39
Ship Rat	Male	58			1	5	64
	Female	28	1		2	4	35
Short-nosed Bandicoot	Male	2					2
	Female	8					8
House Mouse	Male	65			3		68
	Female	6			1		7
Quokka	Male	2					2
	Female	4					4
Water Rat	Male						0
	Female					3	3
Brush Wallaby	Male		1				1
	Female	1					1
Native Cat	Male						0
	Female	1					1
Feral Cat		4					4
Reptiles–							
Bobtail Skink		51					51
Smith's Skink		35	4				39
Gray's Skink		3					3
Mourning Skink		48	4			1	53
King's Skink		3					3
Leseur's Skink		1					1
Dugite Snake		2					2
Tiger Snake		1					1
Birds–		8					8
Captures		404	17	0	7	14	442
Recaptures		309	2	0	0	16	327
Total Catches		713	19	0	7	30	769
Trap Nights		12,738	954	301	220	353	14,566
Catch Rates (%)		5.6	2.0	0	3.2	8.5	5.3

TABLE 2
Trapping results for mardos and ship rats before and after prescribed burning

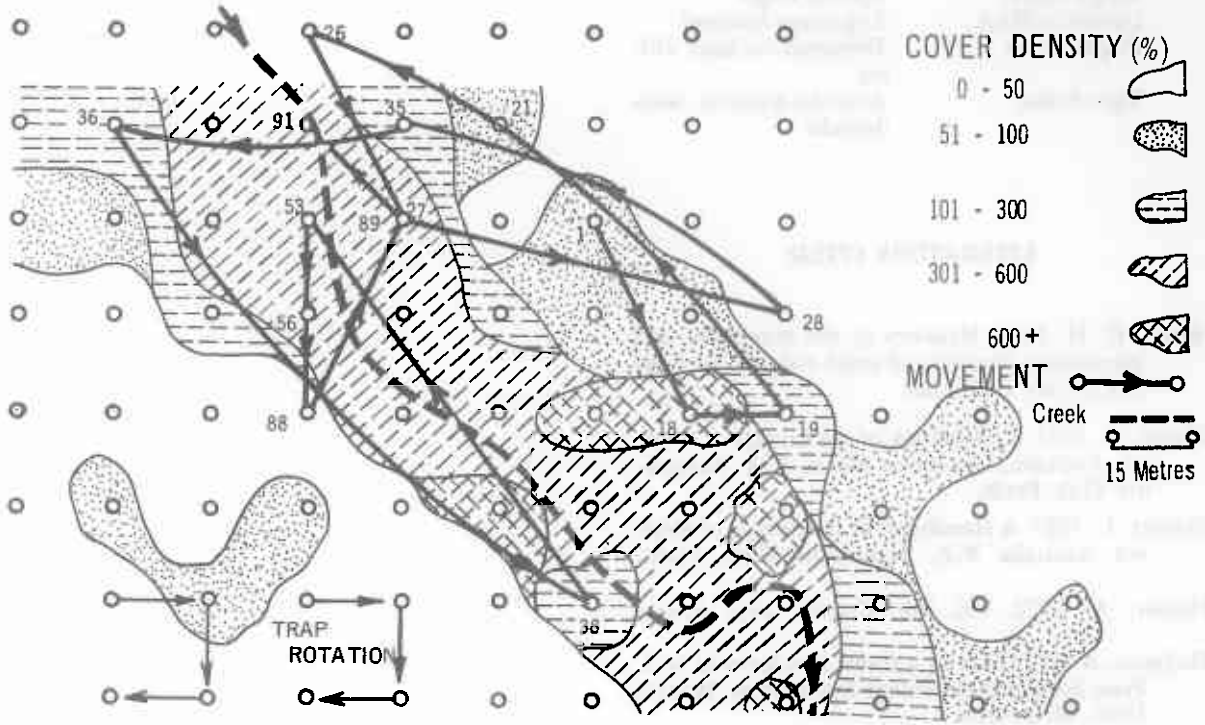
	Trap Nights	Mardo		Ship Rat	
		New Animals	Recaptures	New Animals	Recaptures
Before Burning	1,496	2	–	17	18
After Burning	1,475	14	7	3	7

It would be premature to attribute the increase in number of mardos entirely to burning. Pre-burn trapping was carried out during August and September; the adult population is normally low at this time because a large proportion of the male population dies after the breeding period in August (Woolley 1966, Leonard 1972, Recher 1972). When sufficient data becomes available, it will be possible to accurately assess the effect of prescribed burning on the population by adjusting for seasonal fluctuations.

Burning appears to be a major factor in the decrease in numbers of the ship-rat; our habitat studies revealed that this species prefers dense cover. Extensive reductions in ground cover may have caused the ship-rat to seek new territories in unburnt areas.

Rotational grid systems have been established on two areas that are scheduled for prescribed burning during the spring of 1972. This arrangement permits systematic trapping over a given area and makes possible detailed studies of animal movements and densities (Brant 1962; Ride 1970; Heisler 1972; Leonard 1972). In Figure 1, one of these systems is shown with a vegetation density map superimposed on the grid. In this example, the movement of the mardo is largely restricted to dense vegetation.

FIGURE 1: *The movement pattern of a female mardo on a trap rotation grid. The numbers by the trap sites are the days elapsed since the initial capture (day 1).*



(a) **Representative vegetation of the different habitats:**

Swamp and swamp edge: scattered overstorey of *Eucalyptus patens, E. megacarpa* and *Banksia littoralis,* dense understorey of *Xanthorrhoea preisii, Agonis linearifolia, Hypocalymma angustifolium* and several *Acacia* and *Lepidosperma* species.

Jarrah upland: dense overstorey of *Eucalyptus marginata* and *E. calophylla*, with a sparse understorey of *Macrozamia reidlii, Xanthorrhoea gracilis, Lasiopetalum floribundum, Bossiaea ornata* and several *Leucopogon, Hibbertia, Hakea* and *Daviesia* species.

Upland blackboy flats: treeless or with sparse, low overstorey of *Banksia grandis* and *B. littoralis,* understorey of tall *Xanthorrhoea preissii* and prostrate *Dryandra nivea.*

Murray River Basin: dense overstorey of *E. patens, E. calophylla* and *E. marginata,* dense understorey of *Macrozamia reidlii, Pteridium esculentum, Trymalium spathulatum, Bossiaea aquifolium* and *Acacia urophylla.*

Darling Scarp Edge: open overstorey of *E. marginata, E. calophylla* and *E. laeliae,* dense understorey of *Lepidosperma gladiatum, Macrozamia reidlii, Grevillea bipinnatifida, Hakea elliptica, H. trifurcata, H. lissocarpha* and several species of *Acacia* and *Melaleuca.*

(b) Genus and species names for the animals captured:

Mardo	*Antechinus flavipes*
Ship-rat	*Rattus rattus*
Short-nosed Bandicoot	*Isoodoon obesulus*
House mouse	*Mus musculus*
Quokka	*Setonix brachyurus*
Water Rat	*Hydromys chrysogaster*
Brush Wallaby	*Macropus irma*
Native Cat	*Dasyurus geoffroyii*
Feral Cat	*Felis catus*
Bobtail Skink	*Trachysaurus rugosus*
Smith's Skink	*Egernia carinata*
Gray's Skink	*Lygosoma labillardieri*
Mourning Skink	*Tiliqua luctuosa*
King's Skink	*Egernia kingii*
Lesueur's Skink	*Lygosoma lesueurii*
Dugite Snake	*Demansia nuchalis* affinis
Tiger Snake	*Notechis scutatus* occidentalis

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