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REVIEW OF FAUNA MONITORING AND RESEARCH ASSOCIATED WITH THE MANJIMUP WOODCHIP PROJECT

1. INTRODUCTION

1.1 Background to fauna research by the Forests Department.

Intensive fauna studies were started in 1970 in response to public criticism of the Department's prescribed burning policies. Fauna research was, therefore, oriented to an ecological basis from the outset, with particular reference to fire effects and responses. Initial projects were concerned with the commonest species found in the dry sclerophyll and wet sclerophyll forest formations which comprise most of the State forests. The species were the Mardo (Antechinus flavipes) and the Southern bush rat (Rattus fuscipes) respectively. The progression of work into other species is described in a later section of this review, where a greater discrimination in the selection of species to study will be evident. The decision on which species to study has been largely based on consideration of the expected level of adaptability to habitat changes brought about by forest operations, the least adaptable being selected. A restriction of this nature was inevitable because of the limited resources of the Department for fauna research. Further restriction was imposed by a lack of proven study techniques for some species. This factor although discussed later in the review, is emphasized here because the development of study techniques in itself has proved very demanding in terms of time and staff. When work was planned with the Quokka (Setonix brachyurus) for example, a live trapping technique capable of adequately sampling the scattered mainland populations took some months to develop.

Two natural characteristics of fauna populations have governed our approach and planning in the studies we describe later. Firstly animals are directly or indirectly (in the case of predators) dependent on vegetation for cover and as a food source, hence both plants and animals are studied integrally. Secondly a common source of error and misinterpretation in flora and fauna studies is the dynamic nature of plant communities and animal populations. Both fluctuate and change, even in the absence of outside interference. The concept of predictable change or succession is usually associated with the composition of plant communities. We have found it equally applicable to changes in vegetation structure and in the composition of fauna populations. This characteristic of biological communities generally requires reasonably long-term studies in order to quantify the degree of change, and to be able to separate it from changes due to other influences, forest operations for example.

1.2 Outline of the review

This review covers fauna research from its inception in the Forests Department to the present, as all is relevent to monitoring the effects of the woodchip operation. However, projects which were initiated specifically for woodchip monitoring are described separately. Projects planned for future implementation are listed and fields of study that would be better undertaken by other Institutions are discussed.

1.3 Objectives and Limitations to monitoring woodchip cutting effects.

1.3.1 Objective

We see the objectives of woodchip monitoring for fauna as:

a) The identification of species and their distribution, and the preparation of a check list of at least the mammals, birds, amphibians, reptiles, crustaceans and fishes represented in the woodchip licence area.

b) The detection of changes in fauna species and populations which can be attributed to forest cutting and regeneration operations and,

c) providing information which can be used to amend operation prescriptions in order to avoid changes in the fauna which may be irreversible or undesirable.

Objective (c) is essentially vague because of a lack of definition of an acceptable level of change. The W.A.W.I.A. may be able to advise on this point.

1.3.2 Limitations

The major limitation which we see affecting the immediate monitoring programme is that of the time taken for a given large area of forest, for example a complete forest block of 12,000 hectares, to be completely cutover. Among the safeguards nominated in the Environmental Impact Statement was the maximum dispersion of cutting coupes. This safeguard will ensure that adjacent coupes will be cut with a fairly lengthy period between them. The overall impact of a large area cutover and regenerated therefore cannot be assessed for this lengthy period of perhaps 5 years or more The efficiency of fauna refuges in the form of stream and roadside reserves and corridors will be subject to a similar delay in assessment. Our present approach to monitoring is to study a species on an isolated coupe and to extrapolate the findings to the wide-scale operation. We can see no better alternative to this approach at present, but we realize that it may be inadequate for some species.

2. FAUNA RESEARCH PRIOR TO THE WOODCHIP PROJECT

2.1 Surveys

Fauna surveys, which aim at determining the species present in an area and their relative abundance where possible, have been an essential adjunct to the research programme. Prior to our starting surveys, the fauna of State forests was poorly known with the exception of certain interesting areas such as Dryandra State Forest. We now have a fair knowledge of the fauna present in much of State forest, and surveys are continuing at the rate of two a year. The areas surveyed to the present are listed in Table 1.

2.2 General studies of fauna and fire.

Two projects were undertaken in 1970 to determine the reaction to fire and the effect of fire in modifying the habitat of the Western grey kangaroo (Macropus fuliginosus) and the Brush wallaby (M. irma). The latter study covered the whole of State forests and employed over 90 percent of Forests Department staff.

Table 1

Areas covered by fauna surveys

Forest Blocks	Locality	Vegetation types
Yeagarup	24 km S.W. of Pemberton	Sand dunes and inter-dunal swamps.
Nuyts, Inlet	South coast near Crystal Springs	Karri forest. Coastal heath and Banksia woodland.
Dombakup, Callcup	S.W. of Pemberton	Karri forest, and coastal associations.
North paddock, Lime Kiln, Couch, Central Old 14, Church, Buffer, Memberup, Webster	Ludlow area	Tuart forest
Boranup	30 km south of Margaret River	Karri forest and coastal associations
Brockman, Folly	Nannup	Pine plantations
Soho	30 km north of Walpole	Karri, Tingle, Jarrah forest and extensive flats.
Boonering, Lupton	40-60 km east of Dwellingup	Eastern jarrah and wandoo/powder bark forests.
Wearne, Gibbs	50 km south east of Kelmscott	Eastern jarrah and jarrah/wandoo forests.
Yourdamung, Palmer Fleays	Harris River area, north east of Collie	Jarrah and jarrah/wandoo forests.
Saddleback	20 km south west of Boddington	Jarrah and jarrah/wandoo forests.
Boronia, McCorkill, Whicher, Cambray, Bovell, McGregor. Molloy Punch, Kingia	In the triangle Nannup, Margaret River and Busselton	Donnybrook Sunkland plant associations
Yendicup, Moopinup, Yackelup, Camelar, Chariup, Boyicup, Meribup.	40-80 km east of Manjimup between the Tone and Perup Rivers.	Eastern jarrah and jarrah/wandoo forests
Marrinup, Holyoake, Inglehope, Plavins	Dwellingup area	High rainfall jarrah forest and the Darling escarpment.
Skeleton Frank (1) Peters Dryandra Smith Congelin	Dryandra State Forest 28 km north of Narrogin	Eastern wandoo and powderbark forests
Highbury (1)	25 km south of Narrogin	Eastern wandoo and powderbark forests
Russel (1)	40 km east of Kelmscott	Wandoo forest

(1) Surveyed by Mr. H. Butler under contract to the Forests Department.

2.3 Seasonal and annual fluctuations in population levels.

Short and long-term fluctuations in population levels of the Grey kangaroo, Brush-tailed possum (Trichosurus vulpecula), and Ring-tailed possum (Pseudocheirus peregrinus) have been continuing for over 2 years in the jarrah forest of the Perup Fauna Priority area.

2.4 Detailed studies of the ecology of selected mammal species.

2.4.1 Mardo (A. flavipes). Investigated in detail for over 2 years in the Dwellingup area by live-trapping and marking. The project is continuing on a reduced scale.

2.4.2 Southern bushrat (R. fuscipes). The project commenced in 1971 near Pemberton and is continuing. Live trapping and marking techniques are used.

2.4.3 Quokka (S. brachyurus). The main study was conducted in the Dwellingup area over a period of more than two years; live trapping and marking techniques were used. Additional work using radio-tracking was done near Manjimup.

2.4.4 Woylie (Bettongia penicillata)
Tammar (M. eugenii)
A very detailed study of these two species is continuing using trapping and radio-tracking techniques. The coverage of the study includes:

a) The distribution in southern forests
b) The relationship between distribution and habitat factors.
c) The behaviour of individuals in a fire
d) The short-term effects of fire on populations and individuals.
e) Food preferences.
f) Predation

2.5 Birds

The effects of intense prescribed burns on bird populations and species have been studied in jarrah forest near Dwellingup and in Karri forest near Pemberton. The latter study is continuing and relates changes in bird population levels to changes in vegetation structure.

A detailed study of the feeding habits of the Purple crowned lorikeet (Glossopsitta porphyrocephala) was made in the Karri forest.

2.6 Other species

During the studies described above, other species of animal were frequently caught and recorded. A considerable body of information on distribution and habitat preferences has been amassed for birds, snakes, lizards, frogs and for two mammal species in particular; the Common dunnart (Sminthopsis murina), and Short-nosed bandicoot (Isoodon obesulus)

2.7 Soil fauna

An extensive study to compare soil fauna populations in burnt and unburnt samples of a wide range of forest types was completed between 1971 and 1973.

2.8 Results and information

A list of publications relating to the above studies is given as an appendix to this review. Further information is available from internal Forests Department reports.

3. RESEARCH AND MONITORING FOR THE WOODCHIP PROJECT

3.1 Work in progress or completed

3.1.1 Fauna in regenerated karri forest

A study of the changes in flora and fauna populations associated with clear felling and regeneration was recently completed over a series of different aged ~~stands~~ stands of karri. The conditions ranged from recently clear fallen (but leaving seed trees), through sapling and pole sized regeneration to mature karri forest. Mammals, birds, and insects were covered in detail, and some limited information was obtained on reptiles. The insect studies were planned and supervised by Mr. S. Curry, Entomologist, Department of Agriculture.

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This project covered a period of 19 months, was completed in October 1975 and is now being written up. The various forest conditions studied were the result of felling and regeneration operations identical to those of the woodchip project.

3.1.2 Monitoring cutting effects on birds

Plots of ± 15 hectares are being established in the three main forest types of the chipwood licence area to determine the effects of cutting on bird populations in the actual chipwood operation. This project covers karri forest marri and karri mixtures, and jarrah forest.

The plots are gridded into 50 metre square sub-plots to facilitate the location of all resident breeding birds. Assessments are taking place annually for two years before cutting and for an indefinite period after.

To date the plot in jarrah forest has been established and the breeding population for the current season has been fairly well recorded.

3.1.3 The occupancy of tree hollows by fauna

One of the major impacts of the heavy cutting for chipwood may, perhaps, be a reduced number of tree hollows available for hole-nesting birds and for arboreal mammals. This aspect cannot be investigated fully until a sizeable area has been cutover. However, we have established a preliminary study to determine the percentage of suitable tree hollows that are occupied by birds or mammals. Investigations have been restricted to karri so far, but it is planned to include marri and jarrah in the project.

The criterion of suitability of a hollow remains to be defined. The dimensions of all hollows are measured, their internal condition is noted (e.g. wet or dry), and the aspect of the entrance is measured by compass bearing. Once a reasonable number of occupied hollows has been assessed, we will have a guide to the factors determining suitability.

3.2 Relevant work by other organizations

Some researchers in other organizations are working in fields that may have direct or indirect application to the chipwood project. Relevant work that is known to us is as follows.

Dr. Major - W.A.I.T. - Mardo stomach contents

Dr. Saunders - C.S.I.R.O. - White-tailed black cockatoo (Calyptorhyncus baudinii)

Mr. Long - A.P.B. - Red-capped parrot (Purpureicephalus spurius)

Dr. Start - Dept. Fisheries & Wildlife - Potoroo

3.3 Future monitoring and research projects.

Monitoring work will be limited for some years by the dispersion of cutting with only isolated coupes available for study. These will inevitably suffer edge effects, particularly in karri where the maximum coupe size of 200 hectares will ensure that uncut forest occurs no more than 700 metres from the centre of the coupe. For this reason we propose only a limited level of monitoring for the next two or three years directed mainly at reptiles, amphibians and possibly fish which thus far have received less attention than the mammals and birds.

The projects planned for commencement in the next one or two years are listed below.

3.3.1 Exploratory surveys will be conducted in the five coupes at present being monitored for their hydrological characteristics. The aim of the surveys is to determine the species present before cutting and changes that may take place following cutting. The project will continue for a number of years after cutting.

3.3.2 The swamp habitat preferred by the Quokka is generally little damaged by logging. Further studies are planned to determine whether this species has any dependence on the forest surrounding their swamp habitat.

3.3.3 The areas representing various stages in karri regeneration and mentioned in section 3.1.1 will be worked again to determine more precisely the populations of snakes, lizards and frogs.

3.3.4 The effect of clear cutting karri forest on stream water temperatures will be investigated concurrently with aquarium studies into the tolerance of indigenous fish to temperature fluctuations.

3.3.5 The investigation of trapping and study techniques for the more difficult mammal species. Among these we include the Common dunnart (S. murina) the Wambenger (Phascogale tapoatafa), the rabbit and the fox.

3.3.6 The development of improved sampling techniques for insects.

3.4. The involvement of other organizations

There are some aspects of fauna work which we consider essential to the woodchip monitoring project, but which may prove beyond the scope of Forests Department staff. Other organizations, particularly tertiary education centres would, perhaps be prepared to undertake research in these fields. We have listed some fields of investigation below.

a) Essential projects

i) The degree of dependence of the Purple-crowned lorikeet on karri flowers.

ii) The relative abundance of the Red-capped parrot in relation to the abundance of marri trees.

iii) A survey of insects in the woodchip licence area.

b) Desirable projects

i) A survey of frogs in the woodchip licence area.

ii) The effects of habitat alteration by forest cutting on the physiology of the smaller macropods.

APPENDIX

References to Published Material

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