Landnote

Department of Conservation & Land Management

GUIDE TO RESEARCH FINDINGS ON BIOLOGY AND ECOLOGY OF THE KARRI FOREST

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The attached paper is a response to earlier criticisims by the South-West Forests Defence Foundation that the biological and ecological research in the karri forest has been deficient. It serves as a valuable contemporary statement of the Department's view of the utility and priority of this research.

Most significantly this paper offers land management staff a very useful guide to the current research projects, and publications over the years reporting findings from research on karri forest ecology and biology, and karri silviculture and forest management.

Biological and ecological research in the karri forest.

1. Introduction

The South-West Forests Defence Foundation recently released a publication entitled "Biological and Ecological Research in the Karri Forest: What Needs to be done". Specifically, the Foundation listed six areas of research deficiency, as follows:

"1. although the karri forest is intensively used for timber production, the effects on it of logging are inadequately known;

2. although the karri forest is more intensively exploited than the jarrah forest, ecological and biological research on the karri forest is neglected by comparison with jarrah forest research;

3. much of the limited biological and ecological karri forest research done by the former Forests Department remains unpublished;

4. there are no quantitative or objective data that can be used to assess variability between or within karri habitat types;

5. existing reserves in the karri forest are not necessarily sufficient to preserve even the major vegetation units or site-vegetation types;

6. the karri forest is probably the least well-known floristically of any South-Western Australian ecosystem of comparable size."

This briefing paper discusses these criticisms of the Foundation.

2. Background

When the Forests Department started to manage the karri forest more than 50 years ago a large timber industry was already well established. The first essential task was to regenerate the cut over areas and develop effective protection measures for the forest. As a result there is now more than 50 years of research into karri reproductive biology, regeneration techniques, fire protection and other aspects of management.

In the early 1970s the Forests Department directed research priorities into the ecology of forest ecosystems, in particular the effects of prescribed burning on flora and fauna. At the time there was very little quantitative information available on the animals and plants of the forest area and other research agencies did not have the funds or staff resources to work in the forest.

Over the years 1970-1985 the Forests Department managed to build up considerable expertise and knowledge of the fauna and flora of the forest. In more recent times as forest management has become a public issue more people and agencies have become involved in forest ecological research.

Research projects carried out in the karri forest by the Department should not be seen in isolation. By both formal and informal arrangements it is integrated with the research programmes of other agencies, groups and private individuals. Departmental research officers maintain a network of contacts with other research scientists in WA, Australia and overseas.

Inevitably, firm decisions must be made about research priorities. In the field of forest ecology, the former Forests Department decided that the effect of forest operations, more specifically the effects of fire and logging operations on flora and fauna would receive top priority. Second priority was given to biological survey and resource inventory. Within the general area of effects of forest operations priorities were accorded to those operations which were believed to have the greatest potential to cause changes to the forest ecosystem. Thus fire research was and still is regarded as being of higher priority than the effects of logging. It

has been observed over the centuries that mismanaged fire has a greater potential to cause significant long term changes to forests than logging.

Research into forest ecology continues to be a major part of the Department of Conservation & Land Management overall research effort. Naturally it could be expanded significantly, were funds available. However, we are not so short of information that we need to be unduly worried about our present management activities. We have enough information to be confident that current timber harvesting operations are not causing long term or irrevocable ecological damage to the forest.

3. Specific Comments on the criticisms raised by the SWFD Foundation

As a general comment, the Department agrees with the SWFDF that more research is desirable. However, in the absence of an increase in funding, it is not possible to increase research in the karri forest except by a re-allocation of priorities from other areas. We do not see a need for re-allocation of present research priorities to do more work in the karri forest at the expense of research in other areas. Nor is it possible to re-allocate operational staff into research because they are not trained as research scientists, and forest management would be put at risk.

The following brief comments are offered on each of the six major points made in the S.W.F.D.F. report.

Point 1.Quote "Although the karri forest is intensively used for timber production, the effects on it of logging are inadequately known."-

First, only 51% of the karri forest is used for timber production. The remaining 49% is in reserves not to be managed for timber production.

Second, a number of studies on flora and fauna of forest areas regenerated after logging, including areas clear felled more than 50 years ago, have been done. These give no indication of any long term changes to plant or animal communities, or to stream quality. Soil compaction by logging equipment was initially a problem in localized areas but methods of overcoming this have been found and have been in use for nearly 10 years.

In the Department's view the effects of logging are well known, and research evidence indicates that no significant or irreversible changes are taking place. Boranup karri forest, intensively logged over 80 years ago is today regarded, as one of the most beautiful forests in Western Australia.

Point 2.Quote "Although the karri forest is more intensively exploited than the jarrah forest, ecological and biological research on the karri forest is neglected by comparison with jarrah forest research."-

There are many reasons why the research effort in the jarrah forest is greater than in the karri. The area of the jarrah forest is far greater than that of the karri; there are many more problems which effect the flora and fauna in the jarrah forest; jarrah dieback has a major impact on the ecology; there are more species of rare and endangered animals in the jarrah forest, some populations of which fire has the potential to effect; the fox is a major problem for fauna in the more open jarrah and wandoo forests.

All of these reasons explain why research emphasis in forest ecology has been given to jarrah forest. At the same time, it is quite untrue to say the karri forest is "neglected". The attached summary of karri forest research and the listing of research projects, backed by many publications is clear evidence of a major research effort.

Point 3.Quote "Much of the limited biological and ecological karri forest research done by the former Forests Department remains unpublished."-

Land management agencies should be viewed differently to a University faculty or a basic research institute on this score. Our emphasis is on getting research findings into practice. Effective internal communication to land managers takes precedence over journal articles. In addition, some studies (e.g. the effects of repeated frequent fires on vegetation species composition) by their very nature are long term, but will be written up in the future. Other work is currently in the process of being written up.

Nevertheless there are a great many more references on biological and ecological research in the karri forest than the six which are listed in the SWFDF report. In fact 68 references directly relevant to karri forest biological and ecological research are readily available. A further 113 references on karri silviculture, protection and aspects of ecology and biology of the karri forest are relevant to its management. Many more on species distribution etc, are not listed here, but are essential to the proper management and conservation of the karri forest ecosystem.

Point 4.Quote "There are no quantitative or objective data that can be used to assess variability between or within karri habitat types."-

This is quite true, however, work is currently in progress which will help to rectify the situation. This is why the Forests Department, prior to reservation of the Shannon, opted for a system of widespread smaller reserves linked by stream, river and road reserves. This system covers a wide range of karri forest types, a safeguard in the absence of a complete biological data base. Therefore although the research itself is not complete, management action has been taken to set aside representative areas and therefore ensure reservation of karri habitats.

Point 5.Quote "Existing reserves in the karri forest are not necessarily sufficient to preserve even the major vegetation units or site-vegetation types."

About half the karri forest has been set aside from commercial exploitation for wood products and it is believed that most major vegetation types are represented. Further, these reserved areas are not conservation 'islands' as occurs with isolated patches of native vegetation in the wheatbelt. The surrounding forest quickly regenerates after logging and plants and most animals soon return to these areas. Areas reserved from cutting are therefore not simply reserves, they also function as foci from which re-colonization of cut areas can occur. More importantly they provide permanent areas of mature forest. The major present concern is that some hole-using native animals require mature forest and this is another reason for retaining as wide as possible a distribution of the retained unlogged forest.

Point 6.Quote "The karri forest is probably the least well-known floristically of any South-Western Australian ecosystem of comparable size."

There is no basis for this statement. The floristics of many south-west ecosystems are incompletly known. It is only recently, for example, that the Stirling Range National Park flora was fully surveyed.

It is acknowledged that botanical research is important, and this applies across the State. In the karri forest such research will proceed now that basic techniques for regeneration and protection have been satisfactorily researched and put into practice.

In summary, provided the current system of management priority areas and the system of road, river and stream reserves in the karri can remain intact and there are no major changes in management practices,

the Department believes there will be no long term problems in the karri. Today there is no greater case for increasing the level of research in the karri forest area than there is to increase research in nearly every other area of the Department's activities.

CALM's Research Division has very wide responsibilities and many important problems are not being investigated in the more fragile arid and semi-arid parts of the State where the conservation of plants and animals are seriously under threat. As funds become available and problems are solved in one area research priorities are re-allocated to new areas or strengthened in traditional areas. The karri forest is an important centre of Departmental activitiy and research will continue into all aspects of management and ecology, subject to priority and the availability of funds and resources.

Overall, the conservation status of the forest is secure enough that no need is seen to redirect scarce Departmental resources from other areas. At the same time, the Department will continue to give every support and assistance possible to other agencies or individuals who wish to carry out research, and increase our knowledge about the biology and the management of the karri forest.

4. Listings of Current Karri Forest Research Projects and Research Papers.

Listed here are research projects and available publications pertinent to biological and ecological research in the karri forest, plus others relevant to karri forest management.

The line between research related to the regeneration of karri (silviculture) and ecological research is extremely fine. For example, research on natural regeneration of karri might be termed ecological research whereas fertilizing and planting trials would be regarded as silviculture. Both, however, contribute to knowledge about the species, and to the sound management of the forest in perpetuity.

Likewise there is a fine line between what is karri forest and what is not. The case is clear where karri grows in pure stands with no other major tree species present. In timber production management priority areas, however, karri occurs mostly in mixture with marri, jarrah and other species. Small edaphic changes often result in intrusions of woodland, heathlands or sedgelands into the forest; animals do not necessarily recognise such boundaries.

Similarly with publications, there are many topics which touch on the karri forest or pertain to its flora and fauna, which at first sight may seem to have nothing to do with the topic. For example a paper by Roberts and Maxson (1985) is titled "Tertiary speciation models in Australian Anurans: Molecular data challenge Pleistocene scenario". Evolution, 39/2 pp. 325-334. This paper examines the genetic relationship between frogs in the faunas of south western and south eastern Australia. Several karri forest species are included. Another example is Rosen, D.E. (1974). "Phylogeny and zoogeography of the salmoniform fishes and relationships of Lepidogalaxius salamandroides, Bull. Amer. Mus. Nat. Hist 153: 263-325. This work presents evidence to suggest that L. salamandroides may be the sole southern hemisphere representative in a group of northern hemisphere fishes, the esocoids, a group including the well known pike. The paper describes basic anatomical research on L. salamandroides, a species which occurs in the karri and the results are of significance to the conservation of this species.

There are also many papers on the distribution of species of reptiles, birds, invertebrates etc. which pertain to karri forest ecology and management but are not included in the present list; for example Storr, G.M. (1973). "The genus Ctenotus (Lacertilia, Scincidae) in the south west and Eucla Division of Western Australia." J. Roy. Soc. of W.A. 56, 3, 86-93. Several species of C. tenotus occur in the karri forest.

It would be a major task to assemble a complete list of biological and ecological research projects and papers for the karri forest. Included here is a preliminary list which provides the interested scientist or environmentalist with a handy lead-in to the topic.

Current research projects in the karri forest carried out by the Forests Department and Department of Conservation and Land Management

Since 1954 a total of 125 research projects to do with karri silviculture, ecology, and fire have been carried out by Departmental staff. The silvicultural work has been summarized by Briedahl (1983) and the work on fire is included in Burrows (1984). Some of these projects are still current.

Current research projects dealing specifically with aspects of karri forest biology and ecology are:

Southern forest scrub response to fire intensity and season. (1970) Research Working Plan No. 16.

Fire effect on Crowea dentata and Acacia strigosa scrub. (1971) RWP 4.

The effects of a hot karri fire on the bush rat (Rattus fuscipes). (1971) RWP 25.

Fauna surveys of Southern Forest areas. (1978) RWP 1.

Effects of various types of soil damage on karri growth. (1978) RWP 22.

Karri provenance trial. (1978) RWP 26.

Effect of karri management on a number of hollow nesting animals. (1982) RWP 21.

Effect of karri management on birds. (1982) RWP 22.

Investigation into the distribution and taxonomic status of Geocrinia rosea and G. lutea in S.W. Australia. (1983) RWP 1.

Effect of hollow supply on mardo recolonisation in karri. (1984) RWP 6.

External symptoms of infestation of karri by the borer Tryphocaria sp. (1985) RWP 32.

Long term fire effects on vegetation in the southern forest region. (1986) RWP 12.

Site types in karri regeneration areas. (1986) RWP 19.

Karri forest floristics. No RWP No. yet allocated.

Genetic variability of different karri provenences. No RWP No. yet allocated.

Biological survey of Walpole/Nornalup National Park. (1985) No RWP No. yet allocated.

In addition to the projects which CALM are conducting there are many others being done by institutions such as the CSIRO on aspects of nutrient cycling, and mycorrhizal relationships.

At various times the Department has provided funds and encouraged projects on aspects of karri forest ecology. Some of these have been written up as Honours theses (e.g. Halstrom (1984)), scientific papers (e.g. Hindmarsh and Majer (1977)), or as student projects (e.g. projects on vegetation and karri birds by K. Arnold and R. Flugge (1983) of W.A.I.T.).

Published Research Papers directly related to karri forest ecology and biology

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* Christensen, P.E. and Kimber, P.C. (1975). "Effect of prescribed burning on the flora and fauna of south-west Australian forests". Proc. Ecol. of Australia 9, 85-106.

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Hindmarsh, R. and Majer, J.D. (1977). "Food requirements of mardo [Antechinus flavipes (Waterhouse)] and the effect of fire on mardo abundance." Research Paper 31, Forests Department of Western Australia.

Hingston, F.J., Turton, A.G. and Dimmock, G.M. (1977. "Nutrient elements in Eucalyptus diversicolor and Eucalyptus calophylla from the karri forest, south-west Western Australia." CSIRO, Division of Land Resources Management, Perth, Report to the Department of Conservation and Environment.

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