

STATUS OF CURRENT KNOWLEDGE

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Abstract

The flora and fauna of the northern kwongan are very rich in species and the limited number of studies on it are inadequate for a detailed analysis of the possible impact of any development on the Lesueur Area. With regard to the flora, more research is needed into local endemics, impacts of dieback disease, cryptogams, regional plant communities, community processes and population biology. Considerable research is required into rehabilitation techniques for many plant groups that cannot be regenerated at present. In the fauna, vertebrate surveys are at present inadequate to understand either the habitat requirements or the minimum area required by most species. Data on terrestrial invertebrates are lacking for most of the Lesueur Area and data on aquatic invertebrates need to be upgraded by conducting surveys throughout the wet season. Because of lack of information this report has not dealt with possible effects of any development on groundwater levels and quality, or possible effects on the area's freshwater springs.

11.1 INTRODUCTION

It is important to consider the amount of data available on the Lesueur Area when evaluating the possible impact of any development on it.

Detailed studies of the flora and vegetation commenced only in 1979. While the amount of effort has been greater in this area than is the case for some other areas in the south west of Western Australia, it is by no means adequate for an accurate assessment of impact. The kwongan vegetation of the northern sandplains is one of the most complex and species-rich in the world; the number of species of vascular plants per unit area being eclipsed only by the fynbos vegetation of southern Africa and some tropical rainforests.

11.2 FLORA

Knowledge of the flora of the surrounding region is even more deficient - the high number of poorly known plant species on the list of Lesueur flora is as much an indication of the lack of detailed knowledge of the district's flora as it is of the richness of the Lesueur Area itself.

There are five areas where knowledge of the flora needs considerable improvement to enable a reasonable assessment of the effects of any development.

11.21 Local endemics

There are 145 known geographically restricted regional endemics in the northern sandplains between the Moore and Irwin Rivers whose distribution and abundance are so poorly known that a reasonable assessment of their conservation status is not possible. Current information indicates that 54 of these 145 occur in the Lesueur Area (Table 5.8). Of these 54, 26 have a known geographical range of less than 50 km, and do not occur on any conservation reserves. Nine taxa are entirely confined to the Lesueur Area, and a further 25 have 50-80% of their known populations so confined (Table 5.6).

11.22 Cryptogamic flora

No study of bryophytes (mosses and liverworts) or thallophytes (algae, fungi and lichens) has been undertaken in the Lesueur Area. Comprehensive collections and appropriate taxonomic research will be required to develop a reasonable inventory and to determine what plant communities, soils and landforms are occupied by cryptogamic taxa.

A knowledge of cryptogams may be essential to the success of revegetation of disturbed areas. The Western Australian kwongan flora has a poorly known but diverse array of symbiotic relationships between vascular plants and cryptogams such as mycorrhizal fungi (Lamont 1984).

11.23 Plant communities in a regional context

Preliminary quantitative work on selected sites (e.g. Griffin *et al.* 1983; Froend 1987) enables a first approximation at placing Lesueur plant communities in a regional context. However, it is clear from the work of Martinick and Associates (1989d) that a substantial injection of resources is needed in this arena before a reasonable understanding is obtained. For example, on the basis of a rapid reconnaissance of surrounding national parks and subjective assessment of communities Martinick and Associates (1989d) were only able to conclude "Thirty-eight vegetation units have been identified in the Hill River Project area. Only three of these were identified definitely in other reserves". The complexity of plant communities in the northern kwongan clearly requires careful quantitative studies at a fine geographic scale to adequately assess plant community conservation status.

11.24 Effects of vegetation clearing or degradation on community processes and population biology

The reduction in area of communities and populations of flora that would arise should vegetation be cleared within the Lesueur Area would have impacts on community processes and population biology that are largely unknown. Such processes became evident in studies on the relationships between *Banksia tricuspis*, the moth larvae that eat it, and predation by Carnaby's Black Cockatoo, and on the pollination ecology of the Black Kangaroo Paw (Chapter 7). Similarly, the potential disruption of community structure and processes through the introduction of dieback disease is great at Lesueur, but specific details and hazard assessment are poorly documented.

11.25 Revegetation of disturbed sites

The feasibility of revegetating disturbed areas in such species-rich communities and on such complex soils requires extensive research. Many important components of the Lesueur vegetation, such as the sedges and rushes, are notoriously difficult to propagate (Fox *et al.* 1987). Experience elsewhere in the region suggests that successful regeneration of kwongan communities after mining is not achievable by existing techniques (e.g. Griffin and Hopkins 1985b).

11.3 FAUNA

As is the case for flora, there are areas where the knowledge of the fauna needs considerable

improvement to enable a reasonable assessment of the impacts of the proposed mine and power station.

11.31 Vertebrates

Faunal studies are few. Had not the Department of Fisheries and Wildlife commissioned the Western Australian Museum to carry out a biological survey of the "Horse Breeding" reserve in 1973-74, there would have been few data available to compare with the recent short-term surveys carried out by consultants to the mining companies. CALM's experience with biological surveys is that vertebrate species records continue to accumulate with effort, and that trapping and recording of vertebrates needs to be carried out in as many seasons as possible. The results of the surveys of the Eastern Goldfields, which were carried out over three different seasons, clearly demonstrate this point (McKenzie 1984).

The disadvantages of short-term surveys can be demonstrated by comparing the consultants' results for mammals, reptiles and frogs at Lesueur in 1988 (Martinick and Associates 1989b) with the Museum survey, which was carried out during late spring 1973 and late autumn 1974 (Chapman *et al.* 1977).

The greatest difference between the results of the Museum's and the consultants' results is in the reptile data (Table 11.1). Even though the Museum did not use the modern technique of pit-fall trapping, they recorded 41 species of reptiles compared to 29 by the consultants (who examined a smaller area and fewer landforms). Two of the additional species collected by the consultants, *viz.* *Lerista christinae* and *Pletholax gracilis* (also recorded by Foulds and McMillan n.d.) would probably have been captured in pitfall traps.

The amount of vertebrate data for the Lesueur Area is not sufficient to properly describe habitat requirements for most species. Considerably more data on the regional distribution and requirements of vertebrates are needed before the long-term conservation of many species can be assured.

11.32. Invertebrates

The most significant shortcoming in the data on the fauna of the Lesueur Area is the lack of detailed information on invertebrates, except for minor, inadequate data from the western landforms and on aquatic fauna. Data available on some groups of invertebrates suggest that there are likely to be many species of invertebrates restricted to the vicinity of the Lesueur Area, because of the close relationship of some invertebrates with specific species of food plants. Many plants depend on invertebrates, especially insects, for pollination. There are few data available on which

Table 11.1
Comparison of Martinick and Associates 1988 results with W.A. Museum 1973-4 results.

	WAM	M&A		WAM	M&A
Indigenous Mammals			<i>Ctenotus lesueurii</i>	x	x
<i>Tachyglossus aculeatus</i>	-	x	<i>Ctenotus pantherinus</i>	x	x
<i>Sminthopsis griseoventer</i>	x	x	<i>Egernia kingii</i>	-	-
<i>Sminthopsis dolichura</i>	-	-	<i>Egernia multiscutata bos</i>	x	-
<i>Sminthopsis crassicaudata</i>	x	x	<i>Egernia napoleonis</i>	x	x
<i>Sminthopsis granulipes</i>	x	-	<i>Lerista christinae</i>	-	x
<i>Tarsipes rostratus</i>	x	x	<i>Lerista distinguenda</i>	x	x
<i>Macropus irma</i>	x	x	<i>Lerista elegans</i>	-	-
<i>Macropus fuliginosus</i>	x	x	<i>Lerista planiventralis decora</i>	x	-
<i>Macropus robustus</i>	-	x	<i>Lerista praepedita</i>	x	-
<i>Chalinolobus gouldii</i>	x	-	<i>Menetia greyii</i>	x	x
<i>Chalinolobus morio</i>	x	-	<i>Morethia lineoocellata</i>	x	x
<i>Eptesicus regulus</i>	x	-	<i>Morethia obscura</i>	x	x
<i>Nyctophilus geoffroyi</i>	x	-	<i>Omolepida branchialis</i>	x	-
<i>Pseudomys albocinereus</i>	x	x	<i>Tiliqua occipitalis</i>	x	-
<i>Rattus fuscipes</i>	x	x	<i>Tiliqua rugosa rugosa</i>	x	x
Totals 15 species	12	9	<i>Varanus gouldii</i>	-	x
			<i>Varanus tristis tristis</i>	x	x
			<i>Morelia stimsoni stimsoni</i>	x	-
			<i>Demansia psammophis reticulata</i>	x	-
			<i>Notechis curtus</i>	x	x
Reptiles			<i>Pseudonaja nuchalis</i>	x	-
<i>Ctenophorus maculatus maculatus</i>	x	-	<i>Pseudechis australis</i>	-	-
<i>Pogona minor minor</i>	x	x	<i>Rhinoplocephalus gouldii</i>	x	x
<i>Tympanocryptis adelaidensis adelaidensis</i>		xx	<i>Vermicella littoralis</i>	x	-
<i>Crenadactylus ocellatus ocellatus</i>	x	x	<i>Vermicella bimaculatus</i>	x	-
<i>Diplodactylus alboguttatus</i>	x	-	<i>Ramphotyphlops australis</i>	x	x
<i>Diplodactylus granariensis granariensis</i>	x	x	Totals 48 species	42	29
<i>Diplodactylus ornatus</i>	x	-			
<i>Diplodactylus polyopthalmus</i>	x	x	Amphibians		
<i>Diplodactylus spinigerus spinigerus</i>	x	x	<i>Litoria moorei</i>	x	-
<i>Gehyra variegata</i>	x	-	<i>Myobatrachus gouldii</i>	-	x
<i>Phyllodactylus marmoratus marmoratus</i>	x	-	<i>Ranidella pseudinsignifera</i>	x	x
<i>Underwoodisaurus millii</i>	x	x	<i>Heleioporus albopunctatus</i>	x	x
<i>Aclys concinna concinna</i>	x	x	<i>Heleioporus eyrei</i>	x	x
<i>Delma fraseri</i>	x	x	<i>Heleioporus psammiphilus</i>	-	x
<i>Delma grayii</i>	x	x	<i>Limnodynastes dorsalis</i>	x	x
<i>Lialis burtonis</i>	x	x	<i>Neobatrachus pelobatoides</i>	x	x
<i>Pletholax gracilis</i>	-	x	<i>Pseudophryne guentheri</i>	x	x
<i>Pygopus lepidopodus lepidopodus</i>	x	x	Totals 9 species	7	8
<i>Cryptoblepharus plagiocephalus</i>	x	x			
<i>Ctenotus fallens</i>	x	x			
<i>Ctenotus impar</i>	x	-			

pollinators are important for the rare and geographically restricted plants, or what the pollinators require from the environment for their survival.

The lack of data on the terrestrial invertebrate fauna should be remedied by conducting a baseline survey and detailed studies of selected groups where endemism and close association with particular plant species is likely, e.g. the jewel beetles.

The information on aquatic invertebrates should be upgraded by conducting detailed surveys throughout the wet season, and conducting comparative surveys throughout the district.

11.4 OTHER MATTERS

Landscape information lacks a detailed regional basis. The brief study reported here is apparently the first to be conducted in the northern kwongan. Recreational information is also not based on detailed questionnaires or other comprehensive studies.

Knowledge about the regional occurrence and effects of dieback diseases caused by *Phytophthora* species is also inadequate. No systematic surveys of the Lesueur Area and environs have been carried out. CALM's work in the northern kwongan, which commenced only in 1987, has been confined to checking areas where local staff have noticed disease-like symptoms. Of fundamental importance is a better understanding of the ecology of *Phytophthora* spp. in the Lesueur Area and in the northern kwongan generally. Studies on host susceptibility, hazard mapping, rate of spread in differing communities and soils, and control of outbreaks of the disease are needed urgently.

Because of lack of information we have not considered in this report:

1. Possible effects of any development on groundwater levels and quality. Decreases in groundwater levels could seriously affect the survival of the native vegetation and associated terrestrial fauna, particularly under drought

conditions (cf Hnatiuk and Hopkins 1981b). Any increase in groundwater levels could kill some vegetation types directly and would increase the chances of survival of *Phytophthora* spp., if introduced.

2. Possible effects of any development on the freshwater springs of the area. These are critical to the survival of the population of Carnaby's Black Cockatoo, and presumably to some species of aquatic invertebrates. The role of Carnaby's Black Cockatoo in the regeneration of *Banksia tricuspis* has been discussed earlier (Chapter 7). The springs in the Salt Lake Complex are extremely important to many birds that utilise the salt lakes as a summer refuge, providing the necessary fresh drinking water.

Because of the lack of data on many aspects of the Lesueur Area, it is instructive to compare the current state of knowledge at Lesueur with the information available at the time that an assessment of proposed coal mining was made in 1972 at what is now the Fitzgerald River National Park. This issue was one of the land-use controversies that led to the creation of the EPA, and was one of the first issues it looked into. When the EPA recommended against mining in Fitzgerald River about 700 species of vascular plants were known to occur there, of which 63 were considered locally endemic. Today, after much more intensive research, 1748 species of vascular plants have been recorded, of which 75 are locally endemic and 14 have been listed as Declared Rare Flora under the Wildlife Conservation Act (Chapman and Newbey 1987).

In 1972 no species of endangered fauna was known to occur in the Fitzgerald River National Park. Now, 10 declared rare species are known to occur there, including three critically endangered rare animals, i.e. Dibbler *Parantechinus apicalis*, Heath Rat *Pseudomys shortridgei* (which, in 1972, was thought to be extinct in W.A.) and the western subspecies of the Ground Parrot, *Pezoporus wallicus flaviventris* (Chapman and Newbey 1987).