West. Aust. Nat. Reserve Manage. Plan No. 4 (DRAFT)

LAKE MAGENTA NATURE RESERVE

by

IAN G. CROOK

and

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ACKNOWLEDGEMENTS

We are grateful to Dr D. J. Kitchener and staff members of the Biological Survey Section of the Western Australian Museum for access to the unpublished findings of their surveys of the Lake Magenta Nature Reserve and work on wheatbelt Nature Reserves generally. We also wish to thank Mr Ray Aitken for information concerning his collection of mammals from the region.

An earlier draft of this Plan was discussed with the Council of the Shire of Kent. Several important management proposals were raised at this meeting which have been written into this version of the Plan. Included among these was one for the establishement of a management advisory committee for the Reserve. Cr R. W. Mortimer (Shire President); Cr K. Lewis (Deputy President); Crs N. J. Day, R. K. Calderbank, D. W. C. Ball, M. H. Collins, A. G. Addis and W. G. G. Mills were present at this meeting together with Mr T. H. Broadhurst, Shire Clerk of the Shire of Kent. We are particularly grateful to the Shire of Kent for its interest and valued contributions to this document.

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THE LAKE MAGENTA NATURE RESERVE : SUMMARY

The Lake Magenta Nature Reserve (Class A* Reserve no. 25113, 94 170 ha) in the Shire of Kent consists almost entirely of eucalypt mallees and woodlands once characteristic of heavier soils in the low rainfall parts of the Western Australian wheatbelt (Fig. 1).

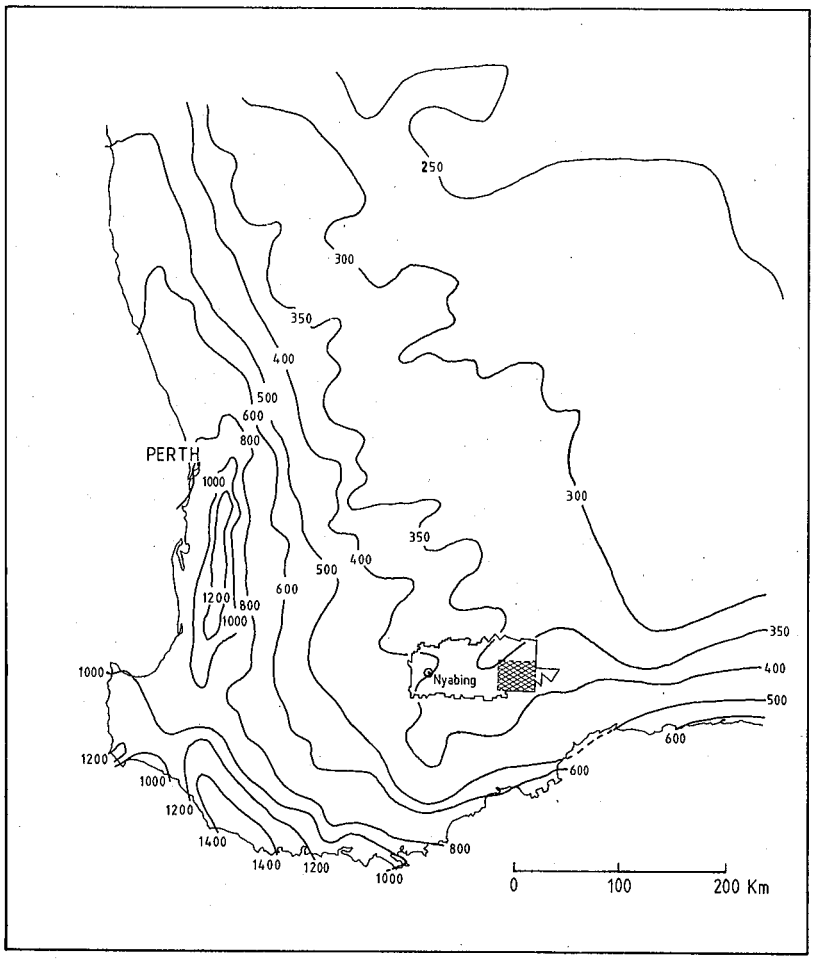

Figure 1. Location of Lake Magenta Nature Reserve and the Shire of Kent showing rainfall isohyets for southwestern Australia (after the Average Annual Rainfall Map of W.A. Based on complete records to 1979. Department of Science, Bureau of Meteorology 1980.)

* Class A in terms of the Land Act 1933.

The Reserve is about 35 km east of Pingrup on "East Road" and is bounded by broadacre crop and grazing lands on its north, west and southern sides. The eastern side is dominated by Lake Magenta, the lake after which the Reserve was named.

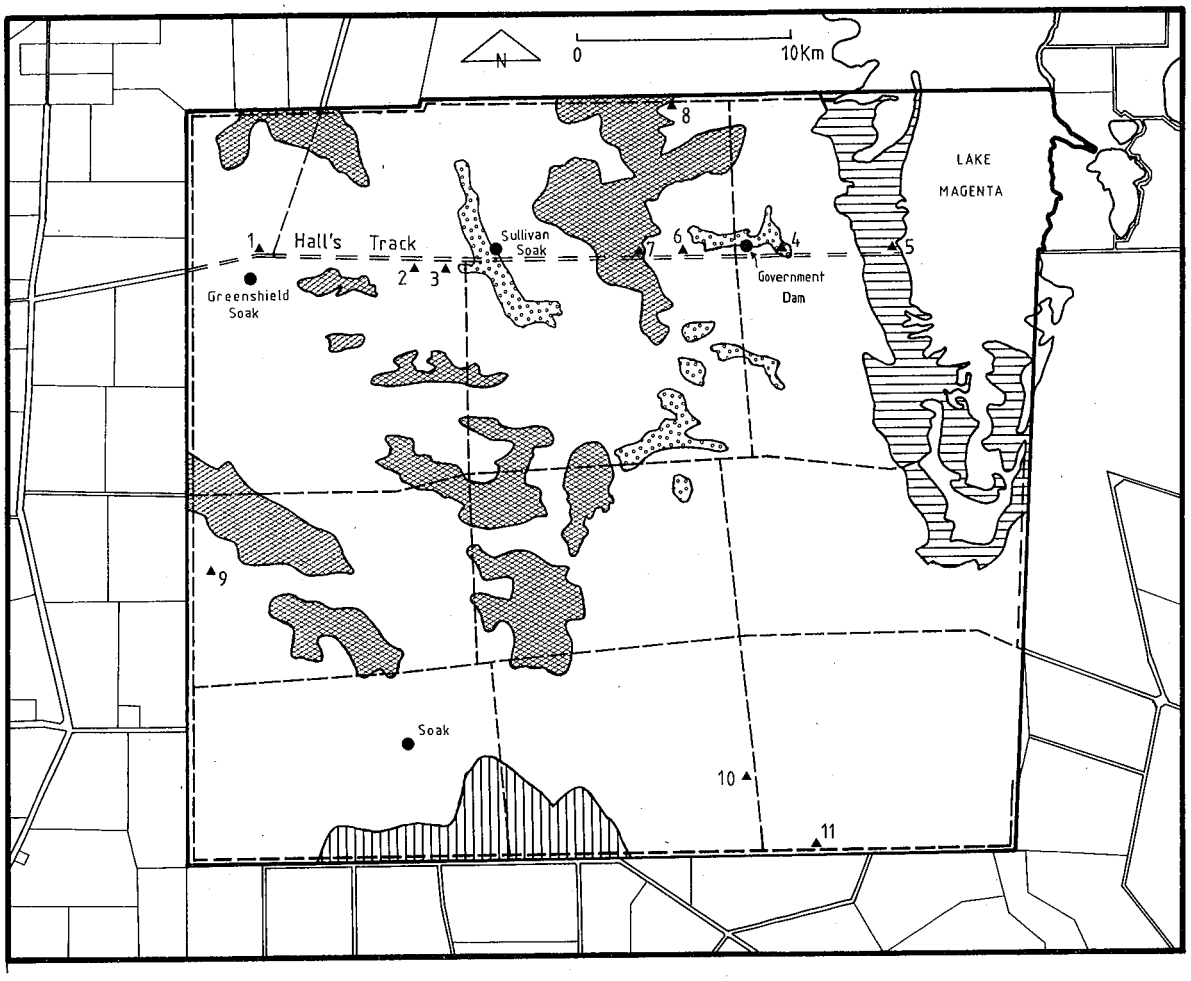

Figure 2. The Lake Magenta Nature Reserve showing relationships with surrounding lands, firebreaks and tracks (dashed lines), soaks and sources of freshwater, locations of stands of vegetation described on pp.18 to 26 of this Plan (numbered 1 to 11) and vegetation as mapped by Beard, J.S. (1972) Vegetation Survey of Western Australia, Newdegate : Sheet no. S150-8. Vegmap Publications, Sydney. The key to the vegetation types differentiated by Beard is given on p. 18 .

The Reserve covers a substantial portion of a distinct landscape unit defined by the mallee and woodland formations. This block of mallees and woodlands was originally almost isolated from expanses of similar vegetation by areas of heaths and scrublands

to the north, west and south and to the east by Lake Magenta itself.

The mallee - woodland vegetation, itself diverse and possessing many species, therefore presents in the one Reserve the greater part of a naturally discrete system of associations, many of which are large in extent and capable, in turn, of supporting a diverse fauna.

The Reserve is undoubtedly one of the most important key sites in the Western Australian system of Nature Reserves which, because of its size and remoteness, can be maintained as a "Primitive Area" with a minimum of outside interference.

PART A

THE RESERVE

PART A : THE RESERVE

1. INTRODUCTION

Following a fire on the Lake Magenta Nature Reserve between 2 and 9 December 1979, the Shire of Kent requested that the management regime for the Reserve, particularly those aspects relating to fire protection, be reviewed. In the last 12 months, also, the Shire of Kent has been investigating the possibility of developing Hall's Track (East Road), which runs across the Reserve from its western boundary to near the edge of Lake Magenta (Fig. 2), into an all-weather road. Hall's Track is a Protected Road.

Since the Lake Magenta Nature Reserve was set aside in 1958 nearly all the land on its southern, western and northern boundaries has been cleared and developed as farm land. A final release of several blocks on and near the eastern part of the northern boundary of the Reserve took place in late 1980. Now that development of the surrounding land is nearly complete it is appropriate that all aspects of management of the Reserve should be subject to such a review. Lake Magenta is one of the most important Nature Reserves in the south-west. The interest of the Shire of Kent and near neighbours of the Reserve in its future and management has encouraged the preparation of this Draft Management Plan early in the present series.

2. HISTORY OF THE RESERVE

2.1. EVENTS LEADING TO ESTABLISHMENT OF THE RESERVE

Support for establishing a large Nature Reserve in the mallee country of the eastern wheatbelt was widespread among scientists and Government Agencies in the early 1950s. The initiative which turned the idea into reality was taken by Dr D.L. Serventy, then Senior Research Scientist of the Wildlife Survey Section of the CSIRO.

In a letter to the Under Secretary for Lands, Mr H.E. Smith, in December 1952, Dr Serventy proposed that such a Reserve might be established in the vicinity of Nyabing. Land in this area was already committed to development, however, and the Under Secretary encouraged Dr Serventy to look eastwards, towards Lake Magenta:

> *"...there is a large area of mallee country further east, and it might be possible to reserve some of this for the purpose mentioned."*
>
> Mr H.E. Smith, Under Secretary for Lands *in litt.* to Dr D.L. Serventy, 5 January 1953.

Dr Serventy moved quickly, surveying the area in company with a party of scientists from the Western Australian Museum, which included Dr G.M. Storr, and reporting back to the Under-Secretary by mid-February:

> *Our party traversed the area along the old road from Pingrup to Lake Magenta* and sampled the country at various points along the road. We saw Mallee Fowl in the area and observed two fresh mounds from our vehicle close to the road...*
>
> *...The area appears to be a stronghold of several other characteristic Mallee bird species whose habitat is being diminished in other parts of the State owing to progressive clearing and other disturbances by closer settlement. In our rapid survey, we compiled a list of 51 bird species of which special mention may be made of the following:*
>
> *Southern Scrub-Robin* (Drymodes brunneopygia) *almost confined to Mallee areas.*
>
> *Shy Ground-Wren* (Hylacola cauta) - *also confined to Mallee areas and now very rarely seen in its previous haunts in the wheatbelt.*
>
> *Blue-breasted Wren* (Malurus pulcherrimus) - *characteristic of the Mallee and, in former times, regarded as one of the rarest of the Blue Wrens; we encountered it several times in the area.*
>
> *Rufous Tree-Creeper* (Climacteris rufa) - *a eucalypt woodland species once common but which is now disappearing from a large portion of the South-west.*
>
> *In the case of marsupials, we were shown a small collection made by Mr Ray Aitken of the Government School Nyabing, and collected recently in the neighbourhood. This collection included two very rare and disappearing species in the south-west. The Honey Mouse* (Tarsipes spencerae) *and the Red-tailed Wambenger* (Phascogale calura). *The area, if preserved from dispoilation, would serve as a permanent haven for these and undoubtedly other rare marsupials.*

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*Hall's Track (see Fig. 2).

> *The advantages of the eucalypt belt in this area (comprising Salmon Gum, Mort* (sic) *and Mallee (Mallee forms* Eucalyptus spathulata, E. oleosa, E. cylindriflora *and* E. astringens) *are that it is almost isolated by a ring of sand plain in the north, west and south, and by Lake Magenta in the east. Thus the fauna inhabiting this woodland is confined, as it were, by a natural fence which it will not normally cross. There is no settlement nearby and human interference will be at a minimum.*
>
> Dr D.L. Serventy *in litt.* to the Under-Secretary for Lands, 18 February 1953.

Dr Serventy went on to define his proposal for a "faunal reserve or primitive area" of some 342 700 acres (135 768 ha, Fig. 3) to cover the bulk of the eucalyptus belt in this area.

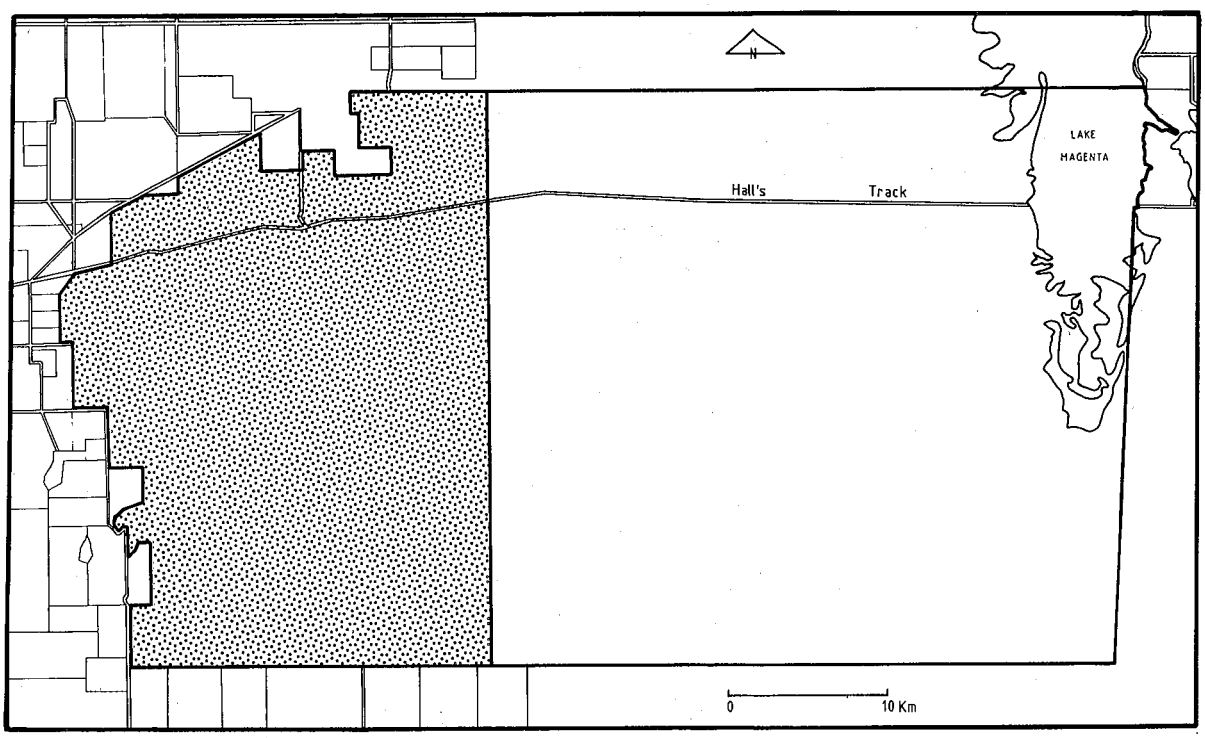

Figure 3. Lake Magenta Nature Reserve: as it is now and as originally proposed by Dr D.L. Serventy in 1953.

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WEST. AUST. NAT. RESERVE MANAGE. PLAN No 4 (Draft)

LAKE MAGENTA NATURE RESERVE No A 25113

This management plan will remain open for submissions and comment from all interested parties until 30 April 1981. Submissions received after this date cannot be assured of being taken into account in the preparation of the final management plan for the Nature Reserve. Submissions are normally published as appendices to the "Audit of Public Submissions" for each draft management plan.

In the light of comments received this draft or a revised plan based upon this draft will be formally submitted to the Shire of Kent as a plan for the Reserve in terms of Section 34, Sub-section (1a) of the Bush Fires Act and subsequently to the Bush Fires Board.

The final management plan will then be reviewed by the Western Australian Wildlife Authority before submission to the Minister Of Fisheries and Wildlife as a plan for management of the Nature Reserve in terms of Section 12D of the Wildlife Conservation Act.

B.K. BOWEN
(DIRECTOR)

The proposal gained support from a number of prominent scientists including Professor A.R. Main (then lecturer in zoology at the University of Western Australia) and Mr C.A. Gardner, Government Botanist. It was also supported by several Government Departments and Agencies including the Soil Conservation Commission and the Forests Department. The Forests Department recommended that two Timber Reserves within the area defined should be cancelled and incorporated in the proposed Nature Reserve.

The proposal was not favourably received by local interests, however. The Kent Vermin Board considered the Reserve should not be created in the interests of proper vermin control. Dingoes, particularly, were a continuing problem in these eastern wheatbelt areas at the time and such a large Reserve was seen as an area in which large numbers of dingoes (and foxes) would breed and where pest animals generally could never be properly controlled. The proximity of the proposed Reserve to agricultural land and the suitability of much of it for farm development were also sources of long-lasting local opposition.

The Under-Secretary for Lands referred the proposal to the Fauna Protection Advisory Committee in late 1954. Opinions in the Committee reflected those of the wider community, but its deliberations resulted in two other areas, suggested as possible alternatives, being inspected and compared to Lake Magenta:

> *While the creation of a reserve east of Pingrup for mallee fowl had the support of the majority of the members of the Fauna Protection Advisory Committee, considerable opposition was raised by the Agriculture Protection Board. This came chiefly from the road board representative, but also from the Department of Agriculture, which has apparently established a research station practically in the middle of the proposed reserve. The Chief Vermin Control Officer also objected to the creation of the reserve on the grounds that there were established wild dog tracks through the area, which he described as one of the worst areas in the State for this class of vermin. One of his officers has suggested an alternative area near Twertup Creek, apparently adjoining the existing flora and fauna reserve recently created north of Bremer Bay.**

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*Now the Fitzgerald River National Park (Figure 4). The area that was the subject of this proposal has, for the most part, since been incorporated in the Park.

An inspection will be made by this Department of the alternative areas; the one suggested by the Agriculture Protection Board and also one east of Lake Magenta (known as the "Hamersley area"). ....When the inspections have been carried out, a further approach will be made to you.

Chief Warden of Fauna *in litt.* to the Under-Secretary for Lands, 21 June 1955.

The alternative areas were inspected during 1956 but were found to be less than suitable.

1. *In the Twertup Creek and Hamersley areas only 6 old nests were located and no recent signs of mallee fowl were seen.*

2. *Both areas had contained some limited mallee fowl habitat, but insufficient to ensure the survival of the species.*

3. *Both areas are in auriferous country in which mining concerns are showing increasing interests. The party found that extensive areas in both had been devastated by fire and it was believed that the habitat would not be restored to a condition suitable for mallee fowl for a long time, possibly as long as twenty years, as these birds need thick cover and a generous amount of litter for their mound-building activities.*

4. *The Lake Magenta area not being an auriferous one should not be successfully subjected to deliberate burning as is the alternative area where prospectors burn extensively to facilitate their surveys. In addition the Lake Magenta country contains a wider range of mallee and is less likely to be in demand for agricultural or industrial purposes than the suggested coastal areas.*

Chief Warden of Fauna, *in litt.* to the Under-Secretary for Lands, 20 June 1957.

In view of the lack of suitable alternatives the Fauna Protection Advisory Committee resolved to revive Dr Serventy's original proposal. This intention was transmitted to the Under-Secretary for Lands who, in reply, advised his Department's approval for the Lake Magenta Reserve. Executive Council endorsement was sought and granted and a "Class A"* Reserve of 237 700 acres

*Class A in terms of the Land Act, 1933.

(94 170 ha), 41 598 ha less than originally suggested (Figs. 2 and 3), was established and vested in the Fauna Protection Advisory Committee by Order in Council dated 6 November 1958.

2.2. EVENTS FOLLOWING ESTABLISHMENT - CONSOLIDATING THE STATUS OF THE RESERVE

In the period immediately after its establishment some local interests continued to argue against the Reserve. They were concerned that it would prevent a very large area of land suitable for agriculture being opened for settlement, so disrupting development and growth of the region, dislocating transport arrangements and supporting large populations of "vermin" including kangaroos, emus, foxes and rabbits. Various proposals were put forward by neighbouring Local Authorities through Members of Parliament and the Great Southern Regional Council of W.A. in the period after its Gazettal to have the Reserve cancelled, relocated or substantially reduced in size and the area so released opened for selection.*

The alternative viewpoint, for continuance of the Reserve, was summarised for the Minister of Fisheries and Wildlife at the time by Officers of his Department:

> *The area sets aside a representative selection of mallee habitat most of which has been undisturbed and is still in its original state. In recent years, the reservation of such primitive areas has been accepted as an essential form of land use. Reserves of considerable extent are needed for a variety of purposes, and have considerable scientific, aesthetic and recreational value. They form outdoor laboratories for the benefit of all the biological sciences. They allow the study of soil structures and soil successions which, I understand, is essential in any programme of soil conservation or land management. Botanically, they make possible the study of plant climaxes and normal successions and afford scientists an opportunity to study and to understand the evolution of the environment. Studies such as these make it possible for a proper adjustment of human management of the land to its natural limitations. Eventually, therefore, primitive reserves must be of immense value to agriculture. They have,*

---

*At the time of Gazettal of the Reserve, substantial amounts of land in the area which were suitable for agriculture were still uncommitted. The argument that the Reserve would disrupt development was difficult to sustain at a time when so much land in the vicinity remained vacant.

too, a day-to-day economic value to apiculture and provide recreational areas for out-door pastimes such as bird-watching, bush-walking, photography and nature studies generally. The present reserve includes, I believe, a wide range of soil types of mallee associations. Moreover, it is contiguous with the halophytic formation of Lake Magenta, which adds greatly to its importance.

During this period other possible alternative sites for the Reserve were inspected by Departmental Officers, mainly in vacant Crown land north and east of the present Reserve. Like the earlier proposals, however, these areas were found to be less suitable for a Reserve of mallee habitats than the Lake Magenta Reserve.

Several attempts to have the Reserve cancelled, moved or substantially reduced in size (one proposal suggested that 30 000 acres would be adequate) were therefore not agreed to, and their main effect was to consolidate appreciation of the values of the Reserve by all parties. These were summarised by the Premier, the Hon. D. Brand, in April 1964 in what proved to be the last exchange of correspondence in the debate for the continued existence of the Lake Magenta Nature Reserve.

These decisions to retain the Reserve at its present size and location were reached because the ecosystems in those parts of the Reserve which might otherwise have been alienated were not duplicated in any of the available Crown land north or east of the present Reserve. It was considered essential that this Reserve retain all sections of the various mallee habitats of the region, each of which had to be of sufficient extent to be self-perpetuating. It was also considered that if the Reserve was left as a compact unit, various problems such as fire and vermin control, fencing and invasions of exotics would be kept to a minimum. It was further considered that clearing of substantial parts of the Reserve would cause an increase in the salinity in and have a detrimental effect upon, the present agricultural land and the lakes of the drainage area.

The Hon. D. Brand, Premier, *in litt.* to the Chairman, Albany Zone Development Committee, Public Works Department, 17 April 1964.

3. LOCATION AND PHYSICAL FEATURES

Lake Magenta Nature Reserve (94 170 ha, 33°30'S, 119°00'E) is, for the greater part, situated in the Shire of Kent*, its western boundary being about 30 km east of Pingrup. It therefore lies within, and near the eastern margin of, that part of the south-west of the State used for cereal production, in a region which receives an average annual rainfall of between 350 and 400 mm (Fig. 1).

The Reserve is compact in shape and basically rectangular, 33 km long on the east-west axis and 27 km on the north-south axis. At the north-east corner the otherwise rectangular boundary is extended eastward to take in all the eastern shore of Lake Magenta (Fig. 2)**. Details of its location and relationships to other Nature Reserves and National Parks in the vicinity are shown in Figure 4.

Most of the Reserve is low-lying and of gently undulating terrain, being part of an area notable for its lack of rivers and for the presence of salt lakes. The Reserve includes all of the southern portion of Lake Magenta, a large salt-pan lake, and part of a chain of salt and ephemeral freshwater lakes to the south of Lake Magenta itself (Fig. 5).

Several small soaks (Fig. 2), one of which was, in the past, developed into a small dam ("Government Dam") complete the meagre sources of fresh water on the Reserve.

In line with its physiographic features the soils of the Reserve are consistent with the SI 30 soil unit of the CSIRO "Atlas of Australian Soils"*** *viz:*

> "Hard-setting loamy soils with yellow clayey Subsoils.
> SI 30 : Gently undulating pediments with narrow ironstone gravel ridges, some swamps and some lakes."

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* The north-eastern corner of the Reserve extends into the Shire of Lake Grace.

** A proposal is currently being considered to extend the Reserve northward near its eastern boundary to take in the remainder of Lake Magenta, the southern part of Lake Lockardt and dry lands on the west of Lake Magenta and to the south of Lake Lockardt which are not suitable for farm development.

*** Northcote, K.H., Bettenay, E., Churchward, H.M. and McArthur, W.M. (1967). Atlas of Australian Soils, Sheet 5. CSIRO. Published in Association with Melbourne University Press.

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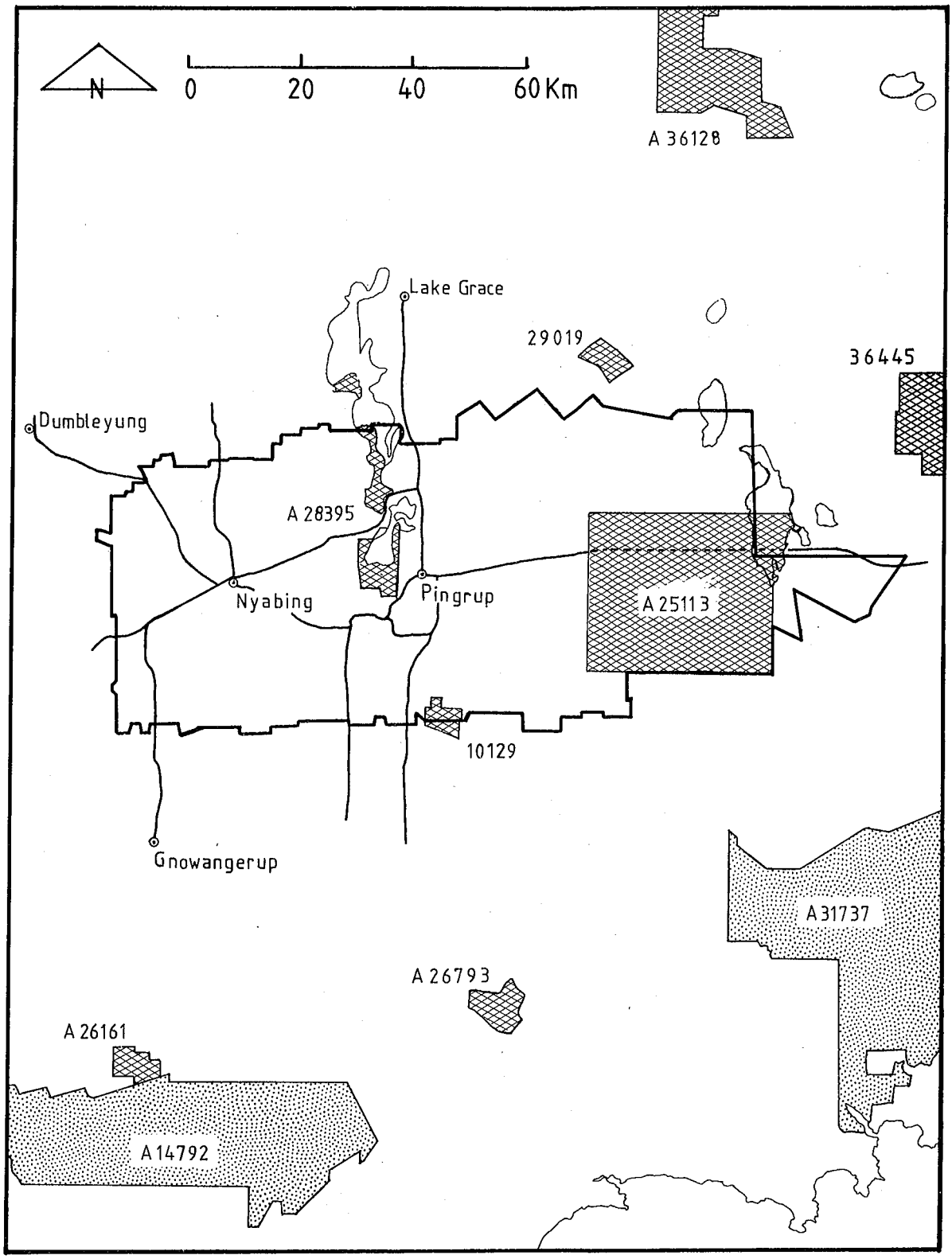

Figure 4. Lake Magenta Nature Reserve and the Shire of Kent showing main access roads, towns, Nature Reserves (cross-hatched) and National Parks (stipled areas) in the vicinity, *viz:* Stirling Range National Park (A14792), Fitzgerald River National Park (A31737), Lake Grace Nature Reserves (A28395), Dragon Rocks Nature Reserve (A36128) and unnamed Nature Reserves numbers 10129, A26161, A26793, 29019 and 36445.

Figure 5. An ephemeral freshwater claypan lake in the southern part of the Lake Magenta Nature Reserve.

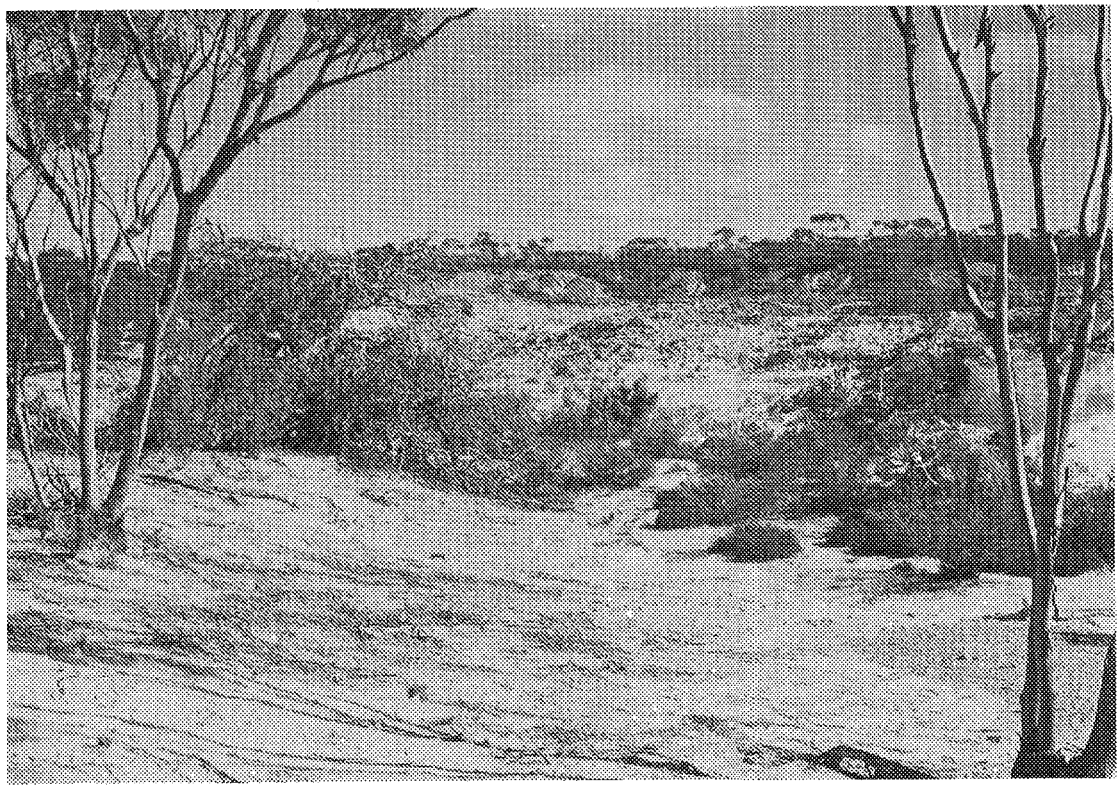

Figure 6. One of several eroded ridges of decomposed kaolinised granite found in the northern part of the Reserve. Mostly unvegetated, the fringes of the breakaway support a woodland of *Eucalyptus gardneri* and *E. platypus*.

This general description covers a variety of soil types to be found on the Reserve, from eroded kaolinised ridges capped with thin layers of laterite (Fig. 6) through gravelly and sandy loams to soils with increasing clay content toward the lower end of the landscape sequence.

This variety of soil types and the associated, though most gentle, changes in topography on the Reserve are reflected in the sequence of vegetation formations for which the Reserve is most notable (Figs. 7 to 13).

4. VEGETATION

A feature of the vegetation of the Reserve is that it comprises the greater part of an isolated belt of eucalypt woodlands and mallees. When Dr Serventy first visited the area in 1953 he found it to be surrounded by sandplain heathlands and scrub to the north, west and south.* Lake Magenta, of course, provides a discontinuity between the eucalypt vegetation of the Reserve and land to the east. With development of surrounding land for farms on the north, south and west sides, the Lake Magenta Nature Reserve is now as isolated as most other mainland conservation areas. Unlike many others, however, it contains a substantial proportion of a naturally discrete landscape unit.

The vegetation was mapped on a broad scale by J.S. Beard as part of the Vegetation Survey of Western Australia (Beard, J.S. (1972) Vegetation Survey of Western Australia, Newdegate : Sheet no. SI 50-8. Vegmap Publications, Sydney). Beard differentiated 5 vegetation formations on the Reserve (Fig. 2), as follows:

		Key to Fig. 2
Shrublands		
$e_{15}Si$	Mallee on lateritic soil *Eucalyptus eremophila - E. oleosa* association (the most extensive formation on the Reserve).	
$e_{26}SZc$	Mallee-heath *Eucalyptus tetragona* community	
xSZc	Scrub heath Mixed Proteaceae - Myrtaceae	
m_1Si	Boree scrub *Melaleuca thyoides* community	
Woodlands		
e_8Mi	Salmon gum woodland *Eucalyptus salmonophloia* woodland	

*Dr Serventy originally proposed reservation of an area some 41 500 ha larger than the present Reserve (cf Fig. 3). Some of the original mallee belt to which he referred was therefore not included in the Reserve as Gazetted.

An unpublished survey by staff of the Western Australian Museum* indicates that, among those mapped by Beard, the mallee formations, in particular, consist of a complex of associations, distinguishable on both floristic and structural features.

Two Museum expeditions to the northern part of the Reserve (April 1971 and October 1972) described 16 vegetation formations: 4 of open mallees, 3 of closed mallees, 3 of closed forest, 2 open forests (woodlands), 3 heath and scrublands and one "herbland" (samphire) formation.

During a recent inspection of the Reserve (July 1980) the structure of the vegetation was described at 11 sites around the Reserve to further demonstrate some of its variability. The descriptions follow the classification of Muir (1977)**and the site numbers correspond to locations shown on Fig. 2. Descriptions are placed in three groups: those of Mallees, Scrub and Heathlands (6), Forests and Woodlands (4) and finally lakeshore formations (1).

4.1. MALLEES, SCRUB AND HEATHLANDS

Location 1 : Mixed open-mallee.

Mixed Mallee of a number of *Eucalyptus* species including *E. eremophila* and *E. foecunda* 3-4 m tall, 10-30% cover.

There are two understorey layers:

Melaleuca scrub: Open Low Scrub B of *Melaleuca uncinata*, 1-1½ m tall, 30-70% cover; and
Species rich low heath: Low Heath D (0-½ m, 30-70% cover) containing numerous species including *Leucopogon, Acacia, Grevillea* and *Melaleuca* spp. *Pimelea brevifolia, Lechenaultia formosa* and patches of *Conospermum bracteosum*.

Soil is a well drained grey loamy sand.

Location 2 : Mixed mallee/open woodland (Fig. 7).

Mixed Mallee/Open Low Woodland B of *Eucalyptus platypus, E. redunca*, and *E. eremophila* 3-4 m tall, 10-30% cover.

The understorey of this formation is sparse and open, consisting mainly of dwarf shrubs (½-1 m tall, 2-10% cover - Open Dwarf Scrub C) and including *Eucalyptus platypus, Exocarpus aphyllus* and *Melaleuca uncinata*.

Soil is a grey loamy sand.

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* Kitchener, D.J., Chapman, A., Dell, J. and Smith, L.A. "Lake Magenta Reserve (Northern Part)". Unpublished manuscript.

** Muir, B.G. (1977). "Biological Survey of the Western Australian wheatbelt. Part 2. Vegetation and habitat of Bendering Reserve." Records of the Western Australian Museum Supplement No. 3. 1977.

Location 3 : Closed Moort mallee/forest (Fig. 8).

Dense Mallee/Dense Low Forest B of *Eucalyptus platypus* (3-4 m in height, 70-100% cover).

The understorey is open and contains occasional specimens of *Exocarpus aphyllus*, *Melaleuca* and *Grevillea* spp.

Location 7 : Open Tallerak mallee (Fig. 9).

Very Open Shrub Mallee of *Eucalyptus tetragona* with *E. foecunda* 2-3 m tall, 2-10% cover.

Understorey is a species rich Low Heath C containing Myrtaceous and Proteaceous shrubs ½ - 1 m tall, 30-70% cover. Heathland species identified include *Hakea multilineata*, *Verticordia mitchelliana* and *Banksia baueri*.

This stand is on a low ridge and the soil is a sandy gravelly loam.

Location 9 : Mixed open shrub mallee/open scrub.

Open Shrub Mallee of *Eucalyptus tetragona*, *E. foecunda* and *E. incrassata* 2-4 m tall, 10-30% cover intermixed with an Open Scrub of *Hakea multilineata* and *Santalum murrayanum* shrubs, 2-3 m tall, 2-10% cover.

The understorey is a species rich Heath B of Leguminous and Proteaceous shrubs over Open Low Sedges.

Soil is a deep sand and well drained.

Location 11 : Mixed mallee/heath (Fig. 10).

Very Open Shrub Mallee of *Eucalyptus eremophila*, *E. redunca*, *E. foecunda* and *E.* aff. *pileata* 3-4 m tall, 2-10% cover emergent over 2 shrub layers:

Open Low Scrub B of an unidentified *Hakea* sp., 1-1½ m tall, 2% cover; and

Species Rich Open Dwarf Scrub D (0-½ m tall, 30-70% cover) including *Leocopogon*, *Grevillea* and *Acacia* spp.

4.2. WOODLANDS AND FORESTS

Location 4 : Salmon Gum woodland (Fig. 11).

Woodland of *Eucalyptus salmonophloia* trees 15-20 m tall, 10-30% cover.

Understorey is Open Low Scrub B (1½-2 m tall, 2-10% cover) of *Exocarpus aphyllus* and *Santalum acuminatum*.

Soil is a grey brown sandy loam over yellow clay.

Location 6 : Mixed eucalypt forest. (Fig. 12).

Dense Low Forest A of *Eucalyptus astringens*, *E. falcata*, *E. gardneri* and *E. platypus* 5-8 m tall, 70% cover.

Figure 7. Mixed mallee/open woodland at Location 2.

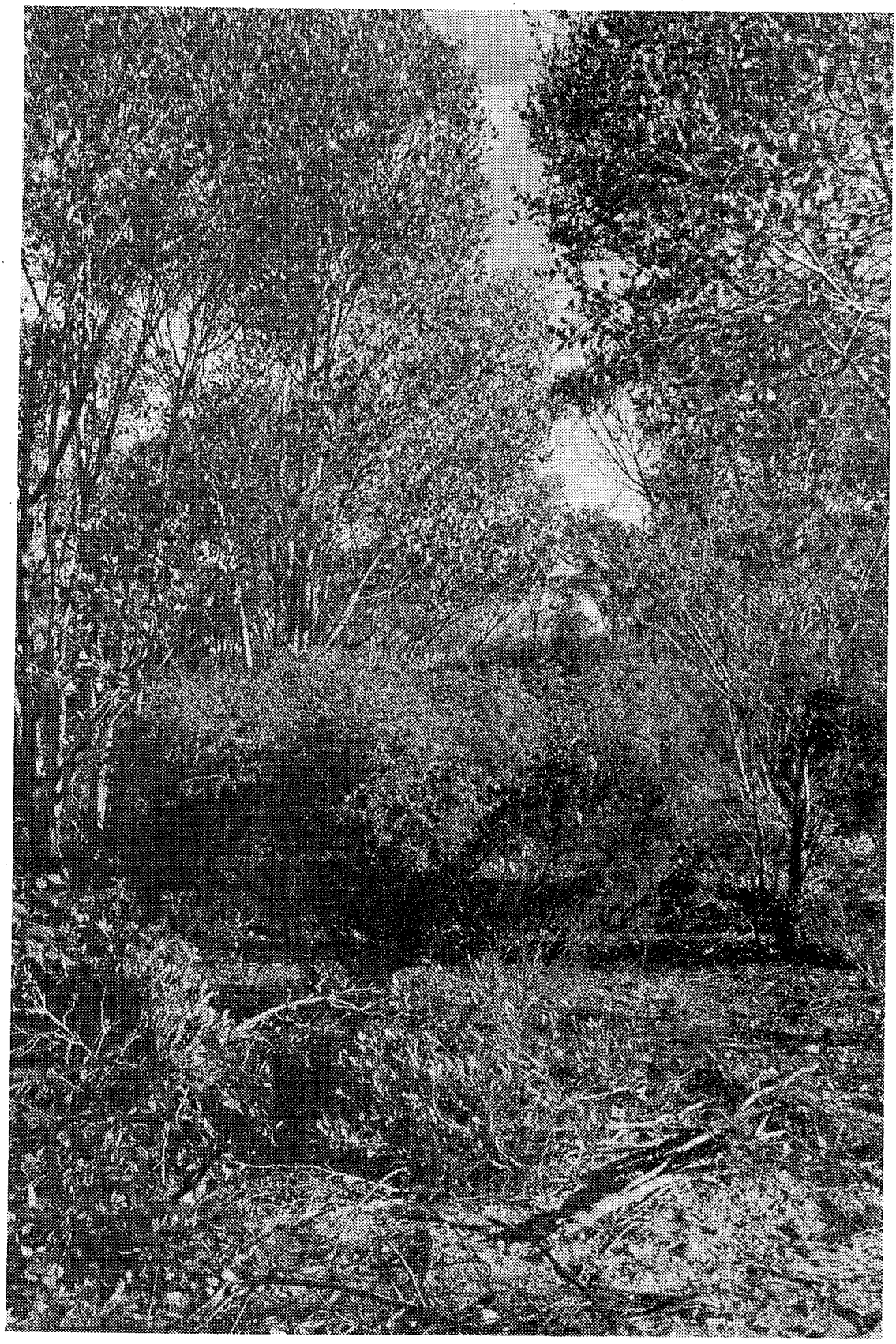

Figure 8. *Eucalyptus platypus* mallee/forest (Location 3).

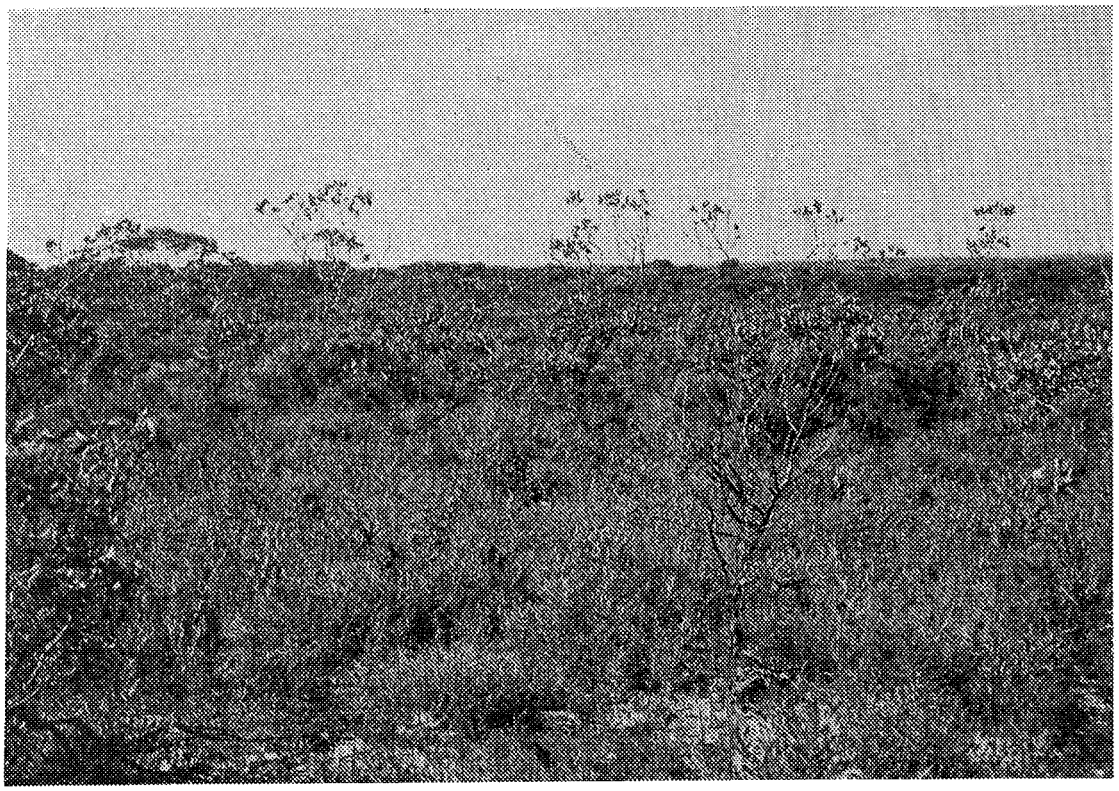

Figure 9. Tallerak *(E. tetragona)* open mallee (Location 7).

Figure 10. Mixed mallee/heath at Location 11.

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Figure 11. Salmon gum *(Eucalyptus salmonophloia)* woodland (Location 4).

Figure 12. Mixed forest of *Eucalyptus astringens*, *E. falcata*, *E. gardneri* and *E. platypus* at Location 6.

Figure 13. Yate *(Eucalyptus occidentalis)* woodland (Location 8).

The understorey is a species rich Low Scrub B of shrubs 1-1½ m tall, 10-30% cover including various legumes and *Melaleuca* and *Hakea* spp.

Soil is a grey-brown sandy loam.

Location 8 : Yate swamp. (Fig. 13).

Low Forest A of *Eucalyptus occidentalis* 8-10 m tall, 30-70% cover over scattered shrubs of *Melaleuca* sp. 2 m tall.

Location 10 : *Eucalyptus spathulata* woodland.

Low Woodland A of *Eucalyptus spathulata* trees (5-15 m tall, 10-30% cover) over Scrub of *Melaleuca thyoides* (2-3 m tall, 30-70% cover) over open ground.

Soil is a grey-brown sandy loam.

4.3. SAMPHIRE HERBLANDS

Location 5 : Samphire low heathland.

Low Heathland of dwarf shrubs of *Halosarcia* and *Aizoon* spp. (0-½ m high, 70% cover) around the shoreline of Lake Magenta.

These descriptions fall far short of a comprehensive coverage of the great diversity of vegetation formations to be encountered on the Reserve, some of which cover broad expanses of country, others of which occur in small and isolated areas of suitable habitat. It is clear from inspections carried out to date that refinement of the management provisions for this Reserve will require a detailed inventory of the vegetation and flora it supports.

5. FAUNA

The fauna of the Lake Magenta Nature Reserve was studied in a series of expeditions by Dr D.L. Serventy and the Western Australian Museum on 3-5 February 1953, 25-27 November 1963, 3-13 April 1971 and 4-13 October 1972. Information collected on the bird fauna during these expeditions was published by Mr J. Dell (1976) in a paper entitled "Birds of Lake Magenta Wildlife Sanctuary, Western Australia" *Records of the Western Australian Museum* 4 : 117-132. Records of the mammals and herpetofauna compiled during the same expeditions are unpublished, and we are grateful to Dr D.J. Kitchener for permission to abstract these data from an unpublished report on the Reserve written by himself and Messrs A. Chapman, J. Dell and L.A. Smith for inclusion in this Management Plan.

In addition to the Museum expeditions records of mammals were obtained from the area by Mr Ray Aitken when he was Teacher at the Government School in Nyabing during the early 1950s. A collection of lizards was made by Mr T. Evans of the Department of Fisheries and Wildlife while supervising firebreak

construction on the Reserve in 1973. A further collection of lizards was made by the W.A. Naturalists' Club Easter Expedition to the Reserve in 1974, and sight records of several mammals were made during a management inspection of the Reserve in 1980.

5.1. THE MAMMALS

Eleven species of mammals were recorded from the Lake Magenta Nature Reserve as a result of the 1971 and 1972 Museum expeditions. The following annotated list is based on these two sets of observations and sight records made in July 1980.

Western Grey Kangaroo *(Macropus fuliginosus)*

Frequently seen in all main habitat types. Over one hundred individuals counted grazing croplands on the southern margin of the Reserve at dusk (July 1980).

Western Brush Wallaby *(Macropus irma)*

A group of four seen grazing in agricultural land close to the north-west corner of the Reserve in April 1971. A pair sighted feeding in recently burned country near Sullivan Soak in October 1972. One seen feeding on croplands near the southern boundary of the Reserve, July 1980.

Honey Possum *(Tarsipes spencerae)*

One specimen caught in a pit trap on white, coarse grained sand, 8 km south of Hall's Track 1971-72.

Little Bat *(Eptesicus pumilis)*

Two females shot at Sullivan Soak while flying around a flowering eucalypt (October 1972). Probably feeding on insects.

Mitchell's Hopping Mouse *(Notomys mitchellii)*

Three males trapped in different localities 1971-72.

Echidna *(Tachyglossus aculeatus)*

Diggings and scats observed 1971, 72, 80.

Red Fox *(Vulpes vulpes)*

One specimen seen near southern boundary of the Reserve, July 1980.

Dingo *(Canis familiaris)*

A pair seen on Hall's Track in October 1972.

House Mouse *(Mus musculus)*

Several trapped in both 1971 and 1972.

Domestic Cat *(Felis catus)*

One seen in April 1971.

European Rabbit *(Oryctolagus cuniculus)*

Present in several areas of the Reserve.

This is a probably far from definitive list of the mammals which occur on the Lake Magenta Nature Reserve. The Museum expeditions restricted their attentions to the northern part of the Reserve, much of which was subject to severe fires during the 1960s. A number of mammals usually found in mallee and woodland habitats were not seen by the Museum expeditions, some of which had earlier been recorded from the region by Mr R. Aitken during his stay at Nyabing. These include the Red-tailed Wambenger *(Phascogale calura)*, a Native Cat (probably *Dasyurus geoffroii)*, the Pigmy Possum *(Cercatetus concinnus)* and a marsupial mouse, which may have been one of several possible *Sminthopsis* spp. or *Antechinomys laniger*. The Brush-tailed Possum *(Trichosurus vulpecula)* is also a likely resident of the Reserve which has so far gone unrecorded. Future surveys of the mammal fauna would therefore almost certainly result in significant additions to present records.

5.2. THE BIRDS

Mr J. Dell recorded 98 species of birds from the Reserve in his paper referred to earlier, which is the combined results of observations made in 1953, 1963, 1971 and 1972. This is the largest number of bird species recorded from any wheatbelt Nature Reserve.* The annotated species list included in Mr Dell's paper is reproduced in Appendix I to this Management Plan.

In his discussion of the bird fauna Mr Dell drew attention to a number of differences, both in species recorded and apparent numbers of some species, from an earlier published bird list for the Lake Grace area**, the site of two Nature Reserves 35 km west of Lake Magenta (Fig. 4).

The major differences in the two lists concerned several waterbirds recorded at Lake Grace but not at Lake Magenta and ten species of land birds similarly unrecorded at Lake Magenta. Among the more interesting omissions from the apparent bird fauna of the Lake Magenta Nature Reserve are the Redthroat *(Pyrrholaemus brunneus)*, which has become very scarce in the wheatbelt in recent years, and species like the Western Shrike Tit *(Falcunculus frontatus leucogaster)* which is widespread but uncommon and frequently difficult to observe. As Mr Dell commented in his paper, several of these species probably do occur on the Lake Magenta Nature Reserve and will reveal themselves as more intensive observation becomes possible.

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*Dr D.J. Kitchener, Personal communication.

**Carnaby, I.C. (1933). The birds of the Lake Grace District, W.A. *Emu* 33 : 103-109.

Other species, such as the Smoker or Regent Parrot *(Polytelis anthopeplus)*, which was recorded from the Reserve in 1953 and 1962 but in neither 1971 nor 1972, and which has declined in numbers throughout its range, suggest that the bird fauna even of a large Reserve such as Lake Magenta cannot be expected to remain completely unaffected by development of surrounding lands.

On a more encouraging note, several species have apparently increased in numbers on the Reserve since surveys began. These include the Blue-breasted Wren *(Malurus pulcherrimus)*, Purple-gaped Honeyeater *(Meliphaga cratita)* and Spotted Pardalote *(Pardalotus punctatus)*. Even the Smoker Parrot is appearing again in flocks of reasonable size (but much smaller than previously) in several parts of its old range, and a resurgence of the populations of this magnificent bird seems possible given the fine network of large Nature Reserves and National Parks throughout this part of the south-west of Western Australia.

Fluctuations of some species aside, the Reserve has remained a most important and stable refuge for a number of bird species totally reliant on the mallee and woodland habitats represented there. The Shy Ground Wren *(Hylacola cauta)*, Restless Flycatcher *(Myiagra inquieta)* and the Mallee Fowl *(Leipoa occeilata)* itself are spectacular examples. The continuing presence of birds such as these and the large total number of species found on the Reserve are living vindications of its immense values as a conservation area.

5.3. THE REPTILES AND AMPHIBIA

Seven frogs and 31 reptiles (27 lizards and 4 snakes) have been collected from the Lake Magenta Nature Reserve, mainly during expeditions by the Western Australian Museum. The species recorded are listed collection by collection in Appendix II.

Like those for the mammals and birds this list is almost certainly not a complete one, but the number of lizards alone is greater than that found on any other wheatbelt Nature Reserve with the exception of the East Yuna Reserves (Reserves nos. 28245 and 29231) which are north of Geraldton and total 1 717 ha in area.*

6. NATURE CONSERVATION VALUES

The values of the Lake Magenta Nature Reserve as a conservation area stem from its great size and from the fact that it takes in

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*A comparison of the lizard faunas of 23 Nature Reserves in the Western Australian wheatbelt was made by Kitchener, D.J., Chapman, A., Dell, J., Muir, B.J., and Palmer, M. (1980) "Lizard assemblage and reserve size and structure in the Western Australian wheatbelt - some implications for conservation." *Biological Conservation* 6 : 26-62.

the greater part of a naturally discrete area of eucalypt-dominated vegetation with all its variations of floristic composition and structure, from forests to woodlands and from closed mallees to mallee-scrublands and mallee-heaths. What appears on the surface as a nearly uniform expanse of mainly mallee vegetation resolves on closer inspection into a rich mosaic of widely and more subtly differing associations of a surprising diversity of species.

Because of its size (and compact shape) many of the immediate effects of development of surrounding land that tend to degrade the values of wheatbelt Nature Reserves, such as the inwards spread of grasses and other pasture plants and the drift of fertilisers, seeds, chemicals and soil, can be confined to a "buffer zone" around the perimeter of the Reserve which takes up only a small proportion of its total area. The remainder and greater part becomes a "core area" subject to minimum influence from outside. The vegetation and flora of this area stand a good chance of being able to continue their natural evolution and succession with a minimum of interference.

The size factor and the natural diversity of habitats represented on Lake Magenta are also potentially most advantageous to the more sedentary fauna of the Reserve. In addition, however, the isolation of the Reserve resulting from the development of surrounding farmlands does not represent the same massive quantum change in the environment which must have been so detrimental to populations of many animals in most other wheatbelt Nature Reserves. As Dr Serventy observed in 1953, the Lake Magenta Nature Reserve has always been naturally a major part of a substantial "island" of mallee and woodland vegetation. The development of surrounding areas as farmlands is a change in the *degree* of isolation rather than a sudden disruption of a previously continuous expanse of similar habitats.

For the more mobile fauna, particularly the birds, Lake Magenta lies at the hub of a series of major Nature Reserves and National Parks (Fig. 4) which provide complementary and alternative summer and winter range habitats. The Lake Grace Nature Reserves (35 km west, 19 825 ha) provide additional littoral and salt and fresh water lake habitats in the near vicinity. Ecosystems represented in the Dragon Rocks Nature Reserve (70 km north, 32 096 ha) complement those present in Lake Magenta. Dragon Rocks includes a series of ecosystems from higher in the landscape sequence including mallees, sandplain heathlands and lithic complexes.

Closer to the coast, but in easy striking distance for stronger-flying birds, are the Fitzgerald River National Park (30-40 km south, 242 739 ha) and the Stirling Range National Park (85 km south-west 115 671 ha). Being in higher rainfall areas (400-600 mm A.A.R.) and containing many summer-flowering plants, these National Parks may well provide important summer habitats for nectarivorous and other birds found inland at other times of the year.

Further intensive surveys of both animals and plants on Lake Magenta Nature Reserve are needed to confirm the present indications of a diverse flora and fauna, but together with what can be inferred from its physical characteristics and relationships to surrounding lands and Reserves, present knowledge is sufficient to confirm the Reserve as a Primitive Area and Nature Reserve of the highest significance. It is fully deserving of its "A" classification under the Land Act and fulfils many of the requirements needed to be nominated a "Biosphere Reserve" as defined by the International Union for the Conservation of Nature and Natural Resources.

7. FIRE HISTORY

A picture of the recent history of fires on the Reserve has been built up from aerial photography of the area flown in November 1956, January 1968 and January 1974 and from E.R.T.S. (Earth Resources Terrestrial Satellite) and Landsat imagery recorded from satellite passages in October 1972, November 1976 and October 1978 (Figs. 14 and 15).

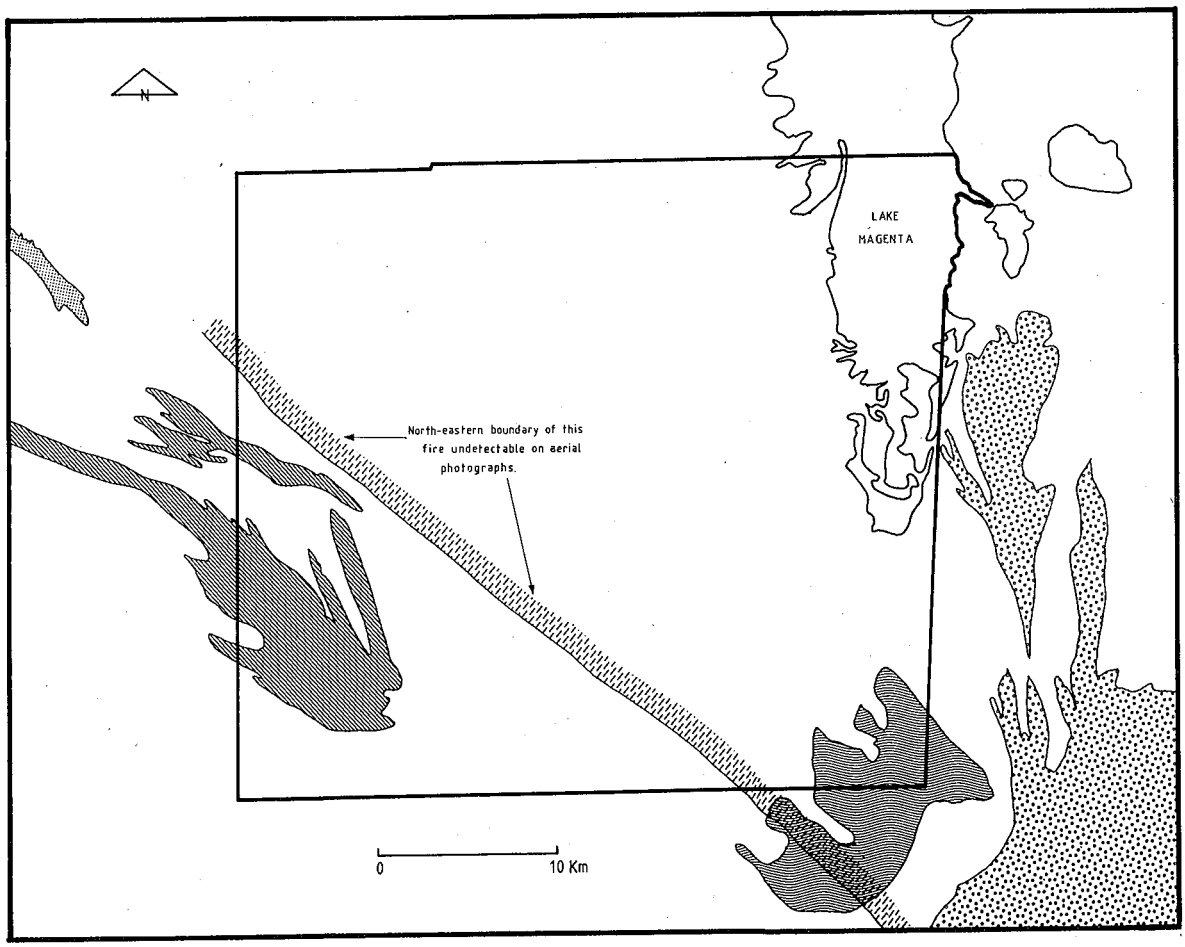

Figure 14. Fire history of Lake Magenta Nature Reserve 1: pre 1956.

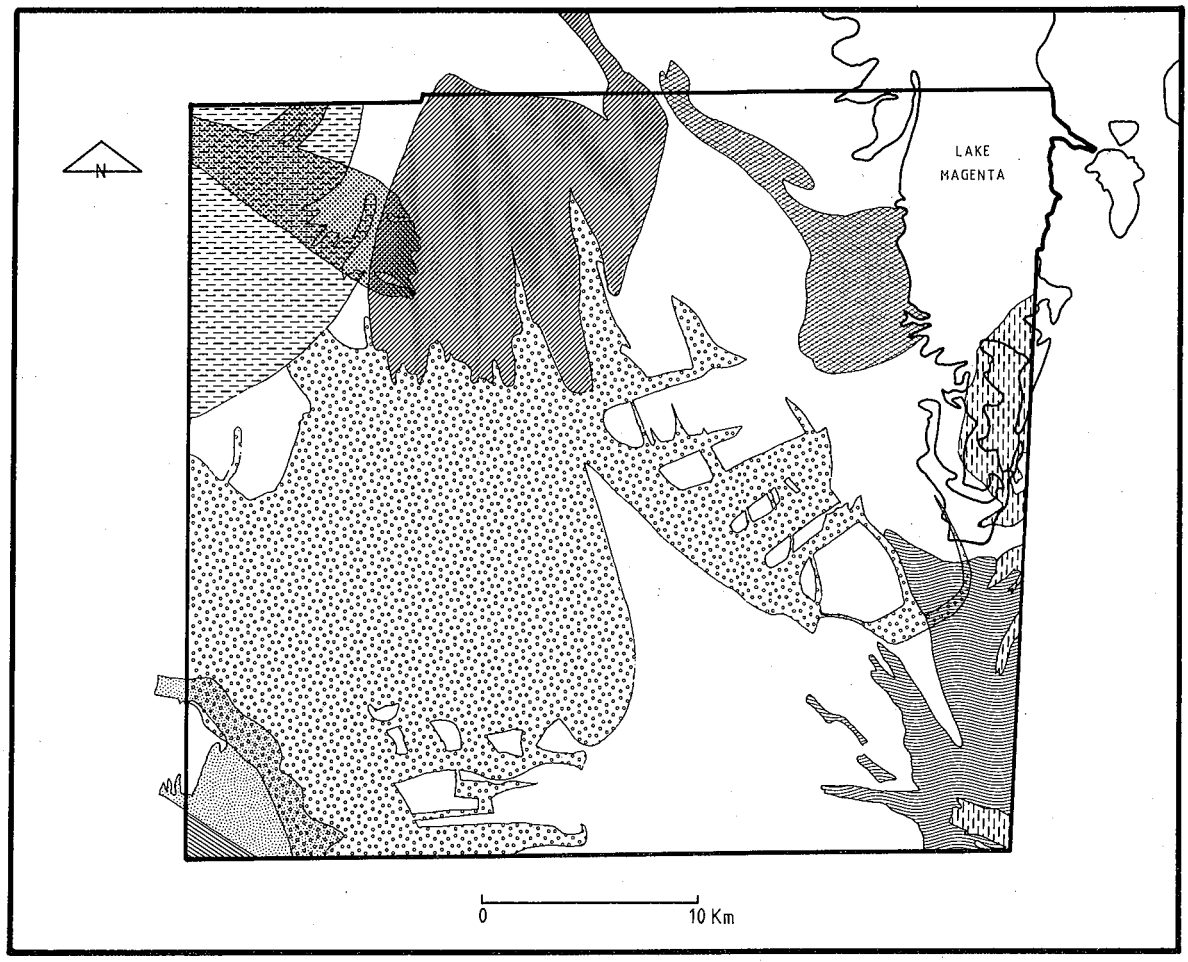

Figure 15. Fire history of the Lake Magenta Nature Reserve 2: 1957 to present

pre- 1968

1971-72

Nov. 72

1977-78

Dec. 79

The earliest photography available (November 1956) shows there to have been one recent (5-10 years age) fire in the south-east corner of the Reserve (Fig. 14). The western edge of a large but very old fire* is visible running diagonally north-west/south-east across much of the Reserve and the tracks of smaller fires of similar age can be seen in the south-east corner. Some recent fires, which may have started in developed farmlands, probably from clearing burns, are visible on this photography but did not enter the Reserve.

Four major fires are clearly visible on the 1968 photography which were not present in 1956 (Fig. 15). Tonal differences in these fire tracks in later photography, resulting from increasing density of regenerating vegetation, suggest that these pre-1968 fires may have occurred between 1960 and 1964.

The largest and most recent of the pre-1968 fires appears to have started in recently cleared land to the west of the Reserve. It affected some one-quarter of the Reserve area.

The other three pre-1968 fires occurred earlier and burnt over smaller areas of the north-western and south-eastern corners of the Reserve.

A very intense fire, which started some 12 km to the north, burnt about one-tenth of the Reserve in February 1972. This fire completely defoliated mallee vegetation in its path, destroyed all litter and killed an estimated 70 percent of the Salmon Gum trees at Sullivan Soak. The track of this fire, which started in agricultural land, probably from a clearing burn, has been mapped on Figure 15 from the earliest satellite imagery available for the Reserve area (October 1972). Its origin in a farm paddock is clearly visible in this photography.

In November of the same year a smaller fire, which may have started from a lightning strike on adjoining, uncleared land, entered the Reserve near the south-western corner. It burned north and west and out of the Reserve on the western boundary.

There were no further major fires until the summer of 1976-77 when a fire entered the Reserve near the north-western corner and burned south-eastward, being stopped by Hall's Track, back-burning operations carried out by local firefighters and the area previously burned in February 1972. This fire also originated on farmland.

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*The ageing of some of the earlier fires visible in the 1956 photography is most difficult and can only be inferred from the rates at which the tracks of later fires of known age fade in successive photographic coverages. Tracks of fires which occurred prior to 1968 but after 1956, for example, are still quite clearly definable on satellite imagery recorded in 1978 (and 1979). From this comparison it seems reasonable to infer that the old fire tracks visible on the 1956 photographs originated at least 20 years, and possibly longer, prior to that time.

The last fire to have occurred on the Reserve (December 1979) burned southward and eastward from near the northern boundary being stopped at the lakeshore and, at its southern end, south of Hall's Track, by firefighting units of the Department of Fisheries and Wildlife. This was the first occasion of a fire on Lake Magenta Nature Reserve since firefighting capacity of the Department of Fisheries and Wildlife has developed sufficiently to permit it to attempt to suppress fires on this Reserve.

In total, therefore, about 60% of the Nature Reserve has been burnt in eight major fires during the past 20 years. Each but the last of these fires started outside the Reserve, either as a result of lightning strike (2 recorded occasions) or the accidental escape of clearing burns. Prior to the 1960s fires appear to have been a less common occurrence.

8. MANAGEMENT SIGNIFICANCE OF FIRE HISTORY

The possibility of lightning strikes starting fires on the Reserve will continue, but since nearly all the land on the northern, western and southern boundaries is now developed or due to be developed in the near future, the risk of fire spreading into the Reserve from farm development fires will be much reduced.

The effects of fires which have occurred during the past 20 years, however, will be evident for a long time. The tracks of those dating from the mid-1960s are quite clearly visible on aerial photographs from 1978 and on the ground.

Parts of the stand of moort *(Eucalyptus platypus)* at Location 3 on Figure 2, shown in its unburnt state in Figure 8, were burned in the largest fire of the pre-1968 period. From Figure 8 the closed canopy of the unburned moort shrubs and trees, which are up to 4 m in height, can be clearly seen. The understorey is sparse and the ground has a thin layer of leaf and bark litter. This is the kind of habitat required by birds such as the Mallee Fowl. In the areas burned in the mid-1960s (Fig. 16) the moort shrubs have regenerated and reached a height of about 2 metres in the intervening 16 years. They have formed a low closed canopy, but the burned stems of the plants killed by that fire are clearly visible and show the amount of growth required before the stand will reach maturity.

Comparison of the aerial photography of 1956 and later, summarised in Figs. 14 and 15, and the rate of re-growth of this one stand of *Eucalyptus platypus* combine to suggest that the frequent fires of the past 20 years were an unusual occurrence and mostly associated with development of the surrounding farmlands. Information from other areas of semi-arid woodlands and mallees

Figure 16. Part of the stand of moort *(Eucalyptus platypus)* at Location 3 (Fig. 2) burned in the 1960s. The unburned part of the same stand is shown in Fig. 8.

in Western Australia support this contention*. Plant communities such as these are extremely slow-growing and are unlikely to have developed in areas subject to regular or frequent fires. Measures to reduce the frequency of fires and suppress such fires as do occur, while assiduously maintaining the security of adjoining properties, should have the highest priority in the future management of the Reserve.

9. PAST MANAGEMENT OF THE RESERVE - CLASSIFICATION

Lake Magenta Nature Reserve was declared a "Prohibited Area" under Section 12A of the Wildlife Conservation Act in August 1969. Since that time access to all the Reserve, except along the line of Hall's Track, a Protected Road, has been legally restricted to those holding permits issued by the Director of the Department of Fisheries and Wildlife.

This step was taken preparatory to construction of boundary and perimeter firebreaks on the Reserve (Fig. 2). Though considered necessary as a strategic basis of fire protection for the Reserve and surrounding lands, these firebreaks also provide ready access to previously remote areas. The legal restrictions to access imposed at the time were considered necessary in the interests of maintaining the "Primitive Area" status of the Reserve.

*Hopkins, A.J.M. and C.J. Robinson (1980). "Fire induced structural change in a Western Australian Woodland." Australian Journal of Ecology, in Press.

PART B

PLAN OF MANAGEMENT

1. MANAGEMENT PRIORITIES

1.1. PROTECTION OF NATURE CONSERVATION VALUES

Paramount among the objectives of management for the Lake Magenta Nature Reserve is the protection of its values as a large and little-disturbed, naturally discrete area of mallee and woodland ecosystems characteristic of this low rainfall region of the south-west of Western Australia. It has both "Key Site" and "Primitive Area" status in the Western Australian system of Nature Reserves and is deserving of international recognition as a "Biosphere Reserve" under the criteria laid down by the International Union for the Conservation of Nature and Natural Resources.

1.1.1. Continuation of the strategy of conservative management

Lack of detailed knowledge of the distribution of vegetation associations and the flora and fauna of the Reserve limit management action which may be taken without risk to values still incompletely understood. Lack of knowledge and the "Primitive Area" status of the Reserve require that a conservative approach to management be continued except where the risk of serious pertubation (such as continued frequent fire) or risk to the values of surrounding lands dictate otherwise.

1.1.2. Regulation of use

Consistent with the status of the Reserve as a "Primitive Area" its use for recreational and other purposes should be maintained at a low level. Provision should continue to be made, however, for scientists and naturalists, amateur and professional, to visit the Reserve and thereby improve knowledge of its habitats and its flora and fauna.

1.1.3. Fire Protection

Considering the evidence of the fire history of the Reserve and information now coming to light on the rates of regeneration of semi-arid woodlands and mallees in Western Australia, minimising the risk of fire on the Reserve should be a management objective of highest priority throughout the period of currency of this Plan.

1.1.4. Fire Suppression

Measures adopted under the general objective of "fire protection" shall include the suppression

of such fires as may occur on or threaten the Reserve.

1.1.5. Control of weeds and pests on the Reserve margins

Such measures as may be necessary to minimise the ingress of weeds and pasture plants around the periphery of the Reserve will be taken. Attention will also be paid to managing attendant problems of fire hazard and attraction to animal pest species such as rabbits to any proliferation of volunteer species on the margins of the Reserve itself.

1.2. PROTECTION OF SURROUNDING PROPERTY

Second only to protection of the conservation values of the Reserve itself is the responsibility to protect the assets of neighbouring property holders. In one field, that of fire protection, it is recognised that the ideal of thoroughly conservative management of the Reserve may need to be compromised to some degree in the interests of providing adequate security from fire of surrounding properties.

1.2.1. Fire Protection

It is therefore an objective of first priority in this Plan to provide adequate protection to neighbouring landholders against the risk of fire escaping from the Reserve and into their properties.

1.2.2. Weed and pest control

Further to the provisions in paragraph 1.1.5. above, measures will be taken to protect surrounding farmland from damage as a result of occurrence on the Reserve of such animals and plants as may be declared from time to time under the Provisions of the Agriculture and Related Resources Protection Act.

1.3. USE OF THE RESERVE

1.3.1. Research and survey

This Management Plan shall provide for the continued encouragement of casual and systematic surveys of the vegetation, flora and fauna of the Reserve, and for such other research of a non-destructive nature as will increase knowledge of the Reserve and its biota and strengthen the foundation of any management programme.

1.3.2. Use for other purposes

In view of the status of the Reserve as a Primitive Area, its use for purposes other than research will be closely regulated.

2. ESTABLISHMENT OF A MANAGEMENT ADVISORY COMMITTEE

The substantial interest of the local community in the Lake Magenta Nature Reserve has led to a proposal for establishment of a committee of residents of the Shire of Kent to advise and liaise with the Department of Fisheries and Wildlife on questions of the management of the Reserve. The proposal has been adopted as a provision of this Management Plan.

The Committee, which will be known as the Lake Magenta Nature Reserve Management Advisory Committee, shall consist of four members: the Reserve Management Officer in charge of the Reserve and three others to be nominated by the Shire Council of the Shire of Kent and appointed by the Director of Fisheries and Wildlife.

The terms of reference of the Committee shall be to advise the Department of Fisheries and Wildlife on the application of the general provisions and principles of management set down in this Management Plan and to provide an avenue of communication between the local community and the Department.

3. FIRE PROTECTION

Fire protection for the Lake Magenta Nature Reserve is currently based on a system of six metre-wide ploughed firebreaks and a policy of suppression of fires on the Reserve. These measures together proved to be adequate as a fire control strategy for the Reserve during the December 1979 fire.

The existing firebreak system gives good access to all parts of the Reserve, dividing it into 12 compartments of near equal size, forming lines from which to fight fires and providing some impediment to fire spread. These advantages are considered to offset the potential that the firebreak network creates for unauthorised access to remote parts of the Reserve. This Plan will therefore provide for the continuation of the established approach to fire control on the Reserve, making improvements and amendments in detail indicated as being desirable from local knowledge and as a result of the December 1979 fire.

3.1. INTERNAL FIREBREAKS

The current programme of maintenance of internal firebreaks, ploughing and raking at two year intervals to knock down eucalypt re-growth and progressively remove mallee roots, will be continued under the provisions of this Plan.

Local knowledge, and experience from other major Nature Reserves in the wheatbelt, such as Boyagin Nature Reserve (No. 19128), however, suggest that the value of the internal breaks would be greatly increased by establishing some of them as wider barriers to fire spread. Fires in this region and in the vegetation types characteristic of the Lake Magenta Nature Reserve are frequently quite fierce and driven by very strong winds. (This is particularly the case in fires starting from electrical storms. Lightning strike is likely to be the predominant cause of fires on the Lake Magenta Nature Reserve in the future).

Provision will therefore be made in this Plan for the establishment of one or more internal buffers of frequently burned vegetation. The internal buffers formed under this provision would be based on the existing system of fire-breaks and would be constructed by installing a second cleared break parallel to, and 100-200 m distant from, the existing one along the selected buffer lines. The vegetation in the intervening strip would then be burned on a regular basis.

The detailed layout of the proposed system of buffers, the width of the burned strips and the frequency of their burning depend on balancing advantage to fire control against degree of dissruption to other management objectives and the possibility of damage to rare plant species and vegetation associations of limited distribution on the Reserve. It will therefore be finalised by the Department after consultation with the Management Advisory Committee. The final installation of a buffer system will also be dependent on the results of a pilot study of their effectiveness in mallee vegetation types detailed in Section 3.2.2. of this Plan of Management.

3.2. PERIMETER FIREBREAK

Apart from its access function, the perimeter firebreak system provides a level of protection to the Reserve from fire on adjoining lands and vice versa: It is the basis for the protection of surrounding farmland, in particular, from fires which may start on the Reserve.

Since most of the adjoining farmlands are now developed, the risk of fire entering the Reserve from outside in the future will be much reduced. Clearing operations (and their attendant fires) are largely complete, and such fires as do start on farmland are likely to be effectively blocked by the existing perimeter firebreak system. The low fuel loads characteristic of productive farmlands of the wheatbelt for most of the summer obviate the need for perimeter firebreaks wider than the standard six metre cleared break in routine use on Nature Reserves in this region. Placed immediately inside the Reserve boundary breaks of this type combine with the farmer's own to protect fence lines and provide a line from which fire-

fighters can burn back or otherwise attack fires coming out of the Reserve itself.

As with the internal firebreaks, however, some improvements to the perimeter firebreak are possible and will be allowed for under the provisions of this Plan.

3.2.1. Realignment of perimeter firebreaks

Having been installed prior to the clearing of most adjoining properties, the perimeter firebreak on the Lake Magenta Nature Reserve does not exactly follow the boundary of the Reserve itself along all of its length. Where the firebreak runs into adjoining land it will be realigned by the Department of Fisheries and Wildlife. Wherever a fringe of bushland remains between the break and the farm fenceline adjacent, Reserve neighbours may apply to the Department of Fisheries and Wildlife for permission to enter on the Reserve and clear between the firebreak and their fences. Such permission will be granted subject only to concerns for the security of the Reserve from fire.

3.2.2. Perimeter firebreaks adjoining undeveloped farmland

Parts of the perimeter firebreak opposite land released for development but which is not cleared, most notably along the eastern part of the northern boundary of the Reserve, will be upgraded into a low fuel buffer, 100 - 200 m wide and of otherwise similar specification to buffers in the proposed system of internal firebreaks. The necessary clearing and burning of this north-eastern section will be completed during autumn 1981 or otherwise before development of the adjoining land commences. The experience gained in this operation will be applied in making final decision concering the practicability of installation and likely effectiveness as barriers to wildfire of the proposed system of internal buffers on the Reserve.

3.2.3. Weed grcwth on perimeter firebreaks

Growth of pasture grasses and weeds on the existing perimeter firebreak, particularly on parts of the western and southern boundaries, is creating a potential fire hazard to fences and an attraction to pest animals such as rabbits. This problem is likely to be a continuing one because the strong westerly and southerly winds to which the region is subject will continue to carry soil, seeds and fertilisers onto the firebreaks and encourage the growth of volunteer species. (This is a common management problem in Nature Reserves on

light soils, both in the wheatbelt and sandplain areas. It is one of the reasons why perimeter buffers of frequently burned vegetation are not favoured for general application as a strategic measure for fire control on Nature Reserves bounding farmland. Regular disturbance by fire of natural vegetation, especially on sandy soils, has been shown in a number of places to encourage its invasion by grasses and other weeds. The resultant increase in fire risk quickly overcomes any benefit that may be obtained by the frequent burning).

To reduce the immediate fire hazard to fence lines this Plan will provide for the boundary firebreak to be ploughed annually in places where weed growth is conspicuous.

In addition, close liaison will be maintained with the Agriculture Protection Board and neighbouring landholders to ensure that any populations of rabbits that may reach high numbers as a result of the feed provided by weeds and grasses on firebreaks are reduced to low levels.

(It should be noted, however, that annual ploughing will not remove grasses from all of the firebreak. Under this regime the fences and vegetated edges of the firebreak will continue to carry some growth of grasses. The presence of small numbers of animals such as rabbits around the Reserve margins, therefore, will have the advantage of keeping down vegetation out of reach of the plough).

3.2.4. Use of herbicides in firebreak maintenance

Residual, pre-emergence herbicides provide a possible alternative means to ploughing or maintaining the boundary firebreak of the Reserve free of grasses and weed growth.

Herbicides are likely to be more effective, reaching right up to fence and natural vegetation lines, and may be cheaper than ploughing. Application of herbicides would not be necessary every year.

This Plan will therefore provide for investigation of the feasibility and effectiveness of maintaining the boundary firebreak of the Reserve using herbicides, designating a section of the western boundary firebreak up to one kilometre in length for trial purposes. The trial programme will be conducted over a five to ten-year period and will include provision for monitoring of the effects of herbicide use on the native vegetation.

These trials will be conducted following appointment of the Katanning Reserve Management Team, and in consultation with the Management Advisory Committee for the Reserve.

3.3. FIRE SUPPRESSION

3.3.1. Fire notification

The Department of Fisheries and Wildlife will, with the assistance of the Management Advisory Committee, establish a system of fire notification involving the neighbours of the Lake Magenta Nature Reserve. In the event of a fire on the Reserve it will be the duty of these neighbours immediately to inform Fire Control Officers of the Shire of Kent who will in turn inform the Departmental Officer in charge of the Reserve.

3.3.2. Responsibility for first attack

Fire Control Officers of the Shire of Kent will assume responsibility for taking first attack measures in the event of fire occurring on the Lake Magenta Nature Reserve. This responsibility will include:

3.3.2.1. Assessing the location, direction and rate of spread of the fire and taking such first attack measures as may be required to facilitate its control;

3.3.2.2. Mobilising such heavy equipment as may be deemed to be required to control the fire, the cost of the movement of such equipment to be borne by the Department of Fisheries and Wildlife; and

3.3.2.3. Maintaining contact with the Departmental Reserve Management Officer in charge of the Reserve over the disposition of heavy equipment.

All restrictions to access to the Reserve arising from its Classification under Section 12D of the Wildlife Conservation Act (Section 5 of this Plan of Management) are waived for firefighters in the case of a fire occurring on the Reserve.

3.3.3. Role of the Departmental Fire Fighting Organisation

Department of Fisheries and Wildlife fire fighting units will attend fires on and threatening the Lake Magenta Nature Reserve.

In line with Departmental policy, fire teams from the Department will, upon arrival, place themselves under the control of the Officer in Charge of the fire, normally the Senior Fire Control Officer present. The Officer in Charge will, however, be required to consult with the Reserve Management Officer in charge of the Reserve (or failing him the senior Departmental Officer present) on the proposed use of heavy machinery and any operations involving back-burning.

3.3.4. Fire suppression plan

The Reserve Management Officer based at Katanning shall, upon his appointment and as a matter of high priority, prepare and implement a detailed Fire Suppression Plan for the Reserve based upon the principles enumerated here and including provisions for fire notification, communications and details of the locations of equipment, maps of access to the Reserve, and such other matters as may be relevant to the control of fires. Liaison with the Shire of Kent and neighbouring landowners in the preparation and implementation of the fire suppression plan will be maintained through the Reserve Management Advisory Committee.

4. CONTROL OF PEST ANIMALS AND PLANTS

In addition to the particular provisions for pest control in relation to maintenance of the perimeter firebreak (Section 3.2.3. of this Plan), control of pest plants and animals may be necessary to protect fauna and flora and the environment of the Reserve generally and as part of organised control of vertebrate pests and various weeds in the vicinity of the Reserve.

Such arrangements as may be necessary in respect of organised pest control action shall be made by consultation and cooperation between Officers if the Agriculture Protection Board and the Department of Fisheries and Wildlife.

4.1. PERMITS REQUIRED FOR ENTRY

Notwithstanding the general provisions of this section, Officers of the Agriculture Protection Board shall be expected to obtain permits for entry onto the Reserve for all inspections and operations they may wish to undertake.

4.2. ADEQUACY OF CONTROL MEASURES

Owners of land in the vicinity of the Reserve are invited to draw the attention of the Director of the Department

of Fisheries and Wildlife to what they consider to be inadequacies of control of pest plants and animals on the Reserve. On receipt of such a complaint the Director may organise a joint inspection of the problem or take such action as may be necessary to remedy the situation.

5. CLASSIFICATION

The present classification of the Reserve under Section 12A of the Wildlife Conservation Act as a "Prohibited Area" shall continue under the provisions of this Plan.

6. RESEARCH

6.1. AERIAL PHOTOGRAPHIC COVERAGE

Anticipating the detailed survey, classification and mapping of the vegetation of the Lake Magenta Nature Reserve the Department of Lands and Surveys will be requested to undertake a special aerial photographic project to obtain large scale colour aerial photographic coverage of the Reserve. Copies of these photographs will normally be made available to research workers wishing to undertake investigations on the Reserve.

6.2. PERMITS REQUIRED FOR ENTRY

Research workers wishing to undertake projects on the Lake Magenta Nature Reserve shall be required to obtain permits for entry to the Reserve from the Director of Fisheries and Wildlife. Application for a permit should be accompanied by a brief statement of the research or survey work intended.

7. OTHER USE

Use of the Reserve by persons other than scientists and naturalists will not be encouraged. Intending visitors to the Reserve will be required to obtain a permit to do so from the Director of Fisheries and Wildlife.

No development for the purposes of recreational or educational use of the Reserve is envisaged.

8. GENERAL

8.1. TERM OF THE MANAGEMENT PLAN

Unless superseded earlier the term of this Plan shall be ten years.

8.2. OTHER PROVISIONS

During the currency of this Plan the Department of Fisheries and Wildlife may, with the approval of the Chairman of the Western Australian Wildlife Authority, undertake any other work or research or institute any other provisions for management which may become necessary to properly promote the objectives of management stated in Section 1 of this Plan.

APPENDIX I

ANNOTATED LIST OF BIRDS - Reprinted from Dell, J. (1976) "Birds of the Lake Magenta Wildlife Sanctuary, Western Australia". Records of the Western Australian Museum 4 : 117-132.

Emu (*Dromaius novaehollandiae*). Sparse throughout Reserve and adjacent country. Breeding: adult with three half-grown young on farmland west of Greenshield Soak on 5 February 1953; adult with seven small chicks on firebreak in low regrowth mallee on 12 October 1972; old nest with eggshells in *Eucalyptus platypus* mallee in October 1972.

Hoary-headed Grebe (*Podiceps poliocephalus*). Twenty on freshwater lake *ca* 500 m x 400 m, and two on freshwater lake *ca* 1600 m x 1400 m at southwest fringes of Lake Magenta in October 1972.

Pelican (*Pelecanus conspicillatus*). Four over Newdegate on 26 November 1963 at 0750 hours.

White-faced Heron (*Ardea novaehollandiae*). One at freshwater swamp, 35 km south of Newdegate on 27 November 1963, and one on swamp 19 km north of Hall Track on east side of Lake Magenta on 27 November, 1963.

Black Swan (*Cygnus atratus*). Approximately 50 on freshwater lake ca 1600 m x 1400 m and five on smaller lake at southwest fringes of Lake Magenta in October 1972. Two on salt lake 6.5 km west of Pingrup on 25 November 1963.

Mountain Duck (*Tadorna tadornoides*). Approximately 1,000 on salt lake 6.5 km west of Pingrup on 25 November 1963; *ca* 27 on salt lake 8.4 km south of Newdegate on 27 November 1963; *ca* 30 on small freshwater lake on southwest fringes of Lake Magenta in October 1972.

Grey Teal (*Anas gibberifrons*). Approximately 200 on salt lake 6.5 km west of Pingrup on 25 November 1963; *ca* 300 on small freshwater lake 14 km north of Pingrup on 25 November 1963; *ca* 100 on small lake 13 km south of Lake Grace on 25 November 1963; 15 on freshwater swamp 19 km north of Hall Track on east side of Lake Magenta on 27 November 1963; *ca* 300 on freshwater lake, 500 m x 400 m, and *ca* 50 on freshwater lake, 1600 m x 1400 m, on southwest fringes of Lake Magenta in October 1972.

Black Duck (*Anas superciliosa*). Remains of dead bird in sedges lining freshwater lake on southwest fringe of Lake Magenta in October 1972. Ten adults, one pair with 15 young, on small lake 13 km east of Lake Grace on 25 November 1963.

Blue-winged Shoveler (*Anas rhynchotis*). Nine among large flock of Grey Teal on freshwater lake on southwest fringes of Lake Magenta in October 1972.

Wood Duck (*Chenonetta jubata*). A male on freshwater lake 19 km north of Pingrup on 25 November 1963; a male on swamp 18 km south of Lake Grace on 25 November 1963; ten on swamp 19 km north of Hall Track on east side of Lake Magenta on 27 November 1963: seven on one freshwater lake and four on another at southwest fringe of Lake Magenta in October 1972.

Musk Duck (*Biziura lobata*). A pair on freshwater lake at southwest fringe of Lake Magenta in October 1972.

Square-tailed Kite (*Lophoictinia isura*). Frequent throughout Reserve in October 1972, hunting over Salmon Gum (*Eucalyptus salmonophloia*) woodland, mallee, and heath.

Whistling Kite (*Haliastur sphenurus*). Two over Lake Magenta on 27 November 1963; one over sandplain and mallee on northwest side of Lake Magenta on 7 October 1972.

Brown Goshawk (*Accipiter fasciatus*). A pair in Salmon Gums 25 km east of Pingrup on 3 February 1953; pair with nest 10 m from ground in Salmon Gum 7 km west of Lake Magenta during October 1972.

Little Eagle (*Aquila morphnoides*). A white-phase bird recorded in 'woodland' on 4 February 1953.

Wedge-tailed Eagle (*Aquila audax*). One at Sullivan Soak on 5 February 1953; recorded in April 1971; one high over Salmon Gum woodland on 9 October 1972.

Little Falcon (*Falco longipennis*). One chasing Yellow-throated Miners at dusk in burnt Salmon Gums at Sullivan Soak on 10 October 1972.

Brown Falcon (*Falco berigora*). Several outside Reserve in February 1953 and November 1963. Recorded in Reserve in April 1971. Occasionally along tracks in mallee and Salmon Gums; more plentiful in burnt country in October 1972.

Nankeen Kestrel (*Falco cenchroides*). One over farmland 14 km south of Newdegate on 26 November 1963; one carrying lizard, probably *Amphibolurus*, 10 km west of Greenshield Soak on edge of burnt area on 27 November 1963.

Mallee Fowl (*Leipoa ocellata*). Adult bird on road 9 km east of Pingrup on 3 February 1953; nest in use 7 km east of Sullivan Soak on 3 February 1953; old nest in burnt area at Greenshield Soak in November 1963; old nests recorded in April 1971. No sightings of old nests or birds in October 1972.

Little Quail (*Turnix velox*). One recorded 14 km east of Lake Grace on 25 November 1963; one in mallee/heath 39 km south of Newdegate on

26 November 1963; two at Greenshield Soak in burnt area on 27 November 1963.

Coot (*Fulica atra*). Approximately 70 on freshwater lakes at southwest fringes of Lake Magenta in October 1972.

Bustard (*Otis australis*). One near Greenshield Soak in April 1971.

Banded Plover (*Vanellus tricolor*). Three at Pingrup on 3 February 1953; ten sheltering in shade of mallees 27 km south of Newdegate on 26 November 1963.

Red-capped Dotterel (*Charadrius ruficapillus*). One at Hall Track crossing of Lake Magenta on 4 February 1953; *ca* 30 on salt pans of Lake Magenta and 14 at freshwater lakes at southwest fringes of Lake Magenta in October 1972.

Hooded Dotterel (*Charadrius cucullatus*). One on small salt lake 25 km south of Newdegate on 26 November 1963; three on salt pans of Lake Magenta in October 1972. A specimen collected on 7 October 1972 had developing ovarian follicles, the largest 3.1 mm. The stomach contained fragments of gastropod shells, probably *Coxiella*.

Black-fronted Dotterel (*Charadrius melanops*). One at edge of freshwater lake at southwest fringe of Lake Magenta on 5 October 1972.

Sharp-tailed Sandpiper (*Calidris acuminata*). One on small salt lake 23 km south of Newdegate on 26 November 1963.

White-headed Stilt (*Himantopus himantopus*). Two on small lake 18 km south of Lake Grace and three 12 km east of Lake Grace on 25 November 1963.

Banded Stilt (*Cladorhynchus leucocephalus*). Approximately 50 at 7 km west of Pingrup on 25 November 1963.

Avocet (*Recurvirostra novaehollandiae*). Seven at 14 km south of Lake Grace on 25 November 1963; one on shore of nearly dry lake 14 km south of Newdegate on 27 November 1963; 18 in shallows of freshwater swamp with partially submerged Swamp Yates 44 km south of Newdegate on 27 November 1963; one on small lake 10 km north of Pingrup on 4 October 1972.

Common Bronzewing (*Phaps chalcoptera*). In February 1953 five single birds sighted in the Reserve; in November 1963 one sighted; in October 1972 four in Salmon Gum and mallee. During February 1953 twenty-three were sighted in a 28 km drive between Badgebup and Nyabing. I doubt whether similar counts could be made in this region now.

Brush Bronzewing (*Phaps elegans*). Possible sighting of single bird at granite outcrop near Greenshield Soak on 10 April 1971.

Purple-crowned Lorikeet (*Glossopsitta porphyrocephala*). Approximately 20 in Salmon Gums and four in mallee in Reserve in February 1953. Not recorded in November 1963. Recorded in April 1971. During October 1972 at least 50 pairs breeding in Salmon Gums. Young heard being fed in some of the nests on 8 October. Paired birds were combining into small flocks to feed in flowering *E. sargentii* mallee.

White-tailed Black Cockatoo (*Calyptorhynchus baudinii*). A pair in Salmon Gums 4 km southeast of Lake Magenta on 5 October 1972.

Smoker Parrot (*Polytelis anthopeplus*). One recorded 27 km east of Pingrup on 3 February 1953; six in Salmon Gums between Sullivan Soak and Lake Magenta on 4 February 1953. Large flocks recorded in the Nyabing area on 3 February 1953. Not recorded in November 1963, April 1971 or October 1972. This decline is evident throughout the Wheatbelt, as sightings of up to five birds are now only made at widely scattered localities.

Western Rosella (*Platycerus icterotis*). Recorded in Salmon Gums 7 km west of Lake Magenta on 4 February 1953. A pair in flowering *Melaleuca acuminata* among Salmon Gum woodland in the same area on 10 October 1972.

Port Lincoln Parrot (*Platycercus zonarius*). Occasional birds recorded each time the Reserve was visited.

Elegant Parrot (*Neophema elegans*). Two at 12 km east of Nyabing on 5 February 1953; five at 22 km north of Pingrup on 25 November 1963.

Pallid Cuckoo (*Cuculus pallidus*). One on west side of Lake Magenta on 5 October 1972.

Fan-tailed Cuckoo (*Cuculus flabelliformis*). Sighted occasionally in Salmon Gum woodland during October 1972.

Horsfield Bronze Cuckoo (*Chrysococcyx basalis*). One on east side of Lake Magenta on 5 October 1972, and another at the southwest end of Lake Magenta on 8 October 1972.

Golden Bronze Cuckoo (*Chrysococcyx lucidus*). Frequent in Reserve during October 1972. Mostly singly or in pairs, in mallee and Salmon Gum woodland. Three pairs in Salmon Gums on 10 October 1972 were in close proximity and displaying and calling loudly.

Boobook Owl (*Ninox novaeseelandiae*). Not recorded in February 1953 or November 1963. Heard during April 1971. During October 1972 heard nearly every night in Salmon Gums. Several seen while spotlighting along Hall Track in Salmon Gums.

Tawny Frogmouth (*Podargus strigoides*). Two in tall mallee 9 km east of Pingrup on 3 February 1953. Recorded in April 1971. During October 1972 five birds seen in mallee, chiefly *E. platypus*, during a 6 km spot-

lighting run along Hall Track. Nest with adult sitting, on top of Salmon Gum stump, 4 m from ground on 8 October 1972.

Crested Owlet-nightjar (*Aegotheles cristatus*). Heard nearly every night in Salmon Gums during the October 1972 survey. One flushed from hollow tree during daytime.

Laughing Kookaburra (*Dacelo gigas*). Heard during April 1971. One calling near Sullivan Soak during October 1972.

Black-tailed Bee-eater (*Merops ornatus*). Three at Greenshield Soak on 5 February 1953; four at Sullivan Soak on 8 October 1972; two on firebreak in sandplain near freshwater lakes at southwest fringe of Lake Magenta on 8 October 1972.

Welcome Swallow (*Hirundo neoxena*). Sparse outside Reserve in towns and farm country. Recorded at Newdegate on 25 November 1963; at farm tank 42 km south of Newdegate on 27 November 1963; at farm 50 km south of Newdegate on 27 November 1963.

Tree Martin (*Hirundo nigricans*). Recorded at 27 km and 28 km east of Pingrup on 3 February 1953; in Salmon Gums 5 km west of Lake Magenta, and open *Melaleuca* and *Eucalyptus spathulata* woodland east of Lake Magenta on 4 February 1953. Not recorded in November 1963. Recorded five times during October 1972, total approximately 40 birds including 20 flying south over freshwater lakes at southwest fringe of Lake Magenta.

Richard's Pipit (*Anthus novaeseelandiae*). Recorded frequently in February 1963 in cleared country. Sparse in Reserve in October 1972 round edges of Lake Magenta, on firebreaks, and in bare burnt country near Sullivan Soak.

Black-faced Cuckoo-shrike (*Coracina novaehollandiae*). Recorded in Reserve during February 1953; at and to the south of Newdegate in November 1963; and in Reserve during April 1971. Nine sightings totalling twelve individuals in Salmon Gums and mallee, including burnt mallee, in October 1972.

White-winged Triller (*Lalage sueurii*). Pair in regenerating mallee on firebreak on 13 October 1972.

Southern Scrub-robin (*Drymodes brunneopygia*). Recorded during February 1953, November 1963 and October 1972. In 1972 it was widespread in mallee, especially under dense understories of *Melaleuca*, *Hakea* and *Daviesia*.

White-browed Babbler (*Pomatostomus superciliosus*). Sparse in woodland in Reserve. Three groups recorded in 1953: in Salmon Gums 7 km west of Lake Magenta on 4 February; in 'woodland savannah' 2 km east of Lake Magenta on 4 February; in mallee an Greenshield Soak on 5 February. Only one pair recorded in 1972 on 5 October in Salmon Gums feeding under *Melaleuca acuminata*. This bird is rare in large blocks of undisturbed vegetation, but is much more frequent in road-verges and fringes of cleared country. It has no doubt increased since clearing.

Blue-breasted Wren (*Malurus pulcherrimus*). Recorded in February 1953 and October 1972. Widespread in Reserve in heath, dense vegetation round freshwater lakes, and mallee with under-shrubbery of *Melaleuca*, *Hakea*, *Daviesia*, and *Exocarpus aphyllus*. Nuptial male, female ratio in October 1972 was 5 : 6.

Western Warbler (*Gerygone fusca*). Single bird feeding in *Melaleuca thyoides* and *Eucalyptus spathulata* on eastern side of Lake Magenta on 5 October 1972 and single bird in *E. annulata* mallee at Greenshield Soak on 10 October.

Broad-tailed Thornbill (*Acanthiza pusilla apicalis*). Recorded in February 1953 and October 1972. In 1972 all sightings were of pairs of birds. A fledgling scarcely able to fly was being fed in *Exocarpus aphyllus* under mallee on 8 October.

Chestnut-rumped Thornbill (*Acanthiza uropygialis*). Recorded 2 km east of Lake Magenta on Hall Track on 4 February 1953 in 'savannah woodland'. This species inhabits open vegetation and its absence from the mostly dense vegetation at Lake Magenta reserve was predictable.

Yellow-rumped Thornbill (*Acanthiza chrysorrhoa*). Recorded in February 1953 and October 1972 in Salmon Gum woodland, open grassy flats at Sullivan and Greenshield Soaks, in mixed eastern fringes of freshwater lakes, and open grassy edges of Lake Magenta. Two adults feeding two young among *Melaleuca thyoides* on east side of Lake Magenta on 11 October; two adults with nest, 2 eggs, one metre from ground in *Melaleuca thyoides* at extreme west edge of Lake Magenta on 12 October.

Spotted Scrub-Wren (*Sericornis frontalis maculatus*). Recorded in February 1953 and October 1972 in *Melaleuca thyoides* fringing Lake Magenta.

Weebill (*Smicrornis brevirostris*). Recorded in February 1953, November 1963 and October 1972. In 1972 particularly common in *Eucalyptus annulata* and *E. spathulata*. Also feeding in *Melaleuca thyoides*.

Shy Ground-wren (*Hylacola cauta*). Recorded in February 1953, November 1963 and October 1972. Widespread in heath with *Eucalyptus tetragona* and *Eucalyptus* sp. emergents and in mallee regrowth to one metre with low shrubs and sparse litter.

Field Wren (*Calamanthus fuliginosus*). Several flushed in heath at northern end of Reserve 40 km south of Newdegate on 26 November 1963.

White-fronted Chat (*Epthianura albifrons*). Recorded twice in samphires at Lake Magenta in October 1972.

Brown Flycatcher (*Microeca leucophaea*). Two recorded in 'savannah woodland' 2 km east of Lake Magenta on 4 February 1953.

Red-capped Robin (*Petroica goodenovii*). In February 1953 a pair recorded in woodland 7 km west of Lake Magenta and another at 2 km east

of Lake Magenta in 'savannah woodland'. In October 1972 fairly plentiful in *Eucalyptus spathulata* and *Melaleuca thyoides* association fringing Lake Magenta but sparse on the west side where the *E. spathulata* and *M. thyoides* were less than half the stature of those growing on deeper wind-deposited soils on the east side.

The population on the east side of Lake Magenta was very dense and comparable to that in *Melaleuca pubescens* thickets fringing the salt lakes on Rottnest Island (Dell, unpublished). At Lake Magenta the preferred habitat included *E. spathulata* which forms many-branched often thick-trunked trees to 11 m, mainly in groups or scattered on higher ground. Mingled throughout the *E. spathulata* and becoming dominant in lower areas and depressions were dense, often rounded *M. thyoides* to 4.5 m with bluebush (*Kochia oppositifolia*) to a height of 80 cm. Many of the glades were carpeted with grasses and composites to 5-10 cm and there was considerable bare ground. Decaying logs of *M. thyoides* were abundant as were carpets of moss among which the birds were feeding.

A nest with two newly hatched young was 2.3 m from the ground in a *M. thyoides* on 11 October. The rim and exterior of the nest was composed largely of moss.

Western Yellow Robin (*Eopsaltria australis griseogularis*). Pair recorded in tall mallee 8 km east of Pingrup on 3 February 1953; two pairs engaged in territorial fighting under *Melaleuca acuminata* in *Eucalyptus salmonophloia* woodland on 5 October 1972.

Grey Fantail (*Rhipidura fuliginosa*). Recorded during February 1953, April 1971 and October 1972. In 1972 five sightings totalling six birds in *E. spathulata* fringing Lake Magenta and in Salmon Gums.

Willie Wagtail (*Rhipidura leucophrys*). Recorded in February 1953, November 1963 and October 1972. In 1972 six sightings totalling seven birds in Salmon Gum woodland and near freshwater lakes fringing the southwest end of Lake Magenta.

Restless Flycatcher (*Myiagra inquieta*). One near freshwater lakes at southwest fringe of Lake Magenta and a pair recorded four times in Salmon Gum woodland during October 1972.

Golden Whistler (*Pachycephala pectoralis*). One pair recorded in February 1953. Not recorded in November 1963 or April 1971. In October 1972 frequent in Salmon Gum woodland and adjacent mallee; and sparse east of Lake Magenta in *E. spathulata* and *Melaleuca thyoides*.

Rufous Whistler (*Pachycephala rufiventris*). One in Salmon Gum woodland 7 km west of Lake Magenta on 27 November 1963.

Western Shrike-thrush (*Colluricincla harmonica rufiventris*). Not recorded in February 1953 or November 1963. Recorded in April 1971 and widespread in Salmon Gums and mallee in October 1972.

Crested Bellbird (*Oreoica gutturalis*). Recorded on each trip to the

Reserve mainly in shrubbery under mallee and in heath. Two adults feeding fledgling not able to fly on 6 October 1972 in *Melaleuca* under mallee. Nest (clutch 3) in *Exocarpus aphyllus* under mallee, 70 cm from ground on 8 October.

Black-capped Sittella (*Neositta chrysoptera pileata*). Four in Salmon Gum woodland on 11 October 1972.

Rufous Tree-creeper (*Climacteris rufa*). Recorded twice in woodland 7 km west of Lake Magenta on Hall Track in February 1953; single bird in same area in October 1972.

Mistletoe-bird (*Dicaeum hirundinaceum*). One in Salmon Gums at Greenshield Soak on 5 February 1953 (D.L. Serventy pers. comm.).

Spotted Pardalote (*Pardalotus punctatus*). Common in Reserve in October 1972 throughout mallee and sandplain where there were mallee emergents. Breeding burrows along all tracks and firebreaks throughout Reserve.

Red-tipped Pardalote (*Pardalotus striatus substriatus*). Recorded in February 1953, November 1963 and October 1972 feeding among foliage of eucalypts. In October apparently moving south through Reserve, feeding as they went.

Western Silvereye (*Zosterops lateralis gouldi*). Not recorded in 1953, 1963 or 1971. In October 1972 common in *Melaleuca thyoides* fringing Lake Magenta, sparse in heath with *Eucalyptus tetragona* emergents and in scrub on laterite ridges.

Brown Honeyeater (*Lichmera indistincta*). Recorded three times in February 1953. In October 1972 frequent in flowering *Melaleuca* fringing freshwater lakes and occasional in mallee. A pair giving broken-wing distraction display among *Eucalyptus calycogona* on 8 October were probably nesting.

Singing Honeyeater (*Meliphaga virescens*). Recorded at 13 km south of Newdegate on 26 November 1963. In October 1972 a few in *Eucalyptus spathulata/Melaleuca thyoides* association fringing Lake Magenta, and in *Melaleuca* fringes of freshwater lakes at southwest end of Lake Magenta.

Yellow-plumed Honeyeater (*Meliphaga ornata*). A few recorded in woodland in February 1953. In October 1972 moderately common in woodland, feeding among foliage of Salmon Gums.

Purple-gaped Honeyeater (*Meliphaga cratitia*). Recorded in mallee and woodland in February 1953 and October 1972. Feeding in flowering *Eucalyptus annulata* and *Grevillea patentiloba* at Greenshield Soak in October. Parent feeding two newly-flying young in low mallee with shrub layer to 1.5 m on 10 October.

White-eared Honeyeater (*Meliphaga leucotis*). Possible record at 26 km east of Pingrup in dense whipstick mallee merging into Salmon Gum on 3 February 1953; recorded at Sullivan Soak in open Salmon Gum woodland

surrounded by mallee and *Acacia* on 5 February 1953. The apparent scarcity of this bird near Lake Magenta was not expected considering its abundance in mallee elsewhere in the wheatbelt.

Brown-headed Honeyeater (*Melithreptus brevirostris*). Recorded during February 1953 in Salmon Gum woodland and *Eucalyptus platypus* mallee. In October 1972 flocks of up to seven feeding among foliage of Salmon Gums, *E. platypus*, and *E. calycogona* and taking insects from flower-buds of *E. annulata*.

Tawny-crowned Honeyeater (*Phylidonyris melanops*). Recorded in February 1953, April 1971, and October 1972 in heath and sandplain. Breeding at Greenshield Soak : 5 October, two juveniles being fed; 10 October, nest with clutch two; 12 October, nest with clutch three.

Yellow-winged Honeyeater (*Phylidonyris novaehollandiae*). Frequent in Reserve in October 1972 in Salmon Gum woodland feeding among flowering *Melaleuca acuminata*.

Yellow-throated Miner (*Manorina flavigula*). Recorded on 3 February 1953 at Pingrup; 4 February at Sullivan Soak; 26 November 1963 at 2 km south, 13 km south, and 19 km south of Newdegate; 27 November at Sullivan Soak; October 1972, five at Sullivan Soak.

Red Wattle-bird (*Anthochaera carunculata*). Recorded in February 1953, November 1963, April 1971 and October 1972. Mainly in Salmon Gum woodland and mallee. Numbers increased during latter part of October 1972 when noisy flocks of up to twenty birds were feeding among flowers *E. annulata* and *E. sargentii* mallee. These flocks were possibly migrating southwards.

Magpie-lark (*Grallina cyanoleuca*). Recorded on 25 November 1963 at Pingrup, at 18 km north of Pingrup, at 18 km south of Lake Grace, at 12 km south of Lake Grace, and at 12 km east of Lake Grace; on 26 November 1963 at Newdegate, and at 9 km north of Hall Track on each side of Lake Magenta; in October 1972 a pair on grassy flats at Sullivan Soak.

Black-faced Wood-Swallow (*Artamus cinereus*). Recorded on 25 November 1963 at small lake 13 km south of Lake Grace, at 10 km south of Lake Grace, at 19 km west of Newdegate, at 23 km west of Newdegate.

Dusky Wood-Swallow (*Artamus cyanopterus*). Recorded in February 1953 and October 1972 in Salmon Gum woodland.

Grey Currawong (*Strepera versicolor*). Recorded on all visits. Nest with large young in Salmon Gum, 8 m from ground on 8 October 1972.

Grey Butcher-bird (*Cracticus torquatus*). Recorded in February 1953, April 1971 and October 1972 in mallee and Salmon Gum woodland.

Western Magpie (*Cracticus tibicen dorsalis*). Sparse in Reserve and adjacent country. In Reserve only in open Salmon Gum woodland or burnt areas.

Australian Raven (*Corvus coronoides*). Moderately common in Reserve and adjacent country. Bird sitting on nest in *Eucalyptus spathulata*, 10 m from ground on east side of Lake Magenta on 11 October 1972.

Little Crow (*Corvus bennetti*). Small flock on 9 October 1972 and eight in thermal over Lake Magenta on 11 October 1972.

APPENDIX II

REPTILES AND FROGS OF LAKE MAGENTA NATURE RESERVE*

The following reptiles and frogs have been collected at Lake Magenta Nature Reserve. Dates of collection are indicated.

	April 1971	October 1972	Other
FROGS			
Litoria cyclorhynchus	X	X	April 1974
Pseudophryne guentheri	X	X	
Lymnodynastes dorsalis	X	X	April 1974
Heleioporus albopunctatus	X	X	April 1974
Neobatrachus centralis	X	X	April 1974
Ranidella pseudinsignifera		X	Storr (1963)
REPTILES			
GECKOS			
Diplodactylus granariensis	X	X	May 1973
Diplodactylus maini	X		
Diplodactylus spinigerus	X		
Phyllodactylus marmoratus	X		May 1973
Crenadactylus ocellatus ocellatus	X	X	May 1973
Phyllurus milii	X	X	
Gehyra variegata		X	
PYGOPODS (Legless Lizards)			
Delma fraseri	X		May 1973
Aprasia repens	X		May 1973
Pygopus lepidopodus			November 1971
AGAMIDS			
Amphibolurus minor	X	X	
A. maculatus griseus	X	X	May 1973
A. salinarum	X	X	
A. cristatus	X		April 1974
A. adelaidensis chapmani			November 1971
SKINKS			
Ctenotus gemmula	X		
Ctenotus impar	X	X	May 1973
Ctenotus schomburgkii	X		
Egernia multiscutata bos	X		
Egernia carinata	X	X	April 1974
Hemiergis peronii peronii	X		
Hemiergis initialis initialis	X	X	
Lerista distinguenda	X	X	May 1973
Menetia greyii	X		
Cryptoblepharus plagiocephalus	X		
Morethia obscura	X	X	May 1973
Tiliqua rugosa	X	X	

	April 1971	October 1972	Other
SNAKES			
Pseudonaja affinis affinis	X		
Denisonia gouldii	X	X	April 1974
Brachyaspis curta	X		
Ramphotyphlops australis	X		

*Nomenclature according to Dr G.M. Storr, Department of Ornithology and Herpetology, Western Australian Museum.

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