SOME NATURE RESERVES OF THE WESTERN AUSTRALIAN WHEATBELT

PART 9: MOORA SHIRE

B.G. MUIR

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A report prepared for
and funded by the
Department of Fisheries
and Wildlife.

This report may be referred to as:

MUIR, B.G. (1978). Some nature reserves of the Western Australian wheatbelt. Part 9: Moora Shire. Perth: Dept. Fish. Wildl. Unpubl. Rept.

This series of reports may be referred to as:

MUIR, B.G. (1978-). Some nature reserves of the Western Australian wheatbelt. Parts 1- continuing. Perth: Dept. Fish. Wildl. Unpubl. Repts.

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PART 9 : MOORA SHIRE

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INTRODUCTION

Moora Shire lies in the western-central wheatbelt and has an area of about 3788 square km. There are 6 Nature Reserves within the Shire, totalling 8.14 sq. km. or ca 0.2% of the area of the Shire. The largest Nature Reserve in the Shire is only ca 292 ha (Reserve 23316) and the smallest one only ca 4 ha (Reserve 28287). Four of the 6 Reserves are less than 50 ha in area and 2 less than 10 ha. Only 1 Reserve (A2736) has 'A' classification and none of the Reserves are vested.

This survey took place in July 1978 and consisted of brief examinations of 5 Reserves: A2736, 7765, 23179, 23316 and 28674. A report on each of the Reserves is appended.

METHODOLOGY

Physical characteristics of the reserves were obtained directly from the most recently available lithographs as published by the Department of Lands and Survey, and interpreted from observations made on the reserves.

Reserves were examined by vehicle where tracks were available, and on foot. Local knowledge and air-photographs were consulted to find areas of particular interest. Only a very short time could be spent on each reserve, the smaller ones being examined in 1 or 2 hours, the larger ones in a full day.

Vegetation was classified using Muir's (1977) system (Table 1), which was designed specifically for describing wheatbelt vegetation. In the presentation of the abbreviated descriptions (in the section titled "Vegetation") capital letters in descriptive terms refer to specific classes of life form, height and canopy cover as used in the classification.

As the survey period on any reserve was very brief only the commonest plant species could be noted. Any species in which less than 3 individual plants were encountered within a space of 10-15 minutes examination of the vegetation were considered uncommon and are not listed. As much of the survey work was carried out rapidly and in unfavourable seasons, many plants were not flowering and so identifications were made from foliage alone. Only if an

TABLE 1: VEGETATION CLASSIFICATION AS USED IN WHEATBELT SURVEY

LIFE FORM/HEIGHT CLASS	CANOPY COVER			
	DENSE 70-100% d	MID-DENSE 30-70% c	SPARSE 10-30% i	VERY SPARSE 2-10% r
T Trees >30m	Dense Tall Forest	Tall Forest	Tall Woodland	Open Tall Woodland
M Trees 15-30m	Dense Forest	Forest	Woodland	Open Woodland
LA Trees 5-15m	Dense Low Forest A	Low Forest A	Low Woodland A	Open Low Woodland A
LB Trees <5m	Dense Low Forest B	Low Forest B	Low Woodland B	Open Low Woodland B
KT Mallee tree form	Dense Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee
KS Mallee shrub form	Dense Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee
S Shrubs >2m	Dense Thicket	Thicket	Scrub	Open Scrub
SA Shrubs 1.5-2.0m	Dense Heath A	Heath A	Low Scrub A	Open Low Scrub A
SB Shrubs 1.0-1.5m	Dense Heath B	Heath B	Low Scrub B	Open Low Scrub B
SC Shrubs 0.5-1.0m	Dense Low Heath C	Low Heath C	Dwarf Scrub C	Open Dwarf Scrub C
SD Shrubs 0.0-0.5m	Dense Low Heath D	Low Heath D	Dwarf Scrub D	Open Dwarf Scrub D
P Mat plants	Dense Mat Plants	Mat Plants	Open Mat Plants	Very Open Mat Plants
H Hummock Grass	Dense Hummock Grass	Mid-Dense Hummock Grass	Hummock Grass	Open Hummock Grass
GT Bunch grass >0.5m	Dense Tall Grass	Tall Grass	Open Tall Grass	Very Open Tall Grass
GL Bunch grass <0.5m	Dense Low Grass	Low Grass	Open Low Grass	Very Open Low Grass
J Herbaceous spp.	Dense Herbs	Herbs	Open Herbs	Very Open Herbs
VT Sedges >0.5m	Dense Tall Sedges	Tall Sedges	Open Tall Sedges	Very Open Tall Sedges
VL Sedges <0.5m	Dense Low Sedges	Low Sedges	Open Low Sedges	Very Open Low Sedges
X Ferns	Dense Ferns	Ferns	Open Ferns	Very Open Ferns
Mosses, liverwort	Dense Mosses	Mosses	Open Mosses	Very Open Mosses

important dominant plant was not recognised were specimens bought back to the laboratory for examination.

Soil was examined very briefly and classified according to Northcote's (1971) texture groups and Munsell (1954) colour terms.

Fire history was determined from observation of the area, appearance of air-photographs and information from nearby farmers.

Fauna were not specifically sought, but some species (usually the most obvious) were encountered while examining vegetation. The lists provided are only a small fraction of the species present on nearly every reserve examined. Scats, footprints, burrows, nests and other indirect evidence is used only where identification is certain. Observations by farmers are used if considered reliable.

Opinions and recommendations expressed in these reports are entirely those of the author and are based on extensive experience in vegetation mapping and description in the wheatbelt, and association with faunal and habitat studies conducted by suitably qualified researchers.

RESULTS AND DISCUSSION

The features of each reserve can be summarised as follows:

Reserve A2736- ca 251 ha: 11 distinct plant assemblages apparent, ranging from York Gum woodland to shrublands, heath and salt flat; excellent condition and little disturbed; important conservation area.

Reserve 7765- ca 47 ha; several vegetation types, mostly shrubland or post-fire heaths; partly disturbed; quite rich in plant and animal species.

Reserve 23179- ca 8 ha; narrow strip of woodland between railway line and farmland; useful corridor for transient birds and provides some nest sites.

Reserve 23316- ca 292 ha; mostly complex of salt lakes and flats; small areas of heath and Banksia shrubland; heavily grazed and trampled; 6 plants of particular interest found; important breeding area for birds, particularly waterfowl.

Reserve 28674- ca 212 ha; heaths with emergent Actinostrobus and small area of salt complex; good representative of sandplain heath; contains 2 interesting varieties of Banksia.

Of the 5 Reserves examined one was a narrow strip of vegetation, one was heavily damaged by sheep and another partly disturbed and will probably be frequently burnt. The remaining 2 Reserves, A2736 and 28674, are in good

condition and are probably the only two serving their full value as conservation refuges. Woodlands, mallee and lithic complex are found in the Moora Shire but are either absent or poorly represented in reserves.

There is little doubt that Moora Shire contains one of the poorest selection of natural bushland in the wheatbelt and effort should be made to enlarge reserves or obtain new land while the opportunity exists.

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ACKNOWLEDGEMENTS

J.H. Muir and I. Simpson assisted in the field. The Western Australian Herbarium provided access to collections and assistance in identifying plants. The Department of Fisheries and Wildlife have allowed me the use of this data as part requirement of an Honours Thesis.

Reserve A2736

Located ca 19 km WSW of Dalwallinu Townsite and shown on lithograph 64/80, AB,1.

Background

Originally set aside as "Resting Place for Travellers and Stock" with an area of ca 259 ha, on 18 January 1895. It was reduced in size to ca 255 ha on 25 August 1916 and then vested in the Moora Shire for "Water and Public Utility" on 7 June 1940. The Reserve was then further reduced in size to ca 251 ha on 5 December 1955 and was declared class "A" and designated "Protection of Flora" on the same date. Its area was further decreased at a date unspecified to its present size of 250.7736 ha.

Physical characteristics

Reserve A2736 is square, with a total perimeter of ca 6.4 km and an area of 250.7736 ha. No contour maps or spot altitudes are available but there is a spot altitude of ca 314 m above sea level ca 9 km NE of the Reserve. There is probably a difference of ca 100 m between the highest and lowest points on the Reserve.

Vegetation

Eleven distinct plant assemblages are apparent.

York Gum Mallee: two types - Eucalyptus loxophleba (York Gum) Tree Mallee over Acacia erinacea Open Dwarf Scrub C over Bassia diacantha Open Dwarf Scrub D; and York Gum Open Shrub Mallee over Acacia acuminata (Jam) Open Low Woodland B.

Casuarina shrubland: Casuarina acutivalvis Scrub with no definite understory.

Melaleuca shrubland: Melaleuca hamulosa Dense Thicket with no understory.

Actinostrobus heath: highly mosaiced heath of Actinostrobus arenarius Heath A over Ecdeiocolea monostachya and Mesomelaena uncinata Dense Low Sedges as a matrix in which are contained areas of A. arenarius and Hakea falcata Heath A over an understory containing many more shrubby species than were found in the matrix.

Melaleuca/mixed heath: Melaleuca oldfieldii Dense Low Heath B.

Casuarina/mixed heath: Casuarina campestris Dense Low Heath B.

Lake heaths: variable Low Heath C or Low Heath D surrounding many salt affected areas.

Fire regrowth heath: mixed Dense Heath B. Post fire regrowth of mosaic of Melaleuca/mixed heath and Casuarina/mixed heath.

Lakes and lake margins: bare salt pans with fringing margins of Acacia or Melaleuca Dense Thicket.

Watercourse: drainage line with scattered shrubs and sedges.

Plant species

Reserve A2736 is relatively rich in plant species, mostly because of the heath components and overall habitat diversity. A total of 103 species were recorded, of which 27 are exploited by the wildflower seed trade. A species of Lomandra collected in the watercourse appears to be new to the collection of the Western Australian Herbarium and may be a new species.

Nest hollows

Absent except for a few in the York Gum areas. Hollow logs on ground fairly common.

Weeds

Abundant in York Gum areas and around lake margins where soil heavier and wetter. Mostly small annual species.

Fire history

With the exception of the fire regrowth heath, which is 11 years old, the Reserve has not been burnt within the last 30 years.

Fauna

Grey Kangaroo (Macropus fuliginosus): 2 on SW corner, 1 on N side.

White-faced Heron (Ardea novaehollandiae): 1 on lake at SW corner.

Grey Teal (Anas gibberifrons): 2 feeding along watercourse.

Crested Pigeon (Ocyphaps lophotes): 1 on fenceline SW corner, near lake heath.

Pallid Cuckoo (Cuculus pallidus): 1 calling from perch on top of Actinostrobus emergent from heath on SE corner.

Tawny Frogmouth (Podargus strigoides): 2 flushed from perch in York Gum mallee type 1.

Weebill (Smicrornis brevirostris): common in York Gum mallee types 1 and 2 and in Melaleuca/mixed heath.

Singing Honeyeater (Meliphaga virescens): several seen in York Gum mallee type 1, Melaleuca/mixed heath and fire regrowth heath.

Red Wattlebird (Anthochaena carunculata): 5 seen in York Gum mallee type 2.

White-fronted Chat (Epthianura albifrons): nest with 3 eggs in Rhagodia nutans shrub near salt flat at SW corner of Reserve.

Western Magpie (Cracticus tibicen dorsalis): 5 feeding along firebreak on SW corner Reserve.

Grey Currawong (Strepera versicolor): 2 seen and heard calling in York Gum mallee area 2.

Little Crow (Corvus bennetti): 9 nests believed to be this species in small part of York Gum mallee type 1.

Australian Raven (Corvus coronoides): 2 flying over Reserve on SE corner.

Exotic fauna

Fox tracks seen: rabbit scats in York Gum areas. Occasional sheep probably enter Reserve .

Firebreaks and fences

Firebreaks and good quality fences on all sides. Central road divides Reserve in two.

Human usage

Gravel pit at NE corner, timber removed from York Gum areas, old well at SW corner.

Adjacent uncleared land

None within some distance of the Reserve.

Opinion and recommendations

An excellent Reserve rich in flora and habitat diversity. Its present classification of "A" class is deserved. I recommend that Reserve A2736 be vested in the Western Australian Wildlife Authority.

APPENDIX I

Reserve A2736

York Gum Mallee 1

Eucalyptus loxophleba tree mallee, mature to senescent, stratum 2-8 m tall, 30-70% cover over Acacia erinacea shrubs, mature to senescent, stratum 1 m tall, 2-10% cover over Bassia diacantha shrubs, mature, 0.2 m tall, ca 3% cover. Other plant species recorded were: Acacia acuminata, Alyxia buxifolia, Atriplex bunburyana, A. affin. inflata, Carpobrotus edulus and Rhagodia preissii. Soil red, silty clay loam; poorly drained.

York Gum Mallee 2

Eucalyptus loxophleba shrub and tree mallee, mature to senescent, stratum 3-8 m tall, 10-30% cover over Acacia acuminata trees, mature to senescent, to 4 m tall, 2-10% cover. Localised areas with Trymalium ledifolium to 1.5 m tall and 30-70% cover within clumps. Also present were Acacia assimilis, Bassia diacantha, Casuarina acutivalvis, Dianella revoluta, Enneapogon caerulescens, Grevillea paradoxa, G. petrophiloides, Melaleuca adnata, M. radula, Ptilotus obovatus and Santalum spicatum. Soil red, sandy clay; poorly drained.

Casuarina shrubland

Casuarina acutivalvis shrubs, mature, stratum 4-6 m tall, 10-30% cover. No understory present but scattered shrubs of Baeckea muricata, Calothamnus quadrifidus, Grevillea petrophiloides and Platysace maxwellii. Soil yellow, clayey sand with ca 80% laterite pebbles. Moderately drained.

Melaleuca shrubland

Melaleuca hamulosa shrubs, mature, stratum 2-3.5 m tall, 70-100% cover. Only other plant species recorded were M. adnata and Trymalium ledifolium. Soil pinkish grey, sandy clay; poorly drained.

Actinostrobus heath

Complex mosaiced heath of uniform structure but some floristic variation. Majority of area is Actinostrobus arenarius shrubs, mature, 2 m tall, 30-70% cover over Ecdeiocolea monostachya* and Mesomelaena uncinata* sedges, mature, 30 cm tall, 70-100% cover. Other plants were Baeckea muricata, Calothamnus quadrifidus, Casuarina acutivalvis*, Harperia lateriflora, Lyginia tenax, Melaleuca cordata and Platysace maxwellii. Soil yellow, excessively drained. Small areas contained in the above matrix were of the same physiognomy but dominated by A. arenarius and Hakea falcata* and had more species present

including Acacia dielsii, Baeckea crispiflora, B. muricata, Calothamnus sanguineus, Daviesia aphylla, Hakea circumalata, Harperia lateriflora*, Isopogon scabriusculus*, Melaleuca scabra, M. spathulata, M. platycalyx, Petrophile seminuda, Platysace effusa, Synaphaea polymorpha and Verticordia ?acerosa. Soil was yellow, clayey sand; excessively drained. Slightly raised areas within this assemblage had Daviesia nudiflora, Dryandra cirsioides and Eucalyptus youngiana. Soil yellow, clayey sand and excessively drained but contained ca 10% laterite pebbles.

Where this heath mosaic nears lake edges or watercourses the soil becomes more grey in colour and drainage is only moderate. Species in these areas are reduced in number, and contain those marked * above plus Acacia assimilis, Casuarina acutivalvis, Grevillea didymobotrya, Hakea incrassata, Leptospermum erubescens, Melaleuca spicigera and M. subtrigona.

In a limited area just N of the central road on the W side of the Reserve the Actinostrobus heath becomes taller and scattered Xylomelum angustifolium are present.

Melaleuca/mixed heath

Melaleuca oldfieldii shrubs, mature to senescent, stratum 1.5 m tall, 70-100% canopy cover with scattered clumps of Eucalyptus concinna shrub mallee, mature to senescent, 2-10% cover within clumps but ca 1% cover over the whole area. Other plant species present were: Acacia acuaria, A. assimilis, A. spathulifolia, Actinostrobus arenarius, Baeckea muricata, Cassytha glabella, Casuarina acutivalvis, C. campestris, Cryptandra leucophracta, Dianella revoluta, Dryandra cirsioides, D. sp. A, Ecdeiocolea monostachya, Eucalyptus youngiana, Grevillea excelsior, G. paniculata, G. petrophiloides, Hakea coriacea, H. falcata, H. scoparia, Isopogon drummondii, I. scabriusculus, Jacksonia furcellata, Leptospermum erubescens, Melaleuca affin. ciliata, Micromyrtus racemosa, Persoonia rufiflora, Petrophile conifera, P. shuttleworthiana, Phebalium tuberculosum, ?Phyllanthus calycinus, Platysace maxwellii, Santalum acuminatum, Verticordia brownii, V. ?ovalifolia.

Casuarina/mixed heath

As per Melaleuca/mixed heath but M. oldfieldii is replaced by Casuarina campestris 2 m tall.

Lake heaths

Many of the salt lakes are surrounded by heaths which have developed on sandy soils with varying levels of salt. The heaths vary from 0.5 to 1 m tall and average 30-70% canopy cover. There is generally variable dominance because of variations in microtopography and distance from the lake edge. Plant species recorded were: Dianella revoluta, Grevillea integrifolia, Lepidosperma tenue, Melaleuca lateriflora, M. subtrigona, Persoonia coriacea, Plectrachne danthonioides, Rhagodia nutans, Scholtzia parviflora, Triodia scariosa, Verticordia chrysanthera, V. roei, V. affin. picta.

Fire regrowth heath

Mixed shrubs, no particular dominant, immature, 1.5 m tall, 70-100% cover. Species recorded were: Acacia assimilis, A. chrysella, A. spathulifolia, Actinostrobus arenarius, Calothamnus quadrifidus, Casuarina campestris, Comesperma scoparia, Cryptandra myriantha, Dryandra cirsioides, Eremaea beaufortioides, Eucalyptus youngiana, Gahnia polyphylla, Grevillea didimobotrya, G. paniculata, Hakea circumalata, Harperia lateriflora, Jacksonia furcellata, Leucopogon dielsianus, Melaleuca affin. ciliata, M. spathulata, Platysace maxwellii, Verticordia brownii, V. affin. ovalifolia. Soil yellow, clayey sand; well drained.

Lakes and lake margins

Lakes generally bare with fringing margins ca 5 m wide comprising shrublands to 4 m tall and 70-100% cover. Dominant species variable but usually Acacia ligulata, Melaleuca acuminata, M. hamulosa or M. ?parviflora, sometimes with scattered Eucalyptus loxophleba trees. Soils transitional from grey muds of lake to yellow clayey sands of heath.

Watercourse

Drainage line from Reserve onto farmland at S side Reserve. Water flowing and moderately salty to the taste in July. Mostly scattered shrubs of Melaleuca affin. cymbifolia 1.5 m tall and scattered small plants such as Arthrocnemum bidens, Bassia diacantha, Didymanthus roei, and Saueda australis. Margins of watercourse had clumps of Melaleuca scabra or small tussocks of Lomandra sp. Soil pink, clayey sand; poorly drained.

Reserve A 2736.

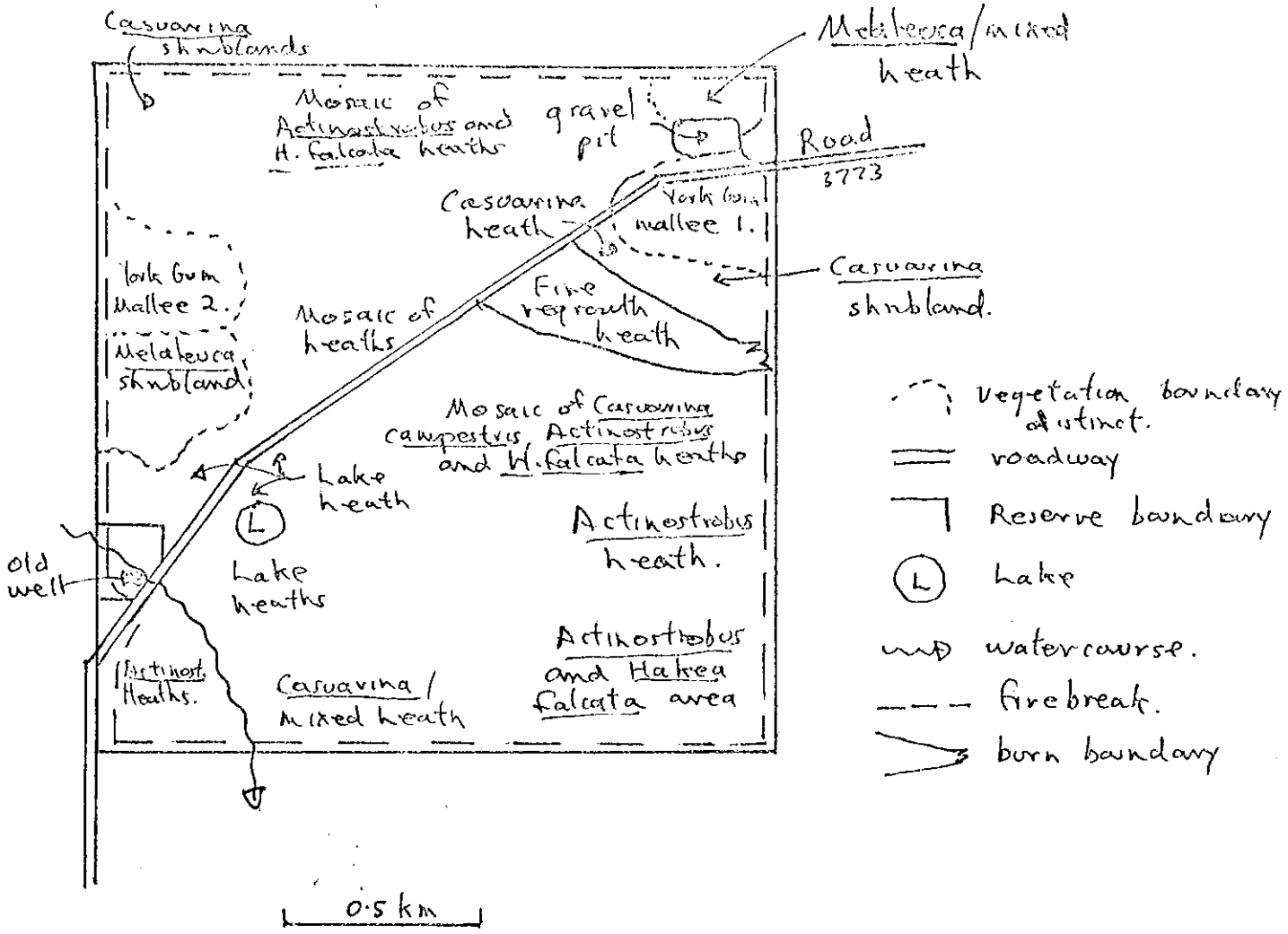


Plate 1. Reserve A2736 showing York Gum mallee type 1. Note extensive development of annual weed species on rich, poorly drained soil.

Plate 2. York Gum mallee type 2. Note scattered Jam trees and shrubs of Trymalium ledifolium.

Plate 3. Melaleuca hamulosa thicket on Reserve A2736.

Plate 4. Actinostrobus heath showing patchy distribution of Actinostrobus and some Hakea falcata shrubs. Foreground is mostly Ecdeiocolea monostachya sedge.

Plate 5. Heathy development and scattered shrubs of transition area between Actinostrobus heath and watercourse. Scattered Casuarina acutivalvis are present. Actinostrobus heath is visible in the distance.

Plate 6. Melaleuca/mixed heath on Reserve A2736. Plate shows one of the small patches where Actinostrobus and Eucalyptus concinna has developed.

Plate 7. Lake heath, marginal thicket and lake on Reserve A2736.

Plate 8. Watercourse showing sparse scattered shrubs and tussocky, sedgelike clumps of Lomandra sp. The grey area at mid-distance is lake heath with Actinostrobus heath behind.

Reserve 7765

Located ca 8 km WNW Moora Townsite and shown on lithograph 58/80, B-C,0 and 63/80, B-C, 5.

Background

Originally set aside on 7 June 1901, with an area of ca 41 ha, as a "Resting Place for Travellers and Stock". Placed in the control of the Victoria Plains Roads Board on 23 August 1907 then transferred to the Dandaragan Roads Board on 13 July 1915. The Reserve was decreased to ca 32 ha on 14 April 1916 and then its vesting changed to Moora Shire on 18 May 1962. Subsequently the Reserve was reclassified for "Conservation of Flora" on 22 April 1966 and increased to ca 49 ha. The area was later decreased to 47.4423 ha on 22 February 1974 and further to 47.2248 ha on 15 August 1975.

Physical characteristics

Reserve 7765 is rectangular with a truncated SW corner. It has a total perimeter of ca 2.9 km and an area of 47.2248 ha. No contour maps are available but there is a spot altitude of ca 205 m about 3 km SE of the Reserve.

Vegetation

York Gum woodland: Eucalyptus loxophleba (York Gum) Dense Low Forest A.
Jam woodland: Acacia acuminata (Jam) Low Woodland A.
Casuarina shrubland: Casuarina campestris (Tamma) Dense Thicket.
Post-fire regrowth - originally Casuarina shrubland: mixed Open Dwarf Scrub D.
Actinostrobus shrubland: Actinostrobus arenarius (Sandplain Cypress) Thicket over Verticordia and mixed Low Heath C.
Post-fire regrowth - originally Actinostrobus shrubland: mixed Dwarf Scrub D.
Gravel pit regrowth: mixed Dense Heath B.

Plant species

Fifty-seven plant species were recorded, of which 16 are exploited by the wildflower seed trade. Calothamnus longissimus and Scaevola humifusa have not previously been recorded by me on any of the 93 wheatbelt reserves previously examined. The record of Hibbertia affin. desmophylla is of interest as it is normally found in the south-eastern wheatbelt. This specimen may however represent some other species.

Nest hollows

Some nest hollows in the York Gum woodland. Some young trees present.

Weeds

Very few except in disturbed areas and wetter portions of Reserve. Arctotheca calendula is common in the York Gum woodland, Romulea rosea in the Jam woodland and A. calendula and Cucumis myriocarpus in the gravel pit.

Fire history

The burnt area is ca 3 years old (2 years and 10 months in August 1978) and the remainder is older than 30 years.

Fauna

Grey Kangaroo (Macropus fuliginosus): group of 6 seen feeding in burnt area.

Port Lincoln Parrot (Platycercus zonarius): several in Jam woodland.

Galah (Cacatua roseicapilla): several flying over Reserve.

Corella (C. tenuirostris): 2 flying over Reserve.

Pallid Cuckoo (Cuculus pallidus): 2 calling in York Gum woodland.

Grey Fantail (Rhipidura fuliginosa): common throughout Reserve, particularly in burnt areas.

Willie Wagtail (R. leucophrys): 2 on fence near transmitting station.

Weebill (Smicrornis brevirostris): in York Gum woodland.

Singing Honeyeater (Meliphaga virescens): amongst Banksia prionotes.

New Holland Honeyeater (Phylidonyris novaehollandiae): amongst Banksia prionotes.

Australian Raven (Corvus coronoides): several in various associations.

Spotted Burrowing Frog (Helioporus albopunctatus): calling from roadside drain.

Banjo Frog (Limnodynastes dorsalis dorsalis): calling from roadside drain.

Pseudophryne guentheri: calling from roadside drain.

Exotic fauna

Rabbit scats common.

Firebreaks and fences

No firebreaks except around transmitters. Fenced on W, N and E boundaries only.

Human usage

Timber has been removed from the Jam and York Gum woodlands. Stock have been run on all or part of the Reserve, particularly the Jam woodland. An old stock trough testifies that the Reserve was a watering point. Rubbish has been dumped in the Jam and York Gum woodlands. Tracks enter the gravel pits, go to the transmitters and pass through the Jam woodland. There are three transmitter towers (Bush Fires Board) on the Reserve.

Adjacent uncleared land

There is some uncleared land on the SW corner of Melbourne Loc. 1429 and a small area at the extreme SE corner of Melbourne Loc. 3627. The total area of the two is ca 10 ha.

Opinion and recommendations

Reserve 7765, although disturbed, supports a reasonable variety of vegetation types. The York Gum woodland provides some nesting sites and the Banksia areas attracts honeyeaters.

Regrowth following the fire is providing soft forage for kangaroos and will, in the future, provide immature seral stages of shrubland. Other parts of the Reserve will probably be burnt in the future to provide protection for the transmitting stations. I recommend the Reserve be retained in its present condition, but that perimeter firebreaks be established. I also recommend that the vesting be made to the Western Australian Wildlife Authority.

APPENDIX 2

Reserve 7765

York Gum woodland

Eucalyptus loxophleba trees and tree mallee, senescent, stratum 8-12 m tall, 70-100% cover. No understory but seasonal cover of grasses and scattered shrubs of Acacia microbotrya and Lomandra effusa.

Jam woodland

Acacia acuminata trees, immature, stratum 2-6 m tall, 10-30% cover. Understory absent but seasonal growth of Romulea rosea (Guildford grass). Scattered Eucalyptus loxophleba trees to 8-16 m tall. Other species recorded were Acacia leptospermoides, Dianella revoluta, Muhlenbeckia adpressa and Santalum acuminatum.

Casuarina shrubland

Casuarina campestris shrubs, mature, stratum 1.5-2.5 m tall, 70-100% cover. No understory. Also recorded were Dryandra fraseri and Ecdeiocolea monostachya. Soil reddish brown, sandy clay with 80-90% laterite pebbles.

Post-fire regrowth - originally Casuarina shrubland

Mixed shrubs to 0.5 m tall, 2-10% cover. Species recorded were: Acacia intricata, A. leptospermoides, Dampiera spicigera, Dianella revoluta, Dryandra sp., Hakea lissocarpha, H. prostrata, Harperia lateriflora, Loxocarya pubescens, Mesomelaena uncinata, Muhlenbeckia adpressa, Opercularia vaginata, Thysanotus patersoni. Soil reddish brown, sandy clay loam with 80-90% laterite pebbles. Vegetation is ca 3 years old.

Actinostrobus shrubland

Actinostrobus arenarius shrubs to 4 m tall, 30-70% cover over Verticordia brownii and mixed shrubs, 1 m tall, 30-70% cover. Also recorded were Acacia pulchella, Astroloma serratifolium, Banksia prionotes, Beaufortia micrantha, B. squarrosa, Ecdeiocolea monostachya, Eremaea beaufortioides, Grevillea integrifolia, Harperia lateriflora, Lachnostachys eriobotrya, Leucopogon blepharolepis, Lyginea tenax, Mesomelaena stygia, and Petrophile ericifolia. Soil yellow, sandy loam. Excessively drained. Contained within this association is a small area of Banksia prionotes trees 3-6 m tall and some Casuarina huegeliana, Jacksonia furcellata and Mesomelaena uncinata. Soil in this patch is as above but moderately drained.

Post-fire regrowth - originally Actinostrobus shrubland

Mixed shrubs to 30 cm tall, 10-30% cover. Species recorded were: Acacia pulchella, Beaufortia micrantha, Casuarina microstachya, Chamaescilla corymbosa, Conospermum stoechadis, Dampiera spicigera, Ecdeiocolea monostachya, Gahnia sp., Grevillea paradoxa, Hakea costata, Harperia lateriflora, Hibbertia affin. desmophylla, Leptospermum erubescens, Leucopogon blepharolepis, Loxocarya fasciculata, Melaleuca spathulata, Mesomelaena stygia, M. uncinata, ?Monotaxis lurida, Scaevola humifusa. Soil yellow, sandy loam. Excessively drained. Vegetation is ca 3 years old.

Gravel pit

Regrowth in gravel pit which has been disused for 13-15 years. Mixed shrubs (mostly Dryandra sessilis) to 1.5 m tall, 70-100% cover. Also recorded were: Calothamnus longissimus, Casuarina campestris, C. microstachya, Corynotheca micrantha, Dryandra fraseri, Glischrocaryon flavescens, Hakea subsulcata, H. varia and Isopogon dubius.

Reserve 7765

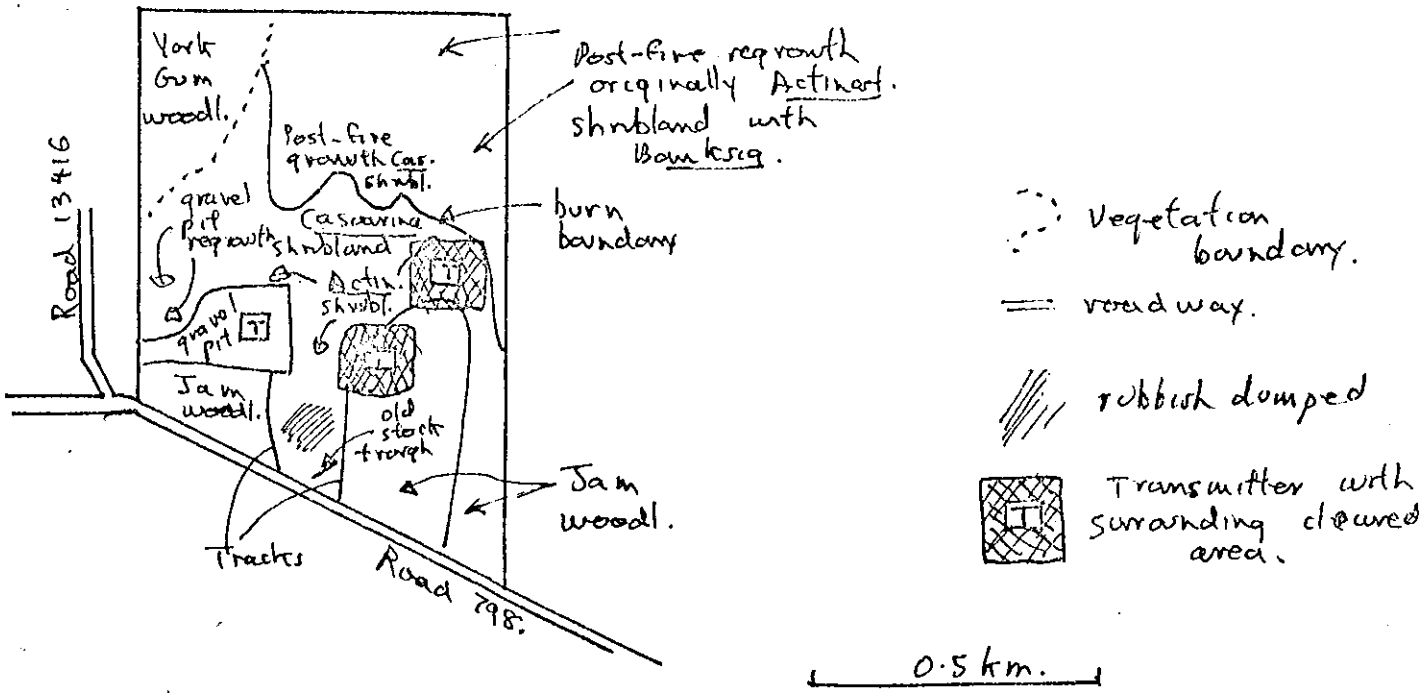


Plate 9. York Gum woodland on Reserve 7765 showing lack of understory, except for annual weed growth.

Plate 10. Post-fire regrowth in area that was previously Casuarina campestris shrubland.

Plate 11. Reserve 7765 showing area of Actinostrobus shrubland over Verticordia and mixed heath.

Plate 12. Regrowth ca 14 years old in disused gravel pit. Predominantly Dryandra sessilis with Hakea subsulcata shrubs in foreground.

Reserve 23179

Located along a road verge extending from Moora Townsite to 2.8 km S of Barberton Siding and shown on lithograph 58/80, C-D, 1-2.

Background

Originally gazetted 5 January 1951 for "Conservation of Flora".

Physical characteristics

Reserve 23179 is linear, ca 10 m wide and ca 11 km long. It has a total area of 8.0937 ha. There are no contour maps available but there are spot altitudes of 185 m above sea level at Moora Siding, 205 m 1.5 km S of Moora Siding, 196 m 2.5 km N Barberton Siding, 180 m at Barberton Siding and 197 m ca 3.2 km S of Barberton Siding. There is thus an altitudinal variation of ca 25 m between the highest and lowest parts of the Reserve.

Vegetation

Most of the Reserve has woodlands ranging from Low Forest A to Woodland to Forest.

Understory development is limited to a patchy distribution of shrubs.

Plant species

Thirty-six species of plants were recorded of which 12 are exploited by the wildflower seed trade.

Nest hollows

Abundant hollow limbs, trunks and several dead trees. Logs common on ground. Some young trees present.

Weeds

Abundant in disturbed areas, on paddock edges and in drainage channels beside railway line. There is some penetration into the woodland. Mostly herbaceous species, e.g. Arctotheca calendula and Ursinia anthemoides and grasses, particularly Avena barbata and A. sativa fatua. Romulea rosea (Guildford Grass) is patchily distributed.

Fire history

No fire for at least 30 years.

Fauna

Mountain Duck (Tadorna tadornoides): two in Salmon Gum.

Tree Martin (Hirundo nigricans): several flying.

Magpie Lark (Grallina cyanoleuca): 1 in York Gum.

Black-faced Wood-Swallow (Artamus cinereus): several on power lines.

Exotic fauna

None recorded.

Firebreaks and fences

Firebreaks along railway line and in adjacent paddock. Adjacent paddock fenced.

Human usage

Farmland on one side and railway line on the other. Some timber removed and rubbish dumped.

Adjacent uncleared land

Scattered patches of 1 or 2 ha but predominantly absent.

Opinion and recommendations

Although of limited use as a conservation reserve it provides a valuable corridor for N-S moving transient species and the abundant nest hollows provide useful breeding sites in an area otherwise mostly devoid of woodland. It also provides an aesthetically pleasing approach to Moora from the south. I recommend that Reserve 23179 be left in its present condition and be vested in the Western Australian Wildlife Authority.

APPENDIX 3

Reserve 23179

"Sample sites" are given in kilometres from the S end of the Reserve heading N towards Moora.

0 Eucalyptus salmonophloia trees, mature, 22-25 m tall, 30-70% cover. Scattered E. wandoo to 18 m tall and occasional E. loxophleba. Understory of Acacia erinacea, A. graffiana, A. merrallii, Alyogyne hakeifolia, Bassia diacantha, Enchylaena tomentosa, Eremophila oppositifolia, Melaleuca cymbifolia, M. pauperiflora, M. uncinata, Santalum acuminatum and Stylobasium australe. Soil throughout the Reserve is pinkish grey, fine sandy clay loam; poorly drained.

1.1 E. wandoo trees, mature, 6-18 m tall, 10-30% cover.

2.0 Barberton East Road cuts through Reserve. Scattered Acacia acuminata, A. pulchella, and Eucalyptus loxophleba in this portion together with extensive development of Avena barbata, A. sativa fatua, Enneapogon caerulescens and Romulea rosea.

3.1 Crystal Brook Road cuts through Reserve. Melaleuca acuminata common here.

3.6 Creek crossing. Acacia microbotrya common.

4.4 E. wandoo as for 1.1 with some E. loxophleba tree mallees.

4.6 E. loxophleba tree mallee, mature, stratum 8-15 m tall, 30-70% cover.

4.9 E. salmonophloia trees, immature, 18-22 m tall, 30-70% cover.

5.6 E. salmonophloia as above with understory shrubs including: Bertya cunninghami, Beyeria leschenaultii, Choretrum glomeratum, Exocarpus aphyllus, Grevillea huegellii, Melaleuca adnata, M. undulata, Rhagodia preissii and Stipa elegantissima. Plate illustrates this portion.

7.5 Scattered E. wandoo with understory well developed.

7.7 Disturbed area with heathy regrowth of Acacia multispicata and some of the species listed above. Hakea decurva shrubs prominent. Scattered E. wandoo and E. loxophleba present.

8.8 E. salmonophloia and E. loxophleba woodland.

9.1 Road to E - access to railway yards.

9.5 Creek crossing. E. salmonophloia and E. loxophleba woodland with Grevillea paniculata. Abundant rubbish dumped, runoff from railway line and superphosphate from adjacent farmland has promoted extensive development of weeds, particularly grasses, Arctotheca calendula and Erodium cygnorum.

10.9 E. salmonophloia woodland with heathy understory.

11.0 Moora Townsite.

Plate 13. Reserve 23179 looking S along railway line. This portion is 5.6 km N of the S end of the Reserve.

Reserve 23316

Located ca 6.4 km WNW of Namban Siding and ca 10.5 km SW Watheroo Townsite and shown on lithograph 63/80, C,2.

Background

Originally set aside 5 October 1951 for "Protection of Flora and Fauna". Its area at this time was ca 296 ha. The Reserve was decreased to 292.0692 ha and changed to "Protection of Fauna" on 21 October 1960.

Physical characteristics

Reserve 23316 is square, with a total perimeter of 6.6 km and an area of 292.0692 ha. No contour maps are available but Namban Siding has an altitude of ca 219 m above sea level. The Reserve has an altitudinal variation of only 1-2 m over most of its area, the SW corner rising to 10-15 m above the altitude of most of the lakes.

Vegetation

Most of the Reserve is a complex system of salt lakes and flats with a heathy area on its S boundary and Banksia sandplain developed on its W boundary.

The heath is a mixed Dense Low Heath C and the sandplain Banksia menzeissii (Firewood Banksia) and Xylomelum angustifolium (Woody Pear) Low Woodland B over mixed Scrub over mixed Open Dwarf Scrub D. Much of the vegetation has been destroyed by grazing and trampling of sheep.

Plant species

Fifty-five species of plants were recorded, of which 13 are exploited by the wildflower seed trade. Four plants, a Beaufortia, Leptocarpus, Micromyrtus and a Patersonia could not be matched to any specimens in the Western Australian Herbarium and a further 2 are of uncertain affinities.

Nest hollows

None.

Weeds

Abundant throughout Reserve, mostly Arctotheca calendula and Ursinia anthemoides.

Fire history

Burnt in summer of 1960-1961. The fire was mostly restricted to the heath area, the lake vegetation being too sparse to burn and the Banksia area has old logs and standing dead trees suggesting it has not been burnt for more than 20 years.

Fauna

Inclement weather prohibited making an extensive faunal list during this survey. The following species were noted.

Grey Kangaroo (Macropus fuliginosus): 2 in lake margins.

Mountain Duck (Tadorna tadornoides): 4 in heath.

Crested Pigeon (Ocyphaps lophotes): 1 flushed from Melaleuca uncinata thicket.

Crested Bell-bird (Oroeica gutturalis): heard calling.

Chestnut-rumped Thornbill (Acanthiza uropygialis): in Banksia woodland.

White-fronted Chat (Epthianura albifrons): common throughout. Nest with 3 eggs in Arthrocnemum bidens shrub.

Australian Raven (Corvus coronoides): several flying over Reserve.

In addition to the above observations the Reserve has been visited several times by representatives of the Department of Fisheries and Wildlife. Their records include the following:

Year	Observer(s)	Species observed
1960	Bowler, Shugg and McLaughline	Port Lincoln Parrot (Platycercus zonarius)
		Red-capped (or King) Parrot (Platycercus spurius): needs confirmation.
		Galah (Cacatua roseicapilla)
		Tree Martin (Hirundo nigricans)
		Pipit (Anthus novaeseelandiae)
		Black-faced Cuckoo-shrike (Coracina novaehollandiae)
		Crested Bell-bird
		Willie Wagtail (Rhipidura leucophrys)
		Yellow-rumped Thornbill (Acanthiza chrysorrhoa)
		Black and White Wren - needs confirmation, probably Blue and White Wren (Malurus leuconotus)
		Singing Honeyeater (Meliphaga virescens)
		Magpie-lark (Grallina cyanoleuca)

Year	Observer(s)	Species observed
1960	Bowler, Shugg and McLaughline (cont.)	Black-faced Wood-swallow (Artamus cinereus) Western Magpie (Cracticus tibicen dorsalis) Australian Raven
1962 (1st visit)	Bowler	White-faced Heron (Ardea novaehollandiae): nesting, 3 young seen. Black Swan (Cygnus atratus): nest recorded. Mountain Duck (Tadorna tadornoides): 1 adult and 15 young seen. Black Duck (Anas superciliosa): young seen. Grey Teal (A. gibberifrons): 64 seen. White-headed Stilt (Himanotopus himanotopus leucocephalus): 23 seen including 5 young birds.
1962 (2nd visit)	Bowler	Banded Plover (Vanellus tricolor): nest seen. White-headed Stilt Pallid Cuckoo (Cuculus pallidus) Red-capped Robin (Petroica goodenovii): nest recorded White-browed Babbler (Pomatostomus superciliosus): nest recorded. Brown Thornbill (Acanthiza pusilla): nest recorded. Yellow-rumped Thornbill: nest recorded. Spotted Scrub-wren (Sericornis maculatus) Western Silvereye (Zosterops lateralis gouldii): nest recorded. White-fronted Chat Black-faced Wood-swallow.
1963	Bowler	Black-throated Grebe (Podiceps novaehollandiae): adults and young Straw-necked Ibis (Threskiornis spinicollis) Laughing Dove (Streptopelia senegalensis) Red-winged Wren (Malurus elegans) Little Wattlebird (Anthochaena chrysoptera)
1966	Bowler	Barn Owl (Tyto alba)

Between 1960 and the present survey about 38 bird species have been recorded. This probably represents only a fraction of the species utilising the Reserve. Thirteen of the recorded species have had nests or young.

Exotic fauna

Fox was recorded by Bowler in 1960. By far the most destructive introduced fauna are sheep. Bowler reports that grazing on the Reserve was advanced in 1959 and still common in 1966. At the time of this visit grazing was still being carried out on the Reserve and all palatable plant species were reduced to tussocks of stems about 10 cm high. Only unpalatable species or those too tall for the sheep to eat have survived.

Seedlings of palatable species have not been allowed to develop and replacement of senescent shrubs is not occurring.

Firebreaks and fences

There are firebreaks only on S and W sides. All sides of the Reserve are fenced.

Human usage

Sheep have been grazing on the Reserve for at least 19 years. Some Melaleuca uncinata have been cut to make whipsticks, probably for windbreaks.

Adjacent uncleared land

Salt flats are developed to the N and S of the Reserve and occupy 1000 ha.

Opinion and recommendations

It is both unfortunate and short-sighted that Reserve 23316 had its classification changed in 1960 from "Protection of Flora and Fauna" to just "Protection of Fauna". It is strange that such a change be made rather than prohibiting further grazing on the Reserve. The feeling amongst farmers that it is possible for them to do anything they want to a Reserve and get away with it, is supported and strengthened by examples such as the above where the Reserve's classification has been changed.

The argument that the vegetation of the Reserve was already destroyed is invalid. This brief survey detected 55 plant species, about 32 of which are eaten by sheep (my estimate) and no doubt many more still exist as scattered plants or would have survived had grazing been stopped in 1960. Amongst the plants I recorded were 4 which could not be matched to any specimens in the Western Australian Herbarium (a Beaufortia, Leptocarpus, Micromyrtus and a Patersonia). Two other specimens,

Leptospermum affin. oligandrum which does not exactly match the species description and Labichea affin. teretifolia which is found as a tufted, wiry, almost herbaceous form quite unlike normal L. teretifolia which is a shrub. All these plants require further study.

The Reserve is of some importance as a breeding site for birds, as testified by Bowler's records of 13 nesting species.

I strongly recommend that action be taken to prohibit further grazing on the Reserve and that a study programme be undertaken to examine the regeneration processes which follow removal of sheep from bushland which has been overgrazed for some 20 years. The results could be valuable in reclamation studies elsewhere. I also recommend that the classification revert back to "Protection of Flora and Fauna", that signs be erected on the SE and SW corners to indicate that Flora and Fauna are protected, and that the Reserve be vested in the Western Australian Wildlife Authority.

APPENDIX 4

Reserve 23316

Banksia - Woody Pear area

Banksia menzeissi and Xylomelum angustifolium trees to 4 m tall, 10-30% canopy cover over mixed shrubs, 0.5-2 m tall, 10-30% cover over mixed shrubs 0.5 m tall, 2-10% cover. Other species recorded were: Acacia acuaria, Adenanthos cygnorum, Beaufortia sp., Cryptandra pungens, Grevillea amplexans, Hibbertia acerosa, Lachnostachys eriobotrya, Leptospermum affin. oligandrum, Leucopogon blepharolepis, Scaevola canescens. Soil yellow, clayey sand; well drained.

Heath

Mixed heath, unstratified, 1 m tall, 70-100% cover. Scattered emergent Actinostrobus arenarius 1.5 m tall. Other species recorded were: Arthrocnemum lepidosperma, Leptocarpus sp., Lomandra glauca collina, Melaleuca affin. seriata, M. spathulata, Micromyrtus sp., Patersonia sp., Podolepis capillaris, and Thryptomene prolifera. Soil pink, sandy loam; poorly drained; probably with some salt.

Salt lake margins and inter-lake ridges

Lake edges had Arthrocnemum halocnemoides and A. undulatum on the water's edge and A. bidens outside these. This passed into Casuarina obesa stands to 5 m tall or Melaleuca uncinata thickets to 6 m tall. On the inter-lake ridges is a heathy assemblage comprising: Acacia leptospermoides, A. pulchella, Dianella revoluta, Jacksonia ulicina, Labichia affin. teretifolia, Leptospermum erubescens, Lomandra glauca collina, Melaleuca acuminata, M. pauperiflora, M. scabra, Rhagodia drummondii, Santalum acuminatum and Senecio lautus. Soil in the heathy areas was grey, light sandy clay loam; poorly drained; salty.

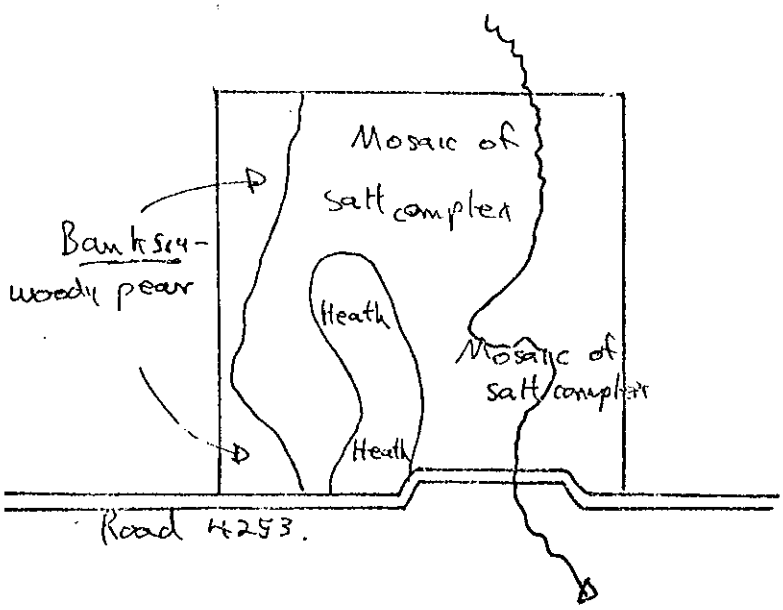
ADDENDUM

The following species have also been recorded on Reserve 23316 but were omitted from the appendix. Banksia-Woody Pear area: Actinostrobus arenarius, Banksia sphaerocarpa var. pinifolia, Calytrix empetrioides, Dampiera spicigera, Eremaea beaufortioides, Grevillea integrifolia, Isopogon drummondii, Jacksonia floribunda, Melaleuca uncinata, M. subtrigona, Pileanthus peduncularis, Synaphaea polymorpha.

Heath: Acacia pulchella, A. saligna, Actinostrobus arenarius, Cassytha glabella, Darwinia purpurea, Dianella revoluta, Dryandra nivea, Eremaea beaufortioides, Gahnia polyphylla, Harperia lateriflora, Jacksonia ulicina, Melaleuca spathulata, M. uncinata.

Figures have been altered in the discussion to allow for these additions.

Reserve 23316



vegetation boundary distinct.

water course.

1km

Plate 14. Edge of lake on Reserve 23316 showing marginal Samphire and Casuarina obesa fringes. Much of the Reserve is covered with this type of formation, the remainder being mostly heaths.

Reserve 28674

Known as Memoling Springs Reserve on Fisheries and Wildlife records but Manaling Springs on Lands Department lithographs.

Located ca 9.5 km NW of Coomberdale Siding and ca 8 km SW of Namban Siding. Shown on lithograph 63/80, B-C, 2.

Background

Originally gazetted 4 August 1967 for "Conservation of Flora and Fauna".

Physical characteristics

Reserve 28674 is approximately rectangular, the N boundary being 2 km long, the S boundary 1.8 km long and the width 1.1 km. The Reserve therefore has a total perimeter of 6 km and an area of 211.4963 ha. No contour maps or spot altitudes are available, but Namban Siding is ca 219 m above sea level (ASL) and Coomberdale Siding ca 200 m ASL. There is a difference of ca 10 m between the highest and lowest parts of the Reserve.

Vegetation

Predominantly a heath with Actinostrobus arenarius (Sandplain Cypress) emergent to 2.5 m tall. The density varies from very sparse or absent to dense. Irrespective of the Cypress density the heath vegetation is basically Melaleuca spathulata Dense Low Heath C.

A salt complex of heath/shrubland/samphire crosses the SE corner of the Reserve.

Plant species

Thirty-three species of plants were recorded of which 8 are exploited by the wildflower seed trade. A more detailed examination of the Reserve would probably double the number of species. Two species, Banksia attenuata (shrub form) and B. sphaerocarpa var. pinifolia are of unusual character.

Nest hollows

None.

Weeds

Absent.

Fire history

Vegetation older than 15 years.

Fauna

Echidna (Tachyglossus aculeatus): scats seen.

Grey Kangaroo (Macropus fuliginosus): 1 seen.

White-fronted Chat (Epthianura albifrons): common.

Exotic fauna

Rabbit scats seen.

Firebreaks and fences

Firebreaks on all sides, with a double firebreak adjacent to the roadway. Fenced on N, E and S sides.

Human usage

None.

Adjacent uncleared land

About 80-100 ha of uncleared heath contiguous with the S boundary.

Opinion and recommendations

Reserve 28674 has an excellent representation of heath vegetation and contains representative populations of Banksia attenuata (shrub form) and Banksia sphaerocarpa var. pinifolia, both species of unusual character and worthy of further study. I recommend the Reserve be left in its present condition and that it be vested in the Western Australian Wildlife Authority.

APPENDIX 5

Reserve 28674

Heath flats

Melaleuca spathulata shrubs and numerous other species mature to senescent, stratum 0.5-1.0 m tall 70-100% canopy cover. Actinostrobus arenarius shrubs are throughout the assemblage, mostly to 2.5 m tall and of variable density, being up to 70% cover in localised areas. Other plant species recorded were: Beaufortia micrantha, Calothamnus sanguineus, Choretrum pritzellii, Dryandra nivea, Eremaea beaufortioides, Gastrolobium spinosum, Hakea circumalata, Harperia lateriflora, Jacksonia ulicina, Leptospermum erubescens, Loxocarya fasciculata, Lyginia tenax, Melaleuca subtrigona, M. sp., M. thuyoides, M. uncinata, Micromyrtus racemosa, Patersonia occidentalis and Petrophile seminuda. Soil pinkish grey, clayey sand; well drained.

Heath-raised areas

These areas were only 1-2 m above the heath flats. Structurally as before but Banksia prionotes emergent to 4 m tall. Also present were: Banksia attenuata (shrub form), B. sphaerocarpa var. pinifolia, Beaufortia micrantha, Cassytha glabella, Conospermum stoechadis, Dryandra nivea, Isopogon drummondii, Jacksonia floribunda, J. furcellata, Leptospermum erubescens, Leucopogon preissii, Loxocarya fasciculata, L. pubescens, Stirlingia latifolia, Synaphaea polymorpha. Soil pale yellow, clayey sand; excessively drained.

Salt complex

A salt complex crosses the SE corner of the Reserve. The area was not examined but air-photographs suggest it is a heath/shrubland/samphire mosaic similar to those encountered in many other parts of the wheatbelt.

Reserve 28674

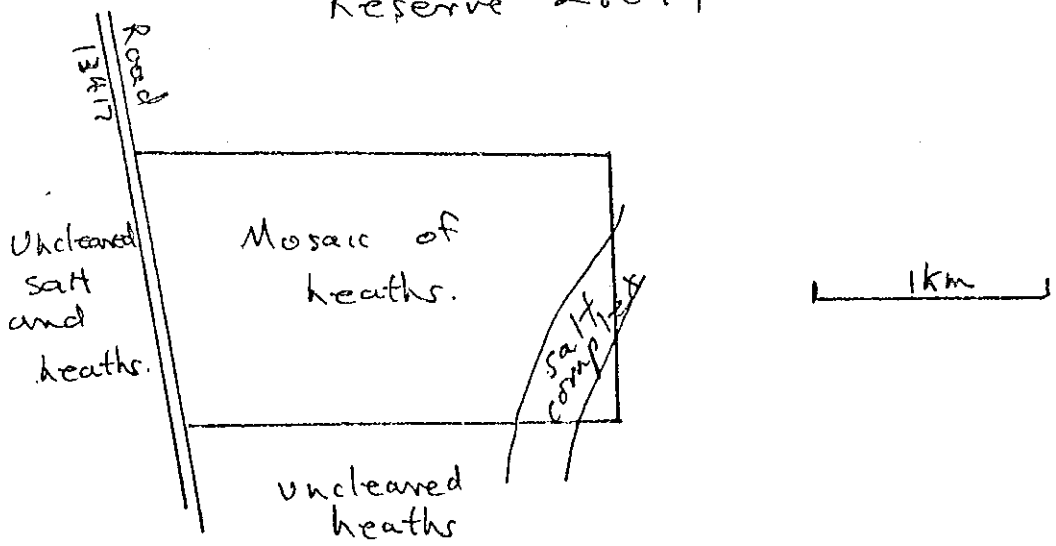


Plate 15. View E on Reserve 28674 showing heath with scattered Actinostrobus arenarius.