II VEGETATION OF DUROKOPPIN AND KODJ KODJIN NATURE RESERVES

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INTRODUCTION

Durokoppin Reserve (DR) and Kodj Kodjin Reserve (KKR) both fall within the Avon district of the South-west Botanical Province of Gardner and Bennetts (1956) and the vegetation of the Reserves largely conforms to that generally found throughout this region.

Abbreviated vegetation descriptions of DR appear in **Appendix 1** and of KKR in **Appendix 3.** Full descriptions of the vegetation following the format presented in Muir (1977a) have been lodged in the Archives of Western Australian Museum; details are available on request from the Librarian. A description of the road verge connecting DR and KKR is given at the end of **Appendix 1.**

Methodology

The vegetation of DR and KKR was mapped at Level 2 of the reliability scale set out in Muir (1977a). Each vegetation formation discernible on the air photographs was examined on the ground; this information was then extrapolated to adjacent formations. Uncleared land contiguous to the Reserves but not included within them was mapped at formation level directly from the photographs (Level 3).

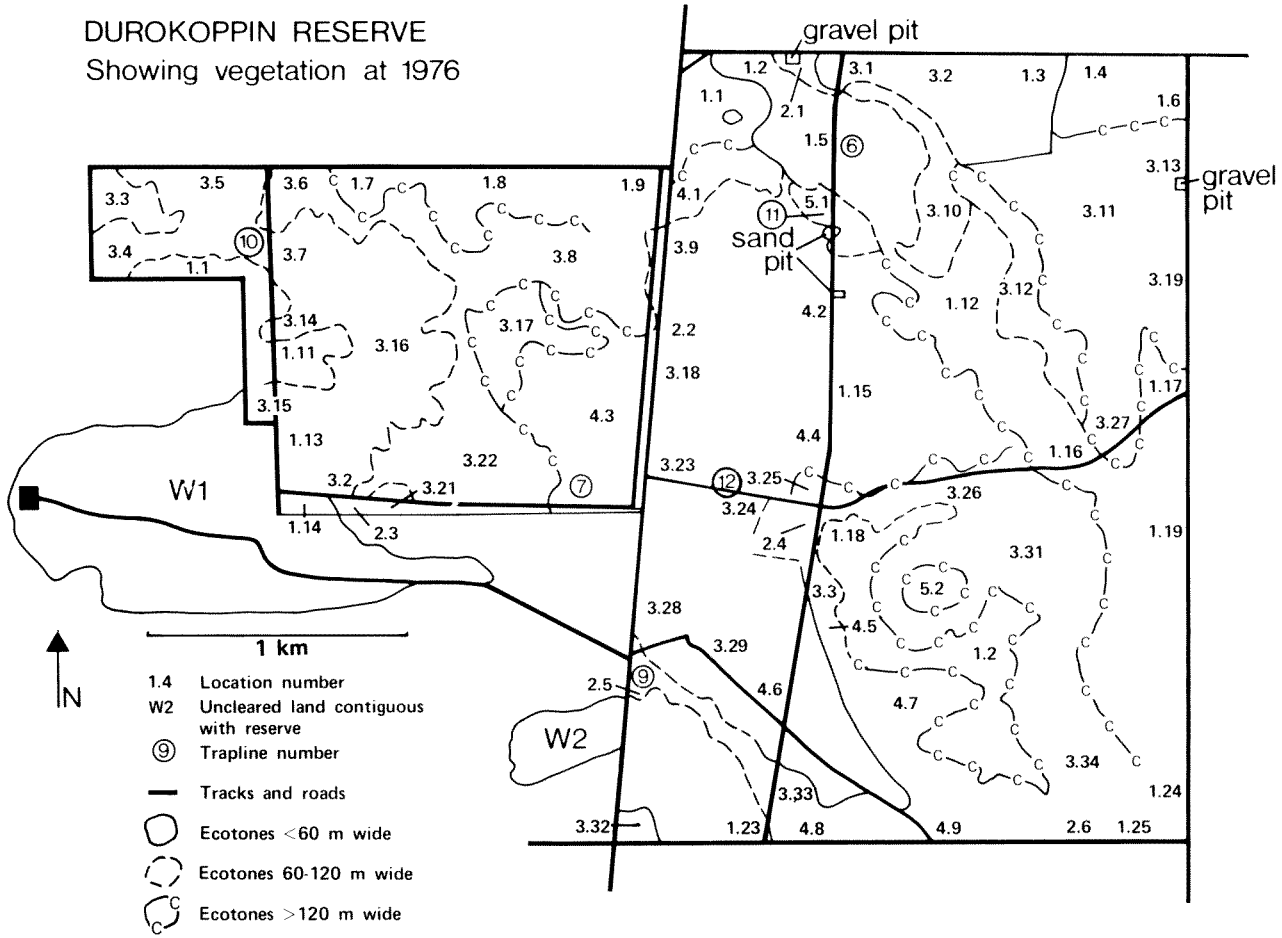
Level 2 locations, shown on vegetation **Maps 1** and **2** represent 'sample areas' where the vegetation was examined and described using the classification shown in **Table 1** and discussed in detail in Muir (1977a). The following prefix numbers of the locations represent basic formation types.

1 = woodland formations
2 = mallee formations
3 = shrubland formations
4 = heaths
5 = lithic complexes
6 = breakaway complexes
7 = salt complexes
8 = other

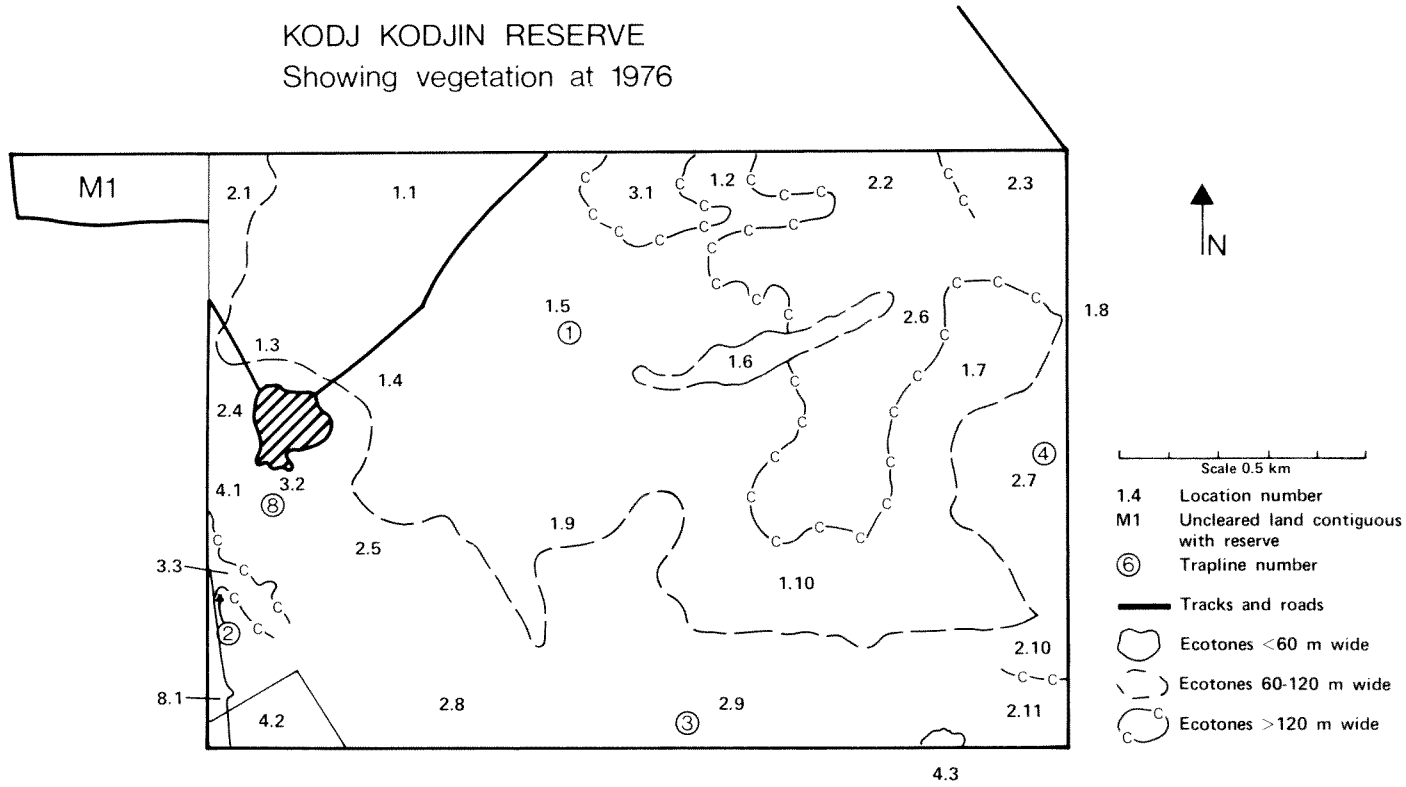
Level 3 locations are shown on the maps prefixed by:

W = woodland formations
M = mallee formations

The methods used in classifying formations, coding habitat data, preparing plant lists, classifying litter and describing soils are those of Muir (1977a).



Map 1: Map of Durokoppin Nature Reserve showing vegetation location numbers, ecotones, and location of traplines.



Map 2: Map of Kodj Kodjin Nature Reserve showing vegetation location numbers, ecotones, and location of traplines.

TABLE 1

Vegetation classification to be used in wheatbelt survey.

LIFE FORM/HEIGHT CLASS		DENSITY CLASS (CANOPY COVER)			
		Dense d 70-100%	Mid-dense c 30-70%	Sparse i 10-30%	Very Sparse r 2-10%
T	Trees > 30 m	Dense Tall Forest	Tall Forest	Tall Woodland	Open Tall Woodland
M	Trees 15-30 m	Dense Forest	Forest	Woodland	Open Woodland
LA	Trees 5-15 m	Dense Low Forest A	Low Forest A	Low Woodland A	Open Low Woodland A
LB	Trees < 5 m	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 > 2 m	Dense Thicket	Thicket	Scrub	Open Scrub
SA	Shrubs 1.5-2.0 m	Dense Heath A	Heath A	Low Scrub A	Open Low Scrub A
SB	Shrubs 1.0-1.5 m	Dense Heath B	Heath B	Low Scrub B	Open Low Scrub B
SC	Shrubs 0.5-1.0 m	Dense Low Heath C	Low Heath C	Dwarf Scrub C	Open Dwarf Scrub C
SD	Shrubs 0.0-0.5 m	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 > 0.5 m	Dense Tall Grass	Tall Grass	Open Tall Grass	Very Open Tall Grass
GL	Bunch grass < 0.5 m	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 > 0.5 m	Dense Tall Sedges	Tall Sedges	Open Tall Sedges	Very Open Tall Sedges
VL	Sedges < 0.5 m	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

DISCUSSION

Formations and Distribution

Breakaway and salt complexes are absent from both DR and KKR. Except lithic complex, which is absent from KKR, all other major wheatbelt vegetation formations are represented on both Reserves. Woodlands on both Reserves tend to occur on low lying ground near watercourses, on lithic complexes or on raised lateritic outcrops. The woodlands on DR are mostly on granite derived soils with poor drainage, although some, e.g. loc. 1.18, are on laterite; those on KKR are on soils which have an A horizon mostly derived from granite, but loc. 1.6 is growing on laterite and loc. 1.8 on soils probably derived from dolerite or other basic intrusive. Mallee, shrubland and heath formations on DR are mostly on sandy loam soils, whereas on KKR mallees are on sandy loams while shrublands and heaths are on a wider range of soil textures.

The area of vegetation formations and their proportion of the Reserves are set out in **Table 2.** Woodland is fairly well represented on both Reserves. Mallee is well represented on KKR but poorly represented on DR. In contrast, shrublands are better represented on DR. Heaths are poorly represented on both.

TABLE 2

	Durokoppin Reserve		Kodj Kodjin Reserve	
Formation	Area	% of Res.	Area	% of Res.
Woodland	326 ha	31.5	103 ha	50.5
Mallee	27	3.0	91	44.6
Shrubland	486	47.0	5	2.5
Heath	184	18.0	4	1.9
Lithic complex	7	0.5	-	-
Other	-	-	1	0.5

There is 112 ha of uncleared woodland contiguous with DR, and 5 ha of mallee near KKR. Additionally there are *ca* 11 ha of uncleared land, mostly mallee, in a 40 m wide by 2.7 km long roadside strip connecting the two Reserves.

Associations

'Associations' as used here, include associations, associes and consociations according to the definition of Beadle and Costin (1952) and Polunin (1960). Associations found on DR and on KKR are listed below.

Durokoppin Reserve

WOODLAND

Acacia acuminata
Casuarina huegeliana
Eucalyptus loxophleba
E. wandoo
E. wandoo-E. loxophleba
E. wandoo-E. loxophleba-A. acuminata
E. wandoo-E. salmonophloia

MALLEE

Eucalyptus cylindriflora-E. eremophila
E. eremophila-E. foecunda
E. foecunda-E. pileata
E. loxophleba-E. redunca
E. redunca-E. annulata

SHRUBLAND

Casuarina acutivalvis
C. acutivalvis-Hakea falcata
C. campestris
C. campestris-Acacia stereophylla
Grevillea didimobotrya-C. campestris-C. acutivalvis
Melaleuca uncinata-C. campestris
Mixed with no dominant
Xylomelum angustifolium
X. angustifolium-Grevillea excelsior

HEATH

Acacia fragilis-Casuarina campestris-Hakea scoparia
A. fragilis-Leptospermum erubescens-H. scoparia
C. campestris
Melaleuca uncinata
Mixed with no dominant

Kodj Kodjin Reserve

WOODLAND

Acacia neurophylla-Casuarina campestris

Eucalyptus salmonophloia
E. wandoo

MALLEE

Eucalyptus redunca
E. redunca-E. foecunda
E. transcontinentalis-E. cylindriflora
E. transcontinentalis-E. redunca

SHRUBLAND

Casuarina campestris
C. campestris-Melaleuca uncinata
Mixed with no dominants

HEATH

Leptospermum erubescens
Mixed with no dominants

OTHER (GRASSLAND)

Poaceae sp.

TABLE 3

Total number of associations in each formation, and on each Reserve

Formation	DR	KKR
Woodland	7	3
Mallee	5	4
Shrubland	9	3
Heath	5	2
Grassland	-	1
Total	26	13

DR has about twice as many associations in each formation as KKR, except in mallee where DR has 5 and KKR 4 associations. Overall, DR has twice as many associations as KKR. Considering that DR is about 5 times the size of KKR it has relatively less associations per area, thus DR has 2.5 associations/km^2 and KKR 6.4 associations/km^2. On this criterion KKR is about 2 to 3 times as diverse. Of all the associations, *Eucalyptus wandoo*

and 'mixed with no dominant' associations were the only ones common to both Reserves.

Senescent Trees

The artificially contrived index of abundance of senescent trees discussed in Muir (1977b) can be calculated for DR and KKR. On DR there are about 326 ha of woodland averaging about 20% canopy cover and thus having about 65 ha of actual canopy. About 10% of the trees are senescent and the index for DR is 6.5. On KKR, in contrast, there is *ca* 100 ha of woodland averaging *ca* 18% canopy cover and giving about 18 ha of actual canopy. Again about 10% of the trees are senescent and the index is 1.85. This shows that the abundance of senescent trees on DR is about 3-4 times that on KKR, but that both Reserves have low indices of senescence compared to some wheatbelt reserves, e.g. West Bendering (Muir 1977b) and Dongolocking Reserves (Muir 1978).

Floristics

Total number of plant species recorded for the two Reserves was 203, with 177 being found on DR and 90 on KKR. Plant species common to both Reserves totalled 58 (about 29%). Based on previous experience, the total number of common perennials and ephemerals on the Reserves is probably about 200 on DR and 120 on KKR. In terms of number of plant species believed present per area of Reserve, KKR has about 3 times more (58.8/km^2) than DR (19.4/km^2).

Twenty-seven families are represented on DR and 24 on KKR (**Appendix 5**). The dicotyledons are dominated by Mimosaceae, Myrtaceae and Proteaceae on DR and by the latter two families on KKR. The monocotyledons, although poorly represented, are dominated by Cyperaceae and Poaceae on both Reserves.

Several plants of particular interest are found on the Reserves. *Santalum spicatum* (Sandalwood) occurs scattered through several associations on DR. Elsewhere in the wheatbelt this species has all but disappeared, with the exception of West Bendering Reserve where it is still fairly abundant (Muir 1977b). Six species which were encountered on the Reserves during this survey are listed by Specht *et al.* (1974) as of special interest. There are *Alyxia buxifolia*, *Enchylaena tomentosa*, *Eremophila glabra* and *Santalum acuminatum*, of geographic interest due to disjunct or isolated distributions, and *Cryptandra polyclada* which has only small colonies remaining, and *Loxocarya vestita* which is known only from the original collection.

Table 4 compares floristic diversity between formations.

TABLE 4

Formation	Durokoppin		Kodj Kodjin	
	spp.	spp./ha	spp.	spp./ha
Woodland	78	0.23	31	0.30
Mallee	32	1.18	45	0.49
Shrubland	86	0.17	29	5.80
Heath	56	0.30	23	5.75
Lithic complex	8	1.14	-	-
Grassland	-	-	2	0.50

The number of species recorded *only* in a single type of formation (restricted species) are shown in Table 5. DR has the greatest number of restricted species in shrubland and KKR the greatest number in mallee formations. In relation to area, mallee has the most restricted species on DR and heath the most on KKR.

TABLE 5

Restricted species and restricted species per area

Formation	Durokoppin		Kodj Kodjin	
	spp.	spp./ha	spp.	spp./ha
Woodland	27	0.80	12	0.12
Mallee	13	0.48	20	0.22
Shrubland	39	0.08	12	2.40
Heath	17	0.09	10	2.50
Lithic complex	1	0.14	-	-
Grassland	-	-	1	1.00

A synthesis of all ecological and floristic data for the Reserves will be included in the final wheatbelt study to be presented later.

APPENDIX 1

VEGETATION DESCRIPTIONS — DUROKOPPIN RESERVE

WOODLANDS — DUROKOPPIN RESERVE

Loc. 1.1

Stratum 1: *Acacia acuminata* trees, immature, stratum 2-5 m tall, 2-10% canopy cover. Stratum 2: *Waitzia acuminata* herbs and *Stipa hemipogon* and *Avena fatua* grasses. Stratum 0-0.4 m tall, 30-70% canopy cover. Scattered *Eucalyptus loxophleba* present, 8-10 m tall. There are also scattered shrubs to 1 m tall between strata 1 and 2. Timber removed from area. Area has been disturbed prior to 1962. The exposed areas of granite are only a small proportion of the total area, and lithic complex species are mostly absent. The area is thus effectively a woodland rather than a lithic complex. The extreme south-western corner of this loc. is a stand of: *Eucalyptus loxophleba* tree mallee mature, 8-10 m tall 2-10% canopy cover over *Olearia revoluta, Acacia acuaria* and *Hakea scoparia* shrubs, 1-2 m tall, 2-10% canopy cover. Occasional *Santalum spicatum* present. Soil is slightly pedal, sandy, coherent, unbleached, slightly calcareous, pH4.9, pale brown, 10YR 6/3, sandy loam. Litter: Heaps of logs and debris from clearing of sand pits. Abundant dead *Waitzia* and grasses during summer. Deeper soil is granitic sand, part of which has been removed. Much of the area has shallow soil with granite pavements and boulders exposed.

Loc. 1.2

As for loc. 1.5.

Loc. 1.3

Regrowth of *Acacia acuminata* trees, mature, 6-7 m tall, mostly less than 2% canopy cover over *Waitzia acuminata* herbs and *Stipa hemipogon, Avena fatua* and several other species of grass mostly less than 0.5 m tall, 70-100% canopy cover. *A. acuminata* trees mostly 20-30 cm diameter at breast height, maximum diameter 40 cm. Area was cleared and cropped *ca* 40 years before survey.

Loc. 1.4

As for loc. 1.9. Understory of *Waitzia acuminata* herbs and *Loxocarya* affin. *vestita* sedge, 70-100% canopy cover. Soil as for loc. 1.9.

Loc. 1.5 (Trapline 6)

Stratum 1: *Eucalyptus wandoo* trees, mature, stratum 6-14 m tall, 30-70% canopy cover. Stratum 2: *Loxocarya* affin. *vestita* sedge, mature, stratum 0-30 cm tall, 2-10% canopy cover. Grasses moderately abundant. Timber removed from area. Evidence of very old fire scars. Area probably not burnt for 40-50 years. Litter: Abundant. Friable soil less than 1 m deep. Light grey, clayey sand.

Loc. 1.6

Woodland of *Eucalyptus wandoo, E. loxophleba* and *Acacia acuminata* trees, mostly mature or senescent, the eucalypts 6-14 m tall, the *A. acuminata* 4-8 m tall. The area is a mosaic of these species as pure stands or mixed with each other. Large timber has been

removed. The area has probably been heavily grazed as the understory consists almost entirely of grasses.

Loc. 1.7

Mosaic of associations similar to locs 1.8 and 1.9.

Loc. 1.8

Single stratum: *Eucalyptus wandoo* and scattered *E. salmonophloia* trees. The *E. wandoo* immature the *E. salmonophloia* senescent. Stratum 11-13 m tall, 10-30% canopy cover. *E. wandoo* trees regrowing in small pockets of deeper soil. Large timber removed from area. Some *E. salmonophloia* trees emergent to 17 m tall. Scattered grasses present. Evidence of very old fire scars. Area probably 40-50 years old. Litter: Sparse. Soil: Yellowish red, light sandy clay loam.

Loc. 1.9

Single stratum: *Acacia acuminata* trees, mature, stratum 6-8 m tall, 2-10% canopy cover. Timber removed from area. Scattered *Eucalyptus loxophleba* trees emergent to 14 m. Scattered grasses present. Evidence of very old fire scars. Area is probably 40-50 years old. Litter: Moderately abundant. Soil: Reddish yellow, sandy clay loam.

Loc. 1.10

As for loc. 1.9.

Loc. 1.11

As for loc. 1.9.

Loc. 1.12

Vague mosaic of vegetation similar to locs 1.5 and 1.17.

Loc. 1.13

Vague mosaic of loc. 3.6 vegetation with stands of *Eucalyptus loxophleba* trees, 3-5 m tall, 2-10% canopy cover over *Casuarina campestris, Melaleuca radula, Acacia fragilis* and several other species of shrubs 0.5-2 m tall, 30-70% canopy cover.

Loc. 1.14

As for loc. 1.6 with patches similar to loc. 1.13.

Loc. 1.15

Small stand of *Casuarina huegeliana* trees similar to loc. 1.21.

Loc. 1.16

Stratum 1: *Eucalyptus wandoo* and *E. loxophleba* trees, mature, stratum 8-12 m tall, 10-30% canopy cover. Stratum 2: *Acacia acuminata* trees, senescent, stratum 6-9 m tall, mostly 2-10% canopy cover, occasionally less than 2%. Scattered grasses present. Some large timber has been removed. Evidence of very old fire scars. Has not been burnt for at least 45-50 years. Litter: Abundant. Soil: Light brownish grey, sandy clay loam.

Loc. 1.17

As for loc. 1.5.

Loc. 1.18

Single stratum: *Eucalyptus salmonophloia* and *E. wandoo* trees, mature to senescent, stratum 15-20 m tall, 2-10% canopy cover. Scattered shrubs in understory, particularly *Olearia muelleri.* Some timber removed. Old fire scars present. Probably 40-50 years since last fire. Litter: Sparse. Soil: Strong brown loam pH 7.0 containing *ca* 80% laterite gravel.

Loc. 1.19

Single stratum: *Eucalyptus salmonophloia* and *E. wandoo* trees, both species mature, stratum 16-20 m tall, canopy cover *ca* 10%. No lower strata but there are scattered shrubs of two height classes, 1-2 m and 0-0.5 m tall. Both classes have a canopy cover of about 1%. There is no evidence of weeds or grasses but timber has been removed from the area. There is no evidence of fire. Litter: Moderately abundant. Soil: Reddish, sandy clay.

Loc. 1.20

Vague mosaic of vegetation similar to locs 1.5, 1.16 and 1.18.

Loc. 1.21

Stratum 1: *Casuarina huegeliana* trees, immature, 2-10 m tall, 2-10% canopy cover. Stratum 2: *Grevillea pritzellii* and *Leptospermum erubescens* shrubs 0-1.5 m tall, 2-10% canopy cover. Stratum 3: Numerous species, no particular dominants, stratum 0.5 m tall, 10-30% canopy cover. No evidence of weeds, grasses, human utilisation or fire. Loc. is a small area within a heath/shrubland mosaic. There are scattered *Acacia lasiocalyx* between strata 1 and 2. Litter: Very sparse. Soil: White, sandy loam.

Loc. 1.22

As for loc. 1.23.

Loc. 1.23

Eucalyptus wandoo trees, mature/senescent, 8-15 m tall, *ca* 30% canopy cover over *Casuarina campestris, Melaleuca uncinata* shrubs, 1-2 m tall, 2-10% canopy cover. Scattered *Gastrolobium crassifolium* and *Dodonaea attenuata* shrubs and occasional *Lepidosperma tenue* sedge. Abundant litter, mostly broad leaves, twigs, large debris, continuous layer to 2 cm deep. A shallow watercourse in this loc. has abundant *Spartochloa scirpoidea.* Soil is slightly pedal, sandy, coherent, unbleached, non-calcareous, pH 5.5, greyish brown, 10YR 5/2, sandy clay loam. About 30% of the soil volume is granite rock fragments.

Loc. 1.24

Similar to loc. 1.19 with *Eucalyptus wandoo* trees more prominent. Canopy cover is 10-30%. Understory of *Acacia acuaria, Grevillea paniculata* and other species of shrubs 0.5-1.5 m tall, 10-30% canopy cover.

Loc. 1.25

As for loc. 1.24.

MALLEE — DUROKOPPIN RESERVE

Loc. 2.1

Eucalyptus incrassata and *E. foecunda* shrub mallee, immature, stratum 3-4 m tall, 10-30% canopy cover. Scattered *Casuarina campestris* present. The gravel pit in this location is 30-40 years old, being last used 7 years before this survey.

Loc. 2.2

Eucalyptus foecunda and *E. pileata* shrub mallee with scattered *Casuarina campestris* shrubs. *Ecdeiocolea monostachya* prominent in understory. *Santalum acuminatum* present. Soil similar to loc. 3.23 but texture clayey sand. Well drained.

Loc. 2.3

Eucalyptus cylindriflora and *E. pileata* shrub mallee, mature to senescent, stratum 2-8 m tall, 30-70% canopy cover. Understory is several species of shrubs, mature, to 1.5 m tall, 2-10% canopy cover. Soil is highly pedal, sandy, very coherent, unbleached, non-calcareous, pH 5.4, brown, 7.5YR 5/4, fine sandy loam. Drainage poor, runoff from adjacent breakaways. Granite pebbles and quartz fragments abundant. Laterite pebbles constitute *ca* 60% of the soil volume.

Loc. 2.4

Eucalyptus loxophleba and *E. redunca* shrub and tree mallee of variable height and density. Area is an ecotone between locs 3.30 and 1.18.

Loc. 2.5 (Trapline 9)

Stratum 1: *Eucalyptus redunca* shrub mallee, mature, stratum 4-6 m tall, 10-30% canopy cover. Stratum 2: *Melaleuca laxiflora* and *M. uncinata* shrubs, senescent, stratum 1.5-2.0 m tall, 30-70% canopy cover. This mallee association occupies the extreme western end of a degraded breakaway. The top (platform) of the breakaway has *Casuarina campestris* shrubs 2-4 m tall, 70-100% canopy cover with occasional *Ecdeiocolea monostachya* sedges as an understory. Where pallid zone clays are exposed *Melaleuca lateritia* and *M. undulata* shrubs 1.0 m tall are common. There is no evidence of fire in any of the associations. Litter: Moderately abundant. Soil: Light brownish grey, sandy loam.

Loc. 2.6

Eucalyptus redunca and *E. annulata* and some *E. cylindriflora* shrub mallee, 2-5 m tall, 10-30% canopy cover over *Melaleuca pauperiflora, M. uncinata* and *Acacia acuminata* shrubs 1.5-2.5 m tall, 30-70% canopy cover over *Loxocarya* affin. *vestita* and *Borya nitida* herbs, 0-0.1 m tall, 2-10% canopy cover. Some scattered *M. eleutherostachya* shrubs and *Santalum acuminatum* trees where the mallee is more open. Evidence of very old fire scars. Area is probably 40-50 years old.

SHRUBLANDS — DUROKOPPIN RESERVE

Loc. 3.1

Disturbed area with numerous species regrowing. Mostly shrubs to 1 m tall, 30-70%

canopy cover with numerous but scattered shrubs, particularly *Grevillea eriostachya* and *Xylomelum angustifolium* to 3-4 m tall. Grasses are common. Soil is pH 4.8, yellow 10 YR 7/8, sandy clay loam. The area was cleared in the early 1930s and was under crop about 1936. Regrowth is *ca* 40 years old.

Loc. 3.2

As for loc. 3.1 with *Hakea decurva* common. Scattered *Acacia acuminata* present.

Loc. 3.3

Mostly as for loc. 3.6 with mosaic of small patches of *Acacia stereophylla* and *A. neurophylla* or of *Melaleuca radula, M. undulata* and scattered *Eucalyptus loxophleba* shrub mallee.

Loc. 3.4

Mostly as for loc. 3.6 but no understory for most of the area. Some patches with *Spartochloa scirpoidea* grass or scattered *Acacia acuminata.*

Loc. 3.5

As for loc. 3.6 with patches of *Acacia stereophylla, A. neurophylla, Melaleuca radula, M. undulata* and *Eucalyptus burracoppinensis.*

Loc. 3.6

Stratum 1: *Casuarina campestris* shrubs, mature to senescent, stratum 1-2 m tall, 30-70% canopy cover. Stratum 2: *Ecdeiocolea monostachya* sedge, mature, 0.5 m tall, 10-30% canopy cover. Scattered *Eucalyptus loxophleba* trees and shrub mallee, mature to senescent, 6-8 m tall, mostly less than 2% canopy cover. Abundant *Spartochloa scirpoidea* grass and *Borya nitida* herbs in some areas. Evidence of very old burnt stumps. Area is probably 40-50 years old. Soil: Strong brown, fine sandy loam.

Loc. 3.7 (Trapline 10)

Stratum 1: *Casuarina acutivalvis* shrubs, mature, stratum 3-5 m tall, 70-100% canopy cover. Stratum 2: *Grevillea paniculata* and several other species of shrubs, mature, stratum 1-1.5 m tall, 2-10% canopy cover. Stratum 3: *Ecdeiocolea monostachya* sedge and several species of shrubs, mature, stratum 0.5 m tall, mostly 2-10% canopy cover, but drops below 2% in some areas. Evidence of very old fire scars. Area probably burnt 40-50 years ago. Litter: Abundant. Soil: Brownish yellow, clay loam. Soil contains *ca* 50% gravel pebbles with some areas up to 100% gravel.

Loc. 3.8

Basically as for loc. 3.6.

Loc. 3.9

Basically as for loc. 3.6 with scattered *Eucalyptus burracoppinensis.*

Loc. 3.10

Basically as for loc. 3.6 with patches similar to loc. 3.13 and stands of *Xylomelum angustifolium* and scattered *Eucalyptus loxophleba.*

Loc. 3.11

Basically as for loc. 3.10.

Loc. 3.12

Mosaic of vegetation similar to locs 3.6 and 3.7.

Loc. 3.13

Stratum 1: *Casuarina campestris* and *Acacia stereophylla* shrubs, both mature, stratum 2-3 m tall, 10-30% canopy cover. Stratum 2: *Melaleuca conothamnoides* shrubs and *Ecdeiocolea monostachya* sedge, both senescent, stratum 0-0.5 m tall, 30-70% canopy cover. Stratum 3: *Borya nitida* herbs, mature, stratum 0-0.1 m tall, 10-30% canopy cover. No weeds, grasses or human utilisation. No evidence of fire. The gravel pit in this location was established and last used 2 years prior to this survey. Litter: Virtually absent. Soil: Yellow, sandy clay loam.

Loc. 3.14

As for loc. 3.37.

Loc. 3.15

As for loc. 3.7 with some areas of loc. 3.6 and scattered *Acacia acuminata* trees.

Loc. 3.16

Mosaic of vegetation similar to locs 3.5, 3.6 and 3.7.

Loc. 3.17

Stratum 1: *Xylomelum angustifolium* shrubs, mature, stratum 3-5 m tall, *ca* 2% canopy cover. Stratum 2: *Casuarina campestris* shrubs, mature, 1-3 m tall, 30-70% canopy cover. Stratum 3: *Ecdeiocolea monostachya* sedges and several species of shrubs, mature, stratum 0-0.5 m tall, 10-30% canopy cover. Area has not been burnt for *ca* 40 years. Litter: Moderately abundant. Soil: As for loc. 3.22.

Loc. 3.18

As for loc. 3.23 with stratum 1 being 2-10% canopy cover. Some *Dryandra* affin. *cirsioides* present. Soil as loc. 3.23 with gravel *ca* 80% of soil volume.

Loc. 3.19

As for loc. 3.13 with mosaic of areas similar to locs 3.6 and 3.7. Scattered *Eucalyptus foecunda* in some areas.

Loc. 3.20

As for loc. 3.7 with *Acacia fragilis* and *Casuarina campestris* abundant.

Loc. 3.21

Casuarina acutivalvis, Grevillea excelsior, Hakea coriacea and several other species of shrubs, mature to senescent, 2-5 m tall, 70-100% canopy cover. Understory virtually absent. Soil is highly pedal, sandy, moderately coherent, unbleached, non-calcareous,

pH 4.7, brownish yellow, 10YR 6/6, clay loam. Soil contains *ca* 20% laterite gravel pebbles. Well drained.

Loc. 3.22

Stratum 1: *Casuarina campestris* shrubs, mature to senescent, stratum 2-4 m tall, 2-10% canopy cover. Stratum 2: *Hakea falcata* and numerous other shrubs, mature, stratum 1-2 m tall, 30-70% canopy cover. Stratum 3: *Ecdeiocolea monostachya* and *Mesomelaena uncinata* sedges, mature, stratum 0.5 m tall, 2-10% canopy cover. Evidence of very old fire scars. Litter: Moderately abundant. Soil: Yellow, light sandy clay loam.

Loc. 3.23

Stratum 1: *Grevillea didymobotrya, Casuarina campestris* and *Casuarina acutivalvis* shrubs, mature to senescent. Stratum 1.5-3.5 m tall, 10-30% canopy cover. Stratum 2: *Grevillea pritzellii, Melaleuca conothamnoides* shrubs, *Ecdeiocolea monostachya* sedge, senescent. Stratum 0-1 m tall, 30-70% canopy cover. *Eucalyptus burracoppinensis* shrub mallee and *Acacia acuminata* trees emergent to 5 m tall. Evidence of very old fire scars. Area was cleared and cropped *ca* 40 years before survey. Litter: Very sparse. Soil: Yellow, fine sandy loam.

Loc. 3.24 (Trapline 12)

Stratum 1: *Xylomelum angustifolium* and *Grevillea excelsior* shrubs, senescent 1-5 m m tall, 2-10% canopy cover. Stratum 2: Several species, no dominants, senescent 0.5-1.5 m tall, 10-30% canopy cover. Evidence of very old fire scars. Probably cleared and cropped once in the early 1930s. Association is thus probably *ca* 40 years old. Litter: Moderately abundant. Soil: Yellow, fine sandy loam.

Loc. 3.25

As for loc. 3.33.

Loc. 3.26

Casuarina campestris shrubs, mature to senescent, 2-4 m tall, 2-10% canopy cover over numerous species of shrubs, no particular dominants, 0.5-1.0 m tall, 70-100% canopy cover.

Loc. 3.27

As for loc. 3.33.

Loc. 3.28

Stratum 1: *Casuarina acutivalvis, Hakea falcata* shrubs, immature, stratum 1-2.5 m tall, 10-30% canopy cover. Stratum 2: *Ecdeiocolea monostachya* sedge and *Melaleuca conothamnoides* shrubs, mature, stratum 0.5 m tall, 30-70% canopy cover. *Eucalyptus leptopoda* to just under 2%. Evidence of very old fire scars. Area probably burnt 40-50 years before survey. Litter: Sparse. Soil: White, sandy loam.

Loc. 3.29

As for loc. 3.23 with scattered *Acacia acuminata, Casuarina huegeliana, Hakea coriacea* and *Eucalyptus albida.*

Loc. 3.30

As for loc. 3.33 with some *Melaleuca uncinata* and *Leptospermum erubescens.*

Loc. 3.31

As for loc. 3.33 with patches of loc. 3.6.

Loc. 3.32

Melaleuca uncinata and *Casuarina campestris* shrubs, 1.5-2.5 m tall, 30-70% canopy cover over *Ecdeiocolea monostachya* sedge 0.5 m tall, 30-70% canopy cover. Scattered *Eucalyptus transcontinentalis* shrub mallee present. Cyperaceae gen. 1 common in small dense clumps. Soil is pH 5.5, yellow, 10YR 7/6, fine sandy loam with *ca* 60% gravel pebbles.

Loc. 3.33

Stratum 1: *Casuarina campestris* and some *Hakea scoparia* shrubs, both immature, stratum 1-2.5 m tall, 70-100% canopy cover. Stratum 2: *Beaufortia bracteosa* and *Ecdeiocolea monostachya* sedge, both mature to senescent, stratum 0-0.5 m tall, *ca* 30% canopy cover. No evidence of weeds, grasses or human utilisation. No evidence of fire. Litter: Moderately abundant. Soil: Yellow, clay loam. Laterite gravel constitutes 80% of the soil volume.

Loc. 3.34

As for loc. 3.3 with patches of loc. 3.6 and scattered *Eucalyptus redunca, Melaleuca uncinata* and *M. undulata.* There are also scattered clumps of *E. cylindriflora* and *E. transcontinentalis.*

HEATHS — DUROKOPPIN RESERVE

Loc. 4.1

Mosaic of *Casuarina campestris* shrubs, mature, mostly 1.0-2.0 m tall merging into *Melaleuca uncinata* shrubs, 1.5-2 m tall, 70-100% canopy cover. Scattered shrubs of several species in understory. Occasional *Eucalyptus burracoppinensis* and *Santalum spicatum* present.

Loc. 4.2

Mosaic of *Casuarina campestris* over *Ecdeiocolea monostachya* and associations of *Grevillea pritzellii* and *Leptospermum erubescens* 0-1.5 m tall, 2-10% canopy cover over heath with no particular dominants, 0.5 m tall, 10-30% canopy cover. Soil is moderately pedal, sandy, moderately coherent, unbleached, non-calcareous, pH 5.5, light grey, 2.5YR 7/2, clayey sand. Sand pit in this location was established and last used 15 years prior to this survey.

Loc. 4.3 (Trapline 7)

Mosaic of two associations of distinct character. Firstly *Casuarina campestris* shrubs, senescent, 0.5-2 m tall, 2-10% canopy cover over *Ecdeiocolea monostachya* and *Mesomelaena uncinata* sedges, mature, stratum 0.5 m tall, 70-100% canopy cover.

Secondly, numerous species shrubs, no particular dominant, 0.5-1.0 m tall, 70-100% canopy cover. Litter in both associations is sparse, terete leaves, clumped to 1 cm deep, clumps 2 m apart. Soil in first association is highly pedal, sandy, moderately coherent, unbleached, non-calcareous, pH 5.0, brownish yellow, 10YR 6/6, fine sandy loam with *ca* 5% gravel. The second association has moderately pedal, sandy, moderately coherent, unbleached, non-calcareous, pH 4.8, very pale brown, 10YR 7/4, light sandy clay loam. Soil with *ca* 80% gravel. Drainage excessive.

Loc. 4.4

Mosaic of areas similar to loc. 4.3 with some components of loc. 3.23, but less than 2 m tall. Scattered *Xylomelum angustifolium* and *Grevillea eriostachya.*

Loc. 4.5

Acacia fragilis, Leptospermum erubescens and *Hakea scoparia* shrubs, mostly 1-2 m tall (some emergent to 3 m) 2-10% canopy cover over numerous species, no particular dominant, 0.5 m tall, 10-30% canopy cover. Area burnt *ca* 40-50 years before survey. Soil is pH 5.0, pale yellow, 2.5YR 7/4, clayey sand.

Loc. 4.6

As for loc. 4.5 with *Astroloma serratifolium* and *Ecdeiocolea monostachya* common. Upper storey still 2-10%, lower storey *ca* 70% canopy cover. Area cleared and cropped *ca* 40 years before survey. Soil is pH 5.0 very pale brown, 10YR,7/4, fine sandy loam.

Loc. 4.7

As for loc. 4.5. Area burnt *ca* 40-50 years before survey.

Loc. 4.8

Melaleuca uncinata shrubs 1-1.5 m tall, 70-100% cover. No understory present. Scattered *Eucalyptus albida* mallee present.

Loc. 4.9

Stratum 1: *Acacia fragilis, Casuarina campestris* and *Hakea scoparia* shrubs. Several other species present. All immature, stratum 1-1.5 m tall, 2-10% canopy cover. Stratum 2: *Melaleuca conothamnoides, M. seriata* shrubs and *Ecdeiocolea monostachya* sedge. All mature, stratum 0-0.5 m tall, 30-70% canopy cover. Stratum 3: *Borya nitida* herbs and Cyperaceae sp. 1 mat plants. Both mature, stratum 0-0.1 m tall, 10-30% canopy cover. No evidence of weeds, grasses, human utilisation or fire. Litter: Sparse. Soil: Very pale brown, sandy loam.

LITHIC COMPLEX — DUROKOPPIN RESERVE

Loc. 5.1 (Trapline 11)

Lithic complex with very variable soil depth and drainage. This results in a very patchy distribution of all plant species present. The loc. description for the area as a whole is as follows. Stratum 1: *Casuarina huegeliana* and some *Acacia acuminata* trees, 4-10 m tall, 10-30% canopy cover. Stratum 2: *Lepidosperma gracile* 0-0.4 m tall, 10-30% canopy

cover. Stratum 3: *Borya nitida* 0-0.2 m tall, 30-70% canopy cover. Whole area with *Avena* spp. and *Stipa hemipogon* grasses and *Waitzia acuminata* herbs in the winter. Where soil is shallow *Stypandra imbricata* is prominent. Scattered *Leptospermum erubescens* present throughout. Sand pit near this location was established and last used 15 years prior to this survey. Litter: Variable, from absent to very abundant. Soil: Variable, brown or dark yellowish brown, texture varying from sandy loam to sandy clay loam.

Loc. 5.2

Lithic complex of variable structure, mostly *Casuarina campestris* 0.5-2.5 m tall but of varying height, density 30-80%. *Borya nitida* common, again of variable density. Granite exposures of low pavement type with very few exfoliations. Scattered *Casuarina acutivalvis* present.

PRIVATELY OWNED LAND CONTIGUOUS WITH DUROKOPPIN RESERVE

W1

Mosaic of woodland associations, mostly *Eucalyptus wandoo* trees, 6-14 m tall, 30-70% canopy cover. Some areas with no understory, others with *Acacia acuminata* 4-7 m tall, 2-10% canopy cover. Scattered shrubs of *Acacia graffiana.* Some *E. loxophleba* present. Towards western side of area W1 *E. loxophleba* and *A. acuminata* much more common, with *Waitzia acuminata* and grasses common in the understory. All heavily grazed. Granite boulders and small exposures of granite pavement present throughout.

W2

Exposure of granite pavement and boulders with *Eucalyptus loxophleba* and *Acacia acuminata* to 3.5 m tall. *Casuarina campestris* common, *Calothamnus chrysantherus* scattered throughout. Area heavily grazed.

ROADVERGE CONNECTING DUROKOPPIN AND KODJ KODJIN RESERVES

The south-east corner of Durokoppin Reserve is connected to the north-east corner of Kodj Kodjin Reserve by a strip of vegetation 2.7 km long and 40 m wide. This strip forms a verge along a road which passes along the eastern boundaries of both Reserves. The verge has been examined carefully as it is one of the most substantial in the wheatbelt, and may give information on the utilisation of such verges by birds migrating regionally or fauna passing from one Reserve to the other.

The vegetation structure of the verge has been recorded at intervals along its length. Going north from loc. 2.3 on Kodj Kodjin Reserve the vegetation is as follows:

Station 1, 0.4 km north

Eucalyptus transcontinentalis, E. redunca and *E. cylindriflora* and *E. foecunda* shrub mallee, 4-8 m tall, 10-30% canopy cover over *Melaleuca uncinata* and *M. pauperiflora* shrubs 1-2 m tall, 30-70% canopy cover over *Borya nitida* 0-0.1 m tall, 2-10% canopy cover.

Station 2, 0.8 km north

Eucalyptus redunca and scattered *E. cylindriflora* shrub mallee, 4-8 m tall, 2-10% canopy cover over *Melaleuca uncinata* and some *M. eleutherostachya* shrubs, 1.5-2.0 m tall, 70-100% canopy cover.

Station 3, 2.0 km north (Trapline 5)

Eucalyptus foecunda shrub mallee, 4-7 m tall, 10-30% canopy cover over *Melaleuca uncinata* and *Leptospermum erubescens* shrubs 1.5-2.5 m tall, 10-30% canopy cover.

Station 4, 2.4 km north

Eucalyptus wandoo trees, 8-15 m tall, scattered, together with some *Eucalyptus transcontinentalis* and *Acacia acuminata.* Understory of grasses, canopy cover and height variable. Much disturbed, sand removed and drains dug.

Scattered throughout the length of the verge are patches of shrubs, mostly 1.5-2.5 m tall, 70-100% canopy cover, *Melaleuca uncinata.* Scattered *Eucalyptus salmonophloia* and *E. wandoo* are present throughout.

APPENDIX 2

PLANT SPECIES LIST FOR SELECTED LOCATIONS — DUROKOPPIN RESERVE

(SC) indicates specimen lodged in Western Australian Museum Survey Collection.

Loc. 1.5

Acacia acuminata
A. lasiocarpa
A. microbotrya
Borya nitida
Calytrix brachyphylla
Cryptandra pungens
Dianella revoluta
Eucalyptus wandoo
Hakea lissocarpha
Lasiopetalum indutum
Lepidosperma gracile
L. tenue
Leptospermum erubescens
Lomandra affin. *mucronata*
Loxocarya affin. *vestita*
Melaleuca uncinata
Olearia revoluta
Persoonia striata
Verticordia densiflora
Waitzia acuminata

Loc. 1.8

Acacia acuaria
A. acuminata
A. erinacea
A. graffiana
A. microbotrya
Cassia nemophylla
Casuarina campestris
Dodonaea bursariifolia
Enchylaena tomentosa
Eucalyptus salmonophloia
E. wandoo
Gastrolobium crassifolium
Grevillea paniculata
Loxocarya affin. *vestita*
Poaceae sp. 6 (SC)
Rhagodia preissii
Santalum spicatum
Waitzia acuminata

Loc. 1.9

Acacia acuminata
Borya nitida
Casuarina campestris
Dianella revoluta
Ecdeiocolea monostachya
Eucalyptus gracilis
Grevillea paniculata
Lepidosperma tenue
Loxocarya affin. *vestita*
Santalum spicatum
Waitzia acuminata

Loc. 1.16

Acacia acuaria
A. acuminata
Eremophila affin. *glabra*
E. woolsiana
Eucalyptus gracilis
E. wandoo

Gastrolobium crassifolium
Grevillea paniculata
Lepidosperma gracile
Lomandra effusa
Loxocarya affin. *vestita*
Waitzia acuminata

Loc. 1.18

Eucalyptus salmonophloia
E. wandoo
Olearia muelleri

Loc. 1.19

Acacia erinacea
A. mackayana
A. microbotrya
Atriplex sp. 1 (SC)
Bassia affin. *diacantha*
Coopernookia strophiolata
Daviesia nematophylla
Dianella revoluta
Dodonaea bursariifolia
Eucalyptus salmonophloia
E. wandoo
Lepidosperma gracile
L. tenue
Olearia muelleri
Pittosporum phylliraeoides
Rhagodia preissii
Stipa hemipogon
Templetonia sulcata
Trymalium ledifolium

Loc. 1.21

Acacia fragilis
A. lasiocalyx
A. mackayana
A. multispicata
Andersonia caerulea
Astroloma serratifolium
Beaufortia bracteosa
Cassytha sp. B (SC)
Casuarina huegeliana
Ecdeiocolea monostachya
Grevillea pritzellii
Hakea ambigua
H. decurva
H. scoparia
Leptospermum erubescens
Leucopogon amplectans
L. conostephioides
Melaleuca conothamnoides
M. laxiflora
M. spathulata
M. uncinata
Olearia revoluta
Petrophile ericifolia
Verticordia brownii
V. densiflora
V. drummondii
Xanthorrhoea nana

Loc. 1.23

Casuarina campestris
Dodonaea attenuata
D. caespitosa
Eucalyptus wandoo
Gastrolobium crassifolium
Lepidosperma tenue
Melaleuca uncinata
Spartochloa scirpoidea

Loc. 1.25

Acacia acuaria
A. acuminata
A. erinacea
A. graffiana
A. affin. *lineolata*
A. mackayana
A. microbotrya
Dodonaea bursariifolia
Eremophila affin. *glabra* var. *viridiflora*
E. woolsiana
Eucalyptus salmonophloia
E. wandoo
Grevillea circumalata
G. paniculata
Melaleuca acuminata
M. eleutherostachya
M. affin. *lateriflora*
Olearia revoluta
Templetonia sulcata

Loc. 2.5

Acacia affin. *nigripilosa*
Amphipogon debilis
Borya nitida
Dodonaea bursariifolia
Ecdeiocolea monostachya
Eucalyptus redunca
Hakea subsulcata
Lepidosperma tenue
Loxocarya pubescens
Melaleuca laxiflora
M. uncinata
Phebalium tuberculosum
Platysace maxwellii
Santalum acuminatum

Loc. 2.6

Acacia acuminata
A. mackayana
Alyxia buxifolia
Borya nitida
Eucalyptus annulata
E. redunca
E. salmonophloia
Grevillea circumalata
G. affin. *disjuncta*
G. huegellii
Jacksonia affin. *racemosa*
Loxocarya affin. *vestita*
Melaleuca acuminata
M. eleutherostachya
M. pauperiflora
M. uncinata
Olearia muelleri
Santalum acuminatum

Loc. 3.1

Acacia acuminata
A. microbotrya
A. nigripilosa
Astroloma serratifolium
Calytrix affin. *brachyphylla*
Casuarina campestris
Comesperma scoparia
Daviesia aphylla
Dianella revoluta
Dodonaea caespitosa
Ecdeiocolea monostachya
Grevillea excelsior
G. paradoxa
G. pritzellii
Hakea recurva
Leucopogon hamulosus
Mesomelaena uncinata
Mirbelia spinosa
Olearia revoluta
Poaceae sp. 9 (SC)

Schoenus affin. *compressus*
Verticordia brownii
V. chrysanthera
Waitzia acuminata
Xylomelum angustifolium

Loc. 3.6

Acacia acuaria
A. acuminata
Astroloma serratifolium
Baeckea sp. 2 (SC)
Borya nitida
Calothamnus chrysantherus
Casuarina campestris
Ecdeiocolea monostachya
Eucalyptus loxophleba
Glyschrocaryon flavescens
Grevillea paradoxa
Hakea scoparia
Harperia lateriflora
Melaleuca conothamnoides
Spartochloa scirpoidea

Loc. 3.7

Acacia neurophylla
A. stereophylla
Astroloma serratifolium
Baeckea crispiflora
Calytrix empetrioides
Casuarina acutivalvis
C. campestris
Cryptandra leucophracta
Dodonaea caespitosa
Ecdeiocolea monostachya
Grevillea paniculata
G. paradoxa
Hakea scoparia
Melaleuca conothamnoides
M. radula

Loc. 3.13

Acacia acuaria
A. fragilis
A. sclerophylla var. *teretiuscula*
A. stereophylla
Borya nitida
Calothamnus quadrifidus
Casuarina campestris
Daviesia aphylla
Ecdeiocolea monostachya
Grevillea pritzellii
Hakea scoparia
Melaleuca conothamnoides
M. platycalyx
M. seriata
Santalum spicatum

Loc. 3.21

Acacia graffiana
A. longispinea
A. neurophylla
Casuarina acutivalvis
Eucalyptus birracoppinensis
Gastrolobium trilobum
Grevillea excelsior
Hakea coriacea
Melaleuca uncinata
Phebalium brachycalyx
Platysace maxwellii

Loc. 3.22

Acacia filifolia
A. nigripilosa
Baeckea crispiflora
B. floribunda

Beaufortia bracteosa
Borya nitida
Calothamnus chrysantherus
Casuarina campestris
Comesperma scoparia
Cyperaceae sp. 1 (SC)
Dodonaea caespitosa
Ecdeiocolea monostachya
Eucalyptus burracoppinensis
Hakea falcata
Isopogon scabriusculus
Lepidosperma angustatum
L. gracile
Melaleuca conothamnoides
M. spathulata
Mesomelaena uncinata
Petrophile ericifolia
Xylomelum angustifolium

Loc. 3.23

Acacia acuminata
A. fragilis
Astroloma serratifolium
Cassytha sp. B (SC)
Casuarina acutivalvis
C. campestris
C. huegeliana
Comesperma scoparia
Cryptandra myriantha
Ecdeiocolea monostachya
Eucalyptus burracoppinensis
Grevillea didimobotrya
G. disjuncta
G. excelsior
G. pritzellii
Hakea recurva
H. platysperma
H. scoparia
Lepidosperma affin. *gracile*
Leucopogon hamulosus
Melaleuca conothamnoides
M. affin. *spicigera*
Mirbelia spinosa
Petrophile ericifolia
Synaphaea polymorpha
Verticordia brownii
V. chrysanthera

Loc. 3.24

Acacia filifolia
A. heteroneura
Astroloma serratifolium
Baeckea floribunda
Beaufortia bracteosa
Borya nitida
Casuarina campestris
Cyperaceae sp. 1 (SC)
Dianella revoluta
Ecdeiocolea monostachya
Exocarpus aphyllus
Grevillea didimobotrya
G. excelsior
Harperia lateriflora
Hibbertia uncinata
Leucopogon hamulosus
Melaleuca spathulata
Mesomelaena uncinata
Mirbelia spinosa
Verticordia picta
Xylomelum angustifolium

Loc. 3.28

Acacia sclerophylla var. *teretiuscula*
Cassytha sp. B (SC)
Casuarina acutivalvis
C. campestris
Choretrum pritzellii
Cyperaceae sp. 1 (SC)
Ecdeiocolea monostachya
Eucalyptus drummondii

Grevillea excelsior
G. pritzellii
Hakea falcata
Lepidosperma angustatum
L. gracile
L. tenue
Melaleuca conothamnoides
M. spathulata
Micromyrtus imbricata
Santalum acuminatum

Loc. 3.33

Beaufortia bracteosa
Casuarina campestris
Ecdeiocolea monostachya
Eucalyptus albida
Hakea scoparia
Melaleuca platycalyx
Persoonia striata

Loc. 4.9

Acacia fragilis
Beaufortia bracteosa
Borya nitida
Casuarina campestris
C. huegeliana
Cyperaceae sp. 1 (SC)
Ecdeiocolea monostachya
Grevillea pritzellii
Hakea ambigua
H. falcata
H. scoparia
Isopogon scabriusculus
Lepidosperma angustatum
Melaleuca conothamnoides
M. seriata
M. spathulata
M. uncinata
Persoonia striata
Xanthorrhoea nana

Loc. 5.1

Acacia acuminata
Borya nitida
Casuarina huegeliana
Lepidosperma gracile
Leptospermum erubescens
Stipa hemipogon
Stypandra imbricata
Waitzia acuminata

APPENDIX 3

VEGETATION DESCRIPTIONS — KODJ KODJIN RESERVE

WOODLANDS — KODJ KODJIN RESERVE

Loc. 1.1

As for loc. 1.5. The transition between locs 2.1 and 1.1 is a degraded lateritic slope, with loc. 1.1 being located on the lower ground.

Loc. 1.2

As for loc. 1.5, some parts with abundant *Melaleuca undulata.*

Loc. 1.3

As for loc. 1.5 with scattered *Eucalyptus redunca* mallee.

Loc. 1.4

As for loc. 1.5.

Loc. 1.5 (Trapline 1)

Stratum 1: *Eucalyptus wandoo* and scattered *E. salmonophloia* trees, mature, 12-20 m tall, 10-30% canopy cover. Stratum 2: *Borya nitida* herbs or *Loxocarya* affin. *vestita* sedge, senescent, stratum 0-0.2 m tall, 70-100% canopy cover. No weeds, but occasional grasses present. Some timber has been removed from the area. Scattered between the strata are *Melaleuca uncinata* shrubs, mature, 2-4 m tall and *Olearia revoluta* shrubs, mature to senescent, 0.5-1.5 m tall. The component species in stratum 2 occupy different areas, with very little coexistence. The *Borya nitida* tends to be in the more open areas, being almost totally replaced by *Loxocarya* affin. *vestita* beneath the trees. There is no evidence of recent fire but old scars and burnt stumps are present. Litter: Abundant. Soil: Light yellowish brown, fine sandy loam.

Loc. 1.6

Area of *Acacia neurophylla* trees and some *Casuarina campestris* shrubs, both senescent, stratum 4-6 m tall, 70-100% canopy cover. Many of the *A. neurophylla* begin branching fairly low and it is difficult to determine whether they are of shrub or tree form. The trunks of the plants are mostly less than 0.5 m apart. Understory is absent. Litter is continuous to 2 cm deep and comprised almost solely of *Acacia* leaves and twigs. The area is situated on top of a degraded breakaway platform, and the soil is pale brown, 10YR 6/3, sandy loam with 80-90% of lateritic pebbles. Well drained. No evidence of fire. Code is aLAd/KSL. The extreme western end of this location is of lower gravel content, overlain by sandy loam *ca* 30 cm deep. Here the formation becomes more like shrubland and is 3-4 m tall, 70-100% canopy cover. *Casuarina acutivalvis* is common.

Loc. 1.7

As for loc. 1.5.

Loc. 1.8

Stratum 1: *Eucalyptus salmonophloia* trees, mature to senescent, 18-22 m tall,

2-10% canopy cover. Stratum 2: *E. salubris* trees, immature, stratum 6-10 m tall, *ca* 10% canopy cover. No weeds or grasses present. Some timber has been removed. Scattered amongst the *E. salubris* trees are a few older trees of larger diameter. There is no understory but there are scattered plants of several species up to 0.5 m tall. All these low shrubs are senescent. There is evidence of old fire scars and burnt stumps. Litter: Abundant. Soil: Yellowish red, sandy clay loam.

Loc. 1.9

As for loc. 1.5.

Loc. 1.10

As for loc. 1.5.

MALLEE — KODJ KODJIN RESERVE

Loc. 2.1

Stratum 1: *Eucalyptus transcontinentalis* and some *E. redunca* shrub mallee, immature, stratum 4-6 m tall, 2-10% canopy cover. Stratum 2: *Casuarina acutivalvis, Melaleuca uncinata* shrubs, with some small mallee regrowth. Shrubs are mature, stratum 1.5-2.5 m tall, 30-70% canopy cover. Stratum 3: *Gastrolobium trilobum* and several other species of shrubs, all senescent. Stratum 0-0.5 m tall, 10-30% canopy cover. Some *C. acutivalvis* emergent into stratum 1. No evidence of weeds, grasses or human utilisation. Evidence of old fire scars, stand is *ca* 40 years old. Also see note loc. 1.1. Litter: Moderately abundant. Soil: Reddish yellow, clay loam. Soil contains *ca* 50% lateritic pebbles.

Loc. 2.2

Stratum 1: *Eucalyptus transcontinentalis* and *E. cylindriflora* shrub mallee, both mature. Stratum 8-12 m tall, 10-30% canopy cover. Stratum 2: Mixed shrubs, no particular dominant, all senescent. Stratum 0-1 m tall, 2-10% canopy cover. Occasional *E. wandoo* emergent to 14 m and *E. salmonophloia* to 20 m tall. No weeds or grasses. Some timber has been removed from the area. Evidence of old fire scare, stand is *ca* 40 years old. Litter: Abundant. Soil: Pink, fine sandy loam, *ca* 20% laterite gravel.

Loc. 2.3

Area comprises *Eucalyptus redunca* and *E. foecunda* shrub mallee 4-6 m tall, 2-10% canopy cover over *Melaleuca uncinata* shrubs 1-1.5 m tall, 30-70% canopy cover over *Ecdeiocolea monostachya* sedge, 0.5 m tall, 10-30% canopy cover. Scattered *Santalum acuminatum* are present. Soil is light brownish grey, 10YR 6/2, sandy loam, with *ca* 30% of its volume comprising angular quartz grains 2-5 mm diameter. Area is poorly drained.

Loc. 2.4

Eucalyptus redunca shrub mallee 4-6 m tall, 2-10% canopy cover, with scattered *E. wandoo* trees and *Dryandra serratuloides* shrubs. Situated on soil of very high gravel content on slopes of very degraded breakaway.

Loc. 2.5

Mostly shrub mallee similar to loc. 2.2 with scattered patches of *Casuarina acutivalvis*

or *Melaleuca eleutherostachya* shrubs to 3 m tall. The proportions of *Eucalyptus transcontinentalis, E. cylindriflora* and occasionally scattered *E. redunca* change constantly with minor topographic and soil variations.

Loc. 2.6

As for loc. 2.2 with scattered *Eucalyptus wandoo* trees and *Melaleuca uncinata* and *Casuarina campestris* shrubs.

Loc. 2.7 (Trapline 4)

As for loc. 2.2 with some areas with abundant *Ecdeiocolea monostachya* sedge in the understory. The sedge usually occupies shallow depressions.

Loc. 2.8

Mostly as for loc. 2.2 with patches of *Casuarina acutivalvis* and *Melaleuca eleutherostachya* shrubs and subtle changes in proportions of mallee species owing to topographic and soil changes.

Areas where the *C. acutivalvis* is present tend to be denser. More green areas tend to be heathy, with some of the species of loc. 4.2 being present.

Loc. 2.9 (Trapline 3)

As for loc. 2.8.

Loc. 2.10

As for loc. 2.2, some areas with abundant *Ecdeiocolea monostachya* sedges.

Loc. 2.11

Similar to loc. 2.2 but slightly more open, and *Eucalyptus cylindriflora* trees and tree mallee become more abundant. Stratum is 6-8 m tall, 10-30% canopy cover, over *Melaleuca eleutherostachya, Santalum acuminatum* and *Acacia acuminata* shrubs and trees 2-4 m, 2-10% canopy cover.

Much large debris amongst the litter and termite mounds are very abundant. Some depressed areas scattered throughout have abundant *Spartochloa scirpoidea* grass.

SHRUBLANDS — KODJ KODJIN RESERVE

Loc. 3.1

Single stratum comprising *Casuarina campestris* and *Melaleuca uncinata* shrubs, mature to senescent, stratum 2-3 m tall, 70-100% canopy cover. Average foliage density of *M. uncinata* 20%, of *C. acutivalvis* 30%. Occasional *M. uncinata* emergent to 4 m. No evidence of weeds, grasses or human usage. Evidence of very old fire scars and burnt stumps. Southern boundary of formation has a band *ca* 20 m wide of *Eucalyptus eremophila* shrub mallee. Termite mounds abundant throughout formation. Litter: Moderately abundant. Soil: Light brown, sandy loam. Situated on low decayed granite rise with numerous boulders, decayed rock and quartz fragments scattered throughout. The area does not show the combination of characters expected in a lithic complex and is therefore classified as shrubland.

Loc. 3.2 (Trapline 8)

Stratum 1: *Hakea coriacea, Grevillea pritzellii, Melaleuca uncinata* and *Casuarina acutivalvis* shrubs, and *Eucalyptus foecunda* shrub mallee, all immature, stratum 1.5-2.5 m tall, 10-30% canopy cover (close to 10%). Stratum 2: *Melaleuca cordata* shrubs and *Ecdeiocolea monostachya* sedge with numerous other species of shrubs, all mature, stratum 0-0.5 m tall, 10-30% canopy cover (close to 30%). Litter: Sparse. Soil: Strong brown, sandy loam.

Loc. 3.3 (Trapline 2)

Small band of *Casuarina campestris* shrubs 2-3 m tall, 70-100% canopy cover, with scattered *Hakea decurva* shrubs. Soil is pH 5.7, light brown, 7.5 YR 6/4, sandy loam.

HEATHS — KODJ KODJIN RESERVE

Loc. 4.1

Unstratified heath containing *Leptospermum erubescens, Melaleuca cordata, Grevillea pritzellii* and several other species of shrubs, and with scattered clumps of *Ecdeiocolea monostachya* sedge. Immature to mature, stratum up to 1.0 or 1.5 m tall, 30-70% canopy cover. Soil is pH 7.6, brownish yellow, 10YR 6/6, fine sandy loam, excessively well drained.

Loc. 4.2

Stratum 1: *Leptospermum erubescens* shrubs, immature, stratum 0.5-1.5 m tall, 10-30% canopy cover. Stratum 2: *Melaleuca cordata* shrubs and some *Ecdeiocolea monostachya* sedge, mature, stratum 0-0.5 m tall, 10-30% canopy cover. No evidence of weeds or grasses. Evidence of old fire scars present. Area has been scrubrolled and possibly burnt. Litter: Sparse. Soil: Yellowish brown, sandy loam.

Loc. 4.3

Small area of shrubs and trees 2-4 m tall but much less than 2% canopy cover over a heath of shrubs and sedges 1 m tall, 10-30% canopy cover. No particular dominants present but the upper layer contains *Santalum acuminatum, Hakea scoparia, Leptospermum erubescens, Acacia acuminata* and *Casuarina acutivalvis.* The heath layer contains *Melaleuca conothamnoides, M. seriata* and *Mesomelaena uncinata.*

OTHER FORMATIONS — KODJ KODJIN RESERVE

Loc. 8.1

This narrow strip of land has been cleared and had pasture grown on it *ca* 8 years before this survey and has since regrown. It is now covered with Low Grass (less than 0.5 m, 30-70% canopy cover) with scattered shrubs of *Baeckea* affin. *crispiflora.* Where this strip overlaps loc. 4.2, *Ecdeiocolea monostachya* is prominent.

UNCLEARED LAND CONTIGUOUS WITH KODJ KODJIN RESERVE

M1

As for loc. 2.1.

APPENDIX 4

PLANT SPECIES LIST — KODJ KODJIN RESERVE

Loc. 1.5

Acacia acuaria
A. erinacea
A. graffiana
Astroloma serratifolium
Bertya cunninghami
Borya nitida
Dianella revoluta
Eucalyptus salmonophloia
E. wandoo
Gastrolobium crassifolium
Hakea lissocarpha
Lepidosperma angustatum
L. gracile
L. tenue
Loxocarya fasciculata
Melaleuca spicigera
M. uncinata
Neurachne sp. 1
Olearia revoluta
Platysace maxwellii
Templetonia sulcata

Loc. 1.6

Acacia neurophylla
Casuarina campestris

Loc. 1.8

Acacia erinacea
Daviesia acanthoclona
Dodonaea bursariifolia
Eremophila decipiens
Eucalyptus salmonophloia
E. salubris
Olearia muelleri
Templetonia sulcata

Loc. 2.1

Acacia acuaria
A. graffiana
Bossiaea eriocarpa
Casuarina acutivalvis
Cryptandra leucophracta
Eucalyptus redunca
E. transcontinentalis
Gastrolobium trilobum
Hakea coriacea
H. multilineata
H. subsulcata
Melaleuca uncinata
Persoonia coriacea
Petrophile seminuda
Phebalium tuberculosum

Loc. 2.2

Acacia graffiana
Dodonaea bursariifolia
D. affin. *concinna*
Eucalyptus cylindriflora
E. salmonophloia
E. transcontinentalis
E. wandoo
Grevillea huegellii
G. sp. indet. (SC)
Melaleuca uncinata
M. undulata
Olearia muelleri
Templetonia sulcata
Westringia cephalantha

Loc. 2.3

Acacia graffiana
Amphipogon debilis
Baeckea sp. indet (SC)
Borya nitida
Daviesia acanthoclona
Ecdeiocolea monostachya
Eucalyptus foecunda
E. redunca
Gastrolobium hookeri
Grevillea paniculata
Lepidosperma brunonianum
L. gracile
L. tenue
Leptospermum erubescens
Melaleuca subtrigona
M. uncinata
Olearia revoluta
Phebalium tuberculosum
Santalum acuminatum

Loc. 3.1

Astroloma serratifolium
Cassytha sp. B (SC)
Casuarina campestris
Eucalyptus eremophila
Gastrolobium crassifolium
Goodeniaceae sp. indet. (SC)
Melaleuca radula
M. uncinata
Westringia sp. indet. I (SC)

Loc. 3.2

Acacia desertorum
A. sclerophylla var. *teretiuscula*
Beaufortia micrantha
Cassytha sp. B (SC)
Casuarina acutivalvis
Comesperma spinosum
Daviesia nudiflora
Ecdeiocolea monostachya
Eucalyptus foecunda
Grevillea pritzellii
Hakea ambigua
H. coriacea
Isopogon scabriusculus
Melaleuca conothamnoides
M. cordata
M. seriata
M. uncinata
Micromyrtus imbricata
Phebalium tuberculosum
Platysace maxwellii
Santalum acuminatum

Loc. 4.2

Astroloma pallidum
Casuarina microstachya
Dampiera sp. 3 (SC)
Dryandra sp. B (SC)
Ecdeiocolea monostachya
Eremophila affin. *glabra* var. *viridiflora*
Gastrolobium hookeri
Grevillea pritzellii
Hakea ambigua
H. lissocarpha
Hibbertia affin. *verrucosa*
Leptospermum erubescens
Melaleuca cordata
M. lateritia
M. seriata
Petrophile seminuda
Xanthorrhoea nana

APPENDIX 5

FAMILY AND SPECIES DISTRIBUTION OF PLANTS ON DUROKOPPIN AND KODJ KODJIN RESERVES

Family	No. species Durokoppin	No. species Kodj Kodjin
Apiaceae	1	1
Apocynaceae	1	-
Asteraceae	4	2
Casuarinaceae	5	3
Chenopodiaceae	3	-
Cyperaceae	7	5
Dilleniaceae	2	1
Epacridaceae	7	2
Euphorbiaceae	-	1
Fabaceae	8	6
Goodeneaceae	3	2
Haemodoraceae	1	-
Haloragaceae	1	-
Lamiaceae	-	2
Lauraceae	1	1
Liliaceae	3	2
Mimosaceae	17	7
Myoporaceae	2	2
Myrtaceae	44	24
Pittosporaceae	1	-
Poaceae	6	3
Polygalaceae	1	1
Proteaceae	25	16
Restionaceae	4	2
Rhamnaceae	5	1
Rutaceae	-	2
Santalaceae	3	1
Sapindaceae	3	2
Sterculiaceae	2	-
Xanthorrhoeaceae	2	1
Total families	27	24