MANAGEMENT PLAN
COCANARUP TIMBER RESERVE

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COCANARUP TIMBER RESERVE C30795

TABLE OF CONTENTS

1. Introduction

The area known as Cocanarup Timber Reserve C30795, was reviewed by the Environmental Protection Authority and in its Conservation Reserves for Western Australia "Red Book" (1976) recommended "interalia" that :

1. Class C reserve 30795 for the purpose of Timber and unvested but managed by the Forests Department, should continue to be managed by the Forests Department but more attention be given to its multiple use for the conservation and management of flora and fauna as well as timber production.

2. The Forests Department prepare a management plan in consultation with the Shire of Ravensthorpe, the Director of Fisheries and Wildlife, the W.A. Herbarium and the Director of Engineering, Public Works Department.

In accordance with the above recommendations and in carrying out the provisions of the Forests Department's General Working Plan No. 87 of 1977 this management plan has been produced.

Initially a draft proposal was circulated to the above organisations and also to the Department of Conservation & Environment, the Mines Department and the Bush Fires Board for perusal. Comments received were most useful and these, together with further internal input, have been responsible for amendments to the original draft.

The underlying philosophies adopted in the strategies outlined in the plan include :

a) recognition of the value of the area for conservation of flora and fauna

b) the need to integrate fire protection measures with those of adjacent Fitzgerald River area.

c) the adoption of a fire protection strategy which can be effectively implemented through local Bush Fires Brigades.

d) recognition of a relatively small but continuing local demand for jam fencing materials.

This plan was prepared by the following officers of the Forests Department.

Mr. O.W. Loneragan, Silviculturalist, Como
Mr. P.C. Richmond, Forest Officer in Charge, Kalgoorlie.
Messrs. N.G. Ashcroft & F.E. Batini, Regional Planning Officers, Como

Acknowledgement is also made to Mr. Alan Carmichael of Ravensthorpe for his contribution to various matters within this Plan.

The Plan is current for the years 1980-85 after which it will be reviewed.

2. Description of the Reserve

2.1 Location and Adjoining Land Tenures

2.1.1 Location

Cocanarup Reserve (8,988 ha in extent) lies across the valley of the Phillips River, a small river flowing to the south coast of Western Australia (figures 1.1, 1.2, 1.3). A section of the main highway passes through the Reserve and crosses the river at the road bridge, 15km. west of Ravensthorpe.

2.1.2 Adjoining Land Tenures

(i) Within the reserve's boundaries

- Cocanarup farm, approximately 87ha. cleared land (loc. 1863, 1864, 801, 802 and G.G. 33).
- surveyed road to Loc. 1863, approximately 22 ha.

(ii) Other reserves within 6km of Cocanarup boundaries include :

- 31881 (179ha) Conservation of Flora and Fauna
- 31425 (250 ha) Conservation of Flora and Fauna
- 31154 (98ha) Gravel
- 32303 (93ha) Government requirements
- 13272 (70ha) Water
- 3820ha. of Vacant Crown Land extending across the valley of the Phillips River and adjoining Cocanarup on the southern boundary (Figures 4).

2.2 Climate

Having a Mediterranean climate, 62 percent of the annual rainfall of 380mm (33 years average) falls in the wettest six months (May - October) Table 1. The growing season is 5.7 months at Cocanarup and 6.2 months at Ravensthorpe. One quarter of all seasons open before 8th March. Dry spells of 7, 8 and 9 months occur once in 3, 5 and 16 years respectively.

The mean isotherms for autumn, winter, spring and summer are respectively 17°C, 12°C, 15°C and 20°C. From 20 to 40 days a year may be hotter than 32°C and frosts may occur on an average of four times a year.

2.3 Soil

The Cocanarup Reserve is on the western edge of the Ravensthorpe "greenstone" comprised of basic igneous and metamorphic rocks. Granites and thin tertiary sediments are found in the northwestern portion. The elevation above sea level is about 300 metres.

The soil units were described by C.S.I.R.O. (1967). The main units (Va67) is on the greenstone; it lies between unit Uf3 (on granites) to the west and Unit MM15 (on greenstone) to the east.

Va67: Hard-setting loamy soils with mottled, yellow, clayey sub-soils and bleached A2 horizon. These soils are common with rocky outcrops on valley side slopes in undulating hilly topography.

MM15 : Self-mulching seasonal cracking clays, brown and grey becoming browner with depth. Of uniformly fine texture and found on rolling to undulating terrain, these soils are calcareous throughout the profile.

Uf3 : Hard-setting loamy soils with mottled, yellow,

clayey sub-soils, bleached A2 horizon and ironstone gravels in their surface horizons. Found on flat to gently undulating ridge crests of the dissected plateau.

A more rudimentary classification of the soils-vegetation relationships has also been provided by the Lands and Surveys Department (Table 2). Of the five classes described, one (3B) is not present on the Cocanarup Reserve. The other four classes have more than one soil type represented in each class.

2.4 Classification of the Vegetation

The classification of vegetation, presented by Beard (1969 and sequels), parallels the Australian standard proposed by Specht (1970). The structure of a plant formation is described by the life-form and height (physiognomy) and foliage density of the tallest stratum (Table 3). The density as defined by Specht (1970) and adopted by Beard (1976) was also used in this study. By adding the floristic category, plant associations are then defined.

In his explanatory notes, Beard (1972) describes 8 formations in the Jerramungup System; and 2 formations in the Ravensthorpe System. These 2 systems, Jerramungup and Ravensthorpe, are included in 20 vegetation systems which Beard had delineated in the Eyre Botanical District of Western Australia. The vegetation system defined by Beard (1969) consists of a particular series of plant communities recurring in a mosaic pattern linked to topographic, pedological and geological features.

The plant associations, which were observed in the field could not be separated in mapping at the scale of 1:250,000 used by Beard (1972, Figure 2). Within the Cocanarup Reserve, at this scale, Beard mapped only 3 eucalyptus formations, a medium woodland (eMc), a mallee shrubland (eSc) and a mallee, mallee-heath mosaic (eSc/eSZ).

The capital letter signifies the plant formation; the prefix denotes the genus of the dominant stratum, and the suffix is the foliage density as defined by Specht (1970).

By using aerial photo interpretation in association with ground inspections, 10 plant associations were mapped by Loneragan (Figure 3 and Tables 4 and 4A). On the airphotos, medium-height open forest appears black and coarsely speckled, whereas low open forest of mallee appears black and finely speckled due to the smaller crowns. Acacia acuminata in mixture with other species appears irregularly grey with a speckled pattern dependent on the diversity of mixture with other species. Mallee, with shrubs over 2m appears coarsely speckled. The lithic complex with shrubs under 2m appears the palest grey. Flared boundaries and pale patches indicate recently burnt areas. About half of the reserve area has been burnt either once or twice during the past 10 years, leaving some 15-20 percent unburnt. Nevertheless, the delineation of plant associations should be reasonably reliable. Of the 10 plant associations delineated in the Reserve, six are classified in the Jerramungup vegetation system and 4 in the Ravensthorpe system.

2.5 Vegetative Types

An outstanding feature of the Reserve is an open forest of salmon gum E. salmonophloia which originally

covered an estimated 1460ha. The repetition of wildfires appears to have reduced this area in 1967 and again in March 1977. At the time of this last fire, mature salmon gum trees carried a heavy crop of flower buds but little seed, and regeneration of this species was less than desirable. Although the total extent of recovery in the burnt stands may not be gauged for a year or two, a provisional estimate of the area of surviving salmon gum stands is of the order of 400ha. Of this area, about 250 ha. has been lightly burnt and 150ha. does not appear to have been burnt or damaged by the recent fires (plates 1 and 2). The woodlands of jam (Acacia acuminata) are usually associated with other species, especially E. salmonophloia (plates 3 and 4). After the recent fire in the Reserve, good germination of jam was evident. Although commonly associated with jam, very little sandalwood (Santalum spicatum) now remains in this Reserve. Jam is associated with other species, notably in open woodlands with swamp yate (E. occidentalis) in the valley, in low open woodlands with Casuarina huegeliana on granites and in low woodland with mallee on hilly ridges (plate 5). Jam associations covers some 4850 ha. Neither salmon gum nor jam is present in the Fitzgerald River National Park, the largest reserve (234,315ha) in the district.

A formation of swamp yate woodland is shown by Beard (Figure 3) to reach its finest development in the Phillips River valley, extending from 1km within the reserve to 5km. south of it within vacant crown land, once held as a temporary reserve. If possible, all of this unique stand should be added to the Cocanarup Reserve (Table 4A). This would supplement the rather unusual combination of salmon gum-swamp yate woodland of about 710ha. already in the reserve.

The other common formation in the reserve is low open forest of tall mallee, rich in Eucalyptus species (plate 6, table 5). These are found together with other shrubs and perennial herbs typical of these mallee regions. Several small granite outcrops in the northwestern part of the reserve carry a different vegetation, the species being typical of such outcrops. Granite exposures are rare in the Fitzgerald River National Park. A list of plant species recorded as present on the Reserve is shown in Table 5.

2.6 Fauna

Reconnaissance and trapping during one week in November 1973, by staff of the Department of Fisheries and Wildlife confirmed the presence of the Little Bat (Eptesicus pumilus), the grey kangaroo (Macropus fuliginosus), two species of frogs and fourteen species of reptiles (Tables 6 and 7). The latter include the skinks (Morethia obscura, Hermiergis initialis and Tiliqua occipitalis), all of which are poorly represented in reserves elsewhere. Twenty three species of birds have been recorded from nearby areas (Table 8). A count of 50 emus (Dromaius novaehollandiae) was sighted in woodland and adjoining farm during one reconnaissance.

The Department of Fisheries & Wildlife have recorded a road-kill tammar (Macropus euginii) and the Conservation through Reserve Committee report highlights the presence of this species which occurs here at the eastern extremity of its known range.

Introduced species include the house mouse, rabbit and fox.

Fauna lists will be updated with each subsequent review of this plan. Records of sightings will be kept by the Forests Department patrol officer.

3. Land Management Objectives

The value of the Reserve for conservation of flora and fauna was recognized by the Environmental Protection Authority (E.P.A.) which recommended the Reserve be managed for conservation of flora and fauna and recreation as well as for timber production.

The recommendations of the E.P.A. (detailed in the Introduction) were endorsed by the Forests Department in its General Working Plan No. 87 of 1977 in which the Cocanarup Reserve was listed as having conservation of flora (salmon gum and jam principally) as a primary management objective, and recognising a potential for recreation and tourism.

Taking into account the existing vegetation, the ravaging effects of fire in the past few decades and the local demand for fencing materials the Forests Department multiple use policy can best be applied in this area by recognising a difference in management priorities between the area north of the Ravensthorpe-Albany Road and the area to the south. Land management objectives are then set out for these areas as follows :

1. Southern Area

Management Priority - Conservation of flora and fauna

Compatible Uses
- Recreation, Amenity and Tourism
- Science and Education
- Seed Collection
- Utilisation of standing dead vegetation which has been killed by wildfire under prescriptions designed to avoid damage to resultant regeneration.

Incompatible Uses - provision of gravel supplies
- utilization of healthy forest produce
- widespread open cut mining
- utilization of groundwood
- any other activity which alters the vegetation structure or composition.

Northern Area

Management Priority - regulated utilization of forest produce to favour regeneration.

Compatible Uses - Conservation of flora and fauna
- Recreation Amenity & Tourism
- Seed Collection
- Science & Education
- Restricted gravel provision

Incompatible Uses - Widespread open cut mining
- Utilization methods not used or subsequent regeneration.

The approach adopted to implement multiple land use philosophy by the Forests Department is that the management priority adopted will be favoured by management strategies. Other compatible uses can be practiced where they do not significantly affect the primary purpose.

The management strategies which follow are designed to enhance land management objectives as allocated above.

4. Management Strategies

4.1 Fire Management Strategy

4.1.1 Integration of Fire Management Programme

Fire protection measures for the reserve will be integrated with, and complement, the district fire protection plan for the Fitzgerald River area. This plan involves the integration of fire protection measures to be taken by Brigades, National Parks Authority, Department of Lands & Surveys and the Forests Department. Coordination is being undertaken by the Bush Fires Board (Fig. 5).

4.1.2 Prescribed Burning

(i) Fuel reduction burning will be permitted on buffer strips around the Reserve perimeter, adjacent to public roads, around recreation facilities and around internal private property. These buffer strips will be 200-400 metres in depth (dependent on topography). Local Bushfire Brigades will be encouraged to undertake burning of the buffers in consultation with the Forests Department.

(ii) The internal portion of the Reserve will be burnt on a rotation of 12-15 years. Fuel buildup and vegetation succession will be monitored by the Forests Department in order to fine tune the fire regime to best meet any compromise necessary between hazard reduction requirements and flora conservation objectives. It is not envisaged that the internal portion be burnt in the period of this plan (5 years).

The prescribed burning schedule will be coordinated with the plan for the Fitzgerald River Area (see (i) above).

4.1.3 Provision of Firebreaks

(i) Few adequate firebreaks exist on the Reserve. In order to implement the buffer burning system some 100 kms of firebreak will be constructed. The location of these firebreaks are shown in Plan No. 5.

(ii) A dual firebreak system will be constructed around the Reserve perimeter to facilitate buffer burning. These breaks will be 200-400 metres apart depending on topography although adjacent to the main road the width may be as little as 50 metres.

(iii) In some instances the location of perimeter firebreaks has been extended beyond the reserve boundary and into vacant Crown land in order to :

a) obtain a practical firebreak alignment

b) incorporate good stands of jam and salmon gum into the area to be protected.

(iv) Firebreaks will be constructed to a width of six metres and to a standard which will allow 4x2 vehicle access in summer. Priority for construction will be :

a) perimeter firebreaks

b) firebreaks adjacent to public roads

c) firebreaks adjacent to private property within the reserve.

A sum of $4,900 has been allocated for this purpose in the financial year 1980/81. The remaining work will be programmed in the 1981/82 financial year.

(v) The requirement for maintenance to firebreaks will be monitored by the Forests Department, who will make budgetary provision for this as required to meet the prescribed burning schedule.

4.1.4 Fire Suppression

The Shire of Ravensthorpe will act for the Forests Department in undertaking suppression of wildfires emanating from or entering the Reserve. Where it is possible the Forests Department will assist.

4.2 Access

The current road system includes the main Ravensthorpe-Albany road and the former main road location (now a scenic drive) which passes Loc. 186 and through part of the salmon gum-jam association. A second grade road links Loc. 1863 to C.G. 255 and other areas of Private Property. Many tracks are located in the north-western section and southwards of 1863.

All weather access to the historical farm at Cocanarup spring is to be maintained and all firebreaks are to be trafficable to conventional firefighting vehicles in dry weather. Adequate parking facilities to be provided at the proposed recreation area.

4.3 Conservation of Flora & Fauna

Conservation of flora and fauna is a major management objective for the Reserve particularly in relation to some fine stands of salmon gum and jam which are otherwise poorly conserved ecotypes in this region. Within the context of the multiple land use policy of the Forests Department the objectives of conservation of the local flora and fauna are to be met by the following management strategies.

4.3.1 The primary purpose of the area south of the Ravensthorpe-Albany Road is to be for the conservation of flora and fauna.

4.3.2 Utilization of jam for fencing will be limited to :

a) salvage of fire killed stems

b) cutting of green stems in the northern part of the reserve according to a prescription which will ensure the continuation of the species on any site (see item 4.4.3).

Utilization of firewood or other wood products will be limited to fire killed trees. Groundwood however may only be collected from the northern part of the Reserve. It is to be retained in the southern area for fauna habitat purposes.

4.3.3 The prescribed burning strategy for the internal portion of the reserve will be a compromise between the need to protect adjacent life and property and conservation objectives.

4.3.4 Where it is absolutely necessary for gravel to be removed from the Reserve it will come from the northern portion. The pit and access track will be rehabilitated with native vegetation by the utilizing Authority.

4.4 Timber Utilisation

4.4.1 Sandalwood (Santalum spicatum). In recent years the removal of green sandalwood has not been permitted and this policy will continue. There is however, no objection to the removal of dead sandalwood. The existing control system operating through the Forests Department's Kalgoorlie office will be retained.

During the period of this plan the Forests Department will investigate the feasibility of propogating high oil yielding varieties of sandalwood in this Reserve.

4.4.2 Salmon gum (E. salmonophloia). No cutting of salmon gum is permitted.

4.4.3 Jam (A. acuminata). Jam is currently utilised to supply local fence post needs. One licence is current, two cutters are employed and levels of production 1973-80 are shown in Table 9. The licencee is currently operating on fire killed jam resulting from the March 1976 fire. This will continue until this salvage supply is exhausted, after which green cutting will be permitted in the northern section of the Reserve. Green cutting will be limited to trees greater than 0.75cm diameter at 1.5 metres above the ground. At least 5 trees must be retained in each 20m x 20m quadrat.

4.4.4 Firewood - Green firewood removal is not permitted. Groundwood removal will be permitted only in the area north of the Ravensthorpe-Albany Road. Trees killed by wildfire but still standing may be harvested from all areas under a written Forests Department prescription which provides for protection of any ensuing regeneration.

4.5 Recreation

4.5.1 The portion of the reserve south of the main road is undulating and aesthetically pleasing, particularly in the salmon gum-jam woodland and in areas close to the Phillips River. One or two small picnic/barbecue areas could be established. Details of location, size, facilities, funding and maintenance will require an on-site inspection and discussion with the Shire. Facilities will be provided by the Forests Department on the basis that they be installed and maintained by either the Shire or a local service organisation (e.g. Lions).

Within the reserve on an area of private property is the historical farm (originally owned by Mr. Dunn and now owned and managed by Messrs. M and G Thomas). The farm, its buildings, historical items, household and farm machinery are suitable as a tourist attraction. Dunn's grave (deceased 1980) is adjacent to the farm.

Dunn's gold mine and smelter are located in Water Reserve 13272, 6km north east of Cocanarup. Current access is along a gazetted road which is only suited for four wheel drive vehicles. The large and interesting Fitzgerald River National Park is located to the south of Cocanarup. Long term planning should provide for access to this and other sites to be upgraded as part of an integrated recreation plan for the region developed and promoted through the Shire.

4.6 Disease and Vermin

4.6.1 Disease. The root rot disease known as jarrah dieback Phytophthora Cinnamomi which has ravaged the forests of the south west is not known in the Ravensthorpe Area. However precautions must be taken to ensure it or any other soil borne disease is not inadvertantly introduced.

Earthmoving equipment to be used for development and maintenance works must therefore be certified as clean prior to commencing work in the Reserve. This will be a condition placed in Tender schedules.

4.6.2 Vermin. Because the reserve is unvested Crown Land, vermin control is carried out by the Agricultural Protection Board under a Government Grant provided for this work. The impetus for initiation of this work and for recommending specific constraints rests with the

managing authority (Forests Department). Vermin problems will be noted and reported in the normal course of patrols by the forest officer at Kalgoorlie (See Patrol Checklist, Table 10).

4.7 Other Management

4.7.1 Gravel. Some gravel pits in the past have been excavated for roadworks by the Shire and the Main Roads Department.

Unless good reason to the contrary can be shown any future gravel requirements are to be met from the gravel reserve west of Cocanarup or from private property. Where suitable alternatives do not exist, gravel will be made available from areas north of the Ravensthorpe-Albany Road according to the following conditions :

- pits to be located at least 100m from the road
- topsoil to be stockpiled prior to removal of gravel
- following removal, pits are to have sides battered, debris burnt within the pit, topsoil replaced, the pit ripped at 2 metre intervals to 1 metre depth along the contours and native tree species and/or understorey vegetation replanted or seeded along the ripped lines.
- this rehabilitation requirement will be under the direction of the forest officer at Kalgoorlie and carried out by the Authority using the gravel in time for planting to take place in the first winter following gravel removal.

Gravel pits in the Reserve which were used for construction and maintenance of the Ravensthorpe-Albany Road in the past will be added to a programme of pit rehabilitation carried out on behalf of the Main Roads Department.

4.7.2 Seed. Licences to collect seed and other plant parts are now issued through the Department of Fisheries and Wildlife. The Forests Department will be permitted to collect seed under such licence for Departmental requirements.

Collection of seed by other organisations will be dependent upon obtaining a licence through the Department of Fisheries and Wildlife and permission of the Forests Department. Where permission is granted the collection will take place under written prescription from the forest officer at Kalgoorlie.

5. Possible Additions to the Reserve

The 3820 ha. of vacant crown land to the south of the Cocanarup reserve extends across the valley of the Phillips River. Salmon gum, jam, mallee and an excellent woodland of swamp yate (E. occidentalis) occur in this area. Consideration should be given whether this area should also be reserved, so as to conserve the plant associations, further protect the river and consolidate the management boundaries.

6. Control and Review

Management responsibility rests with the Forests Department who will liaise with the Shire of Ravensthorpe and the Bush Fires Board in all matters relevant to this plan. These two organisations are encouraged to provide feedback on any matters affecting the Reserve in order to amend or modify the plan where this is shown to be necessary. Liaison will also be maintained with the Department of Fisheries and Wildlife and National Parks Authority on matters pertaining to their area of responsibility and on any major changes to the plan.

Ground control for the measures adopted in this plan will be maintained through the Forests Department Office at Kalgoorlie. At each visit the patrolling officer will fill out a Patrol Checklist (Table 10) and will provide data which will be taken into account when reviewing the plan. Specific prescriptions will be required for all approved activities taking place on the reserve. These will be as directed by the Officer in Charge, Forests Department, Kalgoorlie.

This management plan will be formally reviewed in 1985, at which time the views of the Shire of Ravensthorpe, Department of Fisheries and Wildlife, National Parks Board, Bush Fires Board, Public Works Department, Department of Conservation and Environment, W.A. Herbarium and the Department of Mines, will again be sought.

In the long term particularly when the current commitment to jam fence post production has been satisfied, the position of the Forests Department as managing authority should be reviewed. Possibly the Reserve could then be vested in either :

a) the National Parks Board which would allow consolidation of boundaries and management responsibilities, or,

b) the Department of Fisheries & Wildlife because the reserve contains areas of poorly conserved ecotypes (e.g. salmon gum and jam) and because of the presence of Tammar.

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LIST OF TABLES, PLATES AND FIGURES

TABLE 1

AVERAGE MONTHLY AND ANNUAL RAINFALL (mm)

RAVENSTHORPE (Beard 1973)

55 years	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Total
Average	20	23	33	33	44	44	48	43	41	38	38	23	418
Highest	168	179	117	114	119	118	129	137	145	122	105	140	179
Lowest	nil	nil	nil	3	8	16	12	9	7	4	nil	nil	nil
Highest one day	103	63	44	51	63	28	40	40	31	47	53	94	103
Average no. wet days	6	6	7	8	11	13	14	13	11	10	8	5	112

COCANARUP

33 years (Bureau of Meteorology 1962)													
Average (mm)	15	27	24	32	42	40	40	39	38	36	24	23	380

TABLE 2

LANDS DEPARTMENT CLASSIFICATION - COCANARUP RESERVE

2A	Salmon gum, gimlet, jam Loam to sandy loam
2B	Mallee, blue mallee, broombush, ti-tree, moort, banksia, needlebush, claybush. Sand on clay 4" - 12". 40% of 2B in shallow sand (2") on domed clay.
3A	Mallee, blue mallee, broombush, blackboy, banksia. Sand on clay 12" - 36". Sand on gravel 4" - 36".
3B	Blue mallee, banksia, scrub. Sand over 36"
3C	Rock or ironstone
	Scattered box poison throughout entire area

TABLE 3

PLANT FORMATIONS (After Specht 1970)

Life form and height of tallest stratum	Projective Foliage Cover of Tallest Stratum			
	Dense (d) (70-100%)	Mid-dense (m) (30-70%)	Sparse (i) (10-30%)	Very sparse (t) (< 10%)
Trees > 30m	Tall closed forest	Tall open-forest	Tall woodland	Tall open woodland
Trees 10-30m	Closed-forest	Open-forest	Woodland	Open-woodland
Trees 5-10m	Low closed-forest	Low open-forest	Low woodland	Low open-woodland
Shrubs 2-8m	Closed-scrub	Open-scrub	Tall shrubland	Tall open-shrubland
Shrubs 0-2m	Closed-heath	Open-heath	Low shrubland	Low open-shrubland
Hummock grasses	-	-	Hummock grassland	Open-hummock grassland
Herbs (incl. moss, ferns, hemicrptophytes geophytes, therophytes, hydrophytes, hellphytes)	Closed-herbland Closed-tussock grassland	Herbland Tussock grassland	Open-herbland	Ephemeral herbland

Notes : Isolated trees (emergents) may project from the canopy of some communities, e.g. emergent Araucaria, Acacia, or Eucalyptus species.

A tree is defined as a woody plant more than 5m tall, usually with a single stem.

A shrub is a woody plant less than 8m tall, frequently with many stems arising at or near the base.

PLANT ASSOCIATIONS AND FORMATIONS TABLE 4

COCANARUP RESERVE

Area (ha)	Formation		Plant Association	Soil Types
	Specht	Beard		
	TREES ABOVE 10m			
1460	Medium open forest	e_8Mc	E. salmonophloia A. acuminata	Brown clay loam on bottomland and gentle slopes
710	Medium woodland	e_7Mi	E. occidentalis E. salmonophloia A. acuminata	Heavy loam or clay on valleys and terraces
710	Medium open woodland	e_7Mr aSi	E. occidentalis A. acuminata	Silty loam on lower slopes and depressions.
	TREES 5-10m			
1630	Low open forest	eLc	E. gracilis E. oleosa E. annulata E. spathulata E. gardneri E. nutans	Loam over clay on sideslopes
820	Low woodland	eLi aSi eLSc	E. oleosa E. flocktoniae A. acuminata	Sandy loam over clay on side slopes
1150	Low open woodland	cLSi	C. huegeliana A. acuminata	Loamy sand or sandy loam.
	SHRUBS 2-8m			
168	Open scrub	eSc	E. anceps E. ovularis E. redunca E. uncinata	Shallow sandy clay on hilly ridges and steep gullies
80	Tall shrubland	eSZc	E. tetragona E. incrassata E. foecunda	Sand on gravel lateritic soils
	SHRUBS UNDER 2m			
720	Open heath	mSc	Melaleuca spp. C. campestris	Sand on clay.
1540	Lithic complex	xXZi	Lichens (Boryanitida) and Dwarf shrubs	Rock or ironstone and shallow sand.
	Mosaic of open and lithic complex	SXZ	Lithic complex and heath	
TOTAL 8988				

TABLE 4A

PLANT ASSOCIATIONS AND FORMATIONS

TEMPORARY RESERVE

Area (ha)	Formation Specht	Beard	Plant Association	Soil Types
	TREES ABOVE 10m			
28	Medium open forest	e_8Mc	E. salmonophloia A. acuminata	Brown clay loam on bottomland and gentle slopes.
862	Medium woodland	e_7Mi	E. occidentalis E. salmonophloia A. acuminata	Heavy loam or clay on valley and terraces
	Medium open woodland	e_7Mr aSi	E. occidentalis A. acuminata	Silty loam on lower slopes and depressions.
	TREES 5-10m			
1390	Low open forest	eLc	E. gracilis E. oleosa E. annulata E. spathulata E. gardneri E. nutans	Loam over clay on sideslopes
1540	Low woodland	eLi aSi eLSc	E. oleosa E. flocktoniae A. acuminata	Sandy loam over clay on side-slopes
	Low open woodland	cLSi	C. huegeliana A. acuminata	Loamy sand or sandy loam
	SHRUBS 2-8m			
	Open scrub	eSc	E. anceps E. ovularis E. redunca E. uncinata	Shallow sandy clay loam on hilly ridges and steep gullies
	Tall shrubland	eSZc	E. tetragona E. incrassata E. foecunda	Sand on gravel lateritic soils
	SHRUBS UNDER 2m			
	Open heath	mSc	Melaleuca spp. C. campestris	Sand on clay
	Lithic complex	xXZi	Lichens (Boryanitida) and Dwarf shrubs	Rock or ironstone and shallow sand.
	(Mosaic of open (heath and lithic (complex	SXZ	Lithic complex and heath	
TOTAL 3820				

TABLE 5

FLORA SPECIES RECORDED BY R. EDMISTON - COCANARUP RESERVE, PHILLIPS RIVER

November 1973 (* = specimens identified by W.A. Herbarium)

* Acacia affin. sulcata
* " acuminata
* " glaucoptera
* Astartea fascicularis
* Beyeria leshenaultii
* Billardiera lehmanniana
Borya nitida
Callistemon phoeniceus
* Calothamnus quadrifidus
* Calytrix brachyphylla
* " tetragona
* Cassytha melantha
* Casuarina campestris
" huegeliana
* Cheiranthera filifolia
* Daviesia chrdophylla
* " pachyphylla
* Eremophila decipiens
* Eucalyptus anceps
" annulata
" calycogona
* " foecunda
" gracilis
" incrassata
" loxophleba
" longicornis
" nutans
" occidentalis
* " oleosa
* " ovularis
" platypus
" redunca
" salmonophloia

Eucalyptus spathulata
" tetragona
" uncinata
* Gahnia decomposita
* Gastrolobium hookeri
Grevillea pauciflora
* Guichenotia ledifolia
* Hakea commutata
" erinaceae
" incrassata
* " marginata
* " verrucosa
* Halgania lavandulacea
* Hibbertia gracilipes
* Jacksonia sp.
* Lepidosperma resinosum
* " tubercalatum
Leptospermum ellipticum
" spinescens
* Melaleuca (cuticularis)
" elliptica
* " pentagona
* " scabra
* " sp.
" uncinata
* " viminea
* Microcorys exserta
* Mirbelia ovata
* Olearia muelleri
Oxylobium parviflorum
Petrophile (divaricata)
* Phyllanthus calycinus
* Prostanthera campbellii
* Santalum acuminatum
" spicatum
* Templetonia retusa
* Thryptomene australis
* Verticordia pennigera
* Wilsonia humilis

TABLE 6

PHILLIPS RIVER - FROGS AND REPTILES

NOVEMBER 1973

LEPTODACTYLIDAE

- Litoria cyclorhyncha
- Crinia sp.

GEKKONIDAE

- Phyllodactylus marmoratus
- Crenadactylus ocellatus
- Phyllurus milii
- Diplodactylus vittatus

AGAMIDAE

- Amphibolurus ornatus
- Amphibolurus maculatus griseus
- Amphibolurus barbatus minor

SCINCIDAE

- Morethia obscura
- Hemiergis peronii
- Hemiergis initialis
- Lerista distinguenda
- Tiliqua occipitalis

ELAPIDAE

- Damansia affinis
- Denisonia gouldii

TABLE 7

PHILLIPS RIVER MAMMAL LIST

NOVEMBER 1973

NATIVE	
Grey Kangaroo	*Macropus fuligenosus*
Little Bat	*Eptesicus pumilus*
INTRODUCED	
House Mouse	*Mus musculus*
European rabbit	*Oryctolagus cuniculus*
European fox	*Vulpes vulpes*

TABLE 8

KENT RIVER BIRD LIST

NOVEMBER 1973

Emu	*Dromaius novaehollandiae*
Brown Hawk	*Falco berigora*
Common bronzewing	*Phaps chalcoptera*
White-tailed Black-Cockatoo	*Calyptorphyncus baudini*
Western Rosella	*Platycerus icterotis*
Port Lincoln Parrot	*Barnardius zonarius*
Kookaburra	*Dacela gigas*
Australian pippit	*Anthus novaeseelandiae*
Black-faced Cuckoo-Shrike	*Coracina novaehollandiae*
Broad-tailed Thornbill	*Acanthiza apicalis*
Yellow-rumped Thornbill	*Acathiza chrysorrhoa*
Red-capped Robin	*Petroica goodenovii*
Grey Fantail	*Rhipidura fuliginosa*
Restless Flycatcher	*Seisura inquieta*
Golden Whistler	*Pachycephala pectoralis*
Yellow-rumped Pardalote	*Pardalotus zanthopygus*
Purple-gaped Honeyeater	*Meliphaga cratitua*
White-naped Honeyeater	*Melithreptus lunatus*
Tawny-crowned Honeyeater	*Gliciphila melanops*
Black-faced Wood Swallow	*Artamus cinereus*
Grey Currawong	*Strepera versicolor*
Western Magpie	*Gymnorhina dorsalis*
Australian Raven	*Corvus coronoides*

TABLE 9

PRODUCTION OF JAM POSTS FROM COCANARUP RESERVE

Year Ending June	No. of Jam Posts	
1973	14,620	
1974	14,680	
1975	10,200	
1976	14,832	
1977	10,000	(6,000 fire killed (4,000 green January - October
1978	12,149	(fire killed)
1979	12,069	(fire killed)
1980	13,000	(fire killed)

TABLE 10

PATROL CHECKLIST

DATE .....

DETAILS	CHECK CARRIED OUT	COMMENTS
1) BUSH OPERATIONS A) MINING TIMBER B) FENCE POSTS C) FIREWOOD D) SANDALWOOD		
2) FOREST OFFENCES		
3) VERMIN & DISEASE		
4) ACCESS		
5) FIRE		
6) LIAISON A) OTHER GOVT. DEPTS. B) LOCAL GOVT. C) OTHER BODIES D) MISCELLANEOUS (Inc. unusual species of Flora and Fauna and matters contrary to the management plan of the area.)		---------- FOREST OFFICER

Salmon Gum Woodland
(E. salmonophloia)

Plate 1. Before 1977 Wildfire

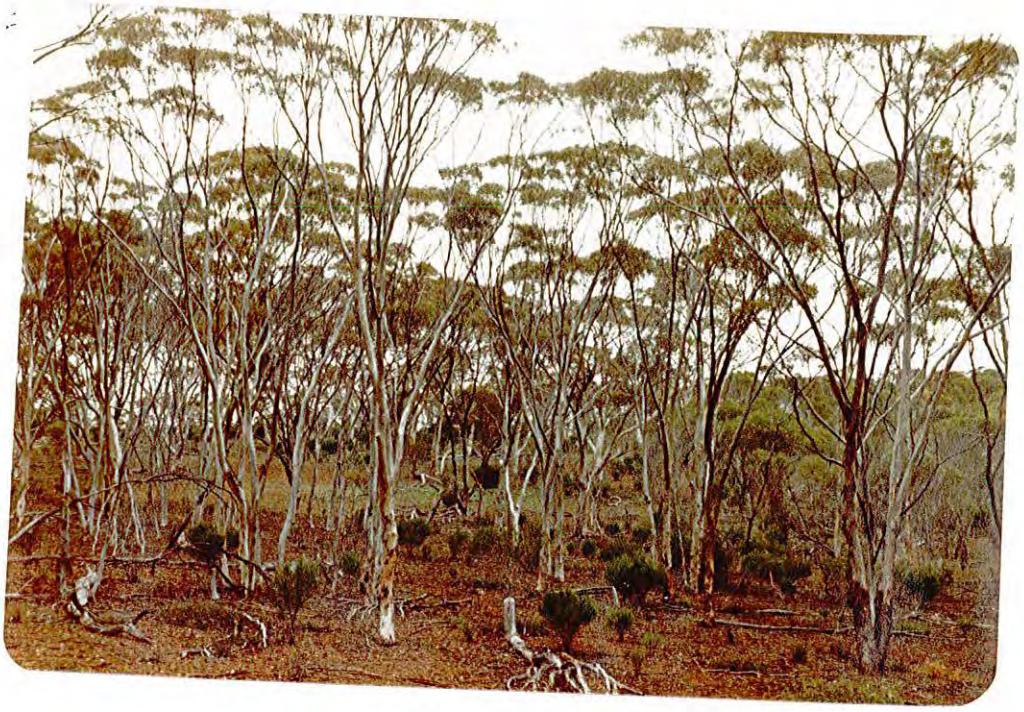


Plate 2. After 1977 Wildfire

Jam thicket (A. acuminata)

Plate 3. Before wildfire

Plate 4. After wildfire

Mallee eucalyptus and jam

Plate 5. Before wildfire

Plate 6. After wildfire

Open Woodland and Scrub (Unburnt)

Plate 7.

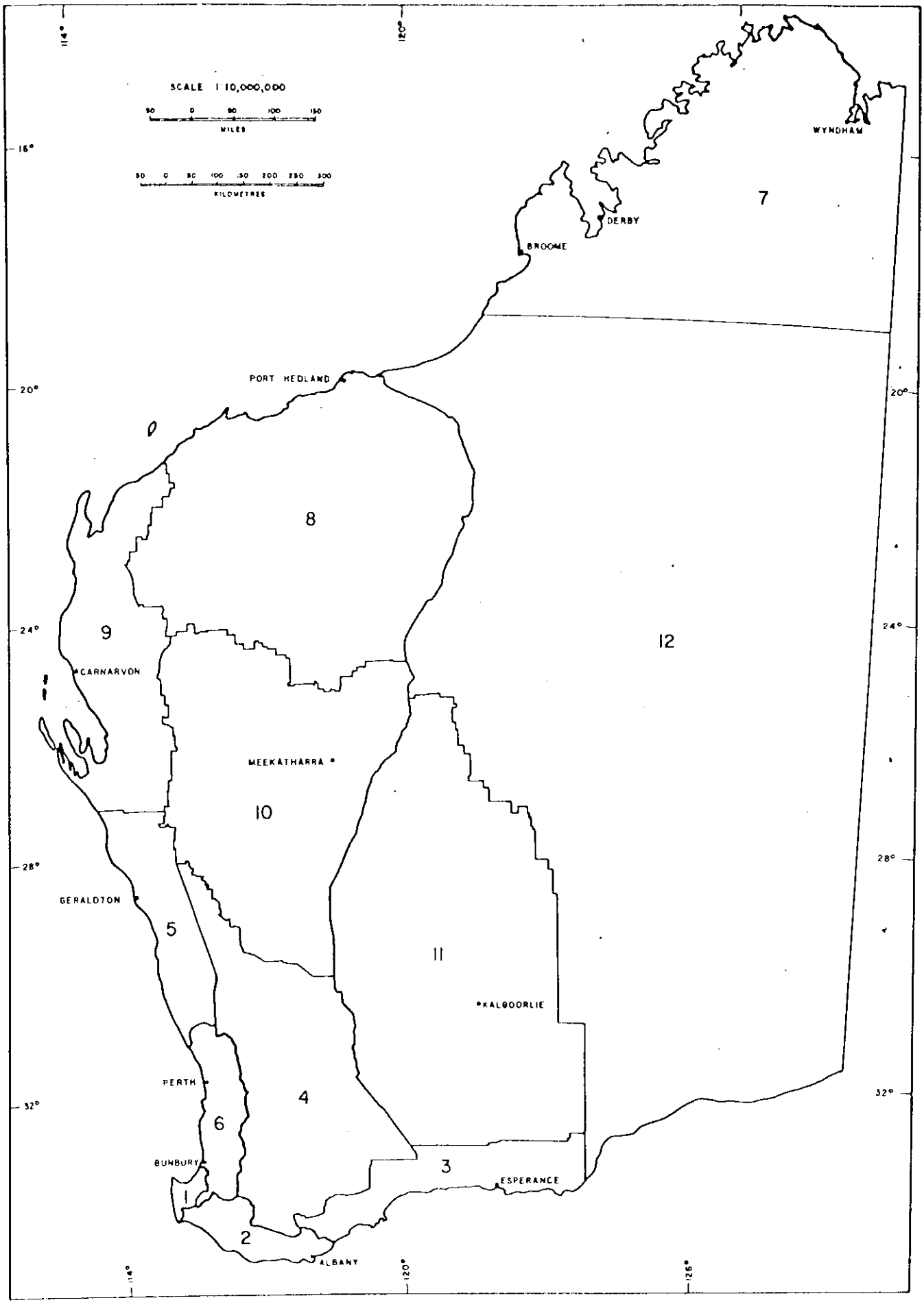


Figure 1.1 Systems

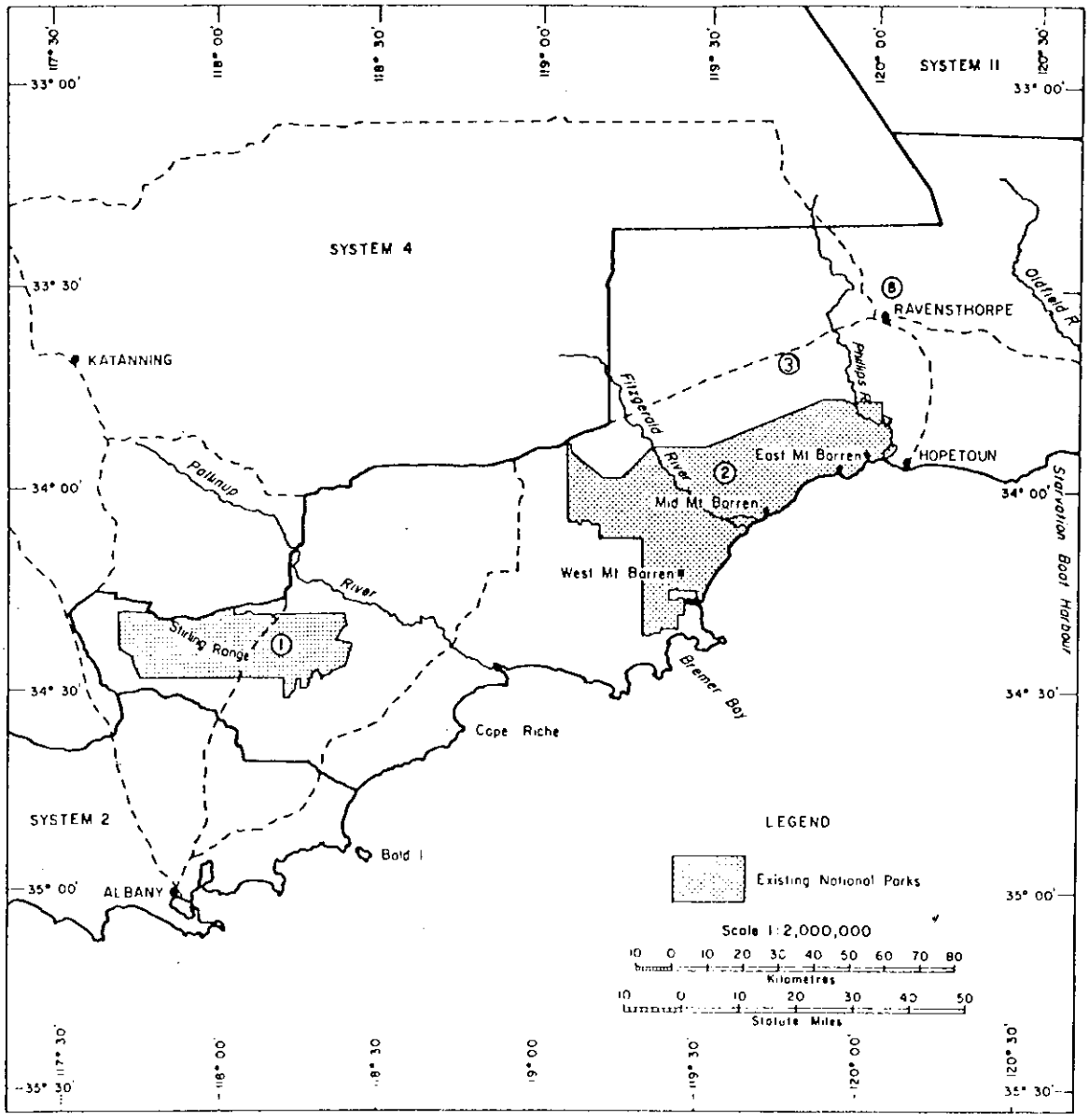


Figure 1.2 System map. Circled numbers denote areas discussed, location of Cocanarup Reserve shown as area 3. See also Figure 1.3

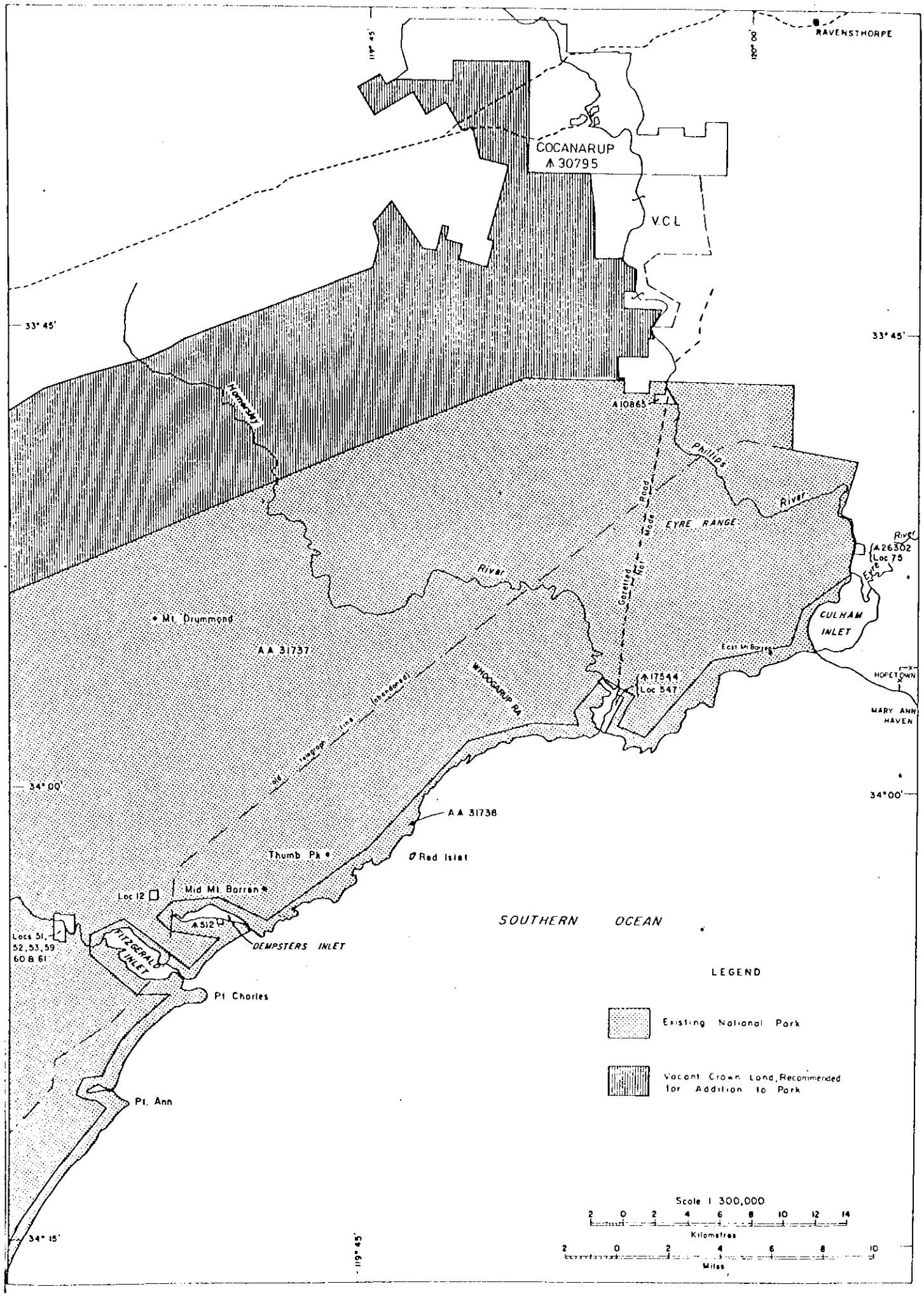


Figure 1.3 Cocanarup Reserve (30795) across Phillips River valley.

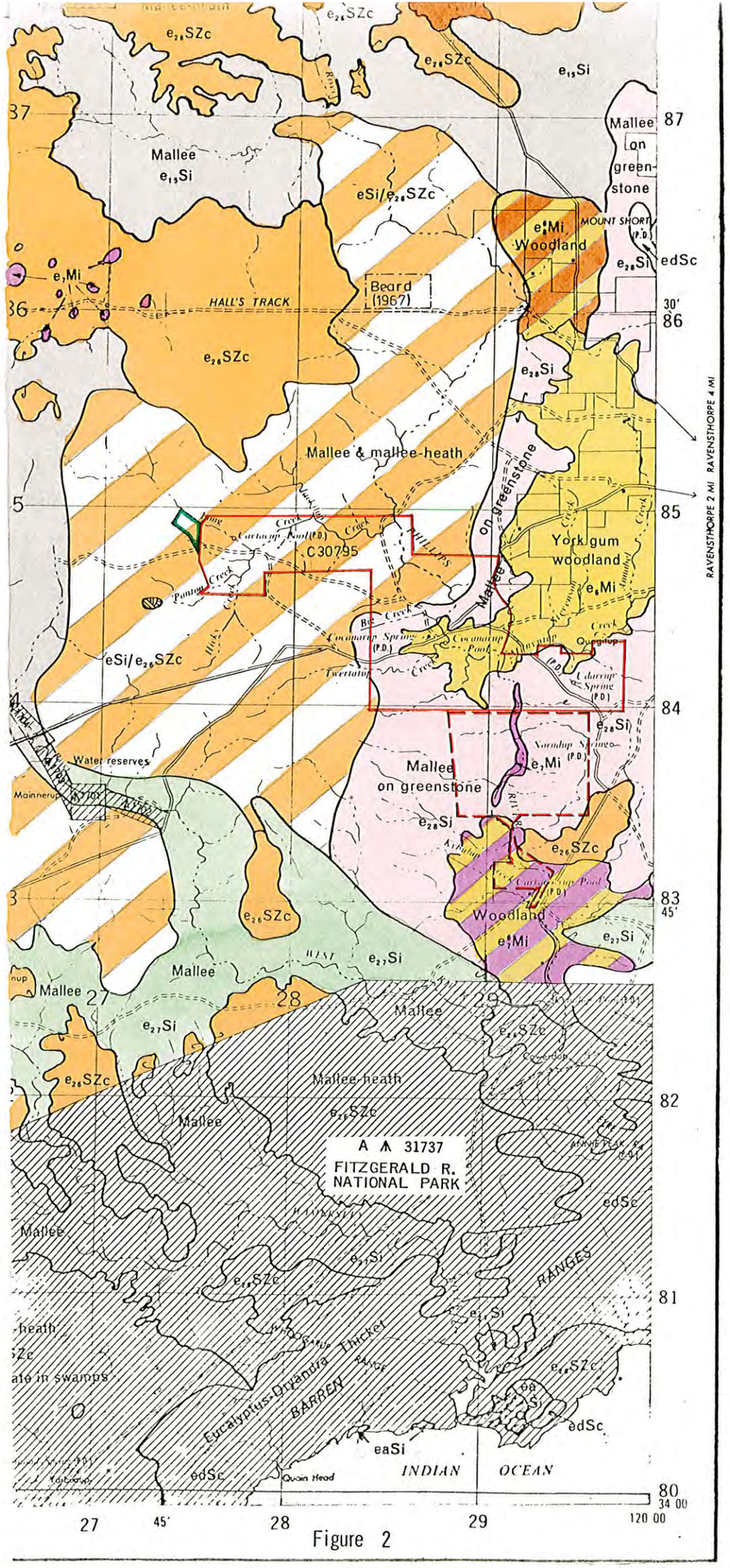


Figure 2

KEY

Shrublands

xSZc	Scrub heath *Mixed Proteaceae—Myrtaceae*
e_{24}SZc	Mallee-heath *Eucalyptus tetragona community*
e_{15}Si	Mallee on lateritic soil *E. eremophila—E. oleosa association*
e_{27}Si	Mallee on granite loam *E. redunca—E. uncinata association*
e_{28}Si	Mallee on greenstone *E. nutans—E. gardneri association*
eaSi	Coastal scrub on driftsand *E. angulosa—Acacia spp. assocation*
m_1Si	Boree scrub *Melaleuca thyoides community*
m_2Si	Paperbark scrub *Melaleuca parviflora community*
edSc	Barren Ranges thicket *E. preissiana—Dryandra quercifolia association*

Woodlands

e_6Mi	York gum *Eucalyptus loxophleba*
e_7Mi	Yate *Eucalyptus occidentalis*
e_8Mi	Salmon gum *Eucalyptus salmonophloia*
e^{s}_{8}Mi	Mixed woodland in lakes country *E. salmonophloia, E. longicornis, E. salubris, E. kondininensis*

Mosaic Units

eSi/e_7Mi eSi/e^{s}_{8}Mi	Mallee with small patches of woodland
eSi/e_{26}SZc	Mallee & mallee-heath

Granite rock

Salt lake

Drift sand

Crown Reserve

Area interpreted by Beard (1967)

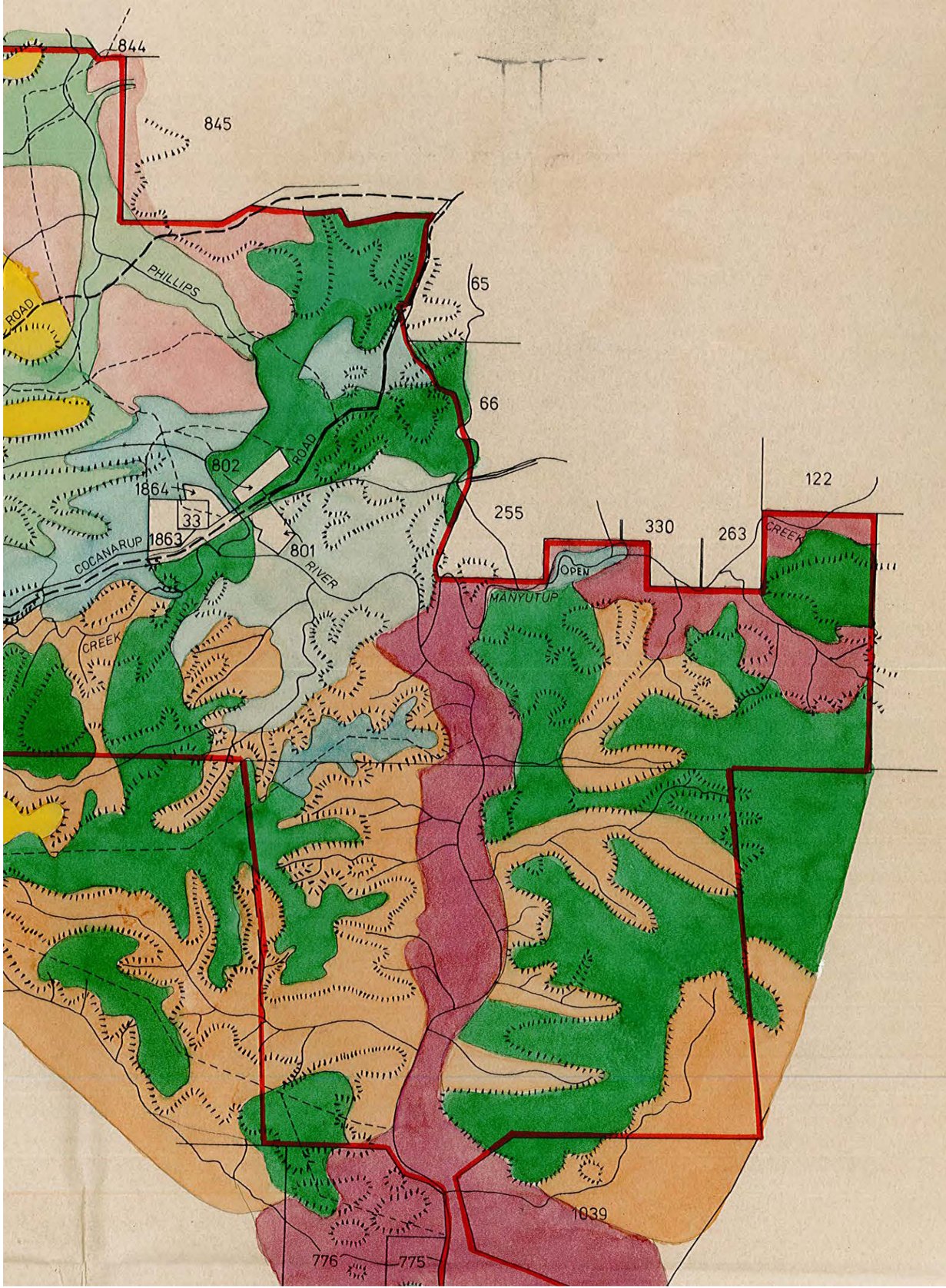
Cocanarup Reserve C30795

Previous Tempy Reserve

Proposed for release

NEWDEGATE
VEGETATION MAP
SHEET SI 50-8
BEARD 1972

Scale 1: 250000



PLANT ASSOCIATIONS AND FORMATIONS IN RAVENSTHORPE AND JERRAMUNGUP VEGETATION SYSTEMS

Colour Code	Formation		Plant Association	Soil Types
	Specht	Beard		
	TREES ABOVE 10m			
	Medium open forest	e_8Mc	E. salmonophloia A. acuminata	Brown clay loam on bottomland and gentle slopes.
	Medium woodland	e_7Mi	E. occidentalis E. salmonophloia A. acuminata	Heavy loam or clay on valleys and terraces.
	Medium open woodland	e_7Mr aSi	E. occidentalis A. acuminata	Silty loam on lower slopes and depressions.
	TREES 5 - 10m			
	Low open forest	eLc	E. gracilis E. oleosa E. annulata - E. spathulata E. gardneri - E. nutans	Loam over clay on sideslopes.
	Low woodland	eLi aSi eLSc	E. oleosa - E. flocktoniae A. acuminata	Sandy loam over clay on side-slopes.
	Low open woodland	cLSi	C. huegeliana - A. acuminata	Loamy sand or sandy loam.
	SHRUBS 2 - 8m			
	Open scrub	eSc	E. anceps - E. ovularis E. redunca - E. uncinata	Shallow sandy clay loam on hilly ridges and steep gullies.
	Tall shrubland	eSZc	E. tetragona - E. incrassata E. foecunda	Sand on gravel lateritic soils.
	SHRUBS UNDER 2m			
	Open heath	mSc	Melaleuca spp. - C. campestris	Sand on clay.
	Lithic complex	xXZi	Lichens (Boryanitida) and Dwarf shrubs	Rock or ironstone and shallow sand.
	Mosaic of open heath and lithic complex	SXZ	Lithic complex and heath.	

FIG. 3

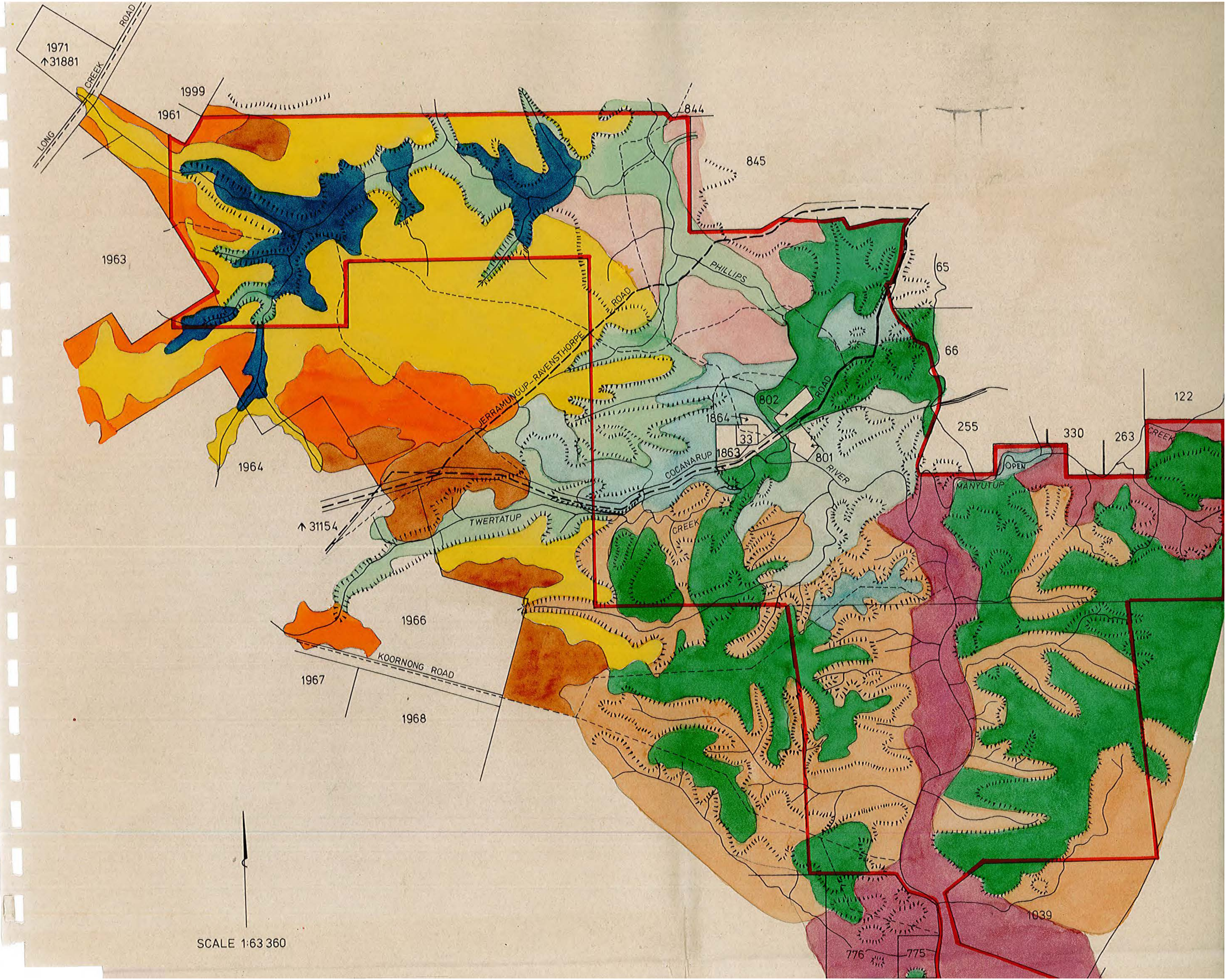

1971
↑31881
LONG CREEK ROAD
1999
1961
844
845
1963
PHILLIPS ROAD
65
66
JERRAMUNGUP-RAVENSTHORPE ROAD
802
ROAD
122
1864
33
255
330
263
CREEK
1863
801
COCANARUP
RIVER
OPEN
MANYUTUP
1964
↑31154
TWERTATUP
CREEK
1966
KOORNONG ROAD
1967
1968
1039
776
775
SCALE 1:63 360

FIG. 4

COCANARUP RESERVE

SCALE 1 : 63360

KEY

LAND ACT RESERVE

PRIVATE PROPERTY

LEASEHOLD PROPERTY

VACANT CROWN LAND

↑ 30795
COCANARUP
TIMBER RESERVE

SCALE 1:50 000

PUBLIC PLAN 420/80
TOPOGRAPHICAL DETAIL
COMPILED FROM DEC. 70 PHOTO'S
CAF 174. RUNS 5&6

Existing Bush Fires Board firebreaks

Proposed 6 metre firebreaks to be constructed

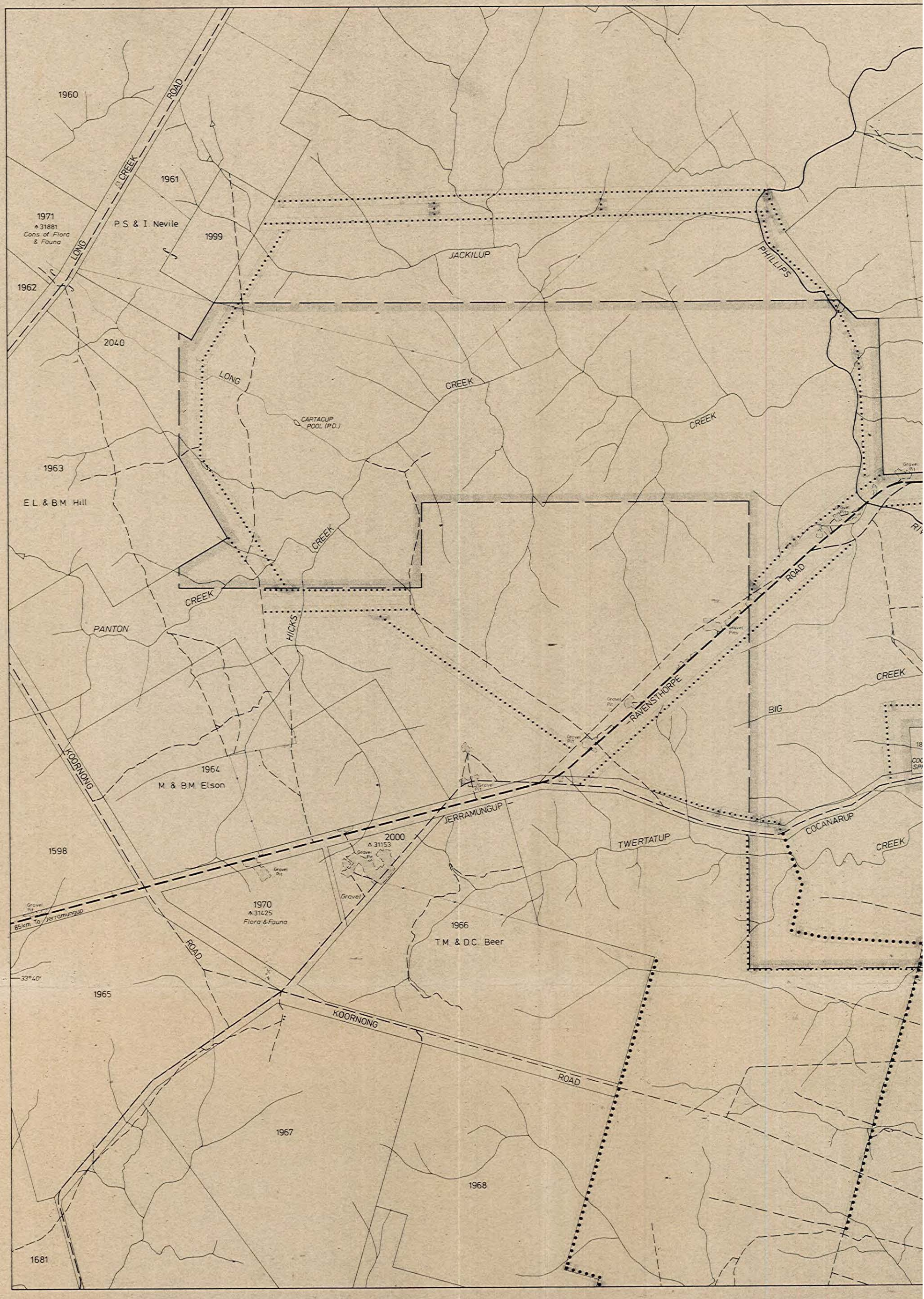
842
849
918
843
846
844
D.R. Thomas
845
R.H.H. Davis
850
M-L 257
M-L 206
M-L 259
M-L 258
A. Anderton
M-L 43
614
D.R. Thomas
65
M-L 270
70
69
113
649
621
138
810
A 32303
Gov't Reg'ts
66
67
122
802
1864
33
1863
801
G. Thomas
P.H. Metz
A.G. Zecca
255
330
263
M-L 338
R.A. & D.M. Krygger
811
A.C. Carmichael
614
UDARRUP SPRING (P.D.)

8km. To Ravensthorpe
ROAD
THOMAS
RAVENSTHORPE
JERRAMUNGUP
RIVER
CREEK
ROAD
MANYUTUP
COCANARUP SPRING (P.D.)
COCANARUP
CREEK
STEVENSON
CREEK
MANYUTUP
PHILLIPS
RIVER
Dam
Gravel Pit

119°50'
33°40'

F.D. 1552 A

PWT
D.A.T FEB 80


1960
LONG CREEK ROAD
1961
1971
A 31881
Cons. of Flora & Fauna
P S & I Nevile
1999
JACKILUP
PHILLIPS
1962
2040
LONG CREEK
CREEK
CARTACUP POOL (P.D.)
1963
E L & B M Hill
CREEK
CREEK
PANTON
HICKS
ROAD
CREEK
RAVENSTHORPE
Gravel Pit
BIG
KOORNONG
1964
M & B M Elson
JERRAMUNGUP
COCANARUP
2000
A 31153
TWERTATUP
CREEK
1598
Gravel Pit
Gravel
1970
A 31425
Flora & Fauna
85 km To Jerramungup
1966
T M & D C Beer
ROAD
33°40'
1965
KOORNONG
ROAD
1967
1968
1681