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WEST. AUST. NAT. RESERVE MANAGE. PLAN SUPPLEMENT No. 1 (DRAFT)

BEEKEEPING ON THE NATURE RESERVES OF WESTERN AUSTRALIA

by

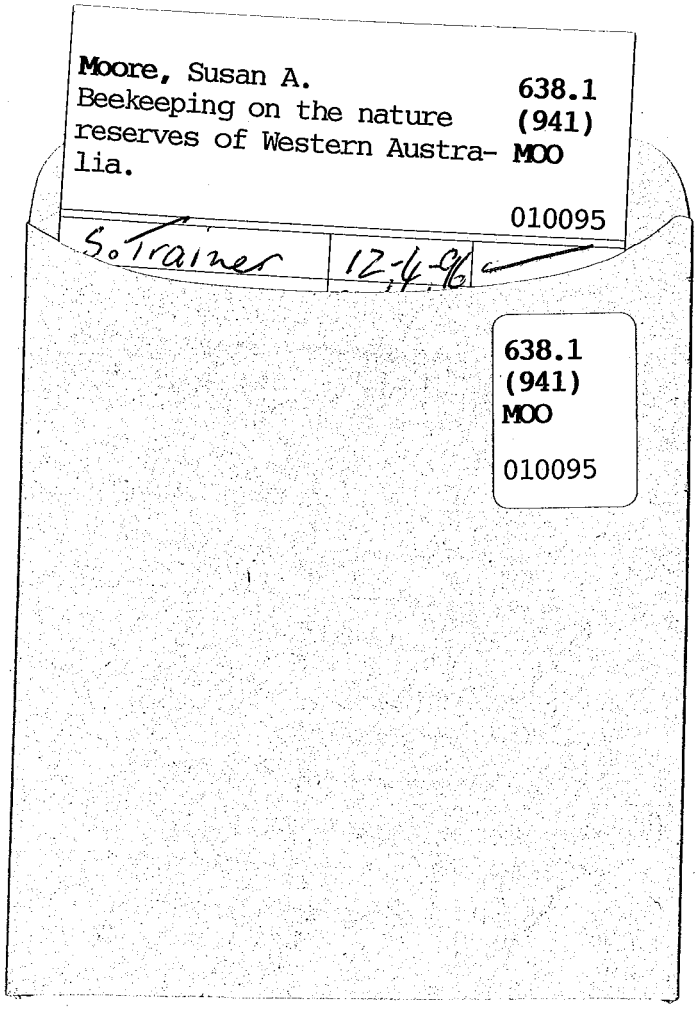
SUSAN A. MOORE

ANDREW A.E. WILLIAMS

and

IAN G. CROOK

HERIES AND WILDLIFE 1983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WESTERN AUSTRALIAN NATURE RESERVE MANAGEMENT PLAN

SUPPLEMENT NO. 1 (DRAFT)

BEEKEEPING ON THE NATURE RESERVES OF WESTERN AUSTRALIA

BY

SUSAN A. MOORE, ANDREW A.E. WILLIAMS

IAN G. CROOK

Western Australian Wildlife Research Centre,
P.O. Box 51, Wanneroo 6065

Department of Fisheries and Wildlife
108 Adelaide Terrace
PERTH 6000

1983

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PART A . INTRODUCTION

1. Preamble

This document has been produced to provide a comprehensive rationale for beekeeping on the nature reserves of Western Australia, according to the policy adopted by the Western Australian Wildlife Authority (WAWA) on May 25 1981. The relevant WAWA policies are outlined in Section 2 of this introduction and are further discussed in PART B.

A nature reserve is an area of Crown land set aside under the provisions of the Land Act (1933) for the conservation of flora or fauna or both. These reserves are managed in accordance with the Wildlife Conservation Act (1950 as amended) and the majority are vested in WAWA.

2. Policy of WAWA on beekeeping

The WAWA adopted the following policy on the use of nature reserves for beekeeping on 25 May 1981.

The placing of hives of bees on nature reserves will be permitted provided:

(i) the nature reserve falls within the geographical area of the State where feral bees are already present.

(ii) the nature reserve is greater than 500 ha in size.

(iii) the particular area within the nature reserve has not been specifically excluded from use by the beekeeping industry in accordance with a specific management decision by the Authority.

(iv) the particular area within the nature reserve is one in which the siting of hives is unlikely to inconvenience or endanger the public.

The "geographical area of the State where feral bees are already present" has been defined by WAWA as that area in which feral bees occur consistently in average or high concentrations. The area has been delineated by A.C. Kessell (Senior Apiarist, Department of Agriculture, Western Australia) and is shown as Area 1 in Figure 1.

To the east of this zone, feral bees may occur in low concentrations and in odd patches depending on seasonal conditions and the availability of fresh water (Area 2 in Fig. 1). In excluding beekeeping from this area the Authority has recognised the dual need to:

(i) not extend the range of feral bees or facilitate interbreeding of existing strains of feral bees with more modern ones; and

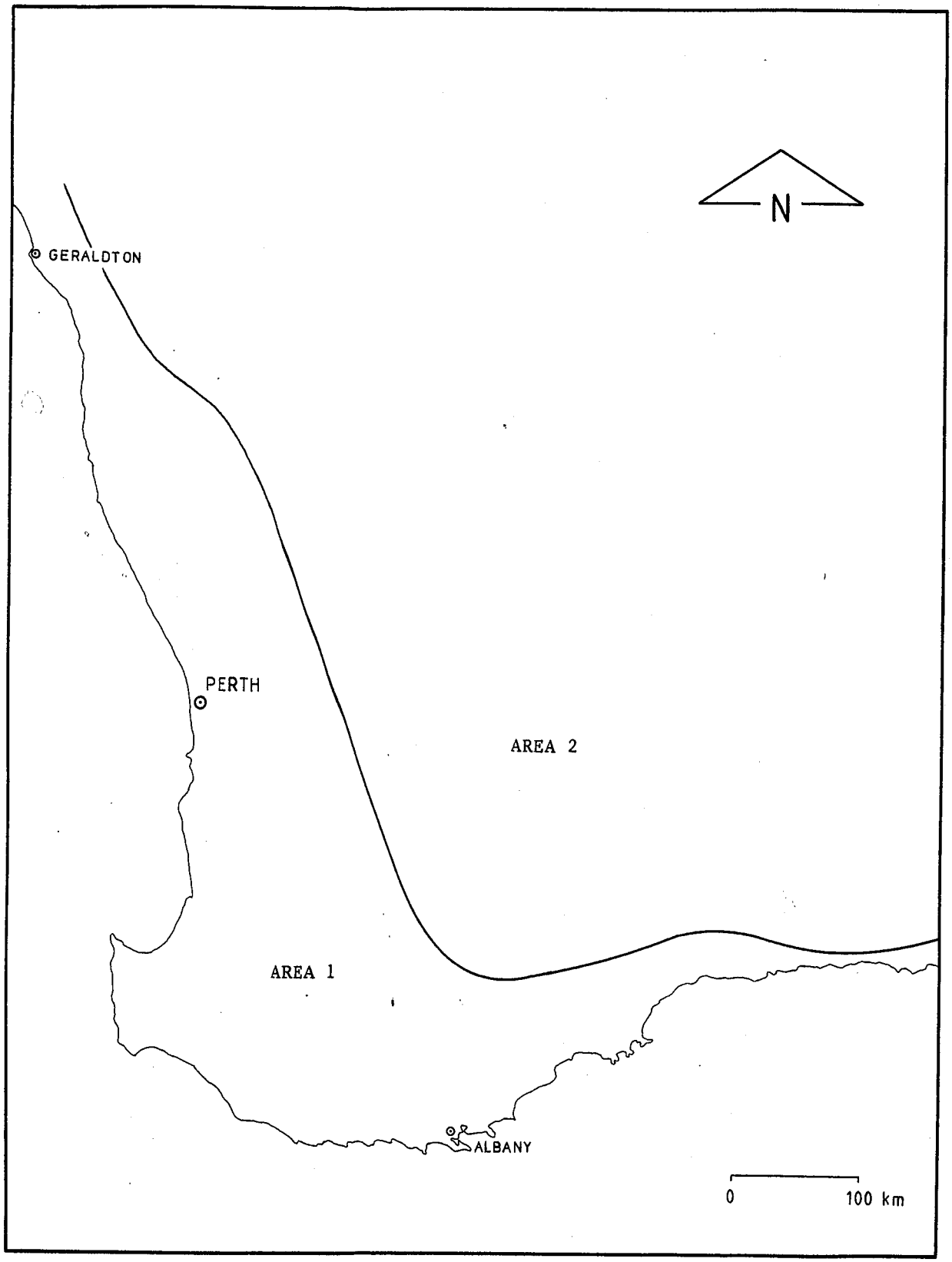


Figure 1. South-west of Western Australia showing the region ("Area 1") in which "...feral bees are already present".

(ii) not introduce hive bees to areas where feral bees are absent or in low concentrations, on the grounds that periods of superabundance of (and therefore low levels of competition for) nectar may be important features of the ecology of nectivorous species of the native fauna.

3. Current Distibution of Apiary Sites on Nature Reserves

Of the 31 WAWA nature reserves on which beekeeping is to be allowed (PART C) seven have existing apiary sites. The location of many of these however, does not comply with Authority policy.

Of the 25 WAWA vested nature reserves from which beekeeping will be excluded (PART B) five have existing apiary sites (Table 1) . In future, according to WAWA policy, beekeeping will be excluded from these reserves.

There are nine nature reserves not vested in WAWA which are used for beekeeping (App. IV) . Existing WAWA policy applies only to vested reserves.

This document is composed of four parts; the remaining three being divided as follows:

PART B deals with the 25 WAWA vested nature reserves over 500 ha in "Area 1" (Fig. 1) from which beekeeping will be excluded in accordance with WAWA policy (App. I).

PART C deals with the 31 WAWA vested nature reserves available for beekeeping in accordance with WAWA policy (App. II).

PART D deals with the five WAWA vested nature reserves under 500 ha which are presently being used for beekeeping and from which, according to WAWA policy, beekeeping will be excluded in the future (App. III).

TABLE 1. PERMIT NUMBERS AND EXPIRY DATES FOR APIARY SITES LOCATED ON NATURE RESERVES GREATER THAN 500 HA FROM WHICH BEEKEEPING WILL BE EXCLUDED

Reserve No.	Reserve Name	Apiary Site Permit Numbers	Apiary Site Permit Expiry Date
27886	South Eneabba*	3048	31.1.83
		3264	31.5.83
28558	Namming*	4819	28.2.83
		1422	31.3.83
		1428	30.4.83
		2304	30.11.82
		1311	31.10.83
31030	South Eneabba*	3523	30.6.83
		3524	30.6.83
		3051	31.1.83
		4952	30.6.83
		4854	30.6.83
31754	Cheadanup	3997	31.3.83
		3991	31.3.83
		3988	31.3.83
		3994	31.3.83
34442	Dobaderry*	2653	30.6.83
		1885	30.6.83

*Approved reserve name

PART B. NATURE RESERVES FROM WHICH BEEKEEPING IS TO BE EXCLUDED

Nature reserves other than those in Area 1 of Figure 1 are excluded from use for beekeeping. Of those nature reserves in Area 1 all those less than 500 ha are excluded from beekeeping. Of the 56 WAWA vested nature reserves greater than 500 ha in Area 1, 25 have been excluded from use for beekeeping by virtue of specific management decisions in accordance with items (iii) and (iv) of WAWA policy (PART A-Section 2). Appendix 1 lists the 25 nature reserves and indicates the information upon which the exclusion decision was based.

Grounds identified by WAWA upon which specific management decisions have been made to limit beekeeping activities on nature reserves are as follows:

1. Minimising the risk of dieback (Phytophthora cinnamomi) infection.

   Movement of vehicles on nature reserves in high rainfall areas (ie. areas receiving greater than 800 mm per annum) may lead to the spread of dieback. The recent confirmation of dieback in several areas of Two Peoples Bay Nature Reserve emphasises the potential problem. Therefore nature reserves in parts of the State with an annual rainfall greater than 800 mm have been excluded from beekeeping.

   The threat of dieback infection is also present in areas with a yearly rainfall less than 800 mm. In the interests of minimising dieback spread the movement of vehicles onto reserves and into the body of reserves should be discouraged. Where granted, any apiary site on a nature reserve receiving less than 800 mm will be limited to areas adjacent to made access routes (formed roads) or to the margins of the reserve.

2. Presence of nectivorous and pollenivorous fauna.

   Beekeeping has been excluded from nature reserves with major communities of nectivorous species as hive bees out-compete native species for nectar and pollen. The exceptionally efficient foraging ability of introduced honeybees, compared to native pollinators, is a result of:

   (i) their greater tolerance of low temperature, enabling them to reach nectar sources earlier in the day than native insects and during more days of the year;

   (ii) their extraordinary communication system, which enables them to exploit nectar sources rapidly and in concentrated numbers;

(iii) their longer proboscis, which enable them to exploit deep flowers which are normally bird pollinated, thus robbing honeyeaters of their food supply;

(iv) their aggressive behaviour, their large individual size and sheer weight of numbers when given the advantage of man-made shelters and favourable siting (Matthews 1982) .

3. Presence of gazetted rare flora and flora of outstanding interest

Beekeeping has been excluded from nature reserves containing gazetted rare flora or flora of outstanding interest or both. The reasons for this are threefold. First, introduced honeybees may be responsible for inefficient pollination. This is brought about by: the bee not positioning itself properly on the flower such that it fails to pick up pollen and deposit it on the stigma; the bee making successive visits to flowers of the same plant, rather than darting from plant to plant after visiting just one or two flowers on each, this means that where plants are self incompatible, most bee visits are ineffective for pollination; the bee damaging flowers when extracting nectar (Matthews 1982).

Second, bee feeding strategy may lead to hybridisation. This would be expected to occur where plants and their pollinators have evolved together such that the plant relies mainly on oligolecty (faithfulness) in its pollinator to maintain reproductive isolation from other related plant species (Armstrong 1979). At least one instance of hybridisation due to honeyeaters has been recorded (Hopper 1980) and others are suspected (Pyke and Balzer 1982; Scheltema 1982).

Third, it appears that in high concentrations hive bees can virtually denude native flowers of their pollen. This can result in a reduced capacity for reproduction (Hopper 1982, per.comm.) .

Current knowledge is not sufficient for final statements to be made on the existence of similar qualities in some of the other reserves concerned. Provision should be retained to rescind apiary site permits on these reserves if and when evidence of especially high biological values is obtained.

4. Scientific research and other public use

Reserves which are important as sites of continuing ecological research are also excluded from beekeeping (App. I) . In accordance with Item (iv) of the WAWA policy on beekeeping, reserves important for public use and environmental education are also excluded (App. I) .

PART C. NATURE RESERVES AVAILABLE FOR BEEKEEPING.

This part deals with the management, in relation to the establishment and maintenance of apiary sites, of those reserves which have not been specifically excluded from beekeeping (App. II, Fig. 2) .

The 31 nature reserves involved have been inspected and a set of criteria applied to determine suitabilities for beekeeping. Before the suitability criteria were applied WAWA policy regarding access was taken into account. This policy (PART B) limits apiary site allocation to areas adjacent to formed roads or to the margins of the reserve concerned. This limitation aims to minimise dieback infection in, and environmental damage of, the reserve and at the same time minimise the need to police apiary sites.

The suitabilities for beekeeping of certain parts of a reserve are generally based on three criteria:

(i) degree of seasonal wetness

(ii) density of understorey

(iii) ease of access

(i) degree of seasonal wetness-

As mentioned previously vehicular movement through wet and low lying areas increases the chance of spreading dieback (Phytophthora cinnamomi). In addition heavy conditions on firebreaks results in people leaving the firebreak and driving around the wet areas. This will lead to vegetation damage and an increase in the susceptibility to erosion of the reserve.

(ii) density of understorey

If the understorey is dense apiary site establishment will lead to significant damage to the vegetation. Therefore these areas should be considered less suitable for beekeeping than areas with a less dense understorey.

(iii) ease of access

Areas with steep verges, stream beds or windblown sand, which are adjacent to formed roads or peripheral firebreaks, should be considered unsuitable.

Using these criteria three ratings have been applied to apiary site allocation: good, fair and poor. The areas of good and fair ratings are suitable for beekeeping, while those with a poor rating are generally unsuitable. An area would receive a fair, rather than a good, suitability consideration if there were limited areas which may become seasonally wet, and/or the

understorey tended to be dense in places.

Where peripheral firebreaks are being considered as vehicular access routes for apiarists, they can only be deemed suitable if they provide firm two wheel drive access. Use of soft, sand firebreaks as vehicle tracks is not desirable as it leads to erosion and vegetation damage.

Where peripheral parts of the reserve are suitable for beekeeping but are inaccessible from the reserve due to soft, sand firebreaks, access from adjacent private property may provide a viable alternative. Where access to apiary sites on the reserve boundary is obtained directly from adjacent private property, none of the peripheral sand firebreaks should be used for vehicular access. In all cases where access can be obtained only from adjacent private property, the other parts of the reserve boundary designated good or fair suitability should be considered first before allocation is made in the former areas. Sites should only be allocated in the "inaccessible" areas when all possibilities in the fair and good suitability areas have been exhausted. The reasons for this are firstly to minimise disturbance to previously little disturbed boundaries, and secondly to make the policing of sites as easy as possible.

In cases where the areas of reserve available for beekeeping are of poor suitability due to seasonal wetness, use of the area may be considered subject to special conditions. These conditions would allow the apiarist to use the site only during the dry summer months. However with so many more suitable sites available, there appears to be little need at the moment to use such areas.

The final important factor influencing apiary site allocation is public use of the reserve. If part of a reserve is used by the public, whether it be for picnicking, duckshooting, or as an access route by duckshooters, beekeeping will be excluded from that area.

In the following sections each of the reserves available for beekeeping and its nature conservation values are discussed. Diagrams showing those parts of the reserve suitable for beekeeping and the related vegetation formations accompanies the discussions. Descriptions of the vegetation formations relating to the suitable sections of the reserve are given outside the reserve boundaries or adjacent to the formed roads to which they refer. A change in vegetation and/or a change in suitability is indicated on the diagram by a single thick line through the reserve boundary. Suitabilities are indicated by a symbol inside the reserve boundary which is described in the accompanying text. Symbols are also used to identify inaccessible and unsuitable areas. Where applicable, the proviso for access from adjacent properties is also indicated in the accompanying text. For reserves with existing apiary sites a second reserve diagram is included which shows the location of existing apiary sites, relevant permit numbers and permit expiry dates.

The vegetation descriptions in the following sections are based on Muir's (1977) classification (App. V) .

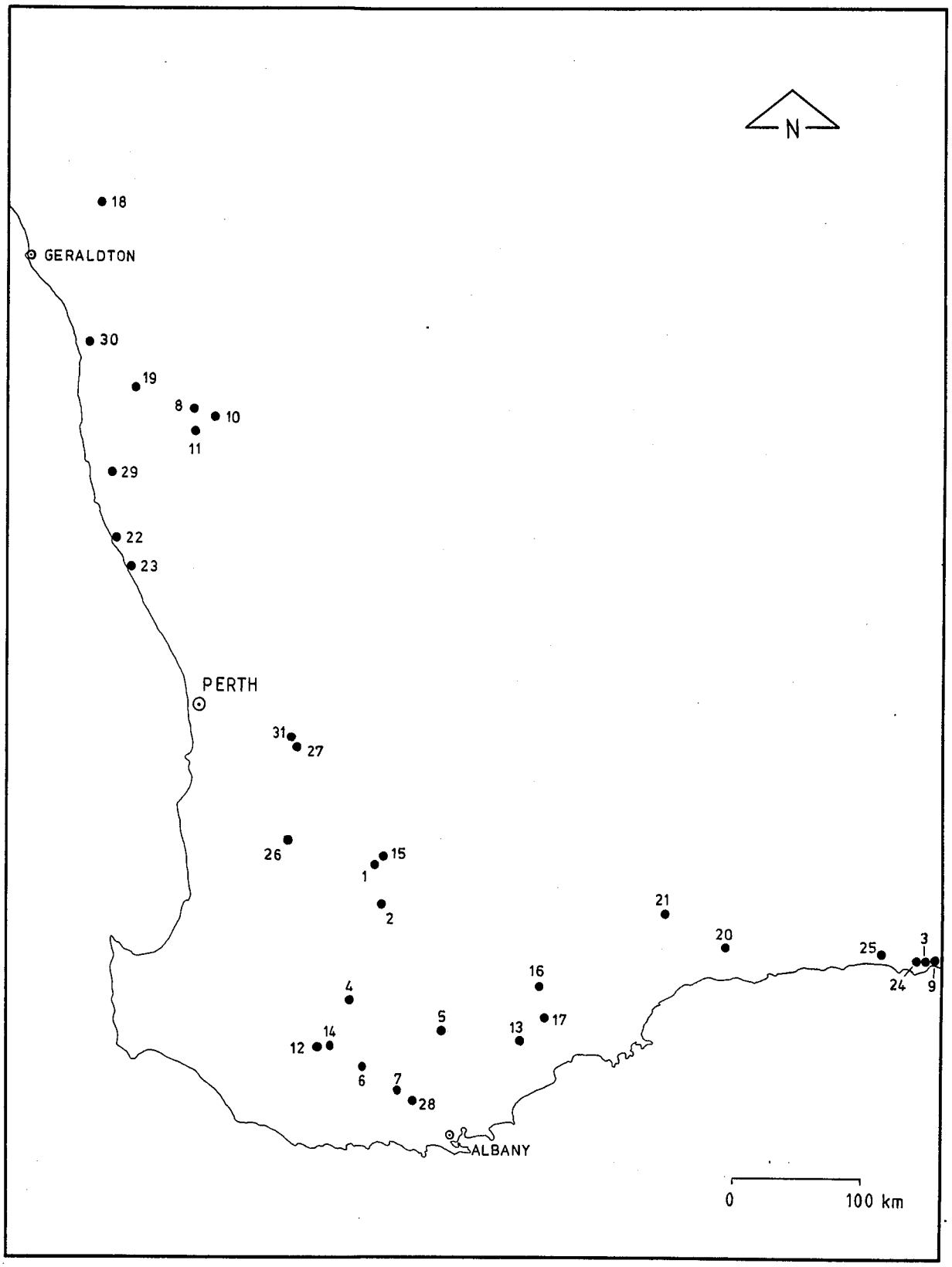


Figure 2. South-west of Western Australia showing the location of the 31 W.A. Wildlife Authority vested Nature Reserves which are available for beekeeping.

Key to Figure 2.

1 Arthur River Nature Reserve (Reserve No. 9508)
2 Parkeyerring Lake Nature Reserve (Reserve No. A10733)
3 Woody Lake Nature Reserve (Reserve No. A15231)
4 Towerlup Creek Nature Reserve (Reserve No. 17760)
5 Balicup Nature Reserve (Reserve No. 18468)
6 Tootanallup Nature Reserve (Reserve No. A22442)
7 Pardelup Nature Reserve (Reserve No. 23171)
8 Marchagee Nature Reserve (Reserve No. 23601)
9 Mullet Lake Nature Reserve (Reserve No. A23825)
10 Capamaura Nature Reserve (Reserve No. 24618)
11 Pinjarega Lake Nature Reserve (Reserve No. A25210)
12 Unicup Nature Reserve (Reserve No. A25798)
13 Mailalup Nature Reserve (Reserve No. 26264)
14 Kulunilup Nature Reserve (Reserve No. 26677)
15 Arthur River Flats Nature Reserve (Reserve No. 26789)
16 Reserve No. 26792 (unnamed)
17 Corackerup Nature Reserve (Reserve No. A26793)
18 East Yuna Nature Reserve (Reserve No. A29231)
19 East Eneabba Nature Reserve (Reserve No. 29806)
20 Kundip Nature Reserve (Reserve No. 31128)
21 Reserve No. 31424 (unnamed)
22 Wanagarren Nature Reserve (Reserve No. 31675)
23 Nilgen Nature Reserve (Reserve No. 31781)
24 Lake Warden Nature Reserve (Reserve No. A32257)
25 Lake Gore Nature Reserve (Reserve No. A32419)
26 Mooradung Nature Reserve (Reserve No. 32448)
27 Mt Westdale Nature Reserve (Reserve No. 33188)
28 Sheepwash Creek Nature Reserve (Reserve No. 35168)
29 Hill River Nature Reserve (Reserve No. A36093)
30 Reserve No. 36203 (unnamed)
31 Reserve No. 37306 (unnamed)

1. Arthur River Nature Reserve (Reserve No. 9508)

Shire: Narrogin
Area: 781.7 ha
Litho: 385/80
1:50 000 2331-I Piesseville
Location No: Williams 3520, 4932, 10295, 6215, 15449, 4860, 11319

a. Introduction

Arthur River Nature Reserve is located 7 km south-east of Highbury and 20 km south-south-east of Narrogin, on the Arthur River (Fig. 3).

The reserve is surrounded by private land, except for a small strip in the north where the Arthur River, flanked by Arthur River Flats Nature Reserve (Reserve No. 26789), enters it. Approximately half of the adjacent land is uncleared. A sealed road passes through the north-west corner of the reserve and continues along the eastern half of the northern boundary. A gravel road bounds the easternmost section of the reserve (Fig. 3). There are no peripheral firebreaks, although there is one short peripheral track (Fig. 3 indicates its location).

The majority of the soils on the reserve are alluvial deposits of sand. The vegetation is a combination of DWARF SCRUB D (Samphire - Halosarcia spp.) and OPEN LOW GRASS bordering bare seasonally wet clay-bottomed shallow lakes, and SCRUB dominated by Melaleuca sp. on slightly higher areas. Occasional patches of Wandoo (Eucalyptus wandoo) LOW WOODLAND A and Allocasuarina huegliana occur on higher ground.

b. Nature Conservation Values

Arthur River Nature Reserve was set aside for the Conservation of Flora and Fauna, and vested in WAWA, in May 1963. The need to protect the catchment area of the Arthur River and to retain viable habitat for waterfowl were the primary reasons for its establishment.

c. Suitability for Beekeeping

Seasonal wetness makes the reserve of poor suitability for beekeeping as most of the area accessible from formed roads and peripheral tracks is inundated during the winter months. However, apiary site allocation may be allowed on areas of higher ground where access can be directly obtained to the site from adjacent private property.

No apiary sites exist on the reserve at present.

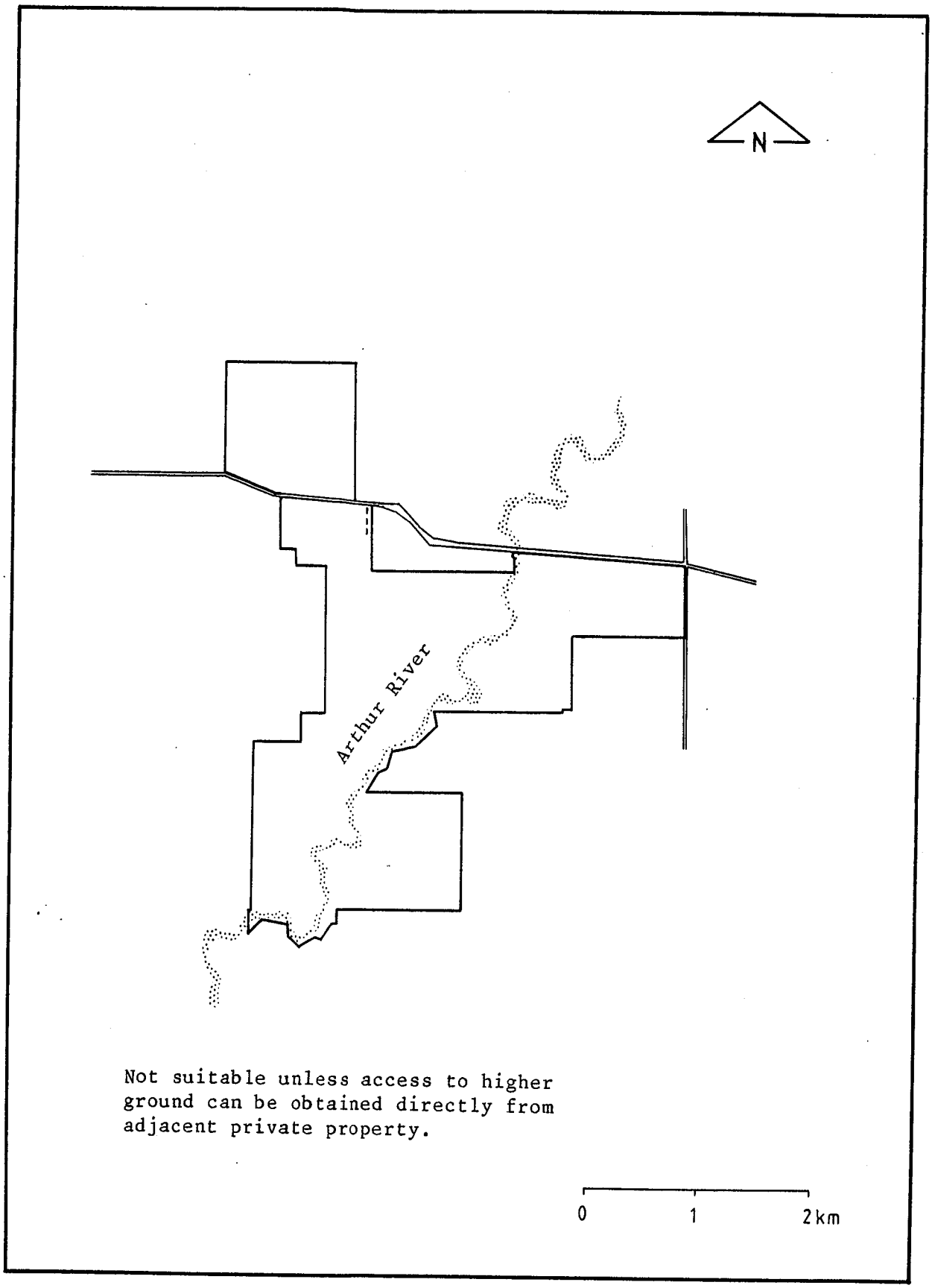


Figure 3. Suitability for beekeeping of Arthur River Nature Reserve (Reserve No. 9508).

2. Parkeyerring Lake Nature Reserve (Reserve No. A10733)

Shire: Wagin
Area: 684.5 ha
Litho: 409/80
1:50 000 2332-II Wagin
Location No: Williams 15677

a. Introduction

Parkeyerring Lake Nature Reserve is approximately seven kilometres south of Wagin; the Great Southern Highway follows part of the eastern boundary of the reserve. A peripheral track follows the northern boundary. The remainder of the eastern side and northern and southern sides of the reserve are bounded by private land. The western boundary is shared with Reserve No. A24792, which is also vested in WAWA.

Most of the soils on the reserve are deep sands. The vegetation is LOW FOREST A of Casuarina obesa with occasional Eucalyptus rudis and Eucalyptus occidentalis, interspersed by an Acacia sp. THICKET. Only a narrow belt of vegetation around the Lake is included in the reserve.

b. Nature Conservation Values

In March 1978 Parkeyerring Lake Nature Reserve was set aside for Recreation and Conservation of Flora and Fauna. It was vested in WAWA in July 1978. The area had been made "A" class in April 1907. This status was due primarily to the lake's importance as a waterfowl feeding and refuge area. Ground surveys during early summer have shown that this area carries extremely large populations of waterfowl. In addition many species of wading birds utilise the sand banks which are part of the lake system.

c. Suitability for Beekeeping

This reserve is not suitable for beekeeping due to the narrowness of the vegetated area surrounding the lake (Fig. 4). In addition the dunes on the eastern side of the lake have a steep gradient and the the soils are potentially unstable. These factors suggest that any disturbance will lead to erosion.

No apiary sites exist at present on this reserve.

3. Woody Lake Nature Reserve (Reserve No. A15231)

Shire: Esperance
Area: 565.0 ha
Litho: 423/80
1:50 000 3230-II Esperance
Location No: Esperance 825, 823, 1962.

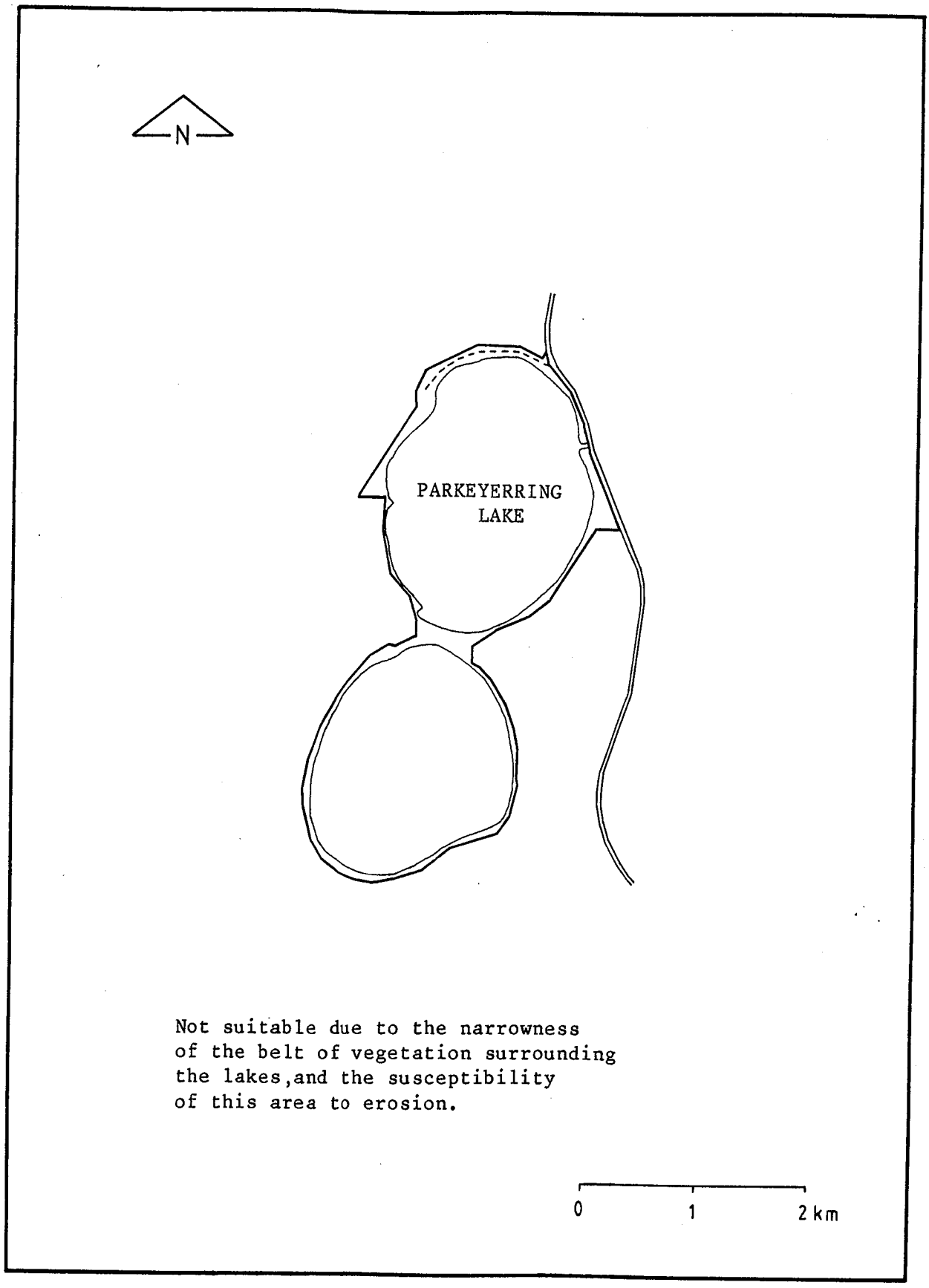


Figure 4. Suitability for beekeeping of Parkeyerring Lake Nature Reserve (Reserve No. A10733).

a. Introduction

Woody Lake Nature Reserve is located five kilometres north of Esperance; the Coolgardie- Esperance Highway passes along the western boundary of the reserve. Woody Lake lies between Lake Warden Nature Reserve (Reserve No. A32257) to the west and Mullet Lake Nature Reserve (Reserve No. A23825) to the east, and forms part of the system of wetlands north of Esperance. The land to the north and south of the reserve is privately owned.

Sealed roads pass along the eastern and western reserve boundaries. A peripheral track traces the northern boundary (Fig. 5).

Adjacent to wetland areas the vegetation is HEATH B/LOW HEATH C, on higher ground the heath becomes a slightly taller THICKET association. The topography is undulating and the soils are grey white sands.

b. Nature Conservation Values

In May 1970 Woody Lake Nature Reserve was set aside for the Conservation of Flora and Fauna. In April 1979 its purpose was amended to Recreation and the Conservation of Flora and Fauna, and vested in WAWA. The reserve had been made "A" class in May 1970. One of the main reasons for reservation was to protect the variety of waterfowl and other birds using the Lake. In addition, the area's continued protection is necessary to maintain the relative freshness of its water supply. A saline water table exists under Woody Lake, Mullet Lake and Lake Warden and any disturbances to it would result in a penetration of the water table and subsequent contamination of the lake system.

c. Suitability for Beekeeping

The lake is used for water-skiing, and a small area on the northern side of the Lake is used as a picnic spot. Therefore apiary sites should not be located in the north-eastern corner of the reserve on the western side of the sealed road, as beekeeping in this area would cause conflict with public use.

Due to seasonal wetness most of the Woody Lake Nature Reserve is of poor suitability for beekeeping. The only area of good suitability is to the east of the sealed road which passes through the north-eastern corner of the reserve (Fig. 5).

No apiary sites exist at present on this reserve.

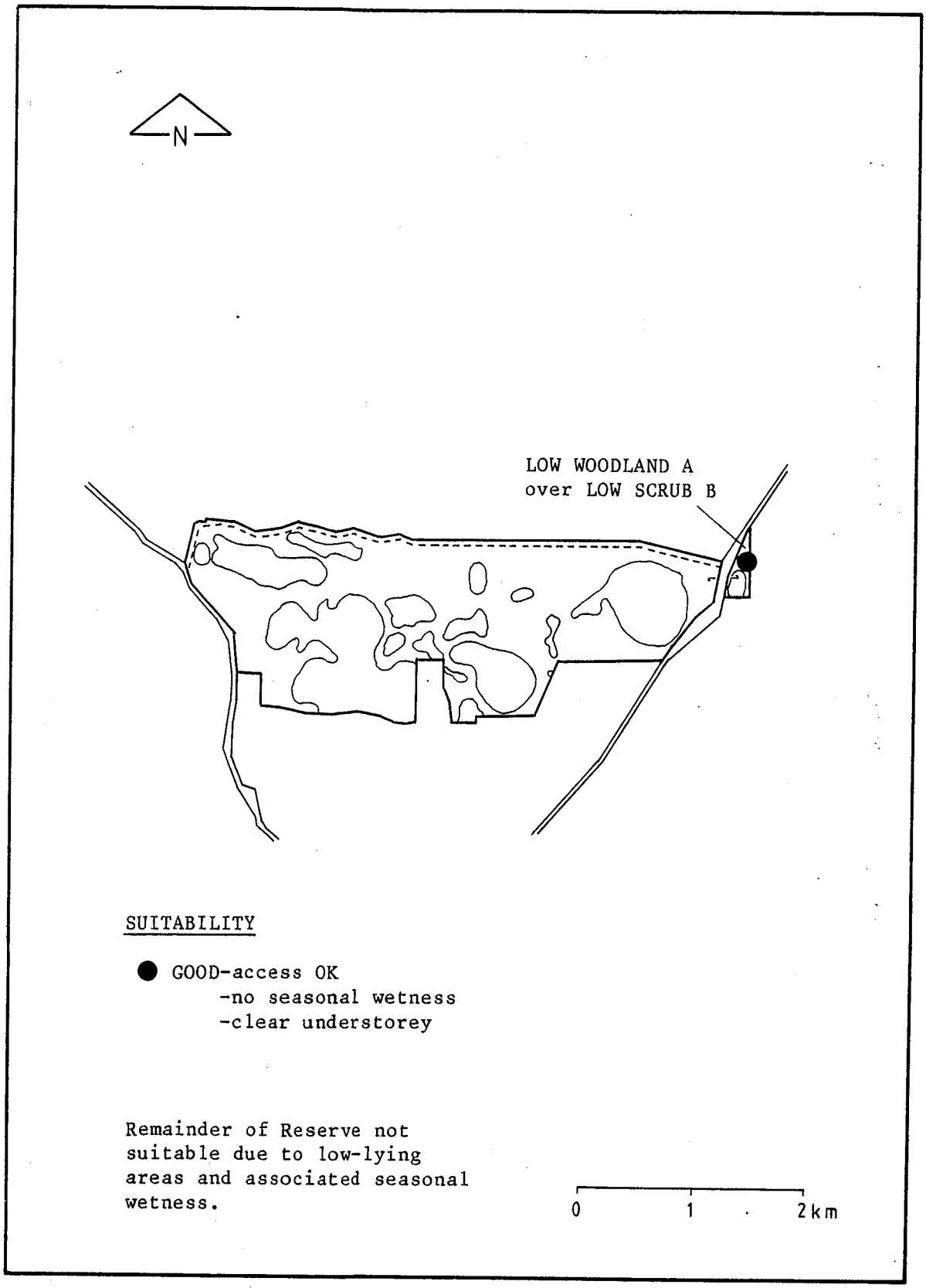


Figure 5. Suitability for beekeeping of Woody Lake Nature Reserve (Reserve No. A15231).

4. Towerlup Creek Nature Reserve (Reserve No. 17760)

Shire: Kojonup
Area: 551.1 ha
Litho: 437/80
1:50 000 2329-IV Nannup

Location No: Kojonup 7690

a. Introduction

Towerlup Creek Nature Reserve is located 27 km south-south-west of Kojonup and is bordered on the east by the Kojonup-Frankland Road. A gravel road passes along part of the north-western boundary of the reserve. An overgrown firebreak follows most of the southern and eastern boundaries of the reserve, and a peripheral track passes along the northern boundary of the reserve (Fig. 6). The reserve is surrounded by cleared private land. Gravel pits are located along the eastern side of the reserve.

The reserve lies in undulating laterite uplands, and the soils are red loams with varying quantities of laterite gravel. The vegetation is a WOODLAND of Jarrah (Eucalyptus marginata), Marri (E. calophylla) and Wandoo (E. wandoo) over OPEN DWARF SCRUB D and occasional patches of Dryandra sessilis THICKET. The reserve has been extensively and frequently burnt.

b. Nature Conservation Values

Towerlup Creek Nature Reserve was set aside for the Conservation of Flora and Fauna, and was vested WAWA, in May 1970. One of the main reasons for the area's reservation was that it contained suitable habitat for the local fauna. This reserve is particularly important as there are very few fauna reserves in the area. In addition the reserve contains good stands of Jarrah and Wandoo.

c. Suitability for Beekeeping

All parts of the reserve boundary accessible by firebreak, peripheral track or formed road, are of fair to good suitability for beekeeping (Fig. 6).

No apiary site permits are held for the reserve at present.

5. Balicup Nature Reserve (Reserve No. 18468)

Shire: Cranbrook
Area: 687.1 ha
Litho: 436/80, 445/80
1:50 000 2429-II Mondurup,
2429-I Toolbrunup
Location No: Plantagenet 7156

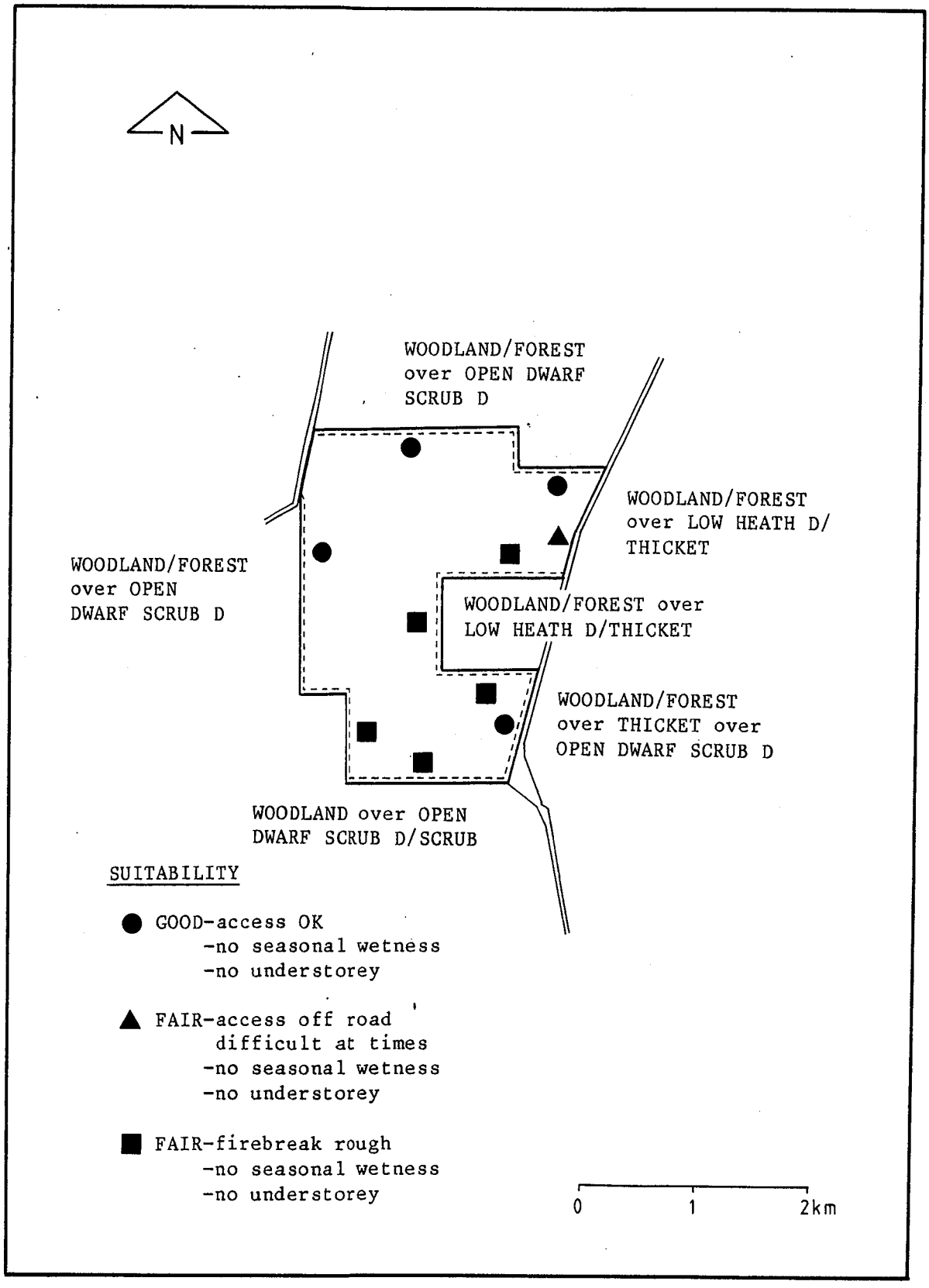


Figure 6. Suitability for beekeeping of Towerlup Creek Nature Reserve (Reserve No. 17760).

a. Introduction

Balicup Nature Reserve is located 22 km east-north-east of Cranbrook and approximately 4 km north of the northern border of the Stirling Range National Park. The reserve encompasses Balicup Lake and the land immediately adjacent.

The reserve is surrounded by private land. The properties adjoining the eastern margin of this reserve have been cleared and fenced. Those adjoining the western sections have not been cleared.

The bed of Balicup Lake is a very shallow clay depression. The Lake is surrounded by clay flats vegetated with Samphire, saltbush, clump grasses and Melaleuca sp. There is a flat clay bank over 100 m in width along the Lake's eastern margin, and this bank is densely vegetated with clump grasses.

b. Nature Conservation Values

Balicup Nature Reserve was initially set aside in 1923 as a reserve for Fauna to protect the resident waterfowl and hence duck-shooters' interests. In June 1970 the reserve was set aside for the Conservation of Flora and Fauna, and vested in WAWA. Therefore Balicup Lake has been reserved, primarily for the protection of fauna, for over half a century, and as such continues to be an important refuge for waterfowl and waders. The narrow belt of vegetation adjacent to the Lake provides refuge for numerous bird species and other fauna.

c. Suitability for Beekeeping

The reserve is only accessible via a narrow track at the southern end of the Lake which becomes impassable in wet weather. Therefore the combination of inaccessibility and the narrowness of the belt of vegetation makes the reserve unsuitable for beekeeping (Fig. 7).

No apiary sites exist on the reserve at present.

6. Tootanallup Nature Reserve (Reserve No. A22442)

Shire: Plantagenet
Area: 943.7 ha
Litho: 444/80
1:50 000 2328-IV Rocky Gully
2329-III Cybelup
Location No: Hay 1996, 1247

a. Introduction

Tootanallup Nature Reserve is located nine kilometres east of Rocky Gully. Formed roads pass along the

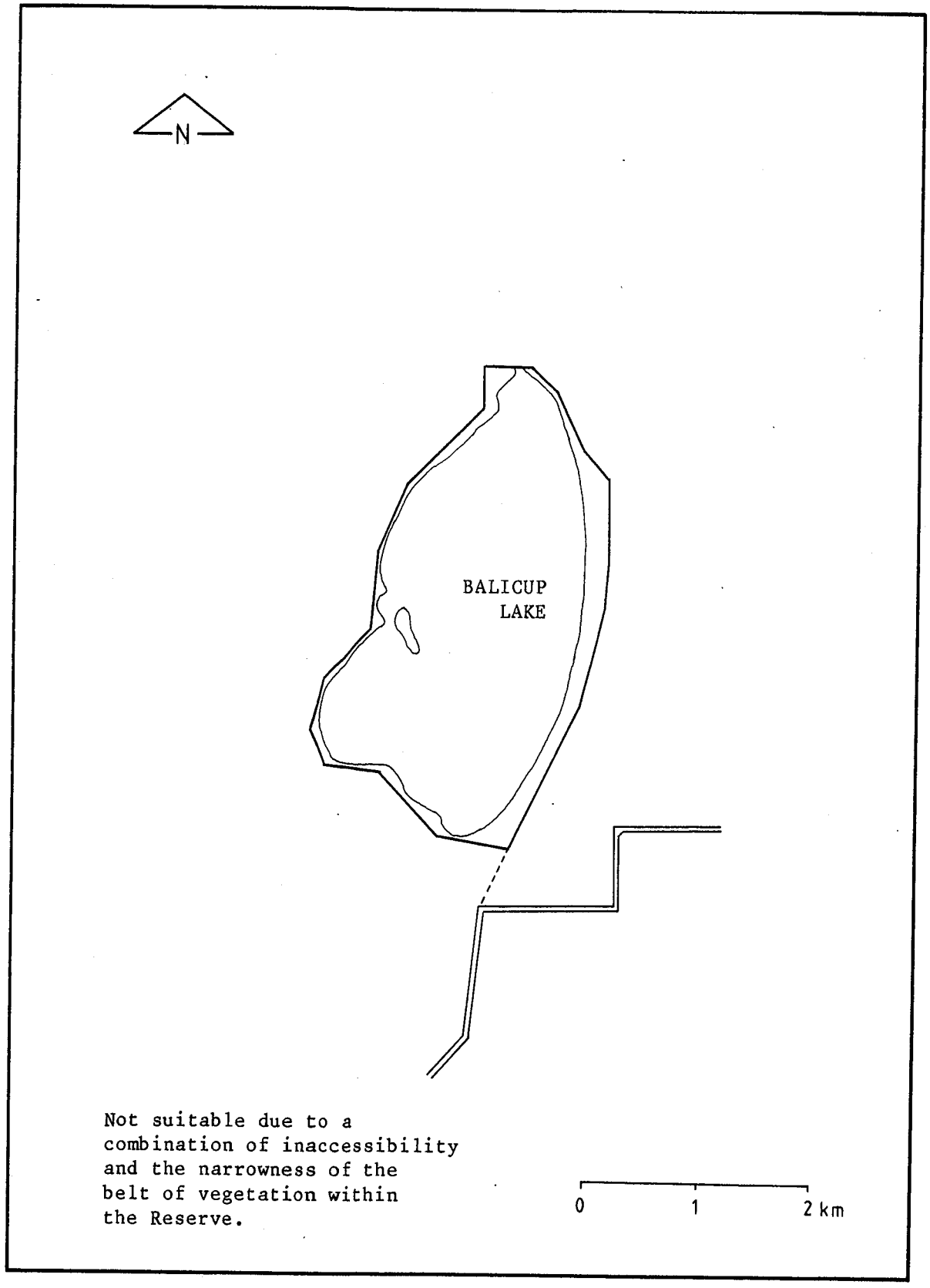


Figure 7. Suitability for beekeeping of Balicup Nature Reserve (Reserve No. 18468).

western and northern boundaries of the reserve and peripheral tracks follow the southern and eastern boundaries (Fig. 8). The land surrounding the reserve is privately owned. The land adjacent to the western, eastern and northern boundaries of the reserve is cleared, while the property adjoining the southern boundary contains portions of cleared, uncleared and partially cleared land.

The reserve has a varying topography and a corresponding diversity of vegetation. The topography ranges from a small lateritic plateau in the western half of the reserve to low lying white-grey sands in the east and a small swamp on the eastern boundary of the reserve. The vegetation varies correspondingly with Jarrah/Marri (Eucalyptus marginata/E. calophylla) FOREST/WOODLAND on the western lateritic plateau, and emergent Melaleuca sp. and Banksia littoralis over LOW HEATH C on the sandplain in the south-eastern corner. Around the swamp an OPEN LOW WOODLAND A of Eucalyptus decipiens over LOW HEATH C and LOW SEDGES occurs.

b. Nature Conservation Values

Tootanallup Nature Reserve was set aside for Water and Conservation of Flora and Fauna, vested in WAWA, and made "A" class, in June 1959. This vesting and reservation resulted primarily from the realisation that the area was an important sanctuary and breeding ground for the black duck (Anas superciliosa), an important game bird.

The Lake on the eastern boundary is colonised by a great variety of birds, particularly where dense Acacia provides ideal habitat and nesting sites for Scarlet Robins (Petroica multicolor) and other birds. The reserve therefore contains a wealth of birdlife.

c. Suitability for Beekeeping

The peripheral parts of the reserve are of fair to good suitability for beekeeping (Fig. 8). The rating of fair rather than good is due to an occasionally dense understorey.

No apiary sites exist at present on the reserve.

7. Pardelup Nature Reserve (Reserve No. 23171)

Shire: Plantagenet
Area: 607.0 ha
Litho: 452/80
1:50 000 2328-I Kwornicup

Location No: Hay 2024, 2023

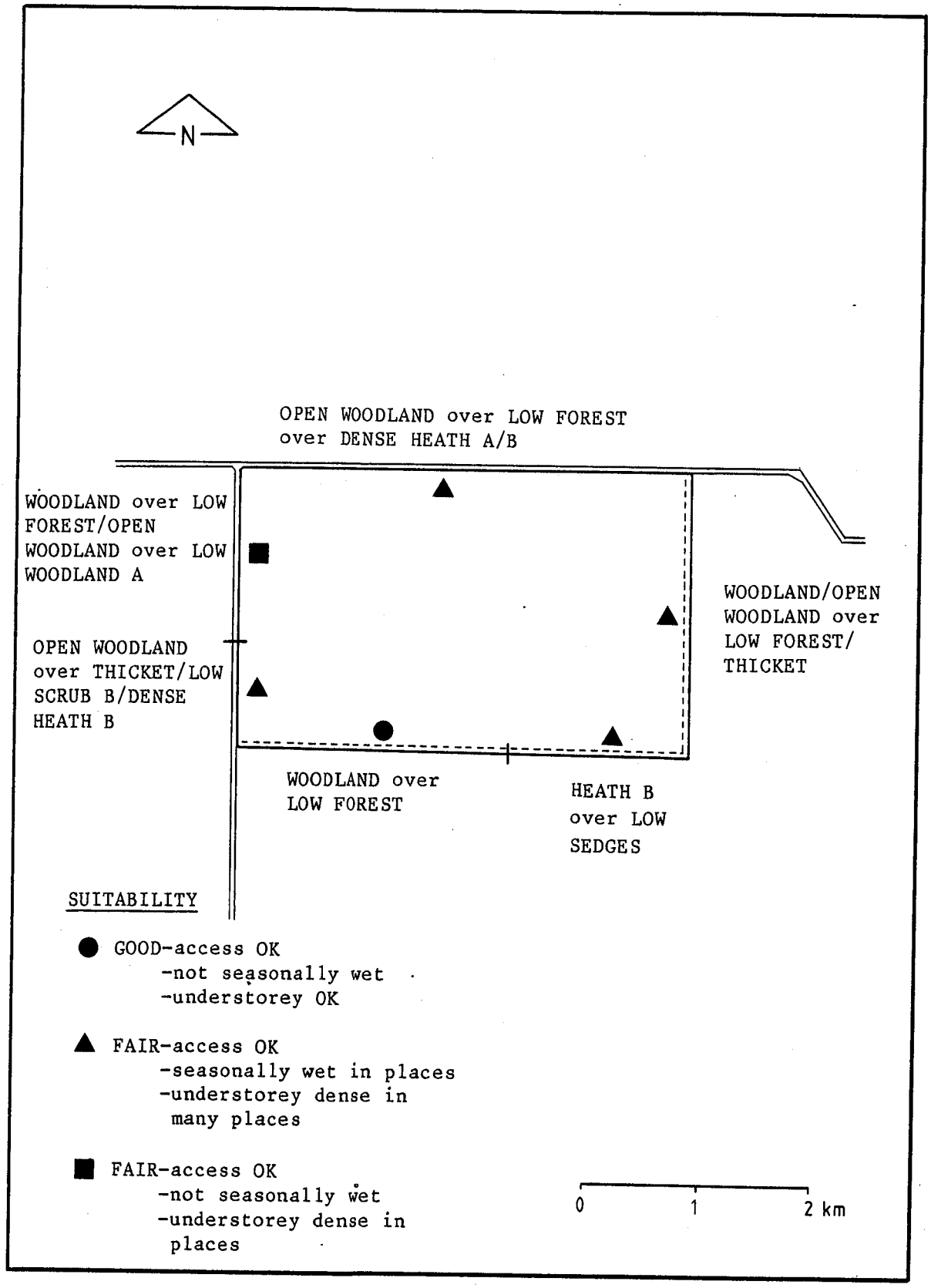


Figure 8. Suitability for beekeeping of Tootanallup Nature Reserve (Reserve No. A22442).

a. Introduction

Pardelup Nature Reserve is located 23 km west of Mt Barker. The Reserve is landlocked by private land and can only be approached by tracks through narrow road reserves which approach the reserve from the north and south (Fig. 9). Pardelup Nature Reserve is firebreaked around its periphery, however, the south-east corner is presently inaccessible due to washouts and fallen timber. The farmland adjacent to the reserve is cleared, the only exception being a small area of woodland flanking the south-eastern corner of the reserve.

The reserve forms the central part of the catchment of a stream system which leaves the reserve through its south-eastern corner. The soils are predominantly loamy sands with some lateritic gravel. The vegetation is Marri (Eucalyptus calophylla) WOODLAND over a SCRUB/THICKET, the main components of which are regenerating Marri saplings and Acacia sp. The THICKET is interspersed by areas of HEATH A.

b. Nature Conservation Values

Pardelup Nature Reserve was set aside for the Conservation of Flora and Fauna, and vested in WAWA, in June 1977. The area was reserved primarily because it contains excellent and varied habitat and the associated fauna and flora is also rich and varied.

The reserve is particularly valuable as it shows little sign of human disturbance, and therefore provides an excellent representative sample of the undisturbed local flora. In addition, at least three macropod species are known to utilise this area for food and refuge.

c. Suitability for Beekeeping

All parts of the reserve directly accessible from the peripheral firebreaks are of good suitability for beekeeping (Fig. 9).

No apiary sites exist on the reserve at present.

8. Marchagee Nature Reserve (Reserve No. 23601)

Shire: Coorow
Area: 577.6 ha
Litho: 90/80
Location No: Victoria 8714, 10071

a. Introduction

Marchagee Nature Reserve is located nine kilometres south-south-east of Coorow. The Midlands Road

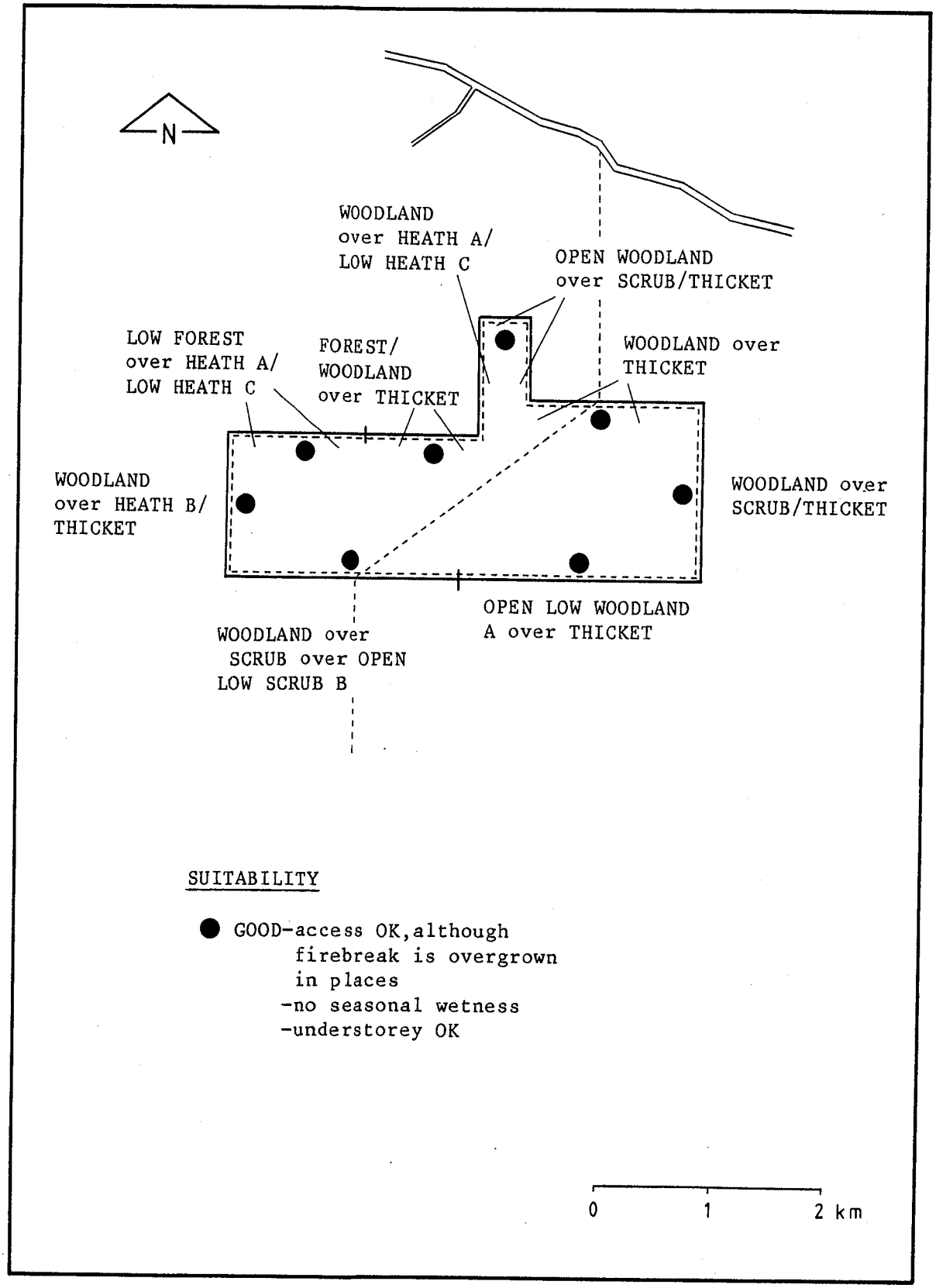


Figure 9. Suitability for beekeeping of Pardelup Nature Reserve (Reserve No. 23171).

bissects the reserve, traversing the reserve from the north-west to south-east corner. The western side of the reserve is bordered by a north-south railway line and associated firebreak. A gravel road follows the eastern boundary and another gravel road cuts through the reserve from the Midlands Road to the southern boundary (Fig. 10). The land surrounding the reserve is privately owned and some of it is still uncleared.

The topography of the reserve is diverse, ranging from claypan salt lakes in low-lying areas, to undulating sandhills with yellow sandy soils and some light gravel in the higher areas in the north-east corner of the reserve. In the lower lying areas a LOW HEATH C of Melaleuca sp. predominates with Samphire flats occurring in seasonally wet areas. On higher ground HEATH A/B predominates with occasional mallees emergent. In well drained areas on higher ground Woody Pear (Xylomelum angustifolium), Native Pine (Actinostrobus arenarius) and Banksia sp. THICKETS appear.

b. Nature Conservation Values

Marchagee Nature Reserve was set aside for the Conservation of Flora and Fauna, and vested in WAWA, in January 1975. Reservation was primarily based on the spectacular native flora display. The reserve also supports a range of topography and an associated diversity of vegetation communities. At least three species of Banksia are found on the reserve.

Birds which utilise shrubland and heath are well represented on the reserve. This includes birds such as the Red-capped Robin, Grey Shrike-thrush, Willie Wagtail, Crested Bellbird and White-fronted Chat. In addition the reserve contains a diversity of reptile and frog species, including typical wheatbelt, and coastal, taxa (Dell et al. 1979).

c. Suitability for Beekeeping

Most parts of the reserve accessible by peripheral firebreak or track or by formed road, are seasonally wet or inundated and consequently are of poor suitability for beekeeping. The two exceptions are the area adjacent to the western boundary of the reserve, and areas adjacent to the Midlands Road (Fig. 10). Both these areas are of fair suitability.

No apiary sites exist at present on the reserve.

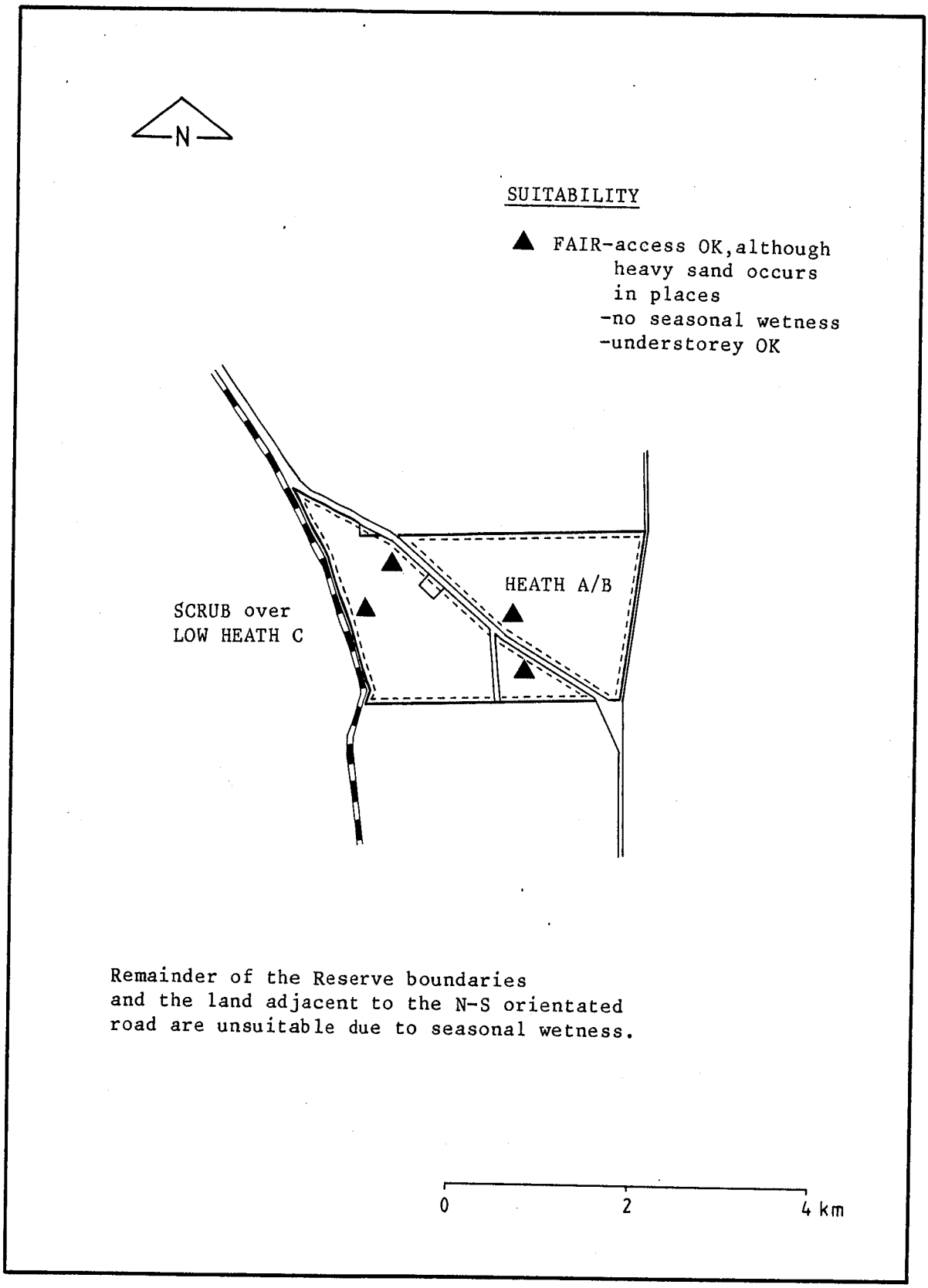


Figure 10. Suitability for beekeeping of Marchagee Nature Reserve (Reserve No.23601).

9. Mullet Lake Nature Reserve (Reserve No. A23825)

Shire: Esperance
Area: 1917.4 ha
Litho: 423/80
1:50 000 3230-II Esperance
Location No: Esperance 43, 813, 815, 816, 817, 818, 1479

a. Introduction

Mullet Lake Nature Reserve is located 10 km north-east of Esperance. Woody Lake Nature Reserve and Lake Warden Nature Reserve lie to the west of Mullet Lake, and together the three reserves protect an important wetland system. A sealed road passes along the northern boundary of the reserve and the Southern Ocean forms the southern boundary. No firebreaks are constructed on or around the reserve. Most of the land surrounding the reserve is privately owned and uncleared.

The reserve is composed of two distinct systems; a chain of wetlands in the north of which Mullet Lake is part, and a series of coastal dunes in the south which includes a number of blow-outs. The vegetation in the northern wetland area of the reserve is OPEN LOW SCRUB B with Samphire flats in the wetter areas. The coastal dunes in the south support heathland.

b. Nature Conservation Values

Mullet Lake Nature Reserve was set aside for the Conservation of Flora and Fauna, and vested in WAWA, in June 1970. It was made "A" class in April 1972. The conservation values of the reserve which contributed substantially to its "A" classification, included the value of its wetlands as waterbird habitat, its importance as the only coastal strip for some distance under the control of the Authority, and its value as a reserved area covering the transition from coastline beaches to wetlands.

c. Suitability for Beekeeping

The only part of the reserve accessible to apiarists is adjacent to the sealed road which follows the northern boundary of the reserve. The only places suitable for apiary sites along this boundary are on areas of hillocky sand which are raised slightly above the surrounding low-lying wetlands (Fig. 11).

No apiary sites exist at present on the reserve.

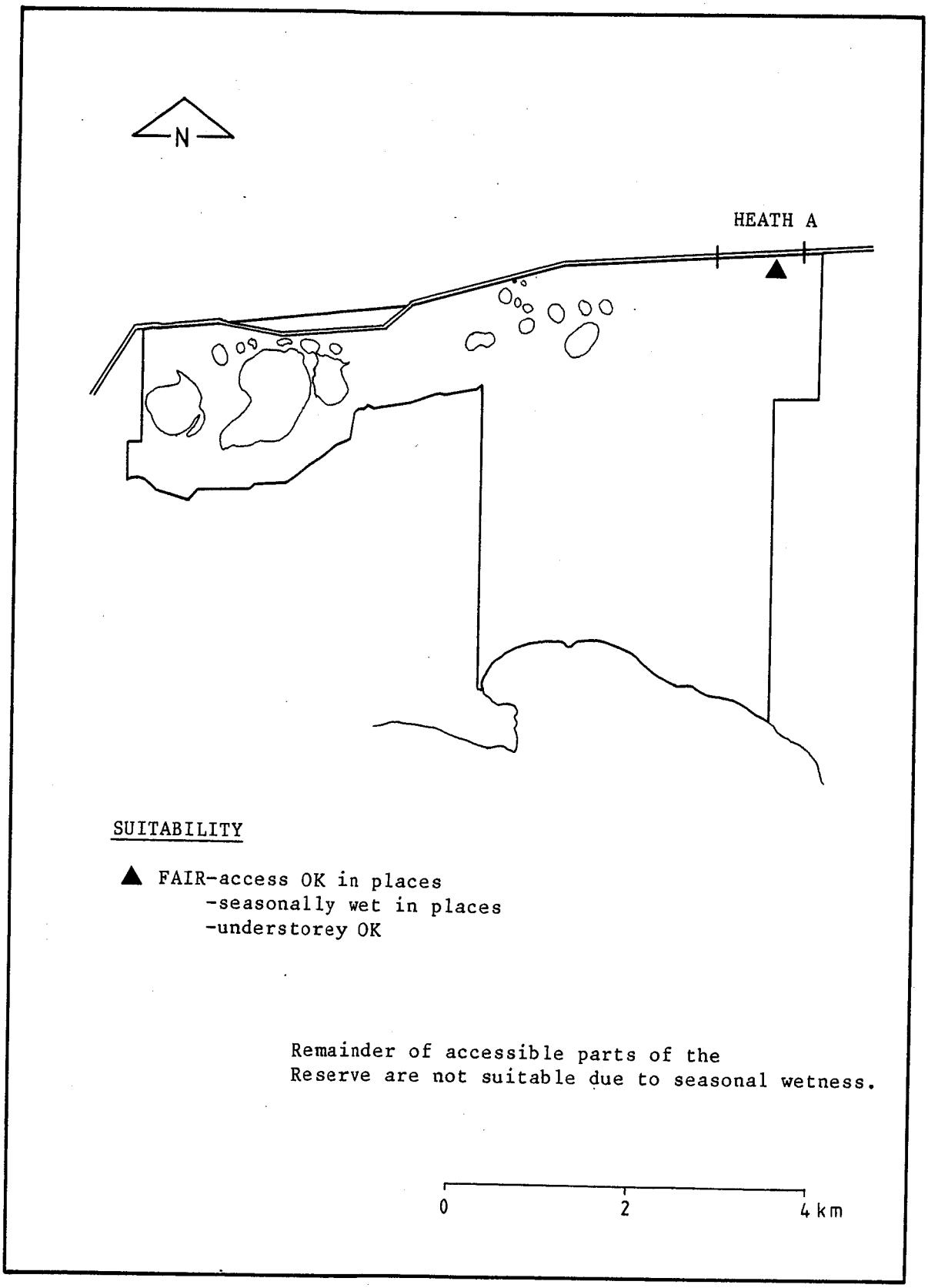


Figure 11. Suitability for beekeeping of Mullet Lake Nature Reserve (Reserve No.A23825).

10 Capamaura Nature Reserve (Reserve No. 24618)

Shire: Coorow
Area: 3587.5 ha
Litho: 90/80, 95/80
Location No: Victoria 8115, 10097, 10966

a. Introduction

Capamaura Nature Reserve is located approximately 10 km west of Coorow. A gravel road passes along the southern boundary (Fig. 12) . All the land surrounding the reserve is privately owned, and much of this is uncleared. The only areas of cleared land adjacent to the reserve are on the southernmost part of the eastern boundary, a small area on the northernmost part of the same boundary, and the western one-third of the northernmost boundary.

A complete perimeter firebreak was constructed on the reserve in 1975, however the northern breaks have not been maintained and are now inaccessible. The remainder of the breaks, due to their heavy sandy nature, are accessible only by four wheel drive vehicle.

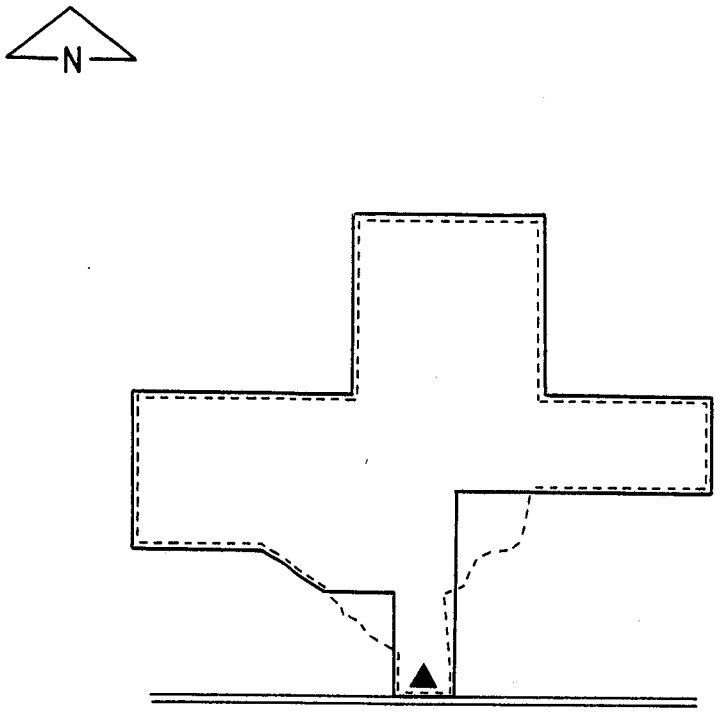
Capamaura Nature Reserve is located almost entirely on sandplain and encompasses an extensive wetland system, including Capamaura Swamp. The vegetation is predominantly HEATH A/B with occasional patches of emergent Banksia prionotes, Woody Pear (Xylomelum augustifolium) and Native Cypress (Actinostrobus arenarius)

b. Nature Conservation Values

The reserve was set aside in April 1971 for the Conservation of Flora and Fauna, and was vested in WAWA in December 1971. This area was reserved primarily for the extensive wetlands it contained and for its good representation of sandplain heath. Not only does the wetland complex act as a refuge and possible breeding area for waterfowl, the surrounding heathland also supports rich bird life.

c. Suitability for Beekeeping

The soft sandy nature of all the peripheral firebreaks make them unsuitable as access routes to apiary sites. Frequent use of sand firebreaks as vehicle tracks is not desirable in any event because of erosion and damage to vegetation. Therefore the only part of the reserve suitable for apiary site allocation is the area adjacent to the formed road which passes along the southern boundary of the reserve. Due to some seasonal wetness, the suitability of this section is best classified as fair (Fig. 12).



SUITABILITY

▲ FAIR-access OK
-some seasonal wetness
-understorey OK

If the Reserve boundaries can be directly accessed from adjacent private property,without using sand firebreaks as vehicle tracks,then they should be considered suitable.

0 4 8km

Figure 12. Suitability for beekeeping of Capumaura Nature Reserve (Reserve No. 24618).

Where access to the reserve boundary can be obtained directly from adjacent private property the area should be considered suitable for beekeeping. However, the sandy firebreaks should at no time be used as access routes.

No apiary sites exist at present on the reserve.

11. Pinjarega Lake Nature Reserve (Reserve No. A25210)

Shire: Coorow
Area: 18 220.7 ha
Litho: 90/80
Location No: Victoria 10090, 11152

a. Introduction

Pinjarega Lake Nature Reserve is centred on Lake Eganu and Pinjarega Lake and is located approximately 19 km south-west of Coorow. The two lakes are linked by a north-south orientated perennial waterway, the Coonderoo River. The Reserve abuts Watheroo National Park in the south and private farmland on the remaining three sides. The southern boundary of Capamaura Nature Reserve (Reserve No. 24618) is approximately three kilometres north of the northern boundary of Pinjarega Lake Nature Reserve. The land surrounding the reserve is uncleared, with the exception of approximately half the land bordering the eastern boundary.

Two parallel east-west orientated roads bisect the reserve. The northernmost of these is sealed, while the southern one is gravel. A gravel road also passes along the southern boundary of the reserve and along the southernmost part of the western boundary of the reserve (Fig. 13). The reserve contains a comprehensive system of firebreaks.

The reserve consists mainly of sandplain country. The higher areas carry a SCRUB of Banksia prionotes, Woody Pear (Xylomelum angustifolium) and Native Pine (Actinostrobus arenarius) and areas of HEATH A/B with the aforementioned species emergent. Lower areas carry LOW HEATH C/D with scattered Eucalyptus todtiana emergent. Low lying flats carry Eucalyptus rudis LOW WOODLAND A and Melaleuca sp. THICKET. The lakes themselves are surrounded by DENSE THICKETS of Melaleuca sp.

b. Nature Conservation Values

Pinjarega Lake Nature Reserve was set aside for the Conservation of Flora and Fauna, vested in WAWA, and made "A" class, in December 1974. One of the area's main conservation values is as a waterfowl breeding habitat, and as such it is extensively used by duck shooters. Pinjarega Lake contains dense living

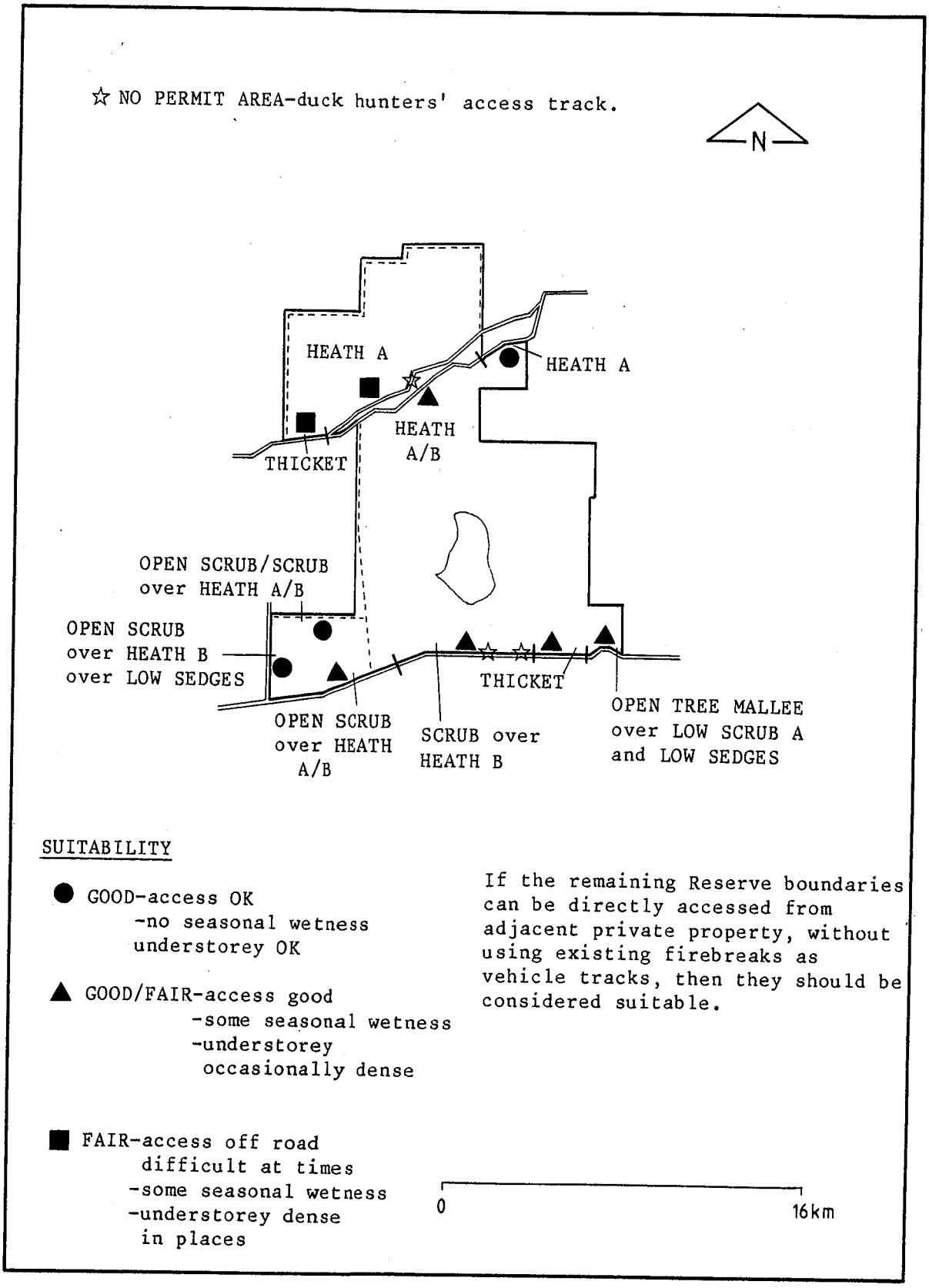


Figure 13. Suitability for beekeeping of Pinjarega Lake Nature Reserve (Reserve No. A25210).

vegetation and therefore is unique in the Coorow Shire as most swamps in this area have lost their vegetation cover through increased salinity of the water. Thus the lake provides an excellent wildlife refuge due to the freshness of its water and the density of the vegetation surrounding it. In addition the size and position of Pinjarega Lake, in relation to surrounding wetland areas, makes it an attractive refuge. During dry periods, waterfowl are forced to congregate on these few remaining wetland areas. Its size and permanent water supply also provide valuable habitat for large macropods.

c. Suitability for Beekeeping

The heavy sandy nature of the peripheral firebreaks means that they are not suitable as access routes for apiarists. Frequent use of sand firebreaks as vehicle tracks is not desirable as it leads to erosion and damage to the vegetation. Therefore the only parts of the reserve suitable for beekeeping are those areas adjacent to formed roads. Parts of the reserve adjacent to the east-west orientated bissecting roads are of fair to good suitability for beekeeping, as are those areas adjacent to the southern gravel roads (Fig. 13). In both areas apiary sites should not be established near the duckshooters' access tracks into Lake Eganu and Pinjarega Lake. These "no permit" areas are indicated in Figure 13. If access to the reserve periphery can be obtained through private property, and not by using the perimeter firebreaks of the reserve as access routes, then applications for these areas should be approved.

At present no apiary sites exist on the reserve, however five sites are located within three kilometres of the southern boundary of the reserve. The close proximity of these sites to the reserve must be taken into consideration in the allocation of sites on the reserve.

12. Unicup Nature Reserve (Reserve No. A25798)

Shire: Cranbrook
Area: 3305.2 ha
Litho: 443/80
Location No: Nelson 12624, 12686

a. Introduction

Unicup Nature Reserve is located 33 km west of Frankland and 11 km north of the Muir Highway. The reserve is surrounded by privately owned land. Most of the land adjacent to the northern and western boundaries, and all the land adjacent to the southern boundary, has been cleared. Of the remaining bushland on the western and southern boundaries, much

has been partially cleared. Finally, on the eastern boundary, approximately one third of the land adjacent to the reserve has been cleared.

The reserve has a comprehensive system of firebreaks, and gravel roads pass along the northern and southern boundaries of the reserve, and a north-south orientated gravel road bissects the reserve (Fig. 14).

The topography of the reserve is dominated by sandplains of grey-white sand interspersed by raised areas of heavily weathered laterite. The whole reserve is covered by a mosaic of vegetation and Unicup Lake, Little Unicup Lake and the southern small salt lake are surrounded by a complex mosaic of heath including Melaleuca sp. with emergent Banksia littoralis. On the remainder of the reserve a WOODLAND of Jarrah (Eucalyptus marginata) and Marri (Eucalyptus calophylla) over a LOW SCRUB A/B of Blackboys (Xanthorrhoea sp.), Hakea sp. and Daviesia sp. occurs on the low lateritic crests, and a WOODLAND of similar composition over a HEATH B of Casuarina sp. and emergent Banksia littoralis occurs on the white sands.

b. Nature Conservation Values

In November 1960 Unicup Nature Reserve was set aside for the Conservation of Flora and Fauna; on the same day it was vested in WAWA, and made "A" class. This gazettal and vesting was primarily in order to protect the nesting habitat of the black duck (Anas superciliosa) and to protect a valuable wetland habitat utilised by both waterfowl and waders. The preservation of uncleared land surrounding wetlands is particularly important as it may slow down or halt land quality deterioration (due to salinity problems) related to excessive clearing.

Unicup Lake provides nesting habitat, feeding grounds and refuge for numerous waterfowl. Little Unicup also has a large number of waders and waterfowl. Many of these birds use the slightly saline areas, such as Little Unicup and the southern salt lake, for feeding and resting, and visit fresh water areas such as Unicup at night for a drink. In addition to its waterfowl and wader populations, the reserve supports numerous other bird species and some interesting mammalian populations. The area is likely to be suitable for Tammars (Macropus eugenii), Woylies (Bettongia penicillata), Ring-tailed Possums (Pseudocheirus peregrinus) and Brush-tailed Possums (Trichosurus vulpecula).

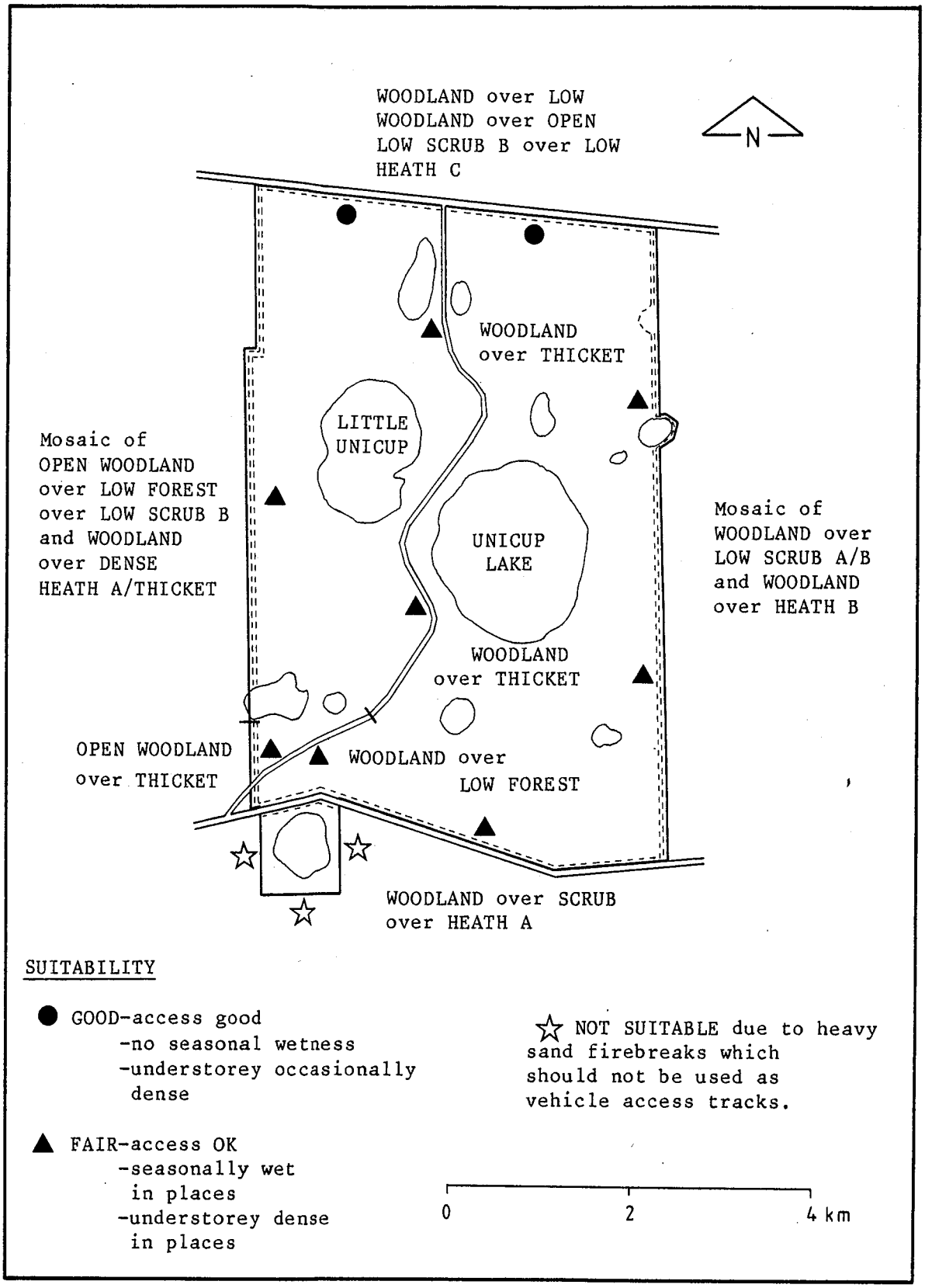


Figure 14. Suitability for beekeeping of Unicup Nature Reserve (Reserve No. A25798).

c. Suitability for Beekeeping

Those parts of the reserve directly accessible from the northern gravel road are of good suitability for beekeeping. Due to an occasionally dense understorey and limited areas of seasonal wetness; those parts of the reserve adjacent to the southern gravel road, to the internal gravel road, and to the eastern and western peripheral firebreaks are of fair suitability for beekeeping. As the peripheral firebreaks around the southern extension of the reserve are composed of heavy sand they are not suitable access routes for apiarists. The frequent use of heavy sand firebreaks leads to erosion and damage to vegetation. These parts of the reserve are therefore not suitable for beekeeping (Fig. 14).

13 Mailalup Nature Reserve (Reserve No. 26264)

Shire: Gnowangerup
Area: 768.2 ha
Litho: 446/80
Location No: Plantagenet 6245

a. Introduction

Mailalup Nature Reserve is located 33 km north-east of Borden and is centred on two salt lakes. The surrounding land is privately owned and has all been cleared with the exception of the central one third of the western boundary. A gravel road follows the northern boundary. Peripheral tracks extend southwards along the eastern and western boundaries, however both become impassable due to swampy conditions (Fig. 15).

The reserve is undulating with several steep laterite breakaways. Most of the soil throughout the reserve is white-grey sand with laterite gravels on the breakaways. The vegetation immediately adjacent to the lake is composed of Melaleuca sp. THICKET interspersed by areas of LOW SEDGES. On the laterite plateau surfaces the vegetation is predominantly VERY OPEN SHRUB /TREE MALLEE over HEATH A/B.

b. Nature Conservation Values

The reserve was set aside for the Conservation of Flora and Fauna, and vested in WAWA, in October 1976. The area was set aside primarily as the two salt lakes provide rest and feed for a variety of wild waterfowl, including migratory species. In addition emus and kangaroos are known to inhabit the area. The reserve also provides suitable habitat for numerous bird species and a number of small marsupials. Various types of Banksia and flowering shrubs provide suitable feed for many birds and possibly the Honey Possum (Tarsipes rostratus).

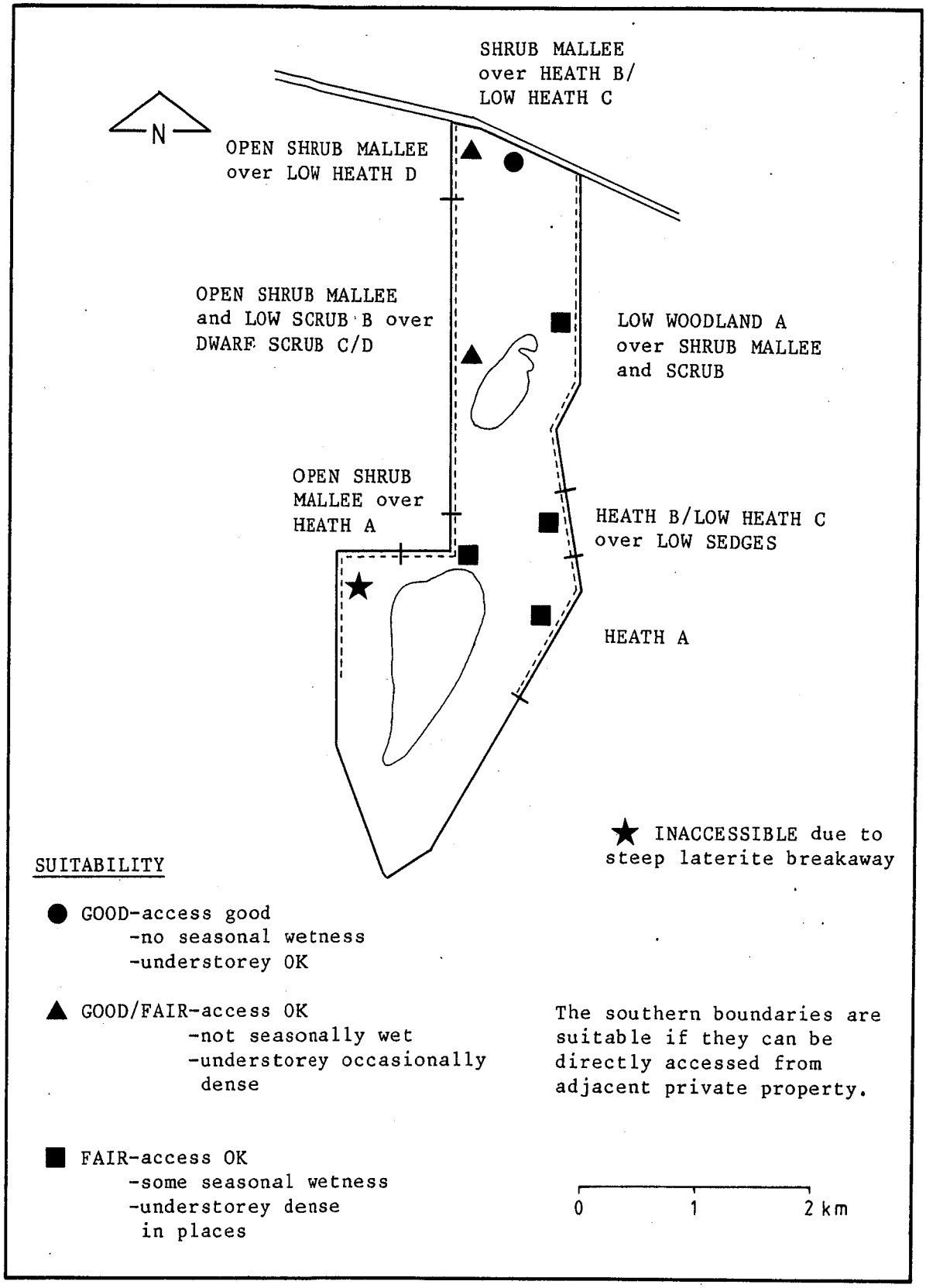


Figure 15. Suitability for beekeeping of Mailalup Nature Reserve (Reserve No. 26264).

c. Suitability for Beekeeping

Parts of the reserve immediately adjacent to the gravel road which follows the northern boundary are of good suitability for beekeeping. The northern halves of the eastern and western firebreaks are generally of fair suitability (Fig. 15). The remainder of the reserve boundary should only be considered suitable if it can be accessed directly from adjacent private property.

No apiary sites exist at present on the reserve.

14 Kulunilup Nature Reserve (Reserve No. 26677)

Shire: Cranbrook
Area: 612.0 ha
Litho: 443/80
Location No: Nelson 12683,13031.

a. Introduction

Kulunilup Nature Reserve is located 22 km west of Frankland and approximately 2 km east of Unicup Lake Nature Reserve (Reserve No. A25798). The land surrounding the reserve is privately owned and most of this remains uncleared. Gravel roads follow the western and northern boundaries, and firebreaks have been constructed around the reserve perimeter.

Kulunilup Nature Reserve is centred on Kulunilup Lake and carries an associated mosaic of vegetation. The geomorphology ranges from laterite capped low hills through white sands to clay bottomed depressions. On the higher ground an OPEN LOW WOODLAND of Marri (Eucalyptus calophylla) and Jarrah (E. marginata), occurs over an understorey varying from a THICKET/OPEN SCRUB of Black Boy (Xanthorrhoea sp.) and Hakea sp. to a LOW HEATH D of Hakea sp. and Daviesia sp. Most of the lower lying ground carries either Melaleuca sp. THICKET or Samphire LOW HEATH D/DWARF SCRUB D.

b. Nature Conservation Values

In October 1978 Kulunilup Nature Reserve was set aside for Water and Conservation of Flora and Fauna; it was vested in WAWA on the same day. The reserve was primarily set aside because of its importance as a refuge for waterbirds, and the diversity of landform and associated diversity of flora it contains.

c. Suitability for Beekeeping

Only the northern and western boundaries provide suitable access for beekeeping. The heavy sand firebreaks on the southern and eastern boundaries are accessible only by four wheel drive vehicle, and

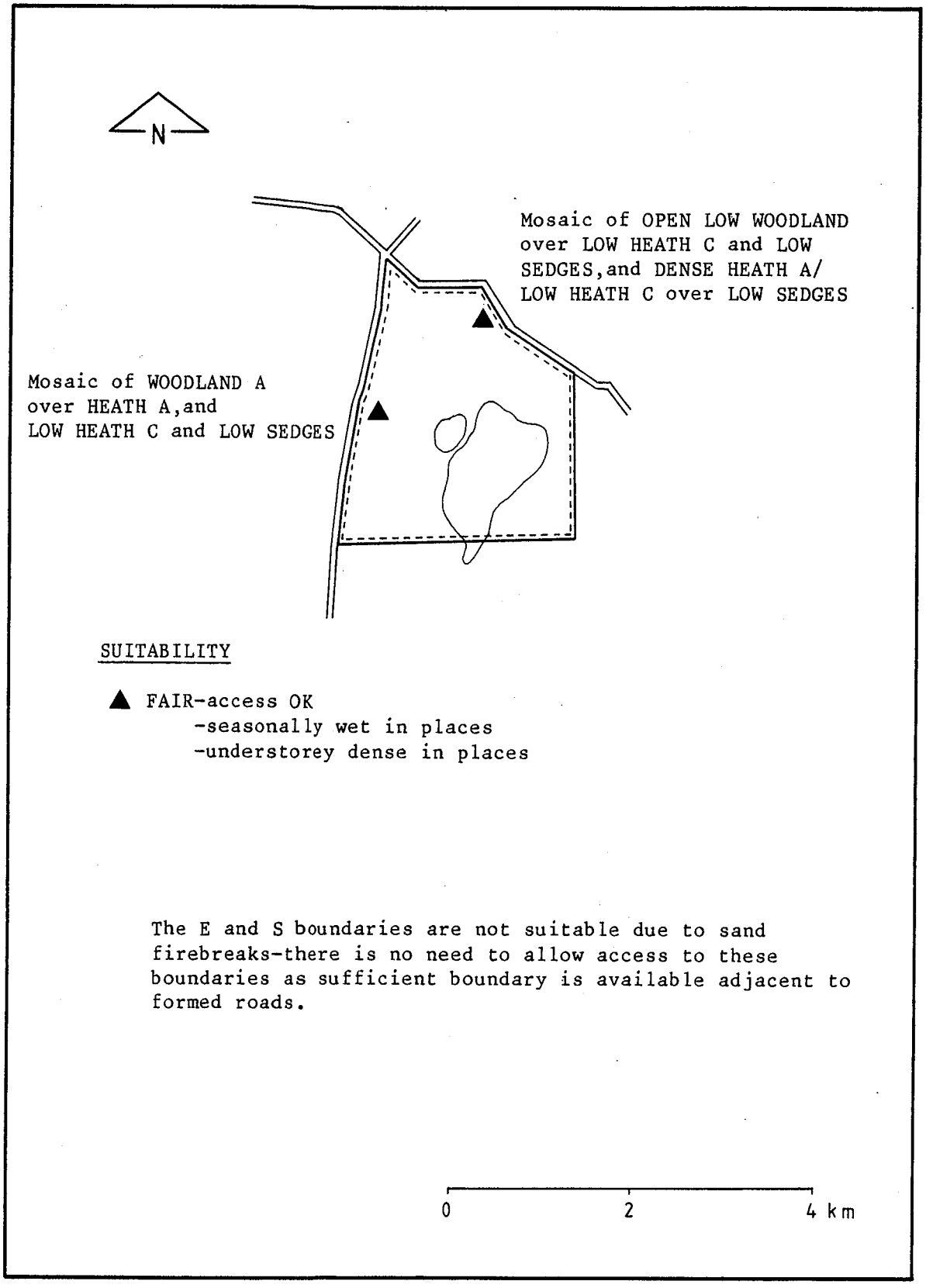


Figure 16. Suitability for beekeeping of Kulunilup Nature Reserve (Reserve No. A26677).

frequent use of such firebreaks as vehicle tracks leads to erosion and vegetation damage. The parts of the reserve immediately adjacent to the northern and western peripheral gravel roads are of fair, rather than good, suitability due to some areas of seasonal wetness and the presence of an occasionally dense understorey (Fig. 16).

No apiary sites exist at present on the reserve.

15. Arthur River Flats Nature Reserve (Reserve No. 26789)

Shire: Narrogin
Area: 1068.8 ha
Litho: 385/80
1:50 000 2331-I Peisseville
Location No: Williams 15392, 15377, 15450

a. Introduction

Arthur River Flats Nature Reserve is located 11 km east of Highbury and 22 km south-east of Narrogin, on the Arthur River. The southern and eastern boundary, eastern half of the northern boundary and southern half of the western boundary of the reserve are all adjacent to cleared privately owned land. The remaining parts of the western and northern boundaries are adjacent to Arthur River Nature Reserve (Reserve No. 26790). A gravel road passes along the easternmost boundary of the reserve, and along the easternmost portion of the southern boundary (Fig. 17).

The majority of the reserve is low lying river flats, supporting OPEN LOW GRASSES and DWARF SCRUB D (Samphire). Much of the reserve is covered by barren clay pans or shallow perennial lakes. The land around the clay pans supports occasional patches of Melaleuca sp. and Casuarina sp. THICKET. An OPEN LOW WOODLAND A of Wandoo (Eucalyptus wandoo) occurs on higher ground.

b. Nature Conservation Values

Arthur River Flats Nature Reserve was set aside for the Conservation of Flora and Fauna, and vested in WAWA, in May 1963. Reservation was principally directed at ensuring the maintenance of favoured duck shooting areas. The flats form wetlands of great value to waterfowl, for both feeding and refuge purposes. The area also has interesting associations of flora, and as such provides opportunities as a study area.

c. Suitability for Beekeeping

Those parts of the reserve accessible from the gravel road are not suitable due to seasonal wetness, with

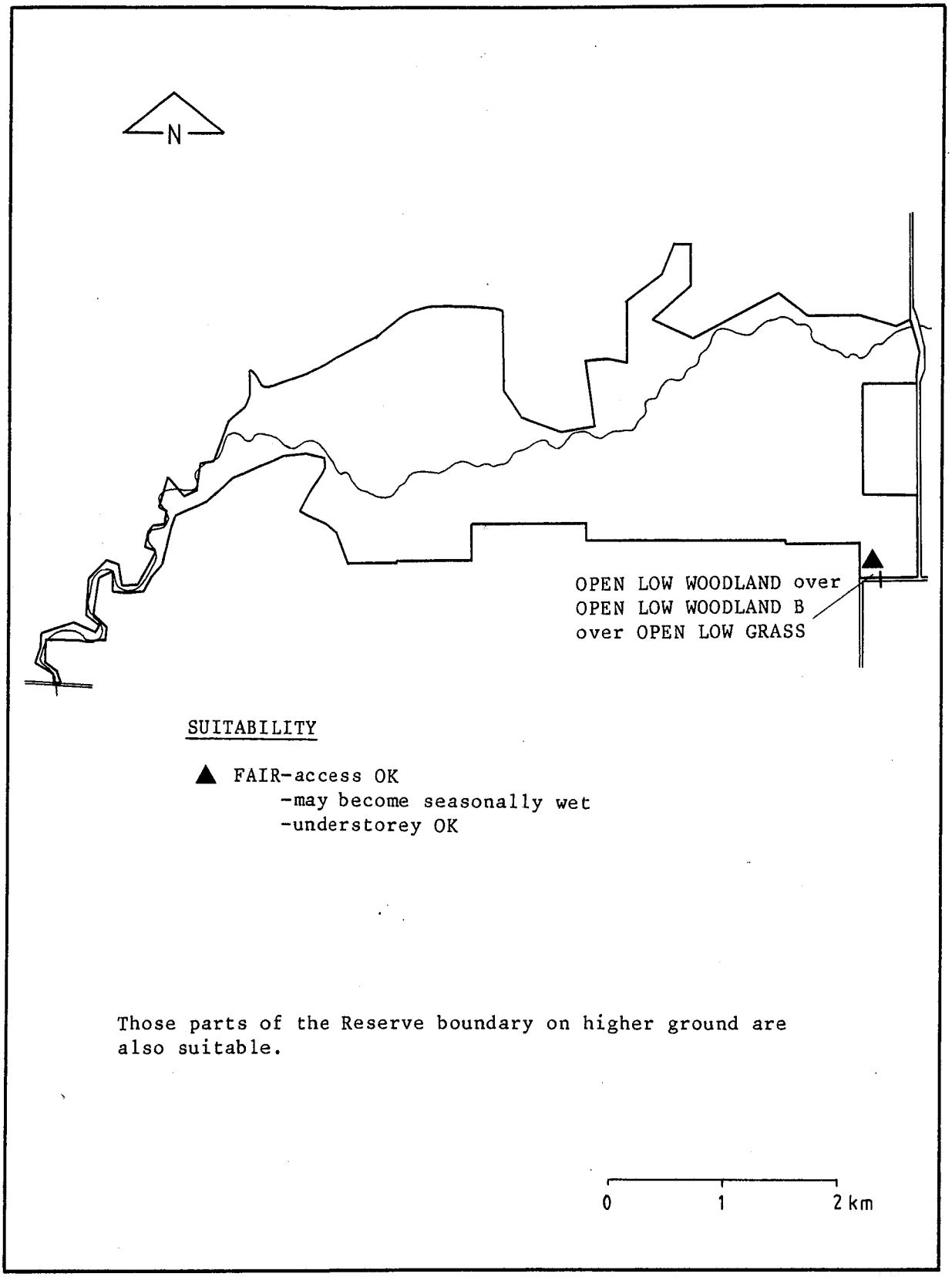


Figure 17. Suitability for beekeeping of Arthur River Flats Nature Reserve (Reserve No. 26789).

the exception of the area indicated in Figure 17. Although no peripheral firebreaks or tracks exist, those parts of the perimeter directly accessible from adjacent private property, and of high enough elevation to avoid seasonal wetness, should be considered suitable for beekeeping.

No apiary sites exist at present on this reserve.

16. Reserve No. 26792 (unnamed)

Shire: Gnowangerup
Area: 1038.9 ha
Litho: 435/80
Location No: Kent 1819

a. Introduction

The reserve is located 14 km east of Ongerup. The land surrounding the reserve is privately owned, and mostly cleared. Several blocks of uncleared land abut the eastern and western boundaries of the reserve. A sealed road linking Ongerup and Jerramungup passes along the northern boundary of the reserve. Gravel roads pass along the eastern and southern boundaries of the reserve. A track is discontinuous along the western boundary (Fig. 18).

The reserve is flat with grey, sandy soils. The vegetation is predominantly OPEN SHRUB MALLEE over LOW SCRUB A/B in the north, south and eastern parts of the reserve, and OPEN SHRUB MALLEE over LOW HEATH C in the western section. Warperup Creek originates in the north of the reserve and flows westwards.

b. Nature Conservation Values

Reserve No. 26792 was set aside for the Conservation of Flora and Fauna, and vested in WAWA, in June 1978. The primary conservation value of the reserve is the presence of good habitat and cover for fauna in the area. The habitat appears to be suitable for the Tammar (Macropus eugenii) and Mallee Fowl (Leipoa ocellata), and is sufficiently dense to provide suitable habitat for smaller animals. In addition at least five species of Eucalyptus including Hook-leaved Mallee (Eucalyptus uncinata) and Silver Mallet (E. flacata) are found on the reserve.

The reserve also protects the catchment area of Warperup Creek. It is vital that such catchment areas remain uncleared so as to minimise salinisation of the related waterbody.

c. Suitability for Beekeeping

All parts of the reserve which are immediately adjacent to the reserve boundary, and are accessible,

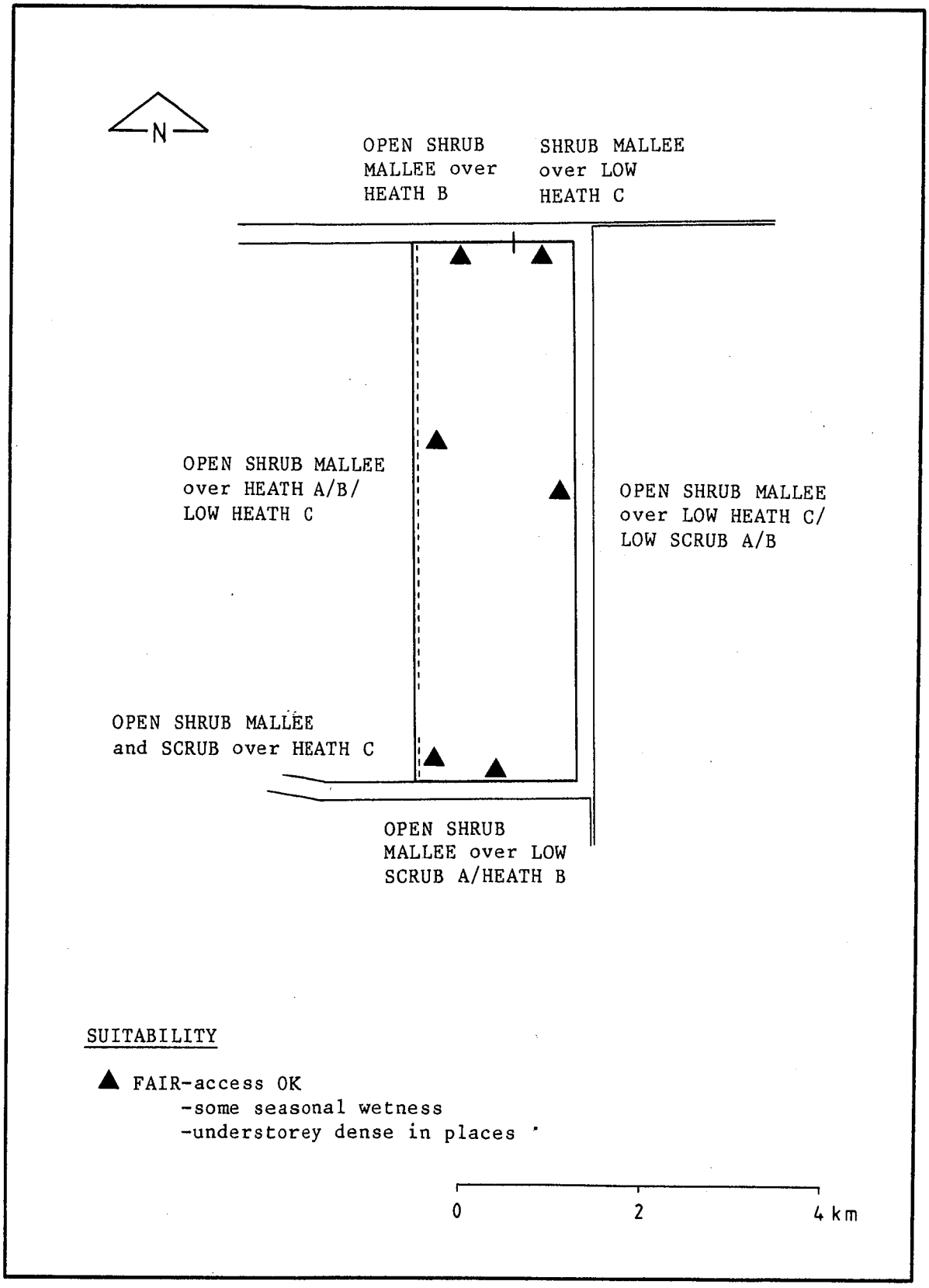


Figure 18. Suitability for beekeeping of Reserve No. 26792.

are of fair suitability (Fig. 18). A fair rather than good suitability rating was given as areas of dense understorey may limit apiary site allocation.

No apiary sites exist on the reserve.

17. Corackerup Nature Reserve (Reserve No. A26793)

Shire: Gnowangerup
Area: 4334.0 ha
Litho: 435/80
Location No: Kent 1843, 1844, 1851, 1845

a. Introduction

Corackerup Nature Reserve is located 31 km south-east of Ongerup. The surrounding land is partially cleared and privately owned. Some limited areas of uncleared bush adjacent to the reserve still remain. Gravel roads pass along the western, south-western, south-eastern and north-eastern boundaries (Fig. 19). A complete peripheral firebreak was constructed in 1977.

The reserve has a topography of rugged laterite breakaways and small intervening areas of sandplain. There are two creeks in the reserve, both of which are tributaries of the Corackerup Creek. Water probably remains in several of the deeper depressions along the creek beds throughout the year. The vegetation is predominantly SHRUB MALLEE over LOW HEATH C/D with some areas of HEATH A and HEATH B. The heath contains Casuarina sp., Calothamnus sp., Hakea sp., Petrophile sp. and Melaleuca sp.

b. Nature Conservation Values

Corackerup Nature Reserve was set aside for the Conservation of Flora and Fauna, and vested in WAWA, in March 1970. On the same day it was made "A" class. Its "A" classification was a function both of its location in the midst of cleared farmland, and its large size.

The availability of fresh water throughout the dry summer months from pools along the creek beds is of major importance to local populations of fauna. In addition to the presence of water, the reserve has good thicket cover for large fauna. The reserve contains various small fauna, including at least 13

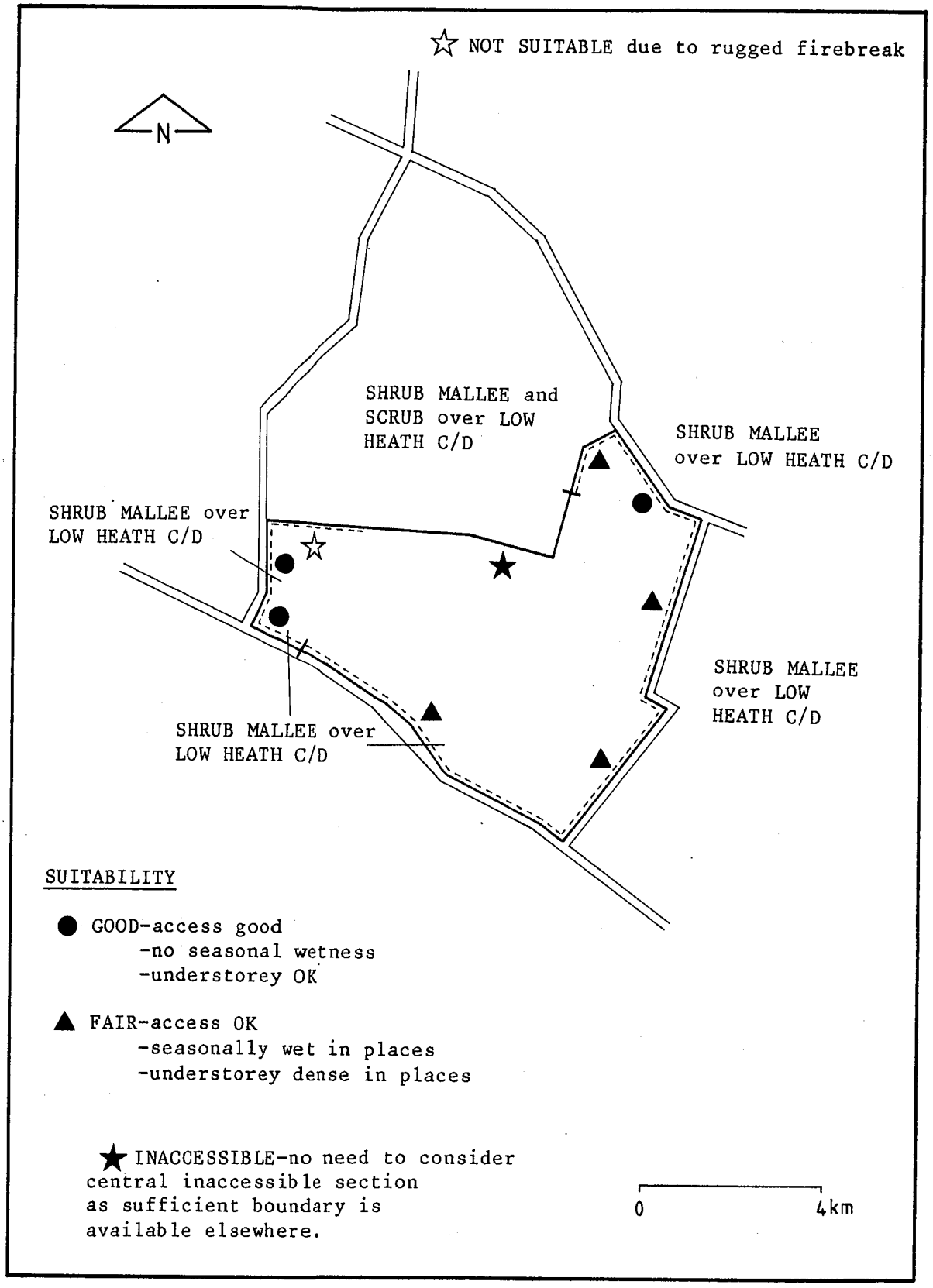


Figure 19. Suitability for beekeeping of Corackerup Nature Reserve (Reserve No. A26793).

species of birds, and at least five species of readily identifiable reptile. In addition, the presence of a permanent water supply makes the reserve an important refuge for macropods.

c. Suitability for Beekeeping

Those parts of the reserve immediately adjacent to the gravel roads which follow much of the boundary of the reserve are of fair to good suitability for beekeeping (Fig. 19). Some of these parts are of only fair suitability due to a dense understorey or indications of seasonal wetness. Much of the northern boundary of the reserve is unsuitable as it is inaccessible. The only exception is the easternmost portion which is of fair suitability (Fig. 19).

No apiary sites exist at present on the reserve.

18. East Yuna Nature Reserve (Reserve No. A29231)

Shire: Chapman Valley
Area: 1446 ha
Litho: 161/80, 156/80
Location No: Victoria 6827, 7323, 9717

a. Introduction

East Yuna Nature Reserve is located 22 km south-east of Yuna and approximately 70 km north-east of Geraldton. The land surrounding the reserve is privately owned except for the central section of the northern boundary, where the northern boundary of the reserve and the southern boundary of Reserve No. 28415 are concurrent; and the southernmost section of the southern boundary, where a water reserve (Reserve No. 265A) abuts the reserve boundary. All the private land adjacent to the reserve is cleared with the exception of several small areas on the eastern, northern and southern boundaries. A gravel road cuts through the reserve from east to west, and another gravel road follows most of the western boundary (Fig. 20). The reserve has a peripheral firebreak system, but it is difficult to traverse using a four wheel drive vehicle.

The reserve occupies a tract of country which is higher than the surrounding country. A spectacular breakaway runs through the north of the reserve; in places part of the breakaway is circular and resembles gorges. The reserve is a watershed for Wandin Creek, which flows along the western boundary of the reserve. Greenough River flows past the southern boundary of the reserve.

The breakaway plateau carries shallow soils with varying amounts of lateritic gravel, while the

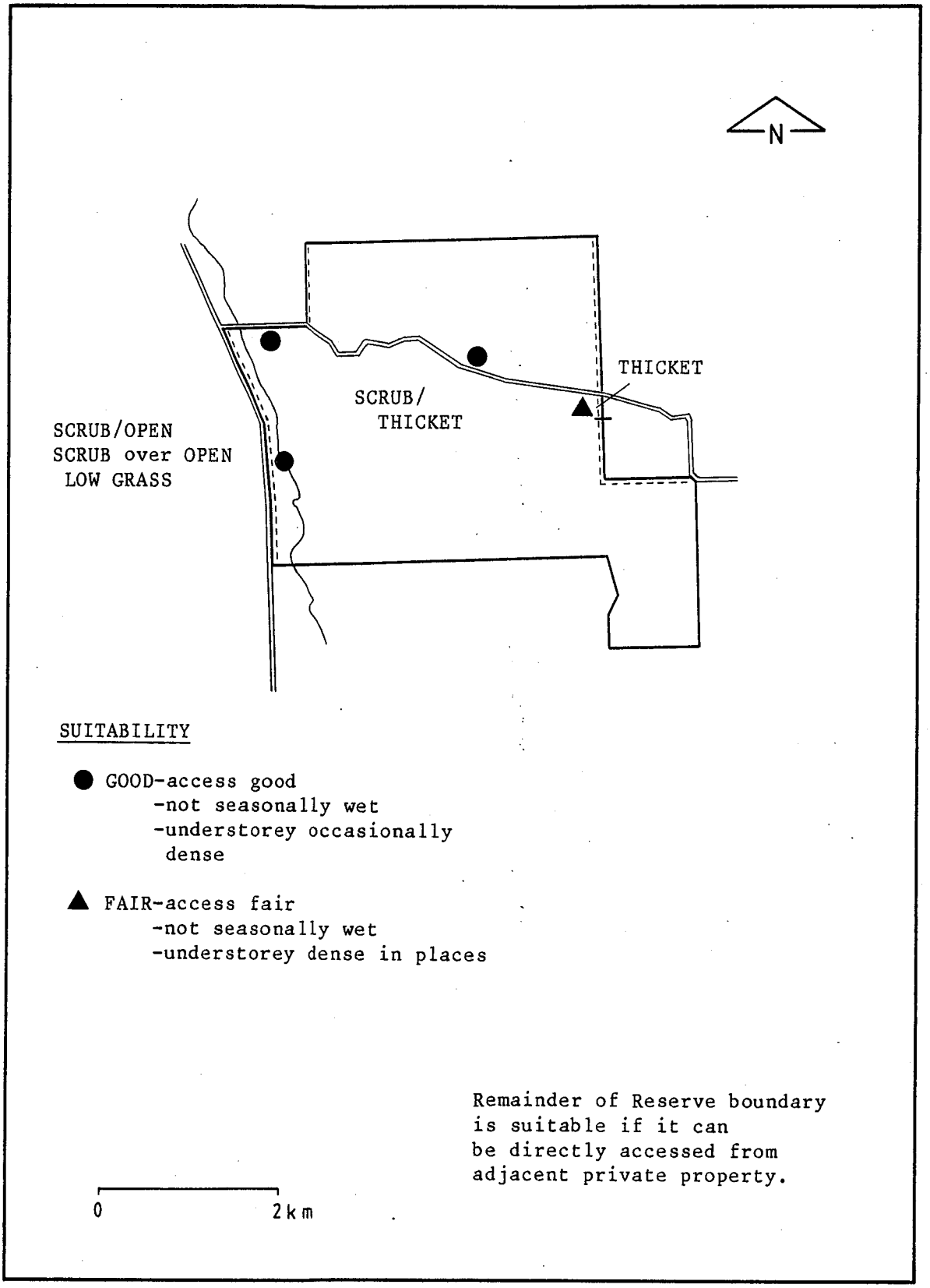


Figure 20. Suitability for beekeeping of East Yuna Nature Reserve (Reserve No. A29231).

breakaway slopes are composed of yellow sand. The western part of the reserve, adjacent to Wandin Creek, has red, loamy soils. Most of the reserve is covered by SCRUB, which becomes taller in the more protected areas below the breakaway plateau surface. The SCRUB becomes OPEN SCRUB in the western part of the reserve and an understorey of OPEN LOW GRASS appears.

b. Nature Conservation Values

East Yuna Nature Reserve was set aside in September 1970 for the Conservation of Flora and Fauna, and vested in WAWA in November of the following year. It was made "A" class in April 1980. Reservation and the "A" classification were based on the area's numerous conservation values. The reserve is rich in floral species and its vegetation is representative of the coastal heath-shrubland transitional zone; an association which has been poorly preserved. The reserve contains 233 species of wildflowers, chiefly Thryptomenes, Baeckeas, Eucalypts, Melaleucas, Acacias and some rare species which are associated with the vegetation characteristic of the area. The reserve also contains spectacular scenery containing rugged gorge-like breakaways. This reserve and adjoining Reserve No. 28415 have apparently not been burnt for some years which is unusual for nature reserves in the south-west of Western Australia.

East Yuna Nature Reserve, as part of a corridor of reserves which includes East Yuna Nature Reserve (Reserve No. A28415) and Bindoo Hill Nature Reserve (Reserve No. A30844), provides habitat and refuge for fauna. Together, the reserves provide refuge for migratory and nomadic bird species, and nesting sites for the resident bird population.

East Yuna Nature Reserves are richer, in terms of their reptile and frog fauna, than reserves elsewhere in the wheatbelt (Dell et al. 1981). This richness is due to two faunas, the south-west and eremaean, coming into contact.

c. Suitability for Beekeeping

Those parts of the reserve immediately adjacent to formed roads are of good suitability for beekeeping (Fig. 20). However in several places, primarily adjacent to the east-west orientated formed road, the understorey is dense and will place limitations on apiary site allocation. Approximately 300 m of the eastern firebreak, immediately to the south of where the east-west orientated road leaves the reserve, is of fair suitability (Fig. 20).

Those parts of the reserve periphery directly accessible from adjacent property should also be

considered as suitable for beekeeping, as long as sand firebreaks are not used as vehicle access tracks.

No apiary sites exist at present on the reserve.

19. East Eneabba Nature Reserve (Reserve 29806).

Shire: Carnamah
Area: 2891.8 ha
Litho: 94/80
1:50 000 1938-II Eneabba
Location No: Victoria 10902

a. Introduction

The reserve is located 20 km north east of Eneabba, and the Eneabba-Three Springs Road passes along the southern boundary of the reserve. A formed road also passes along the western boundary of the reserve.

The land surrounding the reserve is privately owned. The land adjacent to the western boundary is cleared, and most of the land adjacent to southern and south-eastern boundary is cleared or partially cleared. The land adjacent to the northern, north western and north eastern boundaries is uncleared. The reserve has a complete peripheral firebreak.

The vegetation throughout the reserve is a combination of HEATH A and LOW HEATH C/D. It contains a diversity of species including Dryandra, Calothamnus, Hakea, Banksia, Casuarina, Isopogon, Eremaea, Eucalyptus and Banksia menziesii. Eucalyptus todtiana and Blackboys (Xanthorrhoea sp.) are emergent in places. The soils throughout the reserve are deep white sands, with some patches of lateritic gravel.

b. Nature Conservation Values

East Eneabba Nature Reserve was set aside for the Conservation of Flora and Fauna, and vested in WAWA, in December 1977. This area was reserved primarily as it provides a good cross-section of the wildflowers and other vegetation common to the Eneabba district. The diversity of flowering plant species found on the reserve support numerous species of nectivorous birds and probably several nectivorous small marsupials.

c. Suitability for Beekeeping.

Those parts of the reserve immediately adjacent to the gravel roads which pass along the western and southern boundaries are of good suitability for beekeeping (Fig. 21). In contrast the sandy nature of the northern and north-eastern firebreaks makes them unsuitable apiary site access routes. Frequent

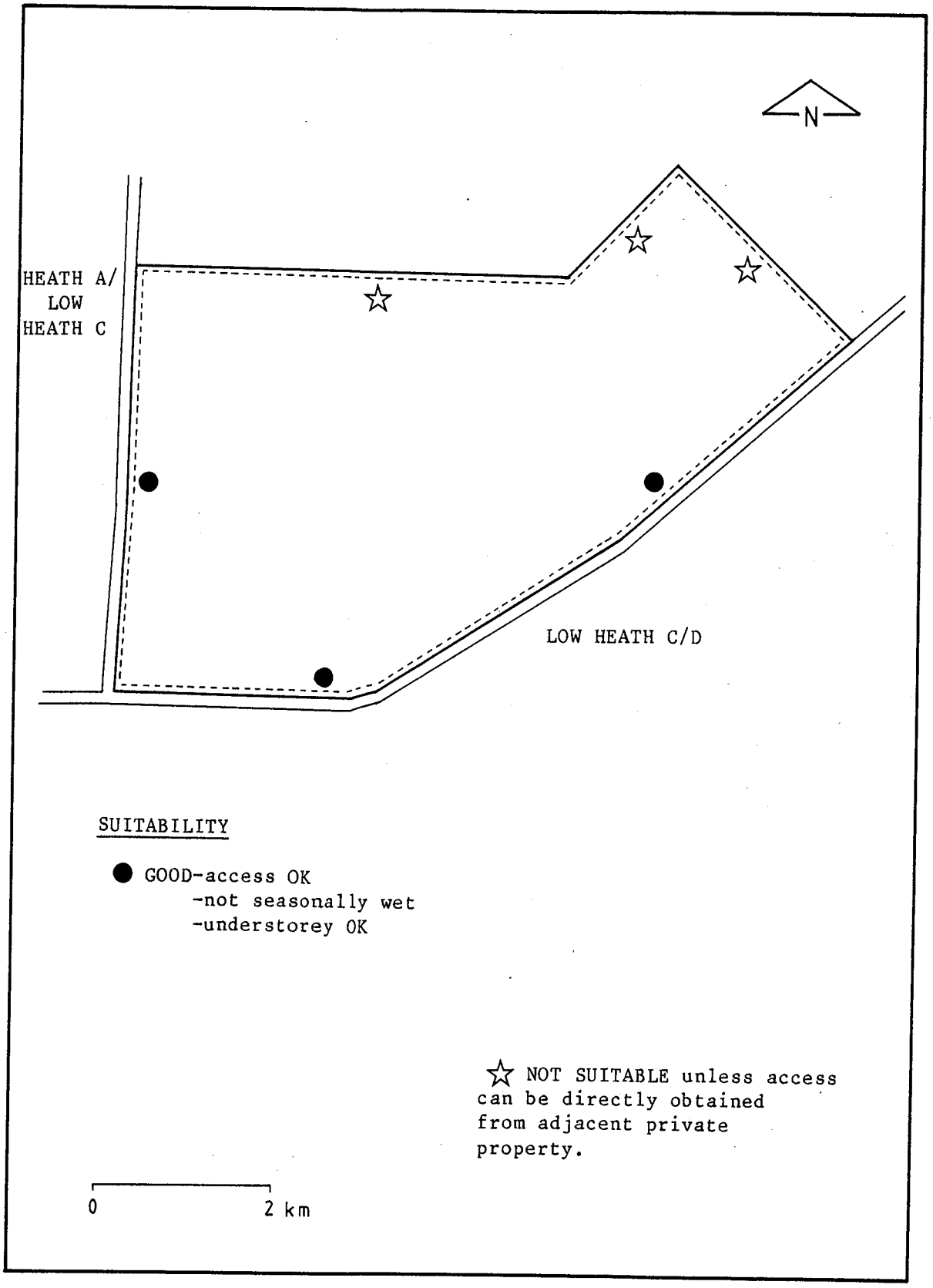


Figure 21. Suitability for beekeeping of East Eneabba Nature Reserve (Reserve No. 29806).

use of sand firebreaks as vehicle tracks is not desirable as it leads to erosion and damage to vegetation. However, if access can be obtained directly to the reserve boundary from adjacent private property then the area concerned should be considered suitable for beekeeping.

Four apiary sites exist at present on the reserve. Of these only one (Permit No. 4142) is located sufficiently close to the reserve perimeter so as to satisfy WAWA guidelines. Once the remaining three apiary site permits expire they should be renewed only if the apiarists concerned agree to relocate the proposed sites close to the reserve boundary. Figure 21a indicates the location, permit number and permit expiry date of current apiary sites on the reserve.

One apiary site outside the reserve is located less than three kilometres south-west of the south-west corner of the reserve (Fig. 21a) and as such must be taken into consideration in the allocation of sites in the south-western corner of the reserve.

20. Kundip Nature Reserve (Reserve No. 31128)

Shire: Ravensthorpe
Area: 2170.2 ha
Litho: 421/80
Location No: Oldfield 1216, 1215, 1352

a. Introduction

Kundip Nature Reserve is located 22 km south-east of Ravensthorpe. The northern and southern sections of the reserve are separated by Jerdacuttup North Road, and the Hopetoun-Ravensthorpe Road passes along the western boundary of the southern portion of the reserve (Fig. 22). The reserve is not firebreaked. The land surrounding Kundip Nature Reserve is uncleared, with the exception of a small area adjacent to the westernmost boundary of the reserve. To the south of the reserve the land is privately owned, while the land to the north is Crown land.

Kundip Nature Reserve is located on laterite upland at the southern end of the Ravensthorpe Range, an area of great botanical interest. The range is a series of low hills of Precambrian granite, migmatite, gneiss and greenstone. Tributaries of the Ravensthorpe River cut through the reserve in an east-west direction. The vegetation on the reserve is predominantly SHRUB MALLEE with some areas of DENSE SHRUB MALLEE. The soils throughout the reserve are laterite derived with significant quantities of laterite gravel.

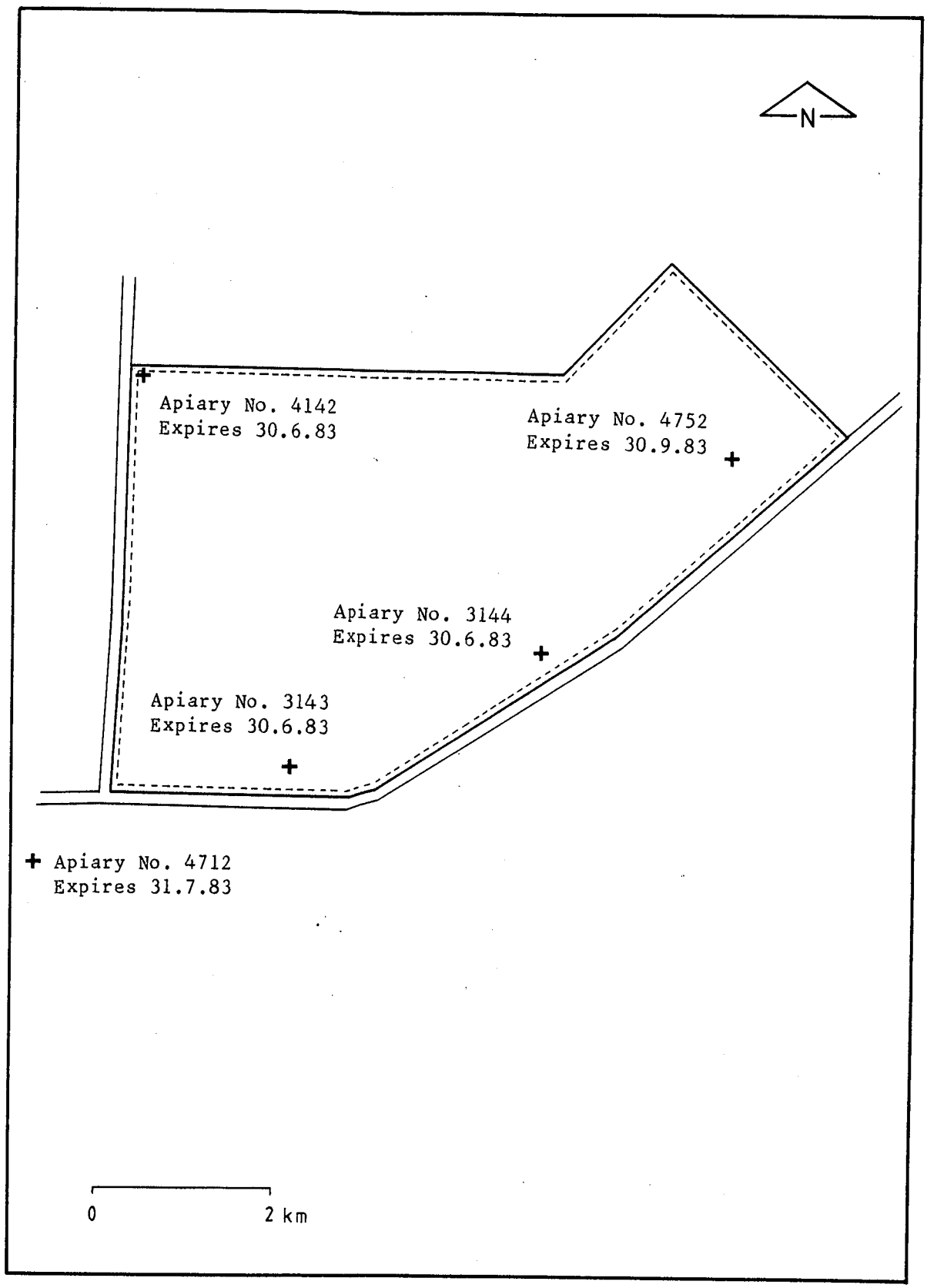


Figure 21a. Location of apiary sites on East Eneabba Nature Reserve.

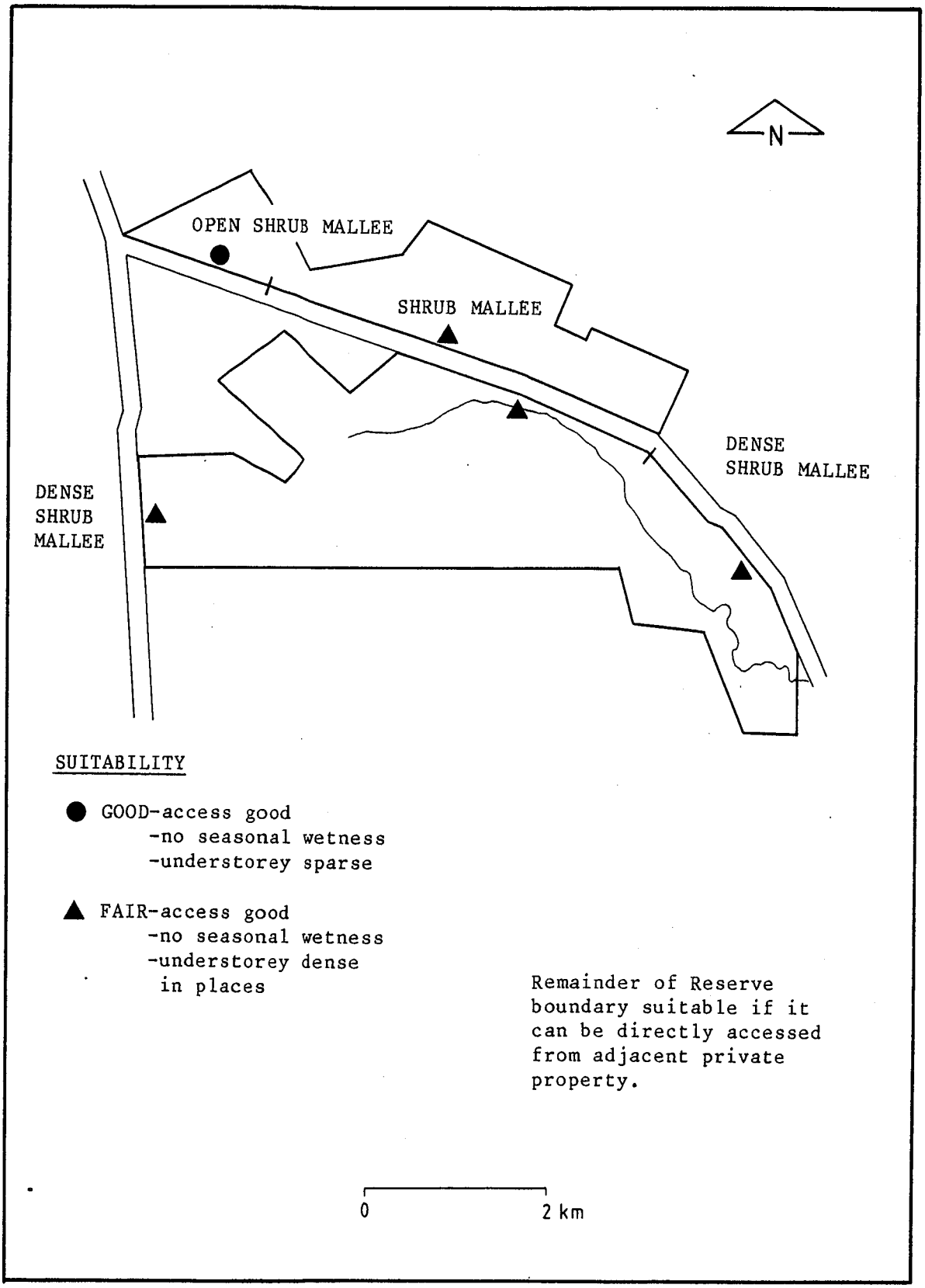


Figure 22. Suitability for beekeeping of Kundip Nature Reserve (Reserve No. 31128).

b. Nature Conservation Values

Kundip Nature Reserve was set aside for the Conservation of Flora and Fauna, and vested in WAWA, in June 1980. This followed a recommendation in May 1977 by the Environmental Protection Authority (EPA) that the reserve be set aside for the Conservation of Flora and Fauna and vested in WAWA.

The Conservation Through Reserves Committee of the EPA reported that "the flora of the range and its immediate vicinity is very rich and contains many species not known from the surrounding county. Some are endemic, others are common here, but rare elsewhere - endemic species include Eucalyptus megacornuta, Eucalyptus desmondensis, E. stoatei, Boronia ternata var elongata, Grevillea fulgens, Banksia laevigata subsp. nov., Guichenotia apetala and several as yet unnamed species of Acacia. Rare species include Beaufortia orbifolia, Hybanthus floribunda subsp. adpressus, Scaevola myrtifolia and Hakea verrucosa. There are many orchids and more than 20 eucalyptus species occur in the area." The EPA concluded that Kundip Nature Reserve occupied a "unique biological niche in the State ....very different from the Fitzgerald River National Park."

c. Suitability for Beekeeping

Those parts of the reserve adjacent to roads are of fair to good suitability for beekeeping (Fig. 22). None of the reserve boundaries are firebreaked and therefore are not suitable for beekeeping unless access to the reserve boundary can be obtained directly from adjacent private property.

Four apiary sites exist at present on the reserve, of these two only (Permit Nos. 2726 and 4312) are located sufficiently close to the reserve perimeter so as to satisfy WAWA guidelines (Fig. 22a). Once the other two apiary site permits expire (Permit Nos. 2730 and 2675) they should be renewed only if the apiarists concerned agree to relocate the proposed sites so as they are directly adjacent to the North Jerdacuttup Road.

The close proximity of two apiary sites outside, but within three kilometres of, the reserve boundary should be taken into consideration in any future allocation of apiary sites (Fig. 22a).

21. Reserve No. 31424 (unnamed)

Shire: Ravensthorpe
Area: 2936.4 ha
Litho: 405/80
Location No: Kent 1972

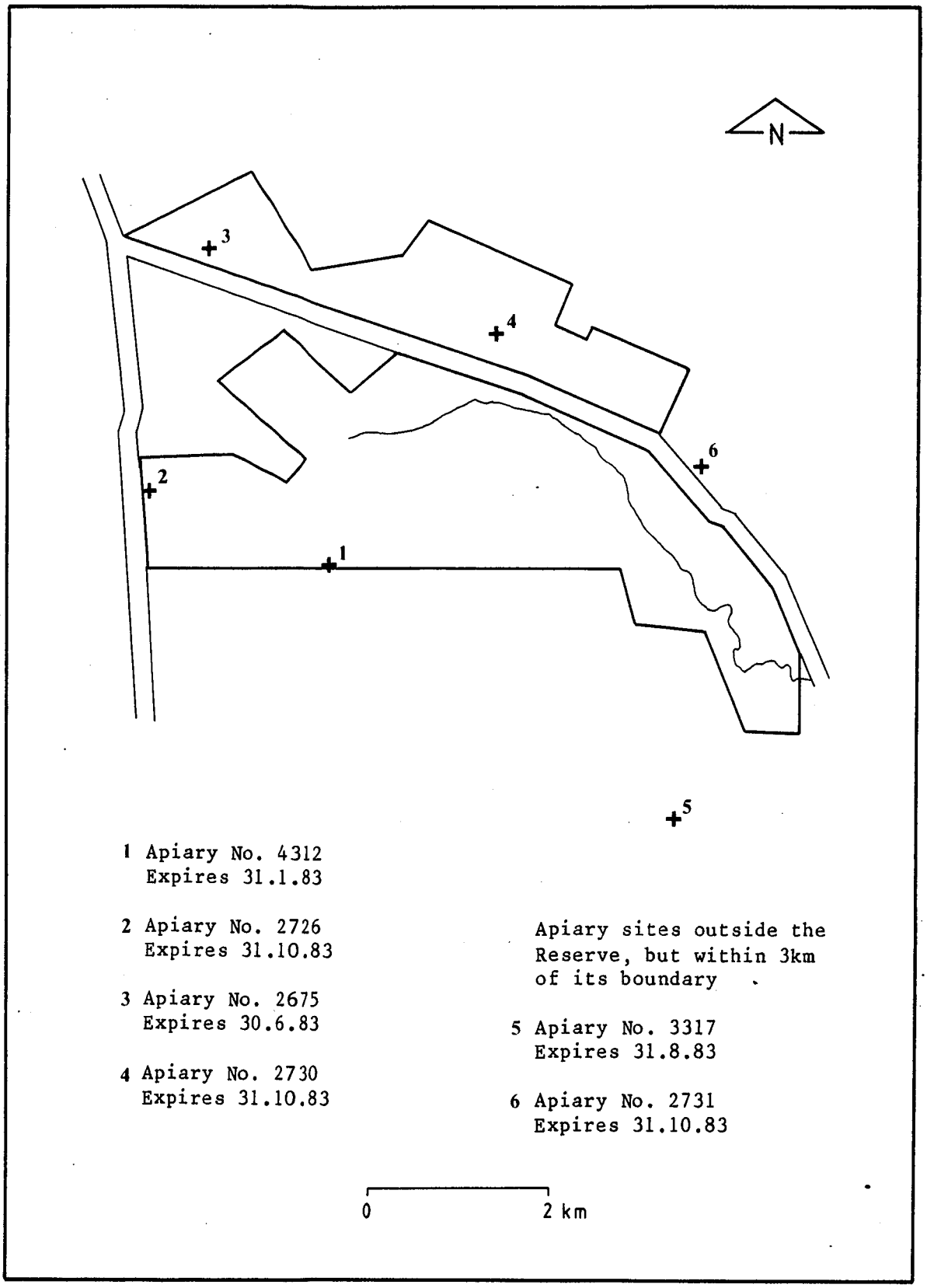


Figure 22a. Location of apiary sites on Kundip Nature Reserve.

a. Introduction

Reserve No. 31424 is located approximately 33 km north-west of Ravensthorpe. The reserve is surrounded by private land, much of which has been cleared for cropping and/or grazing. Gravel roads pass along part of the north-western, and part of the north-eastern, boundaries (Fig. 23). The reserve has a comprehensive system of firebreaks.

The reserve is composed of undulating sandplain including one small perennial salt lake, and several very small timbered depressions which contain water during winter. The vegetation is LOW HEATH D interspersed by areas of SHRUB MALLEE.

b. Nature Conservation Values

The reserve was set aside in July 1972 for the Conservation of Flora and Fauna, and vested in WAWA in February, 1978. The area was reserved primarily because of its value as a refuge for fauna, and also for the attractive show of wildflowers that the area presented in the spring. The reserve is an important feeding site and refuge area for a number of resident, transitory and migratory bird species.

c. Suitability for Beekeeping

Most parts of the reserve adjacent to the reserve boundary are of good suitability for beekeeping. The only exception is the central section of the southern break where the heavy sandy nature of the peripheral sandbreak makes it unsuitable for use as a vehicle track (Fig. 23). Upon receiving any application for an apiary site on this section of the southern boundary, the apiarist should be advised that the only available access is through adjacent private property.

22. Wanagarren Nature Reserve (Reserve No. 31675)

Area: 11137.5 ha
Shire: Dandaragan
Litho: 59/80
1:50 000 1936-I Wongonderrah
Location No: Melbourne 3980

a. Introduction

Wanagarren Nature Reserve is located approximately 150 km north-north-west of Perth, and lies on the coast between the Commonwealth controlled naval artillery range to the south and Nambung National Park in the north. The eastern boundary adjoins largely undeveloped pastoral leasehold and private land. With the exception of the promontory leading to Wedge Island the western boundary follows the line

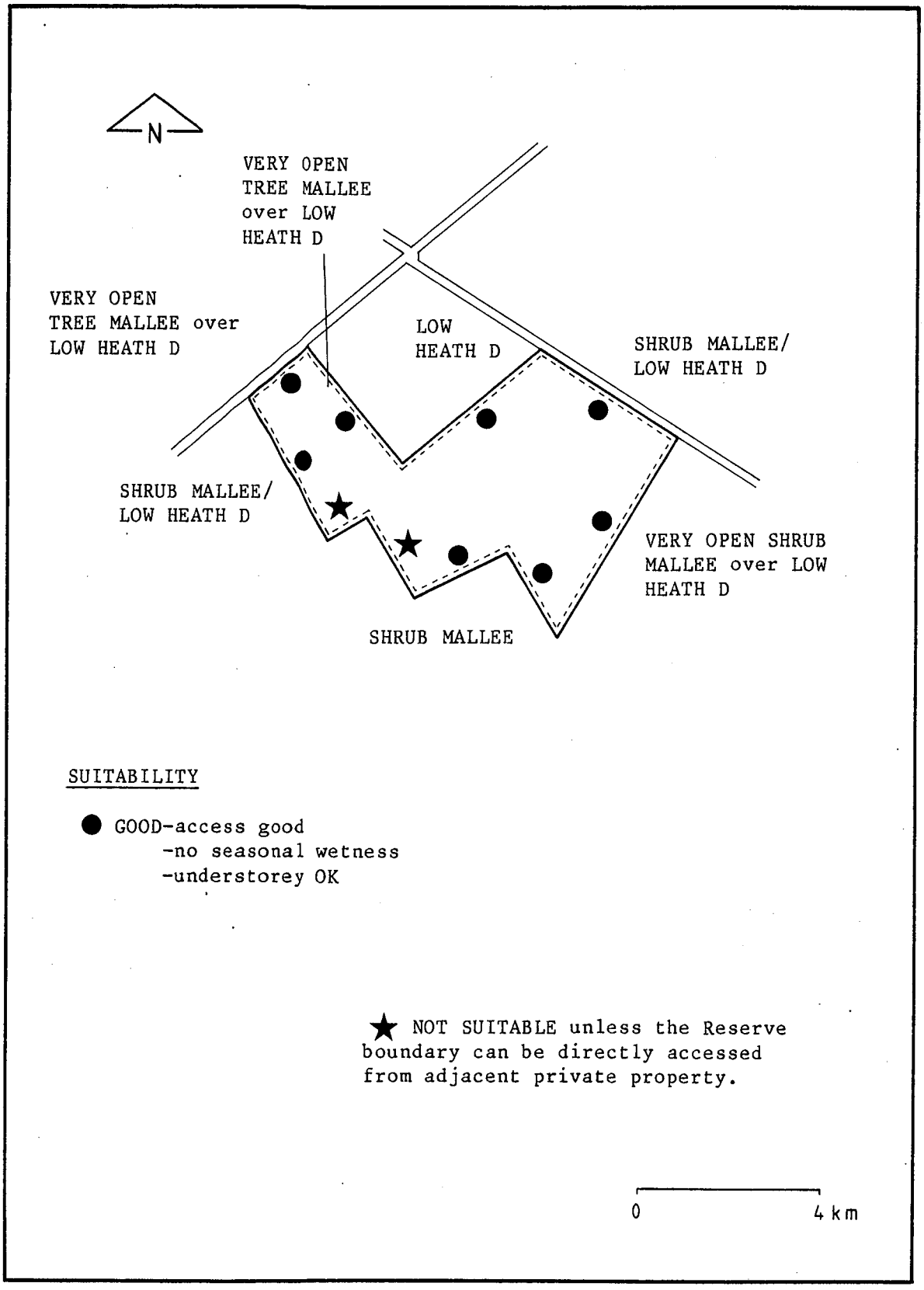


Figure 23. Suitability for beekeeping of Reserve No. 31424.

of the coast. At present there are no gazetted roads on the reserve, however two well used, unformed roads pass through the reserve. These are the north-south orientated Green Islets - Wedge Island Track and the east-west orientated Wedge Island - Lancelin Track (Fig. 24). No perimeter firebreaks exist.

The topography of the reserve varies from gently rolling plains and mobile dunes of the Quindalup Dune System to a succession of stable dunes and steeper hill country of the Spearwood Dune System further inland. Surface outcrops of limestone are a common feature of this landscape and adjacent to the coast erosion of the surface sands has, in some areas, resulted in exposure of the underlying limestone with an accompanying increase in the ruggedness of the coastal topography.

Most of the reserve supports a LOW HEATH C/D with stunted Christmas Trees (Nuytsia floribunda) scattered throughout. These heaths extend into the more rugged limestone hill country near the eastern boundary where Banksia woodlands occur in the upper valleys. The lower, drier reaches of the same valleys have numerous Blackboys (Xanthorrhoea sp.) emergent. The low heath association, with Acacia sp. and Eremaea sp. dominant, extends into the coastal belt of dunes.

b. Nature Conservation Values

Wanagarren Nature Reserve was set aside for the Conservation of Flora and Fauna, and was vested in WAWA, in December 1972. Reservation was based primarily on the recognition of the reserve as a major site of representation of the sequence of coastal ecosystems in this part of the northern sandplains (Crook et al. 1982). It takes in good representative areas of both the Quindalup and Spearwood Dune Systems; the former including unconsolidated mobile dunes, while both systems contain a variety of limestone outcrops.

The second major value of this reserve is for public use associated with such a stretch of remote, undeveloped and rugged coastline.

c. Suitability for Beekeeping

Those parts of the reserve adjacent to major limestone tracks as indicated in Figure 24, and adjacent to the reserve boundaries, excluding the coastline, are of fair to good suitability for beekeeping. The recently consolidated coastal dunes, which are a feature of the reserve coastline, are unsuitable for apiary sites as any vehicular movement may lead to degradation of the vegetation and associated erosion. In addition the coastline is the

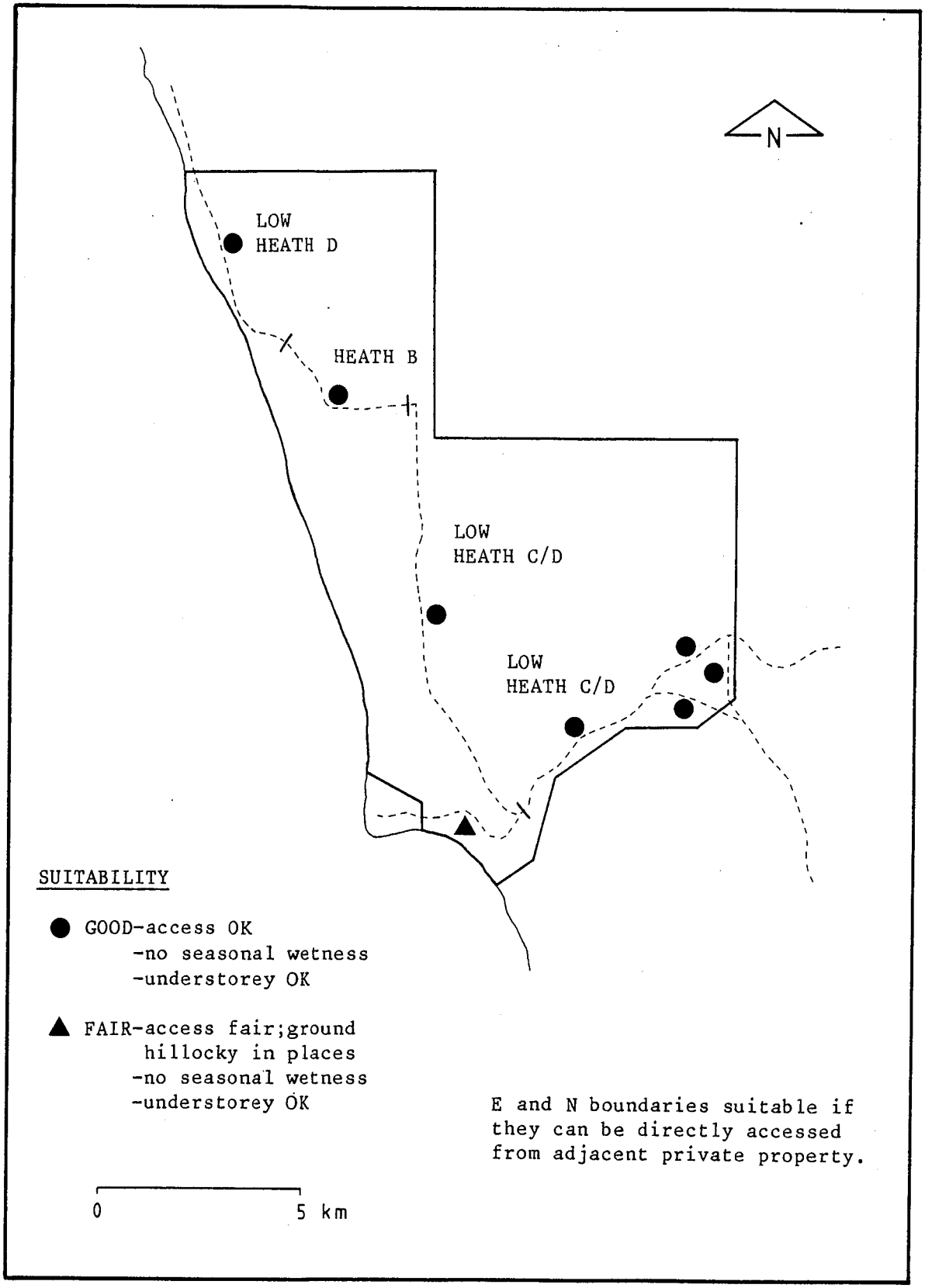


Figure 24. Suitability for beekeeping of Wanagarren Nature Reserve (Reserve No. 31675).

focal point of public use on the reserve.

Other tracks apart from those indicated in Figure 24 should not be used as access routes to apiary sites as vehicular movement into the body of the reserve leads to disturbance of the environment and makes it difficult to monitor and police apiarist activity. As the reserve has no peripheral firebreaks its boundary should only be considered suitable for beekeeping if it can be directly accessed from adjacent property.

There are nine apiary sites on the reserve at present (Fig. 24a); the location of four of these (Permit No.s 2845, 3894, 877 and 4860) contravenes the Authority's policy, as they are not adjacent to the reserve boundary or designated roads. Once these permits expire they should only be renewed if the sites are relocated adjacent to the boundary of the reserve or to the tracks indicated in Figure 24.

23. Nilgen Nature Reserve (Reserve No. 31781)

Area: 5569.0 ha
Shire: Gingin
Litho: 30/80 59/80
1:50 000 1935-I Lancelin
Location No. Swan 4798, 10171

a. Introduction

Nilgen Nature Reserve is located 125 km north-north-west of Perth, between the Commonwealth controlled naval artillery range to the north and the township of Lancelin to the south. The land to the east and south of the reserve is privately owned, while the Indian Ocean forms the western boundary of the reserve. The land to the south of the reserve is used for grazing, as is the land adjacent to most of eastern boundary. The land adjacent to the remainder of the eastern boundary and the north-eastern boundary is subdivided into small rural blocks.

Numerous tracks cut through the reserve. The Wedge Island - Lancelin track runs north-south through the reserve and is intersected in the south of the reserve by a gazetted road running in from the east (Sapper Road). A major track links the western side of the subdivision with Sapper Road. Numerous other minor tracks cut through the reserve. A peripheral firebreak follows the eastern and north-eastern boundaries. A formed road follows part of the eastern boundary (Fig. 25).

The reserve has an undulating topography composed of the Bassendean, Quindalup and Karrakatta dune systems. This complex includes both coastal and inland mobile dune systems. The vegetation

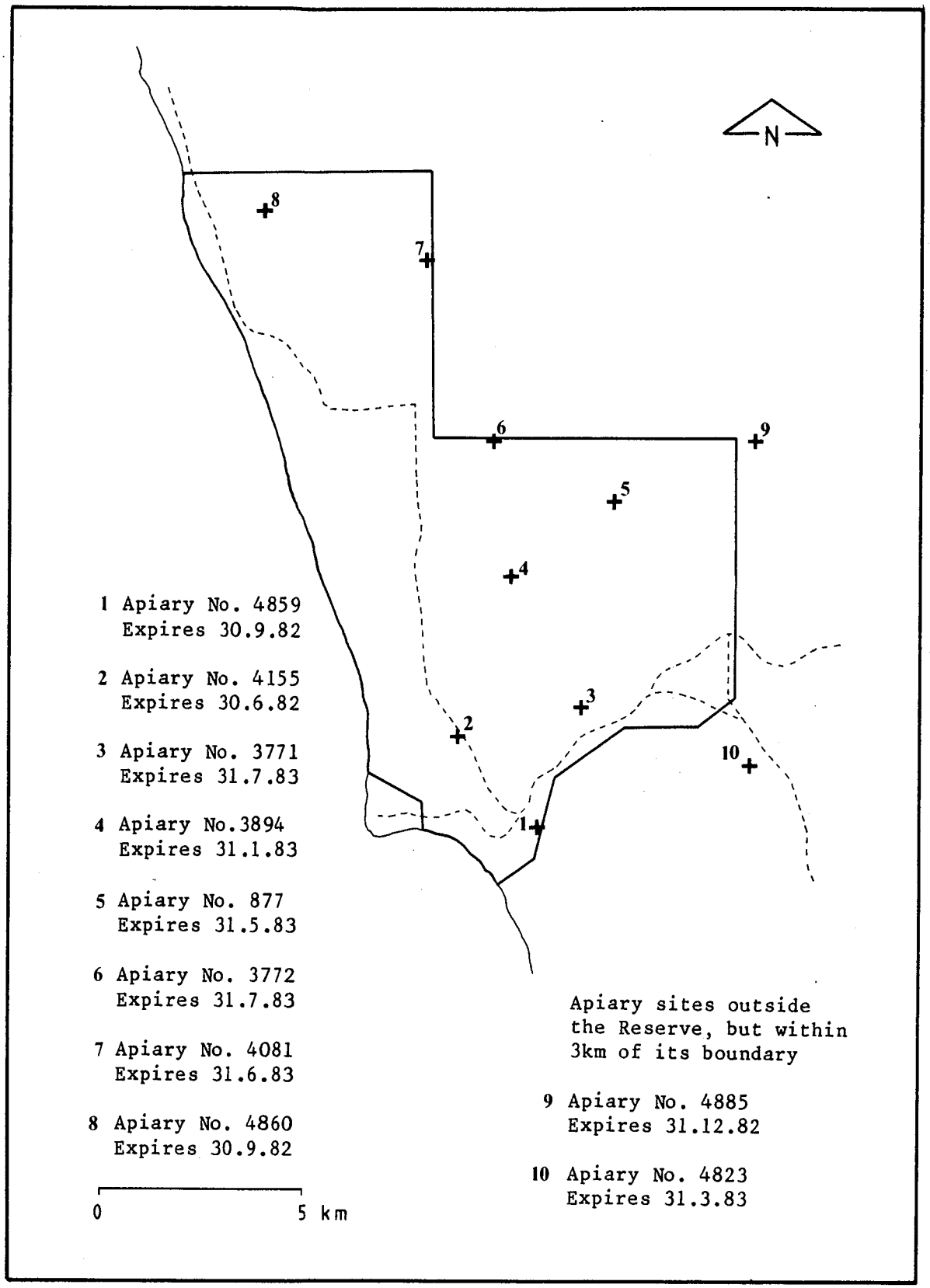


Figure 24a. Location of apiary sites on Wanagarren Nature Reserve.

throughout the reserve is predominantly LOW HEATH C/D with occasional scattered Eucalyptus todtiana, Banksia attenuata and Nuytsia floribunda. The vegetation is taller and denser in the moister protected swales between the north-south orientated longitudinal dunes, and the vegetation also increases in height as one moves eastward away from the coast.

b. Nature Conservation Values

Nilgen Nature Reserve, like Wanagarren Nature Reserve (Reserve No. 31675), contains a representative sample of the coastal dune systems. Nilgen was set aside for the Conservation of Flora and Fauna, and vested in WAWA, in February 1973. The reservation of these two areas has ensured that flora representative of the northern coastal dune systems is adequately conserved.

Similarly to Wanagarren, Nilgen is important in terms of public use. The coastline encompassed by the reserve is used for many passive forms of public use including fishing, boating, swimming and picnicking.

c. Suitability for Beekeeping.

Those parts of the reserve adjacent to major tracks, as indicated in Figure 25, to the eastern and north-eastern reserve boundaries, and to the eastern boundary formed road are of good suitability for beekeeping. Like Wanagarren Nature Reserve, the fragile dune system and the importance of public use means that the coastline is unsuitable for apiary site allocation.

Again, similarly to Wanagarren, tracks apart from those indicated in Figure 25 should not be used as vehicular access routes. This will minimise disturbance to the environment and reduce the need for policing and monitoring apiarist activity.

There are seven apiary sites on the reserve (Fig. 25a). Two of these sites (Permit No.s 773 and 3662) contravene the Authority's policy as they are not adjacent to the reserve boundary or to designated roads. When these permits expire they should not be renewed unless the sites are relocated.

The northern and southern boundaries of the reserve are not suitable for beekeeping as they are inaccessible.

24. Lake Warden Nature Reserve (Reserve No. A32257)

Area: 709.7 ha
Shire: Esperance
Litho: 423/80
1:50 000 3230-II Esperance
Location No: Esperance (un-numbered location)

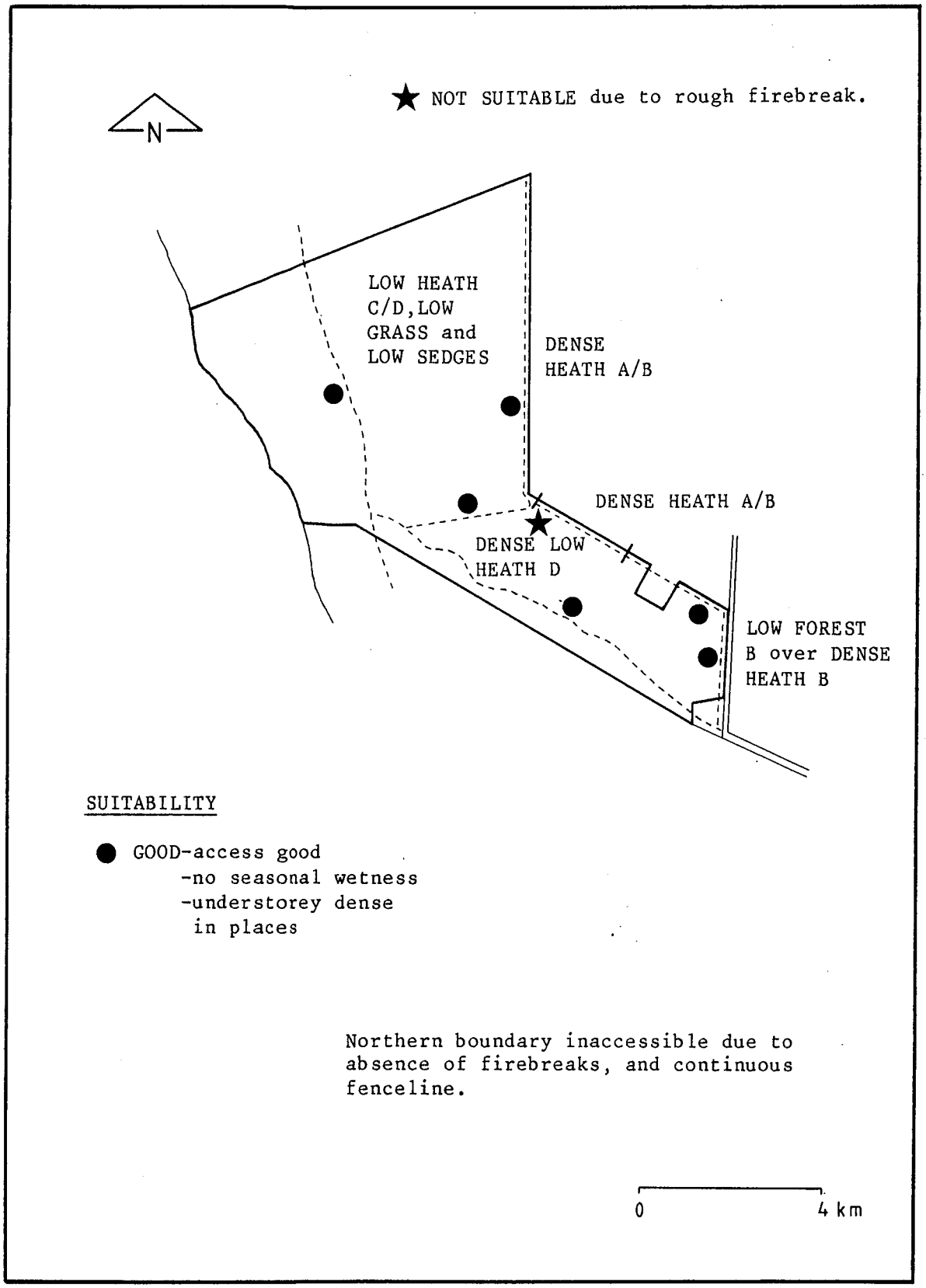
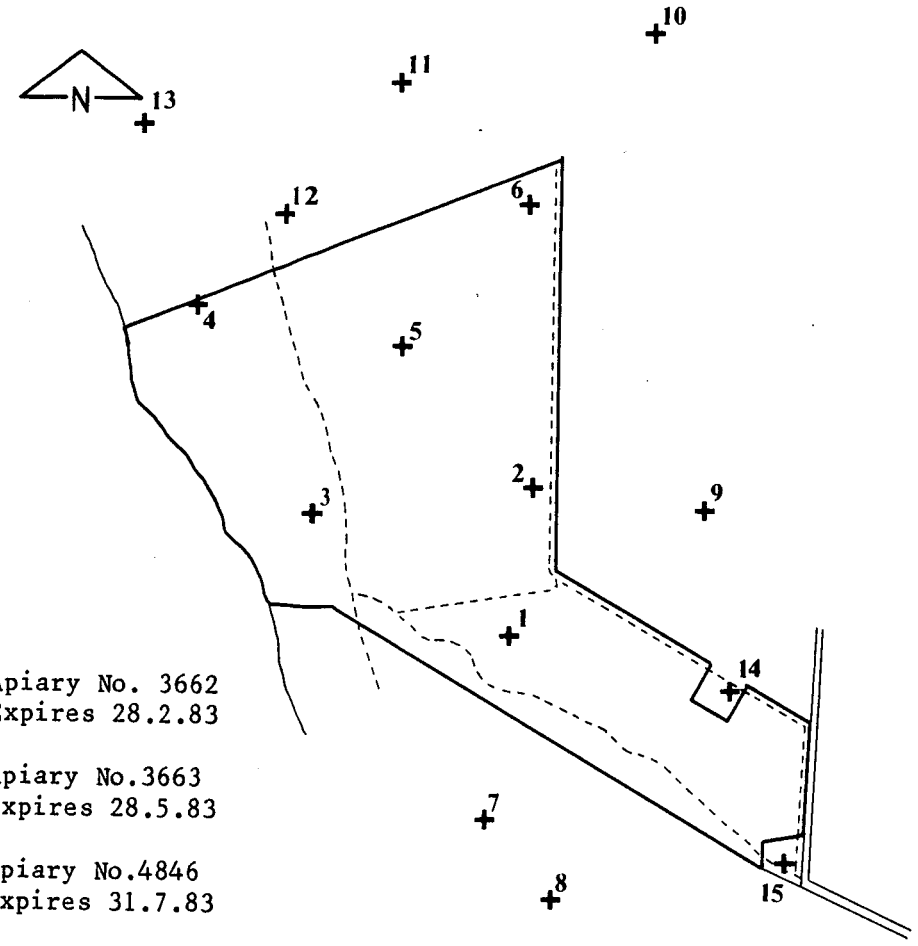


Figure 25. Suitability for beekeeping of Nilgen Nature Reserve (Reserve No. 31781).



1 Apiary No. 3662
Expires 28.2.83

2 Apiary No.3663
Expires 28.5.83

3 Apiary No.4846
Expires 31.7.83

4 Ag. Dept site

5 Apiary No. 773
Expires 30.6.83

6 Apiary No. 3666
Expires 28.2.83

Apiary sites outside the Reserve, but within 3 km of its boundary

7 Apiary No. 4147
Expires 30.6.83

8 Apiary No.3542
Expires 31.7.83

9 Apiary No. 4851
Expires 31.8.83

10 Apiary No. 4583
Expires 31.10.82

11 Apiary No. 772
Expires 30.6.83

12 Apiary No. 4861
Expires 30.11.82

13 Apiary No. 2385
Expires 30.6.83

14 Apiary No. 762
Expires 30.6.83

15 Apiary No. 763
Expires 30.6.83

0 4km

Figure 25a. Location of apiary sites on Nilgen Nature Reserve.

a. Introduction

Lake Warden Nature Reserve is located three kilometres north of Esperance between the South Coast Highway in the south-west and the Coolgardie-Esperance Highway in the north-east. The latter passes along the reserve boundary and another formed road follows the north-western boundary (Fig. 26). The reserve is surrounded by private land, except on the north-eastern side where it abuts Woody Lake Nature Reserve. Most of the privately owned land adjacent to the reserve is uncleared or partially cleared.

Lake Warden is part of the system of lakes which lie just to the north of the township of Esperance. The soils on the reserve are grey white sands which are typical of this coastal strip. The vegetation surrounding the lake is a THICKET/SCRUB of Banksia speciosa, Nuytsia floribunda, Melaleuca sp. and mallee eucalypts.

b. Nature Conservation Values

Lake Warden Nature Reserve was set aside for Recreation and the Conservation of Flora and Fauna,and vested in WAWA, in October 1973. It was made "A" class in October 1978. The lake and its immediate hinterland were reserved due primarily to their importance as a waterfowl habitat and as habitat for other animals. During dry summers the lake is a haven for large populations of Black Swans (Cygnus atratus) and various wading birds such as Banded Stilts (Cladorhynchus leucocephalus)and Avocets (Recurvirostra novaehollandiae).

The lake is also used for recreation purposes and this is an important secondary conservation value.

c. Suitability for Beekeeping

The area of the reserve adjacent to the Esperance-Coolgardie Highway is not suitable for beekeeping as it is too steep to access from the Highway. As such vehicular movement over these recently consolidated dunes of steep gradient will lead to degradation of the vegetative cover and accompanying erosion. The only parts of the reserve which are suitable for beekeeping are those areas adjacent to the north-western boundary which are accessible by formed road and firebreak. These areas are of fair rather than good suitability as the occasionally dense understorey may limit apiary site allocation (Fig. 26).

No apiary sites exist at present on this reserve.

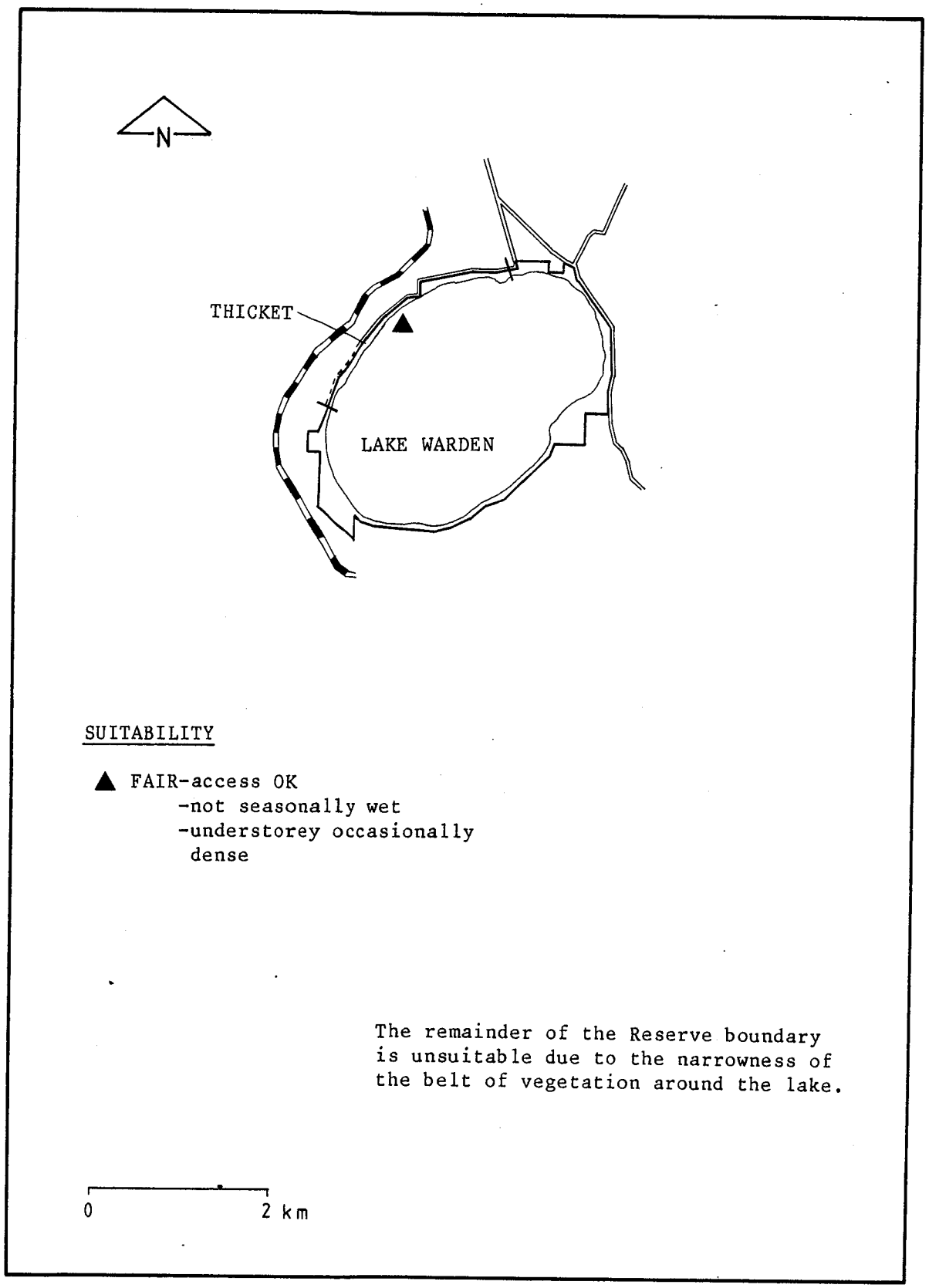


Figure 26. Suitability for beekeeping of Lake Warden Nature Reserve (Reserve No. A32257).

25. Lake Gore Nature Reserve (Reserve No. A32419)

Area: 792.4 ha
Shire: Esperance
Litho: 423/80
Location No: Esperance 1957

a. Introduction

Lake Gore Nature Reserve is located approximately 35 km west-north-west of Esperance, and is situated approximately half way between the South Coast Highway and the Southern Ocean coastline. The reserve is surrounded by private land. The land to the east and the north-west of the reserve has been cleared for farming and the remainder of the land adjacent to the reserve is uncleared. The reserve can only be reached via a track at its northern end (Fig. 27). There are no peripheral firebreaks.

Lake Gore is the northernmost part of a group of wetland nature reserves which stretch along the southern coast from Shoal Cape to Esperance. The lake is fed by the Dalyup River and the overflow spills into adjacent smaller lakes. Lake Gore dominates the reserve, and only a narrow strip of hinterland is included within the reserve boundary. The vegetation on the reserve is composed of a Melaleuca sp. WOODLAND over Samphire flats.

b. Nature Conservation Values

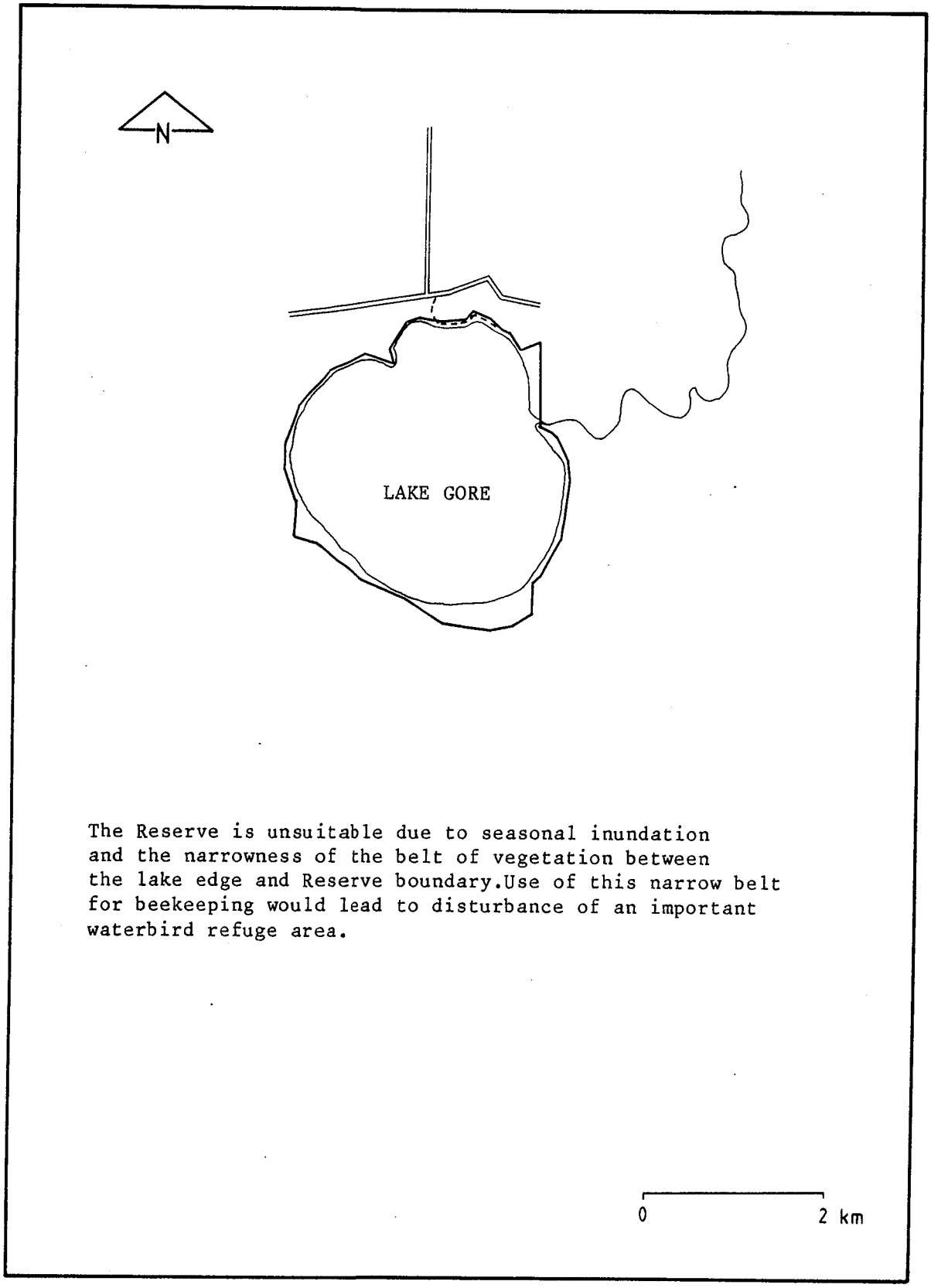
Lake Gore Nature Reserve was set aside for Water and Conservation of Flora and Fauna, vested in WAWA, and made "A" class, in June 1978. One of the main reasons for reservation was the numerous waterfowl found on the lake and the use of the lake, as a moulting area, by Mountain Duck (Tadorna tadornoides). The surrounding area also carries good numbers of other fauna. The "A" classification was a result of recommendations made by the EPA.

The conservation values of Lake Gore are a function of the individual value of the reserve as a suitable waterbird habitat, and the value of the reserve as part of the system of wetlands on the south coast.

c. Suitability for Beekeeping

The extreme narrowness of the band of vegetation between the lake edge and the reserve boundary (Fig. 27) make the northern parts of the reserve unsuitable for beekeeping. Use of this narrow band would lead to disturbance of important waterbird refuge areas.

The southern portion of the reserve is also unsuitable for beekeeping. Much of the vegetated portion becomes seasonally inundated while the only



The Reserve is unsuitable due to seasonal inundation and the narrowness of the belt of vegetation between the lake edge and Reserve boundary.Use of this narrow belt for beekeeping would lead to disturbance of an important waterbird refuge area.

Figure 27. Suitability for beekeeping of Lake Gore Nature Reserve (Reserve No. A32419).

access to the southern boundary is through private property.

Therefore, the entire reserve is unsuitable for beekeeping.

No apiary sites exist at present on the reserve.

26. Mooradung Nature Reserve (Reserve No. 32448)

Area: 630.5 ha
Shire: Boddington
Litho: 384/80
1:50 000 Dwarda 2232-III
Location No: Williams 15312, 15675

a. Introduction

Mooradung Nature Reserve is located 13 km south-south-east of Boddington and 34 km north-west of Williams. A gravel road passes along the northernmost boundary (Fig. 28) and all reserve boundaries are firebreaked. The land surrounding the reserve is privately owned and cleared. The only exceptions are areas of partially cleared land adjacent to the southern half of the eastern boundary of the reserve and a small patch of timbered land on the south-western corner of the reserve.

The general terrain is one of steep laterite breakaways with intervening lowland flats. The vegetation is a WOODLAND/OPEN WOODLAND of Marri (Eucalyptus calophylla), Jarrah (Eucalyptus marginata) and Wandoo (Eucalyptus wandoo) over patchy LOW HEATH D, with occasional emergent Dryandra sp. and Blackboys (Xanthorrhoea sp.). The understorey is sparse to non-existent.

b. Nature Conservation Values

Mooradung Nature Reserve was set aside for the Conservation of Flora and Fauna, and vested in WAWA, in March 1974. This area was set aside as the Boddington Shire contains very few areas reserved for flora and fauna conservation. The relatively large size of the reserve and the presence of ground water for several months of the year makes it valuable for a wide range of fauna. Finally, as the reserve is set in the midst of cleared farmland, it provides an important refuge for resident, nomadic and migratory bird species.

c. Suitability for Beekeeping

Those parts of the reserve immediately adjacent to the reserve boundaries are of good suitability for beekeeping (Fig. 28). Although the Dryandra sp. forms an understorey THICKET in places, apiary site

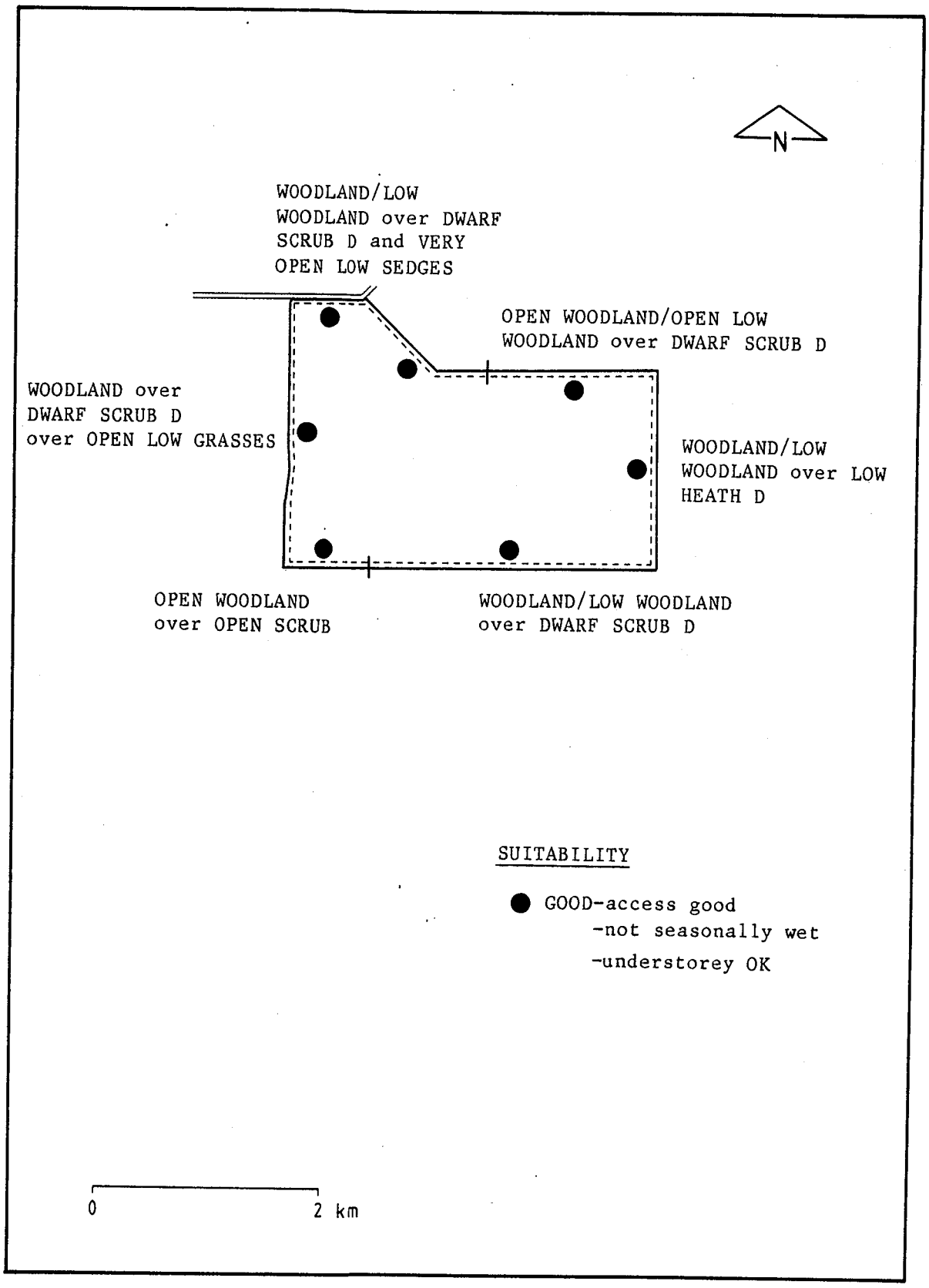


Figure 28. Suitability for beekeeping of Mooradung Nature Reserve (Reserve No. 32448).

allocation is in no way limited.

No apiary sites exist at present on the reserve.

27. Mt Westdale Nature Reserve (Reserve No. 33188)

Area: 802.4 ha
Shire: Beverley
Litho: 342/80
1:50 000 Luptons 2233-II
Location No: Avon 28492

a. Introduction

Mt Westdale Nature Reserve is located 37 km west-north-west of Brookton. A gravel road follows the northern boundary of the reserve. Most of the reserve boundary is firebreaked (Fig. 29). The land surrounding the reserve is cleared and privately owned, with the exception of the eastern half of the northern boundary of the reserve where Reserve No. 37306 adjoins.

The topography of the reserve is rugged with steep-sided laterite breakaways dominated by tall stands of Powderbark Wandoo (Eucalyptus accedens) WOODLAND. The SCRUB understorey consists of Dryandra sessilis, Dryandra nobilis, Hakea undulata, Hakea cyclocarpa and Grevillea sp.

There are also some slightly undulating areas with gravelly soils, on the laterite plateau surfaces that support tall WOODLAND stands of Jarrah (Eucalyptus marginata), Marri (Eucalyptus calophylla), Wandoo (E. wandoo) and Powderbark Wandoo (E. accedens). The understorey in these areas is a complex dense THICKET dominated by Dryandra sp., Hakea undulata, H. cyclocarpa, Xanthorrhoea sp. (Blackboys), Grevillea sp., Isopogon sp., Petrophila sp., Macrozamia reidlei (Zamia Palms), Acacia pulchella, Adenanthos sp. with isolated stands of Banksia grandis and Casuarina humilis.

b. Nature Conservation Values

Mt Westdale Nature Reserve was set aside for the Conservation of Flora and Fauna, and vested in WAWA, in March 1975. This area was reserved primarily as it is one of the few nature reserves which represent the forest formations of the southern Darling Scarp. The area is important as it supports good stands of the four common tree species of the Darling Scarp - Jarrah, Marri, Wandoo and Powderbark.

In addition the topography of the reserve is spectacular and the inaccessibility of much of the reserve has minimised disturbance of the natural environment by the public. Finally the reserve

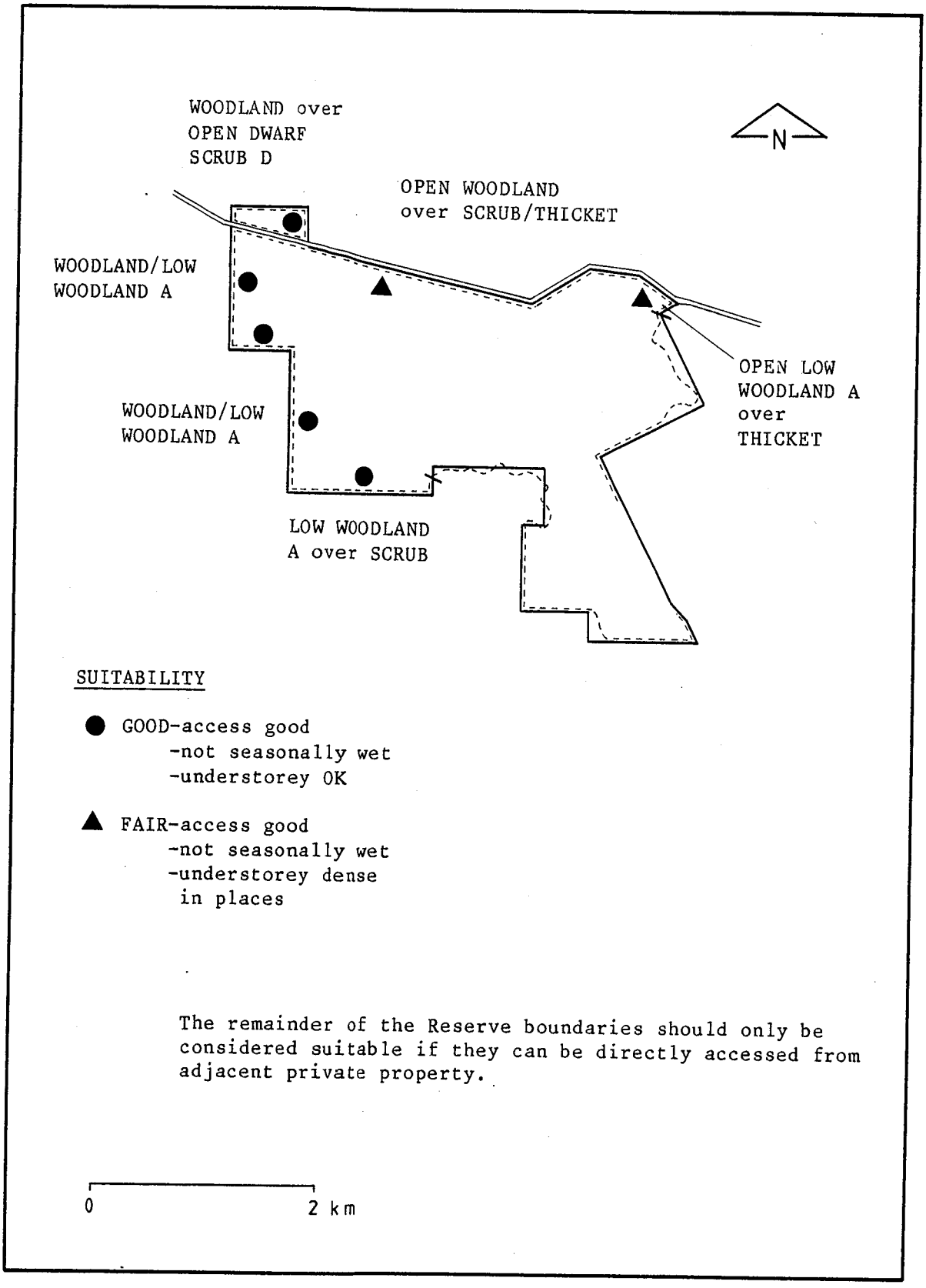


Figure 29. Suitability for beekeeping of Mt. Westdale Nature Reserve (Reserve No. 33188).

contains a diversity of flora, which in turn can be expected to support a variety of fauna, particularly birdlife.

c. Suitability for Beekeeping

Those parts of the reserve adjacent to the gravel road are of fair suitability for beekeeping (Fig. 29). This rating has been given as dense understorey along parts of the northern reserve boundary may restrict apiary site allocation.

All accessible boundary firebreaks are of good suitability for beekeeping (Fig. 29). Very steep and rugged firebreaks make much of the eastern and southern boundaries of the reserve inaccessible to two-wheel drive vehicles. These firebreaks should not be used for access purposes as they are often only negotiable in one direction, making it necessary to cross through the body of the reserve to return to the point of entry. Therefore this part of the reserve boundary should only be considered suitable for beekeeping if access can be obtained directly to the reserve boundary from adjacent private property.

No apiary sites exist at present on the reserve.

28. Sheepwash Creek Nature Reserve (Reserve No. 35168)

Area: 1111.3 ha
Shire: Plantagenet
Litho: 451/80 452/80
1:50 000 2428-III Redmond
2428-IV Mount Barker
Location No: Hay 2193, 2194, 2334, 547

a. Introduction

Sheepwash Creek Nature Reserve is located 18 km south-west of Mt Barker. A sealed road passes along the northern boundary of the reserve and a comprehensive system of firebreaks exists. A well-defined track passes along part of the south-western boundary of the reserve (Fig. 30). The land to the south of the reserve is State Forest, while the remainder of the land surrounding the reserve is privately owned. The land adjacent to the eastern and northern reserve boundaries is cleared, while most of the land adjacent to the western boundary of the reserve is uncleared.

The reserve includes ironstone hill country, sandy flats and limited areas of red loam and gravel country. Sheepwash Creek is a major feature of the reserve. The soils range from laterite gravel dominated loams, to deep white-grey sands. Limited areas of red loam occur.

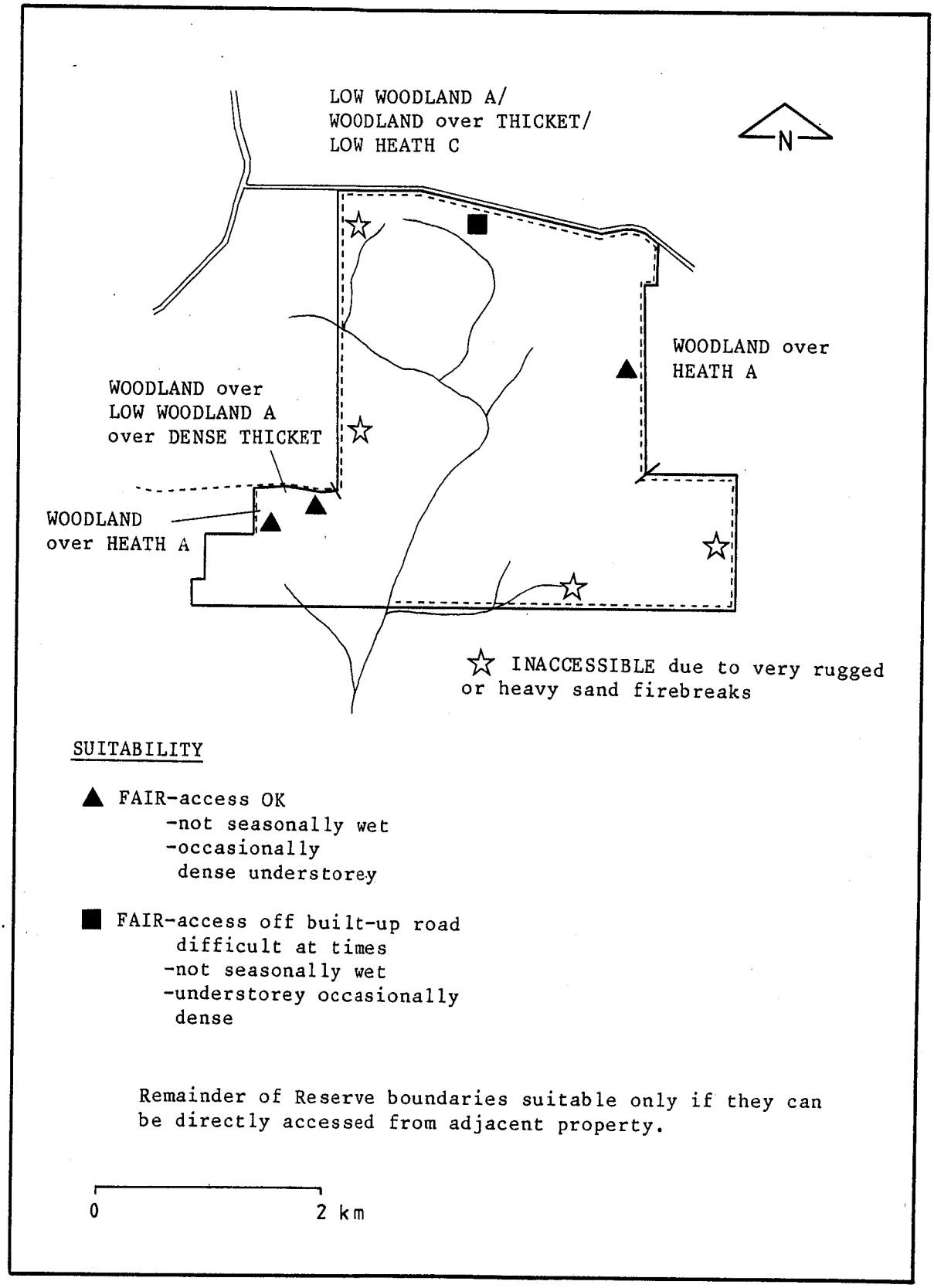


Figure 30. Suitability for beekeeping of Sheepwash Creek Nature Reserve (Reserve No. 35168).

Vegetation associations found on the reserve include Jarrah (Eucalyptus marginata) and Marri (E. calophylla) WOODLAND over HEATH A. A SCRUB of Banksia grandis, B. attenuata, Hakea sp. and Casuarina sp. occurs in many places. Regenerating Marri make the understorey dense in places.

b. Nature Conservation Values

Sheepwash Creek Nature Reserve was set aside for the Conservation of Flora and Fauna, and vested in WAWA, in March 1978. It was reserved primarily to protect the diversity of forest, woodland, heath and minor wetland associations it contains. These represent the naturally occurring vegetation and the various soils typical of the Jarrah-Marri forest belt in this area.

Surveys of the reserve have indicated that the reserve supports a rich flora. Of particular interest is a belt of Wandoo (Eucalyptus wandoo) woodland on the northern bank of Sheepwash Creek. This appears to be the southernmost occurrence of Wandoo as the dominant species in a woodland association.

The reserve also supports a diversity of fauna, including Possums, Bandicoots, Kangaroos, the Brush-tailed Wallaby, Quokka and Emu, and probably the Honey and Pygmy Possum. The reserve also supports numerous birds which use the area for feeding, nesting and refuge. Of particular importance is the occurrence of the Red-eared Firetail Finch (Emblema oculata). This is the only finch which occurs in the south-west and its existence has been severely threatened by the constant clearing of land. The reserve contains dense bush which is used by this bird.

Finally, the reserve contains extensive areas of Boronia sp. which create a spectacular wildflower display during the spring months.

c. Suitability for Beekeeping

Those parts of the reserve adjacent to the south-western track, the firebreak on the northern half of the eastern boundary and the gravel road which passes along the northern boundary of the reserve are of fair suitability for beekeeping (Fig. 30). Deep sand and lateritic boulders make the remaining perimeter firebreaks unsuitable as vehicle tracks. Vehicular use of deep sand firebreaks leads to erosion while the vegetation is damaged if people leave the firebreak to avoid lateritic rocks and boulders. Therefore, these parts of the reserve should be considered unsuitable for beekeeping unless access to the reserve can be obtained directly from adjacent private property.

No apiary sites exist at present on the reserve.

29. Hill River Nature Reserve (Reserve No. A36093)

Area: 882 ha (ex roads)
Shire: Dandaragan
Litho: 62/80
1:50 000 1937-11 Cowalla 1937-III Boullanger and Hill River
Location No: Melbourne and Victoria (un-numbered locations)

a. Introduction

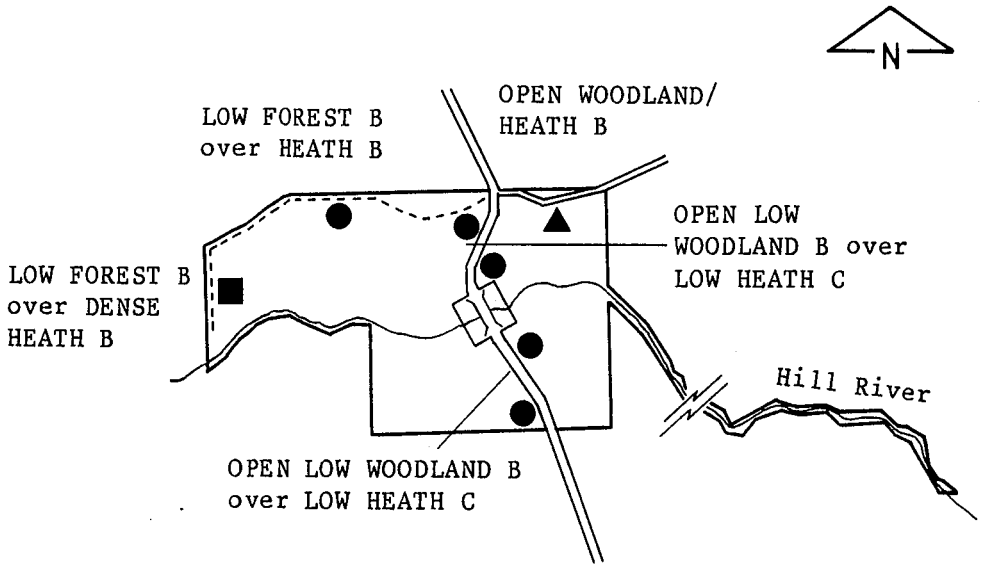
The westernmost extent of Hill River Nature Reserve is located 13 km east of Jurien and 30 km west-north-west of Badgingarra. Over half the area of the reserve is contained in a narrow strip of land, approximately 30 km in length and 300 m wide, along the banks of the Hill River. The other smaller half of the reserve consists of a block of approximately 350 ha at the westernmost end of the reserve.

The land adjacent to the reserve is privately owned and cleared, with the exception of the uncleared land adjacent to the northern half of the westernmost boundary of the reserve. Of the 30 km length of the river and associated nature reserve, only 4 km of this part of the reserve is adjacent to formed roads and is therefore generally accessible. A gravel road and gravel track follow the northern boundary of the western block and a north-south orientated sealed road cuts through the block's centre (Fig.31). A track passes along the westernmost boundary of the reserve (Fig. 31). No perimeter firebreaks exist.

The Hill River cuts through marine and continental sedimentary rocks and the topography is gently undulating with a narrow shallow river valley. The vegetation in the eastern part of the reserve is THICKET immediately adjacent to the river, with LOW HEATH C/D on the remaining area. Moving westwards along the river the vegetation adjacent to the river becomes a WOODLAND of Marri (Eucalyptus calophylla) and Flooded Gum (E. rudis), still accompanied by a LOW HEATH C/D. In the western block the vegetation is predominantly a LOW FOREST/WOODLAND association of Banksia attenuata, B. menzeissii, and E. todtiana over HEATH B.

b. Nature Conservation Values

The reserve was set aside for the Conservation of Flora and Fauna, vested in WAWA, and made "A" class, in October 1979. Reservation and the "A" classification were made primarily in recognition of the fine stands of Marri (Eucalyptus calophylla) on the reserve.



SUITABILITY

● GOOD-access OK
-no seasonal wetness
-understorey OK

▲ GOOD/FAIR-access OK
-some seasonal wetness
-understorey OK

■ FAIR-access fair
-no seasonal wetness
-understorey dense
in places

No need to consider S and E boundaries as sufficient area is available on other boundaries.Those parts of the Reserve adjacent to the river are not suitable due to the narrowness of the vegetated area.

0 2 km

Figure 31. Suitability for beekeeping of Hill River Nature Reserve (Reserve No. A36093).

More importantly, these stands of Marri are used as a summer refuge by the White-tailed Cockatoo (Calyptorhynchus funereus baudinii), and are particularly used for the rearing of fledgeling birds which migrate from the wheatbelt to the Hill River. The birds feed very heavily on the Marri fruits. Long-billed Corellas (Cacatua tenuirostris) also use the Marri, primarily as nesting trees. The White-tailed Cockatoo is restricted to the south west of Western Australia, and therefore reservation of its habitat in the Hill River region is vital to the survival of the species.

The maintenance of woodland along the river's banks is also important as it minimises the hazard of erosion. The woodland also provides refuge for the diverse fauna which use the river's water supply. Finally, the vegetated river banks and the river itself provide refuge, in a predominantly cleared agricultural landscape, for numerous resident, nomadic and migratory bird species.

c. Suitability for Beekeeping

Those parts of the reserve accessible by formed road adjacent to the Hill River are poorly suited for beekeeping due to a very dense understorey and seasonal inundation. These areas should therefore be considered unsuitable. In contrast, those parts of the western block of the reserve adjacent to formed roads and to the northern gravel road and boundary track are generally of good suitability (Fig. 31). Due to occasional patches of dense understorey the reserve adjacent to the western boundary track is of fair, rather than good, suitability.

One apiary site exists at present on the reserve (Permit No. 2224). As it is not adjacent to a formed road or boundary track (Fig. 31a) its location contravenes Authority policy. Therefore, once the permit expires, it should not be renewed unless the site is relocated adjacent to a formed road or boundary track. Another apiary site is located outside the reserve within three kilometres of the western boundary, and any future allocation of sites on the reserve must take into account the position of this site.

30. Reserve No. 36203 (unnamed)

Area: 608.2 ha
Shire: Irwin
Litho: 124/80
Location No: Victoria 3952

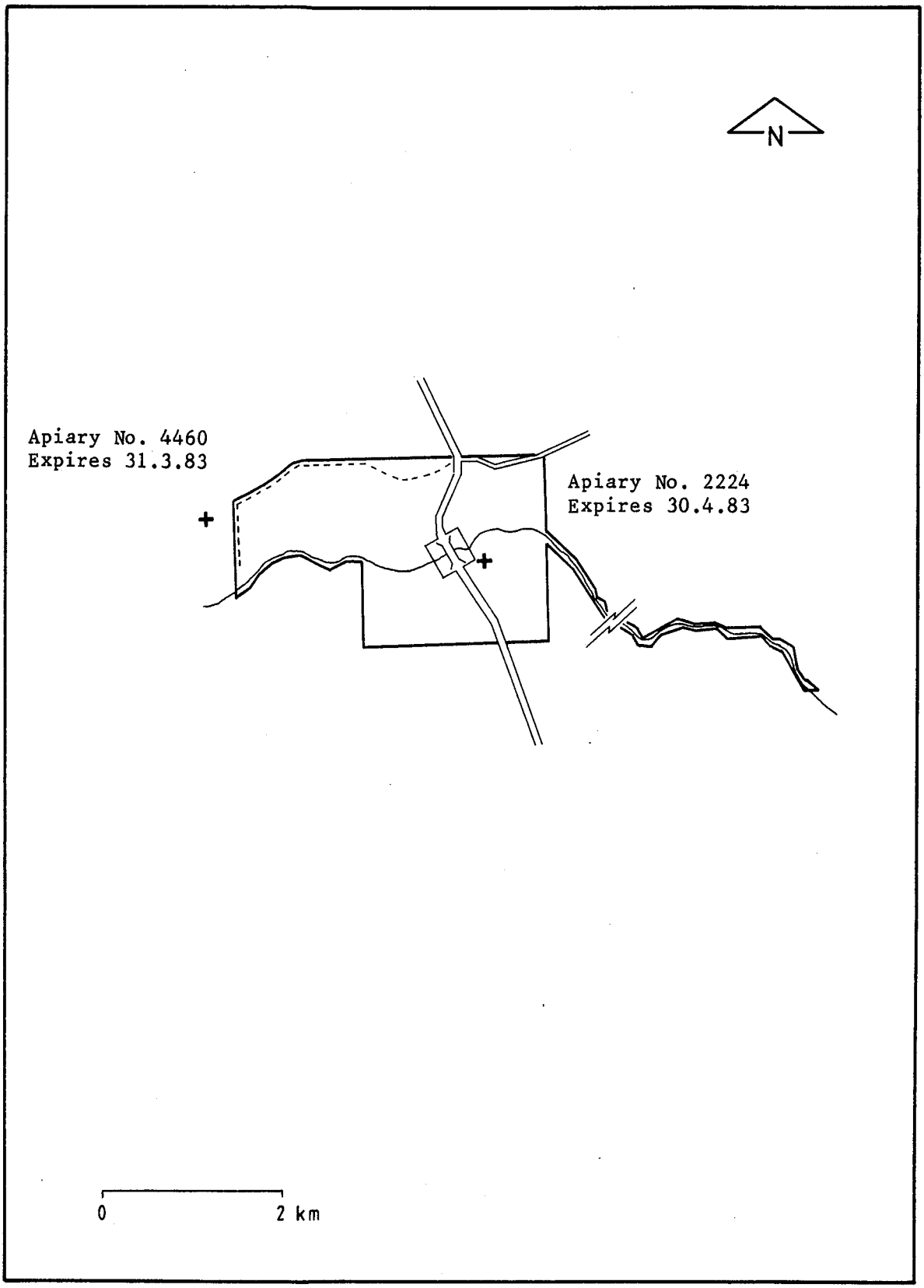


Figure 31a. Location of apiary sites on Hill River Nature Reserve.

a. Introduction

Reserve No. 36203 is located approximately 18 km south-south-east of Dongara and approximately 3 km east of the Brand Highway. The Mt Adams Road passes along the southern boundary of the reserve and a firebreak follows the western boundary. Firebreaks do not exist on the northern and eastern boundaries. The land to the west of the reserve is privately owned, while all other boundaries abut upon vacant Crown land which is under consideration as an addition to the existing nature reserve. The privately owned land to the west of the reserve has been cleared for grazing and/or cropping.

The reserve has an undulating topography and consists primarily of sandplain with the hilltops "capped" by limestone. The soils are shallow yellow grey sands and in many places the limestone bedrock is close to the surface. The vegetation is a combination of HEATH A and THICKET, composed of Native Pine (Actinostrobus arenarius), Banksia spp. and Grevillea sp. Emergent eucalypt mallees (E. Erythrocorys) occur occasionally. The THICKET is dominated by Dryandra sp. on the ridge tops and by Acacia sp. on the intervening sandplains.

b. Nature Conservation Values

The reserve was set aside for the Conservation of Flora and Fauna, and vested in WAWA, in February 1980. The setting aside of this area for conservation was due primarily to the diversity of flora it contains. Not only does the area contain a rich and varied flora, this flora is also in an excellent condition.

The reserve, particularly with the addition of the vacant Crown land to the east, contains a representative sample of the local area's topography, flora and fauna. The Mt Adams area contains a diverse flora, which includes at least five species of Banksia, one of which is the extremely rare Banksia elegans.

c. Suitability for Beekeeping

Those parts of the reserve adjacent to the southern and western boundary are of fair suitability for beekeeping (Fig. 32). These areas have been given a fair rather than good rating due to occasional density of the undergrowth or to difficult access, either of which may limit apiary site allocation.

The proposed vacant Crown land additions will turn the northern and eastern boundary tracks into internal tracks. Therefore, according to WAWA policy, these areas are unsuitable and are unavailable for use by apiarists.

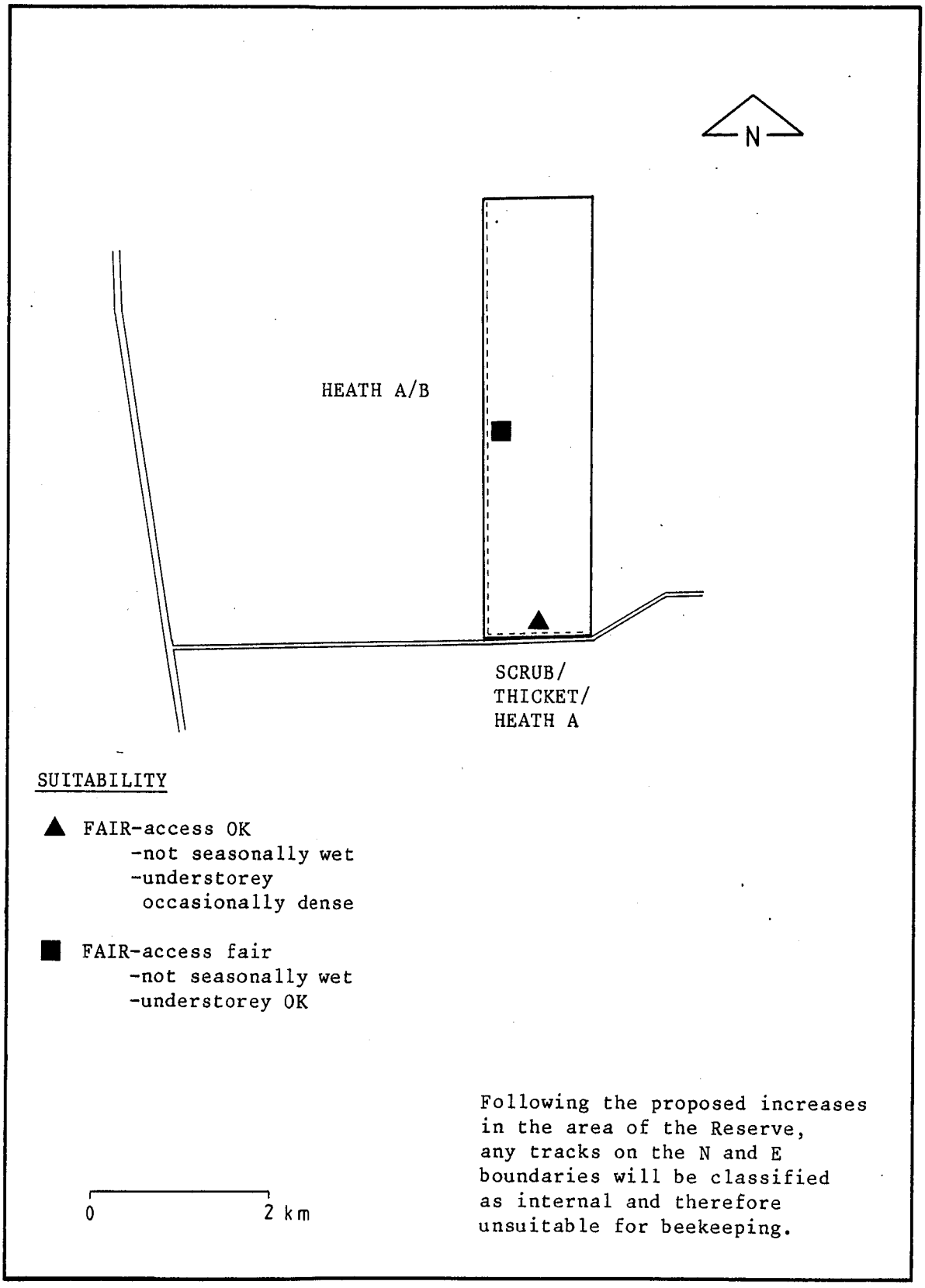


Figure 32. Suitability for beekeeping of Reserve No. 36203.

One apiary site exists on the reserve at present and its position, permit number and permit expiry date are given in Figure 32a. Its present location complies with WAWA policy. Two other apiary sites are located outside the reserve within a three kilometre radius of those parts of the nature reserve considered suitable for beekeeping, and any future allocation of sites on the reserve must take into consideration the position of these two sites.

31. Reserve No. 37306

Area: 1307.4 ha
Shire: Beverley
Litho: 342/80
Location No: Avon 28697

a. Introduction

Reserve 37306 is located 38 km north-west of Brookton, and links Dobaderry Nature Reserve (Reserve No. 34442) in the north to Mt Westdale Nature Reserve (Reserve No. 33188) in the south. Formed roads follow the southernmost, westernmost and northernmost boundaries of the reserve (Fig. 33). Land adjacent to the southern portion of the reserve is privately owned and has been cleared, while the remainder of the land adjoining the reserve is vacant Crown land. Some of this vacant Crown land is in the process of release to adjoining or nearby private landholders.

The topography, vegetation and soils of this reserve are very similar to those of Mt Westdale Nature Reserve (Reserve No. 33188), however the breakaways on Reserve No. 37306 are interspersed by extensive areas of sandplain carrying Marri (Eucalyptus calophylla) - Banksia attenuata WOODLAND over Blackboy (Xanthorrhoea sp.) and Zamia (Macrozamia reidlei) LOW SCRUB B over LOW SEDGES. The remainder of the reserve supports an OPEN WOODLAND of Powderbark Wandoo/Wandoo/Jarrah/Marri (Eucalyptus accedens/E. wandoo/E. marginata/E. calophylla) over DWARF SCRUB D/HEATH A. The dominant woodland species depends on the position of the community on the breakaway; and the structure of the heath understorey is similarly influenced, with the further factor of fire frequency influencing understorey structure.

b. Nature Conservation Values

Reserve No. 37306 was set aside for the Conservation of Flora and Fauna, and vested in WAWA, in August 1981. The reserve is particularly important as it links Dobaderry Swamp and Mt Westdale, thereby creating a continuous biological corridor. This whole area is important as it contains the topography and floral associations representative of the southern regions of the Darling Scarp. The

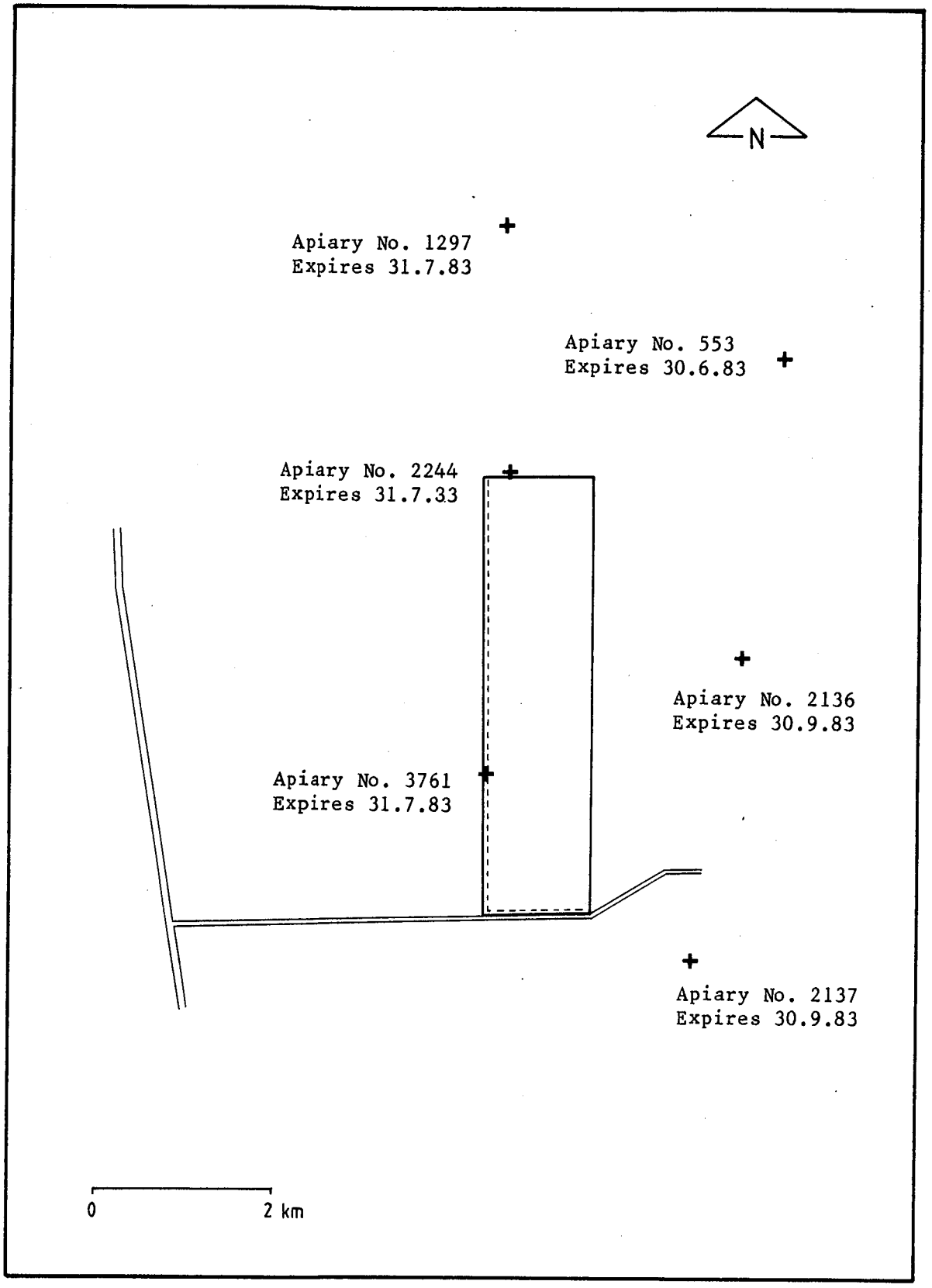


Figure 32a. Location of apiary sites on Reserve No. 36203.

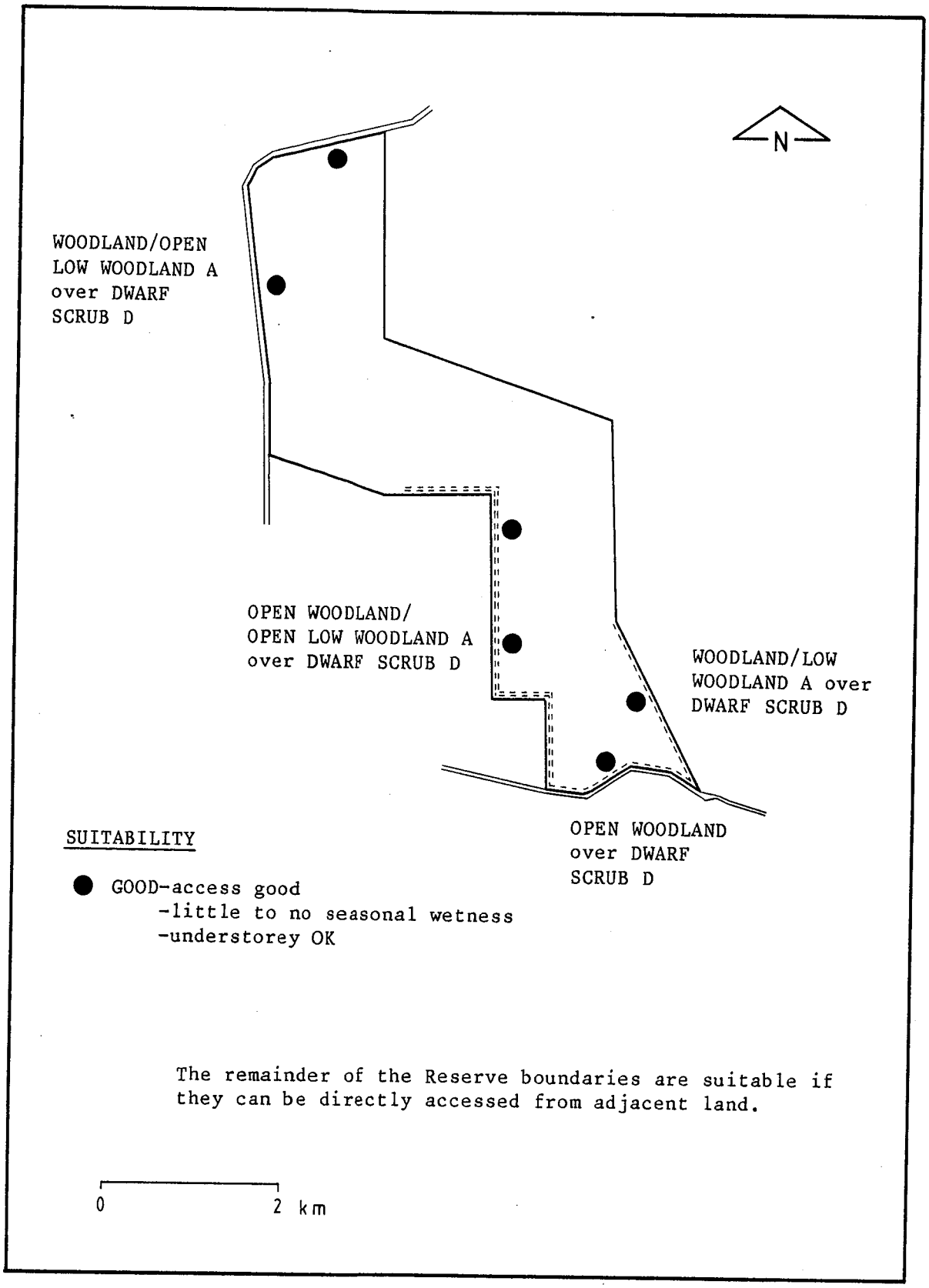


Figure 33. Suitability for beekeeping of Reserve No. 37306.

biological corridor formed by the three reserves provides habitat for a variety of fauna including macropods, small ground dwelling marsupials, arboreal marsupials and numerous species of birds.

c. Suitability for Beekeeping

Those parts of the reserve adjacent to the formed roads which pass along the reserve boundaries are of good suitability for beekeeping (Fig. 33). In addition, parts of the reserve adjacent to the southern halves of the western and eastern boundaries are also of good suitability. The remainder of the reserve boundaries are inaccessible and therefore are not suitable for apiary site allocation. However, those parts directly accessible from adjacent private property should be considered suitable.

Only one apiary site exists on the reserve at present; its location, permit number and permit expiry date are indicated in Figure 33a. The present location of the site contravenes WAWA policy, and once the permit expires it should not be renewed. The site can then be relocated on the reserve boundary and a permit re-issued.

One apiary site outside the reserve occurs within three kilometres of the reserve and as such its location should be taken into consideration before any future apiary sites are approved within the reserve boundaries.

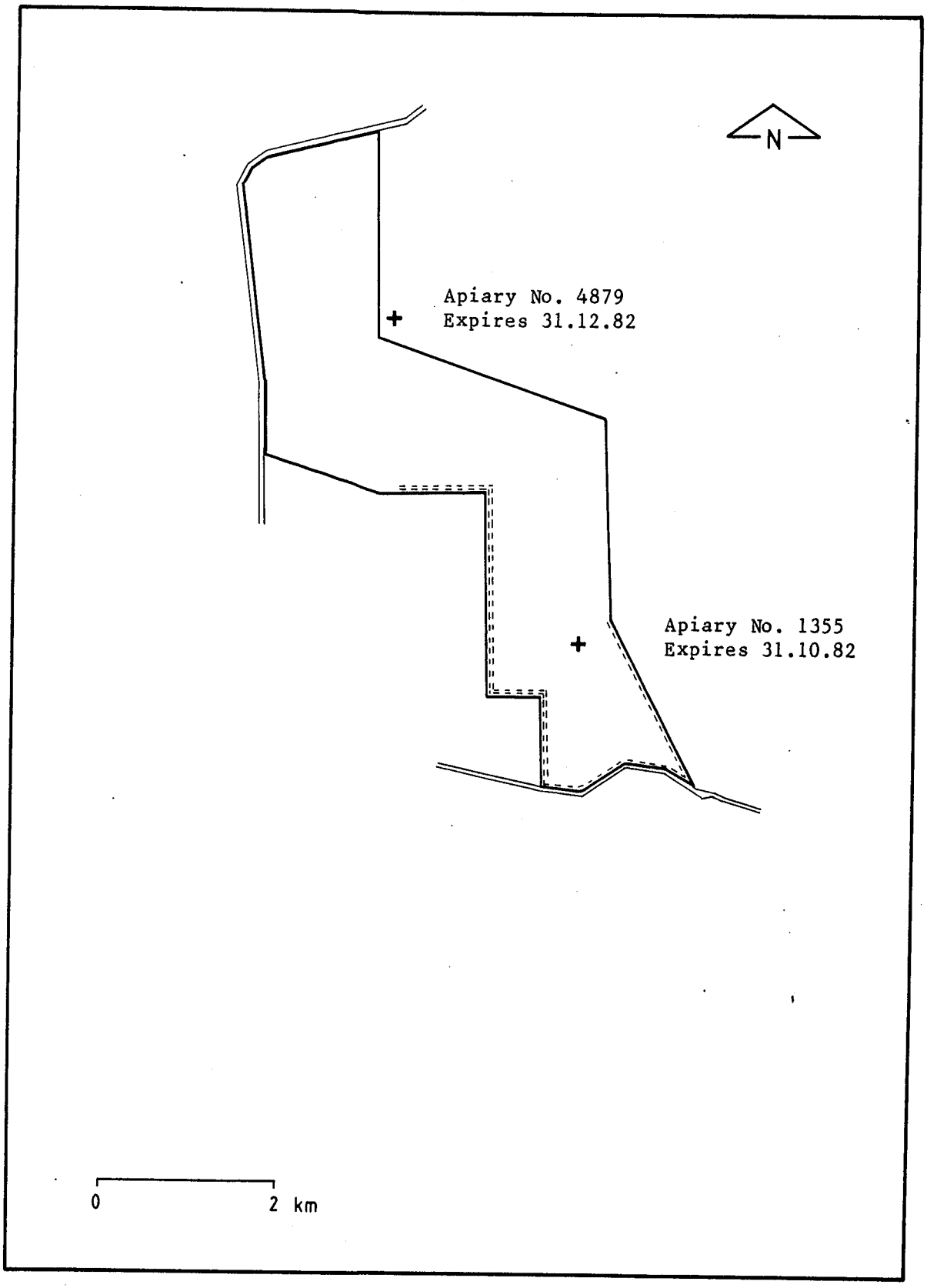


Figure 33a. Location of apiary sites on Reserve No. 37306

PART D. WAWA VESTED NATURE RESERVES UNDER 500 HA IN "AREA 1" FROM WHICH BEEKEEPING WILL BE EXCLUDED

Six WAWA vested nature reserves which are less than 500 ha have existing apiary sites (App. 3). According to WAWA policy apiary sites should not be located on reserves with an area of less than 500 ha. Therefore once the permits for the apiary sites on these reserves expire they will not be renewed.

In the following sections a general overview of each reserve and its nature conservation values are discussed. The information in these sections is based on departmental communications and surveys and unlike Part B it is not based on personal field surveys. Muir's (1977) vegetation descriptions are not generally used as most communications have not utilised his classification method.

1. Reserve No. 7615 (unnamed)

Area: 40.4 ha
Shire: Victoria Plains
Litho: 31/80
1:50 000 2135-IV Wannamal
Location No: Melbourne 850

a. Introduction

The reserve is located approximately 18 km north-east of Wannamal; the Great Northern Highway passes along the eastern boundary of the reserve. There are two basic vegetation associations present on the reserve, Wandoo (Eucalyptus wandoo) and Sheoak (Casuarina huegeliana) woodlands. The former occurs on granite derived soil and is variable according to drainage and gravel content. The Sheoak woodland is on dolerite derived soil and forms a belt across the eastern side of the reserve. The highest altitude portions of the reserve have sufficient laterite residue to support heath and mallee.

b. Nature Conservation Values

In February 1980 the area's purpose was changed from Government Requirements and the Conservation of Flora to the Conservation of Flora and Fauna, and vested in WAWA. This decision was based primarily on the good stands of woodland and the relatively rich flora, including an assemblage intermediate between that of the Darling Range and the wheatbelt, that the reserve supported. The woodlands probably support a rich bird fauna in the breeding season.

c. Beekeeping

One apiary site exists at present on the reserve, Permit No. 2711 which expired on 30 September 1982.

2. Reserve No. 22199 (unnamed)

Area: 300.8 ha
Shire: Waroona
Litho: 383/40
Location No: Murray 1245

a. Introduction

Reserve No. 22199 is located approximately seven kilometres west of Hamel; Buller Road passes along the northern boundary of the reserve. The sandy soil of the reserve supports a woodland of Jarrah (Eucalyptus marginata), Marri (E. calophylla), Bull Banksia (Banksia grandis) and Sheoak (Casuarina fraserana). Blackboys (Xanthorrhoea preissii) and Zamia (Macrozamia riedlei) are common. The understorey is moderately dense, containing species such as Spearwood (Kunzea vestita), Conostephium pendulum, Calytrix flavescens, Hypocalymma robustum, Persoonia saccata, Eriostemon spicatus, Dasypogon bromeliaefolius, Stirlingia latifolia and Daviesia divaricata. In the centre of the reserve is a small swamp which appears to be semi-permanent.

b. Nature Conservation Values

Reserve No. 22199 was set aside for the Conservation of Flora and Fauna, and vested in WAWA, in October 1979. Reservation was based on the diversity of flora contained, and the number of bird species utilising the area (at least 23). In a report for the System Six Study it was recommended that the reserve should be retained for the conservation of its flora and fauna as it is the only large naturally vegetated area of the Southern River soil-landform unit between Mandurah and Bunbury.

c. Beekeeping

One apiary site exists at present on the reserve, Permit No. 3199, which expired on 31 December 1982.

3. Reserve No. 30618 (unnamed)

Area: 346.0 ha
Shire: Gingin
Litho: 30/80
1:50 000 2036-III Yatheroo
Location No: Swan 7810

a. Introduction

Reserve No. 30618 is located 15 km east-north-east of Lancelin; Mimegarra Road passes along the eastern boundary of the reserve. The reserve is flat, with a low limestone ridge on the northern boundary. Two vegetation formations occur on the reserve. Banksia

attenuata Low Woodland B over Mixed Heath A on deep yellow sands; and Eucalyptus todtiana - Banksia attenuata Open Low Woodland A over Dryandra sessilis - Hakea prostrata Heath A on shallow red sand/outcropping limestone. The former formation occurs over a very diverse mixed shrub understorey. The latter formation is restricted to a small area near the northern boundary of the reserve.

b. Nature Conservation Values

Reserve No. 30618 was set aside for the Conservation of Flora and Fauna, and vested in WAWA, in November 1980. Reservation was based primarily on the importance of the reserve as a reference area of long unburnt Banksia attenuata woodland. A further conservation value is the diversity of the HEATH A understorey in the Banksia attenuata LOW WOODLAND B association. In addition the Lesser Long-eared Bat Nyctophilus geoffroyi has been found breeding on the reserve.

c. Beekeeping

One apiary site exists at present on the reserve Permit No. 1979, which expired on 31 January 1983.

4. Wongamine Nature Reserve (Reserve No. 33697)

Area: 212.9 ha
Shire: Toodyay
Litho: 27A/40
1:50 000 2235-III Jennacubbine
2235-IV Northam
Location No: Avon 28505

a. Introduction

Wongamine Nature Reserve is situated approximatelely 12 km east-north-east of Toodyay. Two formed roads pass along the boundary of the reserve, Forrest Road in the west and Beejording Road in the east. Most of Wongamine is part of an isolated laterite plateau, with an elevation ranging from 260 m in the eastern part of the reserve to over 330 m in the west. The plateau is dissected by steep sided gullies and breakaways. At lower elevations the land is more level and slopes gently towards the east. The soils vary from laterite based loams and sandy clays, which support the Wandoo (Eucalyptus wandoo), to reddish loams which support the Salmon Gum (E.salmonophloia) and York Gum (E. loxophleba) associations. Pockets of whitish and yellow sands support Banksia woodland and heath.

b. Nature Conservation Values

Wongamine Nature Reserve was set aside for the Conservation of Flora and Fauna, and vested in WAWA,

in October 1975. The reasons for this reservation were numerous and only an outline is given below.

The reserve is the only area of land in the eastern part of Toodyay Shire set aside for conservation purposes. As such it is invaluable. In addition it illustrates the transition from the Wandoo dominated woodlands which are typical of the central region of the Shire, to Salmon Gum and York Gum communities which are typical of the eastern wheatbelt areas of the State. The diversity of the flora on the reserve is further complemented by pockets of yellow and white sands which support heathland associations. The Toodyay Naturalists' Club has listed 102 plant species and 62 bird species on the reserve.

c. Beekeeping

One apiary site exists at present on the reserve, Permit No. 3280, which expires on 31 July 1983.

5. Reserve No. 36742 (unnamed)

Area: 403.8 ha
Shire: Brookton
Litho: 342/80
1:50 000 2233-III Luptons
Location No: Avon 25707

a. Introduction

Reserve No. 36742 is located approximately 28 km west of Brookton; the Brookton Highway passes along the northern boundary of the reserve. Lupton Road passes along the eastern boundary of the reserve and Fleay Road cuts though the eastern parts of the reserve. Dominant vegetation types include Wandoo (Eucalyptus wandoo), Casuarina sp. and Powderbark Wandoo (Eucalyptus accedens) woodland with a Dryandra understorey containing numerous wildflowers.

b. Nature Conservation Values

Reserve No. 36742 was set aside for the Conservation of Flora and Fauna, and vested in WAWA, in August 1980. This area is important both from the conservation viewpoint and in providing an area where travellers can see wildflowers and woodlands.

c. Beekeeping

One apiary site exists at present on the reserve, Permit No. 4596, which expired on 31 December 1982.

PART E. CONCLUSIONS

Table 2 summarises the suitability for beekeeping and the related special conditions for the 31 WAWA nature reserves available for beekeeping. Beekeeping should be excluded from all other WAWA vested nature reserves.

Provision should be retained within this set of guidelines for the future exclusion of beekeeping from the nature reserves which are presently available, if and when evidence of high biological values is obtained.

Following the vesting in WAWA of nature reserves over 500 ha the suitability of the area for beekeeping should be considered. If the nature reserve possesses exceptionally high biological values then beekeeping should be excluded.

References

Armstrong J.A. (1979) Biotic pollination mechanisms in the Australian Flora - a Review. N.Z. J. Bot. 17 : 467-508.

Crook I.G., Williams A.A.E. and Chatfield G.R. (1982) "Nature Reserves of the Shire of Dandaragan. volume I : (West Aust. Nat. Reserve Manage. Plan No. 5 (Draft)." (Department of Fisheries and Wildlife : Western Australia).

Dell J., Chapman A., Kitchener D.J. and Muir B.G. (1979) Biological Survey of the Western Australian Wheatbelt. Part 2 : Marchagee Nature Reserve. Records of the W.A. Museum Supplement No. 8.

Dell J., Chapman A., Kitchener D.J., McGauran D.J. and Muir B.G. (1981) Biological Survey of the Western Australian Wheatbelt. Part 14 : East Yuna and Bindoo Hill Nature Reserves. Records of the W.A. Museum Supplement No. 13.

Hopper S.D. (1980) Bird and Mammal Pollen Vectors in Banksia communities at Cheyne Beach, W.A. Aust. J. Bot. 28 : 61-75.

Matthews E.G. (1982) "The Introduced Honeybee in Conservation Parks in South Australia". (Unpublished report by the S.A. Museum.)

Muir B.G. (1977) "Biological Survey of the Western Australian Wheatbelt. Part 2 : Vegetation and Habitat of Bendering Reserve." Records of the Western Australian Museum Supplement No. 3.

Pyke G. and Balzer L. (1982) "The Effect of the Introduced Honeybee (Apis mellifera) on Australian Native Bees." (NSW National Parks and Wildlife Service : N.S.W.).

Scheltema M. (1981) "To be or Not to Bee." Project Report, Murdoch University " Western Australia).

TABLE 2. SUITABILITIES FOR BEEKEEPING OF WAWA VESTED NATURE RESERVES OVER 500 HA WHICH ARE AVAILABLE FOR BEEKEEPING.

Reserve No.	Reserve Name	Suitability	Location	Special conditions
9508	Arthur River	Poor		A/S allocation suitable on higher ground directly accessible from adjacent private property†
A10733	Parkeyerring Lake	Not Suitable		
A15231	Woody Lake	Good	E of sealed road which passes through NE corner of reserve	
17760	Towerlup Creek	Fair to Good	all parts of reserve adjacent to fire-breaks and formed roads	
18468	Balicup	Not suitable		
A22442	Tootanallup	Fair to Good	all peripheral parts of reserve	
23171	Pardelup	Fair to Good	all parts of reserve directly accessible from peripheral firebreaks	
23601	Marchagee	Fair	adjacent to W boundary and to Midlands Rd	

A23825	Mullet Lake	Fair	on higher ground adjacent to sealed road on N boundary	
24618	Capamaura	Fair	adjacent to gravel road on S boundary	A/S allocation suitable where reserve is directly accessible from adjacent private property.†
A25210	Pinjarega Lake	Fair to Good	adjacent to E-W bissecting roads, and to S roads	A/S allocation suitable where reserve is directly accessible from adjacent private property† "No Permit" areas at duck shooting access points
A25798	Unicup	Fair	adjacent to S road, N-S bissecting road and E & W peripheral firebreaks	
		Good	adjacent to N road	
26264	Maililup	Fair	adjacent to N halves of E & W peripheral firebreaks	A/S allocation suitable where S boundaries are directly accessible from adjacent private property†
		Good	adjacent to N road	
26677	Kulunilup	Fair	adjacent to gravel roads on N & W boundaries	
26789	Arthur River Flats	Fair	adjacent to formed road in SE corner	A/S suitable where higher parts of reserve are directly accessible

				from adjacent private property†
26792		Fair	all accessible parts of reserve boundary	
A26793	Corackerup	Fair to Good	adjacent to gravel roads on W, SW, SE & NE boundaries	
		Fair	E portion of N boundary	
A29231	East Yuna	Fair	part of E periphery firebreak adjacent to E-W bissecting road	A/S allocation suitable where reserve is directly accessible from adjacent private property†
		Good	adjacent to E-W bissecting and W boundary roads	
29806	East Eneabba	Good	adjacent to gravel roads on W & S boundaries	A/S allocation suitable where reserve is directly accessible from adjacent private property.†
31128	Kundip	Fair to Good	adjacent to E-W bissecting road and to W boundary road	A/S allocation suitable where reserve is directly accessible from adjacent private property.†
31424		Good	most parts of reserve boundary	Central section of S boundary suitable only if

				access can be directly obtained from adjacent private property.†
31675	Wanagarren	Fair to good	adjacent to designated tracks	A/S allocation suitable where reserve is directly accessible from adjacent land.†
31781	Nilgen	Good	adjacent to designated tracks and E & NE peripheral firebreaks, and to E sealed road	
A32257	Lake Warden	Fair	adjacent to gravel road and firebreak on NW boundary	
A32419	Lake Gore	Not Suitable		
32448	Mooradung	Good	all areas adjacent to reserve boundaries	
33188	Mt Westdale	Fair	adjacent to gravel road on N boundary	A/S allocation suitable if S and E boundaries are directly accessible from adjacent private property†
		Good	adjacent to all accessible boundary firebreaks	
35168	Sheepwash Creek	Fair	adjacent to SW boundary track, N boundary gravel road and fire-break on N half of E boundary	A/S allocation suitable where reserve is directly accessible from adjacent private property†

A36093	Hill River	Fair to Good	adjacent to W boundary track, to N gravel road and boundary track, and to sealed N-S road	
36203		Fair	adjacent to S gravel road and W boundary firebreak	
37306		Good	adjacent to formed roads and adjacent to firebreaks on the S half of the E and W boundaries	A/S allocation suitable where reserve is directly accessible from adjacent land.†

N.B. A/S - apiary site

†This condition is considered when there are no peripheral firebreaks to provide access or when the existing breaks are unsuitable for use as access tracks.

In all cases where access needs to be obtained from adjacent properties, other parts of the reserve boundary of "good" or "fair" suitability should be considered before allocation is made in these areas. Sites should only be allocated in the "inaccessible" areas when all possibilities in the "fair" and "good" suitability areas have been exhausted.

APPENDIX I : WAWA NATURE RESERVES OVER 500 HA IN "AREA 1" OF FIGURE 1 FROM WHICH BEEKEEPING WILL BE EXCLUDED

Reserve No.	Reserve Name	Local Authority	Area (Ha)	Reason for Exclusion
A15556	Thomsons Lake*	Cockburn	509	rare flora, public use, dieback prevention
A18739	Mill Brook*	Albany Shire	1497	rare flora, nectivorous fauna, dieback prevention
A20610	Boyagin*	Pingelly	4781	rare flora, research
A23756	Harvey Estuary	Murray	1019	dieback prevention
A26161	Camel Lake*	Gnowangerup	3214	nectivorous fauna, rare flora
26234	Tinkelelup*	Albany	575	nectivorous fauna
26385	North Sister*	Albany	1007	nectivorous fauna
A26678	Kodjinup*	Manjimup	626	dieback prevention
26688	South Stirling*	Albany	1710	rare flora
27394	Eneminga*	Dandaragan	740	rare flora
A27632	Nuytsland*	Esperance	625323	rare flora
27886†	South Eneabba*	Carnamah	1245	rare flora, research
A27956	Two Peoples Bay*	Albany Shire	4637	rare flora, nectivorous fauna, public use, research, dieback
28087	Nirimba Cay	Murray	891	no vegetation
28558†	Namming*	Dandaragan	5411	rare flora
A30191	Moondyne*	Toodyay	1991	public use
30463	Bakers Junction*	Albany	1090	outstanding orchid flora
30626	Gingilup Swamps	Nannup	2807	dieback prevention
31030†	South Eneabba*	Carnamah	4945	rare flora, research
31754†	Cheadanup	Ravensthorpe	6813	rare flora, research
31880	Lake Muir*	Manjimup	11310	dieback prevention
32339	Lake Shaster	Ravensthorpe	10517	nectivorous fauna
33842	Quarram*	Denmark	3825	dieback prevention
34442†	Dobaderry*	Beverley	1896	research
36028	Mt Manypeaks*	Albany	1330	nectivorous fauna, research

†Apiary sites present
*Approved nature reserve name

APPENDIX II : WAWA NATURE RESERVES OVER 500 HA IN "AREA 1" OF FIGURE 1 WHICH ARE AVAILABLE FOR BEEKEEPING

Reserve No.	Reserve Name	Local Authority	Area (ha)
9508	Arthur River	Narrogin	782
A10733	Parkeyerring Lake	Wagin	684
A15231	Woody Lake	Esperance	564
17760	Towerlup Creek	Kojonup	551
18468	Balicup*	Cranbrook	687
A22442	Tootanallup*	Plantagenet	944
23171	Pardelup*	Plantagenet	607
23601	Marchagee*	Coorow	578
A23825	Mullet Lake	Esperance	1917
24618	Capamaura	Carnamah	3587
A25210	Pinjarega Lake	Coorow	18221
A25798	Unicup*	Cranbrook	3305
26264	Mailalup	Gnowangerup	768
26677	Kulunilup*	Cranbrook	612
26789	Arthur River Flats	Narrogin	1069
26792		Gnowangerup	1039
A26793	Corackerup	Gnowangerup	4334
A29231	East Yuna*	Chapman Valley	1446
29806†	East Eneabba	Carnamah	2982
31128†	Kundip	Ravensthorpe	2170
31424		Ravensthorpe	2936
31675†	Wanagarren*	Dandaragan	11137
31781†	Nilgen*	Gingin	5569
A32257	Lake Warden	Esperance	709
A32419	Lake Gore	Esperance	792
32448	Mooradung	Boddington	632
33188	Mt Westdale	Beverley	802
35168	Sheepwash Creek	Plantagenet	1111
A36093†	Hill River	Dandaragan	882
36203†		Irwin	608
37306†		Beverley	1307

†Apiary sites present

*Approved nature reserve names

APPENDIX III : WAWA VESTED NATURE RESERVES LESS THAN 500 HA IN "AREA 1" OF FIGURE 1 WHICH HAVE EXISTING APIARY SITES AND FROM WHICH BEEKEEPING WILL BE EXCLUDED IN FUTURE

Reserve No.	Reserve Name	Local Authority	Area (ha)
7615		Victoria Plains	40
22199		Waroona	300
30618		Gingin	346
33697	Wongamine*	Toodyay	212
36742		Brookton	403

*Approved nature reserve name

APPENDIX IV : NON-WAWA VESTED NATURE RESERVES WITH EXISTING APIARY SITES

Reserve No.	Reserve Name	Local Authority	Vesting	Purpose	Area (ha)
A9708		Boyup Brook	NV	Flora	80
24496		Carnamah	NV	Flora	70 012
25254	Jam Hill*	Dandaragan	NV	Flora	182
26248	Wongonderrah*	Dandaragan	NV	Flora	438
27888		Esperance	NV	Flora	4341
29073	Eneabba	Carnamah	NV	Flora & Fauna	4886
A32035		Boyup Brook	LA	Flora	187
36053		Dandaragan	NV	Apiculture & Cons of Flora	10853
36063		Brookton	NV	Flora & Fauna	553

N.B. NV - Not Vested
LA - Local Authority

*Approved nature reserve name

APPENDIX V : STRUCTURAL VEGETATION CATEGORIES

LIFE FORM/HEIGHT CLASS	CANOPY COVER			
	DENSE 70-100%	MID-DENSE 30-70%	SPARSE 10-30%	VERY SPARSE 2-10%
Trees>30m	Dense Tall Forest	Tall Forest	Tall Woodland	Open Tall Woodland
Trees 15-30m	Dense Forest	Forest	Woodland	Open Woodland
Trees 5-15m	Dense Low Forest A	Low Forest A	Low Woodland A	Open Low Woodland A
Trees<5m	Dense Low Forest B	Low Forest B	Low Woodland B	Open Low Woodland B
Mallee Tree Form	Dense Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee
Mallee Shrub Form	Dense Shrub Mallee	Shrub Mallee	Open Shrub Malle	Very Open Shrub Mallee
Shrubs>2m	Dense Thicket	Thicket	Scrub	Open Scrub
Shrubs 1.5-2.0m	Dense Heath A	Heath A	Low Scrub A	Open Low Scrub A
Shrubs 1.0-1.5m	Dense Heath B	Heath B	Low Scrub B	Open Low Scrub B
Shrubs 0.5-1.0m	Dense Low Heath C	Low Heath C	Dwarf Scrub C	Open Dwarf Scrub C
Shrubs <0.5m	Dense Low Heath D	Low Heath D	Dwarf Scrub D	Open Dwarf Scrub D
Mat Plants	Dense Mat Plants	Mat Plants	Open Mat Plants	Very Open Mat Plants
Hummock Grass	Dense Hummock Grass	Mid-Dense Hummock Grass	Hummock Grass	Open Hummock Grass
Bunch Grass>0.5m	Dense Tall Grass	Tall Grass	Open Tall Grass	Very Open Tall Grass
Bunch Grass<0.5m	Dense Low Grass	Low Grass	Open Low Grass	Very Open Low Grass
Herbaceous spp.	Dense Herbs	Herbs	Open Herbs	Very Open Herbs
Sedges>0.5m	Dense Tall Sedges	Tall Sedges	Open Tall Sedges	Very Open Tall Sedges
Sedges<0.5m	Dense Low Sedges	Low Sedges	Open Low Sedges	Very Open Low Sedges
Ferns	Dense Ferns	Ferns	Open Ferns	Very Open Ferns
Mosses, Liverwort	Dense Mosses	Mosses	Open Mosses	Very Open Mosses