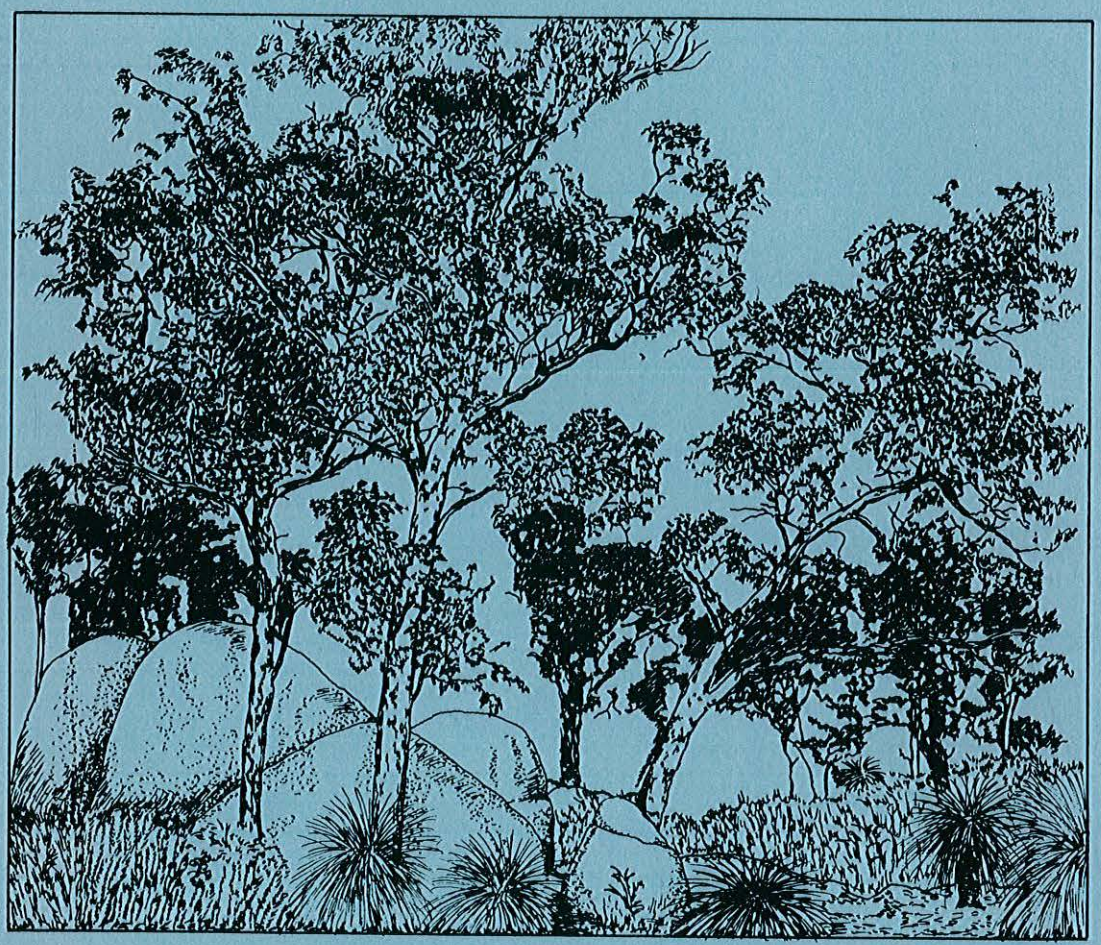
Department of Conservation and Land Management, W.A.

Nature Reserves of the Shires of York and Northam



Draft Management Plan
MARCH 1986

NATURE RESERVES OF THE SHIRES OF YORK AND NORTHAM

DRAFT MANAGEMENT PLAN

MARCH 1986

BY

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MANAGEMENT PLAN NO. 4

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PREFACE

On the 22 March 1985 the Forests Department, National Parks Authority and the Wildlife Section of the Department of Fisheries and Wildlife amalgamated to form the Department of Conservation and Land Management. This Department is responsible for the administration of the Conservation and Land Management Act (1984), which is 'An Act to make better provision for the use, protection and management of certain public lands and waters and the flora and fauna thereof ...'. Under this Act management plans are prepared by the Department of Conservation and Land Management (CALM) for the vested authority or 'controlling body'. The controlling body for state forest and timber reserves is the Lands and Forest Commission (LFC), while for nature reserves, national parks, marine nature reserves and marine parks it is the National Parks and Nature Conservation Authority (NPNCA). The Department of Conservation and Land Management is also responsible for the continuing administration of the Wildlife Conservation Regulations (1950).

This management plan is one of a series produced by the Department of Conservation and Land Management. Completion of each plan involves three stages. The plan is first published as a draft, and members of the local community (particularly reserve neighbours), government departments, tertiary institutions, conservation groups and the general public are encouraged to submit comments. The draft is then reviewed in the light of these comments, and an amended draft and summary of public submissions produced for submission to the National Parks and Nature Conservation Authority (NPNCA), the Minister for Conservation and Land Management, and the Bush Fires Board, for their approval. Once approved, the plan is published in its final form. As such it constitutes a management plan in terms of Section 60 of the Conservation and Land Management Act (1984) and Section 34 (1) of the Bush Fires Act (1954). This plan for management will be effective for ten years after which time it will be reviewed.

Nature reserves are areas vested in the NPNCA and set aside for the conservation of flora or fauna or both.The purpose of this plan is to detail management programs for two nature reserves in the Shire of York - St Ronans (No. 30591) and Wambyn (No. 21981) - and four nature reserves in the Shire of Northam - Clackline (No. 32400), Mokine (No. 31211), Throssell (No. 7220) and Meenaar (No. A29977).

In all plans in this series vegetation is described according to Muir (1977) and named according to Green (1985). The scientific and common names used for mammals are according to Strahan (1983), reptiles according to Storr et al. (1981, 1983) and Cogger (1983) and frogs according to Tyler et al. (1984) and Cogger (1983). The Western Australian Museum is also used as a reference. Birds are named according to Blakers et al. (1984).

This draft plan is in eight parts:

Part 1 introduces the six nature reserves and summarises the biological and physical attributes of the Shires of York and Northam. This part also gives general management objectives for the six nature reserves covered by this plan. Parts 2-7 discuss the individual nature reserves. Each part is split into two sections - 'A. The Reserve' and 'B. Plan for Management'. Section A details the biological and physical attributes of the nature reserve, as well as outlining its historic and nature conservation values. Section B details management objectives and the strategies necessary to achieve these objectives. Part 8 contains general management strategies.

PART 1 INTRODUCTION - THE SHIRES OF YORK AND NORTHAM

The Shires of York and Northam lie approximately 75 km to the east of the Perth Metropolitan region (Fig. 1). Each centres on the town of the same name, although the town of Northam forms a discrete local government authority. Together, the two Shires encompass much of the fertile upper reaches of Avon River valley. The Shire of York, with an area of 2 010 sq. km, is one of the largest local government authorities in the Avon region. The Shire of Northam, on the other hand, with an area of 1 389 sq. km, is one of the smallest. The two Shires have populations of a very similar size, with the largest and second largest populations of the 10 Shires in the Avon region - Northam has a population of 2 620 people and York has a population of 2 200 people (Australian Bureau of Statistics 1981-82). Northam Town local government authority has the highest population of all the local government authorities in the Avon region, with 7 000 people (ABS 1981-82).

1. THE RESERVES

There are six nature reserves in the two Shires - two in York and four in Northam (as at January 1986). The locations of these six areas is given in Figure 2 and their characteristics summarised in Table 1. All six are set aside for the conservation of flora and fauna. In this plan the nature reserves are discussed moving from west to east, from the Darling Range with its higher rainfall, to the wheatbelt which receives moderate to low rainfall.

Three additional nature reserves have been proposed in the Cabinet-endorsed System Six recommendations (Department of Conservation and Environment, 1983). These are recommendations C28, C29 and C30, as shown in Figure 2.

2. CLIMATE

The climate of the Shires of York and Northam is characterised by hot dry summers and mild wet winters. The summers are occasionally relieved by short periods of heavy rain of tropical cyclonic origin.

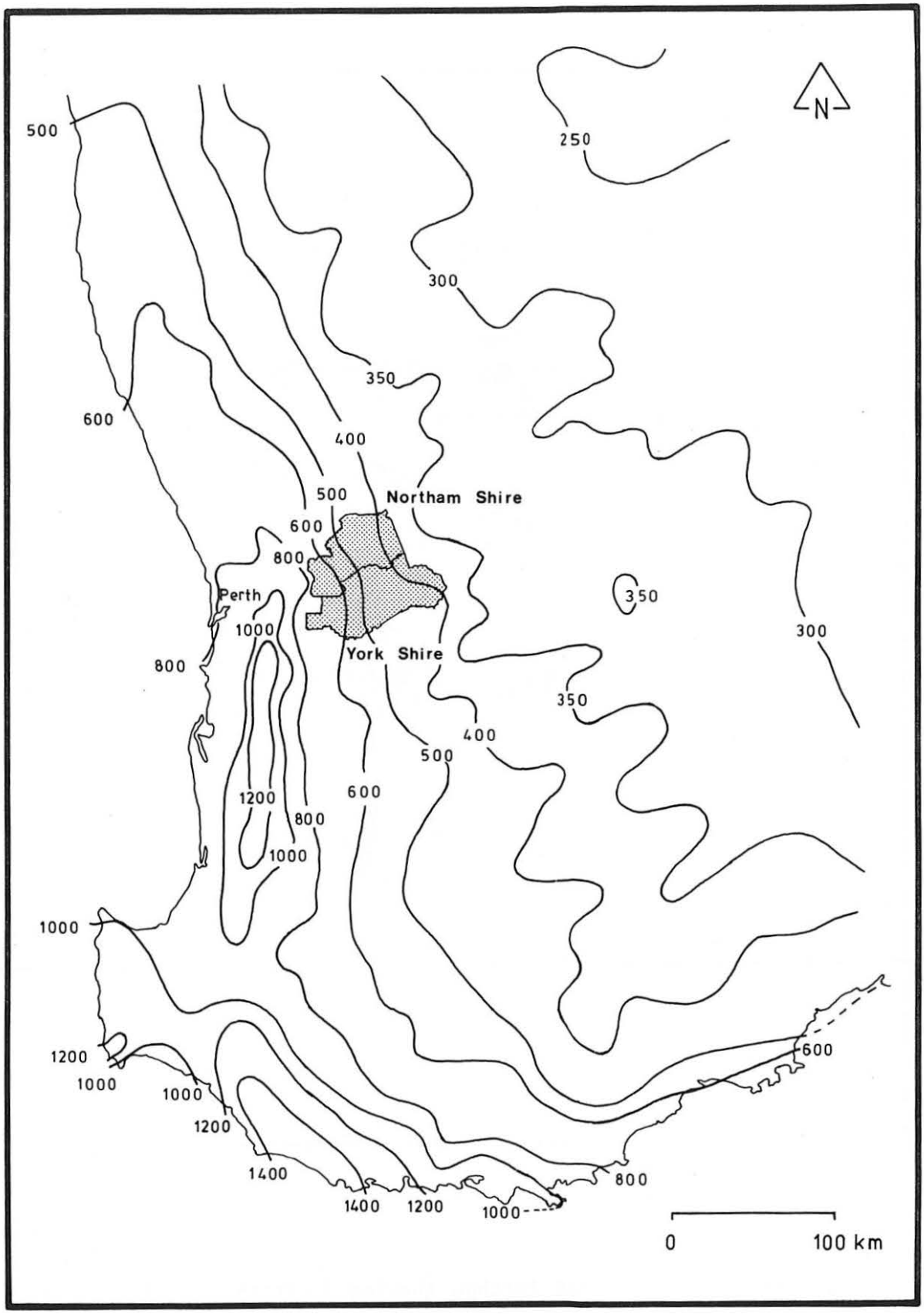

Figure 1. Location of the Shires of York and Northam, and their relationship to annual isohyets (mm). (Source: W.A. Department of Lands and Surveys, 1984 and Bureau of Meteorology, 1984.)

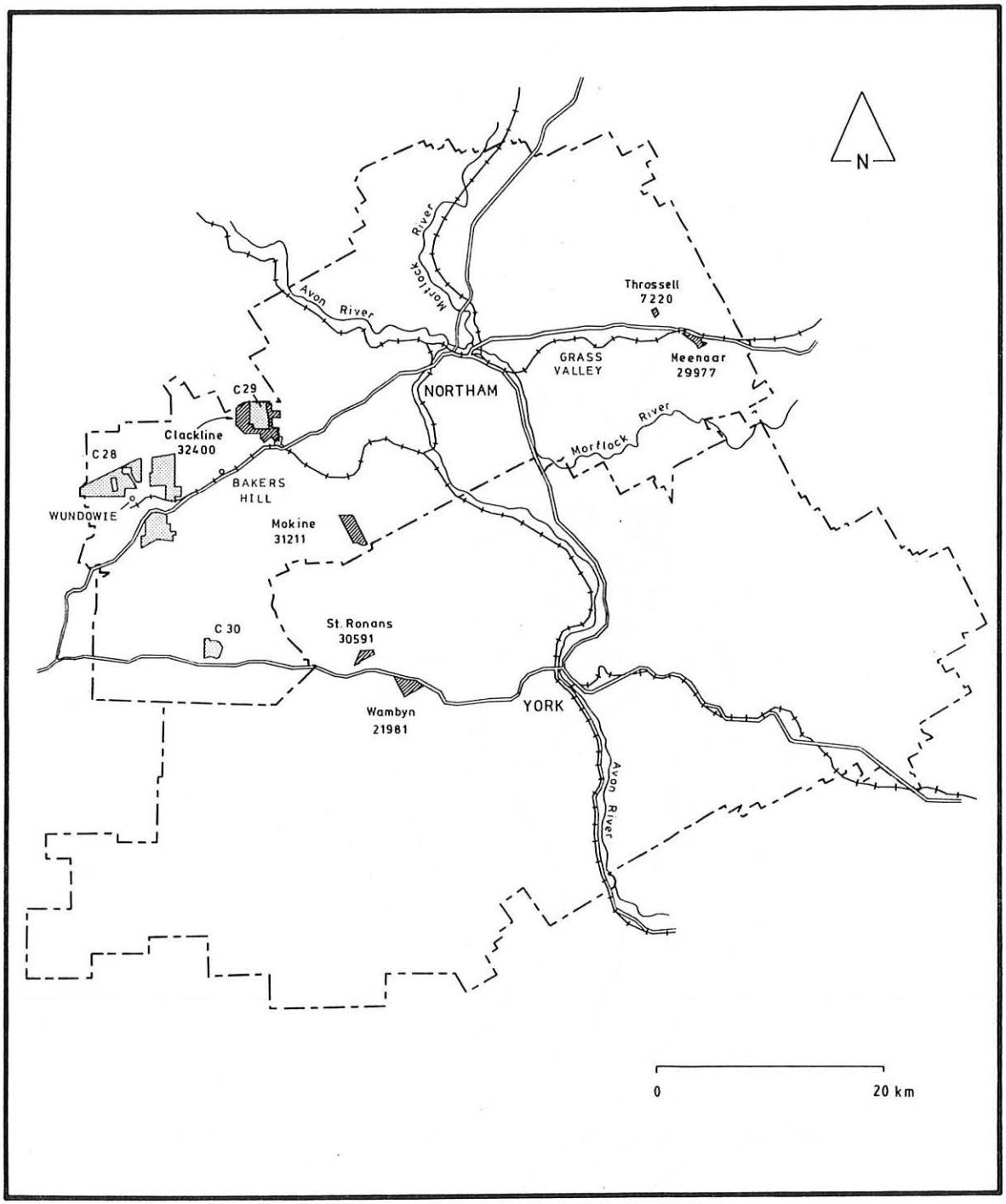

Figure 2. Shires of York and Northam showing location of nature reserves covered by this plan (January 1986). (Source: W.A. Department of Lands and Surveys 1:50 000 series.)

The mean monthly maximum and minimum temperatures in summer are 34°C and 16°C respectively, while in winter they are 18°C and 5°C respectively. (Data collected at Northam by the Bureau of Meteorology.)

The Shire lies between the 800 and 350 mm isohyets with rainfall decreasing from west to east (Fig. 1). This gradient is the result of increasing distance from the coast. Thus two climatic types or regimes, as defined by Bagnouls and Gaussen (1957), prevail across the York-Northam region. In the western part the climate is defined as Warm Mediterranean, which is characterised by five to six 'dry' months (in which potential evapo-transpiration exceeds precipitation), while to the east, where seven to eight months are dry, the climate is defined as Dry Warm Mediterranean. The boundary between these two climatic types corresponds roughly with the 500 mm isohyet. Warm Mediterranean climates are well suited for forestry, horticulture and dairying, while Dry Warm Mediterranean climates are better suited to cereal production and sheep grazing.

In the York-Northam region the seasonality, variability and gradient of rainfall from west to east are significant factors in the determination of vegetation types and their distribution. These factors interact with geomorphology and soils to determine the vegetation patterns across the two Shires. Nature reserves such as Clackline in the west and Meenaar in the east, have a 30-40 % difference in rainfall and the vegetation shows corresponding differences. Clackline lies near the eastern edge of the jarrah (Eucalyptus marginata) forest belt. This species does not occur further to the east on Throssell and Meenaar Nature Reseves.

3. GEOMORPHOLOGY

As mentioned above, a combination of geomorphic and climatic factors, and variable soil types, is responsible for the great diversity of habitats within the York-Northam region.

There have been two main physiographic influences in the York-Northam area weathering and laterisation of the Yilgarn Block and entrenchment of the Avon River. The Yilgarn Block, which is of

TABLE 1. NATURE RESERVES IN THE SHIRES OF YORK AND NORTHAM (AS AT JANUARY 1986)

RESERVE NO.	RESERVE NAME	AREA (HA)	POSITION IN LANDSCAPE	DOMINANT VEGETATION FORMATIONS
32400	Clackline	458.9	eastern edge of Darling Range	wandoo WOODLAND; powderbark FOREST/WOODLAND; jarrah/marri WOODLAND/OPEN WOODLAND
30591	St Ronans	118.2	eastern edge of Darling Range	powderbark LOW WOODLAND A; jam, sheoak and marri LOW FOREST A/LOW WOODLAND A; marri, wandoo and jam OPEN LOW WOODLAND A; wandoo LOW WOODLAND A
21981	Wambyn	215.2	eastern edge of Darling Range	powderbark WOODLAND; wandoo WOODLAND
31211	Mokine	289.1	eastern edge of Darling Range	powderbark WOODLAND; wandoo LOW WOODLAND A; sheoak and jam LOW WOODLAND A/LOW FOREST A
7220	Throssell	17.7	Mortlock River plain	wandoo WOODLAND; salmon gum, wandoo and york gum WOODLAND/LOW WOODLAND A
A29977	Meenaar	71.8	Mortlock River plain	york gum LOW WOODLAND A; sandalwood, blackboy, jam and sheoak SCRUB; tamma HEATH A

Structural Vegetation Categories according to Muir (1977).

Archaean origin, was subjected to laterisation during the Tertiary, resulting in extensive areas being covered by massive laterite, ironstone gravel and sand overlying a thick layer of clay. At the same time several uplifts of the land mass led to entrenchment of the Avon and, to a lesser extent, its tributaries such as the Mortlock.

A third influence led to the formation of sandplains in the eastern parts of the Shires. These are a product of extensive reworking of surface sand deposits during the dry and windy glacial periods of the Pleistocene.

There are three main landform zones across the two Shires. In the west the Shire is dominated by the relatively high elevation and relief of the Darling Range. This range contains the highest point in the two Shires - a major hill rising to 440 m at Coates Siding, immediately to the east of Wundowie township. An elevated ridge at Clackline provides a further break between the generally undulating uplands of the Range and the fall to the Avon Valley. The Avon Valley forms the second landform zone. East of the Avon the land rises, through steep rocky slopes, to the undulating surface of the plateau. In this third landform zone the original lateritic surface has generally been removed, except for areas of laterite and sands on isolated higher areas, often with perimeter breakaways exhibiting active erosion. In the eastern parts the old plateau surface of sands and laterite is dominant, with smaller exposures of the basement granites.

4. SOILS

Detailed soil surveys have not been carried out for either Shire. Rather, the following discussion is drawn from derivations by Taylor and Burrell (1984), based on Northcote et al. (1967). They described the soils according to the three landform zones identified above:

(i) The western third of the Shires, occupied by the dissected features of the Darling Range, is dominated by ironstone gravels and hard, acidic, yellow-mottled soils.

(ii) The central portion comprises the hard, alkaline, red soils of the Avon and Mortlock River terraces, flanked by the hard, red, neutral soils of the surrounding undulating to hilly terrain. These soils extend into both the eastern and western portions of the York-Northam area.

(iii) East of the Mortlock River on the sandplains, intrusions of hard, alkaline, yellow-mottled soils occur, while further to the east a mixture of neutral sandy soils and acidic yellow-mottled earths occur, as well as small areas of acidic, yellow earths.

5. VEGETATION

The vegetation of the Shires of York and Northam has been mapped at a broad scale (1:250 000) by Beard (1979a, 1979b, 1980) who distinguished 17 vegetation associations (Fig. 3). These are, in order of occurrence with decreasing rainfall, and from higher to lower in the landscape:

1. Jarrah (Eucalyptus marginata) and marri (E. calophylla) forest on plateau, wandoo (E. wandoo) in valleys, sandy swamps with teatree (Melaleuca spp.) and Banksia spp.

2. Jarrah, wandoo and powderbark (E. accedens) woodland.

3. Marri and wandoo woodland.

4. Open wandoo woodland and heath.

5. Heath.

6. Jarrah, marri and wandoo forest.

7. Open wandoo woodland.

8. Teatree swamps.

9. York gum (E. loxophleba) woodland.

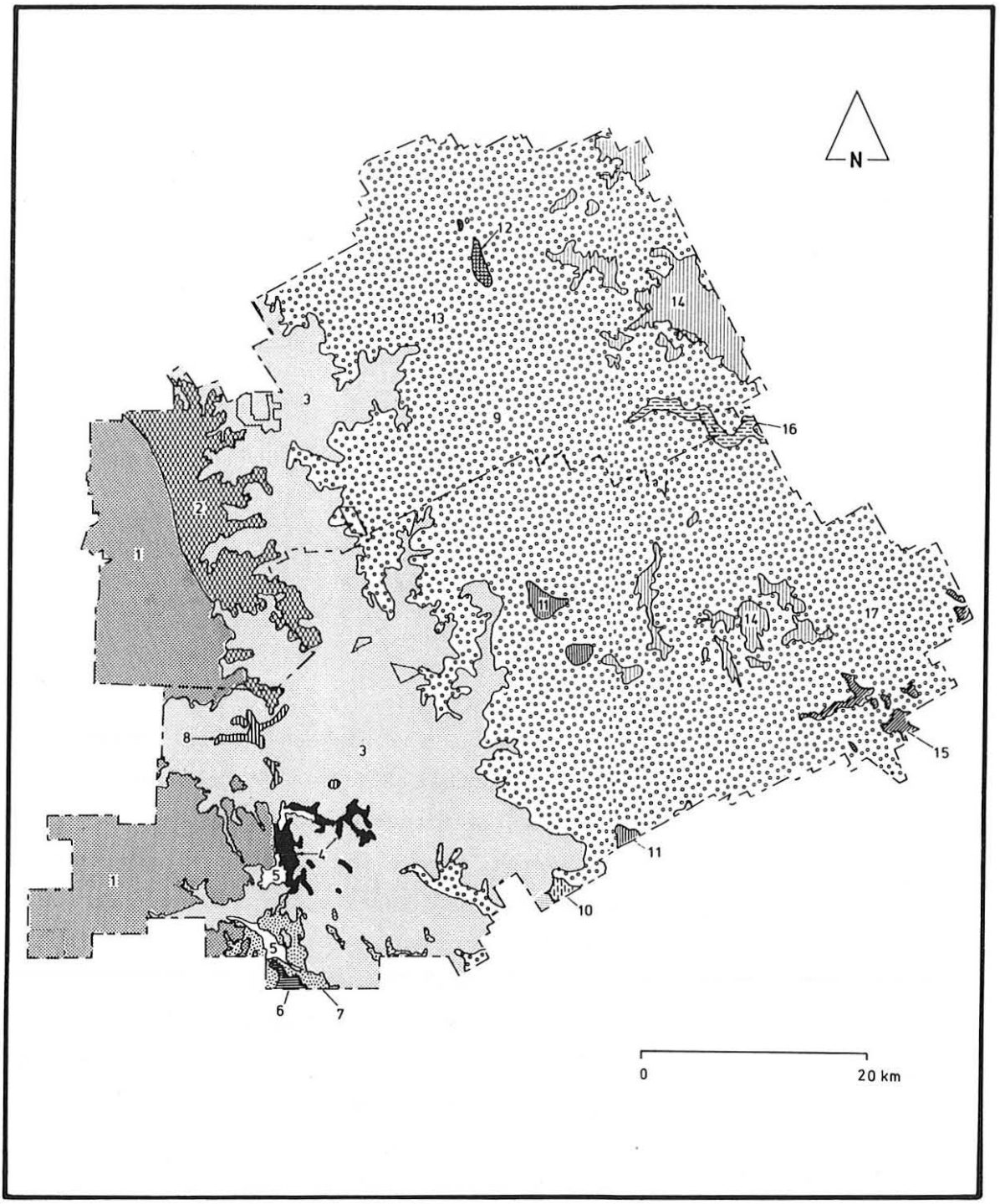

Figure 3. Vegetation of the Shires of York and Northam (Source: Beard, 1979a, 1979b, 1980). Numbered associations are described in the accompanying text.

10. York gum and sheoak (Allocasuarina spp.) woodland.

11. Wandoo woodland.

12. Salmon gum (E. salmonophloia) and morrell (E. longicornis) woodland.

13. York gum and salmon gum woodland.

14. Scrub-heath on sandplain.

15. Sheoak (Allocasuarina spp.) thickets on sandplain, mallet (E. astringens) on breakaways.

16. Teatree and samphire (Halosarcia spp.).

17. York gum and wandoo woodland.

The jarrah and marri forest occupies the highest rainfall area in the western part of the York and Northam Shires. With the decline in rainfall in a northerly and easterly direction this forest grades into a series of open woodlands of jarrah, wandoo and powderbark, and marri and wandoo. Within the latter association, Marri shows a preference for the more sandy soils, while Wandoo occurs on more clayey soils. Clackline is the only nature reserve in the York-Northam area on which stands of jarrah occur - here growing in a woodland association with marri. The four nature reserves on the eastern edge of the Darling Range (Clackline, St Ronans, Wambyn and Mokine) are dominated by powderbark, wandoo, and wandoo and marri woodlands. (Mokine Nature Reserve, although indicated in Figure 3 as carrying york gum, actually supports the aforementioned woodlands.)

Moving east, the remaining half of the York-Northam area is dominated by york gum woodland. Most of this country owes its character to the relatively fertile red loam soils and a surface of gentle relief. This has led to a unique situation in which york gum is no longer confined to the soils of the lower slopes, but may occur as the sole species forming woodland over the whole landscape. Its usual associate, wandoo, is

confined to less basic rocks. In the northern part of this association (in the two Shires) salmon gum shares dominance with the york gum, while in the eastern parts wandoo becomes reinstated as a co-dominant (Beard 1979a). Both Meenaar and Throssell Nature Reserve lie towards the eastern edge of the york gum association (in the two Shires). On both reserves wandoo is an important component. Salmon gums share dominance on Throssell Nature Reserve.

Extensive sandplains occur near the eastern boundary of the York-Northam area (Fig. 3). These are for the most part on higher ground, and appear to be of primarily aeolian origin, consisting of yellow, earthy sands (Beard 1979a). The original vegetation was scrub-heath or banksia low woodland. Along major drainage lines yellow, alkaline loams supported teatree and samphire on extensive salt flats. Meenaar is the only nature reserve in the York-Northam area to contain a sample, albeit small, of these associations.

Appendix 2 lists the plant species found on the York and Northam nature reserves.

6. FAUNA

Detailed fauna surveys of the York and Northam nature reserves have revealed a wealth of wildlife. Mammals recorded include echidnas, western grey kangaroos, western brush wallabies, dunnarts, western pigmy-possums, the white-striped mastiff-bat, foxes, cats, rabbits and house mice (App. 3). A total of 24 lizard, 7 snake and 7 frog species have been recorded.

The detailed fauna surveys included bird species, with a total of 92 species being recorded on the six nature reserves in the York-Northam area (App. 4). St Ronans Nature Reserve had the greatest number recorded on one area, with 56 species. This compares favourably with an average of 65 species recorded by Kitchener et al. (1982) in their surveys of 23 wheatbelt nature reserves. Obviously, the York-Northam nature reserves contain a diverse fauna. This emphasises the value of these small isolated remnants, particularly for bird and reptile species.

7. LAND USE

The Avon River valley, which forms the central part of the Shires of York and Northam, was settled early in the history of this State. York was established in 1831 by Ensign Dale, who led a party of settlers into the area. Dale continued his explorations down the Avon Valley, passing through the future site of Northam. This town was established in 1833. Northam had a slow and uneventful beginning, seeing little early development. One of the main reasons was its lack of a direct link to Perth. Northam was linked only to York and Toodyay, whereas roads directly linked the latter two towns to Perth.

Development throughout the Avon Valley was slow until the 1850s, when the influx of convicts provided cheap labour. This enabled large areas to be cleared and crops established. The availability of cheap labour, plus an increasing demand for produce for domestic consumption, stimulated agriculture and promoted agricultural development of the Avon Valley. The goldrush in the 1890s and the continued growth of Perth led to increased demand for produce such as salted pork, bacon, cheese, eggs and poultry. Production to meet these needs assured the continued development and consolidation of agriculture in the Avon Valley.

The development of Northam was assured by Throssell (an influential Northam businessman who became the second premier of Western Australia in 1901), who secured the route of the Yilgarn railway via Northam, rather than via York or Toodyay. In 1891, again due primarily to the influence of Throssell, the railway was extended from Northam to Southern Cross. Northam was the nearest settled town to the immensely wealthy areas to the east (the goldfields) and as such it became a centre of great commercial importance. By 1929 Northam was a thriving and prosperous municipality of modern appearance.

The 1940s (post World War II) saw the introduction of the bulldozer and mechanised clearing became widespread, particularly in the western parts of the York-Northam area. Formerly this region had been difficult to clear because of the rugged nature of the country. In the ensuing years the fertility problems of the laterite soils and sandplains were solved. Development for cropping and grazing followed.

Today the Shires of York and Northam, with the Shires of Toodyay to the north and Beverley to the south, are described as lying on the western edge of the wheatbelt. Although cereal growing is an important land use in both Shires, over half the area of agricultural establishments in both Shires is devoted to pasture. From the early days of this century Northam has been one of the most important hay-producing areas in the State. Sheep are the main stock, with over half a million animals in the two Shires (Australian Bureau of Statistics 1981-82). Beef cattle are of lesser importance, with 6 638 head in the Shire of Northam and 3 597 in York.

Private holdings, which are predominantly rural, contribute 85.1% to the area of the Shire of Northam and 71.3% to the Shire of York. Crown reserves occupy a further 9.1% of the former and 2.6% of the latter. Nature reserves contribute only 0.6% to the total area of the Shire of Northam and 0.2% to the Shire of York. This deficiency is offset to some degree by state forest, which covers almost a quarter (24%) of the Shire of York. Table 2 gives a more complete analysis.

8. GENERAL MANAGEMENT OBJECTIVES

Management of the six nature reserves covered by this plan will be directed towards the enhancement and maintenance of their collective and individual nature conservation values. This general objective will be achieved by a consideration of the following strategies: protection from fire, pests and dieback; rehabilitation of degraded areas; management of public use; research and monitoring.

The determination of each strategy has been based on one or more specific objectives. These specific objectives are -

For protection from fire: to protect the natural values of nature reserves as well as the assets of reserve neighbours; and, to minimise the risk of wildfires on nature reserves and to suppress any wildfires that occur.

TABLE 2. LAND STATUS IN THE SHIRES OF YORK AND NORTHAM

STATUS	SHIRE OF YORK		SHIRE OF NORTHAM	
	AREA (HA)	%	AREA (HA)	%
FREEHOLD	143,424	71.3	120,763	85.1
RESERVE (i) FLORA & FAUNA	332	0.2	857	0.6
(ii) OTHER	1,728	0.9	9,990	7.0
ROAD & RAILWAY RESERVES	3,015	1.5	2,128	1.5
VACANT CROWN LAND	1,948	1.0	683	0.5
LEASEHOLD	2,187	1.1	3,655	2.6
STATE FOREST	3,823	24.1	3,823	2.7
TOTAL AREA OF SHIRE	201,000	100.00	141,900	100.00

Source: Department of Lands and Surveys, 1985

For protection from pests: to protect the reserve and surrounding farmlands from damage by plant and animal pests, particularly those that are declared from time to time under the provisions of the Agriculture and Related Resources Protection Act (1976).

For protection from dieback: to prevent the spread of dieback into uninfected areas; and, to minimise its spread in infected areas.

For rehabilitation of degraded areas: to rehabilitate degraded areas and minimise further disturbance.

For management of public use: to encourage an appreciation of the nature conservation values of the York-Northam nature reserves.

For research and monitoring: to encourage use of nature reserves for research, by both amateurs and professionals; and, to implement monitoring programs to provide data on the effects of management actions.

Strategies specific to a particular nature reserve are given in the 'Plan for Management' for the individual reserve. General management strategies applicable to all the York-Northam nature reserves are given at the end of this plan (Part 8).

PART 2 : CLACKLINE NATURE RESERVE (NO. 32400)

A. THE RESERVE

1. PHYSICAL CHARACTERISTICS AND RELATIONSHIPS

Clackline Nature Reserve is the westernmost of the York-Northam nature reserves, being 1 km to the north of the old Clackline siding and 18 km west-south-west of Northam, in the Shire of Northam (Fig. 2). It is an irregular 'U'-shape, with a perimeter of 19 km and an area of 458.9 ha. An un-named road touches the western boundary of the Reserve and then joins Refractory Road which runs roughly parallel (1 km to the south) of the southern boundary. Refractory Road joins the Great Eastern Highway which continues eastward, approximately 1 km south of the southern boundary (Fig. 4). The Clackline-Toodyay Road runs roughly parallel to the eastern boundary of the Reserve, again at an average distance of 1 km.

Tenure of the land surrounding the Reserve is complex (Fig. 4). The land on the southern boundary is privately owned. Although much of it remains uncleared it is riddled with tracks. An area of vacant Crown land abuts the south-eastern corner of the Reserve. The eastern edge of the Reserve adjoins private holdings which, towards the northern end, carry patches of uncleared bush. A privately owned, uncleared holding, cut by numerous tracks, abuts the western boundary. The disjointed northern boundary abuts two mineral leases, one of which retains a large area of little disturbed bush. The middle of the 'U' includes a cleared, privately owned agricultural holding in the south, uncleared vacant Crown land and a water Reserve (No. 3307) in the centre, and an uncleared timber Reserve (No. 20014) in the north (Fig. 4).

The elevated ridge on which Clackline Nature Reserve centres, is of considerable landscape significance as it forms a break between the generally undulating uplands of the Darling Range and the fall to the valley of the Avon (Taylor and Burrell 1984). Altitude ranges from 380 m in the north to 260 m on the southern boundary where the Reserve rapidly falls away to Clackline Brook (Fig. 5).

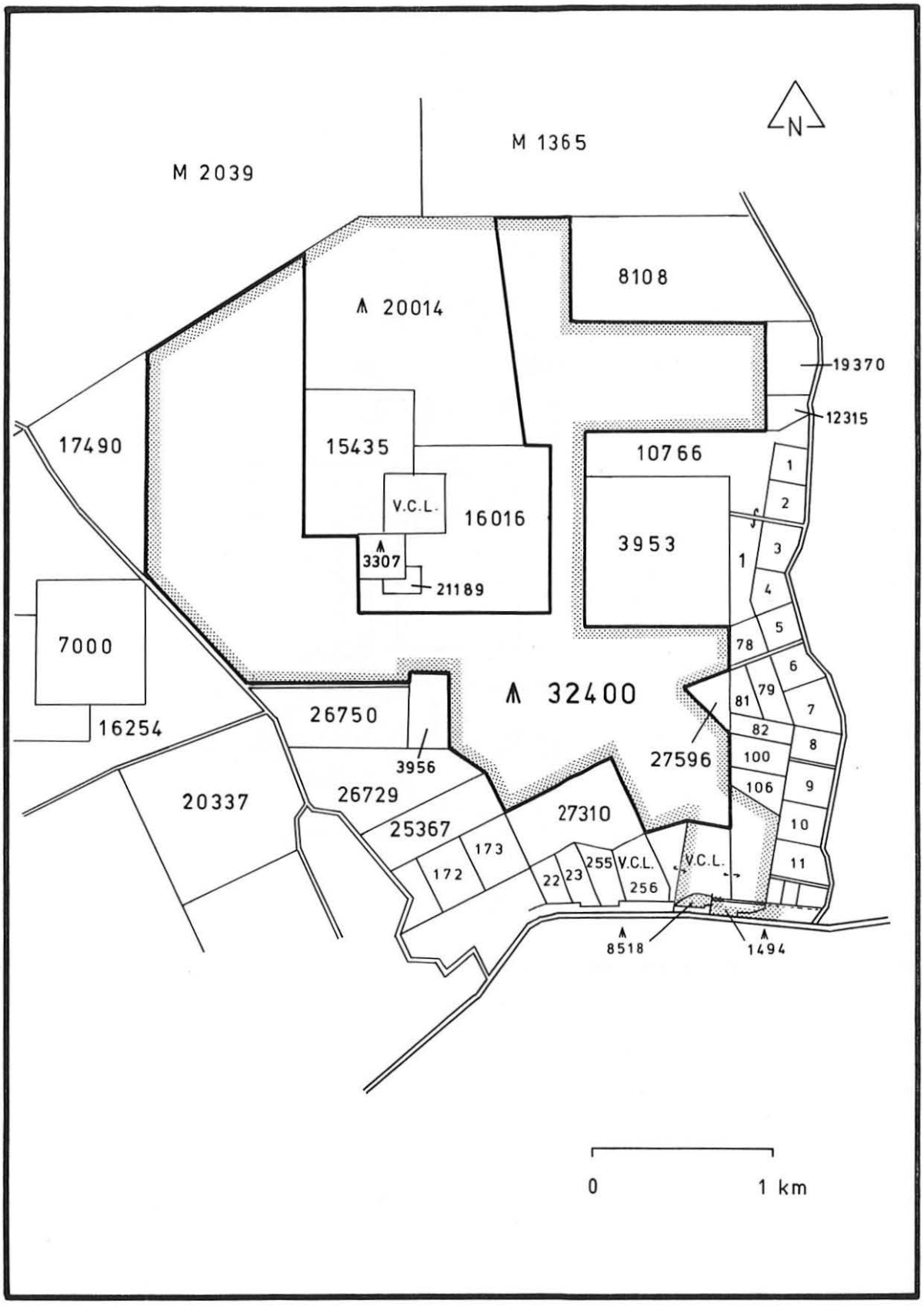

Figure 4. Clackline Nature Reserve showing its relationship with surrounding lands. (Source: W.A. Department of Lands and Surveys 1:50 000 series.)

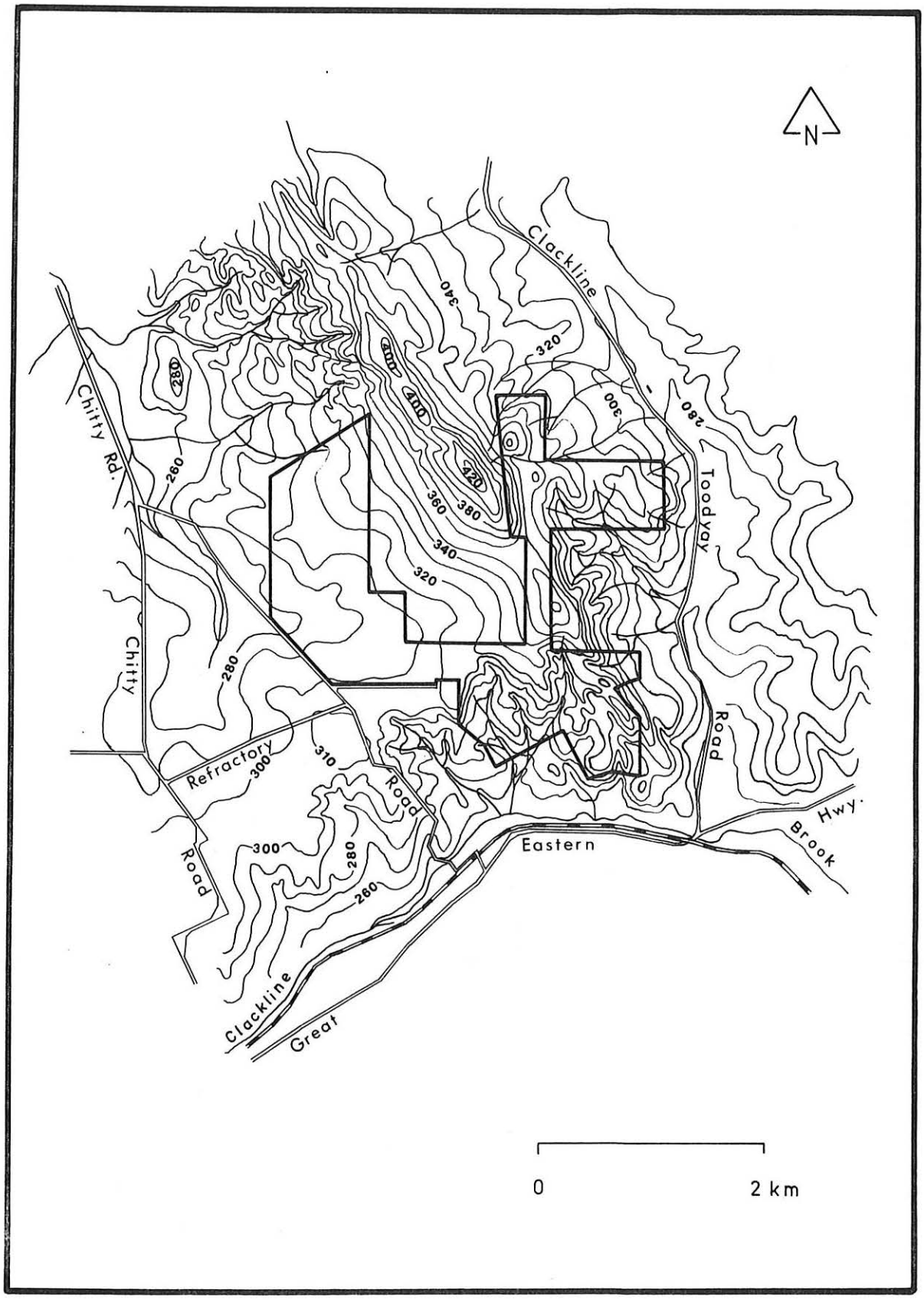

Figure 5. Clackline Nature Reserve showing the associated contours (m). (Source: W.A. Department of Lands and Surveys 1:50 000 series.)

2. HISTORY

The area centred at Clackline, where the Clackline Brook passes through the gap in the north-south trending ridge system, provides passage for the Great Eastern Highway, the Goldfields water pipeline and the old railway line (Taylor and Burrell 1984). The Clackline area has been readily accessible for many years. Only the rugged nature of the area directly to the north prevented its early release for agriculture and settlement. However, by 1928 the Clackline area had been subdivided and given location numbers. In September of the same year an application was made for the conditional purchase of Avon Location 19469 (now Timber Reserve No. 20014). In response, the Conservator of Forests wrote to the Under Secretary for Lands (26 October 1928):

'This block is reported to be carrying good stands of Wandoo, and I shall be glad if you will have some withdrawn from selection and reserved on account of the timber.'

On 6 January 1929 an area of 544 acres was set aside for Timber (Reserve No. 20014). Requests for release of the area continued. By 21 December 1973 the reserved area had decreased to 130 ha.

Strong local interest in protecting the conservation values of the Clackline area culminated in the following communication between the Director of the Department of Fisheries and Wildlife and the Under Secretary for Lands, Department of Lands and Surveys (22 January 1969):

'...After considerable discussion and investigation it has been recommended by local residents and departmental officers that all the available land ... be reserved for the conservation of flora and fauna, together with other such purposes, ie - timber and water and minerals, for which some of this area is already reserved.'

This suggestion was opposed by the Department of Mines (3 April 1969), and they continued to oppose the idea, even after a local mining company, Clackline Refractories, expressed their support for the proposal.

The local community continued to enthusiastically advocate the nature reserve proposal:

'Timber Reserve 19469 (Reserve No. 20014) is rugged country, containing a rich flora, a spring where animals and birds drink and the remains of animal traps used by aboriginals.

'The significant drop in rainfall from Bakers Hill 25" (625 mm) to 17" (425 mm) at Northam makes this a meeting place of inland and coastal floras. This fact is also verified in the variety and number of birds in the area, inland and coastal species being represented.

the area supports a wide range of orchids, including Thelymitra, Diuris, Pterostylis, Prasophyllum, Lyperanthus, Elythranthera and Caladenia, including Caladenia triangularis, an orchid found only in this area.

'Seventy odd specimens of birds use this type of habitat.

'Three species of kangaroo are known in this area

1. the Grey Kangaroo
2. the Black-gloved Wallaby
3. the Red Wallaroo - or Hill Euro

'Brushtail Possums are in good numbers. Quendas or Short-eared Bandicoots are known to be in the area.'

(Ms Raye Paynter, Reserve neighbour to Mr K. McIver M.L.A. Northam, 3 March 1973)

On 21 December 1973, Reserve No. 32400 was set aside for the Conservation of Flora and Fauna and vested in the Western Australian Wildlife Authority (now replaced by the NPNCA).

In 1983 the Department of Conservation and Environment prepared the System Six recommendations for the Environmental Protection Authority to review. These recommendations, which covered existing and proposed conservation reserves, were endorsed by the W.A. Government in the same year. With respect to Clackline it was recommended:

> 'That Reserves C1494 and C8518 be cancelled and their areas added to Reserve C32400.
>
> 'That the vacant Crown land be declared a Class C Reserve for Conservation of Flora and Fauna, vested for a limited term of 10 years in the W.A. Wildlife Authority and managed under a published management plan.
>
> 'That the respective purposes of Reserves C3307 and C20014 be amended to Conservation of Flora and Fauna, and that the Reserves be vested in the W.A. Wildlife Authority for a limited term of 10 years and managed under a published management plan.
>
> 'That ways and means of protecting the conservation value of Avon Locations 16016 and 21189 be sought through planning procedures to be developed as recommended.'

These recommendations, which will increase the area of Clackline Nature Reserve by 278 ha, are currently with the W.A. Department of Lands and Surveys.

The stippled line on Figure 4 encloses the existing Nature Reserve and the proposed additions.

3. SOILS AND VEGETATION

The complex topography of Clackline Nature Reserve supports a diversity of soil types. Soils range from clays, sandy clays and loamy soils in the lower parts of the landscape, to pallid-zone clays exposed on erosional slopes, to gravelly soils on the top of breakaways. The vegetation is similarly diverse with wandoo occurring lower in the landscape, powderbark forest/woodland on the breakaways and breakaway

slopes and jarrah/marri woodland on the breakaway tops. Five associations have been mapped at a broad scale, using the overstorey species as the chief distinguishing feature. These associations are distributed as shown in Figure 6 and described as follows:

1. Wandoo (Eucalyptus wandoo) WOODLAND, 15-18 m in height, with some marri (E. calophylla) and jarrah (E. marginata) and patches of sheoak (Allocasuarina huegeliana). The understorey is generally open, and dominated by blackboys (Xanthorrhoea preisii), parrot bush (Dryandra sessilis) and pingle (D. carduacea). Patches of pingle THICKET, 2-3 m in height, occasionally occur.

2. Powderbark (Eucalyptus accedens) FOREST/WOODLAND, 15-18 m in height, with a variable component of wandoo, marri and jarrah. The percentage cover of the understorey is highly variable, ranging from very sparse to dense. Dominant species include blackboys, parrot bush, Hakea trifurcata and bullock poison (Gastrolobium trilobum).

3. Jarrah/marri WOODLAND/OPEN WOODLAND, 15-20 m in height, over a highly diverse understorey. Much of this diversity is a direct response to the changes in soil type, from laterite-gravel loams to sand. A pingle and Hakea trifurcata dominated SCRUB/THICKET occurs on the gravelly surfaces, while the understorey on the sandplain areas varies from Eremaea pauciflora and mountain kunzea (Kunzea recurva) DENSE THICKET/THICKET, 2-3 m in height, to Leptospermum erubescens and Hakea trifurcata dominated THICKET/SCRUB to 2.5 m.

4. Marri WOODLAND, 15-17 m in height, over jam (Acacia acuminata) and sheoak LOW WOODLAND A over LOW GRASS.

5. Sheoak LOW WOODLAND A/LOW FOREST A, 6-8 m in height, with an open understorey. Jam occasionally appears.

Clackline also contains a gazetted rare species of Spider Orchid, Caladenia triangularis.

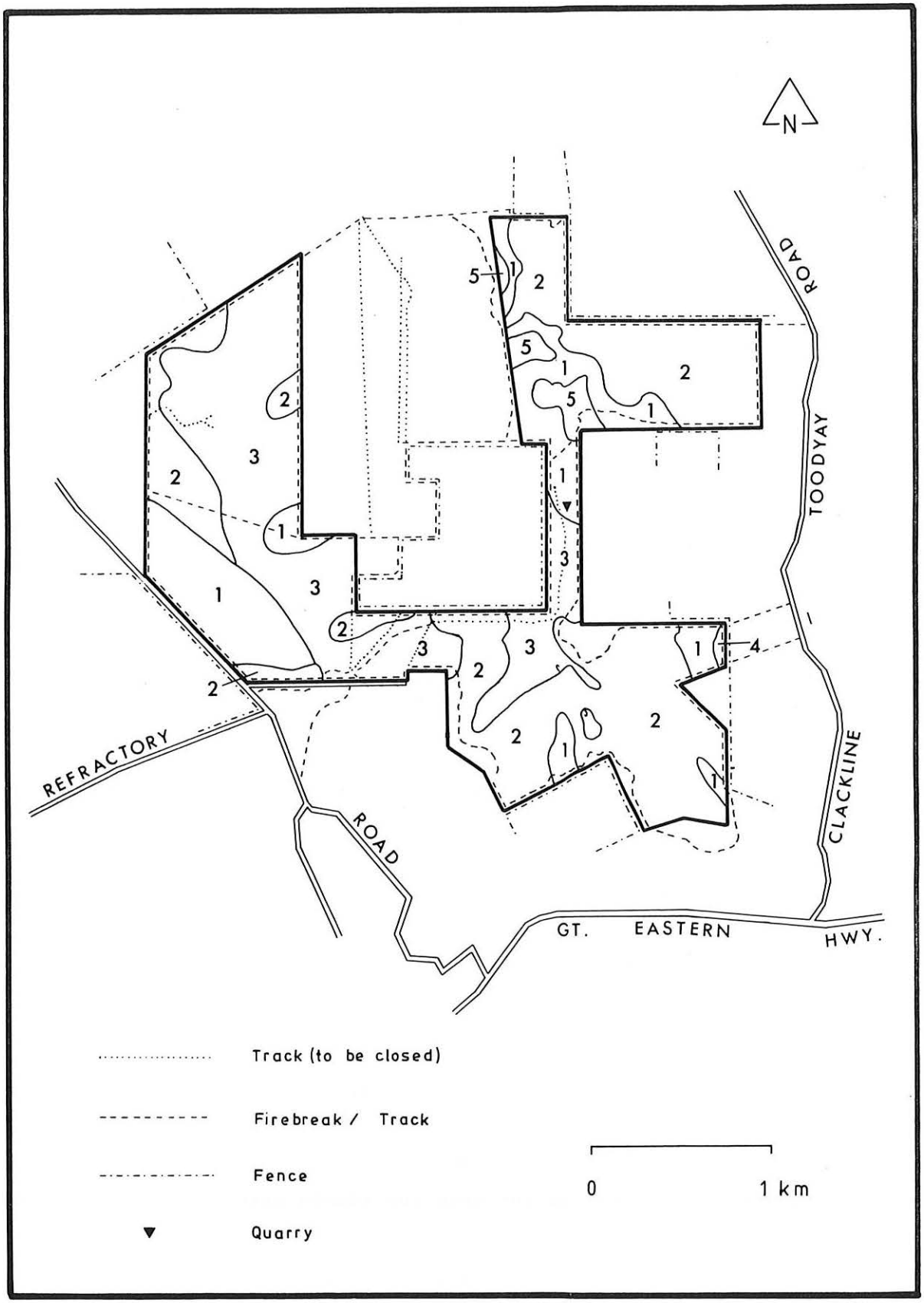

Figure 6. Clackline Nature Reserve showing features and vegetation associations (identified by number and described in the associated text). (Source: Department of Conservation and Land Management, 1985.)

Also of interest is the occurrence of Lomandra nutans on the Reserve. Formerly this species had only been recorded as far north as Narrogin. Lomandra spartea, also recorded on Clackline, was previously thought to be confined to the Darling Scarp (G. Keighery, pers. comm., 1985).

Appendix 2 includes a plant species list for Clackline Nature Reserve.

4. FAUNA

Mammals sighted include the western grey kangaroo (Macropus fuliginosus), western brush wallaby (M. irma), echidna (Tachyglossus aculeatus) and rabbits. A two day survey by the W.A. Naturalists' Club in September 1985 revealed a diversity of animal life. Five frog, four gecko, three legless lizard, one dragon, five skink and two goanna species were recorded. Four snake species were also noted (App. 3).

Fifty one bird species have been recorded on the Reserve (App. 4). Several records are of particular interest. First, a young Brown Goshawk seen on the Reserve suggests that this species breeds in the vicinity. Second, Dusky Woodswallows, whose range has been reduced through competition with Black-faced Woodswallows (Serventy and Whittell 1976), are numerous on Clackline.

5. PAST USES, MANAGEMENT AND FIRE HISTORY

The Reserve has been subject to a variety of past uses. It has been cut over for timber, and various licences and permits for this purpose have been held over parts of the Reserve during the last 30 to 40 years. Industrial Extracts Limited held a licence to use wandoo (and perhaps brown mallet) from the area for tannin extraction. During the 1960s the wood distillation, charcoal, iron and steel industry was interested in using log tops and remaining trees as a source of firewood.

Furthermore, Clackline Nature Reserve is within the Pacminex Agreement Area; however, at present Pacminex has no plans to mine the area. There are also existing mineral claims for the extraction of iron ore,

silica sand, clay, quartz and Toodyay stone. Land immediately south is used by Clackline Refractory Limited for the production of refractory clay.

At one stage the area was used by the armed forces for field exercises and fox holes and shelters can still be seen. Gravel scrapes remain from either geological surveys or searches for gravel for road construction. A quarry on the central ridge (Fig. 6) was used as a source of stone. The Reserve is presently being used by off-road motorcyclists and horse-riders. Both these uses are incompatible with the purpose of the Reserve - the conservation of flora and fauna. Very little rubbish has been dumped on this Reserve.

The Reserve and adjacent uncleared land are riddled with tracks (Fig. 6), the only benefit being the existence of a complete perimeter firebreak. However, the steepness of the terrain makes this firebreak impassable in places. Most of the Reserve boundary is fenced (Fig. 6).

The Reserve does not appear to have carried a major fire in the last 20 years.

6. NATURE CONSERVATION VALUES

Taylor and Burrell (1984) draw attention to the landscape significance of the Clackline area in the Shire of Northam Town Planning Scheme:

'The area centred on Clackline, where the Clackline Brook passes through the gap in the north-south tending ridge system...is of considerable importance from an environmental point of view. The topography reflects a somewhat complex geological structure and a major vegetation change.'

In addition, all of the main tree species of the Darling Range are found on Clackline - marri, jarrah, wandoo, powderbark, sheoak, bull banksia (B. grandis) and christmas tree (Nutysia floribunda).

Clackline is the only conservation Reserve on which the rare Spider Orchid Caladenia triangularis has been found. The presence of this orchid was a contributing factor in the nomination of Clackline Nature

Reserve to the Australian Heritage Commission for placement on the Register of the National Estate. It has not yet been placed on the Register, although it appears on the interim list.

A final important conservation value of the Reserve is the frequent use made of the area by local naturalists and conservation groups, such as the W.A. Naturalists' Club and W.A. Wildflower Society. Use of nature reserves by such groups provides many benefits, one of the most important being the provision of additional biological data which can then be used in management.

B. PLAN FOR MANAGEMENT

1. MANAGEMENT OBJECTIVES

Management will be directed towards enhancing and maintaining the nature conservation values of Clackline Nature Reserve. This will be achieved by managing the existing Nature Reserve and proposed additions as one conservation unit.

Management strategies to achieve this objective will include: protection from fire, pests and dieback; rehabilitation of degraded areas; rationalistaion of Reserve boundaries; management of public use; research.

Any strategies not discussed below are covered in PART 8: GENERAL MANAGEMENT STRATEGIES.

2. PROTECTION FROM FIRE

Clackline Nature Reserve is one of the few areas on the Darling Scarp which has not been frequently burnt. This makes the area valuable for reference purposes and thus it is considered that the majority of the Reserve is kept free from fire. It is equally as important to protect the assets and proterties of Reserve neighbours.

Protection from fire for the Nature Reserve and Reserve neighbours is difficult for two reasons. First, the rugged nature of the Reserve (Fig. 5) makes the establishment of a safe firebreak system within the Reserve boundary impossible. The existing system is inaccessible to vehicles in places due to the steep grade. Also, steep sections of the system are highly susceptible to erosion. Second, along the eastern side of the Reserve, houses are built in bush close to the Reserve boundary. During hot weather conditions, which are generally accompanied by strong north-easterly winds, these areas are at risk from any fires which may originate on the Reserve.

Management Strategies

An integrated approach to protection from fire for Clackline Nature Reserve and adjoining properties will be implemented. A committee, chaired by an officer from the Mundaring Office of the Department of Conservation and Land Management, will be formed with representatives from the Shire of Northam, Bush Fires Board and Reserve neighbours. Working to achieve the goal of exclusion of fire from the majority of the Reserve area and protection of the assets and properties of Reserve neighbours, the committee will be responsible for developing an integrated system of fire control, based on a safe, stable firebreak network. Development of this firebreak system will be based on recognition of the need to minimise erosion and further environmental disturbance.

In the interim, the existing firebreak system will be rationalised. Those tracks which duplicate access (shown as dotted lines in Fig. 6) will be closed. A buffer of frequently burnt vegetation will be established adjacent to th northern boundary of the Reserve, as fires are most likely to move onto the Reserve from the bushland to the north. The buffer, 100-200 m in width, will follow the boundary between the Reserve and Timber Reserve No. 20014.

3. PROTECTION FROM PESTS: ANIMAL AND WEED CONTROL

Although rabbits occur on the Reserve, there are few other signs of pests or extensive weed invasion. The only exception is invasion by exotic grasses into marri woodland on the eastern edge of the Reserve.

Management Strategies

Further spread will be limited by minimising disturbance to the area.

4. REHABILITATION AND MAINTENANCE OF THE NATURAL ENVIRONMENT

Management Strategies

Tracks which do not form a part of the rationalised firebreak system will be closed (Fig. 6) and, if necessary, ripped to encourage regeneration.

5. RATIONALISATION OF BOUNDARIES

The boundary of Clackline Nature Reserve is irregular, with farm land and land used for other purposes intruding in many places (Fig. 4). Final implementation of the System Six recommendations (DCE, 1983) will alleviate this problem to some degree. However, further rationalisation of the Reserve boundaries is essential.

Management Strategies

Any land which becomes available will be added to the Reserve, particularly if it effectively decreases the length of the Reserve boundary.

6. PUBLIC USE

Clackline is highly suited for use as an educational resource by the interested public. It is readily accessible, being only a kilometre north of the Great Eastern Highway. Furthermore, it provides a diversity of landform, vegetation (combining elements of coastal and wheatbelt flora) and birdlife.

Management Strategies

Use of Clackline Nature Reserve and its surrounds, by local and Perth-based conservation groups, will continue to be encouraged. In the past this approach has developed a two-way information exchange, with the Department receiving additional data which aids management, and members of the conservation groups developing an increased

perception of an area's conservation values and management problems. School groups will also be encouraged to use Clackline for educational purposes. Appropriate uses include nature study, photography and bird-watching.

Two approaches will be used to minimise use of the Nature Reserve by motor cyclists and horse-riders. First, signs will be erected which will clearly indicate permitted and non-permitted forms of public use. These signs, which will also give the Reserve name, will be erected at access points on the southern, western and eastern boundaries. Second, there will be an increased enforcement presence (that is, wildlife officers) on the Reserve.

7. RESEARCH

Clackline is being used as a key site for research into techniques for monitoring changes in vegetation. The project, conducted by the Wildlife Research Branch of the Department of Conservation and Land Management, aims to monitor structural changes and changes in species composition over time, in a number of woodland communities.

Management Strategies

Further work of this type will be encouraged, particularly research which investigates the effect of management actions on ecological processes. As such, accompanying zoological studies would be invaluable.

The diversity of research areas offered by Clackline Nature Reserve and its close proximity to the metropolition area make it a particularly attractive research site for tertiary institutions. Such use will be encouraged.

PART 3 ST RONANS NATURE RESERVE (NO. 30591)

A. THE RESERVE

1. PHYSICAL CHARACTERISTICS AND RELATIONSHIPS

St Ronans Nature Reserve is located 17 km to the west of York in the Shire of York (Fig. 2). It is a roughly triangular Reserve with an area of 118.2 ha and a perimeter of 5.5 km. Wambyn Road follows the western boundary of the Reserve (Fig. 7). All land surrounding the Reserve is cleared and privately owned.

St Ronans Nature Reserve occupies the dissected country on the eastern edge of the Darling Range. It has a significant variation in altitude, from 370 m on the northern boundary, which lies on the southern slopes of Mt Ronan (390 m), to 290 m in the south-eastern corner, where St Ronans Brook cuts through the Reserve (Fig. 7).

The Reserve's namesake, St Ronans Well, is 1 km to the south on the Great Southern Highway. The well lies in the centre of St Ronans Well Reserve (No. 10895) (Fig. 7). This Reserve, with an area of 19.4 ha, was set aside for the Preservation of an Historic Site and vested in the W.A. National Parks and Reserves Association on 25 September 1981.

2. HISTORY

The location now known as St Ronans Nature Reserve first came to the attention of the Department of Fisheries and Wildlife in 1970:

> 'Avon Location 27703 has been recently inspected by an officer of this Department and found to be suitable as a fauna sanctuary.
>
> 'Evidence of 3 different species of mammal was observed as well as sightings of 7 different bird species and 4 species of reptiles.
>
> 'This Reserve has an area of approximately 292 acres and although in the vicinity of State Forest No. 13 there are presently no reserves for Flora and Fauna Conservation in the York Shire.

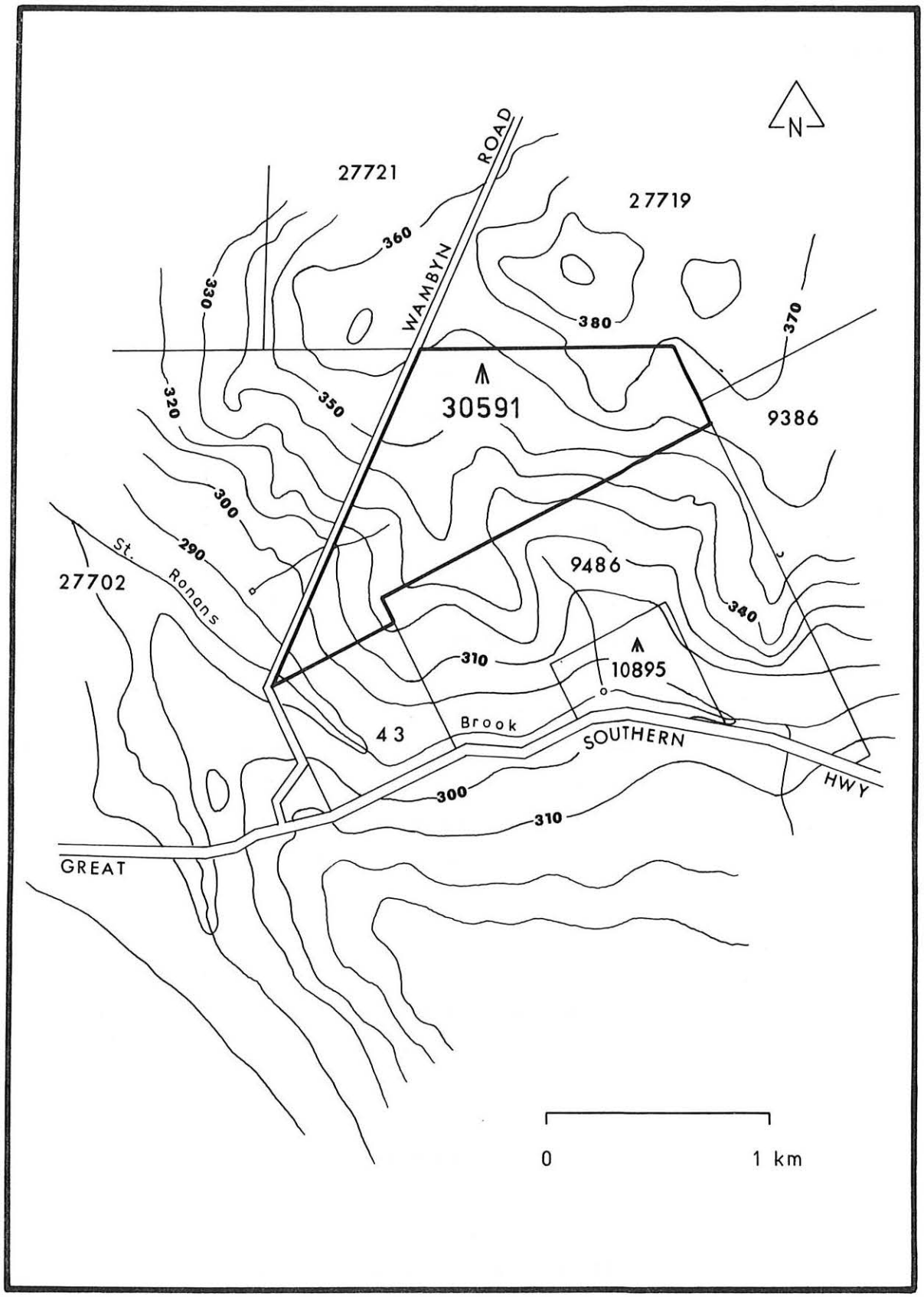

Figure 7. St Ronans Nature Reserve showing its relationship with surrounding lands and associated contours (m). (Source: W.A. Department of Lands and Surveys 1 : 50 000 series.)

'I request, therefore, that action be taken to amend this Reserve to, or include Conservation of Flora and Fauna, and be vested in the Western Australian Wildlife Authority.'

(Director, Department of Fisheries and Wildlife, to Under Secretary for Lands, Department of Lands and Surveys, 7 May 1970)

On 23 October 1970 St Ronans was set aside for the Conservation of Flora and Fauna, and vested in the Western Australian Wildlife Authority (now replaced by the NPNCA).

3. SOILS AND VEGETATION

St Ronans supports a complex mosaic of vegetation. Powderbark woodland on laterite-gravel dominated loams is the most extensive association. Lower in the landscape wandoo woodland occurs on grey loam-clays. Several small areas of white and yellow sands support marri woodland. Various combinations of sheoak, marri, jam and wandoo occur on yellow-brown and grey loams, and are generally associated with granite outcrops.

The vegetation on St Ronans is distributed as shown in Figure 8, and described below:

1. Granite rock surface with occasional patches of pincushions (Borya nitida). Around the edges a THICKET of Thryptomene australis, cliff net-bush (Calothamnus rupestris), sea-urchin hakea (Hakea petiolaris) and Allocasuarina campestris occurs.

2. Allocasuarina campestris and Thryptomene australis THICKET/HEATH A, 1.5-2.0 m in height, with Thryptomene australis and cliff net-bush THICKET fringing the granite sheets. At the northern end of this unit, the association becomes DENSE THICKET to 3 m.

3. LOW HEATH C of Calothamnus sp., Hakea trifurcata, rose cone bush (Isopogon dubius) and scrub sheoak (Allocasuarina humilis).

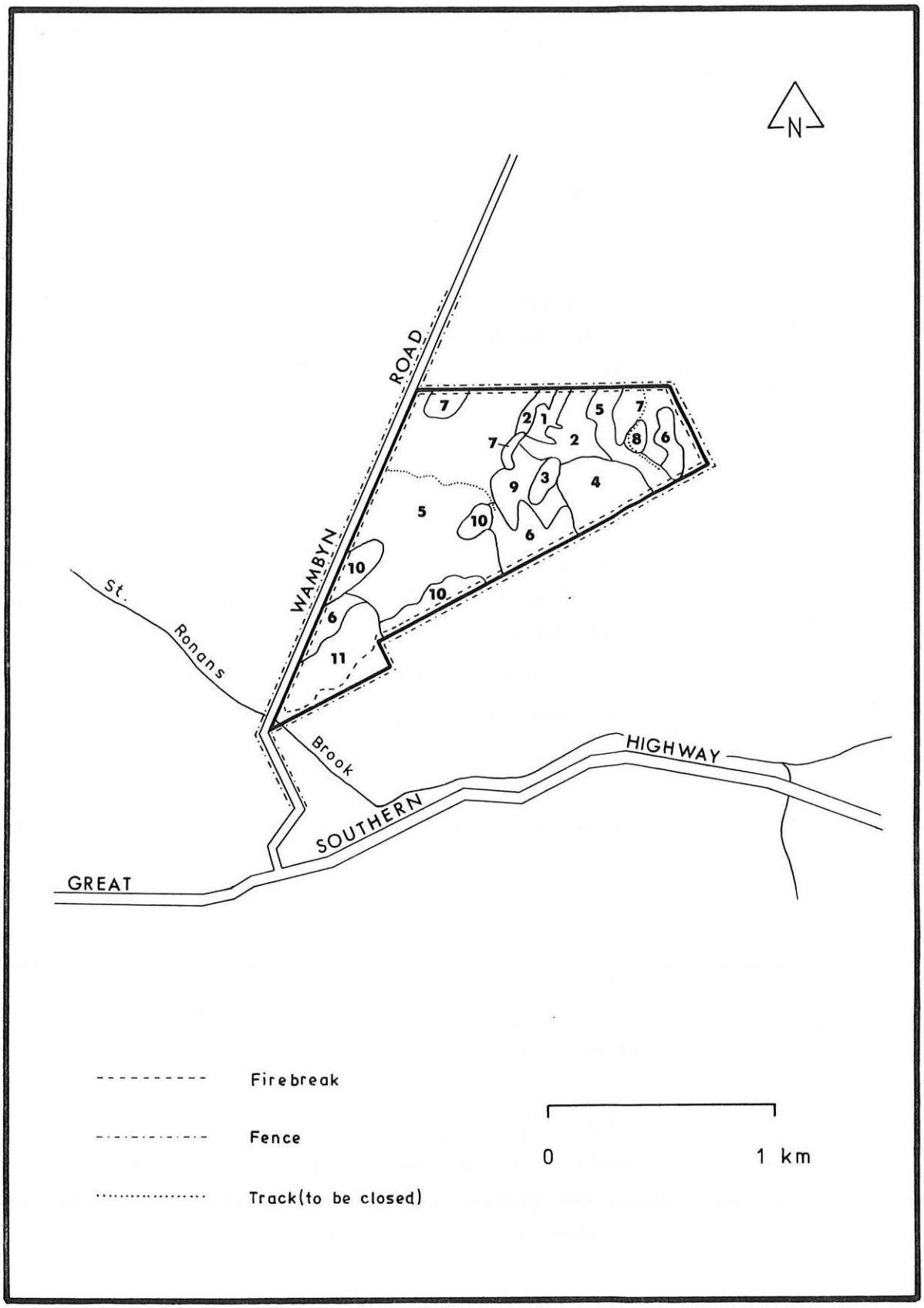

Figure 8. St Ronans Nature Reserve showing features and vegetation associations (identified by number and described in the associated text). (Source: Department of Conservation and Land Management, 1985.)

4. Marri (Eucalyptus calophylla), wandoo (E. wandoo) and jam (Acacia acuminata) OPEN LOW WOODLAND A, 7-10 m in height, over occasional Allocasuarina campestris 1.0-1.5 m, over LOW SCRUB A/OPEN LOW SCRUB A of Leptospermum erubescens. Jam to 4-5 m becomes dominant around the edges of the numerous outcrops of sheet granite. Pincushions occur on the shallow soils associated with the granite. Occasional blackboys (Xanthorrhoea preissii) to 2 m occur.

5. Powderbark (E. accedens) LOW WOODLAND A, 10-12 m in height, over OPEN DWARF SCRUB C of Hakea trifurcata and rose cone bush and DWARF SCRUB D of scrub sheoak, Hibbertia polystachya, H. enervia, Petrophile serruriae, prickly dryandra (Dryandra armata) and prickly moses (Acacia pulchella). The understorey is highly variable, in many places becoming HEATH A of rose cone bush, Petrophile divaricata, Hakea trifurcata, prickly dryandra and silky-leaved blood flower (Calothamnus sanguineus). Drummond's gum (E. drummondii) occasionally appears in the woodland overstorey.

6. Wandoo LOW WOODLAND A, with very occasional marri, 13-15 m in height, over OPEN LOW SCRUB A of Hakea trifurcata, Leptospermum erubescens and blackboys. Beneath the stands of pure wandoo which dominate most of this unit, there are occasional blackboys to 1.5 m and little else.

7. Marri LOW WOODLAND A over DENSE HEATH A/B of Hakea trifurcata, pingle (Dryandra carduacea), Adenanthos cygnorum, Leptospermum erubescens and blackboys. This understorey grades into LOW SCRUB A in the eastern part of this unit.

8. Drummond's gum LOW WOODLAND A over DENSE HEATH B of Hakea trifurcata, Adenanthos cygnorum, pingle and Petrophile serruriae.

9. Powderbark and marri LOW WOODLAND A over DENSE HEATH B of Hakea trifurcata, Adenanthos cygnorum, pingle and Petrophile serruriae.

10. DWARF SCRUB D/LOW HEATH C dominated by Beaufortia bracteosa. Species present include Hakea trifurcata, scrub sheoak, painted featherflower (Verticordia picta), silky-leaved blood flower,

prickly dryandra, Dryandra aff. nivea and Petrophile brevifolia. OPEN LOW SEDGES are a significant component of this association. Powderbark are occasionally emergent to 8 to 9 m.

11. Jam, sheoak (Allocasuarina huegeliana), marri (and occasionally wandoo) LOW FOREST A/LOW WOODLAND A, 8-10 m in height, over LOW SCRUB A/HEATH A of Leptospermum erubescens, wavy-leaved Hakea (Hakea undulata) and prickly poison (Gastrolobium spinosum), with occasional blackboys. Outcropping granite is common, with accompanying expanses of pincushions. In the south-western corner of this association, the overstorey is dominated by jam and the understorey changes to DENSE LOW GRASS and HERBS.

Two interesting finds were made during surveys of this Reserve. First, the discovery of Lomandra spartea, both on this Reserve and on Clackline, Wambyn and Mokine, indicates that it is not confined to the Darling Scarp as previously thought. Second, finding Lomandra nutans on this Reserve, as well as on Clackline and Wambyn, has greatly extended its known range. Formerly this species had not been recorded north of Narrogin (G. Keighery, pers. comm., 1985).

Appendix 2 includes a plant species list for St Ronans Nature Reserve.

4. FAUNA

St Ronans Nature Reserve is one of the three nature reserves in the York-Northam area which have been intensively surveyed for fauna, the other two being Wambyn and Mokine. Surveys were conducted in the autumn and spring of 1985, with systematic and opportunistic sampling and trapping over 5 days in each season. Results from these surveys indicate that St Ronans supports a wealth of mammal, bird, reptile and frog life (App. 3).

Nine mammal species were recorded. To date this is the highest number recorded on a nature Reserve in the York-Northam area. Grey kangaroos (Macropus fuliginosus) and western brush wallabies (M. irma) were sighted, although neither were particularly common. Although echidnas

(Tachyglossus aculeatus) were not sighted, numerous diggings indicate that they were plentiful. Small mammals recorded include the dunnart Sminthopsis dolichura, western pigmy-possum (Cercartetus concinnus) and the house mouse (Mus musculus). The latter species was most common in wandoo woodland. The white-striped mastiff-bat (Tadarida australis) was the only bat species positively identified during the survey. Two introduced mammals were recorded - rabbits (Oyctolagus cuniculus) and cats (Felis catus). It is likely that the fox (Vulpes vulpes) also occurs on this Reserve.

Of the 92 bird species recorded on the York-Northam nature reserves, 56 occurred on St Ronans (App. 4). At the time of survey (late spring 1984) at least 12 of these, including the Splended Fairy-wren and 3 species of Thornbill, were nesting on the Reserve. Of particular interest was the high number of Honeyeater species recorded; also included was the nectivorous Purple-crowned Lorikeet which appears in large numbers at certain times of the year to feed on flowering eucalypts.

Reptiles and frogs were common throughout St Ronans, with 21 lizard, 2 snake and 4 frog species recorded (App. 3). Many of the lizards occur over a wide range of habitats, while others showed distinct habitat preferences. The small burrowing skink Lerista distinguenda was common in all the vegetation types sampled. Similarly, the geckos Crenadactylus ocellatus and Diplodactylus granariensis, the legless lizard (Delma fraseri), the bobtail (Tiliqua rugosa) and bungarra (Vananus gouldii) were all widespread. On the other hand, the gecko Oedura reticulata was recorded only in wandoo woodland and the ornate dragon (Ctenophorus ornatus) only on outcropping granite. The western bearded dragon (Pogona minor) appeared to be restricted to woodlands.

Several points of interest emerge from a comparison of St Ronans with the other two reserves intensively surveyed. First, 13 of the 92 bird species listed for the York-Northam reserves have only been recorded from St Ronans Nature Reserve. These species are the Emu, Square-tailed Kite, Collared Sparrowhawk, Red-capped Parrot, Pallid Cuckoo, Horsfield's Bronze Cuckoo, Shining Bronze Cuckoo, Tawny Frogmouth, Golden Whistler, White-browed Babbler, Rufous Songlark, White-cheeked Honeyeater and Tawny-crowned Honeyeater. Second, the

Gecko Phyllodactylus marmoratus and the common scaly-foot Pygopus lepidopodus (a legless lizard) have not been recorded on any other Reserve in this area.

5. PAST USES, MANAGEMENT AND FIRE HISTORY

One of the most noticeable past uses of St Ronans has been timber removal. Most of the remaining trees have small girths and many of the powderbarks are multi-stemmed having regenerated from sawn stumps. A number of large wandoos remain and it appears as if the powderbark woodland was the most heavily cut-over.

The other obvious use has been the removal of grey sand from a shallow pit on the eastern boundary. The pit is small, covering less than half a hectare, and is reasonably inaccessible, being separated from Wambyn Road by several kilometres of rough firebreaks.

The Reserve is currently being used by horse-riders, a use which has increased markedly over the last couple of years.

St Ronans has a complete perimeter firebreak. There are no internal breaks, although several old tracks, probably used during timber logging days, wind through the Reserve. All boundaries shared with private land are fenced.

From 1972 aerial photography, it appears that the eastern end of the Reserve was either parkland-cleared or subjected to a small fire which cleared the understorey. This area has since regenerated to be barely distinguishable from surrounding areas.

The Reserve does not appear to have experienced any major fires over the last two to three decades. However, charcoal and remnants of charred wood indicate that most of the Reserve has been burnt at some time in the last 40-50 years.

6. NATURE CONSERVATION VALUES

St Ronans Nature Reserve, although small in area, supports a diversity of vegetation types. The plant communities range from powderbark woodland on the plateau surfaces through mixed woodlands of marri, wandoo, jam and allocasuarina, to the valley floors with their stands of wandoo. At the lowest point in the landscape, adjacent to St Ronans Brook, jam woodland becomes dominant. Allocasuarina fringes areas of outcropping granite.

The range of plant communities ensures that a plentiful supply of nectar is available year round. This provides a reliable food source for at least 10 species of Honeyeater, and for small mammals such as the Western Pigmy-possum (Cercartetus concinnus).

These conservation values are enhanced by the relatively undisturbed nature of the Reserve. Now that logging has ceased more trees will reach maturity, providing more nest hollows for small mammals and birds. In addition, the continued exclusion of fire will retain ground cover, fallen timber and dead blackboys, all of which provide habitat for small mammals, reptiles, frogs and invertebrates.

A final important consideration is the value of St Ronans as an outdoor laboratory. Murdoch University is currently involved in studies of the flora and fauna of the Reserve. These studies will contribute to the development of a comprehensive data base for the Reserve, thereby providing a firm basis for future management decisions.

B. PLAN FOR MANAGEMENT

1. MANAGEMENT OBJECTIVES

Management will be directed towards enhancing and maintaining the conservation values of St Ronans Nature Reserve. Minimisation of disturbance to the Reserve is particularly important considering its small size. Management strategies to achieve these objectives will include: protection from fire, pests, and dieback; rehabilitation of degraded areas; minimisation of public use; research.

Any strategies not discussed below are covered in PART 8: GENERAL MANAGEMENT STRATEGIES.

2. PROTECTION FROM FIRE

It is important to exclude fire from St Ronans for several reasons. First, the small size of the Reserve and its isolation amidst cleared farmland means that any fire on the Reserve is likely to burn the whole area, leaving no unburnt patches as sources of recolonisation. Second, most of the highly diverse reptile fauna found on the Reserve is dependent on fallen timber and standing dead blackboys for habitat. If a fire sweeps through the area these habitats will be lost. Third, the close proximity of most of the Reserve area to agricultural land makes it highly susceptible to weed invasion. The grass-choked south-western corner of the Reserve bears testament to this problem.

Management Strategies

Access to and adequate fire protection for the Nature Reserve is provided by a complete perimeter firebreak. This firebreak will be regularly maintained, at its present width, as a precaution against fire moving across the Reserve boundary.

The small size of St Ronans negates the need to develop an internal system of firebreaks.

3. REHABILITATION AND MAINTENANCE OF THE NATURAL ENVIRONMENT

It is important for both fire protection and for protection of the conservation values of St Ronans, that the centre of the Reserve remains inaccessible to vehicles. Vehicle access encourages camping and camp fires, the latter creating a fire hazard.

Management Strategies

The two tracks which cut through the central and eastern, less accessible portions of St Ronans (Fig. 8) are becoming overgrown. Both tracks will be closed and left to regenerate. The western end of the central track will be blocked off to prevent access from Wambyn Road. The number of access points from Wambyn Road to the western firebreak will be minimised. This will ensure that people are discouraged from driving their vehicles onto the Reserve.

The sand pit on the eastern boundary will be levelled and the access track ripped to encourage regeneration. As a substantial degree of natural regeneration has occurred in the mined area, any rehabilitation works will avoid damaging areas of regeneration.

4. PUBLIC USE

St Ronans, with its high diversity of flora and fauna and close proximity to Perth, provides an ideal reference area and 'living laboratory'. However, its rugged topography, associated susceptibility to erosion and small size make it less suitable for public use than other nature reserves in the York-Northam area.

Horse-riding on St Ronans will be discouraged, as it adversely affects the conservation values of the Nature Reserve. The reasons for this are threefold. First, horse's hooves lead to rapid erosion of firebreaks and damage to sensitive plant communities, particularly those associated with granite outcrops, Second, weed seeds are introduced, either via material caught in the animal's hooves or via its manure, into parts of the Reserve which were formerly protected from weed invasion by their inaccessibility. Third, horse manure acts

as a fertiliser, again introducing and encouraging weed growth, and possibly giving rise to changes in the composition of the understorey.

Timber cutting is also an inappropriate use for nature reserves.

Management Strategies

Horse-riding and timber cutting on the Reserve will be prevented by: signs indicating that these activities are not allowed on the Reserve; informing Reserve neighbours that the Reserve is not to be used for these purposes; and, an increased enforcement presence (that is, wildlife officers) in the area.

Signs identifying the Reserve as St Ronans Nature Reserve, and providing information on public use will be erected at the north-western and south-western corners of the Reserve adjacent to Wambyn Road.

5. RESEARCH

The survey of fauna conducted prior to production of this plan provides a basis for ongoing monitoring. In this way, changes in faunal populations over time can be recognised and a greater appreciation obtained of the relationship between management and the biota.

Management Strategies

Ongoing research into both the flora and fauna of St Ronans, by students of Murdoch University (guided by Dr Bernie Dell), will continue to be encouraged. All information collected will be used to guide and temper future management decisions.

PART 4 WAMBYN NATURE RESERVE (NO. 21981)

A. THE RESERVE

1. PHYSICAL CHARACTERISTICS AND RELATIONSHIPS

Wambyn Nature Reserve, with an area of 215.2 ha and a perimeter of 6.6 km, is located 13 km to the west of York, in the Shire of York (Fig. 2). The Great Southern Highway follows the northern boundary of this triangular Reserve (Fig. 9). Wambyn lies 4 km to the east-south-east of St Ronans Nature Reserve, and similarly lies in the dissected country on the eastern edge of the Darling Range. It is surrounded by privately owned land, most of which has been cleared, the only exception being a block of uncleared land which touches the southern tip of the Reserve.

The Reserve is undulating with a gentle ridge running north-south through its centre (Fig. 9). Altitude ranges from 360 m on this ridge, to 320 m in the north-west corner and 300 m in the north-east. Wambyn forms part of the headwater of St Ronans Brook, a seasonal stream leaving the Reserve at the north-western corner.

2. HISTORY

> 'The location, now known at Wambyn Nature Reserve, was selected by A.D. Ashworth in 1920, transferred to another member of the family in 1925, and cancelled in 1928. Early in 1929 the holding was re-instated at the request of the first owner, using the justification that the land was his home, and he had an iron house which had cost 60 pounds.'
>
> (Under Secretary of Lands, Department of Lands and Surveys, in litt. to Deputy Conservator of Forests, Forests Department, 24 September 1942)
>
> '...this area was inspected by the District Forest Officer in March 1929 and he then recommended that it be set apart as a Reserve to provide firewood for local requirements.'

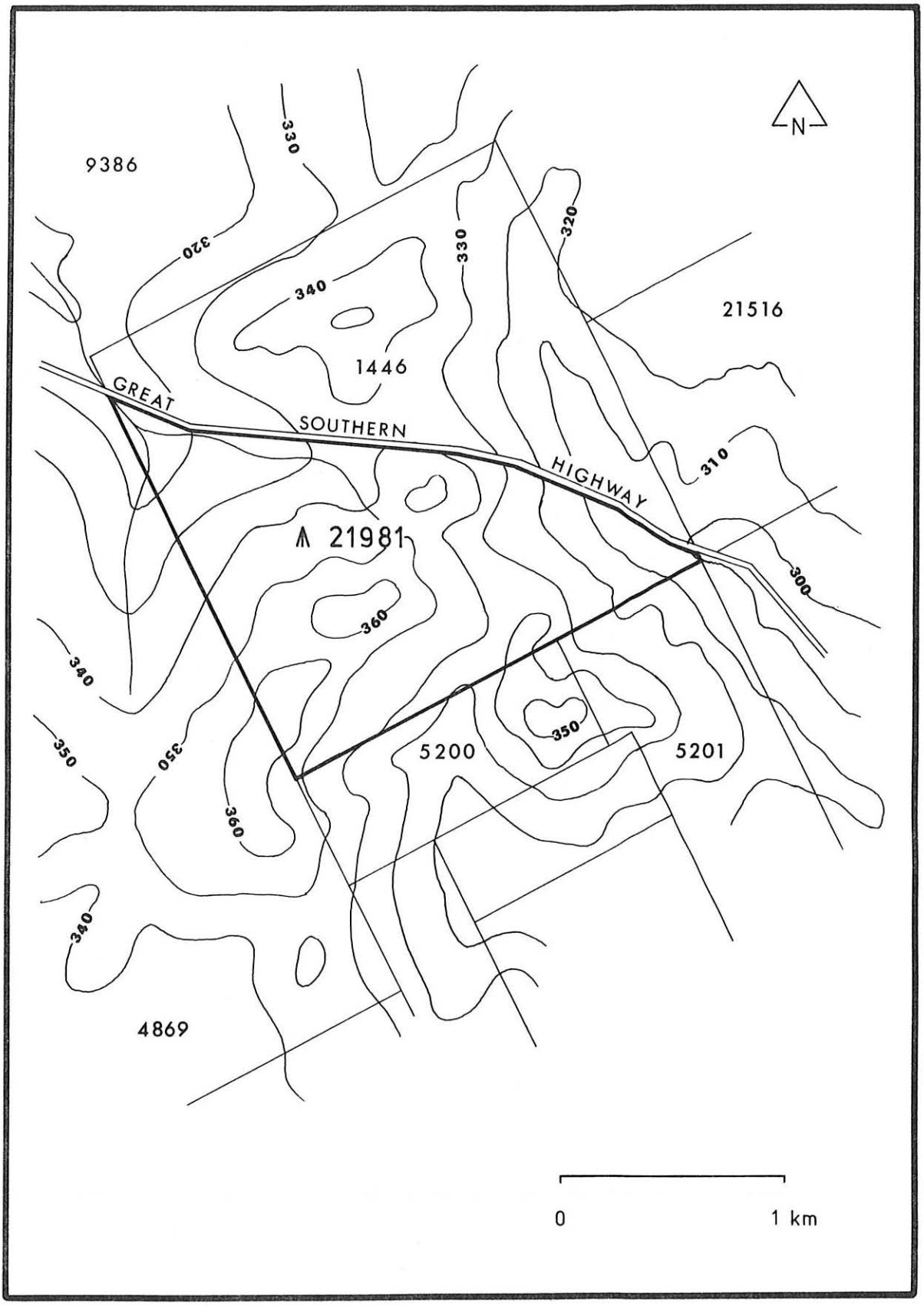

Figure 9. Wambyn Nature Reserve showing its relationship with surrounding lands and associated contours (m). (Source: W.A. Department of Lands and Surveys 1 : 50 000 series.)

(Conservator of Forests, Forests Department, to Under Secretary for Lands, Department of Lands and Surveys, 13 February 1939)

On 4 April of the same year the Reserve was set aside for Timber (Settlers' Requirements). Soon after (4 September 1941), requests began for its release. The following response by the Forests Department to one such request indicates the value placed on the Reserve:

'I have to advise that the Reserve is reported to be carrying a considerable quantity of Wandoo timber suitable for sawmilling and tannin extract. For this reason, I am not agreeable to the area being released for selection.'

(Conservator of Forests, Forests Department to Under Secretary for Lands, Department of Lands and Surveys, 20 March 1956)

However, requests for the release of the area continued.

'My Board ... considers that early consideration should be given to throwing the land open for agricultural development.'

(York Road Board to Under Secretary for Lands, Department of Lands and Surveys, 16 November 1960)

Requests to lease the area for grazing were treated in a similar manner to selection requests:

'Grazing activity would be expected to aggravate the deterioration of the Reserve due to salt encroachment as a result of clearing on neighbouring farms on which water courses have become salty and salt patches are becoming a serious problem.'

(Conservator of Forests, Forests Department to Under Secretary for Lands, Department of Lands and Surveys, 7 December 1966)

This is the first mention of the increasing salt problem on the Reserve, a problem which is now particularly evident in the north-west corner.

In 1970 the first suggestion was made that the area be set aside as a nature Reserve:

> 'Reserve 21981 has been recently inspected by an officer of this Department and found to be suitable as a fauna sanctuary.
>
> 'Evidence of 3 different species of mammal was observed, as well as six species of bird life and one species of reptile.
>
> 'Although not a large Reserve and not particularly rich in flora and fauna, there are no reserves of this type in the York Shire at the moment.
>
> 'I request, therefore, that action be taken to amend Reserve 21981 to Conservation of Flora and Fauna and be vested in WAWA.'
>
> (Director, Department of Fisheries and Wildlife to Under Secretary for Lands, Department of Lands and Surveys, 7 May 1970)

The Forests Department had no objection to such a change in purpose:

> '...no objections ... the area would be of value for tourism'
>
> (Acting Officer-in-Charge, Roads and Reserves to Under Secretary for Lands, Department of Lands and Surveys, 6 August 1970)

On 18 September 1970 the purpose of the Reserve was changed to Conservation of Flora and Fauna, with vesting in the Western Australia Wildlife Authority (now replaced by NPNCA).

The name 'Wamybn' is aboriginal and is the local name for the area.

3. SOILS AND VEGETATION

Wambyn Nature Reserve is dominated by powderbark woodlands on gravelly loams, with wandoo woodlands on grey clay-loams also covering a significant area. Allocasuarinas appear around the granite outcrops, with heath being the dominant association on shallower soils.

The vegetation on Wambyn is distributed as shown in Figure 10, and described below:

1. DENSE HERBS and DENSE LOW GRASS with occasional regenerating parrot bush (Dryandra sessilis), harsh hakea (Hakea prostrata) and wavy-leaved hakea (Hakea undulata) to 1.5-2.0 m.

2. Jam (Acacia acuminata) LOW WOODLAND A, 4-7 m in height, over HERBS and LOW GRASS.

3. Wandoo (Eucalyptus wandoo) WOODLAND, 8-10 m in height, over sheoak (Allocasuarina huegeliana) OPEN LOW WOODLAND A, 5-8 m in height, over blackboy (Xanthorrhoea preissii) SCRUB. DWARF SCRUB D of honey bush (Hakea lissocarpha), Acacia lasiocarpa, Gastrolobium sp. and Dryandra fraseri. Occasional expanses of pincushions (Borya nitida) also occur. In much of the eastern part of this association (Fig. 10) the understorey is non-existent due to old gravel scrapes and the passage of vehicles.

4. Sheoak LOW FOREST A/DENSE LOW FOREST A, 8-10 m in height, with marri (Eucalyptus calophylla) occasionally emergent to 12-15 m. A LOW FOREST A of wandoo and sheoak occurs around the edges of this association.

5. Wandoo WOODLAND, 10-12 m in height, over HERBS. The understorey is structurally variable, with occasional blackboys, areas of box poison (Oxylobium parviflorum) HEATH B/LOW SCRUB B and occasional DWARF SCRUB D of Gastrolobium sp., Acacia lasiocarpa and zamia palms (Macrozamia reidlei).

6. Powderbark (E. accedens) WOODLAND, 15-17 m in height, with occasional marri, over LOW SCRUB B/HEATH B of bullock poison (Gastrolobium trilobum) and Gastrolobium sp. on the sides of breakaways and lower slopes. On the tops of breakaways the understorey is dominated by a HEATH A/SCRUB of Dryandra stuposa, parrot bush, prickly dryandra (Dryandra armata) and Petrophile divaricata.

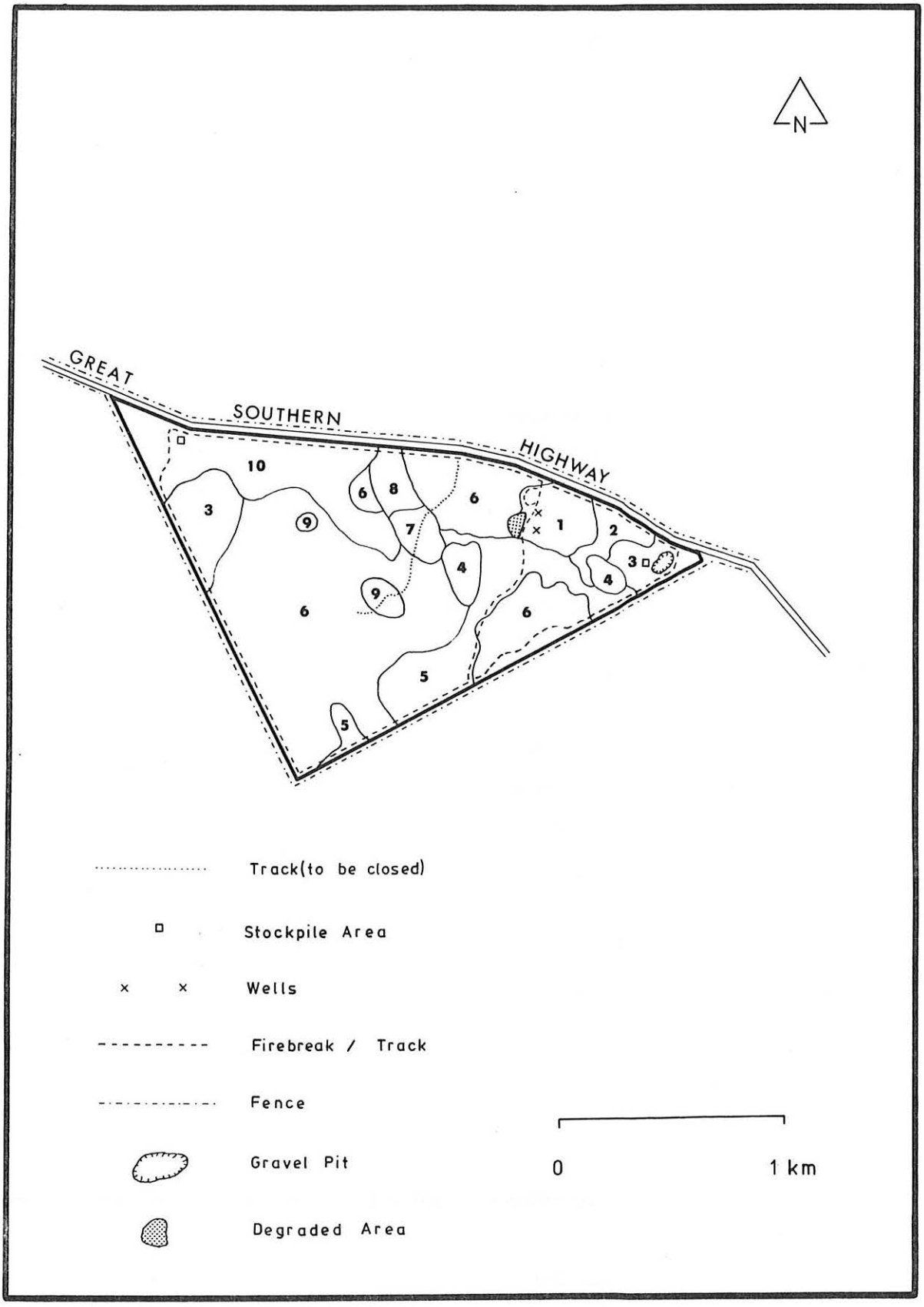

Figure 10. Wambyn Nature Reserve showing features and vegetation associations (identified by number and described in the associated text). (Source: Department of Conservation and Land Management, 1985.)

7. Wandoo OPEN LOW WOODLAND A, 8-10 m in height, over blackboy OPEN LOW SCRUB A over DWARF SCRUB D of Gastrolobium sp. and Dryandra fraseri. Pincushions are a significant component of this association.

8. One-sided bottlebrush (Calothamnus quadrifidus) dominated DENSE HEATH A. Other species present include prickly dryandra, Petrophile squamata, Hakea trifurcata and blackboys. Wandoos are occasionally emergent to 10 m.

9. Species-rich HEATH B/DENSE HEATH B of one-sided bottlebrush, scrub sheoak (Allocasuarina humilis), Hakea trifurcata, Petrophile squamata, Leptospermum erubescens, Petrophile divaricata and Hakea incrassata. Wandoo, powderbark and marri are occasionally emergent to 20 m. This association has strong affinities with Association 8, however, there is not the strong dominance by Calothamnus.

10. Wandoo WOODLAND, 8-10 m in height, with occasional marri, over OPEN DWARF SCRUB C of york road poison (Gastrolobium calycinum), with very occasional zamias and blackboys, over LOW GRASS and HERBS.

The results of survey work on Wambyn have extended the known range of several plant species. As mentioned previously, Lomandra spartea was previously thought to be restricted to the Darling Scarp, and Lomandra nutans had not been recorded further north than Narrogin. Finding Acacia chrysocephala on Wambyn is also a significant range extension for this species.

Of particular interest is Schoenus sesquispiculus which, until recently, had only been recorded from Newdegate and areas to the south. The only other record north of Newdegate was from Badgingara. Therefore, the Wambyn population is a significant new find (G. Keighery, pers. comm., 1985).

Appendix 2 includes a flora species list for Wambyn Nature Reserve.

4. FAUNA

Detailed fauna surveys of Wambyn have produced a wealth of information.

Eight mammal species were recorded. Western grey kangaroos (Macropus fuliginosus) and western brush wallabies (M. irma), although occasionally sighted, were considered uncommon. Echidna (Tachyglossus aculeatus) diggings were noted over most of the area, and two individuals were sighted. Dunnarts (Sminthopsis dolichura) were recorded in the heath, sheoak and powderbark associations. Western pigmy-possums (Cercartetus concinnus) were recorded in the wandoo and powderbark woodlands. House mice (Mus musculus) were recorded throughout the Reserve. Introduced species recorded included the rabbit (Oryctolagus cuniculus) and fox (Vulpes vulpes).

Forty eight bird species have been recorded on the Reserve (App. 4). Eight of these were honeyeaters - of particular interest is the Yellow-plumed Honeyeater which is regarded as uncommon in this area (Jim Masters, pers. comm., 1985). Most of the bird species recorded were noted either in the wandoo or powderbark woodlands.

A wealth of reptile life was recorded on Wambyn - 18 lizard, 4 snake and 1 frog species (App. 3). Many of these were common and widespread across the Reserve. The skink Lerista distinguenda was found in all habitats sampled. On the other hand, the beautifully patterned skink Eremiascincus richardsonii and the legless lizard Aprasia pulchella were only recorded on granite outcrops. These outcrops were not extensive enough to support the ornate dragon (Ctenophorus ornatus). The gecko Oedura reticulata was restricted to the wandoo woodland. Goannas were not recorded on this Reserve.

Snakes, particularly burrowing species, were relatively common. The blind snake Ramphotyphlops australis was recorded in three different habitats across the Reserve, while the giant blind snake (R. pinguis), which is considered rare, was only recorded from the heath.

The only frog recorded from Wambyn was Guenther's toadlet (Pseudophryne guentheri). The low number of frog species appears to be a function of: the high percentage of the Reserve area dominated by laterite

upland; the lack of sandplain and therefore a corresponding lack of suitable burrowing habitat; and, the saline conditions of the lowlands included in the Reserve.

Comparison of the faunal species on the three Reserves intensively surveyed reveals several interesting details. First, the stubble quail, crested pigeon and mistletoebird were only recorded on Wambyn. Second, the gecko Diplodactylus pulcher, which was widely distributed on Wambyn, was only found at one site on St Ronans and was not recorded on Mokine.

5. PAST USES, MANAGEMENT AND FIRE HISTORY

Although Wambyn was on the main route from Perth to the Yilgarn goldfields, it was not used as a stopping place either by travellers or by people moving stock. The reasons for this were twofold. First, difficulties were experienced in obtaining lasting water supplies, and second, much of the understorey in the area was dominated by bullock poison (Gastrolobium trilobum) making it unsuitable for stock. Eradication of the poison was considered, but costs were prohibitive. Thus, grazing pressure on the area has been minimal.

However, the impact of past uses can still be seen. The first of these is timber removal. Originally the Reserve would have been covered by wandoo and powderbark forest, whereas now the only large trees remaining, which are part of an open woodland, are knarled and twisted ones which were unsuitable for timber. Fortunately, similarly to St Ronans, there has been substantial regeneration from stumps.

Second, part of the Reserve was cleared (Association 1, Fig. 10) in the 1920s. During this decade an iron house was built on the western edge of the cleared area. Two wells and a pile of rubble are all that remain. Natural regeneration is gradually occurring across the area.

Third, gravel and road-building materials have been stock-piled in the north-eastern and north-western corners, as well as part of the cleared area in the centre of the Reserve (Fig. 10). Most of this stock-piled material has since been removed. Gravel was also extracted from the north-eastern corner at one stage.

Fourth and finally, a recent inappropriate use of the Reserve has been the dumping of many tonnes of spoil over an area of some 3-5 ha (degraded area in Fig. 10). This has introduced weeds to the centre of the Reserve, reducing its aesthetic value and increasing the fire hazard. The spoil heaps were subsequently removed.

Past and present use of surrounding lands has had an obvious impact on the Reserve. One such impact has been increasing salinity and salt damage to vegetation in the north-western and, to a lesser extent, the north-eastern corners. This is a direct result of clearing on adjacent lands.

Past management has involved construction and maintenance of boundary firebreaks. A track cuts from north to south through the eastern part of the Reserve. An old, disused track winds its way into the centre of the Reserve from the northern boundary (Fig. 10). All boundaries shared with private property are fenced.

The Reserve does not appear to have been burnt recently (in the last 20 years), although there are many burnt stumps, fire scars on trees, charcoal remains and occasional standing fire-killed shrubs indicating past hot fires.

6. NATURE CONSERVATION VALUES

Wambyn Nature Reserve is important for a number of reasons. First, it carries extensive stands of powderbark. Many of these are mature trees and as such provide nest hollows for birds and small mammals. Second, the small areas of heath in the centre of the Reserve are rich in reptile species. Third, the numerous rocky outcrops and standing dead blackboys provide further habitat for reptile species. Fourth, Wambyn seems to be favoured habitat for the echidna, with all parts of the Reserve showing evidence of echidna diggings. This was the only nature Reserve of the six on which echidnas were sighted during surveys.

B. PLAN FOR MANAGEMENT

1. MANAGEMENT OBJECTIVES

Management will be primarily directed towards the enhancement and maintenance of the conservation values of Wambyn Nature Reserve. Located on the Great Southern Highway, and readily accessible from it, Wambyn has been subjected in the past to several inappropriate uses. Future management will aim to ensure that these uses cease and are not repeated.

Management strategies to achieve these objectives will include protection from fire, pests and dieback; rehabilitation of degraded areas, management of public use; research.

Any strategies not discussed below are covered in PART 8: GENERAL MANAGEMENT STRATEGIES.

2. PROTECTION FROM FIRE

Fire should be excluded from Wambyn for several reasons. First, if fire sweeps through the entire Reserve small habitats, such as the jam woodland in the eastern corner and the heath in the centre, will be completely burnt leaving no unburnt sources for recolonisation. Second, close proximity to agricultural land makes the Reserve highly susceptible to weed invasion. The existence of dense grasses through-out the north-eastern corner is indicative of the problem.

Fortunately, the small size of the Reserve and its isolation amidst cleared agricultural land reduce the probability of fire occurring on the Reserve, or originating from clearing burns in the surrounding country and moving onto the Reserve. A regularly maintained perimeter firebreak together with one strategically placed internal break should provide adequate fire protection for the Reserve and adjacent landholders.

Management Strategies

The perimeter firebreak and the internal firebreak linking the northern and south-eastern boundary (Fig. 10) will be maintained to their present standards.

3. REHABILITATION AND MAINTENANCE OF THE NATURAL ENVIRONMENT

Management Strategies

Once the remaining stockpiles have been removed the floors of the stockpile areas and any access tracks will be ripped to encourage regeneration. The three stockpile areas (north-eastern, north-western and central) plus the area degraded by spoil heaps require re-planting. Seedlings propagated from seeds collected from plants growing adjacent to the degraded areas should be used. Both shrub and tree species should be considered in this replanting project. Such a project is the responsibility of the authority who used the Reserve for stockpiling; in this case the Main Roads Department.

The internal track indicated by a dotted line in Figure 10 will be closed by blocking off its northern end.

4. PUBLIC USE

Wambyn Nature Reserve with its open, attractive woodlands and immediate proximity to the Great Eastern Highway is ideally suited for conservative public use.

Management Strategies

The ready accessibility and diverse habitats of Wambyn make it highly suitable for use by members of the public interested in nature conservation. This use will continue to be encouraged.

Signs identifying the Reserve as Wambyn Nature Reserve and providing information on public use will be erected adjacent to the Great Southern Highway.

5. RESEARCH

The survey of fauna conducted prior to production of this plan provides a basis for ongoing monitoring. Continuation of this program will provide a greater appreciation of responses by the biota to various management regimes.

PART 5 MOKINE NATURE RESERVE (No. 31211)

A. THE RESERVE

1. PHYSICAL CHARACTERISTICS AND RELATIONSHIPS

Mokine Nature Reserve is located 17 km south-west of Northam and 21 km north-west of York in the Shire of Northam. It has an area of 289.1 ha and a perimeter of approximately 7.8 km. The Reserve is roughly rectangular with the longer axis running north-south. Leaver Road passes along the southern boundary (Fig. 11). The privately owned land adjacent to the Reserve is cleared, although small uncleared patches abut parts of the eastern and western boundaries.

Mokine lies on the eastern edge of the Darling Range and encompasses numerous rocky outcrops, breakways and dissected gullies. The altitude ranges from 250-260 m where perennial streams cut through the northern and southern parts of the Reserve, to 320 m on the central plateau (Fig. 11). Another perennial stream flows north, along the western edge of the Reserve, from the northern foot of the plateau.

2. HISTORY

The area now known as Mokine Nature Reserve was originally part of the Inkpen Estate subdivision. On 22 May 1967, an application to withdraw the lot from public selection was made so that its viability for grape growing (for the production of wines for export to British Columbia) could be determined. In the same year the Department of Agriculture carried out the necessary soil survey:

> a very small percentage of the total acreage would be suitable ... seek more suitable land elsewhere.'
>
> (Director, Department of Industrial Development to Under Secretary for Lands, Department of Lands and Surveys, 11 December 1967)

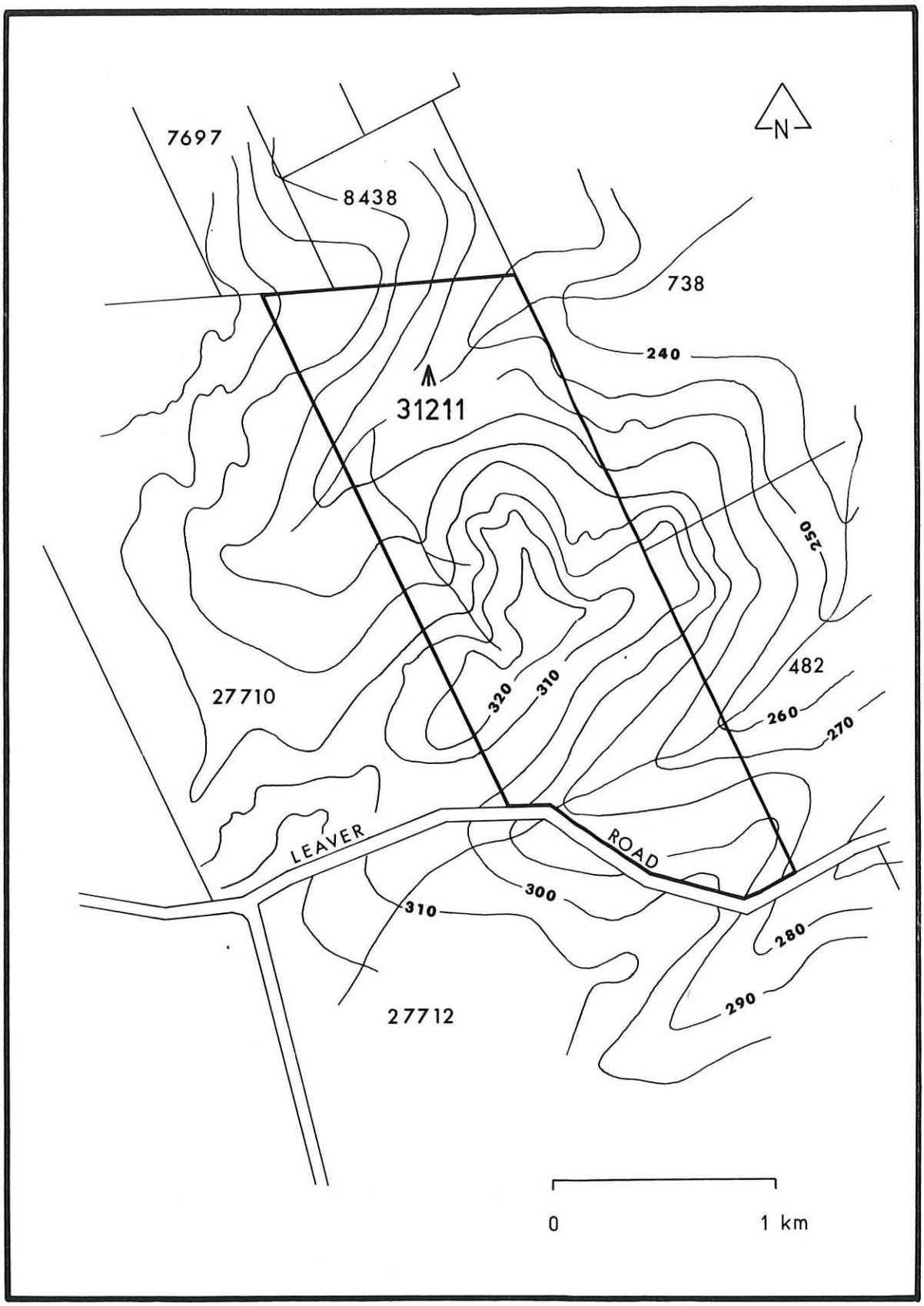

Figure 11. Mokine Nature Reserve showing its relationship with surrounding lands and associated contours (m). (Source: W.A. Department of Lands and Surveys 1 : 50 000 series.)

No correspondence held by the Department of Lands and Surveys mentions the area until 1971 when two groups requested that the area be vested in their respective organisations:

> 'This Department's Reserve Management Officer has recently inspected this location and reported it to be in excellent condition for the purposes of a flora and fauna Reserve.
>
> 'Positive identifications were made of macropod and possum scats and echidna diggings were numerous.
>
> '...I would appreciate action being taken to have (it) set aside as a Reserve for Conservation of Flora and Fauna and be vested in WAWA.'
>
> (Director, Department of Fisheries and Wildlife to Under Secretary for Lands, Department of Lands and Surveys, 19 March 1971)
>
> 'Over the last few years students of this College have made a great deal of use of this virgin block for soil surveys, botanical field trips and related field work. It was chosen because soil survey data were available following a feasibility study for Valencia wines carried out by the Department of Agriculture.
>
> '...I would be grateful if you could outline the necessary steps which should be taken to have the block vested in the Western Australian Institute of Technology.'
>
> (Muresk Agricultural College to Under Secretary for Lands, Department of Land and Surveys, 22 March 1971)

On 11 February 1972 the area was set aside for the Conservation of Flora and Fauna. Following requests from the Department of Fisheries and Wildlife the nature Reserve was vested in the Western Australian Wildlife Authority (now replaced by the NPNCA) on 23 January 1976.

3. SOILS AND VEGETATION

Several associations dominate Mokine Nature Reserve. Powderbark woodland on gravelly loams dominates the laterite ridges and breakaways. Associated with granite outcrops are mixed woodlands of wandoo, marri, allocasuarina and jam. Wandoo becomes dominant on the lower loam-clay flats. Various combinations of these species and several other minor associations total eight broad vegetation associations, delineated in Figure 12, and described below:

1. Wandoo (E. Wandoo) LOW WOODLAND A, 8-9 m in height, over jam (Acacia acuminata) OPEN LOW WOODLAND B, 5-7 m in height, with occasional sheoak (Allocasuarina huegeliana). There is little understorey except OPEN HERBS and LOW GRASS. Areas of DWARF SCRUB D of honey bush (Hakea lissocarpha), Acacia lasiocarpa and Hibbertia spicata, plus pincushions (Borya nitida) on shallow soil around granite outcrops, occasionally occur.

2. Occasional wandoo and marri (E. calophylla) to 10 m, over LOW WOODLAND A/LOW FOREST A of sheoak and jam, 6-8 m in height. There is little understorey except for an occasional DWARF SCRUB D of pincushions and OPEN HERBS and LOW GRASS. Shrubs of Leptospermum erubescens and prickly moses (Acacia pulchella) to 1.5 m, occasionally appear. This unit contains numerous rocky outcrops, and in the intervening areas blackboys (Xanthorrhoea preissii), to 2 m, are common.

3. Wandoo LOW FOREST A, 8-10 m in height, over sheoak OPEN LOW WOODLAND B, 5-7 m in height, over white myrtle (Hypocalymma angustifolium) HEATH A.

4. Powderbark (E. accedens) WOODLAND, 10-12 m in height, over a diverse, species-rich HEATH A/B. On the top of breakaways the understorey contains prickly moses, Leptospermum erubescens, parrot bush (Dryandra sessilis), white myrtle, wavy-leaved hakea (Hakea undulata), Dryandra stuposa, Bossiaea eriocarpa, bullock poison (Gastrolobium trilobum), Petrophile divaricata, scrub sheoak (Allocasuarina humilis) pronged grevillea (Grevillea tridentifera) and Adenanthos cygnorum. On the valley floors the understorey is dominated by Dryandra stuposa.

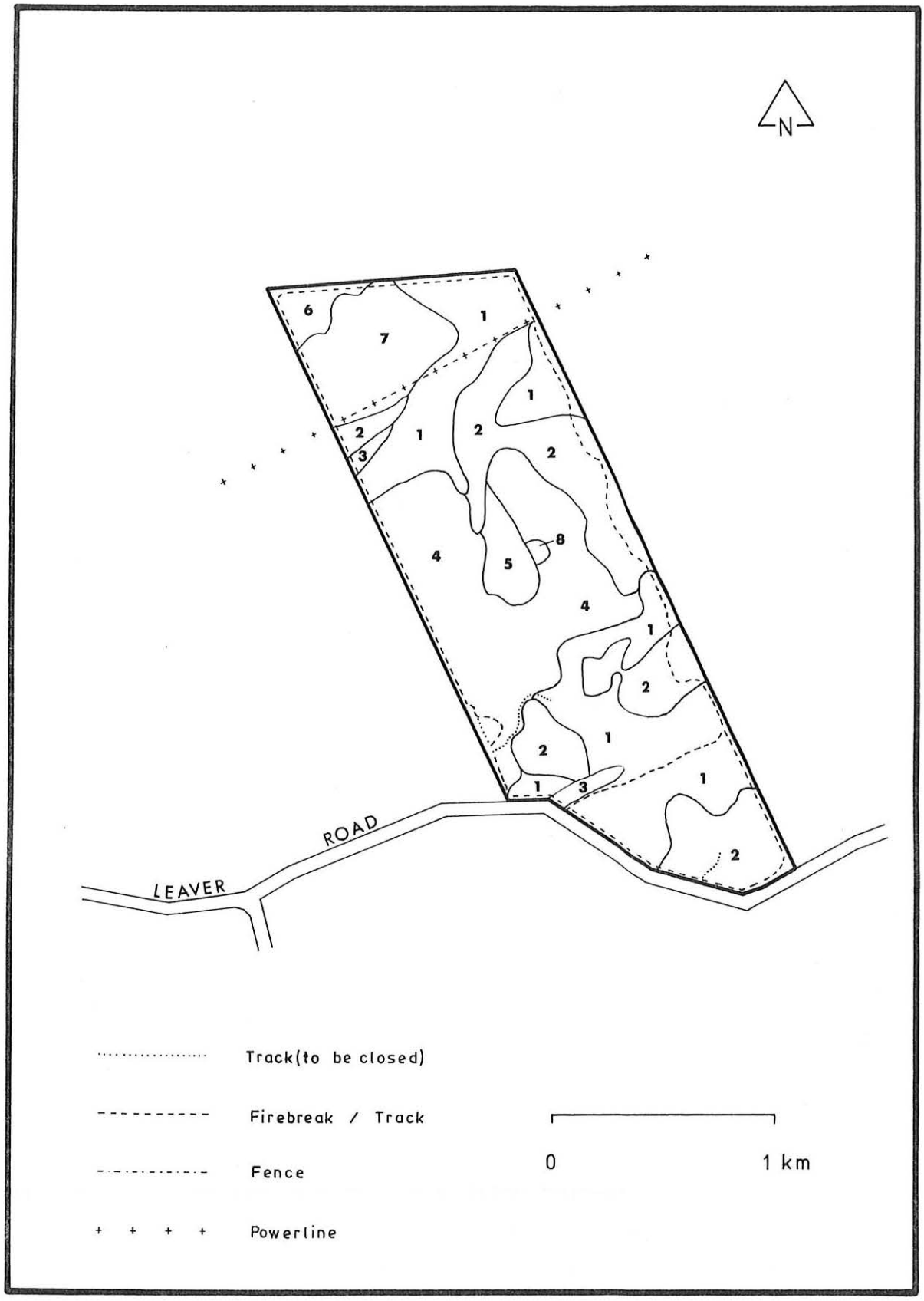

Figure 12. Mokine Nature Reserve showing features and vegetation associations (identified by number and described in the associated text). (Source: Department of Conservation and Land Management, 1985.)

Mid-slope the understorey decreases in height and density to become DWARF SCRUB C/D, with prickly moses, Hibbertia spicata and sedges important components. In most places the mid-slope understorey dominates.

5. Wandoo WOODLAND, 10-12 m in height, over Jam OPEN LOW WOODLAND A, 7-8 m in height, over LOW GRASS. Boulder clusters are common, with blackboys occasionally occurring.

6. Wandoo LOW WOODLAND A, 8-10 m in height, over SCRUB to 3-4 m, of regenerating jam, york road poison (Gastrolobium calycinum), and Leptospermum erubescens, over OPEN LOW GRASS and OPEN HERBS.

7. Marri and wandoo OPEN WOODLAND, 8-10 m in height, over OPEN LOW WOODLAND A/B, 5-7 m in height, of regenerating sheoak and jam, over OPEN LOW GRASS and OPEN HERBS. Acacia restiacea occasionally occurs to 1.5 m. Blackboys are common throughout. This unit contains numerous rocky outcrops.

8. Brown mallet (E. astringens) LOW FOREST A, 10-12 m in height.

A gazetted rare wattle Acacia aphylla and the geographically restricted plant Hibbertia montana occur on this Reserve. Lomandra spartea, previously thought to be confined to the Darling Scarp, also occurs on this Reserve (G.Keighery, pers. comm., 1985).

Appendix 2 includes a plant species list for Mokine Nature Reserve.

4. FAUNA

Mokine is the third nature Reserve in the York-Northam area on which detailed fauna surveys have been carried out.

Eight species of mammal were recorded. Western grey kangaroos (Macropus fuliginosus) were noted as common, while western brush wallabies (M. irma) were more cryptic and were only recorded in the dense understorey of the powderbark woodland. Only one western pigmy-possum (Cercartetus concinnus) was recorded. Although numerous house mice (Mus musculus were recorded, no dunnarts were noted. The white-striped mastiff-bat

(Tadarida australis) was the only species of bat recorded. Two introduced species were seen on Mokine - foxes (Vulpes vulpes) and rabbits (Oryctolagus cuniculus).

Forty seven species of bird were recorded on Mokine (App. 4), the majority of these in wandoo-dominated associations.

Fourteen lizard species were noted (App. 3). The racehorse goanna (Varanus tristis) was common in all areas sampled, including granite outcrops. The bungarra (Varanus gouldii) was not sighted. The bandy bandy (Vermicella bertholdi) was the only snake recorded during the survey periods, although two other species, the blind snake (Ramphotyphlops australis) and the half-girdled snake (Vermicella semifasciata) have subsequently been recorded.

Five species of frog were noted (App. 3). This relatively high number is a result of the suitable habitat offered by the fresh seasonal stream which runs through the northern part of the Reserve and the friable soils of the wandoo-dominated woodlands (which provide an ideal habitat for burrowing species).

5. PAST USES, MANAGEMENT AND FIRE HISTORY

As with most nature reserves in agricultural areas, particularly in the older well-established districts, Mokine has been used as a supply of timber for fencing, stock-yards, sheds and general housing. The only older trees remaining are those which were unsuitable for timber - fortunately these usually contain numerous nest hollows.

Although the Reserve is remote from major highways it is still readily accessible to campers and kangaroo shooters. Both uses conflict with the purpose of the Reserve - the conservation of flora and fauna. The former use is confined to the southern end of the Reserve and is directly associated with ready access from Leaver Road. In the past camping has led to rubbish dumping, an activity which has decreased the aesthetic appeal of the area as well as adding nutrients to the soil and thereby encouraging weed invasion. Furthermore, the inevitable camp fire, particularly during summer and autumn, presents a severe fire hazard.

A recent inappropriate use has been the construction of two contour banks and drains, orientated north-south, across the northern boundary of the Reserve. These increased the flow of water (with its accompanying load of seed and fertiliser) from the adjacent agricultural land onto the Reserve, resulting in increased grass growth on the Reserve and an accompanying increase in fire risk. The adjacent landholder has recently re-structured the drains so the water is no longer channelled directly onto the Reserve.

Mokine has a complete perimeter firebreak, plus two internal breaks, effectively splitting the Reserve into three blocks (Fig. 12). In the south-western corner a small section of the perimeter break has been re-routed to avoid a steep breakaway. Several short tracks meander into the body of the Reserve (Fig. 12). A powerline cuts through the northern part of the Reserve, following one of the two internal firebreaks. All boundaries shared with private property are fenced.

The section of Nature Reserve north of the powerline and internal firebreak was burnt in 1980 by a wildfire which began as a clearing burn to the north of the Reserve. The older, larger trees such as marri and wandoo and a few sheoak survived, with some ensuing regeneration by the eucalypts. The understorey was burnt completely and is now regenerating, with jam to 3-4 m. The southern end of the powderbark woodland (Fig. 12) also appears to have experienced a recent fire (in the last 10-15 years), with standing dead remnants of Dryandra stuposa persisting. Further details of the fire history of Mokine are not known.

6. NATURE CONSERVATION VALUES

Mokine has a number of important conservation values.

First, the numerous rocky outcrops provide habitat for many reptile species, with both dragons and geckos being well represented. In addition, dead blackboys provide favourable habitat for reptiles, particularly the racehorse goanna.

Second, the rich understorey, including genera such as dryandra, beaufortia and calothamnus which flower profusely, provides a reliable source of nectar and pollen for numerous birds and small mammals. This understorey is associated with powderbark woodland, one of the most extensive associations on Mokine (covering about a fourth of the area).

Third, the system of pools which forms a seasonal stream at the northern end of the Reserve (Fig. 11) supports at least four species of frog. Streamlines retaining fresh water into the summer months are rarely found on nature reserves. Usually such features are found lower in the landscape, in areas which were claimed early in the history of settlement and valued for their good soils and ready supply of water. The Mokine streamline is doubly important as it shows no signs of salinity, a long-recognised problem in the York-Northam area.

B. PLAN FOR MANAGEMENT

1. MANAGEMENT OBJECTIVES

The two recent fires, problems with kangaroo shooters and rubbish dumping all necessitate a conservative program of management, directed towards the maintenance and enhancement of the nature conservation values of the Reserve.

Management strategies to achieve this objective will include protection from fire, pests and disease; rehabilitation of degraded areas; management of public use; research.

2. PROTECTION FROM FIRE

Since Mokine is now surrounded by cleared land and clearing in the area has virtually ceased, the fire risk from clearing burns need no longer be considered. Also, the two recent fires on Mokine have reduced fuel levels, making it possible to exercise a conservative program of fire protection.

Furthermore, the diverse fauna on Mokine is best protected by preventing fire on the Reserve during the currency of this plan.

Management Strategies

The existing perimeter firebreak and two internal firebreaks (Fig. 12) will be regularly maintained.

3. REHABILITATION AND MAINTENANCE OF THE NATURAL ENVIRONMENT

Management Strategies

The steep section of firebreak at the southern end of the western boundary has been closed and an alternative route has been in place for several years. However, further management input is needed to halt erosion and encourage regeneration. This will be achieved by cutting several lateral drains across the old firebreak as well as laying logs and brush. These two measures will slow the rate of movement of water

(and therefore erosion) and trap seed. The brush also provides an additional source of seed.

The two internal tracks which meander into the Reserve, one running northwards from the southern boundary and the other eastwards from the southern end of the western boundary, will be closed and ripped to encourage regeneration.

The rubbish scattered along the southern internal firebreak and in the south-eastern corner of the Reserve will be removed.

4. PUBLIC USE

The remote location of Mokine and its history of frequent fires and inappropriate use suggests that public use should remain low key.

Management Strategies

Uses such as birdwatching and wildflower study, which are based on an appreciation of the nature conservation values of the Reserve, will continue to be encouraged.

Kangaroo shooting will be minimised by signs indicating that this activity is not permitted on nature reserves and by an increased enforcement presence in the area.

Signs identifying the Reserve as Mokine Nature Reserve and providing information on public use will be erected at the junction of the southern boundary firebreak and the western end of the southern internal firebreak, and at the south-western corner and south-eastern corners of the Reserve.

5. RESEARCH

As part of planning surveys a program monitoring the fauna of Mokine, Wambyn and St Ronans was established. This program should continue during and beyond the currency of this plan.

Management Strategies

Use of the Reserve by conservation groups, such as the W.A. Naturalists' Club and W.A. Wildflower Society, will be encouraged. Information collected by these groups is a valuable addition to the resource base which guides management.

PART 6 THROSSELL NATURE RESERVE (NO. 7220)

A. THE RESERVE

1. PHYSICAL CHARACTERISTICS AND RELATIONSHIPS

Throssell Nature Reserve is 18 km to the east of Northam (Fig. 2), and 15 km west of Meckering. This square Reserve has an area of 17.7 ha and a perimeter of 1.6 km. Moore Road follows the western boundary. The Reserve lies in flat to undulating country (Fig. 13) and is surrounded by privately owned land which is either under crop or used for grazing.

2. HISTORY

In March 1900 Reserve No. 7220, with an area of 150 acres, was excepted from sale and set aside for Timber (for mining purposes and the use of settlers). From this time onwards requests were made for the release of the Reserve for selection:

> '.....this Reserve ..(should be)... thrown open for selection, as it is of no use for the purpose it was set apart. There is only about 50 acres of mixed timber upon it and the balance is sandplain.'
>
> (Government Land Agent, Northam to Under Secretary for Lands, Department of Lands and Surveys, 26 July 1909)

Such requests were refused as the paucity of reserved land in this area had already been recognised:

> '1. A good many requests have been received to throw open for selection Reserve 7220.
>
> '2. There is so little Crown Land in this locality that I think it would be advisable to retain this Reserve for possible future requirements.

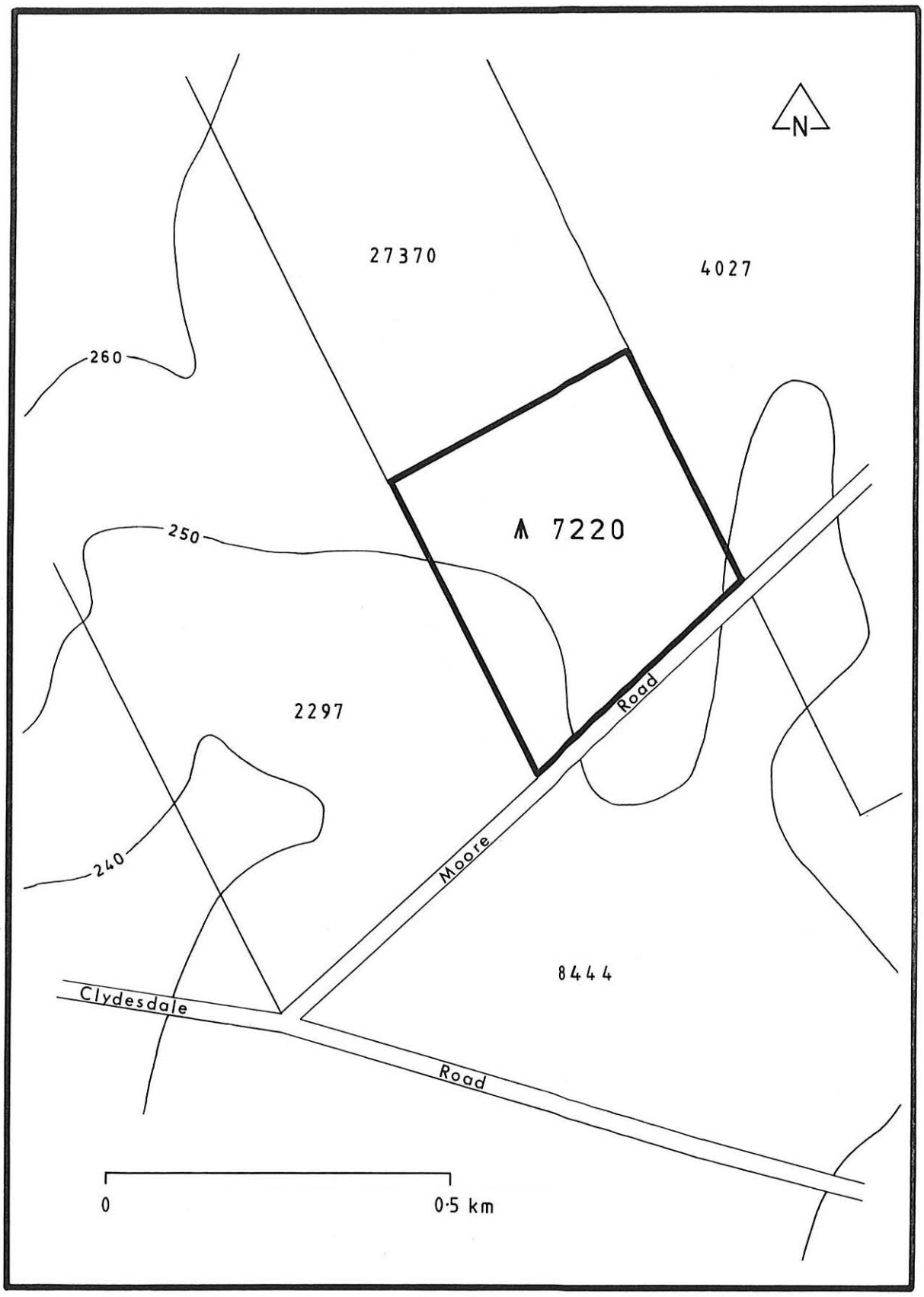

Figure 13. Throssell Nature Reserve showing its relationship with surrounding lands and associated contours (m). (Source: W.A. Department of Lands and Surveys 1 : 50 000 series.)

'3. Portion of the Reserve, however, has at the request of the Road Board, been marked as a Reserve for gravel.'

(Surveyor General to Under Secretary for Lands, Department of Lands and Surveys, 7 August 1912)

On 18 September of the same year, the area of Reserve No. 7220 was reduced to 141 acres and a gravel Reserve (No. 14330), with an area of 10 acres, was excised from the south-western corner. The area of the Timber Reserve was reduced further to 32 acres on 18 April 1935. A special lease was granted over this area on 17 March 1952.

Requests for release of the area for agriculture continued. However, recognition of the value of the area for conservation counterbalanced these demands:

'...reserves .... have been heavily grazed ... As a consequence ... natural scrub growth is fast disappearing .... .

'... very little scrub growth remains, some tussocky grasses, whole area would be subject to flooding in winter.

'...the country surrounding these Reserves is virtually cleared out, the timber growth is a pleasant break in the local countryside.

'In view of the above I would strongly recommend the following:

'...the immediate cancellation of grazing permits on both reserves.

'...Incorporating both Reserves to "Flora and Fauna or Camping", which ... would ... benefit the State and the community.'

(Inspector to Officer-in-Charge Inspections, Department of Lands and Surveys, 8 July 1962)

On 5 April of the following year (1963) both reserves (Nos. 14330 and 7220) were set aside for Conservation of Flora.

As part of the regional review which accompanies the development of a management plan, and following requests by the Department of Conservation and Land Management, the two Reserves were combined under one Reserve number (No. 7220) on 22 March 1985, for the common purpose of Conservation of Flora and Fauna with vesting in the NPNCA.

3. SOILS AND VEGETATION

This flat Reserve is dominated by wandoo woodland on pale sandy clays. A small pocket of salmon gum, wandoo and york gum occurs on more clayey soils in the southern corner. These two associations are delineated in Figure 14 and described below:

1. Wandoo (Eucalyptus wandoo) WOODLAND, 12-16 m in height, over an understorey dominated by LOW GRASS. Occasional blackboys (Xanthorrhoea preissii) to 1-2 m occur.

2. Salmon gum (E. salmonophloia), wandoo and york gum (E. loxophleba) WOODLAND/LOW WOODLAND A, 8-17 m in height, over DWARF SCRUB C OF Daviesia incrassata and Rhagodia crassifolia, over LOW GRASS. Acacia erinacea forms a sparse prostrate ground cover.

Appendix 2 includes a flora species list for Throssell Nature Reserve.

4. FAUNA

Intensive surveys of the fauna on Throssell Nature Reserve have not been undertaken. The small size of this Reserve and the lack of understorey suggests that small native mammals may be absent and reptile species limited in number. The only reptile which has been sighted on the Reserve is the bobtail (Tiliqua rugosa).

The mature woodland however, provides good habitat for birds. Twenty one bird species have been recorded (App. 4); at least six of these species were nesting on the Reserve. Throssell and Meenaar are the only two nature reserves in the York-Northam area on which the Chestnut-rumped Thornbill has been recorded. In the neighbouring Shire of Toodyay this species has been described as scarce (Toodyay Naturalists' Club 1979).

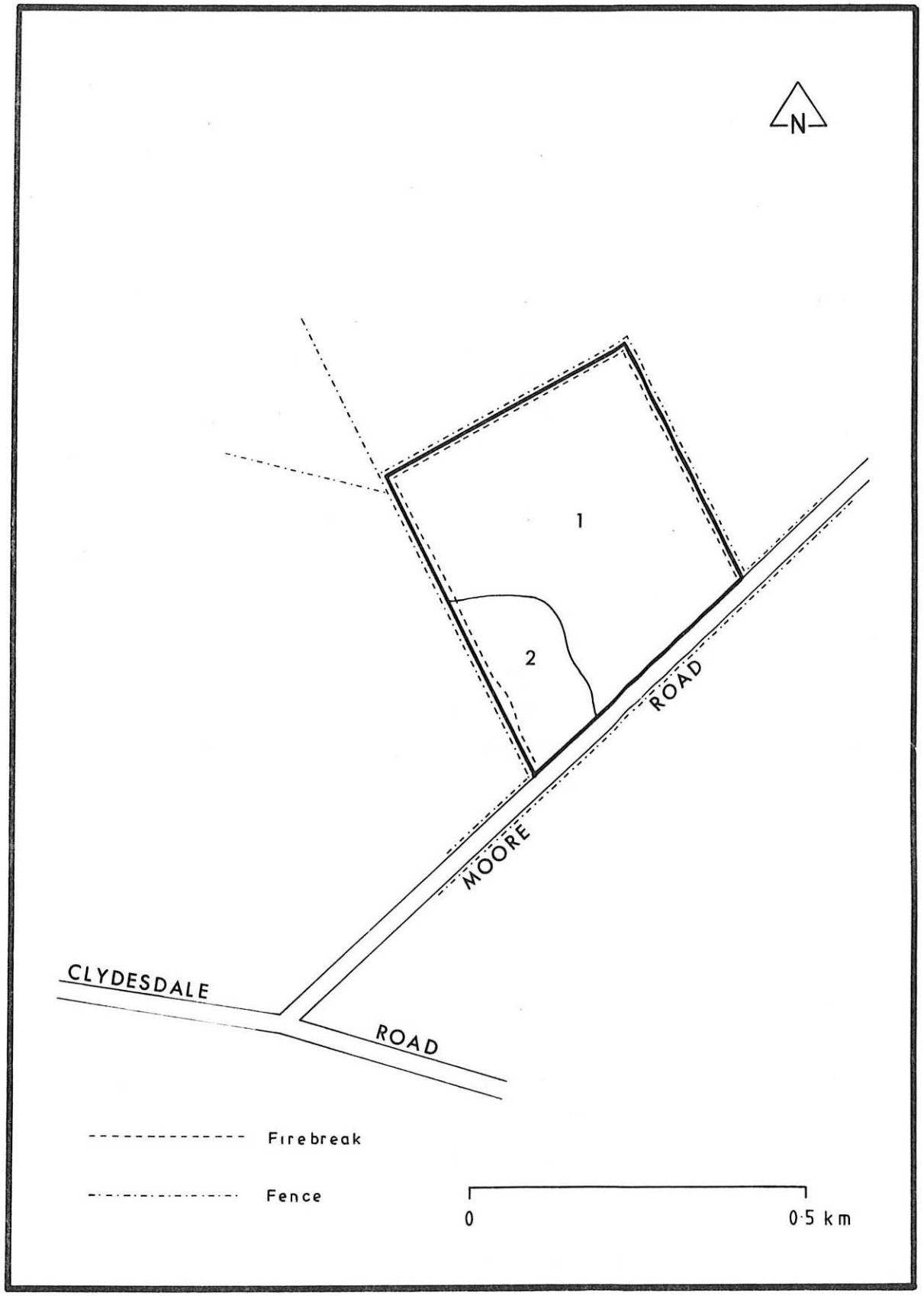

Figure 14. Throssell Nature Reserve showing features and vegetation associations (identified by number and described in the associated text). (Source: Department of Conservation and Land Management, 1985.)

5. PAST USES, MANAGEMENT AND FIRE HISTORY

Throssell Nature Reserve, although originally much larger, only ever carried 50 acres of timber the remainder of the area being sandplain. Therefore, this limited area of woodland was subjected to considerable pressures, particularly as it lies on the edge of extensive sandplains, which lack substantial timber. A strong demand for timber would have occurred in the mid-twentieth century, when the fertility problems of sandplain areas were overcome. These areas subsequently became available for grazing and cropping, and timber was needed for fencing. Fortunately, many old trees still remain on this Reserve. However, timber removal for fencing still occurs.

The Reserve has also been used for grazing and this has resulted in the almost complete disappearance of understorey shrubs.

Throssell Nature Reserve has firebreaks on the three boundaries shared with private property (Fig. 14). Moore Road follows the fourth boundary. All boundaries shared with private property are fenced.

The Reserve does not appear to have been burnt for many years.

6. NATURE CONSERVATION VALUES

The woodland and open woodland on Throssell Nature Reserve are particularly important as they provide refuge and nesting sites for numerous bird species. Many of these species survive for most of the year in the cleared wheatbelt environment, only requiring trees for occasional refuge and as nesting sites. The mature trees on Throssell provide hollows for hollow-nesting birds, plus foliage for refuge and nesting. The Reserve also functions as a windbreak in an almost completely cleared landscape.

Although this Reserve is small, the stands of salmon gum it contains are of great value. This is the only nature Reserve in the York-Northam area on which salmon gum occurs. Prior to European settlement at least a quarter of the York-Northam area carried york gum and salmon gum woodlands (Beard 1979a). It is indicative of the value of salmon gum

country for agriculture that in the York-Northam area only a few hectares have been set aside for conservation.

B. PLAN FOR MANAGEMENT

1. MANAGEMENT OBJECTIVES

Management will be directed towards enhancement and maintenance of the conservation values of the Reserve.

Management strategies to achieve this objective will include: protection from fire, pests and disease; rehabilitation of degraded areas; management of public use.

Any strategies not discussed below are covered in PART 8: GENERAL MANAGEMENT STRATEGIES.

2. PROTECTION FROM FIRE

This small Reserve isolated amidst cleared agricultural land and with a sparse understorey presents little to no fire risk to adjacent landholders. Furthermore, it is important to exclude fire from Throssell Nature Reserve for several reasons. First, salmon gums are particularly sensitive to fire and following severe fire will only regenerate from seed, whereas many other eucalypts can regenerate from rootstock. Second, even if a fire of low intensity moved through the Reserve, many of the tree hollows and foliage used by the birds would be lost. Third, any fire on the Reserve will encourage weed invasion, reducing further the competitive ability of the native understorey species.

Management Strategies

Although fire is unlikely to occur on the Reserve it is important to protect the area from fires originating on adjacent holdings. This will be achieved by maintaining the existing perimeter firebreak to its present standard.

3. REHABILITATION AND MAINTENANCE OF THE NATURAL ENVIRONMENT

Management Strategies

The Reserve will be disturbed as little as possible, thus encouraging natural regeneration of the understorey.

4. PUBLIC USE

Management Strategies

Throssell Nature Reserve appears to be unused by the public. In view of the need to minimise disturbance to the Reserve and to encourage understorey regeneration, public use will remain minimal.

Signs giving the Reserve name and information on public use will be erected at the south-western and south-eastern corner of the Reserve adjacent to Moore Road.

PART 7 MEENAAR NATURE RESERVE (NO. A29977)

A. THE RESERVE

1. PHYSICAL CHARACTERISTICS AND RELATIONSHIPS

Meenaar Nature Reserve, with an area of 71.8 ha and a perimeter of 4.8 km, is located 21 km east of Northam (Fig. 2) and 13 km west of Meckering. It is 3 km south-east of Throssell Nature Reserve. The Great Eastern Highway and Perth-Kalgoorlie railway follow the northern boundary of this triangular Reserve (Fig. 15). Meenaar South Road cuts through the centre of the Reserve and then runs along the southern half of the south-western boundary. Meiklem Road runs in from the west to join Meenaar South Road. The Goldfields water pipeline and a State Energy Commission powerline run through the centre of the Reserve in an east-west direction (Fig. 16).

The land to the south-west and south-east of the Reserve is cleared and privately owned, while to the north the land abutting the Reserve is uncleared, having been set aside as a gravel Reserve (No. 34772). The eastern corner of the northern boundary abuts cleared, privately owned land which was originally part of the proposed subdivision for Meenaar townsite.

Meenaar Nature Reserve lies in gently undulating country and within the Reserve altitude varies by only 10 m (230-240 m) (Fig. 15). A small sandy-bottomed perennial stream flows eastwards through the Reserve.

2. HISTORY

It was first suggested that the Meenaar area be set aside in June 1898, two years after the Perth-Kalgoorlie railway line was completed. A total of 360 acres spanning the railway line was recommended for reservation (Chief Inspector of Lands, Department of Lands and Surveys, 23 June 1898).

There was some disagreement, even in these early days, as to the value of a townsite Reserve at Meenaar:

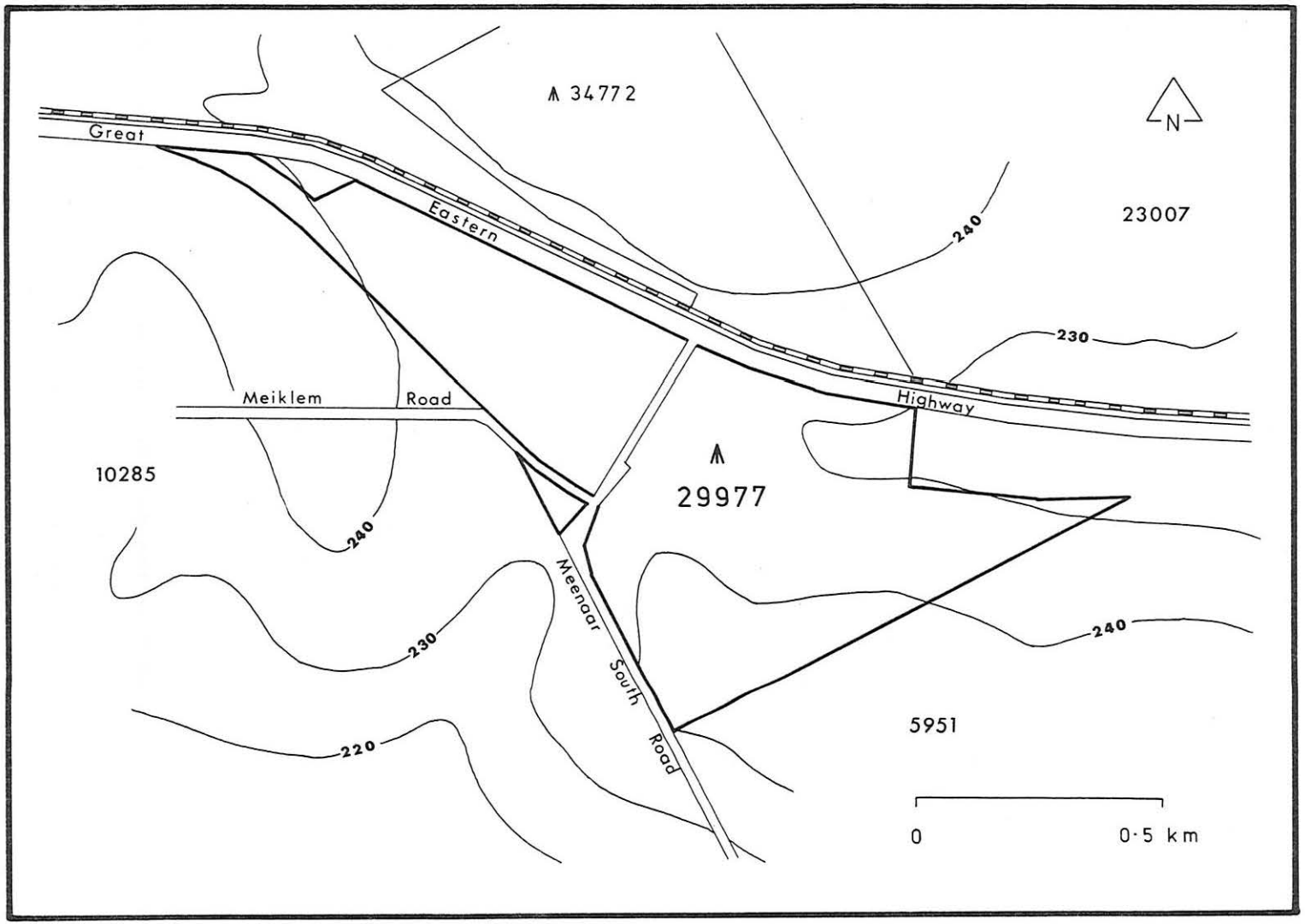

Figure 15. Meenaar Nature Reserve showing its relationship with surrounding lands and associated contours (m). (Source: W.A. Department of Lands and Surveys 1 : 50 000 series.)

'...So far as I can see the railway staff are the only likely applicants for small holdings at Meenaar which is essentially a farming district.

'...Neither the rainfall nor the land around the station are especially suitable for gardeners, except for a few months in the year.

'...In my judgement the probability of a demand arising for many small holdings near Meenaar siding is remote.'

(Inspector, Northam to Under Secretary for Lands, Department of Lands and Surveys, 28 September 1899)

Meenaar was set aside as a townsite on 30 October 1908, with problems in delineating the boundaries being experienced from the earliest days.

The predictions made in 1899, by the Lands Inspector (Northam), proved correct with only one or two of the lots ever being purchased and occupied. In September 1968 application was made for the release of a further three lots. Release was refused and the following recommendations made:

'...The area.... contains a good growth of Jam and Bulloak trees and shrubs. The area adjoins the Great Eastern Highway and should be retained in its natural state.

'...It is recommended that:

'(i) applications for the release of Meenaar lots 41, 42 and 43 be refused.

'(ii) Meenaar lots 41, 42 and 43 and the two portions of closed road (included) be cancelled.....

'(iii) One new lot be created for the area ... and this lot be reserved for the purpose of Conservation of Flora.'

(Divisional Surveyor, Narrogin to Deputy Surveyor General, Department of Lands and Surveys, 5 February 1969).

On 26 September 1969 45 acres was set aside for the Conservation of Flora. This area was decreased to 17.5 ha in 1977, and increased to its present size of 71.8 ha in July 1979. On 6 June 1980, the Reserve was given 'A' class status and its purpose was changed to the Conservation of Flora and Fauna, with vesting in the Western Australian Wildlife Authority (now replaced by the NPNCA). This change was based on recommendations by B G Muir following surveys of the area in 1979 (Muir 1979a).

3. SOILS AND VEGETATION

Three discrete woodland associations occur on Meenaar - york gum on grey-brown sandy clays adjacent to the streamline, a small area of jam on yellow sandy-loams slightly higher in the landscape and wandoo on grey clays in the southern corner of the Reserve. The remaining third of the Reserve is covered by a mosaic of heath, including sandalwood, blackboys, jam and sheoak on pale sand-loams and pale, grey-yellow sands.

These associations are described below and distributed as shown in Figure 16:

1. SCRUB OF sandalwood (Santalum spicatum), blackboys (Xanthorrhoea preissii), jam (Acacia acuminata) and sheoak (Allocasuarina huegeliana), 3-5 m in height, over patches of tamma (Allocasuarina campestris) THICKET, 2-3 m in height, over LOW SEDGES and LOW GRASS. Hakea incrassata, Dryandra fraseri, spreading cone bush (Isopogon divergens), prickly dryandra (D. armata), Daviesia aff. nudiflora, common smokebush (Conospermum stoechadis), Eremaea pauciflora, cat's paw (Anigozanthos humilis), bristly conostylis (Conostylis setigera) and Grevillea sp. occasionally occur in the THICKET. An area of sheoak LOW WOODLAND B over Leptospermum erubescens and tamma SCRUB, 2-3 m in height, also contributes to this association.

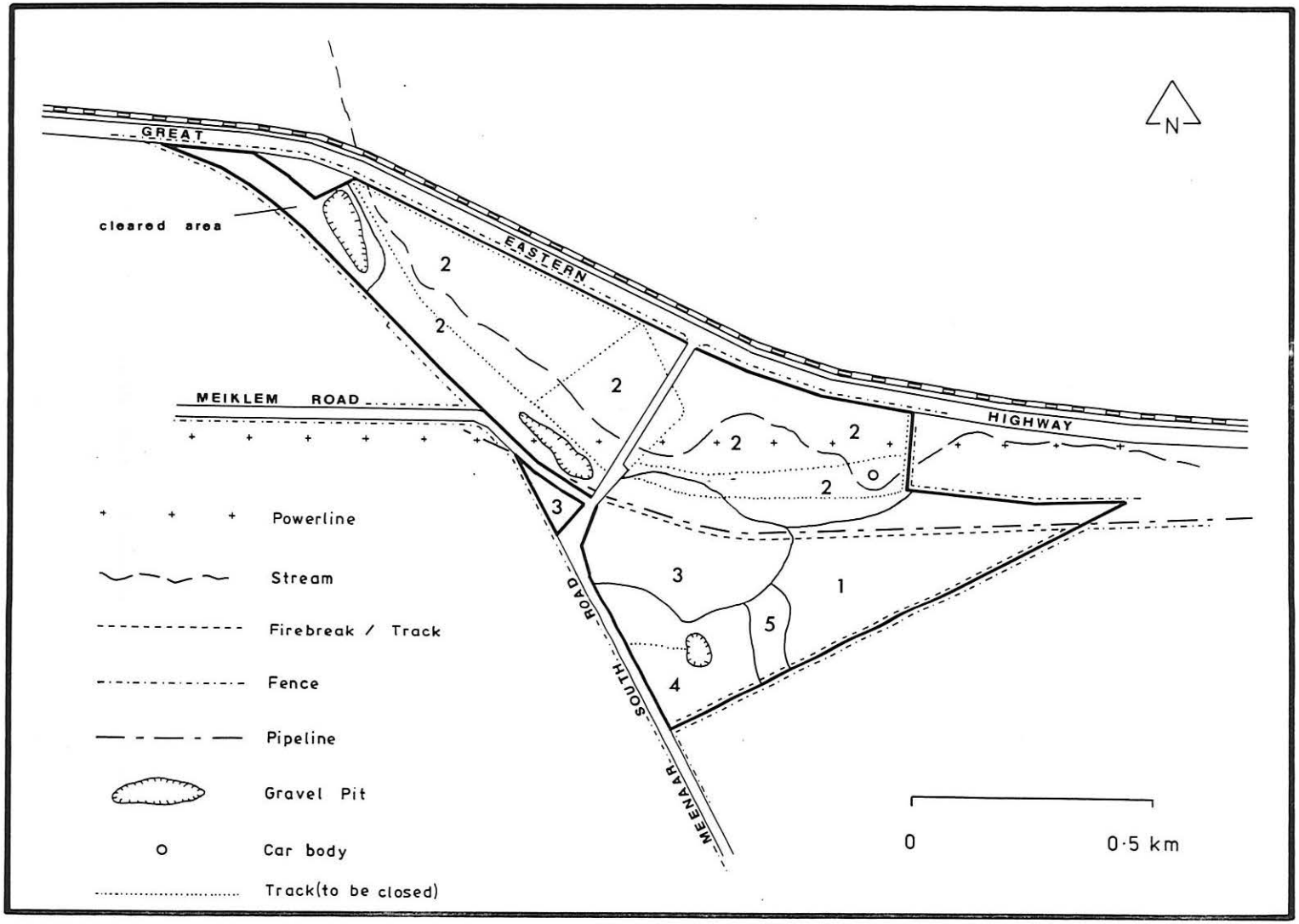

Figure 16. Meenaar Nature Reserve showing features and vegetation associations (identified by number and described in the associated text). (Source: Department of Conservation and Land Management, 1985.)

2. York gum (Eucalytpus loxophleba) LOW WOODLAND A, 5-10 m in height, over jam (Acacia acuminata) LOW WOODLAND B/LOW FOREST B, 4-5 m in height, over LOW GRASS, with occasional patches of sheoak, 5-8 m in height.

3. Tamma HEATH A to 2 m, over LOW HEATH C/DWARF SCRUB C of yellow morrison (Verticordia chysantha), painted featherflower (V. picta), Hakea incrassata, Dryandra fraseri, spreading cone bush, Calytrix brachyphylla, one-sided bottlebrush (Calothamnus quadrifidus) and prickly dryandra.

4. Wandoo (E. wandoo) OPEN LOW WOODLAND A, 10-15 m in height, over LOW GRASS with occasional patches of sheoak LOW FOREST B/LOW WOODLAND B, to 5 m, and tamma SCRUB to 3 m.

5. Jam LOW WOODLAND B, 4-5 m in height, over LOW GRASS and LOW SEDGES.

4. FAUNA

A brief inventory of the fauna on Meenaar was made during planning surveys. However, similarly to Throssell Nature Reserve, detailed surveys of the fauna have not been undertaken. The only native mammal recorded on the Reserve was the Echidna (Tachyglossus aculeatus). Rabbits (Oryctolagus cuniculus) were present in small numbers.

Meenaar is particularly rich in bird species, many of which have not been recorded on the nature reserves in the western part of the York-Northam area. Of these, 18 - the White-faced Heron, Laughing Turtle Dove, Regent Parrot, Budgerigar, Mulga Parrot, Red-backed Kingfisher, White-backed Swallow, Welcome Swallow, Jacky Winter, Crested Bellbird, White-winged Fairy-wren, Spiny-cheeked Honeyeater, Yellow-throated Miner, White-fronted Chat, Zebra Finch, Black-faced Woodswallow, Grey Butcherbird and Pied Butcherbird - were not listed for any other nature reserve in the York-Northam area. Although Meenaar is relatively small, it is used for nesting by at least 17 species.

Limited information is available regarding reptile species on Meenaar. Four species have been recorded - two Geckos Crenadactylus ocellatus and Gehyra variegata, Burton's Snake-lizard (Lialis burtonis) and the Skink Menetia greyii.

5. PAST USES, MANAGEMENT AND FIRE HISTORY

Meenaar is a service corridor for the Perth-Kalgoorlie railway line, Great Eastern Highway, Goldfields water pipeline and State Energy Commission powerlines. Hence, the vegetation on the Reserve is highly dissected and disturbed. Firebreaks follow the south-eastern and western half of the northern boundary and the southern side of the water pipeline. The remainder of the Reserve is also cut by numerous tracks (Fig. 16). The extent of boundary fencing is given in Figure 16.

Meenaar has been used as a source of timber. The stand of wandoo in the southern corner has been extensively cut over and only large trees unsuitable for timber remain. Gravel has been removed from the southern and north-western corners and the central section of the south-western boundary. Rubbish dumping has occurred across most of the Reserve. Much of this is comprised of old tins and bottles from Meenaar Siding. There is also an old car body in the eastern end of the Reserve.

No fire history records exist and it appears as if the Reserve has not been burnt for at least 30-40 years.

6. NATURE CONSERVATION VALUES

Although Meenaar Nature Reserve is small and somewhat degraded it is important for a number of reasons. First, it is the only nature Reserve in the York-Northam area which supports a significant area of york gum woodland - an association which formerly covered the eastern half of the York-Northam area. The soils beneath these woodlands were, and still are, highly favoured by agriculture, and as such york gum is poorly represented on conservation reserves.

Second, the sandplain communities on Meenaar are also poorly represented on conservation reserves. This is the only nature Reserve in the York-Northam area with a significant area of sandplain. This association becomes increasingly dominant towards the eastern edge of the two Shires and is typical of much of the wheatbelt. Although sandplains were originally considered of little value for agriculture, the advent of fertilisers and improved cultivation techniques in the mid-twentieth century proved the value of these light lands (where sufficient rainfall was available).

Third, Meenaar has not been burnt for many years. In the south-eastern corner of the Reserve ancient blackboys, 2-3 m in height, with 'skirts' reaching the ground, are a common sight. Thickets of thick-trunked tamma are also indicative of the absence of fire for many years. The pockets of mature, species-rich heath in the southern part of the Reserve also suggests a long absence of fire.

Fourth, the heath provides a food source for birds and an attractive display of wildflowers in the spring months.

B. PLAN FOR MANAGEMENT

1. MANAGEMENT OBJECTIVES

Initially management will be directed towards rehabilitation of the Reserve environment, and the associated and subsequent enhancement of its conservation values. Management will also be directed toward minimising further impact by the various utilities, such as the water pipeline, railway and powerline, on the conservation values of the Reserve. To achieve these objectives management strategies will include: protection from fire, pests and disease; rehabilitation of degraded areas; management of public use.

Any strategies not discussed below are covered in PART 8: GENERAL MANAGEMENT STRATEGIES.

2. PROTECTION FROM FIRE

This small Reserve, isolated amidst cleared farmland and cut by roads and pipelines, presents little fire risk. The absence of fire for the Reserve for many years is indicative of its low fire hazard. Fire protection and the conservation values of Meenaar could be greatly increased by rationalising the existing system of firebreaks and tracks.

Management Strategies

The firebreak along the south-eastern boundary and along the southern side of the water pipeline will be regularly maintained to their present standard. All other firebreaks and tracks will be closed (Fig. 16).

3. REHABILITATION AND MAINTENANCE OF THE NATURAL ENVIRONMENT

Management Strategies

All rubbish will be removed prior to closure of the tracks. This rubbish will be buried in the central gravel pit before rehabilitation commences.

All tracks not required for servicing the utilities or as part of the Reserve firebreak system (Fig. 16) will be closed. They will be blocked off and ripped to encourage regeneration.

Rehabilitation of the three gravel pits will require:

(a) pushing any available spoil heaps or topsoil onto the floor of the pit;
(b) battering the pit sides to a slope of less than 3 in 1;
(c) ripping the pit floor along the contours; and
(d) ripping and blocking off access tracks.

4. PUBLIC USE

Management Strategies

Considering the degraded nature of the area and the need to enhance its conservation and aesthetic values, public use will remain low key.

Signs giving the Reserve name and information on public use will be erected on the western and eastern corners of the Reserve adjacent to the Great Eastern Highway, on the southern corner of the Reserve adjacent to Meenaar South Road and at the junction of Meiklem Road and the south-western boundary.

PART 8 GENERAL MANAGEMENT STRATEGIES

This part covers management strategies which are generally applicable to all nature reserves in the York-Northam area.

1. PROTECTION FROM FIRE

Management Strategies

Fire-fighting units from the Mundaring District Office of the Department of Conservation and Land Management will attend fires occurring on, or considered to be threatening, the York-Northam nature reserves.

Owing to the remoteness of most of these nature reserves from the Mundaring District Office, it is highly unlikely that the department could carry out an initial attack on wildfires on, or threatening, these reserves. Thus, effective fire protection will depend on liaison between this department, the local government authority and reserve neighbours. The Mundaring District Office will develop these links.

The Department of Conservation and Land Management will become a Notifiable Authority for the Shires of York and Northam. This means that if burning is to be carried out on land adjacent to a particular nature Reserve, or if there are any changes to the prohibited and restricted burning times, then the local government authority (the Shire of York or Northam) is obliged to notify the department (Section 3 of the Bush Fires Regulations, 1954).

2. PROTECTION FROM PESTS: ANIMAL AND WEED CONTROL

Control of pest animals and plants may be necessary to protect the flora or fauna of a particular nature reserve (or group of reserves) or as part of organised pest control in the surrounding area.

Management Strategies

Arrangements for pest control will be made between the Mundaring District Office of the Department of Conservation and Land Management

and the Agriculture Protection Board. Details regarding pest control will be recorded.

The extend of weed invasion will be mapped and the area(s) regularly inspected. If treatments are used all relevant details will be recorded.

3. PROTECTION FROM DIEBACK

While the destructive effects of dieback on jarrah are well publicised, the broader effects are not as well known. Dieback destroys many species of native flora and it is expected that the disease will indirectly affect many animals through its impact on their habitat. Because dieback is so destructive, it is necessary to prevent the transport of the disease within or from a particular Reserve, if it is present, or onto a Reserve if it is absent.

Dieback is known to occur throughout much of the state forest immediately to the west of the York-Northam area. It is likely therefore that dieback may be present on the nature reserves in the western part of the the York-Northam area, if not the reserves in the eastern part as well.

Management Strategies

Each Nature Reserve will be surveyed to determine if dieback is present. Clackline Nature Reserve will be regarded as the highest priority. The remainder of the reserves lie to the east of these areas less susceptible to dieback. Thus, the priority for survey of the remaining reserves is lower.

The following procedures will be implemented:

(a) Regardless of whether the particular nature reserve is infected or not (unless the entire reserve is infected) all vehicles and equipment will be cleaned down, if they have recently been used in other areas of bush, before being used on the reserve.

(b) If dieback is present, the boundaries of the infected areas will be mapped and the infected area quarantined. Access by vehicle into the infected area will only be permitted in an emergency (e.g. wildfire suppression) with vehicles being thoroughly cleaned before moving into uninfected areas.

Firebreak maintenance will be based on complete cleandown of all equipment before moving from infected to uninfected areas.

(c) Prior to the availability of conclusive evidence on the dieback status of the reserves, all work proposed and implemented under this plan will be according to (a).

4. RARE PLANTS

Management Strategies

Before operations (for example, weed control) are carried out, the presence of rare plants must be considered. Rare plants present on each nature reserve covered by this plan are given under the relevant Soils and Vegetation section. Maps giving the exact locations of these species are held by the Mundaring District Office of the Department of Conservation and Land Management.

5. BEEKEEPING

According to policy adopted by the W.A. Wildlife Authority (now replaced by the NPNCA) in May 1981, beekeeping is not allowed on nature reserves less than 500 ha in area. Thus, none of the nature reserves in the Shires of York or Northam are suitable.

Management Strategies

No apiary sites are located on the York-Northam Nature Reserves and it is not envisaged that any sites will be made available during the currency of this plan.

6. PUBLIC USE

The Mundaring District Office is working closely with the local community and community groups who have an interest in the management of lands under the control of the Department of Conservation and Land Management. This close liaison will readily allow the public to discuss management concerns with officers from this Department.

Management Strategies

All signs will comply with the Department of Conservation and Land Management signs standard for nature reserves, which is based on wooden routed signs with primrose yellow lettering on a pine-log green background.

7. RESEARCH

Surveys and research programs by conservation groups and tertiary institutions will be co-ordinated by the Mundaring District Office of the Department of Conservation and Land Management, with advice from the Wildlife Research Branch.

8. MANAGEMENT RECORDS

Management Strategies

The Mundaring District Office will maintain accurate and current records of all management activities undertaken on the York-Northam Nature Reserves. These records will include current inventories of the flora and fauna on the Reserves.

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APPENDIX 1. STRUCTURAL VEGETATION CATEGORIES (MUIR 1977)

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 Mallee	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.o-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 pp.	Dense Herbs	Herba	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, Liv rwort	Dense Mosses	Mosses	Open Mosses	Very Open Mosses

APPENDIX 2. THE FLORA OF NATURE RESERVES IN THE SHIRES OF YORK AND NORTHAM
(Source: Greg Keikghery and Jeni Alford, W.A. Wildlife Research Centre 1985)

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
SELAGINELLACEAE							
Selaginella gracillima				X			
ADIANTACEAE							
Cheilanthes austrotenuifolia	Rock Fern	X	X	X	X	X	X
OPHIOGLOSSACEAE							
Ophioglossum lusitanicum			X	X	X		
ASPLENIACEAE							
Pleurosorus rutifolius		X					
ZAMIACEAE							
Macrozamia riedlei	Zamia Palm	X	X	X	X		
CUPRESSACEAE							
Actinostro us pyramidalis	Swamp Cypress	X					
JUNCAGINACEAE							
Triglochin calcitrapa	Spurred Arrowgrass						
T. centrocarpa			X				
T. minutis ima							
T. procera					X		

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
POACEAE							
Aira caryoph llea *	Silvery Hair Grass	X	X	X			
Amphipogon strictus	Grey-Beard Grass	X					
A. turbinatus		X					
Aristida contorta							X
Avena fatua *	Wild Oat	X	X	X	X	X	X
Briza maxima *	Quaking Grass	X	X	X	X	X	X
B. minor *	Shivery Grass	X					
Bromus rubens *	Red Brome	X					
Danthonia cf. setacea		X					
Eharharta longiflora*	Annual Veldt Grass					X	
Eragrostis curvula*	Love Grass						X
E. dielsii				X			
Lolium sp. *	Rye Grass	X					
Monachather paradoxa		X					
Neurachne alopecuroidea		X	X			X	
Paralophis incurva*						X	
Poa drummondiana	Shaking Grass	X					
Stipa elegantissima	Feather Spear Gras		X	X		X	X
Stipa sp.		X					
Themeda australis				X			
CYPERACEAE							
Caustis dioica						X	X
Chorizandra enodis	Black Bristle Rush				X		
Cyathochaet avenacea					X		
Gahnia dru ondii		X		X	X	X	
G. trifida		X					
Isolepis mar inata		X					
Lepidosperm angustatum		X	X	X	X		
L. longitudinale	Common Sword Sedge		X				
L. tenue						X	X
L. viscidum						X	X

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
Mesomelaena stygia		X	X			X	X
M. tetragona	Semaphore Sedge	X	X				
Schoenus clandestinus		X	X				
S. curvifolius				X			
S. sesquispiculus				X			
S. sp. I		X	X				
S. sp. II		X					
Tetraria octandra			X	X			
RESTIONACEAE							
Harperia lateriflora				X		X	X
Lepidobolous chaetacephalus		X	X	X	X	X	X
Leptocarpus sp.						X	
Lepyrodia cf. monoica					X		
Loxocarya cinerea		X	X	X	X	X	X
L. flexuosa		X					
Restio megalotheca	Cord Rush	X					
CENTROLEPIDACEAE							
Aphelia cyperoides		X	X	X			
A. drummondii			X	X			
A. nutans			X	X			
Centrolepis aristata	Painted Centrolepis	X	X				
C. polygyna	Wiry Centrolepis	X		X			
PHILYDRACEAE							
Philydrella pygmaea		X	X				
JUNCACEAE							
Juncus acutus*				X			
J. bufonius	Toad Rush	X			X		

		CLACKLINE	ST. RONANS		WAMBYN	MOKINE	THROSSELL	MEENAAR
J. capitatus*					X	X		
J. cf. holoschoenus	Joint Leaf Rush	X				X		
J. kraussii						X		
DASYPOGONACEAE								
Acanthocarpos preissii							X	X
Calectasia cyanea	Blue Tinsel Lily	X						
Chamaexeros serra								X
Lomandra brittanii					X			
L. caespitosa		X	X				X	X
L. collina	Scented Mat Rush				X		X	
L. effusa		X			X		X	X
L. micrantha	Small Flowered Mat Rush	X	X		X	X	X	X
L. mucronata			X			X		
L. nutans			X		X	X		
L. preissii		X	X					
L. spartea	Silky Mat Rush	X	X		X	X		
XANTHORRHOEACEAE								
Xanthorrhoea preissii	Blackboy	X	X		X	X		
X. reflexa	Skirted Grass Tree	X	X		X	X	X	X
PHORMIACEAE								
Dianella revoluta	Spreading Flax Lily	X	X	X		X	X	X
Stypandra imbricata	Cluster-leaved Blind Grass	X	X	X		X		X
ANTHERICACEAE								
Agrostocrinum scabrum	The Grass Lily	X						X
Anthropodium capillipes		X	X	X		X	X	X
A. sp. nov.			X	X				
Borya nitida		X	X	X		X	X	X

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
B. scirpiodea			X				
B. sp.					X		
Caesia parviflora		X		X		X	X
Corynotheca micrantha		X	X				
Chamaescilla corymbosa	Blue Squill	X	X		X		X
C. spiralis							X
Laxmannia grandiflora		X	X			X	X
L. ramosa		X			X		
L. sessiliflora		X					
L. squarrosa		X				X	X
L. sp. nov.			X		X	X	
Sowerbaea laxiflora	Purple Tassles		X			X	X
Thysanotus dichotomus	Branching Fringe Lily		X				
T. multiflorus	Many Flowered Fringe Lily	X	X		X		
T. patersonii	Twining Fringe Lily	X	X		X	X	
T. sparteus		X	X		X		
Tricoryne elatior	Yellow Autumn Lily	X	X	X	X		X
ASPHODELACEAE							
Bulbine semibarbata				X			
COLCHICACEA							
Burchardia multiflora							
B. umbellata	Milkmaids		X		X		X
Wurmbea dioica	Early Nancy		X		X		
W. drummondii				X	X		
W. tenella		X	X	X	X		
HAEMODORACEAE							
Anigozanthos humilis	Cat's Paw	X	X		X		
A. manglesii	Mangle's Kangaroo Paw		X				

		CLACKLINE	ST. RONANS		WAMBYN	MOKINE	THROSSELL	MEENAAR
Conostylis aurea	Golden Conostylis		X	X				
C. caricina			X	X				
C. setigera	Bristly Conostylis	X	X	X		X	X	X
C. sp.						X		
Haemodorum laxum			X	X				
H. paniculatum				X				
H. simplex				X		X		
H. simulans								X
H. sparsiflorum			X					
H. spicatum		X						
Tribonanthes longipetala								X
T. violacea		X	X	X		X		
AMARYLLIDACEAE								
Amaryllis belladona *				X				
Narcissus tazetta *	Double Roman			X				
HYPOXIDACEAE								
Hypoxis occidentalis		X	X	X		X	X	X
DIOSCOREACEAE								
Dioscorea hastifolia		X				X		
IRIDACEAE								
Chasmanthe floribunda				X				
Gynandriris setifolia*							X	
Homeria collina								X
H. flaccida *	Cape Tulip		X					
Orthrosanthus laxus	Morning Iris	X				X		
O. polystachyus							X	X
Patersonia cf. juncea			X					
P. occidentalis	Purple Flags	X						

		CLACKLINE	ST. RONANS		WAMBYN	MOKINE	THROSSELL	MEENAAR
P. pygmaea	Pygmy Patersonia		X	X				
P. sp.								X
Romulea ros a *	Onion Grass	X	X	X		X	X	X
ORCHIDACEAE								
Caladenia d formis	Blue Beard	X	X			X		X
C. flava	Cowslip Orchid		X					
C. gemmata	Blue China Orchid		X					
C. patersonii	Water Spider Orchid		X					
C. triangularis	Shy Spider Orchid	X						
C. sp.								X
Diuris laxiflora	Bee Orchid		X					
D. longifolia	Common Donkey Orchid	X	X	X		X	X	X
Elythranthera brunonis	Purple Enamel Orchid		X					
E. emarginata	Pink Enamel Orchid		X					
Eriochilus dilatatus	White Bunny Orchid	X	X	X		X		
Leporella fimbriata	Hare Orchid	X		X		X	X	X
Lyperanthus serratus	Hare Orchid	X		X				
L. nigricans	Red Beaks	X		X		X		
Prasophyllum cyphochilum	Pouched Leak Orchid		X	X				
P. macrostachyum var. ringens	Laughing Leek Orchid			X				
P. parvifolium				X				
Pterostylis barbata	Bird Orchid	X						
P. nana	Snail Orchid			X				
P. recurva	Jug Orchid	X	X	X		X		
P. sargentii						X		
P. vittata	Banded Greenhood	X	X	X		X	X	
Spiculea ciliata		X	X	X				
Thelymitra antennifera	Vanilla Orchid		X					
T. crinita	Blue Lady Orchid		X					
T. spiralis								X

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
CASUARINACEAE							
Allocasuarina campestris	Tamma	X	X	X	X	X	X
A. huegeliana	Sheoak	X	X	X	X	X	
A. humilis	Scrub Sheoak	X	X	X	X	X	X
A. microstachya			X			X	X
A. thuyoides	Horned Sheoak		X				
Casuarina obesa	Swamp Sheoak		X				
PROTEACEAE							
Adenanthos cygnorum	Woolly Bush	X	X		X		
Banksia attenuata	Slender Banksia	X					
B. grandis	Bull Banksia	X	X				
B. menziesii	Menzie's Banksia	X					
B. sphaerocarpa	Round Fruited Banksia	X					
Conospermum stoechadis	Common Smoke Bush	X	X				
Dryandra armata	Prickly Dryandra	X	X	X	X		
D. bipinnatifida		X	X	X	X		
D. carduacea	Pingle	X	X		X		
D. cirsioides							X
D. cuneata			X				
D. fraseri		X	X	X	X		X
D. kippistiana		X					
D. nivea	Couch Honeypot	X	X	X	X		
D. cf. nive			X				
D. nobilis	Golden Dryandra	X	X	X	X		
D. polyceph	Many-headed Dryandra	X	X	X	X		
D. proteoid s	King Dryandra				X		
D. sessilis	Parrot Bush	X	X	X	X		X
D. stuposa				X	X		
Grevillea bipinnatifida	Fuschia Grevillea		X				
G. eriostachya	Flame Grevillea						X
G. pilulifera	Woolly-flowered Grevillea	X	X		X		

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
G. pulchella	Beautiful Grevillea		X	X			
G. quercifolia	Oak Leaf Grevillea	X	X	X	X		
G. synapheae			X				
G. tridentifera	Pronged Grevillea				X		
G. trifida		X					
G. vestita					X		
Hakea cf. crassifolia	Thick-leaved Haken						X
H. erinacea	Hedge-hog Hakea	X	X	X	X		
H. gilbertii	Gilbert's Hakea						X
H. incrassata		X	X	X	X	X	X
H. lissocarpha	Honey Bush	X	X	X	X	X	X
H. loranthifolia		X		X			
H. petiolaris	Sea Urchin Hakea	X	X	X			
H. preissii		X	X	X		X	X
H. prostrata	Harsh Hakea	X	X		X	X	X
H. ruscifolia	Candle Hakea	X	X	X	X		
H. stenocarpa	Narrow Fruited Hakea		X	X			
H. trifurcata		X	X	X	X		X
H. undulata	Wavy-leaved Hakea	X	X	X	X		
Isopogon divergens	Spreading Cone Bush	X			X		X
I. drummondii			X				
I. dubius	Pincushion Cone Flower	X	X		X		
I. longifolius			X				
I. teretifolius	Needle Cone Bush		X				
I. villosus		X	X	X	X		
Persoonia elliptica		X					
P. quinquenervis	Kauberry	X	X	X	X		X
Petrophile brevifolia			X	X			X
P. divaricata		X	X	X	X		X
P. ericifolia							X
P. heterophylla							
P. longifolia	Long-leaved Cone Bush	X	X	X	X		
P. macrostachya		X					
P. serruriae		X					
P. squamata			X				

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
P. striata			X	X			
P. trifida		X	X	X	X		
Stirlingia latifolia	Blueboy	X	X				
Synaphea petiolaris		X					
S. polymorpha	Showy Synaphea						X
S. preissii		X	X				
S. sp.			X				
S. sp.							X
SANTALACEAE							
Santalum acuminatum	Sweet Quandong			X		X	X
S. spicatum	Sandalwood						X
LORANTHACEAE							
Amyema miquelii	Mistletoe	X	X	X	X		
A. preissii				X			X
Nuytsia floribunda	Christmas Tree	X	X				
RAFFLESIACEAE							
Pilostyles hamiltonii			X				
POLYGONACEAE							
Muehlenbeckia adpressa	Climbing Lignum		X	X	X	X	X
Rumex crispus *	Curled Dock	X					
CHENOPODIACEAE							
Halosarcia pergranulata	Samphire			X			
Rhagodia crassifolia						X	

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
AMARANTHACEAE							
Ptilotus declinatus	Curved Mulla Mulla		X	X	X		
P. drummondii		X	X	X	X		X
P. manglesii	Pom Poms		X	X	X		
P. polystachyus		X				X	X
P. villosiflorus			X				
AIZOACEAE							
Carpobrotus sp.							X
LAURACEAE							
Cassytha aurea							X
C. racemosa							X
BRASSICACEAE							
Lepidium rotundum						X	
DROSERACEAE							
Drosera bulbosa		X	X	X	X		
D. gigantea			X		X		
D. glanduligera			X				
D. heterophylla			X				
D. leucoblasta			X				
D. macrantha		X	X	X	X		
D. menziesii	Pinkrainbrow or Menzie's Sundew		X	X	X		
D. modesta	Modest Sundew		X				
D. pallida	Pale Sundew		X				

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
D. subhirtella			X				
D. zonaria			X	X			
D. sp. II						X	X
D. sp. III						X	X
CRASSULACEAE							
Crassula colorata	Dense Stonecrop		X			X	
C. exserta			X				
C. natans				X	X		
PITTOSPORACEAE							
Billardiera bicolor						X	
Sollya heterophylla	Australian Blue-Bell		X				
SURIANACEAE							
Stylobasium australe							X
MIMOSACEAE							
Acacia acuminata	Jam Tree	X	X	X	X	X	X
A. aphylla	Leafless Wattle				X		
A. celastrifolia	Glowing Wattle	X					
A. chrysocephala							
A. drummondii			X				
A. erinacea						X	X
A. lasiocalyx		X	X	X	X		X
A. lasiocarpa			X	X	X	X	X
A. microbotrya	Gum Wattle	X	X	X	X	X	
A. myrtifolia	Myrtle Wattle		X				
A. pulchella	Prickly Moses	X	X	X	X		
A. restiacea					X		
A. saligna		X				X	X

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
A. sessilispica			X				
A. sphacelata			X				
A. squamata		X	X	X	X		
A. urophylla		X					
CAESALPINACEAE							
Labichea lanceolata					X		
PAPILIONACEAE							
Bossiaea eriocarpa		X	X	X	X		
B. spinescens						X	
Burtonia viscida						X	
Chorizema cf. aciculare	Needle-leaved Chorizema		X				
Daviesia brefivolia							X
D. decurrens	Thorny Bitter Pea	X	X	X	X		
D. juncea				X			
D. rhombifolia			X				
D. sp.						X	X
D. sp.						X	X
D. sp.							X
Dillwynia cinerascens	Grey Parrot-pea			X	X		
Gastrolobium bilobum	Heart Leaved Poison		X				
G. calycinum	York Road Poison	X	X	X	X		
G. hookeri						X	X
G. ilicifolium			X				
G. microcarpum	Sandplain Poison	X					
G. obovatum	Boat-leaved Poison	X	X	X	X		
G. parvifolium	Berry Poison	X					
G. rotundifolium							
G. spinosum	Prickly Poison	X	X	X	X		X
G. trilobum	Bullock Poison	X	X	X	X		X
C. villosum	Crinkle Leaf Poison	X	X				
Gompholobium knightianum			X				

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
G. marginatum			X		X		
G. shuttleworthii			X				
Hovea chorizemifolia	Holly-leaved Hovea	X	X	X	X		
H. pungens	Devil's Pins	X	X	X	X		
H. trisperma	Common Hovea	X		X			
Isotropis cuneifolia	Common Lamb Poison	X				X	X
Jacksonia carduacea		X					
J. floribunda	Holly Pea	X					
J. sternbergiana	Stinkwood	X				X	
Kennedia coccinea	Coral Vine		X				
K. prostrata	Red Runner	X	X	X	X		
K. stirlingii	Bushy Kennedia		X				
Lupinus cosentinii							X
Mirbelia ramulosa					X	X	X
M. spinosa							X
Oxylobium capitatum			X		X		
O. cuneatum	Wedgeleaf Oxylobium	X	X	X	X		
O. parviflorum	Box Poison	X	X	X	X		
Templetonia sulcata					X		
GERANIACEAE							
Erodium circutarium*		X					
E. cygnorum	Blue Heron's Bill	X					X
OXALIDACEAE							
Oxalis peren ans		X		X	X	X	X
O. pes-caprae							X
O. polyphylla*							X
O. purpurea*							X
RUTACEAE							
Boronia busselliana		X					

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
B. ramosa		X					
Diplolaena microcephala					X		
Eriostemon spicatus		X					
TREMANDRACEAE							
Tetratheca confertifolia			X	X	X		
T. sp.			X				
POLYGALACEAE							
Comesperma scoparium	Broome Milkwort		X				
C. volubile	Love Creeper		X				
EUPHORBIACEAE							
Phyllanthus calycinus	False Boronia	X	X	X	X		
Ricinocarpos sp.			X				
STACKHOUSIACEAE							
Stackhousia pubescens		X					
Tripterococcus brunonis			X				
SAPINDACEAE							
Dodonaea concinna		X	X	X			
D. divaricata						X	X
D. hexandra			X				
D. viscosa	Sticky Hop Bush		X	X	X		
RHAMNACEAE							
Cryptandra arbutiflora			X				
C. glabriflora					X		

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
C. sp. I							X
C. sp. II							X
Spyridium tridentatum			X			X	
S. sp.							X
Trymalium angustifolium			X				
T. ledifolium		X	X	X	X		
STERCULIACEAE							
Keraudrenia integrifolia	Common Fire bush						X
Rulingia sp.							X
Thomasia foliosa		X	X	X	X		X
DILLENIACEAE							
Hibbertia acerosa							X
H. enervia		X	X		X		X
H. hypericoides	Yelllow Buttercups	X	X	X	X		
H. lineata			X				
H. montana	Mountain Primrose	X	X	X	X		
H. polystachya		X	X				
H. rupicola		X	X	X	X		
H. spicata					X		
H. stellaris	Orange Stars		X				
FRANKENIACEAE							
Frankenia pauciflora				X			
THYMELAEACEAE							
Pimelea ciliata		X					
P. imbricata			X				

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
MYRATECEAE							
Astartea f scicularis		X					
Beackea crispiflora			X			X	X
B. sp.			X				
Beaufortia bracteosa			X				
B. elegans		X					
B. macrostemon		X					
Calothamnus quadrifidus	One-sided Bottlebrush	X			X		X
C. rupestris	Mouse Ears		X	X			
C. sanguineus		X	X	X	X		
Calytrix amgulata		X					
C. depressa			X				
C. flavescens	Summer Starflower	X	X				
C. fraseri	Pink Summer Starflower	X					
C. glutinosa			X				
Chamelaucium uncinatum *	Geraldton Wax			X			
Darwinia sp.			X				
Eremaea pauciflora		X					X
Eucalyptus accedens	Powerderbark Wandoo	X	X	X	X		
E. astringens	Brown Mallet	X		X	X		
E. calophylla	Marri	X	X	X	X		
E. deflexa		X					
E. drummondii	Drummmond's Gum		X				
E. loxophleba	York Gum				X	X	X
E. marginata	Jarrah	X					
E. salmonophloia	Salmon Gum					X	
E. wandoo	Wandoo	X	X	X	X	X	X
Hypocalymma angustifolimm	White Myrthe	X	X	X	X		
Kunzea recurva		X					
Leptospermum erubescens		X	X	X	X	X	X
Melaleuca holosericea		X					
M. pentagona				X			
M. platycalyx							X
M. preissiana		X					

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
M. radula	Graceful Honeymyrtle	X					X
M. trichophylla							
M. uncinata					X		
Pericalymma ellipticum		X	X	X			
Thryptomene australis	Hook-leaf Thryptomene		X				
Verticordia brownii							X
V. densiflora		X					
V. grandiflora	Claw Feather flower		X				
V. huegelii	Variegated Feather flower		X				
V. insignis			X				
V. picta	Painted Feather flower		X				
V. roei	Roe's Feather flower		X				
V. serrata		X	X				
HALORAGACEAE							
Glischrocaryon aureum	Common Pop-flower		X				X
G. flavescens						X	X
G. cf. flavescens			X		X		
Gonocarpus sp.			X				
APIACEAE							
Actinotus leucocephalus	Flannel Flower		X				
Daucus glochidiatus	Australian Carrot	X		X	X	X	X
Eryngium vesiculosum	Prickfoot	X	X				
Platysace cirrosa/eatoniae				X			
Homalosciadium homalocarpum		X	X	X	X		
Trachymene cyanopetala				X			X
T. ornata		X		X			
T. pilosa	Native Parsnip	X	X	X			
Xanthosia candida					X		
X. huegelii		X					

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
EPACRIDACEAE							
Andersonia sprengelioides			X				
Astroloma compactum		X	X				
A. epacridis		X	X	X	X		
A. pallidum		X	X	X	X		
A. prostratum		X					
A. serratifolium (var. placidum)			X		X	X	X
Conostephium preissii							X
Leucopogon australis	Spiked Beard Heath				X		
L. capitellatus		X	X				
L. gracillimus				X			
L. nutans			X	X	X		
L. propinquus		X	X	X	X		
Lysinema ciliatum	Curry Flower	X					X
Styphelia tenuiflora	Common Pin Heath	X	X				
LOGANIACEAE							
Logania flava			X				
Mitrasacme paradoxa			X	X	X		
CHLOANTHACEAE							
Lachnostachys albicans		X					
Physopsis spicata	Hill River Lambstail	X					
LAMIACEAE							
Hemiandra pungens	Snake Bush	X	X				
H. cf. pungens							X
Hemigenia canescens						X	X
H. curvifolia			X				

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
H. drummondii			X				
H. incana	Velvety Hemigenia						
SOLANACEAE							
Solanum hys rix *							X
S. lasiophyllum	Flannel Bush						X
S. nigrum *							X
SCROPHULARIACEAE							
Parentucellia latifolia *	Common Bartsia	X	X		X		
LENTIBULARIACEAE							
Polypompholyx multifida	Pink Petticoats	X	X				
P. tenella			X				
RUBIACEAE							
Opercularia vaginata						X	X
CAMPANULACEAE							
Wahlenbergia gracilenta		X					
W. capensis *		X					
LOBELIACEAE							
Isotoma hypocrateriformis	Woodbridge Poison	X	X	X	X		
Lobelia gibbosa							
L. tunuior	Slender Lobelia	X					

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
GOODENIACEAE							
Dampiera alata	Winged-Stem Dampiera	X	X				
D. eriocephala			X				
D. juncea						X	X
D. oligophylla	Sparse-leaved Dampiera		X				
D. preissii			X				
D. spicigera							X
D. trigona	Angle-Stem Dampiera		X				
Goodenia affinis							X
G. fasciculata	Cluster-leaf Goodenia		X				
G. filiformis				X			
Leschenaultia biloba	Blue Lechenaultia	X	X	X	X		
Scaevola parviflora	Small-flowered Scaevola		X				
Verreauxia sp.							X
STYLIDIACEAE							
Levenhookia pusilla	Midget Stylewort		X				
Stylidium breviscapum	Boomerang Triggerplant		X				
S. brunonianum	Pink Fountain Triggerplant	X	X		X		
S. bulbiferum		X		X			
S. calcaratum	Book Triggerplant	X	X	X	X		
S. caricifolium	Milkmaid Triggerplant	X	X		X		X
S. ciliatum	Golden Triggerplant		X				X
S. dichotomum	Pins and Needles		X				
S. emarginatum	Biddy-four-legs		X				
S. leptophyllum	Needle Leaved Triggerplant		X				
S. obtusatum	Pinafore Triggerplant		X				
S. petiolare	Horn Triggerplant		X				
S. piliferum	Common Butterfly Triggerplant	X	X		X		X
S. pycnosrachyum			X				
S. repens		X					X

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
ASTERACEAE							
Angianthus tenellus	Delicate Angianthus			X			
Brachycome iberidifolia	Swan River Daisy	X	X	X			
Centaurea melitensis *		X					
Ceratogyne obionoides							X
Cotula coronopilofia	Water Buttons	X			X		X
Dittrichia graveolens *	Stinkweed	X		X	X		X
Helichrysum bracteatum	Golden Everlastings		X				
Helipterum cotula			X		X		
H. maglesii				X			
Hypochaeris radicata *	Flatweed	X	X		X	X	
Lagenifera huegelii		X	X		X	X	X
Olearia adenolasia				X			
O. paucidentata			X				
O. revoluta						X	X
O. rudis	Purple Daisy Bush	X			X	X	
Osteospermum clandestinum							X
Pithocarpa achilleoides		X					
P. pulchella				X			
Podolepis canescens	Bright Podolepis		X				
P. capillaris						X	X
P. lessonii				X			
Podotheca angustifolia					X		
Psedudognaphalium luteo-album		X			X		
Quinetia urvillei		X	X	X			
Siloxerus humifusus							X
Trichocline spathulata	Native Gerbera			X		X	
Ursinia anthemoides *	Ursinia	X	X	X	X	X	X
Waitzia citrina			X				

APPENDIX 3. FAUNA (EXCLUDING BIRDS) RECORDED ON NATURE RESERVES IN THE SHIRES OF YORK AND NORTHAM

(Source: Sue Moore and Andrew Williams, W.A. Wildlife Research Centre, 1985 and W. A. Naturalists' Club, 1985)

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
MAMMALS							
MONOTREMES							
Tachyglossus aculeatus	Echidna	X	X	X	X	X	X
MARSUPIALS							
Cercartetus concinnus	Western Pigmy-Possum		X	X	X		
Sminthopsis dolichura	Dunnart		X	X			
Macropus fuliginosus	Western Grey Kangaroo	X	X	X	X		
Macropus irma	Western Brush Wallaby	X	X	X	X		
PLACENTAL MAMMALS							
VERSPERTILIONIDAE (BATS)							
Tadarida australis	White-striped Mastiff-bat		X		X		
MURDIDAE (MICE)							
Mus Musculus	House Mouse		X	X	X		

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
INTRODUCED MAMMALS							
Oryctolagus cuniculus	Rabbit	X	X	X	X	X	X
Vulpes vulpes	Fox			X	X		
Felis catus	Cat		X				
AMPHIBIANS							
FROGS							
LEPTODACTYLIDAE (SOUTHERN FROGS)							
Heleioporus albopunactatus	Spotted Burrowing Frog	X	X		X		
Heleioporus barycragus					X		
Heleioporus sp.			X				
Limnodynastes dorsalis	Western Banjo Frog or Pobblebonk	X	X		X		
Pseudophryne guentheri	Guenther's Toadlet	X	X	X	X		
Neobatrachus pelobatoides	Humming Frog	X					
Ranidella sp.		X			X		

REPTILES		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
LIZARDS							
GEKKONIDAE (GECKOS)							
Crenadactylus ocellatus	Clawless Gecko	X	X	X	X		X
Diplodactylus granariensis	Wood Gecko	X	X	X	X		
Diplodactylus pulcher			X	X			
Gehyra variegata		X	X	X	X		X
Oedura reticulata	Reticulated Velvet Gecko		X	X			
Phyllodactylus marmoratus	Marbled Gecko		X				
Phyllurus millii	Barking Gecko	X	X	X	X		
PYGOPODIDAE (LEGLESS LIZARDS)							
Aprasia pulchella				X			
A. repens		X					
Delma fraseri		X	X	X	X		
Lialis burtonis	Burton's Snake Lizard	X	X	X	X		
Pygopus lepidopodus	Common Scaly-Foot		X				

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
AGAMIDAE (DRAGON LIZARDS)							
Ctenophorus ornatus	Ornate Dragon		X		X		
Pogona minor	Western Bearded Dragon	X	X	X	X		
VARANIDAE (GOANNAS/MONITORS)							
Varanus gouldii	Bungarra	X	X				
Varanus tristis	Racehorse Goanna	X	X		X		
SCINIDA (SKINKS)							
Cryptoblepharus plagiocephalus	Wood Skink	X	X	X	X		
Ctenotus pantherinus				X			
Egernia multiscutata		X	X	X			
Eremiascincus richardsonii				X	X		
Lerista distinguenda		X	X	X	X		
Menetia greyii		X	X	X	X		X
Morethia obscura			X	X			
Tiliqua r gosa	Bobtail	X	X	X	X	X	
SNAKES							
TYPHLOPIDAE (BLIND SNAKES)							
Ramphotyphlops australis		X		X			
Ramphotyphlops pinguis				X			

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
BOIDAE (PYTHONS)							
Python spilotus	Carpet Python	X					
ELAPIDAE (ELAPID SNAKES)							
Pseudechis australis	Mulga or King Brown Snake			X			
Rhinoplocephalus gouldii	Gould's Snake	X					
Vermicella bertholdi	Bandy Bandy	X		X	X		
Vermicella semifasciata	Half-girdled Snake	X	X	X	X		

APPENDIX 4: BIRDS RECORDED ON NATURE RESERVES IN THE SHIRES OF YORK AND NORTHAM

(Source: Andrew Williams, W.A. Wildlife Research Centre, 1985, Jim Masters, Toodyay Naturalists' Club, 1985 and W.A. Naturalists' Club 1985)

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
NON-PASSERINES							
DROMAIIDAE (EMUS)							
Dromaius novaehollandiae	Emu	X	X				
Ardea novaehollandiae	White-faced Heron						X
ANATIDAE (DUCKS)							
Tadorna todornoides	Australian Shelduck (Mountain Duck)				X		X
ACCIPITRIDAE (LARGE RAPTORS)							
Lophoictinia isura	Square-tailed Kite		X				
Accipiter fasciatus	Brown Goshawk (Australian Goshawk)	X		X	X		X
Accipiter cirrhocephalus	Collared Sparrowhawk		X				
Aquila audax	Wedge-tailed Eagle	X			X		X
Hieraaetus morphnoides	Little Eagle	X	X	X		X	X

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
FALCONIDAE (FALCONS)							
Falco longipennis	Australian Hobby (Little Falcon)				X		X
Falco berigora	Brown Falcon	X	X	X	X		X
Falco cenchroides	Australian Kestrel	X				X	X
PHASIANIDAE (QUAILS)							
Coturnix novaezelandiae	Stubble Quail	X		X			
TURNICIDAE (BUTTON-QUAILS)							
Turnix varia	Painted Button-Quail		X	X			
COLUMBIDAE (PIGEONS)							
Streptopelia senegalensis	Laughing Turtle Dove						X
Phaps chalcoptera	Common Bronzewing	X	X	X	X		X
Ocyphaps lophotes	Crested Pigeon			X		X	X
CACATUIDAE (COCKATOOS)							
Calyptorhynchus baudinii	White-tailed Black-Cockatoo	X	X	X	X		
Cacatua roseicapilla	Galah	X		X	X	X*	X
LORIIDAE (LORIKEETS)							
Glossopsitta porphyrocephala	Purple-crowned Lorikeet		X	X			

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
POLYTELITIDAE (PARROTS)							
Polytelis anthopeplus	Regent Parrot (Smoker Parrot)						X
PLATYCERCIDAE (PARROTS)							
Melopsittacus undulatus	Budgerigar						X
Purpureicephalus spurius	Red-capped Parrot	X	X				
Barnardius zonarius	Port Lincoln Ringneck	X	X	X	X	X	X*
Psephotus varius	Mulga Parrot						X
Neophema elegans	Elegant Parrot		X	X	X		X
CUCULIDAE (CUCKOOS)							
Cuculus pallidus	Pallid Cuckoo	X	X				X
Cuculus pyrrhophanus	Fan-tailed Cuckoo	X					
Chrysococcyx basalis	Horsfield's Bronze Cuckoo		X				X
Chrysococcyx lucidus	Shining Bronze-Cuckoo		X				X
STRIGIDAE (OWLS)							
Ninox novaeseelandiae	Southern Boobook (Boobook Owl)	X	X	X	X		
PODARGIDAE (FROGMOUTHS)							
Podargus strigoides	Tawny Frogmouth	X	X				
AEGOTHELIDAE (OWLET-NIGHTJARS)							
Aegotheles cristatus	Australian Owlet-nightjar		X		X		

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
ALCEDINIDAE (KINGFISHERS)							
Dacelo novaeguineae	Laughing Kookaburra	X	X	X	X	X	X
Halcyon pyrrhopygia	Red-backed Kingfisher						X*
Halcyon sancta	Sacred Kingfisher			X	X	X*	X
MEROPIDAE (BEE EATERS)							
Merops ornatus	Rainbow Bee-eater (Australian Bee-eater)	X	X	X	X	X	
PASSERINES							
HIRUNDINIDAE (SWALLOWS)							
Cheramoeca leucosternum	White-backed Swallow	X					X*
Hirundo neoxena	Welcome Swallow						X
Cecropis nigricans	Tree Martin	X	X	X	X	X*	X*
MOTACILLIDAE (PIPITS)							
Anthus novaeseelandiae	Richard's Pipit	X	X				X
CAMPEPHAGIDAE (CUCKOO-SHRIKES)							
Coracina novaehollandiae	Black-faced Cuckoo-shrike	X	X	X	X		X
Lalage sueurii	White-winged Triller	X	X	X	X		X*

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
MUSCICAPIDAE (ROBINS/WHISTLERS/ MONARCHS/FANTAILS)							
Petroica multicolor	Scarlet Robin	X	X	X	X		
Petroica goodenovii	Red-capped Robin	X	X	X	X	X*	X*
Eopsaltria griseogularis	Western Yellow Robin	X	X	X	X		
Microeca leucophaea	Jacky Winter (Brown Flycatcher)						X
Pachycephala pectoralis	Golden Whistler	X	X				
Pachycephala rufiventris	Rufous Whistler	X	X	X	X		X
Colluricincla harmonica	Grey Shrike-thrush	X	X	X	X		X
Oreoica gutturalis	Crested Bellbird						X
Myiagra inquieta	Restless Flycatcher				X		
Rhipidura fuliginosa	Grey Fantail	X	X	X	X		X
Rhipidura leucophrys	Willie Wagtail		X	X	X	X	X
TIMALIIDAE (BABBLERS)							
Pomatostomus superciliosus	White-browed Babbler		X				X*
SYLVIIDAE (OLD WORLD WARBLERS)							
Cinclorhamphus mathewsi	Rufous Songlark		X				X*

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
MALURIDAE (WRENS)							
Malurus splendens	Splendid Fairy-wren	X	X	X	X		
Malurus leucopterus	White-winged Fairy-wren						X
ACANTHIZIDAE (AUSTRALIAN WARBLERS)							
Smicrornis brevirostris	Weebill	X	X	X	X	X	X*
Gerygone fusca	Western Gerygone (Western Warbler)	X	X	X	X	X	X
Acanthiza apicalis	Inland Thornbill (Broad-tailed Thornbill)	X	X	X	X		
Acanthiza uropygialis	Chestnut-rumped Thornbill					X	X
Acanthiza inornata	Western Thornbill	X	X	X	X		
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	X	X	X	X		X
NEOSITTIDAE (SITTELLAS)							
Daphoenositta chrysoptera	Varied Sittella			X	X	X	X
CLIMACTERIDAE (TREECREEPERS)							
Climacteris rufa	Rufous Treecreeper	X	X	X	X		
MELIPHAGID (HONEYEATERS)							
Anthochaera carunculata	Red Wattlebird	X	X	X			X
Anthochaera chrysoptera	Little Wattlebird	X	X	X			
Acanthagenys rufogularis	Spiny-cheeked Honeyeater						X
Manorina flavigula	Yellow-throated Miner						X

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
Lichenostomus virescens	Singing Honeyeater		X		X	X	
Lichenostomu ornatus	Yellow-plumed Honeyeater			X	X		
Melithreptus brevirostris	Brown-headed Honeyeater		X	X	X		X
Melithreptus lunatus	White-naped Honeyeater	X	X	X			
Lichmera indistincta	Brown Honeyeater	X	X	X	X		X*
Phylidonyris novaehollandiae	New Holland Honeyeater	X	X	X	X		
Phylidonyris nigra	White-cheeked Honeyeater	X	X				
Phylidonyris melanops	Tawny-crowned Honeyeater	X	X				
Acanthorhynchus superciliosus	Western Spinebill	X	X	X	X		
EPHTHIANURIDAE (CHATS)							
Ephthianura albifrons	White-fronted Chat						X
DICAEIDAE (MISTLETOEBIRD)							
Dicaeum hirundinaceum	Mistletoebird			X			
PARDALOTIDAE (PARDALOTES)							
Pardalotus punctatus	Spotted Pardalote				X		
Pardalotus striatus	Striated Pardalote	X	X	X	X	X	X*

		CLACKLINE	ST. RONANS	WAMBYN	MOKINE	THROSSELL	MEENAAR
ZOSTEROPIDAE (WHITE-EYES)							
Zosterops lateralis	Silvereye	X	X	X	X	X	
PLOCEIDAE (FINCHES)							
Poephila gu tata	Zebra Finch						X
GRALLINIDAE (MAGPIE-LARKS)							
Grallina cy noleuca	Australian Magpie-lark			X		X	X
ARTAMIDAE (WOODSWALLOWS)							
Artamus cinereus	Black-faced Woodswallow						X
Artamus cyanopterus	Dusky Woodswallow	X		X	X		
CRACTICIDAE (BUTCHERBIRDS/ MAGPIES)							
Cracticus torquatus	Grey Butcherbird						X
Cracticus nigrogularis	Pied Butcherbird						X
Gymnorhin tibicen	Australian Magpie	X	X	X	X	X	X
Strepera versicolor	Grey Currawong	X					
CORVIDAE (CROWS/RAVENS)							
Corvus coronoides	Australian Raven	X	X	X	X	X	X*

* breedin