

Dookie Bushland Reserve



White Box (*Eucalyptus albens*) Grassy Woodland

Draft Management Plan

Steve Hamilton
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Foreword

In the Goulburn-Broken catchment, an area of 2.4 Mha, Ecological Vegetation Classes (EVC's) known as Box-Ironbark Forests and Woodlands and Plains Grassy Woodlands once dominated the northern slopes of the Great Dividing Range and the Riverine Plains, with 290,000 ha and 850,000 ha area respectively (Goulburn Broken Catchment Management Authority (GBCMA) 1999). Early settlers cleared and extensively grazed these areas, and ultimately, the extent of these woodlands and forests has become greatly reduced, and remnants have become highly fragmented and isolated over time. Only some 20 % of Box-Ironbark Grassy Woodlands and 2 % of Plains Grassy Woodlands now remain (GBCMA 1999).

Many of the remaining areas of grassy woodlands are small, and have been grossly disturbed by direct or indirect influences. Localised and regional depletion or extinction of significant numbers of species of flora and fauna has occurred because of this loss of habitat and modification. Because these EVC's have been viewed by policy makers and the general public as neither very scenic nor interesting, those remaining areas of significance have generally not been reserved or managed as conservation zones. Indeed, these EVC's are very poorly represented in the reserve system, with only 0.8 % of the original Box-Ironbark Forests and Woodlands and 0.15 % of Plains Grassy Woodlands reserved (GBCMA 1999). It is hoped that the current Special Investigation into the Box-Ironbark Forests and Woodlands by the Environment Conservation Council (ECC) will improve the reservation status of the former EVC. Options such as Protected Area Networks, which incorporate the biodiversity on public and private land, need to be pursued to ensure adequate conservation of these EVC's. Indeed, it has been shown that many of the best remnants of Box-Ironbark, in particular, are on private land (Hamilton *et al.* 1997).

The Dookie Bushland Reserve is an area of national significance for both its community associations (150 ha of Low Rises Grassy Woodland and 120 ha of White Box Grassy Woodland), the threatened species that it contains, and its size. It is considered to be the single largest and most diverse area of White Box Grassy Woodland remaining in Victoria (Peake pers. comm. 1999). It is unique in that it is a large intact remnant (270 ha) contained within a working agricultural property (the Dookie College property of 2,500 ha). It is because the historical and current emphasis of farm management of the College was, and still largely is, predominantly for educational purposes that we still

have the Reserve as an intact entity today. We are indeed very fortunate to have the opportunity to maintain and enhance such a significant site.

The original management plan, produced in late 1993, provided an initial framework for the management of the area, as well as greatly assisting the public and industry profile of the site. This has certainly assisted in funding for the completion of works, most notably the feral animal fence. In an overall sense on a Dookie College scale, much has changed in this time. Indeed, the Reserve area is no longer Crown Land Reserved for the purposes of an agricultural college: the whole campus is the property of The University of Melbourne Limited (private land). This presents not only some potential threats, but some potential major benefits, and thus the time for a revision of the priorities of the Plan is ideal.

The original Management Plan is now dated and requires revision, as many of the original objectives have been met, were not realistic in being achieved and have not been completed, and/or priorities for management have changed. Nevertheless, there have been some significant achievements in the time since the original Management Plan was written, which are further expanded on in this Plan. Some of these are:

- completion and maintenance of the feral animal fence;
- instigation and continuation of the employment of part-time Rangers for interpretation and general maintenance;
- on-going pest animal and plant management and a perceptible improvement in the structure and habitat quality of the Reserve;
- listing of the Reserve on the Register of the National Estate;
- continual improvement in the incorporation of the Reserve within the academic programs of the College and acceptance of the Reserve as a defined entity by the general community.

I gratefully acknowledge the advice of others who have provided me with information on particular sections or have assisted with general comment and editing.

Steve Hamilton
30.8.99

Executive Summary

The Dookie Bushland Reserve is an area of 270 hectares of Grey and White Box grassy woodland located on the Dookie College campus of the University of Melbourne. It has had a varied land use history, with little or no agricultural impact until the mid-1960's, when some boundary areas were fenced-off and utilised for grazing. Some areas were utilised for timber harvesting, and small areas for gravel extraction between 1950 and 1992. However, a central area remained with little or no impact. The peripheral areas were re-combined with the intact central area in 1992 to form the Dookie Bushland Reserve. A Management Plan was written in 1993 (Hamilton 1993), which has formed the basis of management until the adoption of this Plan.

The original Management Plan set some generalised management directions, which led to significant progress being made since the earlier days of declaration in terms of conservation objectives. Some of the key events have been the completion and maintenance of the feral animal fence, the employment of part-time Rangers, on-going and significant pest animal and plant management, a dramatic improvement in the structure and habitat quality due largely to natural regeneration and grazing pressure reduction, and the on-going incorporation of the Reserve into the academic programs of the College.

The DBR today is a large high quality remnant of some of the original vegetation of the northern plains of Victoria, particularly the threatened Ecological Vegetation Class of Low Rises Grassy Woodland and Box-Ironbark Woodland. It is highly valued for the intactness of these community associations, and the diversity and uniqueness of its flora and fauna, including many threatened species, and as a consequence, is listed on the Register of the National Estate.

However, 1999 sees the original Plan as a dated document, and the objectives, actions and priorities needed urgent revision to allow Reserve management to move forward. Some of the major priorities and actions set out in this Plan are:

- the establishment of a Liaison Committee composed of industry, community and University representatives to oversee the implementation of this Plan;
- the Liaison Committee to develop strategic relationships with community and government organisations for research and monitoring, such as the development of Best Management Practices for grassy woodlands, and the facilitation of the declaration of a conservation covenant;
- the further encouragement of natural regeneration of the indigenous flora within many areas of the Reserve by weed and grazing management, and to augment this with direct seeding and other revegetation methods using local provenance;
- the continued management of Eastern Grey Kangaroos to their designated carrying capacity, and the exclusion of stock grazing in Paddock 42 and adjacent areas of Paddock 30 and 31;
- the development of weed distribution maps utilising a grid locational system to further specifically target weed management works;
- the continued routine maintenance of the feral animal fence and on-going feral animal control programs;

- the continued employment of part-time Rangers, and the further development of visitor information and facilities, such as the Nature trail and associated pamphlet, and internal signage;
- further incorporation of the Reserve into the College and the University's educational programs, and to promote non-destructive ecological and other co-operative research by staff, undergraduate and post-graduate students.

1. Introduction

The Dookie Bushland Reserve (DBR) is an area of approximately 270 hectares of Grey and White Box (*E. microcarpa* and *E. albens*, respectively) grassy woodland located centrally on the Dookie College campus of the Institute of Land and Food Resources (ILFR), a faculty of the University of Melbourne. It is composed of several paddocks of the College property which had a varied land use history from the mid 1960's until 1992 (Fig. 1), when the area was largely excluded from agricultural activity, and the area defined as the DBR. Most of these paddocks had been used for grazing and/or limited cropping, while the paddock called the Timber Reserve had been generally excluded from any agricultural activity.

The DBR today is a large high quality remnant of some of the original vegetation of the northern plains of Victoria, particularly the threatened EVC's of Low Rises Grassy Woodland and Box-Ironbark Woodlands. For this reason, it is highly valued for the intactness of these community associations, and the diversity and uniqueness of its flora and fauna. The listing of the DBR on the Register of the National Estate is indicative of its conservation value.

1.1 Background

Up until July 1992, the College property, including the DBR, was administered by the Victorian College of Agriculture and Horticulture (VCAH). In July 1992, the VCAH was amalgamated with the University of Melbourne (UoM) to form the ILFR, and the property is under the control of the UoM Council. The College land was classified as reserved Crown Land (for the purposes of an agricultural college; Land Conservation Council (LCC) 1983) until early in 1999, and was the responsibility of the now Department of Natural Resources and Environment (DNRE). The College property was recently transferred to the UoM Limited (i.e. private land), however, the legislation included several caveats on this change in land tenure, which largely retain the on-going management of the College area for the purposes of agricultural and related education.

Up until the declaration of the DBR, the DNRE influence was predominantly of an advisory capacity, and the management of the DBR area was the responsibility of the Dookie College administration. As a consequence, the management up until the 1970's more often reflected resource utilisation and agricultural practice than biodiversity management. This is best demonstrated by the DBR not being recommended for gazettal as a Conservation Reserve by the LCC (LCC 1983; Department of Conservation and Environment (DCE) 1992).

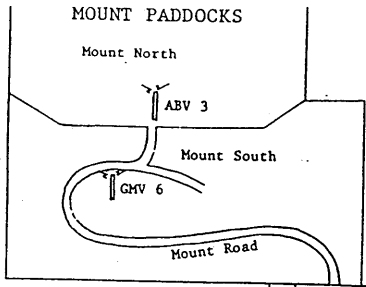
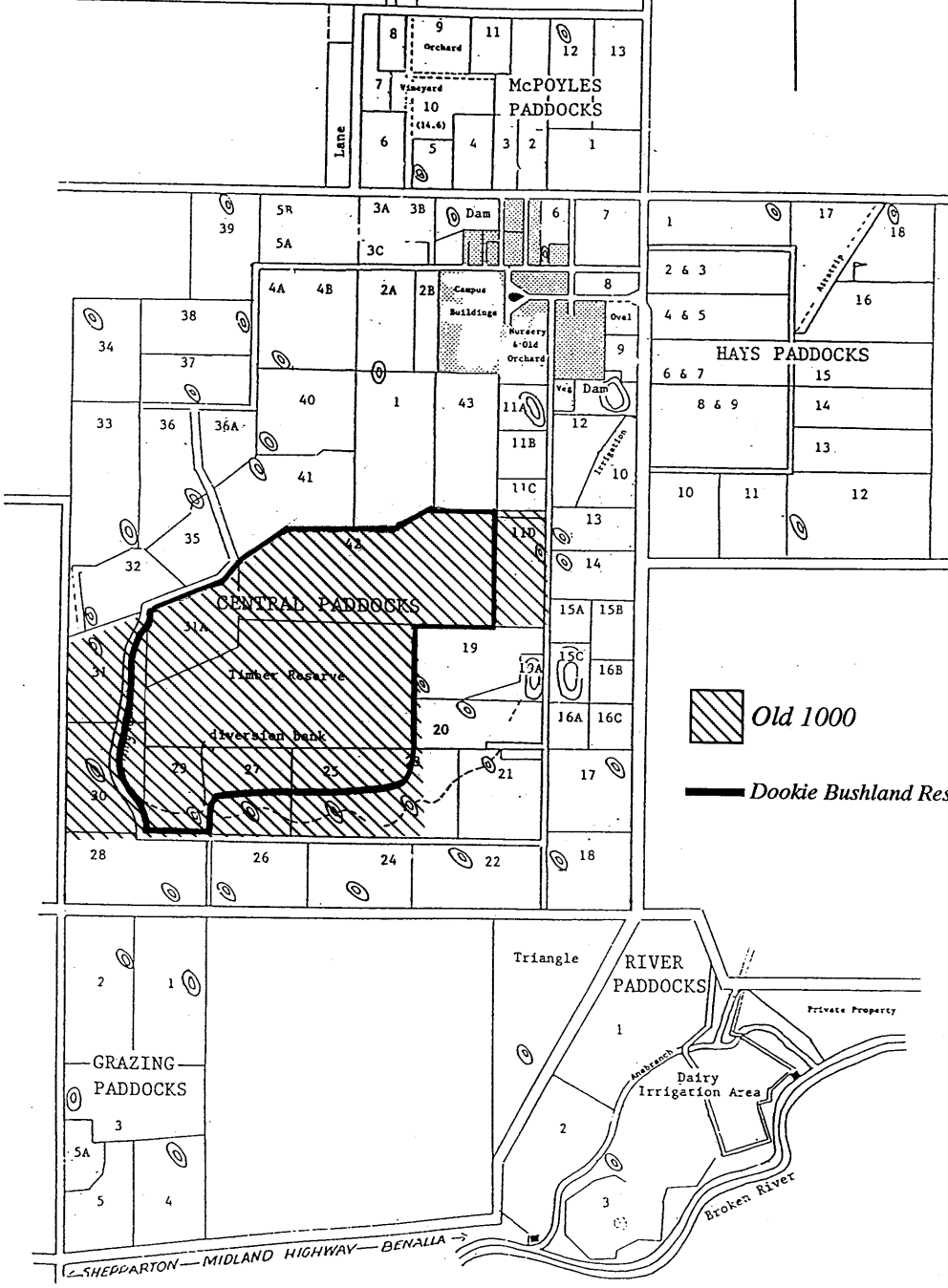


Figure 1. The VCAH Dookie Campus, showing paddock layout.

Total Area 2247 ha



Old 1000

Dookie Bushland Reserve

The management of the DBR since 1992 has been based on conservation objectives, although some compromises with farm management have been required. The management from 1992 has mostly followed the directions and objectives set by the original DBR Management Plan (Hamilton 1993).

1.2 The Plan

The original Management Plan (Hamilton 1993) provided the first framework for the planned management of the DBR area, and was adopted by Campus management and the VCAH as the primary statement of the policy and management. This Plan represents a revision of the management objectives and priorities, and will similarly be adopted by Campus management, and presumably more broadly by the UoM, as the basis for policy and decision-making. The broad vision of the current and future management of the DBR is encapsulated in the management objectives of the area of the DBR, which are:

1. To preserve and protect a significant remnant of grassy woodland, and in particular, rare and restricted species;
2. To provide a range of passive and low impact recreational opportunities;
3. To protect and enhance scenic values;
4. To promote a better understanding of the environment through appropriate interpretation and environmental education and information;
5. To provide opportunities to observe wildlife in its natural habitat;
6. To promote appropriate scientific research;
7. To exterminate or control exotic plants and feral animals;
8. To encourage and actively engage in the re-establishment of indigenous flora and fauna;
9. To minimise the impact on the DBR of surrounding land uses, and the impact of the DBR on adjacent communities;
10. To protect the DBR, its visitors and adjacent landholders, from wildfire.

1.3 The Planning Period

It is envisaged that this Plan be implemented by August 1999 and provides the basis for a period of 5 years, and the Plan modified accordingly at the end of this time (first revision, August 2004).

2. Reserve Description

2.1 *Boundaries*

The DBR (Fig. 2) currently consists of all of the former Timber Reserve Paddock, Paddocks 42, 31A and 29, and sections of Paddocks 30, 31, 27, 25 and 23. It is surrounded by predominantly cleared agricultural land to the west and north (Paddocks 19, 20, 11D, 43, 1, 41, 35), and by areas still reasonably timbered, at least on the boundary of the DBR, to the west and south (Paddocks 30, 31, 32, 23, 25, 27, 29; Fig. 2).

2.2 *History*

There is relatively little known regarding the Aboriginal history of the area (LCC, 1983). The main tribe in the Dookie region appear to have been the Noorilim, who ranged from the Campaspe River to the Dookie Hills. With no permanent creek or river, it is unlikely that the DBR was a site of settlement, and was most likely an area for hunting and the gathering of items such as stones or rocks (Envall *et al.* 1988).

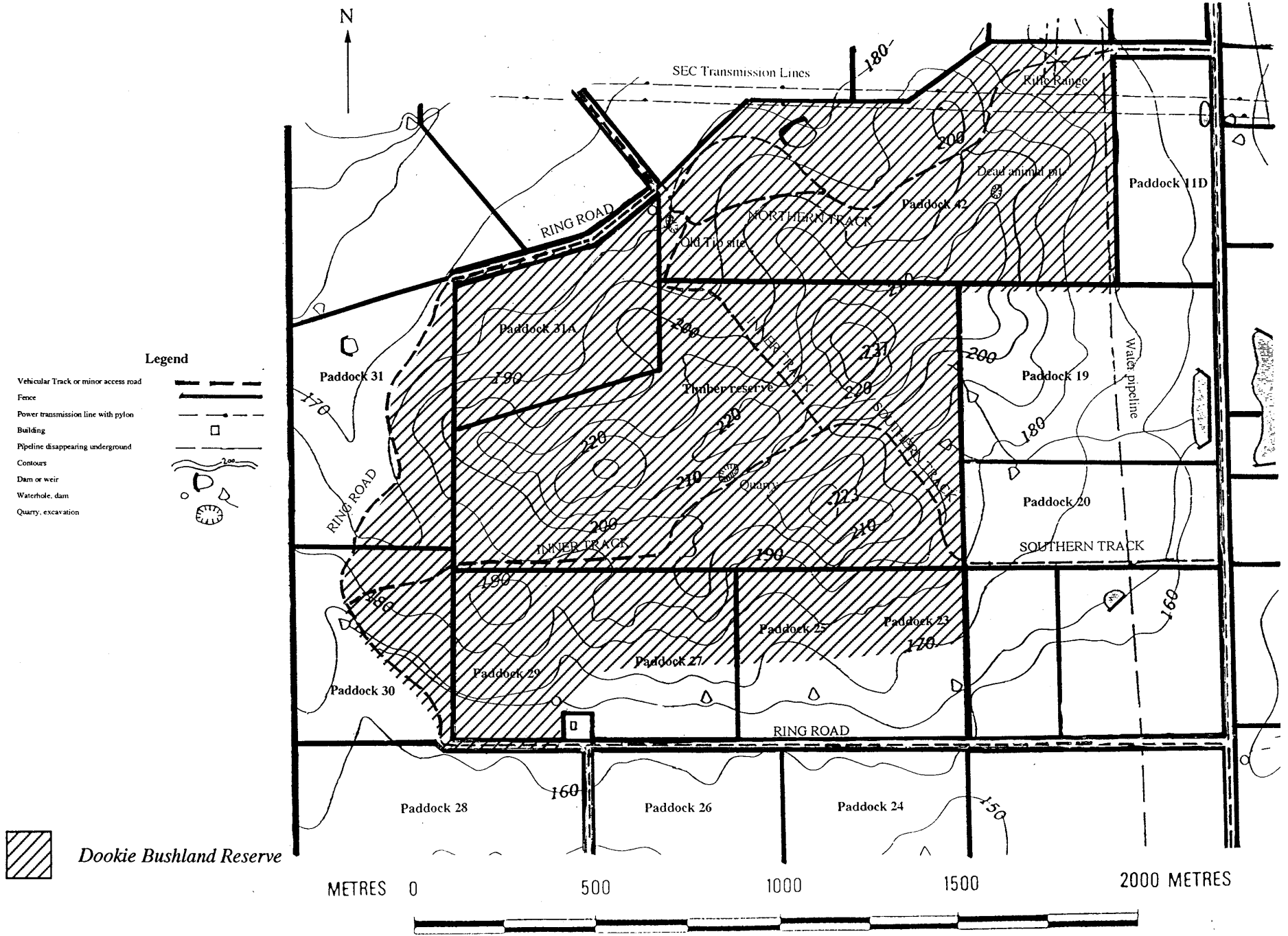
Major Sir Thomas Mitchell passed through the district (more specifically, Benalla) on his return to Sydney from Portland in 1836. His glowing endorsement of the region opened up the way for agricultural development (Aldridge 1986). In 1875, following a series of leaseholders, the then Secretary for Agriculture requested that the undeveloped area now called VCAH Dookie be reserved for the purposes of establishing an Experimental farm (Aldridge 1986).

Several members of the Teaching staff (notably G.T. Levick and W.J. Webb) have obviously had an interest in the DBR, with collections of plants for Herbarium purposes being made from the Timber Reserve in the 1920's, 30's and 40's. However, a perspective on the attitude towards the DBR area can best be judged by the classification of native species as "agricultural weeds" (Hamilton unpublished 1991).

Up until the 1960's, it appears as if the DBR area was not cleared, and was used for general grazing (known as the "Old 1000"; see Fig. 1), with minimal amendment or pasture improvement. The area of the old Timber Reserve encompassed the current paddocks Timber Reserve, 42, 31A, 31, 30, 29, 27, 25, 23 and 11D (Fig. 2). However, there are considerable differences in the land use history of these various areas according to documented Farm records.

The current area occupied by Paddock 42 was contour furrowed in 1941 and 1946, a road graded to the Tip site in 1947 (now referred to as the Old Tip site), and in 1965 an eastern boundary fence was erected to form the current Paddock 11D. The southern fence with the Timber Reserve was erected in 1967. Several top-dressings with superphosphate occurred in cleared areas from 1941 to 1972. The Dead Animal pit was excavated in 1974, and in 1980, trees were removed from the proposed site of an Transmission line, which was erected in 1982/83. Some other clearing of trees along fence lines has taken place, although when this occurred has not been recorded.

Figure 2. The Dookie Bushland Reserve and environs.



In 1966, Paddock 31A was fenced off from Paddock 42. Paddock 31A has never been top-dressed with superphosphate, and has been used for grazing or firewood collection only since that time.

In 1963, Paddocks 25 and 23, and in 1966, Paddocks 31A, 31, 30, 29, 27 (Fig. 1) were fenced off from the Timber Reserve. The southern area (cleared) of the current Paddocks 23 and 25 was cropped for wheat and oats in rotation from 1907 to 1916. Following this, the area was occasionally top-dressed with superphosphate and used for either pasture, or the occasional wheat or oats crop.

Paddock 25 was fenced off from Paddock 23 in 1962, and was part of Paddock 24 until 1966. Since that time, it has been top-dressed with superphosphate several times, and used for pasture, oats and wheat. Some clearing of trees must have taken place, although this is also not recorded.

The other paddocks (31, 30, 29 and 27) had a similar history. They had all been used for grazing since 1966, with the occasional top-dressing, cultivation and cropping for oats. Some clearing of trees must have taken place, particularly in the southern sections of Paddocks 29 and 27, although this too is not recorded. Paddock 29 was considered to be a diverse native grassland until heavy grazing during the 1982/83 drought altered the species composition (Newman pers. comm. 1992).

The "Timber Reserve" had obviously diminished in size from the days of the Old 1000 (346.8 hectares) in 1965, to its 1992 size of 96.3 hectares. The southern sections of the current Paddock were contoured furrowed in 1946, and some of these areas were mined for gravel in the 1950's and 1960's. In 1970, two dams were excavated. The internal road in this paddock was built in 1971 (Inner Track, Fig. 2), and was improved several times with the addition of gravel during the late 1970's derived from various quarry areas established within the DBR area in 1976. These areas have been periodically used to provide gravel for the Ring Road and other Farm tracks, however, no gravel extraction has occurred in the most recent area since September 1990 (Gribben pers. comm. 1991).

As a management decision, the Timber Reserve Paddock has not been deliberately grazed since 1990, however, the paddock has suffered from heavy grazing by escaped goats in 1989/90, and by a large indigenous Eastern Grey Kangaroo population (estimated > 700 animals) which reached large numbers during the period 1988 to 1992, and has since been reduced by permit culling to the estimated carrying capacity of 100 animals (a value derived from dry matter production data; Hamilton unpublished 1991). The population of the Kangaroos has been monitored bi-annually through student exercises in fauna survey (following the procedures of Morgan 1986), and a number of permit culls have been undertaken (in 1994 and 1997) to keep the populations at carrying capacity. It is likely that such a cull will be required in 1999 based on early estimates of individuals.

The area was heavily used as a source of timber in the 1950's and 60's, as evidenced by the employment of two full-time staff involved in timber collection, with the usual assistance of at least two students. This timber was used as the fuel for boilers on the

College, and was kept in a large wood yard north-west of the College buildings (Newman pers. comm. 1991).

Bee keeping was noted in Paddock 31 in 1974, and has been present in the DBR area for some time (until 1993) under the auspices of the College Bee Club and private apiculturists.

The Army has used the DBR area a number of times for military exercises, with the exercise held in 1990 with 500 men and heavy vehicles being the most extensive. Paddocks 31A, 42, 31 and 30 have been the areas most commonly used, although most areas in the DBR proper have been utilised at some time. This form of activity is unlikely to occur in the DBR area again.

Historically, the DBR area does not appear to have been strongly utilised as an educational resource or an area of conservation value. Since 1993, there has been increasing use of the DBR for educational purposes to moderate levels, largely associated with the Natural Resource Management (NRM) programs on the College. While not at a high level, there has also been some research activity in the DBR since 1994, and this is increasing steadily. Some recent student projects have assisted in improving the inventory of fauna, and the management of major weeds.

Agriculturally, the DBR was seen as a mostly marginal and unprofitable area, which was of some value as a source of timber and gravel, and was of use in extreme circumstances for grazing (i.e. in drought periods). Since the declaration of the DBR in 1992/93, there has been a series of changes in the management of the area commensurate with conservation management objectives. The management of the kangaroo populations, and the exclusion of stock grazing, except for the off-shears grazing of Paddock 42 by sheep for one month a year by Management Plan agreement are examples of this change.

The internal fence lines of Paddock 42 have been retained because of the continued grazing. The drought years of 1996/97 and 1997/98 did not see any grazing of this Paddock, as a conscious decision by Farm Management based on the level of natural regeneration that had occurred during this period. There would appear to be some likelihood that this area will not be formally grazed by stock again.

In 1991/92, the DBR area was no more than an established overstorey canopy with no regeneration, shrubs taller than 3 metres in height only, and some ground layer shrubs that were either prickly (e.g. Spreading Wattle, *Acacia genistifolia*, and Gorse Bitter-pea, *Daviesia ulicifolia*) or otherwise unpalatable to herbivores (e.g. Slender Rice-flower, *Pimelia linifolia* spp. *linifolia*). In essence, there was little plant material at ground level to 1.8 metres in height (kangaroo grazing height).

The declaration of the DBR in 1992/93 coincided with two summers of well-above average rainfall in 1992/93 and 1993/94, which, when combined with the removal of stock grazing and reduction in kangaroo levels to carrying capacity, resulted in a dramatic regeneration of vegetation. This event rapidly re-established a grass and herb layer at ground level, a shrub layer, and regenerating Eucalypts. This provided an excellent basis for the re-establishment of a grassy woodland structure that continues to

this day. A full account of the pre-declaration condition of the DBR and the subsequent events is provided in Hamilton (1995).

The feral animal fence that was undertaken over the period of 1993-1996, and finally completed in 1997 with erection of appropriate gates has finally afforded the opportunity to permanently exclude stock, and to some level, deter feral animals. Internal fences have been removed where no longer necessary during the period 1994-1996, such as the western fencelines on the Timber Reserve and Paddock 31A, and the southern and eastern fenceline of the Timber Reserve. The northern sections of Paddocks 23, 25, 27 and 29 have also been removed.

There has been increasing and more systematic management of the DBR on a number of major issues since 1993, such as pest animal management and weed management, especially Horehound, Thistles, St. John's Wort, Paterson's Curse and European Olive. While the effort has been largely undertaken under the auspices of various Higher Education and TAFE subjects, the effort has been yearly and consistent, and more-or-less co-ordinated. Weed management efforts in particular, are clearly being moderately successful in tackling the major weed issues, with the almost complete eradication of the major thistle weeds, and significant control of Horehound, Paterson's Curse and European Olive (all reduced to less than 50 % of their 1992 distribution). The establishment of a grid network in 1998 has seen the development of formal weed distribution mapping information, which will now be up-dated annually, and which will form the basis for a more planned approach to weed management.

In 1995, an application for the listing of the DBR on the Register of the National Estate was submitted, and this application has seen the DBR currently listed as an indicative site on the Register (Hamilton unpublished 1999).

Since 1995, the College Residential Manager has employed part-time Rangers, in all cases students within one of the NRM courses, on an annual contract basis. The major duties of these Rangers have been to provide tours and interpretation to visiting College groups, however, they have other routine duties, such as checking the feral animal fence, clearing tracks and acting as a link between Dookie staff who do not get to the DBR regularly and what is happening on-ground.

After requests to close the Dead Animal Pit within the DBR, Farm Management made the decision in late 1998 to relocate the Pit to another site on the College property, not within the DBR.

2.3 Climate

The climate of the DBR is typically Mediterranean, with an average annual rainfall of 556 mm and 99 rain days, mostly in the winter months. Approximately 330 mm of this rainfall falls in the period May to October, and there are on average 22 frosts annually, usually between April and September. Evaporation exceeds rainfall from September to April, and direct sunlight hours varies from 12 in the summer, to less than 7 in the winter. The maximum mean monthly temperature is 30.9 °C in February, and the minimum is 3.7 °C in July. Summer temperatures can exceed 41°C (Table 1). Winds usually predominate from the north-west or south-west (VCAH Dookie 1992).

2.4 Topography, Geology and Soils

The elevation of the DBR ranges from 165 to 237 metres above sea level, and contains the full range of aspects. Flat, ridge areas occur at elevations greater than 200 metres above sea level, and some areas of gentle slopes to flat topography occur at elevations of 165 to 180 metres (Fig. 2).

The DBR is composed of exposed Silurian-Devonian sedimentary rocks on the ridges and steeper slopes, with lower sloping areas of colluvial origin. These sedimentary rocks were formed following marine deposition in the late Silurian-early Devonian period (410 million years ago). These sediments were broadly folded during the middle Devonian (380 million years ago). The areas of colluvial deposition formed more recently in the Quaternary period (< 1.8 million years ago) following the erosion of the sedimentary material (LCC 1983). These areas of different origin tend to broadly correspond with current soil types.

The soils of the Dookie region were categorised by Geoff Downes in the 1940's using the nomenclature of the day, and three soils were identified within the DBR area (Downes 1949; Table 2). Soil survey has discovered only two distinct soil types in the DBR (Table 2; Fig. 3), and that the types categorised as Gowangardie and Caniambo Loam by Downes (Downes 1949) and know as these in common usage since, are classified by Isbell (1993) and Northcote (1983) as the same soil type.

The Tenosol (Table 2) tends to be naturally low in available nutrients, and has a low cation exchange capacity. This soil also tends to be very strongly acid ($\text{pH}_{\text{water}} < 5.0$), and is generally dispersive, however, it is not saline. The A horizons of these soils are shallow, and high proportions of rock and gravel are present in the upper horizons. Downes classified this soil as Skeletal, a term of the day which describes a rocky soil which has no potential for agriculture (Downes 1949). This adequately describes this soil.

Table 1. Climatic data for Dookie College to 1992* (from VCAH Dookie 1992).

Month	J	F	M	A	M	J	J	A	S	O	N	D	Year
Mean Daily Maximum Temperature (°C)	30.2	30.9	27.6	21.9	17.8	13.4	12.7	14.7	16.9	20.9	25.3	27.4	21.6
Mean Daily Minimum Temperature (°C)	14.7	15.4	13.4	9.9	7.9	4.9	3.7	5.1	6.3	8.6	11.0	12.8	9.5
Mean Monthly Rainfall (mm)	35	32	40	44	54	60	55	59	50	54	37	35	556
Mean Monthly Evaporation (mm)	211	179	137	79	45	28	30	51	68	110	152	179	1270
Mean no. rain days	5	4	5	7	9	11	13	13	10	9	7	6	99
Mean no. of frosts	-	-	-	1	3	4	8	4	2	-	-	-	22
Sunlight hours (approx.)	12.5	11.5	10	9	7.5	6.5	5.5	7	8.5	9.5	10.5	12	

*Temperature values based on data collected from 1976. Rainfall and rain days values based on data collected since 1880. Frost and evaporation values based on data collected from 1987. Sunlight hours values based on data collected from 1987 to 1989.

Table 2. Soil types identified in the DBR, and their classifications (Hamilton unpublished 1993; Sadler unpublished 1993).

Northcote description (Northcote, 1983)	Northcote Classification (Northcote, 1983)	Isbell (1993)	Downes (1949)
Shallow, stony uniform textured brown soil	Um 5.1	Leptic, Lithic Brown Tenosol	Skeletal soil
Brown duplex soil	Db 3.2	Dystrophic Haplic Brown Chromosol	Gowangardie loam
Brown duplex soil	Db 3.2	Dystrophic Haplic Brown Chromosol	Caniambo loam

The Chromosol (Table 2) is also inherently low in available nutrients. Although not as acidic as the Tenosol, ($\text{pH}_{\text{water}} > 5.0$), it is generally found to be moderately to strongly acid. This soil is generally neither saline or dispersive, unless heavily cultivated for prolonged periods. Unlike the Tenosol, lower proportions of rock and gravel occur in the A horizon, and this horizon also tends to be deeper (Hamilton unpublished 1992).

These soils exhibit considerable differences in terms of potential land use and erosion risk. Indeed, the shallow, stony uniform textured brown soils of ridge areas are considered to be of limited use because of their extreme drought-prone nature, and were restricted to annual pasture usage. As there is relatively limited A horizon present in these soils, the erosion risk is low provided considerable vegetative remains. On the other hand, the brown duplex soils can be used for cropping, and sheet erosion is the most common form of land degradation (LCC 1983).

2.5 Vegetation

More than 90 % of the remaining remnants of grassland and grassy woodland in Victoria have been disturbed through a variety of interventions, including annual weed invasion (Department of Conservation and Environment (DCE) 1992). Presently, only small remnants of the original vegetation, such as the DBR, now remain (Frood 1983; LCC 1983). For this reason, historical and current information on vegetation communities of the greater area, and the DBR in particular, are hard to find. The current vegetation associations can only be pieced together from available evidence, and thus current associations observed in remnants may not reflect past associations.

The border or perimeter areas of the DBR have been considerably disturbed by the invasion of agricultural weeds, while the inner areas tend to have retained the grassy understorey characteristic of "climax-like" grassy woodland.

The vegetation of the DBR is classified as Box-Ironbark Woodland and Low Rises Grassy Woodland (EVC's, Berwick personal communication 1999; Muir *et al.* 1996) and the broad distribution of these vegetation types tends to follow soil type and topography (Fig. 4; *E. albens* grassy woodland vegetation on the higher points, surrounded by *E. microcarpa* grassy woodland on the slopes).

There have been 165 species of indigenous plants identified as occurring in the DBR, and 81 species of introduced plants (Appendix I). Most of the introduced species occur in a relatively low abundance. It must be noted that following years of significant regeneration in 1992/93, there have been regular updating of the species inventory when any survey effort has been made. This reached a peak in 1995, when 26 new species were recorded.

The White Box woodland occupies areas of shallow, stony uniform textured brown soils. White Box is the dominant overstorey species. Other overstorey species, such as Yellow Box (*E. melliodora*), Lightwood (*Acacia implexa*), Cherry Ballart (*Exocarpus cupressiformis*), Drooping She-oak (*Allocasaurina verticillata*) appear to have been widespread in this soil type, although their distribution throughout the DBR is now clumped, for reasons of probable grazing and clearing pressures. Common understorey species currently include Chinese Scrub (*Cassinia arctuata*), Gorse Bitter-pea (*Daviesia ulicifolia*) and Slender Rice-flower (*Pimelia linifolia* spp. *linifolia*).

The Grey Box woodland occupies areas of Brown duplex soils. Grey Box is the dominant overstorey species. Species such as Drooping She-oak were likely to have been common, while other species such as White Box and Yellow Box may have occurred irregularly.

Anecdotal evidence suggests that selective clearing from white settlement probably removed the majority of Drooping She-oak (< 50 individuals remaining) for fuel- and firewood, and Lightwood for its high quality timber (Boland *et al.* 1984), and accounted for their now locally restricted occurrence. Indeed, Drooping She-oak was once very common on the higher elevations and western slopes of the DBR (Newman pers. comm. 1992).

The DBR contains a significant array of weeds, however the ones that cause the greatest management concern are Horehound (*Marrubium vulgare*), Spear Thistle (*Cirsium vulgare*), Paterson's Curse (*Echium plantagineum*) and European Olive (*Olea europaeae*), the abundance of the latter being an artefact of the extensive Olive groves maintained at the College until the 1970's.

Several invasive native species occur within the DBR area. White Cypress Pine (*Callitris glaucophylla*) occurs in low numbers in the DBR (< 6 individuals), and anecdotal evidence suggest that this species was not present in the early 1940's (Marshall pers. comm. 1992). White Cypress Pine is considered depleted in Victoria by Gullan *et al.* (1990). Natural stands of White Cypress Pine occur within 5 kilometres, and thus the spread of this species may have occurred at times of considerable disturbance.

The Kurrajong (*Brachychiton populneus*) is a species of predominantly northern NSW distribution, and in this region (Warby Ranges), is at its southern-most occurrence (Costermans 1994). There are a small number of individuals within the DBR (< 5 individuals remaining). None of these individuals are mature, and no evidence of mature specimens can be found. Certainly, this species was not known in the DBR in the 1940's (Marshall, pers. comm. 1992). It is planted extensively on adjacent

properties, and many of these specimens are more than 50 years old. Invasion by bird distribution is likely.

There are several rare, restricted or vulnerable species within the precincts of the DBR.

There are 9 endangered, rare, depleted or vulnerable species (Gullan *et al.* 1990) within the precincts of the DBR (Appendix I), including the Dookie Daisy (*Brachyscome gracilis*), Slender Tick-trefoil (*Desmodium varians*), Mallee Pellitory (*Parietaria cardiostegia*), Australia Piert (*Aphanes australiana*), Red Bird's-foot Trefoil (*Lotus cruentus*), and Small Scurf-pea (*Cullen parvum*).

Western Silver Wattle (*Acacia decora*) is no longer found in the DBR area today, however, it is likely to have occurred in the DBR, given its presence on nearby timbered areas of the same geological history and topography. Western Silver Wattle is classed as vulnerable in Victoria by Gullan *et al.* (1990).

Species that once occurred in the DBR, such as Dark Swainson-pea (*Swainsona phacoides*), are considered extinct in Victoria (Gullan *et al.* 1990). This species, as well as Australian Millet (*Panicum decompositum*) and Running Postman (*Kennedia prostrata*), have not been observed since 1941. Australian Millet is considered rare in Victoria (Gullan *et al.* 1990). The possibility of these species still occurring is considerable, and thus further searches are warranted.

2.6 Landscape

The DBR is an open forest or woodland, and is without spectacular landscape features. Good views can be obtained from the higher points of elevation within the DBR of the Broken River and associated plains, and the Mt. Major massif. However, these views suffer from the intrusion of natural vegetation.

Roads, tracks, and sites of excavation are not obvious from outside the DBR area (from Ring Road), and in this regard, have low visual impact. They do, however, have localised impacts, particularly the Old Tip site and Quarry on the Inner Track. From an aerial view, the Quarry has a major visual impact.

Some clearing along fence lines do have a low visual impact from the Ring Road. The existence of fence lines and dams within the DBR intrude on the bushland vista.

The former Dead Animal Pit site no longer has the level of visual intrusion it had when still in active use, but is significantly disturbed, and does require some revegetation and rehabilitation to improve the scenic quality.

The transmission line and the clearing associated with the Rifle Range do have a significant impact on the northern section of the DBR.

Generally, the landscape values of the DBR are moderate to low, depending on the extent of visual intrusion of works and developments. The DBR area does contribute to the visual diversity of the landscape for the traveller along the Midland Highway. It is a contrasting element in otherwise predominantly cleared grazing country.

Within the DBR itself, the extent and projective cover of natural vegetation offers opportunities for relatively undisturbed views of a bushland setting.

2.7 Land systems

The DBR is classified by the Land Conservation Council as low hills and rocky ridges (Land System - Hills Sedimentary), a land system type that extends over extensive regions to the north-east and south-east (LCC 1983).

This land system type extends over the annual rainfall range of 425-650 mm, with generally open forest and woodland type indigenous vegetation. Stony gradational soils (crests), red sodic duplex soils (mid-slopes), yellow sodic duplex soils (lower slopes and depressions) tend to typify the soils of this land unit type (LCC 1983).

2.8 Fauna

There is little past or present information available on the fauna of the DBR. Most of what is known of past species is anecdotal. However, the extinction or depletion of mammals and other fauna from grassland and grassy woodland habitats across the State this century would be reflected in their depletion or extinction in the DBR (LCC 1983; DCE 1992).

The reason for this extinction or depletion has been due to the systematic clearing of natural vegetation for agriculture. This reduction of habitat has led to small "island" populations, such as the DBR, which then became more susceptible to the vagaries of climate, direct human predation and interference, feral animal invasion and predation, genetic isolation, etc. (Bennett 1990; Davidson pers. comm. 1992).

It is more than likely that species such as the Emu (*Dromaius novaehollandiae*), Dingo (*Canis familiaris*), Wombat (*Vombatus ursinus*), Eastern Quoll (*Dasyurus viverrinus*), Bandicoots (*Perameles* spp.), Rufous Bettong (*Aepyprymnus rufescens*) and others, would have once occupied the area of the DBR in pre-European times (DCE 1992; Davidson pers. comm. 1993). Their removal has been for reasons of threat to stock and poultry (e.g. Dingo, Quolls), competition for resources with stock (e.g. Emu, Wallabies, etc.) and the presence of predatory feral animals (e.g. Bandicoots, Wombat, etc.), such as the fox (*Vulpes vulpes*), dogs (*Canis familiaris*) and cats (*Felis catus*).

It appears as if there are few ground-dwelling indigenous mammal fauna remaining, after significant survey efforts. Interestingly, Quolls persisted until the early 1970's in the DBR and on Mt. Major (Newman pers. comm. 1992). It is possible that a partially arboreal animal, such as the Yellow-footed Antechinus (*Antechinus flavipes*) may still occur in the DBR area (Davidson pers. comm. 1993). An unidentified *Antechinus* sp. was trapped in 1992 (Hamilton unpublished 1991). It is likely that the same fate had befallen many of the ground-dwelling bird, amphibian and reptile fauna, however, recent herpetological surveys have greatly expanded the species inventory of amphibians and particularly reptiles (Hunter unpublished 1997). This would tend to indicate that reptiles and amphibians have avoided the major impacts of predation from

introduced carnivores because of their preference for sheltered sites under rocks, underground, or under or in woody materials.

Despite the likely disturbances, the DBR is still relatively rich in arboreal mammals and avifauna. There have been 128 species of indigenous birds, 5 species of amphibians, 15 species of native reptiles, and 26 native species of mammals identified as occurring in the DBR or its environs, and an additional four species of native mammal awaiting positive identification (Appendix II).

There have been 4 species of introduced mammals, and 5 species of introduced birds identified as occurring in the DBR or its environs (Appendix II).

Of the native species, 13 have been classified as having conservation status, a few of which have not been sighted in the DBR for a number of years.

The Squirrel Glider (*Petaurus norfolcensis*), Barking Owl (*Ninox connivens*), Brush-tailed Phascogale (*Phascogale tapoatafa*) and the Proximus Blind Snake (*Ramphotylops proximus*) have all been sighted in the DBR or its environs, and are considered to be rare and restricted in Victoria.

The Bush Thick-knee (*Burhinus grallarius*), Swift Parrot (*Lathamus discolor*), Grey-crowned Babbler (*Pomatostomus temporalis*), Square-tailed Kite (*Lophoictinia isura*), Bandy Bandy (*Vermicella annulata*), Regent Parrot (*Polytelis anthopeplus*), Turquoise Parrot (*Neophema pulchella*) and Striped Legless Lizard (*Delma impar*) have all been sighted in the DBR or its environs, and are all classified as vulnerable in Victoria (DCE unpublished 1991). The Regent Parrot observation was likely a “one-off” sighting during the height of a drought, and it is considered an incorrect identification of the Striped Legless Lizard was made in 1992 during a DCE fauna survey in the area.

The Regent Honeyeater (*Xanthomyza phrygia*) has not been seen in the DBR since 1964, and is currently considered endangered in Australia.

Restoration and creation of habitat for these animals of conservation significance should be paramount in any management strategies developed for the DBR.

Strategies based on vegetation management may be required. For instance, Squirrel Gliders have been observed feeding on Golden Wattle (*Acacia pycnantha*) (Millington pers. comm. 1993), and thus areas of the DBR should be managed to promote mature stands of this species.

Populations of the Bush Thick-knee have been reduced regionally due to cultivation, grazing and fire. They require short vegetation (low grasses) with relatively low density tree cover, little predation by feral animals, and preferably considerable wood and litter in which to browse and hide (Davidson pers. comm. 1993). Areas of the DBR should be managed to maintain or create that habitat, especially to retain fallen woody materials at ground level.

In some cases (e.g. Regent Honeyeater, Grey-crowned Babbler or possibly *Antechinus* sp.), the removal of native vegetation connecting the DBR to other areas (e.g. Broken

River), may have resulted in the species not "finding" the DBR (Davidson pers. comm. 1993). In addition, White Box is a key nectar species for nectivores, such as the Regent Honeyeater and Swift Parrot, and as flowering is most abundant in mature trees, these must be incorporated into any connecting vegetation to the DBR (Davidson pers. comm.). There is an obvious and dire need to reconnect the DBR by corridors or patches of vegetation to these areas, utilising mature trees wherever possible. While significant efforts have been made in this regard, complete connectivity has still not occurred.

A small group of koalas (*Phascolarctus cinereus*) were sighted in the south-western area of the Mt. Major paddock (Fig. 1) around 1993-1996. While the population on the Violet Town-Nalinga Road (15 km south) has been known of for some time (Newman pers. comm. 1993), their occurrence on College had never been recorded. This implies that the detected group has re-populated that area, and has further implications in that the DBR area was likely to have part of their former range. The issue of connectivity with Mt. Major therefore assumes heightened importance to encourage habitation of the DBR by this species.

2.9 Fire

There is no documented fire history of the DBR up until 1993. There would be no doubt that controlled grassfires have been conducted for fuel reduction in the past, however, this has been episodic, and has not been recorded. Annually in autumn since 1995, small fuel-reduction burns have been conducted by staff and students in a number of locations on the periphery of the DBR as part of fire suppression subjects within the Diploma in NRM. In 1995, 1996 and 1997, these burns were conducted on the eastern boundary of the DBR, adjacent to the Southern Track and Paddock 20. In 1998, a burn was conducted on the southern boundary of Paddock 42, adjacent to the Inner Track, and in 1999, a burn was undertaken in the south-western corner of the DBR, adjacent to the Ring Road.

Generally, these fires have been of less than 1 ha in area, and less than 500 kW m⁻¹. Areas where burns have been conducted in 1995-1997 and in 1999 have been dominated by annual weeds and are not of good habitat quality. In 1998, however, the area burnt was of moderate habitat quality, and the vegetation was predominantly indigenous, and the resultant regeneration after the fire was a variety of Thistle weeds. This is a disturbing result, which required considerable labour to remove, and would indicate that burns in any quality area of the DBR must be undertaken with caution as to the regeneration outcome.

There is no evidence of a wildfire in the DBR itself, and it would seem unlikely that the area could presently support a fire of such intensity, as available fuel loads would be < 10 tonnes hectare⁻¹ (Hamilton unpublished 1993).

2.10 Adjacent land use and planning controls

The DBR is bordered by College grazing land on all boundaries (Fig. 1). In recent times, Paddock 30 and 31 have rarely been used for grazing, and given the extent of natural regeneration in these areas, it would seem prudent to pursue their incorporation

into the DBR, as both Paddocks are substantially indigenous. The western boundary fence of Paddocks 30 and 31 borders the Gowangardie Road. An active Quarry is on the western side of this road. Paddocks 23, 25 and 27 also are rarely grazed. While the ground layer vegetation is mostly exotic, there has been substantial Eucalypt regeneration, and it would seem logical to allow this regeneration time to grow beyond grazing height, even if these areas are not to be retired from grazing.

The land use of the grazing/cropping land is managed by the Farm Manager. It is assumed that the use of this land will always be agricultural, and thus, there is little possibility of any large scale development on the DBR boundaries.

3. Use and Development

The DBR was controlled by Farm Management since settlement until 1993 for the purposes of agricultural education, and was used for a number of purposes including recreation, timber harvesting, grazing, limited cropping, shooting and beekeeping. With the exception of passive recreational activity, these other uses have generally not occurred within the DBR since 1993, as such activity was not in accordance with the Management Plan (Hamilton 1993).

Notwithstanding the DBR now being private land, the management of the area is still determined by certain State legislation, including *the Catchment and Land Protection Act* (1992), *Wildlife Act* (1975), *Fauna and Flora Guarantee* (1989) and the *Native Vegetation Clearance Control Act* (1992).

3.1 Vehicular Access

The DBR is only accessible from four points on, or near, the Ring Road (Fig. 2). These are:

1. the commencement of the Inner Track in the north-western corner of Paddock 42;
2. the end of the Inner Track in Paddock 30;
3. the Northern Track crossing between Paddocks 11D and 19 and entering the north-eastern corner of Paddock 42;
4. the exit of the Eastern Track across Paddock 20 from the south-west corner of Paddock 42.

All tracks are unsealed and are to-date, unmarked. All entrances have gates appropriate to the feral animal deterrent fence, and are not locked. Grading works were undertaken in late 1996 on all DBR tracks.

Entrance 1 used to be too boggy to traverse near the Track entrance in winter. The dumping and grading of gravel in the wettest section in 1996 has largely alleviated these problems. Thus, the Inner Track can be used all-year-round. When strong winds occur, the Inner Track is frequently blocked by fallen trees and limbs, however, the frequent visitation of the Rangers since 1995 has improved communication of blockages, and has led to track blockages being swiftly dealt with.

Entrance 2 is the most frequently used entrance to the DBR since a formal gate was erected in 1994. The section of track immediately to the east of this gate used to be almost impassable in winter, however, the use of gravel and the grading of drainage run-offs have largely solved this problem.

The Southern Track remains in relatively poor condition near the fork with the Inner Track, and has considerable channel erosion. The erosion problems evident in this section originated after more than 120 mm of rain on the 3.10.93. To combat this problem, channels were filled with rock and gravel on two occasions in 1995/96. However, the problem remains and is becoming worse, and is again in urgent need of repair.

Entrance 3 and the Northern Track are probably in the best condition of all tracks throughout the DBR. This is most likely to be because of the considerable usage of the former Dead Animal Pit and the Rifle Range in this region of the DBR, and the need to maintain this as an all-weather track. However, a steep section of the track near the Rifle Range is eroding badly, and needs urgent attention. The Northern Track also is prone to erosion at the head of the Army Dam in Paddock 42, and this too requires constant monitoring and attention.

Entrance 4 appears to have been rarely used, given that the rough track along the southern boundary of Paddock 20 is in poor condition, and is a dry-weather track only. To get there, vehicles need to traverse a major embankment and excavation in Paddock 20 that is part of the water harvesting system of the southern part of the College. This system was re-dug in 1997, and access to this gate is now almost impossible for 2WD vehicles.

3.2 Recreation

The DBR has been, and continues to be, an important area for recreation for College residents, given that there are very few parks and areas of public land in the immediate vicinity. However, knowledge of the DBR is still relatively limited outside of the College community, and this is exacerbated by the limited access to the area. Entrance to the DBR is from the Ring Road, which is occasionally locked to general traffic out-of-hours, and the DBR has few facilities, which limits the range of recreational opportunities.

No systematic survey of the recreational usage of the DBR has been conducted, however, anecdotal information suggests that usage for such purposes is relatively low, excepting formal usage of the Rifle Range.

Activities within the DBR up to 1993 included horse-riding, trail-bike riding, orienteering, bushwalking, nature study and shooting. A Rifle Range exists in the northern section of the DBR. Other than the continued use of the Rifle Range, bushwalking and nature study, the other activities have not been encouraged.

Camping/picnicking

Picnicking is a relatively unimportant recreational activity in the DBR, and use levels remain very low. There are few relatively attractive sites for facilities to be placed, and

at the present time, no facilities exist. Most camping undertaken is usually around the western entrance gate, or in Paddock 42, near the Old Tip Site.

The DBR has few attractions for the typical camper, and very little use of the area is made for that purpose. There are no facilities provided, and the lack of water, other than several dams, is a significant constraint to this activity. There are no plans to develop such facilities.

Walking

This activity is mostly confined to residents of the College, and the occasional professional scientist and amateur naturalist. The DBR does not provide any challenge to the experienced walker, and most walking tends to take place on one of the vehicular tracks, rather than off-track.

A student project in 1997 developed a ten-stop nature walk of approximately 2.5 km around the central area of the DBR. Numbered posts were put in place, and a draft pamphlet was produced. This requires a small amount of effort to become available to the general community. A longer trail, of approximately 4-5 km would be desirable to develop in the future.

Orienteering and rogaining

It is understood that these activities have occurred in the DBR infrequently up to 1993. There has been no approach for such activities since, and they are not being encouraged. It would be assumed that large and frequent events of this kind in a DBR of this size could cause conflicts with other DBR users and with conservation objectives.

Horse riding

Horse riders have used the DBR area for many years, although the level of use has been small. Horse riding, is likely to conflict with other activities and result in damage to tracks, accelerated soil erosion, and weed introduction. These types of problems have not been specifically identified in the DBR as a consequence of such activity, however, the use of the DBR for such purposes should be discouraged.

Trail-bike riding and four wheel drive vehicle usage

These activities have occurred at very low levels up to 1993, and have been largely unknown since. Clearly, such activities are potentially very damaging, and must be discouraged from within the DBR and its surrounds.

Some reckless off-road driving in mid-1999 led to some minor vegetation damage in some areas of reasonable habitat quality, but this appears to have been an isolated incident. This level of activity has never created a major impact, but there is considerable potential for these activities to be more frequent, with improved DBR information and access.

Hunting and shooting

The Dookie College Gun Club does make frequent use of the Rifle Range, and does occasionally organise an outing in the DBR proper to hunt feral animals, following appropriate consultation with Staff. There is an on-going need to maintain the presence

of this group within the DBR on organised outings on request, to assist in feral animal management.

Farm Management has obtained Wildlife Destruction Permits on occasions to reduce the damage caused by Eastern Grey Kangaroos to farm enterprises.

There is evidence that high levels of indiscriminate shooting has occurred in the DBR in the recent past, given the low numbers of Brown hares, feral cats and foxes in a relatively "unmanaged" habitat of this type. Rabbits exist at present in low numbers.

3.3 Information and interpretation

Until recently, there was little information regarding the DBR available to the public. However, an information pamphlet has been very recently produced by the author, and is in circulation from the College reception desk. The basic structure of an Information Board was erected near the western gate of the DBR in late 1997, and in 1999, the structure of the Board was completed, and information on the DBR provided on-site. A means of providing the information pamphlet at the Information Board must be provided as a matter of urgency.

Since the employment of Rangers in 1995, an estimated 70 groups of diverse age ranges and interests (approximately 1000 people) have toured the DBR during the day, or partaken of spotlighting tours at night. This represents a major commitment to environmental education in general, and profile to the DBR in particular. A workshop for 70 professional scientists/environmentalists held at Dookie in 1997 on the Management of the Box-Ironbark Ecosystem in Northern Victoria, saw the DBR used as a field demonstration site. These types of activities clearly emphasise the importance of the DBR as an educational asset, which has the potential to be developed further.

3.4 Education/Research

The educational usage of the DBR is quite diverse, but other than the tertiary component of this, is relatively unstructured. Primary and Secondary students do utilise the DBR frequently as part of the visitor interpretation tours conducted by the Rangers (as do a range of visiting groups other than schools), or by visiting school groups. The teaching staff accompanying these school groups generally co-ordinate the activities undertaken within the DBR, in consultation with Dookie staff and the Rangers and other NRM students. College input into the formulation of these activities is significant, but is often informal.

The majority of the educational usage comes from Tertiary students enrolled in the various subjects and modules of the TAFE Diploma in NRM and the BAppSc(NRM) full-time and articulation programs, which have been conducted on-campus full-time since 1994 and 1995 respectively. Much of this usage by tertiary students has now been built into subjects where the DBR is used annually for a particular assessable and/or experiential component, such as vegetation and fauna survey and trapping, catchment studies, fire suppression, or pest plant and animal management.

Research activity up until 1993 was confined to the now DNRE staff (Mammal Survey Group, Arthur Rylah Institute) who conducted frequent fauna counts between 1986-1992. Studies by post-graduate students and professional scientists (i.e. Rowley 1961) had occurred up until this time, but had been infrequent.

Dookie staff have undertaken some research in the DBR since 1993, with some long-term floristic plots being established in late 1992, and monitored on a number of occasions since. A number of student projects, mostly in the BAppSc(NRM), have examined aspects of the DBR, from the management of Horehound, to the cultural history of the site, to an inventory of herpetofauna and spider fauna. Recent projects are largely associated with the habits and distribution of the Tree Goannas of the DBR, and an inventory of bats and non-vascular plants.

Research on the DBR is likely to increase given the development by NRM degree students of a grid system in late 1998, at 100 metre intervals and with posts in the ground, across the whole area. This will allow the location of experimental sites and plots, as well as the mapping of various features. There is also likely to be an increase in the number of Honours and post-graduate student and staff usage with increasing emphasis on post-graduate students and research within the ILFR, and the UoM in general.

3.5 Resource Utilisation and other uses

There have historically been several activities in the DBR which caused conflict in some way with the primary conservation and recreation objectives.

Apiculture

Usage of the DBR area for apiculture was low and infrequent up until 1992. The Dookie College Bee Club periodically placed up to 20 hives on the eastern boundary to Paddock 42, and a private apiculturist was also known to place up to 100 hives in Paddock 31. The usage of the DBR for hive placement was an activity not recommended by the Management Plan (Hamilton 1993), and there has been no apiculture practiced in the DBR since that time.

Timber harvesting

The DBR area had been utilised for timber harvesting and collection since the early days after paddock clearing, and has never been regulated (Sec. 2.2). However, there has been no timber harvesting (felling of live trees) in the DBR since 1988 (Gribben personal comm. 1992), and certainly the Management Plan (Hamilton 1993) indicated that this practice was to be prohibited. It is highly likely that species such as Drooping She-oak had been preferentially logged, given their current-day rarity in the DBR.

Despite being prohibited in the Management Plan (Hamilton 1993), and by the College administration across the whole College area in 1994, firewood gathering is still occurring in the DBR at a low level (fallen timber). This usage has been both unenforceable and indiscriminate by both College residents and outside individuals, and one event in 1995 saw a truck load of timber being removed by a member of staff and relatives, and was only detected when their vehicle became bogged near the western gate of the DBR.

Firewood gathering will have a major impact on potential refuge sites for avifauna, ground-dwelling mammals and insects, as well as the likely impact on the nutrient dynamics of the ecosystem. With the current increasing use of wood for domestic heating, firewood gathering will continue to be a significant and important issue for the management of the DBR, and strategies must be formulated to reduce the frequency of such activities.

Gravel extraction

Gravel extraction has historically been a major use of part of the DBR area (Section 2.2). The vast majority of the gravel produced has been used around the various College internal tracks and roads. Areas within the DBR that have been gravel mined have become floristically impoverished, and have become mostly pure stands of Golden Wattle (*Acacia pycnantha*). They form a stark contrast to surrounding areas which have not been mined.

The Quarry area has been extensively utilised until recently for gravel extraction (Section 2.2). The excavated quarry site has been denuded of vegetation, and detracts from the forest landscape of the DBR.

Gravel extraction is not compatible with conservation objectives, as was prohibited in the Management Plan (Hamilton 1993). It is unlikely that the DBR will be again used for such activities.

Army exercises

Army exercises have taken place in recent times in the DBR area (Section 2.2). Impact has generally been minimal, and the Army, when on site, have made structural improvements to roads, dams and tracks in the DBR and the Campus property. However, the most recent Army exercise (June 1993) created new vehicular tracks on the western boundary of the DBR. This caused a considerable localised disturbance to vegetation regrowth, but no longer term damage resulted.

LCC recommendations for other areas in the Murray Valley Study Area (LCC 1983), have seen the phasing-out of army activities on reserved crown land on the basis of the incompatibility of these activities with conservation and recreation values. Army activities on the site are not compatible with conservation objectives, and future activities are prohibited in the Management Plan (Hamilton 1993). It is unlikely that the DBR will be again used for such activities.

Transmission Line

The overhead transmission line runs along the northern boundary of Paddock 42 and of the DBR (Fig. 2). Clearing under the line has considerable visual impact on the landscape, and is highly visible from the northern and eastern approaches to the DBR. There is little possibility of lessening the impact of the line.

Dead Animal Pit

Situated in the eastern region of Paddock 42, this Pit was used regularly by College farm staff. The site is in a visible location, and had a significant impact on the landscape in the northern section of the DBR. Following negotiations over a number of years,

College administration made a decision in late-1998 to fill-in the pit, and re-dig a new pit outside of the DBR. This has resulted in an improvement in the visual impact of the site, but the area has undergone substantial soil disturbance, and there is a need to rehabilitate the site with some revegetation works.

Old Tip Site

The Old Tip Site was last used in September 1990, and after that was filled-in, and a number of diversion banks placed at the head of the Tip to prevent direct water flow. The area has been partially cleaned-up on a number of occasions, but some surface rubbish still remains. The site does have considerable visual impact, and is an obvious feature in the western section of Paddock 42 and eastern section of Paddock 31A. There has been significant natural regeneration of Eucalypts in and around the site from 1996/97 and 1997/98, which is now being encouraged with the removal of sheep grazing pressure from the paddock since 1997. It is hoped that sheep grazing will now be permanently removed from this paddock to allow more natural regeneration to occur.

Plant material and seed collection

Although this is relatively limited at the moment, the DBR has become an increasingly important reserve of seed and propagating material, which has largely at this time been confined to *Acacia*, *Eucalyptus* and Fabaceae seed.. The expanded future use of the DBR for this purpose and adequate regulation of this usage must be considered.

4. Objectives and Zoning

4.1 Basis of the Plan

The DBR has been managed from a conservation perspective since 1993, and resource utilisation had been relatively uncontrolled and unsupervised up until this time.

The DBR is a remnant area of Low Rises Grassy Woodland and Box-Ironbark Woodland EVC's (Berwick pers. comm. 1999) that were once typical of the sedimentary hills of the local area, and of the riverine plain, respectively (DCE 1992). These EVC's are poorly represented on public land in the region, and thus this places the DBR into the category of high conservation significance. It contains a number of species of plants and animals that have a recognised conservation status (DCE unpublished; Gullan *et al.* 1990; Appendix I and II).

The loss of animal species this century would appear to have been the indirect results of being an isolated remnant surrounded by agricultural land and the presence of introduced carnivores, rather than any direct intervention in the DBR itself. Despite the lack of regulation until 1993, the DBR remains a relatively "undisturbed" remnant, with an inner section in excellent vegetation structure and habitat quality. In addition, the overall size of the DBR in a predominantly cleared region gives it heightened significance.

Information on the natural values of the DBR is still barely adequate to provide a good basis for ecological management or for recreational or educational development. Until there is more known about the DBR, management should be conservative and minimalist, and there must be a strong emphasis in this plan on research, investigative

programs and monitoring. Indeed, the management prescribed in the original Management Plan (Hamilton 1993) reflected this conservative and minimalist approach.

While there are no recommendations by the LCC or National Parks Act specifically aimed at the DBR (LCC 1983), an number of parallels for management strategies can be drawn from the Management Plan of Reef Hill Park (35 km to the east; Department of Conservation, Forests and Lands (DCFL) 1987). This Park is quite similar in its conservation value, type of habitat, recreation and resource use pressures (DCFL 1987).

The Reef Hills Plan (DCFL 1987), as an example, contains recommendations including that shooting be strictly controlled on licensed shooting Ranges (except for the purposes of vermin control), that no grazing, gravel extraction or Army activities be permitted, and that wood collection be permitted in certain areas with a permit. The plan provides for the strict regulation of any resource utilisation or recreation pursuit, to ensure the protection of vegetation, fauna and flora habitats, landscape values, and the safety and continued enjoyment of the Park by the general public (DCFL 1987). Many of these features and concepts were incorporated into the original Management Plan (Hamilton 1993).

4.2 Management Objectives

Management objectives are stated in Section 1.2.

4.3 Zoning

The purpose of zoning is to establish a geographical pattern of use and management which satisfies the management objectives for the DBR. Zoning provides for the protection of areas of high conservation significance, the protection of scenic resources, the provision of a range of recreation opportunities, and is a means of reducing conflicts between conservation, recreation and other land uses (DCFL 1987).

The DBR is a small area with relatively little variation in character or accessibility, and hence little variation in recreation settings. A zoning system was established in the original Management Plan (Hamilton 1993) primarily on the need for protecting and restoring areas of conservation significance.

The boundaries of the zones established here are based either on management objectives and 1993 vegetation status. "Buffer" zones have been indicated along tracks, and around the perimeter of the DBR (Fig. 5). These zones have been functional, are still relevant in 1999, and will remain as the framework in the revised Plan.

Zone 1. Conservation (Reference)

This zone includes the majority of the southerly and some easterly slopes and plateau/ridge areas of the DBR. The vegetation in this zone was relatively undisturbed by human intervention up until 1993, and the quality and structure of this area has improved significantly since then due to removal of stock and kangaroo grazing pressure and favourable summer rainfall. For this reason, this zone is the prime area of conservation significance within the DBR, and should remain as a Reference area.

Some areas of Horehound infestation on the ridges of this zone have been eradicated, but further efforts are required, and affected areas require some active revegetation.

Significant species diversity occurs in this zone, and the conservation of flora and fauna should therefore be the principle objective.

Recreational activities in this zone should be highly limited, and facilities such as walking tracks and nature trails, etc. should not be permitted, indeed, the nature trail developed skirts around the edge of this zone. Vehicular access is by the Inner Track, and no further track development should occur.

Limited non-destructive education and research activities should be permitted.

No resource utilisation activity should be allowed in this zone. Unrestricted shooting should not be permitted. Any fuel-reduction/control burning carried out should be specifically for flora or fauna management, and should almost be attempted initially on small areas as experimental plots.

Zone 2. Conservation and Revegetation A

Conservation and rehabilitation of flora and fauna should be the principle objective of this zone.

This zone includes the majority of the south section of the DBR. The northern section of this zone had been disturbed by moderate grazing and selective timber removal up until 1993, however, it is of considerable conservation significance, as it provides an excellent southern buffer to Zone 1. The zone does not possess the diversity of fauna and flora found in Zone 1, and is quite weedy, however, this zone contains many native species and associations. Continued control of weed species is required in these areas.

The southern sections of the zone adjacent to still recently active grazing paddocks, had been substantially disturbed by moderate grazing, gravel extraction (adjacent to Inner Track), erosion and even limited cropping up until 1992, and little vegetation structure occurs in 1999, with the mature overstorey being the only major element. For this reason, this zone possess little indigenous diversity, and is of low conservation significance.

Across all areas of this zone, seven years after the removal of grazing pressure has seen little regeneration of any species, presumably due to the loss of the topsoil (and the soil's seed store) during erosion in the 1920's and 1930's, and germinating plants are attempting establishment on a hard, rocky and exposed B horizon. Active revegetation of this zone is required.

In areas of gravel extraction, Squirrel Gliders have been observed feeding on the Golden Wattle regrowth, so despite the level of disturbance, the zone does act as a significant fauna habitat. This Golden Wattle is largely now senescent, with very little regeneration, and the continued provision of niche requirement to Gliders needs to be considered. Some revegetation with Golden Wattle specifically in these areas is in order.

Vehicular access is by the Inner Track, and no further track development should occur.

Low impact passive recreational activities, such as walking, orienteering, etc. should be allowed, and facilities such as walking tracks and nature trails, etc., should be permitted.

Limited non-destructive education and research activities should be permitted.

No extraction or any other resource utilisation activity should be allowed in this zone. Unrestricted shooting should not be permitted. Any fuel-reduction/control burning carried out should be specifically for flora or fauna management, and again, should be undertaken in a small area as an experimental burn initially.

Zone 3. Conservation and Revegetation B

The principle management objective of this zone should be conservation, limited recreation, and promotion of regeneration and revegetation.

This zone includes the majority of the western and north-western areas of the DBR, and also includes substantial sections of the northern slopes. The vegetation in this zone was used for grazing up until 1992. This zone has dramatically regenerated since 1992, especially the western sections, and the majority of VROT (vulnerable, rare or threatened) flora species occur in the northern section of this area. Vegetation structure has been largely re-established in the last 7 years, and there is now significant Eucalypt regeneration. This zone is of high-moderate conservation significance.

While the western section has regenerated well, the northern section has regenerated sparsely, and active revegetation is required in these areas. Despite significant efforts to control the major weed species (Horehound, Paterson's Curse and European Olive), there are still large patches of these weeds infesting areas in the northern section. Efforts must continue to control and attempt to eradicate these species.

Vehicular access is by the Ring Road, and no further track development should occur.

Low impact recreational activities, such as walking, should be allowed. Indeed, the majority of the length of the nature trail developed occurs in this zone, and along the Inner Track.

Limited non-destructive education and research activities should be permitted.

No extraction or any resource utilisation activity should be allowed in this zone. Unrestricted shooting should not be permitted. Any fuel-reduction/control burning carried out should be specifically for flora or fauna management, and again, should be undertaken in a small area as an experimental burn initially.

Zone 4. Conservation and Revegetation C

The principle management objective of this zone should be to allow rehabilitation and revegetation, contingent upon grazing being removed permanently.

This zone includes the majority of the northern area of the DBR, and comprises most of Paddock 42. The vegetation in this zone has been used extensively for grazing up until

1997, and limited cropping (cleared areas) up to 1940's, and few shrub species remain. There has been no perceptible change in this zone since 1992. However, despite the absence of a shrub layer, the ground layer is predominantly indigenous grasses and some herbs. Since the absence of sheep grazing since 1997, there has also been significant Eucalypt regeneration, however, this has been very patchy.

Up until 1996/97 in this paddock, off-shears grazing occurred in late summer every year for approximately a month. This period of grazing was negotiated to allow perennial native grasses and native annuals to seed prior to grazing re-introduction, and thus the zone was excluded from stock grazing from September through to February. The need for this area for off-shears sheep grazing appears to have diminished in a conscious decision by farm management to allow regeneration to occur. This move should be further pursued to allow the permanent removal of stock grazing.

The Old Tip site has been largely cleaned-up, but still requires further work. An erosion hazard that existed in 1993 has been managed. The site has experienced significant Eucalypt regeneration, that has flourished since the removal of sheep grazing.

Overall, this zone requires significant efforts in revegetation when, and if, stock grazing is permanently removed. Especially, several strategic areas require revegetation to restore both overstorey and understorey, and to allow for fauna movement to adjacent areas to the north, even if stock grazing is not included. Some areas need to be revegetated to prevent gully erosion, especially around the Army Dam.

Vehicular access is by the Inner Track, Ring Road and Northern Track, and no further track development should occur. Indeed, existing tracks should be upgraded to prevent erosion, and to allow year-round access to other zones.

Recreational activities, such as walking, should be allowed, and facilities such as walking tracks and nature trails, etc., should be permitted.

Education and research activities should be permitted.

No gravel extraction or any other resource utilisation activity should be allowed in this zone. No extraction of minor wood products should be allowed. Unrestricted shooting should not be permitted. Any fuel-reduction/control burning carried out should be specifically for flora or fauna management.

There are some areas of weeds such as Paterson's Curse and Horehound in this zone, and spot-spraying of persistent weed species should be permitted where appropriate.

Zone 5. Special Use

The management objective of this zone should be to minimise its impact on the remainder of the DBR.

This zone applies to several special management areas in the north-eastern section of the DBR, including; the Transmission lines and Rifle Range. There are limited recreation opportunities in the zone. This zone is adjacent to Zone 4, and is part of Paddock 42. No fences separate the two zones. Like Zone 4, the vegetation in this zone

has been used extensively for grazing up until 1997, and no shrub species remain. There has been no perceptible change in this zone since 1992. Eucalypt regeneration has not occurred, even with the removal of grazing.

Like Zone 4, up until 1996/97 in this zone, off-shears grazing occurred in late summer every year for approximately a month. The need for this area grazing appears to have diminished. This move should be further pursued to allow the permanent removal of stock grazing.

Overall, this zone requires significant efforts in revegetation when, and if, stock grazing is permanently removed. There are no major weed issues, however, significant areas of this zone have been cleared, and most of the ground layer of this zone has been impacted by moderate grazing, and is largely introduced. Weed growth will need to be monitored and managed regularly.

The Transmission lines require clearing underneath as a special management requirement, especially any regenerating Eucalypts. This becomes an important management requirement, given the likely removal of stock grazing permanently.

The Rifle Range is used from time-to-time, and the management of this area should continue as in the past. This area should be fenced from the DBR proper to restrict access.

The Dead Animal Pit was filled-in in 1998 and a new pit dug at another site on the College out of the DBR. The site remains obviously disturbed, and revegetation and weed management is required in the immediate area.

Several sections adjacent to the Northern Track on a north-east facing slope are badly eroded, and require urgent attention.

Any fuel-reduction/control burning carried out should be specifically for flora or fauna management.

5. Management Strategies

This section defines broad courses of action, called management strategies, required to achieve management objectives. In some instances, they detail management actions following these strategies, and then define how these actions should be put into practice. Strategies and actions should be carried out with reference to the management objectives and zones.

The priority of each action is indicated, as a guide to the urgency or relative importance of the particular item.

5.1 Vegetation Management

The conservation of the native flora is a major management objective for the DBR, as it is a significant remnant of the original vegetation of the region. A number of species in the DBR are of restricted distribution in Victoria and/or Australia (Appendix I).

Strategies

- Enhance natural regeneration through chemical and/or physical weed removal, reduction in grazing pressure, and to augment natural regeneration by direct seeding and other re-introduction methods using local provenance;
- Encourage further research into the distribution of plant species in the DBR, particularly those of conservation significance;
- Protect native plant species, particularly those of some conservation significance. This includes controlling seed, plant or plant material collection for propagation purposes by permit and restricted access;
- Control and, where possible, eradicate introduced plants, particularly European Olive, Paterson's Curse, Thistle species, St. John's Wort and Horehound;
- Seek the co-operation of Farm Staff in controlling the spread of weeds from adjacent land into the DBR;
- To ensure that the DBR does not become a repository of weed species to distribute into adjacent land;
- Encourage and strategically plan for the establishment of adjacent vegetation and road reserves adjacent to the DBR to provide for fauna emigration and immigration. Ultimately, the DBR will be linked by vegetation "corridors" to Mt. Major to the North, and to the Broken River to the South.

Priority and action

Very High	To encourage natural regeneration of the indigenous vegetation by the strategic removal of weeds, and to augment natural regeneration using direct seeding and other revegetation methods using local provenance.
Very High	Develop weed distribution maps for the major weeds in the DBR, and use these maps as a basis for the continuing management of the major weed species. To prevent weed infestation from the DBR to adjacent farmland.
Very High	To develop and formulate Best Management Practices for the management of the grassy woodlands of the DBR, which would also be of value to similar remnants in southern Australia.
High	To continue and expand programs to monitor the long-term changes in floristics of the DBR, with a particular emphasis on significant species.

Medium	Investigate, through research, the impact of fuel-reduction burning and other management practices on the DBR vegetation.
Medium	Continue to establish strategic areas or corridors of indigenous species to the DBR to link the DBR to the Broken River and Mt. Major areas.
Medium	To take appropriate action to control seed and plant material collection within the DBR.

5.2 Landscape

The natural character and visual amenity of the DBR landscape is affected by a number of works and structures, the clearing of vegetation, and the debris scattered over a wide area from previous activities. The Rifle Range and Transmission lines have considerable visual impact, however, there is little that can be done to shield these structures from general view. Because of the high visibility of the area from the Midland Highway, great care should be taken with any works or development.

Strategies

- As far as possible, reduce the impacts of permanent structures and works, such as the Quarry, Dead Animal Pit surrounds and the former Old Tip site by revegetation works.
- As outlined in Vegetation Management recommendations, restore and rehabilitate, by revegetating or encouraging regeneration in areas which have been subjected to grazing, clearing, stock erosion by rabbits, quarrying or gravel extraction with indigenous vegetation.
- Erosion works at the junction of the Inner Track and the Southern Track.
- Clean away any rubbish or debris from the surrounds of the structures and work sites, and the DBR area in general.
- Re-align areas of track within the DBR to improve year-round access and reduce erosion hazard.

Priority and Action

Very High	Revegetation of the Old Tip, Quarry and former Dead Animal Pit areas.
Very High	Soil conservation works in the area of the junction of the Inner and Southern Tracks to prevent further gully erosion. Further work required along parts of Southern Track.

High	Continue clean-up of rubbish and debris specifically around the Old Tip site.
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5.3 Fauna Management

The DBR provides habitat for a number of species of fauna that are rare or uncommon, and for a general wide diversity of fauna. Because of the significant conservation status of the DBR, the populations of fauna present should be managed to promote continued residence and enhancement of habitat, particularly rare or uncommon species.

Strategies

- To maintain on a regular basis the feral animal fence, and to strive to improve its level of feral animal exclusion.
- To promote further research into the status, distribution and ecology of native animals, with an emphasis on the known species of significance.
- To commence long-term studies of the population dynamics of introduced and native species that would require annual monitoring of population levels.
- To protect all native animal species.
- Direct management to improve and maintain a diversity of habitats, particularly to encourage significant species. This includes the maintenance of standing dead trees, logs, fallen wood and other forest litter.
- Control, and where possible, eradicate feral animals by undertaking bi-annual control programs. Encourage Farm staff and adjacent landholders to control the introduction of feral animals to the DBR.
- To prevent the animal species within the DBR becoming a pest to local landholders.
- To exclude all domestic pets from entering the DBR.

Priority and Action

Very High	To maintain by regular weekly inspection, and improve the level of control of, the feral animal fence.
Very High	To eradicate feral animals from the DBR using shooting, trapping and baiting techniques by management programs undertaken on a twice-a-year basis.

Very High	To exclude shooting, except by management arrangement, from the DBR area.
Very High	To ensure that the existing stock fence surrounding Zone 4 (Paddock 42) is in good condition to prevent accidental stock grazing in other Zones. This action to be reviewed if grazing is excluded permanently.
High	To conduct bi-annual surveys of fauna populations as part of a long-term monitoring program. Particular emphasis must be placed on the monitoring of Eastern Grey Kangaroo population levels.
High	To continue to gather information on the fauna of the DBR to establish distribution, habitat, ecology and behaviour of native species.
High	Following fauna surveys, to maintain Eastern Grey Kangaroos to their estimated carrying capacity within the DBR, and if this capacity is exceeded, to regulate the population levels through Wildlife Destruction Permits.
Medium	To take appropriate action to exclude domestic pets from the DBR

5.4 Fire Protection and Management

Fire has not been a dominant part of the DBR history as previously discussed.

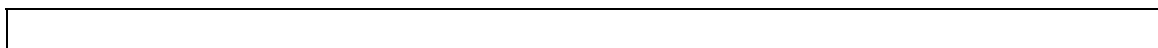
The DBR, therefore, has developed as a disclimax community in the absence of fire, which has led to a domination of the ground vegetation by grasses. However, specific plant and animal species may require low-moderate intensity fire to stimulate regeneration or promote suitable habitat. As previously discussed, some fuel-reduction burning undertaken within the DBR has resulted in some major weed regeneration, so caution needs to be exercised with any burning.

A high intensity ground fire is unlikely, given the relatively low fuel-load compared to moister forests types.

In the event of a wildfire, the outbreak should be controlled around tracks and perimeters of the DBR, and that **no new tracks/firebreaks be created in the DBR area.**

Strategies

- To inform local Fire Prevention and Control authorities of the implications of the Management Plan in the event of unplanned burning.



Priority and Action	
Low	To conduct fuel-reduction burning if and when appropriate to promote habitat for fauna, and to stimulate regeneration of fire-promoted species.
Low	To inform local units of the Country Fire Authority of Management Plan of the DBR, and of the likely strategies required in the event of fire.

5.5 Adjacent land use/stock access

The land use of adjacent areas to the DBR is controlled by Dookie Farm Management staff, and is either sheep/cattle grazing or cropping. On most boundaries, it is unlikely that this land use will change with time, and it is equally unlikely that this land use will affect the DBR either directly or indirectly to any greater extent than it has to date.

Zone 4 (Paddock 42) may remain as an area of limited grazing, subject to negotiation. Other than this exception, grazing by stock will be excluded from the DBR.

It is possible that Paddocks 30 and 31, and sections of Paddocks 25 and 27 may be permanently excluded from grazing, again subject to negotiation with Farm Management. These potential actions should be pursued to provide what would be useful “buffer” areas to the DBR.

The future need for strategic ecological grazing to augment natural regeneration, or for a specific fuel reduction purpose should not be ruled out. Such actions would require negotiation between Farm management and relevant staff.

Strategies

- Ensure that Farm staff are informed of the Plan, and that communication and negotiations on areas of overlapping interest is comprehensive. Such communications and negotiations should be documented.
- Ensure Farm staff are aware of the implications of the Plan.

Priority and Action	
Medium	Ensure communication and negotiation is established regarding the usage of Zone 4 for grazing, and on the future of Paddocks 30, 31, 23, 25 and 27 in regards to future agricultural activity.

5.6 Vehicular Access

The current vehicular access to the DBR is satisfactory. Some vehicle access will be required for management and educational purposes. There is no perceived need for additional vehicular tracks. The entrance to the DBR through Paddock 20 should remain closed.

Strategies

- Maintain the tracks for low levels of use, and improve some aspects of track design to prevent erosion and allow year-round access (see Section 5.2).
- Restrict vehicle access.
- Entrance to the DBR through Paddock 20 to remain closed, and to discourage vehicle access by the use of signage in the first instance, and to lock gates if this strategy is not successful.
- Close and rehabilitate tracks around the former Dead Animal Pit.

Priority and Action	
High	Maintain the rough track around the perimeter of the feral animal fence lines on the inside of the DBR for management purposes. Limited clearing of vegetation may continue to be necessary to ensure a clear fence line. The felling of mature trees should be avoided.
High	Erect signs to indicate Track names.
High	Indicate restricted track access in visitor information.
Medium	Maintain the closure of the entrance to the Southern Track (Paddock 20), while maintaining the Southern Track as a Fire access track.
Medium	Close and rehabilitate tracks in the vicinity of the former Dead Animal Pit.

5.7 Recreational use and development

The DBR provides opportunities for a limited number of activities, such as walking and nature observation. Picnicking and camping have been relatively low level activities, largely associated with Field Naturalists groups and BOCA (Bird Observers Club of Australia), and should continue to be kept at a low level to avoid impacts on conservation values. It is not expected that there will be an increase in demand for these types of recreational activity, based on experience since 1993.

Further information is required regarding the values and uses of the DBR before any significant developmental work or changes to existing levels of activity should be contemplated.

Strategies

- Maintain existing recreational uses of the DBR, where compatible with management objectives and zoning.

Priority and Action	
Medium	Monitor the level and type of visitor use.

5.7.1 Camping/Picnicking

There has been little utilisation of the DBR for these activities, probably because of the relatively low value of scenic quality, complete lack of camping facilities, and the relative inaccessibility of the DBR.

It is not considered feasible, based on the cost initially, and in terms of maintenance and enforcement, to establish basic facilities (defined camp sites, fireplaces, rubbish bins, etc.). Camping, when it has occurred, has been within Paddock 42 or near the western gate, both relatively cleared areas of low conservation value with no established facilities, and this arrangement seems to have worked satisfactorily. These events have happened with responsible groups who have cleaned-up the site fully after use, so no negative experiences have been noted since 1992. This may not always be the case.

The feasibility of the establishment of such an area needs to be fully investigated.

Strategy

- To monitor camping and picnicking activity within the DBR, and to maintain existing arrangements for these activities.
- To ensure that groups that do camp or picnic are aware of the existing arrangements, i.e. location of suitable sites, no facilities or available water, and the need to take all rubbish out.

Priority and Action	
High	To ensure potential campers or picnickers are aware of the existing arrangements.
Medium	To monitor usage of the DBR by picnickers and campers.

5.7.2 Walking

Walking has probably been the predominant recreational activity within the DBR area, mostly by Campus residents and amateur and professional naturalists, and is generally an appropriate activity. Other than the vehicle tracks, there are few defined tracks or trails for walking, and so walking has historically involved trampling through vegetation and along ill-defined animal tracks.

A nature trail of around 2.5 km length has been developed around the perimeter of Zone 1 (following the Inner Track and former fence lines), which provides good opportunities for off-track walking with minimal conservation impact. This trail has numbered posts in the ground, and a draft trail pamphlet has been produced, so little effort is required to have this trail operational. This should be pursued as a matter of urgency.

A second trail of longer length (4-5 km in length) would be an appropriate development and should be pursued.

Strategies

- Walking will be encouraged.
- To complete the nature trail developed and make it operational as soon as possible;
- To develop a longer nature trail in the immediate future.

Priority and Action	
Very High	To maintain and further develop the short distance self-guided nature trail with the appropriate information available (as an information sheet).
Medium	To develop a longer walking-only track of up to 3-4 kilometres, avoiding areas of conservation significance.
Medium	To monitor usage of the DBR by walkers, and to evaluate the impact of usage, and the need for further facilities.

5.7.3 Orienteering and rogaining

These activities occurred infrequently within the DBR up to 1992, and have not occurred since. As long as access is restricted to low conservation areas (i.e. not Zone 1 or areas of regeneration), and that these events are held infrequently (no more than one event per year) and involve only small numbers of participants (< 30), then usage for these activities could be allowed.

Strategy

- To allow the use of the low conservation value areas of the DBR for these recreational activities. Only infrequent usage (maximum of one event per year) confined to low numbers of participants (< 30) should be permitted, and approval must be sought from the Committee of Management.

Priority and Action	
Medium	Monitor the impacts of orienteering and rogaining.

5.7.4 Horse riding

Low levels of activity were observed within the DBR up to 1992, and have rarely been noticed since. Whatever the frequency of use, the ecological impact of this activity could be considerable, and should probably be discouraged

Strategy

- Horse riding should not be permitted anywhere within the DBR.

Priority and Action	
Medium	Prohibit the horse riding in the DBR, and to ensure that all potential users are aware of this fact.

5.7.5 Trail bike riding and four wheel drive vehicles

Relatively small numbers of riders and drivers used the DBR prior to 1992, and impacts do not appear to have been significant. However, there is considerable scope for higher levels of usage of the DBR with improved profile, and there is also considerable potential for off-track riding and driving (i.e. in Zone 4). Given the potential ecological and conservation impact of such activities, they should be prohibited within the boundaries of the DBR.

Strategy

- To prevent the usage of the DBR for these activities.

Priority and Action

High	To ensure that entrances to the DBR are appropriately signed to deter usage, and that appropriate information on this aspect of management is including on any pamphlet or guide.
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5.7.6 Hunting and Shooting

There has never been any direct regulation or management of shooting or hunting in the DBR area. College residents must possess a gun permit to allow shooting/possession of a firearm on Campus. All firearms are kept in one central locked area. Those persons wishing to shoot currently must seek the permission of the Farm Manager before any shooting/hunting is undertaken. Under these constraints, the Dookie College Gun Club has occasionally used the DBR area for organised events. By-and-large, Gun Club members have been extremely responsible and willing to undertake pest animal control activities in the DBR upon request.

However, beyond this control of usage, there is considerable evidence that indiscriminate shooting has occurred and is still occurring within the DBR from persons not associated with the College. These activities conflict with the conservation objectives of the DBR, and are also a potential threat to the safety of recreational users.

Shooting at the Rifle Range should remain under the present appropriate management and usage. However, a better system of visually warning Rifle Range usage (i.e. a prominent flag at either end of the Northern Track) would prevent recreational and other DBR users straying into the line of fire. There have been a number of close calls with persons exiting the DBR eastward along the North Track when the flags have not been displayed.

Strategy

- Shooting and hunting will not be permitted within the DBR. The need for pest animal control will be assessed by the Committee of Management, and requests for assistance for management purposes to organised groups will be made when appropriate.
- The need for control of Eastern Grey Kangaroos will be assessed by formal annual population counts, and if control is required, Wildlife Destruction Permits will be sought.
- To allow continued usage of the Rifle Range under current arrangements.
- For Rifle Range use to be visually indicated in the vicinity of the Northern Track by some form of warning system (i.e. by flags).

Priority and Action	
Very High	To erect appropriate signage indicating the regulations regarding shooting/hunting in the DBR, and to include such information in any literature generated.
Very High	To provide visual warning of Rifle Range use for DBR users.
Very High	To monitor the population levels of Eastern Grey Kangaroos, and if population levels exceed the defined carrying capacity of 100 individuals, seek a Wildlife Destruction Permit from DNRE.
High	To monitor the presence/absence of feral animals within the DBR, and if appropriate, approach organised groups to assist with control.

5.8 Information and Interpretation

There is now both a general DBR information pamphlet (available at College reception), and an Information Board (on the western boundary of the DBR) developed, that collectively provide a reasonable level of information to visitors. The Rangers currently provide interpretation for visiting groups on a needs basis. These services, and more detailed information proposed to be developed in the future, will promote more understanding and enjoyment of the DBR, and should assist in the future management of the Reserve by the education of the visitors and the community of its values.

Strategies

- Information about the DBR and the Nature Trail, in the form of a pamphlets, should be made available within the DBR at the Information Board, and at the Dookie College administration.
- Information and interpretation services through the Rangers continue to be provided for the DBR.

Priority and Actions	
Very High	Provide the Information pamphlet at the Information Board, as well as at College administration and reception.
Very High	Develop a guided Information sheet for the Nature Trail.
High	Erect signs at vehicle access points to the DBR indicating restriction of access.

Medium	Erect Track name signs at the commencement of, and within the DBR.
Low	Develop a guide to the flora and fauna of the DBR in booklet and/or multimedia form.

5.9 Education

The DBR, as discussed previously, has experienced greater utilisation for tertiary education since 1994, however, this can and will be increased in the future.

It is important that the DBR be fully utilised as an multidiscipline educational resource of the highest quality. In addition, there will be opportunities for students to take part in staff research projects undertaken within the DBR, and for undergraduate, honours and post-graduate research projects.

Students usage of the area will engender a feeling of "ownership" of the DBR, and may assist in the enforcement/patrol aspects of DBR management.

Strategy

- Continued and enhanced educational use of the DBR will be encouraged in current and future programs at Dookie College.

Priority and Actions	
High	Encourage the usage of the DBR by the Higher Education undergraduate and post-graduate and TAFE programs offered by the College, as well as by secondary and primary students.
Medium	Monitor the impacts of educational activities.
Low	Establish student interest in the Management aspects of the DBR.

5.10 Resource utilisation and other activities

Many of the resource utilisation activities undertaken in the past conflicted with the primary conservation and recreational objectives of the DBR. None of these activities are now permitted.

5.10.1 Stock access/Farm activities

Traditionally, the whole DBR area has been used for grazing, with some areas being cropped or amended with fertilisers. These usages were not compatible with conservation objectives. Farm Management has requested that sufficient access points

be provided in the perimeter fence to easily retrieve stock that have gained access to the DBR, and this has mostly been provided. This particularly refers to the south-western corner of Paddock 29 where a gate is now situated.

There have been few breaches of the feral animal fence since its completion, however, there have been some problems with the current flow over the whole 7.5 km perimeter of the fence, and these need to be properly evaluated and permanently solved.

Strategies

Grazing, cropping and amendment will not be permitted in the Zones 1, 2 and 3 of the DBR. These zones will not be available for access by farm staff or for the transportation/movement of stock.

Limited off-shears grazing will be permitted in Zone 4 and 5. No cropping or amendment will be permitted. The continued presence of grazing in Zones 4 and 5 is to be negotiated with Farm management. If grazing is to continue in these zones, strategic areas of regeneration/revegetation should be fenced-off from stock.

Priority and Actions

Very High	Maintain communication and negotiate with Farm staff regarding the future of grazing activities in Zones 4 and 5.
High	Continue to monitor the effects of grazing removal in Zones 1-3.

5.10.2 Dead Animal Pit

As previously stated, the Dead Animal Pit has been filled-in, and re-located to an area off the DBR area. The area has been greatly disturbed over many years, and revegetation is required.

Strategy

- Rehabilitate and revegetate the site.

5.10.3 Apiculture

Both the Dookie College Bee Club and private apiculturists used the DBR area up to 1993. Ecological studies have indicated that apiculture conflicts with the conservation of indigenous fauna, and these activities were prohibited in the previous Management Plan (Hamilton 1993).

Strategy

- Continued prohibition of apicultural activities in the DBR.

5.10.4 Wood cutting and harvesting

Dead timber (including standing dead trees) act as habitat for many fauna. Its removal results in loss of habitat and ultimately, diversity for significant species such as the Bush Thick-knee, reptiles and other species. Management must be aimed at habitat retention and restoration. In addition, dead timber does act as a reservoir pool for the supply of nutrients within the forest ecosystem, and the loss of this timber will result in gradual nutrient depletion.

Wood cutting and harvesting have been traditional activities within the DBR area up to 1993, and were prohibited within the area in the previous Management Plan (Hamilton 1993).

Enforcement of this prohibition has been difficult, and the one well-known major breach has been previously discussed. It is likely that there will be occasional wood collection by College residents and others. The best form of preventing this is by education on the reasons why such collection is damaging to the conservation values of the DBR.

Strategies

- Timber harvesting, or wood extraction will not be permitted in the DBR.
- There is a need to educate potential wood collectors on the reasons for management decisions, which should be emphasised in any information developed for distribution.

Priority and Action

High	Widely advertise amongst the College community the rules governing wood collection, and the management basis for the rules.
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5.10.5 Gravel extraction

The Quarry on the Inner Track has not been used for several years, and is an unsightly element of the DBR landscape. Gravel extraction through strip mining has occurred in several areas throughout the DBR in the past, and in areas where practised, has been a major localised ecological disturbance. Areas stripped mined in 1972 and in more recent times within the DBR are depauperite floristically, and are highly unlikely to be restored to anything approaching pre-mining condition. The Management Plan (Hamilton 1993) recommended that gravel extraction in the DBR and use of the Quarry not be permitted, and this prohibition should remain.

Strategies

- Gravel extraction/quarrying will not be permitted in the DBR.
- Areas affected by past activity should be rehabilitated.

Priority and Action	
High	Rehabilitate the Quarry on the Inner Track as far as practicable. Ground shaping will not be an option, however, revegetation and regeneration should be encouraged.

5.10.6 Defence exercises

The Army has used the DBR area several times for field exercises, the most recent time being in June, 1993. While damage has not been significant, and some improvements to roads, dams, etc. have been carried out by the Army while in the DBR vicinity, usage resulting in soil disturbance, vehicular access, camping, etc. by the Army or usage by other organisations is not compatible with conservation objectives. The restrictions on access placed on movement while exercises are occurring, while necessary for safety reasons, are not in accordance with recreational, educational and research objectives.

Strategy

- Army/defence forces exercises will not be permitted in the DBR area.

5.10.7 Mineral exploration and mining

There is no evidence that these activities have occurred within the DBR. These activities would not be compatible with the conservation and landscape objectives of the DBR. There is doubtless a mining claim on the College area, given that Mt. Major is a known source of various minerals and metals, including iron ore, nickel and titanium, and has been the subject of several mineral surveys, the latest in 1993. However, the DBR area is of a different geological history, and would not be a likely source of these minerals.

Strategy

- To prevent, if possible, any future threat of mining or mineral exploration.

Priority and Action

Low	To ascertain the status of any mining claim(s) on the DBR area, to establish the likelihood for mineral exploration and mining.
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5.10.8 Transmission Lines

Clearing by grazing or slashing underneath the Transmission lines is a requirement of management. If grazing is removed permanently from this zone, then slashing or some other management actions will be required to meet this requirement. This should enable clearing underneath the lines to be maintained. Some areas in Zone 5 will be revegetated or regeneration promoted. These areas will have to be clear of the Transmission lines.

There is little potential for reducing the visual impact of the lines on the northern sections of the DBR.

Strategy

- To maintain grazing as a practice to allow clear area under line, or if grazing is removed permanently from this zone, then alternative management practices will need to be employed to keep vegetation low.
- To ensure that any revegetation or regeneration work will not impinge on the cleared area underneath the lines.

5.11 Boundaries

There are a few boundary issues in regard to the DBR. Significant areas of regeneration exist on the western and southern areas adjacent to the DBR. As previously stated, it is possible that Paddocks 30 and 31, and sections of Paddocks 25 and 27 may be permanently excluded from grazing, again subject to negotiation with Farm Management. These potential actions should be pursued to provide what would be useful “buffer” areas to the DBR.

The other areas in Paddocks that maintain clumps of mature trees to the north and south of the DBR will act as linkage points in a corridor between the DBR and Mt. Major, and the DBR and the Broken River. Some progress has already been made with areas to the south of the DBR.

Strategies

- To pursue the removal of grazing from Paddocks 30, 31, and parts of Paddocks 23, 25 and 27.

- To continue to develop shelterbelts and clumps of mature trees in adjacent Paddocks as linkage sites in corridor works between the DBR and Mt. Major and the Broken River.

Priority and Action	
High	To negotiate with Farm staff the future of grazing in Paddocks 30, 31, 23, 25 and 27.
Medium	To continue the set-up of linkage areas for habitat corridors.

6. Management and Resources

Up until 1992, there had been little direct management of the DBR. Farm staff dealt with problems, however this was often been on a need-to basis, rather than involving a process of forward planning and conservation management.

A specific Committee of Management was established after the publishing of the original Management Plan (Hamilton 1993). This Committee was envisaged to be directly responsible for all aspects of DBR management and usage at College level. This Committee of Management was proposed to be a group of no more than eight individuals:

- Three members of Dookie Resource Management staff;
- Principal VCAH Dookie;
- VCAH Dookie Farm Manager;
- One representative from DCNR Regional staff;
- One representative from DAV (Department of Agriculture Victoria) Regional staff;
- One representative from the Victorian National Parks Association.

In reality, this Committee met only twice, both in 1994. Meetings ceased when there was a reluctance by College staff to be involved in such a forum. It was impossible to attract the Industry and community group representatives to meetings, even after considerable effort. From 1994, issues and decisions on the management of the DBR were made by NRM academic staff, and this is the current management arrangement.

Management development works have mostly relied on external project funding, such as the National LandCare Program, Tree Victoria and the Greening Australia Corridors of Green program. Labour for works has been provided from a variety of sources. The LandCare and Environment Action Program (LEAP) program provided participants over the period 1993/94, with the completion of the feral animal fence their major project. An number of Australian Trust for Conservation Volunteers (ATCV) and GreenCorp groups have spent week-long stints over 1994-1997 engaged in management activities such as fencing and weed control.

Regular programs for seed collection, propagation, fencing, revegetation, and weed and pest animal management have been incorporated into various subjects presented in the NRM programs at Dookie, and so limited curriculum funding has supported these educational outcomes, as well as providing a basis for a regular works program.

Patrol of tracks, routine maintenance of the feral animal fence, and general observation and enforcement duties have become the role of the part-time Rangers. While these aspects cannot be done as adequately as desirable on the very part-time basis under which they are employed, they have provided a regular management influence that has generally worked well. The tour and interpretation role undertaken by the Rangers has been highly successful for profiling the DBR, as well as giving individual Rangers valuable experience with a diversity of groups. These dual roles should continue, and the valuable contribution made by the funding of these positions provided by the Campus Residential Manager must be maintained.

In 1999, there is a move to place the management of the DBR on the same footing as the agricultural enterprises on the College and within ILFR: that is to put together a Bushland Reserve Liaison Committee that would oversee the management of the DBR in the same way as the original Committee of Management was supposed to. This Liaison Committee will likely be drawn from a variety of Dookie and ILFR management staff, the Farm Manager and community representatives.

In addition, with the DBR now being private land, there is a strong basis for the covenanting of the DBR area to ensure perpetuity in conservation management. This is a process facilitated by the Trust for Nature Victoria (TFN; formerly the Victorian Conservation Trust), and involves the drafting of specific legislation at State level to change the land status. This type of process clearly requires full UoM involvement, and to date, there have been some preliminary discussions at regional and College level only. Such a change in land status will provide prescriptions for management that will be negotiated with the TFN. It is unlikely that the recommendations and actions specified in this Plan will contradict these prescriptions to any great extent. Some revision of the Plan before the next review period may be required to support and promote such changes.

The development of a Liaison Committee is crucial in the cultivation of future relationships with a range of groups, such as Green Corp, TFN, Greening Australia – Victoria, DNRE and the Goulburn-Broken CMA, in the implementation of a range of the priority actions outlined in this Plan, many of which involve a research and monitoring component. To this end, there is considerable scope for the development of such partnerships in the use of the DBR in the development and formulation of Best Management Practices (BMP's) for grassy woodlands in northern Victoria. Such BMP's are not readily available from regionally published research, and would be an invaluable tool in the management of remnant vegetation in south-eastern Australia.

Strategies

- That a DBR Liaison Committee be formed and meet periodically to consider management issues and future directions;

- That the DBR Liaison Committee negotiate with the TFN regarding the feasibility of a conservation covenant for the DBR;
- Strategic partnerships be formed by the DBR Liaison Committee with relevant groups to assist in the implementation of priority actions and the formulation of BMP's for grassy woodlands using the DBR as a case study;
- That resourcing for major management development works be based around external funding and special projects;
- That the routine works programs be maintained as part of the NRM curricula given that they still provide valuable educational outcomes;
- The role of the part-time Rangers continue, and that funding provided by the Campus Residential Manager for this purpose is maintained.

Priority and Action

Very High	The establishment of a DBR Liaison Committee to implement the above strategies, and the objectives and priorities outlined in the Management Plan.
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7. Research and Monitoring

This section is presented as a priority summary of research and monitoring specified throughout the Plan. Reference should be made to earlier sections for the detail of each item involved.

Research Priority

Very High	Investigate the status, distribution, ecology and biology of fauna and flora in the DBR, with a special emphasis on those species of significant conservation status or of other special interest.
High	After consideration of the distribution of species within the DBR, to determine the management requirements of important species or communities.
Moderate	Conduct studies into the effects of various types of management (i.e. fuel-reduction burning, ecological grazing, etc.) on ecosystem floristics, faunal distribution and nutrient dynamics.

Monitoring Priority	
Very High	Monitor the distribution of major weed species.
Very High	Monitor the population levels of feral animals and Eastern Grey Kangaroos.
High	Monitor the population levels and distribution of significant animal and plant species.
High	Monitor the unauthorised use of the DBR for various resource utilisation activities and their impact, including: vehicular traffic, shooting and hunting, apiculture, rubbish dumping, gravel extraction, wood extraction and harvesting, seed and plant material collection and grazing.
Moderate	Monitor levels and type of recreational use of the DBR.

8. Priority Actions

Throughout the Plan, actions have been listed under various categories of priority, ranging from Very High to Low. While all actions specified are important, Very High priority tasks should reasonably be undertaken within 12 months of Plan implementation. Due to past experience, no timelines are set for lower priority actions, as staffing and management often proved to be major limitations to progress of these. Lower priority tasks should be undertaken within the lifetime of the Plan when funding, time and labour permit. The Very High priority tasks from throughout the Plan are listed in the table below.

<i>Activity</i>	<i>Action</i>	<i>Timeline for completion</i>
DBR Management	The establishment of a DBR Liaison Committee to implement the above strategies, and the objectives and priorities outlined in the Management Plan	March 2000
Research	Investigate the status, distribution, ecology and biology of fauna and flora in the DBR, with a special emphasis on those species of significant conservation status (VROT's).	On-going
	To develop and formulate Best Management Practices for the management of the grassy woodlands of the DBR, which would also be of value to similar remnants in southern Australia.	On-going
Management of vegetation	To encourage natural regeneration of the indigenous vegetation by the strategic removal of weeds, and to augment natural regeneration using direct seeding and other revegetation methods using local provenance.	On-going

<i>Activity</i>	<i>Action</i>	<i>Timeline for completion</i>
Management of vegetation (cont.)	Develop weed distribution maps for the major weeds in the DBR, and use these maps as a basis for the continuing management of the major weed species. To prevent weed infestation from the DBR to adjacent farmland.	December 1999 and on-going
	Revegetation of the Old Tip site, Quarry and former Dead Animal Pit areas.	August 2000 and on-going
Soil conservation works	Soil conservation works in the area of the junction of the Inner and Southern Tracks to prevent further gullyng. Further work required along parts of Southern Track.	December 2000
Animal management	To maintain by regular weekly inspection, and improve the level of control of, the feral animal fence.	Weekly and on-going
	To eradicate feral animals from the DBR using shooting, trapping and baiting techniques by management programs undertaken on a twice-a-year basis.	Bi-annual and on-going
	To exclude shooting, except by management arrangement, from the DBR area.	On-going
	To ensure that the existing stock fence surrounding Zone 4 (Paddock 42) is in good condition to prevent accidental stock grazing in other Zones. This action to be reviewed if grazing is excluded permanently.	On-going
Interpretation and information	To maintain and further develop the short distance self-guided nature trail with the appropriate information available (as an information sheet).	December 1999
	To erect appropriate signage indicating the regulations regarding shooting/hunting in the DBR, and to include such information in any literature generated.	June 2000
	To provide visual warning of Rifle Range use for DBR users.	On-going
	Provide the Information pamphlet at the Information Board, as well as at College administration and reception.	December 1999
	Develop a guided Information sheet for the Nature Trail.	December 1999
Grazing management	To monitor the population levels of Eastern Grey Kangaroos, and if population levels exceed the defined carrying capacity of 100 individuals, seek a Wildlife Destruction Permit from DNRE.	On-going
	Maintain communication and negotiate with Farm staff regarding the future of grazing activities in Zones 4 and 5.	December 1999 initially and on-going

9. References

- Aldridge, R. (1986), *Dookie College: The First One Hundred Years*. Globe Press, Melbourne.
- Bennett, A. (1990), *Habitat Corridors: their role in Wildlife Conservation and Management*. Department of Conservation and Environment.
- Boland, D.J., Brooker, M.I.H., Chippendale, G.M., Hall, N., Hyland, B.P.M., Johnston, R.D., Kleinig, D.A. and Turner, J.D. (1984), *Forest Trees of Australia*, Thomas Nelson and CSIRO, Melbourne.
- Calder, D.M., Calder, J. and McCann, I.R. (1994), *The Forgotten Forests. A Field Guide to Victoria's Box and Ironbark Country*. Victorian National Parks Association, Melbourne.
- Chapman, A.D. (1991), *Australian Plant Name Index*, Australian Flora and Fauna Series Number 12. AGPS, Canberra.
- Cogger, H.G. (1996) *Reptiles and Amphibians of Australia*, 5th edition. Read Press, Sydney.
- Costermans, L.F. (1994) *Native Trees and Shrubs of South-eastern Australia*, 3rd edition, Rigby, Hong Kong.
- Department of Conservation and Environment (1992), *Draft Conservation Program for Native Grasslands and Grassy Woodlands in Victoria*. Victorian Government Publishers, East Melbourne.
- Department of Conservation and Environment. Unpublished Sheep Pen Creek Catchment Flora List. DCE Regional Flora Information System as at 3.8.92.
- Department of Conservation and Environment. Unpublished Summary of Fauna of the Dookie Agricultural College and Surrounds as at 20.11.92. Wildlife Section, Arthur Rylah Institute, Department of Conservation and Environment.
- Department of Conservation, Forests and Lands (1987), *Reef Hills Park Management Plan*. Benalla Region, Department of Conservation, Forests and Lands.
- Department of Conservation and Natural Resources (1994) *Victorian Flora Species List October 1994*. Flora Section, Department of Conservation and Natural Resources, Heidelberg, Victoria.
- Downes, R.G. (1949), *A Soil, Land-use, and Erosion Survey of Parts of the Counties of Moira and Delatite, Victoria*, CSIRO, Melbourne.
- Envall, R., Feldtmann, N., Law, M., McManus, P., Roberts, W. and Treacy, M. (1988), *Dookie: The Years to 1988*. S.M. and T.A. Williams, Shepparton.

- Frood, D. (1983), *The Vegetation of the Murray Valley Study Area*, Unpublished report to the Land Conservation Council of Victoria.
- Goulburn Broken Catchment Management Authority (1999), *Goulburn Broken Native Vegetation Management Strategy*. Goulburn Broken Catchment Management Authority, Shepparton.
- Gullan, P.K., Cheal, D.C. and Walsh, N.G. (1990), *Rare or Threatened Plants in Victoria*, Department of Conservation and Environment, Victoria.
- Hamilton, S.D. (1993), *Dookie Bushland Reserve Management Plan*. VCAH Dookie.
- Hamilton, S.D. (1995), *The Dookie Bushland Reserve*. Land for Wildlife News 2(9) 6-8.
- Hamilton, S.D. (1999), *The Public Land Grassy Woodlands of the Dookie Region in Northern Victoria*. Unpublished final report prepared for the National Estate Grants Program of the Australian Heritage Commission. University of Melbourne, Dookie College.
- Hamilton, S.D., Dettmann, P.D. and Curtis, A.L. (1997), *Landholder Perceptions of Remnant Vegetation on Private Land in the Box-Ironbark Region of Northern Victoria*. Technical Report produced for LWRRDC and Environment Australia. University of Melbourne, Dookie College.
- Hero, J., Littlejohn, M. and Marantelli, G. (1991), *Frogwatch Field Guide to Victorian Frogs*. Department of Natural Resources and Environment, Melbourne.
- Hnatiuk, R.J. (1990), *Census of Australian Vascular Plants. Australian Flora and Fauna Series Number 11*. Bureau of Flora and Fauna, Canberra.
- Hunter, D. (1997), *The herpetofauna of the Dookie Bushland Reserve*. Unpublished report, University of Melbourne, Dookie College.
- Isbell, R.F. (1993). *A Classification Systems for Australian Soils: 3rd Approximation*. CSIRO Division of Soils Technical Publication 2/1993.
- Land Conservation Council (1983), *Report on the Murray Valley Study Area*. Land Conservation Council, Melbourne.
- Lunt, I.D., Barlow, T.J. and Ross, J.R. (1998) *Plains Wandering. Exploring the Grassy Plains of South-eastern Australia*. Victorian National Parks Association and Trust for Nature Victoria, Melbourne.
- Marriott, N. and Marriott, J. (1998), *Grassland Plants of South-eastern Australia*. Bloomings Books, Hawthorn, Victoria.
- Menkhorst, P. (ed.) (1995), *Mammals of Victoria. Distribution, Ecology and Conservation*. Oxford University Press, Melbourne.

Morgan, D. (1986), *Estimating Vertebrate Population Densities by Line Transect methods*, Occasional Paper No. 11. Melbourne College of Advanced Education.

Muir A.M., Edwards S.A. and Dickins M.J. (1995) *Description and Conservation Status of the Vegetation of the Box-Ironbark Ecosystem of Victoria*. Flora and Fauna Technical Report 136. Department of Conservation and Natural Resources, Melbourne Victoria.

Northcote, K.H. (1983), *A Factual Key for the Recognition of Australian Soils*, 4th edition, Rellim Technical Publications, Glenside, S.A..

O'Brien, B. (1992), *VCAH Dookie Whole Farm Plan*. VCAH Dookie.

Rowley (1961), *Birds of Dookie Agricultural College Victoria*, *Emu* **61**, 7-17.

Sadler, G.S. (1993), *The soils of the Dookie area*. Unpublished paper, VCAH Dookie

Simpson, K. and Day, N. (1998), *Field Guide to the Birds of Australia*, 5th edition. Viking O'Neill.

VCAH Dookie (1992). Unpublished weather data.

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Appendices

The Appendices contain lists of the flora and fauna for the DBR.

The flora list contain a number of items of information: the Scientific and Common Names of each species listed, according to the most recent taxonomic nomenclature (as listed in the Appendix caption), the Flora Information System (FIS) Identification number (DCNR 1994), and the Conservation Status (if any) of species listed (Gullan *et al.* 1990). The scientific names of introduced plants are indicated with an asterisk. Total numbers are provided for vascular plant species, indigenous and introduced species, and vulnerable, rare or threatened (VROT) species.

The fauna lists contain: the Scientific and Common Names of each species listed, according to the most recent taxonomic nomenclature (as listed in the Appendix caption), and the Conservation Status (if any) of species listed. The scientific names of introduced fauna are indicated with an asterisk. Total species numbers are provided for each faunal group, introduced species, and vulnerable, rare or threatened (VROT) species.