# Mokota Conservation Park Management Plan

## Mid North

June 2003

Government of South Australia

Department for environment and heritage

# Our Parks, Our Heritage, Our Legacy

Cultural richness and diversity are the marks of a great society. It is these qualities that are basic to our humanity. They are the foundation of our value systems and drive our quest for purpose and contentment.

Cultural richness embodies morality, spiritual well-being, the rule of law, reverence for life, human achievement, creativity and talent, options for choice, a sense of belonging, personal worth and an acceptance of responsibility for the future.

Biological richness and diversity are, in turn, important to cultural richness and communities of people. When a community ceases to value and protect its natural landscapes, it erodes the richness and wholeness of its cultural foundation.

In South Australia, we are privileged to have a network of parks, reserves and protected areas that continue to serve as benchmarks against which we can measure progress and change brought about by our society. They are storehouses of nature's rich diversity, standing as precious biological and cultural treasures. It is important to realise that survival of species in 'island' reserves surrounded by agriculture or urban areas is uncertain, and that habitat links between reserves are essential for their long-term value as storehouses.

As a result of more than a century of conserving nature and cultural items, we possess a "legacy" which is worth passing on to future generations.

There are twelve essentials for the protection of our park environments:

- Recognition that a primary purpose of our national parks system is to conserve the wide diversity of South Australia's native plants and animals and to improve their chances of survival through active wildlife management.
- Recognition that all our parks also protect cultural legacy of relevance to both Indigenous and Non-indigenous people, and that Indigenous people have had cultural association with this land over many thousands of years.
- Freedom to improve our legacy by making additions to the park system -- enhancing existing protected areas and including landscapes and environments containing native plant and animal communities not already protected.
- Realisation that the continuance of our native species cannot be dependent upon island reserves alone but should be provided for in a regional landscape with linkages between natural areas to enhance the prospect of long-term survival.
- Recognition that there is potential for new and useful substances or genetic material to be found in native plant and animals.
- Recognition of economic and social benefits for local communities, which arise from the presence of national parks in their region and the consequent opportunities to offer service for visitors.
- Development of close relationships with the community, so that there is an understanding of the role of parks in conserving native wildlife, cultural items and in providing recreational opportunities.
- Promotion of community participation in making decisions on the management of parks, so that a sense of community ownership of the reserve system may be fostered, and so that parks and surrounding landscapes are managed in harmony.
- Appreciation that those qualities presented to visitors for their use and enjoyment in parks, should be the diversity of plants, animals and landscapes for which the parks were set aside.
- Understanding that development in a park should proceed where it :
  - contributes to the conservation of the environment;
  - provides for better appreciation of the need to conserve the diversity of plants and animals;
  - protects wildlife habitats and landscape (especially vulnerable and threatened species or communities); and
  - is necessary for management of the park.
- Reassurance, in support of our cultural character, that natural areas can survive even though those who care deeply for their survival may never visit them.
- Provision of valued natural areas for people to be at one with nature and for personal and spiritual refreshment.

# MOKOTA CONSERVATION PARK MANAGEMENT PLAN

**Mid North** **South Australia**

June 2003

Department for Environment and Heritage

This plan of management has been prepared and adopted in pursuance of Section 38 of the *National Parks and Wildlife Act 1972*.

Government of South Australia

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Cover Photo: Blue Devil (*Eryngium rostratum*), courtesy of Yvonne Steed

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## FOREWORD

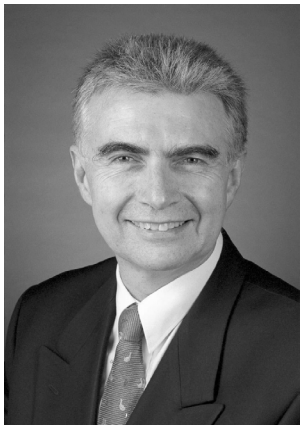
Mokota Conservation Park was the first reserve in South Australia to be acquired with the priority aim of protecting a native grassland. Hard Mat-rush (*Lomandra multiflora* ssp *dura*) tussock grasslands are endemic to South Australia and were once widespread in the North Mount Lofty Ranges. Unfortunately, they are now a threatened community and few undisturbed examples can be found today.

Grassy ecosystems have tended to be overlooked when building the reserve system, perhaps because they may not appear as visually attractive as forests or deserts, although they provide important habitat for species of plants and animals that are not found elsewhere. Consequently, Mokota Conservation Park's 455 hectares are fulfilling a very important conservation role and the park provides an ideal venue for acquiring scientific knowledge on the best way to manage native grasslands. If we are to retain the biodiversity of this park, ongoing, active management may well prove to be necessary.

Given the relative rarity of native grasslands, there has been considerable interest in conservation circles as to the future of Mokota Conservation Park and a number of persons have contributed to the development of this plan of management. That strong commitment, enthusiasm and helpful suggestions are gratefully acknowledged. The park can be an important focus for raising broader public awareness of the need to preserve this type of ecosystem.

This plan of management is the first to be adopted for the park. It outlines a series of objectives and actions for the future use and management of what is, I believe, a most significant biodiversity asset. The actions in the plan are intended to facilitate the implementation of high quality conservation programs to ensure this example of an increasingly rare habitat type is retained for posterity.

I now formally adopt the plan of management for Mokota Conservation Park under the provisions of section 38 of the *National Parks and Wildlife Act 1972*. I would encourage you to read the plan and visit and enjoy this special park.



**JOHN HILL**

**MINISTER FOR ENVIRONMENT AND CONSERVATION**

## SYNOPSIS

This management plan is the first for Mokota Conservation Park, located 15 kilometres north of Burra, in the North Mount Lofty Ranges of South Australia. The park is managed by the Mid North District Office of the Yorke Mid-North Region of the Department for Environment and Heritage (DEH). The park was first proclaimed on 26 October 2000 and was established to conserve 455 hectares of native grassland that had a long history of light winter stock grazing.

Mokota Conservation Park is the first example of Hard Mat-rush (*Lomandra multiflora* ssp *dura*) tussock grassland to be included in South Australia's reserve system. This plant community was formerly very widespread in the state's Mid-North but has largely been cleared for cropping, or greatly modified. The park includes grassland areas of unusually high quality - those with an open structure, gaps between the dominant plant species, an intact soil crust and diversity in native plant species and life forms. Due to the park's size, management history and diversity of habitat, it contains more than 150 indigenous plant species, including 32 of particular conservation significance under the South Australian *National Parks and Wildlife Act 1972*. Most surviving grassland remnants of high quality in the region are of very small size; therefore this area is exceptional.

The park was acquired in 1999 through the Natural Heritage Trust's National Reserve System Program which aims to make Australia's conservation reserve system representative of the range of ecosystems that exist on the continent and adequate to conserve them.

The area is also of educational and scientific value and its major uses since acquisition have been natural history exploration and education. The number of visits to the park by the public should be monitored, but is expected to be low due to the absence of spectacular natural features, trees and permanent water.

No heritage sites have been identified, but cultural heritage values have yet to be investigated.

The major management goal is to ensure that the quality of the native grassland and its range of biodiversity values are maintained and improved, following the change in land use from grazing to conservation. The area was formerly freehold land and had been grazed for over one hundred years before pastoral use ceased in late 1998. The condition of the grassland is patchy. Vegetative cover is a mixture of indigenous and alien flora in varying proportions, ranging from predominantly indigenous to predominantly alien. Grasslands are generally known to be highly dynamic ecosystems, many being dependent on periodic and appropriate disturbance (eg. fire) to maintain their structural and floristic richness. In this example, stock grazing was a form of disturbance, at least since the 1860's. The area continues to be grazed, mostly by Western Grey Kangaroos (*Macropus fuliginosus*) and Euros (*Macropus robustus*).

The main potentially threatening process is increasing dominance of plant species such as dominant native grasses and/or some alien species, or substantial build up of plant litter leading to loss of an open grassland structure. This would decrease the range of microhabitats available and some smaller plants could be threatened. This threat will be addressed through the ecological management of fire and / or grazing in a mosaic pattern to cater for different species and condition. However, much additional information is needed to enable such management, and acquisition of information is a major strategic direction for Mokota. There is a need to apply adaptive management techniques as research findings come to light.

To conserve the park's biodiversity, management will pursue the following goals:

- Maintain the structure and condition (high diversity of native plant species, low weed biomass) of the better quality sections of native grassland.
- Conserve populations of species that are of particular regional, state, or national conservation significance.
- Encourage regeneration of native grassland plant species that are sensitive to overgrazing and currently in small populations in the area.
- Encourage natural regeneration of indigenous plant species in the more degraded sections of native grassland that are dominated by alien plants and have few native plants.
- Conserve native fauna habitat.

Due to the park's small size and sensitive vegetation, public vehicle access, built facilities and camping are not judged to be sustainable and will not be permitted.

To achieve the major management goals, this plan recommends the following key actions:

- Monitor plant biodiversity as indicated by cover and density of dominant species (particularly tussock grasses), the presence of gaps between tussocks, population size of threatened species, plant litter and the persistence of all native species. Trends in cover of alien species and the persistence of native species in the more degraded patches should be monitored.
- Implement a trial to investigate and demonstrate the impact of continued light seasonal grazing. Investigate in detail through consultation with the previous landowner the intensity, timing and duration of grazing and fertilising over the past twenty or more years. Measure the outcomes of the trial quantitatively.
- Management tools such as fire, grazing, slashing and the application of selective herbicides will also be employed on an experimental basis. If these trials and monitoring indicate that such disturbance is required to maintain an open grassland structure and retain diversity of native species, larger scale implementation will be considered.
- Investigate and monitor native fauna including invertebrates.
- Assess the impact of macropods by erecting suitable exclosures. Manage native macropod populations, to prevent overgrazing.
- Manage visitors – information and parking will be provided on the northern boundary. DEH will signpost the park and install posts to guide visitors on a short informative walk from the carpark.

The park's small size may also threaten the survival of some species if they are unable to maintain a viable population size. Conservation management of other native grasslands in the region should be pursued by way of cooperative partnerships.

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## ABBREVIATIONS AND GLOSSARY OF TERMS

ALRM: Aboriginal Legal Rights Movement

Alien species: A plant or animal species that is not native to the area.

Biomass: The total mass of a set of living organisms (eg plant species) present in an ecosystem or area.

CARRS: Comprehensive, Adequate, Representative Reserve System

CFS: Country Fire Service

DEH: The Department for Environment and Heritage

DEHAA: The (former) Department for Environment, Heritage and Aboriginal Affairs

DENR: The (former) Department of Environment and Natural Resources

DAARE: Department for Aboriginal Affairs and Reconciliation

Forb: Non-grass, herbaceous species, eg. daisies and lilies.

GETAG: Grassy Ecosystem Technical Advisory Group

GIS: Geographic Information System

IBRA: Interim Biogeographic Regionalisation of Australia

IUCN: International Union for Conservation of Nature and Natural Resources (The World Conservation Union)

MNGWG: Mid North Grassland Working Group

Nature Foundation SA: Formerly National Parks Foundation of South Australia

NCSSA: Nature Conservation Society of South Australia

TPAG: Threatened Plant Action Group of the Threatened Species Network

## ACKNOWLEDGEMENTS

The draft version of this plan of management was prepared by the consultant planner, Meg Robertson with assistance from Reserve Planning Unit, DEH. It was edited to final form by consultant planner, Alex McDonald and staff at Reserve Planning.

The significant contribution of the staff of the Yorke Mid-North Region, Department for Environment and Heritage is acknowledged.

The valuable assistance received from other groups and individuals, who at various times provided information or comment, is also acknowledged. Those persons either provided informative pre-draft comments or made written submissions when the draft plan was out on public exhibition. The final plan, as adopted, has benefited from that input.

# 1 INTRODUCTION

This management plan has been prepared in accordance with the *National Parks and Wildlife Act 1972*.

Section 38 of the Act states that a management plan is required for each reserve. A management plan should set forth proposals in relation to the management and improvement of the reserve and the methods by which it is intended to accomplish the objectives of the Act in relation to that reserve.

Upon completion of a draft plan an announcement is made in the Government *Gazette* and the plan is placed on public exhibition for three months. During this period, any interested persons may make submissions, which are then referred, with the plan, to the South Australian National Parks and Wildlife Council for their comments and suggestions.

Having formal community input into public land management is a requirement of the legislation and supported by park managers. The consultation process undertaken for Mokota Conservation Park included a community meeting that was well attended.

The draft plan was released for public exhibition in June 2001. At the close of the comment period, four written submissions had been received. From the points made in submissions, most interest centered on the need for active management to maintain biodiversity and for ongoing community involvement in the management of the park. All the submissions were considered by members of the Yorke Consultative Committee before being forwarded to the SA National Parks and Wildlife Council (after review by the Reserve Planning and Management Advisory Committee).

The Minister, after considering all representations, may then adopt the management plan with or without alterations. In the case of the plan for Mokota Conservation Park, a number of alterations have been incorporated as a result of the community consultation process. Notice of such official adoption is published in the Government *Gazette* and copies of the final plan are made available for sale to the public.

Once a plan of management is adopted, its provisions must be carried out in relation to the reserve in question and no actions undertaken unless they are in accordance with the plan. However, the Act does make provision for amending adopted plans and this process is similar to the one described above.

This document is the first management plan for Mokota Conservation Park. This reserve is located in the North Mount Lofty Ranges, and falls within the Yorke Mid-North Region of the Department for Environment and Heritage. The plan outlines proposals to effectively conserve the natural and cultural values of the park, while providing for public use and enjoyment.

## 2 MANAGEMENT FRAMEWORK

Management planning is a statutory requirement for all reserves prescribed in S38 of the *National Parks and Wildlife Act 1972* and S31 of the *Wilderness Protection Act 1992*. The management planning process is but a small part of a much larger, state-wide hierarchy of management. This is directed from the highest level by state government policies and departmental priorities and implemented, on a day to day basis, at a regional and district level.

Management plans provide a ministerially endorsed and legally binding framework for the use and management of *National Parks and Wildlife Act* reserves. They are intended to accommodate anticipated trends and community aspirations over a five to ten year time frame. The legislation anticipates that management plans will be formally reviewed from time to time, but there are no prescribed time limits for this to occur.

DEH regional staff have been assigned primary responsibility for preparing management plans and undertaking the associated community consultation process. A standard management planning process is mandated, to ensure that all statutory obligations are met.

Management plans define what is considered acceptable activity in a reserve while still allowing park managers some flexibility in day to day decision-making. They should be proscriptive enough to prevent deleterious activities, or inappropriate developments, taking place. They are not intended to be comprehensive compendiums of resource information, nor are they heavily prescriptive action statements; other documentation covers those aspects. They do however, identify the key values of reserves, the appropriate utilisation and the major issues of concern requiring action, thereby providing the community (and park managers) with a blue-print of how public land is going to be used and managed.

Management plans often foreshadow the preparation of 'delegate' plans to achieve the proposed objectives. Delegate plans are detailed, non-statutory action plans that provide additional details on how the actions, listed in the management plan, are to be progressed. With regard to Mokota Conservation Park, the development of a Fire Management Plan is proposed. Although such in-house action plans are not subject to the same statutory processes as are formal management plans, DEH will continue to involve relevant stakeholders, other agencies and community groups in their preparation and implementation as part of the on-going management of the park.

Each year park managers, taking regional and district priorities into account, draw up work programs to implement some of the actions proposed in management plans. Whether these projects are actually undertaken is determined by, and subject to, the availability of resources (eg staffing and funding) and to any requirements of the Minister for Environment and Conservation and the department's Chief Executive, who take a state-wide overview in setting departmental priorities and allocating resources.

## 2.1 Park Classification

Parks are established for the conservation of biodiversity and cultural heritage and the environmentally responsible use of our natural resources. The classification of parks provides a general statement of purpose for which the area was acquired.

Classifications under the *National Parks and Wildlife Act 1972*, the *Crown Lands Act 1929* or the *Wilderness Protection Act 1992* are as follows:

*Recreation Parks (RP)* - areas of significance under the *National Parks and Wildlife Act*, managed for public recreation and enjoyment in a natural setting;

*National Parks (NP)* - areas proclaimed under the *National Parks and Wildlife Act* considered to be of national significance due to wildlife, natural features of the land or cultural heritage;

*Conservation Parks (CP)* - areas under the *National Parks and Wildlife Act* that are protected for the purpose of conserving wildlife or the natural or historic features of the land, where the development of visitor facilities tends to be kept to a minimum;

*Game Reserves (GR)* - areas set aside under the *National Parks and Wildlife Act* for the conservation of wildlife and the management of game at prescribed times for controlled seasonal hunting;

*Regional Reserves (RR)* - areas proclaimed under the *National Parks and Wildlife Act* for the purpose of conserving wildlife or natural or historical features while allowing responsible use of the area's natural resources (ie. mining);

*Conservation Reserves (CR)* - land currently set aside for conservation of natural and cultural features under the *Crown Lands Act 1929* and held under the care, control and management of the Minister for Environment, that for various reasons were not proclaimed under the *National Parks and Wildlife Act, 1972*;

*Wilderness Protection Areas (WPA)* - land set aside under the *Wilderness Protection Act 1992* to protect natural and remote areas.

## 2.2 Government Policy and Legislation

When managing reserves, DEH is required under section 37 of the *National Parks and Wildlife Act* to have regard to, and provide actions that are consistent with the following objectives stated in the Act:

- preservation and management of wildlife;
- preservation of historic sites, objects and structures of historic or scientific interest within reserves;
- preservation of features of geological, natural or scenic interest;
- destruction of dangerous weeds and the eradication or control of noxious weeds and exotic plants;
- control of vermin and exotic animals;
- control and eradication of disease of animals and vegetation;
- prevention and suppression of bush fires and other hazards;
- encouragement of public use and enjoyment of reserves and education in, and a proper understanding and recognition of, their purpose and significance; and
- generally, the promotion of the public interest.

Additional legislation, conventions and agreements, DEH is obliged to comply with are listed in Appendix A.

## 2.3 Native Title

"Native Title" is used to describe the interests Aboriginal and Torres Strait Islander People have in land and waters according to their traditional laws and customs. Federal legislation, the *Native Title Act 1993*, was enacted to:

- provide for the recognition and protection of native title;
- establish ways in which future dealings affecting native title may proceed and to set standards for those dealings;
- establish a mechanism for determining claims to native title; and
- provide for, or permit, the validation of past acts, and intermediate period acts, invalidated because of the existence of native title.

Any development proposed for a reserve must be valid in terms of the *Native Title Act 1993*.

This reserve is subject to a claim for a determination of native title by the Barkandji People. A 'determination' is a decision made by the courts as to who holds native title for an area.

This management plan is released and will be adopted subject to any native title rights and interests that may continue in relation to the land and/or waters. Nothing in the management plan is intended to affect native title. Before undertaking any future acts that might affect native title, DEH will follow the relevant provisions of the *Native Title Act 1993*.

However, in addition to the requirements of native title legislation, DEH is committed to developing partnerships with Aboriginal people. This may include a number of native title and Aboriginal heritage groups.

Consistent with South Australian Government policy, DEH is also keen to pursue Indigenous Land Use Agreements (ILUAs) where appropriate. ILUAs are voluntary agreements between a native title group and other people about the use and management of land and/or waters.

## 2.4 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) represents a fundamental reform of former Commonwealth environment laws. The Act establishes a new Commonwealth approval process for assessment of proposed actions that are likely to have a significant impact on matters of national environmental significance and provides an integrated system for biodiversity conservation and management of important protected areas.

Matters that require assessment and approval of proposed actions under the EPBC Act 1999 are:

- any action that has, will have or is likely to have a significant impact on the following identified matters of national environmental significance:
  - World heritage properties
  - Ramsar wetlands of international significance
  - Nationally listed threatened species and ecological communities
  - Listed migratory species
  - Commonwealth marine areas
  - Nuclear actions (including uranium mining)
- any activity involving Commonwealth land that has, will have, or is likely to have a significant impact on the environment.

With regard to Mokota Conservation Park, three nationally threatened species occur within the park, they are the Flinders Worm Lizard (*Aprasia pseudopulchella*), Small Scurf-pea (*Cullen parvum*) and Trailing Hop-bush (*Dodonaea procumbens*). Commonwealth approval is required for any action that has, will have or is likely to have a significant impact on these nationally threatened species in addition to any State approval required.

Furthermore, in consultation with relevant State authorities, the Commonwealth Minister for the Environment and Heritage may develop and implement recovery plans and threat abatement plans for threatened species and ecological communities listed under the EPBC Act. Where applicable, DEH should contribute to and incorporate these plans into park management regimes and operational procedures.

# 3 MANAGEMENT CONTEXT

## 3.1 Purpose of Reserve

The reserve was acquired as part of the National Reserve System Program to contribute to a comprehensive, adequate and representative reserve system (CARRS) for Australia. The program aims to make Australia's conservation reserve system representative of the range of ecosystems that exist on the continent. The acquisition of the park was made possible by combining funds from the Commonwealth Government, the Government of South Australia and a generous donation by the Nature Foundation (formerly National Parks Foundation SA).

Native grasslands have been identified as being under-represented in the reserve system nationally, in South Australia and in the Lofty Block Bioregion. Mokota Conservation Park is the first park dedicated to conserving Hard Mat-rush (*Lomandra multiflora* ssp. *dura*) tussock grassland. It is grassland of unusually high quality and contains more than 150 indigenous plant species, including 32 of particular conservation significance in South Australia.

The conservation of Hard Mat-rush (*Lomandra multiflora* ssp *dura*) tussock grassland is the primary management objective for Mokota Conservation Park. To achieve this, it may be necessary to implement a planned disturbance regime.

Mokota Conservation Park is intended to be managed as an IUCN Category IV reserve - that is, as a Habitat/Species management area; a protected area managed mainly for conservation through management intervention (IUCN 1994). The relevant objectives of management for such areas are to:

- secure and maintain the habitat conditions necessary to protect significant species, groups of species, biotic communities or physical features of the environment where these require specific human manipulation for optimum management;
- facilitate scientific research and environmental monitoring as primary activities associated with sustainable resource management;
- develop limited areas for public education and appreciation of the characteristics of the habitats concerned and of the work of wildlife management; and to
- eliminate and thereafter prevent exploitation or occupation inimical to the purposes of designation.

## 3.2 Location and General Description

Mokota Conservation Park is located approximately 6 kilometres east of Mount Bryan township and 15 km north of Burra (Figure 1). The park is roughly square in shape and covers 455 hectares in the Hundred of Kingston, south of White Hill Road. The terrain is hilly with ephemeral watercourses and rock outcropping on the ridges.

Native vegetation in the park comprises tussock grassland dominated by Hard Mat-rush (*Lomandra multiflora* ssp *dura*) over Brush Wire-grass (*Aristida behriana*). Various spear (*Stipa* spp) and wallaby (*Danthonia* spp) grasses are co-dominant throughout. Due to the high proportion of herbaceous species, the appearance of the grassland changes markedly with the seasons. Vegetation on the northern and western slopes is very patchy. In places the structure is relatively open, with gaps between perennial grass and Lomandra tussocks occupied by a variety of seasonal herbs and soil that is bare or covered with a moss and lichen crust. Elsewhere the vegetation may be much denser, with alien species such as Wild Oats (*Avena barbata*) occupying the space between native grass tussocks and fewer native herbs. Several low shrub species form an important component of the vegetation in places, but the park is treeless apart from a few planted specimens. The condition of the vegetation is very variable due to past use for grazing with alien species becoming dominant near dams and on hill tops.

### 3.2.1 Climate

The climate is typically Mediterranean; with hot, dry summers and cool, wet winters. Average rainfall at Mount Bryan Post Office is 439 millimetres per annum, of which almost half occurs during the four months of June to September inclusive (Bureau of Meteorology data). Frosts are frequent and snow sometimes falls on the ranges north of Burra.

Bundaleer Forest is the nearest weather recording station from which temperature data are available (although it is at a lower altitude with a higher rainfall). Average daily temperature maxima (and minima) vary from 13.7°C (3.4°C) in July to 30.3°C (14.2°C) in January. A minimum temperature of less than or equal to 0°C occurs on average 2 or 3 days in each of the winter months.

## 3.3 Regional Setting

The park occurs among the highest parts of the North Mount Lofty Ranges, an area in which many peaks and ridges are more than 700 metres above sea level; eg. Mount Bryan (933 metres) and the Razorback north of Mokota, and Mount Cone (789 metres), 3 kilometres to the south. About 10 kilometres to the east, the ranges fall away to the South Olary Plains.

Native grassland was formerly the most widespread vegetation type in the state's Mid-North, but has largely been cleared for cropping or grazed. Most surviving remnants of high quality are only a few hectares in size; therefore this area of more than 450 hectares makes a significant contribution to grassland conservation in the region and in South Australia.

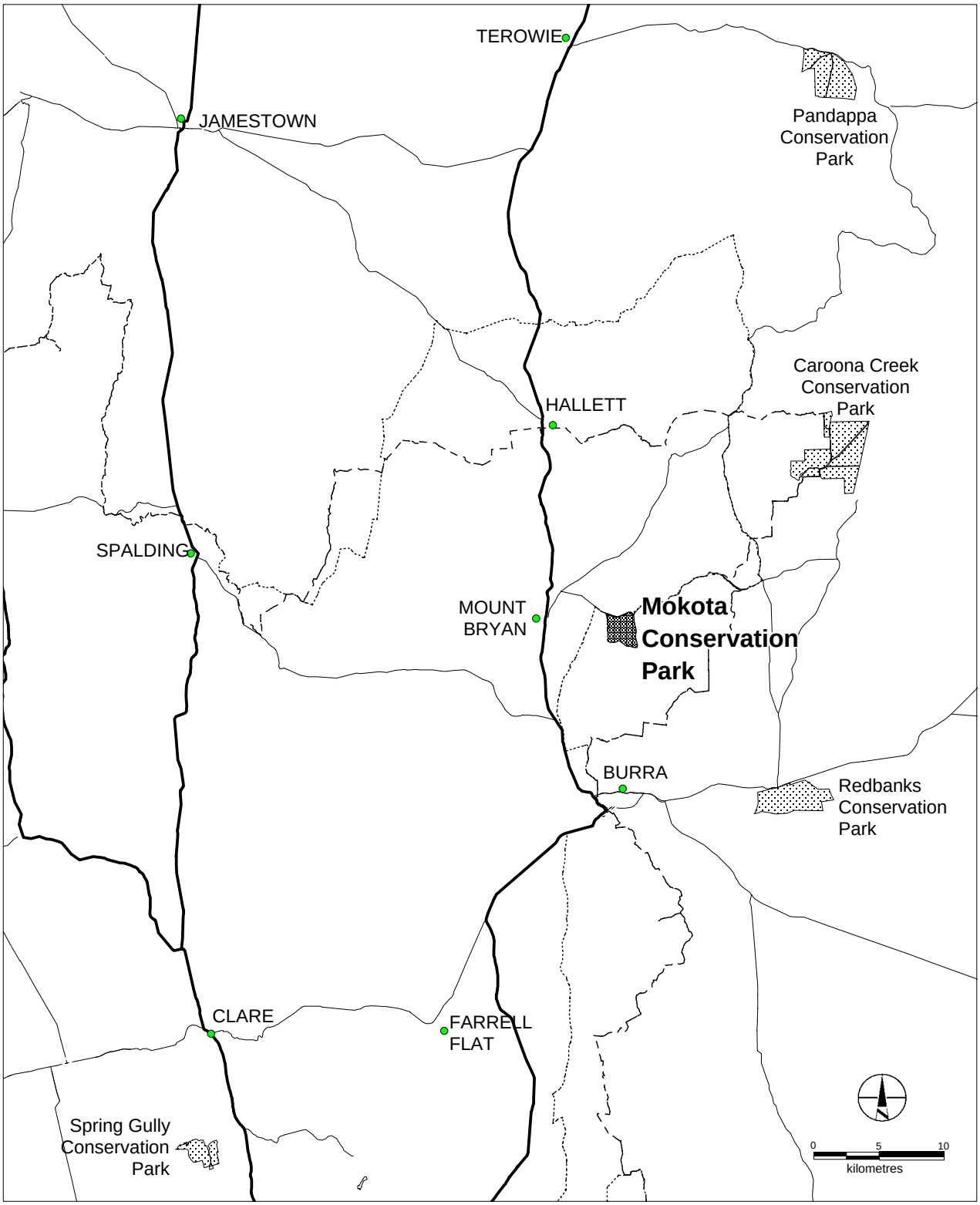
Land use in the vicinity of Mokota is a mixture of cultivation, mainly in the valleys, and "rough grazing" on hilly pasture that has rarely, if ever, been cultivated. The park was in the latter category, but as part of a sheep stud property, was only lightly grazed relative to general regional practice. The valley to the west, and land to the north with comparable slopes are intensively cultivated. A few kilometres east of the park, land use changes from mixed agriculture to pastoral with modified native vegetation cover.

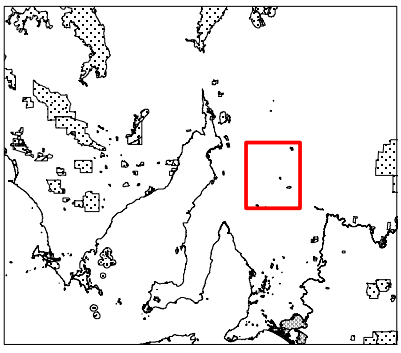
A key objective of the DEH is to maintain biodiversity within each interim biogeographic region of the state. The Interim Biogeographic Regionalisation of Australia (IBRA) provides a bioregional planning framework within which to identify the gaps and to set priorities for developing the National Reserve System. IBRA regions represent a landscape based approach to classifying the land surface from a range of continental data on environmental attributes. In 1999, IBRA version 5.1 was developed with 85 bioregions delineated, each reflecting a unifying set of major environmental influences which shape the occurrence of flora and fauna and their interaction with the physical environment. (Environment Australia 2002)

Mokota Conservation Park lies within the Flinders Lofty Block IBRA region, which totals 7,131,816 (ha) and has been extensively cleared of native vegetation for agriculture and urban development. Remaining native vegetation is highly fragmented and only 5.5% of the Flinders Lofty Block's area is conserved in protected areas. Laut *et al* (1977) include the park in the Mid-North Wheatlands Region (the northern part of the Flinders Lofty Block), a highly modified landscape in which very little land is conserved in parks or Heritage Agreements.

Most of the park is included in the Burra Hill Environmental Association comprising "steep strike ridges on metasediments with dissected footslopes." Vegetative cover is described as grassland, chenopod shrubland and some cereal cropland. A small section of the northwest corner is included in the Hansen Environmental Association comprising "extensive intramontane plains with occasional narrow strike ridges on metasediments." Cover is generally described as cereal cropland and sown pastures, open parkland with native grass understorey.

Only .93 % of the Burra Hill EA and .03% of the Hansen EA is conserved in protected areas. There is a widely recognised benchmark that at least 15% of an original ecosystem should be conserved where possible. Even with the addition of Mokota Conservation Park, land representing these ecosystems is inadequately protected and is considered a high priority for conservation and acquisition.



LEGEND

- Main road
- Secondary road
- Mawson Trail
- Heysen Trail

Map designed and created by
Reserve Planning using PAMS
Date: 2003

**Figure 1**

Mokota Conservation Park
**Location**

DEPARTMENT FOR environment and heritage

The management of the park must be seen in the context of the broad regional pattern of land use and community activity. Issues such as fire prevention and suppression, plant and animal control, kangaroo management and park access must be planned in conjunction with neighbouring landowners to achieve a coordinated approach. Consequently, on-park biodiversity conservation and recreation management should complement broader regional programs. A series of overview plans are being developed, that will set priorities for conservation programs and recommend strategies to retain, restore, re-establish and provide links between remnant native vegetation. Mokota Conservation Park falls within the scope of the Biodiversity Plan for the Northern Agricultural Districts, prepared as part of the Department for Environment and Heritage (Graham *et al* 2001). As well, a number of strategic plans to assist with coordinating recreational activities have also been prepared.

The park, alone, is much too small to conserve native grassland in the region adequately. Conservation of native grasslands also depends on the management of privately owned areas for the combined goals of conservation and pastoral production. Trials are currently under way to determine how this can be achieved.

Mokota CP will provide the focus of native grassland conservation in the region, acting as a scientific reference area, upon which to gauge the impacts of land management practices elsewhere in the region.

## 3.4 Existing Management Arrangements

The area is managed from the DEH Mid-North District Office in the Yorke Mid-North Region, with a Ranger staff of two. This office is also responsible for Spring Gully Conservation Park near Clare, Pandappa, Whites Dam and Brookfield Conservation Parks, Martindale Hall (managed by the Heritage branch of DEH) and future Caroona Creek Conservation Park.

Informal management arrangements exist with the Grassy Ecosystem Technical Advisory Group and Mid-North Grasslands Working Group.

The Threatened Plant Action Group and the Nature Conservation Society of South Australia have undertaken some preliminary surveys of the area (Hyde, 2000), with the assistance of the SA Herpetology Group and the SA Museum and these groups have a continuing interest in the management and monitoring of the park.

There has been consultation between the SA Museum, DEH and the Plague Locust Control board to minimise the impact of spraying on native grasslands in the region, particularly sites known to provide habitat for pygmy blue tongue lizards.

## 3.5 History of Land Use

The Ngadjuri people occupied land in the North Mount Lofty Ranges, including the park, north into the southern Flinders Ranges and north-east into the Olary Ranges (Tindale, 1974). Grasslands were probably used for hunting or foraging, but it is unlikely that Mokota was permanently occupied due to its lack of permanent water and shelter. The grasslands may have been burnt from time to time. Early settlers in the Burra region reported frequent fires in grasslands during the heat of summer.

The area was described by the first surveyor in 1860 as good pastoral land. No timber was noted, suggesting that the area was probably originally treeless, apart from scattered stands of drooping sheoak or golden wattle.

The area was freehold land that had been grazed from the 1860's until acquisition in 1999. It was never cultivated (Gebhardt, pers comm). The previous landowner indicated that the land was grazed at a rate of approximately one lambing ewe per hectare between May and September each year. Burning was not part of the management regime, but in autumn of 1996, the northern and western slopes of the park up to an altitude of about 650 metres were burnt.

Lack of cultivation, consistently low stocking rate and minimal application of fertiliser, along with the yearly removal of stock at the start of spring are believed to be responsible for the high biodiversity values of the native grassland.

A land tenure history of the park is provided in Appendix B.

## 3.6 Management Philosophy & Strategic Directions

### *Management Issues*

Mokota Conservation Park is the first highly diverse native Lomandra tussock grassland to be acquired for conservation in South Australia. As the area has a long history of sheep grazing, its purpose has changed and its management prior to 1860 is unknown, the main management issue for Mokota is how such grassland may best be managed to retain and improve its biodiversity values.

Management will have the following aims:

- Maintain the structure and condition (high diversity of native plant species, relatively low weed biomass) of the better quality sections of native grassland.
- Conserve populations of species that are of particular regional, state, or national conservation significance.
- Encourage regeneration of native grassland plant species that are sensitive to overgrazing and currently in small populations in the area.
- Encourage natural regeneration of indigenous plant species in the more degraded sections of grassland that are dominated by alien plants and have few native plants.
- Conserve native fauna habitat.
- Apply adaptive management techniques as research findings come to light.

There is a lack of information as to how these goals can best be achieved, because little scientific research or deliberate conservation management has been applied to similar environments to date. Grasslands are generally known to be highly dynamic ecosystems, many being dependent on periodic disturbance (eg. fire or seasonal grazing). Research into grasslands in general indicates that management intervention may be needed to reduce the cover of dominant plant species, to prevent loss of an open grassland structure and diversity of seasonal herbs.

A philosophy which has been applied in a new grassland reserve on a former grazing property in northern Victoria is to mimic the past management regime (light seasonal grazing, resting during drought) as nearly as possible to maintain the structure and composition that was present at the date of acquisition. However, some native plant species in Mokota, including threatened species, may benefit from a different management regime from that which was applied by the previous landowners. DEH aims to conserve such species.

It is not considered appropriate to apply active management intervention such as fire and domestic stock grazing broadly over the park until potential impacts have been investigated. Native herbivore populations may increase following the creation of the park and their impacts on the native grassland need to be considered. Important attributes of the grassland will be monitored rigorously to indicate any trends in structure or condition. Initially, management intervention will be investigated through small-scale trials in grassland of intermediate biodiversity value.

Day to day operational systems for issues such as fire prevention and suppression will be described in greater detail in a ‘delegate’ Fire Management Plan, prepared in consultation with the local CFS Brigade.

### *Park Vision*

The long-term vision for Mokota Conservation Park is of a park that effectively conserves and protects biodiversity values, where visitors may enjoy passive recreational and educational activities in a sustainable manner. The park will promote and foster understanding of the conservation of Lomandra tussock grassland in particular, where management decision making is informed by scientific principles and objective data, so that it is valued by the local and wider community.

*Strategic Directions*

Management intervention may be needed on a broad scale or tailored to localised problem areas. A patchwork of management regimes may be appropriate to cater for different species and vegetation condition. Tools that are available for broad scale ecological management of the grassland are:

- grazing by native fauna or native fauna and domestic stock;
- application of selective herbicides or slashing (with due care); and
- burning (infrequently, in a mosaic, avoiding the spring season that is important for native plant reproduction).

Much additional information is needed to gain confidence with such management intervention and acquisition of information is a major strategic direction for Mokota Conservation Park. These tools could be used in combination or exclusively in particular areas. Investigative use may be made, on a small scale, of slashing, selective herbicide, hand weeding, hand pollination and/or exclosure. The outcomes of trials will be monitored quantitatively.

Trials

A trial will be implemented to investigate and demonstrate the impact on high quality native grassland of removing light seasonal sheep grazing. Other trials into the use of applied fire, selective herbicides and slashing are worth undertaking.

Monitoring

The monitoring program should include:

- measurement of trends in dominant species' cover on a large scale;
- replicated, small-scale plots and quantitative methods to measure trends in complete native species cover, frequency and richness in vegetation of high quality;
- monitoring of grassland in exclosures to measure impact of kangaroo grazing;
- threatened and sensitive species population size, extent and reproductive success;
- collection of data comparable with grazing trials on private properties;
- macropod population size and mobility; and
- fauna habitat quality.

Due to variation in seasonal conditions from year to year, monitoring should be undertaken each year. Information obtained through the monitoring program must be evaluated immediately to enable DEH to adapt management appropriately.

Research

In addition to trials and monitoring essential for adaptive management, there is scope for further scientific research that will assist in the management of Mokota's native grassland and student involvement should be encouraged. The small size of the park and the high quality of the vegetation dictate that research conducted on the park should be limited to that which is required for the management of this park, and cannot be undertaken elsewhere. Important areas for research are fire ecology, techniques for regenerating degraded areas and interactions between vertebrate and invertebrate fauna and flora. DEH will encourage appropriate research and liaise with education and research institutions regarding suitable topics for study.

# 4 MANAGEMENT PRESCRIPTION

## 4.1 Natural Resources

### 4.1.1 Geology and Landform

*Background*

The rocks comprising the dominant ridges of the park are of Neoproterozoic age, 710 to 760 million years old (Preiss, 1998). The hills to the west of the park are lower and formed from the Burra Group.

The main topographic feature of the park is the central ridge (Figure 2). This ridge and the slopes to the south-west corner consist of Appila Tillite with quartzite or sandstone interbeds. This ridge includes the highest point of 729 metres and its western slope falls to the lowest point of 582 metres in the north-west corner. The west-facing lower slopes of the central ridge are Umberatana Group partly covered by undifferentiated Quaternary sediments. They are dissected by drainage lines with deposited undifferentiated alluvial /fluvial sediments of Holocene age.

Most of the land over 675 metres altitude occurs in the south-eastern quarter where the central ridge is linked to the less well-defined eastern ridge by a broad saddle in section 165. The eastern ridge is the Wilyerpa Formation consisting of sandstone and quartzite interbedded in siltstone. There is a central valley of undifferentiated alluvial /fluvial Holocene sediments from the saddle to the northern boundary and a smaller valley to the southern boundary. Along the eastern boundary is the Tapley Hill Formation of dark laminated siltstone, 710-740 million years old, with the Tindelpina Shale member at its base.

All steps will be taken to ensure that park management works and visitor activities have minimal impact on geological and geomorphological assets. Information about the geology of the park will be incorporated into visitor information.

*Objectives*

Protect geological and geomorphological features of the park and interpret them for visitors.

*Actions*

- Include geological information in visitor materials.

### 4.1.2 Soils

*Background*

Soils are mainly red brown earths, including sandy clay loam to medium clay. Natural weathering has resulted in the pattern of shallow soil and rock outcropping on ridges and small areas of deeper alluvial soils on lower valley slopes. Old gully erosion has occurred in some creeklines and along the old route of the southern track due to past grading.

*Objectives*

Limit erosion to natural weathering.

*Actions*

- Minimise disturbance of soil that could lead to erosion, including fires in mid summer, overgrazing and vehicular access within the park.
- Monitor erosion in creek gullies and other sites of past erosion and take remedial action to halt excessive erosion as required.
- Monitor areas used by visitors and regulate pedestrian use of any areas where excessive erosion could occur.

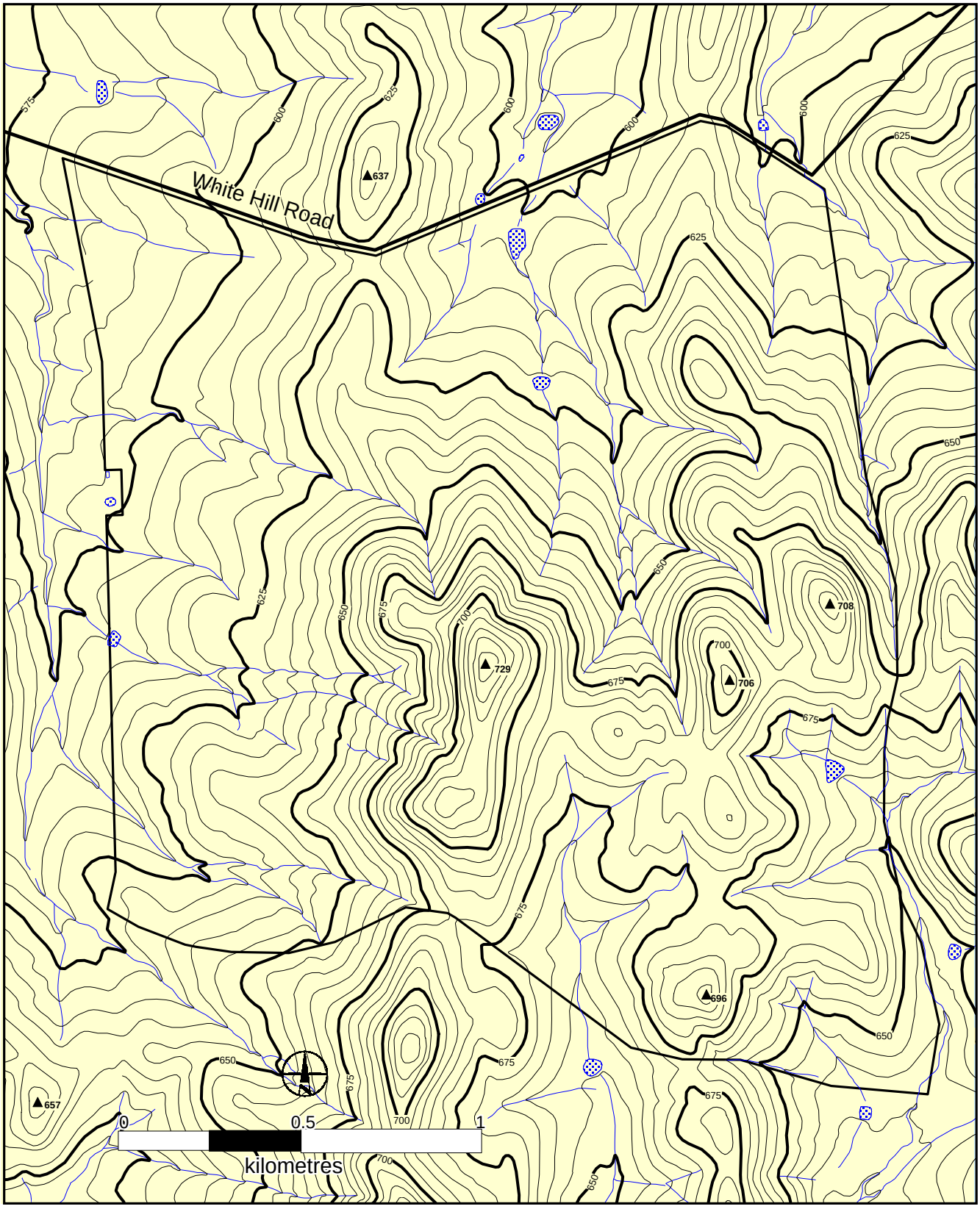



**Figure 2**

Mokota Conservation Park
**Features**

Map designed and created by
Reserve Planning using PAMS.
Date: 2003

LEGEND
729 Spot height
Dam

DEPARTMENT FOR environment and heritage

### 4.1.3 Hydrology

*Background*

Most of the run off on the park originates internally because the land in the park slopes down towards all boundaries. As shown in Figure 2, several drainage lines run west from the central ridge to the western boundary. Drainage systems beginning from the saddle in Section 165 run towards the north to Newikie Creek and south to Wandalla Creek. There are several other small creeks near to the eastern boundary. The creeks flow intermittently and otherwise are dry apart from small pools.

The natural hydrology has been altered by the presence of four dams on the park and dams are also abundant on neighbouring properties. The main park dams are North Dam and East Dam, and the small High North Dam is situated above North Dam. West Dam on the western boundary has become silted up and forms a small wetland. Due to the small catchment area the dams intercept insufficient water for a reliable year round supply and the stock water supply was previously supplemented by a bore and tank on the western boundary. This watering point has been excluded from the park. The presence of artificial water bodies may contribute to populations of native macropods being at unsustainable levels and removal of dams from the park may assist in fauna management (see native fauna section).

*Objectives*

Maintain or reinstate a natural hydrology as far as possible.

*Actions*

- Consult stakeholders regarding the removal of dams not required for emergency fire fighting, the eastern and higher northern dams. Consider the impact of removing dams on native flora and fauna. The silted West Dam has value to some native species and need not be disturbed.
- Decommission surplus dams and rehabilitate dam sites to enable regeneration of indigenous vegetation.

### 4.1.4 Native Vegetation

*Background*

Following its discovery as a high quality grassland in the 1980's (R. Bates, pers comm), the area was included in two Biological Survey of SA vegetation surveys; the Burra Hills survey in 1994 (Playfair & Heard, 1995) and the Lofty Block grassy ecosystem survey (Robertson 1998). Both surveys sampled one quadrat in the north-western corner and information on the rest of the grassland was minimal. The area had not been identified by Davies' threatened plant community surveys (Davies 1982, 1983). Later, low level aerial survey showed Lomandra tussocks as a dominant mainly confined to the north and west three quarters of the park (Hyde in McDougall & Kirkpatrick, 1994). The latter survey was very broad scale, and did not indicate the comparatively high value of the area. A detailed overview of the vegetation of the whole property was therefore lacking.

The Nature Conservation Society, the Threatened Plant Action Group and the SA Herpetology Group, with funding from the Wildlife Conservation Fund and the Nature Foundation, combined to conduct a baseline study of the flora and fauna of the area in 1998 and 1999. Vegetation and physical environment were surveyed at 12 quadrats on 14-16 November 1999. Other vegetation survey outcomes were a complete plant species inventory for the park, general vegetation condition mapping and documentation of nationally threatened plant species populations (Hyde, 2000). A quantitative vegetation monitoring program was established with support from the Native Vegetation Fund in 2000.

Overall the tussock grassland plant community on the northern and western slopes is dominated by Hard Mat-rush (*Lomandra multiflora* ssp *dura*) over Brush Wire Grass (*Aristida behriana*). Spear (*Stipa* spp.) and wallaby (*Danthonia* spp.) grasses are important throughout. Vegetation on low to mid slopes is a patchwork of the following:

1. Sparse native species-rich herbland with few weeds consisting of predominantly native forbs and sparse native grasses, with or without *Lomandra* sp., *Cryptandra amara* occurs locally on low rises;
2. Moderate to dense species-poor grassland dominated by Wild Oats (**Avena barbata*) and Brush Wire-grass (*Aristida behriana*) with or without Hard Mat-rush (*Lomandra multiflora* ssp *dura*) and native spear grasses (*Stipa* spp.), having fewer native species overall;
3. Dense weedy patches dominated by Salvation Jane (**Echium plantagineum*), Onion-grass (**Romulea* spp.), Wild Oats (**Avena barbata*) and/or other alien plants, with few native species;
4. Dense, native species-poor grassland dominated by Kangaroo Grass (*Themeda triandra*).

In the sparse herbland, gaps between the perennial native grass, lomandra tussocks or low shrubs provide habitat for native annual and perennial forbs such as Little Buttons (*Leptorhynchos tetrachaetus*), Sunray (*Hyalosperma* sp), Behr's Swainson-pea (*Swainsona behriana*), Hairy Tails (*Ptilotus erubescens*), and Spur Velleia (*Velleia paradoxa*). Blue Devil (*Eryngium rostratum*), a species that is vulnerable in South Australia is common on these lower slopes.

Native grasses dominated the bank of the well-defined creekline just above North Dam. The southern creekline was a broad, weedy depression dominated by Finger Rush (*Juncus subsecundus*). Five native species were recorded only in creeklines. Vegetation in the south east quarter of the park (section 165) has been found to be generally more weedy (Hyde, 2000); however, sparse native grassland of very high quality, dominated by Short Wallaby Grass (*Danthonia carphoides*), occurs on broad saddles in this area. The timing of the survey was optimal for native spear and wallaby grass seed maturity but resulted in early spring-flowering herbaceous species, including orchids and native daisies being under-represented.

Vegetation rich in indigenous species was recorded in all four sections of the park. The northern and western slopes are particularly diverse in native species. Deeper soils and some drainage lines have been invaded to a greater extent by alien species such as Wild Oats (**Avena barbata*), Rye Grass (**Lolium* spp.), Brome (**Bromus* spp.) and Salvation Jane (**Echium plantagineum*). Sheep camps on hill-tops are also dominated by alien species including Horehound, grasses, Salvation Jane and clovers due to nutrients accumulating from sheep dung. Sites that were weedy as measured by a high proportion of total species and/or high weed cover abundance estimate in quadrats, were not necessarily poor in number or uniqueness of native species recorded. Wild Oats was one of the most frequently recorded species and the only alien species to be recorded as a dominant in hill sites.

The most frequently recorded native species in quadrats (Appendix C) were Hard Mat-rush (*Lomandra multiflora* ssp *dura*) and Pussy-tails (*Ptilotus spathulatus* forma *spathulatus*), followed by five grasses. These were:

| **Species** | **Common Name** |
|---|---|
| *Aristida behriana* | Brush Wire-grass |
| *Danthonia auriculata* | Lobed Wallaby-grass |
| *Danthonia caespitosa* | Common Wallaby-grass |
| *Stipa blackii* | Crested Spear-grass |
| *Stipa nodosa* | Tall Spear-grass |

The native vegetation, apart from lomandra and shrubs, is subject to seasonal variation, due to a relatively high proportion of herbaceous species. Native grasses are mostly perennial and flower and seed mainly in the late spring into summer. Annual native forbs generally grow in winter and flower in spring, while perennial native forbs include both spring and summer-flowering species. Vegetation is also greatly affected by yearly variation in rainfall.

Significant Flora

More than 150 indigenous plant species have been recorded in the park, including 32 of particular conservation significance in South Australia. Species of state or regional conservation significance are listed in Appendix C. Relatively large populations of two nationally threatened plant species are present in the park; Small Scurf-pea (*Cullen parvum*) and Trailing Hopbush (*Dodonaea procumbens*). Both species are low growing perennials. *C parvum* is a sprawling herbaceous legume and grows in several creeklines. *D procumbens* is a prostrate shrub that in SA is confined to the Northern Lofty Region and is

not conserved elsewhere. It grows mainly on the rocky ridges and saddles in the south eastern section of the park. While naturally prostrate, individuals of this species have been grazed to a few centimetres tall and appear like mat plants.

Permanent monitoring grids have been established for both these species. In 1999, 172 *C parvum* plants were counted in 11 contiguous plots of one square metre (Davies and Steed in Hyde, 2000). Twenty three native and 14 alien taxa were also counted in these plots. In four plots of 5x5metres each, 165 *D procumbens* plants/clumps were individually mapped and measured. Of these, eight were seedlings.

Habitats of importance to particular species include:

- Northern and western slopes, on which high quality grassland was recorded, and habitat for five orchid species;
- West dam, an old dam site on the western boundary that has become silted and supports a number of native plant species not found elsewhere in the park, eg. Nardoo (*Marsilea drummondii*) and a creekline on the western boundary where Thick-fruit Buttercup (*Ranunculus pachycarpus*) was recorded;
- The creekline above North dam, which supports the largest population of *Cullen parvum;*
- Ridges, saddles and outcrops in the south-eastern part of the park, which support *Dodonaea procumbens.*

### *Objectives*

Conserve in perpetuity all the plant species indigenous to the park through maintaining the integrity and dynamics of the plant community.

Facilitate ecological and evolutionary processes.

Improve the biological condition of the more degraded areas of the park towards native species including grasses and forbs with inter-tussock spaces.

### *Strategies*

Depending on the results of scientific trials (initially on small areas) and quantitative vegetation monitoring, actively manage the native grassland using the management techniques of grazing and/or applied fire and/or selective herbicides and/or slashing to create a habitat mosaic and maintain species diversity. If trials and monitoring indicate that disturbance is required to maintain an open grassland structure and retain diversity of native species, management intervention on a larger scale will be considered, using the most appropriate technique(s).

Encourage natural regeneration of native species into degraded grassland.

Facilitate recovery of species with particular conservation significance and those that are sensitive to overgrazing.

Protect restricted habitats that are important to particular species with a conservation rating.

### *Actions*

- Investigate as far as possible, through consultation with the previous landowners, the intensity, timing and duration of grazing and fertilising in the past.
- In conjunction with GETAG and MNGWG, investigate the impact on quality native grassland of removing light seasonal sheep grazing, by continuing to graze in scientifically designed experimental plots. The use of fire, herbicide or slashing as management tools may also be investigated.
- If these trials and monitoring indicate that disturbance is required to maintain an open grassland structure and retain diversity of native species, management intervention on a larger scale will be considered, using the most effective and appropriate technique(s).
- Continue the annual monitoring program to measure change in frequencies of all native and alien plant species in replicated plots in areas of high quality grassland and in more degraded areas.

- Continue monitoring populations of the nationally threatened plant species *Cullen parvum* and *Dodonaea procumbens* and, with the assistance of volunteers, undertake minimal impact control techniques where these species are under threat from competition with alien species. If populations decline, investigate the reasons for that decline and take remedial action.
- Research various techniques for improving the condition of degraded areas of grassland, comparing results with control areas, where there is no management intervention. Any trials must protect those native species that persist in some degraded areas, such as *Pimelea curviflora* var *gracilis.*

### 4.1.5 Native Fauna

*Background*

An interim inventory of native fauna was undertaken in 1999 through pitfall lines and systematic observation of larger fauna, including avifauna, at four of the vegetation quadrats, and opportunistic observations (Hyde, 2000). Seven reptile, one amphibian and 25 bird species were recorded (Appendix D) but no native small mammals. Western Grey Kangaroos and Emus are sometimes present in large numbers but may be transitory. Red Kangaroos and Euros have been recorded. As the survey was of short duration and included only 4 pitfall sampling points, further investigation of the vertebrate and invertebrate fauna of the park is needed. An open tussock grassland structure is known to be important for some grassland fauna and areas of predominantly native vegetation with such a structure in the park will be maintained (as described in the native vegetation section).

Invertebrates are important components of native grassland ecosystems, but as yet, little is known about the invertebrate fauna of the park. Grasslands are known however, to be habitat for a wide range of insects, including rare and endangered species. Ground dwelling invertebrates were collected in micropitfalls during the fauna survey. In 1999, seven butterfly species were recorded by members of Butterfly Conservation SA, including the Small Copper and Rare White Spotted Skipper. This species' larval food plant is Hard Mat-rush (*Lomandra multiflora* ssp *dura*).

The park is within the region where native locusts reach plague proportions and cause problems to agriculture, but such events may be natural in native grasslands. In the past PIRSA (acting on behalf of the Plague Locust Commission) has undertaken broad-scale, aerial spraying for these insects. Native grassland invertebrates may be threatened by insecticide chemical spraying.

The Pygmy Bluetongue Lizard (*Tiliqua adelaidensis*) was presumed extinct until a population was rediscovered living in native grassland near Burra in 1992. Its required habitat includes spider burrows of entrance diameter ranging from 12 to 19mm, and native tussock grassland which is, at least in part, unploughed. The grassland in Mokota Conservation Park appears to be a similar type of grassland to that of known bluetongue sites, but in better condition generally (Milne 1999).

Given the proximity of known sites, the presence of unploughed tussock grassland and suitable diameter spider burrows, it might be expected that Pygmy Bluetongues would be found in the Park. However, extensive searching has failed to reveal any of these lizards, and it is unlikely that the species is present (S. Clarke, T Milne pers comms). The reasons for this absence are unclear, but may relate to soil depth or past land use. Research is currently under way to document the habitat of known Pygmy Bluetongue populations in more detail (M Hutchinson, pers comm). At this stage however, there is insufficient information on their habitat requirements and reasons for their current absence, to justify their (re) introduction to the park.

Native herbivore populations may increase following the creation of the park and their contribution to maintaining diverse native grassland needs to be assessed. Macropods need to be maintained at a density where this contribution will be optimal. Regional monitoring of kangaroos and past fauna destruction permits indicate that most kangaroo culling by professional shooters has occurred on the plains, therefore the hills in which the park occurs provide refuge, apart from some control by graziers (Ian Falkenberg pers comm).

*Objectives*

Manage populations of large fauna such as kangaroos and emus at sustainable levels.

Conserve and restore habitat of native fauna recorded in the park.

*Strategies*

Record animal species and habitats on a database with GIS capability, including opportunistic sightings of fauna. Monitor populations and, where necessary develop and implement species management plans to ensure their conservation.

Continue to monitor kangaroo numbers to assess population trends and observe their behaviour to endeavour to understand their contribution to the total grazing pressure on vegetation throughout the park.

Survey further the fauna of the park and include fauna in monitoring programs.

Incorporate research results into park fauna management where applicable.

*Actions*

- Measure the impact of macropods on vegetation by erecting suitable exclosures in representative areas of the park's vegetation.
- Manage macropod populations to prevent overgrazing. This will be achieved by controlling availability of water, and culling if needed, as part of a continuing district strategy.
- Assess the impact of park dams on macropod numbers.
- Increase knowledge of invertebrates, adding to data from the 1999 survey.
- Liaise with local landowners and the Plague Locust Commission to limit the use of insecticides in the region of the park and minimise the impact of insecticide spraying on the park's fauna.
- Undertake further vertebrate and invertebrate fauna survey.

### 4.1.6 Introduced Plants

*Background*

A number of plant species proclaimed in the District of Goyder have been recorded in the park and require control under Section 57(2) of the *Animal and Plant Control Act (Agricultural and other purposes) 1986*. The proclaimed plants occurring in the park are Horehound (**Marrubium vulgare*), Artichoke Thistle (**Cynara cardunculus*) and African Boxthorn (**Lycium ferocissimum*). Horehound is mainly localised along the southern boundary and on high ground. Artichoke Thistle is localised near the main dams and occurs elsewhere as scattered patches or individuals.

The survey in 1999 (Hyde, 2000) found that a suite of herbaceous alien species is widespread throughout the park (Appendix C). Most are small annual species, generally of lesser concern than large perennials. Only Wild Oats (**Avena barbata*), the largest of the frequently recorded annual species, was recorded as a dominant in quadrats. While most alien species are annual, most indigenous plant species are perennial.

The most frequently recorded perennial alien species are Wild Sage (**Salvia verbenaca*), Rough Catsear (**Hypochaeris radicata*), Small-flower Onion-grass (**Romulea minutiflora*) and Bulbous Meadow Grass (**Poa bulbosa*). The former two species are competitive because they are rosette-forming, while romulea has a perennial underground corm and can reach high densities. Two species of romulea are common, widespread and locally dense. These species have the potential to adversely affect the native plant community, however none were recorded as dominant, nor are they expected to increase rapidly in response to the cessation of domestic stock grazing.

Salvation Jane (**Echium plantagineum*) is biennial and common in wetter and disturbed sites and may be dominant near streams. It is not proclaimed in the district under Section 57(2). Annuals, Wimmera Ryegrass (**Lolium rigidum*) and Great Brome (**Bromus diandrus*) have a scattered distribution but may be dense in creeklines.

Herbaceous alien species are particularly prominent on hill tops where sheep have camped due to increased concentration of nutrients from sheep dung and overgrazing of native grasses. In the absence of sheep, such concentrations would be expected to decline over time, a process that may be hastened by removal of plant biomass by localised slashing of alien annual grasses (or fire). The monitoring program is designed to indicate whether the cover of any alien species is increasing or decreasing over time in the better areas of grassland.

### *Objectives*

Eradicate proclaimed plants and prevent establishment of alien species that are not yet present in the park.

Minimise the impact of alien plant species generally on the native plant community, fauna habitat and plants of particular conservation significance.

### *Strategies*

Eradicate proclaimed plants within the park. Attention should be given to the area from which they have been removed to prevent invasion by the same or other weed species.

Integrate pest plant control into regional and district programs to fulfil the obligations of the *Animal and Plant Control Act*.

Implement broad scale ecological management strategies to minimise the impact of alien species on the native plant community. All introduced species that pose a threat to the native plant community will be addressed in any proposed management intervention. Localised, selective weeding may be needed to remove threats to populations of threatened or sensitive native plant species.

Practise weed hygiene to enable preventive action before new infestations of alien plants become established. Particular priority areas for monitoring are the boundaries, creeklines, dam sites, tracks and ridgetops.

### *Actions*

- Eradicate Horehound outbreaks in the park, monitor the area so treated and undertake any follow up required.
- Eradicate Boxthorn using basal spray treatment and prevent their re-establishment.
- Eradicate Artichoke Thistle from the vicinity of the dams and anywhere else it is found
- Eradicate proclaimed plants consistent with the practices of adjoining landowners.
- Ensure that management vehicles are free of weed propagules when entering the park.
- Undertake appropriate fungal hygiene measures to ensure all management vehicles and the footwear of personnel are free from *Phytophthora* root disease propagules before entering the park.
- Investigate the installation of a raised mesh pathway in the park to cater for the casual visitor wanting to see the spring grassland wildflowers, as both a Phytophthora control measure and an interpretive device.
- Ensure that all sheep used in proposed grazing trials are free of weed propagules in their wool and in their faeces by managing their diet for an appropriate time before their introduction to the trial sites in the park.

### 4.1.7 Introduced Animals

*Background*

Rabbits (**Oryctolagus cuniculus*) have been recorded in the park near the south east corner but are in low numbers. Warrens are present on adjacent land. Hares (**Lepus capensis*) are present, but have been observed in low numbers. Foxes (**Vulpes vulpes*) are present. Four introduced bird species have been recorded in the park, being Feral Pigeons (*Columba livia*), House Sparrow (*Passer domesticus*), Common Starling (*Sturnus vulgaris*) and Eurasian Skylark (*Alauda arvensis*) (Appendix D).

*Objectives*

Minimise the adverse impact of introduced animals on the park's biodiversity and contribute to regional control of pest animals.

*Strategies*

Control, and where possible eradicate introduced animals such as rabbits, hares, and foxes from the park. Monitor all alien fauna populations.

*Actions*

- Eradicate rabbits, destroy warrens and prevent their re-establishment.
- Assess the population of hares and foxes and control them if required.
- Integrate pest animal control into regional and district programs.

## 4.2 Fire Management

*Background*

The only known history of fire in the park is of the autumn of 1996, when the northern and western slopes to an altitude of about 650 metres were burnt. The fence that approximated its eastern limit has since been removed, but its location can readily be detected on the ground and is apparent in the most recent aerial photograph, dated 8/2/1999.

Many grassland ecosystems are dependent on regular firing to maintain their structure and diversity, therefore fire management is a very important issue in Mokota Conservation Park. The most appropriate fire frequency for the various parts of the park is unknown. Research is needed to determine whether the planned use of fire is an appropriate management tool for the area. Any species that are directly dependent on frequent fire would have disappeared from this area due to the rarity of fires since settlement. However, some species present may be promoted by fire and the indirect impact of burning through alteration of habitat may be significant. Conversely, some species may be adversely affected.

Fires in grassland tend to move quickly but are less intense than fire in woody vegetation. The park's assets at risk from fire are limited to boundary fencing. The main assets on adjacent properties are winter crops, stock, and pastoral infrastructure. The main potential sources of fire ignition hazard in summer are catalytic converters on petrol-fuelled vehicles and lightning strikes. Dry annual grasses in the more degraded sections would be the most readily ignited vegetation in summer. Therefore the areas of greatest risk are boundaries and ridgetops.

Appropriate response to unplanned fires will require effective communication and cooperation with the local CFS, vehicular access to the park boundary, availability of water for fire fighting near White Hill Road and the capacity to backburn from the boundary where necessary and appropriate. The detail will be covered in a Fire Management Plan developed with the local CFS and adjacent landowners.

*Objectives*

Minimise the risk of, and ensure rapid response to, unplanned fires in the park. In suppressing fires, ensure the protection of biodiversity assets.

Use planned fire as a management tool in a mosaic pattern for ecological purposes only where research shows that it is appropriate, on an experimental basis.

*Strategies*

Limit the deliberate use of fire as a management tool to ecological or emergency purposes.

Research the fire ecology of grassland in the park.

Maintain dams needed for emergency fire fighting use.

Undertake fire prevention and suppression on a district basis in conjunction with other stakeholders.

Prohibit campfires and public vehicular access within the park.

*Actions*

- Prepare a Fire Management Plan/Statement, in consultation with the local CFS Brigades and Group.
- In undertaking bushfire prevention works or suppressing a fire, activities that disturb the ground will only be used if there is no alternative strategy feasible.
- Demonstrate fire readiness prior to each bushfire season to and with the local CFS and adjoining landowners.
- Investigate the adequacy of the water supply for fire fighting during the bushfire season.
- Include information about fire bans in material for visitors to the park. Enforce the prohibition on campfires and vehicles in the park.
- Investigate and use fire as a management tool for ecological purposes only if appropriate.
- Ensure that there is no ground disturbance in the park such as ploughed breaks in fire prevention works or during fire suppression.

## 4.3 Cultural Heritage

### 4.3.1 Aboriginal Heritage

*Background*

Dreaming

For Aboriginal people, land and waters have many interconnected complex meanings and values. The significance of land and waters is central to Aboriginal people's lives: at birth, death, ceremonies and socially, whilst hunting, gathering camping, and travelling. The term "Dreaming" is the term used to describe the combination of these aspects of life, religion, mythology, law and history which includes the past, the present and the future.

The land or waters that an Aboriginal person has a traditional or contemporary association with is commonly referred to as "Country." Both "Country" and "Dreaming" are complex concepts that are difficult for Non-Indigenous people to understand. For example "Dreaming" can be a site located in song, in physical space or embodied in an object. Its physical, social or psychological importance can vary according to the speaker's traditional country, gender, age and personal experience. For these reasons the "Dreaming" is rarely mapped in the western sense but the significance of a site is integral for Aboriginal people.

Furthermore, mythological sites associated with these stories are known only to the Aboriginal people with cultural knowledge of the area. These sites are often landscape features which can be one or many trees, rocky outcrops, riverbeds or water holes. These sites physically represent the ancestors and their activities in the story with the knowledge and "Dreamings" associated with these sites passed down through stories of travellers, ancestors and mythological beings. Many "Dreaming Stories" travel throughout an area and may be known as a "Dreaming Trail" or "Track". Some stories focus on specific "sacred sites". These stories and traditions exclusively belong to Aboriginal people. Who tells them, where they are told, to whom they are told and when, are all a part of their culture and must be respected.

Ngadjuri Culture and Heritage

The Ngadjuri people are the traditional owners of the land now conserved by Mokota Conservation Park (Tindale 1974) in South Australia's mid-north. Dreaming stories and ceremonies were important to the Ngadjuri people. Corroborees and meetings were held to settle disagreements to share stories and experiences.

Before colonial settlement the Ngadjuri people managed and preserved the inland environment, which provided important seasonal food resources.

Along with colonial settlement in 1936, came disease, dispersal, and the occupation of land and water supplies. This resulted in violent conflict. The Ngadjuri were progressively dispossessed and their ability to maintain a traditional lifestyle diminished, which lead to segregation and the loss of language, traditional stories, ceremonies, significant and sacred sites, hunting and gathering techniques, and many other important cultural and heritage issues. These issues had a huge impact on their population which dwindled significantly.

Today, Ngadjuri people continue to live on their traditional country and practice their culture, language, and traditional associations. Some of the language and traditional stories were recorded and are now being re-established.

The Aboriginal Heritage Act 1988

Under the *Aboriginal Heritage Act 1988*, the South Australian Government is responsible for the protection and preservation of sites, objects and remains of significance to Aboriginal people. The Department for Aboriginal Affairs and Reconciliation maintains a Central Archive of some 6000 site recordings of Aboriginal sites.

The *Aboriginal Heritage Act 1988* defines a site as 'An area of land that is of significance to Aboriginal tradition, Aboriginal archaeology, anthropology or history.' Site types include:

- **Archaeological sites, campsites, middens, artefact manufacturing sites.** These may occur in isolation or in conjunction with other sites. These may contain scattered pieces of stone leftover from the manufacture of tools, stone or clay hearths, and food remains such as shellfish or animal bone. Middens are characterised by large deposits of shells. They may also contain animal bone, charcoal, stone tools and possibly skeletal remains.
- **Burial sites.** Can be historic or pre Contact. In some areas burials are marked with stones, logs or brushwood at the head or sides of the grave, however most burial sites are only recognisable when they become exposed by erosion or by disturbance. Many are found in sandy areas where they are readily exposed through erosion.
- **Quarry sites - stone tool, grindstone and ochre quarries.** Quarries can be identified from signs of chipping or hammering on suitable rock outcrops and from associated surface scatters of flaked stone.
- **Stone arrangements- ceremonial, hunting hides, and fish traps.** Arrangements can be made out of stone timber or earth. They are distinguished by large or small arrangements of stones laid out in patterns on relatively clear ground, but can also be found across watercourses as fish traps.
- **Mythological sites.** Mythological sites are dreaming sites. These may include natural features in the landscape, such as single trees, rock formations and waterholes to mountain ranges.
- **Historic sites.** Historic sites can include missions, ration depots, birthplaces and fringe camps.
- **Paintings and engravings.** Painting and engraving sites are widely distributed and are found in a range of environments where suitable rock surfaces, shelters and overhangs are found.
- **Scar trees.** Scar trees exhibit scars on the trunk or limbs where bark has been removed for various purposes to make canoes, shields, dishes or shelters. These are also termed Culturally Modified Trees.

Any land, developed or undeveloped can contain sites. Sites relate to living patterns and use of environmental resources such as water, animal and vegetable foods and stone by Aboriginal people. They also relate to spiritual beliefs, and ceremonial activities.

Certain landforms at Mokota Conservation Park likely to contain evidence of Aboriginal pre-historic occupation include:

- *Rocky outcrops* (quarries, rock art, rock holes, stone arrangements, ceremonial religious sites, stone artefact scatters)
- *Bush or forested areas* (stone artefact scatters, campsites or ovens)

The full extent of Aboriginal heritage at Mokota has yet to be comprehensively researched and no sites have been recorded on the park to date. To promote better cultural heritage management at Mokota, research needs to be undertaken to identify and record sites of significance on the park.

Management of Aboriginal sites is largely at the direction of authorised Aboriginal Heritage Committees, constituted under the *Aboriginal Heritage Act 1988*. To ensure the protection sites, DEH shall consult with DAARE and the Ngadjuri Walpa Juri Lands & Heritage Association before commencement of any development works.

### 4.3.2 Colonial Heritage

The land comprising Mokota Conservation Park was granted freehold in 1866 to Gustav Gebhardt and remained in the Gebhardt family until 1999, when it was purchased by DEH.

The colonial heritage of the park is as native grassland with an unusual management history, indicated by the fact that it retained significant biodiversity value through more than a century of domestic stock grazing. This heritage will be protected through maintaining and recording the park's biodiversity.

DEH has a responsibility to comply with the provisions of the *Heritage Act 1993* and the *Aboriginal Heritage Act 1998* in managing cultural heritage.

#### *Objectives*

Conserve and protect significant archaeological, cultural and historical sites, and provide suitable interpretive material.

#### *Strategies*

Meet legal requirements under the *Aboriginal Heritage Act 1988*, the *Heritage Act 1993* and the *Development Act 1993*.

The advice of relevant authorities should be sought prior to undertaking restoration work or any developments at sites of cultural or historic significance.

#### *Actions*

- Consult Ngadjuri people who have a traditional association with the land, Native Title Claimants and relevant State and Federal Aboriginal heritage authorities, in decisions regarding the management of Ngadjuri cultural heritage.
- Before proceeding with any development works within the reserve, obtain an assessment and clearance from the appropriate authority, under the provisions of the *Aboriginal Heritage Act 1988*.
- Identify, record, protect restore and monitor known or relocated sites and items of archaeological, anthropological, cultural and historical significance located in the park, in cooperation with the Department for Aboriginal Affairs and Reconciliation, the Heritage branch of DEH and other relevant authorities and organisations. Ngadjuri and historic cultural heritage sites require conservation plans to facilitate appropriate management.
- As resources permit and in consultation with the Ngadjuri community and other relevant authorities, research and inventory, cultural and historic sites and stories that relate to the history of the park and where appropriate develop interpretive material for visitors.
- Ensure that the park is included in a regional cultural heritage survey.
- Encourage and support archaeological, anthropological and historic studies within the park. All sites located should during these surveys should be recorded to the standards set by the Heritage branch of DEH and/or DAARE and submitted for inclusion on the DAARE Central Archive and/or State Heritage Register.

## 4.4 Recreation and Tourism

### 4.4.1 Visitor Use

*Background*

No facilities are currently provided. Visitors to the park generally walk into the area from White Hill Road. Prior to becoming a park, the area was used as a demonstration site for grassland workshops and visitors have been limited largely to participants in such workshops, researchers and people involved in natural history surveys. The number of people visiting the park should be monitored, but is not expected to be very great, due to the absence of spectacular natural features, trees and permanent water.

The area is not generally appealing or appropriate as a camping area due to the lack of potable water, shelter and its small size. Permanent picnic facilities (eg. Toilets, barbeques, tables) are also inappropriate, given the sensitive nature of the vegetation, the risk of fires and the exposed nature of the environment.

No commercial operators currently utilise Mokota Conservation Park. Future public activities will not involve vehicular activity or camping in the park and entry fees would not be appropriate. Commercially run cycling or vehicle tours may include the Mawson Trail along White Hill Road (Figure 1) and the park may become a point of interest once it is signposted. The Heysen Trail is about 5km south-east of the park. It is not envisaged that there would be an interest in operations that would require a commercial agreement.

*Objectives*

Encourage visitors to observe grassland and wildflowers and to appreciate the conservation value of grasslands and their historical importance in the region and state.

Encourage the public to visit the park on day trips.

Ensure that no commercial activities compromise the conservation of the park's natural assets.

*Strategies*

Provide information to assist visitors to understand the park and behave appropriately, including interpretive/educational material for promoting a greater awareness of grassland conservation.

Have regard to the natural assets of and management intent for the park when assessing proposed commercial activity.

Monitor visitor numbers to determine level of management required.

*Actions*

- Promote the park as a day visit area of interest for its general landscape and seasonal natural attractions.
- Provide information to the public through regional tourism centres and DEH offices about access to the park, the best time to visit (Spring), its attractions, the conditions likely to be experienced. Provide interpretive/educational material through appropriate media.
- Encourage people interested in visiting the park to base themselves at Burra, Mount Bryan or Hallett or other accommodation in the district outside these towns.
- No commercial licences will be issued for the park at this time. DEH will monitor the need or demand for such licences.

### 4.4.2 Vehicle Access

*Background*

White Hill Road runs along the northern boundary of the park and is a gravel road, requiring regular maintenance to be passable in most conditions. Local access to the southern boundary is via a dry weather track through a paddock and two farm gates. The southern boundary track is on a road reserve that is not fenced on the northern (park) boundary. Tracks within the park were used for maintaining dams and fences and managing stock within the area but these are now indistinct.

Lomandra tussocks are vulnerable to damage by vehicles. Vehicles in the park would be difficult for DEH to control and the public could be liable to risk on unformed tracks in the hilly terrain. Due to the steep terrain, increased traffic would contribute to erosion and deterioration of the boundary track, resulting in costly ongoing maintenance. Catalytic converters on petrol fuelled vehicles would pose a significant fire ignition hazard in summer. Public vehicular use of the southern track could potentially spread horehound. For these reasons, vehicular access within the park by the public will be prohibited.

*Objectives*

Maintain a single defined public vehicle access point and car park from the existing fenced, public road.

*Strategies*

Vehicular access within the park will be limited to management or emergency purposes. The northern boundary will have a parking area provided and clearly identified as the visitor access point.

*Actions*

- Install a car parking area for up to six cars on White Hill Road with pedestrian access into the park and an interpretative sign.
- Erect signs off the Barrier Highway directing visitors to the park along the Mount Bryan East and White Hill Roads.
- Install locks on the gates on the northern boundary and provide keys to CFS and other agencies that may need to enter for official purposes.
- Install a DEH sign at the south west corner of the park to indicate the park boundary and limitations on access into the park.

### 4.4.3 Walking Trails

*Background*

A network of sheep and kangaroo tracks exists on the park. Due to the open, low vegetation, formed walking trails are not required. Visitors will be directed to points of interest by a set of marked posts from the car park at the northern boundary. These posts may need to be moved from time to time to prevent erosion or trampling of significant species.

One of the greatest threats to the integrity of natural habitats is the *Phytophthora* root-rot fungus. Appropriate measures should be taken to prevent it being introduced to the park. It may prove necessary to install footwear hygiene stations at public entrance points to the park or to construct elevated walkways – expert advice should be obtained and acted upon.

*Objectives*

Encourage visitors to appreciate native grassland diversity while minimising any adverse impact.

*Strategies*

Cater for visitors exploring the park by guiding them to a safe, interesting route.

*Actions*

- Investigate a suitable route for a short walking trail from the car park in consultation with Threatened Plant Action Group. If necessary, delineate such a trail by use of marked posts, or other means, from the car park at the northern boundary.
- Review the location of the trail annually to prevent erosion or trampling of significant species.

## 4.5 Mineral Exploration and Mining

*Background*

The park is subject to a joint proclamation relating to prospecting, mineral exploration or mining. The area is under a current Exploration Licence. There has been no mineral deposit discovered in the park, but the area may in the future be subject to mineral tenements as issued under the *Mining Act 1971*. The acquisition of rights of entry, prospecting, exploration or mining requires the approval of the Ministers for Environment and Heritage and for Minerals and Energy. All exploration and mining activities are to follow guidelines issued by the Minister for Minerals and Energy and are subject to conditions specified in the joint proclamation, which include having regard to the operational plan of management.

*Objectives*

Ensure that any mineral exploration or mining activity does not compromise the conservation of the park's natural assets.

*Strategies*

Have regard to the natural assets of, and management intent for, the park when assessing proposed mining activity.

*Actions*

- Assess applications for mineral or petroleum exploration licences for the park and provide advice to the Minister on the potential impacts and conditions that should apply to any such licence, including the protection of threatened species and communities.

## 4.6 Management Arrangements

### 4.6.1 Partnerships and Cooperative Management

*Background*

DEH supports and promotes partnerships and cooperative management arrangements as the best way to progress integrated natural resource management. Achieving positive biodiversity and recreation outcomes requires the development of effective working relationships with other government agencies, local authorities, non-government organisations and the local community.

The Regional Council of Goyder manages land in the Mid-North region and co-operation between DEH and Council, regarding matters of common interest is, therefore desirable. Tourism initiatives, biodiversity conservation, control of abundant native (and pest) animals, weed control and fire protection schemes would all benefit from a coordinated approach.

With regard to Mokota Conservation Park, ongoing management links should be maintained with the following:

- Regional Council of Goyder
- Goyder Animal and Plant Control Board
- Hummocks District Soil Board
- Plague Locust Control board
- SA Museum
- Native Title Claimants
- Aboriginal Heritage Committee
- Grassy Ecosystem Technical Advisory Group
- Mid-North Grasslands Working Group

DEH is committed to reconciliation and to the development of partnerships with the Ngadjuri community to effectively manage Mokota Conservation Park in a way that respects both contemporary and traditional culture, knowledge and skills. Partnerships involve the delivery of programs that promote reconciliation, cultural awareness, Indigenous employment and training, cooperative management and Indigenous cultural heritage management on parks.

Furthermore, the South Australian Government is keen to pursue Indigenous Land Use Agreements (ILUAs) which are voluntary agreements between native title groups and other people about the use and management of country. For Mokota Conservation Park such agreements would be between the Ngadjuri Walpa Juri and Heritage Association and the South Australian Government.

Partnership arrangements should be developed to provide a positive direction for the shared development and management of the park to fulfil the objectives of this plan.

*Objectives*

Develop and maintain partnerships and/or working relationships between state and local government, non-government organisations and the community generally, in the management of the park and adjoining land to help fulfil the reserve's potential without compromising its natural values.

*Actions*

- Encourage and contribute to the development of partnership arrangements to integrate biodiversity and recreation management in the region, with organisations that have an interest in contributing to the sustainable management of the park.
- Involve the Ngadjuri community, Native Title Claimants and the Ngadjuri Walpa Juri and Heritage Association in the cooperative management of the reserve and the preservation of their Indigenous cultural heritage.

### 4.6.2 Community and Volunteer Involvement

*Background*

Volunteer support and community-based involvement that conserves and improves biodiversity and cultural values, and establishes quality management of recreational use, has become an essential component of park management. Partnership arrangements need to be developed with the local and wider community to provide a positive direction for the maintenance and management of the park, integral with the management of native grasslands on adjacent, private land. Partnerships can also improve the resourcing and funding capability to manage the park in accordance with the objectives of this plan.

Volunteer contribution is invaluable and DEH acknowledges the contribution that the numerous Friends' groups have made across the State. Convening a Friends of Mid-North Parks group would therefore be a most worthwhile initiative in terms of the future management of Mokota Conservation Park and provide a vehicle for community involvement in support of future park management programs. DEH recognises that an integrated approach to coordinate priorities for conservation in consultation with the (proposed) Friends of Mid-North Parks group, adjoining property owners (including the former owners of the property) and other volunteer organisations and individuals is required.

DEH already liaises with the local community over regional issues such as fire and kangaroo management and regional pest plant and animal control. Further consultation and information sharing at the regional level occurs through the MNGWG. Volunteer involvement in park management has begun through the survey of 1998-9 by the Nature Conservation Society and the Threatened Plant Action Group. The monitoring program has commenced through a partnership between GETAG, NCSSA, and DEH with support from the Native Vegetation Council, and MNGWG.

Volunteers often require the provision of materials, equipment and supervision by park staff. Therefore, it is important for DEH to maintain liaison with volunteers to provide support and encouragement, and to ensure their efforts are consistent with park management objectives and work programs. Once convened, it is important for DEH to consult regularly with Friends members regarding the ongoing management of the park and provide support and assistance including legal and policy advice, technical, planning and management direction.

Other community programs, organisations and individuals, can also help support park management. Schools and tertiary institutions, in particular, may wish to use the park for education and research and can contribute to better management. Involvement with educational institutions should therefore be encouraged.

*Objectives*

Encourage and support the involvement of the local community, volunteer organisations and individuals in park management and in the development of conservation programs in collaboration with DEH.

Manage kangaroos, fire hazard and other issues that may arise on a district basis in conjunction with neighbours and other stakeholders.

*Strategies*

Continue liaison with the local community over management issues that affect them directly.

Provide information to the local community about the park and its management and encourage their involvement in partnership with DEH and other agencies by supporting the creation of a Friends of Mid-North Parks group.

Continue to support the involvement of Nature Conservation Society and Threatened Plant Action Group in park programs, and encourage other organisations and individuals to contribute.

*Actions*

- Encourage the establishment of a Friends of Mid-north Parks Group and provide support for such an organisation's continued involvement in appropriate management of development projects by providing training and other assistance.
- Encourage and assist the Nature Conservation Society, Threatened Plant Action Group and other volunteers to continue their voluntary contribution to park management.
- Liaise with neighbouring property owners and interested key stakeholders over fire and kangaroo management, regional pest plant and animal control and other issues as they arise.
- Hold community field days to discuss the condition of the park and any management issues arising from monitoring and research programs.
- In consultation with volunteer groups, review the direction of work activities based on the initiatives outlined in this plan of management, and integrate annual work programs of the groups into the proposed management programs for the park.
- Encourage and facilitate the involvement of schools and universities in research and volunteer programs.

## 4.7 Future Directions

### 4.7.1 Additional Land

*Background*

Mokota has an area of 455 hectares. As it is the only reserve in the region that conserves native grassland, this is very small in ecological terms. To conserve Hard Mat-rush (*Lomandra multiflora* ssp. *dura*) grassland, a much larger area in the region should be managed for conservation. Additional grassland areas need to be reserved and managed, like Mokota, primarily for biodiversity conservation, but areas managed for conservation and pastoral use can also contribute to regional conservation of grasslands. For example, known populations of pygmy bluetongue have all been found on private grazing land.

Through the Mid North Grassland Working Group and the Natural Heritage Trust, trials have been designed on working properties to compare the outcome of various grazing regimes for combined biodiversity and production goals.

It is the current policy of the Goyder Council that the road reserve on the southern boundary of the park will remain open. From a park management perspective, it would be beneficial to close the reserve under the *Roads (Opening and Closing) Act 1991* and incorporate the road reserve into the park.

### *Objectives*

Control public access to the park for management purposes.

Increase the area of native grassland in the region, to be managed for conservation - both solely for biodiversity conservation and in conjunction with production at a compatible grazing level.

### *Actions*

- Close the north south road reserve through the centre of the park under the *Roads (Opening and Closing) Act 1991*.
- Encourage conservation of grasslands in the region if they will contribute to the comprehensiveness, adequacy and representativeness of grasslands conserved in South Australia.
- In partnership with GETAG and MNGWG, encourage appropriate management of grassland on grazing properties in the region to promote biodiversity and demonstrate the outcomes of the Mid-North grazing and biodiversity trials. Advise on assistance available to improve conservation outcomes in the region.

## 5 SUMMARY OF MANAGEMENT ACTIONS

| ACTION | PRIORITY | DURATION |
|---|---|---|
| **Natural Resources** | | |
| Geology and Landform | | |
| Include geological information in visitor materials. | Low | 5 years |
| Soils | | |
| Minimise disturbance of soil and vegetation that could lead to erosion, including fires in mid summer, overgrazing and vehicular access within the park. | High | Ongoing |
| Set up erosion monitoring points in creek gullies and other sites of past erosion and take remedial action to halt excessive erosion as required. | Medium | Ongoing |
| Monitor areas used by visitors | Medium | Ongoing |
| Regulate vehicle or pedestrian use of any areas where excessive erosion could occur. | High | Ongoing |
| Hydrology | | |
| Consult stakeholders regarding the removal of dams not required for emergency fire fighting, the eastern and higher northern dams. Consider the impact of removing dams on native flora and fauna. The silted West Dam has value to some native species and need not be disturbed. | Medium | 12 months |
| Remove surplus dams and rehabilitate dam sites to enable regeneration of indigenous vegetation. | Medium | 5 years |
| Native Vegetation | | |
| Investigate in detail through consultation with the previous landowners the intensity, timing and duration of grazing and fertilising over the past twenty or more years. | High | 1 year |
| In conjunction with GETAG and MNGWG, investigate the impact on quality native grassland of removing light seasonal sheep grazing by continuing to graze in scientifically designed experimental plots. The use of fire, herbicide or slashing as a management tool will also be investigated. If these trials and monitoring indicate that such disturbance is required to maintain an open grassland structure and retain diversity of native species, management intervention on a larger scale will be considered. | Very High | 2 years |
| If these trials and monitoring indicate that disturbance is required to maintain an open grassland structure and retain diversity of native species, management intervention on a larger scale will be considered, using the most effective and appropriate technique(s). | Very High | 3 years |
| Continue the annual monitoring program to measure change in frequencies of all native and alien plant species in replicated plots in areas of high quality grassland and in more degraded areas. | Very High | Annual |

| ACTION | PRIORITY | DURATION |
|---|---|---|
| Continue monitoring populations of the nationally threatened plant species *Cullen parvum* and *Dodonaea procumbens* and, with the assistance of volunteers, undertake hand weeding where these species are under threat from competition with alien species. If populations decline, investigate the reasons for that decline and take remedial action. | High | Ongoing |
| Research various techniques for improving the condition of degraded areas of grassland, including controls (no management intervention). Any trials must protect those native species that persist in some degraded areas, such as *Pimelea curviflora* var *gracilis.* | Very High | 5 years |
| Native Fauna | | |
| Measure the impact of macropods on vegetation by erecting suitable exclosures in representative areas of the park's vegetation. | High | 12 months |
| Integrate park macropod management into regional strategies. | High | Ongoing |
| Assess the impact of park dams on macropod numbers. | High | Ongoing |
| Increase knowledge of invertebrates, adding to data from the 1999 survey. | Medium | 12 months |
| Liaise with local landowners and the Plague Locust Commission to limit the use of insecticides in the region of the park and minimise the impact of insecticide spraying on the park's fauna. | High | Ongoing |
| Undertake further vertebrate and invertebrate fauna surveys | High | 5 years |
| Introduced Plants | | |
| Eradicate horehound outbreaks in the park, monitor the area so treated and undertake any follow up required. | High | 12 months |
| Eradicate all boxthorn using basal spray treatment and prevent their re-establishment. | Medium | 2 years |
| Eradicate artichoke thistle from the vicinity of the dams and anywhere else found | Medium | 2 years |
| Eradicate proclaimed plants consistent with the practices of adjoining landowners. | Medium | Ongoing |
| Incorporate all alien species in the general vegetation monitoring program | High | Ongoing |
| Ensure that management vehicles are free of weed propagules when entering the park. | High | Ongoing |
| Undertake appropriate fungal hygiene measures to ensure all management vehicles and the footwear of personnel are free from *Phytophthora* root disease propagules before entering the park. | High | Ongoing |
| Investigate the installation of a raised mesh pathway in the park to cater for the casual visitor wanting to see the spring grassland wildflowers, as both a Phytophthora control measure and an interpretive device. | Medium | 3 years |
| Ensure that all sheep used in proposed grazing trials are free of weed propagules in their wool and in their faeces by managing their diet for a week before their introduction to the trial sites in the park. | High | Ongoing |

| ACTION | PRIORITY | DURATION |
|---|---|---|
| Undertake regular patrols throughout the park to detect and destroy new infestations of proclaimed plants or colonisation by alien species that are not yet known from the park. | High | Ongoing |
| Introduced Animals | | |
| Eradicate rabbits, destroy warrens and prevent their re-establishment. | High | Ongoing |
| Assess the population of hares and foxes and control them if required. | Medium | Ongoing |
| Integrate pest animal control into regional and district programs | High | 2 years |
| **Fire Management** | | |
| Prepare a Fire Management Plan, in consultation with the local CFS Brigades and Group. | High | 12 months |
| In undertaking bushfire prevention works or suppressing a fire, activities that disturb the ground will only be used if there is no alternative strategy feasible. | High | Ongoing |
| Demonstrate fire readiness prior to each bushfire season to and with the local CFS and adjoining landowners. | High | Ongoing |
| Investigate the adequacy of the water supply for fire fighting during the bushfire season. Maintain North Dam for emergency fire fighting use if required. | High | 2 years |
| Include information about total fire bans in material for visitors to the park. Enforce prohibition on campfires and vehicles in the park | High | 12 months |
| Investigate and use fire as a management tool for ecological purposes only as appropriate. | High | 5 years |
| Ensure that there is no ground disturbance in the park such as ploughed breaks in fire management plans or during fire suppression. | High | Ongoing |
| **Cultural Heritage** | | |
| Consult Ngadjuri people who have a traditional association with the land, Native Title Claimants and relevant State and Federal Aboriginal heritage authorities, in decisions regarding the management of Ngadjuri cultural heritage. | High | Ongoing |
| Before proceeding with any development works within the reserve, obtain an assessment and clearance from the appropriate authority, under the provisions of the *Aboriginal Heritage Act 1988*. | High | Ongoing |
| Identify, record, protect restore and monitor known or relocated sites and items of archaeological, anthropological, cultural and historical significance located in the park, in cooperation with the Department for Aboriginal Affairs and Reconciliation, the Heritage branch of DEH and other relevant authorities and organisations. Ngadjuri and historic cultural heritage sites require conservation plans to facilitate appropriate management. | High | Ongoing |
| As resources permit and in consultation with the Ngadjuri community and other relevant authorities, research and inventory, cultural and historic sites and stories that relate to the history of the park and where appropriate develop interpretive material for visitors. | Medium | 5 years |
| Ensure that the park is included in a regional cultural heritage survey. | Medium | 5 years |

| ACTION | PRIORITY | DURATION |
|---|---|---|
| Encourage and support archaeological, anthropological and historic studies within the park. All sites located should during these surveys should be recorded to the standards set by the Heritage branch of DEH and/or DAARE and submitted for inclusion on the DAARE Central Archive and/or State Heritage Register. | Medium | Ongoing |
| **Recreation and Tourism** | | |
| Visitor Use | | |
| Promote the park as a day visit area of interest for its general landscape and seasonal natural attractions. | Medium | Ongoing |
| Provide information to the public through Goyder Tourism and DEH offices about access to the park, the best time to visit (Spring), its attractions, the conditions likely to be experienced, the need to be self contained and the nearest facilities. | Medium | Ongoing |
| Encourage people interested in visiting the park to base themselves at Burra, Mount Bryan or Hallett or other accommodation in the district outside these towns. | High | Ongoing |
| No commercial licences will be issued for the park at this time. DEH will monitor the need or demand for such licences. | Low | Ongoing |
| Vehicle Access | | |
| Install a car parking area for 6 cars on White Hill Road with pedestrian access into the park and an interpretative sign. | High | 12 months |
| Erect signs off the Barrier Highway directing visitors to the park along the Mount Bryan East and White Hill Roads. | Medium | 6 months |
| Install locks on the gates on the northern boundary and provide keys to CFS and other agencies that may need to enter for official purposes. | Medium | Immediate |
| Install a DEH sign at the south west corner of the park to indicate the park boundary and limitations on access into the park. | Medium | Immediate |
| Walking Trails | | |
| Investigate a suitable route for a short walking trail from the car park in consultation with Threatened Plant Action Group. If necessary, delineate such a trail by use of marked posts, or other means, from the car park at the northern boundary. | Medium | 2 years |
| Review the location of the trail annually to prevent erosion or trampling of significant species. | Medium | 2 years |
| **Mineral Exploration and Mining** | | |
| Assess applications for mineral or petroleum exploration licences for the park and provide advice to the Minister on the potential impacts or conditions that should apply to any such licence, including the protection of threatened species and communities. | High | Ongoing |

| ACTION | PRIORITY | DURATION |
|---|---|---|
| **Management Arrangements** | | |
| Partnerships and Cooperative Management | | |
| Encourage and contribute to the development of partnership arrangements to integrate biodiversity and recreation management in the region, with organisations that have an interest in contributing to the sustainable management of the park. | High | Ongoing |
| Involve the Ngadjuri community, Native Title Claimants and the Ngadjuri Walpa Juri and Heritage Association in the cooperative management of the reserve and the preservation of their Indigenous cultural heritage. | High | Ongoing |
| Community and Volunteer Involvement | | |
| Encourage the establishment of a Friends of Mid-north Parks Group and provide support for such an organisation's continued involvement in appropriate management of development projects by providing training and other assistance. | Medium | 2 years |
| Encourage and assist the Nature Conservation Society, Threatened Plant Action Group and other volunteers to continue their voluntary contribution to park management. | Medium | Ongoing |
| Liaise with neighbouring property owners and interested key stakeholders over fire and kangaroo management, regional pest plant and animal control and other issues as they arise. | High | Ongoing |
| Hold a community field day each year to discuss the condition of the park and any management issues arising from monitoring programs. | High | Ongoing |
| In consultation with the (proposed) Friends of Mid-North Parks and other major volunteer groups, review the direction of work activities based on the initiatives outlined in this plan of management, and integrate annual work programs of the Friends Group into the proposed management programs for the park. | High | Ongoing |
| Encourage and facilitate the involvement of schools and universities in research and volunteer programs. | Medium | Ongoing |
| **Future Directions** | | |
| Additional Land | | |
| Close the north south road reserve through the centre of the park under the *Roads (Opening and Closing) Act 1991*. | Medium | 12 months |
| Encourage conservation of grasslands in the region if they will contribute to the comprehensiveness, adequacy and representativeness of grasslands conserved in South Australia. | High | Ongoing |
| In partnership with GETAG and MNGWG, encourage appropriate management of grassland on grazing properties in the region to promote biodiversity and demonstrate the outcomes of the Mid-North grazing and biodiversity trials. Advise on assistance available to improve conservation outcomes. | High | 5 years |

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**Personal Communications**

R. J. Bates, Threatened Plant Action Group

Gebhardt family, former property owners.

Ian Falkenberg, District Ranger, Mid North District, DEH

Tim Milne and Sylvia Clarke, former and current pygmy bluetongue Project Officers, SA Museum.

Mark Hutchinson, Curator of Reptiles, SA Museum.

## APPENDIX A: LEGISLATION, CONVENTIONS AND AGREEMENTS

In addition to the *National Parks and Wildlife Act*, DEH is obliged to comply with the provisions of the following legislation, conventions and agreements:

| **South Australia** |
|---|
| *Aboriginal Heritage Act 1988* |
| *Animal and Plant Control Act (Agricultural Protection and Other Purposes) 1986* |
| *Biological Control Act 1986* |
| *Catchment Water Management Act 1995* |
| *Coast Protection Act 1972* |
| *Country Fires Act 1989* |
| *Equal Opportunity Act 1984* |
| *Environment Protection Act 1993* |
| *Development Act 1993* |
| *Harbors and Navigation Act 1993* |
| *Heritage Act 1993* |
| *Historic Shipwrecks Act 1981* |
| *Mining Act 1971* |
| *National Trust of South Australia Act 1955* |
| *Native Title (South Australia) Act 1994* |
| *Native Vegetation Act 1991* |
| *Occupational Health, Safety and Welfare Act 1986* |
| *Petroleum Act 1940* |
| *Prevention of Cruelty to Animals Act 1985* |
| *Roads (Opening and Closing) Act 1991* |
| *Recreational Greenways Act 2000* |
| *Soil Conservation and Land Care Act 1989* |
| *Water Resources Act 1997* |
| *Wilderness Protection Act 1992* |

| **Commonwealth** |
|---|
| *Aboriginal and Torres Straight Islander Heritage Protection Act 1984* |
| *Disability Discrimination Act 1992* |
| *Environment Protection and Biodiversity Conservation Act 1999* |
| *Native Title Act 1993* |
| *Natural Heritage Trust Act 1996* |

| **International** |
|---|
| Japan / China Australia Migratory Bird Agreements (JAMBA, CAMBA) |
| Ramsar Convention |
| World Heritage Convention |

## APPENDIX B: MOKOTA CONSERVATION PARK - LAND TENURE HISTORY

The park comprises sections 164, 165, 166, 168, and part 167, Hundred of Kingston. Sections 164, 166, 167 and 168 were granted freehold in 1866 to Gustav Gebhardt and remained in the one family until 1999. Section 165 was granted freehold to John and Alfred Hallett in 1866 and was acquired by G A Gebhardt in 1879. It also remained in that family until 1999. The full tenure history of those parcels of land proclaimed as Mokota Conservation Park is described below.

**Sections 164 to 168 Hundred of Kingston**

Sections 164, 166, 167 and 168 were granted to Gustav Gebhardt in Land Grant volume 80 folio 134 on 21/1/1866. Transfer of the land has been as follows:-

Transfer 315515 from G. Gebhardt to Charles Ernest Gebhardt on 29/4/1897

Transfer 408543 from CE Gebhardt to Ludwig Wilhelm Gebhardt on 29/4/1904

New Title issued, CT 1078/157 in name of LW Gebhardt

Transfer 1158287 from LW Gebhardt to Donald Charles Gebhardt on 27/9/1933

Transfer 1446617 from DC Gebhardt to Robert Marcus Gebhardt on 18/12/1945

New Title issued, CT 1953/121 in name of RM Gebhardt

TATS Title CT 5207/29 issued to RM Gebhardt on 10/8/1994

Transfer 7748682 from RM Gebhardt to Donald Charles Gebhardt on 12/8/1994

Transfer 8602781 from DC Gebhardt to Minister for Environment and Heritage on 8/4/1999

Section 165 was granted to John and Alfred Hallett in Land Grant volume 81 folio 60 on 8/3/1866. Transfer of the land has been as follows:-

Transmission 1554 dated 4/9/1878 to Catherine Hallett and Henry Archibald Price and new title CT 288/140 issued

Transfer 91396 from C Hallett and HA Price to William Watts on 12/10/1878 and new title CT 291/69 issued

Transfer 105722 from W Watts to Gustav Adolph Gebhardt on 3/12/1879

Transfer 315515 from GA Gebhardt to Charles Ernest Gebhardt on 29/4/1897

Transfer 408543 from CE Gebhardt to Ludwig Wilhelm Gebhardt on 29/4/1904

New Certificate of Title 1078/158 issued

Transfer 1158286 from LW Gebhardt to Donald Charles Gebhardt on 27/9/1933

New Certificate of Title 1620/194 issued

Transfer 1446617 from DC Gebhardt to Robert Marcus Gebhardt on 18/12/1945

TATS Title CT 5207/24 issued to RM Gebhardt on 10/8/1994

Transfer 7748682 from RM Gebhardt to Donald Charles Gebhardt on 12/8/1994

Transfer 8602781 from DC Gebhardt to Minister for Environment and Heritage on 8/4/1999.

The land is within the current Native Title Claim SG6023/1998 Barkandji (Paakantyi) #9.

## APPENDIX C: MOKOTA CONSERVATION PARK - FLORA

**Summary of Vegetation Survey, 1999 (Biological Survey 116)**

*Physical data*

Most quadrats (seven) were hill footslope or hill slope, two sampled a ridge, one a plain. These are collectively described as 'hill sites'. Two quadrats were in the main creeklines, one faced north and one south. Slope ranged from 0-8 degrees. Altitude varied from 580 to 680 metres above sea level. The soil in half of the quadrats was sandy clay loam and in the remaining six was clay loam. Strew was present at eight quadrats, as cobbles or boulders, with less than 30% cover. The cover of plant litter was between 5 and 20% in most quadrats, with a maximum of 40%.

Most of the quadrat locations were selected for their quality of native vegetation and ease of access, therefore the centre of the park and the southerly aspects near the southern boundary were not well represented. All but two quadrats have an aspect between west and north north-east.

*Vegetation data*

The most commonly recorded vegetation structure was open tussock grassland, with two sites described as tussock grassland and two as closed tussock grassland. Most plant species were relatively sparse in estimated cover abundance generally (<5%).

Hard Mat-rush (*Lomandra multiflora* ssp. *dura*) and Pussy-tails (*Ptilotus spathulatus* forma *spathulatus*) were the most frequent native species, recorded at 10 out of 12 quadrats.

Five native grasses were recorded at 9 sites. These were:

| | |
|---|---|
| *Aristida behriana* | Brush Wire-grass |
| *Danthonia auriculata* | Lobed Wallaby-grass |
| *Danthonia caespitosa* | Common Wallaby-grass |
| *Stipa blackii* | Crested Spear-grass |
| *Stipa nodosa* | Tall Spear-grass. |

Seven native forbs were recorded at 7 or 8 sites, generally with low cover. All of these are common species in Mid-North grasslands except Blue Devil (*Eryngium rostratum*). The highest number of native species in a quadrat was recorded near the north-eastern corner and this quadrat also contained the highest number of native species that were recorded only once.

The five most frequently recorded species were alien and almost ubiquitous and 9 of the 11 most frequently recorded species (recorded at 10 or more quadrats) were alien. Percentage of alien species varied from 21% to 57%, with an average of 39%. Two quadrats had a high cover of Wild Oats **Avena barbata* and low number of native species. However, sites that were weedy as measured by a high proportion of total species and/or high weed cover abundance estimate, were not necessarily poor in number or uniqueness of native species recorded.

*Hill sites*

Thirteen species were recorded as a dominant at one or more sites. The species most frequently recorded as dominant (with a cover abundance estimate of 5-25% or more at a site) were brush wire-grass (5 sites) and Wild Oat **Avena barbata* (5 sites, 50-75% at 2 sites). Kangaroo Grass and Short Wallaby Grass *Danthonia carphoides* were recorded once with a cover abundance of more than 25% (25-50% or 50-75%). Wild oats was the only alien species to be recorded as a dominant.

## APPENDIX C: MOKOTA CONSERVATION PARK - FLORA (continued)

**Plants of Particular Conservation Significance**

Plant taxonomy follows Jessop (1993) but includes recent taxonomic changes in the unpublished Florlist database. See Appendix E for regional and conservation status codes.

| Species | Common name | Conservation Status | | | |
|---|---|---|---|---|---|
| | | EPBC Act | NP&W Act | Regional | |
| | | | | NL | MU |
| *Alternanthera denticulata* | Lesser Joyweed | | | K | N |
| *Amphibromus archeri* | Pointed Swamp Wallaby-grass | | R | | V |
| *Aphanes australiana* | Australian Piert | | | R | R |
| *Aristida contorta* | Curly Wire-grass | | | R | R |
| *Bromus arenarius* | Sand Brome | | | X | |
| *Calocephalus citreus* | Lemon Beauty-heads | | U | U | V |
| *Carex breviculmis* | Short-stem Sedge | | | R | K |
| *Carex inversa* var *major* | Knob Sedge | | R | R | R |
| *Centipeda cunninghamii* | Common Sneezeweed | | | K | |
| *Chrysocephalum semipapposum* | Clustered Everlasting | | | Q | U |
| *Convolvulus* aff *erubescens "linear lobes"* | Grassland Bindweed | | U | U | |
| *Cryptandra amara* var *longiflora* | Long-flower Cryptandra | | R | R | K |
| *Cullen parvum* | Small Scurf-pea | E | V | E | |
| *Cymbonotus preissianus* | Austral Bear's-ear | | U | R | K |
| *Cynoglossum suaveolens* | Sweet Hound's-tongue | | Q | R | R |
| *Danthonia auriculata* | Lobed Wallaby-grass | | | N | U |
| *Danthonia carphoides* var *carphoides* | Short Wallaby-grass | | K | K | |
| *Danthonia duttoniana* | Brown-back Wallaby-grass | | R | K | K |
| *Danthonia eriantha* | Hill Wallaby-grass | | R | R | K |
| *Danthonia pilosa* var *paleacea* | Velvet Wallaby-grass | | | K | |
| *Danthonia racemosa* var *racemosa* | Slender Wallaby-grass | | | U | K |
| *Danthonia tenuior* | Short-awn Wallaby-grass | | Q | Q | |
| *Dianella longifolia* var *grandis* | Pale Flax-lily | | R | T | |
| *Diuris behrii* | Behr's Cowslip orchid | | R | V | V |
| *Dodonaea procumbens* | Trailing Hop-bush | V | E | E | |
| *Elymus scabrus* var *scabrus* | Native Wheat-grass | | | U | R |
| *Enneapogon nigricans* | Black-head Grass | | | U | |
| *Epilobium billardierianum* ssp *cinereum* | Variable Willow-herb | | | R | |
| *Eryngium rostratum* | Blue Devil | | V | V | |
| *Goodenia pinnatifida* | Cut-leaf Goodenia | | Q | U | U |
| *Hymenanthera dentata* | Tree Violet | | U | R | R |
| *Isolepis hookeriana* | Grassy Club-rush | | U | K | K |
| *Juncus flavidus* | Yellow Rush | | R | V | V |

| Species | Common name | Conservation Status | | | |
|---|---|---|---|---|---|
| | | EPBC Act | NP&W Act | Regional | |
| | | | | NL | MU |
| *Juncus radula* | Hoary Rush | | V | V | |
| *Leptorhynchos tetrachaetus* | Little Buttons | | U | U | K |
| *Levenhookia dubia* | Hairy Stylewort | | | R | R |
| *Linum marginale* | Native Flax | | | U | U |
| *Maireana excavata* | Bottle Fissure-plant | | K | E | |
| *Marsilea drummondii* | Common Nardoo | | | K | |
| *Microtis frutetorum* | Onion-orchid | | | | |
| *Millotia tenuifolia* | Soft Millotia | | | | |
| *Myosotis australis* | Austral Forget-me-not | | | K | R |
| *Ophioglossum lusitanicum* | Austral Adder's-tongue | | | U | U |
| *Persicaria decipiens* | Slender Knotweed | | | T | |
| *Pimelea curviflora* var *gracilis* | Curved Riceflower | | | | |
| *Pimelea curviflora* var *sericea* | Curved Riceflower | | | | |
| *Pimelea micrantha* | Silky Riceflower | | | | |
| *Pleurosorus rutifolius* | Blanket Fern | | | U | R |
| *Prasophyllum occidentale* | Plains Leek-orchid | | | | |
| *Prasophyllum odoratum* | Scented Leek-orchid | | | R | |
| *Pseudognaphalium luteoalbum* | Jersey Cudweed | | | | |
| *Pterostylis cycnocephala* | Swan-head Greenhood | | | | |
| *Ptilotus erubescens* | Hairy-tails | | R | T | R |
| *Ranunculus pachycarpus* | Thick-fruit Buttercup | | U | R | V |
| *Rumex brownii* | Slender Dock | | | | |
| *Rumex dumosus* var *dumosus* | Wiry Dock | | | | |
| *Solenogyne dominii* | Smooth Solenogyne | | U | R | R |
| *Stipa flavescens* | Coast Spear-grass | | | R | U |
| *Stipa gibbosa* | Fat Spear-grass | | R | T | |
| *Stipa puberula* | Small Rusty Spear-grass | | R | T | K |
| *Stipa setacea* | Corkscrew Spear-grass | | U | R | R |
| *Swainsona behriana* | Behr's Swainson-pea | | K | T | T |
| *Thelymitra nuda* | Scented Sun-orchid | | | | |
| *Thysanotus tenellus* | Grassy Fringe-lily | | R | R | |
| *Velleia paradoxa* | Spur Velleia | | Q | Q | Q |

## APPENDIX C: MOKOTA CONSERVATION PARK - FLORA (continued)

| | |
|---|---|
| Species of National Significance: | 2 |
| Species of South Australian significance: | 32 |
| Species of regional significance: | 54 |
| Number of orchid species: | 6 (5 genera) |
| Surveyor/Source: | Hyde 2000 consolidated list of all plant species recorded in the park including some unvouchered and requiring confirmation. |
| Survey dates: | BS116 in 1999, Bates 1999, Davies 1998&9, BS83 in 1995 |
| Vegetation Association: | *Lomandra multiflora* ssp *dura* tussock grassland |
| Location: | 15 km North of Burra, Northern Lofty Region |
| Hundred: | KINGSTON |
| Section: | 168, 164, 165, 166, part 167 |
| Area in hectares: | 455 |

**Alien Plant Species**

Alien plant species that were recorded at more than 10 quadrats out of 12 during the 1999 survey included 3 clovers and 3 annual grasses. They were:

| | |
|---|---|
| * *Trifolium angustifolium* | Narrow-leaf Clover |
| * *Avena barbata* | Wild Oat |
| * *Trifolium arvense* var *arvense* | Hare's-foot Clover |
| * *Trifolium campestre* | Hop Clover |
| * *Vulpia myuros forma myuros* | Rat's-tail Fescue |
| * *Aira cupaniana* | Hair-grass |
| * *Neatostema apulum* | Hairy Sheepweed |
| * *Carthamus lanatus* | Saffron Thistle |
| * *Echium plantagineum* | Salvation Jane |

A further 6 alien species were recorded at 6 or 7 sites.

| | |
|---|---|
| * *Hypochaeris radicata* | Rough Cat's Ear |
| * *Salvia verbenaca* form | Wild Sage |
| * *Brachypodium distachyon* | False Brome |
| * *Hypochaeris glabra* | Smooth Cat's Ear |
| * *Poa bulbosa* | Bulbous Meadow-grass |
| * *Romulea minutiflora* | Small-flower Onion-grass |
| * *Romulea rosea* | Guildford Grass is also present and widespread. |

Localised or sparsely distributed species are:

| | |
|---|---|
| * *Marrubium vulgare* | Horehound |
| * *Lycium ferocissimum* | African Boxthorn |
| * *Cynara cardunculus* | Artichoke Thistle |
| * *Lolium rigidum* | Wimmera Ryegrass |
| * *Bromus diandrus* | Great Brome |

## APPENDIX D: MOKOTA CONSERVATION PARK - FAUNA

**Summary of Fauna Survey, 1999 (Biological Survey 116)**
Systematic survey was done at four of the vegetation survey sites over a four day period from the 5th to 8th of December 1999. Invertebrates were also collected in micropitfalls at the same locations, but data are not yet available. The following tables include systematic records from quadrats coordinated by Gavin Kluske, bird records from eight of the twelve plant survey sites by Max Possingham on the 2nd and 3rd of November 1999 and opportunistic records in October to December 1999 from these observers, Michael Hyde and Robert Bates. Bird observations by Graham Carpenter in 1998 are also included. (Hyde, 2000).

**Mammals, Reptiles and Amphibians**

* species marked thus are not native to Australia.
Numbers indicate number of sightings or records at quadrats.
Some of the records listed under Hyde 1999 are scat records as noted on the site data sheets.

| Species | Conservation Status | | | Kluske 1999 | | Possingham 1999 | Hyde 1999 | Bates 1999 |
|---|---|---|---|---|---|---|---|---|
| | EPBC Act | NP&W Act | Region MM | survey | opportune | opportune | opportune | opportune |
| **MAMMALS** | | | | | | | | |
| Western Grey Kangaroo *Macropus fuliginosus* | | | | 2 | | 4 | 9 | |
| Red Kangaroo *Macropus rufus* | | | | 1 | | | 1 | X |
| Euro *Macropus robustus* | | | | | | | | X |
| Fox **Vulpes vulpes* | | | | | | | 5 | |
| Rabbit **Oryctolagus cuniculus* | | | | | X | | X | X |
| Hare **Lepus capensis* | | | | | | | | |
| | | | | | | | | |
| **REPTILES** | | | | | | | | |
| Bearded Dragon *Pogona vitticeps* | | | | 1 | | | | X |
| Bluetongue *Tiliqua sp.* | | | | | | | | X |
| Bougainville's Skink *Lerista bougainvillii* | | | | 2 | X | | | |
| Dwarf Skink *Menetia greyii* | | | | 1 | | | | |
| Flinders Worm Lizard *Aprasia pseudopulchella* | V | | | 1 | | | | X |
| Shingleback *Tiliqua rugosa* | | | | 2 | | 1 | 1 | X |
| Brown Snake *Pseudonaja textilis* | | | | 1 | | 1 | | |
| | | | | | | | | |
| **AMPHIBIAN** | | | | | | | | |
| Little Froglet *Crinia signifera* | | | | 1 | | | X | |

Note: See Appendix E for conservation status and regional codes.

**Birds**

Numbers indicate number of sightings or records at quadrats.

- species marked thus are not native to Australia

| Species | Conservation Status | | | Kluske 1999 | | Possingham 1999 | | Hyde 1999 | Bates 1999 | Carpenter 1998 (SW corner) |
|---|---|---|---|---|---|---|---|---|---|---|
| | EPBC Act | NP&W Act | Region MM | survey | other | survey | other | opportune | opportune | opportune |
| **BIRDS** | | | | | | | | | | |
| Emu *Dromaius novaehollandiae* | | | | 2 sites | X | 1 site | | 7 sites (scats) | X | |
| Australian Magpie *Gymnorhina tibicens* | | | | 2 | X | 1 | X | 1 | | |
| Brown Songlark *Cincloramphus cruralis* | | | | | | 8 | | 3 | | X |
| *Skylark *Alauda arvensis* | | | | | | 9 | | | | |
| Richards Pipit *Anthus novaeseelandiae* | | | | 3 | | 6 | | 3 | X | X |
| Crested Pigeon *Ocyphaps lophotes* | | | | 1 | | | | | | |
| *Feral Pigeon *Columba livia* | | | | 1 | | | | | | |
| Elegant Parrot *Neophema elegans* | | U | K | 1 | | | | | | |
| Galah *Eolophus roseicapilla* | | | | 1 | X | 6 | X | 1 | | |
| Willy Wagtail *Ripidura leucophrys* | | | | | | | X | | | |
| Yellow-rumped Thornbill *Acanthiza chrysorrhoa* | | | | | X | | | | | |
| Noisy Miner *Manorina melanocephala* | | | | | | | X | | | |
| Stubble Quail *Coturnix pectoralis* | | | | | | 1 | | | X | |
| Little Button-quail *Turnix velox* | | | | | | | | | | X |
| Welcome Swallow *Hirundo neoxena* | | | | | X | 1 | X | 1 | | |
| Fairy Martin *Hirundo ariel* | | | | | X | | | | | |
| Wedge-tailed Eagle *Aquila audax* | | | | 1 | | | | 1 | | |
| Australian Kestrel *Falco cenchroides* | | | | | X | 1 | | | | |
| Australian Hobby *Falco longipennis* | | U | U | | | | X | | | |
| Brown Falcon *Falco berigora* | | | | | | | | 1 | | |
| Black Falcon *Falco subniger* | | | U | | | | | | | X |

| Species | Conservation Status | | | Kluske 1999 | | Possingham 1999 | | Hyde 1999 | Bates 1999 | Carpenter 1998 (SW corner) |
|---|---|---|---|---|---|---|---|---|---|---|
| | EPBC Act | NP&W Act | Region MM | survey | other | survey | other | opportune | opportune | opportune |
| Australian Raven *Corvus coronoides* | | | | | X | | | | | |
| Raven *Corvus* sp | | | | | | 1 | | 1 | X | |
| Magpie Lark *Grallina cyanoleuca* | | | | | | | X | | | |
| White-faced Heron *Egretta novaehollandiae* | | | | | | | | 2 | | |
| Zebra Finch *Taeniopygia guttata* | | | | 1 | | | | 1 | | |
| Duck sp. | | | | | | | | | X | |
| *Common Starling *Sturnus vulgaris* | | | | 1 | X | | | 1 | | |
| *House Sparrow *Passer domesticus* | | | | 2 | X | | | | | |

**Butterflies**

Roger Grund and Lindsay Hunt of Butterfly Conservation SA undertook a survey of butterflies on 27 September 1999. The list arising from this survey was prepared for the Nature Conservation Society by David Keane (1999). Six species were observed in the park. They were:

| Common Name | Species | Comments |
|---|---|---|
| **BUTTERFLIES** | | |
| Rare White Spotted Skipper | *Trapezites luteus* | Vulnerable. Food plants of the larvae are the irongrasses (*Lomandra multiflora* ssp. *dura).* |
| Caper White | *Belenois java* | Common in the Mid-North. *Capparis* spp. are recorded as the principal food plant of the larvae of this species, but as they do not occur in this region, other plants are being used at Mokota. |
| Lesser Wanderer | *Danaus chrysippus* | Larvae feed on plants from the family *Asclepiaceae.* |
| Painted Lady | *Vanessa kershawii* | Daisies (Asteraceae) are the larval food plants. |
| Meadow Argus | *Junonia vallida* | This species uses a wide range of food plants including plantains (*Plantago* spp.) and piert (*Aphanes australiana*) |
| Common Grass Blue | *Zizina labradus* | Pea flowered plants (*Fabaceae*) are the food plants of this species. |
| An additional species was recorded by David Keane in October 1999 and is believed to be rare: | | |
| Small Copper | *Lucia limbaria* | Food plants are *Oxalis perennans* (native) and **O. corniculata*. |

## APPENDIX E: CONSERVATION STATUS CODES

***Australian Conservation Status Codes***

The following codes are based on the current listing of species under Section 179 of the *Environmental Protection and Biodiversity Conservation Act 1999.*

**EX** **Extinct**: there is no reasonable doubt that the last member of the species has died.

**EW** **Extinct in the Wild**: known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.

**CE** **Critically Endangered**: facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.

**E** **Endangered**: facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

**V** **Vulnerable**: facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

**CD** **Conservation Dependent**: the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

**Note**: Prescribed criteria as defined under the IUCN Red List of Threatened Species.

***South Australian Conservation Status Codes***

The following codes are based on the current listing of species under Schedules of the *National Parks and Wildlife Act 1972*, as amended in 2000.

**E** **Endangered**: (Schedule 7) in danger of becoming extinct in the wild.

**V** **Vulnerable**: (Schedule 8) at risk from potential or long term threats which could cause the species to become endangered in the future.

**R** **Rare**: (Schedule 9) low overall frequency of occurrence (may be locally common with a very restricted distribution or may be scattered sparsely over a wider area). Not currently exposed to significant threats, but warrants monitoring and protective measures to prevent reduction of population sizes.

***Regional Status Codes***

The categories below apply to the species distribution at a regional level.

*Mammals, Reptiles & Amphibians*

There are no regional conservation status categories developed for mammals, reptiles or amphibians to date (2003).

*Birds*

Regional conservation status for birds follow Carpenter and Reid (1998) The Status of Native Birds in the Agricultural Areas of South Australia;

The regions are defined as follows;

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **ML** | Mount Lofty | **MN** | Mid-North | **SE** | South-Eastern | **KI** | Kangaroo Island |
| **MM** | Murray Mallee | **EP** | Eyre Peninsula | **YP** | Yorke Peninsula | | |

*Plants*

Regional conservation ratings for plants follow:

Lang, P.J. & Kraehenbuehl, D.N. (2001). Plants of Particular Conservation Significance in South Australia's Agricultural Regions.

June (2003) update of unpublished database: Florlist. Department for Environment and Heritage.

The regions are as defined by the State Herbarium (Plant Biodiversity Centre), illustrated in the back cover of 'A List of the Vascular Plants of South Australia (Edition IV)' (Ed. Jessop, 1993).

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **NW** | North-Western | **FR** | Flinders Ranges | **NL** | Northern Lofty | **SL** | Southern Lofty |
| **LE** | Lake Eyre | **EA** | Eastern | **MU** | Murray | **KI** | Kangaroo Island |
| **NU** | Nullarbor | **EP** | Eyre Peninsula | **YP** | Yorke Peninsula | **SE** | South-Eastern |
| **GT** | Gairdner-Torrens | | | | | | |

In order of decreasing conservation significance:

**X** **Extinct/Presumed extinct**: not located despite thorough searching of all known and likely habitats; known to have been eliminated by the loss of localised population(s); or not recorded for more than 50 years from an area where substantial habitat modification has occurred.

**E** **Endangered**: rare and in danger of becoming extinct in the wild.

**T** **Threatened**: (*Plants only*) likely to be either Endangered or Vulnerable but insufficient data available for more precise assessment.

**V** **Vulnerable**: rare and at risk from potential threats or long term threats that could cause the species to become endangered in the future.

**K** **Uncertain**: likely to be either Threatened or Rare but insufficient data available for a more precise assessment.

**R** **Rare**: has a low overall frequency of occurrence (may be locally common with a very restricted distribution or may be scattered sparsely over a wider area). Not currently exposed to significant or widespread threats, but warrants monitoring and protective measures to prevent reduction of population sizes.

**U** **Uncommon**: less common species of interest but not rare enough to warrant special protective measures.

**Q** **Not yet assessed**: but flagged as being of possible significance.

**N** **Not of particular significance** (*Plants only*) Also indicated by a blank entry.

**C** **Common** (*Birds only*) Also indicated by a blank entry.

**O** **Occasional Visitor Only** (*Birds only*) Not considered of conservational status.