

**KAJULIGAH NATURE RESERVE
PLAN OF MANAGEMENT**

**NSW National Parks and Wildlife Service
January 2000**

This plan of management was adopted by the Minister for the Environment on 19th January 2000.

Acknowledgments: This plan of management was prepared by staff of the Broken Hill District office of the National Parks and Wildlife Service.

The assistance of the Broken Hill District Advisory Committee, neighbours of Kajuligah Nature Reserve and all who made submissions on the draft plan is gratefully acknowledged.

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FOREWORD

Kajuligah Nature Reserve is located approximately 38km to the north-east of Ivanhoe on the Ivanhoe-Cobar road and comprises 13,660 hectares.

Kajuligah Nature Reserve is one of only five significant nature conservation areas in Central NSW west of Condobolin between the Barrier Highway and the Lachlan River and east of the Darling River. The other four are the Yathong-Nombinnie-Round Hill Nature Reserves complex to the east and Willandra National Park, Mallee Cliffs National Park and Mungo National Park to the south. All are representative of very different landscapes and ecological systems.

Kajuligah Nature Reserve is situated within the Darling Depression land system and contains vegetation typical of this land system. The nature reserve protects small samples of several vegetation community types which suggests that the reserve is an ecotone or overlap area of several ecological regions of Western NSW. The main vegetation types occurring are belah-rosewood (*Casuarina cristata-Heterodendrum oleifolium*) woodlands, bumble box, callitris and mulga woodlands and grasslands with scattered trees.

The reserve supports at least 62 bird species, including the pink cockatoo (*Cacatua leadbeateri*) which is recognised as vulnerable under the *Threatened Species Conservation Act 1995*, in addition to 6 reptile and 3 mammal species.

This plan of management establishes the scheme of operations for Kajuligah Nature Reserve. In accordance with the provisions of section 76 of the *National Parks and Wildlife Act 1974*, this plan of management is hereby adopted.

Bob Debus
Minister for the Environment

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1. INTRODUCTION

The National Parks and Wildlife Act, 1974, requires that a plan of management be prepared for each nature reserve. A plan of management is a legal document which outlines how the area will be managed. It can be revised and rewritten if necessary to accommodate changes in management practices.

The procedures for the adoption of a plan of management for a nature reserve are specified in the Act:

- Where a plan of management has been prepared, the Director-General is required to refer the plan to the National Parks and Wildlife Advisory Council for its consideration and advice.
- The Director-General is then required to submit the plan to the Minister, together with any comments or suggestions of the Advisory Council.
- The Minister may adopt the plan without alteration, or with such alterations as may be thought fit, or may refer it back to the Director-General and Council for further consideration.

A plan of management for Kajuligah Nature Reserve was placed on public exhibition from October 1998 to February 1999. Four submissions were received on the draft plan which raised nine issues. All submissions received were considered by the National Parks and Wildlife Advisory Council. The submissions and comments of the Council were in turn considered by the Minister in adopting this plan of management.

In accordance with the National Parks and Wildlife Act, once a plan has been adopted by the Minister no operations may be undertaken within the nature reserve except in accordance with the plan.

Further information on the management of Kajuligah Nature Reserve may be obtained from the Broken Hill Office of the Service at 183 Argent St, BROKEN HILL (PO Box 459) or by telephoning (08) 8088 5933 during office hours.

2. MANAGEMENT CONTEXT

2.1. NATURE RESERVES IN NEW SOUTH WALES

Fauna reserves in New South Wales arose out of fauna reserves. Fauna reserves were first established under the *Fauna Protection Act 1948*. Under the National Parks and Wildlife Act of 1967 fauna reserves were reclassified as nature reserves. The Fauna Protection Act was replaced by the *National Parks and Wildlife Act 1974*.

Under the National Parks and Wildlife Act, nature reserves are areas of special scientific interest containing wildlife or natural environments or natural phenomena.

The purposes of nature reserves are defined in the Act as:

- “(a) the care, propagation, preservation and conservation of wildlife;
- (b) the care, preservation and conservation of natural environments and natural phenomena;
- (c) the study of wildlife, natural environments and natural phenomena; and
- (d) the promotion of the appreciation and enjoyment of wildlife, natural environments and natural phenomena.”

The value of nature reserves lies in their role as refuge areas, where natural processes, phenomena and wildlife can be studied and conserved. They differ from national parks which include as a major objective the provision of opportunities for outdoor recreation.

2.2. KAJULIGAH NATURE RESERVE

2.2.1. Location and Regional Setting

Kajuligah Nature Reserve was dedicated on the 12th January 1979 and comprises 13 660 hectares. The nature reserve is located 38 kilometres north-east of Ivanhoe on the Ivanhoe to Cobar road and is surrounded by pastoral leases. Prior to dedication as a nature reserve the land had been a Western Lands Lease and managed as a pastoral property. The lease expired in the mid 1970s and the property was divided with just under half the former lease being dedicated as Kajuligah Nature Reserve. The remaining portion, including the homestead complex, was added to adjoining leases.

2.2.2. The Importance of Kajuligah Nature Reserve

The vegetation of Kajuligah Nature Reserve is typical of the vegetation of the Darling Depression. The Darling Depression is a large structural unit of central western NSW which extends from approximately Wilcannia eastwards towards Cobar and is bounded on the north by the Great Australian (Artesian) Basin and in the south by the Murray Basin.

Kajuligah is the only national park or nature reserve that has been established within the area of the Darling Depression. The only other

conservation areas within the region, the Yathong-Nombinnie-Round Hill Nature Reserves complex to the east and Willandra National Park to the south are representative of different landscapes and ecological systems.

The Darling Depression is characterised by a belah-rosewood association with widespread communities of nelia (*Acacia loderi*) occurring throughout the north-west of the area. These associations contrast with the red mallee communities (*Eucalyptus socialis*) found both further east and west of the Darling Depression, the mulga (*Acacia aneura*) found to the north and west, the saltbush (*Atriplex* spp.) and bluebush (*Maireana* spp.) which is typical of the Riverina and the scrubs of white cypress pine (*Callitris columellaris*)-Bimble box (*Eucalyptus populnea*) and red box (*Eucalyptus intertexta*) which occur on the Cobar Peneplain to the north and north-east. Some samples of several of these communities occur on Kajuligah Nature Reserve but only to a comparatively minor extent.

Kajuligah is the only moderately sized Nature Reserve which is representative of this major belah-rosewood community in NSW.

Native animals recorded on the reserve to date include 6 reptile, 3 mammal and 62 bird species including the pink cockatoo (*Cacatua leadbeateri*) which is classified as vulnerable under the Threatened Species Conservation Act. No other threatened animals, threatened plants or plants and animals of local significance have yet been recorded.

Aboriginal sites occur on the nature reserve and include surface artefact scatters, scarred trees and fire hearths. The pattern of these sites, however, suggest transient use of the area on an opportunistic basis by Aborigines, rather than permanent occupation. There is some evidence of the past use of the area as a pastoral lease including fencelines, ground tanks, wells, a system of trails and lack of understorey species.

3. 3. OBJECTIVES OF MANAGEMENT

3.1. 3.1 GENERAL OBJECTIVES OF MANAGEMENT FOR NATURE RESERVES

The following general objectives relate to the management of nature reserves in New South Wales:

- the protection and preservation of scenic and natural features;
- the maintenance of natural processes as far as is possible;
- the preservation of Aboriginal sites and historic places; and
- the encouragement of scientific and educational research into environmental features and processes.

3.2 SPECIFIC OBJECTIVES OF MANAGEMENT FOR KAJULIGAH NATURE RESERVE

In addition to the above general objectives the following specific objectives also apply to the management of Kajuligah Nature Reserve.

- the protection and, where appropriate, regeneration of the nature reserve as a representative sample of the Darling Depression land system of central-western NSW;
- the maintenance of the biodiversity and populations of native plants and animals occurring in the nature reserve; and
- to provide opportunities for scientific and educational use.

3.3 OVERALL STRATEGY

Emphasis will be placed in the management of Kajuligah Nature Reserve on:

- rehabilitation and revegetation of degraded sites;
- protection of the nature reserve from wildfire and control of noxious weeds and feral animals;
- the development of community relations programs, particularly involving neighbours of the park, which emphasise the importance and purpose of management programs relating to the protection of natural features and the control of fire, weeds and feral animals.

4. POLICIES AND FRAMEWORK FOR MANAGEMENT

This chapter contains the policies and framework for the management of Kajuligah Nature Reserve, together with relevant background information. Policies are summarised under the following two headings:

- 4.1 Kajuligah Nature Reserve: Its Natural and Cultural Landscapes
- 4.2 Use of the Area

The proposals outlined in this plan of management are those to which priority will be given in the foreseeable future. Other management actions may be developed over the life span of this plan of management consistent with the objectives and policies set out in the plan.

Where not specifically provided for in this plan of management, the management of Kajuligah Nature Reserve will be in accordance with the National Parks and Wildlife Act, 1974 and with general Service conservation and other management policies.

4.1 KAJULIGAH NATURE RESERVE: ITS NATURAL AND CULTURAL LANDSCAPES

4.1.1 Geology, Landform and Soils

There is only limited small scale mapping available of the geology, landforms and soils of Kajuligah Nature Reserve. The geological information for the plan of management is derived from the Ivanhoe 1:250 000 geology map published by the Geological Survey of NSW in 1968. The Western Lands Commission in 1970 produced a property map at a scale of about 1: 30 000 for Kajuligah Station which gives some information on vegetation and soils. The information which follows is primarily derived from these two sources.

The geology map identifies two main landforms:

a level to undulating sandplain covers most of Kajuligah Nature Reserve. This sand plain is composed of red and brown 'clayey sand loams' and lateritic soils; and

small areas of **playas** (small lakes with internal drainage), **clay pans and lake bottoms** of black and grey silt are scattered throughout the nature reserve. Six separate units of this feature are mapped with the largest example found in the south of the nature reserve. Gilgai formation is a feature of some of these sites. The peculiar depression and mound microrelief of gilgais is an important part of this striking natural environment. The area of gilgaied clay soils which are of an alluvial origin are surrounded by a 'sea' of red sandy soils.

The streams, creeks and soaks found within the nature reserve are all ephemeral. The property map prepared by the Western Lands Commission indicates that sections of the then property were subject to sheet erosion, wind drift and/or to scalding (the process whereby large areas of topsoil are or have been exposed by removal of vegetation). The black and grey soils associated with the playas, lakes and claypans are particularly prone to soil erosion.

Policies

- All management activities within the reserve will, where appropriate, be subject to sediment and soil erosion control measures.
- Eroded and degraded areas, including around ground tanks, will be identified and progressively rehabilitated and/or the erosion controlled.
- Mining, exploration and extraction of materials such as sand and gravel will not be permitted in the reserve.

4.1.2 Native Plants and Animals

Management of native flora and fauna is made difficult by the lack of comprehensive populations surveys and information about the ecology of many of the species. It is evident, however, that protection from frequent fire and control of introduced species will greatly benefit most native plants and animals in the reserve.

The vegetation of the Kajuligah area is outlined in the general (1:1 000 000 scale) map and accompanying notes published in *Cunninghamia* Vol 3(3) on the natural vegetation of North- Western New South Wales by Pickard and Norris in 1994.

The Darling Depression land system within which Kajuligah Nature Reserve is located is characterised by a scrub or open scrub of a **belah-rosewood** association. Limited surveys and mapping of native plant communities undertaken by the NSW National Parks and Wildlife Service and the Western Lands Commission identified the following primary communities:

dense stands of **belah-rosewood** form the most common plant community and occur with scattered wilga (*Geijera parviflora*) on level to undulating sand plains;

much of the remainder of the nature reserve is a similar **belah-rosewood** community but occurs in scattered stands with mulga, nelia, wilga, yarran (*Acacia homalophylla*) and white cypress pine;

bimble box occurs in the low lying ephemeral swamp areas both in dense stands and occasionally as scattered trees.

Fifty seven plant species have been recorded on the reserve but these do not include any native plants considered to be threatened or of local significance. Herbs and ground cover which commonly occur include copperburr (*Bassia* spp.), corkscrew (*Stipa setacea*), cannonball (*Bassia paradoxa* ssp. *paradoxa*), bottle washers (*Enneapogon* spp) and spear grass (*Stipa* spp). Grasslands often form a continuous ground cover with only scattered trees as an overstorey.

Much of the understorey within the reserve is absent possibly as a result of changing fire regimes and past and present grazing pressure. High graze lines and the lack of regenerating plant species within the reserve is evidence of heavy grazing by feral goats (*Capra hircus*), rabbits (*Oryctolagus cuniculus*) and kangaroos (*Macropus* spp). Some regeneration of the box swamps and native grasses is occurring. However more palatable species such as mulga, wilga and rosewood are not yet regenerating.

Native animals recorded on the reserve to date include 62 bird, 6 reptile and 3 mammal species. Common species include Eastern Grey Kangaroo (*Macropus giganteus*), Western Grey Kangaroo (*Macropus fuliginosus*), Red Kangaroo (*Macropus rufus*), Emu (*Dromaius novaehollandiae*), Shingleback Lizard (*Trachydosaurus rugosus*), Mallee Ringneck (*Platycercus zonarius*) and Blue Bonnet Parrot (*Psephotus haematogaster*). The Spotted Bowerbird (*Chlamydera maculata*) is recorded near the southern edge of its known distribution in the reserve. (*Atlas of Australian Birds*; Royal Australian Ornithologists Union)

The pink cockatoo (*Cacatua leadbeateri*) is the only animal species recorded in the reserve which is classified under the Threatened Species Conservation Act 1995. This species is classified as vulnerable. No threatened plant species have been recorded on the reserve to date. Bioclimatic predictive analysis suggests that a further 27 threatened species could potentially occur within the reserve. These species include the Gould's mouse (*Pseudomys gouldii*), pied honeyeater (*Certhionyx variegatus*), western blue-tongued lizard (*Tiliqua occipitalis*) and Australian bustard (*Ardeotis australis*).

Further plant and animal surveys are required to determine a more accurate species list for Kajuligah Nature Reserve.

Policies

- The existing diversity of native plants and animals within the nature reserve will be maintained until further research suggests otherwise.
- Research by qualified individuals, interest groups and institutions into the reserve's ecology will be encouraged.
- Only plant species naturally occurring on the reserve will be used in any revegetation programs. As far as practicable plant material will be propagated from communities within the reserve.

Actions

- A vegetation map for the reserve will be prepared.
- Vegetation and fauna surveys will be conducted where possible by District staff with input from outside interest groups and institutions actively encouraged.
- Records of native plants and animals will continue to be updated and progressively entered into the E-RMS computer data base and Wildlife Atlas.

4.1.3 Cultural Heritage

Archaeological sites are important to Aboriginal communities as they are testament to their culture and history. Aboriginal people may also have traditional spiritual links with an area and hold knowledge which is important for nature conservation. The nature reserve is within the area of the Ivanhoe Local Aboriginal Land Council.

The reserve contains evidence of past Aboriginal activity with surface scatters of stone artefacts, scarred trees and fire hearths having been recorded. Many of the sites recorded on the reserve are located near

ephemeral box swamps. Open sites recorded on the reserve suggest transient use of the area on an opportunistic basis. The low density of sites further supports this hypothesis.

The remains of Carowa Tank Mission and cemetery are located approximately 10km to the north east of the reserve. It is possible that Kajuligah Nature Reserve is of importance to Aboriginal people and their families from the Carowa Tank Mission due to its close proximity.

In 1869 George Williamson of Booligal purchased the first block of land in the Ivanhoe area. This was 40 acres at Waiko, approximately 20 km south of Kajuligah. Ivanhoe at this stage was a bark hut and store on the main route from Booligal to Wilcannia or Balranald.

The first record of settlement at Kajuligah was in 1873 when John Broughan of Kajuligah signed his name on a petition to get a post office in Ivanhoe. There were over 400 people living in the area between Balranald and Ivanhoe at this time. In 1881 G Barton of Kajuligah was appointed magistrate.

Ivanhoe initially serviced the Cobb & Co Mail routes that ran to Wilcannia and Balranald. After completion of the railway it became an important point for providing water for steam engines. With the advent of diesel electric trains Ivanhoe's importance for railway maintenance has declined. The area now Services outlying pastoral areas and is a fuelling point for travellers.

Kajuligah was managed as a pastoral lease until the expiry of the lease in the mid 1970's. The property was then divided with just under half the former lease being dedicated as Kajuligah Nature Reserve. The remaining portion, including the homestead complex, was added to adjoining leases. Evidence of the pastoral era does exist on the reserve with internal fences, ground tanks, old wells and other minor property infrastructure still present.

Policies

- All works proposed for the nature reserve which may lead to ground disturbance will be preceded by an archaeological survey to avoid the destruction of significant evidence of occupation.
- Ivanhoe Local Aboriginal Land Council and other relevant Aboriginal community groups will be consulted in the management of Aboriginal sites.
- Non-destructive research into the Aboriginal and European history and significance of the reserve will be encouraged.

Actions

- The reserve will be progressively surveyed for Aboriginal sites and places, and these will be recorded and protected from disturbance.
- Well sites will be recorded and fenced for safety reasons.
- Local Aboriginal and non-Aboriginal people will be consulted to provide assistance in the compilation of historical information on the reserve and surrounding area.

4.1.4 Introduced Plants and Animals

An introduced species is defined in this plan of management as any plant or animal species not endemic to the reserve. Introduced species within the reserve and on adjoining land are of concern because they have the potential to cause detrimental impacts on the reserve's resources and can spread to and from neighbouring land.

Weeds occurring in the reserve include Bathurst burr (*Xanthium spinosum*), noogoora burr (*Xanthium accidentale*), Pattersons curse (*Echium plantagineum*) and Mexican poppy (*Argemone ochroleuca*). None of these species currently represent a significant problem within the reserve with most occurring in small easily controlled clumps. Horehound (*Marrubium vulgare*) is more widespread in the reserve and is of significance as it can prevent the establishment of more desirable native species.

The Noxious Weeds Act 1993 took effect from 1st July 1993. The Act places an obligation upon public authorities to control noxious weeds on land that it occupies to the extent necessary to prevent such weeds spreading to adjoining lands.

Vertebrate pest species of concern include feral goats (*Capra hircus*), rabbits (*Oryctolagus cuniculus*), foxes (*Vulpes vulpes*) and feral cats (*Felis catus*). Feral pigs (*Sus scrofa*) occasionally occur in the reserve but due to low numbers their impact has been minimal.

Grazing by feral goats and rabbits has resulted in significant damage to the native vegetation within the reserve. This can be evidenced by the high graze lines on native trees and shrubs and the lack of regeneration and re-establishment of more palatable species such as mulga, wilga and rosewood. The impact of feral cats and foxes on native animals of the reserve is difficult to determine. However research undertaken elsewhere has shown that these species do have an impact on small native bird, mammal and reptile populations.

Illegal grazing occurs on the reserve mainly during drought periods and as a result of deteriorating boundary fences. Apart from causing damage to the natural vegetation and regenerating areas, domestic stock may also act as vectors for introduced plant species. Upgrading of boundary fences to a stock proof standard is likely to decrease the frequency of stock encroachments.

There are no Travelling Stock Reserves within the nature reserve and movement of stock will be confined to the present Ivanhoe-Cobar road reserve.

Policies

- Introduced plant and animal species will be controlled and if possible eradicated. Priority for treatment will be given to those which:
 - have been declared noxious;
 - threaten the integrity of native communities;
 - may affect neighbouring lands;
 - have a high capacity for dispersal; and/or
 - are new isolated occurrences.

- Control programs for introduced animals will be directed towards foxes, goats and rabbits until further research suggests otherwise.
- Control programs for introduced plant species will be directed towards the control of noogoora burr, Bathurst burr, Mexican poppy, Pattersons curse and horehound until further research suggests otherwise.
- Preference will be given to control methods which have minimal environmental impact on the reserve.
- The cooperation and where possible, involvement of other authorities and park neighbours will be sought in implementing pest control programs.
- The Service will seek to upgrade boundary fences to a stock proof standard in accordance with Service fencing policy.
- Domestic stock found on the park will be promptly removed or impounded.
- Prior approval from the District Manager needs to be obtained by neighbours before action is taken to remove stock from the reserve.
- Movement of stock through the reserve will not be permitted unless confined to the Ivanhoe-Cobar road reserve.

Actions

- A pest control program for the reserve identifying target species, control methods, time frames and funding will be prepared, implemented and reviewed annually.
- The feasibility of controlling the number of goats on the nature reserve by licensed trapper will be investigated.
- The Service will seek to replace the single grids with double width grids on the Ivanhoe to Cobar road to improve stock proofing along the public road.

4.1.5 Fire Management

Fire is regarded by the NSW National Parks and Wildlife Service as a natural phenomenon, one of the established physical factors of the Australian environment to which native plant and animal communities have become adapted. The proper management of fire is essential to avoid the extinction of native plant and animal species while protecting people and their property.

Fire frequency, intensity and season of occurrence are major factors influencing the distribution and composition of plant and animal communities. A variety of fire regimes is needed in order to conserve floristic diversity and provide diversity of habitat for animals. Fire management aims to maintain this diversity by restricting planned and, if possible, unplanned fires to only a part of each vegetation type within Kajuligah Nature Reserve at any one time. This approach will ultimately result in a mosaic of age classes for each of the vegetation types represented in the nature reserve.

The three vegetation communities in the reserve of concern in fire management are belah-rosewood woodlands, bumble box woodlands and grasslands with scattered trees. Of these associations the grasslands present the highest fire risk. Fuel continuity is extensive following years of high rainfall due to prolific speargrass growth. Speargrass is highly flammable when cured beyond 60% dry plant material.

Since the reserve was declared there have been two recorded incidences of wildfire. One occurred in November 1984 and affected approximately 9 500 hectares. A fire nine years later in November 1993 affected approximately 1 600 hectares. Both fires were started by lightning strikes.

Under the Bush Fires Act the Service is a fire authority and is responsible for controlling fires on the reserve and to ensure they do not cause damage to other land or property. An important part of the Service's fire management is participation in local co-operative fire management arrangements. The Central Darling Bush Fire Management Committee aims to coordinate fire management and fire control on a shire wide basis. The National Parks and Wildlife Service has representation on this committee.

A variety of fire management strategies have been developed on the nature reserve including fuel reduction, fire trails and cooperative fire control arrangements. Some, or at times all, of these are applied where appropriate to best protect life, property and natural and cultural assets within and adjacent to the nature reserve. In particular, close to boundary areas, fuel reduction programs and fire trail maintenance systems will be designed and implemented in cooperation with neighbours.

A system of management trails will be retained for fire management purposes which includes the Boundary Management Trails, Mulga Management Trail, Small Scrubby Tank Management Trail and Whim Tank Management Trail. These trails effectively divide the reserve into four fire management blocks.

The reserve contains no natural surface water with water for fire fighting being provided by ground tanks established during the reserve's pastoral era. Whim Tank, Lambing Camp Tank, Marka Tank and Small Scrubby Tank will be retained for fire fighting purposes.

Bushfire suppression operations may require the construction of temporary trails, helipads and firelines. These will be closed and rehabilitated as part of post fire operations.

A fire management plan will be prepared for Kajuligah Nature Reserve in accordance with the priorities established in the Service's overall fire management plan preparation program which will identify the bushfire threat, requirements for the conservation of native plants and animals and provide the basis for fire management strategies and prescriptions, including the requirements outlined above.

Policies

- Fire in the nature reserve will be managed in accordance with the nature reserve fire management plan, this plan of management and the Central Darling Shire Bushfire Committee plans.
- The co-operation of all relevant authorities and neighbours will be sought in the suppression of unplanned fires on the nature reserve.

- Until research findings become available concerning the effects of fire in the nature reserve, unscheduled fire will be excluded, where possible, from the reserve.
- Records of fire occurrence will be maintained with particular emphasis on mapping and recording of the area, frequency, seasonality and intensity of fire.
- Use of machinery in fire suppression will avoid known archaeologically and ecologically sensitive areas.
- Temporary trails constructed as part of fire suppression operations will be closed and rehabilitated.

Actions

- A fire management plan will be prepared and implemented for Kajuligah Nature Reserve in accordance with the priorities established in the Service's overall fire management plan preparation program. The fire management plan will outline the fire history, fuel management objectives and strategies for the nature reserve. The fire management plan will be placed on public exhibition for comment by the end of 2000.
- The Boundary Management Trails, Mulga Management Trail, Small Scrubby Tank Management Trail and Whim Tank Management Trail will be maintained for fire management purposes.
- Marka, Whim, Small Scrubby and Lambing Camp tanks and associated catch drains will be maintained for fire fighting purposes.
- A maintenance program will be prepared and implemented annually for fire trails and water points within the reserve which are considered necessary for fire management purposes.
- A sign upgrade program will be prepared and implemented to improve safety during fire incidents.

4.1.6 Water Management

Kajuligah Nature Reserve contains no permanent natural surface water. Box swamps retain surface water for short periods of time following suitable rain. Permanent water on the reserve is currently provided by eight artificial tanks remaining from the pastoral era. Four of these tanks, Whim, Marka, Small Scrubby and Lambing Camp tanks are structurally sound, retain water and are strategically located for management purposes, particularly for fire management. The remaining four, Wilga, Scrubby, Rocky and Little Lambing Camp tanks do not retain water for long periods of time and/or are not required for management purposes and will, therefore, not be maintained.

The ground tanks, however, have modified the ecological characteristics of the nature reserve by providing artificial watering points that would not otherwise have been available:

- * they support some species of native animals at artificially high levels. In particular the watering points maintain high levels of kangaroos;

- * some native species which should occur are displaced by species advantaged by the availability of water; and
- * they support populations of introduced animal species; in particular goats.

The four non-essential tanks will not be maintained and the catch drains progressively decommissioned or allowed to deteriorate so that they are no longer effective. Such gradual reduction in artificial water sources would allow native animal populations to adjust to the new conditions and avoid having animals move from the reserves to neighbouring properties. These tanks will then be filled in to prevent further erosion.

Policies

- Marka, Whim, Small Scrubby and Lambing Camp tanks and associated catch drains within the park will be maintained for management purposes.
- Rocky, Little Lambing Camp, Scrubby and Wilga tanks along with associated management trails will not be maintained.
- Marka Tank and catch drains on the reserve may be maintained by the reserve neighbour under a Licence Agreement with the NPWS.

Actions

- The cultural significance of the artificial watering points across the park will be investigated. Those tanks not considered to be of significance and not required for management purposes will be filled in. Those tanks of significance which are not required for management purposes will be de-commissioned and allowed to deteriorate.
- The feasibility of fencing two of the tanks to be retained so as to exclude goats and kangaroos will be investigated.

4.2 USE OF THE AREA

Kajuligah Nature Reserve will be managed to ensure that its use, whether by Service staff, the general public, special interest groups, or other authorities, is appropriate and conforms with the management objectives and strategy of this plan.

The major categories of use that may be appropriate within nature reserves are:

- promotion of natural and cultural heritage conservation;
- environmental education;
- scientific research; and
- management operations by the Service, contractors or other authorities.

The extent to which these categories of use are appropriate to Kajuligah Nature Reserve are indicated below.

4.2.1 Public Use

Recreation opportunities in Kajuligah Nature Reserve are limited by a number of factors including lack of necessary infrastructure and services, particularly water and road access within the reserve. Public use of the reserve will not be encouraged unless for scientific and/or educational purposes.

Policies

- Facilities will not be provided on the nature reserve for public use.
- Recreational use of the reserve will not be permitted.
- Kajuligah Nature Reserve will be available for natural and cultural heritage use, subject to approval from the District Manager responsible for the reserve.
- Vehicle use for educational purposes will be confined to existing roads and trails.

4.2.2 Research

The purpose of scientific study in the nature reserve is to improve the understanding of its natural systems and the processes which affect them. Data and findings from research studies and surveys will be utilised in reserve management. The Service, however, does not presently have the resources to undertake much of the long term research needed for the management of Kajuligah Nature Reserve.

Service policy is to encourage research by recognised authorities and individuals to which the Service may provide assistance with access and information. However, where a research topic is directly applicable to particular management problems, the Service may also provide financial and logistic support.

Policies

- Kajuligah Nature Reserve will be available for appropriate research by permit only. Approved must be obtained by the District Manager responsible for the reserve.
- Research topics which improve knowledge of the resources of the area and assist management will be encouraged. In particular, research will be encouraged into:
 - the biodiversity and ecological requirements of native plants or animals;
 - the control of introduced plants and animals;
 - the management of fire for conservation purposes; and
 - cultural heritage aspects of the reserve.

- Liaison will be maintained with researchers to obtain as much mutual information and assistance as possible. The results of any research will be required to be provided to the Service upon completion.
- The reserve will be made available for research which causes minimal disturbance to the natural and cultural heritage and where the results can be demonstrated to offer significant benefits for improved management of the reserve
- Vehicle use for research purposes, will as far as possible, be confined to existing roads and trails.

4.2.3 Management Use

Kajuligah Nature Reserve has limited management infrastructure. A system of management trails and ground tanks have developed from trails and tanks existing at the time the reserve was dedicated. Small Scrubby Tank trail is the only exception and was constructed by the Service in 1992 for better access to water points for fire fighting purposes. The management trails roughly divide the reserve into four sectors.

The management trail system provides access for service staff involved in reserve management including fire management, feral animal and weed control, monitoring and research. The following management trail system as outlined on the map, center pages will be maintained.

- Boundary Management Trails;
- Mulga Management Trail;
- Small Scrubby Tank Management Trail; and
- Whim Tank Management Trail.

The following ground tanks as outlined on the map, centre pages, will be maintained;

- Whim Tank
- Small Scrubby Tank
- Marka Tank, and
- Lambing Camp Tank.

The reserve boundaries are fenced; however the northern and eastern boundaries are in poor condition and require upgrading as regular stock encroachments occur. The Pine Vale section of the southern boundary also requires upgrading. This section of boundary fence is of lower priority for replacement than the northern and eastern sections. Boundary fences between Marlow and Canally have recently been upgraded and are in good condition. Internal fencing is no longer required and fence wires will be removed where it presents a hazard to the movement of native wildlife.

The main Ivanhoe to Cobar road passes through the north west corner of the reserve. The road has single grids which are maintained by the Service and by neighbours. These single stock grids are regularly damaged by wide vehicles and it is proposed to replace them with double width grids to reduce stock encroachments.

Policies

- The system of management trails outlined on the map, centre pages, will be maintained by the Service for management and other authorised purposes. All other vehicle trails will be closed and where appropriate rehabilitated
- Tanks shown on the centre map will be maintained.
- Vehicle use for management purposes will, as far as possible, be confined to existing roads and trails.
- New works, facilities or operations proposed by any organisation or individual will not be permitted unless they are consistent with the purposes of reservation of the area and this plan of management. Prior approval must be obtained by the District Manager responsible for the reserve.

Actions

- Internal fences will be recorded, and the wire removed except for a sample which will be left *in situ*. Posts and strainers will be retained but not maintained.
- Stock grids on the Ivanhoe to Cobar road will be changed from single width grids to double width grids.
- The northern boundary fence with Wing Ding and the eastern boundary fence with Crossroads will be replaced after consultation with the neighbours. A maximum of three gates will be included in the fences along each of the reserve's boundaries.

4. 5. PLAN IMPLEMENTATION

This plan of management is part of the system of management developed by the National Parks and Wildlife Service. The system includes the National Parks and Wildlife Act, management policies, established conservation and recreation philosophies and strategic planning at corporate, regional and district levels.

The orderly implementation of this plan of management will be undertaken within the annual programs of the Service's Broken Hill District. Priorities, determined in the context of district strategic planning, will be subject to the availability of necessary staff funds and to any special requirements of the Director-General or Minister.

District programs are subject to ongoing review, within which, works and other activities carried out at Kajuligah Nature Reserve are evaluated in relation to the objectives laid out in this plan.

The environmental impact of all development proposals will continue to be assessed at all stages of development and any necessary investigations undertaken in accordance with established environmental assessment procedures.

Section 81 of the National Parks and Wildlife Act, requires that this plan shall be carried out and given affect to, and that no operations shall be undertaken in Kajuligah Nature Reserve except in accordance with the plan. However, if after adequate investigation, operations not included in the plan are found to be justified, this plan will be amended in accordance with Section 76(6) of the Act.

As a guide to the orderly implementation of this plan, relative priorities for identified activities are summarised below:

Activity	Section	Priority
Prepare and implement a maintenance program for fire trails and ground tanks.	4.1.5.	High
Prepare and implement feral animal and weed control programs.	4.1.4.	High
Upgrade boundary fences between WingDing and Crossroads.	4.2.3.	High
Prepare and implement reserve fire plan.	4.1.5.	High
Continue surveys for Aboriginal and European sites and places.	4.1.3.	High
Investigate cultural significance of watering points.	4.1.6	High
Continue surveys for flora and fauna.	4.1.2.	High
Close and rehabilitate unnecessary trails.	4.2.3.	Medium
Upgrade reserve signage.	4.1.5.	Medium
Record and fence old wells.	4.1.3.	Medium
Upgrade stock grids on the Ivanhoe to Cobar road.	4.2.3.	Medium
Investigate Licence Agreement for goat removal.	4.1.4.	Medium
Investigate fencing of tanks to exclude feral animals	4.1.6	Medium
Prepare vegetation map for the reserve.	4.1.2.	Low
Record and remove internal fence lines.	4.2.3.	Low

5. 6. BIBLIOGRAPHY

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