

**NOCOLECHE 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 19<sup>th</sup> January 2000.

**Acknowledgments:** This plan of management was prepared by staff of the Cobar District of the National Parks and Wildlife Service in conjunction with the Biodiversity Survey and Research Division, Head Office.

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**ISBN 0 7313 6101 6**

## FOREWORD

Nocoleche Nature Reserve (74,728 hectares) is 20 km south of Wanaaring in northwestern NSW. It straddles the Paroo River and includes the floodplains and channels of the Paroo River and Cuttaburra and Kulkyne Creeks. The reserve's landsystems include sandplains, dissected low stony tablelands and river and channel country.

Although the floodplains of the Paroo and Warrego Rivers in this arid region arguably constitute the largest wetland areas in the State, they are not well represented in the reserve system of NSW. Nocoleche contains wetlands filled by local rainfall, floodplains and permanent waterholes of the Paroo River. The reserve has a significant diversity of wetlands which provide habitat for a wide range of aquatic animals and plants, including a number of significant plant and animal species that are endangered, vulnerable or of conservation concern at national, state or regional level. As a nature reserve it is a valuable area for scientific research on permanent and ephemeral wetlands and on plants and animals dependent on river flows throughout the catchments.

Nocoleche also contains many Aboriginal sites which indicate the importance of the river and wetlands as a vital resource to Aborigines prior to European settlement.

This plan of management establishes the scheme of operations for Nocoleche 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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MAP OF NOCOLECH NATURE RESERVE

Centre pages

## 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 that outlines how the area will be managed in the years ahead.

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 he may think fit, or may refer it back to the Director-General and Council for further consideration.

Once a plan has been adopted by the Minister no operations may be undertaken within the nature reserve except in accordance with the plan.

A draft plan of management for Nocolèche Nature Reserve was placed on public exhibition from 31<sup>st</sup> December 1998 until 19<sup>th</sup> April 1999. The exhibition of the draft plan attracted 9 submissions which raised 12 issues. All submissions received were considered by the National Parks and Wildlife Advisory Council. The comments and suggestions of the Advisory Council were in turn considered by the Minister before adopting this plan of management.

The planning process leading to the development of this plan involved the collection and use of information which for reasons of document size were not included in the plan. For additional information on the management of Nocolèche Nature Reserve, please contact the National Parks and Wildlife Service office, 19 Barton Street, COBAR Telephone (02) 6836 2692.

## 2. MANAGEMENT CONTEXT

### 2.1 Nature Reserves In NSW.

Reserving areas for nature conservation as a general purpose was introduced into Australia with the establishment of Royal National Park in 1879.

Nature reserves in New South Wales arose out of faunal reserves. Faunal reserves were first established under the *Fauna Protection Act 1948*. Under the *National Parks and Wildlife Act 1967*, faunal reserves were reclassified as nature reserves. The 1976 Act was later 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."

Nature reserves are valuable refuge areas where natural processes, phenomena and wildlife can be studied. They differ from national parks which include as a major objective the provision of appropriate recreation opportunities.

### 2.2 Nocolèche Nature Reserve

This plan relates to all lands reserved as Nocolèche Nature Reserve. The nature reserve, which was established in 1979, currently covers 74,728 hectares. It is located in north-western New South Wales, 210 km west of Bourke, 250 km east of Tibooburra and 20 km south of Wanaaring along the Wilcannia road (see map, centre pages).

Nocolèche is one of three reserves on the Paroo River system. The others are Currawinya National Park in south-western Queensland and Peery Lake on the Paroo River Overflow. There is increasing evidence that these wetland reserves, particularly Currawinya Lakes, are boosting local business as tourist numbers increase (Kingsford & Halse, in press). These three reserves cover a small part of the Paroo River floodplain which, together with the Warrego covered 686,000 ha during the 1990 flood (Kingsford & Porter,

1999). Wetlands within the nature reserve also depend on floods that originate in the Warrego River system and pass into Cuttaburra Creek that flows down the eastern side of the nature reserve.

The Paroo River is not yet affected by river regulation and diversions, making it the last major free-flowing river in the Murray-Darling Basin (Kingsford, 1999). Both the Paroo and Warrego Rivers have extremely high conservation value. Many different types of wetlands exist in the reserve and on the Paroo and Warrego River systems. Other protected areas that contain important wetlands in western NSW include the Macquarie Marshes Nature Reserve, Narran Lake Nature Reserve, Sturt National Park, Culgoa National Park, Kinchega National Park and the proposed national park at Peery Station. Of these, only the Paroo River and the wetlands in Sturt National Park have not been affected by water resource development. The continued protection of the Paroo River and Warrego rivers as the only major unregulated watercourses in the whole Murray-Darling Basin is essential for the conservation of wetlands of arid NSW and the plants and animals which depend upon them.

## **2.3 Importance of Nocolche Nature Reserve: Natural Heritage**

### **2.3.1 Introduction**

The most important natural resource on Nocolche is water. In arid environments water drives spectacular boom and bust periods for wildlife populations. About two thirds of the nature reserve is floodplains, wetland depressions or channels of the Paroo River, Cuttaburra and Kulkyne Creeks. During dry periods some water remains in permanent waterholes, and when floods arrive waterbirds breed on the many wetland habitats within the nature reserve as they do up and down the Paroo River (Maher, 1991; Lawler & Briggs, 1991; Maher & Braithwaite, 1992; Kingsford et al., 1994; Kingsford & Porter, 1999). Nocolche Nature Reserve is one of only a few conservation areas in NSW that protects ephemeral channels of an inland river, the Paroo River and Cuttaburra channels. The reserve also has many ephemeral wetlands outside the river channels and floodplains which are biologically very productive and diverse.

Nocolche is listed on the Register for the National Estate for the value of its wetlands. It is significant because of the scale and diversity of its wetland types and the abundance and diversity of wetland fauna communities, particularly waterbirds, but it also has a diverse aquatic plant community and terrestrial plants and animals.

The Paroo River which flows through Nocolche Nature Reserve is one of three major rivers which lie to the north and west of the Darling River within NSW and Queensland. The other rivers in this area include the Culgoa River which flows into the Darling River and the Bulloo River which terminates in the Bulloo Overflow and a system of ephemeral playas and channels. All rivers and creeks in this section of the Murray-Darling Basin are typical of the pattern of drainage in arid landscapes and demonstrate geomorphological

processes and features such as extensive flood plains, overflow basins and playas or small lakes. These features are periodically flooded and may retain water essential to wildlife for extended dry periods.

The Paroo and Warrego Rivers are the only major rivers in the whole Murray-Darling Basin which have little or no river regulation or are not subject to other interference of their natural flow (Kingsford, 1999). There are very few dams or weirs along the Paroo River and little water extraction for agricultural purposes takes place. Consequently the pattern of water flow, particularly the extent and duration of flooding and drying of these rivers and associated natural drainage features, remains as a natural regime which is necessary for the maintenance of many wildlife populations.

The Cuttaburra Channels and Kulkyne Creek, though not as substantial as the Paroo and Bulloo rivers in terms of total water flow are also an important component of the north-western Darling River system. These creeks lie between the Warrego River and the Paroo River and link these two rivers during periods of moderate to high river flow by means of a highly intricate pattern of braided creek channels and floodplains. Both the Cuttaburra Channels and Kulkyne Creek flow through the eastern sections of Nocolèche Nature Reserve. Like the Paroo and Warrego rivers these creeks have little disturbance of their natural flooding and drying regime.

Nocolèche Nature Reserve needs to be considered as one of a string of areas with floodplain wetlands in the Paroo River catchment. The only other formal reserve presently on the Paroo floodplain is Currawinya National Park in Queensland. All these wetland areas remain dependent on flows upstream.

Besides the main river and creek systems there are also small depressions which rely on local rainfall. Surrounding the Paroo River floodplain there are many thousands and perhaps even tens of thousands of small wetlands dominated by canegrass (*Eragrostis australasicus*) or lignum (*Muehlenbeckia florulenta*) (Kingsford & Porter, 1999). Others are open claypans or open water areas fringed by black box and bumble box. Nocolèche Nature Reserve has more than two hundred and fifty claypans (Lawler & Briggs, 1991). These depressions provide valuable breeding and feeding habitats for waterbirds of many different species. The long term importance and extent of these habitats is not known, nor is the relative importance of different types of wetlands well known or how long they remain with water.

The local rainfall events which produce these wetlands also usually stimulate many other plant and animal species to reproduce while others, for example honeyeaters and budgerigars arrive from other areas, often to breed. At such times there may also be eruptions of invertebrate life and frogs in many small wetland areas. Wetland plants grow and reproduce. Relatively little is known of the distribution and abundance of these organisms and their life histories.

Except for waterbirds there have been few systematic surveys of plants and animals on Nocolèche and the records that exist are from ad hoc sampling



and a single mammal survey by the Royal Zoological Society. Little data exists on the populations and habitat requirements of native animal communities in the nature reserve. It is important that studies are encouraged that specifically address the threatening processes to fauna and flora populations.

To date 280 plant species (22 introduced) have been recorded on the reserve with 177 bird species (1 introduced), 25 species of mammals (8 introduced), 37 species of reptiles (none introduced), 15 frog species (none introduced) and 7 fish species (2 introduced) (refer table 1).

**Table 1 Plant and Animal species recorded on Nocoleche Nature Reserve**

<b>Group</b>	<b>Total no. of species</b>	<b>No. of species of conservation concern</b>	<b>Introduced Species</b>	<b>Source</b>
Plants	280	8	22	Pressey et al. 1990 Bowen & Pressey 1993 Briggs & Leigh 1995 Kingsford & Porter 1999 Harden 1990-1993
Frogs	15	4	0	Sadler & Pressey 1994 Sadler et al. 1996 Kingsford & Porter 1999
Reptiles	37	2	0	Sadler & Pressey 1994 Sadler et al. 1996 Kingsford & Porter 1999
Birds	177	14	1	Smith et al. 1994; 1995 Kingsford & Porter 1999
Fish	8	1	2	Harris & Gerhke 1997 Gerhke et al. 1999
Mammals	26	4	9	Dickman et al. 1993, Dickman 1994 Kingsford & Porter unpublished data 1999

### 2.3.2 Geomorphology

Nocoleche Nature Reserve is located within the Great Artesian Basin structural unit of eastern Australia. The basement rocks of this feature are of Permian (230-280 million years ago) sediments overlain by Triassic (190-230 million years ago) and Jurassic (130-190 million years ago) sediments. The basement rocks within Nocoleche Nature Reserve are however buried by relatively deep Quaternary deposits and are mostly obscured. Some silcrete of Tertiary age (65-130 million years ago) outcrops within the western sections of the Reserve.

Nocoleche is the only conservation reserve located within the North-west Sands land system of NSW (Morgan and Terry, 1992). The North-west Sands comprises late Tertiary and Quaternary unconsolidated sediments overlying the Rolling Downs sediments of the Great Australian Basin (formerly known as the Great Artesian Basin). The nature reserve lies within the drainage basin of the Paroo River and the associated Warrego River and Cuttaburra and Kulkyne creek systems.

Ten of the seventeen land systems identified on the Yantabulla and Urisino land system map sheets produced by the Department of Land and Water Conservation occur on Nocoleche. The reserve contains a diverse combination of land units; stony hills, sandplains, channels, small creeks, depressions, black box depressions, claypans, cane grass swamps, river and floodplains (see also Kingsford & Porter, 1999). The dominant soils are sandy red loam and grey cracking clay soils.

### 2.3.3 Wetlands

A large proportion (116km<sup>2</sup> or 16%) of Nocoleche Nature Reserve is floodplain wetland. These are dependent on the Paroo River while other small wetlands away from the floodplain are dependent on local rainfall. Different types of wetlands with distinctive vegetation communities and water regimes exist within the nature reserve (Lawler & Briggs, 1991; Kingsford & Porter, 1999). Plants, waterbirds, frogs, reptiles, fish and many invertebrates rely on these wetlands up and down the Paroo River.

Of the seven different types of wetland identified in the Paroo and Warrego River catchments (Kingsford & Porter, 1999), Nocoleche Nature Reserve has claypans, river channels and waterholes, Eleocharis swamps, lignum swamps and black box swamps. It does not have large freshwater lakes or salt lakes.

Flows in the Paroo River remain largely unaffected by dams and diversions upstream, unlike nearly all other river systems in the Murray-Darling Basin. Protection of these flows is a priority to ensure that the ecosystems that rely on variable flooding are maintained. Aquatic plants and animals depend on the variable flow regimes for breeding and survival but some terrestrial animals may also depend on them (Kingsford & Porter, 1999).

### 2.3.4 Plants

Nocoleche Nature Reserve is the only known location in New South Wales of *Aponogeton* sp. aff. *queenlandicus* and the endangered *Dentella*

*minutissima*. Large areas of yapunyah (*Eucalyptus ochrophloia*) woodland, restricted to the floodplains of the Paroo and Warrego Rivers and Cuttaburra Creek are present in the reserve. Other plant species of conservation significance include the algae *Chara braunii*, spikegrass (*Elytrophorus spicatus*), downy mother of misery (*Cuphonotus andreasus*), chariot wheels (*Maireana cheelii*), silver turkey bush (*Eremophila bowmannii* ssp *latifolia*) and corkbark (*Hakea ivoryi*).

Major land systems and plant communities of Nocoleche include:

- Deep sandy loams to loamy sands cover most of the **sandplain area**. Much of the sandplain country supports open woodland and shrubland with mulga (*Acacia aneura*), whitewood (*Atalaya hemiglauca*), rosewood (*Alectryon oleifolius*), beefwood (*Grevillea striata*), leopardwood (*Flindersia maculosa*) and belah (*Casuarina cristata*) the dominant tree species; and bimble box (*Eucalyptus populnea*) and black box (*Eucalyptus largiflorens*) common around drainage lines and scattered claypans. The main grasses are kerosene grass (*Aristida spp*), woollybutt (*Eragrostis laniflora*), bottlewashers (*Enneapogon avenaceus*), cotton panic grass (*Digitaria brownii*), Queensland bluegrass (*Dicantheum sericeum*), silky heads (*Cymbopogon obtectus*) and neverfail (*Eragrostis setifolia*).

There are also dense stands of tall woody shrubs occurring over large areas of the sandplain country; the main species that occur are fuchsia (*Eremophila duttonii*), turpentine (*Eremophila sturtii*), cassia (*Senna* spp), sandhill wattle (*Acacia ligulata*), prickly wattle (*Acacia victoriae*), and hop bush (*Dodonaea viscosa* ssp *angustissima*). Smaller shrubs include mallee saltbush (*Atriplex stipitata*), shrubby rice flower (*Pimelea microcephala*) and three-spined roly poly (*Bassia tricuspis*).

- On the Paroo River system, the **channel country**, the most widespread soil types are heavy clays subject to some scalding. Heavy clays with and without gilgais are also present on these areas

On the river and channel country common tree species are black box (*Eucalyptus largiflorens*), red gum (*Eucalyptus camaldulensis*), coolabah (*Eucalyptus coolabah*), yapunyah (*Eucalyptus ochrophloia*) and river coobah (*Acacia stenophylla*). Flowering lignum (*Eremophila polyclada*), spreading emubush (*Eremophila divaricata*), slender-fruited saltbush (*Atriplex leptocarpa*), sneezeweed (*Centipeda* spp), Goosefoot (*Chenopodium* spp) and lignum (*Muehlenbeckia florulenta*) are present on the clay soils while occasional hop bush, turpentine and fuchsia occur on the sandy creeks. Widespread grass species of the heavy clay channels include rats' tail couch (*Sporobolus mitchelli*), fairy grass (*Sporobolus caroli*), channel millet (*Echinochloa inundata*) and Warrego summer grass (*Paspalidium jubiflorum*).

- Areas of loamy sands occur **between the channels** overlying a compact clay subsoil. These areas are highly susceptible to erosion, especially by scalding.

Bimble box and mulga are the main tree species occurring in the sandy watercourses. Beefwood (*Grevillea striata*), leopardwood (*Flindersia maculosa*), long fruited bloodwood (*Eucalyptus terminalis*), gidgee (*Acacia cambagei*) and belah (*Casuarina cristata*) may also occur in these areas.

- Brown gibber soils occur in the **low stony tablelands** which are covered by broken and polished siliceous stones. Beneath are brown to red-brown, shallow loam to clay soils and this changes gradually to a red coarsely structured clay. They support open stands of trees consisting mainly of mulga and whitewood with isolated long fruited bloodwood and leopardwood. Typical shrub species are silver cassia (*Senna artemisioides*), foxtails (*Ptilotus* spp) and dead finish (*Acacia tetragonophylla*). The main grasses on the stony tablelands are kerosene grass, cotton panic grass and naked woollybutt (*Eragrostis eriopoda*) (Cunningham, 1992).

### 2.3.5 Birds

Nocoleche Nature Reserve provides habitat for migratory waterbirds whose survival and conservation, which includes their habitat, is covered by two international agreements:

**The Japan-Australia Migratory Birds Agreement** (JAMBA) provides for cooperation between the governments of Australia and Japan to protect birds which migrate between the two countries, birds in danger of extinction, and their environment.

**The China-Australia Migratory Birds Agreement** (CAMBA) similarly provides for cooperation between the governments of Australia and China to protect birds which migrate between the two countries and their habitats.

Birds recorded on Nocoleche Nature Reserve which are covered by these agreements include the wood sandpiper (*Tringa glareola*), common sandpiper (*Tringa hypoleucos*), marsh sandpiper (*Tringa stagnatilis*), greenshank (*Tringa nebularia*), sharp-tailed sandpiper (*Calidris acuminata*) and painted snipe (*Rostratula beneghalensis*) (Lawler & Briggs 1991).

Sixty-three species of waterbirds are recorded on the Paroo River floodplain in Nocoleche Nature Reserve. Thirty-eight waterbird species breed on the wetlands of the Paroo and Warrego Rivers. The Currawinya lakes (Lake Wyara and Lake Numalla) in southwestern Queensland are among the most significant wetlands in Australia. These lakes may support more than 250,000 waterbirds and the highest concentration of rare freckled duck (*Stictonetta naevosa*) in Australia (>10,000) (Kingsford & Porter, 1994). Islands in Lake Wyara provide nesting habitat for fish-eating birds which generally feed on the freshwater Lake Numalla. The wetlands of the Paroo overflow (Mullawoolka Basin, and Gilpoko, Peery, Poloko, Tongo and

Yantabangee Lakes) regularly support more than 10,000 and as many as 50,000 waterbirds. Yantabulla Swamp (37,200 ha), supplied by Cuttaburra Creek from the Warrego River is the most important breeding area for waterbirds in the Paroo and Warrego catchments and can support at least 40,000 waterbirds (Kingsford 1995, 1996).

Fourteen species of birds recorded on the Nocoleche are listed under the *Threatened Species Conservation Act 1995*. These include the Australian bustard (*Ardeotis australis*), brolga (*Grus rubicundus*), freckled duck (*Stictonetta naevosa*), blue-billed duck (*Oxyura australis*), pink cockatoo (*Cacatua leadbeateri*), grey falcon (*Falco hypoleucos*), black-breasted buzzard (*Hamirostra melanosternon*), square-tailed kite (*Lophoictinia isura*), Hall's babbler (*Pomatostamus halli*), Bourke's parrot (*Neophema bourkii*), red-browed pardalote (*Pardalotus rubricatus*), pied honeyeater (*Certhionyx variegatus*) and brown quail (*Coturnix yspilophora*) (Smith et al, 1994, 1995).

### 2.3.6 Mammals

The reserve at times supports high populations of large animals including red kangaroos (*Macropus rufus*), eastern grey kangaroos (*Macropus giganteus*), western grey kangaroos (*Macropus fuliginosus*) and common wallaroos (*Macropus robustus*) which are common throughout the nature reserve.

Small mammals that have been recorded in the reserve include fat tailed dunnart (*Sminthopsis crassicaudata*) and water-rat (*Hydromys chrysogaster*). Bats such as lesser long-eared bat (*Nyctophilus geoffroyi*), little broad-nosed bat (*Scotorepens greyii*) and western broad-nosed bat (*Scotorepens balstoni*) have also been recorded (Kingsford & Porter unpubl. data, 1999).

Significant mammal species found on Nocoleche include yellow-bellied sheath-tail bat (*Saccolaimus flaviventris*), little pied bat (*Chalinolobus picatus*), Inland forest bat (*Vespadelus baverstocki*) and white-striped mastiff bat (*Nyctinomus australis*) (Dickman et al., 1993).

### 2.3.7 Reptiles and Amphibians

Common reptile and amphibian species on Nocoleche include the Murray turtle (*Emydura macquarii*), shingle-back (*Trachydosaurus rugosus*), central netted dragon (*Ctenophorus nuchalis*), painted dragon (*Ctenophorus pictus*), sand monitor (*Varanus gouldii*), and western brown snake (*Pseudonaja nuchalis*). Frog species include crucifix toad (*Notaden bennettii*), water holding frog (*Cyclorana platycephalus*) and the striped burrowing frog (*Litoria alboguttata*) (Cogger, 1996, Kingsford & Porter, 1999). Commonly found around sheds and buildings are desert tree frog (*Litoria rubella*) and green tree frog (*Litoria caerulea*).

Significant reptile and amphibian species recorded on Nocoleche include fat-tailed diplodactylus (*Diplodactylus conspicillatus*), narrow banded snake (*Simoselaps fasciolatus*) and frogs *Cyclorana verrucosa*, *Crinia parainsignifera*, *Litoria latopalmata* and striped burrowing frog (*Litoria alboguttata*) (Kingsford & Porter, 1999; Sadler and Pressey 1994, 1996).

### 2.3.8 Fish

Although fish are not considered fauna under the National Parks and Wildlife Act, they are nevertheless a prominent part of inland river and wetland ecosystems. They are the sole source food source for a number of waterbirds such as pelican, cormorants and darters, and an important part of the diet of many others. Fish such as yellowbelly (*Macquaria ambigua*), Murray cod (*Maccullochella peelii*), silver perch (*Bidyanus bidyanus*) and catfish (*Tandanus tandanus*) are much sought after by professional and recreational fishers. A comprehensive survey of rivers in NSW has found populations of native fish have declined dramatically since river regulation began in the Murray-Darling basin (Harris & Gerhke, 1997). Modification of river flows has also reduced populations of crayfish, mussels and snails (Gerhke et al. 1999).

Introduced species such as European carp (*Cyprinus carpio*), goldfish (*Carrasius auratus*) and mosquito fish (*Gambusia holbrooki*) are present in the Paroo River (Harris & Gerhke, 1997). Predation by mosquito fish on frogs is thought to be contributing to the decline of frog species in NSW and has been declared a threatening process under the Threatened Species Conservation Act.

Native fish species found in the Paroo include yellow belly, spangled perch (*Leipotherapon unicolor*), bony bream (*Nematolosa erebi*), catfish (*Neosilurus hyrtlii*), crimson spotted rainbow fish (*Melanotaenia fluviatilis*), Australian smelt (*Retropinna semoni*) and the vulnerable silver perch (*Bidyanus bidyanus*) (Gerhke et al., 1999).

### 2.3.9 Invertebrates

Invertebrates are a crucial part of arid zone ecosystems and their biodiversity but despite this they remain the least studied group of all arid zone fauna, though this situation has begun to improve in recent years (Greenlade & Crawford, 1994). Termites (Isoptera), ants (Hymenoptera), beetles (Coleoptera), dragonflies (Odonata), flies (Diptera), moths (Lepidoptera), bugs (Hemiptera), grasshoppers (Orthoptera) and spiders (Arachnida) are all groups present in large numbers on Nocolche and a major food resource for numerous species of mammals, birds, reptiles and amphibians.

The yabby (*Cherax destructor*) is at times abundant in the Paroo and highly prized by recreational and professional fishers. Other commonly encountered aquatic crustaceans on Nocolche include shrimps (*Macrobrachium* sp.) in the river channels and in claypans freshwater crabs (*Holthuisana transversa*) cladocerans and tadpole shrimps (*Triops australiensis*). Smaller aquatic crustaceans include water fleas (cladocerans), ostracods (seed shrimps), conchostrachans (clam shrimps), copepods and amphipods that are abundant in temporary wetlands after flooding.

Crustaceans and many species of aquatic insects are an important food source for waterbirds including herons, egrets, ducks, plovers, spoonbill especially during the large breeding events that may follow a large flood.

## **2.4 Importance of Nocolleche Nature Reserve: Cultural Heritage**

### **2.4.1 Aboriginal Heritage**

The traditional owners of the Paroo are the Budjair, Kunja and Mardgany in the north and the Paruntiji, meaning people belonging to the Paroo, in the south. Aboriginal people are known to have lived along the Paroo for at least 14,000 years (Robins, 1999). The subsistence of these people depended on the Paroo River and its channels and creeks which probably comprised their single most important food source. Thirty to fifty per cent of food eaten by the Aborigines of the Darling River system came from the rivers and included fish, freshwater mussels, crayfish, turtles, aquatic birds and aquatic plants. The economy and society of the Aboriginal people both along the river and in the hinterland would have depended upon the seasonal and irregular fluctuations of river flows.

Aboriginal groups in the west of NSW appeared often to be single families, with occasional larger gatherings. Large gatherings took place when water was available and there were adequate food supplies. However, when water and food resources dwindled groups would become smaller and often retreat to more permanent waterholes (Sullivan, 1970).

Graziers came as squatters to the Paroo in the 1840s. They met resistance from the Aboriginal land owners, and tensions in the area continued well into the 1860s. From the 1850s however a shortage of white labour caused by the exodus to the gold fields saw many in the Aboriginal communities join the pastoral workforce. Aboriginal people continued to be a significant part of this work force for many decades whilst still maintaining their cultural traditions and attending local and regional ceremonies until the 1910s. From the 1920s however, Aboriginal people began to be forcibly removed from their land by government policy. Even when they returned, a downturn in the pastoral industry meant that for many of them there was no longer employment and they were forced to move further from their traditional lands.

Aboriginal people living near to the Paroo continue today to draw on their traditional environmental knowledge and central to this knowledge and to cultural traditions, is the relationship of people to the river. This relationship encompasses both traditional belief systems and resource use with Aboriginal dependency of the river resources in some areas continuing to be high (Goodall, 1999).

To date only seven Aboriginal sites have been formally recorded from Nocolleche Nature Reserve and a comprehensive survey of the whole nature reserve is proposed to establish the distribution and significance of Aboriginal sites in the nature reserve. Anecdotal evidence suggests that there is a high occurrence of Aboriginal sites despite the low number recorded to date. There are some challenges to site identification and assessment in Nocolleche due to the drought and flood cycles. In drought there is a high level of site exposure, but in flood and with consequent vegetation regrowth, sites become obscured. Priority for survey work is along the river road which runs along the western side of the main channel of the Paroo River and where the

most management activity takes place in relation to access to bee sites and pig control sites.

### **2.4.2 European Heritage**

There was a rapid expansion of pastoral activities from the late 1870s when artesian water was discovered and work on bore construction began in earnest. From the 1880s to the early twentieth century however, drought, severe overstocking and rabbit infestation led to massive damage to land, soil and native plants and animals. The land never recovered from this sequence of events and the numbers of grazing stock were permanently reduced as was the size of the pastoral runs (Goodall, 1999).

Nocoleche was one of the first pastoral holdings on the Paroo River and was established some time before 1887 by F.W. Armytage. By the early twentieth century the property was one of four substantial runs leased by Sir Samuel McCaughey on the Darling River. His total holdings were 3.2 million acres and followed 280 miles of winding river bank. McCaughey is a significant figure in Australian pastoral history as he experimented with a number of farming implements and technologies, such as using heavy machinery for ploughing and soil excavation, mechanised sheep shearing, and widespread irrigation. The history of ownership of the property is well documented, and shows the property changed hands eight times between Armytage and when the Service took ownership in 1978.

Buildings that remain on the nature reserve are the shearers' quarters, cooks' quarters, shearing overseer's cottage, store room, shower room/block, and toilet block. There was an old homestead behind the quarters that has now completely deteriorated. Other structures such as sheep yards, bronco yards, suspension bridge, Coorallie Outstation and internal stock fences have deteriorated beyond repair. All these buildings were assessed as part of a Heritage Maintenance Survey undertaken by NPWS in 1995. At that time the shearing complex and the suspension bridge were thought to be of significance to the local community or region.



### 3. OBJECTIVES OF MANAGEMENT

#### 3.1 General Objectives of Management

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 conservation of wildlife;
- the preservation of Aboriginal sites and historic features: and
- the encouragement of scientific and educational enquires into environmental features and processes.

#### 3.2 Specific Objectives of Management

In addition to those general objectives the following specific objectives apply to Nocolche Nature Reserve:

- the protection of river flows and ground water in the Paroo and Warrego River systems;
- the management of wetlands within the reserve to avoid affecting flow patterns and to protect waterbird breeding areas;
- the protection of aquatic and terrestrial plants and animals; and
- the provision of opportunities for scientific research and environmental education use which are compatible with the conservation of the area.

#### 3.3 Overall strategy

To give effect to achieving these objectives of management, the following strategies will also apply to the management of Nocolche Nature Reserve:

- the encouragement of the development of total catchment policy and management for the Paroo River and its tributaries, including the Warrego River, and the prevention of impacts that affect the hydrological or other conservation values of the river system;
- the protection of the existing native plant and animal communities by reducing and where possible eliminating threats to those communities, particularly from weeds and feral animals; and
- the promotion in the local community of the importance and purpose of management programs for the protection of natural features and the control of threatening processes such as fire, weeds and feral animals.

## 4. POLICIES AND FRAMEWORK FOR MANAGEMENT

This section contains the policies and framework for the management of Nocolèche Nature Reserve. The policies established in this plan of management provide the framework for management consistent with anticipated resources available to the Service.

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

### 4.1 Natural Heritage Management.

A number of international, State and Murray-Darling Basin policies are relevant to water management of the Paroo River. State policies are committed to protection in New South Wales but at this stage this commitment to protecting the flows from water resource development is not matched in Queensland.

The Paroo River remains the last free-flowing river in the Murray-Darling Basin and Nocolèche Nature Reserve lies within the Basin and depends on its flows. The basin is subject to the *Murray Darling Basin Act 1993*, which established the Murray Darling Commission. The Commission operates by virtue of an inter-governmental Agreement whereby it is responsible to the Governments of the Commonwealth, NSW, Victoria, South Australia and Queensland for the management of the River Murray system and the provision of advice to the Murray Darling Basin Ministerial Council on land management and environmental issues.

The Council has adopted a policy “to maintain and, where appropriate, improve flow regimes in the waterways of the Murray Darling Basin to protect and enhance the riverine environment”. In addition, the Murray-Darling Basin Council has applied a cap to water diversions in the Basin at 1993/94 levels of development which should mean no new development because there was no major water resource development in the catchment (Kingsford 1999).

The conservation of wetlands dependent upon the Paroo River, the Cuttaburra Channels and Kulkynne Creek requires a catchment wide approach to the management of those rivers and creeks which must involve not only landholders and agencies in NSW but also those in Queensland (Kingsford et al. 1998) where all the rivers and creeks of the system have their headwaters. The aim of catchment management for wildlife conservation purposes is to ensure that the Paroo River and associated creeks are protected from river regulation and withdrawal of water. The construction of dams and weirs and/or the expansion of irrigation along the rivers and creeks that flow through Nocolèche Nature Reserve would result in less flooding in duration and extent.

Total catchment management provides an umbrella framework to aim for amongst other matters, cleaner water, less soil erosion, improved vegetation

cover, the maintenance of ecological processes and a balanced and healthier environment. It also provides a focus to balance conservation needs and development pressures and encourages a more aware and involved community.

The construction of roads, particularly Main Road 429, has disrupted the drainage pattern within Nocolche Nature Reserve. In particular areas of ephemeral wetlands have been cut off both from local rainfall drainage and from minor floods moving down the main rivers and creeks. Priority will be given to an assessment of the impact of these works on areas of ephemeral wetland and to measures that may be practicable to re-establish a more acceptable regime of flooding and drying. Such measures may include, for example, the provision of pipes and culverts under the road to allow water drainage from one side of the road to the other.

There are currently six ground tanks on the reserve. Research in semi-arid Australian rangelands indicates that artificial waters are a potential threat to many components of biodiversity. Langsberg et al (1997) report that the majority of 'decreasers' (species that decrease in abundance as you move closer to water points) are native species. Their results suggest a risk of substantial decline in many native species in areas where artificial watering points are widespread.

There is no documented evidence of fire entering the nature reserve. However, it is understood that lightning strikes started fires in the area during in the 1960s and 1950s. These fires apparently went out on their own accord.

The major actual or potential threats to the management of the natural heritage values of the park are:

- Water management;
- Pest plants and animals; and
- Use impacts.

### **Policies**

- Wetland areas, river flows and their dependent plants and animals will be protected through liaison with the local community, New South Wales Government and the Queensland Government.
- Populations of native animals will be maintained throughout their range in the nature reserve by ensuring the protection of their habitat and management, policy development and research on the processes that threaten the viability of these populations.
- The Service will encourage the application of total catchment management principles for the Paroo River and its associated watercourses.

- The Service will oppose any development or activity which may compromise the hydrology or other values of the Paroo River, the Cuttaburra Channels and Kulkyne Creek.
- The Service will seek the co-operation of the Murray-Darling Commission and other natural resource agencies in both NSW and Queensland to protect the status of the Paroo River, the Cuttaburra Channels and Kulkyne Creek by ensuring that they remain unimpaired by regulation or other modification.
- The need for artificial water points will be assessed. Consideration will be given to maintaining up to two tanks, in addition to those required for Service domestic use, for feral animal control. Those required for management operations will be fenced to trap/exclude goats, pigs and large macropods. All other tanks will not be maintained.
- Fire in Nocolche will be managed in accordance with a Reserve Fire Management Plan to:
  - protect human life and property within and adjacent to the reserve;
  - maintain native plant and animal species, populations and ecological communities through the provision of fire regimes compatible with their conservation; and
  - protect Aboriginal sites, historic places, visitor and management assets.

### **Actions**

- Liaison will be undertaken on a whole of Government basis with the Queensland Government and Paroo River association on long-term sustainability of river flows and dependent wetland systems.
- Liaison will be undertaken with Murray-Darling Basin Commission and Environment Australia on the conservation values of the Paroo River.
- Research and survey to determine composition of fauna and flora in the nature reserve and likely threats to its long-term sustainability will be encouraged. Records of plants and animals will continue to be updated and progressively entered into the Wildlife Atlas and other databases.
- Any structures that may affect flows and how these structures currently affect distribution of floodwaters will be identified. Where required, pipes or other structures will be installed under roads or other barriers to the flow of water in order to establish a natural regime of flooding and drying of the wetlands.
- The need for artificial water sources will be assessed.

- The impact of decommissioning ground tanks on native species and neighbouring properties will be monitored.
- A fire management plan for the reserve will be prepared by December 2001.

#### 4.2 Introduced Plants and Animals

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

Twenty two introduced plant species occur in the reserve including Noogoora burr (*Xanthium occidentale*), three cornered jack (*Emex australis*), athol pine (*Tamarix aphylla*), saffron thistle (*Carthamus lanatus*), cats head (*Tribulus terrestris*), heliotrope (*Heliotropium europaeum*) and prickly pear (*Opuntia stricta*).

Noogoora burr may be affecting the survival of native plants and (indirectly) animals through competition and generally proliferates when water is drying back in small depressions and channels. The main infestations occur around Momba Swamp on the western side of the reserve and are currently controlled by the limited use of non-residual herbicides and by control of introduced animals. The impact of control programs for noogoora burr, however, requires further study because the ecological impacts of herbicides used to control the weed on amphibians and invertebrates are not known. Biological controls have been released in some areas (e.g. Macquarie Marshes) for noogoora burr and are being developed for several other weed species including three cornered jack, heliotrope and cats head (Wapshere 1989).

Three cornered jack, athol pine and prickly pear occur around the old huts and homesteads. These plants are apparently not spreading and remain localised.

The *Noxious Weeds Act 1993* took effect from 1 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.

The following non-native animal species are of concern in the nature reserve and are capable of causing extensive damage to native flora and fauna populations through predation, competition, habitat destruction and disease (Bryant et al. 1984; Dickman 1996, Parks et al. 1996).

**Pigs** (*Sus scrofa*) mainly occur along the Paroo River and Cuttaburra channels on the eastern side of the reserve and to a lesser extent on the western side. Pig populations vary widely with the availability of

food within the reserve. High pig populations can cause silting and erosion on rivers and creeks. They damage roads, fences and the nests of ground nesting birds such as brulgas. They also prey on small slow moving animals including frogs and invertebrates. They may also carry heavy parasite loads and disease causing organisms eg leptospirosis and spargana in pigs (Wilson 1992).

The Service has controlled pigs on Nocolche Nature Reserve for 15 years using mainly silo traps in strategic locations along river and creek channels and baits. There has also been an annual aerial shoot of pigs for several years. These programs have successfully kept pig populations down to a manageable level. However, cooperative management with neighbours and Rural Lands Protection Boards need to be implemented in the future for better control.

**Goat** (*Capris hircus*) populations occur in all parts of the reserve. Goats can change the composition of plant communities through browsing and grazing (Parks et al. 1996). Goats will often eat grasses and small tree roots to ground level and in the case of some trees, pull them out of the ground. Trampling by goats causes wide spread erosion and they compete with native animals, especially during times of drought.

The Service has contracted a goat musterer on the reserve which has kept numbers to a manageable level and the Service will continue to use a licensed musterer. However, co-operative programs with neighbours need to be initiated for more effective control of goats.

**Foxes** (*Vulpes vulpes*) occur in all parts of the reserve but fox control programs have had a lower priority than pig and goat control in the reserve. Foxes may eliminate lizards and small to medium size native mammals including water rats, dunnarts and tortoises.

Programs using 1080 baits is the common method used for controlling foxes. However, all programs in the past have been run independent of neighbours while neighbours' programs have not included the Service. Co-operative management in the future is essential for better control.

**Cats** (*Felis cattus*) occur in all parts of the reserve and prey on most bird species, and mammals weighing up to 2,000g (Dickman 1996). Impacts may be intensified if other species of predators such as foxes are present (Dickman 1996). They are controlled on the reserve through shooting and trapping. Cat populations probably increase when wetlands are containing water and birds are breeding. They may carry diseases that are transmissible to humans including toxoplasmosis and sarcosporidiosis (Wilson 1992).

**Rabbit** (*Oryctolagus cuniculus*) numbers are low on the reserve and are not a major problem at present with only some warrens occurring

on both the eastern and western sides. Much of the east side of Nocolèche is unsuitable for rabbits as it floods periodically. Some of the west side of Nocolèche is hard stony country, unsuitable for burrowing. Rabbits could be controlled with the co-operation of neighbours by ripping warrens and introducing, when available, the myxomatosis flea, calici virus and possible other methods.

**Sheep** (*Ovis aries*), **Cattle** (*Bos taurus*) and **Horses** (*Equus caballus*). Sheep and cattle often stray onto the nature reserve from neighbouring properties because of the poor condition of some boundary fences and the continuing problems of maintaining fencing across a river system of braided channels that floods repeatedly and damages tens of kilometres of fencing. In addition, feral horses occur on the nature reserve. A program of repair and maintenance of boundary fencing is proposed, and domestic stock will be excluded and horses removed from the nature reserve. Repeated incursions of domestic stock may result in impoundment at the owner's expense.

Recent investigations have indicated that European honeybees may compete with and displace native animals, particularly native bees, nectar feeding birds and small mammals and have damaging effects on native plants (Anderson 1989). Badly managed hives produce more swarms than well managed hives and these swarms are seldom collected. Hence a policy of selective admittance of apiarists (not in the swarming period and not if they are poor managers) is required to reduce the incidence of feral hives (see Anderson 1989).

A licensed apiarist maintains 22 sites for honey production in Nocolèche Nature Reserve. Each site is limited to a maximum of 50 stock hives and 20 nucleus hives. Existing tracks to these sites are used most of the time, but following wet weather, new tracks and detours are created to access the sites.

## **Policies**

- Feral animals and non-native plant species will be controlled through co-operative management programs with landholders and the Rural Lands Protection Board on the reserve, giving priority to species that are declared noxious or considered a threat to native species.
- Control techniques should have minimum impact on the environment, neighbours, other landholders and relevant authorities.
- Domestic animals and stock will not be permitted in the nature reserve, with the exception of registered guide dogs.
- Priority for control of introduced species will be given to those which:
  - conflict with significant natural resources;
  - are causing damage to cultural resources;
  - are or may affect neighbouring lands;

- may be a threat with regard to disease;
  - have a high capacity for dispersal;
  - are new isolated occurrences; and/or
  - have the potential to be spread through internal access systems.
- No additional apiary licences will be granted within the nature reserve. The 22 current sites within Nocolèche Nature Reserve may be renewed in accordance with Service policy.
  - Feral bee swarms will be killed or removed.
  - The licensee of the bee hive sites and/or their employees are to keep to approved roads and tracks when accessing bee hive sites on the reserve.

### **Actions**

- Co-operative management programs with neighbours and the Rural Lands Protection Board will be developed and implemented.
- Noogoora burr at Momba Swamp will be monitored to ascertain whether the infestations of noogoora burr is increasing.
- Information will be obtained on what herbicides can be used to eradicate noogoora burr that will have minimal impact on the immediate environment and determine likely effectiveness.
- Introduced plant and animal control programs will be continued and expanded. Prickly pear and three cornered jack will be removed or controlled. Pigs will be controlled by annual shoots and trapping. Goats will be controlled by a contract licensed goat musterer. Rabbits will be controlled and warrens ripped. Increased efforts will be made to control foxes by 1080 poisoning and through co-operative programs, and increased cat control programs will be undertaken during bird breeding seasons.
- The condition of boundary fences at Nocolèche Nature Reserve will be progressively reviewed and a program for their replacement and maintenance prepared in consultation with neighbouring landholders. Gates in the boundary fences which enable stock to enter the nature reserve will be removed.
- Bee hive sites will be monitored to ensure the number of hives do not exceed fifty stock hives and 20 nucleus hives and the number of locations do not exceed twenty-two.
- Roads and tracks accessing bee hive sites will be monitored to ensure that only approved management trails are being used.



### 4.3 Cultural Heritage Management

The major threats actual and potential to Aboriginal cultural heritage management in the nature reserves are:

- Natural processes whereby sites are periodically flooded. This may have the effect of disturbing some site types; and
- Management activities such as road and track maintenance.

The major actual and potential threats to the management of historic heritage on the reserve include:

- Neglect;
- Fire; and
- Lack of maintenance.

#### Policies

- The Service will liaise with the Wanaaring Local Aboriginal Land Council and local Aboriginal communities on all aspects of Aboriginal site management.
- The provisions of the Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (the Burra Charter) will guide management decisions for both Aboriginal and non-Aboriginal sites found in Nocoleche Nature Reserve.
- All Aboriginal sites within Nocoleche Nature Reserve will be protected and all developments or activities proposed within the nature reserve will be preceded by an environmental assessment. Any development or activity having an impact upon an Aboriginal site will be relocated or modified to protect that site.
- The shearers quarters and associated structures will be maintained. Other structures will be retained *in situ* but not actively maintained.

#### Actions

- A survey of Aboriginal sites will be undertaken with priority given to a survey along the river road and related management access.
- As part of any survey and liaison work, the relevant Aboriginal community will be commissioned to prepare a statement of how they view the area today.
- All Aboriginal and non-Aboriginal sites located on the nature reserve will be progressively recorded and an assessment made of each site's significance and of threats to its long term preservation.
- A conservation plan and maintenance schedule for the shearers quarters and associated structures will be prepared and implemented.

#### 4.4 Use of Nocoleche Nature Reserve

A day use only picnic area within Nocoleche Nature Reserve has been developed at King Charlie Waterhole on the Paroo River adjacent to the northern boundary of the nature reserve. It is accessed from Main Road 429 between Wanaaring and Wilcannia and contains a small car parking area, barbeques and rubbish bins. This area has a very low level of use, mainly by local people from Wanaaring who use it for fishing. It is proposed that the picnic area be maintained at its existing level of development.

Uncontrolled vehicular access has resulted in erosion of river banks and damage to vegetation and Aboriginal sites. It is proposed that vehicles will be restricted to the car park and access road by a system of bollards and fencing.

There are no proposals to provide other recreation facilities in the nature reserve. Camping is not permitted within the nature reserve.

Although most species of native fish are in serious decline throughout the Murray-Darling basin, the Paroo River has one of the healthiest populations remaining. Removal of yabbies (*Cherax destructor*) by professional fishing has the potential to disrupt the balance of in stream fauna communities and reduce the breeding success of many waterbirds and other fauna such as water rats that feed on fish or yabbies.

#### Policies

- Recreation within Nocoleche Nature Reserve will be permitted at existing levels of use.
- Camping will not be permitted within the nature reserve.
- Research into the impact of professional fishing on yabby populations in the reserve will be encouraged.

#### Actions

- Vehicle access to the water at King Charlies Waterhole will be restricted by bollards and fencing.
- The Service will encourage research involving the Department of Fisheries into the impact of fishing on native aquatic fauna using Nocoleche as the study area.

#### 4.5 Research

The nature reserve has been the focus for research projects on feral pigs (by the NSW Department of Agriculture), waterbirds, invertebrates and aquatic plants (the latter by NPWS). Scientific interest in the waterbirds and wetlands

of the Paroo and Warrego River systems began in the 1980s. Large numbers of waterbirds were recorded on the Paroo River overflow lakes during aerial surveys flown across the eastern half of the continent (Braithwaite et al., 1986; Maher & Braithwaite 1992). At about the same time, the wetlands were mapped and their large extent understood (Goodrick 1984). Mapping of dominant wetland vegetation types followed for the Paroo River and Cuttaburra Creek (King et al. 1995) and the Warrego River (Green 1992). Sampling of invertebrates on different lakes within the catchment began about the same time (Timms 1992; 1997a,b; 1998a, b). Work also began to identify which were the important wetland characteristics for different species of waterbirds (Maher 1991). Further analysis of waterbird populations and wetlands followed (Kingsford & Porter 1994; Kingsford et al. 1994; Kingsford & Porter 1999). These research programs have significantly improved the Service's knowledge of the natural resources of the area and enhanced management programs for the nature reserve.

Nocoleche Nature Reserve has local and regional educational significance for primary and secondary school groups from Wanaaring, Enngonia and Bourke and has been used by higher education groups such as Universities and by ornithological organisations (Birds Australia) and zoological groups (Royal Zoological Society).

The purpose of scientific study in the nature reserve is to improve the Service's understanding of its natural and cultural heritage and the processes which affect them. Data and findings from research studies and surveys will be utilised in the management of the nature reserve.

Effective wildlife conservation depends upon an understanding of the habitat requirements of native plants and animals which is based on scientific research. Research programs carried out on wetlands at Nocoleche Nature Reserve have contributed significantly to the scientific understanding of the importance and conservation requirements of wetlands throughout the arid parts of eastern Australia (Maher 1991; Maher & Braithwaite 1992; Kingsford 1999)

The interest of scientists in the wetlands of the Paroo River developed following an extensive survey in 1984 by Goodrick which mapped all the wetlands of north-western NSW for the first time. As a consequence of this work, it became evident that the wetland complex in the region was much larger than had been suspected by the scientific community. Aerial surveys that followed revealed that many waterbirds utilised the area and the status of the Paroo River as an important habitat for waterbirds was clear (Maher 1991; Maher & Braithwaite 1992; Kingsford et al. 1994).

Important research has also been conducted into the Aboriginal cultural values of the Paroo River (for example Goodall 1999). This research is particularly important to concepts of landscape management as it documents changing Aboriginal understandings of, and relationships to, the Paroo River. Goodall and others' research has indicated that there is a wealth of environmental knowledge held by Aboriginal people, and rural works and

property owners which should be better integrated into environmental decision making.

The following research will be encouraged on Nocolèche Nature Reserve:

- Map and describe existing vegetation.
- River flows and their importance for wetland flooding.
- Wetlands and waterbirds.
- Establish the flooding requirements for aquatic vegetation, particularly lignum, blackbox, canegrass and aquatic plant communities.
- The ecology of frog species dependent upon flooding.
- Invertebrate ecology, particularly in temporary wetlands.
- Establish the structure of native vegetation communities that existed before grazing by domestic stock, particularly for grasslands and woodlands.
- The impact of professional fishing on yabby numbers and dependent species.
- Research into contemporary landscape and cultural values of the reserve by Aboriginal people, pastoralists and cotton growers.
- Other relevant research areas that will assist with the sustainable management of the Nature Reserve and management of the Paroo River.

## **Policies**

- Service conducted research will aim to provide information on the natural and cultural heritage, and on human use to facilitate management of the nature reserve.
- All research will be subject to Service policy and procedures for the granting of permits, conduct of research and the production of results.
- Preference will be given to research applications which:
  - contribute to long-term sustainability of flora and fauna populations on the reserve and improve management;
  - investigate processes which might threaten populations of native animals on the reserve; and
  - do not conflict with the objectives of management for the nature reserve as outlined in this plan of management.

## **4.6 Management Operations**

Access to the nature reserve is via Main Road 429 between Wanaaring and Wilcannia. Main Road 429 is excluded from the nature reserve. In addition to Main Road 429, there are a number of management tracks which provide access within the nature reserve:

- for fire control along the boundary of the nature reserve;
- for management purposes such as pig control;

- for scientists, educational organisations, special interest groups and other visitors;
- to installations constructed and operated by other authorities; and
- to bee hive sites.

A short public road provides access to King Charlie Waterhole. A road known locally as the "Mail Road" provides access to the staff residence and the shearers quarters.

There are no sealed or all weather roads in the nature reserve and roads and tracks are only passable in dry weather. Nearly all of the reserve is inaccessible during floods or heavy localised rains. Priority will be given to maintaining access to the residence and the shearers' quarters complex.

There are a number of old unused tracks within the nature reserve which were part of the operation of the grazing property as well as more recent tracks where detours have been made off existing roads and tracks to beehive sites and pig trap sites. The management track system will be formalised and all tracks not required for management or other authorised purposes will be closed.

Nocoleche Nature Reserve is a remote conservation area and has an on-site Service presence for its protection, management and for the provision of scientific research opportunities. It also has a dry weather airstrip.

The shearers quarters complex is being maintained for use by Service staff, scientists and other authorised visitors and comprises a bunkhouse, kitchen/messroom, overseer's hut, two storage sheds, an ablutions block and a meathouse.

The aim is to move towards a more natural environment on the nature reserve. It may therefore be appropriate to decommission some of the tanks and cap the bores currently in the nature reserve. There are four bores and associated dams and seven tanks on Nocoleche Nature Reserve. Cuttaburra Bore is slowly leaking and will be capped. Number six and seven bores are owned by the Service, but used by neighbours for stock watering. This arrangement will be formalised by the issue of a licence under the National Parks and Wildlife Act

In the past bores located near the reserve boundaries have been used by neighbours to augment their own watering points. Associated with some of the bores are tanks and windmills in a serviceable condition. One bore (number 7) has been fenced off by a neighbour to improve their access. This arrangement is without any formal written agreement or license. Additionally service access to the bore is impeded and feral animals, pigs in particular, are a recurring problem at this site. Investigations into the feasibility of pumping water from the bores into the users' properties at their cost will be conducted. This will help to reduce the numbers of feral animals on the reserve.

The Great Artesian Basin Consultative Council has produced a Great Artesian Basin Strategic Management Plan. This plan addresses key management issues including reversing the fall of artesian pressures in parts of the basin, reducing water wastage, and improving the security of access to water. The Service's approach to water management on the reserve will be consistent with the Great Artesian Basin Consultative Council's objectives where appropriate.

Two travelling stock routes, which are rarely used for stock, run through the nature reserve adjacent to the main road No 429 and have not been used for many years. These are not dedicated as part of the nature reserve and the provisions of the National Parks and Wildlife Act and its Regulations, therefore, do not apply to that land.

It is proposed to seek the cooperation of the relevant authorities to revoke those parts of the travelling stock routes within the external boundaries of the nature reserve and add them to the nature reserve. If the stock routes are added to the nature reserve they will be closed and allowed to regenerate naturally. In exchange the continued bona fide movement of stock across the nature reserve along stock movement corridors in more appropriate locations will be provided.

Powerlines in the reserve are managed by Namoi Valley Electricity. The location of the powerlines will be formalised by issue of an easement under the National Parks and Wildlife Act and Namoi Valley Electricity will be required to comply with the Agreement between the Service and the Electricity Association of NSW which outlines the guidelines to be followed for the maintenance of powerlines in areas administered by the National Parks and Wildlife Service.

There are two gravel pits located within the external boundaries of the nature reserve. One of the gravel pits is contained within TSR 12873 on the western side of the main road. The other is contained partially within TSR 74723 on the eastern side of the Mail Road.

## **Policies**

- A residence for Service staff will be provided on Nocolche Nature Reserve.
- The shearers quarters complex will continue to provide short term accommodation for Service staff, scientists and other interest groups.
- The Mail Road will be the primary access road. No other roads or tracks will be used except for management, maintenance or scientific research purposes.
- The existing airstrip will be maintained for Service and other authorised users.

- Management tracks shown on the map (centre pages) will be maintained. Other tracks will be closed when there is no further need for them.
- The addition of the travelling stock routes and public watering places to the reserve will be sought.
- Bona fide travelling stock movements through the nature reserve will be subject to the conditions and provisions of the National Parks and Wildlife Act and will also be in accordance with the requirements of the Rural Lands Protection Act and Regulations.
- Policies for management of bores and waters in Nocolleche will be consistent with objectives developed by the Great Artesian Basin Advisory Committee where appropriate.
- It is a long term aim of the Service to reduce, and if possible eliminate, the number of non-nature reserve power lines and other utilities (including tracks used for their maintenance) held under lease or license within the nature reserve. To this end such occupancies will be kept under regular review and where warranted the facility, including associated tracks, will be relocated and or closed and the site rehabilitated.
- Proposals for the occupation of areas within the nature reserve for purposes inconsistent with the National Parks and Wildlife Act or this plan of management will be opposed by the Service.
- No unauthorised use of bores or other water facilities on the reserve will be permitted. All use by neighbouring properties will be reviewed with the aim of minimising impacts on the reserve. Where appropriate, a licence may be issued for this use.

### **Actions**

- Management tracks outlined on the map (centre pages) will be maintained to Service design standards.
- All management tracks will be signposted and/or gated to discourage unauthorised use.
- The management track system in the nature reserve will be mapped and the need for all tracks reviewed.
- A booking process will be developed and implemented for use of the shearers quarters.

- The use of number 6 and 7 bores by neighbours, and options for pumping water, will be reviewed. Licences will be issued to neighbours utilising the bores if appropriate following the review.
- Cuttaburra bore will be capped and groundwater management will be consistent with the objectives of the Great Artesian Basin Advisory Committee.



## 5. PLAN IMPLEMENTATION

Plans of management are part of the system of planning employed by the Service to direct the management of national parks and nature reserves throughout the State. This plan is part of a hierarchy of planning instruments employed for the management of Nocolèche Nature Reserve. As a statutory document, the plan has a special significance not possessed by some other instruments in the hierarchy.

In accordance with Section 81 (4) of the National Parks and Wildlife Act, 1974, and notwithstanding anything in that Act or any other Act or in any instrument made under that or any other Act, no operations can be undertaken within Nocolèche Nature Reserve except in accordance with this plan.

No term is proposed for this plan of management. If, after adequate investigation, operations not included in this plan are found to be justified, either for the purpose of conserving the nature reserve's resources or for their use, this plan will be amended in accordance with Section 75 of the Act.

Other lands may be added to the nature reserve during the currency of this plan. Such lands will be managed to be consistent with this plan. If other lands acquired are proposed to be managed for a purpose inconsistent with this plan, such proposals will be placed on public exhibition as an amendment to the plan.

As a guide to the implementation of this plan, relative priorities for identified activities are summarised on the following pages. The following criteria have been used to allocate priorities:

**High Priority:** programs that need to be done in the immediate to near future on the basis that to not undertake these works will result in unacceptable degradation of the resource and/or greatly increased costs associated with rehabilitation at a later date. Also included as high priority are programs which are given a high priority for legal or public safety reasons.

**Medium Priority:** programs which are important but can be deferred without unacceptable loss of natural and/or cultural heritage values.

**Low Priority:** programs which will be undertaken only after high and moderate priority programs have been completed or which can be undertaken by other means such as volunteers, grant, concession operation, sponsorship or similar.

## **SCHEDULE FOR IMPLEMENTATION OF ACTIONS SPECIFIED IN PLAN.**

<b>Activity</b>	<b>Plan ref.</b>
<b>High Priority</b>	
◆ Liaise with other authorities regarding improved management of river flows and protection of flows from extraction	4.1
◆ Identify where pipes are required to re-establish natural regime of flooding and drying of wetlands	4.1
◆ Assess need for artificial water sources	4.1
◆ Continue introduced plant and animal control programs	4.2
◆ Develop co-operative pest control programs with neighbours	4.2
◆ Survey the river road and related management access for Aboriginal sites	4.3
◆ Prepare conservation plan and maintenance schedule for shearers quarters and associated buildings	4.3
◆ Restrict vehicle access to King Charlie Waterhole	4.4
◆ Review and if appropriate issue licenses for bores to neighbours	4.6
<b>Medium Priority</b>	
◆ Prepare Fire Management Plan	4.1
◆ Monitor decommissioning of ground tanks	4.1
◆ Monitor noogoora burr at Momba swamp	4.2
◆ Obtain information on herbicides to eradicate noogoora burr	4.2
◆ Monitor bee hive sites	4.2
◆ Monitor roads and tracks accessing bee hive sites	4.2
◆ Assess significance and threats to Aboriginal sites	4.3
◆ Institute booking system for accommodation at quarters	4.6
◆ Signpost and gate selected management tracks to stop unauthorised use	4.6

<b>Activity (continued)</b>	<b>Plan ref.</b>
<b>Low Priority</b>	
◆ Encourage flora and fauna surveys of the nature reserve	4.1
◆ Review boundary fences and replace where necessary	4.2
◆ Commission Aboriginal community to prepare statement on contemporary use	4.3
◆ Review and map the management track system	4.6
◆ Maintain management tracks to Service design standards	4.6
◆ Cap Cuttaburra Bore	4.6

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