



Lane Cove National Park



Plan of Management

NSW
NATIONAL
PARKS AND
WILDLIFE
SERVICE

LANE COVE NATIONAL PARK
PLAN OF MANAGEMENT

NSW National Parks and Wildlife Service

August, 1998

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FOREWORD

Lane Cove National Park is an important nature conservation area and recreational resource for the people of Sydney. In addition to its picnic areas and walking tracks which receive approximately one million visits a year it provides a natural break within a highly urbanised area, protects a variety of vegetation communities, and provides habitats which are important for the conservation of locally threatened populations of native animals.

Lane Cove National Park contains evidence of Aboriginal occupation, and of the timber getting and orcharding by Europeans which occurred along the Lane Cove River during the nineteenth century. It also contains evidence of past recreational use of the river and its banks, including recreational facilities built using Depression labour.

This plan of management places increased emphasis on the protection and management of Lane Cove National Park consistent with its status as a national park rather than its previous status as a state recreation area.

The plan provides for the protection of the natural heritage of the park through an increased emphasis on weed control, bush regeneration and control of feral animals. It also proposes the promotion of visitor and community understanding and appreciation of the natural and cultural values of the park through a larger visitor centre within the Jenkins Hall, re-orientation of the Kukundi Wildlife Shelter, upgraded walking tracks, community days and guided and self-guided walks.

The plan also recognises that there is a need to work with local councils, other authorities and neighbours to achieve better protection of the catchment of the Lane Cove River from weeds, pollution and soil erosion.

This plan of management establishes the scheme of operations for Lane Cove National Park. In accordance with the provisions of Section 75 of the *National Parks and Wildlife Act 1974*, this plan of management is hereby adopted.

Pam Allan, MP

**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 national park. A plan of management is a legal document that outlines how the area will be managed in the years ahead.

The procedures for the preparation of a plan of management are specified in the Act and involve five stages:

- The Director-General gives notice that a plan of management has been prepared.
- The plan is placed on public exhibition for at least one month and any person may comment on it.
- The plan and copies of all representations are referred to the National Parks and Wildlife Advisory Council for consideration.
- The Director-General submits the plan, together with the recommendations of the Advisory Council, to the Minister.
- The Minister may adopt the plan after considering the recommendations of the Advisory Council or may refer the plan back to the Director-General and Council for further consideration.

Lane Cove National Park was previously subject to a plan of management adopted in 1983 for the Lane Cove River State Recreation Area. A new plan of management for Lane Cove National Park was placed on public exhibition from 25th July to 27th October 1997. The exhibition of the new plan attracted 38 submissions which raised a total of 18 issues. All comments received were referred to the National Parks and Wildlife Advisory Council for its consideration and advice. The comments and suggestions of the Advisory Council were in turn considered by the Minister before adopting this plan of management for Lane Cove National Park. When this new plan of management was adopted, the Minister cancelled the 1983 plan.

The planning process leading to the development of this plan has involved the collection and use of a large amount of information which, for reasons of document size, has not been included in the plan. For additional information or enquiries on any aspect of the plan or the management of Lane Cove National Park, please contact the park office in Lane Cove National Park or by phone on (02) 9412 1811.

2. MANAGEMENT CONTEXT

2.1 NATIONAL PARKS IN NEW SOUTH WALES

The national park concept was introduced into Australia with the establishment of the Royal National Park in 1879. National parks in New South Wales were originally managed by trusts. The *National Parks and Wildlife Act 1967* transferred the management of national parks to the National Parks and Wildlife Service.

For the purposes of preparing plans of management, the NSW National Parks and Wildlife Service has adopted the International Union for the Conservation of Nature and Natural Resources (IUCN) Guidelines for Protected Area Management Categories which defines a national park as:

"a natural area of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area, and (c) provide a foundation for spiritual, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible" (IUCN, 1994).

National parks are reserved under the *National Parks and Wildlife Act 1974* and are one part of a system of reserves managed by the NSW National Parks and Wildlife Service. Other types of reserves managed by the Service include nature reserves, Aboriginal areas, historic sites and state recreation areas.

National parks are part of the regional pattern of land use. The management of a national park aims at minimising disturbance to the natural and cultural environment. Other land uses such as agriculture, forestry and mining are distinguished by an expectance or encouragement of environmental modification. National parks therefore provide for only a limited part of the range of land uses in a region.

2.2 LANE COVE NATIONAL PARK

2.2.1 Location and Regional Context

Lane Cove National Park is part of the North Metropolitan District of the National Parks and Wildlife Service's Metropolitan Region. It is situated in the inner north-west of Sydney, approximately 11 kilometres from the Sydney Central Business District, and adjoins areas managed by Ku-ring-gai, Lane Cove, Ryde, Willoughby and Hornsby Councils.

Lane Cove National Park currently covers approximately 372 hectares of land adjoining the Lane Cove River. The largest area of the park is located between Fullers Bridge in the south and Browns Waterhole in the north. Smaller sections of the park are located at Fox Valley in Wahroonga, and along the western side of the river below Fullers Bridge. The park includes the bed of the Lane Cove River from the weir to De Burghs Bridge. It also includes the recent addition of approximately 20 hectares of land to the south of the existing park, around and including Sugarloaf Point down to the mean low water mark (see map, centre pages).

A number of other additions to Lane Cove National Park are currently being investigated, including lands previously identified for expressways and no longer required for this purpose. Although these areas are not specifically mentioned in this plan, if added to Lane Cove National Park these lands will be managed in accordance with the objectives and policies identified in this plan of management. No developments will be undertaken in these areas, except for essential stabilisation, weed control, bush regeneration and fire protection works, without an amendment to this plan of management being exhibited for public comment.

Lane Cove National Park was first opened to the public in 1938. From 1967 until 1976 it was known as Lane Cove River Park, following which it became Lane Cove River State Recreation Area. In 1992 the park regained the title of national park.

2.2.2 Importance of Lane Cove National Park

Lane Cove National Park protects an important area of remnant bushland within metropolitan Sydney. The park is located amid a highly urbanised area and represents an important nature conservation area and recreation resource for the people of Sydney. In addition, its links to other reserves and areas of urban bushland make it a very important part of a wider nature conservation corridor. The park also contains sites of Aboriginal and historic heritage value which reflect the long history of human occupation of the Lane Cove valley.

Lane Cove National Park is one of a large group of sandstone national parks and reserves to the north and north-west of Sydney, which also includes Ku-ring-gai Chase, Garigal, Marramarra, Cattai, Brisbane Water, Bouddi, Blue Mountains, Yengo and Dharug National Parks and Muogamarra Nature Reserve. Lane Cove National Park protects the natural and scenic qualities of a major section of the Lane Cove valley, and together with the Council-managed Pennant Hills Park and Berowra Valley Bushland Park as well as many small reserves, forms an almost continuous link between Sydney Harbour and the Hawkesbury River. This greatly enhances the viability of the natural systems of each area.

The major values of Lane Cove National Park are briefly described below and on the following pages.

Landscape

Lane Cove National Park is situated along the banks of the Lane Cove River. The river rises in the Pennant Hills area and flows into Sydney Harbour. It was originally tidal to De Burghs Bridge, however the weir now marks the tidal limit.

The park is a predominantly natural break between the urban landscapes on both sides of the valley. The steep forested slopes provide an attractive backdrop to the river and are a significant asset to Sydney. The feeling of being in the bush is enhanced because, from the river, most of the ridge lines appear to be naturally vegetated, although not all are within the park.

The river foreshores between Fullers Bridge and De Burghs Bridge have been developed for picnicking and the grassed areas provide a contrast to the bushland ridges and slopes. These grassed sites make up less than 10% of the total area of the park, the remainder being substantially native bushland.

The range of landscapes in Lane Cove National Park differs from those in many other national parks within Sydney in that the higher clay content soils and higher rainfall support types of tall forest that, due to land clearance and urbanisation, are now rare in the metropolitan area.

Vegetation

Lane Cove National Park protects and preserves a variety of vegetation communities, ranging from closed forests containing lilly pilly (*Acmena smithii*) and blueberry ash (*Elaeocarpus reticulatus*) and tall forests of blackbutt/Sydney blue gum (*Eucalyptus pilularis/Eucalyptus saligna*), to open woodland and heath on upper slopes and mangroves along the river, particularly around Sugarloaf Point.

Several of the plant communities found in Lane Cove National Park are remnants of formerly widespread vegetation types and have local and regional conservation significance. In particular the remnant stands of mature blackbutt and Sydney blue gum have a restricted distribution in Sydney today due to extensive logging in the early days of the colony.

Three plant species found within the park are listed as vulnerable under the *Threatened Species Conservation Act 1995*: *Darwinia biflora*, *Tetratheca glandulosa* and *Prostanthera marifolia*.

Native Animals

The park provides a variety of habitats and is important for the conservation of locally threatened populations of a range of native fauna species.

A number of native animal species are found in the park despite its urban location. These include brushtail and ringtail possums, sugar gliders, echidnas, the grey-headed flying fox and five species of microbat. Both the long-nosed bandicoot (*Perameles nasuta*) and the brown antechinus (*Antechinus stuartii*) have been historically recorded within the park but have not been sighted for some years.

Over 50 species of birds have been recorded within the park, including the threatened powerful owl (*Ninox strenua*) and masked owl (*Tyto novaehollandiae*), and seven species of native freshwater fish have been recorded in the Lane Cove River above the weir.

Two populations of the threatened red-crowned toadlet (*Pseudophryne australis*) have been recorded in the park as well as nine other frog species and over 30 reptile species.

Aboriginal Significance

Lane Cove National Park contains evidence of Aboriginal occupation, with approximately 40 sites being recorded in the park. These include the largest relatively-undisturbed shelter occupation site known in northern Sydney and two engraving sites with unique motifs, one of which has been assessed by archaeologists as being of State significance.

The Aboriginal sites within the park are significant evidence of some aspects of life of the original occupants of the Lane Cove valley, of which little was recorded by Europeans at contact. The high levels of disturbance to areas outside the park boundaries increases the importance of the remaining sites protected within the park.

Historical Significance

The park contains a number of places and features of historic importance. Remaining buildings include Bakers Kitchen, which is the oldest known historic building in the Ku-ring-gai area, Jenkins Kitchen and Schwartz Cottage. All are associated with early orcharding along the Lane Cove River which was at that time the main transport artery in the area.

A convict sawmill at Fiddens Wharf was the earliest European settlement on the river. The vegetation in the vicinity of Fiddens Wharf is a relic of an early (1820s) reserve which protected the timber, while the Fairyland area is a reminder of early recreational use of the river and its banks.

The weir, Porters Creek Bridge and many other sandstone structures within the park represent work undertaken by employment scheme labour during the Great Depression in the 1930s to create what the government of the day saw as an appropriate park setting.

Recreation

Lane Cove National Park plays a significant recreational role because of its highly urban location. In particular it provides easily accessible outdoor recreation opportunities for residents of the northern suburbs of Sydney. Approximately one million visits a year are made to the park.

Lane Cove National Park is a popular location for picnics and barbecues. It is also popular for walking, jogging, cycling, canoeing and scenic drives. The park provides both short and long bushwalking opportunities, including a section of the Great North Walk which links the park to adjacent natural areas. Lane Cove National Park allows a sense of escape from the city and complements the opportunities provided by nearby Ku-ring-gai Chase, Garigal and Sydney Harbour National Parks.

Tourism

The park is easily accessible by public transport from Sydney and attracts a large number of interstate and overseas visitors as well as visitors from within New South Wales.

It contains many sites of interest, including a large variety of plant communities, a number of historic places and Aboriginal sites. Walking tracks enable visitors to easily explore most parts of the park.

A caravan park and camping area are located in the park and provide opportunities for tourists to stay within the park.

Education and Community Involvement

The many features of the park make it valuable for educational purposes, in particular for the many schools and two universities within walking distance of the park. It also provides opportunities for the people of Sydney to informally learn about the natural environment and cultural history of Sydney.

Kukundi Wildlife Shelter is a wildlife rehabilitation centre for native animals prior to release. It also provides educational activities and material focusing on the plants and animals of the valley. The National Parks and Wildlife Service is assisted in the management of Kukundi by community organisations involved in wildlife care and education. The flying-foxes in the shelter are managed in co-operation with the Ku-ring-gai Bat Conservation Society Inc.

Lane Cove National Park has a long history of community association and involvement dating from the beginning of this century, and a high level of community involvement is still a feature of the park. Following a major bushfire in January 1994, over 100 people volunteered to work on the bush regeneration programs within the park and these numbers had grown to over two hundred by the end of 1996.

2.2.3 Statement of Significance

Lane Cove National Park is one of a number of reserves in the Sydney area protecting samples of the natural and cultural environment.

Lane Cove National Park is important because it:

- protects important communities of urban bushland within the Sydney metropolitan area and forms part of a larger bushland corridor;
- protects rare and threatened native plants and animals, and provides habitat for a variety of native animal species;
- contains one of the largest undisturbed Aboriginal shelters in the region and unusual engraving sites;
- contains a number of historic structures and locations connected with early use and settlement along the Lane Cove River, as well as with early recreational use of the river;
- provides opportunities for a variety of recreational activities in a natural bushland setting within the Sydney urban area;
- is an important recreational resource which attracts around one million visitors a year to its picnic areas;
- is a focus of community involvement in nature conservation activities; and
- has the potential to provide a valuable environmental educational resource within the Sydney region.

3. OBJECTIVES OF MANAGEMENT

3.1 GENERAL OBJECTIVES FOR NATIONAL PARKS

The following general objectives relate to the management of national parks in New South Wales:

- the protection and preservation of scenic and natural features;
- the conservation of wildlife;
- the maintenance of natural processes as far as it is possible;
- the preservation of Aboriginal sites and historic features;
- the provision of appropriate recreational opportunities; and
- the encouragement of scientific and educational enquiry into environmental features and processes, prehistoric and historic features.

3.2 SPECIFIC OBJECTIVES FOR LANE COVE NATIONAL PARK

In addition to the general objectives of management, the following specific objectives apply to the management of Lane Cove National Park. These are:

- to promote visitor and community appreciation of the natural and cultural values of the park, in addition to its values as a recreation area;
- to conserve and restore the natural bush and wildlife values of the park;
- to encourage co-operative arrangements to control water pollution, soil erosion, visual intrusions and weeds which are degrading the catchment of the Lane Cove River and the park environment;
- to provide increased opportunities for visitors to learn about the natural and cultural heritage of the park and the importance of remnant bushland in conserving native plant and animal communities within urban areas; and
- to provide recreation opportunities in a bush setting which are compatible with the protection of the natural and cultural values of the park, complement those available in other reserves within the local area, and encourage appreciation and enjoyment of the park.

3.3 OVERALL STRATEGY

While Lane Cove National Park plays an important recreational role within Sydney, it is recognised that many people see the park as only a picnic area and do not understand that it also has significant conservation values. It is also recognised that the conservation, landscape and recreation values of Lane Cove National Park are affected by the actions of other land use authorities and neighbours. The overall strategy for management of Lane Cove National Park is to:

- improve visitor and community awareness and understanding of the park's natural and cultural values by increasing the educational facilities and information available within the park and to neighbours;
- increase the involvement of local councils, other government agencies, the local community and local interest groups in park management and the management of adjacent bushland areas; and
- conserve as much as possible of the remaining natural areas within the Lane Cove River catchment.

4. FRAMEWORK AND POLICIES FOR MANAGEMENT

This section contains the policies, actions and framework for management of Lane Cove National Park together with relevant background information. Policies and actions are summarised under the following headings:

- NATURAL HERITAGE
- CULTURAL HERITAGE
- USE OF THE AREA

The policies and actions established in this plan of management provide the framework for management of Lane Cove National Park and are consistent with the significance of the park, anticipated resources available to the Service and anticipated community trends for the next five to ten years.

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

Where not specifically provided for in this plan, management of Lane Cove National Park will be in accordance with the National Parks and Wildlife Act and with general Service policies.

4.1 NATURAL HERITAGE

Nature conservation relates to all aspects of the natural environment including physical features such as geology and soils, plants and animals and the interactions between these features. Landscape values, bush regeneration and fire management are also included in this section as these issues relate primarily to natural features.

4.1.1 Geology and Soils

The Lane Cove River has cut down through a shale capping and the underlying Hawkesbury sandstone to form a narrow, steep-sided valley. The major geological elements of the Lane Cove valley are Hawkesbury Sandstone and the Wianamatta group of sedimentary rocks, predominantly Ashfield Shale.

Hawkesbury Sandstone is a coarse grained sedimentary rock consisting mainly of quartz particles, with smaller quantities of claystone grains. Hawkesbury Sandstone weathers to form thin, sandy soils with low water retaining qualities. This soil type is common throughout the park along the ridge lines and midslopes of the valley. These nutrient-poor soils are highly erodible and hence are extremely susceptible to disturbance. Sheet erosion increases substantially wherever the vegetation is disturbed, and can be particularly severe following bushfires, while minor to severe gullyng frequently occurs on unpaved roads and tracks.

The Wianamatta group consists of shales, conglomerates and sandstones which originally overlaid the Hawkesbury Sandstone. In the Lane Cove valley these rocks have been deeply eroded over time, leaving exposed the lower strata almost exclusively derived of Hawkesbury Sandstone. Soils formed from the exposed shales along ridge tops are rich in clay and have relatively high nutrient content and water retaining qualities. They are mainly found in the Macquarie Park, North Ryde and Fox Valley areas of the park. These high nutrient soils often support plant species and communities that are less common on lower nutrient soils and hence uncommon within the park as a whole.

A small area of the park near the caravan park has a soil derived from a mix of both parent materials. This transitional zone from Wianamatta Shales to Hawkesbury Sandstone is called the Hammondville Association, Lucas Heights soil landscape.

An outcrop of prismatic sandstone with a tessellated surface occurs just north of De Burghs Bridge. The columnar jointing of the sandstone is the result of heating by a (probable) nearby igneous intrusion and then cooling, shrinkage and polygonal cracking.

As well as these naturally occurring soil associations, there have been large quantities of imported fill and soil dredged from the river used in the lower sections of the park for the construction of riverside picnic areas and roads.

Policies and Actions

- * Erosion is recognised as a naturally occurring process in Lane Cove National Park. Where erosion has been accelerated by human activity or is threatening significant habitats or other values, appropriate control measures will be undertaken.
- * Erosion control and stabilisation work will be undertaken as a priority along the Great North Walk and Riverside Walk.
- * Informal tracks formed by people making their own routes near the picnic areas will either be formalised and stabilised, or closed and revegetated.
- * All earthworks undertaken on the park will utilise geologically similar soils and will be designed and undertaken in a manner which minimises soil erosion and incorporates soil conservation principles.

4.1.2 Catchment Values and Water Quality

The Lane Cove River originates on the southern edge of the Hornsby Plateau which varies from approximately 130 to 160 metres above sea level. From the plateau the river winds through sometimes steep sandstone country, eventually widening to join Sydney Harbour at Hunters Hill.

The Lane Cove River catchment covers approximately 80 square kilometres. It consists of urban and industrial development surrounding approximately 1,000 hectares of bushland, 372 hectares of which is within the national park. The catchment is bounded on the eastern side by the Pacific Highway with its upper reaches extending up to the Pennant Hills area. The western boundary extends to the upper reaches of Terrys and Devlins Creek in North Ryde and Epping respectively. Within the Lane Cove River catchment there are 17 creeks which directly feed into the river within or upriver of the park. These are:

- Avondale Creek
- Blackbutt Creek
- Blue Gum Creek
- Buffalo Creek
- Carter Creek
- College Creek
- Coups Creek
- De Burghs Creek
- Devlins Creek
- Kittys Creek
- Little Blue Gum Creek
- Pages Creek
- Porters Creek
- Quarry Creek
- Shrimptons Creek
- Terrys Creek
- Twin Creek

The high levels of urban and industrial development along both sides of the valley mean that the river and its tributaries have undergone substantial degradation from their natural state. High levels of stormwater runoff from suburban properties, gardens and roads and from the inadequate sewerage systems along many of the creeks, drainage lines and the Lane Cove River have resulted in extremely high faecal coliform counts, algal growth, reduced oxygen levels, high nutrient loads and high levels of gross pollutants. These problems are worse during times of heavy rain but, even during times of moderate rainfall, large volumes of stormwater carry high loads of pollutants into the river.

The effects of the pollution are compounded by the many introduced water plants and introduced fish species now found in the river. These introduced plants contribute to a reduction in the circulation of water during low flow periods and may increase the growth of algae by increasing dissolved oxygen levels in the river. This is

thought to in turn affect the native fish species found in the river by favouring introduced species which prefer slower flowing and warmer water bodies.

The building of the weir near Fullers Bridge during the early 1930s changed the Lane Cove River between the weir and De Burghs Bridge from a saltwater tidal system to fresh water. This in turn increased sediment build up above the weir and increased the levels of salt intolerant weed species along the river banks. At the same time the weir acted as an energy dissipater and sediment trap that has to some extent protected lower sections of the valley from the damaging effects of flooding and the build up of sediment. The removal of the weir was considered as part of the planning process, but it was decided that its removal would create as many problems as it would solve. The weir is an old structure and may need to be redeveloped in future. Any such redevelopment will take into account the impacts of the weir on flooding as well as other environmental, heritage, social and economic considerations.

The Catchment Management Act came into force in 1989. Total catchment management provides an umbrella framework for cleaner water, less soil erosion, improved vegetation cover, the maintenance of ecological processes and a balanced and healthier environment. It also provides focus to balance conservation needs and development pressures, and encourages a more aware and involved community. An important means of achieving these aims is the formation and support of catchment management committees at a local level.

The Service is a member of the Lane Cove River Catchment Management Committee and strongly supports the work of the committee, including moves by a number of local councils within the catchment to install conditions on development applications that will alleviate stormwater, sediment and weed invasion arising from urban and industrial developments along park boundaries and in the valley's upper catchment. The Service also supports efforts by some councils to reduce sedimentation, nutrient levels and gross pollutants in the river by controlling run-off from existing gardens, golf courses, ovals, roads, rubbish tips and other developments.

In addition, the Service has supported Macquarie University geomorphology students who have undertaken stormwater and sedimentation alleviation measures in four drainage lines running into the park. This has included the hardening of drainage channels and installation of low cost sediment ponds, energy dissipaters and gross pollutant traps. Continued evaluation and extension of these projects is considered essential if longer term solutions to the valley's stormwater and weed problems is to occur.

Policies and Actions

- * The Service will oppose developments near the park which will have visual or other impacts on the national park and encourage local councils to put in place planning controls to protect the visual amenity of the valley.
- * The Service will continue to support and be involved with the Lane Cove Catchment Management Committee, local councils and other authorities to facilitate the development and implementation of total catchment management strategies for the Lane Cove valley and improve the water quality of the Lane Cove River.
- * The Service will meet regularly with local councils and other land management authorities to identify areas of joint concern and to facilitate the implementation of consistent management strategies throughout the Lane Cove valley. Co-operation will be sought to control run-off from gardens, golf courses, ovals, roads, rubbish tips and other developments and to reduce sedimentation, nutrient levels and gross pollutants within the catchment.
- * Sydney Water will be requested to upgrade the sewerage systems in the catchment to reduce the incidence of sewerage overflowing into the river.
- * Interpretive signs will be erected near the weir explaining the need for total catchment management of the Lane Cove River.
- * The continued involvement of university students, school students and volunteers in storm water and drainage amelioration and monitoring projects in the Lane Cove valley will be encouraged.

- * If the weir is severely damaged or destroyed, the environmental, heritage, social and economic cost/benefit of replacing it with a new weir will be assessed.

4.1.3 Native and Introduced Plants

The park includes a variety of vegetation communities, habitats and microclimates which exhibit high levels of both flora and fauna diversity for both native and exotic species. Currently 550 native plant species and 270 exotics have been recorded within the park.

Native Plants

Identified vegetation communities found in the park include:

- Small stands of Sydney blue gum forest (*Eucalyptus saligna*) along Blue Gum Creek and in isolated patches along the banks of the Lane Cove River;
- Blackbutt (*Eucalyptus pilularis*), blue gum and turpentine (*Syncarpia glomulifera*) associations on the lower slopes and alluvial flats throughout the park;
- Turpentine and red mahogany (*Eucalyptus resinifera*) forest, generally in the northern sections of the park;
- Woodlands, shrublands and heaths which include scribbly gums (*E. haemastoma* and *E. racemosa*), dwarf apple (*Angophora hispida*) and Banksia (*Banksia serrata*) along the upper slopes and ridge lines;
- Open forests of Sydney red gum/smooth barked apple (*Angophora costata*), Sydney peppermint (*E. piperita*) and red bloodwood (*Corymbia gummifera*) on drier slopes, with the bloodwood giving way to other species on wetter slopes;
- Closed forest communities of black wattle (*Callicoma serratifolia*), blueberry ash (*Elaeocarpus reticulatus*), sweet pittosporum (*Pittosporum undulatum*), water gum (*Tristaniopsis laurina*), lilly pilly (*Acmena smithii*) and coachwood (*Ceratopetalum apetalum*) in moist gullies, creek lines and on south-westerly slopes;
- Casuarina woodlands along creeks and river banks (*Casuarina glauca*), with isolated stands of *Allocasuarina littoralis* away from creek lines; and
- Riparian vegetation communities including mangroves (*Avicennia marina* and *Aegiceras corniculatum*), saltmarshes and rushlands along the river banks below the weir.

The blue gum, blackbutt and turpentine communities found in the park are now relatively uncommon in the Sydney region and are of high conservation value.

The protection of the riparian vegetation, including casuarina woodlands, mangrove communities, saltmarsh and rushlands found along water courses below the weir, are also of high conservation importance to maintain river bank stability and associated catchment values. The recent addition of lands down to low water mark in the vicinity of Sugarloaf Point has significantly increased the amount of this vegetation type within the park.

Three plant species listed as vulnerable under the *Threatened Species Conservation Act 1995* have been identified in Lane Cove National Park. These are:

- *Darwinia biflora* - associated with scrub or sedgeland, mainly on laterite and residual clay benches;
- *Prostanthera marifolia* - associated with open forests on protected slopes; and
- *Tetratheca glandulosa* - found mainly in heath areas or low woodlands.

The park also contains several plant species that are considered uncommon in the local area. These species, which are becoming increasingly uncommon due to increased urban and industrial land clearance, include:

- *Boronia serrulata* - found in heathland on moist sandy soils;
- *Epacris purpurascens* - found in damp forest, scrubs and swamps;
- *Hibbertia nitida* - found in heath, woodland or forest on on sandstone;
- *Melaleuca deanei* - found usually in marshy heaths on sandstone plateaus;
- *Prostanthera howelliae* - associated with sandy laterites;
- *Pultenaea scabra* var. *biloba* - mainly restricted to clay soils; and
- *Pultenaea viscosa* - associated with woodland communities on sandy soils.

The main changes in vegetation type in the Lane Cove National Park are due to urban development and its associated storm water problems; early logging, clearing for agriculture and development of recreation facilities; and the alteration of the natural or Aboriginal influenced fire regimes. Urban development has led to an increase in run off from developed areas which in turn has increased soil erosion, nutrient levels and changes in the pH of the soils close to boundary drainage lines and water courses. Logging, development of farms and some recreational developments resulted in clearing of the bush, while construction of the weir led to changes in the riparian vegetation. A reduction of the bushfire frequency and intensity in the valley is thought to have led to the increase occurrence of species such as sweet pittosporum and blueberry ash in certain areas. This change in fire frequency may have also led to a possible decrease in the occurrence of woodland plant species reliant on fire for seed dispersal or germination, although there is little quantitative evidence to validate this theory.

Introduced Plants

The disturbance of natural ecosystems has led to an increase in the spread of introduced plants in the park. These introduced species contribute to the ongoing degradation of the park's remnant vegetation communities and a possible loss in biodiversity. The major weed species adversely affecting native plant and animal communities within the park include:

- lantana (*Lantana camera*);
- broadleaf privet (*Ligustrum lucidum*);
- narrowleaf privet (*Ligustrum sinense*);
- morning glory (*Ipomea indica*);
- balloon vine (*Cardospermum grandiflorum*);
- camphor laurel (*Cinnamomum camphora*);
- mistflower (*Ageratina riparia*);
- crofton weed (*Ageratina adenophorum*);
- wandering jew (*Tradescantia fluminensis*); and
- blackberry (*Rubus fruticosus*).

Most high intensity weed infestations within the park are found along urban/park interface boundaries, drainage lines and along the banks of the Lane Cove River. Small populations of weeds such as bitou bush (*Chrysanthemoides monilifera*), pampas grass (*Cortaderia selloana*), rhus tree (*Toxicodendron succedaneum*), ludwigia (*Ludwigia peruviana*) and Montpellier broom (*Genista monspessulana*) are also present in the park. These species are usually found in isolated clumps which, once identified, make target weeding and other control measures relatively simple.

All the above species except mistflower and crofton weed are listed as noxious weeds under the *Noxious Weeds Act 1993* for council areas adjoining the park. The Noxious Weeds Act places an obligation upon public

authorities to control noxious weeds on land they occupy to the extent necessary to prevent such weeds spreading to adjoining lands.

In addition to plants which have entered the park from nearby gardens, a number of introduced plants found in the park were deliberately planted as part of gardens that pre-date the park or as ornamental plantings in picnic areas. These include camphor laurels, Canary Island palms (*Phoenix canariensis*), camelias (*Camelia japonica*), poplars (*Populus nigra 'Italica'*), liquidambers (*Liquidambar styraciflua*), jacarandas (*Jacaranda mimosifolia*), willows (*Salix babylonica*), coral trees (*Erythrina syksii*), radiata pines (*Pinus radiata*) and Chinese elm trees (*Ulmus parvifolia*). Although some introduced plants may be of historic significance (see section 4.2.2), many have spread from their original locations into bushland areas of the park.

The severity and scale of the January 1994 bushfires in the park and surrounding bushland contributed to a substantial increase in the levels of weed infestation found in the park. This was mainly due to the opening up of the understorey by fire, combined with the higher nutrient levels found along bushland boundaries and water courses from urban stormwater and run off. These conditions favoured introduced plant species which are adapted to high levels of disturbance and nutrient-high soils.

The potential threat to native plant diversity in the park posed by this weed problem led to a \$330,000 grant from the Foundation for National Parks and Wildlife to the Lane Cove National Park. This money was used for the formation and support of The Friends of Lane Cove National Park, a community-based bush regeneration program to control and reduce weed levels within the park. There are currently over 200 volunteers working in 26 groups in the Lane Cove National Park, and up to the end of 1997 these volunteers had spent over 10,000 hours working on weed control and bush regeneration in the park. The program will be reviewed to determine how it can best be continued and improved and potential funding sources identified.

Weed control undertaken by Service staff at present consist of clearing and herbicide spraying in the high use areas including picnic areas, gardens and around park buildings and entrances. Major work has recently been undertaken to remove weeds, stabilise and revegetate the area below the workshop. Target spraying and weeding has also been undertaken for specific weed species such as blue grass (*Paspalum quadrifarium*), pampas grass and blackberry. It is proposed that Service staff will concentrate in the immediate future on weed control in those areas near the picnic areas and on small isolated occurrences of weeds where eradication of weeds has a high likelihood of success. Following this, and in conjunction with volunteer groups, priority will be given to the upper sections of drainage lines within the park.

Policies and Actions

- * As far as possible the native vegetation of Lane Cove National Park will be managed to ensure conservation of all indigenous plant species and communities.
- * Populations of threatened or uncommon plant species and uncommon vegetation communities will be protected and managed to maximise their ecological viability and scientific values.
- * All activities undertaken in the park will be required to minimise disturbance to native vegetation and rehabilitate any damage resulting from the activity.
- * The development of voluntary conservation agreements for areas of bushland adjacent to the park will be encouraged.
- * Locations of threatened plant species will be added to District and Service data bases as they are found and any areas that require further plant surveys will be identified.
- * Small, selected areas of the park will be actively revegetated with seed collected from within the park. This will include some areas along River Avenue, areas of major weed infestation, areas to be closed to public use and the edges of Little Blue Gum Creek.
- * Introduced plants assessed as not being of historical significance will be removed and where practicable eliminated (see section 4.2.2 for plants assessed as being of historical significance).

- * A weed management plan for the park which identifies priorities and strategies for weed control, including by volunteer bush regeneration programs, will be prepared and implemented.
- * Priority will be given to the removal of introduced species which:
 - threaten the survival or integrity of threatened or locally uncommon plant communities;
 - are highly invasive of undisturbed native plant communities; and
 - have the potential to spread rapidly to undisturbed areas.
- * Pending preparation of the weed management plan, priority for weed control will be given to the following areas:
 - around the picnic areas between the weir and Fiddens Wharf;
 - the heads of drainage lines; and
 - small, isolated weed occurrences elsewhere in the park.
- * Weed control programs will take into consideration retention of native animal habitat and erosion control strategies.
- * All treated weed infestations and bush regeneration sites will be monitored and receive follow up treatment as necessary.
- * All activities undertaken within the park will, where necessary, include bush regeneration strategies to ameliorate the spread of weed species from or on to the activity site. This will include prescribed burning activities.
- * The Service will seek the co-operation of councils, land management authorities and neighbours to implement complementary weed control programs in adjacent bushland or in areas that are identified as sources for the spread of weed species into the park.
- * The Service will continue to encourage the Friends of Lane Cove National Park in undertaking volunteer Bushcare programs in the park and support volunteer groups with increased participation by Service staff working in conjunction with volunteers in priority weed management and bush regeneration projects.

4.1.4 Native and Introduced Animals

Urban and industrial development in the Lane Cove valley has had a severe impact on the number and diversity of native animals within the valley. Habitat loss, predation by feral and domestic animals, road kills and weed infestation have meant that many previously common species are now rarely seen within the valley. These problems aside, the Lane Cove National Park is still an important habitat for the remaining native animals found in the area. The park is also part of a larger wildlife corridor, linking bushland in central Sydney with the Hawkesbury/Nepean catchments. As such it may be important for the longer term survival of otherwise isolated fauna populations and communities.

Native Animals

Mammals

Native mammal species recorded in Lane Cove National Park over the last 10 years include:

- Echidna (*Tachyglossus aculeatus*);
- Grey-headed flying fox (*Pteropus poliocephalus*);
- Common brush-tailed possum (*Trichosurus vulpecula*);
- Ring-tailed possum (*Pseudocheirus peregrinus*);
- Sugar glider (*Petaurus breviceps*);
- Goulds wattle bat (*Chalinolobus gouldii*);

- Small forest bat (*Eptesicus vulturinus*);
- Lesser long-eared bat (*Nyctophilus geoffroyi*);
- Goulds long-eared bat (*Nyctophilus gouldii*);
- Swamp wallaby (*Wallabia bicolor*);
- Long-nosed bandicoot (*Perameles nasuta*); and
- Brown antechinus (*Antechinus stuartii*).

The latter two species have not been sighted in the park in recent years and may no longer be present. The effects of fire, particularly the major wildfires which burnt most of the park in 1994, and post fire predation by feral predators is thought to have significantly reduced the population levels of the small mammal species found in the park. The common bent-wing bat (*Miniopterus scheibersii*), yellow-bellied sheath-tailed bat (*Saccolaimus flaviventris*) and eastern little mastiff bat (*Mormopterus norfolkensis*), listed as vulnerable under the *Threatened Species Conservation Act 1995*, have been recorded in bushland areas adjacent to the park and hence may use the park for foraging.

Birds

Lane Cove National Park provides a refuge within the Sydney metropolitan area for many native birds. Native birds inhabiting the valley in relatively high numbers include understorey species such as superb fairy wrens (*Malurus cyaneus*), white-browed scrubwrens (*Sericornis frontalis*), noisy miners (*Manorina melanocephala*), willie wagtails (*Rhipidura leucophrys*), spotted pardalotes (*Pardalotus punctatus*) and eastern spinebills (*Acanthorhynchus tenuirostris*); canopy species such as laughing kookaburras (*Dacelo novaeguineae*), eastern rosellas (*Platycercus eximius*), crimson rosellas (*P. elegans*), rainbow lorikeets (*Trichoglossus haematodus*), galahs (*Cacatua roseicapilla*), pied currawongs (*Strepera graculina*), ravens (*Corvus coronoides*), magpies (*Gymnorhina tibicen*), sulphur-crested cockatoos (*Cacatua galerita*), long-billed corellas (*Cacatua tenuirostris*) and little corellas (*Cacatua pastinator*); and water birds including Pacific black ducks (*Anas superciliosa*), wood ducks (*Chenonetta jubata*), chestnut teal (*Anas castanea*), dusky moorhens (*Gallinula tenebrosa*), Eurasian coots (*Fulica atra*) and cormorants (*Phalacrocorax* spp.).

Other species recorded in the park include azure kingfishers (*Alcedo azurea*), sacred kingfishers (*Todiramphus sanctus*) and forest kingfishers (*T. macleayii*), banded rails (*Rallus philippensis*), boobook owls (*Ninox boobook*) and white-faced herons (*Ardea novaehollandiae*). The powerful owl (*Ninox strenua*) and masked owl (*Tyto novaehollandiae*), both listed as vulnerable under the *Threatened Species Conservation Act*, have also been recorded within the park.

Feeding of bread to native and introduced birds, particularly ducks and sulphur crested cockatoos, is encouraging the continued presence of introduced species and may be harming native birds.

Reptiles

Although no comprehensive reptile survey of the park has been undertaken to date, the park has on record approximately 30 species of lizards and several snakes. These include the southern leaf-tailed gecko (*Phyllurus platurus*), the golden crowned snake (*Cacophis squamulosus*), eastern brown snake (*Pseudonaja textilis*), red bellied black snake (*Pseudechis porphyriacus*), diamond python (*Morelia spilota*), blind snake (*Ramphotyphlops nigrescens*) and the eastern blue tongue lizard (*Tiliqua scincoides*). Both the eastern long-necked tortoise (*Chelodina longicollis*) and short-necked tortoise (*Emydara macquarii*) have also been recorded in the park.

Fish

Surveys have identified seven species of native fish inhabiting the Lane Cove River and its tributaries. These are the short-finned eel (*Anguilla australis*), long-finned eel (*Anguilla reinhardtii*), Australian bass (*Macquaria novemaculeata*), native minnow (*Galaxias maculatus*), Coxes gudgeon (*Gobiomorphus coxii*), striped gudgeon (*Gobiomorphus australis*) and Australian smelt (*Retropinna semoni*).

There is little quantitative evidence to suggest accurate population levels for any of the native fish species found in the river, however surveys of Australian bass are undertaken each year. The data collected shows that Australian bass are present in the river above the weir, and appear to be increasing in number.

The native fish species are under pressure from several different environmental problems. Evidence from other east coast rivers suggests that the instillation of the weir may have had a detrimental affect on several native fish species found in the river by acting as an artificial barrier to the migration of some species to their salt water breeding grounds, although some fish can cross the weir at very high tides. All of the species are also threatened by reduced water quality and the many problems associated with introduced fish species present in the Lane Cove River. Carp probably constitute the greatest threat to native fish.

Although the bed of the Lane Cove River between the weir and De Burghs Bridge is part of the park, the management of fish within the river is the responsibility of NSW Fisheries.

Amphibians

The many different microclimates and habitats found in the park provide habitat for a range of amphibian species. Approximately 17 species of frogs have been identified in the Lane Cove catchment over the last few decades but it is not known whether all these species are still present within the area. Two threatened frog species have been recorded in the Lane Cove valley: the red-crowned toadlet (*Psuedophryne australis*) which is listed as vulnerable, and the green and golden bell frog (*Litoria aurea*) which is listed as endangered, however only the red-crowned toadlet has been positively identified within the park. It has been found below the UTS campus at Lindfield and below Khartoum Road in Ryde, and may occur in other places. Many of the amphibian species inhabiting the park may be under threat from changes to the water quality and hydrology of the area caused by urban and industrial development.

Introduced Animals

Introduced animals in Lane Cove National Park have had a profound effect on the native animal populations. The combined pressure from predation by introduced carnivores and competition with exotic herbivores has seen the decline in number of many native mammals and the possible local extinction of several species since European settlement of the area.

Introduced mammals currently present in the park are the fox (*Vulpes vulpes*), cat (*Felus catus*), dog (*Canis familiaris*), rabbit (*Oryctolagus cuniculus*), black rat (*Rattus rattus*), brown rat (*Rattus norvegicus*) and house mouse (*Mus musculus*). The park is particularly affected by foxes, feral cats, domestic cats and domestic dogs. Domestic cats and dogs disturb wildlife and can affect their feeding and breeding, as well as posing a direct threat to small native animals. In many cases they also decrease the visitor experience.

In the past there have been several trial feral animal eradication programs conducted within the park. These have included a three month cat baiting program and a small scale fox baiting trial. To date there have been no rabbit control measures undertaken within the park. Controlling foxes and cats has been given priority to avoid increased predation of native animals as rabbit numbers decline following the introduction of biological rabbit controls.

Introduced bird species found in the park include Indian mynahs (*Acridotheres tristis*), red-whiskered bulbuls (*Pycnonotus jocosus*), mallards (*Anas platyrhynchos*), geese (*Anser anser*), domestic pigeons (*Columba livia*) and spotted turtle-doves (*Streptopelia chinensis*). These species displace native birds by competition for habitat, nesting sites and food resources. Mallards are commonly dumped in the park and interbreed with native ducks, resulting in hybrid individuals and the loss of the genetic integrity of the native species. Introduced ducks and geese are removed at regular intervals, however little can be done to control other introduced birds as they are common throughout the Sydney region.

Introduced fish species include European carp (*Cyprinus carpio*), mosquito fish (*Gambusia holbrooki*) and goldfish (*Carassius auratus*). Carp are considered to be the greatest threat to native fish in the river and possible methods of controlling carp are being investigated.

Policies and Actions

- * The park will be managed to conserve its value as habitat for native fauna and as a wildlife corridor.
- * Care will be taken to when maintaining tracks within the park that there is no impact on threatened plants or animals such as the red crowned toadlet.
- * Research will be encouraged into the habitat requirements, status and distribution of native animals in the park, particularly uncommon and threatened species.
- * Herbicides will not be used in areas identified as containing red-crowned toadlets and as far as possible avoided along drainage channels and waterways.
- * Signs will be erected near the weir explaining why feeding of animals in the park is not encouraged.
- * A fish migration ladder will be installed at the weir to facilitate fish breeding and migration between the salt and fresh water sections of the river.
- * A feral animal control plan will be prepared and implemented for the park. The plan will identify techniques and programs for the effective control of introduced species affecting the conservation of native plants and animals.
- * Priority will be given to the control of feral predators such as cats and foxes in the first instance, with follow up rabbit control as a secondary measure if needed.
- * Introduced ducks, geese and other animals released in the park will be removed on an on-going basis.
- * Appropriate methods to remove carp from above the weir will be investigated.
- * Dogs and other domestic animals will not be permitted in the park, with the exception of registered guide dogs.
- * A community education program will be developed to increase awareness of the problems of domestic animals in the park and possible controls to prevent domestic animals entering the park.
- * The Service will encourage the development of an integrated feral animal control program within the valley in association with local councils.

4.1.5 Fire Management

The National Parks and Wildlife Service is a fire authority within New South Wales and is responsible for the control and suppression of fire within Lane Cove National Park.

The National Parks and Wildlife Service recognises that fire is a natural feature of Lane Cove National Park and is essential to the survival of some plant and animal communities. Frequent or regular fire can however cause loss of particular plant and animal species and communities. Fire can also damage Aboriginal sites, historic sites and recreation facilities, and can threaten visitors and neighbouring lands.

The Service has as its primary aims in fire management:

- to reduce the risk of bushfire damage to life and property both within and immediately adjacent to areas where the Service has a statutory responsibility;
- to effectively manage bushfires for the protection and conservation of the natural, cultural, scenic and recreational features of service areas; and
- to co-operate and work with other organisations in fire management planning and implementation within the region.

Fire History

Aborigines have probably occupied the Lane Cove valley for at least the last 20,000 years. Traditional fire practices of Aborigines in NSW have not been well researched and are therefore poorly understood, however Aborigines are likely to have had burning regimes which encouraged grazing plants in areas in which they hunted game and kept corridors open in lands through which they travelled, although whether they burnt the valleys is debatable.

In the Lane Cove valley the evaporation rate generally exceeds precipitation from October to February. Traditionally, with extreme fire conditions in the area being associated with hot dry north westerly winds, fires have spread in a south-easterly direction down the river valley towards Fullers Bridge. In recent years arson has been the major cause of wildfires occurring within and around the park.

The geographic location and climate of Lane Cove National Park, the bushfire potential and the large numbers of residential park neighbours, has meant that much previous fire management has focused on fire hazard reduction. Prescribed burning has been undertaken in areas of the park which are deemed to be of high risk because of topographic considerations, aspect, fuel loads or near developments.

During January 1994 the Lane Cove valley experienced an extremely high intensity fire. This fire, which was probably a result of arson and inflamed by adverse weather conditions, started in the Browns Waterhole area and spread south-east along the valley burning approximately 87% of the park. In December 1994 another large scale fire in the Fox Valley area in the northern section of the Lane Cove valley burnt a further 8% of the total park area.

Due to the severity and size of the 1994 fires only 5% of the Lane Cove National Park remains recently unburnt. Areas of the park which were not burnt in the 1994 fires include Blackbutt Creek, land immediately adjacent to the caravan park and park office, and small sections of Blue Gum and Carters Creeks. These unaffected areas are likely to be important as a source of habitat for the surviving fauna of the area, particularly those species inhabiting the understorey vegetation. These areas also represent the only examples of mature vegetation communities within the lower sections of the Lane Cove valley.

The large scale of the fires in 1994 has reduced the immediate need for prescribed burning to be used as a management tool for fuel reduction. This has allowed the allocation of resources to other fire protection measures within the park, such as fire trail maintenance, manual fuel reduction measures and fire breaks along the park boundaries.

Protection of Life and Property

A large percentage of the Lane Cove National Park boundary adjoins urban or residential areas. This presents park managers with the challenge of reducing the risk that fire will spread from the national park to adjoining neighbours whilst still conserving the natural heritage values of the valley.

One important fire management activity is the reduction of the risk of high intensity fires by prescribed burning and manual fuel reduction measures in high risk areas. This reduces the risk of intense fires and improves the capacity of firefighters to safely control wildfires. The perimeter of the park adjacent to urban areas therefore has its own combination of fire radiation zones, perimeter fire trails and hazard reduction zones. It is planned to continue consolidation and improvement of this system of protection to the surrounding area, in consultation with local councils, the NSW Fire Brigade, District Fire Committees, Rural Fire Brigades and local residents.

In addition the local community will be informed about fire management issues and encouraged to undertake measures on their own properties to mitigate fire risk. This will include the formation of "Community Fireguard" groups in areas adjacent to the park.

The Lane Cove valley also contains a network of management tracks used primarily for the control of wildfires and prescribed burns and for ongoing management of lands both within and outside the park. These trails, when combined with the use of natural fire breaks such as water courses, moist gullies and ridge lines, provide

fire fighters with strategic cut off points to control both prescribed burns and wildfires. The management track system for the park is shown on the map on the centre pages of this plan.

Maintenance of Natural Heritage Values and Biodiversity

Contemporary ecological research in fire prone ecosystems, such as those which are represented in Lane Cove National Park, has established broad principles about the fire regimes needed to avoid the extinction of species and thus conserve biodiversity:

- Groups of plant and animal species which constitute an ecosystem respond similarly to fire according to the characteristics of their life-history. It is not necessary to specify fire regimes for the conservation of every species, rather fire regimes for groups of species or an ecosystem are required to be developed.
- A diversity of fire regimes is needed to maintain natural diversity. Accordingly the management of fire should aim to provide a pattern of fires of high, moderate and low intensity, frequency and extent. Extinctions are most likely when fire regimes of relatively fixed intensity, frequency and extent prevail without variation.

Scientific understanding of the fire requirements for plant communities is generally more advanced than for animal communities, although recent published research demonstrates that the conservation of many animal species also depends upon a mix of fire regimes including occasional high intensity fires. The use of regular and low intensity fires has an unacceptable impact on critical habitat requirements for native animals, particularly on ground flora and undergrowth.

Based on the similarity of the vegetation communities found in Lane Cove National Park with that of other coastal and sub-coastal areas, such as Ku-ring-gai Chase and Royal National Parks where extensive fire research has been undertaken, the following significant fire regime thresholds have been identified for the management of fire within the Lane Cove National Park:

Vegetation Community	Fire Threshold
Mangrove	no fires, any fires will have significant impacts;
Closed forest	no fires, any fires will have significant impacts;
Blue gum/blackbutt forest	fire frequency should be not less than 15 years or exceed 30 years;
Open forest or woodland	fire frequency should not be greater than two fires within a period of 5 years, and there should not be more than 30 years without fire; and
Tall shrubland and sedgeland	fire frequency should not be greater than two fires within a period of 8 years or three fires within a period of 15-30 years, and there should not be more than 30 years without fire.

Indicator species of native plants and animals will be monitored and an evaluation made of the proposed fire regime thresholds. The thresholds may be modified in the light of new scientific information.

In addition to the thresholds determined above, the following ecological considerations are important:

- many small mammals and most birds breed in spring and summer and are vulnerable to fire during this critical period;
- frequent fires in most vegetation communities reduce the floristic complexity of the understorey. Understorey diversity on a broad scale is a critical habitat requirement for most native animals. Areas

burnt too frequently are reduced to pyrogenic species such as bladey grass and bracken fern, an understorey which accumulates fuel quickly and is capable of further frequent burning;

- as areas regenerate following fires, different animal species find the habitat suitable at different stages of regeneration. To support the full complement of native animals a range of vegetative age classes is desirable;
- some species and communities within Lane Cove National Park are fire sensitive and rely on recolonisation from surrounding areas following fire; and
- fire can both assist in broad area weed control and encourage the growth of certain weed species to the detriment of native vegetation.

The extent of the January 1994 fires has reduced vegetation age class diversity in much of the park. Future fire management will endeavour to reduce the fire threat whilst providing a diversity of areas which exhibit different fire frequencies and intensities to promote greater ecological diversity. In due course this should lead to a mosaic of habitats of different age classes which will be of high value for the protection of native plants and animals and complement residential bushfire protection strategies.

Fire Management Operations

Under the *Rural Fires Act 1979* the National Parks and Wildlife Service is a fire authority and is responsible for controlling fires on Lane Cove National Park. This includes the control and suppression of fires and the implementation of fuel management programs to protect life and property from bush fires. The Service may also assist with the control and suppression of fires adjacent to or threatening the national park.

Those sections of the park on the north-eastern side of the Lane Cove River and in the Fox Valley area are included within the area of the Hornsby/Ku-ring-gai District Fire Committee and are covered by Section 41AB plans prepared under the *Bush Fires Act 1949*. These plans, which detail co-operative arrangements for fire suppression and fuel management within the area, will be updated in accordance with the new Rural Fires Act. Those sections of the park on the western side of the river are included in the NSW Fire Brigade District.

This plan of management outlines the general principles of fire management in Lane Cove National Park. More detailed fire management strategies for the park will be included in the Lane Cove National Park Reserve Fire Management Plan.

Policies and Actions

- * A reserve fire management plan will be prepared for Lane Cove National Park as a high priority.
- * Fire in Lane Cove National Park will be managed in accordance with the reserve fire management plan, the section 41AB plans (1949 Act) or section 52 plans (1979 Act), and this plan of management to ensure:
 - protection of human life and property within and adjacent to the park;
 - conservation of threatened and biogeographically significant plant and animal species and communities;
 - maintenance of species and habitat diversity; and
 - protection of structures, objects and places of cultural significance.
- * All wildfires will be contained in as short a time period as possible.
- * Neighbours, cultural sites and facility areas will be protected by fire trails, fire radiation zones and areas of hazard reduction. The size of fuel reduction zones will be dependent on whether natural features (topography, aspect, low risk vegetation types, etc) provide some existing protection.
- * Records of fire occurrence and risk and threat assessment mapping will be undertaken to identify priority areas within the park for fuel reduction.

- * The Service will provide information to neighbours about fire management and protection measures and will encourage the involvement of park neighbours in co-operative fuel management works where appropriate.
- * The Service will seek to ensure the incorporation of fire protection measures within all proposed new developments adjacent to the park in accordance with the Bush Fire Service's guidelines for "Development in Fire Prone Areas".
- * The park may be closed during total fire ban periods, and park fire bans and closures may be imposed at other times when weather conditions and fuel conditions are such as to present fire control problems.
- * Prescribed burning may be utilised to assist in broad area weed control and for approved experimental purposes where the results can be demonstrated to be directly useful to park management.
- * Prescribed burns will incorporate both pre-fire and post-fire weeding where necessary.
- * Prescribed burning and other fuel management programs will be reviewed annually in accordance with the objectives and policies outlined in this plan of management, the Lane Cove National Park Reserve Fire Management Plan and the Hornsby/Ku-ring-gai District Operation and Bush Fire Risk Management Plans.
- * Fire management will aim to exclude fire from closed forest and mangrove communities and to maintain an appropriate diversity of age classes in open forest, woodland, tall scrubland and sedgeland communities found within the park.
- * Natural fire advantages and strategic control lines will be used to control fires where possible.
- * Temporary wildfire control lines and tracks may be constructed if necessary for fire control or other emergency operations. All new tracks or areas disturbed by fire suppression activities will be rehabilitated as soon as possible after each emergency.
- * The use of heavy machinery, and especially tracked machinery, for fire suppression activities will be avoided as far as possible and only used as a last resort to protect life and property.
- * All fire trails and management tracks will be assessed for their strategic value. Tracks and trails assessed as non-essential for fire suppression will be closed and rehabilitated. Essential tracks and trails will be progressively upgraded and maintained, and usage restricted to authorised vehicles only.
- * The Service will continue to be involved in the Lane Cove Valley Fire Trails Committee to facilitate a combined approach to the valley's fire trail maintenance programs.
- * Close contact will be maintained with the Volunteer Rural Fire Brigades, NSW Fire Brigades, local police units and local councils to facilitate a coordinated approach to fire fighting both within the park and in the valley as a whole.
- * Research into the effects of fire on weed establishment and spread, the effectiveness of prescribed burning as a weed management tool, and appropriate fire regimes and practices for management of native species will be encouraged.

4.2 CULTURAL HERITAGE

Cultural heritage includes aspects of both Aboriginal and non-Aboriginal history. It comprises important components of the environment which may have an aesthetic, historic, scientific and social significance for present and future generations.

4.2.1 Aboriginal Heritage

Lane Cove National Park lies within the area of the Kuring-gai people, whose territory stretched from the northern shore of Sydney Harbour to Broken Bay. Early European colonisers of the areas reported several different groups or clans inhabiting the valley, including the Cameraygal and Walumedegal. The exact boundaries of these groups is not known, although it is thought that the Cameraygal inhabited the lower north shore of Sydney west to the Lane Cove River whilst the Walumedegal lived west of the Lane Cove River through Ryde to Parramatta.

In February 1790 Lieutenant Clark made a number of journeys up the Lane Cove River (believed to have been called "Turrumburra" by the Aboriginal people) at the instigation of Governor Phillip to establish good relations with the Aboriginal communities. He visited an Aboriginal camp and shared their meal of mussels.

Shortly after however relations between the Kuring-gai people and the new arrivals deteriorated. European settlement was devastating to the Aboriginal people living along the Lane Cove River. Land was cleared for farms and forests were cut down to provide fuel and building materials. Aboriginal people lost access to their camping and food gathering areas and were forced into the territory of neighbouring groups. In the first decade of European settlement there were at least two serious outbreaks of disease which decimated the Aboriginal population. By 1797 the Aboriginal community of the Lane Cove valley were reported to be actively resisting the new settlers, and were responsible for burning a house and killing some hogs. "Native raiders" were mentioned again in 1804 and 1809, but there are no later references to Aborigines living in the area.

There is only limited evidence of Aboriginal occupation of the Lane Cove River remaining today, due to the long history of European occupation and use of the valley for farming and recreation. The construction of the weir, which flooded much of the river banks, also probably destroyed many sites. Around 40 Aboriginal sites have been recorded in the park including shelters, cave art, rock engravings, middens and grinding grooves.

Two of the art sites, one containing a sunburst motif which is the only known example in the Sydney region, and the other the only known four-footed macropod north of the harbour, and a shelter with archaeological deposit are considered to be of State or regional scientific importance. The macropod engraving is the only site which may be suitable for interpretation.

Public visitation to Aboriginal sites within the park is not actively promoted due to the fragility of the sites and the difficulties of interpretation. A number of sites in the park have been heavily vandalised and covered with graffiti. Protection measures may be necessary as well as removal of vegetation which has the potential to damage some sites. The walking track through Fairyland crosses a midden and will need to be either relocated or the site protected.

Lane Cove National Park falls within the area of the Metropolitan Aboriginal Land Council. The Council will continue to be consulted about matters which are likely to be of concern to the Aboriginal community and to be involved in the management of Aboriginal sites within the park.

Policies and Actions

- * Aboriginal sites in the park will be conserved and managed in consultation with the Metropolitan Aboriginal Land Council and other relevant Aboriginal community organisations.
- * Aboriginal sites will be protected from disturbance or damage by human activities. Priority will be given to protection of the midden in Fairyland.
- * Regular inspections of Aboriginal sites within the park will be undertaken, and appropriate conservation works implemented where necessary. The Metropolitan Land Council will be invited to participate on these inspections.
- * Due to the fragile nature of many sites in the park, site locations will not generally be publicised except where the site is deemed to possess educational and/or interpretive value. Decisions on the desirability of interpreting Aboriginal sites within the park will be made in consultation with Aboriginal communities.

- * Surveys, inventory and research into Aboriginal occupation and use of the park will be encouraged. Priority will be given to site surveys of Fairyland, Fox Valley and that part of the park upstream of De Burghs Bridge.

4.2.2 Historic Heritage

The Lane Cove valley was a rich source of logs for building the new colony in Port Jackson. Timber getting first commenced in the area in 1805 and was well-established in the valley by 1809. A government sawmill worked by convicts was established near the end of what is now Fiddens Wharf Road and Joseph Fidden, a former convict, was granted the right to transport timber down the river from the sawmill to Sydney. An area around the wharf was declared a Wharfage Reserve, from which no timber could be legally cut. Another settler, Richard Archbold, established a wharf near the end of Grosvenor Road, and Hynde's wharf was opposite the current boatshed. Once the immediate supplies along the river had been removed logs were bought to these wharves from further inland by bullocks. There is no remaining evidence of these wharves.

The first permanent settlement in the area was north of Blue Gum Creek where, in 1814, William Henry established a hut and vineyards on the present Fullers Park which he called Millwood Farm. Other settlers followed Henry into the valley, gaining access to their properties from the river. Robert Baker established an orchard on what is now The Pines picnic area and his kitchen building remains within the park workshop area. The Schwartz family farmed the area upstream of Baker, below their home which still stands in the park. North of De Burghs Bridge was the Brown family, after whom Browns Waterhole is named.

By 1871 Henry's property had been incorporated into a larger property by his grandson Thomas Jenkins. The farm was a major supplier of fruit which was transported by steamer to the city markets, and became a popular destination for picnickers who came up the river to buy fruit from the farm. The kitchen of the old Jenkins family homestead, reputedly built about 1860, still stands near the office but the house burnt down in 1940.

With the increasing popularity of the Lane Cove River for boating, the Swan family converted their riverside market garden on the Ryde side of the river into the "Fairyland Pleasure Grounds". Early this century it was extremely popular for group picnics and swings, slides, a ferris wheel, flying fox, cricket pitch, shelter sheds and a dance hall were constructed over the years. Most of the recreation facilities were removed in the early 1970s although some structures including tracks, stone walls, the remains of the wharf and of a tidal gate on the entrance to the creek, and a few trees such as Canary Island palms still remain. Some artefacts from Fairyland, including crockery and brochures, are stored in the Jenkins Hall and other artefacts are held by the Ryde Historical Society.

On one large rock within the park is an engraving of the Fifth Commandment which was reputedly carved in the late 1800s by Thomas Tunbridge, a nearby resident. Weathering and the passage of feet and cars have resulted in the engraving on Commandment Rock being barely decipherable, however the rock is now protected from human damage by bushes.

By the end of the nineteenth century the remaining orchards in the area had deteriorated and there were public moves to acquire the foreshores of the river for a recreation reserve and to dam the river to "beautify" it in a manner similar to that undertaken in The (Royal) National Park. In 1925 the committee formed to investigate the proposal stated that the whole of the river foreshore between Fig Tree Bridge and "some distance above De Burghs Bridge" including "so far as practicable all contiguous creeks, valleys, ravines and gorges" should be resumed "to reasonably ensure the protection of the waterways against encroachment of pollution and retention of all the natural features of the valley for the purpose of an extensive National Park".

Crown land adjoining the river was reserved from sale and planning for a park was undertaken, but it was not until 1937 that work finally began on the construction of the weir and Riverside Drive as an unemployment relief project. On 29th October 1938, following completion of the weir, Lane Cove National Park was officially opened and the 125 hectare parkland handed over to Trustees to manage. Work continued until 1940, with stone to construct the weir, boatshed, ambulance room, Porters Bridge, Delhi Road and De Burghs Bridge entrance gates, retaining walls and other facilities being quarried on the park. Porters Bridge is a particularly impressive feature, with the concrete road surface supported on piers of ornamental stone with matching wing walls, parapet, and end piers.

During the 1950s tidal flats along the river were filled with material dredged from the river to make picnic areas, and over the following years a number of exotic trees were planted including poplars, pines, liquidambar, willows and coral trees. Max Allen Drive was constructed in the early 1960s as a voluntary project by the NSW Local Government Engineers Association, however at that time it went past the weir not behind the office. More recently, Tunks Farm was added to the park and the old barn, which had been used as a scout hall and two-up school since the demise of the farm, converted to a picnic shelter.

The name of the park has had a varied history. From 1938 until 1967 the park was called Lane Cove National Park and managed by trustees. Following the enactment of the National Parks and Wildlife Act in 1967 which established a National Parks and Wildlife Service to manage national parks in NSW, it was reserved as Lane Cove River Park on the basis that it was considered not sufficiently "spacious" to be a national park (Section 8(2)(a) of the Act). In 1976 it was reserved as Lane Cove River State Recreation Area following the establishment of state recreation areas under the Department of Lands. In 1992, following an assessment of all state recreation areas, Lane Cove River State Recreation Area was identified as having important natural values which warranted its classification as a national park, and it was again reserved as Lane Cove National Park. At this time the Service also took over management of the park from the trust.

The Service's Historic Heritage Maintenance Study undertaken in 1995 identified some 45 places with historic fabric, many of which were visitor facilities and most of which were of low significance. Important structures identified in the study were Jenkins and Bakers kitchens, Schwartz' house, Tunks' barn and the stone structures constructed in the 1930s.

Policies and Actions

- * The management of the historic heritage of Lane Cove National Park will be in accordance with the Burra Charter developed by Australia ICOMOS.
- * Conservation assessments, including where necessary the preparation of conservation plans, will precede any works on a historic structure other than routine maintenance or urgent stabilisation work.
- * An assessment will be undertaken of the cultural significance of the introduced plantings in Lane Cove National Park. Culturally significant plantings identified through the conservation planning process will be replaced by plants of the same species when they become senescent or die unless they are having an unacceptable impact on natural values. Significant plants which impact on the park's natural values will be replaced with visually-similar indigenous species.
- * The historic heritage of the park will continue to be interpreted to park visitors. Interpretive signs will be erected below Schwartz Cottage, near Bakers kitchen, at Fullers Park, in the vicinity of Fairyland, at Porters Bridge, near the weir and at other selected stonework areas. The sign near Jenkins kitchen will be replaced by one which emphasises that the kitchen is a reminder of the agriculture and orcharding which occurred in the area. Cultural heritage information and signs will also be included in the park visitors centre located in Jenkins Hall.
- * The crockery, signs, photographs and other artefacts of Fairyland stored in the hall will be catalogued and selected elements displayed in the hall. The Fairyland artefacts held by the Ryde Historical Society will be catalogued and a management agreement developed.

4.3 USE OF THE AREA

Certain uses are appropriate in Service areas provided that they do not conflict with the primary purpose of conservation of natural and cultural heritage and are consistent with the objectives and strategies contained in this plan of management. The major categories of use that may be appropriate in Service areas are:

- education and promotion of the area, the Service and the conservation of natural and cultural heritage;
- recreation in a natural setting;
- scientific research; and
- management operations by the Service and other authorities with statutory responsibilities in the area.

4.3.1 Promotion, Education and Interpretation

Promoting public awareness of the Service's conservation responsibilities, the values of the area and recreational opportunities is a major aspect of management for visitor use. It assists the protection of the natural and cultural heritage of the park and increases the understanding, enjoyment and satisfaction of visitors.

Lane Cove National Park has a long history of community involvement. Currently Lane Cove National Park is used by university, school and technical college students for excursions and project work. Volunteer guides take occasional guided walks within the park and volunteers assist in the management of the Kukundi Wildlife Shelter. As previously mentioned, there is also a high level of community involvement in bush regeneration within the park.

The high numbers of visitors to Lane Cove National Park and its location within the Sydney metropolitan area provide many opportunities for the Service to reach people who would otherwise not be exposed to national parks. It also provides visitors with many examples of the issues affecting nature conservation within an urban area. However, the only educational facilities currently within Lane Cove National Park are signs within the Kukundi Wildlife Shelter, information and displays in the park office and information signs at Fiddens Wharf.

The Kukundi Wildlife Shelter was originally a small zoo established by the park trustees. Over the years it changed to a zoo displaying animals native to the area, and more recently into a facility for the care of injured wildlife before release back into the wild. The National Parks and Wildlife Service is assisted in the management of Kukundi by community organisations involved in wildlife care and education and the Ku-ring-gai Bat Conservation Society Inc. The shelter's focus as a rehabilitation centre for locally indigenous wildlife provides visitors with information about locally threatened wildlife species, their habitats and ways of protecting urban wildlife. Only the bats which cannot be released and are used by the Ku-ring-gai Bat Conservation Society for research into the age of bats or for educational talks will be retained on a long-term basis in the shelter under an agreement with the committee. It is also proposed to expand the educational information available within the centre, provide for school and educational visits and provide better facilities for rehabilitation of wildlife.

The original park office was in the old Jenkins kitchen. This was replaced by the current office and adjoining Jenkins Hall in 1975. The office is too small to provide adequate working space for staff and an information centre/shop, while the Jenkins Hall is rarely used. It is proposed to reconfigure the park office and provide a larger area for visitor information, interpretive displays and sales within the hall. Provision will also be made for an audio-visual display area and meeting room. Increased parking will be provided near the building.

Improved signage to explain the natural and cultural features of the park and an interpretive walk have been requested by many visitors. Directional signs and information also need to be upgraded to assist visitors to find their way around the park.

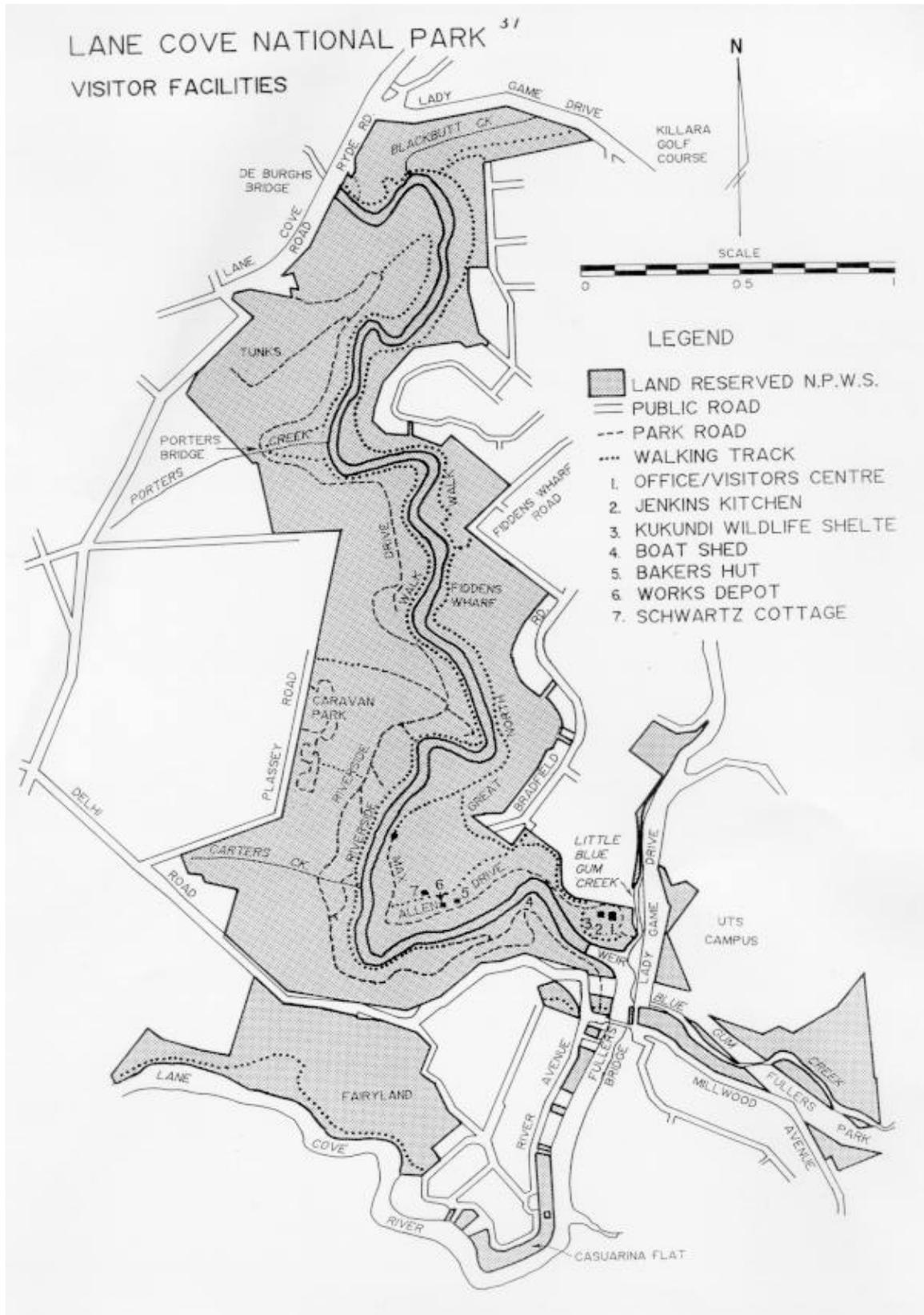
Policies and Actions

- * Education and interpretation within Lane Cove National Park will be endeavour to promote care of the environment and thus assist park management to protect the park's natural and cultural values.
- * The following themes will be emphasised in interpretation programs:
 - the need for on-going protection of the environment;
 - the value of bush regeneration work;
 - the problems of urban pressures such as weeds, fire and stormwater;
 - the need for co-ordinated catchment protection;
 - the history of human occupation and use of the valley; and
 - changes which have occurred in use of the area over time.
- * Jenkins Hall will be developed to provide a park visitor information centre with increased area for interpretation, sales and general park information.
- * Jenkins Kitchen will be used as a centre for volunteer groups working in the park.
- * Kukundi Wildlife Shelter will be managed as a wildlife rehabilitation centre. No animals will be kept long term in the shelter, except for flying foxes used by the Ku-ring-gai Bat Conservation Society for research or in educational programs.
- * The interpretive material in the Kukundi Wildlife Shelter will be upgraded and focus on information on species currently in care, ways of protecting urban wildlife and the benefits of wildlife rehabilitation.
- * A new intensive care building will be constructed adjacent to Kukundi and new aviaries constructed within the existing boundaries of Kukundi.
- * The long term role and function of the Kukundi Wildlife Shelter will be reviewed.
- * The guided walk program within Lane Cove National Park will be expanded.
- * A short self-guided educational walk will be developed in the vicinity of the visitors centre to provide visitors with information on the natural and cultural heritage and management issues within the park.
- * Park information signs will be rationalised and improved at all park entrances.
- * The Lane Cove National Park brochure will be upgraded to include detailed maps and information on the park and its roads and walking tracks.
- * Continued community involvement in the park will be encouraged, particularly involvement in Kukundi, bush regeneration programs, guided walks, educational activities and catchment management programs.
- * Local community days will be held to encourage community involvement and provide information to neighbours and the surrounding community on specific park management issues.

4.3.2 Recreation Opportunities

Lane Cove National Park receives approximately one million visits each year. Its location within greater Sydney makes it an important recreational area for many Sydney residents and overseas visitors. High levels of visitation occur in the park on weekends (particularly Sundays), school holidays, public holidays and family days such as Mothers Day. The majority of visitors to the park use the developed recreation areas between De Burghs Bridge and Fullers Bridge for family picnics and barbecues. The area around the weir is particularly popular for families with young children. Walking, jogging and cycling are also popular activities. High numbers of local residents and staff from local offices and factories participate in these latter activities.

The roads, walking tracks and main visitor facilities within the park are shown on the visitor facilities map on page 37.



Six visitor surveys have been undertaken in Lane Cove National Park since 1988. These surveys indicate that:

- over 85% of visitors to the park live in Sydney, and most (around 60-70%) live within 10 km of the park;
- the main activities undertaken in the park are picnics, followed by barbecues;
- around one quarter of visitors go walking in the park;
- there is a high repeat visitation, with around 60% of visitors coming more than once a year, 45% of whom visit the park every 3 months;
- over half the groups include children, and one quarter of the groups include people over 60 years of age;
- the main qualities which people say attract them to the park are the quiet and restful atmosphere, followed by the scenic qualities of the park; and
- most desired additional facilities were improved information, maps, amenities and food sales.

Public Access

Lane Cove National Park is served by local buses from Chatswood Railway Station, however most park visitors come by car. Vehicle access to the park is currently available via entrance gates on Delhi Road near Fullers Bridge, on Lady Game Drive near Fullers Bridge and on Ryde Road near De Burghs Bridge. These roads provide access to the picnic areas along the western side of the river between De Burghs Bridge and Fullers Bridge and to picnic areas on the eastern side of the river. There is no vehicular access into those parts of the park above De Burghs Bridge or below Fullers Bridge.

The Roads and Traffic Authority (RTA) have stated that it may be necessary to close the entrance on Delhi Road for public safety reasons. If the Delhi Road entrance to the park is closed it is proposed that vehicular access to this area of the park will be provided from Lady Game Drive by either widening the weir to take two-way traffic and a path for walkers, constructing a bridge near the weir, or constructing a bridge further up the river. Providing a river crossing for vehicles will also have the advantage of directing more visitors past the visitors centre and thus increasing its value for information and education.

Scenic drives, walking, jogging and cycling are popular activities along the roads within the park. The roads are narrow and the steep sides of the river valley make widening of the roads impractical. All users of roads within the park must therefore take care and be prepared to give way to other users. Signs and flat-topped speed humps will be erected to slow traffic speeds and warn of other users. Cyclists may also use management tracks within the park but cycling is not permitted on walking tracks to prevent damage to the tracks and minimise conflicts with walkers.

A regional cycleway which crosses a small section of the park at Browns Waterhole has been developed by the Roads and Traffic Authority. The cycleway has involved the sealing of an existing management track and suitable gates will be installed to prevent unauthorised access. In general however the park provides for cycling on unsealed management tracks as an alternative to the urban system of cycleways.

There has never been any horse riding permitted in Lane Cove National Park due to the small size of the park and the fragility of the soils, however horses occasionally cross the park at Browns Waterhole. There is no legal way for horses to access the park in this area due to prohibitions on horses on the lands adjoining the park.

Picnic Areas

At present there are 38 formal, named picnic areas and several smaller picnic sites located within the park between De Burghs Bridge and Fullers Bridge. All these formalised areas contain grassed picnic areas with wood barbecues and picnic tables. Of these 38 areas, 8 are currently able to be booked in advance by the public. Gas or electric barbecues will be provided in these areas and in other high use picnic areas, including near the weir, to reduce the impact of scavenging for wood in the surrounding bush. In other picnic areas the number of wood barbecues will be reduced and the remaining barbecues moved away from the bush to reduce the risk of wildfires. In addition, private gas or similar stoves will be permitted in the park but charcoal or heat bead stoves are not permitted due to the problems of disposing of hot coals.

Fern Valley (area 20), Sandy Point (area 21), Porters Creek (area 22) and De Burghs (area 24) picnic areas are little used but require relatively high levels of maintenance. There are also a number of small, un-named picnic

areas which are maintained but little used. These areas will be closed, the barbecues and other facilities removed, and the areas revegetated. Planting will also be undertaken in some of the other larger picnic areas to break up the areas into smaller family-sized areas. The garbage bins in the park will be centralised near the main parking areas in association with recycling bins. Planting will also be undertaken to screen unsightly toilet blocks and to screen the picnic areas along Lady Game Drive from traffic on the road.

Picnicking also occurs at Sugarloaf Point. There is only limited parking and there are no facilities in this area other than walking tracks. The area will remain as a low-key alternative to the more developed areas along the river and no facilities other than a small parking area adjacent to Pittwater Road, a walking track down to the river and the Great North Walk through the area will be provided. Visitors will be encouraged to remove their own rubbish and no fires will be permitted.

Twelve picnic areas within the park contain children's play equipment. Play equipment is provided in many local parks around the national park and large amounts of play equipment are not considered necessary within the national park. Play equipment will be progressively centralised near the weir, at Barrakee (area 11), at Scribbly Gums (area 15) and at Tunks (area 26). The latter three areas are not near the river and are therefore often favoured by families with children.

Walking Tracks

There are two main walking tracks in the park. The Riverside Walk is along the western/southern bank of the river between Fullers Bridge and De Burghs Bridge. It passes through many of the picnic areas adjacent to the river between Fullers Bridge and De Burghs Bridge. The other main walking track is part of the Great North Walk between Sydney and Newcastle. This track passes through Sugarloaf Point and Fairyland, crosses the river at the weir and runs up the eastern side of the river to De Burghs Bridge, and connects with the main Lane Cove River fire trail to Fox Valley at the northern-most point of the valley. Smaller tracks link into roads and provide a loop through Fairyland, to Fiddens Wharf, to Sugarloaf Point and to the caravan park. The northern track through Fairyland crosses Delhi Road at a dangerous location and will be closed.

Currently there is no walking track along the edge of Lady Game Drive and people must either walk on the road or cross into and out of the park. Walkers with dogs therefore often cross into the park although dogs are not permitted in the park. Negotiations will be undertaken with Ku-ring-gai Council to develop a path along the edge of the road outside the park.

The northern sections of the park, including Fox Valley, have historically received much lower visitation levels than the more developed section of the park between Fullers Bridge and De Burghs Bridge. Recreational activities within this section of the park include bush walking, mountain bike riding and nature appreciation activities such as bird watching. The only facilities provided in this section of the park are multiple use developments such as fire trails and smaller walking tracks. Many of the trails in this section of the park are linked to Ku-ring-gai and Hornsby Councils' access tracks and trails. There are no picnic areas or barbecues within the northern area of the park and parking is limited.

Water Activities

The waters of the Lane Cove River are not within the park, although the bed of the river above the weir is part of the park. The activities undertaken on the river are managed by a range of other authorities including the Waterways Authority, NSW Fisheries, and the National Parks and Wildlife Service where bed of the river or access to the river is within the national park.

Swimming is not recommended in the Lane Cove River due to the large number of tree branches, rocks and other snags and the high level of pollutants which may be washed into the river from upstream.

Canoeing is a popular activity on the Lane Cove River, both above and below the weir. Canoes are frequently launched from the picnic areas along River Avenue but parking can create a problem on this narrow street. It is therefore proposed to provide off-street parking for canoeists at a site along River Avenue.

To minimise conflicts with canoes and row boats, and reduce noise levels, power boats will not be permitted above the weir and launching of trailable boats will not be permitted in the park. Boats are limited by the Waterways Authority to a maximum speed of 4 knots on those parts of the Lane Cove River adjoining the park. The Waterways Authority is responsible for ensuring safe navigation on the State's waterways, including those in and adjacent to national parks, and for reducing the environmental impact of vessels on those waterways.

The management of fish and fishing within the State is the responsibility of NSW Fisheries. A co-operative management agreement between the Service and Fisheries has been implemented to protect ducks and other native animals, protect fish stocks (particularly Australian Bass) and aquatic habitat within the Lane Cove River, and to reduce conflicts between recreationists. This agreement provides for a total prohibition on fishing from below the weir to the boatshed, including no fishing from the weir, and "catch and release" only upstream of the boatshed. Recreational fishing will continue to be permitted in the Lane Cove River downstream of Little Blue Gum Creek.

Commercial and Other Operations

There are currently four commercial operations within Lane Cove National Park: a paddlewheeler, a kiosk, a boat hire, and a caravan park/camping area.

The paddlewheeler has operated on the river above the weir since 1971. It cruises the river on weekends, public holidays and during school holidays. There have been a number of concerns raised about the appropriateness of a large paddlewheeler on a small river in a national park, its impact on the river and surrounding environment, and the relationship of the paddlewheeler to the park. The paddlewheeler is no longer considered to be an appropriate facility to be operating in the national park because it causes erosion to the river banks, creates excessive noise (especially at night) and gives a false impression of the type of early craft using the river. Day-time educational tours of the river on a smaller boat may however be permitted.

The kiosk, located just north of the weir, provides hot and cold drinks, sandwiches, ice creams and confectionary. The kiosk at present has outside seating for approximately 20 people. The kiosk is difficult to find and can become crowded due to its location near the river. It is proposed that the kiosk be relocated next to the new expanded visitors centre and provide both indoor and outdoor seating.

Row boats may be hired from an old stone boatshed on the western side of the river on weekends, public holidays and school holidays. Small hire boats also provide opportunities for visitors to see the park from a different perspective and to recreate on the river.

The caravan park, which is accessed from Plassey Road, was established in 1966 and presently contains approximately 120 powered sites, 82 on-site vans and 15 camping sites. It also contains a swimming pool, shop, camp kitchen, barbecues, playground and bird aviary as well as staff housing. The caravan park needs to be reduced in size, the boundaries clearly marked, have more sites for campers, and conform to park policies in regard to introduced plants and animals. The location of the caravan park on Plassey Road with a separate entrance means that many people do not realise that the caravan park is part of the national park. It is important that the caravan park be seen to provide accommodation for national park visitors, including campers, as well as for visitors to Sydney in general.

The caravan park lease stated that visitors were not permitted to stay in the caravan park for more than 6 consecutive weeks or 12 weeks in any one year however the previous lessee permitted a number of visitors to stay on a long term basis. Given this and that the lease has now expired, the Minister has announced that the Service will manage the caravan park and that certain long term residents can stay in the caravan park until the end of 1999 and others can stay indefinitely. These people may not transfer their sites to another person and may only sell any improvements on the site on the basis that they are immediately removed from the caravan park.

Visitors booking picnic areas sometimes organise hired animals to provide children's rides, or hire mechanical rides such as ferris wheels or trains. Such rides are not considered appropriate in the national park due to their impact on the park and on the enjoyment of other visitors.

The Service also receives requests from commercial, educational and community groups to hold walks, cycle tours, nature study activities, community days, team building and other activities in the park. These activities may be permitted depending on impact and subject to certain controls to minimise impact on the park and other visitors.

Policies and Actions

- * Vehicles will be permitted only on the public access roads shown on the map (centre pages).
- * Flat-topped speed humps, speed limit signs and signs warning of cyclists and walkers on the roads will be erected at strategic locations. The speed humps on Max Allen Drive will be replaced with flat-topped speed humps at strategic locations.
- * If the Delhi Road entrance to the park is closed, the weir will be widened or the river bridged to permit public vehicular and pedestrian access between the two sides of the park. The Fullers Bridge entrance gate on Delhi Road will be closed and the entrance box removed after alternative access arrangements have been implemented.
- * Bicycles will be permitted on roads, management tracks and cycleways within the park but not on walking tracks.

- * The walking tracks shown on the park map will be retained and where necessary upgraded. Directional and information signs will be installed along the Great North Walk, through Fairyland, along the Riverside Walking Track and to indicate the track up to and across De Burghs Bridge.
- * The walking track from Fairyland to Riverside Drive which crosses Delhi Road near the top of the hill is unsafe and will be closed and revegetated.
- * Informal tracks not part of the walking track system will be closed and rehabilitated.
- * Horseriding will continue to be prohibited in Lane Cove National Park.
- * Dogs will not be permitted in the park, except for registered guide dogs.
- * Picnic shelters, barbecues and park furniture will be progressively standardised in accordance with the Service's park furniture manual.
- * No new picnic areas will be constructed within the park.
- * Small and informal picnic areas will be assessed and little used areas will be closed, the barbecues, bins and tables removed, and the areas revegetated.
- * Areas 21, 22 and 24 will be closed and revegetated.
- * Planting will be undertaken in some of the larger picnic areas to break up the areas into smaller areas.
- * Planting will be undertaken to screen unsightly toilet blocks, the picnic areas along Lady Game Drive and storage areas.
- * Gas or similar portable stoves will be permitted, but heat bead and charcoal stoves will not be allowed in the park.
- * Gas or electric barbecues will be progressively installed to replace wood barbecues. Priority will be given to those areas that are available for booking and high use picnic areas near the weir.
- * Wood barbecues in other formal picnic areas will be reduced in number and moved away from the bush where necessary to reduce risk of bush fires.
- * Fires will only be permitted in formal barbecues/fireplaces.
- * Garbage bins/recycling stations will be centralised near carparks.
- * Children's play equipment will be provided near the weir, at Tunks and at areas 11 (Barakee) and 15 (Scribbly Gums). In the longer term, the play equipment will be replaced with more natural play facilities using timber where possible.
- * A small parking area will be provided adjacent to Pittwater Road near Sugarloaf Point.
- * Negotiations will be undertaken with Ku-ring-gai Council to provide a footpath/cycleway along Lady Game Drive outside the park.
- * Power boats will not be permitted above the weir.
- * Off-street parking for cars carrying canoes and other small boats will be provided near Casuarina Flat/Wirrong Flat on River Avenue. No launching for trailable boats will be provided within the park.
- * Signs will be erected notifying visitors of the restrictions on fishing within the park.

- * Commercial organisations, and organised activities with the potential to cause disturbance to other visitors or the park, will require a licence or consent agreement.
- * Activities which pose a danger to other users, create a significant noise or other nuisance, or have an impact on the natural or cultural heritage will not be permitted.
- * Mechanical and animal rides will not be permitted in the park.
- * The kiosk will be relocated to a site adjoining the visitors centre.
- * The paddlewheeler will be removed from the park following the expiration of its lease.
- * Camping will be permitted only in the caravan park area of the national park.
- * The caravan park will be managed by the Service, either directly or by a contract manager.
- * The caravan park will be reduced in size and redesigned to make it more appropriate to its national park setting. The number of on-site vans will be decreased, the number of sites available for campers will be increased, and inappropriate developments such as the aviary will be removed.
- * No people other than those authorised by the Minister in 1997 will be permitted to stay long-term in the caravan park. Those authorised to stay may not transfer their sites to another person and may only sell any improvements on the site on the basis that they are immediately removed from the caravan park.
- * All renegotiated leases will require concessionaires to increase the educational role of their facilities within the park.

- * All lessees and commercial operators will be required by their lease or licence to comply with environmental safeguards such as containment of pollutants including septic tank and stormwater run-off, the removal of introduced plants and animals, and the rehabilitation of any bushland disturbed by their operations or by their visitors.

4.3.3 Research

The purpose of scientific study in Lane Cove National Park is to improve understanding of its natural and cultural heritage and the processes which affect them. Research also establishes the requirements for management of particular species or communities.

Research studies that have previously been undertaken in Lane Cove National Park include drainage amelioration projects, visitor use surveys, native mammal population dynamics, biogeographical research and cultural heritage projects.

The Service's staff and financial resources must be directed towards the research areas of greatest need. Research by other organisations and students may provide valuable information for management and assist management by trialling new systems. Lane Cove National Park is ideally situated to provide accessible research projects for students at Macquarie University and the University of Technology Sydney's Ku-ring-gai campus, both of which are within walking distance of the park.

Some important research topics have already been mentioned in earlier sections of this plan. However the park also has many areas that present further opportunities for appropriate research by outside organisations. A prospectus will be prepared to encourage involvement of other organisations in priority research areas, such as ongoing investigation of user needs, continued research into long term solutions to the parks weed and drainage problems, further studies on the impacts of urbanisation on the valley's small mammal populations and research into the management of the areas threatened species and uncommon plant communities.

Policies and Actions

- * Research which assists in improving the management of Lane Cove National Park will be encouraged.
- * Liaison will be maintained with researchers to obtain as much mutual information and assistance as possible. The results of research will be required to be provided to the managers of the area.
- * Research structures and long term markers must be placed in locations which will minimise their visual impact and be removed upon completion of the research.
- * A prospectus will be prepared as a guide to preferred research projects in flora and fauna management, fire ecology and management, visitor use of the area and cultural heritage management. Preferred topics will be those of direct relevance to management and will include:
 - stormwater and drainage amelioration research;
 - surveys to identify locations of threatened species and management guidelines to protect these species;
 - pre and post fire weed management and bush regeneration studies;
 - Aboriginal occupation and use of the area;
 - ongoing investigation of park visitor expectations and needs; and
 - further study into the species diversity and population levels of small native mammals found in the park.

4.3.4 Management Operations

Lane Cove National Park has a varied and disjointed boundary. Visitors and neighbours are often unaware of the actual location of the park boundary and this causes unnecessary management problems.

There are at present two major roads through the park. Riverside Drive, which follows the river from the entrance gate near Fullers Bridge on Delhi Road up to the De Burghs Bridge entrance on Lane Cove Road, is designated as a public road and hence is maintained by the RTA. Riverside Drive provides access to all the picnic areas situated on the Ryde side of the river. Max Allen Drive which services the Ku-ring-gai side of the park up to area 36 and the park office, is designated a park road and is maintained by the National Parks and Wildlife Service. This road also provides access to the park workshop and two Service houses. The park is closed to vehicles at night as a control on vandalism.

Both sides of the river are linked by the weir at the lower end of the park. The weir was constructed during the 1930s and has been progressively deteriorating since that time. Due to its narrow width and structural condition, the weir is currently only open to use by Service vehicles, cyclists and pedestrians.

Sections of the Great North Walk run through the park. The track is generally maintained by the Department of Land and Water Conservation, although major work such as steps and bridges is undertaken by park staff.

The park also contains a number of management tracks which primarily serve as fire breaks and provide access for fire management. There is also a management track which provides access from the workshop to the picnic areas and Bradfield Road. The management tracks within the park are shown on the map, centre pages. There is some illegal use of these tracks by cars and trail bikes which causes damage to the tracks and increases maintenance costs.

Park buildings include the office and Jenkins Hall, a workshop to service the park, and staff residences. Four houses are situated within the main body of the park and three houses along River Avenue, West Chatswood. Three houses along River Avenue have recently been demolished. Except for 11 River Avenue, the houses along River Avenue which are in the park were transferred to the Service by the Department of Urban Affairs and Planning with the long term aim being to demolish the houses and provide open space by either revegetating or grassing the building sites. Additional houses along the waters edge of River Avenue are proposed for acquisition for open space.

There are a number of toilets within the park that are not connected to the sewerage mains, including those in the residences near the workshop and De Burghs Bridge and in some picnic areas along the river. All toilets will be progressively connected to the sewerage or provided with other means of sewerage disposal, or removed.

There are several sewerage lines, power lines, water lines and water mains which traverse the park. Killara Golf Club has a licence to pump water from the river through the park and Sydney Water and Transgrid have easements for their lines and rights of access to service the lines. Licences are required to formalise those services and access requirements not already covered by a licence or easement and to minimise impacts. Due to the narrow configuration and small size of the park any further such developments in the park are considered inappropriate.

Policies and Actions

- * Signs will be erected to designate park boundaries.
- * The section of the park between Fullers Bridge and De Burghs Bridge will continue to be closed to vehicular traffic at night.
- * The houses along River Avenue which are on land purchased for open space will be progressively demolished and the house sites rehabilitated.
- * The toilets to remain within the park will be progressively connected to the sewerage or alternative environmentally acceptable systems installed.
- * Licence agreements will be negotiated to cover sewerage lines, water mains and power lines which cross the park and are not currently subject to a licence or easement.
- * Use of management tracks, and of the river above the weir by power boats, will be restricted to authorised management purposes.

- * Management tracks shown on the park map will be maintained and gated to prevent illegal access. Other vehicle tracks not part of the management track or vehicle access system will be closed and revegetated.

- * The Service will oppose any further non-park facilities within Lane Cove National Park.

5. PLAN IMPLEMENTATION

This plan of management is part of a 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 implementation of this plan will be undertaken within the annual programmes of the Service's North Metropolitan District. Priorities, determined in the context of district and regional strategic planning, will be subject to the availability of necessary staff and funds and to any special requirements of the Director-General or Minister.

District programmes are subject to ongoing review, within which, works and other activities carried out at Lane Cove National Park 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 the 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 effect to, and that no operations shall be undertaken in relation to the national park unless they are in accordance with the plan. However, if after adequate investigation, operations not included in the plan are found to be justified, this plan may be amended in accordance with section 76(6) of the Act.

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

Activity	Plan Reference
High Priority	
Undertake erosion control works along the Great North Walk and Riverside Walk	4.1.1
Approach Sydney Water and councils to install pollution control and drainage amelioration measures	4.1.2
Provide information on catchment management at weir	4.1.2
Prepare and implement weed management plan	4.1.3
Remove weeds from identified priority areas	4.1.3
Prepare and implement feral animal control plan	4.1.4
Continue control of cats and foxes and removal of dumped animals	4.1.4

High Priority Activities (continued)	Plan Reference
Provide information on feeding of animals at weir	4.1.4
Prepare fire management plan for park	4.1.5
Undertake protection of Fairyland midden	4.2.1
Consult with Metropolitan Land Council concerning Aboriginal sites inspections and maintenance programs	4.2.1
Redevelop Jenkins Hall to provide a visitor information centre	4.3.1
Upgrade educational information within Kukundi	4.3.1
Improve signage at park entrances	4.3.1
Upgrade park brochure	4.3.1
Close and revegetate walking track across Delhi Road	4.3.2
Install gas or electric barbecues in picnic areas	4.3.2
Establish recycling stations	4.3.2
Erect signs on fishing	4.3.2
Redesign caravan park	4.3.2
Medium Priority Activities	
Close and rehabilitate informal tracks	4.1.1
Liaise with universities into continued research into water quality and amelioration projects	4.1.2
Encourage voluntary conservation agreements for bushland adjoining the park	4.1.3
Upgrade sub-district threatened species data base	4.1.3
Seek co-operation of authorities and neighbours regarding complementary weed control programs	4.1.3
Install fish ladder on weir	4.1.4
Develop community education program on domestic animals	4.1.4

Medium Priority Activities (continued)	Plan Reference
Update maps of the fire history of the park	4.1.5
Prepare information on fire for neighbours	4.1.5
Consult with Metropolitan Aboriginal Land Council regarding interpretation of Aboriginal sites in park	4.2.1
Undertake an assessment of the historic significance of introduced plants in the park	4.2.2
Erect interpretive signs at historic sites	4.2.2
Construct intensive care facilities at Kukundi	4.3.1
Install speed humps and speed limit, bicycle and pedestrian warning signs along Riverside Drive and Max Allen Drive	4.3.2
Close and revegetate unwanted picnic areas	4.3.2
Undertake screen and clump planting	4.3.2
Centralise play equipment in designated areas	4.3.2
Provide parking area near Sugarloaf Point	4.3.2
Prepare prospectus for preferred park research topics	5
Erect signs to designate park boundaries	7
Upgrade the park's sewerage system	7
Lower Priority Activities	
Encourage research into native animals	4.1.4
Investigate means to control carp	4.1.4
Encourage integrated feral animal control program	4.1.4
Encourage research into fire	4.1.5
Encourage Aboriginal sites survey of the northern section of the park above De Burghs Bridge	4.2.1

Lower Priority Activities (continued)	Plan Reference
Catalogue artefacts held in park and by Ryde Historical Society and develop management agreements	4.2.2
Review long term function and role of Kukundi	4.3.1
Select site for and construct self guided educational walk	4.3.1
Close and rehabilitate informal walking tracks	4.3.2
Relocate kiosk	4.3.2
Establish path along Lady Game Drive	4.3.2
Provide parking area for canoeists on River Ave	4.3.2
Rationalise park picnic areas, furniture and barbecues and regenerate unused picnic areas	4.3.2
Demolish remaining houses in park along River Ave	7
Negotiate licence agreements to cover services which cross the park	7

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