BROADWATER NATIONAL PARK BUNDJALUNG NATIONAL PARK AND ILUKA NATURE RESERVE

PLAN OF MANAGEMENT

NSW National Parks and Wildlife Service

August 1997

Acknowledgments: The principal author of this plan of management was Bob Moffatt, ranger, Lismore District of the National Parks and Wildlife Service. The contribution of staff from the Grafton District Office, particularly Bob Friederich, District Manager and the District Advisory Committees is gratefully acknowledged. This plan has been reviewed and edited by Graeme McGregor, planning officer, Lismore District office.

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FOREWORD

The area covered by this plan of management comprises three outstanding coastal reserves, Broadwater and Bundjalung National Parks and Iluka Nature Reserve, which are located on the far north coast of New South Wales. These areas protect most of the coastline between Iluka on the Clarence River and Ballina on the Richmond River and, together with Yuraygir National Park to the south, comprise a large conservation system which ranks in importance with only a handful of other conservation areas on the east coast of Australia. Iluka Nature Reserve is an outstanding example of littoral rainforest and is part of the World Heritage listed Central Eastern Rainforest Reserves (Australia) World Heritage area.

The coastal setting of the planning area is popular with holiday makers and is easily accessible from nearby coastal villages and towns. The main physical features of the two national parks are the beaches, headlands, estuaries and rivers and coastal sand plain and dune systems. Freshwater lakes and wetlands and as well as the estuarine lagoons are some of the hydrological features of the parks. This range of physical settings supports a diversity of habitats and wildlife including extensive heathlands and swamps.

This plan of management proposes to continue to manage the catchment of the Esk River as a 'primitive area' suited to self-reliant bush walking and where no formal recreation facilities will be developed.

Aspects identified for further development in the planning area are interpretation and environmental education facilities, extension of the walking track system on the Iluka Peninsula and the construction of further sections of the perimeter fire management trail system in Bundjalung National Park. In Bundjalung National Park emphasis is given in particular to reducing the overall frequency and extent of fires, so as to enable the rehabilitation of native vegetation communities which have become degraded from too frequent fires. Weed control is a high priority to protect the Iluka rainforest.

The National Parks and Wildlife Service of NSW will maintain current access and recreational facilities provided in both the national parks. The Iluka Peninsula in Bundjalung National Park has a full range of recreational facilities and the access roads to this area will be sealed. The plan also sets out steps to be taken that will protect the high quality camping and recreational experience at Woody Head.

The plan identifies the protection of all Aboriginal sites as part of the on-going management requirements and seeks the involvement of the Bundjalung Aboriginal community in site management and interpretation. The plan also indicates the importance of maintaining neighbour relations in assisting to manage fire and pest plants and animals.

This plan of management establishes the scheme of operations for Broadwater and Bundjalung National Parks and for Iluka Nature Reserve. In accordance with the provisions of Sections 75 and 76 of the National Parks and Wildlife Act, 1974, this plan of management is hereby adopted.

PAM ALLAN

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 and nature reserve. A plan of management is a legal document that outlines how an area will be managed in the years ahead.

The procedures for the adoption of a plan of management for a national park 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 all submissions are referred to the National Parks and Wildlife Advisory Council for consideration and report to the Minister.
- The Director-General submits the plan, together with the report of the Advisory Council, to the Minister.
- The Minister may adopt the plan with or without alteration after considering the recommendations of the Advisory Council or may refer the plan back to the Director-General and Council for further consideration.

A draft plan of management for Broadwater and Bundjalung National Parks and Iluka Nature Reserve was placed on public exhibition for four months between January and May 1996. Eighty six representations were received during this period covering twenty two issues and 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.

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

The planning process leading to the development of this plan has involved the collection and use of information, which for reasons of document size, has not been included in the plan. For additional information or enquires on any aspect of the management of the three areas please contact the Service's:

Lismore District Office
Colonial Arcade
Alstoneville **phone** (066) 28 1177

for Broadwater National Park and the northern half of Bundjalung National Park; or the

Grafton District Office
50 Victoria Street
Grafton **phone** (066) 42 0613

for the southern half of Bundjalung National Park and Iluka Nature Reserve.

2. MANAGEMENT CONTEXT

2.1 NATIONAL PARKS IN NSW

The national park concept was introduced into Australia through the establishment of Royal National Park in 1879.

The International Union for the Conservation of Nature and Natural Resources (IUCN) in 1994 defined 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."

National parks are a part of the regional pattern of land use. The management of a national park aims at minimising disturbance to natural and cultural resources. Other land uses, for example, agriculture, forestry and mining, are distinguished by an acceptance 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 NATURE RESERVES IN NSW

Under the *National Parks and Wildlife Act, 1974*, nature reserves are areas of special scientific interest containing wildlife or natural environments or natural phenomena. The purposes of nature reserves are defined in the Act as:

- the care, propagation, preservation and conservation of wildlife;
- the care, preservation and conservation of natural environments and natural phenomena;
- the study of wildlife, natural environments and natural phenomena; and
- the promotion of the appreciation and enjoyment of wildlife, natural environments and natural phenomena.

2.3 WORLD HERITAGE AREA

Iluka Nature Reserve contains the most significant remaining occurrence of littoral sub-tropical rainforest in New South Wales. For this reason it is part of the Central Eastern Rainforest Reserves (Australia) World Heritage area.

The International Convention for the Protection of the World Cultural and Natural Heritage was adopted by the United Nations Educational, Scientific and Cultural Organisation in 1972. The Convention provides a permanent legal and administrative framework for international cooperation and the collective protection of the cultural and natural heritage of outstanding universal value. The World Heritage Convention is designed to complement, aid and stimulate national initiatives, but not compete with them or take their place. The Convention clearly identifies that it is for each country to accept the responsibility for the conservation of its own heritage.

The Convention provides for the listing of properties on the basis of cultural or natural heritage of outstanding universal value. The rainforests of NSWrepresent

a natural heritage of international significance as ancient and isolated reservoirs of a great variety of plant and animal species.

The inclusion of the Central Eastern Rainforest Reserves (Australia) in the World Heritage list adds to the World Heritage properties in Australia, including Kakadu National Park, Uluru-Kata Tjuta National Park, Fraser Island, Shark Bay, the Great Barrier Reef, Willandra Lakes Region, the Tasmanian Wilderness, Wet Tropics of Queensland, Australian Fossil Mammal Sites and the Lord Howe Island Group.

2.4 LOCATION AND REGIONAL SETTING

Broadwater and Bundjalung National Parks and Iluka Nature Reserve (referred to as the **planning area** in this document) are part of a major conservation system covering much of the subtropical coast of northern NSW. The three areas are virtually continuous and are located approximately 750 kilometres north of Sydney and 300 kilometres south of Brisbane. The planning area is easily accessed by sealed roads from the Pacific Highway, the major route along the east coast of Australia (refer to map 1).

Broadwater National Park, (refer to map 2) contains 3 800 hectares of coastal land and is located approximately 35 kilometres south-east of Lismore. The park extends from near Evans Head village in the south, northwards toward the village of Broadwater and includes some 9 kilometres of coastline. The villages of Rileys Hill and Woodburn are located near the northern and south western boundaries of the park, which is fringed by extensive areas of sugar cane farming and rural subdivision.

Bundjalung National Park (refer to map 4), extends from South Evans Head village and the Evans River south to the Clarence River. Approximately 35 kilometres of coastline is covered by the park which contains 17 738 hectares of coastal land. The park includes the full length of Ten Mile Beach, one of the longest beaches on the North Coast of NSW. Inland the park incorporates the Esk River, a tributary of the Clarence River, and much of its catchment. The park is, therefore, a substantial tract of largely natural land backed by State forests and rural land, with urban development abutting the northern and southern extremities.

Iluka Nature Reserve is 136 hectares in area of which approximately 90 hectares is littoral rainforest (refer to map 3). The Reserve abuts the southern end of Bundjalung National Park and the village of Iluka at the entrance of the Clarence River.

Iluka Nature Reserve was dedicated in 1976 and both Broadwater and Bundjalung National Parks were reserved in 1980.

2.5 IMPORTANCE OF THE PLANNING AREA

Iluka Nature Reserve, Broadwater and Bundjalung National Parks together with Yuraygir National Park to the south, protect much of the long stretch of coastline between the Richmond River in the north and the village of Red Rock in the south. These four areas are recognised as being one of a small number of groupings of protected areas of national and international significance which are found on the east coast of Australia.

An essential aspect of the management of the national parks and the nature reserve is to recognise their significance in the framework of a regional

conservation strategy. Such a strategy is to protect biodiversity and take into account the inter-relationships that exist between individual protected areas, and groups of protected areas, and other forms of land use. The provision of a network of conservation areas, such as exists on the north coast of NSW, is essential to allow plant and animal communities to survive and adapt in the context of environmental change.

The planning area is also significant as it exhibits high levels ofbiodiversity which reflects the diverse vegetation communities and climatic conditions within the three areas. The planning area contains subtropical communities, being at the end of the southern range of the subtropics, as well as coastal communities and supports temperate species. The variation in vegetation communities in the parks provides large ecotones that supports a diverse range of animal species.

The planning area lies within a regionally important land system of coastal sand plain containing coastal erosion and deposition landforms within the ancient river valleys of the Clarence and Richmond Rivers. The ancient valleys lie on the eastern margin of the Clarence-Morton Basin, and geologically the area is of particular interest.

Examples of the large sand dune and swale complex which were formed during the Pleistocene Epoch some 60 000 years ago, are contained in both Bundjalung and Broadwater National Parks. A full range of coastal landforms and related biological features are protected in these parks which demonstrate important aspects of the evolution of the coastline of northern NSW.

The vegetation supported by these landforms is equally complex, with a mosaic of wet and dry heathland communities, hind-dune swamps of sedges and rushes, swamp sclerophyll forest along marshes and waterways, areas of open eucalypt woodland and forest and small areas of subtropical littoral rainforest. The pattern of vegetation varies according to soil nutrients, topography, drainage, exposure to coastal winds and fire history.

At least 48 of the plant species found in the planning area are considered to have special ecological significance and two are listed as endangered and three as vulnerable. The littoral rainforest community at Iluka Nature Reserve is of particular significance as the largest and one of the most diverse stands of this community in NSW. This type of community is of considerable scientific interest because of the specialised environment in which it occurs.

The planning area protects more than 280 species of reptiles, birds and mammals. Twenty-six species of bird which occur in the planning area are recognised as being either endangered or vulnerable and therefore of high conservation status. Emus appear to be locally extinct in Broadwater National Park but survive in small numbers in Bundjalung National Park. Fourteen species of mammal and three species of amphibian occurring in the planning area are listed as vulnerable.

The coast of NSW includes a discontinuous chain of heathlands which are essential for the north-south migration of animals, particularly honeyeaters. Broadwater and Bundjalung National Parks are important links in this chain.

The forests of the Iluka Peninsula are temporary summer camps for several species of bat and the wide range of vegetation communities in the park provides over-wintering habitat for many species of birds.

The coastal wetlands, dunes and ocean foreshores are important feeding and roosting sites for a number of migratory and resident shorebirds. Several

species are subject to international conservation agreements; particularly the agreements between the Government of Australia and:

- the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment [Japan Australia Migratory Bird Agreement (JAMBA)]; and

- the Government of the People's Republic of China for the protection of Migratory Birds and their Environment [China Australia Migratory Bird Agreement (CAMBA)].

Broadwater and Bundjalung National Parks contain sites and places of significance to the Bundjalung Aboriginal community, some of which are of archaeological significance to all Australians. Goanna Headland which lies adjacent to Bundjalung National Park (but is not within the park) has particular mythological significance and is managed by the Dirrawong Reserve Trust.

Sites of non-Aboriginal occupation and use within the planning area include the foundations of a World War II observation tower at Broadwater Lookout and bunkers associated with disused target practice ranges in the central area of Bundjalung National Park. Mineral sands mining is the other major activity that has modified minor parts of the park.

The coastline of Broadwater, Bundjalung and Yuraygir National Parks is one of the most important coastal national park regions of Australia. It attracts visitors from many parts of the continent with an estimated 1.2 million visitors annually to the planning area. Visitors come principally from coastal NSW, Sydney and south-east Queensland.

The combination of coastal resorts, villages, national parks and coastline provides opportunities for every kind of coastal holiday with boating, picnicking, bushwalking, camping, fishing, swimming and surfing available on some of the best beaches in Australia.

The North Coast Region of NSW has been identified as a priority area for tourism development. The Tourism Strategy prepared for the north coast by the Department of Tourism recognises that tourism development needs to be sympathetic to the natural environment and encourages the appropriate and sustainable use of natural attractions and visitor facilities.

The significance of the planning area is summarised below:

Regional nature conservation values. The planning area:

- is part of a sub-regional system of coastal national parks which protect important conservation features typical of the north coast of NSW including plant communities such as wet and dry heathland, eucalypt forest and woodland;

- protects landscape features demonstrating the evolution of the extensive Pleistocene sand plain and dunal system and on-going process of coastal erosion;

- protects diverse habitats which support a wide range of wildlife communities including refuges for plants and animals of ecological significance;

- is an important link for the north-south migration of some animal species particularly migratory birds;

- provides over-wintering grounds for many other species;

- protects extensive freshwater and estuarine wetlands and coastal hind-dune wetland systems; and

- protects parts of the estuaries of the Clarence and Evans Rivers.

Iluka Nature Reserve protects a significant remnant area of sub-tropical littoral rainforest as part of a system of rainforest parks which are World Heritage listed.

Bundjalung National Park protects the river and catchment of the Esk River, a major coastal stream lying largely within Bundjalung National Park.

Regional cultural heritage values. The planning area:

- includes sites which are of spiritual significance and of contemporary importance to the Aboriginal community;

- demonstrates the pattern of Aboriginal occupation and economy; and

- demonstrates the impact of more than 50 years of mineral sands mining and defence activities.

Regional educational and scientific values. The planning area:

- provides opportunities for environmental education and field studies; and

- provides opportunities for scientific studies of:

  - coastal processes;
  - endangered and vulnerable species; and
  - fire ecology.

Regional recreation and tourism. The planning area:

- provides a range of opportunities for outdoor recreation, both land and water based, in a natural setting;

- is a major destination for visitors to the North Coast of NSW to experience the region's outstanding natural coastal environment; and

Provides for the appreciation of the natural environment and cultural heritage of the region.

3. OBJECTIVES OF MANAGEMENT

The following general objectives relate to the management of national parks and nature reserves in NSW:

- the protection and preservation of their scenic and natural features;
- the conservation of wildlife;
- the maintenance of natural processes as far as is possible;
- the preservation of Aboriginal sites and historic features;
- the provision of appropriate recreation opportunities; and
- the encouragement of scientific and educational inquiry into environmental features and processes, prehistoric and historic features, and park use patterns.

Further to these general objectives, the following specific objectives will be applied to the management of the planning area:

- The protection of the planning area as part of a regionally important system of national parks and nature reserves on the north coast of NSW.
- The protection of geomorphological and hydrological features within Broadwater and Bundjalung National Parks.
- The maintenance of biodiversity with priority given to the protection of those communities in the planning area containing endangered and vulnerable species, particularly heathlands and littoral rainforest communities in Iluka Nature Reserve and Bundjalung National Park.
- Protection of the natural values and the recreational setting of the Esk River within Bundjalung National Park.
- Protection of the remote natural area setting within the designated Primitive Area of Bundjalung National Park.
- The protection of Aboriginal sites and places, and the provision of opportunities for the Aboriginal community to be involved in the management of the planning area.
- Promotion of public awareness and appreciation of the planning area with emphasis on:
-

- the importance of the planning area in the regional pattern of conservation areas on the NSW north coast;

- the physical and biological significance of the coastal environment for the conservation of native plants and animals;

- appropriate use of the of the two national parks and the nature reserve, and

- appreciation of Aboriginal and historic heritage.

- Ensuring that the pattern and level of outdoor recreation is appropriate to the conservation objectives for the planning area with emphasis on the

provision of a range of vehicle and walking access opportunities and low key facilities.

Overall Strategy

To give effect to achieving these objectives of management, the following strategies will also apply to the management of the planning area:

- Protection of the existing native plant and animal communities by reducing, and where possible eliminating, threats to those communities.
- Establishment of a fire regime consistent with maintaining native plant and animal diversity in a regional context and in particular excluding fire from the Iluka Nature Reserve.
- The provision of additional environmental education and interpretation programs.
- Promotion of appropriate land use planning and management amongst neighbours and other land management authorities which will protect to the highest levels practicable the natural and cultural values of the planning area.
- Emphasis within the local community, particularly neighbours of the planning area, of the importance and purpose of management programs relating to the protection of the natural and cultural heritage, and the control of fire, weeds and feral animals.
- The development of additional nature based tourist and recreation facilities by the private sector will be encouraged on lands adjacent to, or in close proximity to, the planning area rather than within it.

4. POLICIES AND FRAMEWORK FOR MANAGEMENT

This chapter contains the policies and framework for the management of Broadwater and Bundjalung National Parks and Iluka Nature Reserve together with relevant background information.

Policies are summarised under the following section headings:

4.1 Natural and cultural values of the planning area; and

4.2 Promotion and use of the planning area.

The policies established in this plan of management will provide the framework for management decisions consistent with the anticipated financial and human resources available to the NPWS for the next five to ten years.

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

4.1 NATURAL AND CULTURAL VALUES OF THE PLANNING AREA

4.1.1 Landforms, Geology, Soil and Hydrology

Iluka Nature Reserve and most of Broadwater and Bundjalung National Parks is comprised of coastal sand plain country with low relief, generally less than 10 m in height. The landform features of the parks comprise:

- Rocky headlands, mostly in Bundjalung National Park;
- Coastal frontal dunes and beaches;
- Coastal hind-dune wetland systems, such as Salty Lagoon in Broadwater National Park;
- Sand plains made up of a mosaic of deflated transgressive dunes of aeolian origin and backed by parallel barrier sand ridges and swales of marine origin;
- High dunes up to 70 m above sea level in the north of Bundjalung National Park;
- The coastal river basin of the Esk River;
- Estuarine landforms along the southern bank of the Evans River; and
- Low ridges of sedimentary bedrock in the west of Bundjalung National Park.

The coastal sand plain country of the planning area is Quaternary material ranging in age from Holocene deposits less than 10 000 years old to 120 000 year old Pleistocene sand beach ridge barriers, which now lie several kilometres inland from the present coastline.

The sand plains overly the sedimentary rocks of the Clarence-Morton Basin [laid down during the Late Triassic and Jurassic Periods (about 210 to 145 million years ago)] and the older sedimentary rocks of the New England Fold Belt [from the late Carboniferous (ending 298 million years ago) and possibly extending into the Late Triassic Period (about 220 million years ago)].

Within Broadwater National Park, rocks of the New England Fold Belt are mantled by sand and rise to a height of 40 metres at the lookout on the Broadwater to Evans Head Road. Rocks of the Clarence-Morton Basin outcrop at Lang Hill and Rileys Hill adjacent to the western boundary of the park. In Bundjalung National Park, the New England Fold Belt outcrops at Goanna

Headland immediately north of the park. Clarence Basin rocks occur along the NW and SW edges of the park and make up the headlands of the Iluka Peninsula in the south of the park including Woody Head and Iluka Bluff.

Indurated sands ('coffee rock') of Pleistocene age, overlies the Clarence Basin sedimentaries and forms a substrate to the sand plains in both parks. Coastal erosion has exposed the coffee rock layer along much of the ocean foreshore of Broadwater National Park and in the foredune areas at Black Rocks in Bundjalung National Park.

The Quaternary sands of Pleistocene age, which make up the dominant sand plain landform of the planning area, overly the 'coffee rock' and the older geological features. These sand ridges were deposited during earlier periods of high sea level as marine sediments. Subsequent accumulations of wind-blown sands accentuated the well developed parallel barrier sand ridge and swale complex which is a feature in both parks. These have been worked into a high dune system in the northern section of Bundjalung National Park with dunes up to 70m in height.

A subsequent reworking of the coastal dune systems during a period of shoreline erosion is believed to have concentrated the heavy minerals into a 'zone of mineralisation'. Mineral sands mining of this zone was a significant activity in Broadwater and Bundjalung National Parks and involved the extraction of the heavy minerals, rutile, zircon, monazite and ilmenite. Gold mining was carried out intermittently on beaches in the “Richmond River area”, from about 1875 onward. Platinum was discovered about 1888 in the Buchanan’s Head area (within what is now Yuraygir National Park) and in the Jerusalem Creek area (Macaulay’s Lead) in 1894 while other back barrier deposits were recognised about the same time. The industry recognised the North Coast as a major source of high quality rutile, zircon and monazite in 1925. Commercial mining activity began in about 1932 and continued intermittently till 1982. More than 1,000 hectares of sand dunes were mined in the two parks including approximately 740 hectares in Bundjalung National Park.

In June 1977, the State Government established the current policy on coastal mineral sands mining whereby the granting of new mining approvals in existing and proposed national parks ceased. As established leases expired they were not re-granted and mineral sands mining was progressively phased out in conservation areas along the NSW coast.

Primary restoration of mined and disturbed areas has been completed although the standard and success of restoration varies. There is a requirement for continued protection of restored areas against weed invasion, damage from fire and visitor use.

A large quantity of tailings from heavy mineral sands mining, known as the “ilmenite dump”, remains on the western side of Jerusalem Creek. The dump may constitute a public health hazard if people were to stay on the site for a lengthy period of time as heavy minerals emit low levels of radioactivity. The site is remote from the Black Rocks camping area and walking tracks, and so is not an immediate hazard. The dump, however, requires removal followed by restoration of the site.

Wind-blown sands of Holocene age (over 6,000 years ago) comprise the dune sand masses along the coastal fringe. These cover the Iluka Peninsula and form frontal dunes and beaches along the coast of both parks. These recent dune systems are highly mobile and susceptible to blow-outs and appear to be moving westward in some areas, for example, into the Salty Lagoon area.

The frontal dunes are exposed to coastal erosion and are fragile systems. They require protection from damaging or destabilising uses such as 4WD vehicle use, and having vegetation cover removed such as when burnt by fire.

A community-based volunteer Dune Care group for Broadwater Beach has been established, partly in response to dune erosion and is supported by the NPWS by providing advice. The group undertakes weed control, revegetation and dune stabilisation works in the vicinity of Broadwater Beach picnic area.

Soil development in the planning area relates to:

- the nature of the depositional and soil formation environments; and
- the age since deposition and hence the degree of podzolisation (leaching).

The following soil types are found within the planning area:

- **Quaternary marine-aeolian sands** which comprise

  siliceous sands developed from berm and dune accumulations of Holocene age with little or no profile development. These are pale yellow to light brownish grey in colour.

  sand podzols developed from well drained Pleistocene sands. These are characterised by a dark grey upper horizon rich in organic matter with a conspicuously bleached light grey to white mid horizon and a yellowish brown to dark brown coloured horizon below.

  humus podzols developed from low lying Pleistocene sands subject to extended periods of waterlogging, and which are characterised by a well developed grey to black upper horizon of decomposed and partly humified plant material above a dark indurated horizon.

  acid peats occurring in open depressions where standing water is present for extended periods and which are characterised by a surface accumulation of almost black, strongly acid, peaty organic matter. The underlying mineral material is commonly Pleistocene sand.

- **Quaternary estuarine deposits** which comprise:

  solonchaks developed from Holocene intertidal deposits of mud and sand. The only pedological development is a surface accumulation of organic matter. The soils are frequently waterlogged with saline or sub-saline water.

  sandy back barrier deposits are soils confined to the western portions of Bundjalung National park and appear to be sandy podzols over a shallow watertable.

- **Soils on Mesozoic aged rocks** which comprise red and yellow massive earths formed on the Mesozoic ridges outcropping in the north-west and west of Bundjalung National Park and on the coastal headlands. A loose fine sandy topsoil overlies a sandy loam which merges into a structureless sandy to clay loam below.

All soils, both of coastal or sedimentary origin, present constraints on use as they are highly erodible. This is the result of the soils being sandy, poorly structured

and infertile due to low levels of organic matter. These soils are unable to sustain regular vehicle traffic or high pedestrian use without damage.

There are several substantial hydrological systems within the parks including extensive wetlands, perched freshwater lagoons and coastal rivers and estuaries.

- Within Broadwater National Park the **Salty Creek-Salty Lagoon** system is the major hydrological feature, and along with other smaller intermittent watercourses, drains the heathlands of much of the park.

  The volume and salinity of water in Salty Lagoon fluctuates markedly depending on the amount of freshwater inflow and the presence of a sand bar at the ocean entrance to the system. A channel, excavated between the Salty Creek and Salty Lagoon before the park was reserved, has increased drainage for the catchment and resulted in a much reduced wetland area than existed previously.

  The catchment of the Salty Lagoon - Salty Creek system extends outside the park boundary. Included in the catchment is the Evans Head sewage treatment plant and a garbage disposal area. An assessment of the capacity of the catchment to receive the effluent discharge was undertaken during 1984/85 and found little evidence of eutrophication of the water within the park. The garbage disposal area adjacent to the treatment plant may produce leachates in surface runoff or into the ground water.

- The **Esk River** is an important hydrological system in Bundjalung National Park, being one of the longest coastal rivers on the north coast in a natural condition. The Esk River is some 15 kilometres long and is a tributary of the Clarence River. Most of its catchment is contained in southern and central Bundjalung National Park. Parts of the upper catchment are outside the park in a number of land tenures including State forest.

  Low salinity levels and restricted tidal flow in much of the Esk River result from subsurface freshwater movement from wetlands which cover the majority of the catchment. Significant sand bars in the lower reaches inhibit tidal exchange and so protect the freshwater environment. The freshwater nature of the Esk River could be put at risk if dredging were to occur in the lower parts of the river.

- Some 8 kilometres of the southern bank of the **Evans River** lies within Bundjalung National Park. This protects important estuarine environments.

- Large perched **freshwater lagoons** associated with the high dunes occur in the Defence Bombing Range areas in the north of Bundjalung National Park.

- **Jerusalem Creek** is a small natural creek-estuary system of approximately 5 kilometres in length on the central coast extending north of the Black Rocks camping area in Bundjalung National Park.

Policies

* All geological, geomorphological, pedological and hydrological features and areas of scientific interest within the planning area will be protected, including:

- coastal lagoons and wetlands;
- beach dune systems;
- the high dunes and perched lagoons in the northern section of Bundjalung National Park;
- outcrops of carbonaceous sandrock; and
- outcrops of Mesozoic and Palaeozoic bedrock at headlands.

* The rivers, estuaries and catchments within the planning area will be protected, including the;

  - Salty Lagoon wetland system;
  - Esk River;
  - Jerusalem Creek; and
  - southern bank and the catchment area of the Evans River within Bundjalung National Park.

* All management activities, where relevant, will incorporate soil erosion management principles and practices developed by the Department of Land and Water Conservation.

* The NPWS will oppose any development or activity which may compromise the landforms, hydrology or scenic features of the planning area.

* The understanding, appreciation and protection of the geomorphological features and processes will be promoted through interpretation programs.

* Research will be encouraged to determine the rate of sand movement from the foredunes into Salty Lagoon to establish its long term effects and any management requirements.

* The program of protecting the regeneration of restored mined areas will be continued.

* The long term effects of mining and the ecological processes and the success of restoration works will continue to be monitored.

* The ilmenite dump near Jerusalem Creek will be removed and the site restored.

* The NPWS will continue to assist the Broadwater Beach Dunecare group in its weed control, revegetation and dune stabilisation programs.

* The effects of the Evans Head sewage treatment plant and garbage pit on the Salty Lagoon wetland system will be monitored in conjunction with Richmond River Council.

* The impact of the drain on the Salty Creek - Salty Lagoon system will be assessed and the feasibility of restoring the system, if desirable, to a natural regime will be established.

4.1.2 Native Plants and Animals

The vegetation of Broadwater and Bundjalung National Parks has been surveyed by S. Griffith, (1983, 1985). The vegetation communities identified have been entered into the NPWS's computerised mapping system and this information is used to assist in park management planning. The vegetation mapping for both

parks has been recently upgraded as part of the NRAC (Natural Resource Audit Council) studies on the north coast.

The distribution of plant communities in the planning area is predominantly influenced by topography, hydrology, soils and exposure to coastal influences, though fire is a major influence on plant communities in Bundjalung National Park. Griffith identified major plant groupings according to growth form (structure) of the dominant plants in each community. In Broadwater National Park he found seven major formations and complexes based on the structure and species present. These plant groupings are also present in Bundjalung National Park with the exception of fernland:

- forests;
- shrublands and mallee;
- heathlands;
- sedgelands;
- saltmarsh complex;
- frontal dune complex;
- fernland.

The dominant species which occur within each formation are presented in Table 1. Bundjalung National Park has a greater variety of formations reflecting a wider range of environments than does Broadwater National Park, including mangrove forest along estuaries and dry sclerophyll forest on the Mesozoic ridges in the west of the park.

Broadwater and Bundjalung National Parks are dominated by the coastal heathland communities which occur on mostly undulating sand ridges and plains and are interspersed with swamps. There are two types of heath, 'wet' and 'dry', determined by the depth of the water table and soil drainage. Dry heathlands generally occur where water tables are at a depth greater than 1.5m, and wet heathlands favour poorly draining soils. Both communities are major park attractions with spectacular spring wildflower displays and attendant insectivorous and nectivorous birds.

Littoral sub-tropical rainforest is best developed in the Iluka Nature Reserve where about 90 hectares occurs. The height of the dense closed canopy of the forest varies from 10m on the seaward margin to 30m on the leeward side. The rainforest contains some 187 species of plants, with the broad-leaved lilly pilly (*Acmena hemilampra*) and riberry (*Syzygium luehmannii)* dominating the canopy. There is a lower tree stratum and a shrub-herb layer along with epiphytes and vines.

Smaller littoral rainforest remnants are located in the vicinity of Woody Head camping area and Gumma Garra picnic area in the northern section of Bundjalung National Park and depauperate sub-tropical rainforest remnants occur on alluvium enriched sedimentary soils in gullies in the west of Bundjalung National Park. All camping areas show evidence of fringe impact from fire. Some rainforest species form an understorey in areas of wet sclerophyll forest in Bundjalung National Park.

Table 1: Plant communities of the planning area.

Vegetation Subformations	Dominant Species include:	Common Names
Subtropical littoral rainforest	*Acmena hemilampra*	Broad-leaved Lilly Pilly

Subtropical palm rainforest	*Syzygium luehmannii* *Livistona australis* *Archontophoenix cunninghamiana*	Riberry Cabbage Tree Palm Bangalow Palm
Depauperate rainforest	various	
Wet sclerophyll forest	*Eucalyptus intermedia* *E. grandis* *Lophostemon confertus*	Pink Bloodwood Flooded Gum Brush Box
Swamp sclerophyll forest	*Lophostemon suaveolens* *Eucalyptus robusta* *Melaleuca quinquenervia*	Swamp Box Swamp Mahogany Broad-leaf Paperbark
Dry sclerophyll forest	*Melaleuca nodosa* *Casuarina glauca* *Eucalyptus pilularis* *E. signata / E. intermedia* *E. planchoniana* *E. maculata-E. siderophloia*	Pricklyleaf Paperbark Swamp Oak Blackbutt Scribbly Gum / Pink Bloodwood Needlebark Stringybark Spotted Gum - Ironbark
Mangrove complex	*Avicennia marina var. australasica*	Grey Mangrove
Dry sclerophyll woodland	*Eucalyptus signata* *E. pilularis* *E. gummifera* *Lophostemon confertus*	Scribbly Gum Blackbutt Red Bloodwood Brush Box
Swamp sclerophyll woodland	*E. robusta*	Swamp Mahogany
Dry sclerophyll shrubland	*B. ericifolia* var. *macrantha* *Banksia aemula*	Heath-leafed Banksia Wallum Banksia

Table 1: continued

Vegetation Subformations	Dominant Species include:	Common Names
Dry heathland	*B. serrata*	Red Honeysuckle
	Allocasuarina littoralis	Black She-Oak
	Leptospermum trinervium	
	Callitris columellaris	Cypress Pine
	Banksia aemula	Wallum Banksia
	Allocasuarina littoralis	Black She-Oak
	Banksia oblongifolia	Dwarf Banksia
	Leptospermum polygalifolium	Wild May
	Melaleuca nodosa	Pricklyleaf Paperbark
Wet heathland	*Xanthorrhoea fulva*	-
	Leptospermum liversidgei	-
	Banksia oblongifolia	Dwarf Banksia
	B. ericifolia var. *macrantha*	Heath-leafed Banksia
	Melaleuca quinquenervia	Broad-leaf Paperbark
Sedgeland	*Restio pallens*	-
	Baumea rubignosa	-
	B. articulata	-
	Lepironia articulata	-
	Eleocharis sphacelata	-
Fernland	*Histiopteris incisa*	-
	Hypolepis muelleri	-
Saltmarsh complex	*Sarcocornia quinqueflora*	Samphire
	Paspalum vaginatum	-
	Sporobolus virginicus	-
	Juncus krausii	-
	Baumea juncea	-
	Ischaemum australe	-
Frontal dune complex	*Banksia integrifolia* spp. *integrifolia*	Coast Banksia
	Allocasuarina equisetifolia var. *incana*	Coast She-Oak
	Acacia sophorae	Coastal Wattle
	Carex pumila	-
	**Phyla nodiflora*	Carpet Weed/Fog Fruit
	Spinifex sericeus	-
	**Chrysanthemoides monilifera* ssp. *rotundata*	Bitou Bush

** = introduced species*.

In Broadwater National Park subtropical rainforest occurs as a single 11 hectare patch of simple tall closed fan palm forest dominated by cabbage tree palm (*Livistona australis*) and bangalow palm (*Archontophoenix cunninghamiana*).

In southern Bundjalung National Park swamp sclerophyll forests grade to saltmarshes and mangroves in intertidal areas. As elevation increases, the swamp sclerophyll forests change to casuarina and melaleuca woodlands and eucalypt forests. The central section of the park is dominated by wet heathland and sedgeland communities. The northern section of the park contains predominantly open eucalypt forest and tall dry heathland communities.

In Broadwater National Park, communities other than heathland occur in relatively small patches which add to the diversity and scientific value of the park. These diverse vegetation communities in the planning area provide a wide range of habitats for wildlife.

A total of 417 native plant species have been recorded in Broadwater National Park, Bundjalung National Park has a further 110 species mostly recorded on the Mesozoic sedimentary ridges. 48 species of plant are considered to have special ecological significance and six are listed as endangered and vulnerable (refer to table 2).

The native animals of the area are diverse with more than 280 species of reptiles, birds and mammals known to occur. Animal diversity reflects the habitat diversity and extensive ecotonal areas of the planning area.

A total of 205 species of birds has been recorded in the planning area. These include at least four endangered and 22 vulnerable species (refer to table 2).

These species are considered either endangered or vulnerable in accordance with the following criteria.

An endangered species:
- is likely to become extinct in nature in New South Wales unless the circumstances and factors threatening its survival or evolutionary development cease to operate, or
- numbers have been reduced to such a critical level, or its habitats have been so drastically reduced, that it is in immediate danger of extinction, or
- might already be extinct, but is not presumed extinct.

A vulnerable species:
- is likely to become endangered unless the circumstances and factors threatening its survival or evolutionary development cease to operate.

The planning area is utilised by many species of migratory shorebirds that feed and/or roost on the sandy beaches, estuaries, lagoons and rock platforms during their annual migrations. These species are subject to international conservation agreements (refer to section 2.5):

- With the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA) ; and

- With the Government of the People's Republic of China for the protection of Migratory Birds and their Environment (CAMBA).

Species occurring in the planning area which are identified in one or both of these agreements include the; great egret (*Egretta alba*), white-bellied sea-eagle (*Haliaeetus leucogaster*), ruddy turnstone (*Arenaria interpres*), whimbrel (*Numenius phaeopus*), eastern curlew (*Numenius madagascariensis*), bar-tailed godwit (*Limosa lapponica*), curlew sandpiper (*Calidris ferruginea*), grey plover *(Pluvialis squatarola*), little tern (*Sterna albifrons*), white-throated

needletail (*Hirundapus caudacutus*), and the rainbow bee-eater (*Merops ornatus*).

Many bird species inhabit the littoral rainforest including the; regent bower bird (*Sericulus chrysocephalus*); Lewin's honeyeater (*Meliphaga lewinii*); spectacled monarch (*Monarcha trivirgatus*); southern figbird (*Sphecotheres viridis* race *vieilloti*) and the large-billed scrub wren (*Sericornis magnirostris*). The rainforests are also important overwintering areas for noisy pittas (*Pitta versicolor*), topknot pigeons (*Lopholaimus antarcticus*) and other species which breed at higher elevations. Likewise the swamp sclerophyll forests are important overwintering environments for common insectivorous species like grey fantails (*Rhipidura fuliginosa*) and golden whistlers (*Pachycephala pectoralis*) which move down from higher elevation forests. The heathlands and tall shrublands, dominated by banksias, perform a similar role for eastern spinebills (*Acanthorhynchus tenuirostris*) and red wattlebirds (*Anthocaera carunculata*) as well as supporting many resident honeyeaters.

One of the few remaining coastal populations of emus (*Dromaeus novaehollandiae*) is present in Bundjalung National Park. Coastal populations of this species have been reduced by habitat fragmentation and/or occurrence of fire during the winter breeding season. The emu appears to be locally extinct in Broadwater National Park.

Thirty mammal species have been recorded in the planning area. They include at least 14 species listed on Schedule 2 of the *Threatened Species Conservation Act* as vulnerable species (refer to table 2).

Table 2. Threatened species recorded in the planning area

Common name	Scientific name	Habitat
Schedule 1, Part 1 Endangered species		
Animals		
Birds		
red goshawk	*Erythrotriorchis radiatus*	forest and woodland
beach thick-knee	*Burhinus neglectus*	shoreline
little tern	*Sterna albifrons*	shoreline
regent honeyeater	*Xanthomyza phrygia*	heath and forest
Plants		
an orchid	*Phaius tankervilleae*	Melaleuca forest
a tall shrub	*Acronychia littoralis*	wet sclerophyll forest
	Aldrovanda vesiculosa	Aquatic

Table 2 cont. Threatened species recorded in the planning area

Common name	Scientific name	Habitat
Schedule 2, Vulnerable species		
Animals		
Amphibians		
green thighed frog	*Litoria brevipalmata*	wet sclerophyll forest
wallum frog	*Litoria olongburensis*	coastal acid-peat swamps
wallum froglet	*Crinia tinula*	coastal acid-peat swamps
Birds		
Australasian bittern	*Botaurus poiciloptilus*	freshwater wetlands
black bittern	*Dupetor flavicollis*	freshwater wetlands
black-necked stork	*Xenorhynchus asiaticus*	freshwater wetlands
square-tailed kite	*Lophoictinia isura*	general
osprey	*Pandion haliaetus*	shoreline
brolga	*Grus rubicundus*	freshwater wetlands
sanderling	*Calidris alba*	shoreline
large sand-plover	*Charadrius leschenaulti*	shoreline/rocky headlands
sooty oystercatcher	*Haematopus fuliginosus*	shoreline/rocky headlands
pied oystercatcher	*Haematopus longirostris*	shoreline
broad-billed sandpiper	*Limicola falcinellus*	shoreline
comb-crested jacana	*Irediparra gallinacea*	freshwater wetlands
wompoo fruit dove	*Ptilinopus magnificus*	rainforest
rose-crowned fruit-dove	*Ptilinopus regina*	rainforest
glossy black-cockatoo	*Calyptorhynchus lathami*	Forest She-oaks
ground parrot	*Pezoporus wallicus*	heathland
powerful owl	*Ninox strenua*	forests
eastern grass owl	*Tyto longimembris*	heathland, open woodland
masked owl	*Tyto tenebricosa*	forests
yellow-eyed cuckoo-shrike	*Coracina lineata*	rainforest
mangrove honeyeater	*Lichenostomus fasciogularis*	mangroves
white-eared monarch	*Monarcha leucotis*	rainforest
Mammals		
tiger quoll	*Dasyurus maculatus*	general
brush-tailed phascogale	*Phascogale tapoatafa*	dry sclerophyll forest
common planigale	*Planigale maculata*	moist sclerophyll forest
yellow-bellied glider	*Petaurus australis*	
squirrel glider	*P. norfolcensis*	
koala	*Phascolarctos cinereus*	moist sclerophyll forest
black-flying fox	*Pteropus alecto*	
Queensland blossom bat	*Syconycteris australis*	rainforest and heathland
hoary bat	*Chalinolobus nigrogriseus*	
little bent-wing bat	*Miniopterus australis*	caves and forests
common bent-wing bat	*M. schreibersii*	
large-footed mouse-eared bat	*Myotis adversus*	forests and freshwater
Qld. long-eared bat	*Nyctophilus bifax*	
greater broad-nosed bat	*Scoteanax rueppelli*	
Plants		
	Rutidosis heterogama	sedgelands on clay soils
	Tinospora tinosporoides	rainforest
a swamp orchid	*Phaius australis*	Melaleuca forest

The heathlands and associated communities provide important habitat for small mammals, particularly rodents. The open forest and woodlands are the predominant habitat for large macropods. Smaller macropods also occur in wet sclerophyll forest and rainforest.

Koalas (*Phascolarctos cinereus*) occur in the forests on the Iluka Peninsula, at Gumma Garra in the north of Bundjalung National Park and at Rileys Hill adjacent to the western edge of Broadwater National Park. Studies of the Iluka koala population identified the forest red gum (*Eucalyptus tereticornis*) as the principal food tree but found that koala numbers are in decline. Koala habitat is found both within the planning area and on private lands. The study's management recommendations which are directly relevant to the planning area include:

- Protection of the primary food tree, forest red gum;
- Incorporation of forest red gum in any bushland plantings in the area;
- Protection of forested areas which act as linking corridors to areas of koala feeding habitat; and
- Awareness of the adverse effects of fire and feral pigs on tree regeneration and reduction of these impacts where possible.

The forests of the Iluka Peninsula are used as temporary summer camps by the grey-headed flying-fox (*Pteropus poliocephalus*), little red flying-fox (*P. scapulatus*) and black flying-fox *(P. alecto*).

The invertebrate fauna is diverse. Of note is the occurrence of the north coast form of the sword-grass brown butterfly (*Tisiphone abeona morrisi*); the larval development of this insect is dependant upon the sword grass (*Ghania* spp.) swamps that exist in the parks. This form of the species previously occurred in coastal southern Queensland but has since disappeared as a result of intensive urban development and the associated destruction of sword grass swamps.

Policies

* The management of native plants and animals will place emphasis on protecting significant ecosystems, habitats and species including:
  - those listed as endangered and vulnerable; and/or
  - those subject to conservation agreements; and
  - those that are locally rare or approaching their known limit of distribution.
* The understanding and protection of native plants and animal species and their habitats will be promoted through interpretation programs, in particular the needs of shorebirds using rock platforms and beaches to feed and/or nest.
* The cooperation of neighbouring land holders and land use planning and management agencies will be sought to protect important wildlife habitats adjacent to the planning area.
* The planting of indigenous koala food trees in any tree planting programs near known koala habitat will be encouraged.

4.1.3. Primitive Area

The Esk River above Jackey's Gully and its catchment is mostly contained within Bundjalung National Park. This section of river, some 15 kilometres in length, is an unmodified and unpolluted waterway. The water is clear and slow moving, being fed from the extensive wetlands in its catchment.

The banks of the river are paralleled by steep natural levees vegetated by stands of eucalyptus with a heath understorey. The forest is concentrated on the levee banks which are above the generally water logged environment of the surrounding wetlands and are dominated by blackbutt (*Eucalyptus pilularis*). The lower estuary is fringed by mangroves.

The river is used to gain access to the remote natural area of the Esk River catchment, identified in this plan as a 'primitive area' because of its size and relative isolation (refer to map 4). This area of Bundjalung National Park is one of the few coastal rivers and their catchments in NSW which remain in a natural condition and offers opportunities for solitude and self-reliant bush recreation.

The Esk River catchment is of sufficient size, approximately 128 square kilometres, to maintain its natural condition. The sense of isolation comes from the minimal human activity in this section of the park. The state forests to the west of the park act as buffer areas and most park visitors are concentrated in the north at Black Rocks, in the south on the Iluka Peninsula, and along the Ten Mile Beach to the east.

The area does not presently qualify for wilderness designation because:

- The condition of the mineral sands mining rehabilitation is unlikely to approach a pre-mined appearance in the foreseeable future.
- The disruption to opportunities to experience solitude in the area from frequent low flying aircraft using the bombing range in the park to the north, and
- Activities endorsed by this plan which are not consistent with the management of a wilderness area, including:
    - use of the beach between Shark Bay and Black Rocks by four wheel drive vehicles; and
    - use of sites for beekeeping.

It is accepted that in due course the wilderness quality of the area could be restored. It is intended to protect the area in the interim as a primitive area and to provide appropriate recreational opportunities. To this end it is proposed that vehicle based recreation will not be permitted in the remote natural area. The NPWS will also seek to have the existing licensed beekeeping sites relocated.

A recommendation to declare the Esk River system a Wilderness Area arose from the public exhibition of the draft plan of management. This recommendation will be determined in accordance with the provisions of the *Wilderness Act*. In due course, should the nomination be accepted, an amendment to this plan of management, including public exhibition of this proposal, will then be required.

Access into the area is primarily by canoe or boat along the Esk River. Backpackers and cyclists may use management tracks. Visitor use is for back-country bush walking and self-reliant backpack camping. Consistent with this

use and the remote natural character of the area there are no formal facilities such as camping areas or designated walking tracks.

Policies

* The primitive area shown on map 4 will be managed to protect its potential for future declaration as a wilderness area.

* The importance of the Esk River catchment as a primitive area will be promoted amongst visitors to Bundjalung National Park.

* Public access into the Esk River and its catchment will primarily be by canoe or boat up the river. Specially constructed walking tracks will not be provided so as to protect the primitive values of the area.

Refer to section 4.2.2 “Use of Waterways and Ocean Access” for additional policies relating to the primitive area.

4.1.4 Cultural Heritage

Cultural features are an important component of the natural and cultural environment that may have aesthetic, historic, scientific and/or social significance to present and future generations. Sites of Aboriginal and European settlement occur throughout the planning area and provide a record of human activities.

Aboriginal Cultural Heritage

Bundjalung National Park takes its name from the major Aboriginal language grouping of north-eastern NSW. Broadwater National Park and Iluka Nature Reserve are also located in the Bundjalung area. The Bundjalung Aboriginal Community has dialect speakers and people who have traditional knowledge of the landscape of the parks, their economic resources and the locations of places of mythological and spiritual significance.

The planning area is covered by the Jali, Bogal, Ngulingah and Birrigan Gargle Local Aboriginal Lands Councils.

Aboriginal people occupied the area for thousands of years prior to European settlement. Evidence of that occupation is varied and includes mythological sites, midden campsites and bora ceremonial grounds. These features are part of an extensive system of related sites which occur both outside and within the planning area.

The Aboriginal sites registers show that the planning area has many Aboriginal sites, though there were significant losses through, or caused by, mineral sands mining and in the building of the Iluka Road. A study of Aboriginal heritage in Bundjalung was begun in the 1980's but is incomplete. Only a small proportion of the Broadwater National Park has been surveyed and nine sites have been recorded in the park. It is likely that many sites remain to be recorded in the planning area.

An Aboriginal site is defined as any location having association with, or features resulting from, Aboriginal use or occupation. Some of the sites associated with Bundjalung include:

- the mounded midden systems and associated structural features which occur in the Clarence River estuarine complex of barrier beach ridges

and the embayment flood plains. These substantial middens demonstrate environmental changes in the river estuary during the late Holocene and have been dated from about 4 000 years ago;

- pipi shell middens, interpreted as transitory day camps, are located primarily on the barrier beach ridge system. These middens and associated camp sites predominantly record marine centred activity dated within the last 1 000 years, and

- a fish trap made of rock on the wave-cut platform at Woody Head.

Mythological sites may include sites without physical evidence of occupation and such sites continue to have spiritual and cultural values for today's Aboriginal people. These may be associated with geographical features such as streams or rock formations or historic places such as massacre sites.

Sites associated with Goanna Headland immediately to the north of Bundjalung National Park, the Olive Gap and Gumma Garra, comprise mythological sites, middens, camp sites and stone tool workshops and quarries. Some of these sites have evidence of activities within the last 500 years and are part of present Aboriginal knowledge of places of traditional significance. Goanna Headland is a specially important mythological site.

Aboriginal sites are generally non-renewable and are subject to deterioration from natural and human induced processes. For example art sites and rock engravings can be damaged by wind erosion and vandalism; scarred and carved trees can be destroyed by fire, animal or human interference. Aboriginal sites within the planning area may therefore require active management to ensure their continued existence.

The NPWS liaises with the Bundjalung Aboriginal community as part of its statutory responsibilities in protecting Aboriginal heritage and encourages involvement of the Aboriginal community in the management of Aboriginal sites.

European Cultural Heritage

The history of European settlement and industry since the mid 19th century is demonstrated less in the built environment and more in the ecological and visual impact of European land uses on the vegetation, landforms, and soils. For example, mining for gold in the late 19th century and mineral sands mining and rehabilitation in the last 30 years has modified extensive areas of the beach ridge system.

In the last 100 years, apart from mineral exploitation and defence agency activities, this part of the coast has been occupied only sparsely and often on a seasonal basis. The coastal heathland areas have been used for fishing, recreation, bee keeping and limited cattle grazing during droughts and floods.

One of the few remaining structures in the planning area is the Hammond family home, a cottage erected by Henry Robert Hammond, a miner, in 1923 to accommodate his wife Elizabeth and their four children. It was built from timber cut from the Woody Head "scrub" which at that time was leased by Henry Hammond. The timber was hauled out of the scrub by horse and loaded onto a barge to be taken to a sawmill at Murrayville behind Warregah Island. Some of the milled timbers to be used for the ceilings were further dressed at South Grafton. The cottage has been moved the short distance from its original site opposite the present kiosk and now stands at the base of Woody Head headland. The youngest of Henry Hammond's three sons, William (Bill), built a

home for his family in 1941 north of his parents' cottage. This was later followed by his brothers building their family homes nearby. The NPWS has relocated the homes of Bill and Charles (Charlie) to the nearby site at Woody Head and are now known as Swamp House and Forest House respectively (refer to inset, map 4). The large fig tree in the present camping ground near the kiosk was planted by Bill Hammond in 1943. Stabilisation and restoration work has been undertaken by the NPWS to maintain the historic and structural integrity of the Hammond cottage.

Other historic remains on the Iluka Peninsula include two rock quarries at Iluka and Second Bluffs and the remnants of a tramway to Iluka, all of which were used during the construction of the Iluka breakwater.

Bundjalung National Park has been used for military purposes since 1940 when the two areas in the northern section of park became a target practice area for weapons systems. Clearing of buildings and unexploded ordnance from the northern range has removed a large part of the fabric of the defence use, although the south range is still operational.

Concrete bunkers from World War II target practice ranges remain at Black Rocks camping area. At Broadwater Lookout the concrete base remains from an observation tower built during World War II. Presumably this tower played a role in the military training exercises that were undertaken from Evans Head airport during that period.

A notable part of the history of Iluka Peninsula is the local community's action in 1964, to prevent mineral sands mining in the littoral rainforest area. The consequences of this action were considerable and led to the subsequent dedication of the area as a nature reserve.

The remains of a timber ship of unknown provenance are buried in the dunes in the vicinity of Salty Lagoon in Broadwater National Park. These remains were exposed during storms in 1974 and 1996.

Policies

* The provisions of the Burra Charter (ICOMOS revised 1987) for the conservation of places of cultural significance will guide the management of the cultural heritage of the planning area.

* The Bundjalung Aboriginal Community will be involved in the management of Aboriginal cultural sites.

* Preference will be given to local Aboriginal custodian groups to undertake interpretation of Aboriginal sites and culture.

* All Aboriginal sites will be recorded in the Lismore and Grafton districts' Aboriginal Sites Register.

* The impact of all proposed works and management activities on Aboriginal sites will be assessed. Where appropriate:

    - natural degradation of sites will be minimised; and

    - sites will be protected from impacts arising from visitor use or management practices.

* An understanding and appreciation of the cultural heritage by visitors to the planning area will be promoted.

* Research into the cultural heritage of the planning area will be encouraged.

* A history of the Aboriginal use of the planning area will be prepared.

* All Aboriginal cultural sites will be recorded in the relevant Districts' Aboriginal Sites Register.

* The Hammond cottage will be conserved as an historic structure.

* A history of European activity in the planning area will be prepared.

* All sites of historic significance will be recorded in the districts' register of historic places.

4.1.4 Introduced Plants and Animals

Weeds and feral animals are a major threat to the natural and cultural values of the planning area and their control is an important management activity.

The *Noxious Weeds Act 1993* places an obligation upon public authorities to control noxious weeds on land that it occupies to the extent necessary to prevent such weeds spreading to adjoining lands. The recent additions of government funding for weed control programs by the NPWS will permit increased priority being given to weed control programs in the planning area. In addition to weeds identified under the *Noxious Weeds Act*, the NPWS controls other plants considered to be weeds where these have an unacceptable environmental impact.

Some 60 introduced plant species have been recorded in the planning area, and five of these are aggressive invaders of native plant communities. These species include:

- **Groundsel Bush** (*Baccharis halimifolia*): A noxious plant native to eastern North America which invades salt marsh and swamp forest to form dense thickets. The recent release of biological control agents has partially reduced the invasiveness of this species, particularly in forests.

  Control of groundsel bush has been the priority program around the lower Esk River and this program will continue. It has involved spraying of dense infestations by both vehicle-based and boat-based spraying crews along management tracks and the river respectively. In more remote areas back-pack spraying has been carried out.

- **Bitou Bush** (*Chrysanthemoides molinifera* var *rotunda*): This species is native to South Africa and readily colonises foredune sands to the exclusion of native species. It also assumes scrambling habit in hind dune scrub where it rises through and smothers the canopy.

  A biological control program for bitou bush using the bitou tip moth (*Comostollopsis germannia*) commenced several years ago involving the NPWS, the Allan Fletcher Research Station in Queensland and the NSW Department of Agriculture. A number of releases have been made on the NSW north coast, including within national parks, and although populations of the moth have established themselves they have been slow

to spread. More insect species are proposed to be released as part of this program.

Bitou bush is controlled where it encroaches into visitor areas.

Bitou bush occupies an extensive area within the planning area. Most of the dunal and hind-dune areas along the coastal fringe are affected by this aggressive invading weed.

Bitou bush has been declared a schedule 2 noxious weed species by the Maclean Shire Council. The NPWS and Maclean Shire are working cooperatively in the control of bitou bush on the Iluka Peninsula. The NPWS is controlling the weed in the planning area while the Shire is controlling it on adjoining Crown land.

The Broadwater Community Dune Care group has made an important localised reduction of bitou bush in a relatively short period. This group has a program for on-going control and revegetation with native plants from local seed sources. Recently a similar community based group has formed to remove bitou bush around Black Rocks Camping Area in Bundjalung National Park.

- **Lantana** (*Lantana camara*): This plant is native to South America and is well established in hind dune scrub and littoral rainforest where it assumes the habit of a straggling shrub or liana. Biological control agents released against this species in the 1960's and 1970's have been of limited benefit.

- **Asparagus Fern** (*Protasparagus aethiopicus*) and **Madeira Vine** (*Anredera cordifolia*): Both these climbing plants are native to South America and are established in the rainforest on the Iluka Peninsula. They are capable, if left uncontrolled, of destroying the rainforest canopy. Control can be achieved by labour intensive bush regeneration techniques.

  Removal of asparagus fern in Iluka Nature Reserve is a high priority.

- **Prickly pear** (*Opuntia* sp.): Occurs in small isolated patches in the northern part of Broadwater National Park. The Weed Biological Control Unit of NSW Department of Agriculture has introduced cochineal insects (*Chelinidea tabulata*) to some of the infestations, however the dispersed nature of the weed has not facilitated effective control.

- **Yellow cassia** (*Senna pendula* var. *glabrata*): A new environmental weed in Bundjalung National Park. Control has been undertaken by removing infestations as they are found, mainly along road sides. Occurrences of this weed will be monitored and control techniques trialed to determine the most effective method.

A number of other weeds have been identified in the Iluka Nature Reserve, some of which have invasive potential, including climbing asparagus (*Protasparagus plumosus*), cape ivy (*Delairea odorata*), white passionflower (*Passiflora subpeltata*), coral berry (*Rivina humilis*), mother of millions (*Bryophyllum delagoense*), ochna (*Ochna serrulata*), Brazilian nightshade (*Solanum seaforthianum*), and Dutchman's pipe (*Aristolochia elegans*).

Several non-indigenous native plants are capable of invading littoral rainforest areas within Iluka Nature Reserve and potentially displacing some species, these

include bracken fern (*Pteridium esculentum*), fishbone fern (*Nephrolepsis cordifolia*) and umbrella tree (*Schefflera actinophylla*).

The NPWS is working closely with the Iluka Landcare group. Some of the group's regeneration work focuses on replacing non-endemic plants with indigenous species propagated from locally collected seed.

Two native species not endemic to the area are well established following their introduction during mineral sands mining rehabilitation. They are *Acacia saligna* (native to Western Australia) and *Leptospermum laevigatum* (well north of its natural distribution). The latter species is an aggressive invader of heathland communities.

A reduction in fire frequency in Bundjalung National Park is an important management strategy to slow weed invasion. Fire favours weeds by opening up native vegetation and enabling weeds to become established. Also the shade in unburnt forested areas slows the spread of weeds such as bitou bush into these areas.

Foxes (*Vulpes vulpes*), feral cats (*Felis catus*), feral and domestic dogs (*Canis familiaris*) and feral pigs (*Sus scrofa*), occur infrequently as isolated individuals or in small numbers in and around the planning area. Introduced rats (*Rattus rattus*), mice (*Mus domesticus*) and feral honey bees (*Apis mellifera*) are established in the planning area. Only limited opportunities exist to reduce these dispersed and/or isolated populations.

Cats have been found abandoned in the planning area. The proximity of villages to the planning area is well within the range of domestic cats from the villages. Feral cats are known to occur at the two garbage depots adjacent to Broadwater National Park and reports from neighbours suggest that feral cat numbers are increasing near the park boundary.

Whenever pigs are found to be present in the planning area control is carried out as soon as practical since pigs are destructive of vegetation and dig up large areas of soil. Pigs are either trapped and then shot or poison baits are laid out using special bait stations with the assistance of the Rural Lands Protection Board. Pigs are also associated with illegal hunting activities in Bundjalung National Park. Hunting tends to disperse the pigs through the park and dogs used in hunting are sometimes left behind in the park. Park neighbours are encouraged to contact the NPWS where they are aware of feral pigs so that pig control can be thorough as possible.

Scientific investigations have established that European honeybees are in competition with native animals, particularly native bees, honeyeaters and small mammals and may have significant effects on native flora. Feral European bees have established hives in areas remote from licensed apiary sites.

NPWS policy since 1989 provides that no new bee hive sites be permitted in areas established under the *National Parks and Wildlife Act* and existing licenses are not transferable. Twenty-seven sites within Broadwater National Park and twenty-one sites in Bundjalung National Park are licensed for bee keeping. They are located away from visitor areas and are dependant on access from the management track system. There are no licensed bee sites within Iluka Nature Reserve.

Policies

* Priorities and strategies for control and eradication of weeds will be based on the following:

  - control of noxious weeds;

  - highest priority will be given to the eradication of new infestations;

  - priority will also be given to the control of established infestations where eradication is a possibility in the long-term;

  - the spread of well established weed infestations wil, wherever possible, be controlled;

  - infestations which may affect neighbouring land and cultural and recreational resources will be controlled, and

  - non-indigenous native plants with invasive potential within the Iluka Nature Reserve rainforest will be monitored and controlled if necessary.

* Emphasis in the control of introduced plants and animals will be placed on techniques which have minimum impact on native ecosystems.

* The NPWS may enter into cooperative arrangements with neighbours to control introduced pest species on, or adjacent to, the boundary of the planning area.

* The NPWS will continue to support local Landcare and Dunecare groups working on, or adjacent to, the planning area providing such works are in accordance with this plan.

* Existing bee hive sites will be managed in accordance with NPWS policy.

* Major occurrences of weeds will be mapped.

* A control program for introduced pest plants and animals will be prepared.

* Priority will be given to:

  - the control of groundsel bush and yellow cassia; and

  - asparagus fern,

  in Iluka Nature Reserve.

* The cooperation of Richmond River and Maclean Councils will be sought to effectively manage introduced species where they originate from local garbage disposal depots and/or along roadways.

4.1.5 Fire Management

Fire has been an important factor influencing the environment of Broadwater and Bundjalung National Parks for thousands of years. Fire is regarded by the NPWS as a natural process, one of the abiotic factors of the Australian environment to which native plant and animal communities have become adapted. The correct management of fire is essential to avoid the extinction of native plant and animal species.

A fire management plan has been prepared for Bundjalung National Park and was placed on public exhibition in early 1995.

Fire history

Historical evidence as well as current understanding of the biological impact of fire on the environments of the north coast of NSW has established that the Aborigines fired the vegetation on a regular basis so as to facilitate easier hunting and gathering. Since European settlement of the north coast, and in an endeavour to improve grazing conditions for domestic stock, fire frequency has generally increased to the detriment of some species of native plants and animals.

Prior to and since reservation, Bundjalung National Park has had a high incidence of deliberately lit fires and fire escapes from neighbouring grazing properties and some 43 fires have occurred in the park since 1975. Major fires in which over 40% of the park was burnt occurred in 1989-90 and 1993-94. The combined effect is that most of the park has been burnt in that five year period and some areas have been burnt twice. This fire frequency is too high and at a level that will degrade the vegetation communities in the park (refer to table 3). The overwhelming priority for fire management in Bundjalung National Park is to reduce, and if possible eliminate, the occurrence of deliberately lit fires in the park and fire escapes from neighbouring properties. Not until this is achieved can a practical, socially responsible and scientifically based fire regime be implemented.

Fire in Broadwater National Park is occurring at a lesser frequency and extent than that in Bundjalung and is at an acceptable level. Major portions of Broadwater were burnt in 1977 and 1986, the north eastern section of the park, however, escaped both these major fires. Wildfires in Broadwater National Park are usually from one of two sources; arson or an escape from fire at either the Broadwater or Evans Head garbage disposal depots. Both the Broadwater Bushfire Brigade and the Evans Head Town Brigade have attended many of these fires in and near the park and thus have prevented large areas of the park from being burnt.

Fire responsibilities

The NPWS like other land owners and managers in NSW, is bound by the *Bush Fires Act, 1949*, the *National Parks and Wildlife Act* and the NPWS's fire policy.

The NPWS is a fire authority under the *Bush Fires Act* and is responsible for all fire management in the planning area. This includes the control and suppression of fires and fuel management programs to protect life and property in the event of fire. The NPWS is assisted in this task by volunteer bushfire brigades from the Richmond River and Maclean Councils.

The Service is represented on both the Maclean and Richmond River Council District Bush Fire Committees. These committees are responsible for shire-wide bush fire management plans required under section 41AB of the Bush Fires Act. Bush fire management plans are required to contain both a plan of operations and a fuel management plan. The NPWS contributes to these plans by providing preferred fuel management prescriptions for areas it manages. The fuel management plan is subject to annual review.

The NPWS assists with the control and suppression of fire in other areas as requested by local fire authorities.

The primary aims of the NPWS in relation to fire management are:

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

The responsibility of the NPWS is to specify fire management principles and activities for the planning area which will address the protection of life and property from fire while conserving the natural ecosystems of the planning area.

The Fire Management Plan for Bundjalung National Park details NPWS preparedness for protecting life and property and establishes the ecologically desirable fire frequencies for the major plant communities of the park.

A separate fire management plan will be prepared for Broadwater National Park. Whilst the plant communities and fire prescriptions for both parks are similar, the fire history and, therefore, the proposed prescriptions for each national park are quite different.

Protection of life and property

The NPWS is actively involved in cooperative fire management, and has initiated and worked with local brigades in implementing village protection plans for Woombah, Iluka, Broadwater, Evans Head and the Riley's Hill area. These plans include an integrated system of cleared radiation zones, management trails and the rotation of fuel reduction on crown lands and private property adjacent to the planning area and at strategic locations within the parks.

The NPWS also assists with fire fighting in the bombing ranges within Bundjalung National Park and the Department of Defence uses mosaic burning in the bombing ranges to manage fuel levels.

Both parks are well served by management access trails of a 4WD standard which are used primarily for fire management purposes. The fire management plan for Bundjalung National Park is based on the division of the park into compartments bounded by roads, fire trails and natural features such as streams. An important element of this system of fire management trails is the perimeter management trails. This system is presently incomplete in Bundjalung on the western and north-western boundary of the park where approximately 35 kilometres of trail are required to complete the boundary trail system.

A computerised fire prediction model has been developed by the NPWS for Broadwater and Bundjalung National Parks. A district wide computerised Geographic Information System is also in place which provides information on native plants and animals of relevance in fire management planning.

Maintenance of species habitat and diversity

Contemporary ecological research in fire prone ecosystems such as those which are represented in these parks, has established broad principles about 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.

With these general principles as a basis, fire management guidelines have been developed for Bundjalung and Broadwater National Parks which define fire regime thresholds for several major groups of plant communities. If these thresholds are exceeded the decline and extinction of plant species can be expected. Table 3 outlines the fire regime thresholds which have been identified to guide fire management in the planning area. These thresholds recognise that the vegetation of the planning area, with the exception of rainforest, are generally adapted to moderate frequencies of fire.

Fire frequency in Broadwater National Park lies well within these thresholds and prescribed mosaic burning may be proposed for some areas of the park where the vegetation is approaching the upper limit of the ecologically desirable fire-free threshold.

The aim of burning for ecological purposes is to create a mosaic of habitats of different age classes with a history of varying intensities, frequencies and season of fire necessary to assist in maintaining diversity of species. The system of compartments as outlined in the fire management plan for Bundjalung National Park is the basis for seeking a mosaic of different age classes following fire. In determining the management of fire in a particular compartment it will also be necessary to consider the fire history of adjacent compartments.

Frequency of fire in much of Bundjalung National Park has exceeded the lower limits of the ecologically desirable fire-free thresholds and there will be no mosaic burning implemented in this park until fire frequency is within the desired thresholds.

Protection of Iluka Nature Reserve from fire is a priority for fire management planning on the Iluka Peninsula. Rainforest species are adversely affected by fire and rainforest contains a large proportion of endangered and vulnerable species. The margins of a rainforest are most susceptible to fire damage and particularly the cumulative effects of frequent fires. Fire has effected the western boundary of the littoral rainforest on the Iluka Peninsula.

Table 3. Guidelines on fire regime tolerances for the major vegetation communities in Bundjalung National Park.

Community	***Desirable Ecological Fire Frequency***
Rainforest	Exclude all fires.

Tall shrubland/ swamp forest/ heath	Variable fire frequency; no more than two fires within an 8 year period. No more than two **wet/dry** consecutive fires more than 15 years apart.
Sedgeland	No more than two consecutive fires where less than 10 tonnes/hectares of fuel is consumed. Burn if unburnt for more than 30 years.
Open forest/	Variable fire frequency; no more than two fires **woodland** within a 5 year period. Burn if unburnt for more than 30 years. Avoid successive fires of intensity sufficient to scorch or consume dominant tree crowns.

Policies

* Fire management in the planning area will aim to:

  - protect human life;

  - protect adjoining towns and villages;

  - maintain species and habitat diversity, avoid local extinctions of native plant and animal species and enhance the conservation of endangered and vulnerable species, protect rainforest and dunal areas;

  - prevent fire moving off the planning area onto neighbouring properties;

  - prevent fire moving into the planning area from neighbouring properties; and

  - reduce fire fuel hazards which may threaten life or adjoining towns, villages or properties.

* Fire will be excluded from the littoral rainforest in Iluka Nature Reserve and from beach sand dunes.

* Wherever practical wild fires within Bundjalung National Park will be suppressed with the aim of re-establishing extensive areas of native plant and animal communities which are free of an unacceptable level of fire.

* A program of prescription burning for areas of Broadwater National Park may be undertaken to establish a mosaic of vegetation communities with varying post-fire age classes.

* The role of and management of fire within the planning area will be promoted in the community, particularly amongst neighbours.

* The cooperation of councils, bushfire brigades and neighbouring land holders will continue to be sought in achieving ecologically and socially responsible fire management for the planning area.

* Research into fire behaviour, fire hazard and risk assessment, and the impact of fire on the plant and animal communities will be encouraged.

* A systematic inventory of the fire ecology of plant and animal species will be established and the results utilised to modify fire management prescriptions.

* The villages' protection systems which comprise perimeter management trails, fire radiation zones and hazard reduction zones around villages will be maintained with the cooperation of local fire authorities. Where necessary these will be consolidated and improved.

* Liaise with councils, brigades and neighbouring landholders to maintain quick response, cooperative fire management arrangements.

* The fire management plan for Bundjalung National Park will be subject to periodic review and amendments made to fire management and fuel management strategies as necessary.

* Copies of current fire management plans will be made available for public inspection from the relevant district office.

* A fire management plan will be prepared for Broadwater National Park. The plan will be placed on public exhibition and public comment invited prior to its approval by the NPWS.

* Maintain records of fire occurrence with particular emphasis on accurate mapping and recording of the extent, frequency, seasonality and intensity of fire.

* Maintain and upgrade information on fuel characteristics and fire hazard.

* Continue to participate in the preparation and revision of Section 41AB District Bush Fire Management Plans.

* Continue to support the scientific recording and monitoring of post-fire vegetation and fauna being undertaken by Southern Cross University in Bundjalung National Park.

4.2 PROMOTION AND PUBLIC USE OF THE PLANNING AREA

The planning area will be managed to ensure that its use, whether by the general public, special interest groups, NPWS managers or other authorities is appropriate and consistent with the *National Parks and Wildlife Act*, NPWS policies and the management objectives and policies outlined in this plan of management.

The major categories of use that may be appropriate within NPWS areas are:

- environmental education and the promotion of natural and cultural heritage conservation;
- recreation in a natural setting;
- scientific research; and
- management operations by the NPWS and other authorities.

The extent to which these categories of use are appropriate to the planning area is indicated below.

4.2.1 Promotion of the planning area

The planning area has a significant role to play as a community resource for nature based recreation and environmental study and education. The promotion by the NPWS of the importance of the system of national parks and nature reserves is a major responsibility in the management of visitor use. Visitors to the planning area have an expectation that information on the features of the area and its management is readily available.

Existing facilities and programs in the planning area which promote public awareness and appreciation include:

- facilities for environmental education that have been developed at Woody Head;
- brochures which offer general information;
- brochures on specific topics of natural history interest; and
- signs along the walking track system.

The Discovery Ranger school holiday programs are popular and are often booked out well in advance. The program offers a wide range of activities led by rangers and local specialists which encourage the participants to experience and learn about the natural and cultural features of the planning area.

NPWS staff based at Grafton provide day tours for groups to the Iluka Nature Reserve and these are proving popular with special interest groups and schools. This program is included in tourism promotions in Iluka village.

The use of the planning area for environmental education is well established, particularly on the Iluka Peninsula. The Woody Head camping area is being increasingly utilised by schools and tertiary institutions for field studies. Local schools and Southern Cross University use walking tracks and lookouts along the coast to teach coastal processes. A number of studies have been undertaken of native animal and plant communities in the planning area by both undergraduate and post-graduate students.

The existing interpretation and education programs will be progressively extended with general emphasis on the importance of the planning area as part of a regionally important group of conservation areas on the coast of northern NSW and using, in particular, the following themes:

- the geological evolution of the coastal sand plains and the lower Richmond and Clarence Valleys;
- the biological significance of coastal environments for the conservation of native plants and animals;
- the importance of coastal rainforest;
- the importance of the areas to the Aboriginal community; both in a traditional context and their use by current and future generations of Aboriginal people.

- the appropriate recreational use of the planning area, particularly of beaches and rivers; and

- the management of fire.

Six localities have been identified where interpretation facilities will be upgraded.

- at **Woody Head camping ground** there will be additional interpretive material featuring the natural and cultural values of Woody Head.

- at **Black Rocks camping area** where there are a number of features which demonstrate both cultural and natural features of interest such as coffee rock, coastal geomorphology, shore birds, variation in plant and animal communities and their use by Aboriginal people and the history of the concrete bunkers.

  Promotion of the responsible use of Ten Mile Beach by four wheel drive vehicles and the impact on threatened species such as pied oystercatchers and little terns will also be a major theme at Black Rocks camping area.

- at **Jerusalem Creek** along the walking track to the mouth of the creek where a range of natural features, coastal wetlands/estuaries, variation in plant and animal communities, impact of human use, hind-dune vegetation and weed control will be developed as a self guided nature walk;

- at **Gumma Garra picnic area and nature walk** on the Evans River in Bundjalung National Park where interpretation will be upgraded and expanded with emphasis on Aboriginal heritage;

- at **Broadwater Lookout and Broadwater Headland** where coastal and hinterland features of Broadwater National Park such as the mosaic of heathlands, the hydrology of Broadwater National Park and fire management can be explained, and

- at **Iluka Nature Reserve** an established interpretation program promotes the appreciation of littoral rainforest through environmental education activities such self guided walks and nature tours.

The planning area provides opportunities for commercial recreation and education licensed under the *National Parks and Wildlife Act*. These activities may complement park management and provide increased opportunities for visitors consistent with the objectives of the NPWS and this plan of management. The establishment of commercial operators within the planning area will provide the NPWS with an opportunity to more extensively promote the importance of nature conservation and cultural heritage conservation generally, and the appreciation and understanding by visitors of the importance of Broadwater National Park, Bundjalung National Park and Iluka Nature Reserve in particular.

There are currently no operators licensed for the planning area at present, however, there is growing interest in the development of ecotourism opportunities in the region.

The Iluka Chamber of Commerce proposes to develop a rainforest education facility on land adjacent to Iluka Nature Reserve as a part of an ecotourism strategy adopted for the village. Any such proposal will be subject to an

environmental impact assessment and the Service will seek to ensure that the proposal is compatible with the management of the adjoining Iluka Nature Reserve.

An important aspect of the NPWS public awareness program is to keep members of the local community, particularly neighbours of the planning area, local councils and other authorities informed of park management programs particularly with respect to fire management and feral animal and weed control. To this end, the NPWS will continue to maintain liaison with local authorities such as the District Fire Committees, the Rural Lands Protection Board, community interest groups and neighbours.

Policies

* Public awareness programs will be maintained to encourage people to visit and enjoy the planning area and to understand and appreciate the natural and cultural values and the management role of the NPWS in protecting and promoting these values. Emphasis will be placed on:

  - the importance of the planning area in the context of conservation areas in the region;

  - the geological evolution of the coastal sand plains;

  - the biological significance of the coastal environment for the conservation of native plants and animals;

  - the significance of littoral rainforest;

  - the past occupation and present use of the coastal zone by the Aboriginal community;

  - appropriate recreational use of the planning area, particularly beaches and rivers; and

  - fire management.

* Interpretive information will continue to be provided at or along walking tracks, camping areas and viewing areas, so as to promote the understanding and enjoyment of the natural and cultural features.

* Use of the planning area by school and university groups will continue to be encouraged for environmental and park management education and research.

* Commercial recreation and educational activities which are consistent with the conservation and appreciation of the natural and cultural values of the planning area will be encouraged. Commercial activities are required to be licensed under the *National Parks and Wildlife Act* and will be subject to NPWS policies and this plan of management.

* Commercial recreational activities will not be licensed for vehicular access to the ocean beaches or within the Primitive Area of Bundjalung National Park (refer to map 4).

* Any publicity and interpretation undertaken by commercial operators will be required to be consistent with environmental education and interpretation programs for the planning area.

* A combined interpretation plan for planning area will be prepared.

* In accordance with the interpretation plan, interpretation facilities will be provided at or along:

  - Woody Head camping ground
  - Black Rocks camping area;
  - Jerusalem Creek walking track;
  - Gumma Garra picnic area and walking track;
  - Broadwater Lookout and Broadwater Headland, and
  - Iluka Nature Reserve.

* The Discovery Ranger program and other environmental education programs will continue to be provided and promoted during school holidays and extended to other times as demand allows.

* The NPWS facilities at Woody Head, namely the “Swamp House” and “Forest House”, will primarily be used for NPWS training, seminars and meetings. Subject to availability, these facilities may be booked for appropriate use by individuals, community and student groups.

* Emphasis will be placed on explaining the NPWS programs for fire management to community groups and neighbours of the planning area.

4.2.2 Recreation Opportunities

The north coast of NSW has been identified as a priority area for tourism development in NSW with emphasis on promoting the development of areas with outstanding environmental and aesthetic qualities. Development in these areas is required to be sympathetic to the environment and to encourage the appropriate use of natural attractions and visitor facilities. Broadwater, Bundjalung and Yuraygir National Parks and Iluka Nature Reserve together protect the greater proportion of the coast between Ballina in the north and Woolgoolga in the south. For the purposes of managing recreational use by the NPWS these areas are considered to be complementary and part of the one protected area system.

The planning area provides coastal recreation settings ranging from remote stretches of coastline to areas readily accessible by vehicle. Broadwater and Bundjalung National Parks are also close to the coastal villages of Broadwater, Woodburn, Evans Head, Iluka, and Woombah which offer many complementary styles of accommodation. The recreational mix provided by these villages and the national parks provides for a wide range of recreation and holiday opportunities on the north coast of NSW.

Whilst horse riding is prohibited in nature reserves it is also an inappropriate activity in Broadwater and Bundjalung National Parks. Much of these parks are swamp or heathland unsuitable for horse riding with a sand surface subject to erosion. Horses also spread weeds in their manure. The environmental impact of horseriding and conflict between horseriders and other park users is unacceptable. There are a number of alternative places for horse riding in the area.

Visitor use of the planning area is monitored by a number of techniques including vehicle counts, visitor census, camping area bookings at Woody Head and participation levels in the Discovery Ranger programs.

Policies

* Outdoor recreation and environmental education opportunities provided in the planning area will need to be:

  - consistent with the protection of the natural and cultural values of the planning area;

  - directed towards an appreciation and understanding of the natural and cultural heritage; and

  - complementary to those opportunities available elsewhere in the region.

* The following recreational activities require the prior approval of the relevant district manager:

  - group activities involving more than twenty people;

  - competitive activities;

  - training activities; and

  - adventure activities including hang gliding.

* The development of appropriate nature based commercial visitor and recreation facilities may be encouraged on lands adjacent to, or in close proximity to, the planning area.

* Horse riding will not be permitted in the planning area.

* Visitor use of the planning area will be monitored.

Vehicle Access

Vehicle access within the planning area comprises the park road system and designated beaches available for public vehicle use. The roads and beaches designated for public vehicle use within the planning area are shown on maps 2 and 4.

Vehicle access to Broadwater National Park is provided via sealed roads from the Pacific Highway and the Broadwater to Evans Head Road. These roads are excluded from the national park. Within Broadwater National Park the NPWS maintains gravelled roads to parking areas at:

- Broadwater Beach picnic area;

- Broadwater Headland;

- Broadwater lookout, and

- the trackhead for the Salty Lagoon walking track.

Vehicle access to Bundjalung National Park and Iluka Nature Reserve is provided from the Pacific Highway with sealed roads to Evans Head and the Iluka Peninsula. Access to Black Rocks is via the mostly gravel Gap Road which

is included in the park and maintained by the NPWS. The NPWS provides gravelled roads to the various picnic areas on the Iluka Peninsula.

Traffic flow on the Iluka Peninsula roads is high and increasing as Iluka develops and the attractions of the Iluka Peninsula are more widely appreciated. The maintenance requirements for gravel roads especially during periods of wet weather is high, with the environmental and financial costs of maintaining them as gravel roads is considered to be unacceptable. The problems identified with this road system include:

- excessive noise and dust nuisance, especially within Woody Head camping area;
- safety problems on narrow sections of Iluka Bluff road;
- potholing of road surfaces during wet weather;
- dust blowing onto roadside vegetation, such as rainforest; and
- expense of buying and transporting gravel for road maintenance from distant quarries and likelihood of introducing weeds or soil pathogens in gravel supplies.

It is proposed to progressively seal the roads on the Iluka Peninsula.

Four wheel drive vehicle use of beaches fronting Broadwater and parts of Bundjalung National Parks is popular. Land below high water mark is Crown land and not reserved as national park, vehicles on these beaches are restricted to the intertidal zone and are not permitted above high water mark or onto sand dunes. Beaches are at law public places and all vehicles and drivers on beaches are subject to relevant Acts and regulations; particularly with respect to the registration of vehicles and licensing of drivers.

Vehicle access to the beaches adjoining Broadwater National Park is from outside the park:

- from Evans Head to the south; and
- from near Boundary Creek to the north.

Vehicle use of beaches adjoining Bundjalung National Park is restricted to:

- the southern half of Ten Mile Beach between Black Rocks and Shark Bay. Access to Ten Mile Beach is at Black Rocks and at Shark Bay, with both accesses maintained by the NPWS; and
- the southern end of Iluka Beach on Iluka Peninsula. Entry to Iluka Beach is provided by Maclean Shire Council at the southern end of the beach.

The breeding and feeding of shorebirds have been observed to be disrupted by 4WD use of Ten Mile Beach, in particular the pied oystercatcher *(Haematopus longirostris*). The high visitor numbers at Woody Head can lead to disturbance of shorebirds on the rock platform which is an important roosting and feeding area.

The pied oystercatcher is listed as vulnerable under the Threatened Species Conservation Act 1995. Under the Threatened Species Conservation Act a species recovery plan and a threat abatement plan are required to be prepared

for all vulnerable species, including the pied oyster catcher by the year 2005. In the event that either the species recovery plan or the threat abatement plan identify vehicle use of beaches as having an unacceptible impact on pied oyster catchers, use of vehicles on beaches within Bundjalung National Park will be prohibited.

Vehicles are prohibited on the beaches between Shark Bay and Iluka Bluff (except for vehicles used to launch boats at the Woody Head boat ramp) and between Black Rocks and Evans Head, including the Jerusalem Creek Peninsula. Uncontrolled vehicular access to beaches has in the past severely damaged beach and headland areas. The use of vehicles on beaches also conflicts with passive recreation and visitor safety in these areas and vehicle use has been prohibited where such conflicts have been unacceptable.

Therefore, the Service will introduce a system of permits for vehicle access onto beaches for the purposes of monitoring and controlling vehicle use of the beaches in Bundjalung National Park. The permit system will support necessary research into the impact of vehicles on beaches.

Policies

* Vehicles driven on beaches are prohibited above the intertidal zone so as to reduce the potential impact on beach dwelling birds and dune vegetation.

* Vehicles will only be permitted on park roads and designated beaches, outlined on maps 2 and 4 of this plan, unless otherwise authorised for emergency or management purposes.

* Vehicles will be permitted only on the following designated beaches (refer to maps 2 and 4):

  - Ten Mile Beach between Shark Bay and Black Rocks within Bundjalung National Park;

  - beaches adjacent to Broadwater National Park; and

  - the southern end of Iluka Beach on Iluka Peninsula.

* Vehicles are not permitted to access other beaches in the planning area.

* Access onto Ten Mile Beach within Bundjalung National Park will be provided at:

  - Black Rocks; and

  - Shark Bay.

* A system of permits for vehicle access onto beaches will be introduced.

* The impact of vehicles using beaches on both nature conservation values and the enjoyment of the national parks by other users will be regularly monitored. Vehicles on beaches will be restricted or prohibited where such impact is unacceptable to the NPWS.

* In particular, the disruption to pied oystercatchers and other shore birds by vehicles on beaches, such as Ten Mile Beach, will be monitored.

* Gravel roads on the Iluka Peninsula will be progressively sealed.

Camping and Day Use

There are two established camping areas accessible by vehicle in Bundjalung National Park at Woody Head and at Black Rocks (refer to map 4). Camping facilities are not provided in Broadwater National Park. Self reliant back-pack camping is permitted in the designated areas in both national parks (refer to maps 2 and 4). Camping is not permitted in Iluka Nature Reserve.

Woody Head on the Iluka Peninsula is the most sophisticated camping area in any national park on the north coast of NSW. The NPWS has undertaken significant redevelopment of the Woody Head camping area since accepting responsibility for the area in 1982. Facilities on the site include water, septic toilets, hot showers and a kiosk. Firewood is provided. The number of permanent caravans inherited at the time of transfer to the NPWS has been progressively reduced in favour of providing sites for short term camping.

Cabin accommodation is provided at Woody Head, with three cabins currently available for hire. The Service plans to build three additional cabins.

The Woody Head camping area has a contract manager who arranges the bookings, collects fees, cleans amenities and maintains grounds for a share of the gross takings from the camping ground. This management arrangement has been successful in allowing Service staff to focus on other management requirements in the park.

Cabin accommodation is available at Woody Head, with three cabins currently available for hire.

Some campers have been observed using generators in the planning area despite signs advising of their prohibition. Generators have always been prohibited at Woody Head Camping Area. Campers who use generators create conflict with other campers because of the noise they produce in an environment where there are low levels of background noise. Generators are considered an unacceptable use in the national park camping areas in the planning area.

The coast at Woody Head and immediately north is the fastest eroding section of coastline in New South Wales. The rate of retreat is estimated at one metre per year and is the subject of research and monitoring by the NSW Department of Public Works. The erosion appears to be a natural phenomenon and it is attributed to this section of beach being protected by Woody Head from the influence of the system of littoral drift which transports sediment northwards along the coast.

The current pattern of erosion of beach and hind dunes will lead to loss of part of the camping ground and the NPWS has consulted the Department of Public Works on how to limit this erosion. It is impractical to halt the processes of erosion and the recommended strategy is to allow the beach to continue to erode but to direct the erosion away from the camping area as much as possible by the construction of an appropriate structure at the eastern end of Woody Bay.

Vehicle based camping is also provided at Black Rocks adjacent to the beach in central Bundjalung National Park. The site offers bush-style camping with low key facilities and with sites widely spaced. Campers must provide their own drinking water as none is provided.

The close proximity to, and easy accessibility of, the coastal villages and regional towns to the planning area makes it a popular day trip destination. Facilities for day visitors are provided at:

- **Broadwater Beach picnic area** where pit toilets, gas cooking fire places and picnic tables are provided. This area offers pedestrian access to the ocean beach for fishing, beach walking and surfing.

- **Broadwater Lookout** where pit toilets, fire places and picnic tables are provided near a short walk for spectacular views over heathlands.

- **Gumma Garra picnic area** on the Evans River in Bundjalung National park where pit toilets, fire places and picnic tables are provided.

- **Black Rocks camping area** where pit toilets, gas cooking fire places, garbage receptacles and picnic tables are provided with pedestrian and vehicle access to the ocean beach for fishing, beach walking and surfing.

- **Iluka Peninsula** where picnic areas are provided at Shark Bay, Back Beach, Frazers Reef, Iluka Bluff and at Woody Head. These facilities provide access to beaches and rock platforms on the headlands.

Another site popular with visitors is Broadwater Headland which is a lookout point on the coast accessible by sealed road. A viewing platform has recently been built at this location to take advantage of the view and to reduce erosion to the primary dunes from pedestrians walking down the dunes.

Water is not available, and camping is not permitted, at any of the day use areas. The NPWS is progressively removing pit garbage receptacles at day use areas and encouraging visitors to take their garbage home.

The banks of the Evans River in the vicinity of the Gumma Garra picnic area in Bundjalung National Park have been damaged by vehicle and pedestrian use and by boat launching. Access to these river side picnic areas will be redesigned for pedestrian access only, with car parking bays set back beside the road. This will enable rehabilitation of the river bank.

Bluff Beach is the main beach used by local residents of the Iluka Peninsula (refer to map 4). The facilities at Bluff Beach will be upgraded by building a second car park and expanding the existing picnicking facilities. The Service has approved the construction of a small life guard observation tower behind Bluff Beach by the Iluka sub-branch of the Yamba Surf Life Saving Club.

Firewood is currently provided free at Black Rocks camping area and at Woody Head camping area in Bundjalung National Park. At Black Rocks, however, the firewood is stolen and wasted by excessive use by some visitors. The cost of providing firewood at Black Rocks camping area under these circumstances is unwarranted.

The provision of firewood to campers will therefore be phased out in the short term at Black Rocks Camping Area and free gas fire places have been installed. Six double gas barbecue units have recently been installed at Black Rocks Rest Area. Campers will be advised to provide their own fuel stoves. Monopolisation of the gas barbecues provided in the park will be discouraged and signs to this effect will be installed.

Fees for camping will be introduced at Black Rocks to offset the costs for garbage removal, maintaining access and for improved site management.

There is a walk-in camping area near the mouth of Jerusalem Creek where no facilities are provided. Campers are required to carry out their rubbish.

Policies

* Facilities for short term vehicle based camping will be provided at:

  - Woody Head; and

  - Black Rocks,

  and may be modified to control environmental and visitor impacts to protect their recreational setting.

* At Woody Head camping area, campers will be required to park their cars and boat trailers next to their camp, in accordance with present guidelines for campers.

* Permanent caravans at Woody Head will continue to be progressively phased out.

* Three additional cabins will be provided at Woody Head.

* The occupation of camping sites at Woody Head is limited to a maximum stay of six weeks in any three month period.

* The occupation of camping sites at Black Rocks will be limited to a period of three weeks unless a longer duration is approved by the District Office of NPWS subject to site availibility within the camping area.

* Camping fees will be introduced at Black Rocks camping area.

* Facilities for vehicle based camping will not be provided in Broadwater National Park.

* Camping will not be permitted in Iluka Nature Reserve.

* Use of generators by the public is prohibited in the planning area.

* Facilities for day use within Broadwater National Park at:

  - Broadwater Beach: and

  - Broadwater Lookout, will be maintained and may be modified to control environmental and visitor impacts to protect their recreational settings.

* Facilities for day use within Bundjalung National Park at:

  - Gumma Garra;

  - Black Rocks; and

  - Shark Bay, Back Beach, Frazers Reef, Iluka Bluff and Woody Head on the Iluka Peninsula,

will be maintained and may be modified to control environmental and visitor impacts to protect their recreational settings.

* The picnic areas on the banks of the Evans River near Gumma Garra will be redesigned to provide pedestrian access only and the river banks revegetated.

* Increased car parking and picnicking facilities will be provided at Bluff Beach, Iluka Nature Reserve.

* All camping is prohibited on all frontal dune areas.

* Camping, including backpack camping, is prohibited in Iluka Nature Reserve.

* Backpack camping is permitted in Bundjalung National Park only in the area designated as a primitive area on map 4 and at the entrance to Jerusalem Creek as shown on the inset diagram on Map 4. In Broadwater National Park backpack camping is only permitted in the area designated for backpack camping on map 2. Backpack camping is not permitted in Iluka Nature Reserve.

* The code of minimal impact bushwalking and camping will be promoted amongst visitors to the planning area.

* Impacts arising from recreational use of the planning area will be monitored and measures taken to protect natural and cultural features found to be subject to an unacceptable impact arising from such use.

* The provision of wood for camping and cooking fires in Broadwater National Park and at Black Rocks Rest Area will be phased out and replaced with gas barbeques.

* Campers will be advised to provide their own fuel stoves.

* Monopolisation of the gas barbecues provided in the park will be discouraged and signs to this effect will be installed.

* Backpack campers will be encouraged to use alternatives to wood for cooking and camping fires.

* Subject to environmental and economic considerations, the Woody Head Camping Area will be protected from coastal erosion.

Walking Tracks and Cycling

An important recreational feature of the planning area is the bush walking opportunities they provide. The walking track systems are a key means of encouraging the appreciation and awareness by visitors of the natural and cultural heritage of the planning area. Walking tracks are outlined on Maps 2, 3 and 4.

The beaches provide ready access for walkers to many of the major features of the parks. The extensive network of management tracks in both parks are also available to bushwalkers and cycle riders and provide access to much of the hinterland of the parks.

The following formal walking tracks have been provided in the planning area:

- At **Broadwater Lookout** a short walking track to the lookout offers spectacular views over the heathlands and dunes to the ocean.

- At **Salty Lagoon** a walking track about 2 kilometres in length provides access through the heathland, which features wildflower displays in winter and spring, to the wetland system with its variety of waterbirds. The Salty Lagoon walking track is subject to inundation following periods of wet weather.

- At **Gumma Garra** a walking circuit about 3 kilometres in length starts at a bridge crossing over Oyster Creek and winds around a small ridge through eucalypt woodland and rainforest and beside mangroves and saltmarsh along the southern bank of the Evans River. A feature of this walk is the opportunity to gain an appreciation of the cultural features of the area, including an extensive midden, an Aboriginal campsite and several scarred trees.

- At **Jerusalem Creek** a walking track about 4 kilometres in length follows the eastern side of the estuary through back beach sand dunes adjacent to paperbark forest areas, heaths, wetlands and saltmarsh.

- The **Iluka rainforest walking track** runs the length of the rainforest for 2.5 kilometres and links Iluka Bluff picnic area to Iluka village.

Some upgrading is proposed for the Jerusalem Creek track and Gumma Garra walk with directional and interpretative signs.

To better cater for the recreational needs of visitors to the Iluka Peninsula, the following extensions to the walking track system are proposed:

- a walking track and viewing platform at Iluka Bluff;

- a walking track from Iluka Bluff to Shark Bay which links the day use areas on the Iluka Peninsula and returning to Iluka on the western side of the Peninsula via Saltwater Inlet (refer to map 3).

Policies

* The walking track network and management track system will continue to provide access to, and interpretation of, the coastal environment and selected cultural sites.

* Non-motorised cycle use of management trails will be permitted. Cycles are not permitted on walking tracks.

* The impact of non-motorised cycling on the management track system will be monitored. If the level of impact is found to be unacceptable by the NPWS, cycling on the subject tracks may be restricted or prohibited.

* Where appropriate, walking tracks will be resurfaced to improve access for the elderly and disabled visitors to provide a range of recreational opportunities for all park visitors.

* A walking track and viewing platform will be constructed at Iluka Bluff.

* A walking track from Iluka Bluff to Shark Bay and back to Iluka will be constructed.

* Sign posting and interpretation of the walking trail system will be reviewed and upgraded as a high priority.

* Sign posting of the management track system will be undertaken so as to encourage its use as part of the walking track system.

* Directional and interpretative signs will be provided along the Jerusalem Creek track and Gumma Garra walk.

Use of Waterways and Ocean Access.

Two navigable waterways occur within Bundjalung National Park:

- That part of the **Esk River** which lies within Bundjalung National Park is proposed to be managed to protect its natural values and primitive recreational setting. The river is navigable by larger craft to the Bill Weiley Bridge on the Iluka Road. Small craft are launched from a site near the bridge but no other facilities are provided for the launching of boats or for other recreational use of the river. Upstream the steepness of the banks makes them difficult to use as access points and regular use leads to erosion.

- **Jerusalem Creek** near Black Rocks is navigable for most of its length by small craft and provides a setting for passive, water-based recreation. No formal boat launching facilities are provided and it is proposed to build a canoe launching facility for the launching of small craft.

Boating activity on the Esk River north of Jackey's Gully and on Jerusalem Creek is controlled by the NPWS because the waters are within the Park. However, the lower Esk River, south of Jackey's Gully, is controlled by the Waterways Authority of NSW since this section of the Esk River is not within the Park.

There is a boat launching ramp for fishing craft at Woody Head camping area. This facility becomes very congested during school holidays when more than 50 boats use the ramp, many of these are not park campers and may arrive to be launched in the pre-dawn hours and vehicles with trailers queue along the access road through the camping ground. Once boats have been launched vehicles and trailers are parked on the beach area, obstructing access to and use of the beach by other visitors. Vehicles and trailers also occupy considerable space in the picnic area. Boats returning from the sea pose a risk to swimmers. Many boats return mid-morning when campers, particularly children, are swimming in the same location. The conflict between park visitors and boats reaches a peak in the summer holidays which coincides with the mackerel season.

Another unacceptable impact associated with the boat launching facility is the practice of cleaning fish near the shore. Fish offal thrown into the water may attract sharks and is often washed up on the beach, severely reducing the aesthetic and general recreational amenity of the beach. Mackerel heads and skeletal remains of fish littering the beach are a hazard to beach users.

The volume of use of the boat ramp during peak periods is incompatible with the primary use of Woody Head as a camping ground. Alternate boat launching facilities are available at Iluka and Yamba. Launching at Woody Head is safer, however, when the Clarence River bar is rough. All users will continue to have access to the boat ramp at Woody Head for launching boats during peak times.

However, in an attempt to reduce some of the conflicts inherent in the present situation, the NPWS will:

- request the Waterways Authority to provide a mechanism, such as buoys, to safely separate swimmers and boaters in the boat ramp area;
- prohibit the parking of vehicles and trailers on the beach at Woody Head at all times;
- require campers to return their vehicle and trailer to their camp site immediately after boat launching, and
- provide a 'code of conduct' sign at Woody Head boat ramp. This sign will set out a code for fishers who use the boat ramp and will include such matters as:
    - gutting and gilling fish at least 500 metres seaward of the boat ramp;
    - confining boat use to the Waterways Authority marked boating lane;
    - not parking vehicles and trailers on the beach;
    - speed and courtesy in launching and retrieving boats, and
    - campers to return boats to their camp site after launching their boat.

The use of the Woody Head boat launching ramp by licensed professional fishermen engaged in traditional beach netting activities will not be affected.

One of the major user groups of the national parks are amateur anglers fishing on the adjoining surf beaches and rock platforms and along the estuaries of the Evans and Esk Rivers and Jerusalem Creek. Recreational fishing is regulated by the NSW Fisheries under the *Fisheries Management Act 1994.*

Policies

* The Service will preserve a primitive recreational setting for Jerusalem Creek and the Esk River upstream from Bill Weileys Bridge.
* Only non-powered craft or silent electrical powered craft will be permitted on the Esk River upstream from the junction with Jackeys Gully and on Jerusalem Creek.
* A four knot speed limit will apply to all powered craft using the Esk River upstream of Jackeys Gully and on Jerusalem Creek.
* Signs will be erected at appropriate locations advising visitors and other users about these policies and conditions of use of Jerusalem Creek and the Esk River upstream of Jackys Gully.
* The Service will seek the co-operation of the Waterways Authority to protect the recreational setting of the Esk River between Bill Weileys Bridge and Jackeys Gully by permitting only non-powered or silent electrically powered craft on this section of the river.

* The Service will seek the co-operation of the Waterways Authority and Maclean Shire Council to maintain the natural setting of the Esk River between the Bill Weiley Bridge and the North Arm of the Clarence River.

* The NPWS will request the Waterways Authority to provide a mechanism, such as buoys, to safely separate swimmers and boaters in the boat ramp area at Woody Head.

* Access to the boat ramp at Woody Head will continue to be provided to non-campers as well as campers during school holidays and at other peak periods.

* Campers will be required to return vehicles and boat trailers to their camp sites after boat launching.

* The use of the boat launching ramp at Woody Head will be monitored to ensure that the recreation amenity of the Woody Head camping area, picnic area and beach are not compromised.

* A 'code of conduct' sign for fishers using the boat ramp will be provided at the boat ramp.

* The 'code of conduct' sign will request that fishers who gut and gill fish at sea do so no less than 500 metres out to sea from the boat ramp and swimming area.

* Vehicle and trailer parking will be prohibited on the beach at Woody Head.

* Use of powered craft by NPWS and other regulatory authorities, such as the Waterways Authority and police, will be allowed to access the Esk River north of Jackey's Gully and Jerusalem Creek, for necessary management purposes, including law enforcement, fire fighting, weed and feral animal control and rubbish removal.

4.2.3 Scientific use

Bundjalung and Broadwater National Parks and Iluka Nature Reserve are important scientific resources and have an established use for scientific research and tertiary education. For example, recent long term research programs undertaken by Southern Cross University and the University of New England in the planning area include:

- post-fire population dynamics of vertebrate communities with particular emphasis on endangered and vulnerable species such as the ground parrot (*Pezoporus wallicus*), New Holland mouse (*Pseudomys novaehollandiae*) and native grassland rat (*Rattus tunneyii*);

- monitoring vertebrate animal communities occurring on previously mineral sands mined areas in Bundjalung National Park; and

- the distribution, taxonomy and demographics of short-necked tortoise populations in Bundjalung National Park.

The NPWS, however, does not presently have the resources to undertake long term monitoring or research in the planning area and relies on work undertaken by outside institutions. As part of a strategy to encourage scientific use of the

planning area, liaison will be maintained with Southern Cross University, the University of New England and other research and educational institutions and individuals.

The need for research into park management issues has been identified in a number of sections of this plan. To this end a prospectus will be prepared which identifies the NPWS priorities for research.

Preferred topics will be those of direct relevance to management and will include:

- additional surveys of native animals, for example the management requirements of the eastern chestnut mouse (*Pseudomys gracilicaudatus*) have been recognised as high priority;
- habitat requirements of endangered and vulnerable fauna and plants, such as the swamp orchids (*Phaius australis and P. tankervilleae*) and the plant *Rutidosis heterogama* have been recognised as high priority;
- the monitoring of oystercatchers and the effects of recreational use of the beaches on breeding and feeding activities;
- the management of fire for the conservation of native plants and animals;
- the monitoring of oystercatchers and the effects of recreational use of the beaches on breeding and feeding activities;
- the ecology and hydrology of the Salty Creek - Salty Lagoon system;
- surveys of Aboriginal sites and other places of cultural significance;
- recording of local Aboriginal history, including oral history;
- surveys of invertebrates and invertebrate communities in relation to fire and other management considerations, and
- surveys of visitor use.

Fauna surveys have been carried out in the planning area as part of a major Northern Region Biodiversity Study. The data gathered is available for park management purposes on the NPWS's GIS data system. All records of native plants and animals throughout NSW are also collected and stored in the NSW Wildlife Atlas; a database established by the NPWS. Information about the locality, habitat and breeding records of species is used to increase the knowledge of, and assist in, the management of native wildlife.

Policies

* Research relating directly to natural and cultural resource management issues and recreational use will be encouraged.
* All research will be subject to NPWS policy and procedures for the granting of permits, conduct of research, and the provision and dissemination of results.
* Survey work will be encouraged in the planning area with an emphasis on updating information for the NPWS's GIS data base.

* Research into the impact on pied oyster catchers of vehicles on beaches will be encouraged or undertaken by the Service.

* A prospectus will be prepared and updated as required as a guide to preferred research projects in the planning area.

4. 2. 4 Management Operations

Management of the planning area is undertaken by two Districts of the NPWS. Broadwater and northern and central Bundjalung National Parks are managed by Lismore District. Iluka Nature Reserve and the southern part of Bundjalung National Park including the Iluka Peninsula are managed by Grafton District.

In addition to the public vehicle access system, described in section 4.3.2, there is a network of tracks in Broadwater and Bundjalung National Parks which are maintained for fire and other management purposes such as weed and feral animal control. The management track system is also used by scientists and by other authorised agencies, such as the Department of Defence, Telecom and Councils for the maintenance of their installations and by licensed individuals such as apiarists.

The management track system is shown on maps 2 and 4. Information relating to the location and condition of the management track system is recorded on the NPWS's asset data base.

The following tracks are proposed to be upgraded to the standard necessary for immediate use by fire fighting vehicles:

- sections of Esk River management track;
- the Macauley's Lead management track; and
- access from Olive Gap to the Evans River.

An important fire control strategy in Bundjalung National Park is the establishment of a perimeter management track around its southern, western and northern boundary. This perimeter track is presently incomplete and some 35 kilometres of trail is needed to complete it around the north-western boundary of the park.

Public motor vehicle access for recreational purposes is not permitted on park management tracks. These tracks are however, promoted for bushwalking and non-motorised cycling.

An estimated 500 m^3 of gravel is required annually to maintain Gap Road and the management trail system in Bundjalung National Park. A disused gravel quarry exists in the north bombing range area and the NPWS will seek the agreement of the Department of Defence to the joint operation of this quarry for park management purposes as well as for Department of Defence purposes. A second quarry at Woombah in the south of Bundjalung National Park will also be used for the extraction of gravel for management purposes.

A number of statutory authorities and individuals occupy or use lands in Broadwater and Bundjalung National Parks for activities not directly associated with park management. It is a requirement that all such works, facilities and operations be covered by a lease, licence or easement under the *National Parks and Wildlife Act* or other legislation.

The Department of Defence is responsible for two bombing ranges in the north of Bundjalung National Park, which were gazetted for this purpose in 1940 by the

Commonwealth Government. Use of the north bombing range was discontinued in 1973 because of its close proximity to the township of Evans Head.

In 1984, following a detailed environmental review, the continued occupation of the south range by the Department of Defence for practice bombing, rocketry and air to ground gunnery was approved. Though there has been some clearing of unexploded ordnance in the north range, potential risks require that public access to both bombing ranges remains strictly prohibited. The ranges are shown on map 4.

Both bombing ranges contain a diverse range of habitats and are important for wildlife conservation. In particular, large populations of the ground parrot (*Pezoporus wallicus*), a vulnerable species, inhabit the area. It is apparent that restrictions on public access have contributed to the maintenance of the habitat value of the bombing range areas. Despite some apparent benefits for conservation and scientific study, continued use of the south range for defence activities is incompatible with long term park management.

Beach netting is a commercial fishing activity along the beaches adjacent to the planning area. The 4WD track along the eastern side of the Jerusalem Creek estuary was closed to all vehicular access in 1987. The continued use of the Esk River for commercial fishing has potential for conflict with protecting the natural values and primitive recreational setting of the area.

Land zoned for national park acquisition in the Local Environment Plan for Maclean Shire has recently been acquired by NPWS at Saltwater Inlet on the southern boundary of Bundjalung National Park. As well as being a valuable addition to the park, this property has large sheds and a house. The sheds will be used as the NPWS works centre for the southern section of the park allowing this function to relocate from Woody Head while the house will be used to provide an on-site staff presence. The former works centre at Woody Head may be utilised by the contract manager of the Woody Head camping area. In the event that the manager of the camping ground does relocate plant and equipment to the former works centre, the sheds currently used by the camp ground manager for equipment storage and maintenance will be demolished.

Power is provided to the NPWS workshop, amenity blocks, two cottages, shop, booking office, caretakers office and public telephones by two diesel powered generators which run continuously. The running of this 240 volt power generation system is time consuming and very expensive. Annual running costs are approximately $35,000. It is proposed to replace this system with an underground power line linking Woody Head to the central grid at Iluka. It is not proposed to make any changes to the power reticulation arrangements within the Woody Head area itself.

Policies

* The system of management tracks outlined on maps 2 and 4 will be maintained. Use of management tracks will continue to be restricted to authorised vehicles, walkers and non-motorised cycles.

* The following management tracks will be upgraded to NPWS standards as a matter of priority:

  - the Esk River management track;
  - the Macauley's Lead management track; and
  - access from Olive Gap to the Evans River.

* The perimeter trail system in Bundjalung National Park around the north-western boundary will be completed.

* Additional temporary tracks may be constructed where necessary for fire control and other emergency operations. Such tracks will be closed and rehabilitated as soon as possible after each emergency.

* It is a long term aim of the NPWS to reduce, and if possible eliminate, the number of non-park occupancies (including roads used to service these occupancies), held under lease or license within the planning area. To this end such occupancies will be kept under review and where possible the facility, including associated roads, will be relocated and or closed and the site rehabilitated.

* Non-NPWS uses of the planning area will be managed in accordance with the principles and objectives of this plan of management.

* Where a licence, agreement or lease does not currently exist, action will be taken to negotiate one as early as possible if it is deemed appropriate for such an authority to be issued.

* Proposals for the occupation of areas within the planning area for purposes inconsistent with the *National Parks and Wildlife Act* and this plan of management will be opposed by the NPWS.

* The NPWS will seek the cooperation of the Department of Defence in establishing and maintaining a safe working environment for management and emergency operations within the area of the ranges.

* Vehicular access to ocean beaches will be provided for commercial fishing activities in accordance with government policies and the policies for the protection of natural heritage, cultural heritage and recreation opportunities in this plan.

* Subject to environmental, safety and economic considerations, the NPWS will seek the agreement of the Department of Defence to the joint operation of the quarry site in the north bombing range.

* Gravel extraction from the quarries in north Bundjalung and near Woombah will be for essential park purposes only and will be in accordance with an approved gravel extraction plan.

* Underground power will be connected to Woody Head to replace existing diesel generators.

5. PLAN IMPLEMENTATION

This plan of management is part of the system of management developed by the NPWS. The system includes the *National Parks and Wildlife Act*, the NPWS's Corporate Plan, management policies and established conservation and recreational philosophies. It also includes regional and district operational planning.

The orderly implementation of this plan of management will be undertaken within the annual programs of the NPWS's Grafton and Lismore Districts. Priorities, determined in the context of district and regional strategic planning, will be subject to the availability of necessary staff and funding, and to any special requirements of the Director-General or Minister.

District programs are subject to ongoing review within which works and other activities carried out in the planning area will be evaluated in relation to the objectives set out in this plan.

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

In accordance with Section 81 of the *National Parks and Wildlife Act*, this plan shall be carried out and given effect to by the Director-General and no operations shall be undertaken in relation to the planning area unless those operations are in accordance with this plan. However, if after adequate investigation, operations not included in this plan are found to be justified, this plan may be amended in accordance with Section 75 of the Act.

Other lands may be added to the planning area during the term of this plan. Such lands will be managed in accordance with the objectives and policies of this plan.

As a guide to the orderly implementation of this plan, relative priorities (shown as a high, medium or low priority) for identified activities are summarised below:

Priority	**Activity** (summary of key activities only)	**Plan Ref.**
Broadwater National Park:		
Med	Assist Broadwater Community Dunecare group.	4.1.1
Med	Monitor the impact of the Evans Head sewage treatment plant and garbage disposal on the Salty Lagoon wetland system.	4.1.1
Low	Assess the feasibility of restoring the natural hydrological regime of Salty Lagoon.	4.1.1
High	Prepare a fire management plan.	4.1.5
Med	Phase out wood fires and replace with gas fire places.	4.2.2

Priority	**Activity** (summary of key activities only)	**Plan Ref.**
Bundjalung National Park:		
Low	Arrange removal and restoration of the ilmenite dump.	4.1.1
High	Continue the groundsel bush and yellow cassia eradication programs.	4.1.4
High	Restore an acceptable level and frequency of fire.	4.1.5
Med	Periodically review fire management plans.	4.1.5
High	Complete perimeter fire management tracks in the north and west of Bundjalung National Park.	4.1.5
Med	Redesign picnic areas on the Evans River at Gumma Gurra.	4.2.2
High	Introduce a system to collect camping fees at Black Rocks.	4.2.2
High	Provide short term vehicle based camping facilities at Woody Head and Black Rocks.	4.2.2
High	Implementation of a beach access permit system	4.2.2
Med	Provide appropriate 4WD access to Ten Mile Beach.	4.2.2
Med	Seal roads on the Iluka Peninsula.	4.2.2
Med	Phase out the provision of fire wood and provide gas fire places at Black Rocks Camping Area.	4.2.2
Med	Expand car parking and picnic facilities at Bluff Beach.	4.2.2
High	Connect underground power from the State grid to Woody Head.	4.2.2
Med	Provide canoe and boat launching facilities on Jerusalem Creek for non-motorised (other than electrically powered) craft.	4.2.2
Low	Maintain existing boat launching facilities at Woody Head.	4.2.2
High	Install a “code of conduct” sign for fishers at Woody Head.	4.2.2
High	Seek the co-operation of the Waterways Authority and Maclean Shire Council to maintain the natural setting of the Esk River between the Bill Weiley Bridge and the North Arm of the Clarence River.	4.2.2
High	Request Waterways Authority to provide mechanism to safely separate boats and swimmers at Woody Head.	4.2.2
Med	Seek to reopen the disused quarry in north bombing range.	4.2.4
Low	Provide three additional cabins at Woody Head	4.3.2

Priority	**Activity** (summary of key activities only)	**Plan Ref.**
Iluka Nature Reserve:		
High	Control bitou bush and asparagus fern.	4.1.4
High	Exclude all fires from the littoral rainforest.	4.1.5
Med	Build a walking track and viewing platform at Iluka Bluff.	4.2.2
Overall:		
High	Incorporate soil conservation practices into all works.	4.1.1
Med	Continue restoration program for mined areas.	4.1.1
Med	Map major occurrences of weeds.	4.1.4
High	Prepare and implement a control plan for pest plants and animals.	4.1.4
High	Control and eradication of weeds.	4.1.4
Med	Enter into cooperative arrangements with neighbours to control introduced pest species.	4.1.4
Med	Prepare a history of the Aboriginal use of the area.	4.1.4
Low	Prepare a history of European use of the area.	4.1.4
High	Undertake a public awareness program for the planning area.	4.2.1
Med	Prepare a combined interpretation plan for the planning area.	4.2.1
Med	Promote the code of minimal impact bushwalking and camping.	4.2.2
Med	Monitor impacts of recreation use and undertake measures to protect values.	4.2.2
Med	Prepare a scientific research prospectus for the planning area.	4.2.3
High	Encourage research into fire behaviour, hazard and risk assessment and the impact of fire on plant and animal communities.	4.1.5
High	Research/monitoring of pied oyster catchers	4.2.3
High	Research into the impact of vehicle use of the intertidal zone	4.2.3
High	Maintain perimeter management trails, fire radiation zones and hazard reduction zones around settlements.	4.1.5
High	Provide day use facilities at specified locations.	4.2.2

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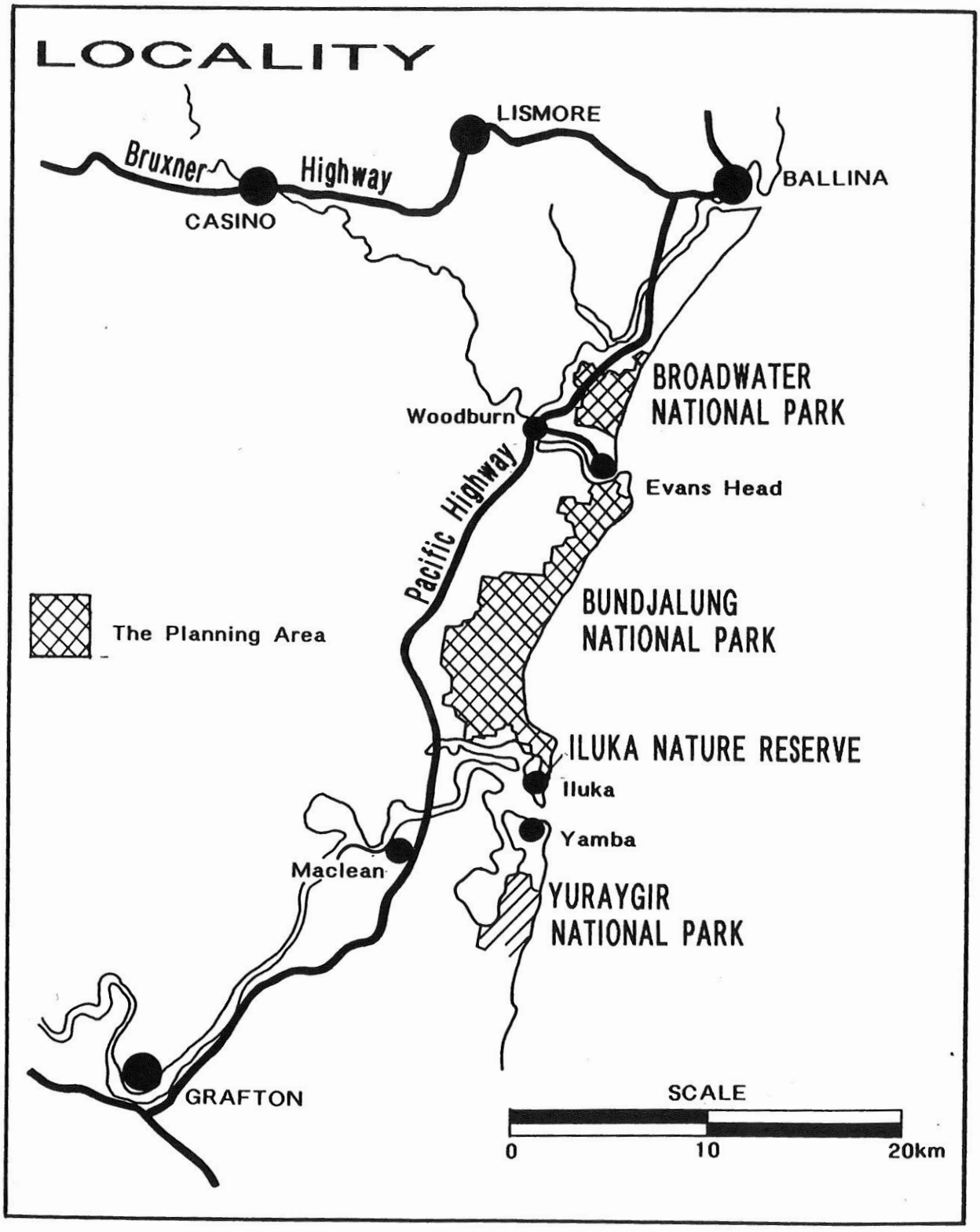
MAP I


LOCALITY
LISMORE
Bruxner
Highway
CASINO
BALLINA
BROADWATER
NATIONAL PARK
Woodburn
Evans Head
Pacific Highway
The Planning Area
BUNDJALUNG
NATIONAL PARK
ILUKA NATURE RESERVE
Iluka
Yamba
Maclean
YURAYGIR
NATIONAL PARK
GRAFTON
SCALE
0
10
20km

MAP 2

RILEYS HILL
Bessies
Rileys Hill F/T
BROADWATER
HIGHWAY
North Boundary F/T
Finns F/T
Broadwater Beach
Sugar Co
Picnic Area
Broadwater Headland
Broadwater Lookout
Maloneys
Boronia F/T
Montis F/T
LINK TRAIL
PACIFIC
Central F/T
Hind Dune F/T
Evans Head Beach
Death Adder F/T
McDonalds F/T
Bee F/T
Old Mining F/T
Crash F/T
Salty walking
Lagoon track
Powerline F/T
WOODBURN ROAD
EVANS HEAD
Airforce Beach
Evans River
P

INSET
Private Property

Pacific Ocean

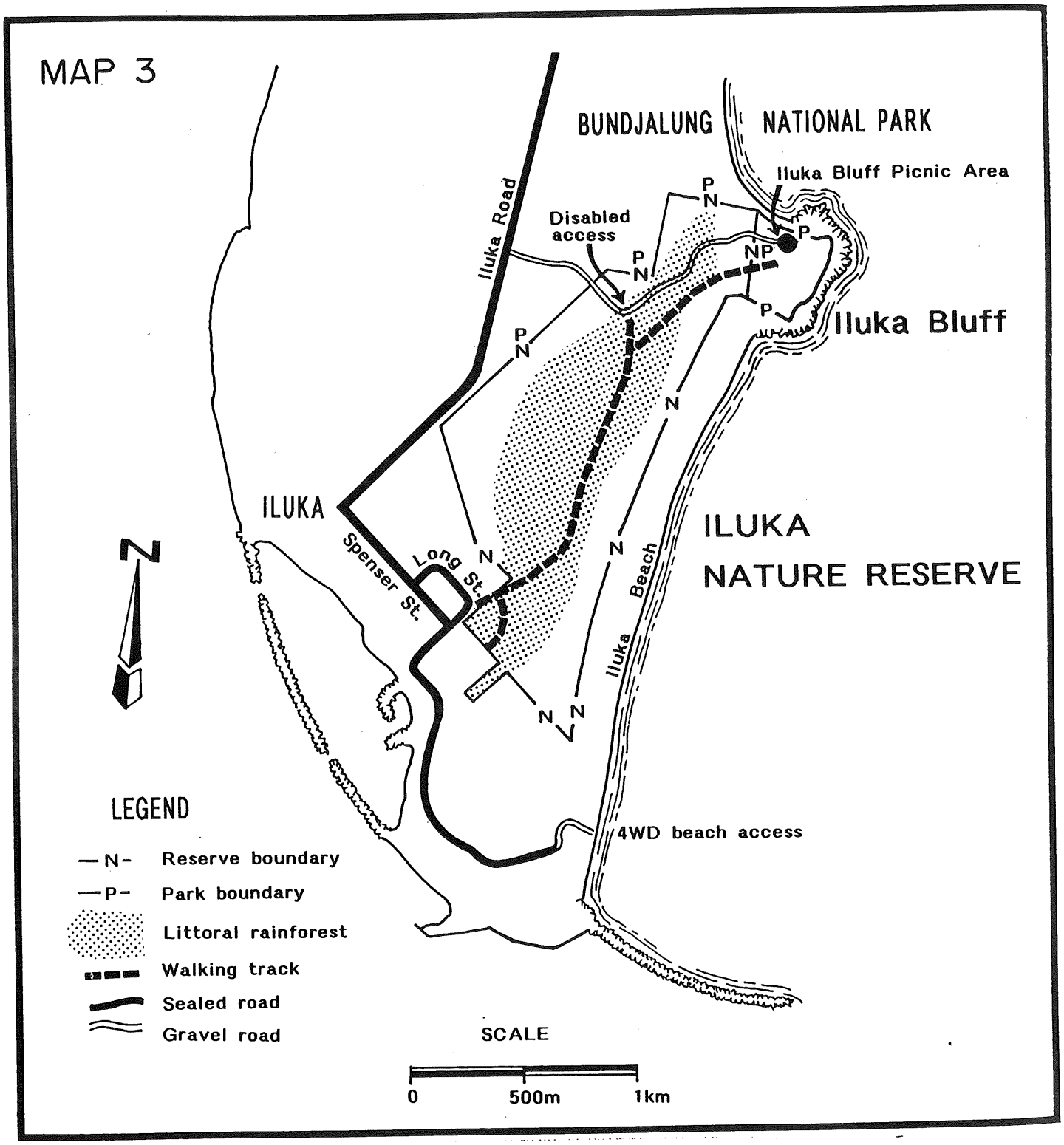
BROADWATER
NATIONAL
PARK

N

LEGEND

- P — Park boundary
- Designated backpack camping area
- Sealed road
- Gravel road
- Walking track
- Fire trail
- Gate

SCALE:
0 0.5 1 km


MAP 3
BUNDJALUNG NATIONAL PARK
Iluka Bluff Picnic Area
Iluka Road
Disabled access
Iluka Bluff
ILUKA
Spenser St.
Long St.
Iluka Beach
ILUKA NATURE RESERVE
N
LEGEND
—N— Reserve boundary
—P— Park boundary
Littoral rainforest
Walking track
Sealed road
Gravel road
4WD beach access
SCALE
0
500m
1km

MAP 4
BUNDJALUNG NATIONAL PARK