BONGIL BONGIL NATIONAL PARK
PLAN OF MANAGEMENT

NSW National Parks and Wildlife Service

November 1999

This plan of management was adopted by the Minister for the Environment on 23rd November 1999.

Acknowledgments: This plan of management was prepared by staff of the Dorrigo District of the NSW National Parks and Wildlife Service.

Thanks are extended to Richard Kelly, NSW State Forests Urunga District, who provided information relating to the Aboriginal significance of Bundagen Headland and the creeks within the park.

Members of the community who participated in consultation workshops, provided submissions on the draft plan, or contributed to the planning process in other ways are gratefully acknowledged.

ISBN 0 7313 6065 6

FOREWORD

Bongil Bongil National Park is located on the mid-north coast of New South Wales, approximately ten kilometres south of the city of Coffs Harbour, between the villages of Sawtell and Mylestom. Gazetted to mean low water mark along its eastern boundary, the park includes the beach and dune system, coastal forests including littoral rainforests, and wetlands of state significance. The park protects approximately 11 kilometres of coastline within a rapidly developing coastal area and, together with other coastal reserves to the north and south, including Moonee Beach Nature Reserve and Bundjalung, Yuraygir, and Hat Head National Parks, is part of a large conservation system which ranks in importance with only a handful on the east coast of New South Wales.

The diversity of vegetation communities and habitat types within Bongil Bongil National Park provide habitat for at least sixteen species of fauna which are listed as threatened under the NSW *Threatened Species Conservation Act 1995*, including the little tern and koala. It also contains Aboriginal middens and stone, and there is a high probability that more sites occur on the sand dunes and estuary shores.

A range of recreational activities can be undertaken within the park including fishing, swimming, boating, walking and picnicking. This plan provides for day use recreation within the park, as well as maintenance of the natural and cultural heritage values of the park.

BOB DEBUS

Minister for the Environment

CONTENTS

1. INTRODUCTION

The *National Parks and Wildlife Act 1974* (NPW Act) requires that a plan of management be prepared for each national park. A plan of management is to contain a written scheme of operations proposed to be undertaken within the national park, and must be consistent with the purpose and objectives of the Act.

The plan of management is placed on public exhibition for at least one month. This provides an opportunity for individuals, community groups, and organisations to formally comment on the plan. During the period of public exhibition, any person may submit comments about the plan.

After public exhibition of a plan of management, the plan and all representations made in response to the exhibition are referred to the National Parks and Wildlife Advisory Council for consideration and advice. The plan is then submitted, together with comments from the Advisory Council, to the Minister for the Environment.

The Minister may adopt the plan of management with or without alteration, or may refer it back to the Director-General and Advisory Council for further consideration.

Once a plan has been adopted by the Minister, no operations may be carried out in the national park unless they are in accordance with the plan.

Negotiations are currently proceeding to add land in the area to north and west of Bonville Creek to Bongil Bongil National Park. Other lands may also be added to the national park in future. Any land added to the park will be managed consistent with this plan of management.

A draft plan of management for Bongil Bongil National Park was placed on public exhibition between 10th July and 19th October 1998. The exhibition of the plan attracted 380 submissions which raised 27 issues. All comments received were referred to the National Parks and Wildlife Advisory Council for its consideration and advice. The comments and advice of the Advisory Council were in turn considered by the Minister when adopting this plan.

Any enquiries relating to the management of Bongil Bongil National Park can be directed to the NPWS Coffs Harbour office at The Jetty (telephone 02 6651 9522).

2. MANAGEMENT CONTEXT

2.1 National Parks in New South Wales

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

For the purposes of preparing plans of management, NPWS has adopted the International Union for the Conservation of Nature and Natural Resources (IUCN) in 1994 definition of a national park:

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

National parks are part of the regional pattern of land use. The management of a national park aims at minimising disturbance to its natural and cultural heritage. 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 land use in any region.

2.2 Bongil Bongil National Park

Bongil Bongil National Park is located on the mid-north coast of NSW, ten kilometres south of the city of Coffs Harbour between the villages of Sawtell in the north and Mylestom in the south (see map, centre pages). The park currently comprises an area of 978 hectares however this plan of management also covers certain lands immediately north and south of Bonville Creek which are proposed for addition to Bongil Bongil National Park in the near future (see map). Neighbouring land uses include Pine Creek State Forest, grazing lands, a large Multiple Occupancy, rural-residential land, and medium and low density urban residential land. The park falls within the Coffs Harbour and Bellingen Local Government Areas.

Bongil Bongil National Park contains an unusual geomorphological feature which consists of three sandy coastal dunes parallel to the coast. These have resulted from deposition in three stages over the past 6,000 years. This dune/ swale complex is the best representation of this type within the NSW reserve system.

The Bongil Bongil area contains a regionally rich mosaic of vegetation types, including littoral rainforests and wetlands which have been identified in State Environmental Planning Policies as being of State significance. Bundagen littoral rainforest at the southern extremity of the park is the second largest and one of the most diverse littoral rainforests in NSW. Other vegetation communities in the park include estuarine systems, wet and dry sclerophyll forests, and saline sedgelands and grasslands. Pine Creek and Bonville Creek estuaries, Scrub Creek, and Bundageree Creek influence the vegetation communities, and also provide regionally significant habitat for native animals.

The diversity of habitats within the park supports a regionally rich bird fauna. The area provides important overwintering habitat for species listed on international

conservation agreements with the governments of China and Japan for protection of migratory bird species. Twelve bird species known to occur within the park, as well as the koala and three species of bats, are listed under the NSW *Threatened Species Conservation Act 1995*.

The park is gazetted to mean low water mark along its eastern boundary and therefore includes the beach intertidal zone. The extension of the boundaries to the mean low water mark allows the management of the full intertidal zone. This is consistent with the Government's approach to ecosystem management and will ensure greater protection of habitat for both terrestrial and marine organisms through the protection of both vegetation and substrate. Much of this habitat is critical to the survival of protected and threatened species.

The invertebrate fauna of the park has not been systematically surveyed however the park is known to contain populations of Knights Dart Butterfly *Ocybadistes knightorum*, a species endemic to the Bonville area. The species is found in the semi-shaded swampy woodland with *Ghahnia* and *Alexfloydia repens* grass understorey. Little is known about either the butterfly or the rare (Briggs and Leigh 1996) *A. repens*, however the butterfly has been observed ovipositing on the grass. The occurrence of the two species in the park, their endemism to the area, and their relationship with each other is an important value for conservation in the park.

The park is also the southernmost extent of the known distribution of the Green Awl, Australian Leafwing, and Capaneus Butterflies.

Three threatened plant species are known to occur within the park. In addition to these, three other species listed nationally as rare or threatened (Briggs and Leigh 1988) have been recorded in the park, and another two are considered likely to occur based on their distribution and habitat characteristics.

Bongil Bongil National Park contains sites and artefacts of significance to the Gumbaynggir Aboriginal community. Aboriginal middens and stone tools have been found within the park, and there is a high probability that more sites occur on the sand dunes and estuary shores. The recorded sites of the area are an indication of the high level of use of the area by the Aborigines. The landscape of the park may, therefore, also be of cultural significance.

The proximity of the park to the city of Coffs Harbour and nearby coastal villages such as Sawtell and Mylestom gives the park high potential to be a popular destination for recreation in an outdoor setting. The beaches, estuaries, and forests provide for a range of recreational opportunities including fishing, bush walking and beach walking, bird watching, boating, photography, and picnicking.

Bongil Bongil National Park completes a forested corridor of publicly owned lands from the Dorrigo Plateau through the Bellinger Valley and lowland coastal forests to the coast. This continuous habitat is important for the seasonal altitudinal migration of fauna, in particular, birds which depend on coastal fruit-bearing trees in winter.

3. OBJECTIVES OF MANAGEMENT

3.1 Objectives of national park management

As outlined in the general objectives for management of national parks in the *National Parks and Wildlife Act 1974* (NPW Act), management of Bongil Bongil National Park will be in accordance with the following objectives:

- to conserve wildlife;
- to preserve the national park and protect its special features;
- to prohibit the execution of any works adversely affecting the natural condition or special features of the national park;
- to preserve any historic structure or object or any relic or Aboriginal place in the national park; and
- to encourage and regulate appropriate use, understanding and enjoyment of the national park by the public.

3.2 Objectives for management of Bongil Bongil National Park

In addition to the above legislative objectives, the management of Bongil Bongil National Park will be subject to the following specific objectives:

- to protect the significant dune/ swale complex of Bongil Bongil National Park;
- to protect the littoral rainforests and wetlands of the park which have been identified as being of State significance;
- to protect the habitat values of the park, particularly for threatened species such as the little tern and knights dart butterfly;
- to protect the water quality of the park, including the wetlands, creeks, and estuarine environments within the park;
- to rehabilitate degraded areas within the park to enhance its natural condition and the diversity of native plants and animals; and
- to provide appropriate opportunities for visitors to experience the scenic and natural qualities of the park, including provision of an appropriate range of access opportunities along the seaward boundary.

3.3 Management strategy

Within the operational timeframe of this plan of management, the emphasis for management of Bongil Bongil National Park is for protection of the natural and biophysical characteristics of the park, as part of the system of coastal reserves in northern NSW. In particular, management will aim to rehabilitate degraded areas, and provide protection for the littoral rainforests and wetlands within the park.

The focus of provisions for recreational use of the park will be north of Bonville Creek, and south of Bundagen Headland. The remainder of the park will be accessible for self reliant and low impact activities such as bush walking and cycling.

4. POLICIES AND FRAMEWORK FOR MANAGEMENT

This section contains the policies and framework for the management of Bongil Bongil National Park, supported by relevant background information. Policies are addressed under the following section headings:

4.1 Conservation of natural landscapes

4.2 Conservation of cultural heritage

4.3 Use of the park

The policies outlined in this plan of management are based on consideration of matters raised through the community consultation process, legislative responsibilities of the National Parks and Wildlife Service (NPWS), and anticipated availability of resources for management of the park.

Management actions in this plan have been developed to pursue the stated objectives for management of the park. Where not specifically stated in this plan, management of Bongil Bongil National Park will comply with the provisions of the *National Parks and Wildlife Act 1974* (NPW Act).

4.1 Conservation of natural landscapes

4.1.1 Geology, landform, hydrology and soils

The majority of the park, with the exception of the foredunes behind Bongil Beach, and areas near Lyons Road, Souris Road, and Bundagen Headland, is less than ten metres above sea level. Some areas within the park are subject to flooding during and after periods of high rainfall.

The sandy coastal deposits seaward of Pine Creek constitute a Holocene sand barrier that is less than 7,000 years old. It is about one kilometre wide and extends between the rocky promontories at the Bonville Creek mouth in the north to Bundagen Head in the south. The barrier comprises three geomorphological units which are parallel to the coast. The relationships between these units is of particular interest as they result from the process of deposition in three stages during the last 6,000 years. This dune/ swale complex, overlying either estuarine deposits, indurated layers, or bedrock, is the best representation of this type within the NSW reserve system.

The largely ephemeral creeks which transect the hind dunes are well developed and their morphology suggests that they probably evolved during the same time period as the beach deposits. This means that they are very old, stable systems and the sediments and preserved pollens of their beds may contain an important scientific record of littoral rainforest evolution.

The steep foothills west of Bongil Bongil National Park are drained by numerous streams which flow onto the coastal plain. These flows merge into either water courses such as Bonville Creek and Pine Creek, or drain into swamp and wetland areas. Parts of Bonville and Pine Creeks are within Bongil Bongil National Park. Areas adjacent to Pine and Bonville Creeks are low lying, with many parts subject to periodic flooding and tidal influences.

Part of the southern section of the park drains into Bundageree Creek, which discharges into the ocean at Bundagen Headland.

Another dominant geomorphological feature of the park is Scrub Creek which transects the parallel dune/ swale system behind the frontal dunes. Scrub Creek, unlike other creeks within the park, has no apparent ocean outlet and is essentially a closed system. A causeway between School Road and Overhead Bridge Road crosses the creek system, impeding the natural flow and drainage. A Review of Environmental Factors has been prepared and approved for the restoration of the Scrub Creek system (Harber 1996). This will involve the excavation of the causeway, which is an artificially raised culvert. Drainage pipes will also be installed beneath School and Overhead Bridge Roads. These roads are essential for management purposes, and the piping will facilitate a flow regime closer to the natural hydrology of the Scrub Creek system.

A study of the hydrology of the park would assess the need to rehabilitate other sections of the park affected by impeded drainage, with a view to installing drainage mechanisms to return the hydrology of the park to a more natural condition. NPWS will encourage research into the hydrological systems of the park.

The geology of the park consists of rocks of the Palaeozoic period, which have been subject to tectonic and orogenic influences. Most of the park south of Bonville Creek is Quaternary sand and alluvium. The geology of the area north of Bonville Creek is comprised of Quaternary Sediments, which overlay the Brooklana Beds and Moombil Siltstone of the Coffs Harbour Block. The Brooklana Beds are comprised of thin bedded mudstone siltstone, minor wacke chert, jasper and metabasalt, and the Moombil Siltstone is comprised of massive siltstone, minor wacke, and granular conglomerate. These groups have moderate to low erosion hazard (Wood 1994).

Two major soil types exist in the area. The stable foredune is composed of quartzose dune sands, formed on Holocene barrier dunes. On either side of the dunes are quartzose beach sands, which is unconsolidated sand with little vegetation, and is subject to wind and water erosion.

Yellow Earths (podsols) occur along the estuary flats and terraces of the creeks and other areas subject to inundation. In the lower reaches of the creeks, the soils are poorly drained.

Policies and actions

- All natural geological, geomorphological, and hydrological features and areas of scientific significance within the park will be protected, including the parallel dune/ swale system, and the beach dunal system.
- Management will ensure that the scenic, natural, and catchment values of the park are maintained or enhanced.
- Management will aim to decelerate or stabilise erosion where it has been accelerated by human activities or is threatening significant habitats or other values.
- In order to ensure that management activities and works within the park do not cause or accelerate the process of erosion, all management activities and works undertaken within Bongil Bongil National Park will be consistent with standard

erosion mitigation guidelines developed by the Department of Land and Water Conservation.

- Management will aim to maintain water quality and natural hydrological systems within the park, including Bonville and Pine Creeks, Scrub Creek, Bundageree Creek, and the coastal wetlands.
- NPWS will encourage the cooperative management of catchments through the Coffs Harbour Waterways Total Catchment Management Committee.
- NPWS will encourage research into the hydrological systems of the park.
- NPWS will install drainage pipes beneath School and Overhead Bridge Roads to facilitate a more natural flow regime.
- Proposed developments or activities which may compromise the landforms, hydrology, or scenic features of the park will not be supported by National Parks and Wildlife Service. This will have a dual effect of conserving Aboriginal sites as well as landscape features.
- The understanding, appreciation, and protection of the geomorphological features and processes within the park will be promoted through public education programs.

4.1.2 Flora

The distribution of plant communities within Bongil Bongil National Park has been influenced by exposure to onshore winds and wind-borne sea salt, and exposure to saline waters in estuarine areas, as well as factors such as topography, hydrology, fire regime, and history of use and management. The vegetation of Bongil Bongil National Park is therefore diverse, with a range of forest communities present including rainforest, swamp forest, dry and wet sclerophyll forest, and low dry sclerophyll forest. There are also mangrove communities, heath communities, grasslands, sedgelands, and sea grass beds. Plantation forests of Flooded Gum *Eucalyptus grandis*, Blackbutt *E. pilularis*, and Sydney Blue Gum *E. saligna* are also present.

Four areas in the park have been listed under State Environmental Planning Policy No. 26 Littoral Rainforests (SEPP 26): one south of Bundagen Headland, one on the northern bank of Bundageree Creek, another behind the dunes of Bongil Beach, and another south of Scrub Creek. The littoral rainforest south of Bundagen Headland is considered to be second in NSW only to the World Heritage listed Iluka Nature Reserve (John Hunter pers. comm.), both in terms of its size and condition. All four identified areas will be managed in accordance with the objectives and principles of SEPP 26.

The littoral rainforest is a variation of subtropical rainforest adapted to coastal locations, particularly exposure to salt bearing winds. Within the park, littoral rainforest areas are dominated by Tuckeroo *Cupaniopsis anaracoides*. The Red Olive Berry *Elaeodendron australe* is a co-dominant species, and in areas showing signs of disturbance, White Banksia *Banksia integrifolia* is common. Yellow Pear-fruit *Misocharpus pyriformis* and Lilly Pilly *Acmena smithii* also occur, and the sparse shrub layer contains a dense tangle of prickly climbers including Austral Sarsparilla

Smilax australis and Orange Thorn *Citriobatis pauciflorus*. The herbs and Rasp Fern *Doodia aspera* which comprise the ground layer are typically sparse.

At elevations of around four metres on the western edge of the Bongil Peninsula, small areas of well developed palm forest communities occur. The peaty soils in the vicinity of the palm forests may elevate the water table locally to allow this vegetation type to exist. The canopy is approximately 12 to 15 metres in height, and is dominated by Bangalow Palm *Archontophoenix cunninghamiana* and Cabbage Tree Palm *Livistona australis*.

Nine wetlands designated under State Environmental Planning Policy No. 14 - Coastal Wetlands (SEPP 14) occur in the area. SEPP 14 aims to preserve and protect coastal wetlands by placing development control on activities that have the potential to damage or destroy wetlands. NPWS will manage these areas in accordance with the objectives and principles of the SEPP.

In addition to the SEPP 14 wetlands, the dune swales support well developed swamp open forest communities. Dominants in these communities include Swamp Mahogany *Eucalyptus robusta,* Broad-leaved Paperbark *Melaleuca quinquenervia*, and Swamp Oak *Casuarina glauca*. The midstorey of the Swamp Oak forests is mostly dominated by Tuckeroo or Wild Quince *Guioa semiglauca*, while the Broad-leaved Paperbark communities contain an understorey dominated by White Bottlebrush *Callistemon salignus*, Prickly-leaved Paperbark *Melaleuca styphelioides* and Prickly Tea Tree *Leptospermum juniperinum*. Crinum Lily *Crinum pedunculatum* forms an extensive ground cover in these communities in some areas.

While the swamp open forest is predominantly found on waterlogged and occasionally saline soils within the park and has a ground layer mostly of sedges, wet open forest communities within the park are characterised by well draining surface soils with a rich understorey of herbs and shrubs.

Wet open forest communities within the park occur on the dunes of the dune/ swale system along the length of the peninsula. These communities within the park are dominated by Pink Bloodwood *Eucalyptus intermedia*, Blackbutt, Flooded Gum, or a mixture of these dominants. Canopy height varies from 20 to 30 metres. The midstorey is commonly dominated by shrubs or low trees such as White Banksia, Black Oak *Allocasuarina littoralis*, Forest Oak *A. torulosa*, and Cheese Tree *Glochidion ferdinandi*. The ground layers are commonly comprised of Bracken *Pteridium esculentum* and Mat Rush *Lomandra spicata*.

Exposure to wind action and salt spray has produced a stunted effect on the dominant species in the low open forest communities. The canopy of this vegetation type is dominated by Pink Bloodwood and White Banksia, and rarely exceeds 12 metres in height. The midstorey is comprised mainly of Black Oak and Swamp Oak, and also contains tough-leaved rainforest species such as Tuckeroo and Yellow Pear-fruit. Mat Rush and Bracken typically occupy the ground layers.

The western section of the area north of Bonville Creek is primarily vegetated with plantations of Flooded Gum *Eucalyptus grandis*, Sydney Blue Gum *E. saligna*, and Blackbutt *E. pilularis*. There are two large dams with extensive areas of wetland and grassland adjacent to them. Swamp forest of Swamp Oak *Casuarina glauca* occurs along Bonville Creek, with a small area of River Mangrove *Aegiceras corniculatum* growing in a shallow inlet of the creek.

The southern and central area of the section of the park north of Bonville Creek is predominantly comprised of poorly established eucalypt plantations that are now covered by a mosaic of wet and dry heath. Areas of relatively successful plantation occur, usually with an extensive shrub understorey. An area of wet open forest dominated by Scribbly Gum *E. signata*, grading into Swamp forest of Swamp Mahogany *E. robusta* and *Melaleuca spp*. occurs to the south of the railway line. The northern banks of Bonville Creek supports Wet Open Forest dominated by Blackbutt, with Tallowwood *E. microcorys*, Smooth-barked Apple *Angophora costata*, and Turpentine *Syncarpia glomulifera* grading to the south-east into Swamp Mahogany and Melaleuca.

In the north-east section of the area north of Bonville Creek, dry open forest dominated by Blackbutt, with Tallowwood, Smooth-barked Apple, and Turpentine, grades to the south-east into Swamp Mahogany *E. robusta/ Melaleuca* Swamp Forest.

Mangrove communities occur on the fringes of Bongil Peninsula where there is an accumulation of estuarine muds and silts. There are two distinct mangrove associations within the park. Communities dominated by Grey Mangrove *Avicennia marina* and River Mangrove *Aegiceras corniculatum* occur in discontinuous patches along the western edge of the peninsula, with more extensive stands in the mud flats at the northern tip of the peninsula. Mangrove communities dominated by Milky Mangrove *Exoecaria agallocha* also occur on the northern tip of the peninsula as well as on the lower elevations near Bundagen littoral rainforest. The understorey is comprised of a variety of sedges.

On the flanks of the foredunes within the park, open scrub communities dominated by White Banksia occur. These communities reach approximately eight metres in height, and the most common understorey species is Coast Wattle *Acacia sophorae.*

Towards the northern and western perimeters of the peninsula, particularly in areas affected by king tides, distinctive saline grasslands occur. Predominant species include Prickly Couch *Zoysia macrantha* and Sandy Couch *Sporobolus virginicus*. On the eastern boundary of the park above the high tide mark, Hairy Spinifex *Spinifex sericeus* forms pure grasslands.

Throughout the peninsula are small sedgeland communities. Species typical of these communities include Sea Rush *Juncus krausii*, Tall Sedge *Carex appressa*, and Bare Twig-rush *Baumea juncea*.

The shallow areas of the Pine Creek and Bonville Creek estuaries contain seagrass beds dominated by Eelgrass *Zostera capricorni* and Strapweed *Pondaria australis*.

Several species listed nationally as rare or threatened (Briggs and Leigh 1988) are known or considered likely to occur within the park, based on their distribution and habitat characteristics. These species are listed in Table 1.

Table 1: Nationally rare or threatened plants known or likely to occur in Bongil Bongil National Park (* denotes listing on NSW TSC Act)

Species known to occur in Bongil Bongil National Park	Species considered likely to occur in Bongil Bongil National Park
Acianthus amplexicaulis	*Austrobuxus swainii*
**Acronychia littoralis*	*Backhousia anisata*
Alexfloydia repens	
**Amorphospermum whitei*	
Marsdenia hemiptera	
**Tinospora tinosporoides*	

Acianthus amplexicaulis is a small terrestrial orchid which grows in moist coastal scrub on the lee side of coastal dunes and in littoral rainforest. It has been recorded in Bundjalung and Yuraygir National Parks, and Iluka and Broken Head Nature Reserves (Sheringham and Westaway 1995). Clearing of coastal habitat and competition from weeds are potential threats to the species.

During vegetation mapping, three small disjunct populations of the rare species *Acronychia littoralis* were recorded on the Bongil Peninsula. The species was recorded in littoral rainforest and open forest within the park (Williams and Bale 1996). The species is also known to occur in the Broadwater and Bundjalung National Parks and Iluka Nature Reserve (NPWS 1995). A draft Recovery Plan has been prepared for the species (Hunter *et al*. 1992). Actions from the draft plan which will be implemented in Bongil Bongil National Park involve weed control, minimising the risk of fire to the populations, and monitoring. Dorrigo District will also be involved in the recovery of the species through participation on the Recovery Team.

Alexfloydia repens is a recently described rare grass which occurs in the moist understorey of swamp oak forests. The species has an extremely restricted distribution, being endemic to the Bonville area, and has so far only been recorded from four localities, between Pine Creek and Boambee Creek. Bongil Bongil National Park is the only locality where the species occurs in a reserve. At least two of the other localities are threatened by commercial development, physical disturbance, or weed invasion (Sands 1997). Only known from peat-like soils, the species is almost monospecific where it occurs (Sands 1997). Within the park, the species occurs in the moist understorey of Swamp She Oak forests. Sites where *A. repens* occurs within the park are not normally burned by fire. NPWS will aim to exclude fire from sites where the species occurs.

Rusty Plum *Amorphospermum whitei* has a distribution north from the Macleay River to southern Queensland (Floyd 1989). The species occurs in littoral and warm temperate rainforest and also in wet sclerophyll forest, with or without a well developed rainforest understorey (Tweedie *et al*. 1995). The species has been recorded in Bongil Bongil National Park and is also known to occur in Bruxner Park, Woolgoolga Creek, and Waihou Flora Reserves (SFNSW 1995).

Marsdenia hemiptera (formerly *Thozetia racemosa*) is a tall climbing plant with twining stems to four metres in height (Harden 1992). The species occurs from north-east NSW through eastern Queensland, monsoonal Northern Territory and across to the Kimberley Region in Western Australia (Orchard 1996). It grows in palm dominated rainforest swamps (Orchard 1996), in littoral rainforest, and rarely in subtropical rainforest (Harden 1992). The occurrence of the species in Bongil Bongil National Park is at or near the southern limit of its distribution.

Tinospora tinosporoides is a tall woody vine found in subtropical rainforest (NPWS 1994). It has been recorded from Bruxner Park near Coffs Harbour, but is predicted to have higher probabilities of occurrence in warmer and moister areas further north (NPWS 1994). The occurrence of the species in Bongil Bongil National Park is significant as it is the southernmost extent of its known distribution.

Austrobuxus swainii is a rainforest tree occurring in warm temperate rainforest, rainforest ecotones, and the understoreys of moist hardwood forests. The Bellinger Valley is the southern extent of its distribution, which ranges to just north of the Queensland border (Tweedie *et al*. 1995). The species regularly occurs in habitat similar to *Amorphospermum whitei*. It has been recorded in Bruxner Park Flora Reserve and Dorrigo National Park, and may also occur in Bongil Bongil National Park.

Known as Ringwood or Aniseed Tree, *Backhousia anisata* occurs in gully rainforests on the better alluvial soils along streams, and is associated with *Archontophoenix cunninghamiana* on the poorer soils of the lower slopes. It is virtually confined to the Nambucca and Bellinger valleys (Floyd 1989). The species has been recorded in the nearby Pine Creek State Forest.

Of geographical significance is the occurrence of Burny Bean (*Macuna gigantea*) within the park. Burny Bean is a rainforest vine which reaches the southern limit of its distribution within the park (Floyd 1990). It is known from both the Bundagen and Scrub Creek littoral rainforest areas.

Red Bean (*Dysoxylum mollissimum* - formerly *Dysoxylum muelleri*) is a rainforest tree which reaches the southern limit of its distribution at Hungry Head, ten kilometres south of the park. It is common as a regrowth rainforest species and on the margins of the Bundagen littoral rainforest.

The TSC Act requires that a recovery plan be prepared for all species listed as endangered or vulnerable by the Act. The purpose of a recovery plan is to promote the recovery of the endangered or vulnerable species to a position of viability in nature. Where a plan exists for plant species occurring within Bongil Bongil National Park, any actions from those plans relevant to the management of the park will be implemented.

Policies and actions

- The range of native flora, vegetation communities, and natural ecological processes within the park will be conserved.
- The management of native plants will place emphasis on protecting and/ or enhancing significant ecosystems, habitats and species, including those listed as endangered or vulnerable (TSC Act), and those that are rare or approaching the limits of their known geographical distribution. Where appropriate, this will

include fire exclusion from vegetation communities and sites containing species sensitive to fire.

- Fire will be excluded from littoral rainforest and sites where *Alexfloydia repens* is known to occur.
- Works will be implemented to protect *Acronychia littoralis*. These will include weed control, works to minimise the risk of fire to the population, and monitoring, as outlined in the draft recovery plan for the species.
- NPWS will promote research into species and vegetation communities occurring within the park and their management requirements.
- The cooperation of neighbouring land managers and land use planning and management agencies will be sought to protect important vegetation communities adjacent to the park.
- For threatened (TSC Act) plant species and other significant vegetation communities occurring within the park, appropriate protection and management will be undertaken to reduce or eliminate threats to the species and communities. Where recovery plans exist for plant species or communities within the park, these will be implemented.
- Additional information on native plants and vegetation communities within the park, including their location and conservation status (for example, listing on TSC Act schedules) will be entered into the NPWS Wildlife Atlas database as it becomes available and made accessible for the management of and planning for the park.

4.1.3 Fauna

The diversity of vegetation communities in Bongil Bongil National Park provides a range of habitat types for fauna. The park has a rich and diverse assemblage of animal species, reflected by the number of species recorded in the park to date despite no comprehensive fauna surveys having been undertaken, including 165 bird species, 16 mammals, 14 reptiles, and eight frog species. Several threatened species (species listed as endangered or vulnerable under the NSW *Threatened Species Conservation Act 1995*) have been recorded within the park and are listed in Table 2.

In addition, a number of other threatened species are considered likely to occur within the park, based on their distribution and habitat requirements (Table 3).

Bongil Bongil National Park is utilised by many species of migratory shore birds that feed and/ or roost on the sandy beaches, estuaries, lagoons and rocky headlands during their annual migrations. Some of these species are protected under international conservation agreements with the Government of Japan for the Protection of Migratory Birds in Danger of Extinction and their Environment, and/ or with the Government of China for the Protection of Migratory Birds and their Environment.

Table 2: Threatened fauna known to occur within Bongil Bongil National Park.

Common Name	Scientific Name
Little Tern	*Sterna albifrons*
Pied Oystercatcher	*Haematopus longirostris*
Sooty Oystercatcher	*Haematopus fuliginosus*
Comb-crested Jacana	*Irediparra gallinacea*
Mongolian Plover	*Charadrius mongolus*
Black Bittern	*Dupetor flavicollis*
Black-necked Stork (Jabiru)	*Xenorhynchus asiaticus*
Osprey	*Pandion haliaetus*
Rose-crowned Fruit Dove	*Ptilinopus regina*
Wompoo Fruit Dove	*Ptilinopus magnificus*
Yellow-eyed Cuckoo Shrike	*Coracina lineata*
Glossy-Black Cockatoo	*Calyptorhynchus lathami*
Koala	*Phascolarctos cinereus*
Queensland Blossom Bat	*Syconycteris australis*
Little Bent-wing Bat	*Miniopterus australis*
Common Bent-wing Bat	*Miniopterus schreibersii*

Species which have been recorded in the park and are protected under one or both of these agreements include the Little Tern *Sterna albifrons*, White-bellied Sea Eagle *Haliaectus leucogaster*, Eastern Curlew *Numenius madagascariensis*, Red-necked Stint *Caladrus ruficollis*, Ruddy Turnstone *Arenaria interpres*, and Mongolian Plover *Charadrius mongolus*.

The Little Tern is listed as endangered under Schedule 1 of the *Threatened Species Conservation Act 1995*. These birds nest annually at the northern sand spit of the Bongil Peninsula. The colony is threatened by predation from feral cats and foxes and domestic cats and dogs, and by human disturbance. A draft recovery plan is being prepared by NPWS for the Little Tern, which will be implemented at Little Tern breeding sites and habitat along the length of the NSW coast. The major actions required by the draft plan include identification and protection of critical habitat, habitat enhancement, intensive management of nesting colonies to control the factors inhibiting the breeding success of Little Terns during each breeding season (including control of encroaching vegetation, human disturbance, and predator control), and monitoring and research.

Table 3: Threatened species considered likely to occur within Bongil Bongil National Park.

Common Name	Scientific Name
Pouched Frog	*Assa darlingtoni*
New England Tree Frog	*Litoria subglandulosa*
Stuttering Frog	*Mixophyes balbus*
Giant Barred Frog	*Mixophyes iteratus*
Sphagnum Frog	*Philoria spagnicolis*
Stephens Banded Snake	*Hoplocephalus stephensii*
Golden-tipped Bat	*Kerivoula papuensis*
Queensland Long-eared Bat	*Nyctophilus bifax*
Great Pipistrelle	*Falsistrellus tasmaniensis*
Masked Owl	*Tyto novaehollandiae*
Sooty Owl	*Tyto tenebricosa*
Rufous Scrub-bird	*Atrichornis rufescens*
Regent Honeyeater	*Xanthomyza phrygia*
Swift Parrot	*Lathamus discolor*
Long-nosed Potoroo	*Potorous tridactylus*
Common Planigale	*Planigale maculata*
Brush-tailed Phascogale	*Phascogale tapoatafa*
Squirrel Glider	*Petaurus norfolcensis*
Parma Wallaby	*Macropus parma*
Rufous Bettong	*Aepyprymnus rufescens*
Yellow-bellied Glider	*Petaurus australis*

Adapted from NPWS fauna modelling databases

Actions which have already been implemented in the park for the management of Little Terns include fox and feral dog control to reduce the threat of predation on the colony; community education through media releases and interaction of rangers, field staff, and community wardens (volunteers working on Little Tern recovery actions) with visitors; exclusion of vehicular access to the beach north of Bundagen Headland; prohibition of dogs in the park; and monitoring of the colony. NPWS will continue to take pro-active measures for the recovery and protection of this species in Bongil Bongil National Park.

The Pied Oystercatcher and Sooty Oystercatcher are territorial species and breed in solitary pairs. The nest is a mere scrape in sand or gravel, often decorated with a few fragments of shell, bone, or pebbles around the rim. Pairs return to the same nesting place, and sometimes the same nest, each year. The species feed almost

entirely from sandy beaches and mudflats on the sea shore. The bulk of their diet consists of small molluscs such as cockles, marine worms and snails.

The Mongolian Plover breeds in central and north-east Asia during the northern summer and migrates south during the winter. Throughout its wintering ranges, the species only occurs on sea shores, feeding mostly from sandy beaches and mudflats, but also from rocky reefs. In its wintering grounds, its diet consists primarily of sand hoppers, marine worms, and molluscs.

The Eastern Curlew, Ruddy Turnstone, and Red-necked Stint also inhabit the beaches, tidal flats, and river estuaries. An important aspect of management for shorebirds in the park will be to minimise disturbance in the beach and estuary habitats. For Bongil Bongil National Park, this will include the restriction of beach vehicular access north of Bundagen Headland, prohibition of dogs in the park, and control measures for feral predators in the park. Interpretation within the park, including educational signs and through volunteer wardens and the local media, will highlight its importance as habitat for the protection of these species.

Comb-crested Jacanas feed along the edges of pools and among floating leaves. Nesting between September and January, the birds become aggressive during the breeding season. The nest is a fragile raft of sedge, grass and aquatic vegetation (Schodde 1993).

The Black Bittern occurs at low elevation in coastal valleys. The species inhabits margins of rivers, swamps, tidal creeks, and mangroves, and breeds in the closed forests of mangroves adjacent to estuarine waters or gallery or remnant rainforest adjacent to fresh water (Gilmore and Parnaby 1994). Predation by cats is a threat to the species.

The Black-necked Stork inhabits lagoons, swamps, estuarine mudflats, and mangrove swamps. The species feeds mainly on fresh water fish, but also eats reptiles, frogs, crabs, rodents, and carrion. The birds nest as solitary pairs, and the nest is constructed from sticks, grasses and rushes, at or near the top of a tree or large bush, and often in a swamp (Serventy 1985). Maintenance of water quality to ensure a continued food supply is an important aspect of habitat management for this species.

Optimal habitat for the Osprey is a shallow estuary or water body containing sufficient fish 25 to 35 centimetres in length, a feeding platform which also provides a vantage point and is most commonly a tall dead tree, and a tall dead tree for nesting (NPWS in prep.). The species feeds on live fish taken from fresh, brackish, or salt water. Water quality is of importance to the species as increased turbidity makes sighting of their prey more difficult.

The rainforests of the park are important areas of habitat for the threatened Wompoo Fruit-dove, Rose-crowned Fruit-dove and Yellow-eyed Cuckoo Shrike. Rainforest fruits are a major component of the diet for these birds.

The Glossy-black Cockatoo occurs in a range of eucalypt dominated forest types, and the seeds of mature Casuarinas (*Allocasuarina* spp.) are its primary food source. In north-east NSW Forest Oak *Allocasuarina torulosa* and Black Oak *A. littoralis* are important food sources. The Glossy-black Cockatoo requires large hollow-bearing trees for nesting, and breeding occurs from March to August.

Potential threats to the species within the park include habitat loss and modification, including the loss of nesting hollows and feed trees through natural attrition and frequent fires.

The aquatic habitats associated with Bonville Creek provide a valuable food source for a number of bird species such as the Osprey *Pandion haliaetus*, White-bellied Sea Eagle, Brahminy Kite *Haliastur indus*, Little Tern, Azure Kingfisher *Ceyx azurea*, Egrets and Cormorants. Two artificial dams in the North Bonville area, as well as the fresh water creeks, provide habitat for the Black Bittern and Comb-crested Jacana. The Black Bittern is known to have bred in the park.

The Forest Raven *Corvus tasmanicus* occurs at the northern extent of its distribution within Bongil Bongil National Park.

Mammals recorded within the park include macropods such as the Swamp Wallaby *Wallabia bicolor*, Red-necked Wallaby *W. rufogriseus*, and Red-necked Pademelon *Thylogale thetis*. Three climbing possums, the Common Brush-tailed Possum *Trichosaurus velpecula*, Mountain Brush-tailed Possum *T. caninus*, and Common Ring-tailed Possum *Pseudocheirus peregrinus*, and one gliding possum, the Sugar Glider *Petaurus breviceps* have been recorded within the park. The possums and gliders rely on the hollows of mature trees for breeding sites and shelter.

The heathlands and associated communities provide important habitat for small rodents, including the Grassland Melomys *Melomys burtoni*, Bush Rat *Rattus fuscipes*, and Fawn-footed Melomys *Melomys cervinipes*.

The dry open forest area just south of Lyons Road is important to arboreal marsupials such as the Koala. Records of Koalas in the Coffs Harbour area are concentrated along the coastal and near coastal, low elevation forests, including Bongil Bongil National Park. The park represents a significant area of habitat for the species.

Studies of Koalas in Pine Creek State Forest, which adjoins Bongil Bongil National Park, indicate that Koalas prefer habitat which has high structural and species diversity and is characteristically uneven aged. Preferred Koala food tree species in Pine Creek State Forest were found to be Tallowwood *Eucalyptus microcorys*, Grey Gum *E. propinqua*, Forest Oak *Allocasuarina torulosa*, Sydney Blue Gum *E. saligna*, Forest Red Gum *E. tereticornis*, and Swamp Mahogany *E. robusta*. A total of 17 species, including *Angophora*, *Callistemon*, *Eucalyptus*, *Lophostemon*, *Melaleuca*, and *Syncarpia*, were found in Koala scats from Pine Creek State Forest, indicating that the Koalas are feeding on a range of food tree species in the area. Threats to the species include clearing of habitat, simplification of the structural or species diversity in its habitat, predation by introduced predators (for example, dogs), traffic on roadways, and disease.

Other species recorded in Bongil Bongil National Park include the Long-nosed Bandicoot *Parameles nasuta*, Northern Brown Bandicoot *Isooden macrourus*, and Grey-headed Flying Fox *Pteropus poliocephalus*. The Bonville area is the southern stronghold for the vulnerable Queensland Blossom Bat *Syconycteris australis*, a species more typical of northern latitudes. Other vulnerable bats recorded within the park include the Little Bent-wing Bat *Miniopterus australis* and Common Bent-wing Bat *M. schreibersii*.

The Queensland Blossom Bat is a species more typical of northern latitudes, and Bongil Bongil National Park is considered to be its southern stronghold. The species roosts predominantly in littoral rainforest patches or habitats with a similar microclimate, such as adjacent wet sclerophyll forest. Animals roost individually in the foliage of the sub-canopy, and change roost sites both daily, and in response to climatic changes (Law 1993). Seasonal changes in roost site selection occurs, with sites closer to the rainforest edge in winter, and further inside rainforest patches in summer. The species feeds on nectar and pollen (Law 1991), foraging in heathland, rather than in the rainforest. A continuous year round supply of flowering trees and shrubs is critical for the survival of the species (Law 1994).

In NSW, the Little Bent-wing Bat is largely restricted to the sub-tropical coastal areas in the north-east of the state (NPWS in prep.). The species utilises caves near dense vegetation, either wet sclerophyll forest, rainforest or dense coastal Banksia scrub (Dwyer 1968) and forages between the shrub and canopy layers of densely wooded areas, with insects taken on the wing. The only known maternity colony for the species is at Willi Willi, near Kempsey, where it occurs in close association with a maternity colony of the Common Bent-wing Bat.

The Common Bent-wing Bat has been recorded in wet sclerophyll forest, rainforest, dry sclerophyll forest and woodland. The species forages for flying invertebrates, possibly above the tree canopy (Dwyer 1965). Females form colonies during spring and summer to give birth and nurture young. Nearly all adult females in a population aggregate in the one maternity colony. In northern NSW, maternity sites have been recorded at Willi Willi, Riverton and Glen Lyon.

Fourteen species of reptiles and eight frog species have been recorded within the park. This includes a record of the Forest Dragon *Hypsilurus spinipes* (Aaron Harber pers. comm.). The record of the species in the park is of regional significance as it is the only known record of the species on a sandy substrate.

With the abundance of suitable wetland habitat, the number of frog species occurring within the park is potentially greater. Based on predictive habitat modelling, five threatened frog species and one threatened snake are considered likely to occur within the park (see Table 3).

The invertebrate fauna of the park has not been systematically surveyed, however, the park is known to contain populations of Knights Dart Butterfly *Ocybadistes knightorum*. The species is known only from near Boambee Creek, and its habitat consists of swampy, sparse eucalypt woodland mixed with Melaleuca, with an understorey of Gahnia and mixed grass species (Lambkin and Donaldson 1994). Females have been observed ovipositing on the rare grass *Alexfloydia repens* (Atkins 1996, Sands 1997). Sands (1997) concludes that *O. knightorum* is almost certainly monophagous and dependent on the geographically restricted rare grass *A. repens* as a food plant for its larvae. This relationship is considered to be important for conservation as the butterfly, which has a restricted distribution, is dependent on the rare grass, which also has a restricted distribution and may be under threat, and may in turn prove to be dependent on small patches of coastal peat (Sands 1997). Management will aim to maintain the habitat of the species. This will primarily be through the exclusion of fire from the known localities. NPWS will also participate with research organisations to establish conservation measures for the species.

The Bonville area is also believed to be the southernmost extent of the distribution of the Green Awl, Australian Leafwing, and Capaneus Butterflies.

The TSC Act requires that a recovery plan be prepared for all species listed as endangered or vulnerable under the Act. Where a plan exists for endangered or vulnerable animals occurring within Bongil Bongil National Park, any actions from those plans relevant to the management of the park will be implemented.

Policies and actions

- The management of native animals will place emphasis on protecting and/ or enhancing significant ecosystems, habitats and species, including those listed as endangered or vulnerable under the *Threatened Species Conservation Act 1995,* those listed under international conservation agreements, and those that are locally rare or approaching the limits of their known geographical distribution.
- Education programs will promote understanding of the needs of native animals within the park, particularly the needs of migratory shore birds and waders, and species likely to be sensitive to disturbance by humans.
- The cooperation of neighbouring land managers and land use planning and management agencies will be sought to protect important wildlife habitats adjacent to the park.
- For threatened animals and other significant species occurring within the park, appropriate protection and management will be undertaken to reduce or eliminate threats to the species and their habitat. Where recovery plans exist for species or communities within the park, these will be implemented.
- Pro-active measures such as pest species control, habitat protection, and interpretation and monitoring by volunteer wardens, rangers and field staff will continue to be implemented to enhance the recovery of Little Terns within the park.
- NPWS will maintain the habitat of the Knights Dart Butterfly through exclusion of fire from its habitat. NPWS will also participate with research organisations to establish conservation measures for the species.
- Information on native animals and their habitat within the park, including their location and conservation status (for example, listing on TSC Act schedules), will be entered into the NPWS Wildlife Atlas database as available and made accessible for the management of and planning for the park.

4.1.4 Fire management

Fire is an important natural phenomenon recognised as one of a number of factors determining the composition of vegetation and animal communities in Australia. Many species of Australian plants and animals have developed mechanisms or behaviour to survive fire, and some require fire for reproduction or stimulation of new growth. Rainforest communities and swamp forest communities, however, are particularly sensitive to fire.

Rainfall averages in the park are highest in summer and autumn, with a drier season in winter and spring. The warmest months are from November to March. Winds from the north to south-west are typically hot and dry, raising the bush fire danger,

particularly when high wind speeds occur. These winds are most prevalent in spring and generally provide the most difficult of fire weather conditions. The implication for fire management of these weather patterns is an early spring to early summer fire season, with higher rainfall affecting the months normally preferred for burning for management purposes (Rose 1997). Extreme bush fire weather conditions are most likely on days in dry seasons with low humidity, high temperature, and strong wind (Rose 1997).

The natural landscape in the northern part of the park is dominated by Bonville and Pine Creeks and associated wetland and estuarine vegetation. These features may interrupt the spread of wildfire.

The area of land north-west of the park is largely cleared and has rural - residential style development. The extent of the clearing minimises the eastward movement of major fire from the north-west. The highway and railway also provide useful interruption to the eastward movement of fire, at least for low to medium intensity wildfires.

South and east of Pine Creek, the landscape of the park and neighbouring State forest is primarily forested. Wildfire movement is less restricted through these areas, although areas of moist forest communities and the road and trail network provide some mitigation.

The Bellinger River and associated clearing, and the villages of Repton and Mylestom are a barrier to large scale wildfire movement from the south and south-west. The Pacific Ocean eliminates wildfire threat from the east.

All recorded wildfires within the park between 1946 and 1996 have been in the months of September, October, or November. The major cause of wildfire within the park has been from illegal sources. Table 4 summarises the recorded wildfire history of the park since 1980.

Table 4: Summary of recorded wildfire history in Bongil Bongil National Park

Year	Location	Approximate area*
1980/81	Bundagen	170 ha
1992/93	Portion 76	29 ha
1993/94	School Road	125 ha
1994/95	Pine Creek	250 ha

* represents approximate area burnt within Bongil Bongil National Park, and does not include the areas burnt outside the park.

Adapted from Rose (1997).

Fire records within the park show that fires generally travel from west to east. Most fires which have burned through the park originated outside its boundaries. The park, therefore, poses little threat to its neighbours. The major emphasis for fire planning within the park, therefore, is for the conservation of biodiversity.

The survival of pockets of rainforest and other fire sensitive vegetation in the park reflects the occurrence of predominantly unburnt localities. These vegetation types primarily occur in moist and protected areas, which are less prone to wildfire. The majority of rare or threatened plant species known or considered likely to occur within the park (see Table 1) occur in rainforest habitat. Effective management of fire in rainforest areas is also important for the protection of these species in the park.

The littoral rainforest community south of Bundagen Headland is the second largest area of littoral rainforest in NSW. Management will aim to permanently exclude fire from all areas of littoral rainforest within the park. NPWS will liaise with the Bundagen Community to ensure their awareness of the significance of the littoral rainforest and the importance of excluding fires from these areas. NPWS will also inform local fire authorities of the significance of the rainforest. Cooperative fire management will be essential to ensure rapid initial response to fires threatening or within littoral rainforest areas.

The area between the Scrub Creek littoral rainforest and Pine Creek is an area of moister vegetation communities which have been subject to more disturbance than the littoral rainforest areas. This area has some developing and depauperate rainforest elements. NPWS will protect these developing rainforest elements by exclusion of fire from areas of developing rainforest and moist sclerophyll forest with rainforest understorey, and by maintaining older aged (fire free) vegetation for the non-rainforest areas. NPWS will also maintain the trail on the western boundary of this area to enable effective fire control.

Populations of the rare grass *Alexfloydia repens* also occur in this section of the park in the moist understorey of Swamp She Oak forests. These sites are not normally burned by fire. NPWS will aim to exclude fire from sites where *A. repens* occurs.

The riparian vegetation along Pine and Bonville Creeks includes areas of mangrove forest, swamp open forest, sedgeland, and saline grassland. These communities are generally fire free areas. Burning in these areas is likely to result in siltation of the creeks and erosion of burned areas. NPWS will aim to exclude fire from within 100 metres of the creeks within the park to protect the riparian vegetation communities, and to avoid siltation and erosion likely to be associated with burning in these areas.

NPWS is a fire authority under the *Rural Fires Act 1997*, and therefore has a responsibility to contain fires on areas of national park and to ensure they do not cause damage to other land or property. This responsibility includes the implementation of fuel management programs by prescribed burning or other mechanical means. NPWS may also assist with the control and suppression of fires on property adjacent to reserved lands.

In order that fire management can be prescribed to meet the objectives of protecting life and property and conserving wildlife and natural processes within the park, it is necessary to undertake strategic planning for fire management. With information on areas and assets requiring protection from fire, and information on the ecological requirements of the species and communities of plants and animals within the park, informed decisions can be made on an appropriate fire regime.

Fire management will be important in the vicinity of the residential areas of Bayldon and North Bonville in the northern area of the park, Sawtell to the north-east of the park, and in the vicinity of the Bundagen Multiple Occupancy near Bundagen Headland. There are also areas of medium density occupation in rural-residential areas west of the park. Protection of life and property will be the principal factor affecting fire management in these areas. Management will ensure an adequate fire trail network is maintained to enable rapid and effective response to wildfires. Dorrigo District's Fire Action Plan details the response of the District to fire incidents.

A draft Fire Management Plan has been prepared for the park (Rose 1997) and placed on public exhibition. The draft Plan outlines in more detail NPWS statutory obligations with regard to fire management, and specifies the fire management objectives and strategies appropriate for Bongil Bongil National Park.

Community Fireguard is a program that encourages people to take responsibility for their local fire safety. The program is coordinated by the NSW Rural Fire Service through local Fire Control Officers, and is supported by all fire authorities. People involved in the community Fireguard program work in small groups to develop strategies to cope with their local fire threat. A Community Fireguard program has been initiated with the Bundagen community. NPWS will continue to provide assistance to the Community Fireguard program for the Bundagen Community, including assistance with technical advice for the preparation of a community fire protection plan.

The Coffs Harbour and Bellingen Bushfire Management Plans, the draft Fire Management Plan for Bongil Bongil National Park, and the local Community Fireguard program together provide a comprehensive planning network and strategy for protecting life and property, and providing complete community participation in fire management and fire management planning within the park and surrounding areas.

NPWS regards co-operative fire management as essential for both the protection of life and property and the conservation of native plants and animals and communities within Bongil Bongil National Park. An important part of NPWS's fire management is participation as a member of local District Bushfire Management Committees in the preparation of District Co-operative Fuel and Fire Management Plans under the *Rural Fires Act 1997*. NPWS is an active member of the Bellingen and Coffs Harbour Bushfire Management Committees. The Plans contain operational arrangements, fuel management planning, and a resources directory. The commitments each organisation makes in the plan are legally binding.

Policies and actions

- Fire management will aim to minimise the threat of fire to life and property, and contain fires within the boundaries of the park.
- NPWS will suppress all wildfires within the park, minimising the area burnt by wildfire, and the extent of environmental degradation caused by suppression techniques.
- Fire management within Bongil Bongil National Park will be consistent with NPWS responsibilities under the *Rural Fires Act 1997,* this plan of management,

the regional fuel and fire management plan, and the Fire Management Plan for the park once adopted.

- Dorrigo District will maintain liaison with the Coffs Harbour and Bellingen Rural Fire Brigades, Fire Control Officers, State Forests of NSW and other neighbouring land managers, and the Bellingen and Coffs Harbour Bush Fire Management Committees to ensure cooperative fire management and coordination of wildfire suppression within the park and on adjoining private property and State forests.
- Priority for fire management within the park will be given to protection of life and property; suppression of wildfire; conservation of vegetation communities and plant and animal species which require specific fire regimes; maintenance of species and habitat diversity; and protection of Aboriginal sites, historic places and management facilities.
- Fire management in the park will aim to maintain species habitat and diversity, avoid local extinctions of native plant and animal species and enhance the conservation of rare and threatened native plant and animal species.
- Fire will as far as possible be excluded from areas of rainforest, moist sclerophyll forest with rainforest understorey, sites of the rare grass *Alexfloydia repens*, and areas within 100 metres of creeks within the park.
- Fire planning within the park will include provisions to protect Aboriginal sites, historic places, and management facilities within the park.
- A geographical information database will be maintained within the Dorrigo District to record fire history, fire advantages (for example, fire trails, permanent water), sites requiring specific protection (boundaries, archaeological sites, threatened species sensitive to fire), and other information relevant to fire management in the park.
- Fire authorities and the Bundagen Community will be advised of the significance of the littoral rainforest and the occurrence of the rare grass *Alexfloydia repens* within the park, and the intention to exclude fire from these areas.
- NPWS will provide assistance to the Community Fireguard program for the Bundagen Community.
- A fire trail network, including public roads and management trails will be maintained within the park (refer map, centre pages). Where necessary, this will involve regular slashing and grading.

4.1.5 Introduced plants and animals

Introduced plants and animals have an impact on the natural environment through displacement, predation, and disturbance. They can also have adverse impacts on Aboriginal and historic sites and landscapes. Introduced species may also have an economic impact for NPWS and for neighbours. Activities such as road construction, traffic, logging, and fire have provided opportunities for the introduction and invasion by introduced plants and animals.

Thirty seven introduced plants have been recorded in the area (Clancy 1987). Of these, three are currently declared noxious under the *Noxious Weeds Act 1993*, and five are recognised weeds of conservation concern in the area.

Noxious weeds within the park and their management requirements under the *Noxious Weeds Act 1993* are as follows:

- groundsel bush (*Baccharis halimifolia*): requirement to fully and continuously suppress and destroy this weed.
- crofton weed (*Ageratina adenophora*): requirement to prevent these weeds from spreading and that their numbers and distribution be reduced.
- giant Parramatta grass (*Sporobolus indicus* var. *major*): requirement to prevent these weeds from spreading and that their numbers and distribution be reduced.

Other weeds of conservation concern within the park bitou bush *Chrysanthemoides monilifera*, lantana *Lantana camara*, glory lily *Gloriosa superba*, molasses grass *Melinis minutiflora*, and slash pine *Pinus elliottii*.

A noxious plant native to South America, groundsel bush invades relatively undisturbed salt marsh and swamp forest to form dense thickets. NPWS management will aim to eradicate the large isolated occurrence of this species in the paperbark forest in the southern portion of the park, and maintain a constant suppressive control program for this species in the wetland areas in the northern section of the park.

NPWS is undertaking a co-operative biological control program with the Queensland Department of Natural Resources and the NSW Department of Agriculture for the release of gall flies *Rhotallomyia californica*, and a stem-boring moth larvae *Oidaematophonus ballanotes* for the control of groundsel bush. A number of releases of these insects have been made on the NSW north coast, including within national parks, however it is still too early to determine the effectiveness of these methods.

Crofton weed has been recorded in swamp forest areas. Although it does not pose an immediate threat to the conservation values in the park, it is toxic to stock and may spread to neighbouring properties where livestock could be threatened (NPWS 1996). NPWS will maintain a constant suppressive control program for this species in the park.

Primarily a weed of disturbance, giant Parramatta grass has established along many of the public roads and fire trails within the park. Control programs for this species within the park will be concentrated along the roads and trails. Control of vehicular movement within the park will minimise further spread of this species.

Bitou bush was planted to stabilise dunes along the coast in the 1970s. Bitou bush is native to South Africa and readily colonises foredune areas, completely excluding native species. It assumes a scrambling habit in hind dune communities where it rises through and smothers the canopy of native vegetation. Bitou bush has been a vigorous coloniser of bare sand dunes within the park, including areas which have been subject to sand mining activities in the past. Most of the dune and hind dune areas of the coastal fringe are affected by this aggressive invader.

A biological control program for bitou bush commenced several years ago involving NPWS, the Victorian Department of Environment and Natural Resources, and the NSW Department of Agriculture. The bitou tip moth *Comostolopsis germana* was the first agent relaesed and is now establishedin the park.

Another biological control agent for bitou bush, the bitou seed fly *Mesoclanis polana,* destroys the developing seeds of bitou bush. The bitou seed fly has also been released within Bongil Bongil National Park and early results look promising.

The Tuckers Rock and Bundagen Dune Care groups have made an important localised reduction of bitou bush in a relatively short period. These groups have a program for ongoing control and revegetation with native plants from local seed sources.

NPWS management of bitou bush aims to control the weed along the coastal ecotonal edge of the Scrub Creek Littoral Rainforest and the adjacent hindune; control the species along the coastal and ecotonal edge of the Bundagen Littoral Rainforest (behind the hindune), as maintenance of this community is essential to preserving the hindune formation and protection of the coastal edge of the littoral rainforest; and to control the weed on the coastal and foredune areas, revegetating with native coastal species.

Molasses grass has spread along the northern road of the peninsula. The species is invasive of native plant communities and is able to persist under the canopy. Management of this species will primarily be concentrated along the roadsides. Control of vehicular movement within the park will further minimise the spread of this species.

A perennial scrambler which reproduces from rhizomes, glory lily is a native to tropical Asia and Africa. The plant has established in the lee of the beach hind dunes, particularly in areas adjoining littoral rainforest within the park. NPWS is currently investigating effective methods for control of this species.

On the northern end of the Bongil Peninsula behind the foredunes, a slash pine *Pinus elliotti* plantation had been established prior to the gazettal of the area as national park. There are also pine wildings and plantation remnants in the Bonville Station Road section of the park. NPWS has commenced a program of poisoning the pines on the peninsula, and rehabilitating the site, including planting of local native species and promotion of existing native regrowth. Management of this species will continue, with the aim of eradicating the species from the park and revegetating the plantation area. Follow-up programs to protect establishing native species will be implemented as necessary.

Lantana, which is a native of South America, is well established in hind dune scrub and openings in littoral rainforest where it assumes the habit of a straggling shrub or liana. It is also present in logged areas and is very dense in some of the plantation areas. Biological control agents released in the 1960s and 1970s were not effective, but a new program using the leaf mining insect *Ectaga garcia* is underway.

Within the park there are also plantation areas of native hardwood species including Flooded Gum (*Eucalyptus grandis*), Blackbutt (*E. pilularis*), and Sydney Blue Gum (*E. saligna*). The plantation areas are in different stages of growth and have varying understoreys resulting from past management practices. Management of these

areas will aim to return the areas to a natural condition. Managed disturbance of the areas may be implemented to stimulate understorey growth.

Experimental trials are proposed to be undertaken in some of the native plantation areas. This will involve trialing methods such as thinning, clearing, replanting, and different fire regimes. The project will be undertaken in consultation with State Forests of NSW and universities in the area. Results of the project will be used to determine best management practices for the remainder of the plantation areas, with the aim of improving the biodiversity of these areas and the habitat values they can provide.

Introduced animals known to occur within the park include foxes *Vulpes vulpes*, feral dogs *Canis familiaris*, and feral cats *Felis catus*. The vicinity of the park to urban and semi-rural properties and the existing road network make the park easily accessible to these feral and domestic predators. Foxes, cats and dogs are known to prey on a wide variety of native fauna, including juveniles, nesting adults, and eggs of nesting shorebirds such as the Little Tern. Control programs will be implemented to reduce fox and wild dog predation upon Little Tern nestlings and eggs in the nesting area on the northern sand peninsula.

There are no apiary sites within the park.

NPWS has prepared a pest species management plan for the park (NPWS 1996). The plan outlines in more detail NPWS legislative responsibilities, the objectives for pest control in the park, and pest control programs for the park. The pest species management actions in this plan of management are consistent with those on the pest species management plan.

Policies and actions

- Management will aim to minimise damage to natural vegetation, fauna communities, and water quality by introduced plants and animals.
- Priority for control of introduced plants and animals will be given to those species which are aggressive competitors known to displace native species; are damaging cultural heritage; are or may affect neighbouring lands; may be a threat because of disease; have a high capacity for dispersal; are new isolated occurrences; and/ or have the potential to spread along roads and management trails.
- Appropriate biological control organisms, where available, will be utilised to suppress and control introduced plant species within the park.
- Pine plantation areas will be eliminated from within the park. Pine wildings will be removed or destroyed. Plantation areas will be rehabilitated to a natural forest condition.
- Hardwood plantation areas will be regenerated to a natural condition, primarily through the process of natural succession. Managed disturbance may be implemented in some instances to stimulate a more rapid rehabilitation of these areas.
- Only indigenous plant species propagated from locally collected seed or plant material will be used in any rehabilitation works.

- Where appropriate, NPWS may enter into cooperative arrangements with neighbours to control pest species on or adjacent to the park boundary.
- Domestic pets and stock and other introduced species will not be permitted to enter the park, with the exception of guide dogs for the blind.
- Domestic dogs will not be permitted on the beaches within the park.
- Bee keeping will not be permitted within the park.
- In considering control techniques for pest plants and animals, consideration will be given to minimum impact to known and potential Aboriginal sites, and minimum exposure to damage such as erosion.
- Research into more effective control methods, and assessment of the distribution, abundance, and impact of introduced species on native species and habitats within the park will be encouraged.
- NPWS will continue to undertake control of bitou bush in the park, particularly in and near areas of littoral rainforest and along the coastal and foredune areas. This will include seeding and replanting with appropriate native species. Aircraft will be used for control on the coastal foredune areas, including aerial seeding with coastal wattle.
- NPWS will maintain the established research sites within the park and use them to introduce new biological control agents as they become available. If particular agents are found to be effective, this area will be used as a nursery to introduce the agents to other areas in the park.
- NPWS will eradicate slash pine from the park, revegetate the plantation area by planting local native species and promote existing native regrowth. NPWS will undertake follow-up weed control to protect establishing natives.
- NPWS will eradicate groundsel bush from the paperbark forest in the southern section of the park, and maintain a constant suppressive control program for groundsel bush, crofton weed, and garden escapees in the park.
- NPWS will undertake control of giant Parramatta grass and molasses grass, primarily along the roadside edges within the park. Control of vehicular movement will also minimise further spread of these species within the park.
- NPWS will undertake control of foxes and wild dogs prior to and during the nesting period of the Little Tern.
- NPWS will undertake experimental trials to determine the best management practices for plantation areas with the aim of improving the biodiversity of these areas and the habitat values they can provide.
- The known occurrence, distribution and density of introduced plants and animals in the park will be periodically mapped as part of the monitoring strategy included within the pest species control plan.

4.2 Conservation of cultural heritage

Cultural features of Bongil Bongil National Park are an important component of the environment of the park which may have aesthetic, historic, scientific, and/ or social

significance to present and future generations. Sites of Aboriginal and European occupation occur throughout Bongil Bongil National Park and provide a record of human activity within the area.

4.2.1 Aboriginal cultural heritage

Bongil Bongil was the term used by the local Gumbaynggir Aboriginal people to describe this ‘place where one stays a long time’ because of the abundance of food. The territory of the Gumbaynggir people covers an area ranging from the Clarence River to a point south of the Nambucca River and west to the eastern margin of the New England Tablelands. Bongil Bongil National Park falls within the area of the Coffs Harbour Local Aboriginal Land Council.

Estimates indicate that around the mid 1830s the indigenous population for the north coast was amongst the highest in Australia. Around 1880 the area known as Bongil Bongil supported a group of about 180 people camping together in groups of about 30 individuals for the greater part of the year. At certain times of the year larger groups would congregate to exploit the seasonal resources of the area such as the autumn - winter fish runs, and participate in ceremonies. Food resources within the area were abundant with major items being fish from the surf and estuaries, rock shellfish, estuarine shellfish, pipis, kangaroos, wallabies, bandicoots, goannas, snakes and ducks.

In Bongil Bongil National Park, mounded middens and associated structural features occur in the estuarine complex of barrier beach ridges, and at the embayment of flood plains located near the Sawtell Headland and along or near Bonville Creek. These middens contain a variety of shell species and stone artefacts. The Bongil Beach ridges were presumably a favoured location, given the diversity of food resources in the area.

Shell middens, interpreted as transitory day camps, are located primarily within the swales of the dune/ swale system in the body of the park. These middens and associated camp sites provide a record of activity centred around the marine and estuarine environment within the last 1,000 years.

Bundagen Head, the rock near Bundagen Head, the mouth of Bundagen Creek and Tuckers Rocks are all sites of significance to Aboriginal people. The area was known for its plentiful supply of fish. Artefact scatters are found at various locations throughout the park. The artefacts consist mainly of flakes and pebble tools. Burial sites are known from sites adjacent to the park. The potential for a range of additional sites, for example quarries, scarred trees, and burial sites, to be located within the park is extremely high.

Aboriginal sites are subject to deterioration from both natural and human induced processes. For example, middens and camp sites are vulnerable to accidental or deliberate disturbance. Aboriginal sites located within the park may therefore require active management to ensure their continued existence. This would be done in consultation with the local Aboriginal community and may include fencing sites or restricting access where necessary. A strategic approach will be adopted in collaboration with the local Aboriginal community to allow targeting of sites for conservation and protection, and the condition of known sites will be monitored.

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

Policies and actions

- The District will maintain liaison with the Gumbaynggir Aboriginal community and Coffs Harbour Local Aboriginal Land Council.
- The Gumbaynggir Aboriginal community and the Coffs Harbour Local Aboriginal Land Council will be consulted regarding the management of Aboriginal heritage within the park.
- Aboriginal sites within the park will be conserved. Where necessary, the natural degradation of sites will be retarded, and sites will be protected from visitor and management activities.
- A strategy for the protection and interpretation of Aboriginal sites and of the meaning of the park to Aboriginal people will be developed in collaboration with the local Aboriginal community.
- Further research into the cultural and scientific significance of Aboriginal sites will be encouraged, subject to consultation with the relevant Aboriginal community groups.
- Any activity proposed within the park that is likely to result in ground surface disturbance will be preceded by an assessment of the likely impact on Aboriginal sites.
- Aboriginal sites will be progressively entered onto the NPWS Aboriginal sites database. The database will be consulted for management of and planning for the park.

4.2.2 Non-indigenous cultural heritage

The earliest known European visitors to the Bonville area were probably escaped convicts from the Moreton Bay settlement at Brisbane, making their way to larger settlements such as Port Macquarie or Sydney. In 1845, runaway convicts ambushed two policemen at Bonville Creek, stealing their horses, weapons and boots, forcing them to walk to Kempsey barefoot.

The first European settlers in the area were cedar getters. They drew cedar logs from the upper reaches of Bonville Creek and floated them down in rafts to the junction of Pine and Bonville Creeks. As the tide rose they were floated up Pine Creek to where they were loaded onto carts and transported to what is now Repton, from where they were shipped to Sydney.

There are no known relics of European settlement and industry within the park. The impact of European land use is best demonstrated by its effect on the vegetation, landforms and soils within the park.

Intensive mining of mineral sands and the subsequent rehabilitation over the last 40 years has modified extensive areas of the beach ridge system by leveling of the hind dune areas and the subsequent planting of exotic plant species such as Bitou Bush. In addition to mineral sand mining, other European uses of the park consisted

of native timber harvesting, plantation timber production, cattle grazing, recreation, and holiday cabin accommodation on the western edge of the peninsula. Evidence of the plantations remain, however, the holiday cabins were sold and removed.

Policies and actions

- The provisions of the Australia ICOMOS Charter for the conservation of places of cultural significance (the Burra Charter) will guide management decisions for cultural places within Bongil Bongil National Park.
- Historic sites found in the park will be assessed for significance, and conservation guidelines will be prepared to maintain cultural significance.
- Historic sites will be recorded on the NPWS Historic Sites Register. The database will be consulted in management planning.
- The history of land use and vegetation of the park will be interpreted at the Bonville Creek picnic area and Sawtell boat ramp.
- The oral history of members of the community who are prepared to provide information on the area will be recorded. This information will be used to assist in interpreting the area to visitors.

4.3 Use of the park

Major categories of appropriate use for Bongil Bongil National Park include recreation in a natural setting; scientific research; education and promotion of the conservation of the natural and cultural heritage of the park; and management operations by NPWS to meet its statutory requirements and management objectives for the park. Management of Bongil Bongil National Park will ensure that its use by the general public, special interest groups, NPWS officers, and other authorities is appropriate, and that it is consistent with the objectives and management strategy outlined in this Plan of Management.

NPWS has undertaken extensive consultation with the local community and user groups of the park prior to the preparation of this Plan of Management. The consultation included a Focus Group Planning Workshop, face-to-face or telephone discussions with individuals, groups, and organisations likely to be affected by management of the park, and exhibiting public information displays at local shopping centres. News releases were also issued to local newspapers and radio and television stations. An Issues Paper based on outcomes of the initial stages of the community consultation was prepared and circulated with a submission form, and over 500 responses were received.

An outstanding message from the community consultation was that the park should be accessible for a range of recreational pursuits. Equally outstanding was the concern for the conservation values of the park, particularly in the core area between Bonville Creek and Tuckers Rock, and the need for rehabilitation of disturbed areas in this section of the park.

The strategy adopted by this plan for use of the park was developed after consideration of the issues raised during the initial public consultation phase of the planning process. The strategy attempts to focus the majority of the use of the park in its northern and southern sections, with provisions for less intensive use in the

core area of the park. The strategy aims to balance use of the park with conservation objectives, and takes into consideration recreation opportunities available within the region.

4.3.1 Recreation

The north coast region which includes Coffs Harbour, is growing at a rate amongst the fastest in NSW. The diversity of natural environments found in the area are a prime attraction for this population migration. The demand for recreational areas, especially in a coastal setting close to urban amenities, is extremely high.

Planning for outdoor recreation in Bongil Bongil National Park is undertaken in the wider sub-regional context of recreational opportunities currently offered by public or private organisations for coastal outdoor recreation in the Coffs Harbour and Bellingen local government areas. Recreational opportunities currently available range from remote stretches of coastline, such as Moonee Beach Nature Reserve, to those which are readily accessible by vehicle. Both Coffs Harbour and Bellingen local government areas offer a range of camping areas, walking tracks, day use areas, and interpretive facilities for recreation. The challenge for management of Bongil Bongil National Park is to provide a recreation setting which complements those already offered in the region, whilst not compromising the objectives of this plan of management.

Recreational use of Bongil Bongil National Park has historically been minimal, with the majority of use of the area being by local residents with knowledge of the area and the road networks. However, because of its proximity to coastal villages and the city of Coffs Harbour, Bongil Bongil National Park has the potential to be accessible for low impact recreational activities in a natural coastal setting.

Vehicular access

Prior to the gazettal of Bongil Bongil National Park, vehicular access to the park was unrestricted. This resulted in the degradation of the informal trails throughout the park. The trails were previously established for purposes such as silviculture and timber harvesting, sand mineral extraction, and fire management. They are often used for illegal activities, such as rubbish dumping, arson and illegal crop production.

Existing access roads within the park will be rationalised to provide a range of visitor access and to provide access for essential management purposes outlined in this plan of management. The main public vehicular access points will be to the day use area at Bonville Creek, and via Tuckers Rock carpark to the beach south of Bundagen Headland.

The access to each section of the park will be as follows:

- North of Bonville Creek: via Williams Road. This road will be gated at the park boundary at night.
- Between Bonville and Pine Creeks: via Bonville Station Road. This road provides walking access to Pine and Bonville Creek estuaries.

- Beach south of Bundagen Headland: via Tuckers Rock Road to the Tuckers Rock car park. This provides four wheel drive access onto the beach and walking access to the Bundageree Rainforest walk.
- Between Pine Creek and Bundagen Headland: via Overhead Bridge Road and School Road to the park boundary. These provide walking access to Bonville Beach.

Vehicular access to the proposed day use area on Bonville Creek was the subject of extensive discussions with park neighbours, Coffs Harbour City Council and the Roads and Traffic Authority. Following these discussions it was determined that the best access to the picnic area is via Williams Road.

Vehicular access between Bonville Creek and Bundagen Headland will be for NPWS management vehicles only. The sections of School Road and Overhead Bridge Road within the park (see map, centre pages) will be closed to public vehicles at the park boundary. Within the park, these roads will be maintained as management trails. Management of this section of the park will primarily be for the conservation of its natural values, including littoral rainforest areas, the Scrub Creek hydrological system, the parallel dune/ swale system, wetlands, and rare and threatened plants and animals. Rehabilitation and restoration works will be undertaken in degraded areas, as outlined in other sections of this plan. Walking access to the beach from the park boundary along School and Overhead Bridge Roads, and bicycle riding along these roads, will be permitted. In order to assist vehicle parking at the gates on Schools Road and Overhead Bridge Roads, small car parks accommodating up to 4 vehicles each will be constructed inside the boundary of the park adjacent to the gates.

Following public consultation, Bonville Station Road was investigated as an option for public vehicular access. The high cost of providing a safe level crossing over the north coast railway to access this section of the park was found to be prohibitive. This road will continue to provide walking access to the Bonville and Pine Creek estuaries.

The beach between Tuckers Rock and Bundagen Headland will remain accessible to four wheel drive vehicles. This section of the beach is accessible from the Tuckers Rock car park just outside the southern boundary of the park. Vehicles on the beach will be restricted to the intertidal zone, and will not be permitted north of Bundagen Headland or on the dunes. As vehicle access will not be permitted beyond Bundagen Headland, the launching of vessels in the bay immediately north of the headland will also not be permitted. If alternative access close to Bundagen Head can be obtained from the west, vehicle access on the beach north of Tuckers Rock will be prohibited.

Four wheel drive access to the beach within the park will be monitored, and reviewed. The review will assess the impact of four wheel driving on the beach and foredunes, particularly on vegetation communities, animal species, and known and potential Aboriginal sites, and the level of conflict with other beach users. The review will also assess compliance with the requirements to keep within the intertidal zone of the beach, and to limit vehicles on the beach to the area south of Bundagen Headland. If four wheel driving on the beach within the park is assessed to be having unacceptable impacts on the environment and ecology of the beach, or

on other beach users, or if four wheel drivers are found to be using areas of the beach not open to four wheel drive access, the beaches within the park may be completely closed to four wheel drive access.

Having regard to the National Parks and Wildlife Service's responsibility for the intertidal zone, and in order to eliminate conflicts between conservation and recreation, it is anticipated that vehicles will be prohibited from all beaches in the park in the future. Accordingly, the review of vehicle access of North Beach between Tuckers Rock and Bundagen Headland, which will be undertaken within 5 years of the adoption of this plan, will be placed on public exhibition together with amendments to this plan of management.

Day Use

The proximity of the park to coastal villages, regional towns, and the city of Coffs Harbour, and the accessibility of the park from these areas, gives the park the potential to be a popular destination for day use visitors.

NPWS proposes to develop a picnic area to accomodate up to 100 people on the northern side of Bonville Creek. The proposal includes development of a carpark, picnic shelters, gas barbecues, a canoe launching facility and composting toilets. Access to this area will be of two wheel drive standard and the gates to the area locked at night. Camping will not be permitted. The walking track system within the northern part of the park will be linked to the picnic area.

Bongil Bongil National Park provides opportunities for bush walking and beach walking in a remote coastal setting. All management trails within the park will be accessible for bush walking. Littoral rainforests, wetlands, coastal estuaries, a diversity of threatened, migratory, and other bird species, and extensive stretches of remote beaches are some of the attractions for walking in the park.

NPWS proposes to develop a Wetlands Walk which would wind its way around the wetlands and wet sclerophyll forests in the park north of Bonville Creek. The walk will be approximately one kilometre in length, and the track will start from the picnic area proposed to be developed on the northern side of the creek. Educational panels will be shown along each of the designated walking tracks. Construction of the tracks will be subject to appropriate environmental assessment.

The Bundageree Rainforest Walk is an established walking track in the park. The walk begins at the Tuckers Rock carpark, and passes through wet sclerophyll forest, littoral rainforest, and Crinum Lily dominated wetlands on its way to Bundagen Headland. There is the option of returning to Tuckers Rock along the same track or via the beach. NPWS proposes to construct a walking track to link the Bundageree Rainforest Walk to the management track along Bundageree Creek, thus providing a short loop walk from the Tuckers Rock carpark.

At the boundary of the Scrub Creek littoral rainforest area along School Road, NPWS will provide a picnic table and educational panel which identifies the conservation significance of the Scrub Creek littoral rainforest.

Non-motorised bicycles will be permitted on management tracks within the park. However, due to the potential for erosion and conflict with pedestrians, bicycles will not be permitted on walking tracks within the park.

The beaches within the park are not patrolled. Bongil Beach offers treacherous surf conditions and is widely recognised as a dangerous area for swimming. For the safety of visitors to the park, swimming and surfing at the beaches within the park will not be encouraged or promoted.

Use of waterways

Parts of two navigable waterways, Pine Creek and Bonville Creek, lie within Bongil Bongil National Park. The beds of the creeks form part of the national park and the NPWS has some control over use of the waterways. On-water activities along the creeks are also regulated by the NSW Waterways Authority.

These creeks will be managed to protect their natural and catchment values, as well as providing opportunities for safe recreational boating and fishing. Watercraft are currently launched from the Sawtell boat ramp, which is on the northern boundary of the park. Upstream, no boat launching facilities have been developed for access to the park. NPWS is proposing to develop a canoe launching facility on the northern bank of Bonville Creek in close proximity to the proposed picnic area. The facility will include a carpark, an unloading area, steps down the bank, a timber jetty, and landscaped areas (see figure 2).

Boating on the waterways within the park will be restricted to a four knot speed limit. Jet skis are prohibited on the waterways. NPWS will liaise and co-operate with the NSW Waterways Authority to manage and regulate the recreational boating use of the creeks within the park.

NPWS proposes to develop remote picnic areas along Pine Creek and/or Bonville Creek. This will involve installing steel ladders on the banks to avoid damage to the banks and to which boats can be secured. A picnic table will also be provided at each site. It is proposed that these would be temporary facilities with the potential to be relocated to a new site to rehabilitate areas if necessary, and to minimise disturbance at each site.

Recreational fishing within the waterways is regulated by the NSW Fisheries Department under the *Fisheries Management Act 1994*.

Commercial recreation operators

Commercially operated recreation may be appropriate for some of the recreational opportunities available within the park. Commercial activities promoting the appreciation of natural and cultural heritage features of the park will be encouraged, subject to their compliance with this plan of management and licensing by NPWS.

Horse riding

Horse riding is an activity with limited opportunity within Bongil Bongil National Park. Horse riding is considered an inappropriate activity in the park, as most of the park is comprised of sandy surface soils, and is of a swampy nature, subject to inundation. Horses are known to encourage erosion and cause compaction of soils, facilitate the introduction of weeds, and cause siltation and sedimentation of streams. Opportunities for horse riding exist in other areas in the region, both on a private basis, and through commercial operators. The environmental impacts of horse riding, and potential conflict between horse riders and other park users is unacceptable in Bongil Bongil National Park. Horse riding will not be permitted within the park.

Camping

There is currently a diversity of camping facilities and other accommodation in close proximity to Bongil Bongil National Park. Due to the small size and sensitive nature of the park and its environment, and the availability of camping facilities and other forms of accommodation in the vicinity, no camping will be permitted within the park.

Commercial fishing

Commercial bait collecting for pipis and worms is undertaken on the park's beaches. Existing commercial bait collectors will be permitted to continue this activity, consistent with the conditions laid down by NSW Fisheries and a licence for access from the NPWS.

Policies and actions

- The impact of recreational activities within the park on the natural environment and other values within the park will be minimised.
- A range of outdoor recreational opportunities will be provided which are consistent with the protection of natural and cultural values and ecological processes, are appropriate to the appreciation and understanding of the natural and cultural values, and complement the recreational opportunities which are available elsewhere in the region.
- Visitor and recreational impacts on the environment within the park will be monitored and, where necessary, measures will be taken to protect natural and cultural heritage features. This may include temporary or permanent closure of sites.
- Due to safety considerations, swimming and surfing will not be encouraged from beaches within the park.
- A network of walking tracks and management trails which provide access for walkers will be maintained in the park (see map, centre pages).
- Non-motorised bicycle riding will be permitted on public roads and management trails within the park. Bicycle riding will not be allowed on walking tracks within the park.
- Vehicle access will be provided to the area north of Bonville Creek from the end of Williams Road.
- Vehicles will not be permitted on the beach north of Bundagen Headland.
- Subject to ongoing review of environmental and social impacts, vehicles will be permitted on North Beach between Tuckers Rock and Bundagen Headland. If monitoring and review determines that use of the beach by vehicles is having an unacceptable or adverse impact on the environment or on other park users, or if vehicles are found to be driving on the beach north of Bundagen Headland, vehicles will be excluded from all beaches within the park.
- A review of the use of North Beach between Tuckers Rocks and Bundagen Head by vehicles will be undertaken within 5 years of the adoption of this plan.

- The Service will negotiate with local councils a policy for the management of facilities and access along the coast in the vicinity of the park and the development of a coastal access strategy.
- A permit system will be introduced for beach vehicle access along North Beach between Tuckers Rock and the southern side of Bundagen Headland. Signs will be erected at the Tuckers Rocks carpark and on the beach at Tuckers Rock explaining the conditions of access to the beach.
- The Service will discuss alternative options for access to Bundagen Head with neighbouring landowners and the local council with a view to reducing the need for four wheel drive access on the beach. If alternative access close to Bundagen Head can be obtained from the west, vehicle access on the beach north of Tuckers Rock will be prohibited.
- Boating on the navigable waterways within the park will be restricted to a four knot speed limit. Jet skis are prohibited within the park. NPWS will liaise with the Waterways Authority to regulate use of the waterways.
- Commercial recreation activities, group activities involving more than 20 people, competitive activities, training activities, and adventure activities within the park will require prior approval of the District Manager.
- Commercial activities promoting appreciation of the natural and cultural heritage features of the park will be encouraged, subject to their compliance with the objectives of this plan of management and licensing by NPWS.
- Horseriding will not be permitted within Bongil Bongil National Park.
- Camping will not be permitted within Bongil Bongil National Park.
- All proposals within this plan for development of recreational facilities, and any future proposals for potentially high impact recreational activities within the park will be subject to a feasibility study and assessed for their potential environmental impacts, including an assessment of the potential impact on Aboriginal sites and values, and consistency with the objectives of this plan of management.
- A picnic area for up to 100 people will be developed on the northern side of Bonville Creek. The picnic area will include a sealed public access road, carpark, picnic tables, covered galley areas with gas barbecues, landscaped areas, toilets, and park information displays. Gates to the picnic area will be locked at night.
- A canoe launching facility will be developed on the northern bank of Bonville Creek in close proximity to the proposed picnic area. This facility will include a carpark, an unloading area, steps down the bank, a timber jetty, and landscaped areas.
- A walking track of up to one kilometre in length will be developed in the section of the park north of Bonville Creek. The track will depart from and return to the picnic area at Bonville Creek. The proposal will include information panels highlighting features of interest and significance to the park. The track will lead through scenic areas including wetlands, heathlands, and wet sclerophyll forest.
- A walking track will be developed to link the Bundageree Rainforest Walk to the management track along Bundageree Creek, providing a loop walk from the

Tuckers Rock carpark. A picnic table will be provided on the bluff on the loop walk.

- An information panel will be installed at the Sawtell boat launching ramp adjacent to the park, indicating scenic areas and facilities accessible from the creeks within the park, and outlining regulations for use of the waterways within the park.
- An information panel and directional signs will be placed in the Tuckers Rock carpark near the start of the Bundageree Rainforest walk and at the start of the Bundageree loop walk.
- Up to a total of three picnic areas for boat users will be installed on the banks of Pine Creek and/or Bonville Creek. These sites will include a steel ladder to enable access to the bank and to which boats can be secured, educational panels, and a picnic table. Access to the sites will be via boat or canoe only. The sites may be periodically relocated to minimise environmental impacts to each site and allow rehabilitation of sites if necessary.
- NPWS will provide a small parking area and turning bay adjacent to School Road and Overhead Bridge Road on the boundary of the park. Track head facilities, including a picnic table and signage, may be provided near the gates. The sections of these roads within the park will be publicly accessible for walking and non-motorised bicycle riding only.
- A picnic table and educational panel will be provided at the boundary of the Scrub Creek Littoral Rainforest area along School Road. The panel will identify the conservation significance of the littoral rainforest.
- In conjunction with Bellingen Shire Council, NPWS will erect a sign near the walking track to the beach warning that the beach is used by vehicles.
- A sign will be erected on the foredune of the beach warning those driving on the beach that pedestrians use the beach and that pedestrians have priority.
- Existing commercial fishermen will be given a licence which permits access to the back of the beach along School and Overhead Bridge Roads.

4.3.2 Research and education

There has been little systematic research and scientific survey work undertaken within Bongil Bongil National Park. Work which has been undertaken within the park has focused on flora and fauna, although this has also been limited.

The purpose of undertaking scientific research within the park is to provide NPWS with a comprehensive understanding of the natural and cultural components and ecological processes of the park. This enables more efficient and effective management practices.

Because of its proximity to the regional coastal city of Coffs Harbour and educational institutions in the area, the park could play an important role for environmental education for school and university groups and the wider community.

NPWS will encourage research activities within the park through liaison with educational institutions in the region. A prospectus identifying priorities for research

within the park will be prepared and distributed to these institutions. Research identified in other sections of this plan will be given priority.

NPWS considers that it is important for visitors to have an understanding and appreciation of the natural values of the park. Provision of information relating to the natural and cultural heritage of the park, recreation opportunities available within the park, and regulations and policies relating to visitor use is important to enhance visitor enjoyment of the park, encourage appropriate visitor use and behaviour, engender environmental awareness within the community, and gain the support and cooperation of neighbours and the local community.

Policies and actions

- Research proposals identified in this plan of management, relating directly to natural and cultural resource management issues within the park and research which could potentially contribute to future management of the park are preferred and will be encouraged.
- A prospectus identifying research priorities within the park will be prepared and distributed to research and educational institutions in the region.
- Research proposals will be assessed for their likely impact on the environment. All research will be subject to NPWS policy and procedures relating to the granting of permits, the conduct of research, and the provision and dissemination of results.
- NPWS will encourage use of the park as an environment for education. Approval from the District Manager must be obtained prior to the use of the park for this purpose.
- Public awareness programs will be implemented to encourage people to visit and enjoy Bongil Bongil National Park and to understand and appreciate the natural and cultural features and the management role of NPWS. Emphasis will be placed on the importance of the park in the regional pattern of conservation areas, both terrestrial and marine; the biological significance of the coastal environment for the conservation of native plants and animals; the importance of littoral rainforest; the past occupation and present use of the coastal zone by the Aboriginal community; appropriate recreational use of the park, particularly beaches and estuaries; and fire management.
- Use of Bongil Bongil National Park by school and secondary education groups will be encouraged for environmental and park management education and research.
- Any publicity and interpretation undertaken by commercial recreation operators will be required to be consistent with environmental education and interpretation programs designed for the park by NPWS, and with the objectives of this plan of management.
- Environmental education programs such as the NPWS Discovery program will be provided and promoted during school holidays, and extended to other times according to demand and available resources.
- Emphasis will be placed on explaining NPWS programs of fire management and feral animal and weed control to neighbours of the park.

- Data and findings from research within the park will be recorded in the NPWS Wildlife Atlas database.
- A range of information on the park, including brochures and leaflets, will be produced and disseminated through appropriate Service visitor centres and offices.

4.3.3 Management operations

Bongil Bongil National Park is part of the Dorrigo District of the National Parks and Wildlife Service. The District office is located at the Rainforest Centre in Dorrigo National Park. A sub-district workshop is located in Toormina.

In addition to the public roads discussed under section 4.3.1 of this plan, there is a network of management trails in the park (see map, centre pages). The purpose of the management trails is to enable fire, weed, feral animal, and public activity management. Vehicular access to the trails is restricted to essential NPWS management purposes, and other essential purposes authorised by the District Manager of the Dorrigo District of NPWS. The trails may be used by walkers and cyclists using non-motorised bicycles.

The northern section of the park which is accessible from Lyons Road has been subject to illegal rubbish dumping, including old cars and garden waste, and ad hoc creation of roads and trails. The entry to this section of the park will be gated to prevent private vehicular access. NPWS will also place signs at the boundary identifying the area as Bongil Bongil National Park. NPWS will undertake restoration and rehabilitation work in this area to restore it to a more natural condition.

There are five old sand mining sites within the park, located behind the foredunes of Bongil Beach. Most of these sites have high levels of weeds, with Bitou Bush being the major species. Management of these sites will aim to control weeds and rehabilitate the native vegetation.

Policies and actions

- The management trails shown on the map (centre pages) will be maintained in an environmentally stable condition. Use of the trails within the park will be restricted to vehicles authorised by the District Manager.
- Management trails within the park will be gated and sign posted to prevent public vehicular use.
- No new trails will be constructed within the park unless they are necessary for fire control or other emergency operations. Trails constructed for these emergency operations will be closed and rehabilitated as soon as possible following completion of the emergency.
- Management trails within the park may be used for walking and cyclists using non-motorised bicycles without specific authorisation.
- Tracks and trails not part of the road, management trail or walking track system within the park will be closed and rehabilitated.

- A barrier to private vehicular access will be placed at the northern entrance of the park from Lyons Road to discourage illegal activities, including dumping of rubbish, and the track into the park restored to a more natural condition.
- A sign will be erected at the park boundary along Lyons Road identifying the area as Bongil Bongil National Park.
- Weed control programs will be undertaken in the old sand mining sites within the park, and management of these sites will encourage rehabilitation of the native vegetation.

5. PLAN IMPLEMENTATION

This plan of management is part of a framework of management developed by the National Parks and Wildlife Service (NPWS). The framework includes the *National Parks and Wildlife Act 1974* (NPW Act), the NPWS Corporate Plan, field management policies, established conservation and recreation philosophies, and strategic planning at corporate, regional and district levels.

The orderly implementation of this plan of management will be undertaken within the annual programs of the NPWS Dorrigo District. Priorities, determined in the context of district and regional planning, will be subject to the availability of necessary staff and funds, and to any specific requirements of the Director-General or Minister.

District programs are subject to on-going review, within which works and other activities carried out in Bongil Bongil National Park will be evaluated in relation to objectives laid out in this plan.

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

Section 81 of the NPW Act requires that this plan be carried out and given effect to, and that no operations shall be undertaken in relation to the national park unless they are in accordance with the plan. However, if after adequate investigation, operations not included in the plan are found to be justified, this plan may be amended in accordance with Section 76(6) of the Act.

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

HIGH PRIORITY	**Plan reference**
• Install drainage beneath School and Overhead Bridge Roads	4.1.1
• Advise fire authorities and the Bundagen community re fire policies	4.1.4
• Provide assistance to Community Fireguard program for Bundagen community	4.1.4
• Remove Slash Pine and revegetate area	4.1.5
• Eradicate Groundsel Bush from the paperbark forest	4.1.5
• Develop strategy for protection and interpretation of Aboriginal sites	4.2.1
• Install information at Sawtell boat ramp and Bonville Creek picnic area	4.3.1
• Develop picnic area on the northern side of Bonville Creek	4.3.1
• Establish permit system for beach driving	4.3.1
• Review use of North Beach by vehicles	4.3.1
• Gate management tracks in park to prevent unauthorised access	4.3.3
• Erect sign at park boundary on Lyons Road, place barrier at the northern entrance of the park from Lyons Road and restore track into park	4.3.3

MEDIUM PRIORITY	**Plan reference**
• Upgrade fire trail network to NPWS standards	4.1.4
• Construct board and chain driveway along foredune	4.3.1
• Monitor four wheel drive use of the beach	4.3.1
• Develop canoe launching facility on northern bank of Bonville Creek	4.3.1
• Upgrade Bundageree Rainforest Walk and construct loop walk	4.3.1
• Provide small parking areas and turning bay adjacent to School Road and Overhead Bridge Road on the boundary of the park	4.3.1
• Provide picnic table and educational panel at the boundary of Scrub Creek Littoral Rainforest area along School Road	4.3.1
• Produce brochures, leaflets and display panels on park	4.3.2
• Prepare and distribute prospectus identifying research priorities.	4.3.2
• Rehabilitate tracks and trails not needed for management purposes	4.3.3
LOW PRIORITY	
• Protect habitat of Knights Dart Butterfly and encourage research	4.1.3
• Undertake experimental trials to determine the best management practices for hardwood plantation areas	4.1.5
• Record oral history of park	4.2.2
• Construct walking track north of Bonville Creek	4.3.1
• Construct low impact picnic areas for boat users at two locations on banks of Pine Creek	4.3.1
• Encourage research into hydrological systems of the park	4.3.2
• Undertake rehabilitation of old sand mining sites within the park	4.3.3
ONGOING	
• Assist with recovery of *Acronychia littoralis*	4.1.2
• Implement actions for recovery of Little Terns within the park	4.1.3
• Maintain liaison on fire management with neighbours, etc.	4.1.4
• Maintain constant suppressive control of Bitou Bush, Groundsel Bush, Crofton Weed, and garden escapees	4.1.5
• Control weeds along the roadside edges within the park	4.1.5
• Maintain Keith Turnbull Institute site free from disturbances	4.1.5
• Maintain liaison with the Gumbaynggir Aboriginal community and Coffs Harbour Local Aboriginal Land Council	4.2.1
• Maintain data bases on native plants and vegetation communities, native animals and their habitat, information relevant to fire management, Aboriginal sites and research findings	various

REFERENCES

Atkins, A. 1996. The Life History of *Ocybadistes knightorum* Lambkin & Donaldson (Lepidoptera: Hesperiidae). *Australian Entomologist* **23(1)**: 29-31.

Briggs, J.D. and Leigh, J.H. 1996. *Rare or Threatened Australian Plants*. Australian National Parks and Wildlife Service, Canberra.

Clancy, G. 1987. *Report on Vegetation and Fauna Survey - Bonville Beach Area*. For Lockett & Montgomerie Pty. Ltd., Coffs Harbour NSW. Unpublished report.

Crome, F. and Shields, J. *Parrots and Pigeons of Australia*. Collins Angus and Robertson Publishers. Australia.

Dwyer, P.D. 1965. Flight patterns of some eastern Australian bats. *Vic. Nat*. **82**: 36-41.

Dwyer, P.D. 1968. The biology, origin and adaptation of *Miniopterus schreibersii* (Chiroptera) in New South Wales. *Australian Journal of Zoology* **17**: 665-668.

Floyd, A.G. 1989. *Rainforest Trees of Mainland South - Eastern Australia*. Inkata Press.

Gilmore, A.M. and Parnaby, H. 1994. *Vertebrate fauna of conservation concern in north-east NSW forests*. North East Forests Biodiversity Study Report No. 3e, NSW National Parks and Wildlife Service.

Harber, A. 1996. *Review of Environmental Factors. Scrub Creek Restoration Project. Bongil Bongil National Park*. NPWS Dorrigo District. Unpublished report.

Harden, G.J. (Ed.) 1992. *Flora of New South Wales Volume 3*. Royal Botanic Gardens, Sydney.

Hunter, J., Jay, A., Nicholson, N., Nicholson, H., and Horton, S. 1992. *Species Recovery Plan* Acronychia littoralis *(Hartley and Williams).* Australian National Parks and Wildlife Service. Endangered Species Program. Project No. 155.

Lambkin, T.A. and Donaldson, J.F. 1994. A new species of *Ocybadistes* Heron (Lepidoptera: Hesperiidae) from Australia. *Australian Entomologist* **21**(1): 15-20.

NSW NPWS 1994. *Flora of NSW Forests*. North East Forests Biodiversity Study Report No. 4, unpublished report, NSW National Parks and Wildlife Service.

NSW NPWS 1995. *Broadwater National Park, Bundjalung National Park, Iluka Nature Reserve: Draft Plan of Management*. NSW National Parks and Wildlife Service, Lismore District.

NSW NPWS 1996. *Bongil Bongil National Park Pest Species Management Plan*. New South Wales National Parks and Wildlife Service. Unpublished report.

NSW NPWS in prep. Threatened Species Manual. NSW National Parks and Wildlife Service, Threatened Species Unit.

Orchard, A.E. 1996. *Flora of Australia Volume 28 Gentianales*. CSIRO Australia, Melbourne.

Pringle, J.D. 1987. *The Shorebirds of Australia*. Angus and Robertson Publishers. Australia.

Rose, R. 1997. *Bongil Bongil National Park Draft Fire Management Plan*. Prepared by Bushfire and Environmental Services for the NSW National Parks and Wildlife Service. Unpublished report.

Sands, D.P.A. 1997. *Alexfloydia repens* Simon: A food plant for *Ocybadistes knightorum* Lambkin & Donaldson (Lepidoptera: Hesperiidae) and their conservation significance. *Australian Entomologist* **24(3)**: 117-118. (in press).

Schodde, R. (Ed.) 1993. *Reader's Digest Complete Book of Australian Birds*. Reader's Digest, Sydney.

Serventy, V.N. (Ed.) 1985. *The Waterbirds of Australia. The National Photographic Index of Australian Wildlife*. Angus & Robertson Publishers, Sydney.

SFNSW 1995. *Coffs Harbour - Urunga Management Areas Environmental Impact Statement*. State Forests of New South Wales, Northern Region.

Sheringham, P. and Westaway, J. 1995. Significant Vascular Plants of Upper North East New South Wales. A report by the New South Wales National Parks and Wildlife Service for the Natural Resources Audit Council.

Tweedie, T.D., Bruskin, S., Chapman, W.S., and Heyward, R.W. 1995. *Coffs Harbour/ Urunga Management Area EIS Supporting Document No. 5 Flora Survey of the Urunga and Coffs Harbour Management Areas*. State Forests of New South Wales, Northern Region.

Williams, J.B. and Bale, C.L. 1996. *Report on discovery of* Acronychia littoralis *in the Bonville Peninsula sandmass* (Bongil Bongil National Park).

Wood, E.T. 1994. *Coffs Harbour/ Urunga Management Area EIS Supporting Document No. 2: Urunga - Coffs Harbour Land Resources Study*. Prepared by Department of Land and Water Conservation for State Forests of NSW.