



The Vertebrate Fauna of Kanangra-Boyd National Park

Project funded under the Central Directorate Parks and Wildlife Division
Biodiversity Survey Priorities Program

Conservation Programs and Planning
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Cover Photos

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Black Crevice-skink (D. O'Connor)

Tall Moist Blue Gum Forest (DEC)

Rainforest (DEC)

Short-beaked Echidna (D. O'Connor)

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Red-crowned Toadlet (Dave Hunter)

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OVERVIEW

Kanangra-Boyd National Park, located approximately twenty kilometres south east of Oberon, comprises 68000 hectares of land encompassing the Boyd Plateau and the surrounding deeply incised valley system. Elevation ranges from just over 150 metres above sea level in the Coxs River Valley to 1334 metres at Mount Emperor. The dramatic range in elevation contributes to a diverse mix of vegetation structural forms, including closed forests (rainforests), swamps, heaths and mallees, and extensive areas of Eucalypt dominated forests and woodlands. A number of landscape features characterise the park, including the system of limestone karsts (Colong, Billys Creek, Church Creek and Tuglow Caves) and the Kanangra Walls that form the dramatic boundary between the Boyd Plateau and the Kanangra gorges below.

The diverse range of habitats in the park support a rich assemblage of vertebrate fauna. This report describes the terrestrial vertebrate fauna of Kanangra-Boyd National Park, derived from fauna surveys that have been undertaken by the Department of Environment and Conservation (DEC, formerly NPWS). It documents for the first time the species and habitats present in the reserve and combines survey results derived from systematic surveys undertaken between 1997 and 2004. It concludes that:

- There are 235 native vertebrate fauna species known to occur within the reserve. This includes 124 diurnal birds, eight nocturnal birds, sixteen bats, eight arboreal mammals, fifteen ground mammals, 34 reptiles, eighteen frogs and twelve introduced species.
- Kanangra-Boyd National Park supports habitat for at least eighteen fauna species that are listed as threatened on the NSW Threatened Species Conservation Act (1995). Seven of these species have been recorded in high numbers, indicating that healthy populations are present within the park. This includes the Glossy Black-cockatoo, Powerful Owl, Yellow-bellied Glider, Large-eared Pied Bat, Greater Broad-nosed Bat, Eastern False Pipistrelle and Eastern Bent-wing Bat. Additional threatened fauna species include Barking Owl, Sooty Owl, Spotted-tailed Quoll and Squirrel Glider.
- Four threatened species have been recently observed within two kilometres of the park and given the presence of suitable habitat, are considered highly likely to occur within its boundaries. These are the Koala, Masked Owl, Eastern Freetail-bat and Rosenberg's Goanna.
- Habitats for the threatened Booroolong Frog and Littlejohn's Tree Frog are protected within the park, however neither species have been recorded in recent times.
- It is considered likely that Brush-tailed Rock-wallabies persist within the park, though recent surveys have failed to conclusively confirm their presence.
- The limestone caves at Colong were found to contain significant roosting populations of the Eastern Bent-wing Bat (>1000 individuals estimated) and the Eastern Horseshoe-bat. No evidence was found to suggest that this cave system is being used as a maternity site.
- Feral animals including Rabbits, Foxes and Pigs are present in the reserve. Pigs and evidence of their activity are particularly dense on the Boyd Plateau and the Jenolan and Kowmung River valleys.
- The composition and distribution of fauna species within the park strongly reflects landscape patterns in elevation, geology and topography, and the location of the park at the junction of the Sydney Basin and South Eastern Highlands Bioregions. There are clearly distinctive assemblages of fauna that correspond to the montane and sub-alpine environments, and to the lower altitude valley systems.

The recent fauna surveys in Kanangra-Boyd National Park have contributed important information to our understanding of the distribution, range, habitat preference and conservation status of many animals, including threatened and newly described species. One such example is the threatened Greater Broad-nosed Bat, which has been recorded at higher altitudes than previously reported, and at the western extent of its distribution. Such information will improve our understanding of species conservation status across the region and assist in the updating of effective management strategies.

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1 INTRODUCTION

1.1 PROJECT AIMS

The Central Directorate Parks and Wildlife Division (PWD) of the NSW Department of Environment and Conservation (DEC, formerly NSW National Parks and Wildlife Service (NPWS)) has for the first time established a biodiversity survey priorities program for all DEC managed estate within the Directorate. This program recognised that Kanangra-Boyd National Park (NP) was characterised by low levels of information on both its flora and fauna values (NPWS 2003a). The decision to sample this area was enhanced by the opportunity to integrate new survey work into a broader study examining the biodiversity values of the Warragamba and Metropolitan Special Areas (DEC in prep.).

The fauna survey program seeks to address the shortfall in information on vertebrate fauna within Kanangra Boyd NP. Improved information will enable park managers to better integrate local information into planning decisions and to become more active in promoting the values of the reserve. It will provide the opportunity to develop more focused strategies on threatened species management, monitoring programs and community education. Importantly it will expand the ability of park managers to understand the role the reserve plays in conserving fauna within the greater Sydney region.

Specific objectives of this report are to:

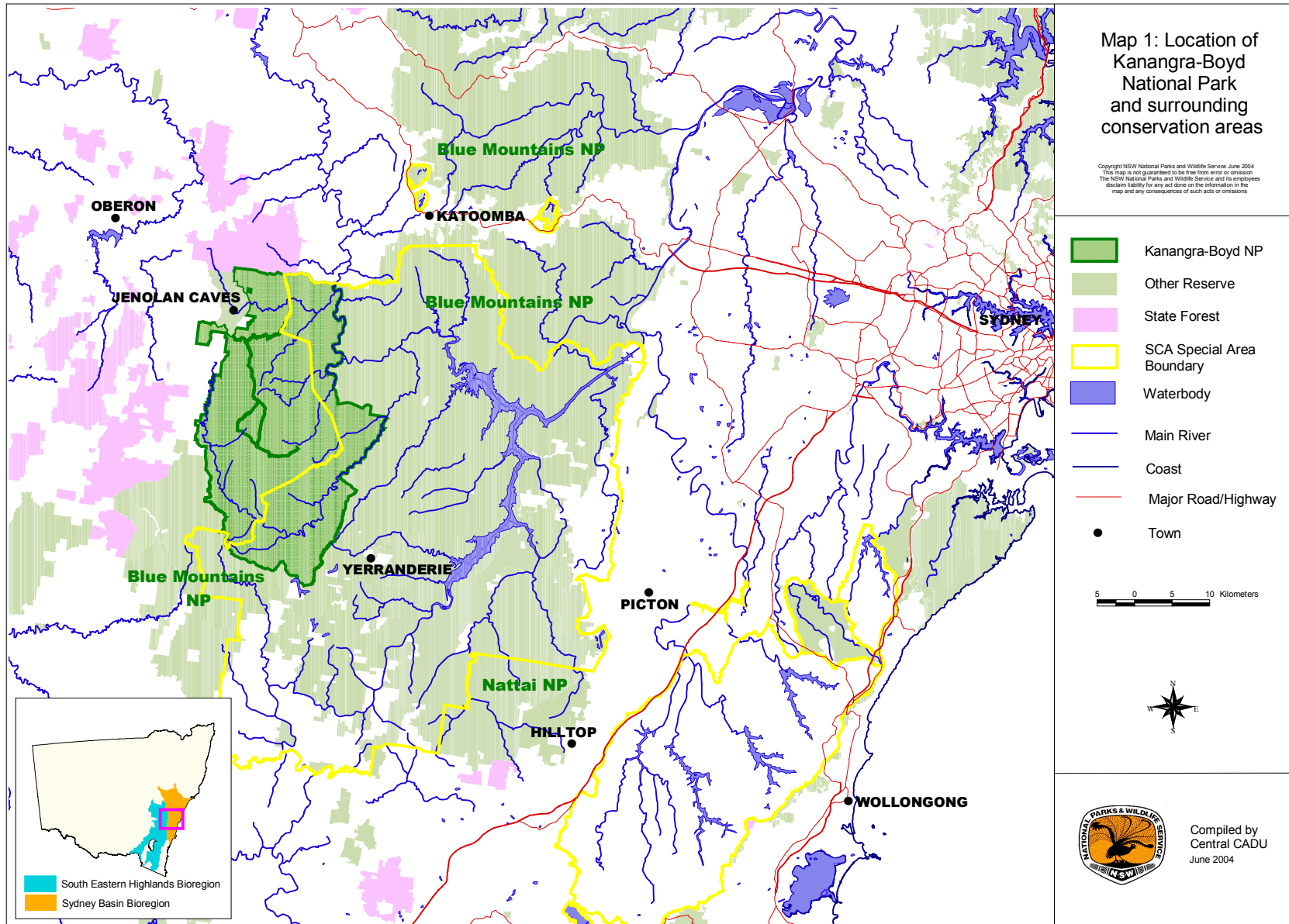
1. Document, review and collate existing fauna data
2. Identify and profile threatened fauna species and other regionally significant fauna that are known or likely to occur
3. Identify broad-scale patterns in fauna occurrence and habitat use across the reserves and identify habitats of particular conservation significance.

1.2 BACKGROUND

Kanangra-Boyd NP is located approximately 130 kilometres west of the outskirts of the Sydney metropolitan area and approximately twenty kilometres south east of Oberon. The park is bordered to the east, south and south west by Blue Mountains National Park, by Jenolan Karst Conservation Reserve to the north west, and by cleared land, native State Forest and pine plantations to the mid west. The northern boundary of the park is formed by Black Range, which runs east-west from the Coss to the Jenolan River (Map 1).

Kanangra-Boyd NP was gazetted in 1969. The park currently comprises over 68000 hectares of land, encompassing an extensive plateau and a dramatic deeply incised valley system. It includes the catchments of the Kanangra, Jenolan and Kowmung Rivers that together form part of the catchment area of Lake Burragorang, Sydney's primary water storage area. Consequently, approximately 27000 hectares of the park is co-operatively managed by DEC and the Sydney Catchment Authority (SCA).

Kanangra-Boyd NP forms part of the Greater Blue Mountains Area, which was inscribed on the World Heritage List in November 2000. The park encompasses part of the Kanangra-Boyd Wilderness, the second largest wilderness area in NSW identified under the NSW Wilderness Act 1987. Park management is committed to restore and protect the unmodified state of the area and its plant and animal communities (NPWS 2001a). Part of this commitment is to close and rehabilitate vehicular tracks in or through the wilderness, except where required for essential management purposes (NPWS 2001a). Consequently, large tracts of the park, particularly in the north east and south west, remain inaccessible by vehicle and difficult to access on foot.



1.3 HISTORY OF LAND USE

Evidence suggests that Aboriginal occupation of the Kanangra-Boyd area dates back to approximately 20000 years ago (NPWS 2001a). There are approximately forty recorded sites and places of pre-European cultural significance within the park, primarily in the form of art and grinding groove sites, and there are likely to be hundreds of places as yet unrecorded (NPWS 2001a).

European explorers first reached the Kanangra area in the first half of the nineteenth century, during attempts to cross and settle the mountain ranges (NPWS 2001a). In the mid nineteenth century the area began to be used as a resting place for the movement of cattle between the pastures of the Burratorang Valley and the Tablelands (National Trust of Australia 1974). The early and mid twentieth century saw extensive harvesting of native hardwood timbers, particularly of the Northern Plateau Moist Forest on the Boyd Plateau (National Trust of Australia 1974). Shale oil and coal mining sites were exploited, and phosphates from the bat droppings at Colong Caves were mined in the 1930s (NPWS 2001a).

Despite forestry and mining activities within the area, many of the park's scenic and recreational opportunities gained widespread recognition in the mid 1800s and early 1900s. In 1891 a reserve for public recreation was created at Kanangra Walls, soon followed by the reservation of Colong Caves, Tuglow Caves, Box Creek and Canyon Falls, Tuglow Falls and Morong Falls (National Trust of Australia 1974). In 1920 Myles Dunphy conceived a proposal to include the area as part of the Greater Blue Mountains National Park; then in 1937 large parts of the Boyd Plateau and surrounding lands were gazetted as a reserve for the preservation of flora and fauna. Kanangra-Boyd NP was gazetted in 1969, encompassing an area of 40000 hectares that excluded the northern section of the plateau and the area around Mount Armour. Debate regarding alternative proposals for use of the land for forestry (including pine plantations) and for limestone mining continued through the 1970s, until finally both the entire Boyd Plateau and the Church Creek area were added to the park.

1.4 ENVIRONMENT

Biogeography

Kanangra-Boyd NP lies within the South Eastern Highlands Bioregion (Thackway and Creswell 1995). This Bioregion covers an extensive area of the Central Tablelands and slopes of New South Wales and Victoria. The Bioregion is dominated by a temperate climate characterised by mild to warm summers and no dry season (NPWS 2003c). Approximately fifteen percent of the Bioregion is reserved for conservation (in National Parks, Nature Reserves, karst conservation reserves and State Conservation Areas) (NPWS 2003c).

The Sydney Basin Bioregion lies immediately to the east of the park. The incised valley system in the eastern section of the park shares many climate, geology and landscape features with the western extremity of this Bioregion. Kanangra-Boyd NP plays a significant role in conserving the integration zone between these two Bioregions, which leads to a high diversity of flora and fauna species.

Geomorphology

Kanangra-Boyd NP encompasses two major landscape systems: the Boyd Plateau in the north of the park; surrounded by the deeply incised valley systems of the Hollanders, Jenolan, Kowmung and Cocks Rivers. The Boyd Plateau covers over 10000 hectares of the reserve and encompasses a complex geology. In the north of the plateau, soils are more fertile (National Trust of Australia 1974) being derived from rhyolite and gabbro. The southern portion of the plateau is underlain by a weathered knoll of Carboniferous granite (King 1994). The plateau forms a complex of low rising hills and crests, with swamp depressions along drainage lines and soaks.

The deeply incised east-flowing valley systems expose the older rocks from the Devonian period. These rocks are primarily quartzite, sandstone, siltstone and claystone. Some of the deeper gullies probably expose older rocks again, those from the Ordovician period (King 1994). These weather to produce infertile, well-drained soils. West-flowing valleys include rocks such as tuff, slate, and phyllite laid down during the Silurian period.

Residual peaks and tops of sandstone and quartzite remain on the plateau at Ti Willa, at Mt. Cloudmaker, and at the knolls, peaks and crests of Black Range. These peaks are aligned with the lithic sandstones that are associated with the Shoalhaven Group from the Permian period. The most

dramatic example of these residual landscapes is displayed at Kanangra Tops with the impressive sandstone Kanangra Walls exposed below. Plate 1 shows the landscapes along the Gangerang Range. These landscapes are characterised by infertile sandy soils.

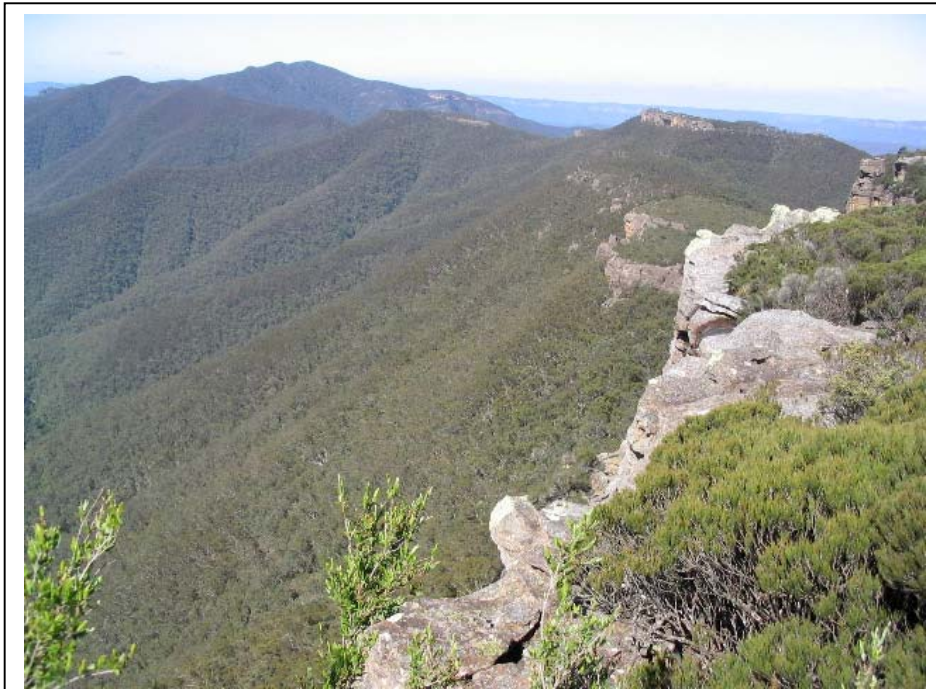


Plate 1: Looking towards Mt. Cloudmaker from Kanangra Walls ©David O'Connor

On the northern fall of the Boyd Plateau, a knoll of intruded granite covers a substantial area. This area forms Moorara Boss and overlooks the precipitous Hellgate Gorge.

Amongst the oldest and most impressive landforms in the reserve are the limestone outcrops that are exposed in the Kowmung and Jenolan River Valleys. These outcrops are disjunct, but form part of a belt that includes Billys Creek, Colong and Tuglow Caves.

Elevation

The characteristic landforms of Kanangra-Boyd NP are the spectacular gorges that plummet from narrow peaks and ridges. Large ranges in elevation emerge from these landforms: elevation falls from highpoints such as Mt. Emperor at 1334 metres above sea level to the Coxs River at just over 150 metres above sea level. The Boyd Plateau lies above 1000 metres in elevation and makes up about one third of the park.

Climate

Climate data indicates that the north western half of Kanangra-Boyd NP, primarily the Boyd Plateau, has relatively high average rainfall of 1000 to 1150 millimetres per year, with the central ridge of Kanangra Range having between 1151 and 3000 millimetres per year. The south and eastern sections of the park have considerably lower rainfall, ranging between 631 and 875 millimetres per year depending on topography, with the lowest occurring in a rain shadow immediately south of the plateau.

The mean annual temperature across the park follows a similar pattern. The Boyd Plateau maintains an annual average temperature of between eight and twelve degrees Celsius, with a maximum of 23 degrees in summer and minimum of minus two degrees in winter. The escarpment slopes have an average annual temperature of between twelve and fourteen degrees Celsius. The valleys of the Kowmung and Coxs Rivers maintain a higher average temperature of between fourteen and sixteen degrees Celsius, with a maximum of 29 degrees in summer and a minimum of one degree in winter.

1.5 VEGETATION

Vegetation across Kanangra-Boyd NP was mapped on a broad scale in 2000 as part of the CRA program (NPWS 2000a). In 2001 DEC was commissioned by the SCA to undertake a comprehensive flora survey of the entire Warragamba Special Area. Fine scale vegetation mapping was undertaken in the eastern section of the park as part of this program (NPWS 2003a). The following description of vegetation is based on information contained in NPWS (2000a) and NPWS (2003a).

The vegetation of Kanangra-Boyd NP is strongly influenced by its montane and sub-alpine environments and by its proximity to the drier cool climates of the central tablelands. There are a wide variety of structural forms of vegetation including closed forests (rainforests), swamps, heaths and mallees, and extensive areas of Eucalypt dominated forests and woodlands. The Eucalypt communities are extremely varied, responding to the dramatic variations in elevation, soils, shelter and rainfall that span the reserve.

Above 800 metres, forests and woodlands within the park are typical of those found at higher elevations of southern NSW. On exposed residual sediments and slopes that remain as peaks and ridges in the western portions, sclerophyllous shrubby woodlands occur, with an often crowded canopy of Silvertop Ash (*Eucalyptus sieberi*), Narrow-leaved Peppermint (*E. radiata* subsp. *radiata*) and Blaxland's Stringybark (*E. blaxlandii*).

Near the western boundary Brittle Gum (*Eucalyptus mannifera* subsp. *mannifera*) and stunted Red Stringybark (*E. macrorhyncha*) may co-dominate. Gullies support taller forests that are generally dominated by Brown Barrel (*Eucalyptus fastigata*) and Narrow-leaved Peppermint, and at sites above 1000 metres by Mountain Gum (*E. dalrympleana* subsp. *dalrympleana*) (Plate 2). The understorey in these high elevation gullies tends to be ferny and open; only in the deepest gullies and very protected slopes does a strong mesic shrub layer develop. On the richer soils of the Boyd Plateau a tall to very tall open grassy forest occurs across the gentle gradients. Brown Barrel and Mountain Gum are abundant here, above a very open understorey with a lush cover of tussock grasses. Snow Gums (*Eucalyptus pauciflora*), with a similarly profuse grass cover, dominate sites that are of slightly less fertility or in frost hollows. These forests share much with higher elevation basalt caps of the Liverpool Range and Barrington Tops.

The lower elevations of the park support a completely different assemblage of plants. The metasediments of the Kanangra Gorges are clad in woodlands and forests that align them to the grassy woodlands of the Central Tablelands. Exposed slopes are often very open characterised by a canopy of Narrow-leaved Ironbark (*Eucalyptus crebra*), Forest Red Gum (*E. tereticornis*) and Grey Gum (*E. punctata*) over a very dry understorey with scattered shrubs and grasses (Plate 3). Vegetation in sheltered aspects is taller and includes some depauperate dry rainforest species on the forest floor, although due to the rain shadow of the Kowmung and Kanangra Gorges only the hardiest rainforest species survive. Grey Myrtle (*Backhousia myrtifolia*) will sometimes form dense thickets in the understorey of these tall forests. In the northern slopes Grey Gum assumes greater prominence on sheltered slopes, and with sufficient soil depth can grow into a tall forest featuring a carpet of grasses and herbs.

Rainforests are particularly interesting in Kanangra-Boyd NP. Due to the high elevation, they exhibit clear cool temperate influences with species such as Rough Possumwood (*Quintinia sieberi*) and Austral Mulberry (*Hedycarya angustifolia*) joining Sassafras (*Doryphora sassafras*) as the most prominent plants. As elevation falls and the environment becomes drier, particularly along the



Plate 2: Tall gully forest on the Boyd Plateau (Kanangra Creek.) © DEC

Kowmung River, dry rainforests grow in the most protected gullies and on limestone outcrops. These rainforests feature Giant Stinging Tree (*Dendrocnide excelsa*), Red Cedar (*Toona australis*) and Port Jackson Fig (*Ficus rubiginosa*) as prominent trees. On less protected sites dense thickets of Grey Myrtle develop.

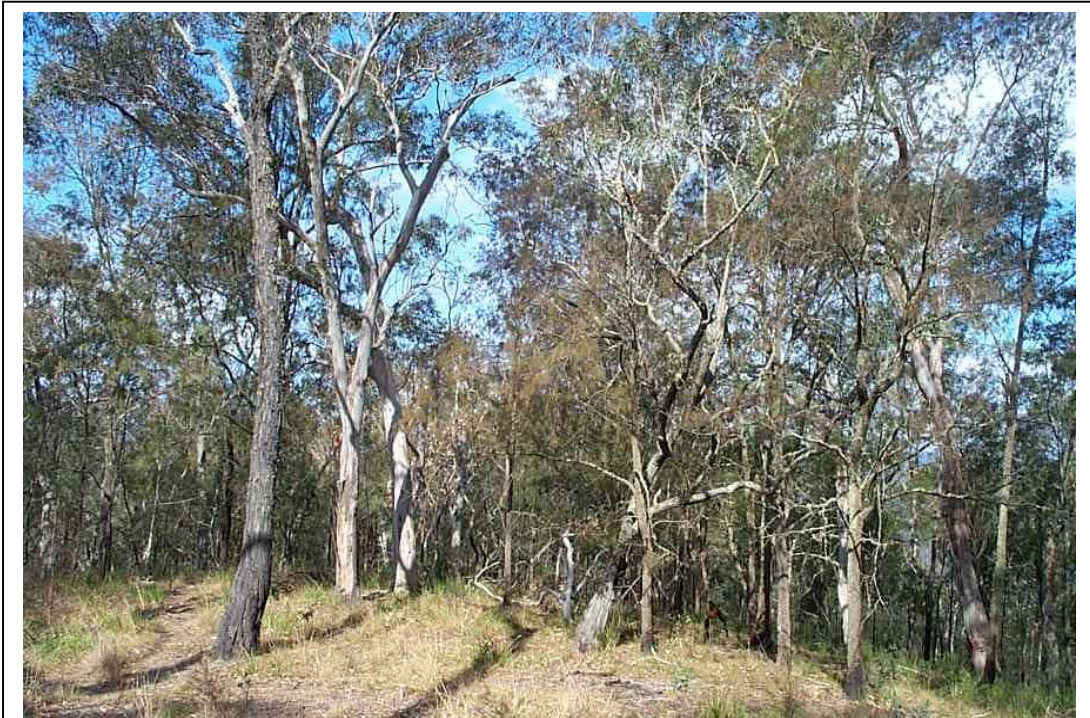


Plate 3: Kanangra Gorge Narrow-leaved Ironbark Woodland on Gingra Range © DEC

Heaths, mallees and scrubs occur on highly exposed and wind buffeted sites on impoverished sandy soils. Vegetation at Ti Willa and Kanangra Tops comprise typical examples of such communities, featuring Blue Mountains Mallee Ash (*Eucalyptus stricta*) and Heath Banksia (*Banksia ericifolia* subsp. *ericifolia*) (Plate 4). An interesting heath-mallee community also features on the Loombah Plateau, featuring Silver Banksia (*Banksia marginata*) and Mountain Gum.



Plate 4: Mallee Heath at Kanangra Tops © DEC

Montane swamps and bogs are a feature of the Boyd Plateau and surrounds. These occur at sites with impeded drainage that are periodically water logged. Tea Trees (*Leptospermum obovatum*) and sedges (*Carex appressa*) mark drainage lines and soaks on gentle gradients.

1.6 FIRE

There is little information about fires in Kanangra-Boyd prior to 1957. In that year most of the park, except the south eastern escarpments of the Boyd Plateau, burnt in a single wildfire (NPWS 2001a). Four substantial fires occurred between 1957 and 2001, including two in the Morong Swamps area of the plateau and two on the drier slopes of the lower Kowmung Valley and Tonalli River catchment. The two lower Kowmung fires burnt relatively large areas in the east of the park, and extensively in the neighbouring Blue Mountains National Park. The most recent wildfire within the park was a small fire at Cam's Creek in February 2004 (M. Jones pers. comm.).