

BIG SCRUB NATURE RESERVES

**(INCORPORATING ANDREW JOHNSTON BIG SCRUB,
VICTORIA PARK, DAVIS SCRUB, HAYTERS HILL,
BOATHARBOUR AND WILSON NATURE RESERVES)**

PLAN OF MANAGEMENT

NSW National Parks and Wildlife Service

December 1997

The plan of management for the Big Scrub Nature Reserves was amended by the Minister for the Environment on 1st March 2001. This plan includes the 2001 amendments.

Acknowledgments: This plan of management has been prepared by the Lismore District office of the National Parks and Wildlife Service in consultation with the Northern Regional office and the Planning Services Unit in Head Office.

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FOREWORD

The Big Scrub was once the largest continuous tract of sub-tropical rainforest in Australia, covering 75 000 hectares of the rich basalt soils to the east and north of Lismore on the north coast of New South Wales. From the 1860's onwards the Big Scrub was heavily cleared for agriculture and by 1900 was essentially gone. Today only about 100 hectares or 0.13% remains as isolated patches.

Six significant remnants, Boatharbour, Victoria Park, Davis Scrub, Hayters Hill, Andrew Johnston Big Scrub and Wilson, are nature reserves dedicated under the National Parks and Wildlife Act 1974. They are collectively referred to as the Big Scrub Nature Reserves in this draft plan of management.

The Big Scrub Nature Reserves are characterised by distinctive rainforest vegetation. These areas contain rare and threatened plant species, and are significant as habitat for native animals. Their small size makes them particularly vulnerable to weed invasion and to visitor impacts.

This plan of management provides for:

- The protection of the Big Scrub Nature Reserves as scientific reference areas which protect surviving natural heritage values of the former Big Scrub sub-tropical rainforest communities;

- The revegetation of cleared or otherwise disturbed areas of rainforest within the nature reserves;

- Extending rainforest protected within the nature reserves by linking them, with the co-operation of neighbours, to nearby rainforest remnants by corridors of revegetated lands; and

- The total exclusion of fire from rainforest.

Boatharbour, Victoria Park and Wilson Nature Reserves have a history of public recreation and provide opportunities for picnicking and bushwalking in attractive rainforest settings. Accordingly, public appreciation and awareness of the importance of the Big Scrub sub-tropical rainforest will be promoted by encouraging educational use and providing appropriate recreational facilities in these three nature reserves.

Davis Scrub, Hayters Hill and Andrew Johnston Big Scrub Nature Reserves have no formal recreational use.

The management of the six nature reserves recognises that they are important and attractive components of the landscape and provide a contrast to the rural scene dominated by land modified for agriculture.

This plan of management establishes the scheme of operations for the Big Scrub Nature Reserves. In accordance with the provisions of Section 75 of the National Parks and Wildlife Act, 1974, this plan of management is hereby adopted.

PAM ALLAN

Minister for the Environment

31 October 1997

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Map 5 Hayters Hill Nature Reserve

Map 6 Andrew Johnston Big Scrub Nature Reserve

Map 7 Wilson Nature Reserve

1. INTRODUCTION

The National Parks and Wildlife Act of 1974 requires that a plan of management be prepared for one or more nature reserves. A plan of management is a legal document which outlines how a nature reserve will be managed in the foreseeable future.

The procedure for the adoption of a plan of management for a nature reserve is specified in the Act.

The Director-General of National Parks and Wildlife shall cause a plan to be prepared.

The plan is referred to the National Parks and Wildlife Advisory Council for its consideration and advice.

The Director-General shall then submit the plan of management with any comments or suggestions of the Council to the Minister who before adopting the plan, considers the comments and suggestions of the Council.

The Minister may adopt the plan with or without alterations or refer it back to the Director-General and the Council for further consideration.

Although not a requirement of the Act the plan of management for the Big Scrub Nature Reserves was placed on public exhibition for a period of three months ending 25th July 1995 and attracted 14 submissions which raised 16 issues. All comments received were referred to the National Parks and Wildlife Advisory Council for its consideration and advice. The comments and suggestions of the Advisory Council were in turn considered by the Minister when adopting this plan.

This plan of management is for six nature reserves dedicated under the National Parks and Wildlife Act; Boatharbour, Victoria Park, Davis Scrub, Hayters Hill, Andrew Johnston Big Scrub and Wilson. Together they protect important remnants of the Big Scrub and are managed as one system of conservation areas with identical or complementary objectives of management and management policies. They are collectively referred to as the Big Scrub Nature Reserves in this plan of management.

For simplicity, much background information has been omitted. Further information on the management of the Big Scrub Nature Reserves may be obtained from the Lismore District Office of the National Parks and Wildlife Service (Suite 9, 75 Main St, Alstonville).

2. MANAGEMENT CONTEXT

2.1 NATURE RESERVES IN NEW SOUTH WALES

Reserving areas for nature conservation as a general purpose was introduced into Australia with the establishment of Royal National Park in 1879, some seven years after the world's first national park was created at Yellowstone in the United States of America.

Fauna reserves in New South Wales were first established under the Fauna Protection Act of 1948. Under the National Parks and Wildlife Act of 1967 fauna reserves were reclassified as nature reserves. The Fauna Protection Act was replaced by the National Parks and Wildlife Act, 1974.

Under the National Parks and Wildlife Act, nature reserves are areas of special scientific interest containing wildlife or natural environments or natural phenomena.

The purposes of nature reserves are defined in the Act as:

- "(a) the care, propagation, preservation and conservation of wildlife;
- (b) the care, preservation and conservation of natural environments and natural phenomena;
- (c) the study of wildlife, natural environments and natural phenomena; and
- (d) the promotion of the appreciation and enjoyment of wildlife, natural environments and natural phenomena".

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

2.2 THE BIG SCRUB NATURE RESERVES

2.2.1 Location and Regional Context

The landforms of the Big Scrub were formed from volcanic activity associated with the Mount Warning shield volcano during the mid to late Tertiary (about twenty million years ago). Basaltic lava from the volcano has weathered to produce a krasnozem soil of good fertility and water holding capacity.

The Big Scrub essentially covered this area of krasnozem soil from as far south as Wardell, west to Lismore, east to the coast and north to the Nightcap Ranges.

Associated dry rainforest (such as at Wilson Nature Reserve) occurred on chocolate soils near its periphery (see Map 1, page 2).

The Big Scrub Nature Reserves are included in the one plan because:

they are the major remnants of what was once a major continuous ecosystem on the north coast and share many affinities;

they share many management objectives and programs such as exclusion of fire, weed control and regeneration;

the six nature reserves together are subject to an integrated strategy of public use and promotion whereby three will be promoted and three will be protected from public use; and

they are perceived locally as "The Big Scrub", not as Wilson Nature Reserve, Boatharbour, Victoria Park or other individual remnant areas.

The management of the six areas dedicated as nature reserves under the National Parks and Wildlife Act is only one means whereby all remnant areas of the Big Scrub are protected. The conservation of all remnant areas is important for the continuing survival of Big Scrub native plant and animal species.

Boatharbour Nature Reserve

Boatharbour Nature Reserve (24 ha) is situated on the Wilsons River near its confluence with Coopers Creek (see Map 2, page 4). The four separate sections which comprise this nature reserve are bounded by Wilsons River and Coopers Creek, grazing land and the Lismore-Bangalow Road.

Victoria Park Nature Reserve

Victoria Park Nature Reserve (17.5 ha) is located 16 km south-east of Lismore near the village of Meerschaum Vale (see Map 3, page 6). It is bounded on two sides by roads and paddocks. Surrounding land use is primarily fruit growing and cattle grazing.

About 9 ha of Victoria Park is covered with Big Scrub rainforest as is a road reserve along the western edge of the forest. The remainder, mainly former grazing paddocks, are subject to rainforest restoration works, which commenced in 1978.

Davis Scrub Nature Reserve

Davis Scrub Nature Reserve (13.9 ha) is located near the village of Rous (see Map 4, page 8), and is surrounded by agricultural land used for grazing and macadamia growing.

Hayters Hill Nature Reserve

Hayters Hill Nature Reserve (4.5 ha) is located 5 km south-west of Byron Bay on a moderately steep escarpment which lies on the north-eastern edge of the original Big Scrub (see Map 5, page 8). It is bounded by the Byron Bay to Bangalow Road, the Lismore-Murwillumbah railway line and by banana growing and grazing properties.

The Byron Bay-Bangalow Road separates a nearby Big Scrub remnant known as Hayters Hill (West). It comprises 3 hectares of freehold land.

Andrew Johnston Big Scrub Nature Reserve

Andrew Johnston Big Scrub Nature Reserve (22.5 ha) is located 9km west of Bangalow and 2km south-west of the village of Eureka (see Map 6, page 10). It is bounded by Coopers Creek on the north-west side and by grazing land and macadamia growing.

Wilson Nature Reserve

Wilson Nature Reserve (27.2 ha) is located on the southern limits of the Lismore urban area (see Map 7, page 10). It is bounded by the Wyrallah Road, a water reservoir, urban dwellings and grazing land.

2.2.2 Significance of the Big Scrub Nature Reserves

The Big Scrub was once the largest continuous tract of sub-tropical rainforest in Australia and is estimated to have exceeded 75 000 hectares. It was situated mainly on a low basaltic plateau, part of the residual southern slope of the Mt. Warning shield volcano. Of the original 75 000 hectares only about 100 hectares or 0.13% remains as small, isolated remnants. This plan of management is for six important remnants of the Big Scrub. They are a sample of a number of similar remnants which occur in the district (Holmes 1987), all of which are highly significant for nature conservation and heritage conservation.

The clearing and habitation of the Big Scrub began around the 1840's with the arrival of the cedar getters. Shortly thereafter, farmers settled "selections". At the behest of Government, selections were cleared for agricultural purposes and as a consequence of these farming initiatives most of the forest had been removed by 1900. Initially, many of the selections were small and used for intensive agricultural activity which included the growing of maize and in some areas sugar cane. However, the fertility characteristics of the red basaltic soils did not support long term cropping and dairying became the significant rural industry of the Lismore-Ballina-Byron Bay area until its decline in the mid 1900's.

From early military Topographic Mapping, it seems that the majority of remnants have persisted in their present configuration for in excess of 50 years either as reserves not subject to clearing, or because of the benevolent attitude of private owners.

Glenn Holmes in his study of the Avifauna of the Big Scrub Region (1987) surveyed 32 sites which were widely dispersed throughout the area bounded by Lismore, Terania Creek, Mullumbimby, Byron Bay, Broken Head, Ballina and the Blackwall Range and were considered very generally as 'Big Scrub remnants'. Of these eleven are considered to be significant remnants; six of which are the group of nature reserves included in this plan of management. Other significant remnants are Hayters Hill (west), Rocky Creek, Boomerang Fails and Minyon Fails. Rocky Creek, Boomerang Fails and Minyon Fails lie on the Nightcap Range.

The long term protection of the rainforest remnant at Lumley Park at Alstonville by the local community, exemplifies the "cultural significance" of the Big Scrub to the residents of the sub-region. Similarly, other remnant stands have been protected for many years by trustees or by private land owners.

In both a local and regional context, rainforest conservation issues have dominated the nature conservation stage for over a decade. The simple but innate attraction of rainforests which stimulated the protection of places such as Lumley Park demonstrates how rainforests enjoy a cultural value which cuts across broad sectional interests.

Whilst not unique to the North Coast of New South Wales, the history of exploitation of the Big Scrub is, in both an historical and a contemporary context, of particular cultural significance.

The clearing of the Big Scrub was so rapid that little has been recorded about the plants which constituted this once enormous forest. While it may be described as having been predominantly a "White booyong alliance", this description fails to convey the tremendous diversity and variation in the plants that existed in the Big Scrub.

The importance of the Big Scrub Nature Reserves is summarised as follows:

For Nature Conservation

The Big Scrub Nature Reserves comprise six significant remnants of the Big Scrub (Planners North 1988). Thus they are important components of what remains of the once largest area of sub-tropical rainforest in Australia.

Each is floristically different and portrays different samples of Big Scrub vegetation.

Each contains rare and threatened plant species and communities.

Each is important as foci for rainforest plant dispersal in regrowth areas throughout the region.

Each is an important refuge for avifauna and contains remnant populations of other native animals.

For Cultural Heritage Conservation

The Big Scrub Nature Reserves demonstrate, by dramatic contrast with the surrounding rural lands, the changes wrought by European settlement on the whole lowland sub-tropical rainforest of the region.

They also provide evidence of previous landuses for recreation and transport.

They may provide evidence of Aboriginal use of the Big Scrub.

For Educational and Scientific Use

The Big Scrub Nature Reserves provide environmental education sites for the increasing population of the region and serve community interests in rainforest conservation issues.

The nature reserves are important scientific reference areas for the surviving native plants and animal communities of the Big Scrub and demonstrate human exploitation of the Big Scrub rainforest.

For Recreation and Aesthetics

Boatharbour, Victoria Park and Wilson Nature Reserves have a history of public recreation, and provide opportunities for picnicking and bushwalking in attractive rainforest settings. Davis Scrub, Hayters Hill and Andrew Johnston Big Scrub Nature Reserves have no formal recreational use.

The nature reserves are important and attractive components of the landscape and provide a contrast to the rural scene dominated by land modified for agriculture.

3. OBJECTIVES OF MANAGEMENT

The following general objectives relate to the management of nature reserves in New South Wales:

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

In addition to these general objectives, the following specific objectives also apply to the management of the Big Scrub Nature Reserves:

- the protection of the Big Scrub Nature Reserves as scientific reference areas which protect surviving natural heritage values of the former Big Scrub sub-tropical rainforest communities;
- the revegetation of areas of former rainforest in a manner consistent with established ecological principles of rainforest management;
- neighbours of the Big Scrub Nature Reserves will be encouraged to protect existing areas of rainforest on their lands and to participate in revegetation programs aimed at extending the area covered by sub-tropical rainforest;
- subject to the protection of the nature conservation values of the nature reserves, the use of the Big Scrub Nature Reserves for scientific research will be promoted;
- subject to the protection of the nature conservation values of the nature reserves, public appreciation and awareness of the importance of the Big Scrub sub-tropical rainforest will be promoted by encouraging educational use and providing appropriate facilities in Boatharbour, Victoria Park and Wilson Nature Reserves.

4. POLICIES AND FRAMEWORK FOR MANAGEMENT

This section contains the policies and framework for the management of the Big Scrub Nature Reserves together with relevant background information. Policies are summarised under the headings:

Natural Heritage;
Cultural Heritage; and
Use of the Areas.

The policies established in this plan of management will provide the framework for management consistent with anticipated resources available to the Service and community expectations for the next five to ten years.

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

4.1 NATURAL HERITAGE

4.1.1 Physiography

The area covered by the Big Scrub is a low volcanic plateau lying between 100 and 150 metres above sea level. The main soil types in the region are krasnozem and chocolate soils derived from Tertiary basalts. There are however, variations in both topography and soil types in the six areas now dedicated as the Big Scrub Nature Reserves.

Boatharbour Nature Reserve:

Boatharbour Nature Reserve is located on the Wilsons River floodplain with a small tributary creek flowing north-easterly through the nature reserve. The whole area is subject to periodic flooding from the Wilsons River and from Coopers Creek which lies to the north. Fluvial processes over many years have led to mixing of alluvial deposits with the underlying basalt soils.

Victoria Park Nature Reserve:

The gently sloping topography of Victoria Park Nature Reserve is typical of much of the Big Scrub country. No distinct drainage lines occur, but surface runoff eventually drains in a south-easterly direction into Tuckean Swamp, 2 km to the south. The nature reserve is located on krasnozem soil.

Davis Scrub Nature Reserve:

Davis Scrub Nature Reserve slopes gently to the west and is located on krasnozem soil. There is a fairly distinct drainage line running from east to west that originates near the middle of the forest.

Hayters Hill Nature Reserve:

Hayters Hill Nature Reserve has a steep and rocky aspect exposed to the north-east and is located on soil of mixed origin. Besides the krasnozems there are also chocolate soils and Quaternary soils formed from sedimentary and metasedimentary rocks.

Andrew Johnston Big Scrub Nature Reserve:

The Andrew Johnston Big Scrub Nature Reserve slopes to the north-west and north-east and is bordered by Coopers Creek on its north-west edge. A small, ephemeral creek runs north near the eastern edge of the nature reserve which is located on krasnozem soil.

Willson Nature Reserve:

Wilson Nature Reserve has a steeply sloping east to south aspect. Two major drainage lines run towards the east and join to form a small creek. The soils are chocolate rather than krasnozem.

Wilson Nature Reserve is potentially subject to concentrated storm-water run-off and pollutants from urban developments within its catchment.

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

Service support for the catchment management committee for the Richmond River is seen as an important means of protecting water quality.

Policies

The soils of the six nature reserves will be protected. All land management and development will incorporate effective soil erosion and sedimentation control principles and practices.

The Service will seek the cooperation of environmental, planning authorities in ensuring that any developments proposed in the vicinity of Wilson Nature Reserve will not adversely affect water quality within the nature reserve.

The Service will continue to participate in and support total catchment management committees.

Action

Water quality within Wilson Nature Reserve Park will be monitored in conjunction with Lismore Council.

4.1.2 Native Plants and Animals

The Big Scrub remnants are the sole relics of the former sub-tropical rainforest communities and afford valuable insights into what the rainforest may have been like before clearing. The remnants are also important as foci for the dispersal of rainforest seeds to nearby regrowth areas.

Soil type is the dominant factor in determining plant species composition, although other physiographic factors including size, shape, aspect and degree of disturbance of the remnant community are also important considerations.

Andrew Johnston Big Scrub and Boatharbour Nature Reserves have been listed as containing Lowland Rainforest on Floodplain in the NSW North Coast bioregion by the NSW scientific committee. This threatened ecological community has been listed under Part 3 Schedule 1 of the Threatened Species Conservation Act 1995.

The Big Scrub Nature Reserves have been established to protect remnant areas of sub-tropical rainforest which are either fire-free or subject to very infrequent fire. Rainforest margins are, however, susceptible to fire damage; particularly to the cumulative effects of frequent fires. Fires may change the composition of rainforests and favour those species which are resilient to fire such as eucalypts. Since the primary objectives of management for this group of nature reserves is the conservation of rainforest and to revegetate areas of disturbed land with rainforest species, it is an aim of management to totally exclude fire from the nature reserves.

The Big Scrub Nature Reserves comprise a number of rainforest sub-alliances and each of these includes rare and endangered plant species. Typical of small vegetation remnants, the nature reserves are particularly susceptible to weed invasion.

The control of introduced plants and increasing the size of the remnants are important programs in ensuring their long term survival.

Maintaining the genetic integrity of the different rainforest remnants is an important consideration in conserving their value as scientific reference areas for the Big Scrub. Plant material used for the revegetation of individual sites will be collected and propagated from the specific site concerned.

The Big Scrub Nature Reserves are significant as a rich avifauna habitat. Locally, many species are highly dependant upon these rainforest remnants including species typically associated with open habitats.

Most bird species are highly mobile and unlikely to reside permanently within any one of the nature reserves. The protection of a system of remnant areas is however, essential for their continued survival in the district.

Fructivorous birds are among the most significant dispersal agents for rainforest plants and facilitate natural rainforest regrowth in the region.

The marbled frogmouth (*Podargus ocellatus*) is known to be resident at Wilson Nature Reserve. This bird is listed as vulnerable under Schedule 2 of the Threatened Species Conservation Act.

An as yet to be confirmed but reputable sighting of the double-eyed fig parrot (*Psittacutirostris diophthalma coxeni*) was made at Boatharbour in 1985. This is a significant record of an extremely rare bird which is listed as endangered under Schedule 1 of the Threatened Species Conservation Act but is thought to be extinct in the Big Scrub region.

Mammals recorded from the Big Scrub Nature Reserves generally include species not fully dependent upon rainforest habitat. Species such as the common ringtail possum (*Pseudocheirus peregrinus*) and the mountain brushtail possum (*Trichosurus caninus*) are widespread in the reserves and surrounding rural lands. The red-necked pademelon (*Thylogale thetis*) is found in Victoria Park and Davis Scrub and is dependent upon rainforest and adjacent grasslands and woodlands.

Microchiropteran bats are likely to inhabit all the Big Scrub Nature Reserves, including species listed as vulnerable under Schedule 2 of the Threatened Species Conservation Act. Information on these species is inadequate.

The grey-headed flying fox (*Pteropus poliocephalus*) forms ephemeral camps in Boatharbour and Davis Scrub Nature Reserves and may cause localized canopy damage. Grey-headed flying foxes are important as dispersal agents for rainforest plants. Also present in the nature reserves are black flying foxes (*P. alecto*) and little red flying foxes (*P. scapulatus*).

The management of flying foxes is the subject of a species management plan prepared by the Service. Flying foxes do not generally have a long term impact on roosting sites although little red flying foxes may have considerable short term impact but these are not as common on the north coast as other species of flying foxes.

Koalas (*Phascolarctos cinereus*) are known to range through the sclerophyll forest in Wilson Nature Reserve. The koala is also listed under Schedule 2 of the Threatened Species Conservation Act.

The ubiquitous black rat (*Rattus rattus*) and the house mouse (*Mus musculus*) are commonly recorded introduced species.

The herpetofauna includes a few species solely dependent upon the rainforest habitat such as the southern angle-headed dragon (*Gonocephalus spinipes*) and the skink *Ophioscincus truncatus*.

The southern angle-headed dragon is known to occur in Andrew Johnston Big Scrub Nature Reserve.

Records of *Ophioscincus truncatus* from various Big Scrub remnants show certain distinct morphological features from other populations of this species. It is possible that further study may separate these skinks into a taxonomic group of their own.

The introduced cane toad (*Bufo marinus*) has been recorded from Victoria Park, Boatharbour and Andrew Johnston Big Scrub Nature Reserves.

The invertebrate fauna of the Big Scrub Nature Reserves is poorly documented although it is known to include many rainforest dependent species. It is probable that many species are unique to the Big Scrub remnants. Two butterflies which are considered endangered, the regent skipper (*Euschemon rafflesia rafflesia*) and the Richmond birdwing (*Ornithoptera richmondia*) are known from several Big Scrub remnants. Each is dependant upon particular plant species for larval food.

Few animal species are in need of particular attention. The importance of monitoring the impact of grey-headed flying fox populations is recognized, as is the possible need for supplementary planting of larval food for the regent skipper. Further documentation of microchiropteran bats and the invertebrate fauna is necessary.

The only alien use of the Big Scrub Nature Reserves is a grazing licence for the paddock on the southern portion of Boatharbour Nature Reserve.

The plant communities of each nature reserve are discussed below.

Boatharbour Nature Reserve:

One hundred and ninety plant species have been recorded in Boatharbour Nature Reserve

The nature reserve is a sub-tropical rainforest described as a pepperberry-fig sub-alliance. It exhibits a classical three storey structure and includes many of the largest trees occurring in the Big Scrub remnants.

The reserve also includes an ecotone between the rainforest and a woodland community dominated by forest redgum (*Eucalyptus tereticornis*).

Austromyrtus fragrantissima and *Ochrosia moorei* are two endangered plant species listed under Schedule 1 of the Threatened Species Conservation Act which occur in Boat Harbour Nature Reserve. Plants occurring in the nature reserve and listed under Schedule 2 of that Act as vulnerable, include *Floydia praealta* and *Desmodium acanthocladum*.

Problem introduced plants which are addressed as a matter of priority include Madeira vine (*Anredera cordifolia*), wandering jew (*Tradescantia albiflora*), asparagus fern (*Protasparagus africanus*), broad-leaved and small-leaved privet (*Ligustrum lucidum* and *L. sinensis*) and some camphor laurel (*Cinnamomum camphora*) near the edges.

Reforestation is to be progressively undertaken in cleared areas. The existing licence for grazing will be progressively phased out as reforestation works are commenced.

Victoria Park Nature Reserve:

One hundred and fifty-two plant species have been recorded in Victoria Park Nature Reserve. The plant community on the nature reserve is a sub-tropical rainforest, white booyong sub-alliance with a classical three storey structure including many tall strangler figs (*Ficus watkinsiana* and *F. macrophylla*) as a feature.

Plants occurring in Victoria Park Nature Reserve and listed under Schedule 2 of the Threatened Species Conservation Act include *Baloghia marmorata*, *Macadamia tetraphylla* and *Floydia praealta*.

About half of the remnant is rainforest and a further quarter is under rainforest reforestation. The remainder of the nature reserve includes a picnic area and a cleared paddock proposed for rainforest reforestation work.

Victoria Park Nature Reserve lies immediately to the north-west of another minor remnant of Big Scrub rainforest at Meerschaum Vale. Both Victoria Park and this remnant of 3 hectares in area could be, with the co-operation of the landowner, joined by a corridor of regenerated rainforest.

Introduced plants are generally not a problem within Victoria Park Nature Reserve, although the control of asparagus fern requires priority attention. A number of introduced plants are affecting reforestation areas notably lantana (*Lantana camara*), broad-leaved privet, cassia (*Cassia coludeoides*), camphor laurel and various grasses (especially buffalo grass and kikuyu).

Davis Scrub Nature Reserve:

Davis Scrub Nature Reserve is a sub-tropical rainforest predominantly of a black bean-red bean sub-alliance. One hundred and thirty-four plant species have been recorded.

Two large Moreton Bay figs (*Ficus macrophylla*) stand out as emergents. There are also exceptionally large specimens of small-leaved doughwood (*Melicope micrococca*), red bean (*Dysoxylum mollissimum*) and rosewood (*Dysoxylum fraserianum*).

Species listed under Schedule 2 of the Threatened Species Act include *Syzygium hodgkinsoniae*, *Tinospora tinosporoides* and *Macadamia tetraphylla*. Other species of interest include *Archidendron muellerianum*, *Rhodamnia maideniana*, *Acronychia baeuerlenii* and a species of *Quassia*.

An area within the rainforest near its western side was cleared and is now overgrown with lantana and mixed rainforest species.

Weed species include lantana, camphor laurel, broad-leaved privet, asparagus fern, and some bamboo. These generally occur as edge species and around the cleared site.

Hayters Hill Nature Reserve:

Hayters Hill Nature Reserve is a dry rainforest dominated by emergent hoop pines (*Araucaria cunninghamii*). One hundred and twenty-five plant species have been identified.

Species listed under Schedule 2 of the Threatened Species Act include *Floydia praealta*, *Owenia cepiodora*, *Syzygium hodgkinsoniae* and *Tinospora tinosporoides*. Other species of interest include *Archidendron muellerianum* and *Acronychia baeuerlenii*.

Weed species include small leaved privet, lantana, and camphor laurel.

There is little scope for reforestation work here as it is essentially all forested. However, there is further potential for corridor planting between this reserve and the nearby Hayters Hill (west) remnant.

Andrew Johnston Nature Reserve:

Floyd (1977) describes this rainforest as the "finest and most impressive remnant of the Big Scrub". It includes 4 distinct rainforest types, combining elements typical of the Victoria Park, Davis Scrub and Booyong remnants, together with dry rainforest elements on the western edge.

Over 170 species of trees, shrubs and vines have been identified from this reserve. One species of native plant which occurs in Andrew Johnston Nature Reserve, *Ochrosia moorei* is listed on Schedule 1 of the Threatened Species Conservation Act as endangered. Species listed on Schedule 2 of the Threatened Species Conservation Act include *Desmodium acanthocladum*, *Syzygium hodgkinsoniae*, *Floydia praealta*, and *Tinospora tinosporoides*.

Other species of interest include *Archidendron muellerianum*, *Trichosanthes subvelutina* and *Milletia australis*.

Weed species include asparagus fern, camphor laurel, large and small leaved privets and Madiera vine.

Wilson Nature Reserve:

Wilson Nature Reserve is a large sample of dry rainforest remaining from the periphery of the Big Scrub. It is dominated by emergent hoop pines.

Part of the reserve is sclerophyll forest dominated by forest red gum and pink bloodwood (*E. intermedia*).

Over 190 species of plant have been recorded from Wilson Nature Reserve. One species of native plant which occurs in Andrew Johnston Nature Reserve, *Austromyrtus fragrantissima*, is listed on Schedule 1 of the Threatened Species Conservation Act as endangered. Species listed on Schedule 2 of the Threatened Species Conservation Act include *Desmodium acanthocladum* and *Tinospora tinosporoides*.

Other species of interest include *Archidendron muellerianum*, *Xeromphis* sp. and *Parsonsia lilacina*.

Numerous gaps in the rainforest and most of the understorey of the sclerophyll forest are dominated by lantana.

Lismore District has prepared pest plant species management plans for thirteen of the Big Scrub remnants including the six nature reserves. The preparation of these plans are part of a major project '**Rainforest Remnants Restoration and Rehabilitation: Plant Pest Species Survey and Prior Works Documentation**'. Each plan will record the non-native plant species present in the remnant and the major infestations are located on a site map. A descriptive profile of each of the listed pest plant species is being compiled, growth habit and dispersal mechanisms described and the impact of the pest plant species on the native vegetation assessed. On this basis pest plant species control priorities will be determined within an integrated and sustainable approach to regeneration.

A key program in the management of the Big Scrub Nature Reserves is the reforestation of cleared areas within each reserve. To maintain the genetic integrity of each reserve only plants propagated from seed collected from local sources in accordance with the Service's Field Management Policies will be used in reforestation programs.

Policies

Cleared lands will be revegetated and where possible the size of rainforest remnants will be expanded.

Rainforest remnants on the nature reserves will be linked where possible to nearby rainforest remnants by corridors of revegetated lands.

Only plant species endemic to the site being revegetated will be used in revegetation work. As far as possible plant material will be propagated from communities found within the area to be treated.

The management of fire in the Big Scrub Nature Reserves will aim to totally exclude fire.

Introduced plants will be controlled and where possible eliminated.

Native animal communities of the Big Scrub Nature Reserves will be protected through programs of habitat maintenance and enhancement.

Non-native animals will be controlled and, where possible, eliminated.

The Big Scrub Nature Reserves will be protected to the greatest extent possible from any impacts arising from the development and use of adjacent lands.

The natural condition of each nature reserve will be monitored.

Rainforest communities at Boatharbour and Davis Scrub will be protected from excessive impact of grey-headed flying foxes.

Domestic stock will be excluded from the rainforest remnants and reforestation areas.

The grazing of stock at Boatharbour Nature Reserve will be progressively phased out as revegetation work proceeds.

Actions

Rainforest restoration and rehabilitation programs for Andrew Johnston Big Scrub, Victoria Park, Boatharbour, Davis Scrub and Wilson Nature Reserves will be undertaken in accordance with the Rainforest Remnants Restoration and Rehabilitation Plan (1995a).

Seed collection programs will be undertaken at each reserve for reforestation programs.

The co-operation of neighbouring landholders will be sought in establishing rainforest vegetated corridors:

- between Hayters Hill Nature Reserve and the Hayters Hill (west) remnant; and
- between Victoria Park Nature Reserve and the Meerschaum Vale remnant.

Further surveys for microchiropteran bats in all the Big Scrub Nature Reserves will be encouraged.

Research into the invertebrate fauna of the Big Scrub Nature Reserves will be encouraged.

The feasibility of planting supplementary larval food for the regent skipper and the Richmond birdwing butterflies will be investigated.

The impact of grey-headed flying foxes on rainforest communities at Boatharbour and Davis Scrub will continue to be monitored.

Stock proof fences will be erected and maintained around each nature reserve.

The protection of the uncleared road reserve adjacent to Victoria Park will be sought.

4.2 CULTURAL HERITAGE

The Big Scrub Nature Reserves bear testimony to the exploitation and clearing of the large area of sub-tropical forest which existed until the beginning of this century. They are also significant in the history of rainforest conservation.

The Big Fig tree in Victoria Park was for many years a feature of local interest before its death in the early 1970's and subsequent collapse.

Cultural sites on the Big Scrub Nature Reserves are uncommon but include the following:

The wharf at Boatharbour;

A loggers' camp on Andrew Johnston Nature Reserve although no structures or artefacts have been recorded to date; and

Boundary and internal fencing.

There are no Aboriginal sites recorded in the Service's Aboriginal Site Register for the Big Scrub Nature Reserves. Nevertheless, Aborigines did traditionally use the rainforests of the Big Scrub and Wilson Nature Reserve may be associated with Aboriginal mythology.

Policies

The provisions of the Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (the Burra Charter) will guide management decisions regarding Aboriginal and historic places within the Big Scrub Nature Reserves.

The protection of cultural resources is secondary to the management of the sub-tropical rainforests of the Big Scrub Nature Reserves.

Any Aboriginal or other cultural sites discovered will be recorded in the appropriate Service register.

Research into the cultural values of the nature reserves will be encouraged.

Actions

On-site interpretation at Victoria Park, Boatharbour and Wilson Nature Reserves will incorporate information on the cultural values of the Big Scrub.

A conservation plan for the wharf at Boatharbour will be prepared.

An archaeological investigation of the loggers' camp at Andrew Johnston Big Scrub Nature Reserve will be undertaken.

The location of fences within each nature reserve will be recorded.

The location of grazing paddocks will be recorded prior to reforestation works.

4.3 USE OF THE AREAS

The Big Scrub group of nature reserves will be managed to ensure that their use, whether by the general public, special interest groups, the Service or other authorities is consistent with the Act and the objectives and policies of this plan of management.

Uses that may be consistent with the management of nature reserves include:

education and promotion of the area, the Service and the conservation of their natural and cultural heritage;

research; and

management operations by the Service and other authorities.

The extent to which these uses are appropriate to The Big Scrub Nature Reserves is indicated in the following sections.

4.3.1 Scientific Use

The purpose of scientific study in the Big Scrub Nature Reserves is to improve the Service's understanding of their natural heritage and the processes which affect them. Research will also establish the requirements for the management of particular species. Data and findings from research studies and surveys will be utilised in the management of the nature reserves. All six nature reserves lie in close proximity to Lismore and its wide range of tertiary education and research organisations and are therefore potentially important to research programs originating in that city.

The Big Scrub Nature Reserves are remnant areas of a once extensive but now very depleted ecosystem. As such the genetic/seed bank values of the remnants are of very high scientific importance.

The Service does not presently have the resources to undertake long term research subject to this plan in the nature reserves as proposed in this plan and relies upon work done by outside scientific institutions. As part of a strategy to encourage scientific use of the park a prospectus will be prepared as the basis for the involvement of scientists and research organisations in research in the Big Scrub Nature Reserves.

The need for research into management issues affecting the Big Scrub Nature Reserves has been identified in other sections of this plan. Research projects which require field study sites will require support from management in protection of those sites.

Policies

A prospectus will be prepared as a guide to preferred research projects in the Big Scrub Nature Reserves. Preferred topics will be those of direct relevance to management.

Service conducted research will aim to provide information addressing park management issues.

All research will be subject to Service policy and procedures for the granting of permits, conduct of research and the production of results. Research applications will be granted where:

- the research has the potential to facilitate the better management of the park; and
- the research does not conflict with the objectives of management for the nature reserves.

The Service will encourage survey work in the nature reserves with emphasis on updating information the Service's Environmental Resource Mapping System.

Actions

The prospectus will include as preferred research projects:

completion of the mapping of vegetation communities in the nature reserves and the establishment of a systematic baseline inventory of all reserves to form a basis for monitoring; a program of monitoring rainforest regeneration work;

additional surveys of native animals, particularly microchiropteran bats and invertebrates; habitat requirements of threatened native fauna and plants;

the impact of grey-headed flying foxes on rainforest communities at Boatharbour and Davis Scrub;

the management of pest species, particularly pest plant species ecology and eradication techniques;

an oral history of the Big Scrub Reserves;

Aboriginal use of the Big Scrub;

Non-Aboriginal use of the Big Scrub; and

visitor use impact.

The priority list for research projects will be amended and updated as required.

4.3.2 Promotion and Recreation Opportunities

Use of nature reserves is concerned with promotion of the appreciation and enjoyment of wildlife, natural environments and natural phenomena. Outdoor recreation opportunities catered for in nature reserves are limited and can only be considered appropriate where they do not conflict with the primary function of protecting features of nature conservation significance. Facilities will be provided in Boatharbour, Victoria Park and Wilson Nature Reserves to encourage the public to visit these areas and gain an awareness of the importance of all of the Big Scrub remnants, their protection and rehabilitation.

Communication with the public through interpretation and environmental education programs assists in the protection of natural features in the nature reserves and is a major aspect of managing public use. There is a strong expectation that information on the natural heritage of the Big Scrub will be readily available.

The following will apply to the management of public use in the Big Scrub Nature Reserves:

Victoria Park Nature Reserve:

Victoria Park Nature Reserve has an established picnic area and walking track together with no-barrier access facilities for disabled visitors and interpretive displays. These facilities will be maintained.

Boatharbour Nature Reserve:

Boatharbour Nature Reserve is the most accessible and generally obvious Big Scrub remnant and presents opportunities to improve public understanding and presentation of the conservation and cultural values of the Region.

Boatharbour Nature Reserve had visitor facilities constructed during the 1950's to the south of the river which were known locally as "Lions Park" and has a system of ad hoc tracks. Prior to dedication as a nature reserve, Lismore Council closed vehicle access to this area with steel barriers in an attempt to control vandalism. The facilities were not maintained and have since been removed. Vehicle access to the site of the former Lions Park from the busy Lismore-Bangalow Road is considered dangerous.

New facilities at Boatharbour Nature Reserve have been constructed on the northern side of the Wilsons River allowing the old Lions Park area to be reforested. The new facilities also permit a safer road access. The provision of access from the facilities on the northern side of the river to the main body of rainforest on the southern bank of the river will be assessed and may be undertaken if feasible and if public demand warrants such action.

The existing car park and much of the existing grassed areas within Boatharbour Nature Reserve will be revegetated to assist in ensuring

greater integrity and sustainability of the threatened ecological community (refer to section 4.1.2). The areas of rainforest are more ecologically sustainable if they can be allowed to amalgamate and enlarge. The car park will be relocated closer to the Lismore-Bangalow Road within the reserve near the existing eastern boundary fence.

Wilson Nature Reserve:

Wilson Nature Reserve has visitor facilities provided by the former Lands Department during the 1980's. The picnic facilities will be redesigned to appropriate Service standards.

No provision will be made for recreational use of Davis Scrub, Hayters Hill or Andrew Johnston Big Scrub Nature Reserves.

Policies

On site interpretation will be provided for visitors to Boatharbour, Victoria Park and Wilson Nature Reserves.

Limited, low key day use recreational opportunities consistent with the conservation objectives of this plan of management will be provided at Boatharbour, Victoria Park and Wilson Nature Reserves.

No facilities for recreational use of Davis Scrub, Hayters Hill or Andrew Johnston Big Scrub Nature Reserves will be provided.

Actions

Interpretation of reforestation work at Victoria Park will be extended and upgraded.

The no-barrier walkway at Victoria Park will be extended.

The car parking facilities in Boatharbour Nature Reserve will be relocated within the Reserve near the existing eastern boundary fence on the Lismore-Bangalow Road. The existing car park and majority of open grassed area will be rehabilitated with locally indigenous rainforest species.

With the exception of the walking track on the northern side of Wilson River all other tracks in Boatharbour Nature Reserve will be closed and rehabilitated.

The walking track and picnic facilities within Wilson Nature Reserve will be redesigned and relocated where necessary.

Discovery ranger guided activities at Boatharbour, Victoria Park and Wilson Nature Reserves will be undertaken during periods of peak visitation.

5. PLAN IMPLEMENTATION

This plan of management is part of a system of management developed by the National Parks and Wildlife Service. The system includes the National Parks and Wildlife Act, management policies, established conservation and recreation philosophies and strategic planning at corporate, regional and district levels.

The orderly implementation of this plan will be undertaken within the annual programs of the Service's Lismore District. Priorities, determined in the context of district and regional operational planning, will be subject to the availability of necessary staff and funds and to any special requirements of the Director-General or Minister.

District programs are subject to on-going review, within which, works and other activities carried out at the Big Scrub Nature Reserves are evaluated in relation to the objectives laid out in this plan.

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

Section 81 of the Act requires that this plan shall be carried out and given effect to, and that no operations shall be undertaken in relation to the nature reserves 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:

ACTIVITY	PLAN REFERENCE
HIGH PRIORITY'	
Encourage conservation of the other Big Scrub reserve	2.2.2
Monitor water quality within Wilson in conjunction with local government.	4.1.1
Seek the co-operation of environmental planning authorities to ensure that any developments will not adversely affect water quality within Wilson Park.	4.1.1
Erect and maintain stock proof fences around each nature reserve	4.1.2
Seek the protection of the uncleared road reserve adjacent to Victoria Park	4.1.2
Phase out grazing at Boatharbour as reforestation works progress	4.1.2

Continue rainforest reforestation and regeneration programs at Victoria Park, Boatharbour, Davis Scrub and Wilson.	4.1.2
Control non-native plants as required.	4.1.2
Establish a monitoring program for each area	4.1.2
Encourage surveys of microchiropteran bats in all the Big Scrub Nature Reserves.	4.1.2
Continue to monitor the impact of canopy damage by grey-headed flying foxes at Boatharbour and Davis Scrub.	4.1.2
Record the location of fences within each reserve	4.2
Record the location of grazing paddocks in each reserve prior to the commencement of reforestation works.	4.2

MEDIUM PRIORITY

Undertake seed collection programs at each nature reserve for reforestation programs	4.1.2
Encourage research into invertebrate fauna	4.1.2
Control non-native animals as required.	4.1.2
Incorporate the cultural values of the Big Scrub as part of the on-site interpretation at Victoria Park, Boatharbour and Wilson.	4.2
Prepare a conservation plan for the wharf at Boatharbour	4.2
Initiate an archaeological investigation of the loggers' camp at Andrew Johnston Nature Reserve.	4.2
Encourage research into the cultural values of the reserves	4.2
Upgrade the interpretation of reforestation work at Victoria Park	4.3
Extend the no-barrier walkway at Victoria Park	4.3
Redesign the walking track and picnic facilities within Wilson Nature Reserve.	4.3
Provide seasonal ranger guided activities at Boatharbour, Victoria Park and Wilson during periods of peak visitation.	4.3
Close other tracks in Boatharbour Nature Reserve.	4.3

LOW PRIORITY

- Seek the co-operation of neighbours in establishing rainforest corridors between Hayters Hill Nature Reserve and the Hayters Hill (west) remnant, and between Victoria Park Nature Reserve and the Meerschaum Vale remnant. 4.1.2
- Investigate the potential for planting supplementary larval food for the regent skipper and the Richmond birdwing butterflies. 4.1.2
- Investigate the feasibility of providing access across the Wilsons River at Boatharbour Nature Reserve. 4.3

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