

# **INGALBA, BIG BUSH AND PUCAWAN NATURE RESERVES**

## **PLAN OF MANAGEMENT**

**NSW National Parks and Wildlife Service**

**Part of the Department of Environment and Conservation (NSW)**

**May, 2006**

**This plan of management was adopted by the Minister for the Environment on 3<sup>rd</sup> May 2006.**

### **Acknowledgments**

This plan of management is based on a draft prepared by staff at Riverina Region of the Parks and Wildlife Division (NPWS), Department of Environment and Conservation.

The Department would like to thank all who attended the neighbour and stakeholder meetings. The Department recognises the valuable contribution your comments have made in the planning process.

For additional information or enquiries about any aspect of this plan, contact the NPWS Griffith office on 6966 8100.

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## FOREWORD

Ingalba, Big Bush and Pucawan Nature Reserves are located on southwestern slopes of New South Wales. Ingalba Nature Reserve is situated 10 kilometres west of Temora and Pucawan Nature Reserve a further 6km west. Big Bush Nature Reserve is 15 kilometres northwest of Temora. All three reserves are located within Temora Shire.

The reserves are part of only 1.07% of the NSW South Western Slopes Bioregion within conservation areas. As well as being important remnants within a poorly reserved Bioregion, the reserves contain several regionally significant plant species and provide habitat for a number of threatened animal species.

The *National Parks and Wildlife Act 1974* requires that a plan of management be prepared for each nature reserve. A plan of management is a legal document that outlines how the area will be managed in the years ahead.

A draft plan of management for Ingalba, Big Bush and Pucawan Nature Reserves was placed on public exhibition for three months from 22<sup>nd</sup> June to the 1<sup>st</sup> October 2004. The exhibition of the plan of management attracted 8 submissions, which raised 8 issues. All comments received on the draft plan of management were carefully considered before adopting the final plan.

This plan of management establishes the scheme of operations for Ingalba Nature Reserve, Big Bush Nature Reserve and Pucawan Nature Reserve. In accordance with Section 73B of the *National Parks and Wildlife Act 1974* this plan is hereby adopted.

**Bob Debus**  
**Minister for the Environment**

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## **1. MANAGEMENT CONTEXT**

### **1.1 Legislative and policy framework**

The management of Nature Reserves in NSW is in the context of the legislative and policy framework, primarily the *National Parks and Wildlife Act 1974* (NPW Act), the *Threatened Species Conservation Act 1995* and the policies of the National Parks and Wildlife Service (NPWS). The matters to be considered in the preparation of the plan of management are listed in Section 72AA of the NPW Act. NPWS policies relate to nature conservation, cultural heritage conservation, recreation, commercial use, research, and communication.

Other legislation, international agreements and charters may also apply to the management of the area. In particular, the *Environmental Planning and Assessment Act 1979* (EPA Act) requires the assessment and mitigation of environmental impacts of any works proposed in this plan.

A plan of management is a statutory document under the NPW Act. Once the Minister has adopted this plan, no operations may be undertaken within Ingalba, Big Bush and Pucawan Nature Reserves except in accordance with the plan. The plan will also apply to any future additions to these reserves. Where management strategies or works are proposed for the reserves or any additions that are not consistent with the plan, an amendment of the plan will be required.

### **1.2 Management purposes and principles**

Nature reserves are reserved under the NPW Act to protect and conserve areas containing outstanding, unique or representative ecosystems, species, communities or natural phenomena.

Nature reserves are to be managed to:

- Conserve biodiversity, maintain ecosystem functions, and protect geological and geomorphological features and natural phenomena;
- Conserve places, objects, features and landscapes of cultural value;
- Promote public appreciation, enjoyment and understanding of the reserve's natural and cultural values; and
- Provide for appropriate research and monitoring.

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

## **2. THE PLANNING AREA**

### **2.1 Location, reservation and regional setting**

Ingalba, Pucawan and Big Bush Nature Reserves (collectively referred to herein as 'the reserves') are located on the south-western slopes of New South Wales, between the towns of Temora and Aria Park.

Ingalba Nature Reserve (4013.5 ha) lies 10 kilometres west of Temora on the Burley Griffin Way, and was gazetted in three stages. On the 17<sup>th</sup> July 1970, 3,440.5 ha. of the

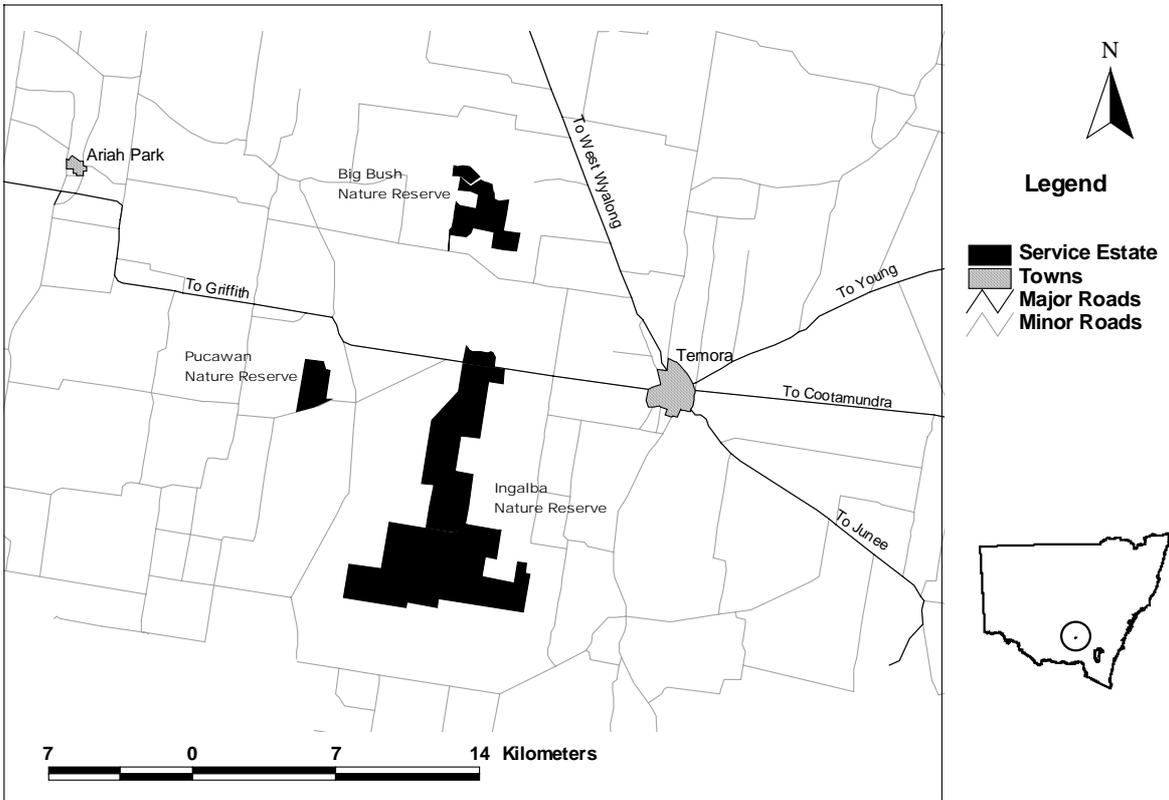
former Temora State Forest was gazetted, and further additions followed: the dedication on the 1<sup>st</sup> October 1976 (16.19 ha) of the former Trigonometrical Reserve at Wharrun Trig, and on the 7<sup>th</sup> January 1983 (556.8 ha) following the acquisition of private land.

Ingalba Nature Reserve is intersected by and excludes the Burley Griffin Way (Griffith–Temora Road) and an easement through the southern part of the reserve east from Kellows Lane.

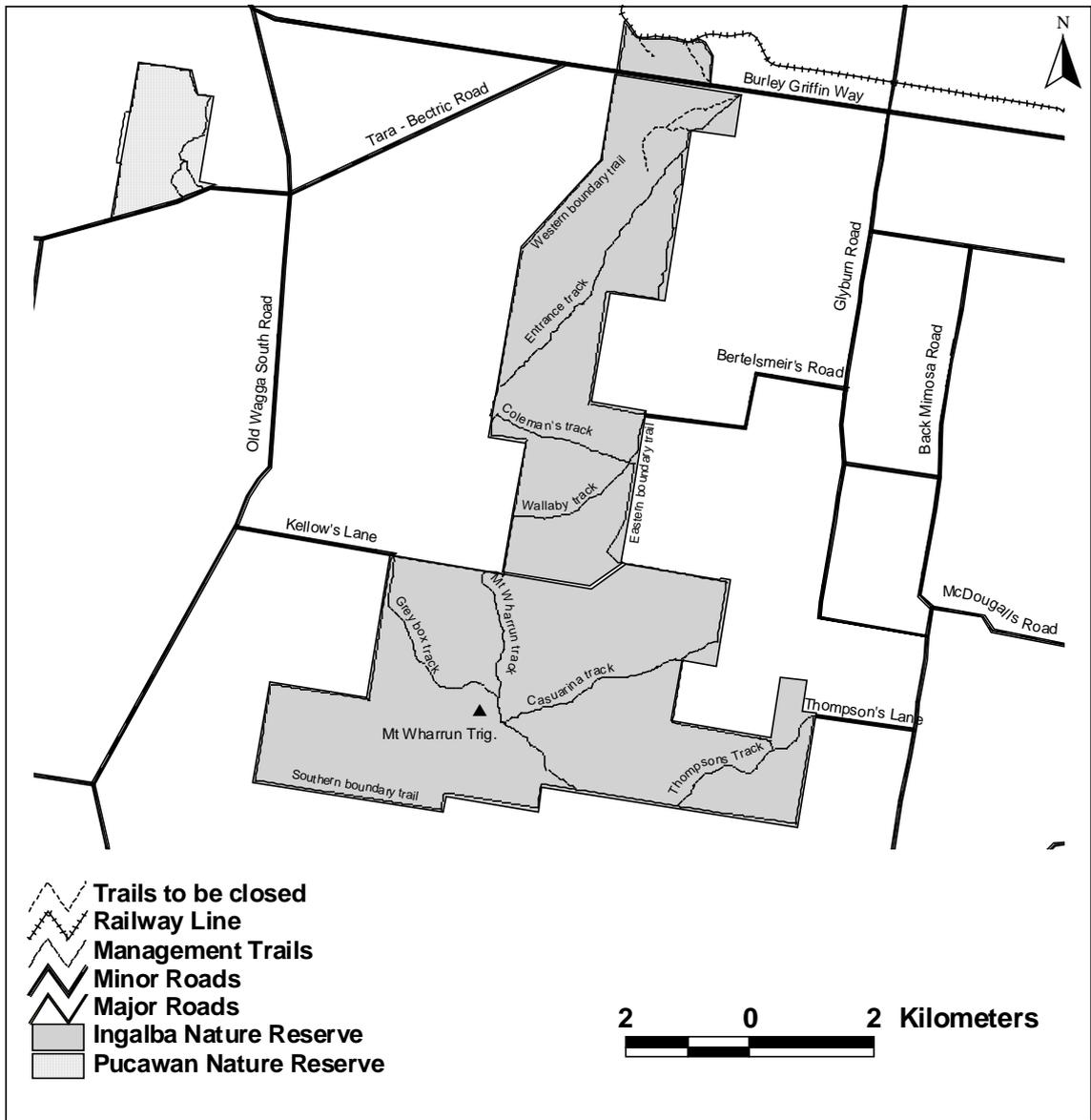
Pucawan Nature Reserve (274 ha) is a further 6 km west on the Coolamon Road, and was gazetted on the 11<sup>th</sup> March 1988. Prior to gazettal the area was vacant Crown land, part of which was proclaimed as a Rifle Range.

Big Bush Nature Reserve (640 ha) is 15 km north-west of Temora on Thanowring Road, 7 km north of Ingalba Nature Reserve, and was gazetted in four stages. On 23 November 1984 the 42.09 ha. of Crown land gazetted as a Native Flora and Fauna Reserve was revoked and proclaimed as Big Bush Nature Reserve. Adjoining private land was purchased and gazetted on the 31<sup>st</sup> January 1986 (67.68 ha.), 30<sup>th</sup> October 1987 (98.63 ha.) and on the 1<sup>st</sup> October 1999 (431.53 ha.).

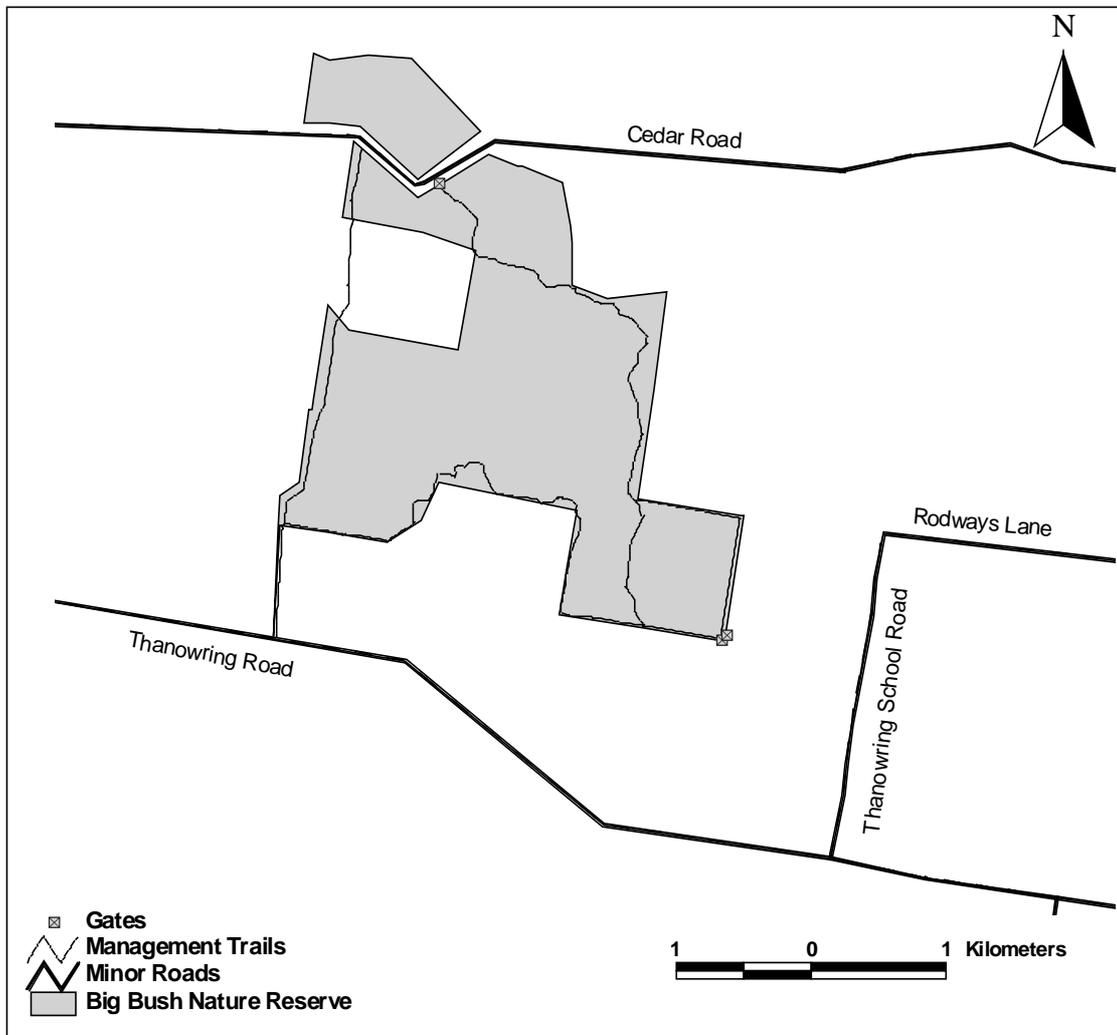
The reserves were subject to a range of past land uses, from logging as state forest (Ingalba Nature Reserve); a rifle range, quarrying and an illegal rubbish dump (Pucawan Nature Reserve); firewood cutting and timber for fence posts prior to a native flora and fauna reserve (Big Bush Nature Reserve). Today all three are significant woodland fragments in an agricultural landscape dominated by sheep grazing and dryland cropping (especially for wheat). The reserves are linked by corridors of vegetation in adjacent private land and along roads and Travelling Stock Routes.



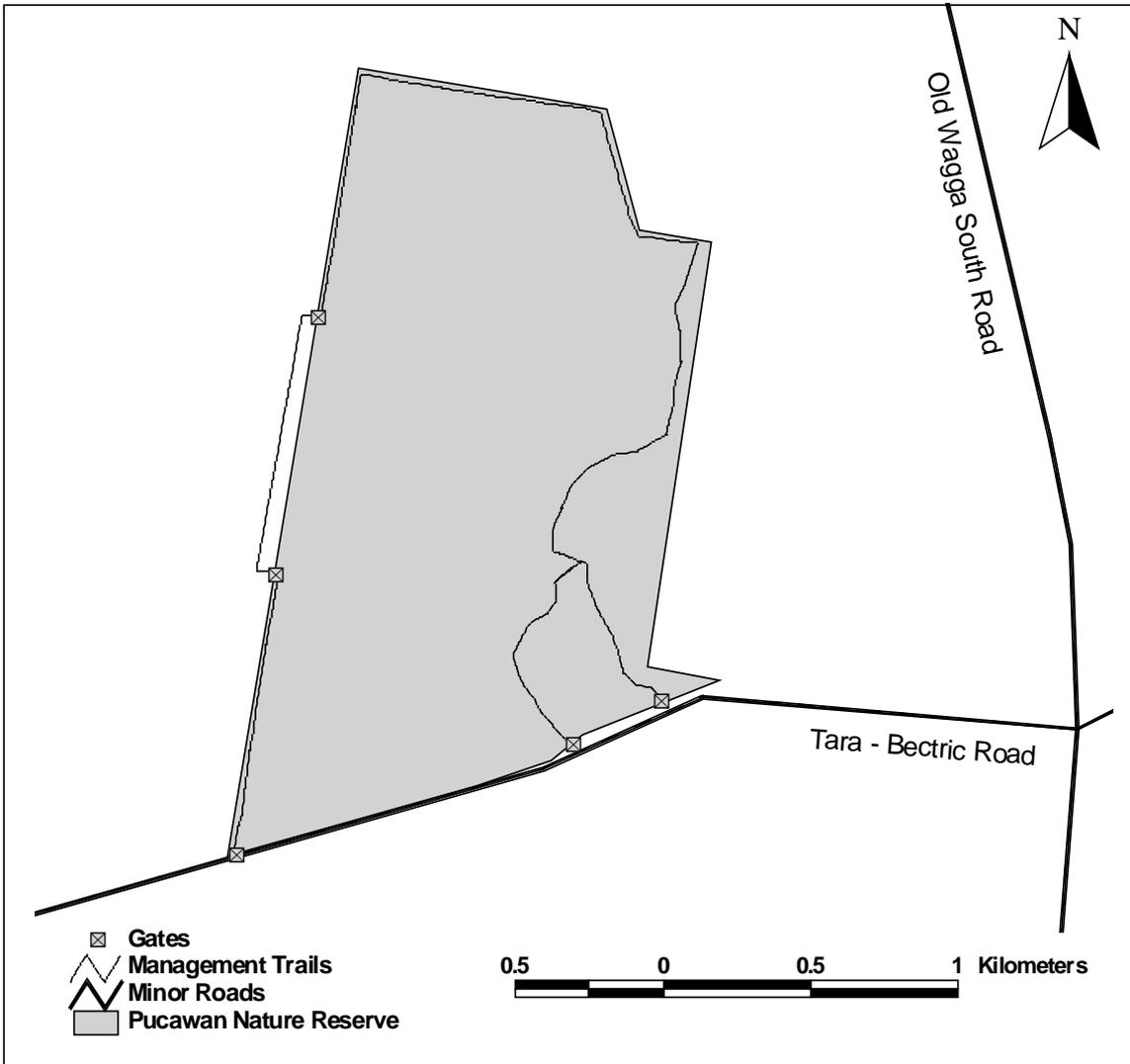
**Map 1: Locality of Ingalba, Big Bush and Pucawan Nature Reserves**



**Map 2: Ingalba Nature Reserve**



**Map 3: Big Bush Nature Reserve**



**Map 4: Pucawan Nature Reserve**

### 3. VALUES AND MANAGEMENT DIRECTIONS

#### 3.1 Values of the area

The reserves lie within the gently undulating terrain of the NSW South Western Slopes Bioregion. In an agricultural landscape dominated by sheep grazing and dryland cropping, all three reserves are significant remnants of woodland and dry heath. The reserves have high conservation value in a region where extensive clearing for agriculture makes such remnant vegetation rare. The Bioregion is one of the most poorly represented in the conservation reserve system. Only 86, 634 hectares, or 1.07% is set aside in conservation reserves (Western Riverina Regional Vegetation Committee, 1999).

The reserves are linked by corridors of vegetation on adjacent private land and along roads and Travelling Stock Reserves.

The most important conservation values are outlined below. More detailed information is provided in Section 4.

#### **Summary statement of significance:**

Ingalba, Big Bush and Pucawan Nature Reserves are of regional conservation significance in protecting:

- excellent examples of open box and ironbark woodlands, as well as dry heathlands with low open woodland species;
- several regionally significant plant species; and
- habitat for native animals, including a number of threatened species, migratory and nomadic birds, and reptile species.

#### 3.2 Management directions

The reserves will be managed to protect existing plant and animal communities, and to provide opportunities for research and educational use. Major efforts will be directed towards:

- fire planning to maintain the biodiversity of the reserves while meeting broader obligations for protection of life and property;
- continued research to expand knowledge of ecological processes and management prescriptions that maintain or enhance species diversity;
- control of introduced plant and animal species;
- liaison with neighbours for cooperative implementation of pest control and broader management programs to promote reserve values; and
- evaluation and identification of features and values of Aboriginal heritage significance.

## 4. CONSERVATION OF NATURAL AND CULTURAL HERITAGE

### 4.1 Geology and landform

The reserves comprise of flat to gently undulating terrain at a slight elevation above the surrounding land. Ingalba Nature Reserve has the most varied topography, containing small drainage lines, and with elevations from 315m to 402m at Mt Wharrun. The other reserves are of slightly lower altitude.

The landscape is characterised by a complex system of sedimentary, volcanic and igneous rocks of the Lachlan Fold Belt. Pucawan Nature Reserve and the southern part of Ingalba Nature Reserve have an Upper Ordovician geology of quartzite, shale, slate, phyllite and schist. There is an indistinct boundary with the Upper Silurian geology predominant in Big Bush and Ingalba Nature Reserves. These areas consist of sandstone, shale, siltstone, slate, conglomerate and limestone, with some volcanics.

Abundant but poorly preserved fossil graptolites are found in a disused quarry in Pucawan Nature Reserve. These fossils (an extinct group of oceanic colonial organisms) have been dated from the late Ordovician period.

The soils are of intermediate loamy texture. Crest soils are mostly shallow, with broken shales and siltstone present on the surface. On the gentle slopes and flats, deposition of alluvial materials has produced deeper, dark brown soils. The surrounding cleared land supports rich crops on red-brown earths and red earth soils.

Minor erosion is present in gullies.

#### Desired outcome

- Erosion is minimised.

#### Strategies and Actions

- Erosion and run-off control works, as well as rehabilitation and stabilisation measures, will be undertaken where necessary on eroded gullies and management trails.
- All works will be undertaken in a manner that minimises erosion.

### 4.2 Native plants

Two distinct vegetation communities occur on the reserves: tall open woodland and low open woodland with dry heath. These communities are considered regionally significant due to their remnant status.

The tall woodland vegetation is dominated by mugga ironbark (*Eucalyptus sideroxylon*) and western grey box (*Eucalyptus microcarpa*). It also supports white cypress pine (*Callitris glaucophylla*) on lower slopes, with black cypress pine (*Callitris endlicheri*) common on upper slopes and ridges. Shrubs include quandong (*Santalum acunation*), native cherry (*Exocarpus cupressiformis*), rough wattle (*Acacia aspera*), bent-leaf wattle (*A. genistifolia*), hakea wattle (*A. hakeoides*), and wedge-leaf hopbush (*Dodonaea cuneata*).

The mugga ironbark - western grey box woodland community was considered to be inadequately conserved in NSW and vulnerable to further loss by Benson in 1989. As there has been little addition to the area conserved since that time, this is still the case.

Dry heathland or low open woodland is found on ridgetops and exposed upper slopes. This community is characterised by *Allocasuarina diminuta*, with scattered scribbly gum (*Eucalyptus rossi*) and Dwyer's mallee gum (*E. dwyeri*). There is frequently a dense shrub layer with common species being heath myrtle (*Calytrix tetragona*), urn heath (*Melichrus lanceolatus*), daphne heath (*Brachyloma daphnoides*) and rusty spider flower (*Grevillea floribunda*).

Big Bush Nature Reserve contains green mallee (*Eucalyptus viridis*). This mallee species has a restricted range in NSW and is poorly represented in conservation reserves. The reserves are three of only four reserves known to conserve Cootamundra wattle (*Acacia baileyana*) as an endemic species.

Whilst no plant species listed under the *Threatened Species Act 1995* or Rare or Threatened Australian Plants (ROTAP) have been recorded, twelve plant species are considered regionally significant due to limited distribution (Porteners 2001).

To protect native vegetation, some burning may be needed to provide the conditions required for germination and growth of some species eg. *Goodia*, *Daviesia* and *Dillwynia* spp.

### **Desired outcome**

- Native vegetation will be managed to:
  - Maintain or achieve floristic and structural diversity;
  - Conserve regionally significant plant species; and
  - Maximise habitat values for those native animal species which depend upon the reserves, in particular for conservation of threatened species.

### **Strategies and Actions**

- Work with neighbours and Catchment Management Authorities to encourage conservation of remnant native vegetation in the vicinity of the reserves.
- Encourage the establishment and maintenance of vegetation corridors on adjacent crown and private land, with particular focus on linking the three nature reserves.
- Encourage research into the fire ecology of plant species, and if required conduct limited-sized ecological burns to regenerate those plants needing fire to reproduce.

### **4.3 Native animals**

The vegetation communities of the reserves provide a range of habitats for native fauna. Seventeen animal species listed under the *Threatened Species Act 1995* have been recorded on the reserves (see Table 1). Known resident species include the Gilbert's whistler (*Pachycephala inornata*), barking owl (*Ninox connivens*), superb parrot

(*Polytelis swainsonii*), turquoise parrot (*Neophema pulchella*) and diamond firetail (*Stagonopleura guttata*).

A number of declining eastern woodland birds also occur, including the hooded robin (*Melanodryas cucullata cucullata*), grey-crowned babbler (*Pomatostomus temporalis temporalis*) and black-chinned honeyeater (*Melithreptus gularis gularis*). The painted honeyeater (*Grantiella picta*) is often present in spring. Autumn and winter flowering eucalypts, especially mugga ironbark, occasionally attract the endangered swift parrot (*Lathamus discolor*), and on rare occasions regent honeyeaters (*Xanthomyza phrygia*).

Malleefowl (*Leipoa ocellata*) were once present at Ingalba and Big Bush Nature Reserves, but individuals or active breeding mounds have not been observed for over twenty years and it is considered to be locally extinct.

Seven amphibians, 12 reptiles, 16 mammals (including 8 species of bats) and 164 native bird species have been recorded from the reserves (NPWS Wildlife Atlas).

**Table 1 Threatened fauna species recorded from Ingalba, Big Bush and Pucawan Nature Reserves.**

Species	Conservation Status	Status on Reserves
<b>Bush Stone-curlew</b> <i>Burhinus grallarius</i>	Endangered	Rare visitor
<b>Major Mitchell's Cockatoo</b> <i>Cacatua leadbeateri</i>	Vulnerable	Vagrant
<b>Purple-crowned Lorikeet</b> <i>Glossopsitta porphyrocephala</i>	Vulnerable	Vagrant
<b>Painted Honeyeater</b> <i>Grantiella picta</i>	Vulnerable	Regular spring migrant
<b>Swift Parrot</b> <i>Lathamus discolor</i>	Endangered	Regular winter migrant
<b>Malleefowl</b> <i>Leipoa ocellata</i>	Endangered	Locally extinct
<b>Square-tailed Kite</b> <i>Lophoictinia isura</i>	Vulnerable	Unclear-possible regular migrant
<b>Hooded Robin</b> (south-eastern form) <i>Melanodryas cucullata cucullata</i>	Vulnerable	Resident
<b>Black-chinned Honeyeater</b> (eastern subspecies) <i>Melithreptus gularis gularis</i>	Vulnerable	Regular winter visitor
<b>Turquoise Parrot</b> <i>Neophema pulchella</i>	Vulnerable	Resident
<b>Barking Owl</b> <i>Ninox connivens</i>	Vulnerable	Resident
<b>Gilbert's Whistler</b> <i>Pachycephala inornata</i>	Vulnerable	Resident
<b>Superb Parrot</b> <i>Polytelis swainsonii</i>	Vulnerable	Regular visitor
<b>Grey-crowned Babbler</b> (eastern subspecies) <i>Pomatostomus temporalis temporalis</i>	Vulnerable	Resident
<b>Diamond Firetail</b> <i>Stagonopleura guttata</i>	Vulnerable	Resident
<b>Regent Honeyeater</b> <i>Xanthomyza phrygia</i>	Endangered	Rare visitor

(Conservation Status is as listed under *Threatened Species Conservation Act, 1995*.)

The reserves are connected by narrow vegetation corridors allowing movement of some fauna species between the three areas.

### **Desired Outcomes**

- Habitat will be maintained.
- Priority will be given to management of habitats for conservation of threatened species and those species dependent upon the reserves.
- Structural diversity and habitat values will be restored in areas subject to past logging.

### **Strategies and Actions**

- Undertake targeted fauna surveys in the reserves focussing on threatened species.
- Implement measures included in recovery plans for threatened fauna species where relevant.
- Encourage the establishment and maintenance of vegetation corridors on both crown and privately owned land in conjunction with various conservation departments and interest groups to provide habitat corridors.

## **4.4 Cultural heritage**

Cultural heritage includes both Aboriginal and non-Aboriginal history and associated activities and works. It comprises important sites, structures and relics that may have aesthetic, historic, scientific and social significance to present and future generations.

The geology, landform, climate and plant and animal communities of the area, plus location, have determined use by humans. Main forms of past disturbance include clearing (especially in southern portions of Ingalba and Big Bush Nature Reserves), sheep grazing, and logging for fences and firewood. Mugga ironbark, grey box and white cypress pine have been extensively logged at Ingalba Nature Reserve. Regeneration since reservation has resulted in a progressive increase in vegetation density with significant tree and shrub regrowth.

Ingalba Nature Reserve contains disturbed areas relating to its logging past, including historical rubbish piles, trails and cleared areas. Quarrying and fire have also shaped the landscape. Pucawan Nature Reserve was formerly used as a quarry site.

The *NPWS Riverina Region Cultural Heritage Strategy (2002)* provides guidance on management of cultural heritage.

### **Aboriginal Heritage**

Knowledge of past use is limited. Scarred trees and open campsites are the only registered sites known in the area. Sites are likely to have been widespread throughout the reserves, but the ground has been disturbed by past land use such as logging. On lands adjoining Ingalba Nature Reserve, scattered stone artefacts have been found.

The reserves lie within the area occupied by the Wiradjuri people. Today Pucawan and Ingalba Nature Reserves lie within the area of the Narrandera Local Aboriginal Land Council, while Big Bush Nature Reserve is within the area of the Young Local Aboriginal Land Council.

### **Historic Sites**

All three reserves have previously had timber cut, especially Ingalba and Big Bush Nature Reserves. Timber was removed for many purposes, such as fencing posts, firewood, charcoal for farm forges, shed poles and railway sleepers. Today regrowth from tree stumps serve as reminders of this past use.

Subsidiary material, such as tins and bottles, has been left behind from logging activities and these are scattered throughout Ingalba Nature Reserve. Both Ingalba and Pucawan Nature Reserves also served as a depository for rubbish dumping by many generations of neighbouring farmers.

The Casuarina Track in Ingalba Nature Reserve is part of an old horse drawn vehicle route between Temora and Mimosa Station. A stock route runs between the two sections of Big Bush Nature Reserve along Cedar Road, formerly called Campbell's Stock Route.

Two small peaks in Ingalba Nature Reserve, Northcote and Mt Wharrun, were used for Trigonometric surveying and state surveying markers remain in these points.

Pucawan Nature Reserve was used as a rifle range in 1917, as a means to maintain rifle skills in the post-World War 1 period, and is still known locally as 'rifle butts hill'. A target mound, and shooting mounds at set distances from the target still remain.

### **Desired Outcome**

- Cultural features will be conserved and managed in accordance with their significance.

### **Strategies and Actions**

- All ground disturbance work will be preceded by a check for cultural features and a review of environmental factors (REF) will be prepared.
- The Narrandera and Young Local Aboriginal Land Councils will be consulted in all aspects of management of Aboriginal sites, places and values in areas under their jurisdiction.
- Site surveys of the reserves will be undertaken in conjunction with Local Aboriginal Lands Councils where possible.
- Rubbish present in the reserves prior to gazettal will remain in situ until an assessment of its cultural significance is made. Rubbish dumped subsequent to gazettal will be removed.
- The Pucawan rifle range site will not be actively managed, other than to control weeds or pests. It will be allowed to naturally revegetate.

## 5. PARK PROTECTION

### 5.1 Introduced species

#### Introduced plants

Weed infestations are concentrated in areas of previous disturbance, particularly in past grazing areas, and along current agricultural boundaries. The reserves contain limited discrete patches of weeds including Paterson's curse (*Echium plantagineum*) and horehound (*Marrubium vulgare*). Bridal creeper (*Myrsiphyllum asparagoides*) occurs along roadsides adjacent to Ingalba Nature Reserve. There have also been minor occurrences of bathurst burr (*Xanthium spinosum*), galvanised burr (*Scerolaena birchii*), saffron thistle (*Carthamus lanatus*) and of pasture species.

#### Introduced animals

Introduced animals occurring within the reserves include foxes, rabbits and cats. Feral goats and deer have been sighted occasionally in Ingalba Nature Reserve, but are not resident. The lack of permanent water sources in the reserves restricts the occupation of the reserve by feral animals.

#### Desired Outcome

- The impact of introduced species on native species and neighbouring lands will be minimised.

#### Strategies and Actions

- Programs to control introduced plant species will give priority to noxious weeds.
- The reserves will be regularly monitored for new infestations of noxious and significant environmental weeds, such as bridal creeper. Outbreaks will be treated promptly.
- The co-operation of other authorities and of neighbours will be sought in implementing weed and pest animal control programs and anticipating threats where appropriate.
- Where necessary, fencing agreements will be negotiated with neighbours to exclude livestock from the reserves (in accordance with NPWS Boundary Fencing Policy).

### 5.2 Fire management

Fire is a natural feature of the environment of the reserves and is essential to the survival of some plant species. Frequent or irregular fire, however, can cause loss of particular plant and animal species and communities. Fire can also damage fences and threaten assets on neighbouring land.

Fires in the reserves are rare; there have been two fires in Big Bush Nature Reserve in the last forty years and one known fire in the last eighty years at Ingalba Nature Reserve, which occurred in 1999 burning 35 hectares. Other ignitions of individual trees by lightning have occurred, but have been extinguished before developing into a fire.

No known cultural features have been identified as requiring protection from fire.

Neighbours and local bush fire brigades have expressed concerns about navigating around the trails in Ingalba in the event of fire. Neighbours and bush fire brigade representatives have recommended that trails in Ingalba Nature Reserve be signposted with the trail name.

The predominant opinion of the local community is in support of current fire management practice of no fuel reduction burns. This is because fuel levels in the ironbark / pine woodland are low, and because prescribed fire can result in the regeneration of shrub fuels such as *Cassinia* spp. and *Acacia* spp. However, disturbance by fire is required by some species for regeneration, especially peas such as *Goodia*, *Daviesia* and *Dillwynia* spp.

### **Desired Outcomes**

- Fire regime appropriate for conservation of plant and animal communities will be maintained.
- Persons and property will be protected from fire.

### **Strategies and Actions**

- All wildfire on the reserves will be suppressed.
- The NPWS will participate in the Temora/Bland Bush Fire Management Committee, and maintain co-ordination and co-operation with the Rural Fire Service, local RFS brigades and neighbours, with regard to fuel management and fire suppression.
- No prescribed burning will be undertaken in the reserves, unless for well justified ecological reasons, or for removal of hazards adjacent to fire trails.
- Monitoring of the January 1999 fire site will continue, and new sites established if further opportunities for research arise. Research into ecological effects of fire in the reserve will be encouraged.
- Trails in Ingalba Nature Reserve will be signposted at intersections with the trail names.
- Current fire trails will be maintained. Two short dead-end trails in the northern part of Ingalba Nature Reserve will be closed, as detailed in Section 9 and Map 2.
- Fire control guidelines will be prepared and listed for each reserve in the NPWS Griffith Area Incident Procedures.

## **6. VISITOR OPPORTUNITIES AND EDUCATION**

### **6.1 Involving the community**

The key to successful implementation of the management plan will be to have local community support. This is being achieved by ensuring the plan reflects the community's concerns through effective consultation during its development. Meetings have been held with the Friends of Ingalba, with bush fire brigade representatives, and with neighbours for feedback on management issues.

#### **Desired outcomes**

- Community appreciation of and support for the reserves values is maintained.
- There is a positive image of the reserves in the community.
- Damaging activities in the reserves are minimised and visitor enjoyment maximised.

#### **Strategies and Actions**

- The Friends of Ingalba group will be supported and membership encouraged.
- Reserve neighbours will be encouraged to protect habitat values on land adjoining the reserves. Local conservation initiatives such as conservation agreements, wildlife refuges and Landcare will be supported.
- Community liaison will be conducted in a range of forums on an ongoing basis, including district bush fire management committees, field days, and neighbour newsletters.

### **6.2 Visitor use and access**

Currently there is vehicle access to all reserves. The reserves are visited by small numbers for nature study activities such as bird watching. There are no visitor facilities on the reserve.

There are vehicular entry points into Ingalba Nature Reserve off the Burley Griffin Way, Kellows Road, Thompsons Track, and Bertelsmeirs Lane, accessing a network of trails used for fire and other management purposes. The trail along the eastern boundary of the reserve north of Burley Griffin Way is required for public access and will be managed as a public road. Additional tracks have developed in the reserve due to illegal activities such as wood collecting, and dumping of cars and rubbish. There are ongoing problems with these activities in Ingalba Nature Reserve.

Indiscriminate use of trail bikes has resulted in environmental impacts such as track formation and soil erosion. Of particular concern is the use of trail bikes on the track to Mt Wharrun trig. The track is steep and becoming deeply eroded from use by bikes.

Access to Pucawan Nature Reserve is from a minor side road off Old Wagga Road. Big Bush Nature Reserve is accessed from Cedar Road or a trail entering the reserve from the south from Thanowring Road. Fire management trails following the reserve boundaries can be accessed from these public roads.

Visitor use poses few management problems for Pucawan or Big Bush Nature Reserves. Low visitation of these reserves can be attributed to low use of adjacent public roads, and lack of knowledge of these reserves by the general public.

### **Desired Outcome**

- Visitor use is ecologically sustainable and in keeping with the purpose of nature reserves.

### **Strategies and Actions**

- Registered vehicles may use the road along the eastern boundary of Ingalba Nature Reserve north of Burley Griffin Way for general public access.
- Use of the reserves for low impact educational activities such as bush walking, nature observation and bird watching will be permitted.
- Public vehicular access will not be permitted on management trails in the reserves. Bicycles will be permitted on specified management trails.
- No facilities will be provided for visitors to the reserves.
- Park identification and visitor information signs will be maintained at all access points into the reserves and at the vehicle stopping area on Burley Griffin Way.
- Fencing along the Burley Griffin Way will be maintained to prevent trail bike and off road vehicular access into Ingalba Nature Reserve.
- Organised group visits may be permitted, subject to limits on numbers and/or other conditions as necessary to minimise impacts.
- No camping or fires will be permitted.
- Competitive activities will not be permitted.
- Visitor use and vehicular access will be monitored for impacts on the reserves. Parts of the trail system may be temporarily or permanently closed if visitor impacts are detrimental or for management or safety reasons.

## 7. RESEARCH AND MONITORING

Scientific study is needed to improve understanding of the reserves' natural and cultural heritage, the processes that affect them and the requirements for management of particular species.

The reserves are, on occasion, visited by school groups and universities. The reserve is also visited by bird watchers.

### Desired Outcome

- The reserves will be available and promoted for appropriate research and educational use.

### Strategies and Actions

- Priority will be given to research to improve knowledge of resources and to aid management. Priority research areas will include:
  - native plant and animal survey, especially rare and threatened species;
  - management requirements of significant flora and fauna species present;
  - fire ecology of the reserves;
  - monitoring of vegetation changes; and
  - surveys for Aboriginal and other cultural heritage sites.
- Research and educational groups may be permitted to drive on management trails in the reserve, by permission from NPWS Griffith office.
- Researchers will be required to provide research results to NPWS as a condition of their permit.

## 8. COMMERCIAL AND OTHER USES

### 8.1 Apiaries

There is a registered apiary site in Pucawan Nature Reserve. The European honeybee (*Apis mellifera*) can have adverse impacts on some native plants and animals (Paton 1996). NPWS policy on bee keeping allows existing sites to continue but does not allow any new or additional sites.

#### Strategies and Actions

- The existing apiary site may continue, but no new sites will be allowed.

### 8.2 Telstra easement

An underground Telstra Junction cable is located in the northern section of Ingalba Nature Reserve. All maintenance is the responsibility of Telstra.

#### Strategies and Actions

- All works with the potential to affect the Telstra junction cable (or by Telstra that might affect the reserve) must be undertaken in the presence of both a Ranger and Telstra representatives.

### 8.3 Vehicle rest bays

Truck stopping areas are located adjacent to Ingalba Nature Reserve on both sides of the Temora-Griffith Road. There are ongoing management issues associated with use of these rest bays. The reserve is being accessed for rubbish dumping and toilet stops, resulting in significant degradation. There is an identified shortage of truck parking areas with toilet facilities along this section of road.

RTA have been consulted over options for upgrading these rest bays to provide toilets, but have indicated this is unlikely due to funding restrictions. A vehicle rest area west of Ingalba Nature Reserve is currently being upgraded with toilets, which should help alleviate the problem.

#### Desired Outcome

- The vehicle rest bays are managed in a manner that will minimise degradation of the reserve.

#### Strategies and Actions

- Discussions with the RTA to mitigate impacts on the nature reserve of the vehicle rest bays located adjacent to Ingalba Nature Reserve will continue.

- Interpretive signs on the natural values of Ingalba Nature Reserve and on appropriate regulations relating to nature reserves will be provided at the rest bays, to enhance appreciation of the area.

#### **8.4 Neighbour access**

Some neighbours to the reserves have traditionally used the management trails for access to property. Neighbours have emphasised the importance of retaining this access.

##### **Desired outcome**

- Neighbours with no practical alternative means of access will be able to access their properties through the reserve.

##### **Strategies and Actions**

- Formal access agreements will be negotiated with neighbours requiring access through the south-eastern corner of Ingalba Nature Reserve and the neighbour with the inholding on the western side of Big Bush Nature Reserve.

## **9. NPWS MANAGEMENT FACILITIES AND OPERATIONS**

### **9.1 Vehicular trails**

The three reserves have a network of perimeter and internal trails. Most function effectively for access and management operations (pest control, access, and potentially for fire control) but some trails in Ingalba Nature Reserve are used predominantly for illegal activities such as rubbish and car dumping.

Trails are required for fence maintenance, fire management and weed control purposes. However, ongoing problems with wood cutting and dumping of rubbish and garden refuse are associated with vehicular access.

#### **Strategies and Actions**

- Maintain the trails shown on the maps in this plan for management purposes. Close and rehabilitate all other trails.
- Trails may be gated if necessary for management of the reserves.

### **9.2 Boundary fencing**

The reserve boundaries are fenced to exclude stock, to minimise wildlife access to neighbouring properties, and to prevent off-trail vehicle or trail bike access.

#### **Strategies and Actions**

- Boundary fencing will be maintained and upgraded as required, in accordance with the Service's Fencing Policy.

## 10. PLAN IMPLEMENTATION

This plan of management establishes a scheme of operations for Ingalba, Big Bush and Pucawan Nature Reserves. It will remain in force until amended or replaced in accordance with section 73B of the NPW Act. The plan is part of a system of management which includes the National Parks and Wildlife Act, management policies, established conservation and recreation philosophies, and strategic planning at corporate, directorate and regional levels. The latter may include development of related plans such as regional recreation plans, species recovery plans, fire management plans and conservation plans.

Relative priorities for activities identified in this plan are set out in the table below. These priorities are subject to the availability of necessary staff and funds, and to any special requirements of the Director-General or Minister. High priority activities are those considered imperative to achievement of the objectives and desired outcomes. They must be undertaken in the near future to avoid significant deterioration in natural, cultural or management resources. Medium priority activities are those that are necessary to achieve the objectives and desired outcomes but are not urgent. Low priority activities are desirable to achieve management objectives and desired outcomes but can wait until resources become available.

The environmental impact of proposed activities will be assessed at all stages in accordance with established environmental assessment procedures. If the impacts of any activity proposed in this plan are found to be unacceptable, the activity will not be undertaken or it will be modified so as to comply with the environmental assessment.

### Strategies and Actions

- Undertaken an annual review of progress in implementing this plan of management.
- Undertake an assessment after 5 years of the effectiveness of managing Ingalba, Big Bush and Pucawan Nature Reserves in accordance with this plan and of the degree of success in achieving the plan's objectives and desired outcomes. Base the evaluation on the monitoring programs set out in this plan and any others that may be developed.

### ACTIVITIES

High Priority	Plan Ref
• Trails in Ingalba Nature Reserve will be signposted at intersections with the trail names.	5.2
• Fire control guidelines for the reserves will be prepared.	5.2
• Park identification and visitor information signs will be maintained at all access points to the reserves.	6.2
• The trails shown on the maps in this plan will be maintained for management purposes. All other trails will be closed and rehabilitated, including the two short dead-end trails in the northern part of Ingalba Nature Reserve.	5.2 & 9.1

- Noxious weeds will be controlled and the reserves will be regularly monitored for new infestations of noxious and significant environmental weeds. Outbreaks will be treated promptly. 5.1
- The co-operation of other authorities and of neighbours will be sought in implementing weed and pest animal control programs and anticipating threats where appropriate. 5.1
- Community liaison will be conducted in a range of forums on an ongoing basis, including district bush fire management committees, field days and neighbour newsletters. 5.2 & 6.1

### **Medium Priority**

- Undertake targeted fauna surveys in the reserves focussing on threatened species. 4.3
- Implement measures included in recovery plans for threatened fauna species where relevant. 4.3
- The Narrandera and Young Local Aboriginal Land Councils will be consulted on management of Aboriginal sites, places and values. 4.4
- Formal access agreements will be negotiated with neighbours requiring access through the reserves. 8.4
- Negotiate fencing agreements where necessary with neighbours. 5.1 & 9.2
- Fencing along the Burley Griffin Way will be maintained to prevent trail bike and off road vehicular access into Ingalba Nature Reserve. 6.2
- Erosion and run-off control works, as well as rehabilitation and stabilisation measures, will be undertaken where necessary on eroded gullies and management trails. 4.1
- Visitor use and vehicular access will be monitored for impacts on the reserves. 6.2
- The Friends of Ingalba will be supported. 6.1

### **Low**

- Work with neighbours and Catchment Management Authorities to encourage conservation of remnant native vegetation in the vicinity of the reserves. 4.2 & 6.1
- Encourage the establishment and maintenance of vegetation corridors on adjacent land, with particular focus on linking the three nature reserves and providing habitat corridors. 4.2 & 4.3

- All ground disturbance work will be preceded by a check for cultural features and a review of environmental factors will be prepared. 4.4
- Site surveys of the reserves will be undertaken in conjunction with Local Aboriginal Lands Councils where possible. 4.4
- Rubbish present in the reserves prior to gazettal will be assessed for its cultural significance. Rubbish dumped subsequent to gazettal will be removed. 4.4
- Monitoring of the January 1999 fire site will continue and new sites established if further opportunities for research arise. Research into the ecological effects of fire in the reserve will be encouraged. Conduct limited-sized ecological burns to regenerate those plants needing fire to reproduce. 4.2 & 5.2
- Discussion with the RTA to mitigate impacts on the reserve of the vehicle rest bays located adjacent to Ingalba Nature Reserve will continue. 8.3

## REFERENCES

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