



Environment,
Climate Change
& Water



Curracabundi Wilderness Assessment Report

NOVEMBER 2010



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SUMMARY

Wilderness areas are the most pristine areas in NSW. They form an essential component of the National Reserve System and will be important for mitigating the impacts of climate change on biodiversity.

The *Wilderness Act 1987* provides a mechanism for NSW to identify where these areas are and, for selected lands, to ensure they are declared and managed in a way which protects their wilderness values. The NSW Department of Environment, Climate Change and Water (DECCW) administers this Act.

Under the *Wilderness Act 1987*, wilderness is those lands which are:

- substantially unmodified by humans
- of sufficient size to retain their natural values and
- capable of providing opportunities for solitude and appropriate self-reliant recreation.

Lands found to meet the criteria in the Act are **identified** as wilderness. Wilderness identification is a statement that the area contains wilderness values and does not affect the types of activities that may be legally conducted on these lands. Wilderness is identified by the Director General of DECCW.

Some identified wilderness areas are eligible for wilderness **declaration**. These are identified wilderness areas that are suitable to be permanently managed and protected as wilderness after consideration of several factors including tenure, community and stakeholder comment, land management requirements, and policy and legislative constraints. Declared wilderness must be managed in a way that will maintain its wilderness values. Wilderness provides opportunities for unique, low impact recreational activities but higher impact activities such as recreational use of motor vehicles and horse riding are not permitted. Wilderness is actively managed to prevent and control fire, pests and weeds consistent with all DECCW national parks and other reserves.

This report documents the wilderness assessment of an area known as Curracabundi on the north coast of NSW located between Gloucester and Walcha.

Curracabundi was assessed in response to proposals made in 2005 and 2006. The assessment area incorporates DECCW reserves and freehold land. All Crown lands, including Crown leasehold and State forest, have been excluded from the assessment in accordance with the *Forestry and National Parks Estate Act 1998*.

The Curracabundi wilderness assessment area occupies steep gorge country on the Great Dividing Range, linking the Northern Tablelands with the plains of the North Coast. The area forms an important part of the Manning River catchment, the main water supply for the Greater Taree region. Vegetation is highly varied and includes subtropical and dry rainforest, old-growth moist eucalypt forest and heath.

The Curracabundi wilderness assessment area supports some of Australia's most iconic and endangered marsupials, including the brush-tailed rock-wallaby and spotted-tailed quoll. The Area contains a number of Aboriginal cultural heritage sites as well as homesteads, huts and other evidence of European history.

The Curracabundi wilderness assessment found much of the area has been logged at varying intensities, and clearing has occurred in the major river valleys. This land use history has resulted in a patchwork of varying levels of disturbance across the assessment area. However, the majority of Curracabundi remains in a substantially

unmodified state, and the more disturbed areas have a high recovery potential due to the overall large size of the reserves and their current management regime. The area offers a range of opportunities for self-reliant recreation and solitude.

An area of 38,500 hectares has been found to support wilderness values and to meet the criteria for wilderness identification under the *Wilderness Act 1987*. This area was identified as wilderness by the Director General of DECCW on 17 November 2010. This area is comprised of 95% DECCW reserves and 5% freehold. No leasehold, State forest or other Crown land has been identified.

An area of 34,600 hectares has been recommended for declaration as wilderness. This area is entirely on DECCW estate. **No freehold or leasehold is proposed for wilderness declaration.** A number of recreational facilities remain outside of the proposed wilderness, including Woko Camp Ground, Wrights Hut Camp Ground, Myall Creek Camp Ground, Christies Hut and Karamea Homestead. These locations provide bases from which to explore the proposed wilderness. The Bicentennial National Trail is outside of the proposed wilderness so that horse riding remains permissible along this route. These exclusions ensure a range of recreational opportunities remain throughout the region. Those features of highest conservation value, including core habitat for the brush-tailed rock-wallaby are within the proposed Curracabundi Declared Wilderness.

Routine management activities, including fire prevention, pest control, and management of historic heritage, will continue within Curracabundi Declared Wilderness.

Declaring Curracabundi Wilderness will ensure the area is managed to protect its highly natural state in perpetuity.

This report is being exhibited to encourage public comment on the areas that should be declared wilderness and protected under the *Wilderness Act 1987*.

What is in this report?

This report is divided into four main sections:

Section 1 describes the proposals received and how the Curracabundi assessment area was determined and defined.

Section 2 summarises the wilderness assessment, the process of community consultation and presents the Curracabundi Identified Wilderness.

Section 3 describes the factors considered in delineating the potential declarable boundary including land tenure, regional wilderness significance and social and economic factors.

Section 4 describes the proposed Curracabundi Declared Wilderness for which public comment is sought. Included are any known issues that may affect the final determination of areas for wilderness declaration.

Section 5 discusses the management of declared wilderness in relation to access, cultural heritage, recreation, fire management and introduced species.

NOTE:

Maps in this assessment report are indicative only. For detailed boundary locations and reference points, please refer to topographic maps on display at Parks and Wildlife Group regional offices throughout the exhibition period, and on the DECCW website.

All area figures are rounded to the nearest 100 hectares.

Making a submission regarding wilderness

This Wilderness Assessment Report has been prepared for public comment. Stakeholders are now invited to express their views on which parts of the identified wilderness (that is, those areas found to support wilderness) should be declared and managed as wilderness. Comment is invited on the potential social, economic and reserve management consequences, both positive and negative, that wilderness declaration may have.

The Report has been publicly released following the formal identification of Curracabundi Identified Wilderness by the Director General of the NSW Department of Environment, Climate Change and Water (DECCW).

The Wilderness Assessment Report contains maps showing two boundaries:

- areas already identified as wilderness by the Director General, DECCW
- areas proposed for wilderness declaration.

Identified wilderness areas, as defined by the *Wilderness Act 1987* (the Act), must be:

- substantially unmodified by humans
- of sufficient size to retain their natural values and
- capable of providing opportunities for solitude and appropriate self-reliant recreation.

Declared wilderness areas are identified wilderness areas that are suitable to be permanently managed and protected as wilderness after consideration of several factors, including tenure, initial community and stakeholder inputs, policy and legislative constraints.

DECCW is seeking comment about the proposed declaration areas presented in Section 4 of this Report, which includes a map. All parts of the wilderness declaration proposal are DECCW reserves. No freehold or leasehold is included in the proposed wilderness declaration.

Any final declared wilderness areas may be different to the draft proposal presented in this document.

Comment is invited on the social, economic and reserve management consequences (positive and negative) that wilderness declaration may have.

The NSW Government is committed to considering all views on what should be declared wilderness and what should not. In considering these views, emphasis will be placed on those issues relevant to the area under consideration and those comments which are supported by facts or evidence. You may be contacted by DECCW in order to gather further information about your submission.

Submissions received in response to this Report and any earlier submissions received in the course of the assessment will be considered.

Submissions:

- can be typed or handwritten and should include the name of the organisation (if applicable) a contact name, address and signature
- should be concise and clear

- should state whether you agree or disagree with any statements in the text, giving your reasons and sources of information, and suggesting alternatives to deal with any issue with which you disagree.

DECCW's review of the submissions and recommendations on wilderness declaration will be written up in a report. This report is considered by the Minister for Climate Change and the Environment in making a final wilderness decision, and is also made available to the public.

Make sure your submission is posted before the exhibition period closes on 17 December 2010.

Sending your submission

Remember:

- the closing date for submissions is 17 December 2010.
- DECCW's recommendations to the Minister will be based on issues, not on the numbers of people supporting an issue or claim
- submissions should be supported by relevant evidence and facts.

You should send your submission to:

Curracabundi Wilderness Assessment
Director North East
Department of Environment, Climate Change and Water
Locked Bag 914
Coffs Harbour NSW 2450

Privacy

Information you provide will only be used for this wilderness assessment process. Your submissions will be held and used by DECCW in accordance with the *Privacy and Personal Protection Information Act 1998*.

DECCW will allow public access to submissions made in response to the *Curracabundi Wilderness Assessment Report* to enhance transparency in government decision making. Your submission will be publicly accessible for a period of two years after a final wilderness decision has been made by the Minister.

You may request that your personal details such as your name and address be kept confidential. This information will then be masked out prior to any public access being given. Those who request to see the masked out details will need to apply for access under the *NSW Government Information (Public Access) Act 2009*.

Further information

For full details regarding the wilderness assessment process and treatment of submissions please refer to DECCW Wilderness Assessment Guidelines (DECC 2008) available at:

<http://www.environment.nsw.gov.au/parktypes/HowWildernessIsProtected.htm>

You may request a hard copy of these Guidelines by telephoning DECCW on 1300 361 967 or writing to DECCW at:

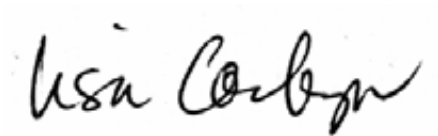
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Wilderness identification by the Director General

I, Lisa Corbyn, Director General of the Department of Environment, Climate Change and Water, having considered the findings and recommendations contained in the *Curracabundi Wilderness Assessment Report* identify as wilderness the area described in this report and shown by a red line in Figure 6 of this report, in accordance with section 6 of the *Wilderness Act 1987*, exclusive of any Crown-timber lands covered by an Integrated Forestry Operations Approval within this area.

A handwritten signature in black ink that reads "Lisa Corbyn". The signature is written in a cursive style with a large initial 'L' and 'C'.

Lisa Corbyn
Director General

Date: 17 November 2010

ACKNOWLEDGEMENTS

The NSW *Wilderness Act 1987* provides for the assessment, identification, declaration and management of wilderness in NSW. The NSW Department of Environment, Climate Change and Water is responsible for administering this Act. This assessment has been conducted by staff from the Department's Biodiversity Assessment Unit, Environment Protection and Regulation Group in North East Branch. Additional information has been provided by Area staff of the Parks and Wildlife Group.

CONTENTS

SUMMARY	I
What is in this report?	ii
Making a submission regarding wilderness	iii
Sending your submission.....	iv
Privacy	iv
Further information	v
Wilderness identification by the Director General.....	vi
ACKNOWLEDGEMENTS	VII
1 INTRODUCTION	1
1.1 The wilderness program	1
1.2 Wilderness legislation and policy	1
1.3 History of the proposal	4
1.4 Description of the assessment area.....	7
2 WILDERNESS ASSESSMENT	20
2.1 Community consultation.....	20
2.2 Wilderness assessment methods	21
2.3 Results of the wilderness assessment.....	25
2.4 Curracabundi Identified Wilderness	32
3 CONSIDERATION OF SOCIAL, ECONOMIC AND MANAGEMENT FACTORS	35
3.1 Land tenure.....	35
3.2 Social and economic significance	36
3.3 Competing land uses within reserves	37
4 PROPOSED WILDERNESS DECLARATION AREA.....	40
4.1 Proposed Curracabundi Declared Wilderness for public comment	40
4.2 Suitable boundary	40
5 MANAGEMENT OF DECLARED WILDERNESS	43
5.1 Roads, tracks and trails in declared wilderness.....	43
5.2 Management of Aboriginal and historic heritage.....	43
5.3 Recreation in declared wilderness	44
5.4 Raising awareness.....	44
5.5 Fire.....	44
5.6 Introduced species.....	45
6 ABBREVIATIONS	46
7 TERMINOLOGY	46
8 REFERENCES	47

APPENDIX 1 WILDERNESS NATURALNESS ASSESSMENT METHODS	49
Problems associated with previous data	49
Updating the existing wilderness quality layer: remapping	49
Refinements from CRA methods	50

LIST OF FIGURES

Figure 1.Process of identifying and declaring wilderness.....	3
Figure 2.Location map	6
Figure 3.National parks and other DECCW reserves in the wilderness assessment area.....	8
Figure 4.NSW wilderness network.....	10
Figure 5.Wilderness quality within the Curracabundi wilderness assessment area	26
Figure 6.Curracabundi Identified Wilderness.....	33
Figure 7.Proposed Curracabundi Declared Wilderness	42

LIST OF PLATES

Plate 1: Curracabundi Wilderness: View of Myall Creek gorge from Myall Creek Management Trail, Nowendoc National Park. Photo: Joanna Muldoon.	11
Plate 2: <i>Eucalyptus nobilis</i> tall open riparian forest in Nowendoc National Park. Photo: Lachlan Copeland.	12
Plate 3: <i>Allocasuarina ophiolitica/Xanthorrhoea glauca/Triodia scariosa</i> grassy heath in Watchimbark Nature Reserve. Photo: Sean Thompson.....	12
Plate 4: The endangered orchid <i>Euphrasia orthocheila</i> subsp. <i>orthocheila</i> in Nowendoc National Park. Photo: Lachlan Copeland.....	15
Plate 5: The barn owl <i>Tyto alba</i> from Watchimbark Nature Reserve. Photo Sean Thompson	15
Plate 6: Brush-tailed rock-wallaby <i>Petrogale penicillata</i> from Curracabundi National Park. Photo Sean Thompson.	17
Plate 7: White everlasting daisy <i>Helichrysum elatum</i> at sunset, Thunderbolts Way. Photo: Greg Steenbeeke.....	34

LIST OF TABLES

Table 1 Curracabundi wilderness proposals/nominations	5
Table 2 Rare or threatened plant species of the Curracabundi wilderness assessment area. (Source: DECCW YETI data base January 2010).....	14
Table 3 Threatened fauna species of the Curracabundi wilderness assessment area	16
Table 4 Disturbance types and corresponding naturalness categories used in the Curracabundi wilderness assessment.....	23
Table 5 Naturalness within the Curracabundi wilderness assessment area	25
Table 6 Naturalness within the Curracabundi Identified Wilderness	32
Table 7 Tenure within the Curracabundi Identified Wilderness	32

1 INTRODUCTION

Wilderness is arguably the world's fastest disappearing non-renewable natural resource.

Resource Planning and Development Commission, 2003.

1.1 The wilderness program

The wilderness program is a significant part of a larger national vision for nature conservation. At the core of this vision is the building of a National Reserve System, a network of parks and reserves which protect a diverse range of landscapes, plants and animals for future generations (Commonwealth of Australia 2009). The National Reserve System provides important ecosystem services such as maintenance of water quality and buffering against the effects of climate change. The reserve network currently covers more than 11% of Australia and includes state-managed national parks, Indigenous lands, and ecosystems protected by farmers on their private working properties. The National Reserve System continues to grow using a scientific framework which includes principles such as protecting a comprehensive and representative suite of plants, animals and communities, and supporting viable populations into the future (Commonwealth of Australia 2010).

Wilderness forms the most protected core of this reserve network in New South Wales (NSW). The wilderness program identifies those areas which are very large and in a substantially natural state, with a minimal history of disturbances such as clearing, logging, mining or fragmentation by roads or transmission lines. Because of their integrity, these areas are more resilient to many pests and weeds. Wilderness areas, due to their large size and diversity, often contain refuge areas for plants and animals during catastrophic or extreme events, such as severe wild fire or drought. Such refuges can then become sources to recolonise the landscape as other areas recover.

The wilderness program identifies where these areas remain in the State, and gradually adds them to national parks and reserves as the opportunity arises (via voluntary acquisition). Once reserved, these areas may be protected as wilderness under the *Wilderness Act 1987*. Wilderness areas are managed to minimise human impacts. Only low impact recreational activities and essential management activities such as fire management are permitted. These areas are where plants and animals have the greatest chance of survival in the long term - where they may continue to adapt and evolve.

Twenty-three years since the commencement of the NSW *Wilderness Act 1987*, the wilderness network now makes up approximately 2.5% of NSW and 30% of all national parks and reserves in NSW.

1.2 Wilderness legislation and policy

There are three key documents that relate to the assessment, identification and declaration of wilderness:

- *Wilderness Act 1987*
- National Forest Policy Statement
- Integrated Forestry Operations Approval.

1.2.1 The *Wilderness Act 1987*

Wilderness is a large area of land that, together with its native plant and animal communities, remains essentially unchanged by modern human activity. Wilderness forms the backbone of the NSW protected area network because it protects the most intact and undisturbed expanses of the landscape.

DECCW recognises that Indigenous people were the original custodians of country that we now regard as wilderness, and that their respect for the environment has safeguarded the values of these areas. Aboriginal cultural heritage forms an important part of the heritage values protected in wilderness landscapes.

The *Wilderness Act 1987* permits land to be identified, protected and managed as wilderness. Section 6 of the Act states that land can only be identified as wilderness if:

- the area is, together with its plant and animal communities, in a state that has not been substantially modified by humans and their works or is capable of being restored to such a state
- the area is of sufficient size to make its maintenance in such a state feasible
- the area is capable of providing opportunities for solitude and appropriate self-reliant recreation.

To effectively apply the principles and requirements of the Act, DECCW's Wilderness Assessment Guidelines ('the Guidelines') provide an agreed operational approach to the wilderness assessment process (DECC 2008). The Guidelines can be viewed on the web:

<http://www.environment.nsw.gov.au/parktypes/HowWildernessIsProtected.htm>

Wilderness is assessed in a number of steps (see Figure 1).

Any person or organisation may propose, or nominate, an area to be assessed for identification and declaration as wilderness.

The area is assessed against the wilderness criteria of naturalness, size and visitor opportunities. If the area meets these criteria it is **identified** as having wilderness values. Generally wilderness identification does not place any requirements on the management or use of the land and it is simply a statement that the area contains wilderness values. The one exception is that the Minister has a concurrence role in relation to some Crown leases over which a covenant applies, however this very rarely needs to be enacted.

DECCW then considers land tenure, land use, reserve design and protected area management principles. Using these factors, DECCW proposes which parts of the identified wilderness might be most suitable for **declaration**. Declared wilderness must be managed in a way which will retain its wilderness values. Wilderness is usually declared only within DECCW parks and reserves. Wilderness may also be declared on other tenures where a legally binding agreement is made under the *Wilderness Act 1987* or *National Parks and Wildlife Act 1974* between the landholder or manager and the Minister. Such agreements have rarely been entered into. Instead, wilderness is usually expanded through voluntary acquisition of freehold or leasehold land and through the transfer of public lands to DECCW.

DECCW seeks public comment on the land that should be declared wilderness and protected under the Act. A wilderness assessment report (such as this one) is provided to inform the public.

Following public exhibition, the wilderness proposal is reviewed in response to the issues and concerns raised in submissions. The proposal may be modified in response to submissions in situations where DECCW’s legislative responsibilities and conservation management objectives can also be accommodated. DECCW prepares a submission analysis and declaration report for the Minister for Climate Change and the Environment. This report recommends boundaries for wilderness declaration in the light of public submissions and other relevant information. The Minister considers the report when making a final decision about wilderness declaration.

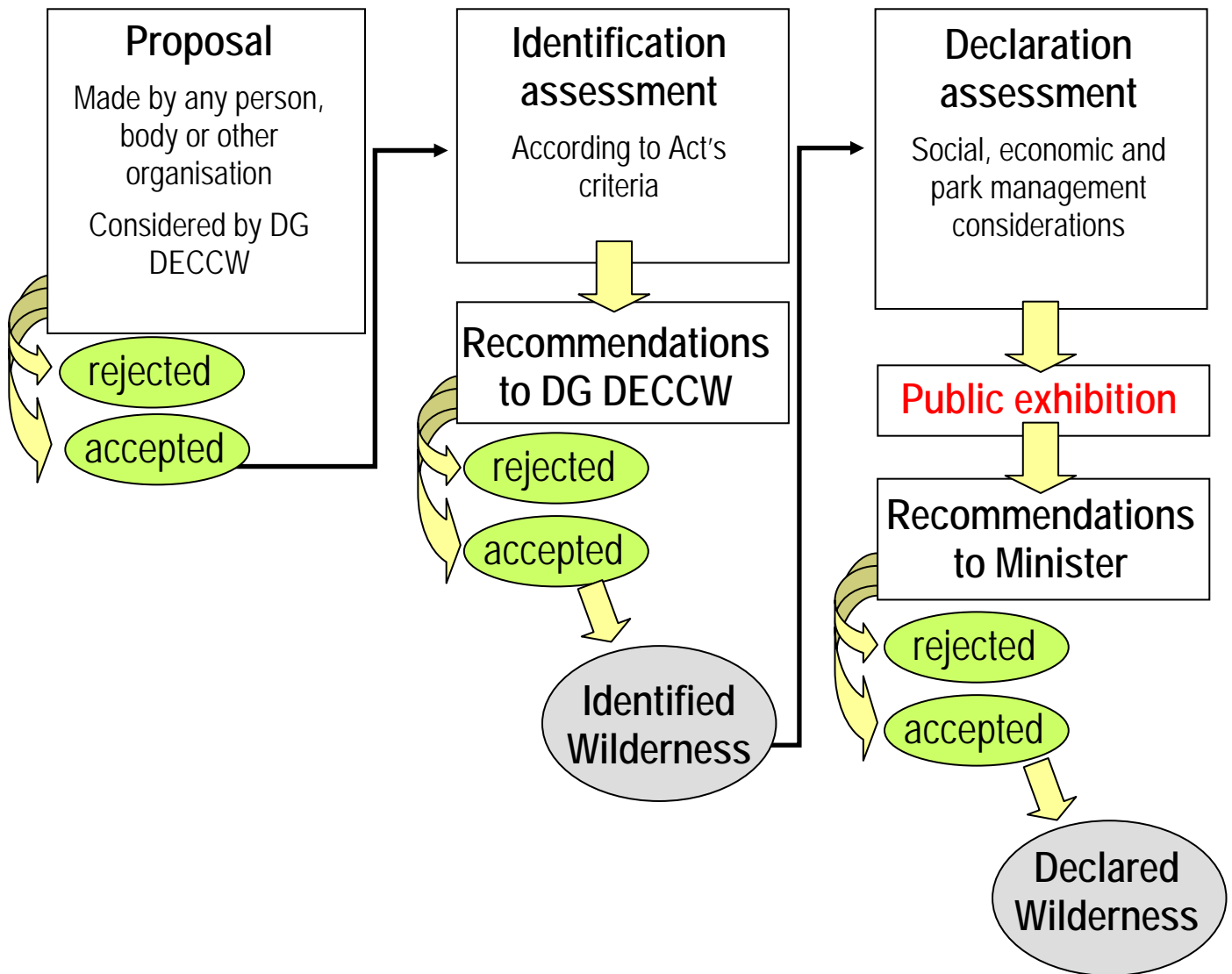


Figure 1. Process of identifying and declaring wilderness

This report represents the “Public Exhibition” stage of the wilderness process and documents the previous stages of wilderness assessment.

1.2.2 The National Forest Policy Statement

As well as fulfilling its obligations under the *Wilderness Act 1987*, the NSW Government is required to protect wilderness under the *National Forest Policy Statement (NFPS)* (Commonwealth of Australia 1992). The NFPS includes a commitment to developing a comprehensive, adequate and representative reserve system to protect biodiversity, and a strategy to protect old-growth forests and wilderness. The NFPS uses a definition of wilderness which is broadly consistent with the criteria for wilderness identification in NSW under the *Wilderness Act 1987*.

The NFPS specifically defines the need for the reserve system to protect old-growth forest and forested wilderness to reflect:

the significance of these areas to the Australian community because of their very high aesthetic, cultural and nature conservation values and their freedom from disturbance. (NFPS p11).

Nationally agreed criteria for implementing the NFPS were endorsed in 1997 by the Australian and New Zealand Environment and Conservation Council and the Ministerial Council for Forestry, Fisheries and Aquaculture (Commonwealth of Australia 1997).

Commitments to wilderness protection include:

- all reasonable effort should be made to provide for biodiversity and old-growth forest conservation and wilderness in the dedicated reserve system on public land
- ninety percent, or more if practicable, of the area of high quality wilderness that meets minimum area requirements should be protected in reserves.

1.2.3 Integrated Forestry Operations Approvals

The *Forestry and National Parks Estate Act 1998* (section 39) requires that an area in which forestry operations may be carried out (as authorised by an Integrated Forestry Operations Approval, or IFOA, made under the *Forestry and National Parks Estate Act 1998*) cannot be proposed, identified or declared wilderness under the *Wilderness Act 1987* or the *National Parks and Wildlife Act 1974*. Lands within the region which are subject to an IFOA include State forest and most Crown lands (including road reserves). These areas have been excluded from this wilderness assessment.

1.3 History of the proposal

1.3.1 The Curracabundi proposal

The Curracabundi wilderness assessment was initiated by a number of proposals made in 2005 and 2006 by two peak environmental organisations: Colong Foundation for Wilderness Ltd and National Parks Association of NSW (Table 1).

Part of the area proposed (covering much of Nowendoc National Park) has been previously assessed and was identified as wilderness in 2001 (NPWS 2001a). It was not possible to declare this area (Tuggolo) as wilderness in 2001 due to size and tenure issues which have since been resolved. This report considers Tuggolo as part of the larger proposed Curracabundi wilderness assessment area. A summary of the nominations made for the Curracabundi area is provided in Table 1 and the general location of these proposals is provided in Figure 2.

Table 1 Curracabundi wilderness proposals/nominations

September 1999	An area of 15,785 hectares in the Tuggolo area was proposed for assessment as wilderness by the North East Forest Alliance.
29 May 2001	The Director General of National Parks and Wildlife identified 7,987 hectares of land as Tuggolo Identified Wilderness under the <i>Wilderness Act 1987</i> .
31 August 2005	The National Parks Association of NSW proposed extensions to the Tuggolo Identified Wilderness.
17 February 2006	The Colong Foundation for Wilderness nominated an area of 15,760 hectares that included Woko National Park.
10 May 2006	Joint nomination received from the Colong Foundation for Wilderness and the National Parks Association of NSW to combine the Woko and Tuggolo nominations into a single unit known as 'Curracabundi'.

1.3.2 The Giro proposal

A number of wilderness proposals have been made for an area immediately east of Curracabundi. The area is known as Giro and includes Brett Nature Reserve and Barakee State Conservation Area. Two nominations were received in 2000 and the area was assessed in 2001 but found to be too disturbed to be identified as wilderness (NPWS 2001a). Additional nominations were received from the National Parks Association and the Colong Foundation in 2005 and 2006, covering a larger area than the 2000 nomination. In response, Giro was reconsidered by DECCW in 2006 and 2009. The Giro area contains substantial areas covered by the Integrated Forestry Operations Approval for Lower North East NSW. These areas may not be nominated or assessed as wilderness (section 39 of the *Forestry and National Parks Estate Act 1998*). DECCW found the remaining area to be of insufficient size and naturalness to be identified as wilderness. This area will not be assessed further.

1.3.3 Landholder and stakeholder consultation

Landholders and relevant stakeholders associated with the Curracabundi and Giro wilderness assessment areas have been contacted (by phone, letter or both) regarding the wilderness nominations and assessment process. The outcome of that consultation process is reviewed in Section 2.

Landholders affected by the Giro proposal have been notified that the Giro proposal has been rejected.

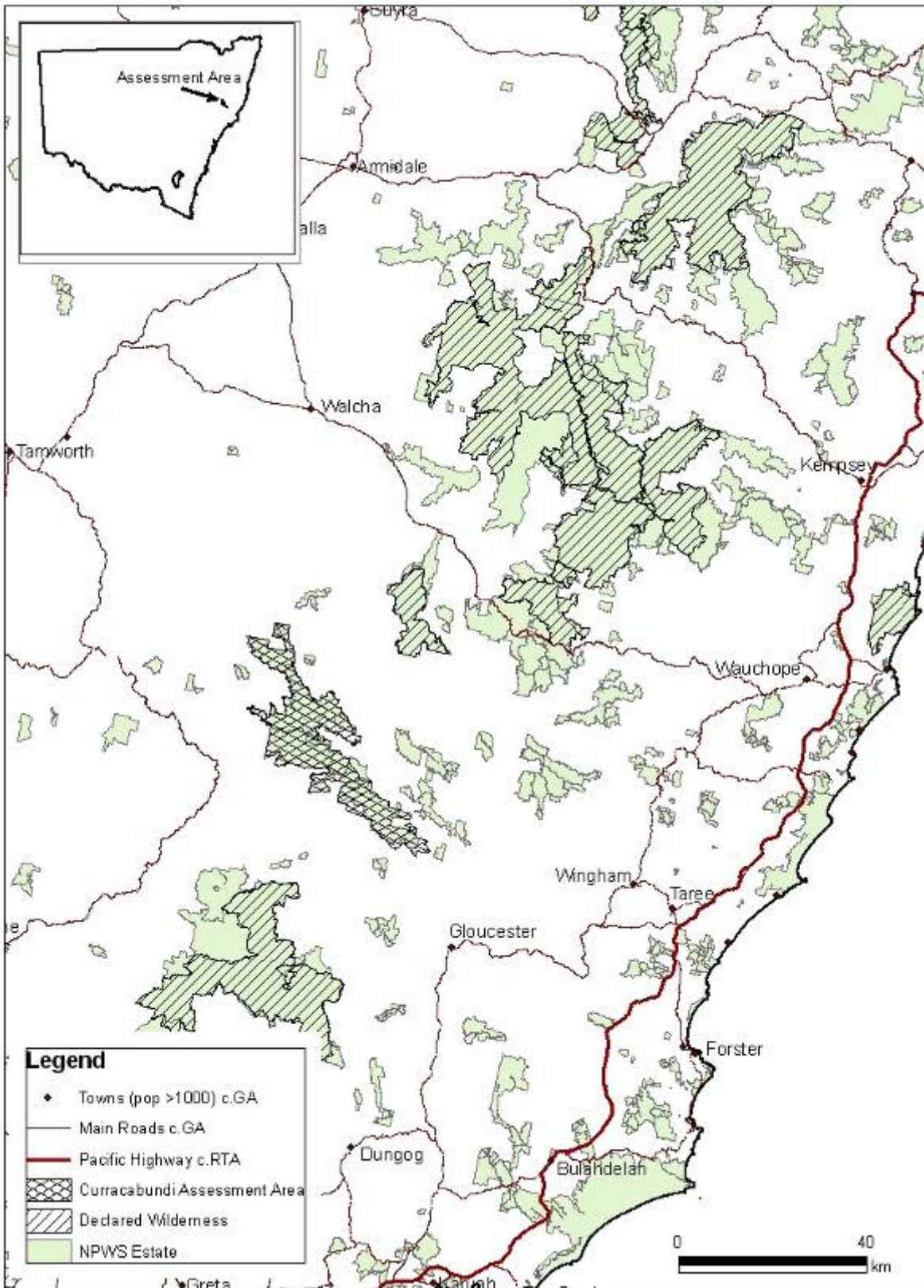


Figure 2. Location map

1.4 Description of the assessment area

1.4.1 Location

The Curracabundi wilderness assessment area comprises approximately 43,300 hectares and covers part of the great eastern ranges escarpment, incorporating the edge of the Northern Tablelands and the coastal ranges near Gloucester. The assessment area includes contrasting landscape features such as mountains up to 1300 metres above sea level on the tablelands and river valleys at 200 metres above sea level.

The northern boundary is 41 kilometres from Walcha and the southern boundary is 21 kilometres north-west of Gloucester. The wilderness is located between Barrington Wilderness to the south and Mummel Gulf Wilderness to the north (Figure 2).

The assessment area is focussed on a group of reserves surrounded largely by forestry lands and agricultural land (Figure 3).

1.4.2 Geomorphology and geology

The topography, altitudinal range and geology of the area are diverse. A major feature is the wild and rugged river gorges that dissect the assessment area. Myall Creek forms a deep river valley along the length of Nowendoc National Park in the north-west of the area. Approximately 20 kilometres of the Barnard River flows towards the coast through the centre of the assessment area. The Barnard River features a narrow floodplain hemmed in by spectacular cliffs and bluffs, including Monkeycot Bluff (996 metres), Cobbs High Point (900 metres) and Mernot Pimple (1057 metres). The reserves in the south are bisected east-west by Tuggolo Creek, Mernot Creek and Curricabark River. These rivers form an important part of the Manning River catchment. The rugged uplifted terrain of the area captures the most reliable rainfall in the region and allows for catchment protection of the valley.

In the north, the impressive cliffs, rugged ridges, spurs and creeks of Nowendoc National Park are part of the New England Fold Belt, characterised by highly metamorphosed Palaeozoic sedimentary rocks, intruded by granites of the Devonian age, as well as partially covered Tertiary basalt flows (Packham 1969 cited in DECCW in prep.).

In the mid and southern sections, Curracabundi State Conservation Area and Curracabundi National Park, Mernot Nature Reserve and Woko National Park are comprised of the Myra Beds, sedimentary rocks of the Silurian-Devonian.

Watchimbark Nature Reserve includes over 200 hectares of Cambrian serpentinite, an unusual and rare geological formation. The resulting soils are high in magnesium and aluminium which are toxic to many plants. Consequently this area supports distinct and unusual vegetation communities (EcoLogical 2009).

There are also isolated scatterings of the Manning Group and Giro beds south-east of Nowendoc National Park and volcanics within Woko National Park south of the communications tower on Mount Myra.

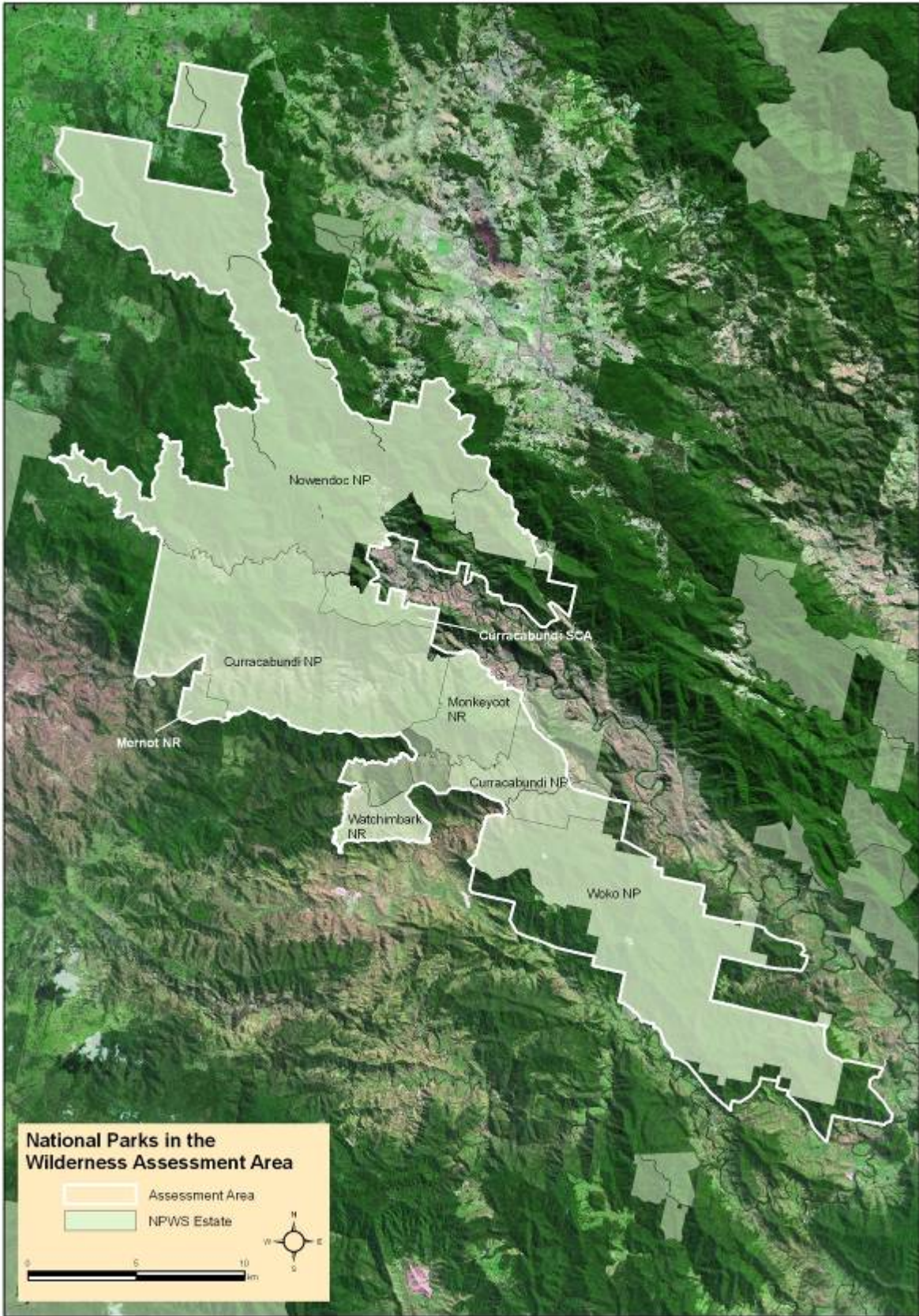


Figure 3. National parks and other DECCW reserves in the wilderness assessment area

1.4.3 Landscape values

The Curracabundi assessment area is of high regional conservation significance. In the north-east of NSW, most large contiguous natural areas have been assessed for wilderness values and many have been protected under the Act. Curracabundi creates a protected landscape link in the wilderness estate between the reserves on New England Tablelands to the north, and the Barrington Wilderness to the south.

Curracabundi is one of a network of wilderness areas along the length of the Great Dividing Range in NSW (Figure 4). The great eastern ranges are recognised as globally and nationally significant refugia for an abundance of native plants and animals (DECCW 2009). In recent years the significance of the Great Dividing Range as an important landscape corridor for adaptation to climate change has been highlighted in the Great Eastern Ranges Initiative (DECC 2007, DECCW 2009). This project aims to help people, plants and animals to adapt to future environmental threats by maintaining, improving and reconnecting 'islands' of natural vegetation along the great eastern ranges from far north Queensland to the Victorian Alps (DECCW 2009). The protection of the proposed Curracabundi Wilderness will contribute to the objectives of the Great Eastern Ranges Initiative (Figure 4).

The role of the wilderness network in conserving biodiversity in NSW is likely to become increasingly important as land use elsewhere in the landscape intensifies, and as impacts of climate change take effect. The size and configuration of the wilderness network is well connected and spans a wide altitudinal and latitudinal range. This provides plants and animals with critical refuges from major ecological events such as extreme drought and wildfire, and is likely to form the most resilient parts of our reservation network into the future.

The key habitats and corridors study (Scotts 2003) identifies areas in north-east NSW which are likely to be of high value as fauna habitat. The predictions are modelled using a range of factors including the combined predicted distributions of over 100 fauna species, habitat patch size and connectivity. A number of locations in the assessment area are mapped as key habitat (Scotts 2003), in particular:

- In Nowendoc National Park, key habitats are predicted in the far north-west of the park, west of Callaghan's Swamp Creek; and the far north-east in the vicinity of Stoney Creek. These areas are predicted to be high value habitat for species dependent on tall wet open forest of the eastern tablelands.
- Also in Nowendoc, the dry forest between Myall Creek and Callaghan's Swamp Creek area is predicted to be of high value for species restricted to the tall open grassy forests of the edge of the eastern tablelands. Dry forests in Woko National Park, near Suns Ridge Trail and Giro Trail, are also predicted as key habitat for these species.

Corridors may be defined as regional landscape connections which both support resident populations of certain fauna species, and facilitate the movement of fauna within and between habitat patches (Scotts 2003). Maintaining such linkages between habitat patches has been widely adopted as a measure to maintain populations, communities and natural ecological processes in the landscape (Bennett 1999).

Modelling predictions (Scotts 2003) indicated a major corridor extending north-east from the Tuggolo Identified Wilderness through Riamukka State Forest to Mummel Gulf Wilderness and beyond to Werrikimbe Wilderness. This link is likely to be important for maintaining viable populations of priority vertebrate fauna characteristic of wet escarpment eastern tablelands and southern New England Tableland environments.

Modelling predictions also indicated significant corridors occurring west from Nowendoc National Park through Tuggolo State Forest to the important tableland areas of Nundle and Hanging Rock State Forests and east to Barakee National Park (Scotts 2003). The security of this north–west link has been recently improved with the purchase and reservation of an additional 3700 hectares adjacent to Tuggolo State Forest. Subregional habitat corridors within a fragmented landscape extend south from Tuggolo Identified Wilderness to the large and biogeographically significant Barrington Wilderness (Scotts 2003; NPWS 2001).

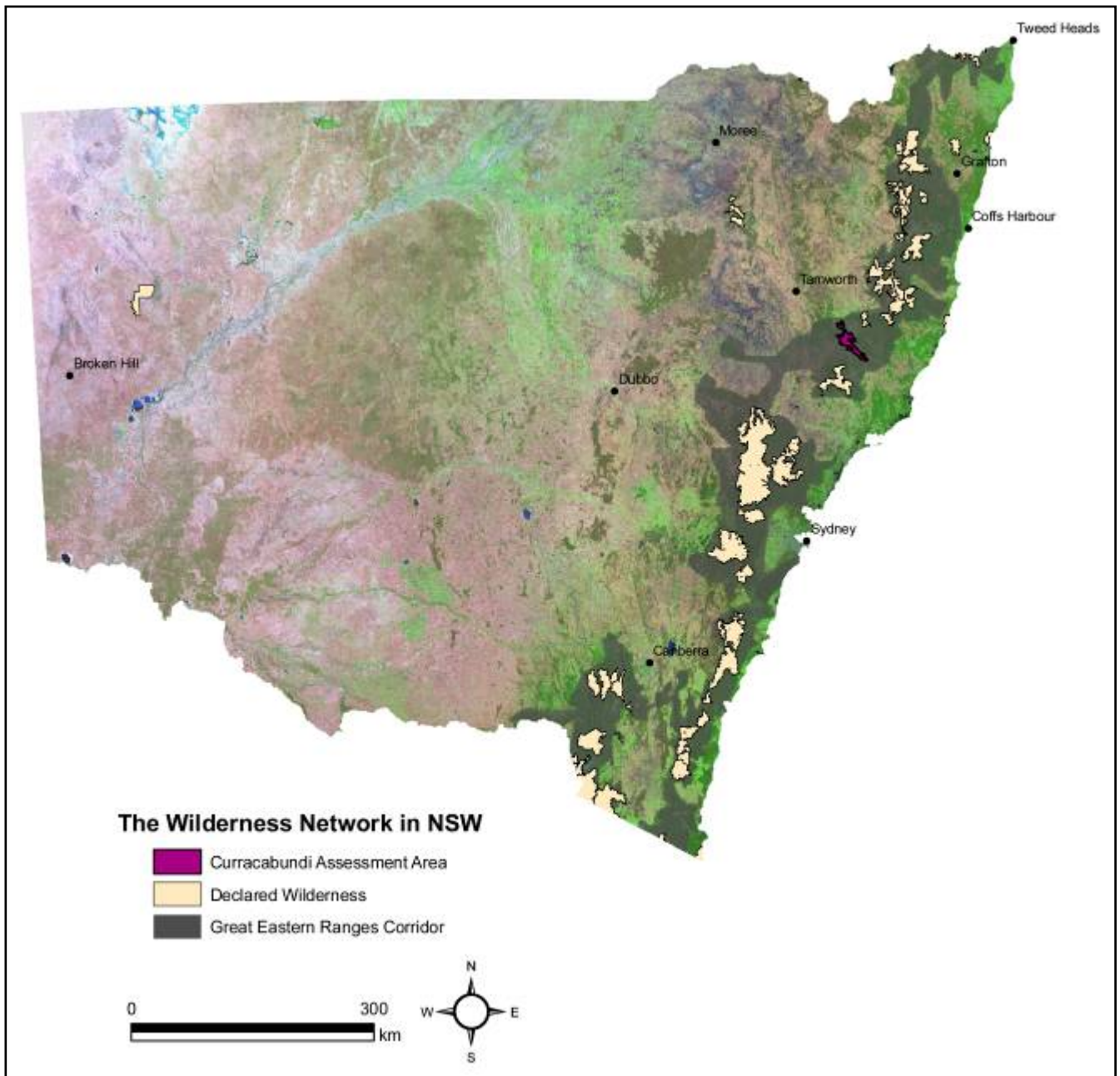


Figure 4. NSW wilderness network



Plate 1: Curracabundi Wilderness: View of Myall Creek gorge from Myall Creek Management Trail, Nowendoc National Park. Photo: Joanna Muldoon.

1.4.4 Flora

This large and geographically diverse area supports a wide range of vegetation communities.

The few flora studies undertaken in the assessment area show the area supports a high diversity of flora species, with 518 flora species recorded (DECCW YETI database, January 2010).

Moist eucalypt forests and rainforests are most common in the south of the assessment area, including much of Woko National Park. Further north, drier eucalypt forest and grassy open forest occur over the ridges and slopes of northern Woko National Park and Curracabundi National Park, with moist eucalypt and rainforest occupying the gullies (NPWS 2001c, Keith 2004). In Nowendoc National Park, in the northern most part of the assessment area, substantial areas of swamp forest occur along deep valleys of Myall Creek. Semi-mesic grassy and tall open forests dominate in many parts of northern Nowendoc National Park, but moist eucalypt forest is also common, (CRAFTI, Copeland 2007), (Plates 1 and 2).

In total, there are 75 different forest ecosystems represented within the Curracabundi wilderness assessment area. The most widespread forest ecosystem types are moist and dry eucalypt forest which occupy over 70% of the assessment area. Common eucalypt-dominated communities include moist open escarpment white mahogany, central mid elevation Sydney blue gum, New England stringybark-blakelys red gum, dry redgum-bloodwood-apple, Barrington wet New England blackbutt-blue gum, open silvertop stringybark-blue gum, dry grassy stringybark and stringybark-apple (NPWS 2001c).

Rare, more restricted vegetation types include dry rainforest, subtropical rainforest and vegetation associated with serpentinite geologies.



Plate 2: (left): *Eucalyptus nobilis* tall open riparian forest in Nowendoc National Park. Photo: Lachlan Copeland.

Plate 3: (right): *Allocasuarina ophiolitica/Xanthorrhoea glauca/Triodia scariosa* grassy heath in Watchimbark Nature Reserve. Photo: Sean Thompson

Rainforest accounts for over 7000 hectares, or approximately 17% of the assessment area. Dry rainforest occurs on steep, seasonally dry boulder and scree slopes throughout the assessment area. It usually occurs as closed forest, with one or two layers of vegetation, and sparse ground cover. Vines and epiphytes (perching plants such as elkhorns, staghorns and orchids) are common. Common tree species include shatterwood *Backhousia sciadophora*, giant stinging tree *Dendrocnide excelsa*, Port Jackson fig *Ficus rubiginosa* and brush kurrajong *Commersonia fraseri*. The shrub layer includes native holly *Alchornea ilicifolia*, brush caper berry *Capparis arborea*, silver croton *Croton insularis* and orange thorn *Pittosporum multiflorum*. Locally, the dry rainforests of Woko are known as 'Curracabark Scrub'.

Subtropical rainforest occurs along sheltered stream lines and in gullies throughout Curracabundi wilderness assessment area, but predominantly in areas south of the Barnard River. It usually appears as a closed forest, with two or three clearly defined layers of vegetation. Epiphytes and vines are common. Common tree species include black booyong *Heritiera actinophylla*, giant stinging tree *Dendrocnide excelsa*, Moreton Bay fig *Ficus macrophylla*, rosewood *Synoum glandulosum* and flame tree *Brachychiton acerifolius*.

Watchimbark Nature Reserve is located on outcropping serpentinite along the Peel Fault in the central west of the wilderness assessment area. Three main serpentinite outcrops occur in northern NSW - at Woods Reef (in the Nandewar Bioregion), Baryugil (near Grafton) and at Watchimbark/Bralga Tops. Each of these areas has its own suite of endemic and rare species. Watchimbark is the only serpentinite outcrop within a reserve.

Serpentine vegetation has characteristics more typical of semi-arid regions. In eastern Australia, spinifex-dominated vegetation types are considered to be relics of a past period of aridity. The low and stunted vegetation at Watchimbark forms a unique landscape that is markedly different to the surrounding tall open forests and rainforest. The xanthorrhoea and spinifex grassy heath (Plate 3) and *Eucalyptus serpentinicola* mallee woodlands at Watchimbark Creek are unique and endemic to the Glenrock - Curricabark - Watchimbark area. These communities are of very high conservation value given their restricted distribution and the large number of rare or threatened plant species within them. Watchimbark Nature Reserve contains the largest known example of spinifex east of the Great Dividing Range (EcoLogical 2009).

The higher altitudes of Nowendoc National Park also support some unusual communities. Several pockets of upland swamp occur in the north west of the park. This community is likely to be particularly vulnerable to climate change (Hughes 2003) and has been listed as an Endangered Ecological Community under the NSW *Threatened Species Conservation Act 1995* (Copeland 2007), (listed as Montane Peatlands and Swamps of the New England Tablelands, NSW North Coast, Sydney Basin, South East Corner South East Highlands and Australian Alps bioregions). Snow gum *Eucalyptus pauciflora* woodland occurs along the north western edge of this park.

Some natural clearings are likely to have been present in the assessment area prior to European settlement. Such clearings were commonly reported by Europeans on the upper reaches of the coastal rivers as well as the tableland proper, and would have provided valuable game hunting grounds for Aboriginal groups (Godwin 1983 cited in Jack 2007).

Ten rare or threatened flora are known from the assessment area (Table 2 and Plate 4).

Table 2 Rare or threatened plant species of the Curracabundi wilderness assessment area. (Source: DECCW YETI data base January 2010)

Family	Species	Common Name	Listing	Status
Mimisoideae	<i>Acacia barringtonensis</i>	Barrington Wattle	ROTAP	2RC-
Casuarinaceae	<i>Allocasuarina ophiolitica</i>		ROTAP	2K
Dilleniaceae	<i>Hibbertia hermanniifolia</i>		ROTAP	3RCa
Fabaceae	<i>Senna acclinis</i>		TSC Act	Endangered
Santalaceae	<i>Thesium australe</i>	Austral toadflax	TSC Act	Vulnerable
Asclepiadaceae	<i>Cynanchum elegans</i>		TSC Act	Endangered
Myrtaceae	<i>Eucalyptus serpentinicola</i>		ROTAP	2R
Gentianaceae	<i>Chionogentias barringtonensis</i>	Snow-gentian	ROTAP	2RC-
Scrophulariaceae	<i>Euphrasia orthocheila</i> subsp. <i>orthocheila</i>		TSC Act/ ROTAP	Endangered
Proteaceae	<i>Grevillea granulifera</i>		ROTAP	3KC

ROTAP = Rare or Threatened Australian Plants. 2=Restricted distribution - range extending over less than 100km. 3 = Range more than 100km but in small populations. R=Rare but with no current identifiable threat. C= Species is known to occur within a proclaimed reserve. K=Poorly known species suspected of being at risk. a=Species is considered to be adequately reserved, 1000 or more plants occur within a proclaimed reserve. TSC Act = *Threatened Species Conservation Act 1995*.

1.4.5 Fauna

There are 239 vertebrate species recorded from the assessment area including 14 frogs, 28 reptiles, 152 birds, 26 non-flying mammals and 19 bats (DECCW Atlas database April 2010) (Plate 5). Nineteen of these species are threatened (Table 3). There is very little known about the invertebrate fauna of the assessment area.

The Curracabundi wilderness assessment area is a significant stronghold for the iconic brush-tailed rock-wallaby *Petrogale penicillata* (Plate 6). This species is listed as endangered and vulnerable under NSW and Commonwealth legislation respectively. The historical range of the species extended along the coast and ranges from the Grampians in western Victoria to Nanango in south-eastern Queensland. The range of the brush-tailed rock-wallaby is now fragmented and numbers have continued to decline in recent years. Since 1990, populations at 49 sites across south-east Australia have become extinct or have vacated the site (DECCW 2008).

The rugged topography of the wilderness assessment area provides ideal habitat for the rock-wallaby. Core habitat occurs along the rocks and escarpments of the Barnard River valley system and ranges in Woko, Curracabundi and Nowendoc National Parks. This species also grazes along the flood plain embankments of the Barnard River.

The rock-wallaby population within Curracabundi is thought to be relatively large, but a DECCW monitoring study suggests numbers are in decline at some sites (DECCW unpublished data, 2010). It is thought the population has persisted because of historically very low numbers of foxes and goats, both proven threats to rock-wallaby populations.



Plate 4: The endangered orchid *Euphrasia orthocheila* subsp. *orthocheila* in Nowendoc National Park. Photo: Lachlan Copeland.

Plate 5: The barn owl *Tyto alba* from Watchimbark Nature Reserve. Photo: Sean Thompson

There are significant populations of spotted-tailed quolls *Dasyurus maculatus* within the Curracabundi wilderness assessment area, particularly in Nowendoc National Park. The spotted-tailed quoll is listed as vulnerable under the *Threatened Species Conservation Act 1995*. The area provides significant areas of old-growth forest and a variety of community types often preferred by this species including extensive areas of rainforest and wet and dry sclerophyll forests. An intensive trapping program to investigate the impact of 1080 baiting on quolls within Tuggolo State Forest, immediately to the west of Nowendoc National Park, identified a significant and concentrated population of quolls within the State forest (Kortner and Watson 2005).

Table 3 Threatened fauna species of the Curracabundi wilderness assessment area

(Source: DECCW Wildlife Atlas database April 2010)

Family	Common name	Scientific name	Legal status (TSC Act)
Amphibians			
Hylidae	Davies tree frog	<i>Litoria daviesae</i>	Vulnerable
Reptiles			
Elapidae	Stephens' banded snake	<i>Hoplocephalus stephensii</i>	Vulnerable
Birds			
Acanthizidae	Speckled warbler	<i>Pyrrholaemus saggitatus</i>	Vulnerable
Columbidae	Wompoo fruit-dove	<i>Ptilinopus magnificus</i>	Vulnerable
Cacatuidae	Glossy black-cockatoo	<i>Calyptorhynchus lathami</i>	Vulnerable
Strigidae	Powerful owl	<i>Ninox strenua</i>	Vulnerable
Tytonidae	Masked owl	<i>Tyto novaehollandiae</i>	Vulnerable
	Sooty owl	<i>Tyto tenebricosa</i>	Vulnerable
Marsupials			
Dasyuridae	Spotted-tailed quoll	<i>Dasyurus maculatus</i>	Vulnerable
Phascolarctidae	Koala	<i>Phascolarctos cinereus</i>	Vulnerable
Petauridae	Yellow-bellied glider	<i>Petaurus australis</i>	Vulnerable
Macropodidae	Parma wallaby	<i>Macropus parma</i>	Vulnerable
Macropodidae	Brush-tailed rock-wallaby	<i>Petrogale penicillata</i>	Endangered
Bats			
Vespertilionidae	Greater broad-nosed bat	<i>Scoteanax rueppellii</i>	Vulnerable
Vespertilionidae	Eastern bentwing-bat	<i>Miniopterus schreibersii oceanensis</i>	Vulnerable
Pteropodidae	Grey-headed flying-fox	<i>Pteropus poliocephalus</i>	Vulnerable
Vespertilionidae	Eastern false pipistrelle	<i>Falsistrellus tasmaniensis</i>	Vulnerable
Kerivoulinae	Golden-tipped bat	<i>Kerivoula papuensis</i>	Vulnerable
Vespertilioninae	Large-footed myotis	<i>Myotis adversus</i>	Vulnerable

TSC Act = Threatened Species Conservation Act 1995



Plate 6: Brush-tailed rock-wallaby *Petrogale penicillata* from Curracabundi National Park. Photo: Sean Thompson.

1.4.6 Aboriginal history and heritage

Aboriginal cultural heritage comprises the landscapes, places, objects, customs, and traditions (and their contexts) that communities have inherited from the past and wish to conserve for current and future generations. Aboriginal people do not distinguish between natural and cultural values.

Aboriginal history and use of the Curracabundi Area is poorly documented, and no archaeological surveys have been undertaken.

The upper Manning River valley, between Tuncurry, Taree and Gloucester, was the traditional land of the Biripi people, speakers of the Kattang language (Narelle Marr, 1997, cited in Leon, n.d.). The New England plateau, which rises from the northern boundaries of the Curracabundi area, may have marked a cultural boundary between the Biripi and the Anaiwan, the traditional occupants of the central portions of the New England Tablelands (Messner 2009).

The area is thought to have been used for ceremonial purposes, food-gathering and trade on a seasonal basis by Aboriginal communities from the coastal plain, foothills and tablelands (Jack 2007). Messner (2009) speculates that the moderate climate of the lower altitudes, in contrast to more northerly parts of the New England Tablelands, may have also been suitable for permanent settlement by Aboriginal groups.

Several open campsites have been discovered on the ridge lines and peaks of Woko National Park. Other recorded sites in the assessment area include scarred trees, artefact scatters, rock shelters and ceremonial sites (Jack 2007, DECCW AHIMS database 2010).

1.4.7 European history and use of the area

Before dedication as national park, most of the assessment area was occupied by large cattle grazing properties. Viability of farming has been limited historically by lower land productivity and isolation from supply sources and markets (Messner 2009, Jack 2007). Cedar logging occurred across the assessment area in the late nineteenth and early twentieth centuries.

The development of land clearing, fencing, planned grazing and the erection of stockyards occurred at different times across the area. Most of this activity has been concentrated within the central part of the Curracabundi area, around northern Woko and Curracabundi National Parks. In the property formerly known as Karamea (now part of Curracabundi National Park), clearing and grazing commenced as early as 1830s and 1840s, as this area gave easy access to the river flats of the Barnard. Karamea Homestead, just outside of the assessment area, is the approximate location of the original outstation of the Australian Agricultural Company. The current homestead was built between 1910 and 1914 (Jack 2007) and restored by DECCW in 2009. To the north-west of Karamea, the former properties which now form part of Curracabundi National Park underwent little development until the early twentieth century. While grazing was the primary land use, some cropping of maize and lucerne also took place (Jack 2007).

A number of dwellings, ruins, historical fence lines and stockyards remain scattered across the assessment area. Remaining homesteads are primarily structures built between the 1920s and 1960s (Jack 2007). Homesteads within the assessment area are:

- Lea-Hurst (c. 1920) - this dwelling was used by the Lonsdale family who ran stock in the area up until acquisition by DECCW.
- Monkeycot (c. 1943) - this dwelling has been used by stockmen as a temporary camp.
- Rock Glen (c. 1963) - this dwelling remains in good condition.
- Ham's Homestead (c. 1920) – only ruins remain of the homestead. A hut and shed remain at this site.

Christies Hut was the location of a historic hut which was dismantled prior to the purchase of the area by DECCW in 2003. A cottage is currently in this location which was built in the 1990s. Karamea Homestead in Woko National Park and Wrights Hut in Nowendoc National Park lie outside of the assessment area.

The name Curracabundi is believed to have been adopted by an old pastoral run of the upper Manning Valley located north of the Barnard River around 1857. The name is thought to be derived from two Aboriginal words in the Kattang language - 'currica' meaning ironwood and 'bundi' meaning fighting stick (Warren Mayers, pers. comm. 16/5/2006).

2 WILDERNESS ASSESSMENT

2.1 Community consultation

2.1.1 Landholder notification

It is a requirement under the *Wilderness Act 1987* that the owner of any land proposed for assessment of wilderness be notified.

Wilderness is usually only declared within national parks and other DECCW reserves. Other land may only be declared as wilderness with the explicit consent of the landholder or land manager. This consent takes the form of a wilderness protection agreement under the *Wilderness Act 1987* or a conservation agreement under section 69B(1C) of the *National Parks and Wildlife Act 1974*.

Wilderness identification over private property or leasehold does not affect a property being sold, does not influence how a property is currently managed, and does not affect access rights. Further information on wilderness identification and private property or leasehold can be found at the following website:

<http://www.environment.nsw.gov.au/parktypes/HowWildernessIsProtected.htm>

DECCW notified all affected landholders of the acceptance of a wilderness proposal and the subsequent assessment of the proposed wilderness areas in March 2006.

A total of 27 landholders directly impacted by the Curracabundi and Giro wilderness nominations were notified. During the notification process, each landholder was asked whether they wished to have wilderness declared on their property.

Of those who responded, no landholder wished to declare wilderness on their land, however several expressed an interest in selling all or part of their land to DECCW.

The main objections or concerns raised in the submissions received from landholders were:

- wilderness proposal would devalue their property
- disturbance associated with past agricultural practices within wilderness assessment area
- the wilderness process was another opportunity for the government to remove landholder's rights and 'land grab'.

2.1.2 Stakeholder notification

DECCW policy requires that all relevant stakeholders, including community groups, government and land management agencies, and other groups and individuals likely to have an interest in the Curracabundi wilderness assessment area are notified about the wilderness process.

In July 2006, 30 stakeholders were notified of the wilderness nominations for Curracabundi and Giro. There were ten respondents: Forests NSW, Department of Planning, Department of Lands, Gloucester Rural Lands Protection Board, Gloucester Shire Council, Rookhurst Rural Fire Service, Curracabark Rural Fire Brigade, NSW

Farmers Association, Australian Trail Horse Riders Association, and Bicentennial National Trail Board.

The main objections or concerns raised were:

- ability to ground and aerial bait for wild dogs within declared wilderness areas (two submissions)
- potential fire hazards within wilderness (three submissions)
- access to the Bicentennial National Trail (three submissions)
- notification of landholders adjoining proposed wilderness areas (one submission).

2.1.3 Notification of outcomes of the wilderness assessment

Before the public exhibition of the Curracabundi Wilderness Assessment Report DECCW notified all landholders and stakeholders of the results of the assessment, including the areas identified as wilderness and the areas proposed for declaration as wilderness.

Landholders with land partly within the boundary of identified wilderness were contacted by telephone or mail or both and were offered face to face briefings if requested. Landholders whose land lay outside of the boundary were notified by mail.

Media releases were issued to inform the wider community about the wilderness assessment and the declaration proposal.

2.2 Wilderness assessment methods

2.2.1 Assessment criteria

The focus of the wilderness identification process is assessing whether the wilderness proposal meets the three criteria specified in the *Wilderness Act 1987*. The *Wilderness Act 1987* requires that identified wilderness is:

- substantially unmodified by humans, or capable of being restored to this condition (naturalness)
- of sufficient size to sustain itself in a substantially unmodified condition (size)
- capable of providing opportunities for solitude and appropriate self-reliant recreation.

If the area meets the above criteria, it is included in a wilderness assessment report and formally identified as having wilderness values by the Director General of DECCW.

The Act also highlights the following issues for consideration when deciding whether an area should be identified as wilderness:

- how long it may take to restore land to a substantially unmodified condition
- whether, despite land being considered otherwise unsuitable, it is required for the management of wilderness
- the outcomes of public consultation about the wilderness proposal.

DECCW's Wilderness Assessment Guidelines (DECC 2008) provide details on how these assessment criteria are applied. They can be provided on request or viewed at:

<http://www.environment.nsw.gov.au/parktypes/HowWildernessIsProtected.htm>

2.2.2 Naturalness

Naturalness is the criterion that distinguishes wilderness from other protected areas. It refers to the degree of disturbance to an area by modern society and the remaining effects of that disturbance. To meet the naturalness criteria, an area must be largely unchanged, or be capable of being returned to this state within a reasonable period of time.

The Guidelines describe the naturalness criteria in the *Wilderness Act 1987* in terms of three 'naturalness' classes of land. These are:

- substantially unmodified ('SU')
- modified, but capable of restoration to a substantially unmodified state within a reasonable time ('MR')
- substantially modified ('SM') land generally not capable of being identified as wilderness.

Substantially modified lands not capable of restoration in a reasonable time are sometimes needed within an identified area in order to create a logical and practical boundary.

The three naturalness classes (SU, MR and SM) were evaluated in this study based on the following characteristics:

- the structural integrity of the forest
- the degree and extent of human-induced disturbances.

A 'wilderness quality' spatial layer was developed (using the software package ArcGIS) based primarily on aerial photograph interpretation of vegetation structure and disturbance. Vegetation structural mapping was interpreted and analysed to identify areas of naturalness according to the wilderness criteria.

The major steps used to create this wilderness quality layer were:

- a) Map forest structure, noting the characteristics of growth stage (i.e. proportion of mature, senescent and regrowth forest), relative stand density and disturbances such as presence of weeds or log dumps. The methods used followed NPWS (2001c). The aerial photos used were the most recent available from the Land and Property Management Authority at the time of this study (photos dated 2006).
- b) Assign wilderness classes to the above mapping using methodology consistent with that used in the Northern Comprehensive Regional Assessment *Northern Wilderness Assessment* (NPWS 1998, NPWS 2001a).
- c) Compare results with information provided by local staff and submissions received from landholders. Some adjustments were made to forest structure and/or wilderness codes where evidence of management history was provided.

Several site inspections were conducted (7/1/10, 22/3/10 and 17-18/5/10) to familiarise those who were mapping forest structure with the forest types and condition and to allow for some validation of mapping.

Table 4 summarises how naturalness classes were allocated to different disturbance types. For further details of this methodology see Appendix 1.

Table 4 Disturbance types and corresponding naturalness categories used in the Curracabundi wilderness assessment

Disturbance type	Substantially unmodified (SU)	Modified but recoverable (MR)	Substantially modified (SM)	Information Source
Forestry activities ¹	<p>Eucalypt forest - <10% regrowth, >30% senescence in canopy. Some negligible disturbances such as canopy gaps or clustering of different crown sizes permitted. Other areas of eucalypt forest with <10% senescence and 10-30% regrowth were included on the basis of a negligibly disturbed condition.</p> <p>Any snig tracks or log dumps have regenerated to the point where they are no longer visible on aerial photos.</p> <p>Rainforest with no indicators of logging or introduced weeds.</p>	<p>Eucalypt forest - <10% regrowth, >10% senescence in canopy. with recently logged or evidence of heavier selective logging where disturbance is clearly apparent (e.g. stumps, sleeper dumps, snig tracks, weeds). These disturbance levels considered significant.</p> <p>Other areas of eucalypt forest with <10% senescence and 10-30% regrowth were included on the basis of a significantly disturbed condition.</p> <p>Rainforest with introduced weeds clearly apparent.</p>	Cleared, plantation or introduced species.	CRAFTI Structural mapping
Tracks and trails ²	Walking tracks, unformed vehicle trails with no cut and fill which are not obvious due to regeneration since last use; rehabilitated fire control lines.	Fire trails and 2WD roads with natural/local surface material and minor cut and fill, or with extensive cut and fill, where time since usage means that it is no longer obvious or contributing to disturbance of the landscape; fire control lines where rehabilitation is not yet complete.	Sealed roads; fire trails and 2WD roads with imported material and/or extensive cut and fill where disturbance is obvious.	Roads and trails GIS layers, local knowledge, CRAFTI
Fire ¹	Any canopy damage from fire has resulted in no more than 10% regrowth and >30% senescence is retained.	Asset protection zone – past (and planned future) fire frequency above predicted ecological threshold. Simplification of vegetation structure but capable of restoration.	Major fire-associated works such as fire breaks.	CRAFTI, local knowledge

¹ Rule set from NPWS 2001a.

² Rule set from NPWS 2001b.

DECCW's Wilderness Assessment Guidelines recommend a minimum of 75% of the wilderness proposal be substantially unmodified (SU); with a maximum of 25% classed modified but restorable (MR), and no more than 10% substantially modified (SM). While these percentages are only a guide, the Guidelines state that the primary focus of wilderness is substantially unmodified land.

Wilderness criteria have not traditionally been applied to freshwater systems: assessments of river condition on reserves are usually undertaken under the *National*

Parks and Wildlife Act 1974 (wild river provisions). As water extraction licences have been issued for the Barnard River, which flows through the assessment area, the condition of this river was considered using available published information.

2.2.3 Size

The second criterion specified in the *Wilderness Act 1987* (section 6(1)(b)) is that an area needs to be of a sufficient size to maintain itself in a substantially unmodified state.

Consistent with nationally agreed criteria (Commonwealth of Australia 1997), DECCW's Wilderness Assessment Guidelines adopt 8000 hectares as a minimum recommended size for wilderness in forested landscapes, with smaller areas acceptable where they adjoin the sea or existing wilderness areas.

Size was assessed using digital spatial analysis.

2.2.4 Self-reliant recreation and solitude

Solitude is by its nature a very personal experience. Where and how we experience solitude varies from person to person and therefore cannot be objectively assessed. Consequently, DECCW recognises that any area capable of providing even the most basic feeling of solitude meets this criterion.

Self-reliance is to some extent also a personal experience. However, for the purpose of the assessment, DECCW recognises that self-reliant recreation must be non-motorised.

Assessment of this criterion was based on the following considerations:

- assessment of existing recreational activities
- features in the landscape conducive to self-reliant recreation
- a qualitative assessment of aesthetic values found in the Curracabundi landscape.

2.3 Results of the wilderness assessment

2.3.1 Naturalness

The naturalness assessment showed that an unacceptably low proportion of the assessment area (67%) was substantially unmodified (Table 5).

Table 5 Naturalness within the Curracabundi wilderness assessment area

Naturalness	Code	Area (ha)	% Total
Substantially unmodified	SU	29,000	67
Modified but recoverable	MR	12,000	28
Substantially modified	SM	2,300	5
Total		43,300	100

In order to meet the 75% substantially unmodified criteria set out in the Guidelines, some areas with high proportions of land classed MR or SM had to be excised to delineate an area suitable for identification as wilderness.

Evidence of more intense disturbance is scattered throughout the assessment area, rather than confined to easily excised areas towards the edges of the reserves. The pattern of disturbance reflects the area's history of more intensive or longer-term logging on less steep areas and of grazing and clearing along the major river valleys. Logging and clearing history was the major determinant of the identified wilderness boundary. These factors, along with other disturbance in the assessment area, are discussed in more detail below.

Some of the areas excised from the identified wilderness have important conservation values, however, they comprise significant sections (usually more than 50%) of modified but recoverable and substantially modified lands. Under the current tenure, it is not possible to include these areas in identified wilderness and achieve a wilderness area of greater than 70% substantially unmodified lands. A number of minor exclusions were made along the edge of the assessment area. The major exclusions greater than 500 hectares are shown in Figure 5. These were:

- freehold to the far south of the assessment area adjacent to Woko National Park
- the south-east arm of Nowendoc National Park and adjacent freehold south of Watts Fire Trail.

With these areas excluded, the proportion of substantially unmodified land was increased to 71% (Table 6 in Section 2.4). This is considered sufficiently close to the 75% substantially unmodified recommended in the Guidelines (see section 2.4 for discussion).

The Curracabundi Identified Wilderness, based on the naturalness criterion, covers 38,500 hectares.

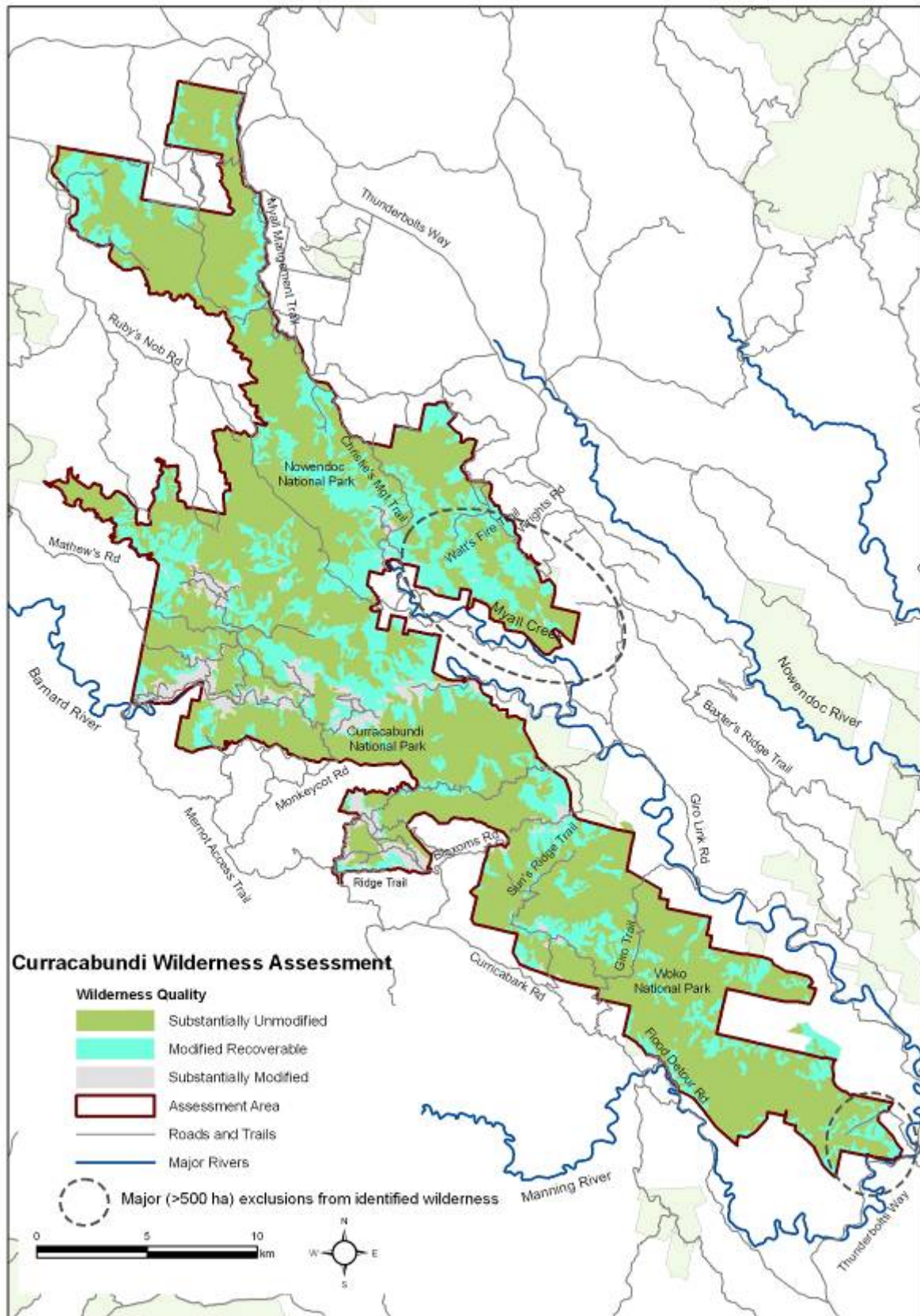


Figure 5. Wilderness quality within the Curracabundi wilderness assessment area

Logging

Selective harvesting has been widespread, affecting many areas on more gentle slopes where commercial timbers are present. This is most pronounced on productive soils. This has created a patchwork of disturbance levels across the Curracabundi assessment area, often at a fine spatial scale. As a consequence, the wilderness quality shows substantially unmodified areas interspersed with modified but recoverable areas through large portions of the assessment area.

Clearing, grazing and agriculture

As documented in section 1.3.8 European history, there has been clearing and grazing, both historic and contemporary, across the assessment area.

Valleys of the major rivers were classed substantially modified due to clearing, particularly along the Barnard River and Curricabark Creek (Figure 5). Larger clearings close to the boundaries of the assessment area were excluded from identification where a logical boundary could be defined. However, most of these valleys are embedded well within the reserves and surrounded by less-disturbed areas, therefore they could not be excluded without splitting the identified wilderness into separate blocks. These areas are therefore included in the identified wilderness for reserve design and management purposes. As these areas have been reserved and cattle removed, they will rehabilitate with native vegetation over time, although active weed control will also be required in some areas.

Some forested areas which have been grazed over a long timeframe show a high level of disturbance and have been classed as modified recoverable. These areas have reduced crown cover, often from a combination of logging and grazing, and have had limited recruitment of canopy species for many years. Infrastructure such as dams, tracks and yards are sometimes present. These areas have been excluded from identification where a logical boundary could be defined. This includes the following areas:

- South of Watts Fire Trail in Nowendoc National Park and private land to the south west of this area (slopes along the Myall Creek valley)
- Parts of Curracabundi State Conservation Area where it borders the Myall Creek valley
- In the west of Curracabundi National Park, an area north of the Barnard River
- The southern edge of Watchimbark Nature Reserve.

Mining

There are currently no known mining leases within the Curracabundi assessment area. The Department of Mineral Resources was notified of the wilderness assessment process in July 2006 but no formal response was received.

Curracabundi State Conservation Area is included within the identified wilderness area. However, the Guidelines do not allow the declaration of areas within this park category as wilderness because it permits mining, which is incompatible with wilderness management.

Two quarries fall just outside of the assessment area: Kulmaren, which is adjacent to, but outside of, the eastern boundary of Nowendoc National Park, and Ruby's Nob which is a small inholding in the north-west corner of Nowendoc National Park. These quarries are currently in use and have not been identified as wilderness.

Water extraction

Water extraction licences have been issued for the Barnard River upstream of the Curracabundi assessment area. All water extraction within the Manning Catchment, including the Barnard River, is regulated by a water sharing plan. This water sharing plan considered the Myall Creek and Barnard Rivers to be under low hydrological stress, with a low risk to instream values from water extraction (Department of Water and Energy 2009). The values of this river remain high: it supports a rich macroinvertebrate fauna (Turak & Hose 2004) as well as threatened amphibians and platypus (Department of Water and Energy 2009). These indicators are considered sufficient to class the Barnard River as at least modified recoverable. Further assessment would be required to determine whether this river could be classed as substantially unmodified. All other tributaries and creeks in the assessment area are considered substantially unmodified.

Utilities and infrastructure

Infrastructure is scattered across many parts of the assessment area and is largely associated with past and present agricultural activity. There are remnants of old fences, powerlines, various buildings, farm structures and old homesteads in various states of disrepair. Many of these structures are already in a degraded state or occur in small clearings which will regenerate over a reasonable timeframe. Refer to previous sections (1.4.7 European History) for further detail regarding early European settlement and occupation of the Curracabundi area.

While the maintenance of structures such as homesteads and huts is generally contrary to the concept of wilderness, DECCW has certain obligations to maintain sites of historic heritage under the *National Parks and Wildlife Act 1974*. DECCW therefore maintains many such structures in wilderness, and uses internal planning processes to ensure any works on these sites are undertaken with minimal disturbance to the surrounding wilderness. Some historic heritage sites in the Curracabundi area will be maintained and have been included in the identified wilderness to create a logical boundary¹.

Mount Myra has a telecommunications tower located at its peak and a service road which traverses ridges along the southern flank of Woko National Park. The tower and its service road are classified as substantially modified but are included in the identified wilderness area to create a logical boundary.

Infrastructure in substantial decay, such as old fence lines along the Barnard River and within Woko National Park, is classified as modified recoverable.

Recreational areas within the identified wilderness area in Nowendoc National Park include Myall Creek Camp Ground and Christies Hut. These are small localised areas of disturbance that are managed as low-key facilities and suitable for inclusion in the identified wilderness.

¹ The high cost of maintaining all historic heritage sites within the reserve system, particularly those in the most remote locations, is prohibitive and some sites will inevitably degrade over time. Priorities for maintaining historic heritage will be identified in the plans of management for the parks within the assessment area.

Woko Camp Ground occurs on the edge of the assessment area and has been excluded from identification.

Ridge Trail and Mernot Access Trail in the south-west corner of Watchimbark Nature Reserve are surrounded by cleared (substantially modified) land and are required for continued access to private property. These roads have been excluded from the identified wilderness.

Introduced species

Pest and weed control is a major part of management within the parks and reserves in the Curracabundi assessment area and these programs will continue after any wilderness declaration.

There are 37 recorded weed species within the Curracabundi wilderness assessment area. Introduced plants are low in abundance across the assessment area, with only isolated patches in some of the more modified areas. A number of priority areas and weed species have been identified within the area:

- agricultural / pasture weeds - kikuyu, paspalum, thistles
- old homestead sites - climbing asparagus, cotoneaster, pine
- environmental weeds - lantana, blackberry, crofton weed
- catchment weeds - tree of heaven, pepper corn tree
- roadside weeds - thorn apple, burrs, exotic grass species.

Exotic grasses are in relatively low abundance across the assessment area.

Areas of native vegetation with a high proportion of weeds are classed as modified recoverable.

Wild dogs, feral pigs, cats, goats, mice, rabbits and foxes are present across the assessment area. Indirect evidence suggests the number of wild dogs and feral pigs may be substantial. The threat of wild dogs and foxes to brush-tailed rock-wallaby colonies is believed to be significant and control programs are ongoing. Pigs cause localised damage to vegetation and soils, prey on native animals and pose a potential health risk through spread of disease.

Herbivorous goats may modify the diversity and structure of plant communities, cause soil compaction and establish trails through the forest. Goats are currently confined to the more disturbed areas around the former homesteads of Lea-Hurst and Rock Glen. While the control of these exotic pests is a key land management issue, the obvious effect on naturalness caused by these introduced species is highly localised. The more unobtrusive effects that these animals cause on ecological communities are more difficult to determine, but nevertheless are anticipated to occur if control programs are not implemented.

The presence of significant flora and fauna across the assessment area suggest that the deleterious impact of introduced animals has not substantially modified the naturalness of the area. Continued control of pests and weeds will be crucial in maintaining the conservation values of Curracabundi Identified Wilderness.

2.3.2 Size

The Curracabundi Identified Wilderness is approximately 38,500 hectares. The large size of the identified wilderness area is likely to add to its ecological integrity, assisting the recovery of modified but recoverable areas by natural regeneration. This will be particularly applicable to areas of disturbance along the Barnard River, as much of this valley is remote from other disturbances.

Evidence of Curracabundi's ability to support viable populations of species is provided by the significant diversity of flora and fauna that have been recorded within the assessment area. There are numerous colonies of brush-tailed rock wallaby and a prevalence of large forest owls, indicating substantial areas of good quality habitat. Additionally, Curracabundi is relatively well linked by other areas of vegetation and may function as a source for species dispersal within an existing network of habitat corridors. The assessment area is large enough for plant and animal communities to survive in refuges during major wildfires and extended periods of drought.

The Curracabundi Identified Wilderness contains a relatively large fragment of substantially unmodified forest within a region that has undergone substantial land clearing, particularly in the river valleys. It supports very good examples of vegetation communities that are under-represented in the reserve system and a number of breeding threatened species populations.

The Curracabundi Identified Wilderness easily meets the size criteria for identification of wilderness areas under DECCW policy (greater than 8000 hectares) and the *NSW Wilderness Act 1987*.

2.3.3 Solitude and self-reliant recreation

The Curracabundi Identified Wilderness is assessed as fully capable of meeting the criteria for solitude and self-reliant recreation.

Curracabundi Identified Wilderness has high scenic qualities and diversity of ecosystems, including rainforest and old-growth forest ecosystems, and rugged topography such as gorges, rivers, canyons and high peaks. These qualities make the identified wilderness highly suitable for nature appreciation, bushwalking, canyoning, camping and a range of other appropriate self-reliant recreational activities.

There are a number of places which provide facilities for day use or overnight stays within or just outside of the identified wilderness. These vary from basic campsites with few facilities, such as Myall Creek Camp Ground in Nowendoc National Park, to a proposal to provide short term self contained holiday opportunities at the Karamea homestead in Curracabundi National Park. These provide excellent bases from which to explore wilderness.

Remote area camping is allowed throughout Curracabundi Identified Wilderness provided visitors do not camp within 200 metres of a public road.

Walks within or on the edge of Curracabundi Identified Wilderness range from short walks on formed and marked trails, to multi-day hikes. Some utilise existing trails which will be retained in the wilderness area for management purposes while others rely on navigation along ridge or creek lines where there are no existing trails or markers. The walks are in areas generally remote from settlement and a sense of solitude is readily experienced. Walks in Curracabundi Identified Wilderness include:

- Woko National Park: A short loop walk (a marked walking trail) starting at Woko Camp Ground. Woko Camp Ground can be accessed by 2WD vehicle from Curricabark Road. The walk passes through dry rainforest and pockets of subtropical rainforest, wet sclerophyll forest, and ends in dry sclerophyll forest/woodland (1:25,000 map sheet: 92342N Tibbuc).
- The Falls (waterfall) in Nowendoc National Park: Vehicle access (4WD) along Myall Creek Management Trail to Myall Creek Camp Ground. From the camp ground, The Falls is accessible via a 2 kilometre walk upstream along Myall Creek or along an old snig track off Myall Creek Management Trail. The track finishes at the base of The Falls (1:25,000 map sheet: 92353S Riamukka).
- Callaghan's Canyon in Nowendoc National Park: From Myall Creek Camp Ground drive or walk 10 km down Myall Creek Management Trail to Callaghan's Rocks Management Trail (marked trails). Walk down old snig track (unmarked) to junction of Myall and Callaghan's Swamp Creek and then one kilometre up Callaghan's Swamp Creek to the scenic Callaghan's Canyon (1:25,000 map sheet: 92353S Riamukka).
- Christies Hut in Nowendoc National Park: Leave vehicle at the north west boundary of Nowendoc National Park on Giro Trail (off Ruby's Nob Rd). Walk approximately 4 km along Giro Trail which takes you through some spectacular old growth, then head off the management trail eastward along a ridge line (unmarked) descending to Christies Hut on Myall Creek (8-12 km depending on route taken). Stay overnight in the Hut or camp, and explore the features of this valley which include a brush-tailed rock wallaby colony. Exit via Giro Trail or walk east to Wrights Hut. An alternative route to Christies Hut which is shorter but steeper and less scenic is via Christies Management Trail (a marked trail) on the eastern side of Nowendoc National Park (3 km) (1:25,000 map sheet: 92344N Nowendoc).
- Wrights Hut: In Nowendoc National Park, next to Jacky Barker's Creek. Turn off Thunderbolts Way 7 km south of Nowendoc to Wrights Rd (4WD trailer accessible). This location provides an alternative access point to Christies Hut (12 km, no trail markers) (1:25,000 map sheet: 92344N Nowendoc).

There are a number of other destinations which cannot be accessed by existing trails or marked routes, but which would make interesting walks for more experienced and adventurous visitors. This includes Bombit Top, Mernot Pimple and Monkeycot Bluff in Curracabundi National Park.

2.4 Curracabundi Identified Wilderness

The Curracabundi Identified Wilderness comprises 38,500 hectares (Figure 6). The identified wilderness area contains 71% substantially unmodified lands, with 25% modified but recoverable and 4% substantially modified (Table 6).

Table 6 Naturalness within the Curracabundi Identified Wilderness

Naturalness	Area (ha)	% Total
Substantially unmodified	27,300	71
Modified but recoverable	9,500	25
Substantially modified	1,700	4
Total Area	38,500	100

While not meeting the 75% substantially unmodified lands recommended by DECCW's Wilderness Assessment Guidelines, the 71% is considered sufficient to warrant wilderness identification on the following grounds:

- The area is very large, far in excess of the 8000 hectares minimum recommended size for wilderness under DECCW policy. The size of the area increases the resilience of Curracabundi to disturbance and increases the potential for recovery to an unmodified state.
- Most of the area is reserved (Table 7) and will be managed as wilderness, thereby increasing its recovery potential.
- To obtain a higher proportion of substantially unmodified land (that is, above 71%) it would have been necessary to split the proposed wilderness area in two and excise a large area between Tuggolo Creek and Barnard River. This would have a major impact on the resilience and integrity of the wilderness and lessen the conservation gains made by declaring this area wilderness.

While the Curracabundi Identified Wilderness consists predominantly of reserves, it also includes private land adjoining Woko and Curracabundi national parks (Table 7, Figure 6). No Crown-timber lands such as State Forest, Crown leasehold and Crown road reserves have been identified as wilderness.

Table 7 Tenure within the Curracabundi Identified Wilderness

Tenure	Area (ha)	% Total
DECCW estate	36,500	95
Freehold	2,000	5
Total Area	38,500	100

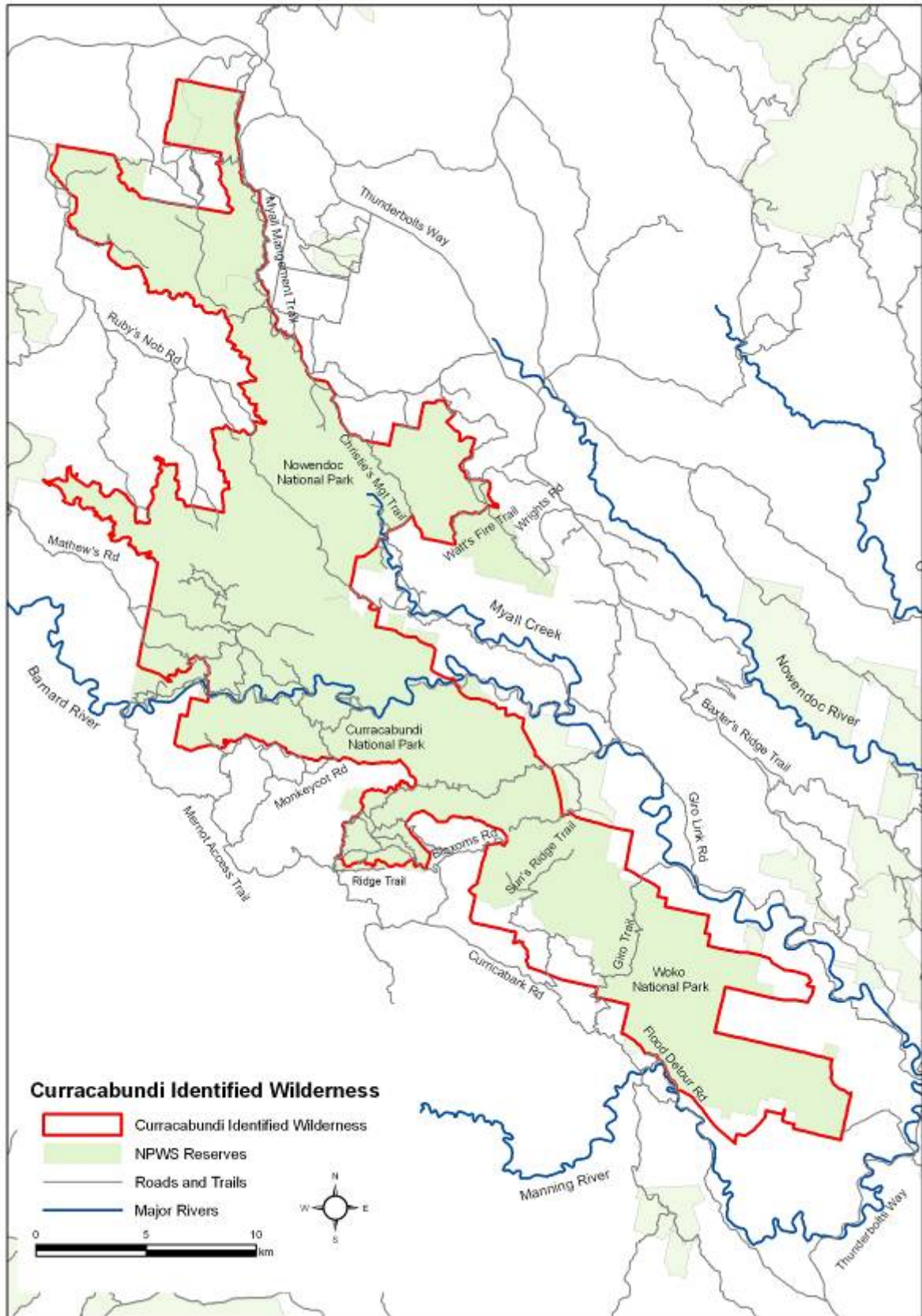


Figure 6. Curracabundi Identified Wilderness



**Plate 7: White everlasting daisy *Helichrysum elatum* at sunset, Thunderbolts Way.
Photo: Greg Steenbeeke.**

3 CONSIDERATION OF SOCIAL, ECONOMIC AND MANAGEMENT FACTORS

In determining what areas within the Curracabundi Identified Wilderness should be protected and managed as wilderness, DECCW considered social, economic, reserve design and management factors such as:

- land tenure
- competing and incompatible land uses
- effective conservation management.

These issues will be reviewed again after public exhibition of the *Curracabundi Wilderness Assessment Report* along with any emerging concerns raised during the exhibition period.

The considerations discussed in this section, along with information received during the public exhibition process, will form the basis of DECCW's recommendation to the Minister for Climate Change and the Environment regarding the proposed declaration area.

3.1 Land tenure

3.1.1 DECCW estate

All lands reserved under the *National Parks and Wildlife Act 1974* (NPW Act) are eligible for wilderness nomination, identification and declaration. However, State Conservation Areas (SCAs) are generally not declared as wilderness because mining is permitted in these reserves, and mining is usually incompatible with wilderness management. Consequently, Curracabundi State Conservation Area is not being proposed for declaration. Every five years, the Minister reviews the status of each SCA, in consultation with the Minister administering the *Mining Act 1992*, and considers whether or not it should remain as an SCA or be reserved as some other category under the NPW Act. The potential for wilderness declaration may also be considered at this stage.

Declared wilderness boundaries are often set back from private land to allow for the maintenance of fencing and boundaries. Such adjustments will be considered after public exhibition.

3.1.2 Crown lands subject to Integrated Forestry Operations Approvals (IFOAs)

The *Forestry and National Parks Estate Act 1998* prevents the proposal, identification and declaration of any lands in which forestry operations authorised by an IFOA may be carried out. All such lands including State forest, Crown leasehold and Crown road reserves, were excluded from the Curracabundi assessment area and none are proposed for identification or declaration.

There are some small areas of Crown land (such as unformed or ‘paper’ road reserves not currently used for access) that are wholly embedded in reserves. These may be sought for transfer to DECCW, and identified and declared as wilderness at a future date. If this occurs, the standard procedures of consultation and approvals will be followed in accordance with NSW Government policy.

3.1.3 Other Crown lands and freehold land

Wilderness may be nominated and identified on Crown lands not subject to an IFOA. There are no known lands within the Curracabundi assessment area that fall within this category.

The *Wilderness Act 1987* prevents declaration of wilderness over freehold land without the written consent of the landowner. This consent takes the form of a conservation agreement under section 69B (1C) of the *National Parks and Wildlife Act 1974*. No landholders within the Curracabundi assessment area have expressed a wish to enter into such an agreement.

Freehold land that is identified as wilderness may be voluntarily offered to the government for sale, and may be purchased from land acquisition funds as funding allocations allow.

3.2 Social and economic significance

Economically, wilderness areas contribute to basic ecological services that natural lands provide. At a landscape scale, the core conservation corridor in north-east NSW provides critical help for the rehabilitation and sustainable use of adjoining and regional agricultural lands.

Ecosystem services provided by the Curracabundi Identified Wilderness include:

- *Maintenance of biodiversity:* The role of the wilderness network in conserving biodiversity is likely to become increasingly important as land use elsewhere in the landscape intensifies, and as the threats of climate change take effect. The size and configuration of the wilderness network, being well-connected and spanning a wide altitudinal and latitudinal range, is likely to form the most resilient part of our reservation network. The proposed Curracabundi Declared Wilderness (Section 4) represents a significant link in the existing wilderness network.
- *Maintenance of a clean, reliable water supply:* The rugged uplifted terrain and native forest captures the most reliable rainfall in the region. This flows to the Barnard and Curricabark Rivers and other tributaries within the proposed wilderness, which in turn flow to the Manning River, the major water supply for the Greater Taree region.
- *Carbon sequestration:* A substantial store of carbon, particularly in the older unlogged forests, and a high capacity for carbon capture within those logged forests that are now regenerating and secured from further logging.

Other values include:

- *Cultural values:* Intact, highly significant landscapes, sites and objects, which enable Aboriginal people to maintain their spiritual connections with Country – important for the health and welfare of Aboriginal communities and for all Australians.

- *Wild, rugged, inspiring and aesthetically-pleasing landscapes* that provide outstanding opportunities for self-reliant recreation, nature tourism and for improving human health and wellbeing.
- *A natural and cultural bridge* that links the stories and experiences of many local people and communities.

3.3 Competing land uses within reserves

3.3.1 Recreational uses

DECCW reserves within the Curracabundi Identified Wilderness are rugged and remote and provide opportunities for solitude and self-reliant recreation activities. The diversity of landscapes and forest types provide opportunities for bushwalking, nature observation and remote camping. Remote area camping is allowed throughout Curracabundi Identified Wilderness but campers must not camp within 200 metres of a public road. Section 2.3.3 lists a number of wilderness walks available in the Curracabundi area.

Christies Hut campsite within Curracabundi Identified Wilderness (Nowendoc National Park) is only available to bushwalkers. The site once supported a historic hut which has since been removed. A small fibro cottage remains in this location, which was built in the 1990s prior to the purchase of the property by DECCW. This cottage is available for use by bushwalkers, with visitor numbers managed by a booking system. There is no suitable public vehicle access to this location, as the management trail is steep and dangerous, so public access is only by foot. While the recreational use of this area is compatible with wilderness principles, the building at this site is not and it has no historic heritage values. It is however an excellent resource for visitors, as it provides modern amenities including beds and cooking facilities and DECCW would like to continue to make this available to the public. DECCW is proposing to exclude this building from the wilderness, as it will increase the range of recreational options available to those visiting Curracabundi Wilderness. The building is less than 2km from the identified wilderness boundary, therefore its excision will have a minor impact on the wilderness boundary.

Myall Creek Camp Ground is also within Curracabundi Identified Wilderness and is proposed for exclusion from wilderness declaration. This site provides a camping experience with only the most basic facilities in a natural landscape that can be accessed by vehicle (4WD), and is the only such campsite available to visitors travelling along Thunderbolts Way between Gloucester and Walcha. Similarly, Woko Camp Ground is also proposed for exclusion from wilderness declaration. It lies just within the identified wilderness and can be accessed by vehicle (2WD).

Wrights Hut and Karamea Homestead are outside of Curracabundi Identified Wilderness. Karamea Homestead can be accessed by 2WD. This homestead has been extensively renovated and it is proposed it be used as short term holiday accommodation. The Wrights Hut Day Use and Camping Area (in Nowendoc National Park) is suitable for 4WD and trailer access, and visitor numbers are managed via a permit system. Both Karamea Homestead and Wrights Hut exist within a modified cultural landscape and provide excellent access points for those wishing to explore the wilderness area.

There are other opportunities for vehicle-based recreation in the region which provide alternatives to vehicle use in the the Curracabundi area. Visitor facilities accessible from the Oxley Highway include a day use and camping area at nearby New Country

Swamp within Mummel Gulf National Park. Day use and camping facilities are also provided at Apsley Gorge and Tia Gorge within Oxley Wild Rivers National Park.

3.3.2 Bicentennial National Trail

The Bicentennial National Trail (BNT), a public use trail developed in 1988, runs from Cooktown in Queensland to Healesville in Victoria. This trail is available for non-motorised recreation such as walking, horse riding and bicycle riding (The Bicentennial National Trail n.b. 2010). Guidebooks published on the BNT in 1991 (The Bicentennial National Trail 1991) map a route which passes through the centre of the assessment area at Curracabark River. The section of the route in Curracabundi National Park commences in the east at Karamea, heads south and then east along Drover's Gate Trail, through a bridle trail at Drover's Gate (also referred to as Drover's Gap), then along Bloxom's Road which exits the park in the west (Figure 7). The guidebooks identify a campsite near Drover's Gate.

The BNT has not been in use along the Curracabark River route since 1995 and no campsite has been established in the park. Access was always dependent on a number of local landholders and since 1995 some landholders in the Curracabundi area have refused access, in part due to public liability concerns. An alternative route to the north of Nowendoc National Park via Nundle is currently in use.

If the Curracabark River route was declared as wilderness, horse riding would no longer be permissible along this route. Under DECCW policy horse riding is considered incompatible with the maintenance of wilderness. Horses are associated with environmental impacts such as the introduction of exotic weed species, the trampling of vegetation and erosion of soils.

A number of arguments *for* and *against* the declaration of wilderness over the Curracabark River route have been proposed to DECCW. DECCW is faced with the difficult task of weighing the risk of environmental damage from horse riding against the social impact of prohibiting any future horse riding along this section of trail.

Arguments against the declaration of wilderness over the Curracabark River route include:

- The route is iconic, following an historic bridle trail, and provides a significant recreational opportunity.
- The exclusion of the trail in this location does not preclude wilderness declarations north and south of the trail.
- The alternative route currently in use (via Nundle) requires travel on public gravel roads with traffic including heavy logging trucks. This route is unsafe and detracts from the overall quality of the trek.

Arguments for the declaration of wilderness over the Curracabark River route include:

- Public access to the trail may increase the threats to the brush-tailed rock-wallaby populations that exist in the Curracabark River area. Although the BNT website and guidebooks state that dogs are not permitted on the trail, landholders have reported instances of users of the trail being accompanied by dogs (prior to access being denied). Bringing dogs into the park increases the risk of predation and could have catastrophic consequences for the wallaby populations.
- Exclusion of the route would effectively bisect the Curracabundi Wilderness into two discrete areas. Access by horse riders along the route would reduce the ecological

integrity of the area and increase its exposure to edge effects such as weed invasion.

The conservation of the highly significant brush-tailed rock-wallaby population in this location is a key consideration. However it is not possible to substantiate the claim that the use of the trail by horse riders will increase the risk of dogs entering the park, thereby increasing risks to the rock-wallaby population.

DECCW is proposing that the BNT Curricabark River route be excluded from the declared wilderness so that the reopening of this route may be possible in the future should adjacent landholders permit access to BNT users. Comment is invited on this proposal.

3.3.3 Vehicle tracks and trails

Public trails within the assessment area are confined to the margins of the assessment area or finish well within the park, often at points which are of little public interest. There are no public trails bisecting the park which can be used as through-roads to and from major points of interest in the region. Consequently, many of the trails are of limited interest to visitors.

Publicly accessible trails which take visitors to major points of interest or are required for third party access are not proposed for declaration as wilderness. It is proposed that the trails listed below remain open to public access.

- The access trails to Myall Creek and Woko Camp Grounds and Christie's Hut.
- Myall Management Trail. This trail meanders in and out of the park boundary for approximately 16 kilometres along the eastern edge of Nowendoc National Park. Frequent fuel reduction control burns are conducted east of this trail to protect plantations in State forest to the east of the park. This trail is required for access by Forests NSW.
- Access to Flood Detour Road from Curricabark Road, on the western side of Woko National Park. This exclusion also encompasses the access trail to Woko Camp Ground and associated walking trail.
- Access to Kulmaren trig station.

The service road for Mt Myra communications tower is excluded from the proposed wilderness to allow third party management access to continue. The service road is currently closed to the public via a locked gate and will remain closed, as it passes through both park and private property.

The trails along the BNT route, Drover's Gate Trail and Bloxom's Road, are not currently accessible to public vehicles.

4 PROPOSED WILDERNESS DECLARATION AREA

“Wilderness comprises the last substantial remnants of the ecologically complete environment that once covered the earth”.

Alex Colley, Colong Foundation for Wilderness, 1996.

This section of the report proposes an area of potential declarable wilderness for public comment, and describes DECCW’s proposed Curracabundi Declared Wilderness.

Approximately 34,600 hectares of the Curracabundi Identified Wilderness are proposed for declaration, subject to the outcomes from the public exhibition process. A map is provided in Figure 7.

All private and leasehold land has been excluded from the recommended wilderness declaration areas being exhibited for community input.

4.1 Proposed Curracabundi Declared Wilderness for public comment

The proposed Curracabundi Declared Wilderness is illustrated in Figure 7. The areas proposed for wilderness declaration only include lands which are currently reserved as national parks or nature reserves. No freehold or leasehold land has been included within the proposed declared wilderness. The greater proportion of the area is substantially unmodified.

The proposed Curracabundi Declared Wilderness provides an important link to the world class network of declared wilderness areas throughout the State, particularly along the eastern escarpment of north-east NSW. The proposed wilderness provides important ecosystem services such as maintenance of biodiversity, watershed protection, climate regulation and carbon sequestration - services which are of significant benefit at the local, regional and national scale. Wilderness, being large areas in a highly natural condition and spanning a range of environmental conditions, may be the best chance for many species’ survival and adaptation under a rapidly changing climate. Wilderness has tremendous aesthetic, spiritual and cultural value. Keeping these areas intact may also provide economic returns through activities such as ecotourism, as well as the economic benefits of the associated ecosystem services.

4.2 Suitable boundary

Figure 7 illustrates the boundary of the proposed Curracabundi Declared Wilderness.

The boundary encompasses much of the Curracabundi Identified Wilderness, including the majority of Nowendoc National Park, Curracabundi National Park, Mernot Nature Reserve, Monkeycot Nature Reserve, Woko National Park and Watchimbark Nature Reserve.

In most cases the proposed declared wilderness boundary follows major geographical features such as ridge lines and creeks, however, a large proportion of the proposed

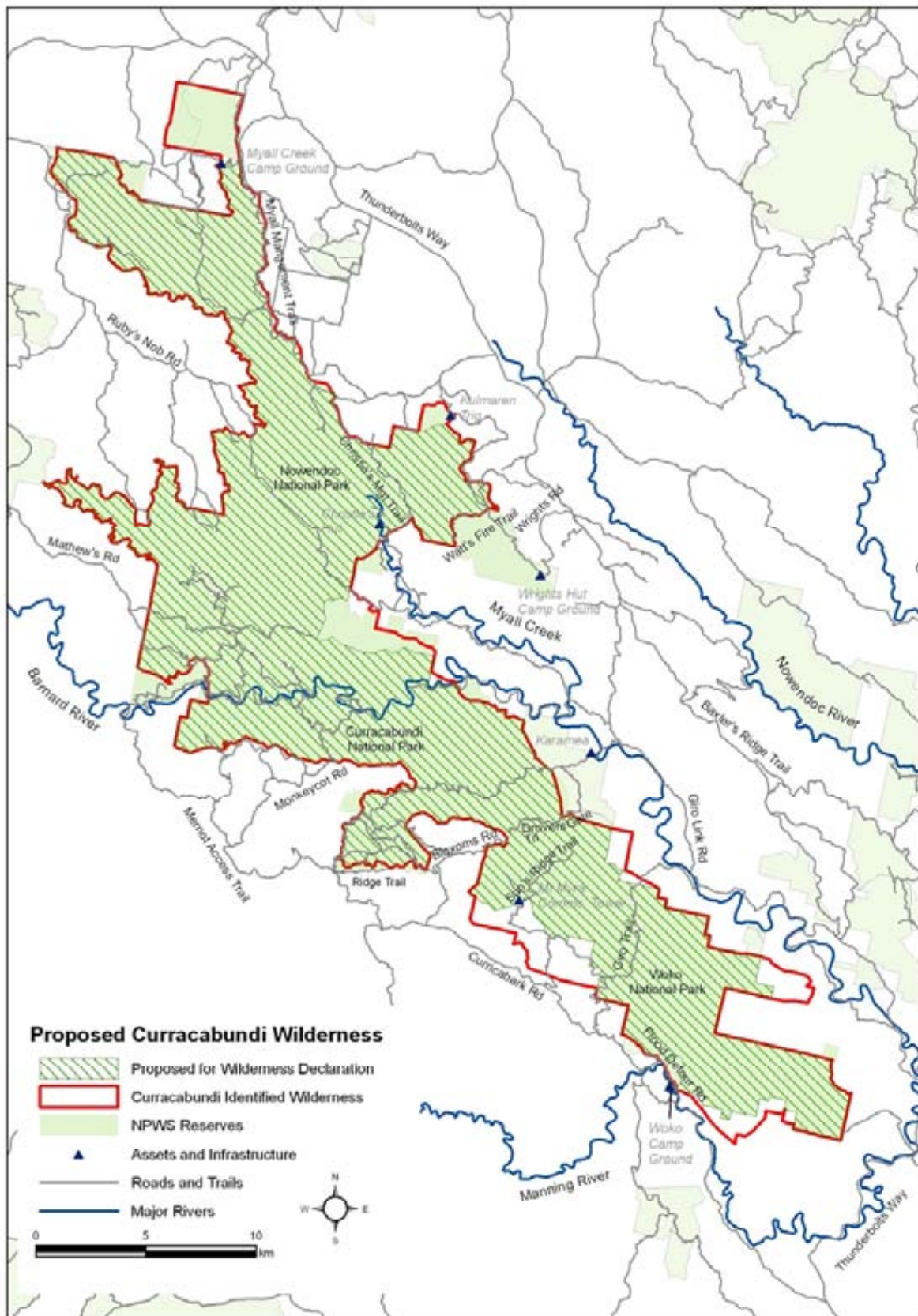
boundary corresponds with the cadastral lines which demarcate national park and nature reserve from freehold and leasehold land. A 30 metre offset from the park boundary is proposed for all areas where the park boundary adjoins freehold or leasehold, to allow for fencing and maintenance activities.

Major exclusions from the proposed Curracabundi Declared Wilderness are:

- All freehold land.
- Curracabundi State Conservation Area: State Conservation Areas (SCAs) are not generally declared as wilderness because activities which are incompatible with wilderness, such as mining, are permitted. The status of SCAs is reviewed every five years, and if this reserve is changed to another reserve category, such as national park, the potential for wilderness declaration may be considered at that time.
- The Bicentennial National Trail route through the Curricabark River area. This follows Drover's Gate Trail and Bloxom's Road. It is proposed that this route be excluded from wilderness to allow access to horse riders in the future, should landholders adjacent to the park permit access. Public vehicle access will continue to be excluded.
- Recreational sites: Woko Camp Ground and walking trails, and Myall Creek Camp Ground have been excluded to allow for continued vehicle access and the provision of basic recreational facilities. The access road to Myall Creek effectively bisects this northern end of the wilderness, which has also been excluded from the proposed wilderness declaration.
- Christies Hut: This area can only be access by foot and the recreational use of this area is compatible with wilderness principles. However the building at this site, a small cottage built in the 1990s, is not compatible with wilderness and it has no historic heritage values. DECCW is proposing to retain this building to allow for continued visitor use and exclude the building from wilderness. The building is less than 2km from the identified wilderness boundary, therefore its excision will have a minor impact on the wilderness boundary.
- Mount Myra communications tower and service road: The tower is outside the park and continued access to the tower is required to allow for essential management activities.
- Kulmaren Trig Station and immediate surroundings: The access road to the trig station is a small inholding and is surrounded by forest which has been logged relatively recently.
- Flood Detour Road (off Curricabark Road) in Woko National Park: This road is adjacent to Woko Camp Ground and is required for continued public access.

Of the 38,500 hectares of Curracabundi Identified Wilderness, 34,600 hectares are proposed for declaration as wilderness. This comprises 90% of the identified wilderness.

Figure 7. Proposed Curracabundi Declared Wilderness



5 MANAGEMENT OF DECLARED WILDERNESS

Consistent with legislated wilderness management principles (section 9 of the *Wilderness Act 1987*), a central management objective in declared wilderness is to remove incompatible forms of development or land use, and restore wilderness values, except where such developments have significant Aboriginal cultural heritage or historic heritage values. This does not affect any existing legal interests in force at the time of wilderness declaration.

This section explains the implications to management and current park use if these areas are declared as wilderness.

5.1 Roads, tracks and trails in declared wilderness

Roads, tracks and trails impact on naturalness because their establishment and maintenance necessitate clearing of natural ecosystems. They are also the focus for non self-reliant recreation, such as horse riding and recreational vehicle use, and illegal activities such as car and rubbish dumping, arson, and theft of wildflowers and bushrock. Other impacts on naturalness include accelerated soil erosion, particularly on steep or poorly constructed trails.

Existing roads, tracks and trails within declared wilderness required for an essential management purpose or for self-reliant recreation will be maintained and used. Those not required for such purposes will be closed. Generally, public vehicle access will be prohibited except in some exceptional circumstances (discussed below).

5.2 Management of Aboriginal and historic heritage

The conservation of significant Aboriginal cultural heritage and historic heritage resources within declared wilderness will be undertaken in accordance with the obligations under the *National Parks and Wildlife Act 1974* and the Burra Charter (Australia ICOMOS 1999). Techniques for the management of these resources will have regard to the protection of wilderness values.

Some Aboriginal sites within declared wilderness may require active management to ensure their continued protection. DECCW will liaise with the relevant local Aboriginal Land Councils and Aboriginal communities on all aspects of Aboriginal site management within declared wilderness. As maintenance of these sites is an essential management operation, the use of vehicles on management trails for such purposes will be permitted.

Aboriginal people may also require access to sites of significance within declared wilderness for cultural purposes. Access for Aboriginal people to sites of significance within declared wilderness for cultural purposes is recognised by DECCW as an

essential management purpose and will be established in consultation with the Aboriginal community.

5.3 Recreation in declared wilderness

In accordance with the Act and its wilderness management principles, DECCW objectives in declared wilderness include the maintenance of opportunities for solitude and appropriate self-reliant recreation and the exclusion of activities which conflict with or diminish these opportunities. Other objectives for declared wilderness include the maintenance (or restoration) of an area in a substantially unmodified state. It may therefore be necessary to manage or prohibit existing or potential recreation activities within declared wilderness.

Low impact, self-reliant recreation practices will be encouraged. Examples of permitted activities within declared wilderness include walking, birdwatching, nature study, photography, picnicking and self-reliant camping. Vehicle use (including motor vehicles, motor bikes and motor boats) and horse riding will not be permitted, unless required for essential management purposes. Declared wilderness will be kept free of signs, trail markers and other management devices where practicable.

Appropriate self-reliant recreation activities that are generally permissible within declared wilderness may degrade the natural values of any area when undertaken too frequently or intensively, under unsuitable conditions, or inappropriately. Further, activities that are acceptable in isolation may not be appropriate for multiple-use areas, as they may present a safety hazard or impair the experience of other wilderness users. DECCW may manage, and temporarily restrict access to, the use of a declared wilderness area by any recreation activity causing environmental impact in conflict with the preservation of ecological integrity or other wilderness values.

5.4 Raising awareness

DECCW will:

- promote public understanding and the appropriate use of wilderness areas, including minimal impact bushwalking practices
- incorporate details on the location of any declared wilderness and management policies that apply to it into new or revised interpretation and public information displays and programs
- seek the cooperation of park neighbours adjoining any declared wilderness, to ensure that the wilderness condition of the park is protected to the maximum extent possible.

5.5 Fire

DECCW's fire activities remain essentially unchanged after a wilderness declaration is made. Fire management trails will continue to be maintained. Designated refuge areas and water access points will continue to be provided within any declared wilderness. Hazard reduction burns will also continue.

Wilderness declaration does trigger an additional requirement that wilderness values be considered when planning for or undertaking fire-related activities. This may result in

rehabilitation or restoration works, such as the rehabilitation of helipads, once the fire-related activity has been completed.

The protection of life and property remains one of DECCW's fire management objectives in declared wilderness. Where it is required, hazard reduction burning will continue, and existing authorised fire trails within declared wilderness will remain open and continue to be available for fire management purposes.

DECCW has consulted with the Rural Fire Service and adjoining landholders in the preparation of Reserve Fire Management Strategies for Woko National Park, Curracabundi National Park and surrounding reserves and Watchimbark Nature Reserve.

5.6 Introduced species

The control of pest animals and weeds is consistent with the management objective of restoring declared wilderness to its natural state. Control programs for pest animals and weeds will therefore continue to be undertaken in declared wilderness. This will occur with minimal environmental impact where practicable.

Feral animal control programs that include ground baiting and aerial baiting would be permitted and implemented. Relevant authorities would need to consult with DECCW regarding any baiting program within a wilderness area and meet any wilderness policy guidelines, but these are no different from existing procedures for baiting within national parks. There are already reactive and strategic wild dog baiting programs within declared wilderness areas, including those in the Oxley Wild Rivers, Guy Fawkes and Washpool national parks.

6 ABBREVIATIONS

CRAFTI	Comprehensive Regional Assessment Air Photo Interpretation Project
DECCW	Department of Environment, Climate Change and Water
IFOA	Integrated Forestry Operations Approvals
NFPS	National Forest Policy Statement
NSW	New South Wales
TSC Act	<i>Threatened Species Conservation Act 1995</i>

7 TERMINOLOGY

Wilderness: Wilderness is a large, natural area of land that, together with its native plant and animal communities, has remained essentially unchanged by modern human activity.

Wilderness Act 1987: The NSW *Wilderness Act 1987* (the Act) is legislation that provides for the identification, protection and management of wilderness areas in NSW.

Wilderness proposal: A written proposal or nomination by a person or an organisation made under the *Wilderness Act 1987* for wilderness identification and declaration.

Wilderness assessment: The assessment of an area for wilderness values according to the criteria in the *Wilderness Act 1987* which specifies that the area and its plant and animal communities, must:

- be in a relatively natural state or be capable of being restored
- be large enough to maintain a natural state
- provide opportunities for solitude and self-reliant recreation.

Wilderness Assessment Guidelines (“Guidelines”): DECCW policy which describes the framework and methodology for undertaking wilderness assessments consistent with the requirements of the *Wilderness Act 1987*.

Identified Wilderness: Upon completion of a wilderness assessment, an area may be identified as wilderness. This is a statutory term indicating that these areas meet the criteria of the Act and have been formally endorsed by the Director General of DECCW.

Wilderness assessment report: A formal report of the wilderness assessment process detailing the method and results of assessment. It describes identified wilderness and makes recommendations for declaration.

Public exhibition of wilderness assessment report: Following formal identification of the wilderness values within the nominated area, the resultant wilderness assessment report is placed on public exhibition and landholders, interest groups and the public are encouraged to provide comments on the report. The Minister will take into consideration the range of public comments on the wilderness assessment when considering which areas are to be declared as wilderness.

Declared Wilderness: This is a statutory term meaning the Minister for Climate Change and the Environment has declared an area wilderness under the *Wilderness Act 1987*. Once an area is declared wilderness, certain management constraints apply to ensure wilderness values are maintained. The Minister considers the wilderness assessment report, public submissions and recommendations from DECCW.

8 REFERENCES

Commonwealth of Australia, 1992, National Forest Policy Statement. Canberra.

Commonwealth of Australia, 1997, Proposed Nationally Agreed Criteria for the Establishment of a Comprehensive, Adequate, Representative Reserve System for Forests in Australia. Report by the Joint ANZECC/MCFFA National Forest Policy Statement Implementation Subcommittee. Canberra.

Commonwealth of Australia, 2009, Australia's Strategy for the National Reserve System 2009 – 2030. Canberra.

Commonwealth of Australia, 2010:
[Http://www.environment.gov.au/parks/nrs/index.html](http://www.environment.gov.au/parks/nrs/index.html)

Copeland, L., 2007, *Notes on the Vegetation of the "Icon" Addition to Nowendoc National Park*. A report prepared for Department of Environment and Climate Change, Walcha Area.

Department of Environment and Climate Change, 2008, *Recovery Plan for the Brush-tailed Rock-wallaby* *Petrogale penicillata*, Department of Environment and Climate Change, Sydney.

Department of Environment and Climate Change, 2007, Alps to Atherton. A continental-scale lifeline to engage people with nature: NSW Business Plan 2007–2010, Department of Environment and Climate Change, Sydney.

Department of Environment, Climate Change and Water, 2009, The Great Eastern Ranges Initiative, available at:
<http://www.environment.nsw.gov.au/ger/abouttheGER.htm>

Department of Environment, Climate Change and Water, (in prep). Nowendoc National Park and Ngulin and Tuggolo Creek Nature Reserves Draft Plan of Management. Department of Environment and Climate Change, Sydney.

Department of Water and Energy, 2009, Commenced Water Sharing Plan for the Lower North Coast unregulated and alluvial water sources, NSW Government Sydney.

EcoLogical Australia, 2009, *Watchimbark Nature Reserve Vegetation Communities and mapping*, An unpublished report prepared for DECCW, 12 August 2009.

Hughes, L, 2003, Climate change and Australia: trends, projections and impacts. *Austral Ecology* **28**, 423-443.

Jack, I, 2007. Curracabundi National Park Contextual History. Report to Department of Environment and Climate Change.

- Keith, D, 2004, Ocean shores to desert dunes: the native vegetation of New South Wales and the ACT, NSW National Parks and Wildlife Service, Hurstville.
- Kortner G. and P. Watson, 2005, The immediate impact of 1080 aerial baiting to control wild dogs on a spotted-tail quoll population, *Wildlife Research* **32**, 673-680.
- Leon, M., n.d., *The History of the Worimi People*, <http://www.tobwabba.com.au/worimi/>, accessed 1 February 2010.
- Messner, A., 2009, *Nowendoc National Park History*, An unpublished report for the Parks and Wildlife Group, NSW Department of Environment, Climate Change and Water.
- National Parks and Wildlife Service, 1998, *Wilderness Assessment Project - Upper North East and Lower North East*, A project undertaken as part of the NSW Comprehensive Regional Assessment, National Parks and Wildlife Service, Sydney.
- National Parks and Wildlife Service, 2001a, *North-east New South Wales Wilderness Identification Report 2001*, Unpublished report to Director-General of National Parks and Wildlife, NSW NPWS (Northern Directorate), Coffs Harbour, NSW.
- National Parks and Wildlife Service, 2001b, *Assessment of the Yengo wilderness*. Unpublished report to Director-General of National Parks and Wildlife, NSW NPWS (Central Directorate), Parramatta, NSW.
- National Parks and Wildlife Service, 2001c, *Completion of GIS Products for the Lower North East CRAFTI Structural and Floristic Layers*, NSW Regional Assessments, September 2001, Sydney.
- Resource Planning and Development Commission 2003, *State of the Environment Tasmania 2003*, <http://www.rpdc.tas.gov.au/soer>, accessed September 2006.
- Scotts, D., 2003. Key Habitats and Corridors for Forest Fauna: A Landscape Framework for Conservation in North-east New South Wales, NSW NPWS Occasional Paper 32, NSW National Parks and Wildlife Service, Sydney.
- The Bicentennial National Trail: <http://www.nationaltrail.com.au/index.html>. Accessed 1 February 2010.
- The Bicentennial National Trail, 1991, *The Bicentennial National Trail Guidebook. Number 8: Ebor to Barrington Tops*, The Bicentennial National Trail, Toowoomba.
- Turak, E. and G. Hose, 2004, River Health in the New South Wales Lower North Coast, Hunter and Central Coast Catchments: A report of AusRivAS assessments 1994–1999, NSW Environment Protection Agency, Sydney.

APPENDIX 1 WILDERNESS NATURALNESS ASSESSMENT METHODS

Problems associated with previous data

During the North East Comprehensive Regional Assessment (CRA) Northern Wilderness Assessment a region-wide 'naturalness' or Wilderness Quality geographic information system layer was developed. First developed in 1998, this layer was derived from a number of sources including forest mapping (constructed from Aerial Photography Interpretation (API), (Broad Old Growth mapping and Lower North East CRAFTI structural mapping), logging history records obtained from FNSW (MANHIC) and ruggedness. Updates to this layer were made during the 2000 wilderness assessment.

While the CRA wilderness quality layer was based on the most current and detailed information available during this period, this layer is now based on information 13–18 years old and is considered to be too unreliable for use in this wilderness assessment. The photos used to derive the CRA wilderness quality for the Curracabundi area were taken in 1992, 1993 in the south of the study area, and in 1997 in the north (Nowendoc National Park). At this time much of the study area was State forest or leasehold. Since then, much of the area has been transferred from State forest and/or purchased from leaseholders and added to national parks and reserves. More recent information was needed to take into account various changes which may have occurred since previous mapping, such as regeneration of minor logging trails and intensively grazed areas or logging events prior to reservation.

Updating the existing wilderness quality layer: remapping

In order to take into account any changes that had occurred since the original mapping, more recent aerial photos (2006) were purchased and the forest structure was re-mapped for the whole of the assessment area using CRAFTI structural rule set (NPWS 1998, NPWS 2001c). These were re-coded into a Wilderness Quality layer using the same rule set applied during the CRA (NPWS 2001a) (Figures A, B and C). Decision rules for this interpretation were based on 'candidate old-growth' identification criteria which were agreed by the old-growth expert working group and used during the Comprehensive Regional Assessment. This rule set uses 3 measures of disturbance:

Growth stage: relative proportions of mature, senescent and regrowth forest.

Relative stand density: this is the proportion of the original 'natural' stand which is present at the time of mapping as either mature or senescent trees. That is, any artificial gaps or regrowth are counted against that measure.

Disturbances such as weeds or log dumps. This is only a record of disturbances that are visible from aerial photos. Where no (or a null) disturbance code has been assigned

this does not necessarily mean disturbance is not present or would not be observable from the ground. In some cases sufficient time has passed for the canopy to regenerate and cover evidence of disturbance from aerial inspection.

While the rule set for the Curracabundi assessment was consistent with the CRA wilderness methodology, some minor changes were made. These were refinements made possible due to the small assessment area (relative to the CRA) and the availability of improved data.

Refinements from CRA methods

Firstly, a separate roads and trails (GIS) layer replaced CRAFTI codes for roads where these overlapped. This gave a more precise footprint for roads in these locations. Wilderness classes were assigned to roads and trails consistent with Yengo Wilderness Assessment (NPWS 2001b) and are described in Table 4 of this report.

Secondly, a number of data sets used to create the wilderness quality mapping during the CRA wilderness assessment in 2001 (NPWS 2001a) were not used in the Curracabundi assessment, including Broad Old Growth Mapping Project, Broad Vegetation Classes State forests Management History (MANHIC) and ruggedness. These layers are either coarse and more useful for broad scale identification of potential assessment areas, or are now too dated to be considered reliable. These data sets were superseded by the revised forest structure (CRAFTI) mapping.

Consistent with the CRA wilderness assessment in 2001 (NPWS 2001a), fire was only considered in so far as evidence of structural alterations due to fire were evident in CRAFTI mapping (Figure B).

Regrowth classification

Regrowth crown cover percent (Table A) is an estimate of the percentage of the total eucalypt crown area over a polygon, which is deemed to be regrowth. Only regrowth trees, which are visible from the aerial photograph, are counted (not regrowth, which is overtopped or too young). The regrowth is estimated as a percent of the total eucalypt cover, not the total polygon area, so that very sparse polygons may still show a high regrowth percentage.

Senescence classification

Senescence crown cover percent (Table A) is an estimate of the percentage of the total eucalypt crown cover over a polygon which is deemed to be senescent. The senescence is estimated as a percentage of the total eucalypt crown cover, not the total polygon area.

Figure A: Growth stage rule set used in forest structure mapping for Curracabundi wilderness assessment area:

From NPWS (1999). CRAFTI Guide 2000. A Guide to Using CRAFTI. Unpublished report.

Code	Relative Crown Cover %	
	Regrowth Trees	Senescent Trees
tA	<10%	>30%
tB	<10%	10-30%
tC	<10%	<10%
sA	10-30%	>30%
sB	10-30%	10-30%
sC	10-30%	<10%
eN	>30%	no value recorded (as N)

Figure B: Disturbance code rule set used in forest structure mapping for Curracabundi wilderness assessment area:

Disturbance codes were assigned on the basis of whether or not there were visible signs of these factors from aerial photographs.

Group	Code	Description
No Evidence	n	No discernible evidence of disturbance
	P	Evidence of intense grazing
Site Changes	b	Landslips
	e	Erosion
	o	Evidence of past clearing, buildings, dams etc.
	J	Roads or tracks
Logging	x	Recent Logging
	c	Older Logging
	g	Canopy gaps
Stand changes	z	Clustering of different crown sizes and/or heights
	k	Clusters of canopy gaps, little or no regrowth
	t	Canopy even aged
	h	Two or more strata of different height
	v	Small canopy gaps, uniformly spread
	f	Wildfire crown damage
	s	Dead standing trees >5 per hectare
	d	Crown Dieback
Veg. Invasions	L	Lantana
	w	Weeds, non specific
	a	Native Pioneers

Figure C: Assigning wilderness naturalness codes to forest structure.

Growth stage, relative stand density and disturbance codes were combined to determine the level of disturbance, and assigned wilderness naturalness classes accordingly.

Growth Stage	Relative Stand Density	Disturbance Codes	Disturbance level	2010 wilderness code
tA, tB, tC, sA	3 or 4	n, or not (x, c, g+z, g+a, g+w, W,L, s, d)	negligible	SU
tA, tB, tC, sA	3 or 4	x, c, g+w, L, W, s, d	disturbed	MR
tA, tB, tC, sA	3 or 4	g+z, g+a, g, z, a	negligible	SU
sB & sC	3 or 4	n, g, z, a or not (x, c, g+z, g+a, g+w, W,L, s, d)	negligible	SU
sB & sC	3 or 4	x, c, g+z, g+a, g+w, W,L, s, d,	disturbed	MR
e,d, f, g	1,2,3,4	All	disturbed	MR
All		b,o or J	disturbed	MR
All		P	disturbed	MR
All	1 or 2	All	disturbed	MR
All natural non-eucalypt forest or non-forest		None, v or W	negligible	SU
All natural non-eucalypt forest		L. c	disturbed	MR
Ex			heavily disturbed	SM