

Assessment of the

Yengo



NSW
NATIONAL
PARKS AND
WILDLIFE
SERVICE

WILDERNESS

**Central, Conservation Programs and Planning Division
NSW National Parks and Wildlife Service
November 2001**

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**Central Conservation Programs & Planning Division
NSW National Parks and Wildlife Service**

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Abbreviations appearing in report

ANZECC	Australian & New Zealand Environment & Conservation Council
ASL	above sea level
BP	before present
NFPS	National Forest Policy Statement
NP	National Park
NPWS	NSW National Parks and Wildlife Service
NWI	National Wilderness Inventory
PO	permissive occupancy
SRA	State Recreation Area

IDENTIFICATION OF THE YENGO WILDERNESS

I, Brian Gilligan, Director-General of NSW National Parks and Wildlife, having considered the findings and recommendations contained in "Assessment of the Yengo Wilderness", dated November 2001, identify as wilderness, in accordance with the requirements of section 6 of the *Wilderness Act 1987*, the area described in this report and shown by a black line in Figure 9 of this report.

A handwritten signature in black ink that reads "Brian Gilligan". The signature is written in a cursive style with a large initial 'B' and a long, sweeping tail.

Brian Gilligan
Director-General
NSW National Parks and Wildlife

EXECUTIVE SUMMARY

Wilderness is a large area of land which, together with its native plant and animal communities, and the ecosystems of which they are a part, is largely unmodified. Wilderness areas represent the most intact and undisturbed expanses of our remaining natural landscapes.

An assessment of the Yengo area has been conducted in accordance with the *Wilderness Act 1987* in order to determine whether there are lands which are considered capable and suitable for declaration as wilderness. Yengo is located between the Hunter Valley and the Hawkesbury and Colo Rivers, i.e. approximately 100 km north of Sydney. The assessment area of potential wilderness consists of approximately 193,000 hectares, mainly encompassing Yengo National Park, Parr State Recreation Area and small areas of vacant Crown land, leasehold land and freehold land. The NSW National Parks and Wildlife Service (NPWS) is responsible for assessments under the *Wilderness Act 1987*.

This wilderness assessment project has been undertaken as a part of the Comprehensive Regional Assessments (CRAs) of forests in New South Wales. The CRAs provide the scientific basis for regional forest agreements (RFAs) for major forest areas in New South Wales. The agreements determine the future use of forests. The wilderness assessments undertaken in 1998-99 assisted the CRA negotiations, however wilderness was **not formally identified** at this stage. Since the initial forest agreements the NPWS have selected a refined wilderness assessment boundary that includes potential wilderness from the National Wilderness Inventory.

During the Yengo assessment, discussions with landowners and local stakeholders as well as a formal public consultation phase provided important input into the process of delineating identified and recommended wilderness boundaries. The NPWS invited initial submissions from landholders within and adjacent to the assessment area and from stakeholders and relevant government agencies.

The NPWS undertook the wilderness assessment based on the three principal criteria in section 6 of the *Wilderness Act*: **naturalness, size, and opportunities for solitude and appropriate self-reliant recreation**. A two-stage wilderness assessment methodology was used:

1. capability assessment
 - **identify** lands with wilderness qualities
 - outcome was a map of **identified** wilderness; and
2. suitability assessment
 - critical evaluation of identified wilderness boundary
 - consideration of practicalities of wilderness protection & management
 - determine **management** boundary
 - outcome is map of areas recommended for **declaration** & management as wilderness.

The capability assessment examined the impacts of past and present land uses on the area's naturalness, as well as assessing whether the area is large enough and is capable of providing solitude and appropriate self-reliant recreation. Previous documents relating to the history, use and management of the area, interviews with

people familiar with the area and examination of air photos and physical evidence were used to assess the location and extent of historical disturbances (logging, clearing, road building, bushrocking, mining, grazing) to the area's naturalness. Discussions with landowners and NPWS managers were used to assess current impacts such as fires, recreational activities, weeds, feral animals, pollution and grazing. Compared with the remainder of the Lower North East CRA area, the Yengo area is data poor in terms of available disturbance mapping. Discussions with people with a long association with area helped to fill some of the gaps in the available data.

Areas which were substantially modified and not capable of being restored were generally excluded from the identified wilderness. Those areas included the majority of Parr State Recreation Area (generally south/ south-east of Webbs Creek), the Big Yango Station within Yengo National Park (lands north-east of Mt. Yengo, bounded to the north by Yango Track) and the valley areas around Wallabadah and Boree Valley.

The suitability assessment addressed practical considerations such as recreational use, feasibility of management and ease of locating wilderness boundaries in the field, whilst keeping in mind the need to create a consolidated wilderness boundary consistent with basic reserve design principals. Those considerations resulted in the boundary being located along features such as creeks, ridges and trails; exclusion of major recreation areas; exclusion of non-NPWS roads and exclusion of freehold land which cannot be declared wilderness without the landholder's consent. Other considerations include setting the boundary back from towns, roads and powerlines and excluding narrow linear areas to ensure wilderness qualities are maintained.

Areas which were excluded from the recommended declared wilderness due to their non-suitability included Mt. Yengo, land north of the Bala Range Trail, land north of Burrowell Creek, projections towards the Macdonald townships and some roads and trails. As a result, the recommended declared wilderness is divided into three significant areas. One area is to the north of the Old Settlers Road, another between the Old Settlers Road and the Howes Valley Trail/ Yango Track and the third being to the south of Howes Valley Trail/ Yango Track (north of the Womerah Range Trail).

The assessment process resulted in an area of 134,900 hectares being identified as wilderness (Figure 9), and a total area of 105,400 hectares being recommended for declaration as wilderness (Figure 9). The area recommended for declaration as wilderness consists entirely of Yengo National Park. The area shown in Figure 9 will be placed on public exhibition as the preferred option for declaration under section 8 of the Wilderness Act 1987 and section 59 of the National Parks and Wildlife Act 1974 as the Yengo Wilderness. The boundary will then be reviewed in light of the submissions received, prior to a final recommendation to government.

The 7,400 ha Simpson Valley section of the identified wilderness has not been recommended for declaration at this point because it is separated from the main wilderness and is smaller than the 8,000 ha size threshold. It could be declared wilderness in the future if it ever becomes contiguous with the main wilderness. Subject to private landholders' voluntary sale of their lands, an area of up to 14,200 hectares of land, which includes some national park lands in close proximity to private lands, could be added to the Yengo Wilderness. Some small areas of Crown land could also be declared as wilderness, if added to Yengo National Park at a later stage.

Table 1: Assessment of the Yengo wilderness - areas

Assessment stage	NPWS Reserve (ha)	Other (ha)		TOTAL AREA (ha)
		Crown land	Private land	
Assessed area	-	-	-	193 000
Identified wilderness	127 940	1 260	5 700	134 900
Recommended for declaration as wilderness	105 400	0	0	105 400

ASSESSMENT OF THE YENGO WILDERNESS

1 Introduction

An assessment of the Yengo area has been conducted in order to determine whether part of it should be officially identified and/or declared as wilderness. The assessment area consists of approximately 193,000 hectares, mainly encompassing Yengo National Park, Parr State Recreation Area and small areas of vacant Crown land, leasehold land and freehold land.

The NSW *Wilderness Act 1987* (the Act) provides for land in New South Wales to be identified, protected and managed as wilderness. Section 6 of the Act states that an area of land cannot be identified as wilderness unless:

- it has not been substantially modified by humans;
- it is of sufficient size; and
- it is capable of providing opportunities for solitude and appropriate self-reliant recreation.

The NSW National Parks and Wildlife Service (NPWS) is responsible for administering this Act. The Conservation Assessment and Data Unit of the Central Conservation Programs and Planning Division is responsible for wilderness assessment of the area within the Central Region. State-wide coordination is provided by the Landscape Conservation Division, at the NPWS Head office. Under the Act, any person, body or organisation may propose that an area be assessed for identification and declaration as wilderness. The NPWS may also initiate wilderness assessments. The Yengo wilderness assessment study formed a component of the Lower North East CRA region assessment (see below).

As a signatory to the National Forest Policy Statement (NFPS), the NSW Government is committed to conserving and managing areas of wilderness as part of the national forest reserve system (Commonwealth of Australia, 1992). Creation of a comprehensive, adequate and representative reserve system was required, which aimed to protect biodiversity, old growth forests and wilderness. Under the NFPS the Commonwealth Government and State governments have agreed that "... forested wilderness areas will be protected by means of reserves developed in the broader context of protecting the wilderness values of all lands". The NFPS also required governments to jointly develop criteria for determining wilderness areas and wilderness boundaries, and specified that "... ninety per cent... of high quality wilderness that meets minimum area requirements should be protected in reserves" (Commonwealth, 1997).

A comprehensive regional assessment (CRA) of forests in New South Wales was conducted by the NSW and Commonwealth Governments to provide the scientific basis for decision-making regarding the future use of such forests under Regional Forest Agreements (RFAs). For the major forest areas of NSW (such as the Lower North East NSW CRA Region), the NFPS was implemented via the development of RFAs.

The Yengo area assessments were instigated by the CRA process. In order for wilderness area declarations to be consistent with nationally agreed criteria, the Commonwealth's National Wilderness Inventory (NWI) has been used to identify areas of potential wilderness. Potential (high quality) wilderness is taken as that having a

minimum NWI rating of 12 and a minimum size of 8,000 hectares (Commonwealth, 1997).

The potential wilderness area has been determined by the NWI ratings and the boundary has been refined by the NPWS since the 1998-99 CRA/RFA negotiations. The refined area delineated for wilderness assessment by the NPWS's desktop assessment totals approximately 193,000 ha. This is referred to as 'the Yengo wilderness assessment study area' which is subjected to a capability assessment to identify areas with wilderness qualities and a suitability assessment to identify areas suitable for declaration as a wilderness.

2 Definition and History of Wilderness

2.1 Concept of Wilderness

'Wilderness' is a somewhat peculiar expression and has certain cultural connotations linked to its origins an English word (Nash, 1990). The word 'wilderness' can be traced to the Old English 'wild-deor-ness', meaning 'place of untamed beasts' (Nash, 1990), and is a combination of the Saxon and Celtic words for 'wild', 'animal' and 'nest, lair or territory' (Robertson *et al.*, 1992). As such, **wilderness** "...stood for the dark, the chaotic, the unknown and fearful, the back of beyond", and was the converse of **civilization**, which was an environment under human control (Nash, 1990). Consequently, the only form of wilderness which is true to its etymological roots is that which humans do not influence in any way whatsoever (Nash, 1990). This element of land having few or minimal signs of use or disturbance by humans is widely evident in modern English definitions of wilderness, as demonstrated in the discussion on definitions in the following section.

The earliest use of the word 'wilderness' can be traced to the Old Testament of the Christian Bible, where it first appeared in English in a fourteenth century translation of the Bible from Latin, and was used as a synonym for uninhabited and arid lands of the Near East (Hendee *et al.*, 1990). The Judeo-Christian interpretation of wilderness in such Biblical references was typically a vast area which was virtually uninhabited, desolate and arid, to which God sent people to punish or test them, eg. the Israelites' 40 years of wandering in the wilderness; Jesus' 40 days of fasting and resisting Satan's temptations in the wilderness.

Few, if any other languages appear to have a direct translation of 'wilderness' or an expression with the same meaning. Spanish in Latin America uses '*area silvestre*', literally meaning 'forested area', to refer to wild or uninhabited lands. French uses '*sauvage*' (meaning 'savage') to describe areas characterised by untamed or uncontrolled conditions. In Russian '*dikaya mestnost*' is believed to mean 'wild area'; however '*zapovedniki*', meaning 'forbidden areas', has been the official term used in the former USSR since 1917 to describe the national system of reserves intended to be "...analogous to American National Parks" (Hendee *et al.*, 1990).

The lack of direct translations for wilderness demonstrates the difficulty of transposing an essentially Anglo-European human construct to other cultures (Stankey *et al.*, 1990). Chief Standing Bear's succinct statement in the 1800s of the enormous gulf between the culture of his people, the Oglala Sioux, and that of the European settlers who were replacing it, still has relevance for the USA today, and could equally be applied to current conflicts over tenure and land use in Australia:

We did not think of the great open plains, the beautiful rolling hills, and the winding streams with their tangled growth as "wild". Only to the white man was nature a "wilderness" and only to him was the land "infested" with "wild" animals and "savage" people. To us it was tame. (Stankey et al., 1990)

It is useful to compare Standing Bear's view with an equally succinct statement about wilderness made by Aldo Leopold in 1948, who, at the end of a lifetime observing the impacts of humans on natural ecosystems in the US, wrote:

Wilderness is the raw material out of which man has hammered the artifact [sic] called civilization. (Leopold, 1966)

It appears that recognition of Indigenous Australians' relationship with the land in terms of identifying and managing wilderness has only begun to be realised (Robertson *et*

al., 1992). Aboriginal people have lived in Australia for at least 50,000 years and have occupied all parts of the continent, and as a result, it is now widely recognised that they have had widespread and significant impacts on the Australian environment over many millennia (Rose, 1996; Robertson *et al.*, 1992; P. Hegarty, pers. comm.). The relationship of Aborigines and Torres Strait Islanders with the land is that land, law and people are inseparable:

.... for Aborigines, the land traditionally provided not only their daily economic sustenance, but also the source of their origins and spirituality. (Young et al. quoted in Robertson et al., 1992)

Australian Aborigines... were intimately familiar with everything within [their natural environment], and the life they led demanded that they should have this detailed knowledge. They believed that they shared the same life-essence with all the natural species and elements within that environment. Their natural world was humanized, and this was true for the land as such. (Berndt & Berndt quoted in Robertson et al., 1992)

Use of 'wilderness' to describe Australian landscapes is largely anathema to Aborigines, as under current definitions it denies the many thousands of years of human occupation of those landscapes and excludes the active presence of humans, which suits non-Aboriginal Australians' desire for natural areas "uncontaminated by their own culture" (Rose, 1996). Our modern definition of 'natural' applied to wilderness landscapes perpetuates the misunderstanding of European settlers about the true forces shaping the Australian landscape:

Here on this continent, there is no place where the feet of Aboriginal humanity have not preceded those of the settler. Nor is there any place where the country was not once fashioned and kept productive by Aboriginal people's land management practices. (Rose, 1996)

Because indigenous Australians are fundamentally opposed to the concept of wilderness, it will be necessary to describe 'wilderness' landscapes with an alternative term in order to allow the aspects of both indigenous culture and non-Aboriginal nature conservation to be recognised (P. Hegarty, pers. comm.). For an alternative term (eg. 'cultural landscape', 'bushscape', 'bushlands') to be acceptable to indigenous Australians, it needs to express both indigenous values related to 'Country' and non-indigenous values already associated with 'wilderness', while at the same time being disassociated with the unacceptable aspects of 'wilderness' (P. Hegarty, pers. comm.).

Because of the apparently exclusive association of the word with English, it is perhaps not surprising that wilderness is only formally protected in countries where English is the dominant language of education and government and which are all former British colonies. Following the example of the United States, five other countries with English as the principal language - Australia, Canada, New Zealand, South Africa and Zimbabwe - share a common purpose of explicitly protecting and managing wilderness (Stankey *et al.*, 1990). The USA provides an important model for wilderness designation and management in those countries, as it has been primarily responsible for developing the concept of wilderness and formulating techniques of wilderness management (Hendee *et al.*, 1990).

By comparison, the USSR, Latin America, the Nordic countries and Italy are characterised by having languages other than English as the principal *lingua franca*, and by having **de facto** wilderness areas as an incidental part of lands reserved specifically for their wildlife or natural values (as opposed to **designated** wilderness areas in countries such as USA and Australia) (Hendee *et al.*, 1990). In addition, some of those countries are attempting to import the principle of wilderness

established in English speaking countries, and to adapt it to their own political and legal systems for administering land. In the north of Italy, for example, the *Wilderness Associazione Italiana* has proposed to the Piedmont Regional Council that it establish a national park in the Val Grande area as a "... first step toward the realization of the first wilderness area in Italy" (Vetrino quoted in Stankey *et al.*, 1990). However the Val Grande area would not qualify as wilderness according to any North American definition, as in the past it has been extensively modified by habitation, deforestation and agricultural activities (Stankey *et al.*, 1990).

By contrast, the American concept of wilderness is appearing to become more widely understood and appreciated in the Nordic countries - Sweden, Norway, Finland, Iceland and Denmark - where opportunities for protecting large areas of essentially natural lands still exist. The world's largest national park, covering 700,000 km², protects a uniform and practically intact arctic ecosystem in Greenland (part of Denmark). In Finland, the Arctic Centre at the University of Lapland initiated a project in 1991 called 'Wilderness - the Biological and Sociological Meaning in the Northern Areas' (Stankey *et al.*, 1990).

2.2 History of Wilderness

As Western (ie. European) society developed and sciences such as geography, physics and botany advanced, people became less superstitious and fearful of the forbidding nature of large, uninhabited natural areas and began to appreciate them for their inherent values (Hendee *et al.*, 1990). The value of large natural areas, albeit principally for the utility they offered to people, was first formally recognised in 1864 by the US Government's granting of Yosemite Valley to the State of California "to hold....inalienable for all time", and in 1872 by the reservation of a large area in the Yellowstone region, which later was named Yellowstone National Park (Hendee *et al.*, 1990). However, calls for wild and natural areas to be set aside in the USA were made as early as 1833, when George Catlin, a painter and chronicler of the North American Plains Indians, called for the establishment of "*a nation's park, containing man and bear, in all the wild and freshness of nature's beauty!*" (DiSilvestro, 1993). A short time later, in 1858, Henry David Thoreau questioned "why should we not have our national preserves in which the bear and panther, and some even of the hunter race, may still exist" (Hendee *et al.*, 1990).

Possibly the first concerted effort to set aside "wild places" can be traced to the day in September 1870, when members of an expedition led by Henry Washburn exploring the Yellowstone region, first observed a geyser erupting beside the Firehole River in Wyoming Territory (DiSilvestro, 1993). The group resolved to campaign for a large area encompassing geysers, hot springs, rivers, lakes and forests to be set aside by Congress. The Act passed by Congress in 1872 specified that:

the area is to be reserved from settlement, occupancy, or sale... and dedicated and set apart as a public park or pleasuring-ground for the benefit and enjoyment of the people... [and]

the Secretary of the Interior is to establish rules and regulations for the preservation... of all timber, mineral deposits, natural curiosities, or wonders within said park, and their retention in their natural condition.

The need to protect large natural areas, albeit primarily for the utility they offered to the European population, was recognised soon after in Australia with the establishment of The National Park (later renamed Royal National Park) by the NSW Colonial Government in 1879. It appears that there is no evidence for The National Park being inspired (in either concept or name) by the reservation of Yellowstone, as it was not

until 1883 that the term 'national park' was used by Congress in legislation to describe Yellowstone (Mosley, 1978). However the very naturalness and ruggedness of The National Park was seen as an obstacle when, in 1881, Sir Henry Parkes said in the NSW Parliament:

The Honourable Member says it is a wilderness and that years must elapse before it can be of any use, but is it to remain a wilderness? ...Certainly it ought not to remain a wilderness with no effort to improve it. (Mosley, 1978)

The idea of establishing reserves primarily to protect natural values evolved in Australia from the 1890s, as evidenced by the need to prevent picking of native flora as a major reason for establishing 'Ku-ring-gai Chase' (later named Ku-ring-gai Chase National Park) in 1894 (Mosley, 1978).

The idea of protecting large natural areas for their own sake rather than for their utility to people was first developed and promoted in the early 1900s by Aldo Leopold, a forester employed by the US Forest Service. As a result of his assessment of the impacts of humans on natural landscapes and his lobbying efforts, the first wilderness area in the world, the Gila Wilderness, was established in New Mexico in 1924. Leopold believed that wilderness had to be "devoid of ...works of man" and very large, which was reflected in the 300,000 hectares set aside as the Gila Wilderness (Robertson *et al.*, 1992).

Over the next 40 years Robert Marshall, another US Forest Service employee, and other wilderness proponents vigorously lobbied the US Government to pass legislation so that wilderness could be properly protected. The result was the passing by Congress of the *Wilderness Act 1964*, under which 37 million hectares of public land has been protected in nearly 500 wilderness areas (Robertson *et al.*, 1992).

In Australia the first formal recognition of wilderness (originally called 'primitive areas' by conservationists such as Myles Dunphy) was the gazettal in 1934 of the Tallowa Primitive Reserve in NSW (later incorporated into Morton National Park) (Robertson *et al.*, 1992). Ten years later the *Kosciusko State Park Act 1944* provided for up to 10% of the Park to be protected as a primitive area (Robertson *et al.*, 1992). However it was not until 1963 that the Kosciusko State Park Trust declared the protection of 25,000 hectares around the summit of Mt. Kosciusko as a primitive area. The declaration was significant for two reasons: it was the outcome of several years of debate and conflict between the bushwalking/recreation lobby and the scientific/preservationist lobby; and it was intended to prevent construction of a dam on Spencers Creek below Mt. Kosciusko by the powerful Snowy Mountains Hydro Electricity Authority (Turner, 1979).

The first major legislative provision for protecting wilderness in Australia was in the *NSW National Parks and Wildlife Act 1967* (also included in a revised Act in 1974), which allowed the whole or parts of national parks to be declared as wilderness areas (Robertson *et al.*, 1992).

Wilderness protection in eastern Australia received a major impetus in 1976 when an inventory of potential wilderness areas in south eastern Australia by Peter Helman and others at the University of New England was published (Helman *et al.*, 1976). This inventory is still used by wilderness proponents, particularly in NSW, to identify areas worthy of protection as wilderness.

In 1987 the *NSW Wilderness Act* was passed, which was the first Act in Australia to deal exclusively with wilderness, and which provided for the identification and protection of wilderness areas both within and outside national parks in NSW. By June 2000 approximately 1.5 million hectares of wilderness in 32 wilderness areas had been protected under the Act.

2.3 Definitions of Wilderness

Three themes have been identified which are central to all concepts of wilderness:

- **experiential** - the direct value of experiencing wilderness;
- **scientific** - the value of wilderness for research and as an environmental baseline; and
- **spiritual/symbolic** values of wilderness to the nation and the world (Hendee *et al.*, 1990).

Most American and Australian definitions of wilderness include aspects of these three themes to varying degrees.

At a more pragmatic level, it is possible to identify five common attributes in wilderness definitions:

- **naturalness** ie. absence of modification;
- **remoteness** ie. spaciousness, capacity for solitude;
- **size** ie. sufficiently large area; ecological viability;
- **modern society** ie. impacts of settlement, industry and technology; and
- **potential for restoration** ie. to enhance the naturalness and remoteness of an area (Robertson *et al.*, 1992).

To understand our modern definitions of wilderness, it is worthwhile first to look at some of the earliest definitions of wilderness formulated by American and Australian conservation pioneers. In the 1830s Henry David Thoreau, whilst not quite postulating a definition for wilderness, succinctly expressed the importance of protecting natural areas:

What we call wildness [sic] is a civilization other than our own. In wildness is the preservation of the world. (Robertson *et al.*, 1992)

In 1921, Aldo Leopold published an article in the American Journal of Forestry titled 'The Wilderness and Its Place in Forest Recreational Policy', in which he defined wilderness as:

...a continuous stretch of country preserved in its natural state, open to lawful hunting and fishing, big enough to absorb a two weeks' pack trip, and kept devoid of roads, artificial trails, cottages, or other works of man. (Brown & Carmony, 1990)

Leopold's definition certainly includes references to naturalness and the impacts of modern society, and is strongly influenced by the necessity for remoteness and very large size ("two weeks' pack trip" refers to the duration of a trip by packhorse). However Leopold made no mention of the need or potential to restore degraded or disturbed areas in his definition.

In 1930 Robert Marshall, an employee of the US Forest Service and a prominent campaigner for wilderness protection, formulated a definition for wilderness which included strong references to naturalness, remoteness, size and freedom from impacts of modern society, but also omitted any reference to the potential for disturbed areas to be restored (Robertson *et al.*, 1992).

The definition of wilderness in the US *Wilderness Act 1964* specifically addresses the first four attributes:

A wilderness... is an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain.

An area of wilderness is... an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or habitation, and which:

- 1. generally appears to have been affected primarily by the forces of nature, with man's imprint substantially unnoticeable;*
- 2. has outstanding opportunities for solitude or a primitive and unconfined type of recreation;*
- 3. has at least 5,000 acres [2,000 hectares] of land or is sufficient size to make practicable its preservation;... (Robertson et al., 1992).*

It may be possible to deduce from the phrase “without permanent improvements or habitation”, that there is an intent implied that disturbed areas and areas subject to minor structures are capable of being restored.

3 Identification of Wilderness

Wilderness is a large natural area capable of providing solitude and self-reliant recreation. It is unmodified by humans, or considered to be modified but restorable. The identification of wilderness involves identifying lands that have these characteristics.

3.1 Criteria under National Wilderness Inventory

The National Wilderness Inventory (NWI) is a project initiated by the Australian Heritage Commission in 1986 which aims to identify wilderness quality across the Australian landscape, and to provide wilderness resource information to scientists and administrators involved in wilderness planning and management. It is based on the concept of wilderness as part of a continuum of remote and natural conditions ranging from pristine to urban, and, as such, is not matched to any particular biocentric or anthropocentric view of wilderness (Lesslie & Maslen, 1995).

The NWI is essentially an assessment of 'remote' and 'natural' lands, and therefore, does not aim to produce a catalogue of wilderness areas. It is designed to measure variation in wilderness quality in the landscape using consistent and objective criteria (Lesslie & Maslen, 1995).

Four criteria are used in the NWI to measure variation in wilderness quality across the landscape. The criteria, called 'wilderness quality indicators', represent the two essential attributes of wilderness: **remoteness** and **naturalness**. The indicators measure the extent to which a location is remote from and undisturbed by the influence of modern technological society (Lesslie & Maslen, 1995). The NWI is a GIS (Geographic Information System) -based process.

Three of the wilderness quality indicators measure the distance of a location from physical features of human disturbance:

- **remoteness from settlement** = remoteness from places of permanent occupation;
- **remoteness from access** = remoteness from established access routes;
- **apparent naturalness** = degree to which the landscape is free from presence of permanent structures associated with modern technological society.

The fourth indicator, **biophysical naturalness** is a simplified, qualitative assessment of the impacts of post-European development on the environment.

A total wilderness quality (WQ) index is produced by summing the standardised values obtained for the three distance-based wilderness quality indicators, and the biophysical naturalness value. The standard process is additive, resulting in a total wilderness quality scale ranging from a minimum value of 0 to a maximum value of 20 assigned to each GIS grid cell covering the region. This procedure rests on the assumption that each criterion contributes independently and equally to total wilderness quality. Areas considered as potential areas of high quality wilderness are taken as those which have a National Wilderness Inventory (NWI) rating of 12.0 or higher.

The NWI criteria have been used to identify areas of high quality wilderness for potential inclusion in a comprehensive, adequate and representative reserve system (Commonwealth, 1997) as required under the National Forest Policy Statement (NFPS agreed to between the federal and state governments (Commonwealth, 1992)).

A comprehensive regional assessment (CRA) of forests in New South Wales was conducted by the NSW and Commonwealth Governments to provide the scientific basis for decision-making regarding the future use of such forests under Regional Forest Agreements (RFAs). For the major forest areas of NSW (such as the Lower North East NSW CRA Region), the development of RFAs was how the implementation of the NFPS took place. The Governments were to assess and delineate wilderness that is consistent with nationally agreed criteria (Commonwealth, 1997). Therefore the Commonwealth's NWI was used as the main vehicle to identify potential wilderness for the purposes of the CRA negotiations. In the CRA process, high quality wilderness is defined as having a minimum NWI rating of 12 and a minimum size of 8,000 hectares (Commonwealth, 1997).

3.2 Criteria under Wilderness Act

The NSW *Wilderness Act 1987* provides the following definition of wilderness:

“**wilderness area**” means lands (including subterranean lands) declared to be a wilderness area under this Act or the *National Parks and Wildlife Act 1974*.

Section 6 (1) of the Act provides a working definition:

An area of land shall not be identified as wilderness by the Director-General unless the Director-General is of the opinion that:

- (a) 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;
- (b) the area is of a sufficient size to make its maintenance in such a state feasible; and
- (c) the area is capable of providing opportunities for solitude and appropriate self-reliant recreation.

As a result there are three criteria which must be satisfied for **an area to be identified as wilderness** under the Act:

- lack of modification (ie. naturalness);
- size; and
- opportunities for solitude and appropriate self-reliant recreation.

Section 6 (2) provides additional advice for identifying wilderness:

In forming an opinion under subsection (1), the Director-General may consider any relevant circumstance, including:

- (a) the period of time within which the area of land could reasonably be restored to a substantially unmodified state;
- (b) whether, despite development which would otherwise render it unsuitable, the area of land is needed for the management of an existing or proposed wilderness area; and
- (c) any written representations received by the Director-General from any person (including a statutory authority) as to whether the area of land should be identified as wilderness.

Consequently, **wilderness in New South Wales** is those areas which are:

1. in a **substantially unmodified** state;

2. **large enough** to be maintained in a substantially unmodified state;
3. able to provide an **experience of solitude**; and
4. able to provide **opportunities for appropriate self-reliant recreation**.

It is apparent that the definition derived from the *Wilderness Act* includes all five attributes of wilderness definitions discussed earlier, ie. naturalness, remoteness, size, modern society, and potential for restoration (Robertson *et al.*, 1992).

Whilst the *Wilderness Act 1987* provides the essential attributes of wilderness, there remains the need to establish criteria or indicators by which those attributes can be measured (Lesslie *et al.*, 1987). This has been the subject of some research and debate, both overseas and in Australia (Hendee *et al.*, 1990; Helman *et al.*, 1976; Wilderness Working Group, 1986; Lesslie and Taylor, 1985; Lesslie *et al.*, 1987). Despite this, the selection of wilderness indicators and their use in evaluating areas remain "complex, variable, and inevitably judgmental" (Lesslie *et al.*, 1987). The indicators adopted for use in this assessment are set out below with a brief justification. They reflect the wilderness attributes derived from the *Wilderness Act 1987*.

3.2.1 Naturalness

Measurement of the naturalness (the inverse of modification) of any system is difficult. Wilderness areas are those areas which have remained in a largely primitive condition, usually evidenced by the presence of a substantially unmodified cover of native vegetation (Helman *et al.*, 1976; Wilderness Working Group, 1986). This is a primarily modern European/Western society's view of the extent of human modification of 'natural' areas. That view stands in direct contrast to the fact that in many countries indigenous peoples have made long and extensive use of land resulting in significant modifications (eg. First Nations People in Canada; Plains Indians in USA; Aborigines in Australia; Maoris in New Zealand) (Flannery, 1989; Flannery, 1994).

Of course, there are no completely undisturbed ecosystems extant. Even in the most apparently pristine environments, such as Antarctica, the impacts of modern society and its works are present. Therefore, any measurement of naturalness is not a test of the absence or presence of modification but instead is an assessment of the degree of modification. This assessment divided sites into three categories describing their level of modification – 'substantially unmodified', 'modified but restorable' and 'substantially modified'.

3.2.2 Solitude and appropriate self-reliant recreation

There have been a number of approaches in defining the recreational and experiential indicators for wilderness on the basis of size or remoteness (Helman *et al.*, 1976; Lesslie *et al.*, 1987). The NSW *Wilderness Act* only requires wilderness areas to be "capable of providing opportunities for solitude and appropriate self-reliant recreation".

Solitude is not defined in the Act. The Macquarie Dictionary defines solitude as:

- “1. The state of being or living alone; seclusion.
2. Remoteness from habitations, as of a place; absence of human life or activity.
3. A lonely, unfrequented place.”

Opportunities for solitude, in this sense, cannot be quantified. Solitude is a highly subjective attribute that will vary from person to person. An enthusiastic bushwalker may only experience solitude when immersed in 'the bush' a full week's walk from the

nearest point of access. Others may experience the same sensation by walking into a wilderness a few hundred metres from their vehicle on a boundary road. There is no justification or legislative need to class one experience as more important or more fulfilling than the other.

Appropriate self-reliant recreation is an attribute which falls into the same category as solitude. It is not defined in the Act but it can reasonably be taken to mean any form of recreation which: (1) does not utilise motorised or other forms of transport (eg. horses) in place of walking, rafting and the like (ie. self-reliant); and (2) does not diminish the biological integrity of the area (ie. appropriate). The forms that this type of recreation will take will vary from user to user.

The recreational benefits of wilderness may include:

- physical exercise in stimulating surroundings;
- satisfaction of a yearning for adventure;
- separation from the pressures and tensions of modern society; and
- the long term mental health of the community (Helman *et al.*, 1976).

Any area which is capable of providing a setting for basic self-reliant recreation meets this attribute (this does not mean the area is therefore a wilderness). In most cases this is simply demonstrated by an existing recreational use which meets the standard of being self-reliant.

3.2.3 Size

Large size has historically been considered an essential attribute of wilderness, commencing with the first wilderness area, the Gila Wilderness in New Mexico, USA, which covered 300,000 hectares (Helman *et al.*, 1976; Brown & Carmony, 1990; Thompson & Dunphy, 1986).

Generally two size criteria have been used:

1. an area large enough to sustain its natural systems; and
2. an area large enough for users to "feel satisfied they have established contact with the wilderness" (Helman *et al.*, 1976).

Reserved natural areas should contain populations of plants and animals which are both large and diverse enough to represent the genetic variability of those populations and to persist indefinitely (barring natural extinction). Areas with greater habitat heterogeneity also should be able to buffer populations against environmental variation (Gilpin & Soule, 1986).

It has been proposed that wilderness in forested country in eastern Australia should have a 'core' area of about 25,000 hectares and a 'buffer' area of similar size, ie. total area should be a minimum of 50,000 hectares (Helman *et al.*, 1976). Such a minimum area is no longer considered appropriate, and the concept of a buffer or management zone has not been adopted in recent studies of wilderness (Wilderness Working Group, 1986; Lesslie *et al.*, 1987). Buffer zones do not always offer protection from external influences, and legislative protection and control of such zones is a more flexible and practical solution (Wilderness Working Group, 1986).

The overall picture to emerge from considerations of size is that larger areas may contain greater species diversity, greater genetic diversity within species, and will enable a greater range of environmental processes to operate without human interference. Consequently, larger areas will have a greater probability of remaining in

a 'natural' and 'undisturbed' state in the long term. Such areas are also more likely to be self sustaining and, certainly, easier to maintain in a substantially unmodified state.

The National Wilderness Inventory (NWI) completed an inventory of high quality wilderness in eastern Australia (Lesslie *et al.*, 1994). The Commonwealth Government adopted, as a minimum area, 8,000 hectares of NWI wilderness necessary to ensure the protection of high quality wilderness in forested landscapes (Commonwealth, 1997).

3.3 Assessment Methodology

Assessment of the proposal uses the NPWS Draft Wilderness Assessment Methodology. The methodology involves two principal stages: a **capability assessment** and a **suitability assessment**.

3.3.1 Capability assessment

The purpose of the capability assessment is to determine **the area to be identified as wilderness**. Capability assessment determines which areas meet the three criteria set out under section 6 of the *Act* (naturalness, size, solitude/ self-reliant recreation) which then means they can be formally identified as wilderness. The result of the capability assessment is a map of the area identified as wilderness. Capability assessment does not consider social, recreational and management issues, such as land tenure and competing land-use interests, and gives only minor consideration to long-term wilderness management issues. Basic reserve design principles are considered in deciding the boundaries of areas that meet these criteria.

The first step in the capability assessment is to delineate an initial assessment area which is both described and mapped. There are then several steps in determining whether an area satisfies each criterion under the *Act*, ie. naturalness, size, and opportunities for solitude and appropriate self-reliant recreation.

The tasks involved in assessing an area's naturalness are:

1. collation of information on the area's natural and cultural heritage;
2. collation of disturbance history eg. logging, grazing, clearing, mining;
3. collation of other historic information eg. early explorers, oral histories of early settlers;
4. field and aerial assessment of disturbed areas; and
5. determining recovery rates of disturbed areas.

The locations and level of disturbance in the area were assessed using the following information:

- satellite images (LandSat images taken September 1994 & March 1995);
- air photos (taken January 1994);
- State Forest (SFNSW) harvesting plans for logging operations in the 1970s & 1980s;
- records of wildfires from the last 20-25 years & records of prescribed fires for the last 10 years;
- advice from landowners about agricultural practices & other activities on their land;
- history of land uses described in other reports of the area;

- advice from NPWS staff familiar with the historical land uses of the area & involved in the current management of Yengo National Park & Parr State Recreation Area;
- advice from members of an Expert Panel of ecologists; and
- field observation of disturbed & regenerating areas.

Naturalness is the most complex of the *Act's* three criteria. Assessing naturalness involves working out whether an area is undisturbed or whether, it has been disturbed, and by how much. An expert panel of ecologists helped with this process by making the decision rules that applied to the disturbance data obtained. The expert panel made rules that could be used to classify parts of each study area as Substantially Unmodified (SU), Modified but Restorable (MR) or Substantially Modified (SM). They provided information on the disturbance thresholds and whether environments within study areas could be restored to their original states following various types of disturbance. Using all of the sources of information listed above, disturbed locations within the assessment area were classified as either 'substantially modified' (SM) or 'modified but restorable' (MR).

The key output from the naturalness assessment is a map of the assessment area with classifications of 'substantially unmodified', 'modified but restorable' or 'substantially modified'. Identified wilderness includes those areas classified as 'substantially unmodified' or 'modified but restorable'.

Following on from the naturalness assessment is the question of whether an area is of sufficient size to enable it to be maintained in a substantially unmodified state. The NPWS uses a minimum size of 8,000 hectares as a guide however most wilderness areas are at least several times the minimum area in practice.

The final step in the capability assessment involves determining whether the area identified under the criteria of naturalness and size actually provides opportunities for solitude and appropriate self-reliant recreation. This usually involves retracting the boundary from major sources of noise or access such as highways and busy roads, frequently used management trails, and other popular recreational sites. The key output is an amended map of the identified wilderness area and a justification for retracting the boundary.

3.3.2 Suitability assessment

After an area of identified wilderness has been determined in the capability assessment, a *suitability assessment* is undertaken to determine **an area that is suitable to be declared as wilderness**. During the suitability assessment phase, the wilderness areas identified in the capability assessment are overlaid with social, recreational and management factors to determine what part, if any, should be declared as wilderness. Only declared wilderness is protected by law. A large part of the suitability assessment is the practical considerations such as feasibility of management; ease of locating wilderness boundaries in the field; consideration of competing land uses; inclusion of whole catchments; and use of natural or man-made features to delineate boundaries. Consultation with NPWS field managers and major user groups provides valuable input to the suitability assessment process. The result of the suitability assessment is a map of the area recommended for declaration, including options for declaration if appropriate.

The determination of an area suitable for declaration should be based on the following criteria (Commonwealth, 1997):

- Both ecological features (eg. topography, water catchments) and management features (eg. roads, utility corridors) should be used to delineate boundaries.
- Boundaries should have strong ecological integrity and relate to the context of the landscape (eg. catchments, connected and intact vegetated areas).
- Ecological and reserve design principles ie. a single large protected area is preferable to several smaller protected areas.
- High boundary-area ratios and linear areas should be avoided.
- Impacts of key threatening processes from adjoining areas should be minimised (eg. use of other protected areas as buffers).

Other factors relevant to determining a declaration area and options include:

- Simplification of tenures, ie. area should consist largely of Crown lands, with as few small areas of freehold and leasehold title as possible (ie. if and where owner has consented to declaration).
- Consideration of existing and future recreational/educational use and access, eg. two wheel drive roads, popular sites of group/commercial activities, major picnic and camping areas.
- Areas of major management input, eg. zones for intensive pest management or intensive fire management; permanent or enduring infrastructure (NPWS' or other agencies') requiring regular maintenance; major cultural heritage sites; zones adjoining incompatible land uses.
- Feasibility of acquiring or managing non-NPWS lands, eg. State Forests; purchase of freehold/leasehold lands; likelihood of voluntary conservation agreements with private landowners.

4 Description of Assessment Area

4.1 Location

The assessment area is located 100 kilometres from Sydney, to the north of the Hawkesbury and Colo Rivers and south of the Hunter Valley (Figure 1). The Macdonald River is the major drainage line through the area. The nearest major towns are Singleton, Bulga, Howes Valley and Wollombi, which lie within 50 kilometres of Yengo. Other settlements include St Albans, Colo Heights, Putty, Broke, Wisemans Ferry, Laguna, Bucketty and Kulnura.

4.2 History of Wilderness Proposals in the Region

Some forests within the Lower North East region have been proposed for assessment and declaration as wilderness by various members of the community or organisations. The Yengo wilderness was not the subject of a submitted proposal but is being assessed to fulfil the Government's obligations under the NSW *Wilderness Act 1987*.

Several studies undertaken on wilderness in NSW since the 1970s and their relevance to the current wilderness assessment are summarised below:

- In 1976 the University of New England undertook a study of wilderness in south-eastern Australia, including the eastern half of NSW, which has influenced the direction of wilderness identification. This study has been the origin of many of the current identified and declared wilderness areas in NSW (Helman *et al.*, 1976). The report from that study identified twenty areas it considered wilderness. The MacDonal River was one such area of which 30,000 ha was identified as having wilderness qualities, and this is incorporated within the current Yengo wilderness assessment area.
- The area was also identified as wilderness by Prineas and Gold (1983).
- In 1986 the NSW Government set up a committee to review the principles for identifying and managing wilderness, and to formulate a suitable legislative framework for protecting wilderness in NSW (Wilderness Working Group, 1986). The committee also made recommendations about areas qualifying as wilderness under its criteria and proposed legislation, with the MacDonal River listed among the thirty six areas identified.
- In 1993 the Colong Foundation for Wilderness reviewed the progress of the NSW Government in protecting and managing wilderness under the *Wilderness Act 1987*, and made recommendations about additional wilderness areas which required formal identification and declaration under the Act to ensure their protection (Colong Foundation for Wilderness, 1993). The Foundation's report ("The Red Index") indicated that Yengo had wilderness qualities worthy of protection.
- The NPWS Draft Plan of Management for Yengo National Park and Parr State Recreation Area describes 45,000 ha of the middle of the MacDonal River catchment as having wilderness values.

The first wilderness area declared in NSW was Nattai Wilderness (30,000 ha), south-west of Sydney in 1991. In June 2000 there were 32 declared wilderness areas in NSW totalling 1.5 million hectares. The largest declared wilderness in NSW is Wollemi Wilderness (approximately 387,000 ha) which lies to the west of the Yengo assessment area.

Prior wilderness proposals and studies in the Yengo region are summarised below:

- Two areas, the MacDonald Wilderness and Mt. Isobel Wilderness areas of approximately 46,025 ha and 15,475 ha were provisionally delineated by NPWS in 1994. These were portions of south Yengo National Park and north Yengo National Park respectively. The assessment did not include any part of Parr State Recreation Area or Yengo National Park south of Gorricks Run (NPWS, 1994). The MacDonald Wilderness and Mt. Isobel Wilderness areas were included in the Interim Forest Assessment finalised in October 1996.
- In 1998, the wilderness assessment for Yengo National Park and Parr State Recreation Area was initiated and an identified wilderness boundary was provisionally determined. Subsequent reviews of the prior assessment area resulted in an enlarged boundary of potential wilderness for the current assessment. The approach has been to reassess the region on lands that meet the NWI 12 threshold, so bringing the current assessment in line with the approach undertaken with other wilderness assessments in New South Wales.
- Other wilderness areas in the region include Wollemi, lying to the west of Yengo and the Grose to the south. The Wollemi Wilderness Area was declared in 1999 and comprises approximately 387,000 hectares. The Grose wilderness, comprising 36,500 ha was declared in May 2001.

4.3 Land Included in Assessment Area

The assessment area comprises land in and around Yengo National Park and Parr State Recreation Area (Figure 2). The total area assessed was 193,346 ha and was bounded roughly by Putty Road, Colo River, Lower MacDonald Valley, Wollombi Valley and cleared lands near Broke and Bulga in the Hunter Valley. A detailed description of the assessment area boundaries is provided in Appendix 1.

The assessment area for the proposed Yengo Wilderness was derived from the following sources:

- Environment Australia's National Wilderness Inventory (NWI) from June 1997 - consolidated areas of high quality wilderness (defined as Wilderness Quality Index >12 in the NWI) were included.
- LandSat images from September 1994 showing vegetation condition and disturbed areas (eg. roads, fire trails, power lines, clearing) - areas of obvious or intensive disturbance were excluded.
- All of the areas determined by NPWS in 1994 as the MacDonald Wilderness and the Mt. Isobel Wilderness. Both these areas were included in the Interim Forest Assessment finalised in October 1996.

4.4 Geology and Geomorphology

Yengo National Park and Parr State Recreation Area form part of the Hornsby Plateau, a highly dissected sandstone plateau within the Sydney Basin, which extends from the eastern edge of the Blue Mountains and the southern rim of the Hunter Valley (Bell *et al.*, 1993; NPWS, 1994).

The predominant geology type is sandstone, although smaller amounts of shale and basalt do occur. There is a gentle tilting of the layers upward towards the north so that the rocks of a particular sequence are often located in different topographical positions across the Park (Sanders *et al.*, 1988).

Two sedimentary series from the Triassic geological period make up the vast majority of the rock type found within the study area. The lowest rocks in Yengo belong to the Narrabeen Group, which is a mixture of sandstone, mudstone and shale. Above this are the rocks of the Hawkesbury sandstone, the predominant geological type occurring in the study area. These rocks are mainly sandstone, but also include some shale lenses.

The other main geologic feature occurring in the assessment area are the small outcrop areas of Tertiary Volcanics, both basaltic extrusions and diatremes (Bell *et al.*, 1993). These are very restricted in distribution and include Mogo Hole and Frog Hollow in the south eastern section of the assessment area. Formations of the Tertiary basalt occur as the spectacular mountains of Yengo and Wareng and as plugs at the bottom of crater-like valleys. Areas of Quaternary and recent sandy alluvium material are also restricted in distribution, with major deposits occurring at the bases of most of the major, and some minor valleys. The majority of soils are not considered good quality.

4.5 Climate

The climate of the assessment area is primarily influenced by its location on the central tablelands of NSW, by the proximity of the coast (about 70 km to the east), and by its altitude (100 m – 668 m). Weather data from selected locations are summarised in Table 2 (Bureau of Meteorology, 2001). Kulnura (33°14'S 151°12'E) is situated east of St Albans. The records here are from 1951 to 1981. Richmond (33°37'06"S 150°44'54"E) is more distant from the assessment area but has good climate records from 1881 to 2001. Richmond is over 30 km south west of the assessment area. Throughout this region, rainfall occurs predominantly in summer and autumn. Frosts (defined as minimum temperatures less than 2°C) occur throughout the assessment area between April and October, at an average of 43 days per year at Richmond and 28 days at Kulnura. Snow falls do not occur at either of the locations but may fall in the higher altitudes. Rainfall data is available at various locations close to the assessment area (Table 3).

Table 2: Averages of selected climate variables for two locations adjacent to assessment area

Location & altitude	Max temp in January (°C)	Min temp in July (°C)	Annual rainfall (mm)	Rainfall in February (mm)	Rainfall in September (mm)	Frost days per year
Kulnura 312m ASL	26.3	5.6	1207	169	52	28
Richmond 20m ASL	29.4	3.2	807	91	44	43

Table 3: Mean annual rainfall for several locations adjacent to assessment area

Location & altitude	Mean annual rainfall	Years of record
Howes Valley 213m ASL	737	1914-1975
Big Yango Station	826	1978-2001
Wisemans Ferry 40 m ASL	852	1903-2001
Broke 76m ASL	654	1887-2001
Laguna 140m ASL	931	1959-2001
Kulnura North 330m ASL	1086	1959-2001

The north-eastern section is the driest part of the assessment area. Yengo lies within an area with lower rainfall than the higher tableland to the west in Wollemi National Park and the coastal range to the east. Low rainfall, together with milder local climates and few areas of good quality soils has resulted in a range of habitats.

4.6 Plants

Due to the location of Yengo at the convergence of three botanical provinces (Central Western Slopes, Central Tablelands, Central Coast), the vegetation types contained therein have developed some unusual associations. There exists a diverse mosaic of vegetation communities in response to complex interactions of environmental factors including climate, topography, slope, elevation, aspect, drainage, geology, soils and fire history. The Park adjoins Dharug National Park to the south-east, and Wollemi National Park to the west. These two reserves differ from the study area in their greater coastal influence, and drier, more rugged topography, respectively.

Patterning of vegetation communities are primarily due to aspect and physiography and less importantly to geology and soil type (Bell *et al.*, 1993). Communities found on the more sheltered southern and south-eastern slopes generally showed the highest plant diversity. Most of the ridge-tops and northwest-facing slopes consist of a less diverse low woodland with sclerophyllous shrubs underneath. There is considerable local variation, such as the occurrence of an open forest of ironbarks with an open grassy understorey, usually in dry habitats with a high clay content in the soil (Bell *et al.*, 1993).

The wetter area closer to the coast in the south-east of the assessment area supports small stands of tall eucalypt forest and warm temperate rainforest in sheltered gullies. The warm temperate rainforest in sheltered valleys and the dry rainforest on the basalt tops (such as Mt. Yengo and Mt. Wareng) reflect the climatic changes that occurred in eastern Australia during the late Tertiary and Quaternary periods. Mt. Yengo and Mt. Wareng's basalt caps support Red Cedar (*Toona ciliata*) and Stinging Trees (*Dendrocnide excelsa*) within the dry rainforest. The drier north-eastern part of the

area supports plant communities with species typical of the Western Slopes of New South Wales, such as ironbarks and cypress pines.

Overall, 701 species of plants have been identified within Yengo National Park and Parr State Recreation Area (Bell *et al.*, 1993). These have been grouped into seven floristic units:

1. sheltered dry Hawkesbury forest;
2. exposed dry Hawkesbury woodland (including the sub-unit of dwarf apple low open woodland);
3. sheltered moist forest complex (including the sub-units Narrabeen sheltered forest, sheltered forest on rich soils, grey box open forest, rough-barked apple woodland, stinging tree dry rainforest, and rainforest on alluvium);
4. Narrabeen - Hawkesbury dry forest (including the sub-units exposed Narrabeen woodland and Hawkesbury ironbark forest);
5. northern escarpment woodland;
6. woodland on alluvium (including the sub-units woodland on perched sands and swamp woodland on perched sands); and
7. melaleuca swamp forest.

Vegetation associations identified as being of regional conservation significance in the area include rough-barked apple woodland, woodland on perched sands, swamp woodland on perched sands, grey box open forest, stinging tree dry rainforest, and the melaleuca swamp forest (Bell *et al.*, 1993). Additional to this are the high number of rare or endangered plants that exist within the area.

Thirty two species of plants classified as rare or threatened (NPWS, 2001; Briggs and Leigh, 1996) have been recorded as occurring in the assessment area. The area of Yengo National Park contains the major remaining populations for most of these species. For example, the park protects three of the four known populations of *Olearia cordata* and most of the population of *Acacia fulva*, which is restricted to the basalt soils on Mt. Yengo and Mt. Wareng. Endangered plants found within the reserves are *Persoonia hirsuta* sp X (Proteaceae) and *Boronia ruppilii* (Rutaceae).

The Hawkesbury Sandstone plateau tops include heathland and dry Hawkesbury woodland, which produce an impressive display of wildflowers. The plants are hard-leaved, and somewhat drought and fire resistant. Fire-resistant seeds, specialised root systems or corms on stems exemplify this vegetation's adaptation to fire. The sandstone tops are prone to fires which caused the early settlers much concern and led to regular burning for hazard reduction and to provide new green growth for free-grazing cattle (Strom, 1981).

There are several introduced plant and animal species occurring in Yengo National Park and Parr State Recreation Area. Some of these plant and animal species may damage natural values by being invasive, directly competing with or preying upon native species. They may also affect soil and water systems and the recreational, cultural, aesthetic and scientific values of the two reserves. Some introduced species in the park may also have economic impacts on neighbouring lands.

The principal weeds of concern in the assessment area are particularly invasive introduced species such as Blackberry (*Rubus fruticosus*), Pampas Grass (*Cortaderia selloana*), Noogoora Burr (*Xanthium occidentale*), Dandelion (*Taraxacum officinale*), Weeping Willow (*Salix babylonica*) (NPWS, 2001), Fireweed (*Senecio madagascariensis*), pink/red lantana (*Lantana camara*), fleabane (*Conyza* sp.) (T. McTaggart, pers. comm.), and previously some Prickly Pear (*Opuntia* sp.) in the Yango Station area (J. Bowen, pers. comm.).

Most of Yengo National Park and Parr State Recreation Area is free of introduced plants, with infestations limited to sites that have been subject to modification from past development or agricultural use. Animals, watercourses and vehicles are major agents for the spread of introduced plants. Runoff from the developed urban and rural zones and increased nutrients from such areas encourage weed infestations. Watercourses, particularly the MacDonald River and its tributaries, are a major concern for the spread of weeds, as the headwaters of these watercourses are outside of the two parks in rural settings to the west of the Putty Road.

Blackberry has colonised disturbed sites in and around the built-up and rural inholdings within the two parks. Pampas Grass is invading the eastern area of Parr State Recreation Area. Water and wind borne weeds such as Noogoora Burr, Dandelion and Weeping Willow occur in some isolated localities downstream of disturbed lands that lie within the catchments of both parks.

Straying stock is another source of weed infestation. Due to the remote location, rugged nature of some of the two park boundaries and associated lack of access, damaged fencing is not always quickly found and repaired. Another major source of weed infestation is along the Putty and Wollombi Roads where seed dispersal occurs from vehicles and travelling stock. Rubbish dumping is also a concern for the spread of weeds, particularly in the southern sections of Parr State Recreation Area.

4.7 Animals

Two hundred and twenty three (223) animal species are currently listed as occurring within Yengo National Park and Parr State Recreation Area (NPWS Wildlife Atlas, Nov 2000). Forty-one (41) species of mammals occur in the two parks and 183 bird species have been recorded to date (NPWS, 1994). Nineteen species of amphibians and fifty (50) species of reptiles have been recorded (Phillips, 1987), representing an unusually high occurrence comparable to the World Heritage Area rainforests in northern NSW (NPWS, 1994). This is probably related to the relative lack of disturbance and the extensive, topographically diverse areas of sandstone terrain.

The illegal removal of rock cover (bushrock) is a significant threat to the conservation of amphibians and reptiles in the two parks. Such cover provides sanctuary from predation, fire and drought, and is a necessary part of the habitat of many species. The removal of bushrock is a major factor in the decline of the endangered Broad-headed Snake (*Hoplocephalus bungaroides*) in the area.

Twenty-four (24) species of threatened fauna have been recorded in the two parks comprising two endangered species and twenty-two vulnerable species listed under the *Threatened Species Conservation Act 1995*. Vulnerable species include the:

- Turquoise Parrot,
- Glossy Black Cockatoo,
- Masked Owl,
- Powerful Owl,
- Spotted-tailed Quoll,
- Yellow-bellied Glider,
- Squirrel Glider,
- Koala,
- Large-eared Pied Bat,
- Common Bent-winged Bat,
- Greater Broad-nosed Bat,

- Giant Burrowing Frog and
- Red-crowned Toadlet.

The two parks present an important habitat for the endangered Regent Honeyeater (*Xanthomyza phrygia*), with a major population centred on the Capertee Valley/ Wollemi and Yengo National Parks as well as the Parr State Recreation Area. The area also provides specialised habitat for species such as the threatened Brush-tailed Rock Wallaby, which now occurs only in very small disjunct populations in New South Wales and Queensland and is vulnerable to predation by foxes.

Other regionally significant species of conservation concern are the Legless Lizard (*Anomalopus swainsonii*), New Holland Mouse (*Pseudomys novaehollandiae*), Yellow-tailed Black Cockatoo (*Calyptorhynchus funereus*) and the Gang Gang Cockatoo (*Callocephalon fimbriatum*).

There are seven (7) species of introduced animals in the assessment area, including some which compete with or prey on native species. Cats, foxes and wild dogs are thought to be distributed throughout the two parks. Wild dogs and cat numbers are more numerous in the southern sections of the area, nearer to urban development where animals have established into bushland areas. Cattle, rabbits, pigs and goats also occur, but are of more localised distribution. These animals cause significant disturbance where they are found.

4.8 Aboriginal History and Heritage

Aboriginal occupation

Aboriginal people have a long history of settlement in the assessment area. The Macdonald River area including Wollombi and Putty formed a part of the territory of the Darkinjung people, while the northern portion of Yengo National Park formed a part of the territory of the Wonnarua people (Sim, 1966). Approximately forty local groups together comprised the Darkinjung people. Such groups included the “Wollombi tribe”, the “Macdonald River group” and the “Kamilroi tribe” (Sim, 1966; Slater, undated). The Kamilroi tribe which inhabited the Wollombi area in their hundreds in 1800 were largely gone by the 1830s. In 1848 there were 54 remaining members of the tribe. Some had moved inland, however, disease and changes to their life and environment killed many (Slater, undated).

Aboriginal sites and relics

There are currently 648 Aboriginal sites of great variety recorded on the NPWS Aboriginal Sites Register in the vicinity of the assessment area. The remote and rugged nature of the terrain and the fact that it has not been systematically surveyed, indicates the likelihood of there being many more sites than those presently recorded. The Darkinjung territory contains some of the richest and most outstanding rock engraving sites in the eastern part of NSW. The large number and wide range of Aboriginal sites recorded in the two parks provide valuable insights into past lifestyles, traditions and interactions of Aboriginal people with the environment. Twenty-six of the Aboriginal rock carving sites are described by Sim (1966). Animal figures and tracks, human figures, boomerangs, spears and axe-grinding grooves feature at the sites. A sailing ship is depicted at a site north of Wrights Creek, not far from St. Albans. This is thought to indicate that engraving was practiced by Aborigines at the time of European settlement. Carvings described are on rock surfaces found on ridges and are often sites offering sweeping views over creeks, down valleys or towards Mt. Yengo. Some figures have been destroyed by vehicles passing over the rock (Womerah Range Trail)

or by cattle (Sim, 1966). Drawings using both infilled and outline styles have also been found on the walls inside rock shelters (Sim, 1966).

Of particular significance to Aboriginal people is Mt. Yengo which is a sacred site. Mt. Yengo (2,190 ft.) is a mesa (flat topped mountain) located in the north-west section of Yengo National Park, rising 1,000 feet above the plateau level. The site has well-documented ethnographic and cultural significance to Aboriginal society. The Aboriginal 'Dreamtime' story recounts the departure of the ancestral being, Biaime, from the top of the mountain into the sky when he had finished his creative tasks in the Dreamtime. For this reason it is believed that many of the other Aboriginal sites in the region are related to Mt. Yengo. Many of the components of the sites are orientated towards it, such as rock engravings including sets of footprints aligning with Mt. Yengo.

Many of the Aboriginal sites in the area demonstrate cultural variations in the design of the rock engravings, which may in turn represent different Aboriginal groups and patterns of Aboriginal land use. Burrigurra and Finchley are two significant Aboriginal engraving sites within Yengo National Park which are available for public access. Burrigurra, a historical initiating ground sometimes called Devil's Rock, appears to be directly related to Mt. Yengo and its rock carvings are thought to bestow information about Aboriginal family kinship. Burrigurra translates as the "rock with words" or "rock on which is inscribed drawings". The drawings inscribed could be interpreted as words by initiated Aboriginals. Many words are those linked to initiation ceremonies which gave 14 year old males ethical instruction, and include "obedience", "fortitude", "fidelity" and "faith" (Slater, undated). Finchley, another nearby site, is believed to indicate a tribal boundary. Both sites are easily accessible and as a result, vandalism has occurred to both sites in the form of vehicle damage and by the practice of tracing or drawing over the engravings to highlight them. Discussions with the Local Aboriginal Land Councils concerning the protection of these sites has led to the construction of vehicle barriers at Burrigurra and an elevated boardwalk at Finchley.

The major educational significance of the sites relates, in part, to their relatively close proximity to major urban centres such as Sydney, Newcastle and the Central Coast. A number of Aboriginal community groups including the Darkinjung, Koompahtoo, Mindaribba, Wanaruah and Awabakal Local Aboriginal Land Councils have a strong interest in the management of sites in the two parks. The NPWS is liaising with these communities on a range of site management issues. The Local Aboriginal community is also involved in the revival of traditional cultural practices.

4.9 European History and Use of the Area

Early exploration and roads

Overland travel between Sydney and the Hunter Valley was difficult until the 1810s due to the Hawkesbury River and Hornsby Plateau acting as barriers. Relics from the early journeys into the frontier are scarce, comprising surveyors markers on rocks and trees and isolated remains of camp sites. Signs of the initial settlers include bridle tracks and early grazing remnants such as stock yards (NPWS, 1994).

The assessment area is rich in European culture with remnants of early transport routes between Sydney and the Hunter Valley running through the area. This area was part of one of the earliest frontiers of European attempts to settle and explore eastern Australia. During the 1810s and 20s, influential people were settling the Hunter Valley, but as their only contact was by water, they called for a road from Port Jackson to the Hunter Valley. Several explorations attempted to find a route. John Howe found one route through the area along what is now the Putty Road/ Old Bulga Road to Singleton. The Putty Road (just west of the assessment area) was pushed

through in 1817. A member of the Blaxland family drove stock from Windsor to the Hunter by a route, now the Boree Track, that followed up along the MacDonald River and then went over the Bala Range via Devil's Rock. Surveyor Heneage Finch, now with knowledge of the exploits of Howe, Morriset and Blaxland, was assigned the task of selecting a route for the (Old) Great North Road which was constructed between 1826 and 1831. The Old Great North Road runs up the eastern side of the assessment area.

These two early transport routes, the Putty Road/ Old Bulga Road and Old Great North Road, provide some of the best examples in Australia of convict-built road engineering. One section of the Old Great North Road, referred to as the Bucketty Wall, occurs near the eastern boundary of a recently gazetted part of Yengo National Park. The wall is located at the corner of George Downes Drive and Mogo Creek Road and is another significant engineering feature. This wall has been well cared for by the efforts of the local community and volunteers of the 'Convict Trail Committee'.

Other features of particular historic interest along the Old Great North Road which exist within Yengo National Park or lie on the boundary are Circuit Flat Bridge, Hungry Flat, Frog Hollow and Shepherds Gully Road.

The historic Boree Track or Blaxland's Road follows a ridge north from the Macdonald and provided the earliest passageway to the Wollombi Valley. It served as access to the valleys in the north from the time it was opened in 1820 until the 1840s (Sim, 1966). The location of the road is linked through anecdotal evidence and a number of rock engravings along the ridge, to walking routes used by the local Aborigines. Such Aboriginal travel routes coincided with the tracks built by Europeans because the routes along main ridges were generally the easiest and fastest path between some of the most fertile valleys in the region (Sim, 1966).

The Old Bulga Road (now part of the Putty Road) was a rough passage through from the Hawkesbury to the Hunter Valley over the Bulga Mountain ridge, first routed by John Howe and Benjamin Singleton. Several parties drove their cattle over to the Hunter Valley from the early 1820s via this route (Roser, 1983). Along the road, water was relatively scarce but in parts there was grass for the travelling stock to eat. The track passed to the west of both Wareng and Yengo mountains, through the Bulga Pass, by the south side of the Rev. Mr Hill's estate of Milbrodale, through the estate of John Blaxland Esq. and across the lower part of Wollombi Brook to meet, once built, the Great North Road 128 miles from Sydney (Roser, 1983). The steep grades and obstacles of the Bulga Road meant it was unsuitable for heavy drays thus the new line of road (the Great North Road) was surveyed and built between Wiseman's Ferry, Corobeare (later Wollombi) and Singleton. The hazardous journey along the Bulga Road meant it was used only by the more hardy travellers. While heavily laden drays used the Great North Road, horsemen and drovers mainly used the Bulga Road. It is apparent that the Bulga Road, actually more a 'track', evolved rather than being constructed deliberately (Roser, 1983). The Bulga Road declined in importance by 1837, but with population growth in the latter parts of the 19th century, road improvements were implemented. The reconstruction was to benefit the Howes Valley settlers and lessen pressure on the Great North Road, particularly as the rail line between Sydney and Newcastle had not yet been constructed. The diversion of the Bulga Road down Darkey's Creek dates from the 1880s. Today, the Old Bulga Road has a 15 km stretch within Yengo National Park.

The Old Settlers Road, crossing the northern section of Yengo National Park, was built in the late 1800s to provide a transport route between Howes Valley and the Wollombi district. There has been a misconception that the Old Settlers Road or 'Old Convict Road' was built by convicts. It was in fact commenced from as late as 1880 by the

Public Works Department (Roser, 1983). Only limited funds were spent on the Old Settlers Road and it was a poor grade, minor road which when completed in 1903 may have been mistaken for a convict road (Roser, 1983). Historic stone embankments and pavements demonstrate early dry stone engineering techniques along the road's route, much of which remains intact. The Old Settlers Road is currently a 28 km long, 4WD-standard public road.

Agriculture, grazing and settlement

Due to the rugged nature of the study area, the little standing water and rapid run-off of rainfall, settlement and land use of the area has been very restricted. It is believed that settlement proceeded up Webbs Creek before the MacDonal River, from around 1810 (Strom, 1981). The fertile valleys of Webbs Creek, the MacDonal River and Wollombi Brook were settled and cleared early in the 19th century, where a mixture of grazing and farming occurred. From these areas, settlers ventured out and cleared most of the remaining valleys that showed any agricultural potential for example limited areas along Mogo Creek, Melon Creek and Womerah Creek (small farms established by 1830s eg. Gorricks Run) (Hutton Neve, 1978). It is estimated that only about five percent of the MacDonal catchment has ever been cleared (Prineas 1997). The Cross Brothers entered the Boree Valley to graze their stock as early as 1803. This valley has historic values as its settlement almost dates back to the beginning of colonial settlement. The Boree Swamp/ Wallambine Common at the confluence of the Mogo River and Macdonal River has seen dairy and beef cattle grazing for 150 years (Hutton Neve, 1978). The common was rich grazing land with shallow water and swamp offering communal use for grazing, the cutting of wood for fuel and furniture and turf to burn. The farms on the banks of the Macdonal River as far up as the Wallambine Common numbered 50 or 60 by 1834. These farms would most commonly cultivate maize and raise healthy beef cattle (Hutton Neve, 1978).

Much of the rugged country in between cleared valleys was subject to fenceless rough grazing for cattle, linked with frequent burning to induce green feed including the favoured Kangaroo Grass *Themeda australis* (Sanders *et al.*, 1988). Intense agriculture on the small plots of land and annual burning practices quickly affected the natural ecological processes in the area. Pastures were affected by bracken fern and blady grass, the diversity of the forest understorey declined and the soil landscape became unstable (Strom, 1981). The practices of Europeans has increased the extent of damage caused by heavy rain, ie. floods, erosion and large depositions of sand and silt in the creeks and rivers. Sand has filled the bed of the MacDonal River and ferry crossings and bridges have had to be relocated or rebuilt (Strom, 1981).

The initial settlers, often emancipated convicts, took up free grants of 30-60 acres in the MacDonal Valley until such grants ceased in 1832. The village of St. Albans came about and the MacDonal Valley communities were becoming well established by the 1830s and 40s. The maximum Valley population may have been around 1,200 (1841 figure). Populations over a century later have been recorded at 79 (in 1966) and 149 (in 1971) (Strom, 1981).

Clearing of the best land occurred by the early settlers' ringbarking, felling and thinning activities in the 1800s. These settlers lodged applications for land title in the cleared valleys and these constitute the freehold blocks of today. Very little clearing took place on the additional Crown land areas where permissive occupancies (POs) were granted. Often, these were sufficiently open to allow rough cattle grazing.

Clearing of "Big Yango" took place in the years up to the early 1900s. The Big Yango property was first settled in 1851 by Mr John White who purchased 30 acres within the valley. His sister Mrs Sophia Forbes resided on Big Yango and ran cattle (Walker, 2001). The Bulls Arms was at this time home to wild cattle. Big Yango was

unoccupied for twenty-six years from 1924 until 1950 when David Walker and his son Bruce purchased it. The Walkers were the first to build fences, roads, sheds and yards, from 1950. The home run was around seventeen kilometres of grassy valley floors. Tracks were soon formalised from the home run, over well vegetated and rugged ridges, to grazing runs in valleys up to thirteen kilometres away (Walker, 2001). Stock of high quality was developed through breeding and in 1969 a Poll Hereford Stud was registered (Walker, 2001).

In 1973, Big Yango was purchased by John and June Bowen (Bowen, 2001). A further part of the station was purchased in 1974 and over the years freeholds within the area were consolidated into one property. Four-wheel drive standard roads were built to connect parts of the property in 1975. This allowed fencing materials to be taken with greater ease than when taken on horseback. Dams were constructed and strategic fencing was placed on parts of permissive occupancies adjoining the freehold land (J. Bowen, pers. comm.).

Rileys, Nowlands and Timor holdings were purchased in 1983, bringing John Bowen's Yango to 5,300 hectares of freehold and 47,800 hectares of lease (permissive occupancy, or PO) stretching over Parishes Burton, Cosgrove, Finchley and Moruben. It included Mt. Yengo, where the most nutritious cattle feed was to be found (J. Bowen, pers. comm.). In the interests of maintaining the property as a single unit, Big Yango was sold by John Bowen to National Parks and Wildlife Services in 2000.

Cattle graziers in the McTaggart family have owned land in the Howes Valley district for 5 generations. The valleys in this area opened up in the 1820s, the McTaggarts arriving in 1825 (T. McTaggart, pers. comm.). Some of the valleys are watered by spring water. The McTaggarts gradually bought freehold blocks, particularly those with the good waterholes. They also took up leases (POs) over the land adjoining the freehold blocks.

In recent years, the old farm country of the MacDonald and Wollombi Brooks and other parts has seen a new wave of landowners. The new arrivals are people from the city seeking a quiet bush setting and small hobby farms, country shacks and "weekenders" have become increasingly common.

Timber-getting

Some early timber felling activities occurred in the area, predominantly for general use as fencing and building materials. The best timber for huts, barns and fencing were in the valleys, including blue gum, ironbark and turpentine which were found to be durable, and oak which split easily to make roof shingles (Strom, 1981). Early logging excess was taken by boat to be sold in Sydney. A sawmilling industry took hold in the 1940s-50s, where east of Putty Road up towards Putty and in the present day Parr SRA area, repeated selective logging events took place over decades. In more recent times, the cessation of logging west of the Putty Road following the declaration of Wollemi National Park increased logging activities in the assessment area. Access tracks built by the timber-getters also provided access for others including bushrockers. The boom in the landscaping trade has encouraged removal of bush rock which had become a large problem, particularly in the south.

Mining

Loggers were contracted to build Pierce's Track into the diatreme volcanic deposit which was to be mined. Pierce's Quarry did not operate with much success due to the depth of the deposit and amount of overburden that needed to be removed. The extent of what was taken was some samples and some blue metal roadbase for the local council (L. McIntosh, pers. comm.). Other small quarries within the assessment

area can be found along Mogo Creek Road and Boree Track, from which roadbase or blue metal was acquired. Minor sandmining activities continue to operate around the Mellong Swamps area.

Fire trails

An extensive system of fire trails was constructed by the Army shortly after the Second World War, which increased access for timber-getting and other landuses. Many tracks in the two parks were established by timber-getters themselves, or for private access to properties. Trails through the two parks such as Howes Range Trail, Womerah Range Trail, Old Settlers Track and Wheelbarrow Ridge Road run east – west and assist in management of fire. They were often initially constructed to provide access to settlements and properties. Other currently used fire trails include Mt. Simpson Track, Bala Range Trail, Boree Track.

Walking tracks

Three walking tracks used regularly are the Old Great North Road, Mogo Camping area to Circuit Flat Bridge and Burragurra walking tracks. Burragurra is a short track leading from the Boree Track to an Aboriginal engraving site. Since Yengo National Park and Parr State Recreation Area were declared, the level of bushwalking use has increased. There is not an extensive network of walking tracks through the assessment area. Walkers often utilise the National Parks management tracks or the fire trails.

Recreation

Visitation to the two parks is not high compared to the coastal parks nearer to Gosford and Newcastle. Mountain-bike riding is becoming more popular particularly in the area near Wiseman's Ferry and St Albans along the Old Great North Road and fire trails. Horse riding is also popular in the southern section of Yengo National Park and Parr State Recreation Area. Day trips, particularly by recreational vehicles from Sydney, Central Coast or Newcastle, are the most common use of the northern section of Yengo National Park, with the Howes Trail and Old Settlers Road being most popular.

Vehicle based camping facilities are provided at Mogo and Finchley camping areas. For hikers and mountain bike riders, camping areas are provided at Heartbreak Hill along the Womerah Range Track and adjacent to Yengo National Park along the Old Great North Road at Ten-Mile Hollow (Dharug National Park). Overnight camping is permissible along the Old Great North Road for walkers travelling between Ten-Mile Hollow and Mogo camping area. Picnic facilities are provided at Finchley, Mogo camping area, Bucketty Wall and Little Mogo Creek. Other recreational activities include bird watching, nature study, photography and picnicking.

Current use

The area was gazetted as Yengo National Park and Parr State Recreation Area in 1989. In November 2000, the Greater Blue Mountains World Heritage Area was established. Yengo National Park is an important part of this Area and as such it is currently managed to identify, protect, conserve, present and transmit to future generations, the World Heritage Values of the property. Presently, Four-wheel drive vehicle touring is the main recreational use of the two parks followed by bushwalking, mountain-bike riding, horse riding and trail-bike riding (NPWS, 2001). Some grazing continues to occur on freehold inholdings within the area, and some permissive occupancies for cattle grazing also exist.

5 Capability Assessment

The disturbance thresholds (or naturalness categories) determined by the Expert Panel are described in Table 4 below.

Table 4: Thresholds for determining categories of disturbance for Yengo Wilderness Assessment

Naturalness Categories

	Substantially unmodified SU	Modified but restorable MR	Substantially modified SM
Logging	No evidence of recent logging (eg. for 25-30 years) or only selectively logged	Recently logged (<25 years ago) or evidence of heavier logging (weeds, stumps, log dumps), or where hardwood forest with dense rainforest understorey logged <50 years ago	Evidence of intensive, recent logging (dense weeds and no evidence of regrowth through weeds, few mature trees, vegetation mainly regrowth)
Roads, vehicle trails, walking tracks & bridle trails	Walking tracks, unformed vehicle trails with no cut & fill which are not obvious due to regeneration since last use; rehabilitated fire control lines; low use bridle trails with little marking	Fire trails & 2WD roads with natural/local surface material & minor cut & fill, or with extensive cut & 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; bridle trails with many markings	Sealed roads; fire trails & 2WD roads with imported material &/or extensive cut & fill where disturbance is obvious
Mining & quarrying	Minor (<1ha) gravel stripping or quarry with advanced regrowth	Minor (<1ha) gravel stripping or quarry with poor/no regrowth; or larger quarried area (>1ha) with advanced regrowth	Major (>1ha) quarry with poor/no regrowth

Naturalness Categories

TYPE OF DISTURBANCE	Substantially unmodified SU	Modified but restorable MR	Substantially modified SM
Clearing, grazing & agriculture	Cleared area <5ha with advanced regrowth of native species with few weeds	Cleared area <50ha with established regrowth of native species or with some advanced regrowth & moderate weeds; or cleared area <5ha with little regrowth or moderate weed infestation	Cleared area >50ha or smaller cleared area with little regrowth &/or heavy weed infestation
Utilities & other infrastructure	Minor or unmaintained structures from disused farm/habitation in natural decay; disused power/telegraph poles	Currently used or maintained farm structures, visitor facilities & power/telegraph poles capable of removal	Major power lines & buildings only capable of removal at high cost & major disturbance
Fire	No visible affects on vegetation structure & floristics from HRs or wildfires; or regrowth vegetation from single fire event	Evidence of frequent fire regime on structure or floristics but capable of recovery if protected from fire	Evidence of impacts of frequent fires eg. weed infestations, soil erosion, altered floristics
Weeds	Nil. weeds/scattered individuals of less invasive species	Moderate or scattered infestations which aren't preventing native plant regeneration	Major weed infestation (dominates native vegetation)
Bushrock removal	Nil. or negligible rock removal	Moderate rock removal with little reduction of naturalness quality	Intense rock removal with high reduction of naturalness quality

5.1 Naturalness and Disturbance

Compared with the remainder of the Lower North East CRA area, the Yengo area is data poor in terms of available disturbance mapping. Discussions with people with a long association with area helped to fill some of the gaps in the available data. Nevertheless, there may be instances where it was not possible to fully document either the full spatial extent or the level of impact of land uses with the potential to affect naturalness.

5.1.1 Grazing and clearing

A large part of the study area was never used for grazing and agriculture due to its extremely rugged landforms, unsuitable soils and little standing water. Settlement itself has also been very restricted. However, the fertile valleys of the MacDonal River, Webbs Creek and Wollombi Brook were settled and cleared early in the 19th Century, where a mixture of grazing and farming occurred. From these areas, settlers ventured out and cleared most of the remaining valleys that showed any agricultural potential. It is estimated that only about five percent of the Macdonald catchment has ever been cleared (Prineas, 1997). Much of the rugged country in between grazed valleys was subject to rough grazing for cattle, linked with frequent burning to induce green feed (Sanders *et al.*, 1988). Some feral cattle present within Yengo and Parr State Recreation Area still exist today following these grazing practices.

Two types of cattle grazing have been practised in the assessment area. In the more fertile valleys, the land was cleared and improved pastures were introduced. In the rougher country between the valleys, the clearing was minimal and grazing was on native pasture. Fire was often used to encourage the growth of sweet grasses. The grazing on improved pasture was predominantly on freehold lands, while grazing on native pasture was often practised on grazing licences (permissive occupancies or POs).

The most actively managed property within the assessment area was the Big Yango Station. The property has run cattle for as long as 150 years. In 1950, building of fences, roads, sheds and yards began. Cattle were run in both the cleared home run and other grazing valleys up to eighteen kilometres away.

Tracks were created through well timbered ridges and over to these other grazing runs, commonly utilised in winter (Walker, 2001; J. Bowen, pers. comm.). Four-wheel drive standard roads were built to connect parts of the property in 1975. A bulldozer was used, and the tracks were well established, sometimes being used to drive stock from one place to another. Earth dams were constructed and strategic fencing was placed around the PO adjoining the freehold land (J. Bowen, pers. comm.).

The land on which cattle were run totalled more than 53,000 ha, lying between Howes Valley fire trail, south to the Macdonald River and to Yango Creek. The cattle were contained within well fenced paddocks in the cleared areas or by utilising natural boundaries and short, strategic fencelines in the adjoining POs.

Clearing of Big Yango took place in the years up to the early 1900s. The grassy valleys used for grazing were cleared and “improved” consistently (J. Bowen, pers. comm.). The clearings had to be maintained so that the acacias and trees did not return. Acacia regrowth comes back onto the flats rapidly. Regular, strategic burns were used around the edges of the clearings to protect the buildings and control the woody regrowth encroaching onto the flats. The paddocks in the freehold areas (eg. home run) were improved pasture, and these were rotationally grazed. The maximum number of cattle run by the Bowens was 1,000 head, although the average stock number was 400-500 head.

There are in excess of 50 dams throughout the property. These dams are used by wildlife, reduce the impact of flash floods and can be used for strategic fire fighting (J. Bowen, pers. comm.).

Fire risk on Big Yango was reduced by strategic burning and the control of grass and weed growth in the valleys and on Mt. Yengo by grazing. In addition, Big Yango has seen an annual expenditure of \$10,000-\$15,000 for weed control by slashing and spraying (J. Bowen, pers. comm.).

The majority of Big Yango station has been classified as SM. Likewise, other intensively grazed lands such as the Boree and Wallabadah valleys, Werong and Stockyard Creeks and the Macdonald River, Rush Creek and Webbs Creek are mostly classified as SM.

In the Howes Valley district, the McTaggart family has owned land for 5 generations, first settling in 1825 (T. McTaggart, pers. comm.). The early McTaggarts cleared land by hand using axes and ringbarking (T. McTaggart, pers. comm.). The ringbarking was last done in the 1940s. The more accessible holdings such as Darkey and Devils Hole have broad open valleys and were more intensively cleared. The more remote holdings (eg. The Ridges, Burtons) encompassed the steep ridges and were not cleared due to their inaccessibility and ruggedness (T. McTaggart, pers. comm.). Their isolation and ruggedness ensured that no roads, fences, dams or the such were built in this area. Management activities such as mustering and weed control were carried out by horseback and with dogs (T. McTaggart, pers. comm.).

Fire was an integral part of pasture management, with the land being burnt approximately every two years. One year a ridge would be burnt and the following year the adjacent ridge would be burnt (T. McTaggart, pers. comm.). The burns promoted the growth of sweet Kangaroo Grass, which would fatten the cattle, and also controlled scrub growth (eg. acacias). The cattle were fed angophoras for roughage from time to time (T. McTaggart, pers. comm.).

The remote country was used to raise bullocks, which were moved from the home run following weaning. However this practice began to decline when market demand shifted towards younger animals (T. McTaggart, pers. comm.).

Some logging was done in Darkey Creek, but big timber was scarce. No logging occurred on The Ridges. The majority of these lands are classified as MR, with smaller pockets of SM.

Many of the remaining privately owned blocks with the assessment area were managed for periodic grazing when required. In these cases, the main grazing property is outside the assessment area. The isolated blocks were often grazed in winter or in dry periods. Thus, there was not the level of fencing, dams or tracks on other properties, as is found at the more intensively managed properties.

Impact of clearing on naturalness

Clearing impacts the naturalness of an area as it represents the replacement of natural ecosystems with pasture. Other impacts on naturalness include the spread of weeds into adjoining bushland, damage to stream banks, decreased water quality and accelerated soil erosion, particularly in periods of drought.

Locations within the assessment area which have been subject to clearing and associated disturbances are listed in Table 5 and shown in Figure 3. Cleared areas showing none or little regeneration that are over 50 ha in size are considered to be difficult to restore within a reasonable time and hence classified as substantially modified (SM). If regeneration has commenced, then the area is classified as modified but restorable (MR). Small clearings (<5ha) without regeneration are also classed as

MR as they will readily regenerate from surrounding bushland. Small clearings with regeneration are classed as substantially unmodified (SU).

Large areas which have been substantially modified by clearing include:

- Big Yango Station (area of 852 ha cleared); a cattle station with well established farm infrastructure and access tracks, close to other cleared areas;
- Colo Heights;
- Werong Creek;
- Boree Valley, stock grazing for almost 200 years; and
- Big Wallabadah.

Other SM areas which are smaller in size include:

- Partridge Creek, clearing on large freehold block at edge of assessment area;
- Watts Creek, clearing within boundary of assessment area;
- Darkey, clearings on edge of assessment area;
- South of Adams Peak, clearing on freehold land;
- Sandy Creek, close to junction with Werong Creek;
- Stockyard Ford;
- Fletcher Creek;
- Quart Pot Creek;
- Nowlands Creek, Timor Creek, Nowlands Creek South, cleared blocks with established infrastructure and access tracks, These are part of Big Yango Station;
- Back Creek;
- Reedy Creek;
- Eastern area of inholdings including Little Wallabadah, Sandy Arm, Boree Valley North, Stickybush Arm, South Boree Creek, Little Boree Creek, New Place Creek, clearing with structures;
- Western area around Boggy Swamp Creek including Boggy Swamp, Bunjim Creek, Radio Repeater Station, The Holes, Round Topped Arm, Broad Arm, Grassy Arm and Boggy Swamp North, with clearing along creeklines and some weeds;
- Mogo Creek;
- Hilltop near Webbs Creek;
- Doyles Creek;
- Greens Swamp;
- Cosy Nook;
- Wheelbarrow Ridge;
- Terraborra, clearing continuing periodically; farm house and sheds, access trail;
- Pierces Valley, area cleared, grazed, quarrying;
- Haughey Hut; and

- Culoul Creek, largely cleared, some regrowth.

The following sites are smaller in size or already regenerating and are classed as modified restorable (MR):

- Wallaby Swamp South and Stoney Creek/Waterhole, powerline clearing, burnt area with very patchy vegetation;
- Bala Range, cleared area, regenerating;
- Mt. Yengo, although it is above the size threshold to be classified substantially modified, it is classified MR because it is not wholly cleared and is regenerating, being basalt and also being relatively free from weed infestation
- Tumbledown Creek, block regenerating, close to other cleared areas;
- Nowlands Creek North, block with access tracks, close to other cleared areas;
- Upper Werong Creek
- Mt. Calore/ The Bulls Run, has rough access track, some clearing
- Coogee Creek
- Cockatoo Creek

Impact of grazing on naturalness

Grazing assists in maintaining the cleared areas as it suppresses the regeneration of native species. Other impacts from grazing include damage to stream banks, decreased water quality and accelerated soil erosion. Grazing of native vegetation suppresses the more palatable species that are selected by the stock and also results in changes to species composition in response to regular fire used to promote new growth. The level of these impacts would clearly be influenced by stocking rates and fire regimes associated with grazing.

The classification of the impact of grazing on naturalness is considered the same as what is described for the clearings themselves. Thus cleared areas showing minimal regeneration that are over 50 ha in size are classified as SM; where grazing is sufficiently light to permit regeneration to commence, the classification becomes MR. Small clearings (<5ha) where grazing is preventing regeneration are also MR while lightly grazed small clearings are classed as SU.

Grazing on native vegetation is classed as MR where grazing pressure is likely to be highest (eg. in blocks closely associated with clearings) or where fire was used as a regular tool to encourage the growth of sweet grasses. Otherwise, grazing on native vegetation is classed as SU. The details of clearing and grazing are shown in Figures 3 and 4 and summarised in Table 5.

The places most intensively grazed include Big Yango Station, the Boree and Wallabadah valleys, lands around Howes Valley, tributaries of Wollombi Brook (eg. Werong and Stockyard Creeks) and along the Macdonald River, Rush Creek and Webbs Creek.

5.1.2 Infrastructure

The most common type of infrastructure within the assessment area includes houses, sheds, stockyards, gates, fences and dams associated with grazing properties. There are a number of power lines and associated developments through the two parks, the installation and maintenance of which requires clearing. There are also a number of

communication towers, camping areas and trig stations. Known infrastructure is shown in Figure 5.

Impact of infrastructure on naturalness

Farm infrastructure is often closely associated with cleared agricultural land and contributes to the general SM classification of such areas. Generally, infrastructure is classed as SM for structures for which there is no prospect of easy removal and restoration (eg. houses, towers, farm dams, industry/factory features). Minor infrastructure that can easily be removed or has minimal impact on naturalness is classed as SU (eg. trig points and ruins).

Suites of animals, including macropods and birds, have made use of the dams which were built throughout the property for watering stock. These dams are used by wildlife, reduce the impact of flash floods and can be used for strategic fire fighting purposes (J. Bowen, pers. comm.).

The utilities/ infrastructure features at the following sites are classified as SM:

- Major powerline adjacent to Putty Road;
- Little Darkey Camp powerlines, Howes Valley;
- Bulga Mountain, powerlines and permanent infrastructure, Parnell/ Howes Valley;
- Radio Repeater Station, Putty; and
- Weather station, Mt. Calore.

The main concentrations of houses, farm dams and buildings, considered SM, occur at:

- Stockyard Tributary, yards and farm dams at inholdings north of Finchley Track;
- Finchley where there is a camping ground, farm dam and a quarry;
- Boree Valley, Wallabadah and Little Boree Creek, particularly dense infrastructure along the creeklines and roads;
- Mogo Creek;
- Cosy Nook at Wheelbarrow Ridge Rd;
- Wheelbarrow Ridge;
- Inverleigh at Wheelbarrow Ridge Rd;
- Colo Heights; and
- Haughey Hut, there is a tower, quarry, sheds and a house.

5.1.3 Logging

Some early logging activities occurred in the area in the 1940s. The timber-getters used bullocks to extract the timber and made old bullock tracks through Parr State Recreation Area by hand (L. McIntosh, pers. comm.). The earliest timber mills were established in the late 1940s and early 50s. These included a mill down by the Colo River, another at Colo Heights that subsequently burnt down, the Culoul Sawmill in Auburn and another on the southern side of the Colo River. The timber industry really gathered momentum in the area in the 1950s, with 4 different mills operating at once (L. McIntosh, pers. comm.), all being supplied by the Yengo area.

In 1965 a mill was built at Colo Heights by the McIntosh brothers, then another mill was built at Wheelbarrow Ridge in the 1970s (L. McIntosh, pers. comm.).

There were further simultaneous logging activities taking place from the Gosford side (east) of the Yengo area, with loggers gaining access by coming in along the Yango Track. Logs from the northern part of the assessment area went up to a mill in Muswellbrook (L. McIntosh, pers. comm.).

The McIntosh's sawmill sourced timber from a specific area in the Yengo region. The Forestry office issued a licence to each operator over the area they could log. The McIntosh's generally entered from Putty Road, heading east into the bush to cut logs, along a 65 km stretch from Colo Heights up towards Putty. They penetrated in about 12 kilometres, eg. going no further east than Heartbreak Hill along the Womerah Range Trail. Most of the trails remaining in the assessment area were constructed by the loggers. Parties spent days on foot and horseback searching for good patches of timber. Roads were then surveyed and constructed to the patch of good timber, generally along the ridges. Where possible, roads that already existed were extended. The bushrockers came in after the loggers on the new tracks and later lower value products such as firewood or pulpwood were extracted (L. McIntosh, pers. comm.).

In time, there was increased concern over erosion scars down the sides of gullies as a result of the logging activities. The Forestry Commission then introduced restrictions and instructed the loggers not to go into the gullies, so that all snig trails had to be built on the ridges (L. McIntosh, pers. comm.).

The logging efforts were selective, focusing on Ironbark, Blue Gum, Stringybark, Mahogany or Turpentine. On entering a particular area, the loggers would extract one class of timber, always felling mill logs, which would be greater than 35 cm in diameter. The subsequent logging events in that area would not always rely on regrowth, but could take a different type of timber. The first patches logged, in the early 1940s were those on shale caps. Loggers were at work before the Singleton Road was constructed post-WWII.

When better machinery became available (chainsaws from 1956 onwards), areas previously logged would be re-logged more efficiently. For example, additional classes of timber could be felled, such as Turpentine which was previously left due to the amount of silica it contained making it difficult to cut. As a result, shale cap areas around Wallaby Swamp, Womerah Range, Colo Heights and Webbs Creek were logged several times (L. McIntosh, pers. comm.).

Large volumes of fence posts were cut by other contractors in the timber industry. They would take smaller trees than the sawmillers. Later, in the early 1980s, a mill was established at Putty to produce railway sleepers for garden retaining walls (L. McIntosh, pers. comm.). This logging was more intensive than previous activities, utilising large volumes of the Swamp Gum, a species which had never been previously logged. This logging operation focussed on the swampy country in the Mellong Swamps further north in the park. He followed the powerline adjacent to Putty Road and went in between the ridges, logging the Swamp Gum (L. McIntosh, pers. comm.).

The declaration of Wollemi National Park in 1979 and its subsequent closure to loggers increased logging activities in the assessment area. Substantial logging therefore took place in the 80s until Yengo National Park was gazetted in 1988. As a result, parts of the assessment area have been logged within the last 20 years.

The loggers were given 6 months to wind up operations following Yengo National Park's declaration. All sawmills closed down except one which is still in operation today. This sawmill, 'Culoul Sawmill' in Colo Heights is now run by one of the McIntosh brothers and sources logs from Barrington Tops (L. McIntosh, pers. comm.).

Impact of logging on naturalness

The most direct impact of logging is a shift in the age structure of the forest from mature trees to regrowth. This shift is most dramatic where logging is most intense (eg. clearfelling) or where logging is repeated on a short rotation. The other direct impact is the establishment of a network of roads associated with access and extraction of the timber. Logging operations that have substantially affected age structure by removal of a high proportion of mature trees leaving regrowth forest are classed as SM. Selective logging operations within the last 25 years are classed as MR and areas not logged in the past 25 years as SU (refer to Table 5).

Indirect impacts include the introduction of weeds and increased erosion. In 1966 the Soil Conservation Service conducted an investigation into the source of sand deposits accumulating along the Lower MacDonald River flats. Among the possible causes of this increase in erosion was the practice of burning scrub after logging and the proliferation of steep, poorly constructed access roads and snigging tracks (Prineas, 1997).

There are reasonably accurate records of logging events since the 1970s, which are shown in Figure 6. However there is no detailed information on earlier logging. All areas known to have been logged once in the last 25 years from these records have been classed as MR since the logging operation was selective. Parts of these areas are likely to have been logged more frequently and may be more appropriately classified as SM (eg. the more accessible and fertile areas around Colo Heights). However, there is insufficient information to identify areas that have been logged more intensively or frequently.

The main sites logged in the last 25 years and classed as MR are:

- South eastern section of Parr State Recreation Area near Wheelbarrow Ridge, last logged in 1979;
- Colo Heights vicinity, logged by Portland Timber Co. and later by McIntosh Brothers;
- Womerah Range and near Webbs Creek;
- Parr SRA, south of Webbs Creek has been logged several times. Most recently, 12,000 ha was logged in 1984, with more logged in 1985, and 1987;
- Howes Swamp and along Howes Range Track;
- Mellong Range, numerous logging events, timber taken by the Portland Timber Co. among others, last logged in 1984;
- Wallaby Swamp, a large area in from the Putty Road, last logged in 1983;
- East Yango, a large area south of Yango Track, near Tumbledown Track and Sandy Creek Loop Track, last logged in 1985; and
- Drews Creek, a smaller area in the northern section of the assessment area, logged once within the last 15 years though the logging operation was curtailed by the establishment of Yengo NP (T. McTaggart, pers. comm.).

5.1.4 Fire

There is little doubt that humans have influenced fire regimes in the area for thousands of years, and that the pattern of fires and their effects on vegetation changed when traditional Aboriginal burning ceased early last century due to the devastating effects of

European diseases such as smallpox, measles and influenza on the indigenous population (Merriman, 1993).

Wildfire within the two parks is most severe during late spring and summer, when dry north-west and westerly winds create conditions favouring the rapid spread of fire. Lightning strikes are a significant ignition source later in the fire season. NPWS fire records indicate that escaped burns from surrounding properties and burns which start adjacent to roads and tracks represent the main cause of wildfires within the parks. The naturalness of some lands managed for grazing has been affected by regular (1-2 year) prescribed burns to promote green feed for cattle and control woody regrowth in clearings.

Recent fires in the area are often caused by humans and are likely to occur at a much greater frequency than fires caused solely by natural causes; a situation which is a major threat to the natural values of Yengo.

Multiple fires often occur in spring and summer, which are often very challenging for authorities to control. A total of 492 unplanned fires have been recorded in Yengo National Park and 101 unplanned fires in Parr State Recreation Area since 1975. Some unplanned fires within the two parks have burnt very large areas including 43,502 hectares in the 1997/1998 fire season and 113,726 hectares in the 1993/1994 fire season. Combined these two fire events burnt 71.3% of Yengo National Park and 85.8% of Parr State Recreation Area. The fire frequency since 1977 is shown in Figure 7.

Fires burning within the area south of the Womerah Range threaten the rural farms in St Albans, Colo Heights and other developed areas to the south and south east of the Womerah Range. This area is the focus of a vigilant program to reduce fuel loads to protect these privately owned lands (WJ. Rodger, pers. comm.).

Impact of fire on naturalness

Naturalness is impacted when bush fire suppression operations require the construction of temporary trails, helipads and fire lines and utilise creeks and rivers. Natural control lines such as streams are largely ephemeral and in dry periods are often not useful, although natural fire boundaries can exist along wide sandy creek beds or in dense rainforest gullies.

Frequent human-introduced fires will affect the overall naturalness of the area, but the naturalness is capable of being restored if the fire regime becomes more variable over space and time. A diversity of fire regimes is needed to maintain natural diversity. Accordingly the management of fire should aim to provide a pattern of high, moderate and low intensity, frequency and extent (including both the size of areas burnt and completeness within burnt area). Extinctions are most likely when fire regimes of relatively fixed intensity, frequency and extent prevail without variation. In particular, frequent fire (eg. <10 years) will cause some species in Sydney sandstone vegetation to decline and eventually disappear.

Areas classed as substantially modified (SM) are those which have had 5 or more fires during the time period from 1977 onwards. Areas where fires have occurred 3 or 4 times during this period are considered to be modified but restorable (MR) and where frequencies of 0, 1 or 2 fires occurred, the area is considered substantially unmodified (SU).

Frequently burnt areas include:

- Between Paynes Crossing and Dalton's Defence Trig (north east part of assessment area);

- Surrounding inholdings south of Finchley Trig and west of Yango Track, also surrounding parts of Yango Track. Large area of mosaic of MR and SM patches;
- Mellong Range near Kimma Creek, an area of SM crossing the assessment boundary in the western part of the assessment area;
- Haughey Hut area, a large patch around the Womerah Range Trail which is a combination of MR and SM;
- Parts of the various grazing properties within the assessment area; and
- The area west of St Albans which is subject to regular prescribed burning.

5.1.5 Mining

Mining in the assessment area has been restricted to small scale, local operations. Volcanic rock was quarried from Pierce's valley in Parr State Recreation Area. However, only a small proportion of the available material was extracted. There has been some extraction of sand from the Mellong Swamps, but this operation appears to have been limited by its distance from available markets.

Impact of mining on naturalness

Mining has a direct impact on naturalness in relation to the native vegetation that is cleared to establish the mine, onsite processing equipment and related infrastructure. There are often downstream impacts on water quality resulting from discharge from mining sites. The approach to naturalness classification of mining sites is shown in Table 4.

Mining at Pierce's Quarry has had a significant, but localised impact on the area's naturalness, being a site where grazing and clearing also took place. NPWS has now acquired this quarry and assumed the responsibility for its rehabilitation. This site is nevertheless classed as SM.

The Mellong Swamp sand mine is located on the edge of the assessment area. The actual mine site is outside the assessment area and hence has not been allocated a naturalness ranking.

Road base was removed from other small quarries that are located adjacent to roads within the assessment area, such as the Mogo Creek Road and the Womerah, Boree and Yango Tracks. These quarries are classed as SM.

5.1.6 Introduced species

The plant and animal communities in Yengo have been affected by several species of introduced animals and by several species of introduced plants, including some declared noxious weeds. Weeping Willow (*Salix babylonica*) is a noxious weed which spreads along the waterways in the assessment area. Blackberries (*Rubus fruticosus*) are dispersed by birds (eg. currawongs) and have become problematic near creeks and on edges of cleared flats. Graziers in the area have had to control blackberries with spraying and slashing.

Other weeds which become established in grazed or disturbed areas are Noogoora Burr (*Xanthium occidentale*), Dandelion (*Taraxacum officinale*), Pampas Grass (*Cortaderia selloana*), Fireweed (*Senecio madagascariensis*), pink/red lantana (*Lantana camara*) and fleabane (*Conyza sp.*) (T. McTaggart, pers. comm.; NPWS, 2001). Isolated areas of Prickly Pear (*Opuntia sp.*) previously existed on Big Yango station (J. Bowen, pers. comm.). There are reported to be no blackberries on Mt. Yengo, and few weeds have become established except some burrs which stock had

previously kept at bay (J. Bowen, pers. comm.). Foxes and wild dogs move around the landscape more than wallabies, and it is believed that they are the vector for weed dispersal (eg. by burrs).

Cats, foxes and wild dogs, which can compete with or prey on native species, are thought to be distributed throughout the two parks. Wild dogs and cat numbers are more numerous in the southern sections of the area, nearer to urban development where animals have established into bushland areas. Cattle, rabbits, pigs and goats also occur, but are of more localised distribution.

Feral cattle and straying domestic cattle are a major cause of disturbance to native plant and animal communities. Cattle cause the spread of weeds, stream bank and waterhole erosion as well as repetitive and selective grazing of native vegetation. They also reduce the re-colonisation of native vegetation in previously cleared areas by grazing on young shoots. Feral cattle occur near Pierce's Quarry (L. McIntosh, pers. comm.). Cattle have escaped from properties that were not fully fenced or where fencing becomes damaged and breed up in increasing numbers. Feral pigs occur in the Mellong Creek – Wallaby Swamp and Wallabadah areas and cause soil disturbance when rooting for food and wallowing. Isolated small herds of feral goat have occurred in the two parks. These are targeted quickly for control when located. Goats cause significant damage as they aggressively compete with native animals for food and habitat eg. goats in Brush-tailed Rock Wallaby habitat threaten this vulnerable species (NPWS, 2001).

Impact of introduced species on naturalness

Introduced species affect the area's naturalness most markedly in locations which are close to or influenced by disturbances such as urbanisation, clearing, farming, and frequent fires. Introduced species can be a threat to natural values, and affect those values by being invasive (eg. weeds); by directly competing with or preying on native species (eg. feral cats, dogs, goats and foxes); or by affecting soil and water systems (eg. cattle).

NPWS weed control programs focus on species with a high potential for dispersal and those that are declared noxious. Along with cleared sites, streams with developed areas in their headwaters are at risk from weed invasion, particularly from blackberries and willows. At this point, the main weed infestations are associated with clearings, and have not been mapped separately from those clearings in this assessment. Thus, the presence of weeds has not influenced the allocation of disturbance categories outside cleared areas.

5.1.7 Roads, trails and tracks

Roads and fire trails

The roads and fire trails in the assessment area are shown in Figure 5 and described in Table 5. These range from roughly constructed 4WD tracks through to sealed public roads.

There is a network of trails in the assessment area which assist in the management of fire, pests and other essential management activities. These include Yango Track, Howes Range Trail, Old Settlers Road, Wheelbarrow Ridge and Womerah Range Trails. The Womerah Range Trail is also used for controlled access recreation by off-road vehicles and horse riders.

There are other roads suitable for two- or four-wheel drive vehicles in the assessment area, which are maintained at a higher standard than fire trails. These roads mostly provide access to private land and include:

- Old Settlers Road, a good standard public road excluded from the park, has heritage value (traverses park east - west);
- Howes Valley Trail, an access route from Putty Road for inholdings, joins Yango Track, a well utilised 4WD road (traverses park east - west);
- Yango Track, a major access for inholdings, unsealed 4WD public road that joins Howes Valley Trail;
- Finchley Track, a 2WD road leading to the camping area, including the loop back to Laguna via the Boree Track;
- Wheelbarrow Ridge Road, a 2WD public road;
- Boree Track, a 4WD crown reserve road;
- Mt. Simpson Track, a 4WD road; and
- Mogo Creek Road, a public road from St Albans towards Bucketty.

Many of the remaining trails were constructed for logging purposes. Those that are not required for management purposes will be closed and rehabilitated (NPWS 2001).

Walking tracks

There are relatively few walking tracks in Yengo NP and Parr SRA. Walking is popular along the Old Great North Road, which partly runs into the assessment area. There are plans to install interpretation and sign posting at interesting points along this walk (NPWS, 2001). Since Yengo National Park and Parr State Recreation Area were declared, the level of bushwalking use has increased. Two walking tracks used regularly are the Mogo Camping area to Circuit Flat Bridge and Burragurra walking tracks. Neither track has been formalised nor provided with erosion control works. The Circuit Flat Bridge Track experiences problems of illegal vehicle access and fire damage.

Burragurra is a short, popular walking track and leads to an Aboriginal engraving site. Previous vehicle access and uncontrolled water drainage has caused severe erosion along this steep track.

Impact of roads, trails and tracks on naturalness

Trails impact on naturalness because their establishment and maintenance necessitates clearing of natural ecosystems. They are also the focus for non self-reliant recreation such as horse riding and 4WDing or illegal activities such as car and rubbish dumping, arson, theft of wildflowers and bushrock. Other impacts on naturalness include accelerated soil erosion, particularly on steep or poorly constructed trails.

Public access roads and fire trails have more prospect of being restored if they are not surfaced with imported materials nor constructed with extensive cuts and fills which constitute a significant impact on the area's naturalness. Roads that do not intrude far into the assessment area are considered to have less overall impact on the area's naturalness. Management access trails, other authority access trails and private access roads are maintained to keep them passable but do not usually use imported materials. Grading or bulldozing such roads means that there will be little regeneration since the last use. As such they are classed as MR. Horse trails are generally assigned MR.

The roads classified as SM include highways, sealed major or minor public roads, unsealed public roads or 4WD public roads. Such roads have imported material (eg. gravel) or have been constructed with considerable cut and fill. Substantially modified roads in the assessment area include:

- Major roads on the boundary of the assessment area, including the Putty Road, Wollombi Road and St Albans Road
- Old Settlers Road, which is well constructed in places, and has historic stone formations;
- Part of the Yango Track, which provides major access for inholdings, unsealed 2WD or 4WD public road;
- Part of the Boree Track, unsealed public road providing access for inholdings and other Authorities access;
- Finchley Track, unsealed 2WD public road, including the loop back to Laguna via the Boree Track;
- Wheelbarrow Ridge Rd, established, unsealed public road (Parr SRA); and
- Wheelbarrow Ridge track, to be maintained to 2WD standard between Wheelbarrow Ridge Rd and Bicentennial Road.

The majority of these roads are not part of the national park and hence are not under consideration for inclusion in the wilderness.

5.1.8 Bushrock removal

Bushrock removal was occurring at a reasonably slow pace during the three decades prior to the 1980s. The rock collectors followed the loggers on their newly built trails, obtaining quantities of flukey black sandstone rock (L. McIntosh, pers. comm.; J. Sanders, pers. comm.). In the 1960s some PO applications were submitted for the gathering of bushrock in the southern parts. However, much of the bushrock collection was without authorisation. In other places, landholders allowed the bushrockers to gather rock on their properties adjoining Putty Road.

Bushrock removal became intense in the 1980s with up to 100 trucks a day taking bushrock from the western side of the assessment area. Access for trucks was from the Putty Road and the illegal collectors would push their trucks through the vegetation

on the ridgetops, some of which were also burnt. In the 1980s, bushrockers received \$1,000 a truckload and two truckloads could be collected in one day. Even greater volumes could be obtained by the bushrockers who had two transport vehicles operating up and down Putty Road plus a 4WD vehicle which went down the tracks, drove onto the sandstone shelves and retrieved the rock.

Up as far north as Howes Valley, bushrockers were operating from the 1970s until the late 1990s (T. McTaggart, pers. comm.), although these areas were sometimes more difficult to access due to the narrow ridges.

Impact of bushrock removal on naturalness

Bushrock collection has impacted on the naturalness of ridges within the park and decreased habitat available to snakes, geckos, skinks, invertebrates, lichens and mosses. Population declines would have occurred due to habitat removal and disturbance, with a main concern being rare and endangered species that rely on rock outcrops such as the Broad-headed Snake. Pushing access tracks along ridgetops to gain access to bushrock has also directly damaged vegetation.

The general areas where bushrock gathering was focussed are listed below. Some parts were thoroughly cleared of bushrock, in particular the more accessible parts of ridges from the Putty Road (J. Sanders, pers. comm.). Ridges subject to thorough removal of bushrock have been classed as MR, whilst more remote ridges have been classed as SU. These areas are illustrated in figure 8.

- Howes Range,
- Wallaby Swamp,
- Wheelbarrow Ridge,
- Womerah Range (west),
- Gorricks Run,
- Pierce's Valley tracks and
- East of Putty Road between Colo Heights and Putty.

5.1.9 Water quality

The quality of water in the MacDonald River, Webbs Creek and other creeks and tributaries is affected by a range of human activities and land uses which occur near the assessment area. Settlement and clearing early in the 19th Century was based in the fertile valleys of the MacDonald River, Webbs Creek and Wollombi Brook, where a mixture of grazing and farming occurred.

Downstream of disturbed lands that lie within the catchments of both parks, there are isolated locations of weeds including Weeping Willow, Noogoora Burr and Dandelion. For the MacDonald River, Boggy Swamp Creek, Burrowell Creek, Reedy Creek and Howes Valley Creek particularly, spread of weeds is a concern because these watercourses have their headwaters in rural land to the west of Putty Road. The MacDonald River's headwaters are many kilometres west of Yengo, near the Great Dividing Range east of Mudgee. Developed areas are not only the source of the weeds, but are a source of increased runoff, elevated nutrients (encouraging weed infestations) as well as a number of pollutants. Built-up and rural inholdings within the two parks are a concern and Blackberry is one weed that has colonized these areas.

Increased sedimentation from land clearing and high fire frequencies has also been a problem. Within the assessment area, the burning of scrub following logging and

increased erosion due to poorly constructed access roads and snigging tracks is thought to have influenced the naturalness of the waterways by causing sand deposit accumulation along the lower MacDonald River as early as the 1960s. (Prineas, 1997).

Other impacts to creeks and rivers include damage from fire fighting operations, as well as from cattle and pigs causing disturbance to creek systems. Pigs occur in the Mellong Creek – Wallaby Swamp and Wallabadah areas.

Impact of water quality on naturalness

The naturalness of aquatic ecosystems and the ecological health of streams is affected by human disturbances, fire fighting operations, cattle and feral pigs.

Feral cattle and straying domestic cattle cause the spread of weeds, stream bank and waterhole erosion as well as repetitive and selective grazing of native vegetation. Feral pigs utilise soft ground in low-lying areas, and cause large-scale soil disturbance when rooting for food and wallowing.

Extensive weed infestations can occur downstream of rural landuses and developed areas. Weed infestations can remain for many years as a result of residual nutrients in the soil and continued polluted runoff from developed and rural areas.

The types of disturbances degrading water quality are localised within the assessment area. Hence water quality in the majority of the streams within the assessment area is reasonably good. Thus no riparian areas are classified as MR or SM due to poor water quality.

5.1.10 Results of the naturalness / wilderness capability assessment

Locations of the sites of disturbance are shown in Figures 3 to 8 and are described in Table 5 *Disturbed sites within assessment area & disturbance categories*. The parts of the assessment area which were not disturbed, or were not sufficiently disturbed to be classified as SM or MR, were classified as 'substantially unmodified', SU.

Table 5: Disturbed sites within assessment area & disturbance categories, Yengo Wilderness Assessment Area

Category and site location	Comments	Naturalness Category	Area to be identified as wilderness?	Recommended for declaration as wilderness?
Roads, tracks & trails*				
Bagnells Creek Road	Access to private property; natural surface	MR	No	No
Bala Range trail	4WD road, has been extended west; 4WD park fire management access	MR	Yes	Part
Boree track	4WD Crown Reserve road, natural surface, north more extensively used; 2WD from junction with Yango track to Laguna	MR	Part	No
Bridale track	Natural surface; recreational use	MR	No	No
Bunjim Creek /Boggy Swamp tracks	Natural surface	MR	Yes	No
Doyles Creek track	Natural surface	MR	No	No
Doyles Hollow track	Natural surface; recreational use	MR	No	No
Finchley track	Unsealed public road, natural surface; 2WD access to camping area	SM	No	No
George Downs Drive	Major public road; outside assessment area but adjoins it on eastern side	SM	No	No

ASSESSMENT OF THE YENGO WILDERNESS

Roads, tracks & trails*	Comments	Naturalness Category	Area to be identified as wilderness?	Area to be declared as wilderness?
Gorricks Run trail	Fire management access, natural surface	MR	Yes	Yes
Grono north trail	Natural surface; recreational use	MR	No	No
Grono south trail	Natural surface; recreational use	MR	No	No
Heartbreak Hill Camp track	Natural surface	SU	No	No
Howes Range trail	Fire and logging trail, natural surface	SU	Yes	Yes
Howes Valley trail	4WD road, well utilised (traverses park east-west), access route from Putty Rd for inholdings, adjoins Yango track natural surface	MR	Yes	No
Kief Trig track	Natural surface	MR	No	No
Left Arm track	4WD park management access, natural surface; recreational use	MR	No	No
Little Boree track	Unsealed public road to Boree Valley area, plus Other Authorities Access	MR	No	No
MacDonald Road	2WD public access road; adjoins assessment area	SM	No	No
Mellong track	Natural surface	MR	Part	Part
McKenzie track	Natural surface; recreational use	MR	No	No
Milk Can Hill trail	Natural surface	MR	No	No
Mogo Creek Road	2WD public road	SM	No	No
Mt. Simpson track	Closed track, natural surface	MR	No	No

ASSESSMENT OF THE YENGO WILDERNESS

Roads, tracks & trails*	Comments	Naturalness Category	Area to be identified as wilderness?	Area to be declared as wilderness?
Powerline access roads	Numerous roads from powerline to Putty Rd for maintenance purposes; natural surface	MR	No	No
Old Bulga Road	Unsealed road, small section at southern end is excluded from the NP, powerlines to east, access for power lines and fire management, joins Putty Rd	MR	Part	No
Old Great North Road	Has heritage value	SM	No	No
Old Settlers Road	Good standard public road excluded from park, has heritage value (traverses park east - west)	SM	Yes	No
Pierces Quarry track	Natural surface; recreational use	MR	No	No
Pierces track	Natural surface; recreational use	MR	No	No
Prestons trail	Recreational use	MR	Yes	No
Putty Road	Sealed major public road; outside assessment but adjoins it on western side	SM	No	No
Quart Pot Creek track	4WD road, park management access	MR	No	No
Rush Creek track	Natural surface	MR	No	No
Sandy Creek Loop track	4WD park management access	MR	Part	Part
St Albans Road	2WD public access road; adjoins assessment area	SM	No	No

ASSESSMENT OF THE YENGO WILDERNESS

Roads, tracks & trails*	Comments	Naturalness Category	Area to be identified as wilderness?	Area to be declared as wilderness?
Stockyard Creek Road	Natural surface and clearing, Other Authorities Access	MR	No	No
Terraborra North	Natural surface; recreational use	MR	No	No
Terraborra South	Natural surface; recreational use	MR	No	No
The Bullock Run	Fire management, natural surface	MR	Yes	Part
Timor Creek track	4WD park management access	MR	No	No
Tumbledown track	Private access, natural surface	MR	Yes	No
Wallabadah Creek track	Natural surface	MR	Yes	No
Wallabadah loop track	Road network to Boree Valley area, natural surface	MR	No	No
Wallaby Swamp track	Fire trail	SU	Yes	Yes
Webbs Creek track	Natural surface	MR	No	No
Mogo Creek private land access	Access for inholding, 4WD track natural surface	MR	Yes	No
Wheelbarrow Ridge Road	Established, unsealed major public road	SM	No	No
Wheelbarrow Ridge track	2WD unsealed road; recreational use	SM	No	No
Wollombi Arm trail	Natural surface, with imported gravel	SM	No	No
Womerah Range trail	Natural surface ; fire trail, horse trail, recreation	MR	No	No
Werong Creek Road	Natural surface	MR	No	No

ASSESSMENT OF THE YENGO WILDERNESS

Roads, tracks & trails*	Comments	Naturalness Category	Area to be identified as wilderness?	Area to be declared as wilderness?
Yango track	Unsealed 4WD public road, major access for inholdings, adjoins Howes Valley trail, natural surface; 2WD between Finchley track and Boree track	MR	No	No
Wollombi Arm to Bullock Run link track	Natural surface; part of Big Yango Station road network	MR	No	No
Wollombi Arm to Timor Creek link track	Natural surface; part of Big Yango Station road network	MR	No	No
Timor Creek to Sandy Creek loop trail link track	Natural surface; part of Big Yango Station road network	MR	No	No
Mt. Yengo loop track	Natural surface; part of Big Yango Station road network	MR	Yes	No
Sandy Creek /Gilli Gilli Gully access trail	Natural surface	MR	Yes	No
Mogo Creek headwaters – branch trails	Natural surface; short branch trails off Mt. Simpson & Boree tracks	MR	Yes	No
Gooraba Creek track	Natural surface	SU	No	No
Mile Ridge track	Natural surface	SU	No	No

* Unnamed branch tracks off the tracks listed above are not listed separately. These branch tracks are typically classed as SU or MR.

ASSESSMENT OF THE YENGO WILDERNESS

Clearing, grazing & agriculture	Comments	Naturalness Category	Area to be identified as wilderness?	Area to be declared as wilderness?
South of Adams Peak	Clearing on freehold land on edge of assessment area	SM	No	No
Adjacent to powerline along Putty Road (various clearings)	Generally small cleared areas	SM	No	No
Auburn Creek	Cleared area	SM	Yes	Yes
Back Arm	Cleared area	SM	No	No
Back Creek	Area of disturbance	SM	Yes	No
Bagnells Creek	Cleared area	SM	No	No
Bailey Trig	Regenerating	MR	Yes	No
North of Bala Range	Cleared area, Regenerating	MR	Yes	No
Big Wallabadah	Cleared area and structures	SM	No	No
Big Yango Station (homestead block)	Cattle station with well established farm infrastructure and access tracks, close to other cleared areas	SM	No	No
Upper Big Yengo Creek	Cleared area	MR	Yes	Yes
Blaxlands Arm	Regenerating	MR	No	No
Boggy Swamp Creek (upper)	Cleared area	SM	Yes	No
Boggy Swamp Creek (lower)	Cleared area	SM	Yes	No
Bora Creek tributary	Cleared area, Regenerating	MR	No	No
South of Boree Creek	Cleared area	SM	No	No

ASSESSMENT OF THE YENGO WILDERNESS

Clearing, grazing & agriculture	Comments	Naturalness Category	Area to be identified as wilderness?	Area to be declared as wilderness?
Boree Valley	Cleared area and structures	SM	No	No
North of Boree Valley	Cleared area	SM	No	No
Branch Creek	Cleared area	MR	Yes	Yes
Broad Arm (near Boggy Swamp Ck)	Cleared area	SM	Yes	No
Broad Arm (near St Albans)	Small cleared area	SM	Yes	Yes
Bunjim Creek	Cleared area	SM	Yes	No
Burrowell Creek	Large clearing	SM	No	No
Culoul Creek	Cleared with some regrowth	SM	Yes	Yes
Cockatoo Creek	Some good condition vegetation in this valley	MR	Yes	No
Colo Heights	Cleared	SM	No	No
Coogee Creek	Block regenerating	MR	Yes	No
Cosy Nook	Cleared area and structures	SM	No	No
Darkey	Cleared area	SM	Part	Part
Doyles Creek	Cleared area	SM	No	No
Doyles Hollow	Cleared area	SM	No	No
Dry Creek	Cleared area	SM	No	No
East of radio repeater station	Cleared area	SM	No	No
Fletcher Creek	Cleared area	SM	No	No

ASSESSMENT OF THE YENGO WILDERNESS

Clearing, grazing & agriculture	Comments	Naturalness Category	Area to be identified as wilderness?	Area to be declared as wilderness?
Gooraba Creek tributary	Regenerating	MR	No	No
Grassy Arm	Cleared area	SM	Yes	No
Greens Swamp	Cleared area	SM	No	No
Haughey Hut	Cleared area, new trails	SM	No	No
Howes Valley	Major clearing and structures; outside study area, but adjoins western side	SM	No	No
Left Arm Creek	Cleared area	SN	No	No
Little Boree Creek	Cleared area	SM	No	No
Little Creek	Cleared area	SM	No	No
Little Darkey Camp	Cleared area	SM	No	No
Little Wallabadah	Cleared area and structures	SM	No	No
MacDonald River / St Albans / Webbs Creek	Major cleared area; outside assessment area but adjoins its eastern edge.	SM	No	No
West of St Albans	Cleared area	SM	Yes	No
Reedy Creek / Macdonald River/ junction	Cleared area	SM	No	No
Miile Ridge	Cleared area	SM	No	No
Mogo Creek	Cleared area with structures	SM	No	No
North of Mogo Creek	Cleared hilltops	SM	Yes	No

ASSESSMENT OF THE YENGO WILDERNESS

Clearing, grazing & agriculture	Comments	Naturalness Category	Area to be identified as wilderness?	Area to be declared as wilderness?
West of Mogo creek	Small cleared area	SM	Yes	No
Mountain Creek	Small partially cleared area	MR	No	No
Mt. Calore ("The Bulls Run")	Block sth of Mt. Yengo, has rough access track, some clearing	MR	Yes	Yes
South of Mt. Simpson track	Cleared area	SM	Yes	No
Mt. Yengo	Prior fire and grazing disturbance, regenerating well due to good soils, no blackberries, few weeds	MR	Yes	No
New Place Creek	Cleared area	SM	No	No
New Yards	Regenerating	MR	No	No
West of New Yards	Cleared area	MR	No	No
North of Big Wallabadah	Cleared area and structures	SM	No	No
North of Pipe Clay Ck	Cleared area	MR	Yes	Yes
Nowlands Creek	Two cleared block, established infrastructure and access tracks, close to other cleared areas	SM	No	No
Nowlands Creek	Cleared area	MR	No	No
North of Grassy Arm	Cleared area	SM	Yes	No
North west of Mt. Bagnell	Cleared area	SM	No	No
North of New Yards	Cleared area with structures	SM	No	No
Hill south east of Devil's Hole	Regenerating	MR	No	No

ASSESSMENT OF THE YENGO WILDERNESS

Clearing, grazing & agriculture	Comments	Naturalness Category	Area to be identified as wilderness?	Area to be declared as wilderness?
Parsons Forest	Regenerating	MR	No	No
South of Parsons Forest	Cleared	SM	No	No
Partridge Creek	Clearing on large freehold block at edge of assessment area	SM	No	No
Pierce's Valley	Area cleared and grazed, quarrying	SM	No	No
Quart Pot Creek	Cleared area	SM	No	No
Reedy Creek	Cleared area	SM	Yes	Yes
Round Topped Arm	Cleared area	SM	Yes	No
South of Rush Creek	Cleared	SM	No	No
Rush Creek	Regenerating	MR	No	No
Sandy Arm	Cleared area	SM	No	No
Sandy Creek/ Gilli Gilli Gully	Some clearing, but regenerating	MR	Yes	No
South of Figtree camp	Powerline, cleared area	SM	Yes	No
South of Hopwood Lagoon	Regenerating	MR	Yes	No
South west of New Place Creek	Cleared area, regenerating	MR	No	No
Southern of Devils Hole	Cleared area	MR	No	No
South of Wallaby Swamp	Cleared area	MR	No	No
Staircase Hill	Cleared area	SM	No	No
South of Gorriks Creek	Cleared area, minor disturbance	SM	Yes	Yes
Stickybush Arm	Cleared area	SM	No	No

ASSESSMENT OF THE YENGO WILDERNESS

Clearing, grazing & agriculture	Comments	Naturalness Category	Area to be identified as wilderness?	Area to be declared as wilderness?
Stockyard Creek Ford	Small cleared area; most cleared land at Stockyard Creek outside assessment area	SM	No	No
Stockyard Creek tributary	Cleared area	SM	No	No
Stockyard trail	Cleared area	SM	No	No
Stony Ck waterhole	Burnt area with patchy vegetation	MR	No	No
Terraborra	Clearing continuing periodically; farm house and sheds, access trail	SM	No	No
The Holes	Cleared area	SM	No	No
Timor Creek	Cleared block, established infrastructure and access tracks, close to other cleared areas	SM	No	No
Tumbledown Creek	Block regenerating, close to other cleared areas	MR	No	No
Upper Macdonald	Some disturbance	SM	No	No
Upper Werong Creek	2 blocks nth of Yango track, little clearing	MR	Yes	No
Wallaby Swamp	Burnt area	MR	Yes	Yes
Waits Creek	Clearing within boundary of assessment area	SM	Yes	Part
Hilltop south of Webbs Creek	Cleared area on ridge	SM	No	No
Webbs Creek	Cleared area on ridge	SM	No	No

ASSESSMENT OF THE YENGO WILDERNESS

Clearing, grazing & agriculture	Comments	Naturalness Category	Area to be identified as wilderness?	Area to be declared as wilderness?
Werong Creek	Clearings along creek, some extensive	SM	No	No
Sandy Creek / Werong Creek junction	Clearing along creek	SM	Yes	Yes
Werong Creek tributary	Cleared area	MR	No	No
West of Broad Arm	Cleared plus possible weeds	SM	Yes	Yes
East of Wheelbarrow Ridge	Cleared area	SM	No	No
Wheelbarrow Ridge	Cleared area and structures	SM	No	No
Womerah Creek	Some clearing on ridgetop	SM	Yes	Yes
North of Yango creek	Cleared area	SM	No	No
West of Yango creek	Cleared area	SM	No	No
North of Yango track	Cleared area	SM	No	No
Yokey Creek	Several portions of block partially cleared, has rough access track	MR	Yes	Yes

Logging	Comments	Naturalness Category	Area to be identified as wilderness?	Area to be declared as wilderness?
Draws Creek	Recent selective logging	MR	Yes	Yes
Wilks Creek	Recent selective logging operation not completed	SU	Yes	Yes

ASSESSMENT OF THE YENGO WILDERNESS

Logging	Comments	Naturalness Category	Area to be identified as wilderness?	Area to be declared as wilderness?
East Yango (Nowlands Creek, Gilli Gilli Gully, Sandy Creek, Tumbledown Creek)	Selective logging <15 years ago, close proximity to cleared lands, fragmentation	MR	Part	Part
Gorricks Run	Selective logging <15 years ago, log dumps and logging trails evident	MR	Yes	Yes
Howes Range	Selective logging <15 years ago, logging trails evident	MR	Yes	Yes
Howes Range	Selective logging <15 years ago, logging trails evident	SU	Yes	Yes
Mellong Range	Selective logging >15 years ago	MR	Yes	Yes
Mellong Swamps	Broader-scale logging >15 years ago in swampy areas	MR	Part	Part
Parr SRA (south/ south west of Webbs Creek)	Most of area logged <15 years ago, many trails and some log dumps evident	MR	No	No
Wallaby Swamp	Selective logging <15 years ago, logging trails evident	MR	Yes	Yes
Wallaby Swamp	Selective logging <15 years ago, logging trails evident	SU	Yes	Yes
Wheelbarrow Ridge (Parr SRA)	Selective logging ceased 20 years ago, separated from rest of SU/MR area	MR	No	No
Womerah Range	Selective logging <15 years ago, log dumps and logging trails evident	MR	Yes	Part

ASSESSMENT OF THE YENGO WILDERNESS

Utilities & other infrastructure	Comments	Naturalness Category	Area to be identified as wilderness?	Area to be declared as wilderness?
Radio repeater station at Staircase Hill	Cleared major structures	SM	No	No
Powerlines adjacent to Putty Road	Major powerline	SM	No	No
Powerlines adjacent to Old Bulga Road	Powerline	SM	No	No
Powerlines in Parr SRA	Major powerlines, permanent infrastructure	SM	No	No
Houses, sheds, yards at Boree valley, Wallabadah valley, Little Boree valley, Big Yango, Stockyard Creek Bagnells Creek, Wheelbarrow Ridge, Colo Heights	Major concentrations of infrastructure	SM	No	No
Finchley camping area		SM	No	No
Heartbreak Hill camping area		SM	Yes	No
Finchley Lookout		SM	No	No
Mt. Calore weather station	Weather station will be retained for park management purposes.	MR	Yes	Yes

ASSESSMENT OF THE YENGO WILDERNESS

Mining and quarrying	Comments	Naturalness Category	Area to be identified as wilderness?	Area to be declared as wilderness?
Quarry adjoining Yango track near Boree track junction	Small quarry	SM	Yes	Yes
Quarry adjoining Boree track	Small quarry	SM	No	No
Quarry adjoining Boree track	Small quarry	SM	No	No
Quarry adjoining Finchley track	Small quarry	SM	No	No
Quarry adjoining Mogo Creek Road	Small quarry	SM	Yes	No
Quarry adjoining Mogo Creek Road	Larger quarry on private land	SM	No	No
Pierce's Quarry	Blue metal quarrying, adjoining area also cleared and grazed	SM	No	No
Mellong Swamp sand mine	Sand mining, cleared; outside assessment area, but adjoins western edge	SM	No	No

ASSESSMENT OF THE YENGO WILDERNESS

Bushrock removal	Comments	Naturalness Category	Area to be identified as wilderness?	Area to be declared as wilderness?
Howes Range		SU	Yes	Yes
Wallaby Swamp		SU	Yes	Yes
Wheelbarrow Ridge		MR	No	No
Womerah Range (west)		MR	Part	Part
Womerah Range (east)/ Gorricks Run		SU	Part	Part
Pierce's track (west)		MR	No	No
Pierce's track (east)		SU	No	No
Mellong Swamps		MR	Part	Part
Left Arm track		MR	No	No
Putty Road near Devils Hole		MR	No	No

5.1.11 Summary of the naturalness / wilderness capability assessment

This section provides a summary of the wilderness capability assessment, drawing on the findings of the wilderness capability assessment (see Table 5). It was found that much of the area assessed meets the naturalness criteria for identification as wilderness (see Identified Wilderness, Figure 9).

Three categories of disturbance were used in the assessment of naturalness. Areas assessed as 'Substantially Unmodified' (SU) are considered to meet the naturalness criteria. Areas that are 'Modified but Restorable' (MR) do not meet the naturalness threshold at the current time, but are capable of restoration. Consistent with the Wilderness Act, NPWS has determined that up to 30% of a proposed wilderness area can be classed as MR.

Areas assessed as 'Substantially Modified' (SM) are not considered to meet the naturalness criteria, nor are they restorable within a reasonable timeframe. The Wilderness Act does permit some SM areas to be included in wilderness where they are required for management purposes.

MR areas consisted mainly of areas where re-growth of vegetation after disturbance was visible, or if the area of disturbance was of a small area, eg. naturally surfaced fire trails. Disturbance that was classified as SM was often quite localised in its distribution. It consisted of cleared areas surrounding infrastructure or on private lands. Areas classed as SU are not described in the table.

Three substantial areas within the assessment area are not considered to qualify for wilderness identification. These are the majority of Parr State Recreation Area (generally south/ south-east of Webbs Creek), the Big Yango Station area within Yengo National Park and thirdly, the Wallabadah area, Boree Valley and Little Boree.

The exclusions in the vicinity of Big Yango Station and the Wallabadah/ Boree area have many substantially cleared areas on private lands in close proximity to each other, which collectively constitute a large area of disturbance. These areas have generally been subject to widespread cattle grazing. In the Wallabadah/ Boree Valley area there are numerous roads and infrastructure features adding to the level of modification.

In addition, there is a significant level of disturbance associated with powerlines and the Putty Road along the western edge of the assessment area. The assessment area between Colo Heights and Wisemans Ferry showed a fair degree of disturbance also, along the main road (Wheelbarrow Ridge Road) and from clearing for structures and agriculture.

Due to the greater ease of access to Parr State Recreation Area, the area has seen a reasonable level of selective logging activity which continued until 1988 when the park was gazetted. Many of the logging trails were also used for illegal bushrock removal. Consequently, the area has a large trail network, which has increased access to the park for recreation.

These areas, therefore, have significant ecosystem components which have been substantially modified by humans, resulting in an extensive interface of bushland to cleared land where edge effects and other disturbances affect naturalness, and the visual impacts of humans and their works. Thus, despite the fact that components of these areas could satisfy the wilderness criteria, the wilderness quality of the landscape as a whole is reduced due to substantial modification of major ecosystem components, such as the valleys.

Outside these modified areas, a significant part of the area assessed satisfies the criterion of naturalness.

5.2 Size

The area remaining after the application of the naturalness criterion was found to be large enough to meet the minimum size requirements for wilderness under section 6(1) (b) of the Act.

It is widely agreed that a representative sample of natural areas need to be large enough to maintain populations of flora and fauna which are both sufficiently large and diverse to ensure genetic variability and for those populations to persist indefinitely.

Helman *et al.* (1976) argued that the 'core' of a wilderness area in the forested parts of eastern Australia should be at least 25,000 hectares, plus a 'buffer' of similar size. This meant that the minimum protected area had to be 50,000 hectares, and was based on the belief that larger areas support greater diversity and heterogeneity. However the principles of these criteria have been subject to some criticism, in particular the principle of a wilderness buffer is not utilised by NPWS. Since NPWS does not utilise the principals applied by Helman *et al.* (1976), such a model is not used in this assessment.

In implementing criteria under the NFPS (Commonwealth, 1997), the NWI inventory indicates an area of 8,000 hectares should be the minimum practical size for the protection of high quality wilderness.

The size of the area capable of being identified as wilderness is 134,900 hectares and is sufficiently large to satisfy the requirements of wilderness. That is, (sufficiently sized) populations of plants and animals will be diverse enough to maintain genetic viability and will persist indefinitely, and the area is sufficiently large to ensure opportunities for solitude and appropriate self-reliant recreation.

5.3 Solitude and Self-reliant Recreation

The assessment area is currently used for self-reliant recreation activities, some of which offer solitude as part of their experience eg. bushwalking, nature observation and camping.

The assessment area is considered capable of continuing to provide those opportunities, due to its large size (134,900 hectares), steep and inaccessible landforms, and the variety of natural features (eg. gorges, rock faces, tall forests). It is therefore fully capable of meeting the requirements of section 6(1) (c) of the Act.

5.4 Identified Yengo Wilderness

The Yengo Identified Wilderness comprises 134,900 ha. Whilst it is predominantly national park (127,940 ha), there are sections of crown land (1,260 ha) and private land (5,700 ha) included within the identified boundary.

The Identified Wilderness boundary (see Figure 9) has been determined by excluding, as far as possible, those parts of the assessment area classified as 'substantially modified'. These modified areas are generally those cleared or grazed or with a presence of buildings, dams, fences and other structures. Powerlines and major roads are also excluded from the wilderness. All SM features that are excluded from the proposed wilderness have been cited in Table 5.

Approximately 30% of the wilderness is classified as MR. These areas have been included in the identified wilderness because of lesser disturbance and/or the ability to

successfully regenerate. This figure is within the permitted cap on the amount of MR and SM lands that can be included in wilderness. Parr State Recreation Area, which contains a high proportion of MR and SM lands, was excluded from the identified wilderness to avoid exceeding this cap.

Some small areas classified as SU (eg. in Parr State Recreation Area and east of Yango Track) which were several kilometres from the larger consolidated wilderness area, were excluded because they were substantially less than 8,000 ha in size and hence did not qualify as a stand alone wilderness. In the same way, relatively small SM areas located in a much larger SU area were included in the identified wilderness where their exclusion could not be justified due to their minimal impact on the naturalness of the landscape as a whole. Less than 1% of the identified wilderness is classified as SM.

The identified wilderness boundary generally follows the national park boundary, property boundaries, the edge of clearings or roads.

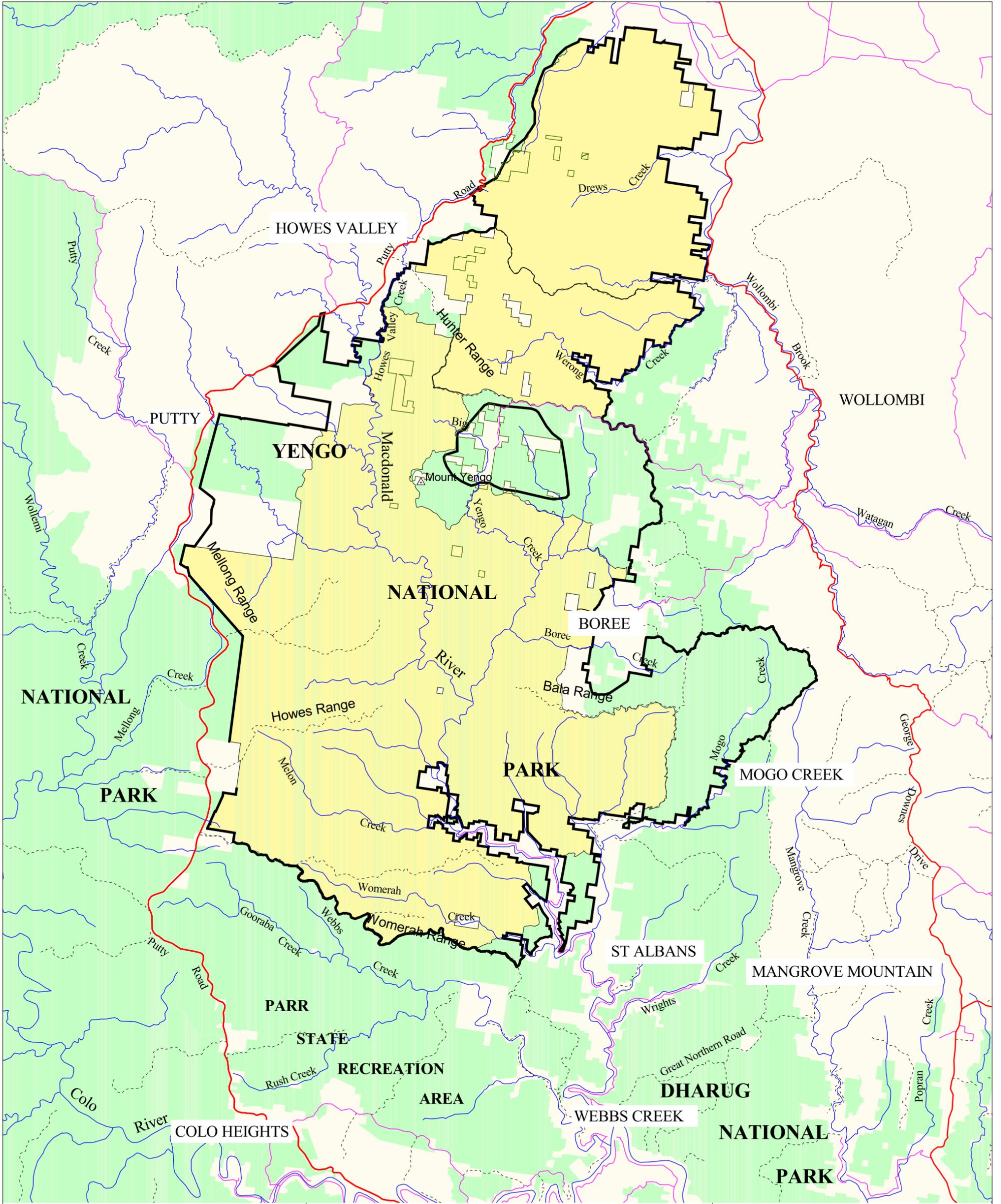
Fifteen inholdings within Yengo NP are within the identified wilderness. Another seven blocks adjoining the western or northern boundary are included within the identified wilderness. None of the private lands are proposed for wilderness declaration, but could be considered for voluntary acquisition, subject to the wishes of the landowner.

The small section in the north-west of the park is left out of the identified wilderness because it is a narrow strip lying between the major disturbances of the Putty Road and the powerline adjacent to the Old Bulga Road.

Some land in the catchment of Stockyard Creek is excluded from the identified wilderness because it is separated from the main block of wilderness by clearings and a public access road along Werong Creek. The area is also fragmented to some extent by several grazing properties with associated public road access (Stockyard Creek Road). The Stockyard Creek block is approximately half the size of the 8,000 ha minimum, so is not suitable for wilderness identification in isolation. The land in the Yango Creek catchment is another area excluded because it is separated from the main block of wilderness by a public road, and is only 1,500 ha in size. Land in the Blaxlands Arm catchment is excluded for the same reasons.

The Big Yango Station exclusion comprises closely related clearings and associated areas modified by grazing and fire. The presence of infrastructure, including a house, sheds, fencing, dams and an extensive network of tracks adds to the level of modification. The excluded Wallabadah/ Boree block comprises actively managed clearings for grazing, a network of roads, fences, dams, buildings and yards.

Within the Mogo Creek catchment, three private blocks along the Mogo Creek Road are excluded due to their clearings and houses. One block also has a quarry.



- Recommended wilderness
- Identified wilderness
- Reserve managed by NPWS
- Land owned by NPWS
- Major Road
- Minor Road
- Other Roads
- Main Rivers

Figure 9: Recommended Wilderness

0 5 10 15 Kilometers

Data supplied by NSW NPWS
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Description of identified wilderness boundary

Where the boundary adjoins a powerline or the Putty Road, the offset is 100m. Where the boundary adjoins a minor road, the offset is 20m.

Commencing near the south eastern corner at the intersection of the Womerah Range track and a horse trail north west of the McKenzie track, the boundary follows the northern side of the Womerah Range track to the western boundary of portion 6, Parish Mellong. The national park boundary is then followed to the powerline east of the Putty Road. The eastern side of the powerline is then followed to the southern boundary of portion 1, Parish Ivory. The boundary of portion 1 is then followed to the point where the powerline emerges on its northern side.

The boundary again follows the eastern side of the powerline until the eastern boundary of portion 28 Parish Tupa. The national park boundary is followed from here until the powerline emerges from portion 28. The powerline is again followed until it leaves the national park. The national park boundary is then followed until the south west corner of Lot 12 DP 786523. The western boundary of this portion is then followed until the north east corner of the adjoining Lot 4 DP 786523, where the clearing associated with 'The Holes' is skirted on its eastern side before rejoining the powerline where it re-enters the national park. The powerline is followed until it emerges from the national park. In turn the boundary then follows the park boundary, the northern boundary of portion 45 Parish Putty, the park boundary, the western boundary of portion 44 Parish Putty, a straight line from the north west corner of this portion to the south east corner of portion 34 Parish Putty, the southern and western boundaries of portions 33 & 34 Parish Putty to the point where they join the park boundary.

The park boundary is then followed until the powerline re-enters the national park. The eastern side of the powerline is again followed until it emerges from the national park. The park boundary is followed to Portion 61 Parish Burton. The western side of portions 61, 71 and 18 Parish Burton is followed to the park boundary, which is then followed to the Old Settlers Trail. The southern side of this trail is followed to the north east corner of portion 29 Parish Burton. The park boundary is now followed until a second powerline enters the national park near the Putty Road, south of the Old Bulga Road. The boundary now follows the eastern side of this powerline until it leaves the National Park.

The boundary follows the national park boundary, only deviating to include portions 9, 23 and 47 Parish Horrowby, all the way to the Werong Creek Road at the north east corner of portion 15 Parish Werong. It then follows the western side of either the Werong Creek road or the private lands adjoining it all the way to the Yango track. The clearings associated with Big Yango Station, comprising the clearings along Big Yengo Creek, Mountain Creek, Wollombi Arm, Tumbledown Creek, Nowlands Creek and Timor Creek are excluded from the identified wilderness. The boundary turns east then south along the western side of the Yango track, before turning west along the northern side of the Sandy Creek Loop track.

In skirting the developed lands of the Wallabadah and Boree valleys, the boundary then takes a straight line to the north west corner of portion 18 Parish Burragarra. It then follows the western side of portions 18, 53, 58, 21, 63, 51, 12, 65, 59 (now lots 2, 3, & 4 DP 702656) and 60 Parish Burragarra. The trail at the south west corner of portion 60 is followed to the north east corner of portion 3 Parish Bala. The eastern side of this portion is followed to the southern boundary of the adjoining portion 2 Parish Bala.

The boundary then heads south and east to exclude the clearings in New Place Creek before re-joining the park boundary at the south east corner of portion 46 Parish Burrigurra. The park boundary is followed to the south side of the access trail to portion 60 Parish Burrigurra. The south side of this trail is followed east to the Boree trail, the east side of which is followed north to the Mt. Simpson track. The south side of this track is followed east until it leaves the national park. The national park boundary is then followed to the Mogo Creek Road. The boundary then follows the western side of either the Mogo Creek Road or the private lands along this road, until the road leaves the national park. The park boundary is then followed all the way to the southern boundary of Lot 460 DP 740748, where a horse trail enters the national park. The west side of this horse trail is followed to the Womerah trail.

6 Suitability Assessment

6.1 Suitable Boundary

The wilderness suitability assessment involved consideration of socio-economic and land management issues. These included land tenure, road status, wilderness management requirements, competing and/or incompatible land uses, recreational pursuits, ecological and reserve design principles, and other practical considerations. This enabled the determination of areas within the identified wilderness that are sustainable and manageable as wilderness, in addition to simply meeting the wilderness identification criteria. These boundaries are proposed for the purpose of public exhibition and will be reviewed in light of submissions received from the public during the exhibition process.

The boundary of the area suitable for declaration and management as wilderness is shown in Figure 9. The boundary has been determined using the general criteria described in 3.3.2 *Suitability assessment*. Use of these criteria has resulted in a wilderness suitable for declaration which meets the criteria in the *Act* (ie. naturalness, size and solitude/ self-reliant recreation).

The recommended wilderness is 105, 400 ha and is in three sections, divided by the Old Settlers Trail and the Yango Track which are excluded from the park and cannot be declared wilderness and the Howes Valley Track (Figure 9). The land within the proposed wilderness is entirely within Yengo National Park, though it does include some land acquired for addition to the park, but not yet gazetted.

In an attempt to create a boundary which can be readily followed on the ground, natural boundaries such as catchment perimeters, ridge lines, creeks or other recognisable features such as trails or the national park boundary were followed. In addition, ecological and reserve design principles were considered, resulting in the exclusion of areas identified as wilderness which formed isolated, narrow 'peninsulas' or 'isthmuses' (less than 1-2 km wide) protruding from the main body of the identified wilderness. This reduces ecosystem functioning problems which can be created by edge disturbances.

Where the wilderness boundary is delineated by a minor road, the boundary is taken as being 20 metres from the centre line of the road, thus excluding it from the wilderness. If the road travels through the wilderness area then the boundary is 20 metres either side of the centre line. Where the boundary adjoins a major road (eg. Putty Rd) or powerline, the wilderness boundary is taken to be 100 metres from the centre line.

Description of recommended wilderness boundary (Figure 9)

All private land within the following external boundary of the recommended wilderness is excluded from that wilderness. Likewise, the Howes Valley track and the Old Settlers, Yango, Boree and other access trails excluded from the national park are similarly excluded from the wilderness. Where the boundary adjoins a powerline or the Putty Road, the offset is 100m. Where the boundary adjoins a minor road, the offset is 20m.

Commencing near the south eastern corner at the intersection of the Womerah Range track and a tributary of Womerah Creek, the recommended wilderness follows the northern side of the Womerah Range track to the western boundary of portion 6, Parish Mellong. The national park boundary is then followed to the powerline east of the Putty Road. The eastern side of the powerline is then followed to the southern

boundary of portion 1, Parish Ivory. The national park boundary is then followed to the point where the powerline emerges from the northern side of portion 9, Parish Ivory.

The boundary then follows the eastern side of the powerline until the eastern boundary of portion 28 Parish Tupa. The national park boundary is followed from here until the point where the powerline emerges from portion 28. The powerline is again followed until it leaves the national park. The national park boundary is then followed until the north east corner of portion 19 Parish Putty. The boundary then heads north along a ridge within the national park to the park boundary on the southern edge of portion 45 Parish Putty. The park boundary is then followed until the junction of the MacDonald River and Howes Valley Creek.

From here, the recommended boundary follows Howes Valley Creek, then ridges south of Mt. Wareng are followed to the western boundary of portion 52 Parish Burton. The boundary skirts the southern side of portion 52, then follows a short ridge to the Howes Valley Trail, the eastern side of which is followed northwards to a ridge leading to the national park boundary. This is then followed until the Old Settlers trail. The southern side of this trail is then followed, skirting the southern side of portions 1 & 29 Parish Burton. From portion 29, the park boundary is followed to the powerline adjacent to the Old Bulga Road.

The boundary then follows either the powerline or the Old Bulga Road, whichever is the most easterly, all the way until the powerline leaves the national park. From this point, the boundary follows the national park boundary until it meets the Werong Creek Road at the north east corner of portion 15 Parish Werong. The boundary follows the western side of either the Werong Creek road or the private lands along this road all the way to the Yango track. The boundary then heads west along the northern side of the Yango and Howes Valley trails before heading south along ridges to the west of Big Yango Station. The boundary then follows the western side of the Bullocks Run trail, then the eastern side of the trail up Big Yengo Creek. It then follows a short creek within portion 26 Parish Cosgrove to the Tumbledown track. The southern side of the Tumbledown track is followed eastward until it approaches Nowlands Creek.

The boundary travels along a ridge and creekline to the western boundary of portion 22 Parish Finchley. It then heads south along the western and southern boundary of this portion to a small creek which is followed to Boree Creek. This creek thence Wallabadah Creek are followed upstream to a short ridge heading south to the northern boundary of portion 12 Parish Burragurra.

The national park boundary is then followed to the south west corner of 60 Parish Burragurra, ie. excluding portions 25, 49, 56 & 57 Parish Burragurra and their access trail. A trail is followed from this point to the north east corner of portion 3 Parish Bala. The national park boundary is now followed to the west of portion 3 all the way to the Bala Range trail. From here the boundary travels along the south side of the Bala Range trail then the west side of the Boree track south to the national park boundary. From here, the park boundary is followed to the northern boundary of portion 71 Parish Auburn, where the boundary continues in a straight line to the Prestons trail, the north side of which is followed back to the park boundary.

The park boundary is followed to the south west corner of portion 55 Parish Womerah, then a southerly prolongation of its western boundary is followed to intersect with the park boundary on the northern edge of portion 41 Parish Womerah. The park boundary is again followed until the southern boundary of portion 47 Parish Womerah where a ridge is followed south through the national park to the north east boundary of portion 28 Parish Womerah. The park boundary is again followed until the south east boundary of portion 53 Parish Womerah where a ridge is followed through the national park to the eastern boundary of portion 47 Parish MacDonald. The park boundary is

again followed until the western boundary of portion 29 Parish MacDonald where Womerah Creek thence a tributary is followed upstream to the northern side of the Womerah Range Trail.

Variation between identified and recommended wilderness

All private property within the identified wilderness is excluded from the recommended wilderness as it cannot be declared as wilderness under the *Act*. Furthermore, the existing level and means of access to private property is maintained.

Mt. Yengo is not recommended for declaration at the request of the Aboriginal community to ensure their access to the site is not restricted. Mt. Yengo is a significant Aboriginal cultural site in the area, constituting the most prominent physical and geological feature in the region and of major mythological and spiritual significance to indigenous Australians. The inclusion of this area could preclude ready access for the traditional owners of the area and for interpretative environmental and cultural heritage education. Such educational pursuits would not be possible if the area were included in the recommended wilderness.

In a regional context, the precinct around Big Yango Station and Mt. Yengo provides an opportunity to interpret the historical and social values of a grazing property in a remote location. Permitting vehicular access to this area would allow interpretation of wilderness by National Parks visitors, without directly impacting on the Yengo wilderness.

The section between the Bala Range Trail and Boree Valley was excluded as it was difficult to locate an identifiable management boundary between the trail and the private land. Furthermore, this parcel of land lies between two roads that are not part of the Park (Bala Range Trail and Boree Trail), such that as a stand-alone area of wilderness it is substantially less than the size requirement of 8,000 hectares.

The section of national park north of Burrowell Creek is a finger of identified wilderness between private lands and is excluded from the recommended wilderness due to the exclusion of narrow peninsulas. There is no likelihood of voluntary acquisition of the private properties either side because they are heavily disturbed.

The section of national park projecting south towards Upper MacDonald is a narrow finger with cleared valleys on either side which is also excluded from the recommended wilderness due to the exclusion of narrow peninsulas. This area is also managed for hazard reduction burning due to its proximity to the numerous properties in the Upper MacDonald and St. Albans area. To exclude this section, the boundary cuts across at Prestons Track. Three other parts of the national park projecting east towards the Upper MacDonald have been excluded for the same reasons.

The assessment area experiences substantial recreational use in some locations. Locations with recreation facilities and relatively high visitation are excluded from the recommended wilderness and will continue to offer recreational opportunities. These include Mogo and Finchley camping sites; the horse trail network in Parr SRA, and Prestons Track, McKenzie Track and Jacks Gully Track in Yengo NP; four-wheel driving roads including Howes Valley Trail, Yango Track, Boree Track and east Bala Range Track, Mt. Simpson Track and Old Settlers Road. Some of these sites are not within the national park and hence are not under consideration for inclusion in the recommended wilderness (eg. Yango Track, Boree Track and east Bala Range Track, Mt. Simpson Track and Old Settlers Road). The horse trail network in Parr SRA is not under consideration for inclusion in the recommended wilderness as it is not within the identified wilderness.

In consideration of current recreational use, the Womerah Range Trail was excluded from the recommended wilderness (forming the boundary). Although the Womerah Range Trail is not open to general public access due to its fragility and susceptibility to erosion, it is used by NPWS for its 'Discovery' educational activities and for licensed commercial 4WD tours subject to certain conditions. Horse-riding events which use the Womerah Range Trail and the other trails include the 'Shazada' and the 'Colo Classic', which are popular annual endurance rides and have used these trails for many years. The inclusion of the Womerah Range Trail in the recommended wilderness would restrict the opportunities for horse riding within the general area as few other suitable locations are available.

The Howes Valley Trail is a 4WD road which is well maintained and serves as an essential access point for private property inholdings within Yengo National Park. Howes Valley Trail is also a popular recreational four-wheel driving road and its declaration would disallow such activities, which are not widely provided for in the region. This road and the adjoining Yango Track have been left out from the recommended wilderness primarily for the importance for inholding access and their recreational value. Furthermore, the Yango Track is a public road which is excluded from Yengo National Park and it is therefore not eligible for wilderness declaration. Similarly the Old Settlers Road is a public road, not part of the national park so has been excluded from the recommended wilderness.

The inability to include the Old Settlers Road and the Yango Tracks and the decision to exclude of the Howes Valley Trail from the recommended wilderness has resulted in the identified wilderness being divided into three significant areas for declaration. One area is to the north of the Old Settlers Road, another between the Old Settlers Road and the Howes Valley Trail/ Yango Track, the third being to the south of Howes Valley Trail/ Yango Track (north of the Womerah Range Trail).

The identified wilderness in the Simpson Valley block to the east of the Boree Track is not recommended for declaration at this time. It is separated from the recommended wilderness by the Boree track, which is not part of the national park. Its size is 7,400ha and hence does not meet the size criterion for declaration as a stand alone wilderness. If that part of the Boree track that does not provide access to private property was included in Yengo National Park in the future, the declaration of the Simpson Valley as wilderness could then proceed.

There is further potential for additional lands to be added to the declared wilderness, subject to voluntary acquisition from private landholders. An area of up to 14,200 ha, which also includes some national park lands in close proximity to private lands, could potentially be added to the recommended Yengo wilderness. Some small areas of Crown land could also be added to the wilderness, if added to Yengo National Park at a later stage.

7 Management of the Declared Yengo Wilderness

7.1 The Declaration Process

The Yengo Wilderness Assessment Report has been prepared from field investigations, aerial photograph interpretation, comments arising from consultation with stakeholders and landholders and a review of existing data on the proposed Yengo wilderness area. It contains boundaries of both the identified area and the area recommended for declaration as the Yengo wilderness. The assessment report will be placed on public exhibition for a period of three months to allow all interested groups and individuals to comment. NPWS is obliged to report on all comments from members of the public, landowners and stakeholders. When all comments are fully considered and once the exhibition period is completed, the wilderness assessment report, a summary of the submissions received and recommendations on the area to be declared will be provided to the Minister for the Environment. The Government will then decide which, if any, areas within the Yengo wilderness will be declared in accordance with the *Wilderness Act 1987*.

As wilderness cannot be declared across freehold or crown leasehold land without the landholder's explicit consent, all declaration options are restricted to only public land within the identified wilderness. It is again reiterated that wilderness assessment is undertaken independent of land tenure, and any wilderness *identified* in the process may include private lands (freehold or leasehold). However, it is stated government policy that there will be no resumption of private land for wilderness *declaration*. Wilderness *identification* simply represents the formal recognition of the wilderness *quality* of an area of land, and in the case of private lands has no influence on how that land is managed. In particular, it does not restrict the existing legal access to, or use of, an area of private land by its owners. This means that wilderness assessment and identification has no effect on activities such as grazing, clearing or development applications.

Freehold and crown leasehold

The Act prevents declaration of wilderness over freehold and crown leasehold land. Unless a landholder enters into a Wilderness Voluntary Conservation Agreement (WVCA), all freehold and crown leasehold land is therefore not suitable for declaration as wilderness. A WVCA occurs where a landholder enters into a voluntary conservation agreement with the Minister for the Environment and where the terms of the VCA are consistent with the management principles for wilderness areas, as set out in section 9 of the Act.

Permissive occupancies and occupational permits

Permissive Occupancies (POs) are renewable licences that apply to vacant crown land. They are generally of one year's duration, for the purpose of grazing activities and other ancillary uses of forest areas. Current POs cannot be declared as wilderness without the lessee's consent, but may be declared on their expiry.

Other land tenures

The following land tenures are suitable for wilderness declaration:

- lands reserved or dedicated under the *National Parks and Wildlife Act*, such as national parks and state recreation areas; and
- crown and other land owned or under the control of a statutory authority or government department, such as State Forests of NSW, only where:

- A Wilderness Protection Agreement has been voluntarily entered into by the owner or lessee [section 10 (1)]; or
- Transfer to the NPWS has been negotiated for reservation or dedication under the National Parks and Wildlife Act.

The government normally considers the transfer of these lands to the NPWS reserve system at the same time as it makes the decision on wilderness declaration.

Land tenure boundaries may be used to draw up wilderness boundaries. Boundaries may be set back from private land to allow for fencing and boundary maintenance.

7.2 Consultation with Landowners and Stakeholders

At the commencement of the wilderness assessment process, NPWS notified all persons who owned land within the assessment area or who owned land directly adjoining the boundary of the area and all of the principal stakeholder groups with interests in Yengo, of the assessment. The written notification circulated in May 2001, included an explanation of the NPWS wilderness assessment process, and invited persons or organisations to make an initial submission on the proposal. Key stakeholder groups included:

- relevant government agencies (NSW State Forests, Department of Mineral Resources, Dept of Land & Water Conservation, NSW Agriculture, NSW Fisheries, Dept of Urban Affairs & Planning);
- Aboriginal land councils & other tribal custodian groups;
- local Councils;
- rural fire services;
- Members of Parliament;
- industry/ interest groups (Nature Conservation Council, NSW Minerals Council, Forest Products Association, NSW Farmers, NSW Apiarists), and
- other relevant local organisations (Telstra, Energy Australia, NPWS Advisory Committee, catchment management committee, horseriders).

A small number of submissions were received. The principal issues raised in those submissions included:

- access to Aboriginal sites and other locations of cultural significance;
- recreational access by vehicles and horses;
- fire management;
- protection of biodiversity;
- control of weeds and feral animals;
- access to natural resources and utilities, and
- suitability of area as wilderness and appropriate management boundaries.

The recommended wilderness will be placed on public exhibition for the purpose of obtaining feedback from neighbours, the wider community, interest groups and government agencies. The recommended wilderness will be reviewed in light of all submissions received during the exhibition process, prior to submitting a final recommendation to the Government.

7.3 Plan of Management for Yengo National Park and Parr State Recreation Area

The Draft Plan of Management for Yengo National Park and Parr State Recreation Area has recently been released for public comment. It aims to manage wilderness areas so as to conserve and protect any wilderness values in the two parks. Management will occur in conjunction with the adjoining national parks and reserves to maintain and enhance opportunities for solitude and self-reliant recreation, while ensuring the maintenance of natural processes.

The Draft Plan states as its objective to restore (if applicable) and to protect the unmodified state of the area and its plant and animal communities; and preserve the capacity of the area to evolve in the absence of significant human interference (NPWS, 2001 p. 24). A program of track and trail closure (surplus to management requirements) and removal of unwanted management structures from any declared wilderness will be prepared and implemented.

Some of the Draft Plan's specific policies and actions for the management of wilderness are described below. Adoption by the Government of final policies and actions depends on the outcome of the public exhibition of the Draft Plan of Management and this assessment report, the analysis of submissions and NPWS' final recommendations on relevant issues.

7.4 Roads and Trails

Public vehicle access to roads and trails within the declared wilderness will be prohibited. The existing level and means of access to inholdings prior to the area being declared wilderness will be maintained. Access to cultural sites (eg. Aboriginal graves) may also be permitted.

A program of track and trail closure in any declared wilderness will be prepared and implemented. However, roads, tracks and trails required for an essential management purpose will be maintained and used. For example, authorised fire trails will maintain their status and their primary use will continue to be for fire management and emergency purposes. Tracks identified as not being required for management purposes will be closed and rehabilitated using locally-derived soil and propagules. The Draft Plan of Management (Map 2; p. 40) indicates which roads are essential for management purposes and which are to be closed.

7.5 Recreation

Wilderness areas must be managed to permit opportunities for solitude and appropriate self-reliant recreation [section 9 (c) of the Act]. However, any recreation must be consistent with the other wilderness management principles of the Act. These relate to protecting the unmodified state of the area and its plant and animal communities [section 9 (a)], and preserving the capacity of the area to evolve in the absence of significant human interference [section 9 (b)].

In order to fulfil all the wilderness management principles of the Act it may be necessary to manage or prohibit many existing or potential recreation activities within declared wilderness areas. This is also reflected in the NPWS Wilderness Conservation Policy, which acknowledges the need for 'the maintenance of opportunities for solitude and compatible self-reliant recreation and exclusion of activities which conflict with or diminish these values'.

For these reasons public vehicle use (including motor vehicles, motor bikes and motor boats) and horse riding are not permitted in declared wilderness areas.

Appropriate self-reliant recreation activities that are generally permissible within wilderness areas may, themselves, 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. The NPWS Wilderness Conservation Policy acknowledges the need to manage, and temporarily restrict, access to and use of a wilderness area by any recreation activity having an impact on the area. The policy also recognises the importance of encouraging low-impact recreation practices.

The NPWS seeks to identify existing and potential recreational uses within identified wilderness and the surrounding region that are not compatible with wilderness management. Additional information on this aspect is gathered via the public consultation process. Group recreational use within any declared wilderness will be restricted to a maximum of 8 persons. Variations in maximum group size may be approved by the Regional Manager. Recreational use of wilderness will be restricted to those activities which are essentially self-reliant and of minimal impact. Permitted activities include walking, hiking, bird watching, nature study, photography, picnicking and self-reliant camping. A program of track and trail closure and removal of unwanted management structures from any declared wilderness will be prepared and implemented.

Commercial recreational activities within any declared wilderness will only be approved where the activities are consistent with NPWS policy. The Service will condition licences and consents issued for activities within any declared wilderness to minimise impact and user conflicts and to ensure consistency with the policies.

A brochure will be prepared which identifies the boundaries of any declared wilderness and which contains a minimal impact code of conduct for recreational activities within the wilderness. The information will seek to encourage visitors to use fuel stoves and to remove all waste.

Public awareness of the appropriate use of wilderness areas will be promoted. The Service will 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 programmes.

The Service will seek the co-operation of the owners of park inholdings and of park neighbours within or adjoining any declared wilderness, to ensure that the wilderness condition of the park is protected to the maximum extent possible.

7.6 Fire

With respect to fire management in Yengo, it is necessary to adequately address:

- the impacts of fire on naturalness;
- protection of life and property;
- retention and maintenance of fire trails; and
- community perceptions of changes in hazard reduction and wildfire suppression in declared wilderness areas.

NPWS will continue to manage fire in the Yengo wilderness consistent with its responsibilities under the *Rural Fires Act 1997* and with the Draft Fire Management Plan for Yengo National Park, Parr State Recreation Area and Dharug National Park (NPWS, 2000). All fire management activities within declared wilderness will be carried out with minimal environmental impact, and disturbances resulting from the

control of a wildfire (eg. helipads, temporary trails and control lines) will be rehabilitated.

The Draft Fire Management Plan states that the vegetation within the reserves produces high fuel levels in short periods of time. Fuel management involves limiting fuel by prescribed burning, manual removal or slashing. The Draft Plan states that strategic prescribed burning for wildfire suppression or to reduce the potential for large scale wildfires which are difficult to control and threaten life and property, is necessary.

The Draft Plan also specifies the following actions for fire management:

- “Strategic prescribed burning to reduce the potential for large scale wildfires (strategic fuel management programs);
- Emphasis on boundary fuel reduction measures to protect against direct flame attack on assets on / off Park;
- Sufficient burning is undertaken to enable safe fire fighting operations to occur with the benefit of providing strategic hazard management for the reserves neighbours; and
- Compliance with identified fire regime thresholds for all vegetation communities, threatened species and communities” (NPWS, 2000).

NPWS will continue to undertake hazard reduction burning where required within the area to be declared as wilderness, however such prescribed burning will be strategic and focussed on the reserve boundaries to allow ecologically sustainable fire regimes within core park areas. It is expected that most hazard reduction in the Yengo area will be undertaken outside the declared wilderness, in Parr State Recreation Area and around the extremities of Yengo National Park (eg. St. Albans). Hazard reduction for protection of inholdings (where appropriate) and biodiversity conservation may be carried out within the proposed wilderness area. It should be noted that prescribed burning is unlikely to be carried out more frequently than 3-4 events every 20 years (MR under the naturalness criteria table).

Existing authorised fire trails in the area will remain open and will continue to be available for fire management purposes, regardless of their inclusion in the declared wilderness.

7.7 Introduced Species

Feral animals and weeds will continue to be controlled in the wilderness area consistent with the NPWS’ statutory obligations and with the Draft Plan of Management for Yengo NP and Parr SRA. The management trails will be utilised to control populations of introduced species where necessary.

8 Recommendations for Declaration of the Yengo Wilderness

It is recommended that an area of approximately 105,400 hectares as shown in Figure 9 be declared under section 8 of the *Wilderness Act 1987* and section 59 of the *National Parks and Wildlife Act 1974* as the Yengo Wilderness.

The area recommended for declaration as wilderness consists entirely of land reserved as Yengo National Park. The Simpson Valley section of the identified wilderness could be declared wilderness in the future if it ever becomes contiguous with the main wilderness. Subject to voluntary acquisition from private landholders an area of 14,200 ha could be added to the declared Yengo wilderness. Some small areas of Crown land could also be declared wilderness, if added to Yengo National Park at a later stage.

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- Pam Hegarty 1988. Aboriginal Heritage Officer, NSW National Parks & Wildlife Service, Hurstville.
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- Terry McTaggart 2001. Land owner, grazier, son of Frank McTaggart, Howes Valley region.

Appendix 1 Detailed Description of Assessment Area

The boundary of the assessment area has been derived from the Commonwealth's National Wilderness Inventory (NWI) study. Essentially, all land with an index of 12 or greater has been included in the assessment area. In some places, the NWI boundary has been slightly amended where it was impossible to align it with recognisable features in the landscape.

Western boundary

- Powerlines are followed north of Wheelbarrow Ridge Rd, with the following deviations:
 - The eastern edge of the private land in the headwaters of Culoul Creek and Tinda Creek
 - The eastern edge of disturbed areas south of radio repeater station near the Holes
 - The eastern edge of clearings centred on Burrowell Creek
 - The eastern edge of cleared land along Macdonald Rive, Reedy Creek & Howes Valley Creek
 - The eastern edge of cleared land at Devils Hole Creek
 - The southern side of the Old Settlers Rd up to the to the national park boundary thence the edge of the clearings north of Old Paddock Creek
 - The Putty Rd / national park boundary between Old Bulga Rd and Little Darkey Camp, apart from the exclusion of some small clearings

North eastern boundary

- The national park boundary is followed except for the following deviations:
 - Along the northern boundary of portion 9 at Watts Creek
 - Along the approximate edge of vegetated land between Drews and Vault Creek

Eastern boundary

- The national park boundary to Stockyard Creek, except some private land in Little Creek included in assessment area
- The approximate edge of cleared land along both sides of Stockyard Creek
- The approximate edge of cleared land along the western side of Bagnells Creek.
- The approximate edge of cleared land on the western, northern and southern sides of Yango Creek.
- Yango State Forest was within the assessment area derived from the NWI study, but was excluded from the final assessment area due to requirements arising from the Regional Forest Agreement process.
- The national park boundary, south from the Boree track to the Great North Road, with the exception of following the northern boundary of portions 53 and 87 in Parish Blaxland.
- West of Mogo Creek Road then Yengo National Park boundary until the Yengo National Park boundary meets Parr SRA at Womerah Range trail

Southern boundary

- The approximate edge of cleared land along the MacDonald River (Central Macdonald, Brookes Ferry, Lower Macdonald)
- The approximate edge of cleared land along Webbs Creek and Doyles Hollow
- The approximate edge of cleared land along Hawkesbury River until Greens Swamp
- The northern side of the Wheelbarrow Ridge track /Wheelbarrow Ridge Road back to the powerline near the Putty Road