Department of
Environment and Climate Change NSW

Grose River

Blue Mountains National Park

Wild River Assessment 2008

April 2008

Published by:
Department of Environment, Climate Change and Water NSW
59–61 Goulburn Street
PO Box A290
Sydney South 1232

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ISBN 978 1 74293 067 1
DECCW 2010/1040
Released by DECC 2008. Web upload to DECCW website December 2010.

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Executive summary

The NSW *National Parks and Wildlife Act 1974* (the NPW Act) was recently amended to permit formal recognition and protection of wild rivers. Whereas most rivers in NSW have been greatly changed by modern society, wild rivers remain in a substantially unmodified condition and are of high conservation value.

A river, or part of a river, may be declared a wild river by the Director General of the Department of Environment and Climate Change NSW (DECC) following a detailed assessment of its conservation value in accordance with DECC's 'Framework for wild river assessment' (DEC 2005). Wild rivers may only be declared on lands reserved under the NPW Act. They are managed to maintain and, where possible, restore natural processes associated with river health and permit the identification, conservation and appropriate management of Aboriginal objects and Places. A declared wild river may also be used as a focal point for protection and rehabilitation works in the catchment.

The Grose River subcatchment is located in the Hawkesbury–Nepean catchment. Over 80% of the subcatchment is reserved as part of Blue Mountains National Park.

The rugged heart of the Grose Valley and the early interest in preserving the area for its natural and recreational values have substantially limited disturbances. Major impacts from residential areas and industry have been confined to the ridges bordering the catchment.

The Grose catchment has always been important to Aboriginal people. The Aboriginal sites and relics recorded from the area contribute to an understanding of Aboriginal lifestyles and occupation of the sandstone plateaus around Sydney.

Historically, grazing and logging took place in the catchment although no major impacts from these activities remain. A mine in the headwaters of the Grose River has caused impacts historically, although this mine no longer operates. This area is now part of Blue Mountains National Park and can be restored to stabilise erosion and remove weeds.

The Grose catchment has been assessed for biological, geomorphic and hydrological condition and has been found to support a high diversity of macroinvertebrate fauna. The biological assessment (AUSRIVAS) indicates the river's condition has not suffered significantly as a result of disturbances that have taken place at the edges of the catchment. A geomorphic assessment of the river indicates it is in a high geomorphic condition. The Grose River is a gorge river, which is relatively resilient to geomorphic disturbances.

Historic flow data, used to detect flow changes over time, is not available for this river. Conversely there is nothing in this catchment's history to indicate that the hydrology of the river or catchment is substantially disturbed. Overall, the Grose River and its tributaries in the Blue Mountains National Park are considered to meet the criteria for wild rivers.

1. Introduction

1.1 Wild rivers under the National Parks and Wildlife Act

The wild river provisions under the *National Parks and Wildlife Act 1974* (the NPW Act) present an opportunity to identify some of the most pristine rivers in NSW and to ensure these rivers, including their cultural features, are well managed.

Wild rivers may only be declared on land that is reserved under the NPW Act. To be considered wild, a river must be in a largely natural condition. The condition of parts of the catchment affecting the river is also considered.

According to section 61 (4) of the NPW Act:

> Wild rivers are those exhibiting substantially natural flow and containing remaining examples in a condition substantially undisturbed since European occupation of:
>
> (a) the biological, hydrological and geomorphological processes associated with river flow, and
>
> (b) the biological, hydrological and geomorphological processes in those parts of the catchment with which the river is intrinsically linked.

The purpose of declaring a wild river is to identify, protect and conserve:

> any water course or water course network, or any connected network of water bodies, or any part of those, of natural origin, exhibiting substantially natural flow (whether perennial, intermittent or episodic) (section 61 (4), NPW Act).

Rivers are assessed in accordance with DECC's Framework for wild river assessment (DEC 2005). If the watercourse meets the NPW Act's requirements, a wild river is declared by the Director General of the Department of Environment and Climate Change (DECC) who places a gazettal notice in the *Government Gazette*. Where the declaration may affect functions carried out under the *Water Management Act 2000* or, in the case of state conservation areas, the *Mining Act 1992*, the concurrence of the responsible Ministers may be required before declaration (section 61 (3), NPW Act).

Wild rivers are managed by DECC to maintain and restore (if necessary) their wild river values, and to identify, conserve and protect associated Aboriginal objects and Places (section 61 (5) (a) and (b) NPW Act). Wild river declarations can trigger investigations of Aboriginal objects and Places, and the development of conservation plans.

A wild river can only be declared if it is consistent with any plan of management in operation for the reserve/s where the water course is located (section 61A, NPW Act). The Grose River is located in the Blue Mountains National Park and a plan of management identifying the Grose River as a potential wild river has been prepared. A wild river declaration will not alter the current management of the river, therefore no amendment to the plan of management is required.

1.2 Why declare wild rivers?

Wild river declaration can raise the profile of the most pristine rivers in the state and provide a focus for environmental monitoring and scientific study.

All rivers within the existing reserve system fulfil a role in protecting freshwater and riparian dependent flora and fauna. Wild rivers, because of their excellent condition, potentially play a wider role in providing a range of environmental services for other parts of their catchment, including a source for recolonisation, water quality improvement, water supply assurance and flood mitigation. They also have a role in protecting cultural and historic heritage.

Wild rivers can provide a focus for land managers that wish to identify and manage high conservation value streams as part of their activities. Those managing lands outside the reserve system may wish to complement the wild rivers program with conservation programs in other parts of the catchment.

2. Assessment

2.1 Assessment methodology

Biological, geomorphic and hydrological aspects of the Grose River were assessed to determine if it is substantially undisturbed and meets the definition of a wild river. The assessment was undertaken in accordance with DECC's 'Framework for wild river assessment' (DEC 2005). A range of information on the condition of the Grose River and its catchment was reviewed and local knowledge was sought.

The following assessment techniques measure the current biological and geomorphic condition and compare these to a reference condition. Biological health was assessed using AUSRIVAS (Davies 2000) analysis. This method samples and analyses freshwater invertebrates and uses the presence or absence of groups of invertebrates as a surrogate for biological health. AUSRIVAS uses rivers in the most pristine condition as benchmarks against which other rivers are compared. These benchmarks, or reference sites, are considered to be rivers which are the least affected by human activities occurring since European occupation.

Geomorphic condition was assessed using River Styles (Brierley and Fryirs 2005). Under this system, each section of a river is classified according to factors such as rainfall, geology and topography of the landscape (e.g. whether the river occurs in a rocky gorge or on a floodplain). Certain features of the river, such as the extent of bank vegetation or the presence of deep pools, are compared to predicted or sample features of that particular river type. River condition is determined according to how well the river's features meet the reference condition. The condition of the river indicates whether the river's geomorphology is changing at an unnatural rate due to human disturbance.

These methods have been used extensively in NSW.

Changes in river hydrology may be determined with some accuracy in locations where flow monitoring stations have been located for some years. However, this information is unavailable for most rivers. Hydrological changes may only be deduced using information on water and land use in the catchment, for example, extent of clearing in the catchment, impediments to river flow such as dams or weirs, and estimates of water usage from water extraction licences.

Current and historical land use practices which could directly impact on river condition were investigated in the Grose River catchment. Current land use information was also used to highlight any management practices that might affect the river or catchment in the future. Disturbances that may impact on the biology, hydrology or geomorphology of the river included logging, clearing, road construction and use, mining, drainage works, water extraction, frequent or severe fire, intensive recreational activities, grazing, and the presence of certain weeds and feral animals. Sources of information included maps of vegetation structure, aerial photographs, physical evidence and any documents relating to the history, use and management of the area. Local knowledge and input to the study were also obtained. Data sources used and experts consulted for the technical assessment are listed in Appendix 1.

3. Results

3.1 Description of the Hawkesbury–Nepean catchment

The Grose River subcatchment is located in the Hawkesbury–Nepean catchment (Figure 1). The Hawkesbury–Nepean catchment covers approximately 2.2 million hectares, 42% of which are located in DECC reserves and 5% of which are managed by the Sydney Catchment Authority. Major rivers in the catchment include the Colo, Cox's, Grose, Hawkesbury, Kowmung, Macdonald, Nattai, Nepean, Wingecarribee and Wollondilly rivers. This catchment is the major source of drinking water for the populations of Sydney, the Blue Mountains and the Illawarra, and supports economically significant agriculture and industries, including tourism. The catchment is undergoing rapid urban expansion, placing increasing pressure on the catchment's water resources (Hawkesbury–Nepean Catchment Management Authority 2005).

The Hawkesbury–Nepean catchment has significant natural and economic values. Over 60% of this catchment retains native vegetation. In 2000, Blue Mountains, Gardens of Stone, Kanangra–Boyd, Nattai, Thirlmere Lakes, Wollemi and Yengo national parks and Jenolan Karst Conservation Reserve were listed as the Greater Blue Mountains World Heritage Area. The World Heritage Area covers over 1 million hectares, with 73% of this occurring within the Hawkesbury–Nepean catchment. Among the reasons for the area's listing are its high diversity of eucalypt species, examples of the structural adaptations of eucalypts to Australian environments and the presence of ancient, relic species of global significance, the most famous of these being the recently discovered Wollemi Pine (NPWS 2001).

3.2 Description of the Grose River subcatchment

3.2.1 Physical features

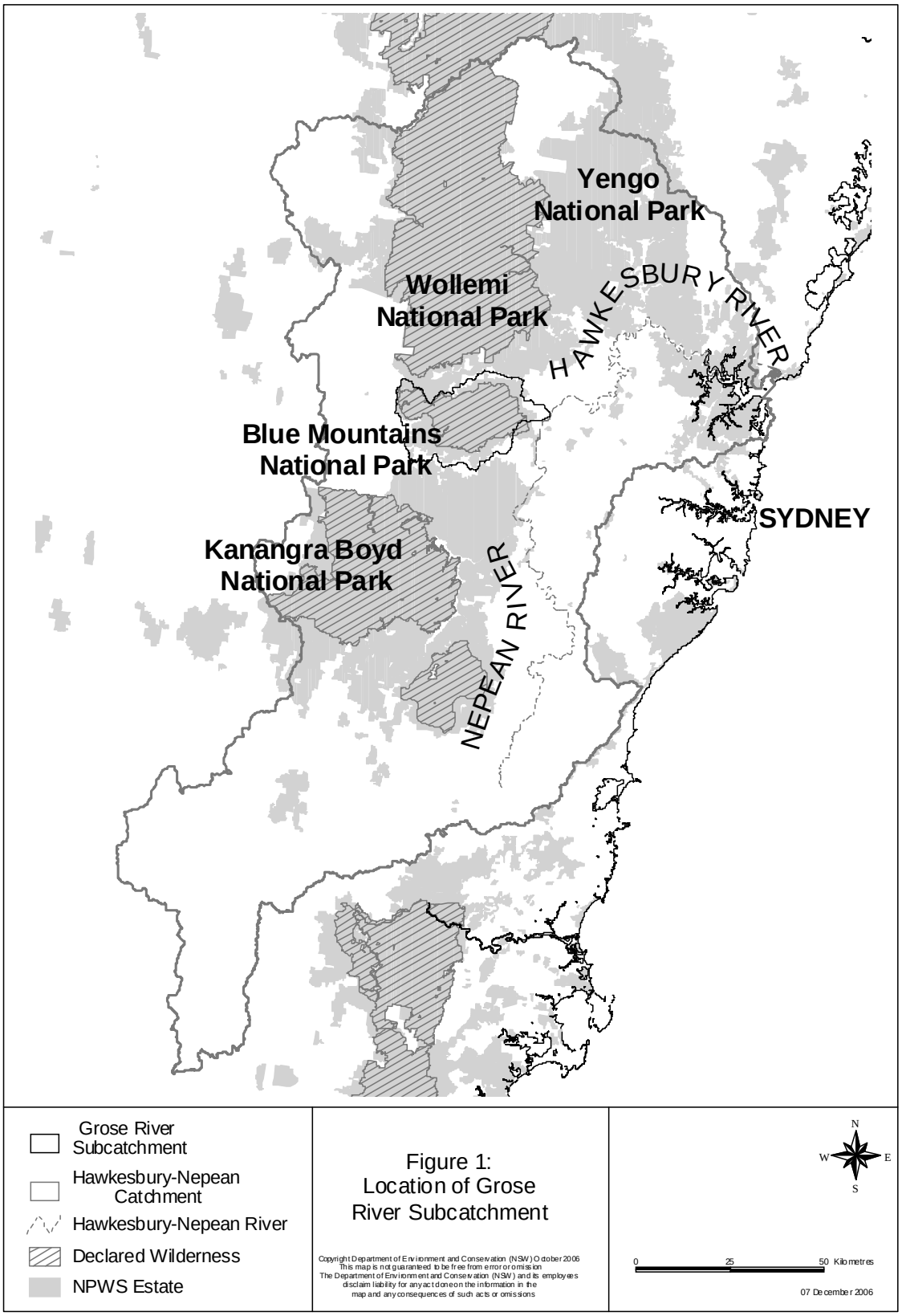
The Grose River subcatchment (Figure 2) covers an area of approximately 65,000 hectares, with over 80% of the sub-catchment reserved as part of Blue Mountains National Park in 1959. Approximately 57% of the catchment is declared and formally managed as wilderness, with 72% in wilderness condition.

Blue Mountains National Park covers over 247,000 hectares of the Blue Mountains plateau between the coastal lowlands of the Cumberland Plain and the Great Dividing Range. The outstanding natural and cultural significance of the area has long been recognised. The Colo River catchment lies north of Grose catchment.

Development is confined to the ridges at the edges of the catchment. The southern and western edges are bounded by the Great Western Highway from Springwood in the south-east to Bell in the north-west. Bells Line of Road roughly follows the catchment's northern boundary.

The Grose River is nearly 60 kilometres long from its headwaters near Mount Victoria to its mouth at the Hawkesbury–Nepean River divide. Over 100 kilometres of drainage lines feed into the Grose River and include Wentworth, Govetts, Hungerfords, Woodford, Burrow and Linden creeks and King George Brook. The major tributaries in the catchment are considered to be in a geomorphologically good condition. For much of its length, the river is flanked by massive single and double cliff lines up to 500 metres high (Confederation of Bushwalking Clubs NSW 1996).

Figure 1 Location of the Grose River subcatchment.



The major rock types in the assessment area are sedimentary sandstones laid down in the Sydney Basin during the Permian and Triassic periods. Subsequent uplift and erosional processes have led to the deep gorges, cliffs, narrow slot canyons and pagoda rock formations characteristic of the Grose Valley. Underlying these are the Illawarra Coal Measures, which are exposed as deep talus (rock fall) slopes below the cliffs in the Grose Valley, and have weathered to form deep clay loams (NPWS 2001).

The eastern part of the assessment area is dominated by younger and harder Hawkesbury sandstones, resulting in narrower and more 'V-shaped' valleys than to the west. The youngest geological layers are located at the extreme eastern end of the area consisting of Quaternary alluvial deposits associated with major rivers and structural features such as the Kurrajong fault, exemplified at Burralow Swamp (NPWS 2001).

The existence of more fertile shale soils around Bilpin and volcanic soils on Mt Tomah have resulted in those areas being cleared for grazing or horticulture (NPWS 1998).

While there is a range of soil types across the catchment resulting from the varied geology and pattern of rock types, there is a predominance of sandstone soils which have very low fertility and are highly permeable and erodible. These characteristics, combined with the area's steep terrain, heavy rainfall and frequent intense bushfires, result in high erosion rates and heavy sediment loads in streams and rivers (NPWS 2001).

3.2.2 Natural values

Most of the area's vegetation consists of dry sclerophyll forests and woodlands dominated by eucalypts, with the balance (between 10 and 20%) consisting of wet and dry heaths, low woodlands, wet sclerophyll forests and rainforests. Eleven vegetation communities occur in the area (Keith and Benson 1988, Benson 1992).

There is a high concentration of rare or threatened plants in the upper Blue Mountains, including at the western end of the Grose Valley, which contains natural features such as swamps, cliff edges, heaths, rainforests and waterfalls. Rare vegetation communities are also present, such as the coachwood–sassafras warm temperate rainforest (*Ceratopetalum–Doryphora* suballiance), which is at its southern limit in the Grose Valley. This vegetation community occurs on shales and coal measures below sandstone cliffs, or on poorer sandstone soils enriched with basalt or shale soils (NPWS 1998).

3.2.3 Aboriginal cultural heritage

Aboriginal heritage research in the Blue Mountains suggests that occupation of the area dates back at least 22,000 years (Attenbrow 1994). The Grose Valley is believed to have been mainly occupied by the Darak (Dharug) community. The southern part of the area may have been occupied by the Gandangara community (Attenbrow 1994).

There are 134 discrete Aboriginal sites recorded on the Aboriginal Heritage Information Management System (AHIMS) for the Grose catchment. These vary from complex sites containing a range of artefacts and evidence of occupation, including open camps, rock engravings and shelters, to single sites containing, for example, axe grinding grooves. Some of the most significant sites are at Asgard Swamp, to the north-east of the Mount Victoria township, and on the Woodford–Linden Ridge.

The high concentration of art sites and stone arrangements may signify that either the area is of special religious and ritual significance (Stockton 1993), a neutral territory between the neighbouring Gandangara and Dharug people, or a transit area for travellers between the upper and lower mountains (Stockton 1993).

The Aboriginal sites and relics recorded from the area contribute to an understanding of Aboriginal lifestyles and occupation of the sandstone plateaus around Sydney, and impacts on lifestyles and occupation patterns due to changes in technology, climate and resource availability (Attenbrow 1994).

3.2.4 Recreational values

Most visitors are day users, although there are an increasing number of wilderness bushwalking, camping, caving, abseiling and camping opportunities. Although there are no reliable data on visitor numbers, it is estimated that about 450,000 people per annum visit the lookouts over the Grose Valley at Blackheath (NPWS 1998).

The Grose Valley contains some iconic areas for recreation. The Blackheath lookouts and walking track network account for most visitors. The walking tracks to Blue Gum Forest are some of the most heavily used overnight routes in the country due to their proximity to Sydney and ease of access. Some tributaries of the Grose River are popular with canyoners. Claustral Canyon, near Mount Tomah, and Grand Canyon, near Blackheath, are two of Australia's most visited canyons (N. Stone, pers. comm.).

Rock climbing occurs at low intensity at several locations, including Pierces Pass and near Mount Victoria.

Intense, localised use of walking tracks that traverse the valley's steep talus slopes has the potential to destabilise small areas due to erosion and the formation of new drainage lines (NPWS 2001).

Campsites in the park are small and do not have a major impact on the catchment. The largest campsite, located at Acacia Flat, caters to a maximum of 40 people at peak times, but this activity also has no significant impact on the catchment (V. Richardson, pers. comm.).

3.2.5 Land-use history

The rugged nature of the Grose Valley, together with an early interest in preserving the area for its natural and recreational values, has substantially limited disturbances. Substantial impacts have been confined to the ridges bordering the catchment.

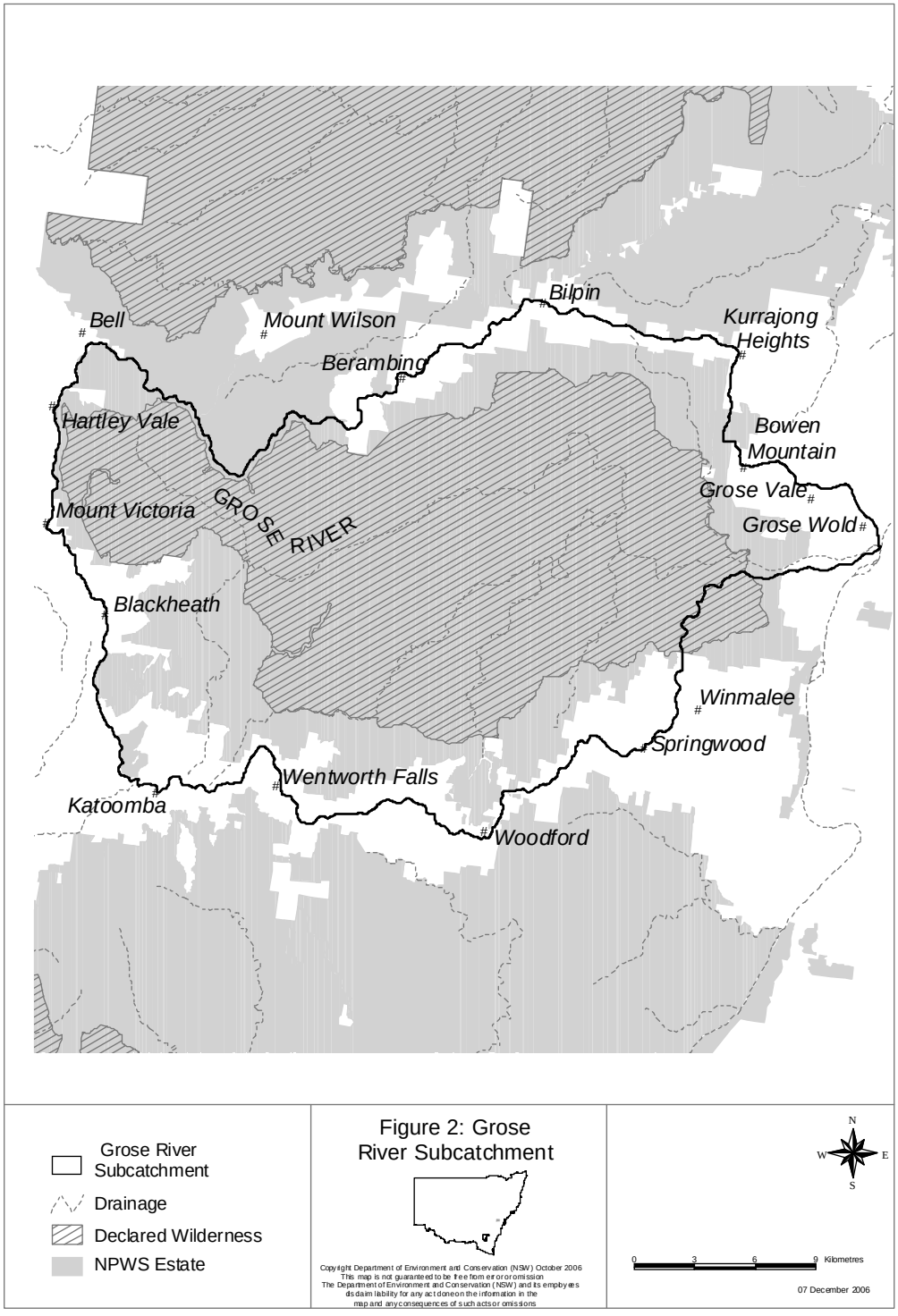
Grazing

Much of the Grose Valley was never grazed or used for agriculture due to its rugged topography and unsuitable soils. The main areas that were grazed were concentrated on the northern side of the catchment along Bells Line of Road (Kurrajong Heights, Bilpin, Berambing and Mount Tomah, where fertile volcanic and shale soils occur), Blue Gum Forest, and Burralow Creek (NPWS 1998). Grazing also occurred at Mount Banks, but to a lesser extent.

Cattle grazing commenced in the 1830s on Mount Tomah, in the 1840s in Burralow Swamp and in the 1860s at Blue Gum Forest, where it continued until the 1960s. Mount Banks was also used for sheep grazing until dedication of the park in 1959 (Yeaman 1977). Unauthorised grazing at Blue Gum Forest was believed to have caused the introduction of feral cattle and horses that were a major management problem, particularly in the 1950s and 1970s (Yeaman 1977).

The only major cleared area in the national park section of the catchment is on the eastern side at Burralow Creek. This area, of approximately 120 hectares, was first cleared in the 1850s for cattle, and today is used for camping and picnicking. Day visitors have a negligible effect on the area, with a few footpaths and the camping area at Acacia Flat being the only visible impacts.

Figure 2 The Grose River subcatchment.



Logging

In the northern part of the catchment, substantial logging took place in the early 1900s along the creeks and ridges between Mount Tomah, Bowen Mountain and Bilpin. Logging and clearing for orchards also occurred during this period along Bells Line of Road. Visible evidence of logging activities remains on Browns and Wilderness ridges, and along Hungerford and Tomah creeks. Freehold land on the slopes of Mount Tomah has been heavily logged and has resulted in regrowth forest with significant weed infestations.

The Burralow area, between Bilpin and Kurrajong, was another major source of timber in the early 1900s, particularly Browns Ridge at Burralow Creek, and the headwaters of Burralow Creek and its tributaries (NPWS 1998).

In the early part of the 20th century, logging occurred in the southern part of the catchment, at Linden Creek and Springwood Creek in the Faulconbridge area.

Mining

Significant mining for coal and shale occurred at Asgard Swamp (from 1891 and 1908, and possibly until 1925) and Blair Athol (from 1920–1924). Historically, these two mines caused the most significant mining impacts in the catchment. Other mining activity was exploratory and had a relatively minor impact on the landscape. Some minor evidence of historical mining activity still remains at Jinki Gully, near the junction of Victoria Creek and Victoria Brook, and east of Beauchamp Falls, near Evans Lookout at Mount Victoria, Pierces Pass and below Mount Banks and Mount Hay (NPWS 1998). However, these areas have long since stabilised and have no current impact on water quality (V. Richardson pers. comm.).

The Canyon Colliery lease area, near Bell, which had a lease between the 1920s and 2005, is the main rehabilitation concern in the upper catchment. Although the mine is now closed (it ceased activities in 1997), water continues to drain into the headwaters of the Grose River, polluting it with coal waste. Coal sediments were reportedly leaching into the Grose River while the mine was operational, and in the 1990s water discharge was reportedly high in acid and dissolved iron (Macqueen 1997). In late 1997, Sydney Water Corporation water tests found high levels of zinc in the upper Grose River, believed to be a result of waste water discharges from the colliery (Currey and Chessman 1995). Levels of zinc up to three times the maximum recommended by ANZECC for protection of freshwater ecosystems have been recorded just above Victoria Creek. Levels of zinc up to five times the ANZECC maximum have been recorded at a lower site, upstream of the confluence of Govetts Creek and the Grose River. High levels of zinc were also recorded at a middle site, at the base of Hungerfords Track. The three sites mentioned have much higher zinc levels than any other streams sampled in the Grose catchment, suggesting that the colliery is the source of pollution (NPWS 1998).

Recent sampling indicated high concentrations of zinc still occur, though not to the extent previously found. These high levels may indicate a loss of biodiversity, while arsenic, copper, cadmium and iron concentrations were low and unlikely to have any negative impact on fauna. Given these results however, and the locations of sampling, the disused mine does not represent a major threat to biodiversity of the Grose River (E. Turak unpublished data).

Erosion and weed incursion represent a continuing impact, as very little progress has been made with rehabilitation over most of the site. Rehabilitation of this area should be made a priority, and will help protect the headwaters of the Grose River (V. Richardson, pers. comm.).

Broadscale subsidence in the plateaus in the Canyon Colliery lease area has caused cracks that drain water from creeks and swamps. This water is discharged from a disused mine tunnel located at Jinki Gully and Dalpura Creek. This seepage is considered to be why some of the upper tributaries of the Grose River, such as Jungaburra Brook, are almost dry (Macqueen 1997). Further work would be required to better quantify the impacts of the subsidence.

The Grose River can be restored over the long term if the colliery's surface workings are successfully rehabilitated.

Fire

The dry eucalypt forests and heathlands that dominate the catchment of the Grose River indicate that this landscape and its vegetation have evolved with fire over tens of thousands of years. Most vegetation types can tolerate and respond to fire frequencies every 10 years, such as the heathlands, and up to about every 60 years for the blue gum forests. There are also some rainforest remnants present which have avoided fire.

Post-European fire history is largely undocumented and anecdotal. Although there were reports of severe fires in the catchment in the 1800s and first half of the 1900s, there is little reliable information about the extent of each fire, particularly in the more remote parts of the valley. Valid fire history information dates back to about the early 1950s, with accurate mapping starting from mid-1970s (the National Parks and Wildlife Service took over management of the national park from 1971).

In 1977–78, severe fires burnt 54,000 hectares, including parts of the Grose Valley between Bullaburra and Faulconbridge (Cunningham 1984), and in 1982 and 1994, severe fires burnt most or all of the Grose Valley.

The last major fire in the Grose River catchment occurred in 2002–03, when about 25% was burnt in two separate fires. Before that, most of the catchment was burnt in 1994. The catchment has received a major fire approximately every 10–15 years since accurate fire mapping commenced (A. Henry, pers. comm.).

Present-day urban and agricultural development

Due to the spread of urban and agricultural development along the southern and northern boundaries of the catchment, impacts from development could potentially occur along its length. In 2001, the Blue Mountains City Council area, encompassing the Grose catchment and sections of adjacent catchments, supported a population of approximately 74,000 people. Built up residential areas covered approximately 1.5% of the catchment.

Major roads running along the catchment's northern border (Bells Line of Road) and southern border (the Great Western Highway) service traffic moving to and from Sydney to west of the Great Dividing Range. Urban townships punctuate the southern boundary of the catchment along the highway. The northern boundary supports homesteads and agriculture, most commonly orchards.

Discharge from sewage treatment plants (STPs) at Blackheath, North Katoomba and Wentworth Falls historically impacted on Hat Hill, Katoomba and Blue Mountain creeks. Effluent from STPs has had a major influence on the water quality of receiving streams with past concentrations of nitrogen and phosphorus in Hat Hill, Katoomba and Blue Mountain creeks at tens or hundreds of times the ANZECC guidelines for protection of freshwater ecosystems (Currey and Chessman 1995). Today, however, only the Blackheath STP could impact on receiving streams, with the other STPs either decommissioned or upgraded. The Blackheath STP will be decommissioned in the near future. Some weed infestations still remain around the STPs as a result of residual nutrients in the soil and continued polluted runoff from urban and rural uses. However, management works are under way to address these problems.

Roads

Roads outside the developed areas are primarily unsealed fire trails in Blue Mountains National Park. There is an extensive fire trail system on the major north–south aligned ridgelines in the south of the catchment (Faulconbridge, Chapman and Linden ridges and the Mount Hay Range). Fire trails are otherwise confined to shorter ridges mostly projecting from the western and northern borders of the catchment.

3.2.6 Threatening processes

Weeds

Many introduced plant species exist in the Grose Valley, 39 of which are noxious (NPWS 1998). Gorse (*Ulex europaeus)*, Scotch broom (*Sarothamnus scoparius*), lantana (*Lantana camara*), privet (*Ligustrum lucidum*) and montbretia (*Crocosmia*) are the main weeds affecting the catchment. Generally, introduced plants are associated with sources of increased nutrients, such as urban and rural runoff, as seen along the Great Western Highway and Bells Line of Road. Volunteer groups have controlled remote occurrences in areas such as the Grose Valley and Katoomba Creek, and have regenerated much urban bushland.

There seems to be an increase in the abundance of weeds at higher altitudes, which may be associated with the fact that the average depth of urban development in stream catchments is greater in the upper mountains than in the middle or lower mountains (AMBS Consulting 1997).

Major earthworks associated with road widening and new subdivisions have also caused significant weed invasions in the past, and continue to be an issue. Urban stormwater, with its pollutants and high nutrients, is another source of weed dispersal.

Introduced animals

Feral cattle and horses, once a major problem on the valley floor, are no longer a threat to the area's natural values due to DECC's ongoing control program which has significantly reduced their numbers or eliminated them (N. Stone, pers. comm.). Cattle no longer occur in the area, and the remaining few horses are thought to have died. No control programs have been needed in the past five years.

Feral pigs and dogs have been recorded near Bilpin, on urban fringes, and as isolated populations on Newnes Plateau, adjacent to the national park (NPWS 1998).

The impacts of other introduced animals such as wild dogs, cats, foxes and introduced fish (brown trout, rainbow trout, European carp) on the catchment's native species are not adequately understood. Currently, small, localised control programs are being used in response to problematic outbreaks until more information is at hand (NPWS 1998).

3.3 Technical assessment

3.3.1 Biological assessment

Macroinvertebrate samples were collected on 7 December 2005 using the AUSRIVAS sampling protocol (Turak et al 2004). Two locations were sampled, one on Grose River and one at Govetts Creek. Each sample site was located just upstream of the Grose River and Govetts Creek junction. AUSRIVAS scores for both the riffle and edge samples from the two sites were high, indicating that both the Grose River and Govetts Creek were in similar condition. Even the soft sediment samples used to assess the edges showed the sites to be in similar condition. This evidence shows there is high aquatic biodiversity in these rivers.

Appendix 2 lists the taxa found in the samples.

These results show that disturbances in the upper Grose River and Blackheath urban area are not affecting the biodiversity of the Grose River system. Previous sampling done for DECC in June 2005 has shown that some of the small tributaries originating in urban areas between Blackheath and Springwood were in poor biological condition. However, only the upper sections of these streams were sampled, and many of these had no flowing water in 2005, so AUSRIVAS scores may not have provided an accurate assessment. Further to this, drought conditions were probably exacerbating urban impacts. As these streams form downstream they pick up many tributaries that originate in Blue Mountains National Park, ensuring creeks are diluted considerably before they join Grose River. Given the high aquatic biodiversity and good ecological condition in Grose River and Govetts Creek, it is unlikely that any of the small streams originating in the urban areas will impact negatively on the biological condition of the Grose River.

3.3.2 Geomorphological assessment

A geomorphological assessment was undertaken for the Grose River catchment (ID&A 2001). Most (94%) of the Grose River sub-catchment is classified as the Gorge River Style, with a few reaches identified as Confined River Style, using the River Styles® framework. The streams in the catchment all have sand beds due to the sandstone geology. Most reaches are in good condition, but there are short reaches in moderate or poor condition due to the presence of small 'sand slugs', although these are thought to be temporary and are being flushed out relatively rapidly.

A sand slug is a large deposit of sediment which moves slowly downstream and is created episodically. Sand slugs potentially alter the natural composition of freshwater fauna (Downes et al 2006) and may be created naturally or caused by human land use. The sand slugs in the lower Grose River are thought to be due to unnatural processes.

The main sand slug is downstream of the national park boundary, on the eastern side of the catchment. The parts of the catchment in Blue Mountains National Park are in good condition and suitable for declaration as a wild river.

3.3.3 Hydrology

There is only minor water extraction from the Grose River system. The largest volume is used to service the towns along the Great Western Highway on the southern and south-western boundaries of the catchment. However, even this extraction means less than 2% of the average flow is being taken from the system, which does not impact on the hydrology of the overall river system.

Subsidence from mining at Canyon Colliery is thought to be draining creeks on the mine site and diverting water to Dalpura Creek. It is recommended that the wild river declaration apply to the Grose River and its tributaries east of the junction of Dalpura Creek and the Grose River (coinciding with the northern boundary of Grose declared wilderness) and exclude the affected creeks to the west.

The Grose River catchment will fall under the Metropolitan Water Sharing Plan being prepared by the Department of Natural Resources. It is not expected that any substantial changes to the Grose catchment's hydrology, including a substantial increase in water allocations, will occur as a result of the plan.

4. Referrals

Where a wild river declaration may affect functions carried out under the *Water Management Act 2000*, the concurrence of the Minister for Water may be required prior to declaration. The *Water Management Act 2000* does not currently cover the Grose River (it is still covered by the *Water Act 1912*). However, in anticipation of the implementation of the Sydney Metropolitan Water Sharing Plan (due mid-2008), concurrence is being sought by the Minister for Water, as declaration of the Grose River as a wild river may impact on functions being carried out under this plan.

Similarly, in the case of state conservation areas, where a wild river declaration may affect functions carried out under the *Mining Act 1992*, the concurrence of the Minister for Primary Industries may be required before declaration. No state conservation area is located in the catchment for the part of the river to be declared, and thus declaration does not require concurrence with the Minister responsible for the *Mining Act 1992*.

DECC invited comment on the declaration of the Grose River as a wild river from the following agencies: Sydney Water, the Cabinet Office, the Natural Resources Commission, the Department of Natural Resources, the Department of Primary Industries, the State Water Corporation and the Sydney Catchment Authority, on 25 October 2006. Replies were received from the Sydney Catchment Authority and the Department of Primary Industries, who expressed no concerns over the declaration.

5. Recommendation

The Grose River and its tributaries within the Grose Wilderness boundary are considered to meet the criteria for wild rivers as listed in the *National Parks and Wildlife Act 1974* and are recommended for declaration as a wild river.

6. References

AMBS Consulting 1997, *Blue Mountains bio-indicators survey and research project*, draft final report for NSW National Parks and Wildlife Service, Australian Museum Business Services, Sydney.

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7. Appendices

7.1 Appendix 1: Data sources – technical assessment: criteria for wild rivers

	Biological condition	**Geomorphological condition**	**Hydrological condition**
Data sources	Department of the Environment and Heritage 2003, Australian River Assessment System (AUSRIVAS) National River Health Database, Australian Government, Canberra. ANZCW0501009864	ID&A Pty Ltd 2005, *Geomorphic categorisation of streams in the Hawkesbury–Nepean Catchment*, report for Department of Land and Water Conservation and Bega Valley Shire Far South Coast Catchment Management Committee	DNR water extraction licence data
Technical advice	Eren Turak, Research Scientist, Policy and Science, Department of Environment and Climate Change Joanne Ling, Research Scientist, Policy and Science, Department of Environment and Climate Change	David Outhet, Research Scientist, Department of Natural Resources	Paul Simpson, Senior Natural Resource Officer, Water Management Division, Department of Natural Resources

Additional expert panel members

Agency	**Name**	**Division/ Branch**	**Title/ Position**
DECC	Neil Stone	PWD	Acting Area Manager, Upper Mountains
DECC	Vanessa Richardson	PWD	Ranger, Upper Mountains
DECC	Tim Hagar	EPRD	Conservation Assessment Officer
DECC	Anita Zubovic	PWD	Acting Wilderness Conservation Officer

Consultation

Paul Bennett, Hawkesbury–Nepean Catchment Management Authority

7.2 Appendix 2: Taxa found in the Grose River and Govetts Creek

Allomatus sp.	*Hydrometra strigosa*
Anisocentropus sp.	*Illiesoperla australis*/*mayi*
Aranaea	*Kingolus tinctus*
Archichauliodes guttiferus	*Koorrnonga* sp. AV3
Asmicridea sp. AV1	*Koorrnonga* sp. AV5
Atalophlebia sp. AV13	*Kosrheithrus* sp.
Atalophlebia sp. AV21	*Leptoperla* sp.
Atriplectides dubius	*Marilia fusca*
Australatya striolata	*Micronecta* sp.
Austroaeschna pulchra	*Microvelia* sp.
Austrogomphus guerini/*ochraceus*	*Mirawara* sp. nr sp. AV1
Austrophlebioides pusillus	*Nannnophlebia risi*
Austrosimulium furiosum	*Necterosoma* sp.
Austrosimulium bancrofti	*Nerthra* sp.
Baetis sp. MV3	*Notalina arena*
Barretthydrus sp.	*Notoaeschna sagittata*
Berosus sp.	*Nousia* sp.
Centroptilum sp.	*Oligochaeta* sp.
Ceratopogonidae sp.	*Orthocladiinae* 2 spp.
Cheumatopsyche sp. AV6	*Oxyethira* sp.
Chimarra australica	*Paranisops inconstans*
Chironominae sp.	*Psyllobetina* sp.
Coelostoma sp.	*Rheumatometra* sp.
Coenoria sp. AV2	*Scirtidae* sp.
Coloburiscoides sp.	*Sclerocyphon basicollis*
Curculionidae sp.	*Sclerocyphon striatus*
Dasyomma sp.	*Simsonia*/*Notriolus* 3 spp.
Daternomina sp.	*Sternopriscus* sp.
Dinotoperla sp.	*Synlestes weyersii tillyardi*

Dixa (*Paradixa*) sp.	*Tanypodinae* sp.
Elmidae sp.	*Taschorema* complex sp.
Empididae sp.	*Tasiogma ciliata*
Enithares hackeri	*Tasmanocoenis* sp.
Eusynthemis brevistyla/*vigula*	*Tasmanophlebia* sp. AV1
Genus 2 sp. MV6	*Tenagogerris euphrosyne*
Genus 2 sp. MV3	*Tipulidae* 3 spp.
Hampa sp. AV1	*Triplectides similis*
Heloccabus sp. AV1	*Triplectides ciuskus ciukus*
Hemigomhus heteroclytus/*gouldii*	*Triplectides volda*
Hydracarina sp.	*Ulmerophlebia* sp. AV2
Hydraena sp.	