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Submission to the Preliminary Assessment Report of the Riverina bioregion regional forest assessment

The National Parks Association welcomes the opportunity make a submission on the Preliminary Assessment Report of the Riverina bioregion regional forest assessment on River Red Gums and Woodland Forests.

Overview

The Riverina region of NSW faces severe contemporary threats to ecosystem processes and biodiversity persistence – in the form of changed water regimes, clearing, logging, mining, salinity, grazing, invasive species, climate change, habitat fragmentation, and conversion of native pastures to introduced grasslands. Recent work by CSIRO and the Bureau of Meteorology suggests that the recent drought is, in fact, climate change in action, and that the weather patterns have changed permanently and previous rainfall profiles will probably not return while the temperatures continue to rise. The implications for the future of the region are immense, and for flood dependent River Red Gum ecosystems the implications are nothing short dire.

In view of this situation, the future management priorities for River Red Gum and Woodland Forests should be:

- Managing first and foremost for the survival, conservation and ecological integrity of the entire ecosystem and removing all external stressors.
- Achieving this by creating large new connected National Parks along the Murray and Murrumbidgee Rivers, substantially increasing environmental water allocations and monitoring closely the results of watering events.
- Immediately initiating research into ecosystem changes, particularly successional processes, and commencing a long-term biodiversity monitoring program.

Every effort must now concentrate on conservation and recovery. Although the future may look bleak for many Red Gum wetlands, it would be appalling if the first real action that was ever taken on their behalf was to 'give up on them', and then allowing the re-doubling of negative impacts, without first trying every effort to preserve them. There has, as yet, been no concerted effort to save the River Red Gum forests and their biota from an extraordinary combination of intensive human impacts. It is, undoubtedly, a last ditch bid, but it needs to be made and it needs to be substantial, far-reaching and committed. To simply 'give up' on Red Gum wetlands now would be an extraordinary abrogation of our collective responsibilities to the natural environment.

Di Stefano reviews all available information on Red Gum regeneration and silviculture and concludes that it is not appropriate to accept 'human-induced changes to red gum

ecosystems' through replacement with box species as a foregone conclusion, but that managers should '*act to reduce, as much as possible, human impacts on red gum ecosystems, and thus minimise the rate of human-induced ecosystem change*'. Minimising the rate of change, by retaining and conserving Red Gum ecosystems in large protected areas, will undoubtedly be crucial in supporting ecological transitions and futures for these environments and their biota.

As far as future flooding regimes are concerned, we would like to see the following measures in place:

- Major increases in environmental flows to Red Gum forests in the southern Murray-Darling, with strong consideration of the proposal by VEAC for a five-yearly overbank flow
- Targeting of environmental water purchases to the highest security water available
- Ensuring that easements are adequate to allow flooding of forests without constraints
- Implementing changes in policy to prevent unseasonal flows from rain rejection events
- Factoring recharge of groundwater into considerations about flooding and environmental flow provision
- Development of a thoroughly researched, systematic plan for delivery of environmental water to Red Gum forests throughout the Riverina region
- Preventing the development of new water infrastructure that will impact negatively on the health of River Red Gum forests (such as the Goulburn-Murray Interconnector).
- Provision of cultural water flows for use by Traditional Owners for cultural purposes.

The measures proposed above should be supported by much stronger measures across all land tenures in the Riverina region, to protect and retain all remaining native vegetation and to maximise the persistence of biodiversity over the long-term, including consideration of the following:

1. An on-going tree health mapping and monitoring program across all tenures along the major rivers – the Murray, Murrumbidgee and Lachlan
2. Implementation of a region-wide biodiversity survey program aimed to address the crisis in baseline environmental data in the South West region.
3. Utilisation of this information to conduct systematic spatial conservation planning in the South West region for use in all aspects of natural resource management, and particularly for integration into Catchment Action Plans and Local Environment Plans.
4. Continuing to build the national reserve system in the Riverina through the purchase of high priority areas for conservation, particularly refugia and linking habitats, in concert with the Federal Government.
5. Protection of remaining high conservation value vegetation on freehold and leasehold land through strong environmental zonings and targeted incentive measures.
6. Ensuring that Travelling Stock Routes in the region are retained in public ownership and are managed for conservation in a consistent and integrated manner.
7. Reviewing the Private Native Forestry Code of Practice for River Red Gum to far better protect environmental values and to ensure that it complies with the EPBC Act 1999.

The Traditional Owners of the southern Murray-Darling have never ceded their rights and interests in land and water. They have maintained their cultural links with Country and are still standing strong in the knowledge and stewardship handed down through untold generations. It is crucial that an informed consent process is conducted between the NSW Government and Traditional Owners in relation to the Riverina region and the future of Red Gum forests. In particular, we urge the NRC to recommend handback-leaseback of new National Parks to Traditional Owners wherever that is sought by them, list such areas on Schedule 14 of the National Parks and Wildlife Act 1974 at the same time as they are gazetted, and commit to binding timeframes to implement joint management arrangements.

Throughout this submission, as well as making recommendations for the future conservation management of the Riverina region, we also make numerous recommendations for improvements to the Preliminary report. We call for the following issues to be fully addressed in the final report:

1. A thorough review of the Environment Protection and Biodiversity Conservation Act 1999, which sets out the measures that will be taken to make logging and other activities comply with the Act, through what process and in what timeframe.
2. A rigorous assessment of the impacts of logging, firewood collection and grazing on the ecological requirements of fauna and flora species in the region.
3. A much improved conservation planning analysis, which explicitly addresses key conservation criteria and which includes:
 - The delineation of key refugia based on principles from the scientific literature
 - The identification of priority habitat linkages across the landscape.
 - Analysis of the distribution and conservation significance of vegetation types, Mitchell Landscapes and IBRA subregions.
 - Analysis of the distribution of species in groups/guilds that are sensitive to logging and other impacts such as grazing
 - Identification and analysis of the distribution of regionally significant species and species at risk from climate change.

The socio-economic information provided in the Preliminary report indicates that the timber industry is already in a terminal decline, and that it is facing a major structural adjustment process regardless of new reserves, as a result of the loss of yield due to reduced flooding. The best way to cushion the economy against those losses is to create large new conservation reserves and diversify the regional economy with jobs in National Parks and expansion of the tourism industry. In the absence of the regional assessment process, the timber industry would be facing a major decline without any financial safety net or business exit support. Therefore, the creation of large National Parks and the associated provision of business exit to mills which are declining represents the best possible outcome for a community which is now facing the impacts of a major environmental crisis.

Introduction

The National Parks Association welcomes the opportunity to comment on the Preliminary Report of the River Red Gum and Woodlands regional assessment. NPA and other environment groups have been requesting a bioregional assessment of the region for more than a decade – it is long overdue. We note that such an assessment actually commenced in 1999, but was later discontinued. The result of that delay has been 10 years of intensive, industrial logging and patch-clearfelling which has undoubtedly had a major negative impact on the environment.

We are concerned that the Preliminary report fails to properly address ecological issues – it does not conduct a scientific analysis of the impacts of logging, commercial firewood collection or grazing, and it does not undertake a systematic conservation planning process. We do not believe that it has met the Terms of Reference in its current form.

Whilst we fully recognise the environmental imperative in relation to water issues, we want to stress that this regional assessment process is, first and foremost, about complementary management of the floodplain ecosystems. The various Murray-Darling water reform processes have all focused solely on 'watering' sites and have not addressed or even considered other issues that can dramatically improve the health, integrity and resilience of

those sites. The regional assessment process is designed to finally address that major gap and that is its primary role. Therefore, whilst consideration of water issues is important and absolutely necessary, it must be accompanied by a rigorous and thorough ecological assessment and evaluation of other factors which affect the health of the ecosystem – such as logging, firewood collection and grazing. It should dramatically improve the available knowledge of the ecological values of the areas, by properly compiling all existing information, and applying best practice scientific principles to map key environmental attributes – such as refugia and habitat linkages.

The urgent case for complementary management of floodplain wetlands to improve the health of the entire river system is contained in numerous policy documents. The Intergovernmental Agreement on Murray Darling Basin Reform 2008, contains the following references to the need for improved protection of River Red Gum wetlands:

“The parties recognise that the extreme drought has exacerbated the Basin’s environmental stress. Continued low flows and lack of natural flooding to Ramsar and other important environmental sites, including the Lower Lakes, Coorong, the Murray Mouth and the Murray Red Gum Forests, are resulting in serious environmental degradation”. Preamble, point (2).

The Basin Plan will, among other things, seek to improve the environmental health of all Ramsar and other key environmental sites in the Basin and secure important environmental outcomes, such as increasing environmental flows, healthier wetlands, and protection of floodplain areas and River Red Gums”. Preamble, point (12).

The water management framework of the Intergovernmental Agreement on the National Water Initiative 2004 included a requirement to *“identify and acknowledge surface and ground water systems of high conservation values, and manage these systems to protect and enhance those values”* (s25x).

Similarly, the science behind the Living Murray First Step decision is clear in its advice on the importance of complementary terrestrial management to health of the overall riverine system. It states that:

‘the health of the River Murray system has been impacted by many factors other than changed flow regime. These include...desnagging, bank erosion, over-grazing of the floodplain and wetland vegetation, logging of forests, construction of levees.... The full benefits that can potentially be derived from a recovery in water for the environment cannot be realised unless these other impacts are also addressed. (MDBC 2004).

The Murray Darling Basin Commission, in its submission to Victorian Environmental Assessment Council draft reserve proposals for River Red Gum wetland forest in Victoria, also recognised that improved land management of Living Murray Icon sites, through measures such as new national parks, will improve ecological outcomes from environmental watering of icon sites. The submission states that:

‘It is reasonable to expect that some of the proposed changes may increase the chances of meeting the ecological objectives at Victorian icon sites. Whilst the focus of The Living Murray has been watering and works to deliver water to sites it is widely acknowledged that many complementary management activities will be required to secure the health of these sites.’

NPA is highly supportive of the NRC investigations into water delivery and future availability of, and requirements for, water provision to River Red Gum wetlands. However, we note that such a task is the primary responsibility of the Murray Darling Basin Authority and the Murray

Darling Basin Plan that it is developing. However, there is no other party tasked with the role of conducting an ecological assessment of floodplain vegetation and assessing impacts on it from a range of activities. That is the primary role of the Natural Resources Commission through the regional assessment process. The Preliminary Report does not deliver on that, and we urge the NRC to ensure that the final report provides a far more rigorous analysis of the ecological values and conservation significance of the region, as well as properly reviewing the impacts of logging and associated activities on those values.

Precautionary Principle

The report on the Directions for the National Reserves System states that “*The absence of scientific certainty is not a reason to postpone measures to establish protected areas that contribute to a comprehensive, adequate and representative national reserve system*”. The same principle is set down in the NSW Biodiversity Strategy and the National Forest Policy Statement.

The terrestrial biodiversity of the Riverina region is very poorly known. A previous review by NPA found that (Flint 2007):

“There has never been sufficient funding to undertake fauna and flora surveys or conduct fine-scale vegetation mapping on a region-wide basis. As a result, most of the survey and mapping projects that have occurred in the region have either been conducted over limited geographic areas or conducted for a restricted and quite specific purpose. This often involves widely disparate data collection methods and is generally not targeted towards filling gaps in the region. As a result, the datasets produced are often not consistent with other datasets in the region, have limited utility for use in broader conservation assessments, and/or do not deliver products that improve systematic knowledge in the most poorly sampled areas. The inadequacies of the data for conservation planning are so profound, that it can only be fixed by a major injection of funds and a focused and concentrated effort of several years duration to collect systematic environmental data in the region”.

Previous data audits by DECC of flora and fauna data have highlighted the extraordinary paucity of environmental data in the region. The Riverina Fauna Audit (Pennay and Gosper 2003), concluded that:

1. Substantial areas contain little or no data for some or all groups of fauna.
2. Fauna data is biased both geographically and taxonomically
3. The total number of systematic survey sites for all fauna was probably less than 40, and even those were biased in distribution.
4. The great bulk of the available data is from opportunistic or incidental records.
5. There is insufficient research on the ecology, status and habitat preferences of most fauna species.
6. There is a lack of knowledge of priority species.

Similar conclusions were reached by the Riverina Flora Audit (Forward 2003), which found the threatened flora data incomplete and biased towards southern areas and public lands, and that existing data contained inaccuracies and duplicates. It identified the need for systematic search effort for threatened flora in the region, the development of a regionally threatened flora list, and the collection of autecological information. However, none of this work has ever been undertaken.

Further assessments of existing data by Todd and McDonnell (2003) concluded that flora datasets were considered to be 'fairly sparse and inadequate for detailed analysis' because 77% of recorded species had fewer than 30 records in the region. The bird data was found to be similarly weighted, with 11 of the most frequently recorded species contributing over 82% of records. Although they noted the need for further information on survey methods and effort, the preliminary conclusion was that both flora and fauna datasets were generally inadequate to conduct assessments of distribution of species in the region.

There has only been one substantial, systematic fauna survey undertaken by Forests NSW in the region, which was that conducted in 1994. There has been no substantive systematic flora survey. The EIS included only 8 systematic survey sites in River Red Gum State Forests – a totally inadequate assessment in every way. The DECC fauna and flora audit reports highlight in detail just how inadequate the biological data is in the region to even provide the most basic assessment of species distributions, let alone more advanced information such as population numbers or habitat requirements. This needs to be properly considered in the process.

The importance of precaution has been underscored by the results from biodiversity surveys undertaken by biologists engaged by environment groups over the last two years. Every survey has revealed records of species that have never been recorded in the Red Gum forests of the region before – such as the Yellow-bellied Sheathtail Bat and the Powerful Owl. Relatively minor survey effort has more than doubled the total number of records for some species. The most recent surveys, being undertaken now, have recorded numerous Squirrel Glider records, including in parts of Millewa State Forest and Gulpa Island State Forest where they haven't been recorded before (see McGregor 2009). It represents a dramatic improvement in the knowledge of the distribution of that species in the region.

Therefore, the assessment needs to be precautionary – it is apparent that River Red Gum forests have very high significance for a large number of flora and fauna species. The process has to assume that areas are significant, even where data is not available, if it is to exercise precaution. It also needs to assume that River Red Gum ecosystems can and will survive the changes in flooding regimes if urgent measures are taken now to recover them – it should not, under any circumstances, be giving up on areas on the basis of the current poor knowledge base.

Uncertainty and precaution needs to be referred to throughout the report – it was lacking from the Preliminary report. For example, there is grave uncertainty about what successional processes might occur in River Red Gum wetlands that are no longer flooded. The Preliminary report makes some educated guesses about the future condition of areas, but they are presented as almost a certainty. In fact, they are just one of a range of entirely plausible outcomes. Also, the report gravely misrepresents the impacts of logging as 'benign', ignoring the body of scientific evidence to the contrary and flouting the precautionary principle in the process.

Therefore, the assessment must be explicitly precautionary – this includes in relation to targets that are set for reservation, criteria that are applied, environmental data that is utilised and recommendations that are made. The report needs to describe clearly how precaution has been applied from an environmental perspective.

Conservation Significance

Despite the appalling paucity of environmental survey in the past, there is sufficient information to show that the Riverina bioregion of NSW is a very high conservation priority at

all levels – state, national and international. It includes a number of globally threatened species, 19 migratory bird species listed on international agreements, and 84,000 hectares of Ramsar-listed wetlands. It includes 17 nationally listed species, approx 240,000 hectares of wetlands listed on the Directory of Important Wetlands of Australia and at least 2 nationally listed Endangered Ecological Communities. It includes at least 69 species listed on the NSW Threatened Species Act 1995 and 6 Endangered Ecological Communities listed on that Act, plus a further 2 aquatic ecological communities listed under the Fisheries Management Act 1994.

It is extremely poorly reserved, with only 1.8% of the bioregion in NSW protected in permanent conservation reserves (DECC 2008). It has been recognised as one of the highest priority bioregions for new conservation reserves in Australia by both the National Land and Water Resources Audit and the National Reserve System Directions report (NHT 2002, NRMCC 2005).

The region is extremely threatened. It has been identified as one of the most highly threatened bioregions in the country by the National Land and Water Resources Audit (NHT 2002), with more than 80% of the subregion along the Murray River having been cleared of native vegetation since 1788 (NSW SOE 2006). It has been subject to very high extinction rates, with at least 16 vertebrate fauna now considered extinct in the region and a further 63 vertebrate fauna species threatened with extinction (Todd & McDonnell 2003).

River Red Gum State Forests themselves have outstanding conservation significance and are a very high priority for reservation – they include River Red Gum ecosystems and other important woodland types within a habitat matrix. Perhaps most importantly, they represent the largest remnants of vegetation left in one of the most heavily cleared and intensively cultivated landscapes in Australia – including the two largest stands of River Red Gum left in the world – Barmah-Millewa and Koondrook-Perricoota-Gunbower, which are Significant Ecological Assets under the Living Murray process. As a result, they are incredibly important to the future of biodiversity in the region.

Notably, they function as filters and buffers (‘green lungs’) that contribute to the healthy functioning of the Murray River and its tributaries. They play a major role in native fish migration, spawning and recruitment during flood events and provide habitat for 4 globally threatened fish species. The forests represent a major nesting site for migratory birds and regularly support more than 20,000 waterbirds

The forests provide likely habitat for at least 46 threatened fauna species and 23 threatened flora species, including species such as the iconic Barking Owl, Squirrel Glider, Southern Bell Frog, Superb Parrot and Regent Parrot. River Red Gum forests represent the best remaining vegetation corridors left between the Australian Alps and South Australia, providing important opportunities for animals to move in response to human-induced climate change and other threats. They are a vital drought refuge for animal species as moist riverine forests in a predominantly semi-arid environment.

The Final NRC report should provide a thorough description of the conservation significance of the region and of the State Forests within it. The Preliminary report was somewhat lacking in this regard, and substantial improvements are required.

Legal Requirements

The Preliminary Assessment Report does not provide an adequate description of the legal requirements under either NSW or Federal environment laws.

The report should refer to the requirements of the NSW Environmental Planning and Assessment Act 1979 and the fact that FNSW have admitted that they require an approval under Part 3A of that Act but that they have not obtained one. The report should make it

clear that current logging activities in the region therefore do not comply with the NSW EP&A Act 1979 but that they are required to do so.

The report should also address in detail the legal situation in relation to the Federal Environment Protection and Biodiversity Conservation Act 1999. The report should clearly present the key findings of the investigation by the Federal Department of Environment, Water, Heritage and the Arts into the impacts of River Red Gum logging on matters of national environmental significance.

Namely, in a letter to Forests NSW, DEWHA state that:

...“the Departments investigation of the impacts of forestry operations initially focused on two matters of national environmental significance: the Ramsar wetland site; and the Superb Parrot. The investigation found that there was a likelihood of significant impact to these matters of national environmental significance as a result of forestry operations. It is important to reiterate that the EPBC Act prohibits such actions, unless they are referred to and approved by the Commonwealth Environment Minister” (Rose Webb, 1/5/2009).

The letter further states that:

*“The Department considers that AGS constitutes an intensification of use and its environmental impacts, if any, require assessment and approval. The Department also considers that the application of this harvesting practice is likely to be having a significant impact upon the Central Murray State Forests Ramsar site and the connectivity of habitat for, but not limited to, the Superb Parrot (*Polytelis swainsonii*) in the wider region”.*

The findings of the Department were also revealed during Senate Estimates questions in Federal Parliament on the 28th May 2009. In a response to a question, Mr Burnett of the Approvals and Wildlife Division of DEWHA provided information on the conclusions reached by the Department on the impact of logging on Ramsar-listed wetlands and nationally threatened species, as follows:

“The concern is that clear felling in patches destroys the continuity of the tree canopy and that has a very significant impact on the ecological character of the Ramsar wetland, obviously where it is occurring within the Ramsar wetland, and elsewhere. By disrupting the continuity of the tree canopy it is having a significant impact on the habitat of nationally listed threatened species”.

The Senate Estimates transcript for the 28th May 2009 goes on to make it clear that DEWHA is considering, and collecting evidence, for potential litigation on the matter. The statements made indicate categorically that as far as DEWHA is concerned, patch-clearfelling in State Forests since 2003 has been contrary to the EPBC Act 1999.

NPA considers it extraordinary that Forests NSW have continued logging River Red Gum since the DEWHA investigation was completed in the full knowledge that it is illegal. We are astonished that the NSW Government would deliberately flout environment laws that it expects all of its citizens to abide by. It represents an appalling abrogation of the most basic environmental responsibilities and sets the worst possible example for the community.

We note that in subsequent letters from DEWHA to Forests NSW, sent after the 1st May, DEWHA propose a process to conduct an assessment of the forests in accordance with the requirements of their Act, and a set of conditions on logging to lessen the impacts of logging whilst the assessment is undertaken. We note that this represents an extraordinary concession that clearly contravenes the law. However, even that offer was rejected by

Forests NSW, who demanded that logging continue unfettered, without any additional constraints until such time as an assessment was completed.

DEWHA state that *“This letter provides more information on a possible strategic assessment under the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act), as well as, on a without prejudice basis, our thoughts on harvest prescriptions that would be needed to ensure no unacceptable impacts in the short-term on matters of national environmental significance”* (Gerard Early to FNSW, 20th May 2009).

There have been no such conditions put in place from that day to this, and unacceptable impacts are occurring from logging in River Red Gum wetlands right now due to operations which have been determined to be unlawful by the environmental regulator.

It is essential that the Preliminary Assessment Report sets out a clear process as to how the EPBC Act 1999 will finally be met and a rapid timeframe for meeting it. It needs to provide surety that unlawful activities will cease and the requirements of the Act will finally be fully and rigorously applied. The only two pathways that appear appropriate for River Red Gum logging operations are a conservation agreement or a strategic assessment under the EPBC Act 1999. Both approaches would provide a formal statutory role for the Federal Government in determining the outcomes of the assessment, provide them an on-going compliance role thereafter, and ensure that the outcomes are binding on both parties.

All River Red Gum logging should stop until such time as it has a valid legal approval under the EPBC Act 1999. That is the only appropriate course available to re-invigorate the rule of law and re-instate some modicum of respect for environmental statutes in this country.

Failing that, at the very least, patch-clearfelling should be banned and all other conditions on logging proposed by the Federal Government back in May should be implemented immediately, in full, as well as action being taken to exclude logging from all high conservation value areas, until such time as the outcomes of the regional assessment are fully implemented and the full process under the EPBC Act 1999 completed.

Impacts of logging, commercial firewood collection and grazing

We have been appalled by the lack of scientific credibility in the report when it comes to the impacts of logging, commercial firewood collection, domestic firewood collection, grazing and uncontrolled recreation on River Red Gum forests and associated woodlands. There has simply been no attempt made whatsoever to scientifically assess the impact of those activities. Almost none of the extensive scientific literature on the impacts of these activities on the environment is cited in the report. Neither general literature on the impacts of such activities on eucalypt forests, nor specific literature from research conducted specifically on Red Gum forests, is referred to.

Instead, the report regurgitates unreferenced forestry propaganda in lieu of conducting a scientific analysis. This is completely unacceptable, especially for an organisation such as the NRC whose role is to provide objective, independent scientific advice. That role was simply not undertaken in this report as far as these matters were concerned.

I refer specifically to the following statements which blithely claim that logging has a benign or indeed, positive impact on the environment, or which laud FNSW management as ‘environmentally sustainable’ simply because they say it is:

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“Standard prescriptions put in place since the mid 1970s to protect large mature trees have ensured that the NSW Central Murray State Forests retain pre-European age trees and

hollow-bearing habitat trees (GHD 2009).

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“An adaptive approach to sustainable forest management has allowed the forests to continue to support social, economic and community interests, and to protect and promote environmental and heritage values”.

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“The condition of river red gum within state forests and elsewhere of the Riverina is generally in decline as a result of substantially reduced flows due to river regulation and compounded by climate change. Condition may also be reduced immediately following harvesting, although long term decline in condition has not been linked to forestry activities specifically”.

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“Vegetation is retained within and adjacent to harvesting areas through formal forest management zoning, licence conditions or silvicultural prescriptions. A significant proportion of the over-storey is retained even within the harvestable area to meet ecological, stream protection, cultural heritage or aesthetic objectives, or elements of the stand retained to meet legislative or policy requirements”.

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“The Forest Management Zone system was developed in consultation with a range of government departments and community groups. It is based on a nationally agreed reserve criteria that clearly differentiates between those areas of State forests that are specifically set aside and offset with Ministerial approval for conservation, and those that are available for other activities and objectives including timber harvesting”.

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“Achievement of prescribed silvicultural and environmental outcomes is assessed after harvesting and this may be based on sampling representative areas”.

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“Management prescriptions are an important component of Forests NSW’s Ecologically Sustainable Forest Management system and have been designed to maintain forest structural diversity to retain and enhance flora and fauna habitat, protect and maintain soil and water quality, while providing a sustainable timber supply (Forests NSW, 2008) “.

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“Permanent reservation areas for Flora reserves and cultural heritage sites, retention of hollow habitat trees for fauna and the recognition of the Central Murray State Forests as wetlands of international significance stand as testaments to ecologically sustainable management practices introduced over the past 30 years (GHD, 2009c, pp. 125 – 127)”.

In contrast to these unsubstantiated statements, there is a body of scientific evidence which indicates that logging, commercial firewood collection and grazing have a major environmental impact on River Red Gum forests. All of the statements quoted above, and others like them, which have no basis in fact, should be removed from the final report.

The National Parks Association provided the NRC with its detailed submission on the impacts of River Red Gum logging on the environment which led to the investigation by the DEWHA, prior to the release of the Preliminary Assessment Report. Our report (Flint & Woods 2008) undertook a detailed analysis of the impacts of logging, by assessing the

extent, distribution and magnitude of logging over the last decade, conducting an extensive review of the scientific literature, and receiving expert advice on likely impacts from four different ecologists. The report objectively applied the test of significance in accordance with the guidelines set down by DEWHA, and concluded that logging was indeed having a significant impact on River Red Gum forests. This conclusion has been vindicated by the subsequent determination by DEWHA as set out in the previous section. We note that there was not a single reference made to the NPA report in the NRC Preliminary report.

Flint & Woods 2008 concluded that logging and associated activities are undoubtedly leading to a substantial degradation in the ecological character of NSW Red Gum forests, due to the following factors:

- The intensity, magnitude and frequency of logging operations,
- The extreme sensitivity and high conservation value of the environment in which they occur,
- The large geographic area affected annually and over time,
- The high cumulative impact in the context of other sources of impact (climate change, drought, invasive species, previous logging, land-clearing and fragmentation),
- The low level of confidence with which the impacts are understood,
- And the context in which they occur of a heavily cleared and highly fragmented landscape with very low levels of reservation,

We believe the framework for the test of significance under the EPBC Act 1999 is a very valid means of assessing the impact of logging, and contend that the NRC should objectively apply that test on the basis of available scientific evidence in the final report (but testing it in relation to all elements of biodiversity, rather than just nationally threatened species) rather than reproducing forestry propaganda.

There is no doubt that patch-clearfelling, logging and grazing are compounding an already drastic situation and having a major environmental impact in the River Red Gum forests.

There are several crucial references in relation to the impacts of timber production on hollow-bearing trees. One of the most notable of these, and the most relevant, is the Threatening Process Determination for the Loss of Hollow-bearing Trees under the NSW Threatened Species Conservation Act 1995. Notably, the NRC report does not refer to that listing in any form.

The determination states that *“In forests managed for timber and firewood production, silvicultural practices have greatly reduced the density of hollow-bearing trees, especially where repeated harvesting events have occurred”*. It highlights the long-term impacts of logging on hollow-bearing trees, thus directly contradicting the unreferenced claim on page 51 of the PAR report that there is no evidence for long-term impacts from logging. The determination states that *“Among trees grown for silvicultural purposes, current rotation intervals between harvesting events – typically 30 to 90 years – are insufficient to allow for hollow development”*. It notes that *“A model of the fate of hollow-bearing trees in production forest in East Gippsland and south-eastern NSW predicts a long-term reduction in densities due to post-harvest mortality of retained trees and an insufficient duration between harvest events for hollow-development (Gibbons 1999)”*.

In relation to tree retention rates (such as those of 2 per hectares used in the Red Gum) it states that *“The diversity of hollow-using fauna, dynamics of hollow use and specificity in*

hollow requirements indicate that these minimal densities will have a large impact on the population viability of some hollow-dependent fauna". It further states that "Trees retained during harvest are susceptible to damage from logging operations and post-harvest burning, or can suffer poor health owing to changes in abiotic conditions (Gibbons and Lindenmeyer 2002). Consequently, retained trees are prone to early mortality, especially with repeated exposure to harvesting events over their lifespan".

In relation to the adequacy of 'recruitment tree' retention rates, the determination states that "Prescriptions for forestry operations also stipulate that young trees are retained for long-term replacement of hollow-bearing trees, typically with one recruit for every hollow-bearing tree. The age structure in natural forests, where recruitment and loss of mature trees is at equilibrium, indicates that only a small proportion of younger trees survive to reach maturity. A ratio of one-to-one will be inadequate in itself to sustain the stipulated minimum densities of hollow-bearing trees in harvested areas".

Therefore, it is apparent that the determination directly contradicts forestry claims in the PAR that tree retention rates are 'sustainable'.

The determination also refers to the many other important habitat resources provided by older trees, as follows: "Mature and old hollow-bearing trees offer other valuable resources. Mature trees provide more flowers, nectar, fruit and seeds than younger trees, and a complex substrate that supplies diverse habitats for invertebrate populations (e.g. Recher 1996). When hollow-bearing trees collapse or shed limbs they also provide hollow logs that serve as important foraging substrates and shelter sites (e.g. Mac Nally et al. 2001)".

All of the impacts that constitute a key threatening process under the NSW TSC Act should be listed in the final report, and the nature of the impacts which they describe should be summarised.

Another seminal reference on this issue, that is not referred to in the NRC report, is the extensively researched and well-referenced book 'Tree Hollows and Wildlife Conservation in Australia' (Gibbons & Lindenmeyer 2003). It reviews all available scientific literature and available data on the topic, and reaches the same conclusions as those reached in the threatening process determination. Gibbons & Lindenmeyer (2003) state that "studies consistently show that the number of hollow-bearing trees that occurs on logged sites is negatively associated with the number of harvesting events". They conclude that there are two main reason for these results: 1) "forests are logged on rotation times shorter than the period required for hollows to form; and 2) logging may result in a pulse of mortality among retained trees are each cutting event". They too, find a strong 'positive association between tree diameter and the occurrence of hollows'. They found that 303 native vertebrate species use hollows. Woodlands, such as River Red Gum, must be considered particularly important for hollow-using species, because approximately 70% of the total number of hollow-using vertebrate species in Australia occur in woodland (Gibbons & Lindenmeyer 2002).

Surprisingly, even though the Red Gum EIS (GHD 2009) is referenced as a supporting document for claims about minimal impacts of logging on hollow-bearing trees, the data contained in that very document actually describes a very different story. The Red Gum EIS actually found that logging decreases the number of hollow-bearing trees from 25 per ha down to a mean of 11 per ha and as little as 3.3 per ha. Therefore, the data points to the fact that logging is reducing the hollow-bearing tree resource by at least 56% and up to 87%. This represents a massive and extraordinary environmental impact as hollow-bearing trees are undoubtedly one of the most vital habitat resources in these forests. The EIS also

indicated that older trees are subject to higher rates of decline due to water stress. Therefore, it can be concluded that the cumulative impacts of logging and stress on the older elements of the stand are likely to be severe.

There are other important scientific references that are highly relevant in relation to the retention of hollow-bearing trees in River Red Gum forests. Newtown-John measured the rate of hollow availability in Barmah forest. He found that “*Diameter at breast height over bark was found to be the best and most useful indicator of hollow numbers in a tree. Forty-three percent of all trees contained at least one hollow and the proportion of trees with hollows increased with dbhob to 100 percent at 150cm. An overall conservative estimate of 92 useable hollows per hectare was derived with the most abundant hollow providers being trees between 100cm and 130cm dbh.*” Studies in northern Victoria have confirmed these findings – showing that most Red Gum greater than 100cm diameter have hollows, that hollows only begin to form in Red Gum greater than 70cm diameter, and that an average of 5 medium to large hollow entrances are visible in Red Gum of 120cm at breast height (Bennett *et al.* 1994, Lumsden *et al.* 2002). Important work by Lumsden and others on bat species which utilise River Red Gum for roosting in Victoria, has confirmed the high levels of roost specificity, the importance of large trees (both living and dead) to provide such roosts, and the preference of bats for roosting in areas with high numbers of hollow-bearing trees per hectare available (Lumsden *et al.* 2002a, Lumsden *et al.* 2002b). This work should be reviewed and properly referenced in the final report.

The data described above on the relationship between tree hollows and tree diameter is particularly relevant, because FNSW allow logging of River Red Gum trees up to 1.5m in diameter (interim legal arrangements with NPA have restricted them to 1.2m, but the general conditions applied by FNSW are 1.5m). Clearly, a 1.5m diameter limit is far too large to prevent irreversible impacts on hollow-bearing trees and the fauna which depend on them, as is a 1.2m diameter limit.

Another major environmental impact from logging in River Red Gum is that caused by the use of patch-clearfelling – called ‘Australian Group Selection’ by FNSW. It allows gaps of up to 0.8ha to be cleared across 30% of a compartment (again, interim arrangements are slightly less than this). The Federal Department of Environment, Water, Heritage and the Art recently conducted a detailed investigation of such activities in Red Gum and concluded that such patch-clearfelling was likely to have a significant environmental impact. In Parliament on the 29th May they stated that:

‘The concern is that clear felling in patches destroys the continuity of the tree canopy and that has a very significant impact on the ecological character of the Ramsar wetland, obviously where it is occurring within the Ramsar wetland, and elsewhere. By disrupting the continuity of the tree canopy it is having a significant impact on the habitat of nationally listed threatened species’.

A previous scientific report prepared for the NSW Government on the impact of this type of patch-clearfelling in northern NSW found that creation of gaps greater than 40m in diameter will lead to the decline of hollow dependent fauna and declines in overall species richness (Attiwill *et al.* 1996). Notably, even though Forests NSW claim that they are using this type of patch-clearfelling in order to get regeneration, observational evidence shows that there is no seedling regeneration occurring in the gaps that they create – instead, there is only coppice regrowth from the stumps, which is going to dominate the stand and which is often unuseable for timber, especially sawlogs. Therefore, not only is this approach bad for the environment, but it is not yielding the timber outcomes claimed by Forests NSW.

In addition to the impacts of the general logging regime, Forests NSW are frequently using this type of patch-clearfelling to target stressed, dead and dying Red Gum for so-called 'salvage' logging in the region. It is apparent that salvage logging is likely to have a substantial, negative impact on the potential for recovery from the current severe decline experienced by River Red Gum. Lindenmeyer et al (2008) identify biological legacies, such as trees with large-cavities, which remain following disturbances as being crucial to patterns of ecosystems recovery and to recovery of specific elements of the biota. They note that salvage logging frequently leads to the accelerated loss of large trees. In other stands subject to salvage logging in Australia, it has been speculated that the loss of large-cavity trees will take at least two hundred years to reverse (Lindenmeyer and Ough 2006, quoted in Lindenmeyer et al 2008).

Other negative impacts from salvage logging that were identified by Lindenmeyer et al (2008), that are likely to apply to salvage logging in River Red Gum include:

1. Changes to post-disturbance plant recovery leading to low levels of plant recruitment and altered plant species composition and abundance of species and life-forms
2. Magnified and compounded impacts on biodiversity as a result of two successive disturbance events to which species are likely to be poorly adapted
3. Reduction in the rates of natural recovery for both ecological processes and individual species.
4. Facilitation of the colonization of invasive species, modification of rare post-disturbance habitats and alteration of patterns of landscape heterogeneity.

Any potential negative impacts on River Red Gum recruitment from salvage logging is likely to be particularly severe, because successful germination and recruitment is dependent on natural flooding regimes which have already been severely disrupted as a result of river regulation. Lindenmeyer et al (2008), recognize the very serious fact that "*the risk of cumulative effects arising from salvage logging and natural disturbance include major changes of ecosystem state*". Such major changes in ecosystem state must be considered a very serious risk for Red Gum forests as a result of current forest management in the context of reduced flooding regimes.

Large woody debris on the forest floor is recognised as being ecologically vital to the functioning of both lowland rivers and floodplains in the Riverina. A number of recent studies in the Riverina have shown that logging, commercial firewood collection and domestic firewood collection result in drastically reduced levels of large woody debris on the floodplains (MacNally et al. 2002, Robinson 1997). Substantial scientific research has been conducted on the impacts of the loss of large woody debris on the ground-dwelling mammal, the Yellow-footed Antechinus (see MacNally and Horrick 2002, Lada et al 2007, Lada et al 2008a, Lada et al 2008b, Lada & MacNally 2008). The impacts of the loss of woody debris on the Antechinus is likely to be similar to the impact on many other species that use coarse-woody debris as an important habitat component for shelter or foraging, including many declining woodland bird species. Notably, MacNally and Horrick (2002) found that both the Yellow-footed Antechinus and the Brown Treecreeper occur at higher densities where volumes of coarse-woody debris exceed 40-50 tonnes per hectare. All of this important research should be properly referenced in the final report, and similar impacts inferred for other debris-using species, especially those which are threatened or regionally significant.

The EIS (GHD 1999) included an assessment of large woody debris across a range of 'harvest' histories. However, it was inherently flawed, because it measured a number of recently harvested sites after logging but before commercial firewood collection was conducted. Given that it is the following commercial firewood operation that has arguably the

greatest impact on volumes of debris, this failure renders the results of the assessment invalid. Despite not providing a valid comparison between different firewood collection histories, the EIS did show that many sites are now severely reduced in debris volume, with most sites below 60 cubic metres per hectare. This compares with Lada & McNally (2008) finding of 66 cubic metres per hectare as a minimum to provide suitable habitat for key species, and with the estimate by MacNally of 200 tonnes per hectare in undisturbed areas.

Notably, Lada and McNally (2008) conclude that all large trees should now be retained in forest areas, that no further timber should be removed from the forest floor, connectivity between forests should be maintained and regular spring flooding provided (less than 3yr intervals) in order to maximise habitat for, and survival of, the Yellow-footed Antechinus. These conclusions are highly relevant to the future management of River Red Gum ecosystems, and the NRC should confer with these authors and include their recommendations in the final report.

Grazing represents another major threat to biodiversity. It can “*potentially lead to pugging, selective plant removal, weed invasion, soil compaction, erosion and increased sediment in rivers and streams*” (VEAC 2006). The selective nature “*of grazing has the potential to significantly change the biodiversity of an area*” (VEAC 2006). VEAC refer to other studies that have found that increased grazing, “*reduces the ecological condition of riparian habitat and results in the loss of bird, frog and plant diversity in river red gum habitats*”. Continuous and intensive grazing is expected to cause “*significant loss of habitat value through species selectivity, changes to vegetation structure and impacts on habitat values*” (VEAC 2006). Although the Preliminary report refers in passing to some of the impacts of grazing, a more thorough coverage of the issue is warranted.

Poor regulation of recreation can also lead to extensive environmental impacts, including uncontrolled off-roading, pollution of rivers and creeks, littering and increased fire risks. These risks should be properly addressed in the NRC report.

The Final report should conduct a proper scientific review of the impacts of logging, firewood collection, grazing and uncontrolled recreation on the environment. The NRC should engage a number of ecologists to assess the ecological requirements and distribution of key species and groups, and to assess the impacts of logging and other activities on those species. As far as fauna is concerned, species could be considered in guilds based on the habitat resources that they utilise – ie hollow-using species, debris-using species, nectivorous species.

Water

Water resources in the Murray-Darling Basin have been substantially over-allocated and current levels of extraction from rivers and groundwater systems are unsustainable (CSIRO 2008, Davies et al 2008, Wentworth Group of Scientists 2008). It is apparent that current environmental flows are markedly deficient across the river system and are inadequate to prevent serious ecological degradation.

The major changes in the NSW Red Gum forests as a result of river regulation can be summarised as a reduced frequency, duration and extent of winter-spring floods; reduced variability in flood flows; and an increased intervals between floods (MDBC 2007b).

VEAC (2007) recommended that 4,000 GL of water was required over five years to achieve overbank flows in the Murray River and maintain the health of Red Gum ecosystems. However, the overall target for water recovery through The Living Murray first step program,

is an average of 500 GL of water per year to the Murray River (MDBC 2005) and it is available only to specific icon sites (Significant Ecological Assets). There is currently no program to water any other parts of the floodplain. In the NSW Riverina, there are only two SEAs that are targeted for watering. However, to date, only the Millewa block has had an Environmental Water Allocation. It is the only major forest area in the NSW Riverina that has had a substantial environmental watering event, apart from Yanga National Park. Much of the water recovered to The Living Murray is low security and under current dry conditions and future climate change scenarios is unlikely to be available in most years.

The NPA welcomes the work done by the NRC in the Preliminary report on the likely future frequency and magnitude of floods in key sites. As far as future flooding regimes are concerned, we would like to see the following measures in place:

- Major increases in environmental flows to Red Gum forests in the southern Murray-Darling, with strong consideration of the proposal by VEAC for a five-yearly overbank flow
- Targeting of environmental water purchases to the highest security water available
- Ensuring that easements are adequate to allow flooding of forests without constraints
- Implementing changes in policy to prevent unseasonal flows from rain rejection events
- Factoring recharge of groundwater into considerations about flooding and environmental flow provision
- Development of a thoroughly researched, systematic plan for delivery of environmental water to Red Gum forests throughout the Riverina region
- Preventing the development of new water infrastructure that will impact negatively on the health of River Red Gum forests (such as the Goulburn-Murray Interconnector).
- Provision of cultural water flows for use by Traditional Owners for cultural purposes.

Koondrook-Perricoota

The Koondrook-Perricoota block has been described as being more adversely affected by river regulation than any other NSW River Red Gum forest along the Murray River (MDBC 2005/06). This is a result of the fact that the site has high river banks, with high commence-to-flow effluents. For Koondrook-Perricoota, flow conditions of greater than 30,000 ML/day are needed for water to enter the forest or to achieve overbank flows (MDBC 2007a).

The Torrumbarry weir is located just upstream of Koondrook-Perricoota, and flows have declined in frequency downstream of this weir by over 25GL per day (VEAC 2006). The last large-scale watering event in Koondrook-Perricoota took place in 1994 (MDBC 2007a).

Wetland sites in Koondrook-Perricoota-Gunbower are becoming increasingly dominated by species tolerant of dry conditions. The most significant bird breeding event occurred in 1994 and large scale breeding events (thousands of birds) have not occurred since 1973/74 (MDBC 2007a).

There is no specific Environment Water Allocation for the Koondrook-Perricoota forest, and to date there has been no substantial recovered water under The Living Murray Initiative delivered to the site, despite the dire state of the health of the Forest (MDBC 20007b). There has been a minor 1GL use of Adaptive Environment Water to water Pollack Swamp in the north-west via private infrastructure on two occasions (MDBC 2007b). The MDB authority is currently pursuing the concept of the 'Torrumbarry cutting' as an engineering mechanism to get water into Koondrook-Perricoota. This is expected to take a number of years to get to the implementation stage.

Millewa

There is a 100GL/year high security environmental water entitlement for the Barmah-Millewa forest, plus a 50GL low security entitlement which is provided in years where the irrigation water allocation in Victoria exceeds 130% (MDBC 2007c). Victorian water allocations have not exceeded 100% for nearly 10 years. These water entitlements can be accrued in a storage kitty up to a maximum of 700GL, and can also be 'borrowed' for consumptive purposes by NSW State Governments in dry times (MDBC 2007c).

During the last 10 years there have been three long, medium-sized flood events in Barmah-Millewa, which inundated 50% of the forest – two natural floods and one environmental watering event. The environmental watering event occurred in 2005/6 and used 513 GL of the Barmah-Millewa Environmental Water Allocation (which had been carried over for several years) on the back of rain-induced natural flows (MDBC 2007c). This resulted in a very substantial bird breeding event and improved the health of River Red Gum across 55% of the Barmah-Millewa area.

The main causes of decline in ecological condition in Millewa include the reduced frequency and duration of winter/spring flooding to large parts of Millewa, especially the eastern portion, and the unseasonal flows in summer as a result of 'rain-rejection events' (MDBC 2007c). The unseasonal flows are currently alternated between Barmah and Millewa on a yearly basis.

These regular unseasonal flows cause declines in River Red Gum health, and also alter the ecological condition of Moira Lake due to disruption of its seasonal drying cycle and subsequent changes to the distribution of Moira grasslands (MDBC 2007c). Fish populations in Millewa have also been effected by numerous regulators located throughout the forest which impede fish passage (MDBC 2007c).

The Murray-Goulburn Interconnector (or Bunna Channel) is a looming threat to the Millewa wetlands. If implemented it would 'push' water along a channel from the Murray to the Goulburn River in order to bypass the slow-flowing Barmah Choke, but the Choke is crucial to the future ecology of the Barmah-Millewa wetlands.

Weraï

Wetlands in the Weraï forest that would have been inundated almost yearly are now only flooded infrequently (NSW MWWG 2001). Variability of flow events in the Edwards River has reduced markedly, with flows at or near channel capacity for most of the year (VEAC 2006).

There is no Environmental Water Allocation or water management plan in place for Weraï Forest. A trial watering event was conducted in 2001, during which 4,000 ML was directed onto approximately 130 hectares of wetland dominated by Common Reeds (*Phragmites australis*) in the eastern part of the forest. This was designed to improve knowledge of commence to flow requirements for the block (NSW MWWG 2001). However, since then there has been no further environmental watering event for the forest. Weraï recently experienced a very serious 'black water' event in Colligen Creek. Fish passage is impeded by Stevens Weir which is yet to have a fish ladder installed.

Conservation Planning

The Preliminary Assessment report does not deliver a systematic consideration of either recognised conservation criteria or their implementation in the Riverina bioregion. In fact, it does not even list, for example, the eight national reserve criteria from the JANIS report. Nor does it mention at all the State and Federal Biodiversity and Climate Change frameworks or the National Reserve System Directions Report

As we have submitted previously, at length, we would like to see each of the major conservation criteria explicitly set out, and objectively addressed. Data analysis should be conducted, where possible and appropriate, to illustrate the distribution of habitats across the landscape to meet those criteria and to accordingly identify conservation priority.

We note that the Preliminary report describes the JANIS criteria as ‘historic’. This is a major misrepresentation of those criteria, which are focused solely on the protection of habitats to meet conservation benchmarks. One need look no further than the National Forest Policy Statement, upon which the JANIS criteria were based, to highlight their contemporary focus on protecting biodiversity. The NFPS identified the following four objectives for biodiversity conservation:

1. *To maintain ecological processes and the dynamics of forest ecosystems in their landscape context;*
2. *To maintain viable examples of forest ecosystems throughout their natural ranges;*
3. *To maintain viable populations of native forest species throughout their natural ranges; and*
4. *To maintain the genetic diversity of native forest species*

Similarly, the JANIS criteria are about the contemporary protection of biodiversity. There is only one criterion that has an historical element – that relating to a benchmark of 15% of the pre-European distribution of forest ecosystems. Only the benchmark has an historical context – the protection of a minimum threshold of each ecosystem is a recognised, scientifically valid, contemporary goal. Notably, there is nothing historic about any of the other JANIS criteria, which include a requirement to maximise the protection of high quality habitats for flora and fauna, to protect all remaining examples of endangered ecosystems and to protect special habitats such as refugia.

We are extremely concerned that ‘ecosystem resilience’ as a concept in the Preliminary report is being mis-used in order to throw out conservation criteria and the pursuit of conservation benchmarks.

The CSIRO report on climate change and the protected area network (2008) finds that the national reserve criteria are a very sound basis for planning to protect biodiversity in a change climate. They conclude that collectively, well-planned and managed comprehensive reserve networks will present a very strong buffer to the effects of climate change, helping significantly to minimise the loss of biodiversity. They state that “*Under the changes and uncertainties of climate change, especially in combination with other human pressures, protecting large areas of habitat and a diversity of habitats both become even more important for conserving species..... Species in areas facing greater levels of change (e.g. significant changes in seasonal growth patterns or landscape hydrology) may be in greater need of additional habitat protection*”. They note that “*while ecosystems and species in any one area will change over time, the greater the total area of habitat available, and the more diverse that habitat, the greater the number of ecosystems and species that will be able to survive*’.

However, none of this information is presented in the Preliminary report, which instead selectively quotes the CSIRO report so as to avoid its key finding. The Preliminary report should be amended to properly include the conclusions set out above – that protected areas, designed on the national reserve criteria, are a very important method for protecting species in the context of a changing climate.

‘Ecosystem resilience’ should require that the national reserve criteria are fully met, with additional areas reserved to protect refugia and important habitat linkages. True resilience requires the strongest possible reserve system with additions for refugia, linking habitats and species most vulnerable to climate change.

However, the Preliminary report suggests that the concept of ‘resilience’ allows all previous conservation planning principles, including the CAR reserve system, to be thrown out the window and replaced with a vague and unsubstantiated notion of ‘adaptive management’. We note that past experiences of adaptive management are quite telling as to its very limited efficacy in delivering conservation outcomes. Forests NSW have dramatically over-logged River Red Gum over the last decade and refused to reduce the volumes logged despite an extraordinary and rapid decline – all in the name of ‘adaptive management’. They have ignored their own growth data which has shown a decline to approximately 25% of previous growth rates, and massively increased the intensity of logging operations through increased extraction and introduction of patch-clearfelling, in an ecosystem that is self-evidently dying. This is possibly one of the worst cases ever of the deliberate over-cutting of a declining resource in modern Australia.

Therefore, as evidenced so starkly by Forests NSW mis-management of River Red Gum, ‘adaptive management’ is most frequently just a euphemism used by natural resource exploiters to do whatever they like without any enforceable constraints. The national reserve criteria and associated policies were designed to hold Governments and business to account by setting hard thresholds that had to be met to deliver baseline conservation outcomes – and these important tools should not be lost in the rush for uncritical acceptance of ‘adaptive management’.

We request that the Final report sets a very clear, strong goal for achieving ecosystem resilience that is in accordance with the best science available – through fully meeting the national reserve criteria with additional measures to protect refugia, habitat linkages and species vulnerable to climate change. The Final report needs to clearly address the criteria contained in each of the following relevant policies:

- The JANIS criteria
- The National Reserve Systems Directions Report
- The NSW National Parks Establishment Plan
- The National Biodiversity and Climate Change Action Plan
- The NSW Biodiversity and Climate Change Adaptation Framework

We believe that the assessment can be considered in terms of five broad elements that need to be considered and addressed: Landscape Context, Climate Change Resilience, Ecosystem Conservation, Biodiversity Conservation and Threat Assessment. We set out in detail below, each of the conservation criteria that are relevant, and the type of data and analysis that we believe is required to properly address each of these elements and to identify high priority areas for conservation.

We contend that the unbiased application of the well-established conservation principles and policies set down below will undoubtedly show an extraordinary and far-reaching conservation imperative for the region. It is clear from the extremely high conservation significance of the region, the paucity of existing reserves, and the magnitude of the threats, that reservation of all public lands is required to meet conservation criteria plus a suite of off-reserve measures to far better protect vegetation in the highly threatened region across tenures.

We believe that emphasis needs to be placed on the highest reserve categories, in the form of National Parks, to provide maximum environmental protection for public land areas. This assessment process is required to build a core reserve system in the region – which is lacking to date and which requires the strongest protection to form the basis for a wider integrated conservation framework across tenures. This is the most basic tenet of all conservation planning policies and frameworks – and especially the National Parks establishment plan. The first step must be to build core areas or ‘nodes’ with the strongest possible protection – ie large new National Parks.

This should then be supported by much stronger measures on other tenures, including consideration of the following:

- An on-going tree health mapping and monitoring program along the major rivers – the Murray, Murrumbidgee and Lachlan
- Implementation of a region-wide biodiversity survey program aimed to address the crisis in baseline environmental data in the South West region.
- Utilisation of this information to conduct systematic spatial conservation planning in the South West region for use in all aspects of natural resource management, and particularly for integration into Catchment Action Plans and Local Environment Plans.
- Continuing to build the national reserve system in the Riverina through the purchase of high priority areas for conservation, particularly refugia and linking habitats, in concert with the Federal Government.
- Protection of high conservation value areas identified through the processes above on freehold and leasehold land through strong environmental zonings, including through a new Murray Darling SEPP if appropriate, and through targeted incentive measures.
- Ensuring that Travelling Stock Routes in the region are retained in public ownership and are managed for conservation in a consistent and integrated manner.
- Reviewing the Private Native Forestry Code of Practice for River Red Gum to far better protect environmental values and to ensure that it complies with the EPBC Act 1999.

As far as international obligations are concerned, the NRC should make a request to the Ramsar Secretariat and DEWHA to provide technical advice to the Natural Resources Commission on the future management of the NSW Central Murray State Forests Ramsar site as it relates to Ramsar obligations.

The Preliminary report has raised concerns for environment groups that the objective application of conservation criteria will be compromised due to concerns about socio-economic impacts. However, we note that there has been no compromise in the socio-economic assessment due to environmental concerns. It is inappropriate to compromise the environmental assessment or the application of the criteria pre-emptively, based on other concerns. The environmental imperatives need to be objectively set out and addressed in full and should not be hijacked or limited by socio-economic considerations before they are even applied.

Landscape Context

The objectives for biodiversity conservation of forests set down in the JANIS criteria are:

- to maintain ecological processes and the dynamics of forest ecosystems in their landscape context;
- to maintain viable examples of forest ecosystems throughout their natural ranges;
- to maintain viable populations of native forest species throughout their natural ranges;
- to maintain the genetic diversity of native forest species.

The NSW National Parks Establishment Plan 2008, requires that *“The following factors will be considered in assessing the adequacy of the reserve system in each sub-region:*

- *JANIS targets (Commonwealth of Australia 1997)*
- *the extent and distribution of remaining native vegetation in each sub-bioregion*
- *the area of each sub-bioregion already reserved*
- *the level of representativeness of current public reserves in each sub-bioregion*
- *the configuration and placement in the landscape of existing public reserves*
- *the likely impact of climate change on the resilience of the reserve system*
- *the nature of surrounding land uses”.*

The JANIS criteria state that *“In fragmented landscapes, remnants that contribute to sampling the full range of biodiversity are vital parts of a forest reserve system”.*

Directions for the National Reserve System report states that *“The protected area system should maximise biodiversity conservation outcomes through the application of scientifically robust protected area/conservation design principles”.*

In order to properly consider landscape context, and to address the criteria listed above, a baseline assessment should be conducted of clearing extent and reservation against landscape units (both IBRA subregions and Mitchell Landscapes). Targets should be set for total reservation within each landscape unit based on clearing and reservation profiles. A patch size/connectivity analysis or equivalent spatial analysis should be conducted.

Resilience

The NSW Adaptation Strategy for Climate Change Impacts on Biodiversity specifies that:

“Future reserves thus need to be designed to protect large landscape areas, as well as climatic refuges, to provide opportunities to maintain diverse species and habitats.

The retention of natural areas, prevention of further fragmentation and degradation, and increased linkages across the landscape are acknowledged to be effective measures for the conservation of biodiversity that should be incorporated into natural resource planning. It is likely that large, unfragmented reserves will be the most useful means of both adapting to climate change and providing resilience within a landscape, although small and isolated reserves are also important to protect specific conservation values.

Adaptation strategies that can be included in the design, planning and establishment of reserves include:

- *developing conservation planning tools that model the effects of climate change and greenhouse gases on ecosystem dynamics and species responses*
- *identifying gaps and priorities for new reserves*
- *establishing regional and continental scale networks of protected areas*
- *identifying refuges for incorporation into reserves*
- *identifying locations where buffers, landscape linkages and reserve expansion are needed to maximise conservation of biodiversity.*

Refuges can protect small, geographically restricted or remnant populations, and may support species expansion in new climatic conditions. Buffers may significantly increase ecological resilience, minimise threats and maintain viable populations of species”.

The National Biodiversity and Climate Change Action Plan 2004-2007, includes two relevant strategies for protecting biodiversity in the context of climate change:

- Strategy 3.3 is to “*maximise the resilience of inland aquatic and semi-aquatic ecosystems to manage the impacts of changes in catchment hydrology resulting from climate change.*”
- Strategy 3.4 commits to “*Reviewing reserve acquisitions to strengthen the capacity of the reserve system to act as refuges for vulnerable inland aquatic and semi-aquatic species and communities and to encompass bioclimatic gradients*”

The National Parks Establishment Plan 2008 identifies ‘*existing and future climate change refuges*’ as receiving ‘*high priority for better protection within reserves over the next decade*’.

Assessment of existing work in identifying climate change linkages at multiple scales – for example, the Victorian Government has identified the Murray River vegetation as a subcontinental scale ‘biolink’ which is defined as an area that will maximise the ‘*capacity for species to ‘move’, recolonise and reconfigure as they adapt to climate change*’ (VEAC 2007). The Red Gum forests have previously been recognised by Law & Anderson (1999) as a vital refuge for bat species due to their role as moist riverine forests in a semi-arid environment.

Application of spatial analyses, including patch size/connectivity, and biodiversity data, in the context of expert knowledge to identify refugia, linkages, and bioclimatic gradients. Consideration should be given to application of the spatial components of the Biometrics Tool to produce a habitat connectivity index for the Riverina region, or utilising existing work using that Tool. Some analysis should also be conducted of species that are most vulnerable to climate change, and of their current known distribution across the region.

Identification of refugia should include the following considerations:

1. River Red Gum areas with the highest probability of regular flooding regimes in the future will be a refuge for healthy and productive ecosystems and the species that depend on them, and should be identified as such spatially.
2. Areas of high productivity are recognised in the scientific literature as having greater carrying capacity and higher faunal significance than lower productivity areas, acting as source habitats for dispersal. More productive areas should therefore be identified as refugia.
3. Riparian areas are also well recognised in the scientific literature as refugia for many species and habitat elements. Riparian areas, defined by a substantial buffer from waterways, should also be mapped as refugia.
4. Areas of vegetation in heavily cleared landscapes must be prioritised progressively, on the basis of their size/configuration, as important refugia.

Ecosystems

The National Reserve System Directions report identifies the following reserve criteria:

“Comprehensiveness: *The National Reserve System will aim to include the full range of regional ecosystems recognised at an appropriate scale within and across each IBRA region. Increasing the comprehensiveness of the national protected area system, particularly in those IBRA regions where biodiversity is poorly conserved in the protected area system, is the primary focus of the NRS.*

Adequacy: *The NRS will aim to provide reservation of each ecosystem to the level necessary to provide ecological viability, resilience and integrity.*

Representativeness: Areas selected for inclusion in the NRS should reasonably reflect the intrinsic variability of the ecosystems they represent. One way of achieving this is to aim to represent each regional ecosystem within each IBRA subregion.

Ecosystems/Regional Ecosystems: Ecosystem surrogates, such as vegetation units, together with environmental information mapped at appropriate scales (regional ecosystems) and species information should be the primary planning information which informs NRS planning”.

The JANIS criteria specify the following requirements for ecosystem conservation:

“(1) As a general criterion, 15% of the pre-1750 distribution of each forest ecosystem should be protected in the CAR reserve system with flexibility considerations applied according to regional circumstances, and recognising that as far as possible and practicable, the proportion of Dedicated Reserves should be maximised (see Section 4).

(2) Where forest ecosystems are recognised as vulnerable, then at least 60% of their remaining extent should be reserved. A vulnerable forest ecosystem is one which is:

- i) approaching a reduction in areal extent of 70% within a bioregional context and which remains subject to threatening processes; or*
- ii) not depleted but subject to continuing and significant threatening processes which may reduce its extent.*

(3) All remaining occurrences of rare and endangered forest ecosystems should be reserved or protected by other means as far as is practicable.

(4) Reserved areas should be replicated across the geographic range of the forest ecosystem to decrease the likelihood that chance events such as wildfire or disease will cause the forest ecosystem to decline”.

As far as defining forest ecosystems, it states that:

Forest ecosystems, forest types and forest vegetation communities, together with their environmental descriptors, are commonly used as surrogates for biodiversity and as a basis for planning a comprehensive reserve system.

Preferably these units should be defined in terms of floristic composition in combination with substrate and position within the landscape.

The JANIS criteria set out guidelines for applying the National Forest Policy Statement to forested areas on a bioregional basis. They were developed with coastal regions with relatively continuous forest cover in mind. It is widely recognised that the JANIS criteria are inadequate for application in western areas where the extent of fragmentation and ecosystem degradation are far more severe than coastal forests, and where recovery potential and growth rates are much reduced. The inadequacy of the JANIS criteria for application in western regions was outlined in detail in a report to the then National Parks and Wildlife Service for the Brigalow Belt South Western Regional Assessment in 2002, which was prepared by Henry Nix and Brendan Mackay.

The report provided the following explanation as to why the National Reserve Criteria designed for coastal forests are inappropriate:

- Trees take longer to develop hollows suitable for nesting and shelter, particularly for larger vertebrates

- Stands produce smaller volumes of food (foliage, nectar etc), hence a larger area is needed to support a given sized population of herbivores and hence the prey species
- Slower decomposition rates means that nutrient cycles operate over longer time periods
- It follows that ecological processes take longer to recover from perturbations, ie . they have a smaller buffering capacity and a longer response time.

Nix & Mackay noted that the 15% target for forest ecosystems set down in the National Reserve Criteria *“has no scientific foundation”*. They review potential alternatives and point out that *“tree clearing legislation in Queensland recognises an important threshold at 30% retention. Theoretical considerations, backed up by field experimentation provide strong indications that 40% is a critical threshold”*. Nix & Mackay conclude that *“in highly fragmented landscapes all remnants are valuable and should be protected across all land tenures and land uses. The proportion of Dedicated Reserves should be maximised.”* The NRC should recommend the protection of all remaining remnant vegetation in the Riverina region, and the maximisation of Dedicated Reserves.

The adequacy of existing vegetation mapping data is highly questionable as to its utility in providing a genuine biodiversity surrogate. Vegetation mapping across the region is derived from numerous different datasets, collected at different scales, using different methodologies. Stitching those layers together is problematic and introduces all sorts of assumptions and inaccuracies. Due to the amalgamation of many different vegetation layers, the only region-wide vegetation map that has been produced to date had only a single broad ‘Red Gum’ vegetation type.

However, we note that for the purposes of the Environmental Impact Statement, Doug Binns produced an ‘expert’ layer of the Red Gum classes from the NSW Vegetation Classification and Assessment Project (Benson 2006), by ‘expertly’ attributing them to specific codes in the various vegetation map layers. There has been no independent review of the mapping, and it is confined to public land from what we can gather. We understand this is the layer on which the vegetation assessment contained in the Preliminary Report is based. We note that, given the absence of a pre-1750 layer, the Preliminary report uses the pre-1750 distribution estimates of Benson (2007).

The validity of both the map and the estimates is questionable. It is important that the Final report makes the constraints with both apparent. Due to the inadequacies of the vegetation mapping, we do not accept it as the only surrogate for biodiversity, although it may have a role in some form. It should, in our opinion, be accompanied by the use of the Mitchell Landscapes as another surrogate for biodiversity and potentially also by subregionalisation of the broader vegetation map.

The analysis of the cross-border reservation status of River Red Gum provided in Table 8 of the report is flawed for a number of reasons. It is based on timber classes, not on ecosystems. The reservation of timber classes has no relevance to an analysis of reserve adequacy or environmental significance. Furthermore, NSW Is committed to a CAR reserve system within the NSW Riverina region and the National Parks Establishment Plan requires the analysis of reservation status within each IBRA sub-region in NSW.

An ecologist with a long history of vegetation classification and field survey in Victorian River Red Gum forests advised NPA that *“The site quality ratings are totally inadequate to base assessments of reservation status - there is no analysis of the status or floristic composition of the relevant plant communities in NSW or how these relate to the relevant Victorian plant communities. Consequently the table combining the representation in Victoria and NSW lacks any meaning except in terms of areas available for timber production”*.

The attempt at a cross-border assessment of reservation status should be removed from the report, as it is not relevant to the NSW Government meeting its commitments, it has never been done in previous assessments, and it is not ecologically meaningful when it is based on timber classes.

It is clear that under any scenario, a 15% of pre-1750 target for River Red Gum types is unacceptable. All of the Red Gum vegetation types, are without a doubt vulnerable ecosystems, that due to the severe water stress they are now facing meet the definition of ecosystems that are '*not depleted but subject to continuing and significant threatening processes which may reduce its extent*' and as such should be given a 60% reservation target. The Final report should clearly identify each of the Red Gum vegetation types as vulnerable types sensu JANIS and set 60% conservation targets for them accordingly.

Unfortunately, there is no reliable map of either vegetation structural condition or health. It is not possible to derive such a layer in the timeframe.

As far as structural condition is concerned, there are some generalisations that can be made:

- Most small State Forests have had less intensive utilisation than the larger forest areas.
- The forests upstream of Millewa are well-recognised as being in the best (ie oldest) structural condition.
- Recent logging history (last 10 years) provides an indicator of areas that have been logged heavily using patch-clearfelling practices and those that have not.

As far as health is concerned, work in Victoria is relevant:

- There is not a direct relationship between decline and position along the river.
- There are downstream areas that are in good health, and upstream areas that are in poor health.
- Downstream areas are adapted to much less frequent flood frequencies than upstream areas (ie 1 in 15 year floods vs 1 in 3 year floods).
- Other localised factors, including groundwater depth, bank heights etc, play a part in determining forest health.
- The forests in the best health are those upstream of the Barmah Choke.

There is no map of the current health of River Red Gum – which represents a major constraint on the assessment and which needs to be addressed through implementation of a rigorous, on-going mapping and monitoring program which should commence as soon as the assessment is complete. There is substantial evidence, mostly from the Ramsar site, that River Red Gum areas throughout the region are severely effected by water stress, with differential levels of stress due to water availability.

A survey of tree health in 2004 (from Gunbower-Perricoota to Mannum SA) found that “in 2002, 51.5% of all the trees surveyed were considered stressed. In 2004, 75.5% of all trees at the same sites were considered stressed, with the increase in stress ranging between 10% and 40% in each region” (Brett & Lane 2004). Brett & Lane (2004) concluded that, “*The results of the 2004 survey, and the comparison with data collected in 2002 indicate that tree health decline has been continuing since the 2002 survey and that both River Red Gum and Black Box on the floodplain may be experiencing significant population losses*”.

A more recent report of River Red Gum health by Cunningham et al (2007) was confined to Victoria, but extended from the Hume dam west to the border. It developed a predictive model of stand condition from remotely-sensed environmental variables. It concluded that only 30.1% of River Red Gum stands were in good condition and that there was a downstream decline in stand condition along the Murray River floodplain. Cunningham et al

(2007) found that “*current watering regimes (rainfall and flooding) below the Yarrawonga Weir are insufficient to maintain the majority of river red gum stands in good condition*”.

A survey of River Red Gum health in Koondrook-Perricoota-Gunbower in 2007 indicated that only 19% of trees were healthy, that 59% were unhealthy, and that 22% were severely stressed or dying (MDBC 2007a). MDBC (2007a) note that the occurrence of tree death across large areas of Koondrook-Perricoota, including the death of large, dominant trees, was the first such event in living memory. Poor health observed in 2005 had declined even further to 2007 such that many trees were ‘at the point of no return’.

In Millewa, 43% of the site was showing signs of severe stress in April 2007 with obvious decline in the health of River Red Gum and some deaths (MDBC 2007a). This was in higher ridge areas that had not received watering since 1996.

The Environment Impact Statement (FNSW 2009) entailed an assessment of forest condition of 847 trees across 53 plots. Unfortunately, these plots were not located on the same sites as plots conducted in 2005. So, whilst the EIS tries to draw conclusions about the changes over time, it is actually difficult to do so because there is no benchmark for the plots in question. Nevertheless, the results show, for example, that in Koondrook-Perricoota, in 2005 some 87% of trees were stressed or dying, whilst in 2008 some 99% of trees measured were stressed or dying (even though different trees were measured). In 2008, 77% were either severely stressed, dying or dead.

The EIS claims that mean stress increased with age class from 2.3 for regrowth trees, to 2.7 for mature trees and 2.8 for overmature, and that subdominant trees show higher mean stress than dominant trees. This raises serious concerns about the cumulative impacts of logging and stress on the older elements of the stand – those which are most crucial habitat for large numbers of hollow-using species. It also raises serious concerns about the viability of retained trees, especially when FNSW frequently select subdominant trees for retention.

The EIS concluded that drought stress has increased since the first survey in the Murray Management Area in 2005, and is particularly severe in Koondrook Perricoota where some very large ancient trees have died in Site Quality 1 stands.

Future health of River Red Gum is dependent on many different factors, including the success of programs such as the Living Murray and the Intergovernmental Agreement on the Murray Darling Basin. There are many different scenarios. It may be possible to map different scenarios based on projected environmental water allocations and commence to flow requirements. It would be inappropriate to map scenarios that hold out no hope for Red Gum forests without first attempting to deliver the water that is needed to keep them healthy.

Biodiversity

The JANIS criteria require that:

“(5) The reserve system should seek to maximise the area of high quality habitat for all known elements of biodiversity wherever practicable, but with particular reference to:

- the special needs of rare, vulnerable or endangered species;*
- special groups of organisms, for example species with complex habitat requirements, or migratory or mobile species;*
- areas of high species diversity, natural refugia for flora and fauna, and centres of endemism; and*
- those species whose distributions and habitat requirements are not well correlated*

with any particular forest ecosystem.

(6) Reserves should be large enough to sustain the viability, quality and integrity of populations.”

The analysis of threatened species contained in the Preliminary report does not constitute a biodiversity assessment, as far as we are concerned. It is a very limited threatened species assessment, not a biodiversity assessment. As such, it considers only a small fraction of the true biodiversity of the forests. The assessment needs to be broadened, to at least consider regionally significant species, to identify and assess biodiversity surrogates, to consider guilds of species based on key habitat attributes, and to better characterise the conservation significance of the biodiversity of the region.

A list of regionally significant species should be prepared for the region. The schema used for determining conservation significance that was used during the coastal Regional Forest Assessments should be applied. It requires all species to be assessed and categorised according to whether they are: Presumed Extinct, Endangered, Vulnerable, Potentially Threatened, Rare, Uncommon, Declining Regionally, Poorly Known, Regionally Endemic, Regionally Uncommon, of Disjunct Distribution or at the Edge of their Range.

The distribution of these species should be used to inform prioritisation of areas for reservation, although the paucity of biodiversity survey means that the absence of records cannot be taken to represent the absence of significant species. The Victorian Rare or Threatened Plant scheme could be used to rapidly derive a list for flora, and an expert familiar with the region could readily derive a list for fauna (NPA has a draft list).

Such an analysis will also highlight broad trends in conservation significance. For example, it would illustrate the importance of the Murray River corridor in enabling numerous species to extend their range westwards. This includes species such as the Swamp Wallaby, White-throated Treecreeper, White-browed Scrub Wren, Brush-tailed Phascogale, which all have western range extensions along the Murray River corridor. This adds substantially to the conservation significance of the region.

The analysis contained in the Preliminary report of threatened fauna and flora attempts to classify species as to whether they Red Gum forests is their ‘preferred habitat’ or not. This analysis is flawed for a number of reasons. Firstly, it is of very limited ecological significance or could even be described as ecologically meaningless – there is a habitat matrix which most species are dependent on and trying to curtail that to a consideration only of strictly ‘endemic’ species is not really ecologically relevant. Secondly, there are major definitional issues – what does ‘preferred habitat’ mean for the vast majority of species that utilise a number of habitats. Thirdly, for most species in the region such information is simply unknown and it is just being inferred from a very weak knowledge base, without even noting the high levels of uncertainty. Fourth, for many species, it appears to be incorrect – notably, species such as the Koala, Yellow-bellied Sheath-tail Bat and Black-chinned Honeyeater are very strongly correlated with River Red Gum in the region, but are not presented as such. Further, the regional assessment is supposed to be considering River Red Gum and other woodlands such as Box vegetation types – and this type of analysis excludes the Box types from proper consideration. Those vegetation types have very high conservation significance, and that significance is heightened by their occurrence in a habitat matrix with River Red Gum forests, wetlands and sandhill vegetation. It is not meaningful to try to carve up that complexity into species ‘preferred habitat’ (however that is defined) on just one vegetation type.

As a result of all these factors, it appears to severely misrepresent the conservation significance of River Red Gum to large numbers of threatened species – implying that only a

small number are dependent on it. It should be removed from the Final report and replaced by an analysis combining species into guilds based on the habitat attributes of River Red Gum habitat and other woodlands that they utilise – ie hollow-using, nectarivorous, ground-foraging. That would be an assessment with ecological meaning that is relevant to assessing the likely impacts from damaging uses.

The Mitchell Landscapes should be used to provide a surrogate for biodiversity – based as they are on hydrology and geomorphological attributes on a regional basis. Mitchell Landscapes should be subregionalised by dissecting with the IBRA subregions, then linked to groups of significant species, and used as surrogate with targets set as thresholds to test the adequacy of reserve outcomes for fauna and flora.

Special habitat areas should be identified and earmarked for protection. These include, for example, Ramsar wetlands, nationally important wetlands (DIWA) and Important Bird Areas. The Ramsar Secretariat should be requested to provide technical advice on the management of Ramsar wetlands in accordance with the Ramsar convention.

Threats

The National Reserve System Directions report states that:

“While the focus of the NRS will be on increasing comprehensiveness, the selection of priority additions to the NRS will also be based on principles of viability and vulnerability to loss. Priority will be given to the addition to the protected area system of ecosystems where there is a high risk of loss which may foreclose future options for the conservation of biodiversity within the region”.

The NSW Biodiversity Strategy commits to the establishment of a Comprehensive, Adequate and Representative reserve system, and states that:

“The emphasis will be on priority bioregions and targeting poorly conserved ecosystems which are most under threat of serious decline”.

There are numerous contemporary threats to vegetation in the Riverina bioregion. These include changed water regimes, clearing, logging, mining, salinity, grazing, invasive species, climate change, habitat fragmentation, and conversion of native pastures to introduced grasslands. The Natural Resources Commission should provide a detailed inventory of threats and their distribution across the region.

Importantly, Red Gum logging on freehold land is extensive, with very few substantive constraints. All Red Gum is available for logging except that within 20m of prescribed streams and 5m of incised channels. Prescriptions are contained in the Code of Practice for only 12 fauna species and 1 flora species. However, there is no requirement to do any surveys prior to logging, so if species have not been recorded previously (which is highly unlikely) the prescriptions are never triggered. Notably, there is no prescription whatsoever for species such as the nationally threatened Superb Parrot and Southern Bell Frog, and no prescriptions relating to Red Gum (only Mallee) for the Regent Parrot.

Patch-clearfelling is allowed in gaps of up to twice stand height in diameter. Cumulative patch-clearfelling of up to 20% of the net harvest area is allowed in any one logging ‘event’ and approvals extent for 15 years. No assessment of regeneration is required until after the ‘second period of inundation following a harvesting or thinning operations’. This means that at current flooding frequencies, there is basically no requirement to check regeneration at all over the 15 year period. There is no requirement for any estimate of sustained yield to be made prior to logging.

In the two year period since the Code of Practice was released in August 2007, DECC have approved 60 River Red Gum Private Native Forestry Property Vegetation Plans covering an area of 74,630 hectares. These will continue for 15 years. Therefore, the timber industry has almost unrestricted access to all Red Gum on freehold land. This dramatically increases the imperative for extensive reserves from public tenures.

There are still numerous approvals for paddock tree clearing also being granted in the Riverina region. The combination of intensive, unsustainable private land logging, extensive PNF operations, and frequent paddock tree clearing approvals underscore the threat posed to hollow-bearing trees and the fauna which rely on them across the landscape. The drastic decline in the Barking Owl population in the region over the last decade (see McGregor 2008) underscores the likely slide towards decline and extinction of many hollow-dependent fauna if the threats to them are not rapidly addressed and better protections not provided to protect existing hollow-bearing trees and enable succession of mature trees in the future.

Indigenous Rights and Interests

River red gum forests are the ancestral domain of Indigenous Traditional Owners who maintain strong connections with their Country and its resources. In the Riverina, red gum-dominated state forests are often of high significance to Traditional Owners both because they are accessible and because as islands of remnant vegetation they retain natural resources and features of the cultural landscape that have elsewhere been destroyed.

New red gum protected areas must be established with the informed consent of Indigenous Traditional Owners and where they desire, their involvement in the management must be maximised through the use of joint management agreements or similar arrangements. A number of International agreements and standards either mandate this approach or recognise it as best practice, and it is inline with the Commonwealth and State policies.

Indigenous involvement in the management of red gum protected areas will enhance social economic and environmental outcomes of these areas by:

- ensuring that biodiversity conservation strategies incorporate traditional knowledge;
- promoting reconciliation and fostering greater understanding and respect for local Indigenous cultures in the community;
- delivering socio-economic outcomes to local Indigenous communities

A 2006 Australian Government review of the Indigenous Protected Areas Programme found that the programme's involvement of Indigenous communities in conservation activities had delivered "considerable social and cultural outcomes," including improved economic participation and development benefits; early childhood development benefits; improved early school engagement; reduction of substance abuse; and reinforced family and community structures.

Through a range of policies and standards, the IUCN recognise the need for protected areas to be compatible with Indigenous rights to use and access land, and be involved in decision-making. In 2003 the *Vth IUCN World Parks Congress* developed the Durban Action Plan, a "checklist of the activities needed to increase the benefits of protected areas to society and to improve their coverage and management." Of its fifteen *main targets*, three were directed at meeting this need:

1. *All existing and future protected areas are established and managed in full compliance with the rights of indigenous peoples, including mobile indigenous peoples, and local communities by the time of the next IUCN World Parks Congress*
2. *The management of all relevant protected areas involves representatives chosen by indigenous peoples, including mobile indigenous peoples, and local communities proportionate to their rights and interests, by the time of the next IUCN World Parks Congress, and*
3. *Participatory mechanisms for the restitution of indigenous peoples' traditional lands and territories that were incorporated in protected areas without their free and informed consent are established and implemented by the time of the next IUCN World Parks Congress*

In 1999, the Conference of Contracting Parties to the *Ramsar Convention* called upon contracting parties to encourage 'active and informed participation, and the assumption of responsibility, by local communities and indigenous people in the management of Ramsar-listed sites' in adopting the *Guidelines for establishing and strengthening local communities' and indigenous people's participation in the management of wetlands*. The Guidelines now form a major part of the *Ramsar Strategic Plan 2003-2008*.

A range of other International treaties and agreements reinforce the need to protect Indigenous rights to land and natural resources, including:

- *UN Declaration on the Rights of Indigenous Peoples (2007)*
- *UN Convention on Biological Diversity (1992)*, (esp. articles 8(j) and 10(c))
- *UN International Covenant on Civil and Political Rights (1966)*, (esp Article 27)
- *International Labour Organisation Convention 169*

We encourage the NRC to properly address each of these treaties and agreements in the Final report. The submissions made by Traditional Owners should be taken on board with regard to the assessment, and the best possible outcomes recommended in accordance with their aspirations.

We are pleased to see that the Preliminary report referred to use and occupancy mapping, the cultural uses of water and the importance of access to country for Traditional Owners. It is very positive that the NRC is consulting both with Land Councils and Traditional Owner representative bodies. We note the concerns that Traditional Owners have with the map that is included in the NRC report, and request that it is removed from the Final report.

The consultation conducted to date with Traditional Owners could not be described as 'extensive'. We contend that the process that should be undertaken is more one of 'negotiation' than 'consultation' – given that Traditional Owners have never ceded their rights to Country.

We would encourage the NRC to consider an agreement-making process or framework between the NSW Government and Traditional Owners, if that is sought by Traditional Owners. We note that the Murray Lower Darling Rivers Indigenous Nations has a successful history of negotiating such agreements, and that they can deliver important outcomes for Traditional Owners. We encourage the NRC to recommend a clear forward process of Indigenous engagement – to enable full, informed participation by Traditional Owners over the next few months. The process should not just 'stop' while the NRC continues working the NSW Government considers its options. The NSW Government has now initiated a dialogue with Traditional Owners – and it needs to continue that dialogue to promote informed consent and demonstrate its commitment to Traditional Owners.

We believe the report should set out clearly all of the legal options that are available to meet the aspirations of Traditional Owners – including handback-leaseback under Part 4A of the National Parks and Wildlife Act 1974. Where Traditional Owner groups have consistently requested handback-leaseback over many years, and continue to do so as part of this process, the Natural Resources Commission should recognise and support this aspiration in the report. It is apparent that such areas could be listed on Schedule 14 of the NPWA 1974 at the same time as they were gazetted as National Park. This has occurred previously in NSW and should also be applied here where sought by Traditional Owners.

Socio-economic issues

Employment

We welcome the employment data in the Preliminary Report which effectively confirms the estimates that the NPA has been providing on this issue for some time. We note that it shows only 157 direct jobs in the Red Gum timber industry, and further that a number of those are based on freehold land and/or in Victoria. We request that the final report shows the break-down of jobs by State and tenure, in full, so that the impacts of potential reserve outcomes can be objectively assessed by all parties. However, we note that the reference to the ABS data and the number of 1,000 jobs is very confusing – because the ABS regions include the southern tablelands and the extensive plantation softwood industry which occurs there. The Final report needs to properly explain the ABS data and the fact that most of the jobs it refers to are based in the softwood plantation industry.

The Preliminary report highlights that there is going to be a major decline in the timber industry, and major employment impacts, due to reduced flooding regimes regardless of whether there are any conservation outcomes. It is important that this fact is fully recognised in the final report. NPA supports a fair exit package for workers and mills that are affected by new reserves in the Riverina region and believes that the provision of large new National Parks and an associated restructure package represents a very positive outcome for the regional community which would otherwise be facing a major decline without any financial safety net.

Value of the timber industry

The Red Gum Timber Industry Strategy produced in 2001 highlighted the limited ability of River Red Gum to yield high value products. It highlighted the limitations of the industry due to the nature of the timber and the decreasing quality of the resource. BIS Shrapnel (2001) stated that the variability and poor quality of Red Gum means that it has only limited ability for the production of high value products. It stated that most mills were operating at marginal viability. The Red Gum industry is not robust, and various sectors are beset by fickle markets, problems with continuity of supply, and seasonality of markets (BIS Shrapnel 2001). There is also a history of industry decline, and job losses due to mechanisation, in the region (BIS Shrapnel 2001).

A report prepared by independent economists for NPA and TWS shows that previous estimates of the worth of the NSW River Red Gum industry have been grossly inflated. Minister MacDonald has frequently quoted that the industry is worth \$60m per year, however, the Economists at Large report shows that the public land based River Red Gum timber industry is worth only \$7.3 million per annum to the NSW economy. The report also confirmed that the industry has very low value outputs, predominantly firewood and fenceposts – only 17% of timber harvested ends up as sawn timber (with less than 5% high value products), and an extraordinary 83% goes to residue markets.

There are readily available, and often environmentally friendly alternatives to traditional Red Gum products, many of which are already out-competing Red Gum and causing its markets to dwindle. For example, Red Gum sleepers have been one of the cornerstones of the industry, but demand for them is now undoubtedly in a terminal decline. When compared to concrete sleepers, it is well-documented that they lead to:

1. Increased maintenance costs
2. Buckling leading to delays
3. Shorter life-span and declining quality
4. Poorer greenhouse outcome

A report by Energy Strategies shows that concrete sleepers last three times as long, have much lower greenhouse impact (up to 5 times less) and cost significantly less than timber sleepers. Red Gum sleepers buckle in extreme heat, and cause major train delays during summer months – this was most evident in the heat wave earlier this year. The Victorian metro rail line and the Adelaide metro rail line are now replacing all timber sleepers with concrete sleepers. The Australian Rail Track Corporation prioritises concrete over timber for its major lines – the Melbourne to Sydney line is currently being upgraded solely with concrete. For example, in 2007/2008, the ARTC installed 945,901 concrete sleepers and only 70,603 timber sleepers state-wide in NSW. The result is that most markets for Red Gum sleepers, and timber sleepers per se, have now gone.

Subsidies

Various documents indicate that Red Gum timber mills are heavily subsidised by Governments, in the form of very low royalty rates (VEAC 2007, BIS Shrapnel 2001). The NSW Auditor General, in his audit of native forest management in early 2009, indicated that native forest logging by Forests NSW ran at a loss of \$14.4m state-wide in the 2007/08 financial year. The same report found that there are problems with FNSW timber pricing and that it should be improved to ensure that log production costs are fully recovered in future and that it is more transparent.

Economists at Large estimate that the value of the royalties paid to the NSW taxpayer at the forest gate to be \$4.1 million, at a profit of \$0.94 million. However, when full costs of production are factored in, FNSW operations in the Riverina operate at a loss of \$1.8m to the taxpayer. Economists at Large also estimated that if non-use values are taken into account, the public are subsidising the RRG timber industry to the tune of \$13.6m per annum. This amounts to a subsidy of \$171 per cubic metre for sawlogs and \$51 per tonne for residues.

The viability of the Red Gum timber industry if production costs are properly recovered is highly questionable. A report prepared for the Barmah-Millewa forum found that if the timber industry was required to pay for its water to produce timber, then it would cost 20 times as much as the economic benefit that was derived from it in the form of timber. Any water provided for timber production purposes must be factored properly into the costs of production and paid for by the timber industry, as it is by other industries – not pinched from the environmental water budget.

In short, all of these reports and information indicate that the taxpayer is paying to cause widespread environmental damage in the Red Gum forests due to unsustainable logging. Economists at Large conclude that *“the actual economic benefits of the RRG industry are predominately accruing to the mill operators, with little benefit to the NSW public. This is due to high subsidies supporting cheap access to the timber resource that is leading to perverse incentives to process high quantities of low value product”*. These subsidies have prevented the implementation of competitive neutrality and stopped a private plantation woodlot industry from becoming established in the region (Economists at Large 2003).

Economic Alternatives

As shown by the Victorian River Red Gum decision, which delivered a net increase in jobs in the region, protection of forest areas diversifies the economy and provides net economic benefits. This has been the outcome from all previous forest assessments in NSW – regional towns have not 'died', but have flourished and prospered after the creation of National Parks.

We assert that converting the forests to National Park has the potential to both generate much more in terms of economic activity for the region, while also providing for many more jobs, as discussed below. The creation of new National Parks has led to a net increase in employment for Victoria. The Victorian Government estimated that 56 people would be affected by the parks announcement, while 66 jobs were created by tourism and National Park creation/maintenance. However, only 32 people applied for the restructure package suggesting a much lower job impact than predicted.

Economists at Large predict that the creation of National Parks across the regions' State Forests would lead to a net gain in employment. Tourism, which makes use of the forests well recognised environmental conservation values, already employs over 1200 people in just 2 of the 3 local government areas where River Red Gum logging occurs in NSW and generates \$797.5m annually in tourism expenditure. Economists at Large estimate that the creation of large new National Parks would generate \$10qm in economic activity per annum and contribute \$25 net per annum to the regional economy. They also concluded that the non-use value of the area of River Red Gum logged each to the community of NSW is \$17.7m.

The creation of new jobs in National Parks and tourism, and the economic contribution from both of these enhanced industries, will in itself be more than sufficient to offset any impacts from a reduction in the timber industry in the region. However, there are also numerous other opportunities for new, sustainable industries in the region which should also be supported and which will help to further diversify and enhance the economic base in the region. An innovative investment package designed to deliver long-term prosperity for affected regional communities should be provided, targeted to areas most effected by the restructure, with the following elements:

1. Investment in the new National Parks estate, including new capital investment;
2. A regional tourism strategy based on an integrated, whole-of-region marketing approach
3. Investment in sustainable industries such as renewable energy, conservation management projects and plantation woodlot establishment.

There is major potential for lucrative niche tourism markets in the region – particularly bird watching and cultural tourism. These customers tend to spend substantially more per person than many other tourism groups. Although there is some bird tourism marketing at present, a lot more could be done to develop it and this would be substantially increased by the presence of National Parks. There is also the potential to increase tourism by some sophisticated, whole or region tourism marketing. Yanga National Park has resulted in the creation of at least 18 jobs and input at least \$2m into the regional economy since it was created.

The creation of large new National Parks with handback-leaseback to Traditional Owners has the potential to shift the socio-economic benefits from these lands to the most marginalised section of the community for the first time. Traditional Owners have been largely disenfranchised from the management and economic outcomes of Red Gum forests to date – with a few minor exceptions. The payment of rent under handback-leaseback schemes is incredibly important to providing self-determination via an economic base for Traditional Owners to use to manage their country and provide jobs for their people.

There is great potential in the establishment of multi-species woodlots for timber production on private land in the region. Species such as Sugar Gum has been proven to be very successful in producing firewood over short timeframes – within 10 to 15 years, which after harvestings regrows from coppice. There is great potential for multi-use woodlot establishment for timber, fodder trees, biodiversity values and other purposes (ie pollen and honey). This can help to drought proof areas and shifts the emphasis to diverse economic opportunities and positive environmental outcomes over the long-term – rather than the short-term over-extraction of a precious native resource as is currently occurring. We refer the NRC again to the Borschmann & Poynter (2003) which reviewed in detail the potential for the development of a farm forestry resource in the Riverina region in Victoria, and to the Economists at Large report which also investigated this issue in detail – particularly as relates to the anti-competitive effect of the supply of cheap timber from public forests. Those reports should be referenced in the Final report by the NRC.

We note, again, the disparity in the treatment of information provided by conservation stakeholders compared to that provided by the timber industry and FNSW in the socio-economic section. The Preliminary report does not refer at all to the independent socio-economic analysis conducted by Economists at Large, which included an economic analysis of the likely economic return from the creation of new National Parks. That analysis is ignored and there is not a single reference to the report made – in contrast, we note that an unreferenced ‘surmise’ by some stakeholders that the tourism numbers estimated by DECC will not be achieved for National Parks such as Yanga, is deliberated upon at some length in the Preliminary report, page 117, as follows:

“During the NRC’s tour the local community and industry queried the size of this projection. The reasons for their disagreement centred on the remoteness of the region, the number of national parks closer to major population centres and the perception that the regional tourist market is already well serviced”.

Recent analysis by Price Waterhouse Coopers of the economic benefits of new Red Gum National Parks in Victoria is not referenced in the Preliminary report either. We find these types of disparities inexplicable and we request that they are properly balanced, or the one-sided claims at the very least removed, from the final report.

We strongly encourage the NRC to use the results of the VEAC Choice Modelling in full in its cost benefit analyses and social assessments. They represent the only relevant available data, and should be used in full to assess cost/benefits as they were in Victoria. We note the suggestion in the Preliminary report to the fact that ‘benefits largely accrue to people who live outside of the Victorian Murray region’ but the ‘costs are borne by those in a handful of communities within the Victorian Murray region’. However, the wider community has borne the hidden cost of subsidising the destruction of these ecosystems contrary to their obvious aspirations for many decades (Economists at Large 2008) – which has substantially benefited local communities who have reaped the economic rewards from a subsidised industry. Therefore, it is only fair and right that the wider community now receive some benefits from protecting those ecosystems, given that they have been paying for their demise for so long.

Timber Resources

We strongly commend the efforts of the NRC to critically assess the impacts of changed flooding regimes and climatic conditions on sustainable timber volumes. Given the entrenched resistance of Forests NSW over many decades to revising yields in response to these issues, we imagine this has been a very difficult task. However, it is incredibly important, and it is crucial that it is followed through in the final report to its full conclusion. The information provided indicates that the timber industry is already in a terminal decline, and that it is facing a major structural adjustment process regardless of new reserves, as a result of the loss of yield due to reduced flooding. The best way to cushion the economy against those losses is to create large new conservation reserves and diversify the regional economy with jobs in National Parks and expansion of the tourism industry.

However, we remain concerned about the specifics of the changes to estimated sustained yields which may be applied. We note that the report suggests that Forests NSW is 'recalibrating' the FRAMES model through halving growth rates and doubling mortality to reflect 'changes since 2003'. The Preliminary report states that "*preliminary (unpublished) work by Forest NSW indicates that growth rates may have halved since 2003 when compared to the period between 1970 and 2002*". However, the NPA has previously obtained Forests NSW growth and timber data through Freedom of Information requests. We have analysed their data, and contend that the decline is far greater than they have suggested. Firstly, we consider it inappropriate to just assess the data since 2003 because there have been a limited number of re-measures since that date, and because the decline clearly commenced in growth rates in about 1995. It is the decline of the last ten years, not the last five, that should be considered. Our analysis shows that such a decline in growth rates is in the order of 75%, rather than 50%. Even though there is little empirical data, observational evidence would suggest that mortality rates have certainly more than doubled over that period. We are concerned that Forests NSW seem to be in charge of this element of the assessment and believe that the NRC should employ an independent consultant to analyse the data, rather than allowing Forests NSW to do it themselves given their long history of obfuscation and creative accounting on this issue.

We are concerned, again, by the uncritical acceptance of much forestry propaganda in the sections on timber resources. We note that statements such as "*Data collected during and following harvesting assists in refining and developing future timber yield estimates*" are just completely false, and should not be included in the report. Forests NSW have not revised yields for 25 years, despite the worst drought on record, dramatically over-allocated river systems and the impacts of global warming – there has been no 'refinement' of future yield estimates for 25 years. This statement, and the numerous others like it, should be removed from the final report.

NPA has used the timber data obtained under FOI to analyse current and likely future timber volumes in detail. Current growth rates are a fraction of previous growth rates, and future growth rates are likely to be even lower. There are additional obvious adverse impacts occurring with regards to mortality and recruitment.

The VEAC report considered only recent past reductions and it reduced yields to 60% of previous yields. However, its own data showed that if growth rates were projected into the future, the most likely scenario was that there would be no growth or negative growth.

The methodology we applied to conduct the analysis, was as follows:

- Derive a standing volume from the average MARVL volumes per hectare and apply it to each site quality – derive growing stock per site quality.

- Setting a rotation - based on the time required to get a small end log of 38cm underbark which is a tree of 50cm dbh based on the average growth by site quality for the last five years (of measurements)
- Apply to the area of each of Site Quality 1 and 2, assuming no future growth in either SQ3 or Red Gum Box (and given no CFI plots placed in those areas).

Apply the simple formula used in the Murray Management Plan to derive a yield, as follows:

$$\text{Yield} = 2 \times \frac{\text{Growing Stock} \times R}{R^2 - r^2}$$

(r = estimated period for regeneration to become established and grow to 10cm ie 40 years)

This method derives a revised estimate of annual yield, from all Red Gum State Forests, of 8,692 cubic metres of high quality sawlogs. This is about a quarter of the current yield estimates for high quality products and it is by no means a worst case scenario.

We believe this is a far more appropriate way to assess the likely future yield than that likely to be produced by FRAMES. FRAMES is a black box which includes numerous assumptions that have been hard-wired in which cannot be tested and that have little or no validity. A simple assessment, that can explicitly take into account climate and water issues, such as that proposed above and that is amenable to sensitivity analysis and is transparent, is a far more appropriate analysis in our opinion.

We note that the FNSW have notoriously, in the past, ramped yields up in the first 20 years of a planning horizon in order to meet short-term industry demands for more timber. Predicted yields then drop dramatically afterwards. There is nothing sustainable about such an approach. This was highlighted by the Auditor General in relation to north east NSW, where they noted that FNSW were logging the trees faster than they were growing back. Environment groups are staunchly opposed to such an approach – it can never, under even the weakest test, meet any standards of ecologically sustainable forest management. We urge the NRC to ensure that yields are not maximised in the first 20 years of the planning horizon in a bid to bump up volumes through a brazen disregard for sustainability.

If FRAMES is utilised in any form, environment stakeholders are seeking full access to it, as we have always had in past assessments. We contend that the results will have no credibility unless such access is provided to deliver a basic level of transparency.

Management of reserve areas

We note the extraordinary, unsubstantiated claims in the Preliminary report that logging and thinning can improve tree health. For example, on page 59, the report states that “*Reducing the number of trees through any of the three silvicultural systems above may reduce tree mortality due to competition for water and improve the regeneration prospects of retained and thinned trees*”. On page 62, the report states that thinning from below “*allows trees which otherwise soon die, through competition and moisture stresses, to be commercially utilised*”.

There is absolutely no independent evidence to support the claims that thinning can be used as a tool to reduce water stress in Red Gum stands. FNSW most recent monitoring data, as described in their Environmental Impact Statement, shows that there is no relationship between tree stress and basal area (ie stocking) (FNSW 2009). Obviously, if the thinning hypothesis was correct, you would expect to see better health in the less stocked stands. Furthermore, State Forests where FNSW have logged and thinned most intensively in the last decade are frequently in worse health than other State Forests where there has been

little logging. Clearly, the affect of water stress from reduced flooding and drought is so profound that micro-climatic issues such as competition for water are not significant to tree health.

The solution to water stress is to deliver much needed water to River Red Gum areas. There is strong evidence to support that as being the only effective means to improve tree health and numerous studies have proven it. Scarce conservation resources should not be directed towards a spurious and unsubstantiated regime of so-called 'ecological thinning' that is likely to detract from the primary task of delivering water to Red Gum reserves and monitoring the results. Forests NSW unsubstantiated claims about its efficacy should be removed from the Final report.

The Victorian Government is developing a precautionary approach to all 'active management' options, and implementing a rigorous scientific trial of a range of methods to best manage Red Gum ecosystems towards health and to maximize biodiversity outcomes. It is titled the Active Forest Health Management Program. The program is disengaged from any economic outcomes, and will be strictly managed by conservation authorities for ecological purposes on parks estate.

The only ecologically sound way forward for NSW River Red Gum is to urgently initiate research into ecosystem succession and to conduct a rigorous trial of a range of methods to maximise Red Gum health, which is thoroughly severed from any link with commercial imperatives and which is conducted by the conservation agency. In the meantime, all conservation resources should be dedicated to increasing the delivery of environmental water and monitoring the results.

Hot wildfires were uncommon on the floodplains prior to European settlement (Curr 1883; DCE 1992). RRG do not *'have the typical features of fire-dependent flora to promote regeneration after fire, suggesting that fire does not naturally play a major role in this ecosystem'* (VEAC 2007). Even since European settlement, *'there have been few major wildfires within RRG floodplain forests, and those that have occurred are typically of limited extent'*. *"Fire distribution and frequency over the last 30 to 40 years indicates that RRG forests are not highly prone to wildfire, partly due to their position on a floodplain...."* (VEAC 2007).

Mosaic burning is the style thought to have been used by the indigenous people of the area, and knowledge of this practice continues in oral history and storytelling of the Traditional Owners (Atkinson & Berryman 1983).

Forests NSW aim in managing Red Gum forests is to exclude fire completely in order to prevent losses to the timber industry, as has been the case with timber management in Victorian Red Gum (FNSW 1985, Forests Commission Victoria 1983; LCC 1985; DCE 1992).

Conservation reserves would be a far more suitable tenure in which to assess and potentially utilise fire as a management tool. The re-introduction of a mosaic burning regime should be considered, but it requires further study on the fire ecology of red gum forests to assess seasonality and intensity of burning regimes for ecological purposes (VEAC 2007). For example, we understand that the Yorta Yorta are interested in reinstating their traditional mosaic fire regime in Barmah-Millewa as a tool for ecosystem and species management, and we encourage the NRC to initiate a dialogue with them about the issue.

There is no evidence to suggest that grazing in Red Gum forests reduces fuel loads significantly – given the open nature of most Red Gum ecosystems there is not a major issue with fuel loads from understorey vegetation. VEAC (2007) note that *"grazing is also unlikely to affect the accumulation of larger fuels that contribute more towards fire intensity"*. VEAC

(2007) state that “*There is little information about which fuel types contribute to wildfire fuel loads in these riverine environments*” and conclude that “*specific research is required in...the riverine forests to provide evidence to support or refute a hypothesis about grazing reducing wildfire fuel loads*”. In fact, grazing may increase the likelihood of intense fires due to an increase in the density and occurrence of weeds.

According to VEAC (2007) “*Reducing the origins of many fires may be a more effective means of protecting both the environment and surrounding communities, than reducing fuel loads*”. Forests NSW already has a summer campfire ban, so extending this automatically across to new reserves will not impinge in any way of previous uses of the area.

Errors

There are some errors in the Preliminary report that should be fixed in the final report. On page 177, it is claimed that the Koondrook-Perricoota block of forests will support species such as the Superb Parrot and Gilberts Whistler under projected flood regimes. However, the Superb Parrot does not occur in that Koondrook-Perricoota and the presence or extent of habitat for the Gilberts Whistler is unknown. Page 182 also refers to the Barooga group of forests as habitat for the Superb Parrot, however the Parrot has only been recorded there as an irregular visitor and is not known to breed there (GHD 2009). It is certainly not an important habitat for that species. The report refers in a number of places to the fact that the last flood in Koondrook-Perricoota was in 2001, however, as we understand that was only on the Victorian side of the river in Gunbower forest and there has not been a flood in Koondrook-Perricoota since 1994. The data on the areas available for logging is inconsistent – on page 54 the report states that there is a net harvestable area of 110,000 hectares, but in Table 7 on page 58 the general area available for harvest is listed as 294,706 hectares.

Other issues

The report lauds the Forest Management Zoning scheme in State Forest areas, claiming that it is based on ‘nationally agreed conservation criteria’ when that is transparently not the case – it is based on areas that are not suitable for commercial timber production. It also implies that ‘Ministerial approval’ is required to change that zoning, however almost all of the zoning is in the weakest category (3a) which can be converted to loggable area at the stroke of a pen by the regional manager.

Management Prescriptions

The Preliminary report provides an uncritical reproduction of FNSW claims about the efficacy of environmental prescriptions on logging operations. We provide an alternative view, based on comparison with constraints in other areas, below:

- The specific conditions on logging in River Red Gum are generally far inferior to conditions on logging in other parts of NSW and to River Red Gum logging in Victoria¹.
 1. Riparian zones:
 - In NSW RRG, the requirement is for a 20m hard buffer only on major waterways.
 - Elsewhere in NSW, major rivers trigger 50m hard buffer, and all streams trigger some protection (minimum of 10m buffers).
 - In Vic RRG, lower order streams trigger protection, and there is a 30m-60m public land water frontage reserve along major rivers
 2. Tree retention:

¹ A detailed comparison of different logging regimes with NSW RRG is provided in Table 1

- In NSW RRG, for general harvest areas only two habitat trees and two recruitment trees per hectare are retained. All trees greater than 1.5m diameter at breast height retained.
 - In northern NSW, for general harvest area five habitat trees and five recruitment trees per hectare are retained
 - In Vic RRG, all trees greater than 1m diameter at breast height must be retained. Two trees per hectare of trees 50cm-100cm at breast height retained.
3. Patch-clearfelling:
- In NSW RRG, gaps of up to 0.8 hectare allowed across up to 30% of the harvest area with no constraints on return time²
 - In northern NSW, maximum size of gaps is 0.25 hectare up to 22.5% of the harvest area with at least five years between events
4. Threatened species survey:
- In NSW RRG, an adequately trained person must search for threatened flora and indicators of fauna. No definition of adequately trained, no prescribed survey effort, and no requirement for standard fauna survey techniques or targeted survey.
 - Elsewhere in NSW, must include extensive targeted fauna surveys, using standard techniques and prescribed effort, and an extensive planned traverse for flora, all undertaken in specified season. Expertise of surveyor clearly defined.
5. Threatened species protections:
- In NSW RRG, prescriptions for Barking Owl, Southern Bell Frog, Koala, Squirrel Glider, Grey-crowned Babbler, Brush-tailed Phascogale are either inadequate or non-existent.
 - Elsewhere in NSW, much greater protections for Barking Owl, Squirrel Glider, Koala, Brush-tailed Phascogale and species of Bell Frog.
 - In Vic RRG, much stronger prescriptions for Grey-crowned Babbler, Squirrel Glider and Brush-tailed Phascogale.
- Constraints on logging on freehold land are even weaker than those on public land. Even nationally threatened species, such as the Superb Parrot, do not trigger any survey or protection whatsoever. Extensive areas have been approved for logging.

² These prescriptions have been temporarily tightened to 0.4 ha and 20% as outcome of NPA legal challenge.

Table 1. Detailed comparison of conditions on logging in different regions with NSW River Red Gum

Region	<i>NSW Red Gum</i>	<i>NSW Upper and Lower North East</i> ³	<i>Victorian Red Gum</i> ⁴
General tree retention conditions	General harvesting: two habitat trees and two recruitment trees per hectare are retained. All trees >150cm DBHOB.	General harvesting: 5 hollow-bearing (“H”) trees must be retained ha, and a “recruitment tree” (one that is likely to develop hollows “R”) must be retained for every hollow-bearing tree. ⁵	A minimum of 20 live habitat trees within the 50-100cm DBHOB range per 10ha; and all trees >100cm DBHOB.
Riparian protection	20m exclusion only on large “nominated waterways” with permanent/semi-permanent water – plus a 30m ‘modified harvesting zone’ with slightly increased tree retention. No buffers on any other streams.	50m exclusion on all 4 th order streams or greater. Exclusions on other streams as follows: 1 st order – 10m 2 nd order – 20m 3 rd order – 30m	20m buffer: Stream Classes 1 and 4 (Permanent streams or permanent springs, swampy ground, wetlands or other bodies of standing water) 10m buffer or filter strip: Stream Classes 2 and 3 (Temporary streams and drainage lines). Filter strip applies when there is no water in the stream. 30 m public land water frontage reserve applies to both sides of the Goulburn River, Ovens River and Gunbower Creek; 60 m public land water frontage reserve along the Murray River (in practice, the area protected in the River Murray Reserve usually exceeds this width);
Australian Group Selection	Up to 30% of the net harvest area can be gapped at any one time and there are no constraints on return time, so that the entire area can be patch-clearfelled in a short period. Size of each gap not to exceed 0.8ha. ⁶	Constraints placed on use, so that only 22.5% can be patch-clearfelled in any one operation, and such operations must be separated by at least 5 years and average of 7 years. Over a twenty-year period, 10% of the net harvest area remains unlogged. The size of each gap is not allowed to exceed 0.25ha.	AGS is not employed in Victorian red gum forests.

³ Most of these constraints are also replicated in the South Coast and Eden regions, with minor variations. Alternate coupe logging rather than AGS is applied in Eden.

⁴ All information in this field derived from the “conservation guidelines” in the 2002 Mid-Murray Forest Management Plan

⁵ This applies in the regrowth zone, where the retention rates are poorest

⁶ The constraints on AGS have been temporarily reduced to 0.4ha and 20% of the harvest area as a result of the NPA legal challenge.

Region	<i>NSW Red Gum</i>	<i>NSW Upper and Lower North East</i>	<i>Victorian Red Gum</i>
General survey requirements	<i>During pre-harvesting mark up, an adequately trained person must search for the presence of threatened species of flora. An adequately trained person must also search for the habitat features, or indicators of the presence, of threatened species of fauna. They include nest, den and roost sites, pellets and scats, latrine and den sites, "feeding-notch" trees, skeletal remains, and animal diggings.</i>	Harvesting operations must not be undertaken in any compartment unless pre-logging and pre-roading surveys have been conducted. Pre-logging and pre-roading surveys incl. Compartment traverse and targeted fauna surveys. SFNSW must plan and conduct surveys in the most appropriate "Survey season" if specified for flora and fauna. Surveyors must have extensive experience in surveying and with identification of relevant species.	None apparent in documentation, further advice being sought from the Department of Sustainability and Environment.
Traverse survey requirements	No requirements	For every 200 ha of net survey area: a minimum survey effort of ten person hours; a traverse at least four kilometres in distance must be planned within which targeted sampling must be conducted;	As above
Targeted survey requirements	No requirements	Targeted fauna surveys must be undertaken for 35 fauna species in their known and potential habitat. Techniques required include seasonal nocturnal call play-back and spotlight for owl species, targeted survey and call playback for frogs, spotlight surveys for arboreal mammals, hairtube and scat and track surveys for terrestrial mammals, harp trapping and ultrasonic call recording for bats.	As above

Region	<i>NSW Red Gum</i>	<i>NSW Upper and Lower North East</i>	<i>Victorian Red Gum</i>
Forest owl prescriptions	A 200m exclusion zone is established around roost trees, if they are identified, but no systematic survey is undertaken.	A two kilometre radius planning area must be identified, centred on the record or records of the same species of owl. Within this planning area an exclusion zone, or exclusion zones, of a total of 300 hectares must be implemented. OR landscape approach identifies a planning area of between 5,000 and 15,000 ha, of which a minimum of 25% must be established as an exclusion zone, a third of which must be outside of statutory reserves.	250 m radius Special Management Zone around all confirmed nesting and roosting trees utilised recently and frequently by Barking Owl or Powerful Owl within which: <ul style="list-style-type: none"> • nesting and roosting trees and all trees within a radius of 100m from them are protected as Special Protection Zone (no harvesting allowed); • balance of area is managed to maintain habitat capable of supporting adequate prey species for the breeding owls; • all potentially disturbing activities are excluded during the breeding season (July to December inclusive).
Koala prescriptions	Only trees that have more than fifty Koala scats underneath the canopy need to be retained, with an exclusion zone of fifty metres (50m) radius established around it. If a Koala is detected in a tree, prior to or during the harvest operation, that is not a high-use tree, a temporary exclusion zone of a minimum of 30m radius must be established around it, until the Koala vacates the tree.	Specified forestry activities are prohibited from within all Koala “high use” areas (ie. a koala is spotted, OR a tree has more than 20 Koala scats beneath OR Three out of any ten consecutive trees have scats, OR scats are in two sizes AND a subsequent star search finds scats under 3/10 trees.) A 20m wide exclusion zone must be implemented around the boundary of Koala high use area. In Koala “intermediate use” areas, per two hectares of net logging area ten primary browse trees must be retained where available and no AGS is to be used in preferred forest types. ⁷	None apparent in documentation.

⁷ In the Eden region, where koalas are extremely scarce (as in NSW RRG), protections are greater. Any evidence of a koala triggers a 50m radius zone, a 40m wide corridor zone and increased browse tree retention, plus a habitat protection zone of 150ha where no gapping is allowed.

Region	<i>NSW Red Gum</i>	<i>NSW Upper and Lower North East</i>	<i>Victorian Red Gum</i>
Squirrel Glider	Trees with glider feeding marks must be retained and must not be damaged by the harvesting operation.	Record of Glider triggers: 250m radius planning area wherein 8ha of exclusion zone must be established. All Yellow-bellied Glider and Squirrel Glider sap feed trees must be retained	Harvesting excluded in a linear Special Protection Zone of at least 50 m width on either side of the Goulburn River (totalling some 2 050 ha, including the 30 m Public Purposes Reserve) principally to protect habitat for Squirrel Glider. All other State forest along the Goulburn and Ovens Rivers is included in the SMZ (the 30 m Public Purposes Reserve bordering the Ovens River will support additional habitat) and Gunbower State Forest near Torrumbarry is within the SPZ.
Bell Frogs	<i>For Southern Bell Frog:</i> No specific prescription triggered by record. A 20m exclusion around wetlands.	<i>For Green and Golden Bell Frog:</i> 50m exclusion around all records and 50m exclusion around any associated wetland or dam.	
Grey-crowned Babbler, Brush-tailed Phascogale	None	Commercial firewood collection must not be permitted in compartments with records of Brush-tailed Phascogale. Site based prescription: 500m planning area centred on the record in which an exclusion zone of 20 ha must be established encompassing high quality habitat. Landscape prescription: Within a planning area of at least 1000ha, a minimum of 8 rough-barked trees must be retained per two hectares for the Brush-tailed Phascogale.	Suspend timber harvesting for five years from within 200m of active colonies of Grey-crowned Babbler in parts of Benwell and Guttrum State Forests, and conduct monitoring. Suspend timber harvesting from within 100m of other active colonies in the Forest Management Area. Establishment of 1,000 ha of 'priority management areas' for the Brush-tailed Phascogale.

REFERENCES

Action Plan for Australian Birds. (Undated a) Recovery outline: Superb Parrot outline.

Action Plan for Australian Birds. (Undated b) Recovery outline: Regent Parrot outline.

The Agreement between the Government of Australia and the Government of the Peoples Republic of China for the Protection of Migratory Birds and their Environment (CAMBA);

The Agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA).

Attwill, P., Burgman, M., and Smith, A. (1996) 'Gaps and Clusters silviculture: How well does it balance wood production and biodiversity conservation?' *A report by the Review Panel to the Ministerial Committee established to review the Principles and Application of the Gaps and Clusters Technique.* Unpublished report.

Brett Lane and Associates Pty Ltd for Murray Darling Basin Commission, *Survey of River Red Gum and Black Box Health Along the River Murray in New South Wales, Victoria and South Australia, 2004.*

Cotton Research and Development Corporation 2003. *Managing riparian lands in the cotton industry.* Narrabri.

CSIRO. 2007. *Climate Change in the Murray Catchment.* Prepared for the NSW Government by CSIRO.

CSIRO. 2008. *Water Availability in the Murray.* Summary of a report to the Australian Government from the CSIRO Murray-Darling Basin Sustainable Yields Project.

Cunningham, S., MacNally, R., White, M., Read, J., Baker, P., Thomson, J., and P Griffioen. (2007). Mapping the current condition of River Red Gum (*Eucalyptus camaldulensis* Dehnh.) stands along the Victorian Murray River Floodplain. A Report to the Northern Victorian Catchment Management Authorities and the Department of Sustainability and Environment.

Department Environment and Heritage. 2003. *Final RIS (Ramsar Information Sheet) NSW Central Murray Forests.*

DECC *Priorities Action Statement*

http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/pas_profile.aspx?id=10644

DECC 2004. S120 Final Redgum Prescriptions March 2004

DECC 2005. *Draft Recovery Plan: Southern Bell Frog*.

DEC 2006. *NSW State of the Environment 2006*.
<http://www.environment.nsw.gov.au/soe/soe2006/>

Environment Australia, 2001. *A Directory of Important Wetlands in Australia*. Third Edition, Environment Australia, Canberra.

Carmel Flint and Georgina Woods. 2008. The impacts of River Red Gum logging and associated activities in NSW on matters of National Environmental Significance. Unpublished report for the National Parks Association of NSW.

Flint, Carmel. 2007. *Forging the Links: The Way Forward for Conservation Planning in South West NSW*. Unpublished report for the National Parks Association of NSW.

Forestry Commission of NSW (FC) 1982. *Management Plan for Mildura Management Area 1982-1992*. obtained under *Freedom of Information Act 1989* (NSW).

Forward, L. (2003). *Riverina data audit: flora*. Unpublished report for NSW National Parks and Wildlife Service.

FNSW FOI 2006. Letter from Bob White, FNSW FOI Co-ordinator, to Mr Andrew Cox, NSW National Parks Association.

FNSW (2007). *Commercial Residue Harvesting Plans - Compartments 17 and 18 Koondrook State Forest*.

FNSW, 2008. *ESFM Plan: Western Region*. Forests NSW.

Flood, Doug. July 2007. Sworn September 2007. Affidavit in the Land and Environment Court of New South Wales. For the National Parks Association of NSW.

Gilmore, Alexander. Sworn 10th August 2007. Affidavit in the Land and Environment Court of New South Wales. For the National Parks Association of NSW.

Hania Lada, James R. Thomson, Ralph Mac Nally, Greg Horrocks and Andrea C. Taylor (2007). Evaluating simultaneous impacts of three anthropogenic effects on a floodplain-dwelling marsupial *Antechinus flavipes*. *Biological Conservation*, 134: 527-536.

Hania Lada, Ralph Mac Nally, and Andrea C. Taylor (2008). Responses of a carnivorous marsupial (*Antechinus flavipes*) to local habitat factors in two forest types. *Journal of Mammalogy*, 89: 398–407.

Hania Lada, James R. Thomson, Ralph Mac Nally and Andrea C. Taylor (2008). Impacts of massive landscape change on a carnivorous marsupial in south-eastern Australia: inferences from landscape genetics analysis. *Journal of Applied Ecology*, 45: 1732–1741.

Hania Lada and Ralph Mac Nally (2008). Decline and potential recovery of yellow-footed Antechinus in parts of south-eastern Australia: A perspective with implications for management. *Ecological Management & Restoration*, 9: 120–125.

Mac Nally, R. & Horrocks, G., 2002. Habitat change and restoration: responses of a forest-floor mammal species to manipulations of fallen timber in floodplain forests. *Animal Biodiversity and Conservation*, 25.1: 41–52.

Law, B. and J. Anderson (1999). A survey for the South Myotis *Myotis macropus* (Vespertilionidae) and other bat species in River Red Gum *Eucalyptus camaldulensis* forests of the Murray River, New South Wales. *Australian Zoologist* 31: 166-174.

Leslie D. J. 2001. Effect of River Management on Colonially-nesting Waterbirds in the Barmah-Millewa Forest, South-eastern Australia. *Regul. Rivers: Res. Mgmt.* 17: 21-36.

Leslie, D. (2005). Is the Superb Parrot *Polytelis swainsonii* population in Cuba State Forest limited by hollow or food availability? *Corella* 29: 77-87. (Forests NSW, 315 Victoria Street, Deniliquin, NSW 2719, Australia).

Lumsden, L.F. and Bennett, A.F. 1995. Bats of a semi-arid environment in south-eastern Australia: biogeography, ecology and conservation. *Wildlife Research* 22, 217-40.

Lumsden, L., Bennett, A. & Silins, J. (2002)a. Selection of roost sites by the lesser long-eared bat (*Nyctophilus geoffroyi*) and Gould's wattled bat (*Chalinolobus gouldii*) in south-eastern Australia. *Journal of Zoology* 257, 207-218.

Lumsden, L., Bennett, A. & Silins, J. (2002)b. Location of roosts of the lesser long-eared bat *Nyctophilus geoffroyi* and Gould's wattled bat *Chalinolobus gouldii* in a fragmented landscape in south-eastern Australia. *Biological Conservation* 106, 237-249.

MacNally R., A. Parkinson, G. Horrocks, L. Conole, and C. Tzaros 2001. Relationships between terrestrial vertebrate diversity, abundance and availability of coarse woody debris on southeastern Australian floodplains. *Biological Conservation* 99: 191-205.

MacNally, R., A. Parkinson, G. Horrocks, and M. Young 2002. Current Loads of Coarse Woody Debris on Southeastern Australian Floodplains: Evaluation of Change and Implications for Restoration. *Restoration Ecology* 10: (4) 627–635.

MacNally, R., Parkinson, A., Horrocks, G., Conole, L., Young, M., Tzaros, C., Koehn, J., Lieschke, J. and Nicol, S. 2000. *Ecological Significance of Coarse Woody Debris On South-eastern Australian Floodplains*. Report Number R7007. Murray-Darling Basin Commission, Natural Resource Management Scheme I and E Program, Riverine Program.

Menkhorst, P., Schedvin, N., and David Geering. *Regent Honeyeater (Xanthomyza phrygia) Recovery Plan 1999-2003*. Department of Natural Resources and Environment, May 1999

Milledge, David 2007. Sworn 30th August 2007. Affidavit in the Land and Environment Court of New South Wales. For the National Parks Association of NSW.

MDBC 2004. Interim Ecological Assessment of Environmental Flow Reference Points for the River Murray System Report for the MDBC Living Murray Initiative, 2004

Murray Darling Basin Commission. (2005). *The Living Murray Foundation Report on the significant ecological assets targeted in the First Step Decision*. MDBC Publication No. 09/05

Murray Darling Basin Commission. 2005/06. The Gunbower Koondrook-Perricoota Forest Asset Environmental Management Plan 2005/2006. Murray-Darling Basin Commission, Canberra ACT 2601

Murray Darling Basin Commission. 2007a. The Living Murray Icon Site Condition Report October 2007.

Murray Darling Basin Commission. 2007b. Draft Gunbower Koondrook-Perricoota Forest Asset Environmental Management Plan 2007-2010. Murray-Darling Basin Commission, Canberra ACT 2601

Murray Darling Basin Commission. 2007c. Draft Barmah-Millewa Forest Icon Site Environmental Management Plan 2007-2010. Murray-Darling Basin Commission, Canberra ACT 2601

Murray Darling Basin Commission. 2008. Water Recovery Progress Report http://thelivingmurray.mdbc.gov.au/programs/water_recovery/progress#wrcurrimp

NSW Murray Wetlands Working Group. 2001. Newsletter December 2001, Issue No.2. <http://www.mwwg.org.au/news2.php>. Downloaded on the 12th October 2008.

Murray Darling Basin Commission. (2008). Murray System Drought Update No. 14 – July 2008.

National Land and Water Resources Audit 2002. *Australian Terrestrial Biodiversity Assessment*. Commonwealth of Australia.

Natural Resource Management Ministerial Council, 2005. *Directions for the National Reserve System – a partnership approach*. Australian Government, Department of the Environment and Heritage, Canberra, ACT.

Newton-John, J. 1992. Arboreal habitat hollows in River Red Gum (*E. camaldulensis*) in the Barmah Forest. Hons. Thesis, Department of Forestry, Melbourne University.

Parker, D.G., Webster, R., Belcher, C.A. and Leslie, D. in prep. 2007. A survey of large forest owls in south-western New South Wales.

Parnaby, Harry. (2006). An assessment of the potential for adverse impacts from forestry operations on bat species on public land in the Riverina bioregion, NSW. Unpublished report to the NSW National Parks Association.

Pennay, M. and C. Gosper (2003). *Riverina data audit: fauna*. Unpublished report for NSW National Parks and Wildlife Service.

Penney, M. and Gosper, C. 2003. Riverina data audit. Fauna. *NSW Western Regional Assessments. Riverina*. Report prepared for RACD by NSW National Parks and Wildlife Service.

Oliver, D & D. Parker. 2006. Woodland birds of the NSW central Murray catchment: Measuring outcomes of the Greening Australia fencing and tree planting program. A report for Birds Australia.

Reid, Julian. 1999. Threatened and Declining Birds in the NSW Sheep-Wheat Belt I: Diagnosis, Characteristics and Management.

Reid, Julian. 2000. Threatened and Declining Birds in the NSW Sheep-Wheat Belt II: Landscape relations – modelling bird atlas data against vegetation cover.

Rodda, Gary, 2006. Email to Mike Bullen, Director, Native Forest Operations with State Forests NSW. Gary Rodda is the Area Planning Manager, Riverina region Forests NSW. Email sent on 25th May, 2006. Mike Bullen forwarded this mail to Carmel Flint of National Parks Association NSW on 26th May, 2006.

Robinson, R. 1997. Dynamics of coarse woody debris in floodplain forests: impact of forest management and flood frequency. BSc (Hons) Thesis. Charles Stuart University, New South Wales, Australia.

Spark, Phil. (2007). Murray Red Gum Forests Survey Report. Unpublished report to the NSW National Parks Association.

Swift Parrot Recovery Team (2001). *Swift Parrot Recovery Plan*. Department of Primary Industries, Water and Environment, Hobart.

Todd, M.K. and McDonnell, R. (2003) - *Riverina Biodiversity Assessment Project*. Unpublished report produced by the NSW National Parks and Wildlife Service, Riverina as part of the NSW Biodiversity Strategy.

- Traill, B.J & S. Duncan. 2000. Status of birds in the New South Wales temperate woodlands region. NSW NPWS.
- Traill, B.J. 1999. *Western Woodlands; Why the West Must be Won*. National Parks Journal, August 1999.
- VEAC 2008. *River Red Gum Forests Investigation: Final Report*. 8 Nicholson Street, East Melbourne 3002, July 2008. www.veac.vic.gov.au
- VEAC 2007. *River Red Gum Forests Investigation: Draft Proposals Paper for Public Comment*. 8 Nicholson Street, East Melbourne 3002, July 2008. www.veac.vic.gov.au
- VEAC 2006. *River Red Gum Forests Investigation: Discussion Paper*. 8 Nicholson Street, East Melbourne 3002, July 2008. www.veac.vic.gov.au
- Webster, R., and Ahern, L. 1992. *Management for conservation of the Superb Parrot (Polytelis swainsonii) in New South Wales and Victoria*. NSW National Parks and Wildlife Service and Department of Conservation and Natural Resources, Melbourne.
- Webster, R., Belcher, C. and Leslie, D. (2003). A survey for threatened fauna in south-western NSW. *Australian Zoologist* 32: 214-227.
- Webster, R. (1991). *The biology and management of the Regent Parrot in NSW*. NSW National Parks and Wildlife Service.
- Wentworth Group of Concerned Scientists. 2008. Submission: Senate Inquiry into the Urgent Provision of Water to the Coorong and Lower Lakes. Unpublished submission.