The Institute of Foresters of Australia

ABN 48 083 197 586

23 October 2009

Forests Assessment
Natural Resources Commission
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Dear Sir/Madam,

Re Submission on River Red Gum Forests

Thank you for the opportunity to comment on the Preliminary Assessment Report for the Riverina Bioregion Regional Forest Assessment – River Red Gums and Woodland Forests (Report).

The Institute of Foresters Australia (IFA) is the peak professional body for forest scientists, forest educators and forested land managers in Australia. We are a non-profit organisation with 1350 members who are committed to the principles of sustainable forest management and the processes and practices which translate these principles into outcomes.

We wish to commend the Natural Resources Commission (NRC) on its Report and in particular to acknowledge the effort it has undertaken to gain first hand knowledge of the forests and to document the management programs past and present as well as the future challenges.

The IFA has a long history of involvement and interest in the science and sustainable management of the Riverina's river red gum forests. We also have a strong interest in climate change and climate variability and recently held the National IFA conference in Caloundra, Queensland, the theme for which was 'Forestry a Climate of Change'. Our submission includes contributions from IFA members who are senior foresters from the public and private sectors who are working or have worked in these forests for many years, both in management and scientific research capacities

The IFA's submission relates only to the River Red Gum Forests and makes comment on issues that we would like the NRC to give careful consideration to. We look forward to ongoing involvement in the assessment process.

Yours sincerely,

Nick Cameron
Chair
NSW Division

Executive Summary

The Riverina's river red gum forests are highly modified regrowth forests that are a product of a long history of purposeful goal driven management. The forests are currently undergoing profound change as a consequence of the regulation of river flows, the worst drought in living memory and past forest practice.

This submission has been prepared in response to the IFA's concern for the declining health of the river red gum forests and our interest in their future welfare. Eight of the nine issues in the Preliminary Assessment Report for Riverina Bioregion Regional Forest Assessment – River Red Gums and Woodland Forests (Report) are addressed in this submission.

A summary of the themes, findings and recommendations that have emerged from our submission are detailed below:

Issue 1:

- A more detailed analysis of the river red gum's ecological history is required in order to fully appreciate the relationship between past practice and current forest condition. In particular, further consideration of the important role of fire and grazing under Aboriginal and European influence is warranted.
- A comprehensive exploration of the interaction between the physiological traits of the river red gum and natural physical elements (water, temperature, fire, soil and terrain) is essential context for the assessment process.

Issue 2:

- There are many lessons arising from previous forest assessment approaches and outcomes that have preceded the River Redgum and Woodland Forests Assessment.
- Our principal conclusion is that there is little justification or rationale for tenure changes in western regrowth forests where there has been a long history of human intervention.

Issue 3:

- The IFA seeks a new approach to forest assessment and management of river red gum forests. The confirmed impact of the prolonged severe drought, river regulation and predictions around climate change are key drivers that should have a bearing on policy and institutional arrangements for an implementation framework.

Issue 4:

- Under a scenario of long term reduced water flows, virtually all forest values may be at risk.

Issue 5:

- A threat analyses should be conducted on the future status of current threats and what new threats will emerge.
- The IFA supports adaptive management and intervention to achieve goals and outcomes within an already modified forest landscape.
- It is unlikely that the full complement of values can be maintained to the level experienced in the past for most of the forests.
- It is likely that decisions will need to be made on the priority that certain values are given in different locations over time.

- Climate change will impact all tenures equally and it has been widely appreciated that changing land tenures will not improve conservation outcomes in these highly modified landscapes.
- We support the establishment of a level of insurance against adverse effects of climate change both directly and indirectly to better secure attributes around which values are sustained.
- It is appropriate that timber harvesting be reassessed and if necessary, altered to accommodate the impacts of climate change

Issue 6:

- Local timber industry and local communities, dependent on the forests for their livelihood, lifestyles and wealth generation, have been highly effective in protecting the forests from destructive wild fire, pests and diseases.
- The greatest human induced threat to the forest (river regulation) has arisen from people and industries with little direct interest in the welfare or values of the river red gum forests.
- Only when the forests become more widely known and appreciated by the Australia community will their future health and welfare be assured.
- A sound economic outcome for the forests may also be achieved by involving local industry and local community.

Issue 8:

- The 'new' (high density) regrowth forests have very high water demands which are not aligned with the current quantum of available water.
- The concept of *'climate change induced ecological thinning'* or *'climate change induced salvage logging'* with a timber production dimension is supported.
- If longer term supply commitments are made by Government, the forest industries will respond and generally make better use of available resources.
- If wood supply is reduced due to transfer of timber production forests to conservation reserves, considerable compensation to the forest industries will be required based on NSW precedents.

Issue 9:

- No other NSW forest agreement process has been conducted with such high levels of uncertainty around tree mortality and growth rates that impact on the reliability of estimates and are outside the control of forest managers.
- In some situations habitat restoration or reconstruction will be necessary to strengthen the chance of survival and persistence of some native species or populations in the region.
- Flexibility in timber supply and adjustment to harvest schedules is needed to permit the harvesting of dead and dying trees rather than lose the volume through deterioration of wood quality or destructive wild fires.
- Mechanisms are needed that actively encourage and/or require land managers to participate in a variety of conservation programs where the values connected to the programs span several tenures.
- An integrated (managers) threat analyses procedure about the status of identified threats and how to refine strategies to manage or control threats is required.
- We support the exploration of a new classification or public land tenure or amendments to existing management philosophies.

Issue 1: Have the values supported by the forests been adequately described?

Overview

Sections 1.5, 2 and 3 of the Report collectively provide a comprehensive account of the values associated with the forests and how these have been evident in management programs across the public estate. (The qualification around Section 3.7 - Carbon sequestration is appreciated).

Possible omissions to the list of reported listed values are described below and are mentioned in light of their potential linkage to future holistic management of the forests in response to the predicted impact of a changing and variable climate.

I. River red gum *(Eucalyptus camaldulensis)* physiological traits and growth habits
II. Ecological History
III. Catchment Values
IV. Research and Education
V. Scenic / Landscape Values

I. River red gum *(Eucalyptus camaldulensis*) physiological traits and growth habits

River red gum (*Eucalyptus camaldulensis* Dehnh.) is one of Australia's most widely distributed and well known eucalypts that dominates Australia's inland waterways and although it inhabits hot and arid environments it is not physiologically adapted to either drought or salinity, although these stresses can be tolerated for short periods or at low levels (CSIRO, 2009).

The species is a profligate and opportunistic water user drawing its water from three main sources: ground water, rainfall and river flooding. This trait helps it to survive in semi-arid and arid regions. Trees possess deep sinker roots, hypothesised to grow down towards zones of higher water supply (Bren et al., 1990). These roots have extremely high rates of hydraulic conductivity, making them very effective in conducting water (Heinrich, 1990).

River red gum is also a prolific seeder and under suitable conditions will invade and expand its distribution. Pollination is mainly by insects but also by birds and small mammals (CAB International, 2000).

The river floodplains, swamps and lakes that characterise the Riverina are naturally favourable to the river red gum and have enabled it to dominate in extensive woodlands not found elsewhere within its natural distribution. River red gums colonise sites at all flood levels, as the floodplain elevation rises above river bed level there is a commensurate decline in the vigour and size of the trees. Stand height is the primary measure of site quality.

Consideration of the physiological traits and growth habits of the river red gum is considered essential for future management under a reduced flooding scenario.

II. Ecological History

A detailed understanding of the river red gum's ecological history is required in order to appreciate the relationship between past practice and current forest condition.

Aboriginals and fire

The observations of the early explorers and paleoecological evidence (e.g. Kenyon and Rutherfurd 1999, Kershaw et al. 2003, Miller et al. 2005, Prideaux et al 2007, in Jurskis 2009) all indicate that indigenous Australians shaped the structure and form of the river red gum forests over millennia before European settlement.

> *Aboriginal fire changed flora and fauna 50,000 years ago (Miller et al, 2005) and Prodeaux et al (2007).*

Jurskis' (2009) account of the observations of the region's early explorers and public land managers are particularly pertinent.

> *Its is clear that the region was occupied by a large Aboriginal population with a culture of fire (Oxley, 1820; Sturt,1833; Mitchell, 1939, 1848; Curr, 1883, in Jurskis 2009).*
>
> *Forests were mostly dominated by eucalypts and had large trees and open grassy understoreys (Mitchell, 1939 in Jurskis 2009).*

The significance of fire as a landscape management tool is also highlighted in Mitchell (1848) where he describes how loss of Aboriginal fire on Cumberland Plain (Sydney) caused "*thick forests of young trees to replace grassy woodlands where you could gallop a horse and see for miles*"

The use of fire by Aboriginals as a management tool in river red gum forests was particularly effective in limiting the development of dense forests or maintaining open woodland forests, due the species' fire sensitivity:

> *Eucalyptus camaldulensis seedlings in the Riverina are not lignotuberous and are killed by fires (Jacobs 1955, Boland et al 1984).*
>
> *Established trees can suffer cambial injury from low intensity fires (Dexter, 1978).*

European settlement

European settlement of the Riverina brought with it significant and rapid change and different forms of human intervention. The dot point summary in Figure 2 (extrapolated from Jurskis (2009)) provides an overview of how the river red forests have changed over time.

A more succinct summary is provided by Di Stefano (2001):

> *Factors as varied as Aboriginal burning practices, river regulation, early silvicultural treatment, modern timber harvesting practices, recreational activities and the introduction of exotic animals have caused major alterations in structure, distribution and growth patterns*.

Jurskis (2009) visually illustrates how the combined affects of grazing and fire play an important role in forest health. His photo in figure 1 highlights a stand of relatively uniform composition and structure native forest on either side of a boundary fence at a location in northern NSW. *Cattle grazing occurred on the privately owned side which was occasionally burnt by low intensity fire. Fire and grazing were excluded from the State forest side from the early 1980's to 'protect' the timber resource.*

Figure 1: Jurskis (2009) *Fenceline contrast: (*healthy) *grazed/burnt on left*, (unhealthy) *'protected' forest on right.*

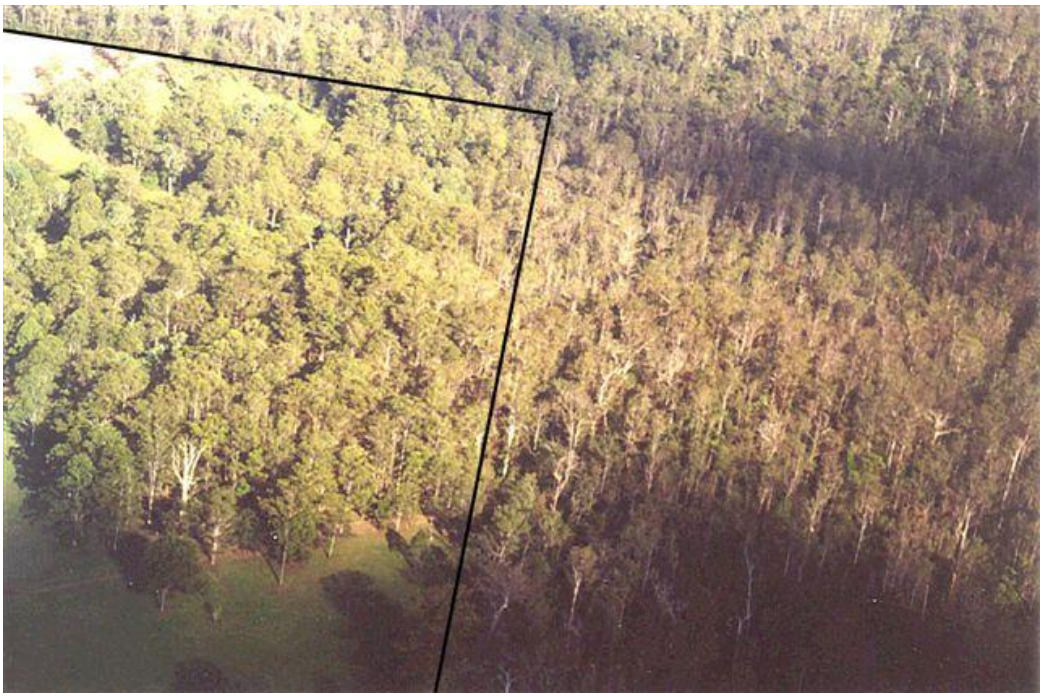

Figure 2: A history of change in the Riverina's river red gum forests

Period	Forest Characteristics	Key Influences
Pre 1850	§ Relative dominance of cypress and box woodland in mixed stands § River red gum woodland ('Old forest') occupied floodplains with shallow aquifers § 30 mature trees ha^{-1} poorly formed (6-20 ha^{-1} with hollows) § Denser stands of better form in narrow strips along some watercourses § Open grassy understorey providing easy access § Regeneration uncommon and localised.	I. Large Aboriginal populations with a culture of fire II. Fallen timber burnt as firewood. III. Commencement of European influence
1850-1900	§ Decline in dominance of cypress and box woodlands § Decline in grassy understorey § Reduction in sedges, rushes and chenopods § River red gum forests invade formerly treeless plains and grassy woodlands. § Emergence of river red gum forests ('New forests') with more than 100 trees ha^{-1} (> 20cm dbh). • Emergence of new dense box forests and cypress scrub • Decline in the no. of ancient river red gum trees (established before European settlement) • Increase in invasive weeds	§ European settlement, clearing of Cypress and introduction of grazing. § Limited clearing of red gum. § Decline in Aboriginal populations and their influence on the landscape § Reduced no. and frequency of fires § Occasional flooding in absence of fire § Initial interest in river regulation/irrigation § Spread of rabbits
1900-1950	• Relative dominance of cypress and box woodland in mixed stands • River red gum woodland ('Old forest') occupied floodplains with shallow aquifers • 30 mature trees ha^{-1} poorly formed (6-20 ha^{-1} with hollows) • Denser stands of better form in narrow strips along some watercourses • Open grassy understorey providing easy access • Regeneration uncommon and localised.	§ Commencement of river regulation and irrigation including development of Murrumbidgee Irrigation Area (MIA) § Selective logging, poor utilisation standards § Grazing § Major flooding events § Rabbits § Limited use of fire
1950-2000	§ Wave of regeneration following rabbit control § Progressive improvement in timber quality § Dense understorey § Reduction in site quality § Lower growth rates	§ Release of myxomatosis to control rabbits § Major expansion of irrigation. Winter/spring floods less frequent, less extensive and shorter. Intermittent un-seasonal summer flooding events. § Improved timber utilisation standards and ringbarking of defective trees § Grazing used as an alternative to fire § Timber industry investment in value adding increasing economic dependence on timber supply § Increasing emphasis on multiple-use forest management including environmental and cultural heritage values and recreation
2000-present	§ Dense river red gum and cypress lacking resilience suffer chronic decline and increased mortality. § Remaining ancient trees under significant threat § Significant reduction in forest growth and site quality	§ Worst drought in recorded history § Focus on protection of threatened plants and animals and hollow bearing trees

III. Catchment Values

The catchment values are similar to floodplains associated with major river systems of the world. Use of strategically located sections of floodplain (forests) for on-route storage and controlled release of water may become important when looking to future water delivery within constraints and expected diminished water availability. (It is appreciated that this concept has been flagged peripherally in the Report in connection with the rain rejection water sharing strategy in place for Barmah – Millewa forest). Also in the quest to develop infrastructure to facilitate and manage delivery of the small volumes of water for targeted locations in future it is important to minimise impediments to landscape scale major flooding, if and when it does occur.

A second facet to floodplain hydrology is potential for localised siltation of effluents to take place. This sometimes requires removal of silt to permit water to enter the forests as the 'commence to flow' levels are reached on a rising river or major anabranch or streams. This may become more important with the predicted diminished water availability.

IV. Research (Forest Science and Other) and Education

Research values may be captured elsewhere. However, in recognition of the known time scales around forest management and river regulation and the generally discrete nature of river red gum ecosystems, opportunities for research initiatives would seem to be high. This is emphasised against the observed impacts of the prolonged drought and efforts by forest managers to respond, coupled with predicted climate variability and climate change. Projects centred on tree reproduction systems and gene pool security, subterranean water and fire ecology are perhaps examples along with refinement of established programs around forest growth and productivity in response to various silvicultural regimes.

On a national scale, these floodplain forests are likely to be the first and most profoundly affected by climate change and it therefore behoves governments and research institutions (supported by communities) to be at the forefront of forest science research with programs probably needing to be conducted over extended periods.

V. Scenic / Landscape Values

These values may have been captured elsewhere as they may be related to other values such as cultural heritage and recreation as both usually embrace some affinity of people to the lands, rivers and forests. This is often observed around intergenerational settings that can give rise to enduring spiritual and emotional connections to the forests or places within the forests. Such sentiments are known to reside within Aboriginal and non Aboriginal communities alike. It is believed that these sentiments will become prominent in future decision making alongside reflection on the future of some of the more tangible values as, in reality, they are often inseparable.

Issue 2: What other information is available to inform the assessment, particularly on areas outside the Central Murray?

Overview

It is appropriate to consider and review the forest assessment approaches and outcomes that have preceded the River Redgum and Woodland Forests Assessment.

Of direct relevance and interest is the 2005 Brigalow Belt South Bioregion Assessment decision. Important lessons for government decision makers may be drawn from this decision. In particular the socio-economic impacts are worthy of careful review. The long term environmental implications of excluding active management from regrowth forests are also worthy of further consideration.

I. 2005 Brigalow Belt South Bioregion Assessment Decision

Under this forest assessment outcome the NSW Government elected to convert around 350,000 hectares of the State's publicly managed regrowth Cypress and Ironbark forests from State forests and Crown land to conservation reserve (refer figure 3). The decision resulted in a 45% reduction in the available timber yield and the closure and exit of some 12 sawmilling enterprises from the NSW Cypress and Ironbark timber industry in the Brigalow Belt South.

These forests were in a regrowth condition and had been the subject of sustainable timber harvesting for many decades, producing a range of high durability green sawn and value-added products.

A key feature of these western forests is that they also exist in landscapes which are highly altered from their pre-European condition. As dense regrowth, cypress forests lack resilience to drought because they transpire more water than sparse stands (Jurskis, 2009). Cypress is also a shade tolerant species which generally does not form lower density stands by natural thinning. If stressed for moisture, trees stagnate and ultimately die. Old trees are most vulnerable, and pre –European cypress and box trees in dense new stands have suffered high mortality in the last decade. Cypress responds readily to thinning, by either non-commercial or commercial processes, to form healthy stands. In the absence of active management it can be difficult to maintain the health and existing values of Cypress forests.

The IFA understands that the Brigalow Belt decision cost Government over $80 million in compensation for local timber and service industries for the cessation of timber supplies, and business development assistance to those companies remaining in business. (Hansard, 2005).

Since the decision the small timber industry communities such as Gwabegar and Bingara have suffered considerably in loss of employment opportunities due to the closure of local sawmills.

The future costs of ceasing harvesting and lost opportunity for a sustainable value-adding timber industry have not been identified but the IFA believes such cost is high. Included in these costs are the losses associated with a reduction to annual allocations of timber of 40,000 m3 of sawlogs and the costs of setting up and operation of new government administration at Baradine.

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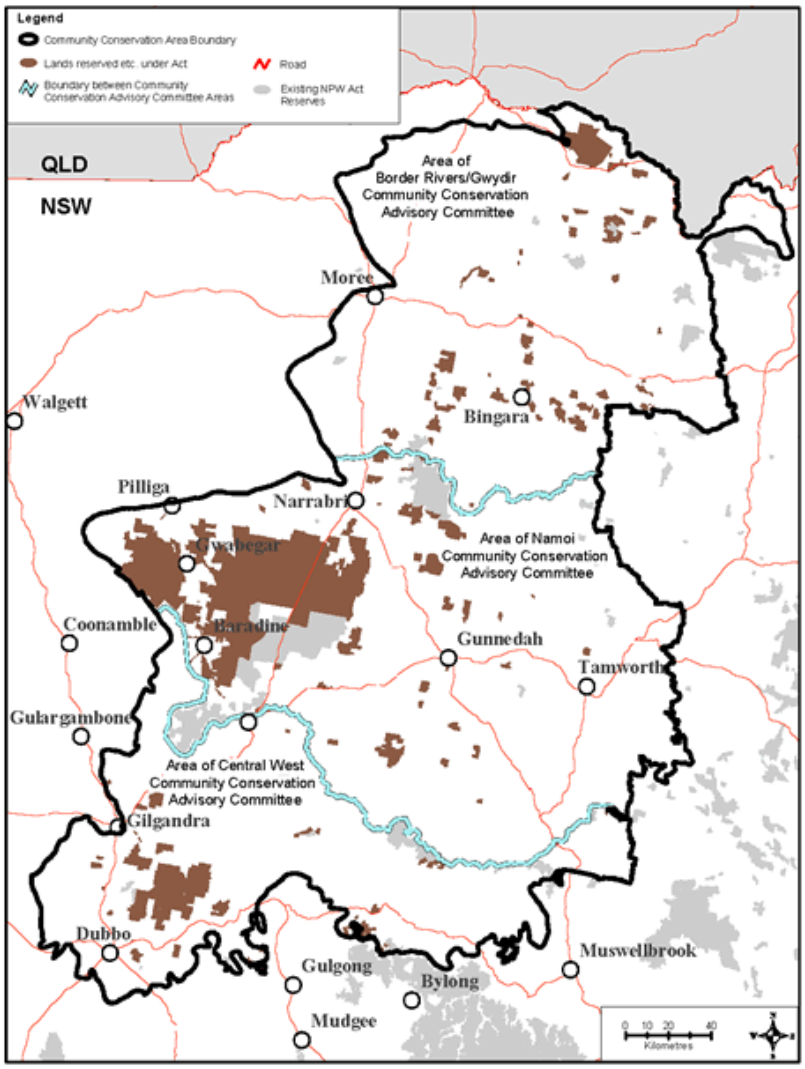
Figure 3: National parks created under Brigalow Belt South Bioregion Assessment decision



The decision to reserve (and prohibit harvesting on) a large areas of cypress regrowth forest which had developed through man's intervention in the landscape, including active thinning and harvesting over many decades will place those forests at risk of stagnating and becoming unhealthy, as documented by Jurskis 2009. The Government's 2005 decision demonstrated its then position that a conservation paradigm can only be met by changing tenure (from multiple use to reservation) and effectively excluded the opportunity to deliver a balance between social, economic and environmental outcomes through active management.

The IFA is prepared to provide a more detailed report on the Brigalow Belt decision. Much of the background and issues arising has been documented in the NSW parliament's Hansard (2005) during and after the decision process. The key point of

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mentioning the Brigalow Belt decision is to urge those involved in the River red gum assessment to not make the same mistake as was made in 2005, that is to reserve managed regrowth forest, which will only remain healthy by ongoing active management, including timber harvesting, but to objectively consider evidence about the river red gum forests, including that from foresters who work and live in these forests.

Issue 3: How will river regulation, climate variability and climate change affect the forests and the values they can support in the future?

Overview

Assuming people want red gum forests to persist in the landscape, albeit in a modified form, then careful management of the effects of river regulation, climate variability and climate change on forest values will be critical.

Remarks on climate variability and climate change are based on predictions of higher temperatures and less rainfall in south eastern Australia as outlined in Section 4 of the Report. Climate variability introduces an added layer of uncertainty on top of the forecast trends with climate change. Remarks are generally related to predictions of further disruption to forest flooding due to less rainfall and runoff from upland catchments and the concomitant depletion of the subterranean aquifers linked to the forested floodplains of the western flowing rivers.

The long running current drought (climate variability) provides a real example of what could be install for the forests under a long term climate change scenario. Clearly, the impacts of river regulation on the environment become much more pronounced. In the Murray 16 years have now elapsed since the last significant flood event (Eddy, V. pers comm. 2009).

> *Most environmental water diverted to "Living Murray icon sites" in recent years has only watered a few trees on the banks of creeks. Under this scenario trees are fooled into fresh growth only to be cheated by not receiving enough water to replenish their reserves before the drought is reinstated and they return to survival mode by dropping leaves (Eddy, V. pers comm., 2009).*

What little water that is available is more heavily contested.

> *I honestly believe no one fully appreciates the quantities of water needed to effectively water extensive river red gum forests. 236,000ha of forest requires a basic volume in the order of 2,100 gigalitres per annum if the forests were perfectly land-formed. This is 1.4 times the largest option suggested (and regarded as unachievable) in the "Living Murray Foundation Report" (2005), (Eddy, V. pers comm., 2009).*

Under long term reduced water flows virtually all forest values may be at risk.
The following affected forest attributes are considered in more detail:

I. Forest health and vitality, including ancient trees,
II. Forest growth and productivity,
III. Distribution of river red gum forest,
IV. Timber production and timber quality,
V. Flowering and seed production,
VI. Susceptibility to invasive weeds,

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VII. Grazing (domestic stock,)
VIII. Aboriginal cultural heritage,
IX. Landscape and scenic
X. Recreation
XI. Research and Education.

I. Forest health and vitality

- Dieback and recovery is recognised as a natural mechanism in healthy forests. Jurskis (2008) notes that recovery of highly stressed trees at Lake Victoria after good spring rains but ongoing decline of trees in thick lignum with mistletoes (indicators of forest in poor health). Continued stress and death of trees (tree mortality) where moisture deficits worsen can however reach critical survival thresholds for the species. This phenomenon often prompts the first expressions of concern or alarm that something is different or gone wrong. The fact that the concern is widespread is an indicator of the large number of values impacted, usually in a negative way. It is conspicuous and affects both production and non-production values in a profound manner;

- Tree mortality on a broad scale may be expected to give rise to a commensurate increase in combustible forest fuels. The accumulation of these fuels will increase bushfire hazard and under a moisture deficit regime significantly increase the likelihood of a catastrophic wildfire incident. Under such a scenario there is a high probability that hollow trees will be lost;

- Large ancient trees are particularly at risk. These trees have outstanding cultural, spiritual and ecological (habitat) values;

II. Forest growth and productivity

- Probable reduction in growth rates of trees that do survive the drought along with associated lessening in volume increments at the stand and forest level;

III. Distribution of river red gum forest

- Progressive reduction in the extent of red gum forest type and where the type does survive, modified tree densities and productivity (site quality) classes. Probable replacement of some red gum trees with other species, incrementally and at higher elevations where previous large floods gave rise to regeneration that has survived until now but where future flooding will be markedly reduced or absent altogether;

IV. Timber production and timber quality

- Probable modification to timber production values as yields are adjusted in response to reduced growth and tree mortality and likely lessening of the extent of the red gum forest type - separate from potential disruptions due to any loss of existing areas of production forests. Stressed trees are more prone to attack by insects and disease which can directly impact on timber quality. Similar affects are likely to occur around apiary values;

V. Flowering and seed production

- Potential disruption to flowering patterns and seed production of red gum from increased temperatures and more disruption to seasonal flooding of forests;

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VI. Susceptibility to invasive weeds

- Potential increase in the proliferation of wind borne invasion weeds with impacts on native vegetation and habitat values;

VII. Grazing (domestic stock)

- Reduction in grazing values as invasive weeds proliferate amongst forests with generally more open canopies and disadvantage for palatable forage species;

VIII. Aboriginal cultural heritage

- River red gum forests are historically and culturally important due to the number of significant Aboriginal sites they contain (CSIRO, 2009). Probable impact on Aboriginal cultural heritage values as more frequent wild fires destroy sites such as scarred trees (including canoe trees) and strong winds coupled with higher temperatures remove sand from the summit of sand dunes where interment took place;

IX. Landscape and scenic

- Increase in the quantity of heavy flammable fuels (dead trees and branches) coupled with increased litter fall, will threaten many values on account of an increase in the frequency of extreme fire danger days that will give rise to destructive wild fires in the landscape. This will impact upon production values e.g. timber and apiary but also on values like the survival of habitat trees as well as assets associated with access to the forests (timber bridges) and other assets such as timber constructed bird observation structures;

- Scenic values will be changed in response to changes to the appearance of the forests and with likely continued tree deaths across the landscape;

X. Recreation

- Recreation values are likely to be impacted as the forest environment becomes more inhospitable with increased temperatures, increased risk of destructive wild fires and potential diminution of the native flora and fauna;

XI. Research and education

- Research and educational values, although potentially altered around the desire to monitor and discover the impacts of climate change should remain.

There is much still to be learnt about the affects of river regulation. Particular consideration of the practicalities of delivering flood waters to the forests is needed as many traditional flood plains are now 'land-locked' and unable to receive flood waters without undertaking physical earthworks.

The impacts of river regulation will vary by location. The Barmah-Millewa Forest Group are well situated to take advantage of regulation, as through the irrigation season "The Choke" runs full allowing water for the forest to be easily drawn off the top of regulated flow[1].

[1] Chapter 5.2.1 expresses a misconception that the Barmah Choke "banks up" flows. "Piggy backing a tagged flow" is only an option when regulated flows can be held at sill level for a chosen forest or wetland. Then without appropriate infrastructure to spread and hold a flow on the floodplain, the diverted water merely runs back to the river by the quickest means with minimal effect.

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Issue 4: What are the key forest values and core ecological processes we should seek to maintain in this dynamic context?

Overview

In the Report considerable care has been given to provide a balanced account of the environmental, social and economics forest values that exist in the Riverina. Submissions from stakeholders to the Report may be expected to reveal additional forests values and ecological processes as well as a more detailed exploration of values that have already been identified.
A diversity of views in relation to the key forest values and core ecological processes sought to be maintained may also be expected.

Given the possible emphasis of environmental values by many stakeholders, the IFA encourages the NRC to continue to give equal consideration to the environmental, social and economic forest value streams.

The IFA is also mindful of the natural physical elements that have played a major role in the evolution of the forests. From our knowledge of the physiological traits of the river red gum we understand the significance of the terrain, soil, water, temperature, and fire and how these elements govern and interact with the forest and its values. Where these elements are regulated by mankind, as is the case with the river water, it becomes increasingly important to understand their significance.

Without explicit acknowledgement of the significant influence of natural physical elements (particularly where they are or have been controlled by mankind) there is a serious risk that nomination of key forests values and core ecological processes may fail to account for significant external threats or opportunities. In doing so, the opportunity to achieve an optimal forest management outcome may be lost.

In attempting to identify the key forest values and core ecological processes there is the risk of being overwhelmed by the sheer number of values and processes and their complex interactions. The identification of high level objectives can help guide this process.

The maintenance of forest health and biological productivity is considered an appropriate and relatively non-contentious, if not, challenging high level objective. If the forests can be maintained in their best condition under the prevailing climatic and ecological conditions then all other needs will be met to the capacity of the forest. By focus on managing the health and vigor of the forest we may be confident that our efforts will not be wasted.

Other key forest values;

I. Biodiversity within the river red gum forests. River red gum forest wetlands provide habitat for fish and waterbirds (breeding, feeding and refuge areas). This requires a certain length of flooding duration and time of year (CSIRO, 2009). Hollows and spouts in river red gum provide habitat for water and forest birds, including two rare species of parrot (Superb Parrot (*Polytelis swainsonii*) and Regent parrot (*Polytelis anthopeplus*)) in the Murray River region (Dalton, 1990).

II. Closed forest stands with minimal diversity of flora were uncommon in the pre-European forests and will always be present on the best quality sites. However if stand density is not managed actively we can expect a loss of diversity.

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III. Cultural Heritage. Cultural relics have traditionally been conserved without necessarily being formally recorded. Dr Wayne Atkinson of the Yorta Yorta in his presentation to the Royal Society of Victoria, Red Gum Conference indicated that a survey of the Barmah-Millewa forests had found many sites throughout these forests. There was no suggestion that sites had been lost.

IV. Wetland ecology: While all river red gum forest qualify as wetlands by all accepted wetland definitions, those who work in them acknowledge the River Red Gum forests are distinct from non forested wetlands occurring within them e.g. reed beds swamps. These distinct wetlands are protected by State forest tenure management for much of the public estate and the River Red Gum Private Native Forest Code of Practice (2008) for private lands.

V. Ancient Trees are widely regarded as the icons of the forest. According to Jacobs (1955) river red gum can reach ages of 500 to 1000 years.

VI. Forest management practice: Both Baur's Silvicultural notes (Forestry Commission of NSW) and the River Red Gum Private Native Forest Code of Practice (2008) provides workable prescriptions for the maintenance or improvement of river red gum forest health.

Issue 5: What approaches should we take to maintaining the forest values and processes through the transitions that seem inevitable?

Overview

The position advanced in the Report is that there will be a 'transition' phase to a 'new equilibrium' and that values need to be managed through this transition phase. This will challenge current paradigms and entrenched views around land tenure and what is permitted to occur within tenures, over what time frame and to what extent.

Our suggested approaches to maintaining forest values and processes are derived in part from comments around expected effects described for Issue 3. There is an element of speculation about these but are informed from field observations by members around the current drought conditions and the narrative contained in the Report.

Comments for Issue 5 are offered at the strategic level with some overlap into tactical and operational scales as outlined below. It is also recognised that some values are more pliable than others and not all values are necessarily exposed the same level of risk with climate change or damage agencies that will become more worrying with climate change.

The key components of our proposed strategy include:

I. Threat analyses
II. Adaptive management and intervention to achieve goals and outcomes
III. Prioritisation of values
IV. A tenure neutral approach
V. Monitoring and research
VI. Contingency planning and insurance
VII. A review of harvest and operational planning
VIII. A review of water regulation and a review of the role of fire

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Strategic Framework

I. Threats

Assuming agreement is reached on the values, a threat analyses should be conducted on the future status of current threats and what new threats will emerge. A risk matrix is one way of assigning a differential ranking of future threats on values. For instance destructive wild fires will likely increase in frequency and severity with predictions around rising temperatures and reduced rainfall impacting most values. In this case response strategies designed to build awareness (education) reduce ignitions (fire bans), mitigate fire severity (fuel management) and facilitate suppression (detection, access and training) should logically feed into management and budget commitments.

Trees under stress are particularly vulnerable to pest and disease threats. Forty-nine phytophagous insects were collected from *E. camaldulensis* canopies at Gulpa Island State Forest in 1991 and 1992 (Stone and Bacon, 1994). High levels of defoliation have been observed during outbreaks of *Uraba lugens* (gumleaf skeletoniser) (Dalton, 1990) and *Doratifera* spp. (cup moths).

II. Management

The Report emphasises the place for adaptive management and intervention to achieve goals and outcomes within an already modified forest landscape. The IFA supports this approach for all red gum forests and companion ecosystems to achieve both production and non-production goals. Such an approach will continue to spawn initiative and innovation around the maintenance of values as managers and others strive to discover the best solutions during transition. The extent to which values are maintained will depend largely on managers continuing to define clear objectives within a suite of management strategies around forecast change. This will apply to production values including commercial activities as well as strengthening responsive management around other values e.g. flora and fauna habitat protection and enhancement in a strategic sense.

III. Prioritization

It is unlikely that the full complement of values can be maintained to the level experienced in the past for most of the forests. Hence it is likely that decisions will need to be made on the priority that certain values are given in different locations over time. These decisions will become increasingly problematic, especially in relation to water allocations around the timing and duration of flooding to service natural processes. It is appreciated that this is not new for wetlands (and water bird breeding in particular) however it is likely that these ‘value judgments’ will need to be more widely promulgated.

IV. Tenure

The Report highlights the already altered landscapes and that this has occurred across all land tenures. Climate change will impact all tenures equally and it has been widely appreciated that changing land tenures will not improve conservation outcomes in these highly modified landscapes. Improved outcomes will depend upon effective control of the threats, adoption of a responsive management culture and a dispassionate disposition to the allocation of resources. For instance a tenure neutral approach should apply to water allocations from storages.

V. Monitoring and Research

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Monitoring of change (with research) will be essential to guide adaptive management, inform the status of identified threats and influence resource allocation decisions and priorities. Investigation into the nature of subterranean water and its connection to forest health and productivity is probably worth considering further, while the prospect that prescriptive fire may be used in a deliberate manner to maintain forest health and limit release of toxic tannins from litter into streams would require close monitoring. Use of grazing as a fuel management tool around fire protection or as an ecological management instrument connected to habitat condition and maintenance might also warrant inclusion in future research programs.

VI. Contingency/Insurance

Establish a level of insurance against adverse effects of climate change both directly and indirectly to better secure attributes around which values are sustained. Examples are:

- Monitoring (see V. above) may indicate a need to collect and store red gum seed as an insurance against loss of genetic material at the local or sub-catchment level. The seed could be used when conditions for regeneration return. (Regeneration of red gum is seen to be more connected to the timing and duration of forest flooding while growth and survival of established trees can be achieved from various sources of soil moisture);
- On an indirect level, consider the prospect that a destructive wild fire destroys all Superb Parrot red gum breeding trees along the Edward River within Millewa and Gulpa Island State Forests south of Deniliquin or, in an analogous setting, all Regent Parrot red gum breeding trees within some locations on the Lower Murray. Such intensive fires have occurred in the Riverina in the past and on current predictions, will likely occur again at greater frequency and severity. In this context it might be prudent to now create some artificial breeding hollows in trees using the known disposition and architecture of existing nest holes and/or develop nest boxes with similar structure to test their uptake prior to such wild fires. Numerous nest trees for these high profile birds contain hollows and are generally in senescence or are already dead. Destructive wild fires during drought conditions and extreme weather conditions can reduce trees such as these to a pile of ash on the forest floor, Thompson. M. Pers comm (2009). It would be unfortunate if the effort going into the protection of foraging habitat and flyways vegetation restoration was compromised by loss of Superb Parrot breeding trees, which forest mangers have protected for decades in the Barmah-Millewa forest (The State of Australia's Birds (2008)). ' - supplement to Wingspan vol 18, no 4, December 2008: Forests NSW Bush Telegraph Magazine Spring/Summer 2009.

Tactical and Operational Planning

VII. Timber Production

Given that these ecosystems are 'man made forests with specific management goals in mind, it is appropriate that timber harvesting be reassessed and if necessary, altered to accommodate the impacts of climate change. The concept of *'climate change induced ecological thinning'* or *'climate change induced salvage logging'* with a timber production dimension is an apt description of how one might adapt a timber cutting strategy to these man made forests in response to climate change and the severe drought.

The concepts or ideas outlined below might be worthy of consideration by forest managers in light of the background outlined above:-

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a. Modify cutting plans within existing net harvest area of production forests to focus a proportion of timber harvesting on areas showing severe moisture stress and tree mortality where present tree density is incompatible with the level of available soil moisture to support survival. The rationale for this approach along with other considerations are outlined below:-

- It is more sensible to harvest trees that have recently died or are going to die rather than continue to harvest healthy stands during the nominal transition phase;

- There is the prospect that individual trees showing resilience amongst stressed and dying trees will survive and such trees may harbour genetics to withstand drought and produce seed for future regeneration episodes. These trees should be afforded every chance of survival;

- Experience has shown that a proportion of stressed (living) trees that are harvested will give rise to coppice regrowth on stumps. Thompson. M (2009) Pers comm.. This permits a new tree to grow but with markedly reduced moisture demands from the same soil root zone (i.e. even if the remainder of the retained trees (post harvest) in the stand were to die, the coppice regrowth on the stumps will probably persist and develop into trees). Coppice regrowth can develop into mature trees to service multiple values and have proved to be capable of contributing significantly to sawlog quality products and a continuous forest canopy;

- By harvesting dead and dying trees there is the prospect that the adverse impact of tree mortality and reduced growth on timber yields throughout the transition period will be offset, at least to some degree. [In this context whilst it has generally been desirable to stabilise timber yields, often around indicative annual non-declining yields - (as one interpretation of sustainable timber supply) - it is logical that there might be a degree of fluctuation in yields around the timely salvage of the dead and dying trees. Generally trees may be used for sawn timber for a short period after mortality as has occurred with fire salvaged trees].

- This approach would potentially require changes to scheduled harvest plan areas to take into account the dynamic nature of drought stress i.e. harvest plan areas may be based around smaller or larger areas compared to existing ‘compartment’ planning units and include provision for ‘repeated passes’ in response to monitor of the status of retained trees. This is similar to the experience with salvage of fire damaged areas where repeated harvest events have applied in conjunction with monitor of survival rates and longitudinal cracking in trees damaged by fire. It is amenable to the red gum forests due to the relatively low costs of access. it is possible to adapt the harvest planning process and incorporate the necessary regulatory approvals, there should be no impediments to adopting this approach to severe drought stressed stands to avoid loss of commercial timber.

- Harvesting dead and dying trees with removal of products for timber production on a commercial basis reduces the quantity of heavy fuels that can increase the intensity of destructive wild fires that

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destroy surviving trees in the stand and any new regeneration, along with other assets that are connected to many values of the forest;

- Modified cutting plans within the existing gross net harvest areas may need to recognise variable costs in harvesting and log delivery, as established supply areas may need to be expanded. This might be mainly about haulage distance and associated costs. Experience has been that industry is conscious of the impact of changes to forest health and the need to undertake salvage operations when and where required as outlined above for fire salvage logging Thompson M. (2009) Pers comm..

b. Develop *'climate change induced ecological thinning or salvage logging'* plans with a timber production element, on areas not currently within the designated net harvest area on State forests or Crown-timber lands and other tenures. This could include cutting younger trees from amongst residual ancient trees and habitat recruit trees to improve their chance of survival and spacing trees within uniform dense regrowth where severe moisture stress exists and the removal of some trees ensures the survival of the remainder of the trees in the stand. To avoid doubt, this includes consideration of conducting 'climate change induced' selective harvesting on reserve areas within existing State forests (e.g. Flora Reserves) and NPWS managed conservation reserves (e.g. National Park or Nature Reserve).

   The rationale for suggesting this is that salvage of dead and dying trees on conservation reserves (with appropriately designed prescriptions) may not adversely impact the values for which the reserve was created in the first place and may even enhance values. For instance it may be preferable that a proportion of trees within stands survive rather than have all trees die due to moisture limitations and it would be sensible to remove a proportion of heavy fuels to minimise wild fire intensity in reserves. Most red gum conservation reserves have a management history similar to the commercial forests; hence the moisture deficits apply to these areas as well. It is appreciated that the existing paradigm around land tenures and respective management policy may result in some finding this suggestion offensive and unachievable. It is not intended that the idea have this effect on people. Rather the suggestion is made on the basis that climate change and the ongoing impact of the prolonged severe drought requires a re-think on how best to manage and maintain the values on all tenures during a transition to the new equilibrium. In this context it is appreciated that this would have implications on the way in which the RFA and IFOA are constructed and potentially signal the need for a new approach to land tenure classification or differentiation, at least for the period of transition.

VIII. Fire Ecology

A comprehensive review of the place of fire in the landscape should be undertaken. This is seen to be connected to forest science and research values and has connections to other values such as forest health and flora and fauna habitat values and potentially water quality and native fish habitat as well. It also has connections to values such as grazing and recreational pursuits across most of the estate.

IX. Water Management

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The report contains a comprehensive treatment of the impact of river regulation and how it has impacted multiple values. Climate change will bring added complexity to this challenge as demands for seasonal flooding of extended duration become critical. The need to have improved knowledge of subterranean water to inform decisions on priority water use has been mentioned elsewhere. Strategies around low and high flow water management plans, adoption of use and re-use where possible and expansion into pumping and even conduit water delivery systems to maintain specific assets such as single ancient, heritage or critical habitat trees, would be appreciated. Equally, use of private irrigation infrastructure such as that used to deliver low flow environmental water to Pollack Swamp in Koondrook State forest near Barham may be duplicated at other locations.

Issue 6: What are the key features of a sustainable future for the forests, forest industries and the local communities?

Overview

Forest sustainability, as a term of use in contemporary settings, is seen as a construct of society that looks to place importance on the continuity of values in a defined way, and around nominated time frames, for the benefit of humanity.

The timber industry and local communities have a major stake in the future sustainability of the river red gum forest on account of their long association and dependence. It was for this reason that the timber industry and local communities supported the listing of a significant block of forests to the Ramsar Convention some 8 years ago.

By having a local timber industry and local communities dependent on the forests for their livelihood, lifestyles and wealth generation; there is a natural willingness within them to give something back. Historically, reciprocation has been delivered through forest stewardship. In particular the local industry and communities have been highly effective in protecting the forests from destructive wild fire, pests and diseases.

In contrast, it may be argued that the greatest human induced threat to the forest (river regulation) has arisen from people and industries with little direct interest in the welfare or values of the river red gum forests. For these people the demise of the health of river red gum forest is of little significance or consequence as their livelihood and dependencies exist elsewhere. A key feature of a sustainable future therefore is to maintain local industries and communities as forest custodians but provide external support to them to promote the unique values of the river red gum forest. Only when the forests become more widely known and appreciated by the Australian community will their future health and welfare be assured.

A sound economic outcome for the forests may also be achieved by involving local industry and local community. Under this arrangement sufficient income may be generated from the forests (e.g. timber, grazing, apiary and recreation) to cover the costs of essential forest management services which are needed to protect and sustain forest values. In this context, sustainability may be interpreted as the wise use of the forests' natural resources for mankind.

For production activities (e.g. timber) there is the understanding that 'wise use' provides for the taking of natural resources at a level compatible with the productive capacity of the ecosystem and in recognition of other values.

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Key features that are seen to underpin the future sustainability of the forests, forest industry and local communities are summarized sequentially by dot points below:

I. The Forests
- Maintenance of an acceptable tree cover as a prominent ecosystem component;
- Maintenance of the companion non-treed ecosystems that collectively comprise the red gum floodplain forests in a holistic portrayal;
- Regeneration of tree species and other native plant species;
- Establishment and growth of trees to form healthy forests in accord with the water (moisture) availability for the site;
- Protection of values from identified threats, especially destructive wild fires;
- Yields of products (including timber) to be compatible with the productive capacity of the ecosystem. [This may include fluctuations for nominated time lines, but would generally be heading towards stable levels with minimal major variation to enable stability around the affiliated social and economic values];
- Commitment to responsive management and allocation of resources by government, relevant agencies and land managers to sustain the features that underpin a sustainable forest and its values;
- Development of plans to promulgate sustainable features of the forests to society with an adequate reporting system on the status of the features. Forests NSW published ESFM plans are an example.

II. Timber Industry
- Competitive and viable;
- Flexible and responsive to timber supply and market fluctuations;
- Innovative and inventive around utilization and product development;
- Commitment to safety in the work place;
- Progressive approach to training and skills development for industry personnel;
- Preparedness to develop industry wide strategic plans to show directions around use of the timber resource to advance understanding and support for the activity.

III. Local Communities
- Supported by diverse economic base around wealth creation, notwithstanding possible existence of small number of major income generation sources;
- Industries and services that support the economic base and wealth creation are adaptive;
- Existence of supplementary services and programs to acceptable standards around communication, education, heath and provision of goods and services to support lifestyles.

Issue 7: How can local communities transform to cope with less water?

The IFA has no comment on Issue 7.

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Issue 8: How can forestry industries respond to declining wood yields?

Under a continuing scenario of reduced and regulated flood waters the IFA acknowledge that there will be lower growth and a further decline in forest productivity which must ultimately translate to lower wood yields.

The IFA believes however that it may be pre-emptive to assume a declining wood yield scenario in the short and medium term. The Report acknowledges that the condition of the river red forests is a consequence of human intervention. It is further acknowledged that the 'new' (high density) regrowth forests have very high water demands which are not aligned with the current quantum of available water. This mismatch is the primary cause of the declining state of the forests' health and vigour.

In order to restore forest health and resilience it will be necessary to either secure increased allocations of water or reduce the forests' demands on it (balance supply and demand). Every effort should be undertaken to secure greater water entitlements for the river red gum. If this objective cannot be fully achieved then active intervention is recommended to reduce the forests' demand for water. In practical terms this may mean decreasing forest density (thickness) by commercial thinning. Under this scenario, it would not be unreasonable for the industry to receive an increased wood allocation in the short and medium term but with a change in the type and quality of the log products that would be harvested.

In the long term the industry may be reasonably expected to respond to a declining wood yield. The answer to how it might respond depends upon the reason for the decline. If the area of production forest is largely retained and the regulations governing harvesting are not markedly altered, but reductions are forecast in the sustainable timber supply due to a lack of water supply and climate change, the IFA would expect, based on previous experience, that forest industries will work closely with foresters to harvest the timber which can be harvested to get the best long term outcome with priority for keeping healthy forests. Similarly for the short and medium term scenario, this may involve a higher proportion of small logs from thinning in the annual supply. The impact will depend on the forests affected and the particular forest industries there. This needs to be part of the assessment.

As a general statement, based on experience of reductions to native forest wood supplies which were made due to improved supply inventory information (not forest transfers), forest industries will adjust by a range of actions. Adjustments may include closure of least profitable plants, others may develop new processing systems and new markets in response to such changes, and there may be opportunities to maintain or even increase employment with greater value-adding of the available wood yields. The key factor is whether there is confidence in the long term tenure of river red gum State forests available for timber production.

However, if the reason for declining wood yield is the transfer of State forest to National Park or conservation reserve status where no harvesting is permitted, some forest industries may exit and the remaining forest industries will be reluctant to invest their funds in further processing systems and markets unless they are confident that the sustainable wood supply has been properly assessed and is not subject to further reductions. In this scenario the forest industries will be expecting compensation for loss of resource, as for other forest decisions in NSW, and will seek Government subsidy for investment in new processing systems and markets. If funding and longer term supply commitments are made by Government, the forest industries will respond and generally do the best they can with available resources.

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Issue 9: What are the appropriate policies and institutional arrangements to manage these forests through such a challenging and uncertain future?

Overview

Policies and institutional arrangements must provide the capacity and flexibility to service their stated goals if they are to reduce the risks to the future sustainability of the forests, the timber industry and local communities.

The IFA has initial concerns that the NRC's framework for making recommendations to government (Section 1.4) seems pre-emptive and may lead to the alienation of production forests in a similar fashion to other forest agreements.

The prospect that tenure changes like those for the Brigalow decision around the northern Cypress forests in NSW or the recent VEAC process affecting river red gum in Victoria might serve as benchmarks brings added uncertainty.

Nevertheless, the IFA is hopeful that a new approach can apply and that there will be a serious examination of policy and institutional arrangements for the river red gum in south western NSW. The confirmed impact of the prolonged severe drought, river regulation and predictions around climate change are key drivers that should have a bearing on policy and institutional arrangements for an implementation framework.

Section 1.4 of the report provides a succinct summary why a JANIS ecosystem target driven approach with the creation of reserves is inappropriate for the river red gum forests in looking to the best mix of actions to service goals. The IFA endorses this appraisal. Not only are these forests highly modified and a product of a long history of purposeful goal driven management, they are undergoing profound change linked to the worst drought in living memory.

Two prominent themes have been connected to previous forest assessments in NSW:

i) The desire to quantify and stabilise timber supply through the application of analytical tools to inventory information to give industry confidence to invest and remain viable.

ii) The desire to achieve improved conservation outcomes through the creation of conservation reserves and the development of regulations around forest operations like timber harvesting, roading and use of fire for silviculture and fuel management reasons.

The IFA seeks a different approach for the Riverina red gum forest. Our thoughts on timber supply and conservation management are as follows:

I. Timber Supply

No other NSW forest agreement process has been conducted with such high levels of uncertainty around tree mortality and growth rates that impact on the reliability of estimates and are outside the control of forest managers. Moreover, predictions around the ongoing impacts of climate change and uncertainty with forest flooding via natural means or scheduled delivery of environmental water suggests that attempts to portray timber yield estimates as stable would be problematic. This is a key ingredient in the mix of factors that point to the need for a different approach for the river red gum assessment.

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With the present dynamic situation it seems unlikely that a timber supply position can be quantified with confidence. Section 5.9 of the report outlines the grounds for uncertainty on this topic.

The IFA advises against making any new timber supply commitments decisions in the present uncertain environment in the belief that they would be likely to constrain future timber supply options and significantly escalate the risks.

II. Conservation

Section 3.4.4 of the report outlines current thinking on how best to achieve conservation outcomes within National and State policies around climate change. Key elements of this approach encompass the control of threats, a more holistic approach to habitat management (including linkages) and the coordination and integration of multiple conservation programs at a landscape scale. The Report has described how the river red gum forests and its companion ecosystems of water bodies and adjoining woodlands and grasslands fall generally within this present-day conservation management model around climate change.

The narrative below offers support for this contemporary approach to conservation management with the river red gum assessment.

The importance of the need to identify threats in a dispassionate way and then systematically set about ranking the risk and devising strategies to mitigate and control threats is a key theme in comments made for other Issues in this response. [Issue 5 Strategic Framework–Threats].

For the Riverina Bioregion, where habitat structure and composition is significantly modified and habitat elements (e.g. breeding, foraging and migratory habitats) often highly fragmented and across several land tenures, improved conservation outcomes will depend largely upon the cooperation of multiple land managers operating within well understood policy and strategy around credible appraisal of threats.

In some situations habitat restoration or reconstruction will be necessary to strengthen the chance of survival and persistence of some native species or populations in the region. As outlined previously, such an approach will need to be conducted within a tenure neutral setting and at multiple scales to be credible and convincing. In these circumstances and with other considerations, including predictions around climate change and history of forest management and river regulation, it seems that the pursuit of land tenure changes to improve conservation outcomes is not convincing or credible. If tenure changes were to occur it would be essential that public and private land managers work collaboratively within agreed frameworks around principles outlined in Section.3. 4.4. This would especially apply to the added complexity and challenges around water management and environmental flow programs. Again, as for timber supply, the unique character of the dimensions of conservation management in this landscape point to the need for a different approach with the river red gum assessment.

III. Policy concepts

The following ideas are offered around the above two themes to potentially inform a policy to take the river red gum forests through challenging and uncertain times. Some of the suggestions or strategies will be seen to flow from comments under Issue 5:-

Timber Supply

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- Establish sufficient flexibility for adjustment to harvest schedules to permit the harvesting of dead and dying trees rather than lose the volume through deterioration of wood quality and give rise to increased levels of heavy fuels that will result in more intense and destructive wild fires. Key elements would be the capacity to facilitate opportunistic harvesting with appropriate prescriptions and the cooperation from regulatory agencies to permit harvesting to occur in a timely manner. The prospect that such sites might need to be jointly assessment by relevant agencies in a collaborative manner may foster uptake of the idea. As uncertainty surrounds the location and quantity of potential timber volumes, an equitable approach to allocation would need to be developed. This might encompass a share of production to existing interests or perhaps some form of contestable process around assessment criteria, or both. This can be managed under appropriate commercial arrangements and equity principles. A transparent reporting mechanism describing which stands were assessed against criteria and what volumes were removed could apply;

- In connection to the above dot point establish mechanisms to extend the same or similar program of climate change induced salvage harvesting to 'reserve' areas where the salvage of dead or dying trees presents no threats to the values for which the reserves were created and will likely mitigate the risk of severe wild fires arising from the accumulation of flammable heavy fuel loads. There may be several land tenures involved in such a program. This might apply for a transition period only for such areas until a new equilibrium around climate change arrives. For such areas additional reasonable planning requirements could be developed and reported. The prospect that destructive wild fires might create antecedent conditions to warrant salvage operations within these areas (or within the already existing commercial forests) should be accommodated;

- It is acknowledged that a goal of looking to have this modified harvesting program developed and implemented is to offset the impact on timber supply to industry. It is also acknowledged that it potentially brings added sophistication to the process and for some, will likely challenge existing paradigms on land tenure and permissible uses. However the approach is viewed as sensible and a form of wise use of the natural resource that would otherwise be lost;

Conservation

- Establish mechanisms that actively encourage and/or require land managers to participate in a variety of conservation programs where the values connected to the programs span several tenures. It is believed that features around this type of conservation management model might already exists for planning and reporting of environmental flow management along the Murray River now within The Living Murray program;

- Construct integrated (managers) threat analyses mechanisms about the status of identified threats and how to refine strategies and programs to manage or control threats. A model similar to the collaborative wild dog control programs in other parts of NSW might offer some guidance.

IV. Institutional Arrangements

- Explore alternatives to the existing land tenure driven paradigms around previous forest assessments to cope with change and deal with the unique challenges

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around timber supply and improved conservation outcomes. This may require a new classification or public land tenure or amendments to existing tenures and associated management philosophies;

- Support the above with the required policy and legislative backing and institutional arrangements and an effective communication and public relations program.

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