The Conservation and Identification of Biodiversity on Travelling Stock Routes and Reserves of North West New South Wales

Natural Heritage Trust

Helping Communities
Helping Australia

A Commonwealth Government Initiative

Report on the Natural Heritage Trust Project 2000-2002 (BD 0163.99)

"Identifying and Managing Biodiversity on Travelling Stock Reserves in North Western NSW"

Incorporating the Rural Lands Protection Boards
Narrabri
Northern Slopes
Moree
Tamworth

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Abstract

As part of the Federal Government funded Natural Heritage Trust (NHT)2000-2002, a project in conjunction with Narrabri, Moree, Tamworth and Northern Slopes Rural Lands Protection Boards (RLPB), was developed that would identify and appropriately manage areas of high conservation value, for travelling stock and biodiversity.
This involved surveying Travelling Stock Reserves and Routes (TSRs) in the board areas, an undertaking that was completed between February 2000 and June 2001.
A database was compiled including; surveyed vegetation communities, disturbance regimes, recorded threatened species, and cultural sites on TSRs.

The second phase of the project attempted to develop appropriate management regimes for the areas that had been identified as being of high conservation value. This was to involve strategic fencing of sensitive areas to allow appropriate grazing where it was identified in the ongoing management of the area. Training of RLPB Rangers and Field Assistants was developed in the areas of native grass identification and roadside reserve management, to enable informed management decisions to be implemented into the everyday management of biodiversity on TSRs.

Executive Summary

Biodiversity conservation on TSRs is an issue that extends further than individual RLPB boundaries and across state and national jurisdictions. The fragmented and developed nature of the general agricultural landscape in the north west, greater than most other parts of the state, places a greater need on the conservation of many areas of TSR. The occurrence of numerous areas of both federal and state listed threatened ecological communities, threatened species and their associated habitats and remnant areas of once common regional vegetation types, means that TSRs have a critical role in nature conservation within the project area.

Within the framework of the *Rural Lands Protection Act* 1998, (RLPA 1998) there are opportunities for RLPBs to adopt a more vigorous role to nature conservation, through the development of Function Management Plans (FMPs), which are required to address the issues of:

- The management of TSRs for the benefit of travelling stock
- The adoption of appropriate stocking practices
- The conservation of wildlife (including critical habitat, threatened species, populations and endangered ecological communities and their habitat)
- The protection of TSRs against soil erosion and diminution of water quality

The aim of the project was to identify the biodiversity values on TSRs across four boards in the northwest of NSW. The acceptance of TSRs as being valuable for conservation is a widely held view within the RLPB system. The ability to transform this view into actions is a much more difficult process, given the current organisational structure of RLPBs, a limited knowledge base of environmental management issues and their non-government-funding base. Being funded by ratepayers and income generated from travelling stock, the boards are restricted in the proportion of their TSR funds that can be directed at conservation measures. Until another source of funding for biodiversity conservation is forthcoming, complete implementation of biodiversity conservation goals, such as those outlined in this document will not be adequately reached.

The linear network of TSRs throughout the northwest form a fundamental corridor network[1], as well as being important Crown Land remnants of numerous vegetation communities not adequately represented in conservation reserves. This is despite the lack of contiguous connections in some areas, and the wide variance in TSRs size, width and vegetation structure and complexity.

The traditional management of TSRs is changing from short duration, intense and infrequent grazing regimes over large areas, to attenuated grazing in fixed areas. This has been a trend that was identified as early as 1981[2]

The actual TSRs resource base is also apparently diminishing, from around 2.27 million ha in 1975, to around 600 000 ha in 2001.[3] Of the statewide resource, the TSRs in the project area contribute a significant 130 000 ha (22%).

Because of the large proportion of TSRs in the north west, a significant proportion of any future funding for conservation management should be directed at the TSRs in the project area.

[1] RACAC, 2000 Preliminary Overview of the Brigalow Belt South Bioregion (Stage 1) NSW Western Regional Assessment NSW NPWS

[2] Hampton, D. (1981) *Review of Multiple Use options for the management of TSRs in NSW*. Land, Resources and Environment Branch. Crown Lands Office

[3] O'Flaherty, K. State Council RLPB NSW pers comm. May 2000

The gradual catharsis that is occurring on TSRs is driven by the need for greater conservation of remnant vegetation in the state. The changing patterns of TSR use over the past few years has resulted in less traditional travelling stock across the region, an increase in local grazing mobs and an increase in electric fenced 'sections'. Whilst these may be valid options for TSRs in the future, they require a greater degree of management intervention to ensure that there is not long term pasture composition change and potential environmental damage. Without stringent guidelines being developed for the frequency and intensity of 'section' grazing, there is the likelihood of areas with a formerly high environmental value under traditional use patterns, suffering from grazing induced degradation.
In boards without large TSRs, capable of sustaining semi-traditional usage patterns, a higher level of grazing pressure has been exerted upon fenced reserves. The nature of these reserves has changed from being intermittently used stock camping reserves to areas of infrequently used reserves, through to continually stocked reserves.
In the project area, fenced reserves are most commonly found on the wooded slope areas of Tamworth and Northern Slopes boards, extending down into parts of the Liverpool plains. Due to previous management, frequently used reserves are typically of low environmental value with little regeneration, simplified understorey and single age cohorts of trees.

The main threats to the value of TSRs as effective biodiversity corridors and reserves come from the both internal and external factors. These include:

- Overgrazing- including increased pressure by electric fenced 'sections'; change of pasture composition through overgrazing; frequent grazing of fenced reserves by local landholders
- Weed invasion- both environmental and noxious weeds
- Linear reserve management issues- fragmentation, disturbance, weeds
- Broadscale tree health decline and loss/simplification of understorey
- In-situ fragmentation of remnant through vehicular track establishment, road widening and driveway entrances
- Degradation of groundcover through the removal of fallen timber and the impact of grazing upon leaf litter levels
- Tree regrowth issues- predominantly *Callitris* (cypress pine) and eucalypt regrowth
- Eucalypt dieback

Ultimately the conservation value of TSRs must be addressed at a higher level in Function Management Plans (FMPs) and also within the RLPB organisational structure. This is crucial if individual RLPBs are to have the responsibility of managing ecologically significant TSRs. RLPBs must recognise that biodiversity conservation is of equal importance as stock movement issues and weed control. This is a duty outlined the RLPA 1998, but is presently not an integral part of routine TSR management.

The project documented the large assemblage of communities occurring on TSRs, identified the areas of high conservation value, attempted to establish suggested management guidelines for these areas and finally, implement procedures that will hopefully integrate the RLPB into local and regional conservation planning mechanisms.

1.0 Introduction

1.1 Rationale for Project

The extensive network of travelling stock routes in NSW is unique in the fact that it is one of the few states with a still important and functioning route system in Australia and internationally.[4]

TSRs in function were established more than 160 years.[5] The connection of these large areas of Crown Land to form stock routes in the 19th century has enabled these remnant areas to form the basis of a pseudo-conservation network. With the majority of TSRs containing remnants of once widely occurring communities, they have a critical role in local, state and national conservation initiatives. An assessment of the resource base and conservation resource status on TSRs was believed justified after a century of use and to provide an inventory of conservation areas and to provide management options for future management.

1.2 A Pre-history to Travelling Stock Reserves in NW NSW

The current appearance of TSRs in the Moree, Narrabri, Northern Slopes and Tamworth RLPBs reflect a continuous history of droving and maintenance of their semi-traditional usage patterns, whereas many other regions no longer have travelling stock.

Consequently the matrix of vegetation reflects the continued impact of grazing and this is seen by the lack of lower storey palatable shrubs and groundcover elements in regularly grazed routes. The regular grazing has also reduced the integrity of the native perennial grass groundcover in many areas, resulting in introduced grasses and exotic weeds being common in almost all TSRs. This has not reduced the importance of the TSRs for nature conservation as irreparably as one might expect, as their existence in developed cropping areas is often the last refuge for native flora and fauna species.

The presence of large areas of open TSRs, has resulted in a different appearance of TSRs than in other areas, where small reserves are more commonplace. This trend can be seen when comparing Tamworth RLPB, with the other Boards in the project area. Primarily size and topographical placement govern the intensity of reserve use, whereas in open routes, often the intensity of use is determined by the proximity to larger rural centres and the positioning of the routes along more frequently used roads. Size of the route is also important, but will normally just result in travelling stock moving quicker through an area and will not have a lessened grazing impact.

The north west botanically and geographically encompasses the north west slopes and the north west plains, and the northern tablelands emerges in the form of the Nandewar Ranges.[6]

There are a number of biogeographical areas within the region, namely the Brigalow Belt South Bioregion, Darling Riverine Plains Bioregion, and the Nandewar Bioregion.[7] This bioregional categorisation is an attempt to broadly categorise and area based on climatic, soil and biodiverity values, and can be utilised to gain an idea of the assemblages of flora and fauna within a region.

The overall result of this regionalistaion, is that the area encompassed by the four RLPBs has an high inherent level of diversity, and the numerous plant assemblages and communities that occur across

[4] McKnight, T.L (1977) *The Long Paddock- Australia's Travelling Stock Routes,* University of New England.

[5] Rural Lands Protection Boards (2001) *The Long Paddock, A Directory of Travelling Stock Routes and Reserves in New South Wales*

[6] Harden, G. (ed.) (1990) *Flora of New South Wales.* University of New South Wales.

[7] Thackway, R. and Cresswell, I.D. (eds.) (1995) *An Interim Bioregionalisation of Australia*. Australian Nature Conservation Agency. Canberra.

the north west, require a dynamic management approach to ensure the continued conservation of biodiversity on TSRs in the north west of New South Wales.
The integration of resource management principles and current conservation strategies into progressive TSR planning is an important future direction for RLPBs.
RLPBs currently are identified in many conservation strategies at a state level and inter-state level, as being key support organisations for activities involving pest control and management and the conservation of threatened species and genetic diversity through their management of TSRs.
To enable recognition of the role that RLPBs potentially can play, a few key strategies and frameworks have been explained.

2.0 Framework for Biodiversity Conservation on TSRs

2.1 Specific International Framework for Environmental decision making

2.1.1 Local Agenda 21

Local Agenda 21 was an international ecologically sustainable development programme developed by the United Nations, aimed at providing solutions to local environmental, economic and social problems, by providing mechanisms for local organisations to develop their own plans that address local concerns. This is potential option for RLPBs, which are elected by local landholders to develop local policies. Especially for conservation issues, the involvement and integration of community issues and concerns into TSR management should be an avenue that RLPBs seriously consider. Given that the FMPs are a public document[8] that must be publicly displayed prior to final approval there are indeed options for local people to provide ideas and feedback to the RLPBs, which may be pertinent in the management of specific areas.
Using definitions based on Agenda 21, [9] the following important principles should be incorporated into operational planning of FMPs.

Integration — the effective integration of environmental, social and economic considerations in decision making. An integrated approach means that decision making processes at all levels should include consideration of a broad range of environmental, social and economic impacts. Integration also suggests the effectiveness of working more closely and cooperatively with other organisations, including neighbouring RLPBs, shire councils, other levels of government and most significantly, all sectors of the local community.

Community involvement — recognition that sustainability cannot be achieved, nor significant progress made toward it, without the support and involvement of the whole community. A cooperative board–community approach from the early stages through to implementation of a project allows for resource sharing, and a supportive and active community that perceives itself as owning both the problems and the solutions. Community involvement is also vital to monitoring the state of the environment and the effectiveness of management strategies.

Continual improvement — the declining environmental situation means there is an imperative to take immediate action to become more sustainable and to make continual improvement. Change

[8] *Rural Lands Protection Act* 1998 (NSW) s 56(1)
[9] Cotter, B. and Hannan, K. (Environs Australia) (1999), Our Community Our Future: A Guide to Local Agenda 21, Commonwealth of Australia, Canberra

will not occur all at once; however, it is important to make continual improvements, making the most of advances in technology and scientific understanding about what is sustainable, and of increases in community awareness of sustainability issues.

Ecological integrity — to protect biological diversity and maintain essential ecological processes and life-support systems. Each region has a unique climate, geomorphology, biota and habitat qualities and patterns that determine the issues and responses to maintaining ecological integrity

2.2 National Framework for Biodiversity Conservation

Biodiversity conservation has become an integral part of the political and social landscape during the last decade of the 1990s and promises to become more so in this century. The *National Strategy for the Conservation of Australia's Biological Diversity*[10] heralded the national acceptance of biodiversity conservation planning, and initiated pressure to full integrate biodiversity conservation planning into all spheres of natural resource management, including the management of travelling stock reserves by associated RLPBs.

2.2.1 The National Strategy for the Conservation of Australia's Biological Diversity

The *National Strategy for the Conservation of Australia's Biological Diversity* identifies a set of key components that can be used to identify priority areas for biodiversity conservation, including:

- Species and ecosystems that are rare or extensively depleted by threatening process, and/or at risk from threatening processes
- Habitat as required by migratory species (specifically applicable to wetland and riparian areas on TSRs)
- Those components of biodiversity not adequately protected in conservation reserves

2.2.2 National Objectives and Targets for Biodiversity Conservation 2001-2005[11]

Following review of the *National Strategy for the Conservation of Australia's Biological Diversity*, in 2000 amended targets and objectives were formulated and redefined for the period 2001-2005. These objectives included strategies aimed at:

- Promoting ecologically sustainable grazing (particularly in high conservation areas of TSR)
- Reversing long term decline in the quality and extent of Australia's native vegetation and ecological communities and the ecosystem services they provide.
- By 2005, all jurisdictions have programs in place to protect areas of high quality native vegetation.
- Protecting and restoring native biodiversity through retention and improved management of native vegetation, and revegetation aimed at reversing lost agricultural productivity, deteriorating water quality, and damage to native ecosystems caused by dryland salinity.
- Protecting grasslands of high conservation significance at risk of unsustainable grazing pressure (especially applicable to grassland areas on TSRs)

[10] Commonwealth of Australia 1996. *The National Strategy for the Conservation of Australia's Biodiversity.* Commonwealth Department of the Environment, Sport and Territories. Canberra.

[11] National Objectives and Targets for Biodiversity Conservation 2001 -2005 (2001) Environment Australia, Canberra

2.2.3 Nationally Agreed Criteria for the Establishment of a Comprehensive, Adequate and Representative Reserve System for Forests in Australia (JANIS report)[12]

Although initially developed for conservation reserves in forest, the principles and criteria can be applied to general conservation management. JANIS recommended;

- Maintenance of ecological processes and dynamics of ecosystems in their landscape context
- Give priority to rare, vulnerable and endangered ecosystems and species
- Dedicating areas to nature conservation based upon the principles of:
- comprehensive (ensuring that all components of biodiversity are sampled)
- adequacy (ensuring that there is sufficient area to maintain ecological processes an dynamics
- representatives (ensuring that the geographic and ecological ranges of species and ecosystems are sampled)

Utilising JANIS criteria, a comprehensive and adequate reserve system (or psuedo-reserve area) should;

- 15% of pre-1750 vegetation types to be managed for conservation
- priority to be given to protection of threatened species
- identified vulnerable forest communities– 60% of the community should be managed for conservation
- for endangered communities- all of the area should be managed for conservation

There is the possibility of applying the JANIS criteria to TSR management, with the majority of vegetation types identified for TSRs, and the poorly conserved vegetation types known for most board areas. Threatened species and to some extent predictive habitat, are also known and both federal and state agencies have identified endangered ecological communities.
This allows for a number for management options to be developed for TSRs

- areas of endangered communities are managed purely for conservation, of which periodic stock grazing may play a role
- areas of threatened species are recognised and the species requirements are included in determining the impacts of any non-routine activity (such as fence or dam construction) occurring on the TSR.
- Boards look to managing 10-15% of all TSRs for conservation.

2.2.4 National Strategy for Ecologically Sustainable Development

The National Strategy for Ecologically Sustainable Development (ESD) was adopted in 1992, and has become a fundamental ethos behind many recent resource management strategies and legislation.
ESD can be achieved through the implementation of the following principles and programmes:

The precautionary principle

Namely, that if there are threats of serious or irreversible environmental damage. Lack of full scientific certainty should not be used as a reason for postponing measures for preventing environmental degradation.

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[12]Joint ANZECC/MCFFA National Forest Policy Statement Implementation Sub-committee, Technical Working Group Draft Report, 1995. Broad Criteria for the Establishment of a Comprehensive, Adequate and Representative Forest Reserve System.

(a) short/medium term actions

- best available environmental practice is used to mitigate damage in development, which is likely to lead to serious or irreversible environmental degradation
- any degraded areas are restored as part of the development project

(b) long term goals

- avoid permitting or initiating developments or activities which are likely to lead to serious or irreversible environmental degradation and seek out alternative methods of allowing development and activities within an area. [*This could involve specifying the type of development permitted in certain areas and even the type, frequency and duration of grazing in certain areas.*]

Inter-generational equity

Present generations should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations and the conservation of biological diversity and ecological integrity.

(a) short/medium term actions

- avoid wasteful use of resources
- think of future generations when making decisions
- recognise the interdependence of humans, other species and natural processes
- protect areas of threatened species and manage natural areas for their conservation values

(b) long term goals

Recognise that in future generations, TSRs may have a different role to their current role for stock. Development and usage of these areas should be maintained in as little disturbed condition as possible, so that they will be available for future generations.

Species diversity generally maintains stability and promotes adaptability. Human survival as a species may depend on maintaining genetic diversity, thus a development path that enhances genetic and ecosystem diversity should be chosen.

Improved valuation and pricing of environmental resources

(a) short/medium term actions

- Value the use of TSRs in a cost/benefit situation, with the financial benefits being weighed against long-term costs. Do the charges applied to TSR use, actually represent the cost of rehabilitation of the area, the impact on an area of HCV and the theoretical cost of replacing a species lost from an area?
- Polluter pays- is the rate of TSR charge high enough to cover the costs of remediation for an area?

(b) Long term goals

- Choose a path of development and usage that doesn't burden future generations with the costs of repairing environmental degradation initiated now.

2.3 Biodiversity Policy in NSW

2.3.1 NSW Biodiversity Strategy

NSW released the NSW Biodiversity Strategy in 1999. This was a unilateral strategy document that was ratified by numerous resource management agencies in NSW, including the RLPBs.

In relation to TSRs, the Biodiversity Strategy stated that the intention was to;

> "(I) Improve management strategies for Travelling Stock Routes (TSRs) to maintain biodiversity values, particularly the contribution of TSRs as wildlife corridors and as sources of vegetation seed stock"[13]

Ideally, all management plans and strategies developed by RLPBs should be complementary to the aims and strategies of the NSW Biodiversity Strategy. The statutory requirements of the RLPA 1998 in regard to Function Management Plans (FMPs) parallel many strategies in the NSW Biodiversity Strategy.

In the northwest, the major biodiversity plans that will apply to RLPBs are the Regional Vegetation Management Plans, which will direct the conservation and sustainable management of native vegetation in a regional context. Other planning instruments such as Recovery Plans for threatened species and Catchment Management Plans will also affect the way RLPBs manage biodiversity on TSRs.

The main point to develop is that FMPs should be consistent with the aims of major regional planing documents, and the individual RLPBs should involve themselves in the planning process and policy implementation.

2.3.2 NSW Native Vegetation Conservation Strategy[14]

The NSW Native Vegetation Conservation Strategy is a strategy for the future management of native vegetation across the state, and relies upon the individual Regional Vegetation Committees to develop the regulatory and procedural implementation of vegetation management at a regional level.

The specific strategies that involved RLPBs, were that where possible:

- TSR FMPs are linked into regional planning processes such as regional vegetation management plans
- Ensure that vegetation conservation principles are incorporated into TSR FMPs
- Improve management strategies for TSRs to maintain their contribution to wildlife corridors and sources of revegetation seed stock.

  RLPB State Council represents the RLPBs on the Native Vegetation Advisory Council and has provided input into the development of the strategy.

2.3.3 State Council RLPB Environmental Policy[15]

The RLPBs own environmental policy supports the concept of Ecologically Sustainable Development and suggests that the principles should be incorporated into legislation affecting rural lands. Assumedly this would include policy and procedures developed from the RLPA 1998.

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[13] NSW NPWS *NSW Biodiversity Strategy (1999)* action 75 p34.

[14] Native Vegetation Advisory Council (2000) *Draft* Native Vegetation Conservation Strategy. NSW

[15] RLPB State Council (unpublished) date unknown. Environmental Policy Motion 98/14

2.2.4 Rural Lands Protection Act 1998

The RLPA 1998 introduced a number of key points that potentially have increased the options for nature conservation on TSRs. The most important of these are the 'beefed up' management plans known as Function Management Plans, and the increased role and authority that the State Council of RLPBs have.
State Council may provide guidelines for RLPBs[16], which may ultimately include providing guidelines for environmental management of significant conservation areas, through the FMP process.[17] Hopefully, through the interaction with government resource management agencies, this will involve providing guidelines based upon existing legislative requirements for conservation, such as implementation of recovery plans and impact assessment through the *Threatened Species Conservation Act* 1995[18]. Other guidelines may be based upon the RLPBs responsibly, arguably as a 'local authority', [19] under state and federal legislation.[20]

Function Management Plans are an opportunity for RLPBs to increase the operational implementation of management strategies on TSRs, whereas previously, there has not been a strong emphasis on planning or recording *modus operandi* for routine TSR management. In relation to specific high conservation areas that fundamentally require individual specific management strategies or outlines, there is adequate flexibility in the FMP for site specific strategies to be attached as appendices to the main plans.

2.2.4.1 Function Management Plans

Section 45 (2) of the RLPA 1998 deals with four minimum points that must be dealt with under the FMP. State Council may ultimately provide guidelines for what should be included in the relevant sections for these areas in the FMP.
These points are:

a) The management of TSRs for the benefit of travelling stock
b) The adoption of appropriate stocking practices
c) The conservation of wildlife (including critical habitat, threatened species, populations and endangered ecological communities and their habitat)
d) The protection of TSRs against soil erosion and diminution of water quality

The management of TSRs for the benefit of travelling stock is reasonably self-explanatory, with all boards aware of the necessity of maintaining traditional routes. Where boards have opted for fencing areas for leasing to landholder, these have been in areas where traditional stock movements have declined.
The adoption of appropriate stocking practices is a difficult concept to define, but should ideally define a range of stocking practices suitable for different types of TSRs and especially for TSRs of different conservation value. It would expectantly include suggested best management for areas of threatened

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[16] *Rural Lands Protection Act 1998* (NSW) s 25 (1)
[17] *Rural Lands Protection Act 1998* (NSW) s 44 (2)
[18] *Threatened Species Conservation Act* 1995 (NSW)
[19] Lacey, C.,(1998) Legislative Frameworks for Conserving Biodiversity on the Travelling Stock Routes of NSW. *The Australasian Journal of Natural Resources Law and Policy* **5**(2) 129-152
[20] *Environmental Planning and Assessment Act* 1979 (NSW), *Native Vegetation Conservation Act* (1997), *National Parks and Wildlife Act* 1974 (NSW), *Rural Fires Act* 1997 (NSW) and *Environment Protection and Biodiversity Conservation Act* 1999 (Commonwealth)

species, ecological communities and regionally significant vegetation, where a stocking rate to benefit the ecological needs, rather than the stock need was implemented. Because RLPBs are bound by the Native Vegetation Conservation Act 1997, the definition of appropriate stocking practices may be influenced by Regional Vegetation Committees (RVC) and their definition of conservation management of TSRs. TSRs are identified in many RVC areas as being of high conservation vale, but separately, are being identified as currently ' managed for conservation'. Periodic grazing may be recognised as a part of the ongoing management, but as of yet, the term *periodic grazing* has not been defined.

The conservation of wildlife, including threatened species and communities should fundamentally include implementing management and grazing strategies which prevent long term damage to the area, or reduce the available area for the species or community to inhabit. One instrument that can be utilised to determine the effect of a development or activity on a threatened species or community, is through an environmental assessment such as a REF and an 8-part test of significance, which may determine the significance of impact upon;

- Lifecycle of a threatened species
- Lifecycle of an endangered population
- Will a significant proportion of regional habitat for the community, species or population will be affected
- Whether critical habitat will be affected
- Whether known habitat of a species, community or population will be isolated from nearby habitat
- If the activity is a threatening process
- Whether the species or community is at the limit of its ecological distribution
- Is the species, community or population adequately conserved in conservation areas

The protection of TSRs against soil erosion and diminution of water quality primarily comes back to stock management and the maintenance of adequate groundcover to prevent soil loss in rainfall events. Maintaining 60-70% groundcover is recognised as being the minimum groundcover necessary to prevent soil loss and thus diminution of water quality. This is a difficult target to meet in drought times, when TSRs area often pushed past their sustainable grazing limits, but especially in normal seasons when stock are just grazing, a high level of groundcover should be maintained. The retention of an adequate groundcover level is especially important on hillslopes, creek and riverbanks and on soil types that are prone to erosion. It may be necessary to remove stock and close the TSR once the groundcover percentages start approaching a certain level, or requiring a reduction in the mob size. In extreme case where repeated overgrazing has occurred, the TSR may have to be closed for up to a year to allow adequate regeneration and establishment of groundcover.

3.0 Conservation Synopsis

3.1 Conservation Objectives for Travelling Stock Reserves/Routes

Rural Lands Protection Boards are a participatory organisation in the NSW Biodiversity Strategy, as previously mentioned, which includes adoption of the JANIS criteria for management.
There is the opportunity for boards to adopt these conservation principles into their reserve management. This would not involve a great deal of alteration to existing management, as reserve management principles could be developed to mirror those used in such conservation systems as biosphere reserve management. This would require an altruistic change in the attitude of the boards toward nature conservation and initiate recognition that even conservation of areas for their ratepayers' benefit is a start towards the community driven notion of TSR conservation management.

Goal: Improve the management of identified significant areas, though altered current management to some areas and the development of permanent long term protection through bilateral Joint Management Agreements with appropriate conservation agencies and community based community conservation groups.

Objectives

- Increased area of TSRs with conservation value under Joint Management/ Conservation Agreements
- Increased conservation management of all TSRs across all quality levels (H: M: L)
- Increased community involvement in the conservation management of certain TSRs
- Increased awareness of the RLPBs conservation role in all levels of strategic conservation planning (Local→State→ National)

Redefine the management of TSRs so that conservation is the key direction in areas with identified conservation significance and that stock management is a secondary (but potentially important) consideration in these areas.

3.2 Management Planning Processes

The initial assessment of TSRs in the project areas, is only the first stage in the conservation of TSRs in the four boards. The NHT project title aptly described the basic steps necessary for management; *'identification and management of biodiversity on TSRs'.* The identification process and certain management steps have been carried out on individual TSRs, but at this stage there has not been an immediate attempt to alter current management.
There are fundamental matters that a conservation programme on TSRs should include:

- Information gathering
- Information assimilation- (understanding the information, change of perspective)
- Prioritisation of objectives and areas to be conserved
- Strategic planning (incorporation in FMPs)
- The means by which conservation will be achieved and implemented
- Information dissemination (making public and community aware of outcomes)
- Review and evaluation of objectives

Many conservation programmes have faltered because only introductory elements have been considered. The RLPBs have achieved the first point, but the impetus needs to be translated into continued fulfilment of the other objectives.
This could be achieved by:

- Making copies of this report available to the community with the TSR FMPs when they become available
- Holding community information nights to discuss outcomes and comments on the project
- Conducting ratepayer surveys (included in animal health newsletters, rate notices etc) about the ratepayers notions and ideas for conservation management of TSRs
- Providing opportunities for outside authorities, educational institutions and non-government agencies to assist in management planning and providing expertise in relevant areas.

3.3 Best Management Practice- Information collection

The assessment carried out as part of the NHT project is limited; due to logistics, survey design and timing of survey and should only be used for broadscale planning. Through skills acquired in vegetation, habitat and cultural assessment, on going assessment should become an integral part of TSR management. This would increase the information base available, thus enabling better decisions to be made regarding specific TSR management issues.

Develop a routine, regular and recordable habitat assessment of TSRs to enable dynamic alteration of management

3.4 Best Management Practice- Conservation priorities

Conservation and operational priority should be given to conservation of recognised significant communities and areas. The protection of high priority sites is more important in some instances than stock related issues in the same area. Priority should be given to threatened species and communities as well as communities of regional and national significance and other areas identified in this report.

Identify vegetation communities to conserve, and prioritise these for immediate work

3.5 Best Management Practice- Mechanisms for conservation

Public land has identified as being the core area with which to form a local and regional conservation network. TSRs will form a portion of this in some areas, and subsequently management of these sites may have to be altered. Long term management agreements should be used to conserve high value sites, where appropriate. These agreements are possible with agencies such as NPWS and DLWC.
Special purpose rates can be levied on ratepayers under the RLPA1998, and boards may investigate levying on ratepayers an environmental rate in order to fund conservation works and reduced stock usage of certain specific HCV TSRs. The local community ultimately gains the benefit from retaining TSRs for conservation purposes. There are many external sources of funding available for conservation works and these should be targeted initially.

Enter into long term Joint Management Agreements on high value TSRs

3.6 Best Management Practice- Stewardship Payments

TSRs provide the opportunity to promote sustainable management of remnant areas in the north west slopes region. State and federal government agencies however, should provide ongoing funds, resources and advice if RLPBs are to drastically alter their current management strategies.

Earnestly lobby state and federal government agencies, conservation groups and stakeholders to support a RLPB attempt to secure ongoing funding for the conservation management of TSRs

3.7 Best Management Practices- Future direction

Initial areas of conservation significance have been identified through this project. Recommendations have been developed for the management of significant areas, but for the board to receive kudos and to secure funding the RLPBs need to be able to demonstrate their ability to manage conservation areas. This may involve an alteration in the financial situation of boards, but it is important that the boards have a demonstratable history of conservation management.

Be able to demonstrate to outside concerns and community interests, a strategic and practical approach to nature conservation

3.8 Community Conservation in NSW

The distribution of the project area across three bioregions (*Darling Riverine Plains, Brigalow Belt South, Nandewar*) with large amounts of each region cleared and small percentages under formal conservation, places greater emphasis upon other Crown Land areas for nature conservation.
Benson[21] identifies that the vegetation types most threatened in the three bioregions include Brigalow woodland, box and ironbark woodlands, vine thickets, plains grasslands and riparian areas. These communities are found in significant and representative stands on TSRs.
Formerly, there was greater emphasis on the protection of specific threatened species, but the directional change to community conservation will be of greater value for TSRs in the North West, as many of the threatened species occurring on TSRs are grouped within particular vegetation communities. Eight threatened flora and fauna species have been recorded within white box woodlands and five threatened flora species have been recorded from grasslands. This illustrates that conserving critical communities also has benefits for individual species.
Not only are all grassland areas in the northwest, considered to be 'Critically Endangered' or 'Endangered', under IUCN 1994 categories[22], but the majority of communities on fertile and arable soil in the northwest also are potentially threatened due to the extensive wide scale clearing. These communities include grassy woodlands of Yellow Box (*Eucalyptus melliodora*) and Grassy White Box (*Eucalyptus albens*) and riparian vegetation communities. Grassy White Box has been reduced to less

[21] Benson, J. (1999) Background Paper 1: *Setting the scene: Native Vegetation in NSW*. Herbarium Sydney. Native Vegetation Advisory Council.
[22] Keith, D.A., Chalson, J.M. and Auld, T.D (1997) Assessing the status of threatened plants: A new methodology and an application to the vascular flora of New South Wales. Final Report: Project Number 450. Commonwealth Endangered Species Programme. Environment Australia, Biodiversity Group.

than 0.05% of original extent[23]. Initial vegetation mapping through the Regional Vegetation Process has identified that in many areas, there is considerably less than 10% of pre-existing vegetation types remaining. Under IUCN classifications, this potentially puts a large number of TSRs across the four boards under the classification of high conservation on a regional basis.
As our knowledge of remnant regional vegetation types increases, the value of TSRs and their remnant vegetation stands will increase.

Table 1 Summary Table of Communities of Conservation Significance in NW NSW, occurring on TSRs (based on Benson[21] and NPWS[29])

Community	Reason
Grassy White Box Woodland	Federally listed endangered community
Brigalow Woodland	State and federally listed endangered community
Semi evergreen Vine Thicket	State and federally listed endangered community
Plains Grass Communities	State listed endangered community
Riparian communities/River Red Gum communities	Not adequately reserved, few remnant areas remaining
Mugga Ironbark Woodland	Barraba Shire Council LEP- community of conservation significance
Myall Woodland	Not adequately reserved, few remnant areas remaining
Carbeen Open Forest	State listed endangered community
Yellow Box Woodland	Not adequately reserved, few remnant areas remaining
Dichanthium (Bluegrass) grassland	Federally listed endangered community

3.9 Management Impacts on Remnant Woodland TSRs

Woodlands are a major part of TSRs in all RLPBs in the project area, and although they have a higher habitat and structural value than most adjoining freehold land, the disparity between their vegetative value and their habitat value, again becomes apparent. The impact of a 160 years of grazing has had serious impacts upon the habitat and structural quality of TSR remnants. This grazing induced degradation has been exacerbated by illegal firewood collection, harbour destruction for rabbit control and 'tidying up' of reserves, which involves removing fallen timber.
This has resulted in a general trend of fenced reserves and heavily used wooded areas on open TSRs, having a park-like appearance, denuded of fallen timber and with large mature trees with a grassy groundcover. Greater than 75% of fenced reserves in the Tamworth RLPB had no significant ground layer of leaf litter, fallen timber and logs. This severely reduces the habitat niches, that many species require for survival. In comparison, only 30 % of Narrabri's TSRs had insufficient ground elements, such as logs, leaf litter and fallen timber. This is largely due to the previous prevalence of rabbits in the Tamworth area, which was not an issue on the heavy black clay soils in the Narrabri area. The demand for firewood by the numerous towns in the Tamworth RLPB area is also largely responsible for the lack of groundcover elements.

[23] Prober, S. M. and Thiele, K.R. (1993) The ecology and genetics of remnant grassy whitebox woodlands: contributions of size and disturbance to floristic composition and diversity of remnants. *The Victorian Naturalist* **110**,30-36

Grazing does have an impact upon all levels of fauna, from mammals through to birds and invertebrates.[24] [25] By reducing available biomass for invertebrates, populations of insects reduce and this affects bird species of the insect foraging guild. This includes recently listed threatened bird species, including; Diamond Firetail, Grey Crowned Babbler and Brown Tree Creeper. Removal of fallen timber reduces habitat for ground dwelling mammals and insects, which in turn can affect foraging opportunities for bird species. It would be best management practice, to conduct and Review of Environmental Factors (REF), when activities are to be conducted that remove fallen timber from a TSR.

In Yates and Hobbs' report[26], they list a range of indicators of woodland degradation, based on contemporary research. They included such indicators as; lack of tree recruitment, dieback, understorey loss, and an increase in unpalatable and exotic groundcover species. These are all common features of fenced reserves and many wooded areas on frequently used open routes in the project area.

Selected results:

- Plains dieback- a third of wooded TSRs in Tamworth RLPB were suffering from dieback, ranging from 10% of trees affected to whole reserves of 100% affected trees.
- Lack or regeneration- 54% of the sample TSRs in Tamworth RLPB had no visible regeneration of either tree or shrub elements.
- Lack of understorey- although not all TSRs would have had a significant understorey layer, only 12% of Tamworth RLPB had an understorey and almost all these were TSRs with a *Callitris, Cassinia* and *Olearia* understorey, which is typical of upper slope white box and ironbark communities.

Although grazing can also impact on soil nutrient levels, soil compaction and infiltration[26], the alteration of soil dynamics can also affect seedling establishment and nutrient tolerances of perennial species. This is the most probable reasoning behind the lack of tree and shrub recruitment in many heavily used fenced reserves in the Tamworth, Northern Slopes and Moree RLPBs.

3.10 Intensity of Travelling Stock Route use

The frequency and intensity of TSRs usage has developed a noticeable trend in the past few decades, with less regular travelling stock and drought usage and a greater emphasis on grazing mobs and grazing for an extended period of time in one area. Coupled with this has been the establishment of semi-permanent electric fencing (‘section' / 'taped' grazing) along once open sections of TSRs. If not managed correctly, and if guidelines are not established that regulate the timing and intensity of grazing, there is the potential for a change in the long-term pasture composition. In the Yetman / Boggabilla area of Northern Slopes RLPB, during the survey period fenced sections had led to overgrazing.

[24] Rambo, J.L and Faeth, S.H. (1999) Effect of Vertebrate Grazing on Plant and Insect Community Structure. *Conservation Biology.* (13) **5**: 1047-1054

[25] Fleischner, T,L. (1994) Ecological Costs of Livestock Grazing in Western North America. *Conservation Biology* (8) **3**: 629-644

[26] Yates, C.J. and Hobbs, J. (1997) Temperate Eucalypt Woodlands: a Review of Their Status, Processes Threatening Their Persistence and Techniques for Restoration. *Australian Journal of Botany.* **45**, 949-973

The unmonitored use of electric fencing is perhaps the one of the greatest threats to native pasture in the Northern Slopes RLPB, Moree RLPB and potentially the Narrabri RLPB.
The FMPs as per the RLPA 1998, specifically address the consideration of appropriate stocking practices.[27] Ideally this will involve greater consideration to plant community composition and to biodiversity conservation, rather than the amount of available feed for stock, as is currently the case. There is also a requirement for the FMP to address protection of the reserves against soil erosion and diminution of water quality. Assumingly, this would require maintenance of groundcover percentages to be between 60-70%, as outlined in Nowland's sustainability report[28], and generally accepted within the conservation farming community as acceptable guidelines.
Although many reserves on the slopes and tablelands may maintain close to a 60-70% groundcover, the biomass levels could be reduced past appropriate levels. There are many situations where towards the end of a grazing permit, groundcover levels fall below 60-70% levels. This is more readily controlled in fenced reserves, where in most occurrences, both stock and the groundcover would benefit from being removed earlier than they currently are.
On cracking clay soils where there are often bare inter-tussock spaces, groundcover percentages may have to be alternatively based on biomass targets. Although the inter-tussock species may be noticeable, these are often colonised by native herbaceous species and forbs, which are the first to suffer from extended periods of grazing. Currently, many plains grassland areas are grazed to levels below 60-70% groundcover levels, both as a result of overgrazing and the normal dynamics of western grasslands.

3.11 Conservation across the North West

The area of land held within formal conservation reserves across the north west is quite small, and is concentrated in the steeper topographical areas of the region, a fact repeated across the state. The only formal conservation areas on the NW plains (within project area) are the small nature reserves of Brigalow Park/ Claremont NR, Gamilaroi NR, Careunga NR, Kirramingley NR Boomi NR, Boomi West NR and Borongar NR. On a bioregional basis, formal conservation reserves only account for 0.9% of the Darling Riverine Plains Bioregion, 2.5% of the Brigalow Belt South Bioregion and 1.9% of the Nandewar Bioregion[29]. This increases the emphasis on TSR to contribute to regional conservation targets, whether it is through informal agreements and increased awareness, or formal conservation agreements.

[27] *Rural Lands Protection Act* 1998 (NSW) s 45 (2)
[28] Nowland, A (1997) *Sustainable Management strategy for TSRs in Central Western New South Wales.* Condoblin, Coonabarabran, Coonamble, Dubbo, Forbes, Molong, and Nyngan Rural Lands Protection Boards.
[29]NSW National Parks and Wildlife Service Western Directorate , (2000) Preliminary Bioregional Vegetation Project (Stage 1) Resource and Conservation Assessment Council.

Table 2 The reserves of Northern Plains region and the vegetation communities they conserve.[30]

***Boomi-* NR**- 156 ha (Carbeen Open Forest (COF))
***Boomi West* NR** 150 ha (COF)
***Borongar* NR**- 195 ha COF)
Brigalow Park and ***Claremont* NR**- 402 ha (Brigalow)
***Careunga* NR**- 518 ha)
***Gamilaroi* NR**- 114 (Ooline community)
***Kirramingley* NR**- 1300 (*Astrebla* mixed grassland)
***Mt Kaputar* NP**-38 816 ha (mixed communities)
***Planchonella* NR**- 717 ha (SEVT) 400 ha of SEVT

The small representation of vegetation communities and assemblages in these reserves means that the TSRs can provide a vital area for nature conservation when alternate conservation reserves do not exist.

[30] NSW, NPWS. *The year in review- July 200- June 2001- NPWS* . An annual report for the Northern Plains Region. NSW NPWS

4.0 Project Results

4.1 Corridor Value of TSRs

Numerous studies have been completed that document the importance of remnant vegetation along roadsides and corridors.[31] Essentially this is correct, and in a monocultural agricultural environment, any retention of native vegetation is a step in the right direction. The actual comparative value of different TSRs has not been established however, and even Freudenberger's report[32] did not comprehensively determine the effects of TSRs width, fragmentation and habitat quality upon the value of the TSR as a wildlife corridor.

The natural continuity of vegetation is also different to other parts of the state, with wooded areas often isolated from other wooded areas by low grassy shrubland and remnant grassland areas. This limits the movement of species in some instances, where the distance between wooded 'islands' is too great for smaller woodland specialist bird species.

The role of TSRs as wildlife corridors has been proposed and touted as the only significant remnants remaining to link larger areas of native vegetation[28]. This is a consequence of the agricultural landscape of the western slopes and plains, where in many instances, the shire road reserve and the associated TSR are the only remnants of native vegetation, and although they are not of pristine environmental quality, they form the only significant natural vegetation. There are considerably more factors that determine the viability of wildlife corridors, than simply the presence of trees in a linear reserve, in an otherwise treeless landscape.

These factors have been well established by authors such as Saunders & Lynch[33] and Freundenberger[34] and include such things as the role of edge effects, width, length and continuity of understorey.

The TSRs throughout the northwest do not form contiguous belts of woodland linking remnant areas. In the Liverpool Plains, many of the TSRs are dominated by Plains grass grassland of poor floristic quality, but high community and structural value. There is questionably any significant corridor value, in many of the TSRs in the Liverpool Plains. In the Narrabri and Moree RLPB, there are large areas and whole routes characterised by open grassland, dominated by *Dichanthium, Panicum* and *Astrebla* grass species. Minimal research has been conducted on the corridor value of grassland areas, although this survey has found that they of an equal conservation value as many woodland areas, and in fact have a higher value in many highly developed agricultural cropping areas, but purely on a floristic level at this stage. As part of the increasing awareness of TSRs for their biodiversity benefits, Boards should investigate funding opportunities to research the faunal value of grasslands, and the role they play in genetic transfer from isolated woodland areas to other woodland areas.

An important factor affecting TSRs as wildlife corridors, is their connectivity to other sections of native vegetation. Although this is beyond the management scope of RLPBs, they should consider the impact

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[31] Bennett, A.F "Roads and wildlife conservation: a review" in DA Saunders and RJ Hobbs (eds) *Nature Conservation 2: The Role of Corridors (*1991*) pp99-117.*

[32] Freudenberger, D. and Drew, A. (2001) Bird Surveys in Travelling Stock routes and Reserves on the Northwest Slopes and Plains; Perspectives on the conservation value of TSRs. CSIRO Sustainable Ecosystems.

[33] Lynch, J and Saunders, D (1991) Responses of bird species to habitat fragmentation in the wheatbelt of W.A in Nature Conservation 2 (Eds Saunders, D.A and Hobbs, R.J) Surrey Beatty, Chipping Norton

[34] Freuenberger, (1999) Guidelines for enhancing grassy woodlands for the vegetation investment project. Report to Greening Australia. CSIRO Wildlife and Ecology , Canberra

of any developments on the fragmentation of existing timbered areas and liaise with Regional Vegetation Committees to increase the corridor value of TSRs.

Most TSRs in the study area do not connect larger areas of vegetation, such as National Parks and State Forests and therefore their value overall must be questioned. They only provide refuge for the resident populations in the fragmented patches of woodland. There are also many instances where there is large break in the vegetation along a linear reserve, often greater than 500-1000m. This is the maximum distance that many woodland birds will travel, and many smaller passerine birds may not travel such a large distance.[35] This further reduces the overall value of the TSR as a corridor, if the TSR is not connected to a larger remnant itself. The report on the status of individual RLPBs, investigates further the value of individual routes towards local and regional biodiversity conservation.

There is a noticeable lack of any native vegetation in many agricultural parts of the area, and therefore the existence of any form of native vegetation in an otherwise developed landscape, could be broadly classified as beneficial to the conservation of biodiversity. However, the role of TSRs as corridors linking remnant vegetation is lowered, when the only remnant vegetation is the TSRs themselves.

TSRs have been shown to have high value, purely on an individual floristic and faunal value, but the association between these two in their value as wildlife corridors is not yet determined.

In parts of the northwest, TSRs are in a similar condition to the grazing land adjoining the TSR, due to the grazing pressure and the general decline in tree health associated with the agricultural landscape. This has been a result of historical grazing pressure, rather than increased pressure in recent times. There is still the opportunity for restoration of many of these areas, as the fundamentals of most communities areas are still present in the TSRs. Route width and vegetation complexity also vary, from only a few metres wide to a few hundred metres in width, and reserve size varies from 0.5 ha to 890ha in size.

Conservation reserves of only 0.2 ha in size are viable for the conservation[36] of some individual species, whilst bird species such as the Hooded Robin may disappear from remnants areas of a hundred hectares in size, where spatial and habitat elements are not present.[37]

4.2 Conservation Values- Quantified

4.2.1 High Conservation Value (HCV)

Establishing a definitive definition of the conservation classification can severely affect the emphasis that is placed upon the conservation status. It is difficult to compartmentalise vegetation communities into distinct categories, and by adopting different conservation classifications, significant areas can be downgraded into a lesser conservation status.

Previous classifications by Colquhoun[38] and Scanlon[39] have referred to High Conservation areas with minimal weed infestation, and 'near natural'. The use of the term near natural is an arbitrary term, as there is no set classification for 'near natural' vegetation.

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[35] Drew, A., pers comm.June 2001

[36] Grassy Box Woodlands Conservation Management Network, 2001 Woodland Wanderings (1) 1, 3

[37] Freudenberger, D. 'Conservation of biodiversity in grazed landscapes: some patchy principles'. In Balancing Conservation and Production in Grassy Landscapes. *Proceedings of the Bushcare Grassy Landscapes Conference*, 19-21 August 1999., ed. Barlow, T. and Thorburn, R., pp- 154-161

[38] Colqhoun, V. (1998) *Roadside Management Guidelines Book 3- Orange to Parkes, Cudal to Forbes.* Roads and Traffic Authority/ Greening Australia Central West.

[39] Scanlon, T., (1998) Nymboida Shire Council Roadside Environment Plan of Management. Nymboida Shire Council. NSW

This definition is in the same classification as 'near natural' vegetation, as the term remnant implies that the area is close to its original natural state. According to Saunders, Hobbs & Margules,[40], remnant vegetation is defined as "an area of native vegetation, around which the original vegetation has been removed".
This definition does not include a quantification of the quality of native vegetation remaining or what the conservation classification of the 'remnant' would be. In many agricultural areas, the TSR and road reserve could be classified as a remnant, due to the presence of native species on the TSR and the cropping either side of the TSR. This would be despite the presence of weeds and lack of regeneration, or a high degree of tree dieback and mistletoe. The question is, just because an area is remnant, does it justify a higher conservation status?

These areas provide good habitat for wildlife and the conservation of wild genomes. Native species are dominant, but not necessarily diversified. Some communities may not necessarily be diversified, due to successional stages in vegetation communities being reached. The use of the terms HCV may also be misleading, as areas that are not grazed and under no threat of modification are often classed as HCV, whereas there may be areas in the landscape that could be rehabilitated and although suffering from some forms of modification, are of more value at a spatial and community level. It also does not take into account regionally significant vegetation types, or unusual vegetation occurrences.

A true conservation classification system should incorporate as many classification criteria to develop an encompassing matrix that allows for extraneous filters to be applied to the area. This would involve external factors that do not rely on *in-situ* features of the reserve area.

Fundamentally:
High-
Minimal weed infestation, or limited presence of only a few types of weeds and exotic species. Characteristic species are present in the community, preferably with high diversity. All layers that should be present are present, intact, and of high quality. Effective regeneration of all species in all layers. Ground elements such as fallen timber and leaf litter should be present.
May have intrinsic value not classified in terms of vegetation or habitat quality. This could be a cultural value, or a remnant value associated with regionally significant vegetation. TSRs with threatened species occurring on them, are defined as high conservation value, despite the habitat or floristic quality of the site.
TSRs with vegetation communities of regional significance should also be reclassified as high conservation value, when this information becomes available.

[40] Saunders, D. A., Hobbs, R.J. & Margules, C.R. (1991) Biological consequences of ecosystem fragmentation: A Review. *Conservation Biology* **5**: 18-32

To aid in the identification of high value areas, a conservation table was used. This table was used to aid in determining ' high ' value features of a TSR.

Table 3 Conservation Criteria applied to TSRs in NW

Criteria	Reasoning
Habitat for Threatened species	[IUCN, JANIS, EPBC Act ,TSC Act] Identified EEC, E, V species
Regional Vegetation Community	Regionally Significant Vegetation communities, as per RVC process
Remnant Size	Remnant size determines the probable species richness
Remnant Status	Relates to regeneration rate of strata, and quality of the elements of strata
Corridor Width	Corridor width determines the genetic and biological flow through a corridor
Integrity of Reserve area	Degree of suitable habitat elements, such as rocks, logs etc.
Community Diversity	Number of vegetation communities present in an area
Corridor Value	Corridor is homogenous in structure, or fragmented
Habitat for 'Rare' species	ROTAP sp, locally rare; not listed threatened species
Localised contribution to Biodiversity	TSR is habitat for a local population of fauna or flora
Corridor Links	Degree of linkage width other remnants such as forests and national parks
Geomorphological Value	Unusual geomorphological value
Natural Heritage Value	Landscape value, locally significant location, unusual landscape feature
Cultural Value	Aboriginal, European or local community values

Medium-

This classification includes the majority of TSRs, as these are areas that are partially modified and degraded due to weed invasion, grazing and structural simplification. Predominantly native species but may be interspersed with exotic species. The habitat value may be lessened, but there is the possibility, that under rehabilitation and changed management regimes, these areas could be elevated to a higher conservation bracket.

Low-

Highly modified, dominated by a mix of native/exotic or purely exotic weed species. The size or width of the TSR may also be a factor, and the potential habitat value of the TSR is minimal. Poor or absent regeneration of native species, and lack of suitable on ground habitat elements.

To include the survey into further planning and mapping systems, each TSR was assigned a vegetation classification code, based upon vegetation communities identified. These communities, were loosely based upon vegetation communities identified through the Moree Regional Vegetation Committee mapping process[41], NSW Western Regional Assessment vegetation[42] classifications, but primarily on those personally developed by the author.(Appendix 3)

[41] Department of Land and Water Conservation, (2001). North West Vegetation Mapping- Moree Shire Metadata. DLWC. Inerell, NSW

[42] Beckers, D. and Binns, D. (2000) Vegetation Survey and Mapping Stage 1 Report WRA Project 13. Resource and Conservation Assessment Council. NSW

4.3 Comparative Conservation Ratings of TSRs in the North West

The Narrabri Sustainable Management Strategy Study[43], categorised TSRs into three ranking; near natural remnants(H), modified remnants (M) and invaded remnants (L). The TSRs were ranked as 21%, 78% and 1% respectively. This is in contrast to Nowland's report[28] that identified an overall rating of 19 %, 65% and 16% for TSRs in the central west. The NHT survey for the respective boards found the ratios quite similar, but with subtle differences.

Table 4 Comparative Conservation ratings of TSRs in the North West

Board	High	Medium	Low
Narrabri	21	65	14
Moree	27	63	10
Tamworth	17	45	38
Northern Slopes	14	73	13

What do these percentages mean? Can anything useful be extracted from these figures?
The answer is yes. Although the figures would not suffer a rigorous statistical analysis, there are a number of trends that can be derived from the figures. The general trend is that the ratio of high: medium: low conservation value TSRs, runs at **20:70:10.** This means that around 80% of the TSRs can have their current management continued, without any investigation of alternative management options or modification of current use. For the 20% of reserves classified as high value, around 5% of TSRs will be of critical value, namely outstanding examples of endangered ecological communities, populations of threatened species or cultural sites of significant importance. These should be the TSRs that boards immediately target for external grants and for possible joint management agreements.
This represents only a small fraction of each boards TSR resource base, with potentially very few impacts upon stock numbers or movement. It does require a commitment from the RLPBs to become involved in regional and state conservation planning instruments and to acknowledge that conservation is of equal importance, if not more important on certain TSRs than travelling stock.
Both Moree and Narrabri had a higher than average amount of TSRs in the high classification, and this is possibly due to the large area of TSRs under semi-traditional usage patterns (large mobs of walking stock). Tamworth and Northern Slopes have a lower number of high quality TSRs, perhaps due to higher percentage of fenced reserves, which traditionally are of lower environmental quality due to more frequent and lengthy grazing events.
The percentage of TSRs classified as high quality in each board area does not reflect the actual number of specific high value sites, as some boards had a greater number of TSRs of habitat and remnant value, rather than habitat for threatened species and communities or cultural sites.
On an individual level, Tamworth had the largest number of TSRs of a low conservation value, due to a number of factors including; the small size of TSRs, lack of remnant habitat, fenced verse open TSRs, high levels of plains dieback, lack of TSRs with adequate regeneration and a general air of environmental degradation associated with TSRs in the Liverpool Plains and surrounding areas.

[43] Narrabri RLPB unpublished.(1998) Sustainable Management Strategy for TSRs in Narrabri RLPB.

Moree RLPB has large areas of relatively intact *Dichanthium* (Queensland bluegrass), *Astrebla* grassland and communities such as Carbeen Open Forest, Ooline and the largest percentage of TSRs with riparian frontage (40%).
I caution boards in equating current conservation status, solely with current TSR management. This may be true for a certain number of TSRs, but it also relies on the distribution of vegetation types, general regional trends, historical usage patterns and the amount of ecological surveying carried out by agencies and individuals.

4.4 Heritage Values

4.4.1 Natural Heritage

Natural landscapes have an intrinsic aesthetic value that can often not be given an economic value.
They have a greater local value, than state or national value, and often reflect local people's attachment to certain features.
These may include particular landscape features such as Mt Kaputar, the Downs/Fall country east of Bellata and the Pilliga Scrub etc. It may even include a particular tree of local significance to a group of people, or irregular geological features such as Little Mountain outside Narrabri.
There is the potential for unusual landscape features to hold local natural heritage value, and many of the remnant watercourse areas/lagoons such as Whittaker's, Barber's, and Boobera Lagoon to have natural heritage values, as well as any associated cultural values.
Two areas of TSR have been listed on the Register of the National Estate, administered by the Australian Heritage Commission. These are the Glacial Area at Rocky Creek on the Upper Horton Rd in Moree RLPB and the Somerton Rd (Klori) TSR in the Tamworth RLPB. The Somerton Rd TSR has been identified as a high conservation value area for its environmental value.

4.4.2 Historical heritage

These are places and items related to early European settlement in Australia. This is exemplified by: cemeteries and old graves along the roadside; abandoned settlements such as Neeworra, near Mungindi and remains of old mining towns and sites, such as in the Nundle area.
Areas where early explorers camped are also of importance.
Some sites include :
(Complete lists are located in individual RLPB reports)

- Neeworra township at Mungindi [old township]
- Lower Waters TSR in Narrabri RLPB (camp site of explorer Mitchell)
- Numerous European grave sites throughout all four Boards
- Tycannah tank (Moree RLPB) hand constructed using Chinese Labour. This same crew also constructed Bunna Tank in Narrabri RLPB. [44]
- Kooloona School site near Delungra (Northern Slopes RLPB)
- Old gazetted school sites at Myall Vale TSR Narrabri
- Cuttabri Corduroy, old road used by Cobb & Co. coaches. Narrabri RLPB
- Tintinhull Reserve- overnight camp area for explorer John Oxley Tamworth RLPB Adjoins area known as 'Oxley's Rock" [45]

[44] Mick Beatty pers comm., (2000) Senior Ranger Moree RLPB
[45] Tamworth Historical Society pers comm, 2001- unknown source

4.4.3 Aboriginal Heritage

Looking after country is of vital importance to Aboriginal people[46]

Aboriginal people have an attachment to the land that can not be explained in just material relics or scarred trees. There are also intangible issues applied to TSRs such as spiritual and regional significance and access traditional fishing and travelling points as well as traditional foods. The concept of 'country' is also important to Aboriginal people, as it is refers to traditional homelands, and provides continued access to spiritual and story places.

The central Aboriginal spiritual belief is oneness with the land and all that lives upon it. [47] To being to understand the value of native vegetation for Aboriginal people, requires an appreciation of the Aboriginal culture to begin with.

This survey is by no means the final study in regard to the location of areas of Aboriginal significance on TSRs. Individual boards should build on progress that has been initiated with Aboriginal Land Councils. Aboriginal cultural information is the property solely of the local Aboriginal communities and RLPBs should look to their local ALCs, when dealing with issues that may potentially affect Aboriginal people, landscapes or sites.

4.5 Threatened Species

The presence of a rare and threatened plant or animal on a TSR, does not necessarily predispose the TSR to being gazetted a nature reserve. In many instances, the management that has been occurring on the reserve has enabled the plant or animal community to exist. For those areas with threatened species occurring on them, care must be taken to identify any possible threats to the population from existing management practices and guarantee that future management for the area is carried out in a manner that bests suits the ecological needs of the species. The management obligations are outlined the Threatened Species Conservation Act 1995 (TSC Act 1995)[48]. Although the NPWS is the designated management authority, there is still an obligation upon the land manager, where the species occurs to ensure its long term protection, modifying management regimes where necessary. There is also the need to consider the effect upon the species, population or community under the federal Environment Protection and Biodiversity Conservation Act 1999[49] (EPBC Act 1999).

Although there is a stronger regulatory responsibility for Boards to consider species and communities listed on the TSC Act 1995 and EPBC Act 1999, boards should not become myopic to the conservation of these area alone, as all near natural communities justify conservation.

4.6 Endangered Ecological Communities

4.6.1 Threatened Species Conservation Act 1995

4.6.1.1 Semi Evergreen Vine Thicket (SEVT)

This EEC is only conserved at Planchonella Hill NR at Yallaroi, and on an area of Crown Land near Bingara (Northern Slopes RLPB). A section of TSR (75-150 ha) has been identified with the major constituents and structure of SEVT. This is along the Bingara to Gravesend Rd and is associated with the Derra Derra Ridge area of SEVT. Other occurrences on TSRs occur near Moema and Couradda SF (Narrabri RLPB) and along the Bingara to Narrabri Rd.

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[46] Roadside Environment Council (2000) *Course in Linear Reserve Conservation*. Natural Heritage Trust Pilot Programme.

[47] Broome, R. (1982) *Aboriginal Australians: Black response to White dominance 1788-1980.* Allen and Unwin, St Leonards.

[48] *Threatened Species Conservation Act* 1995 (NSW)

[49] *Environment Protection and Biodiversity Conservation Act* 1999 (Commonwealth)

4.6.1.2 Carbeen Open Forest (COF)

This community occurs on sandy lenses and ancient drainage systems in the Moree and Northern Slopes RLPB. It is characterised by Carbeen (*Corymbia tesselaris)* and often grows in association with white cypress pine (*Callitris glaucophylla*) or river red gum (*Eucalyptus camaldulensis*). The main occurrence is in the Boomi area (Moree RLPB), where there is over 100ha of COF. The community is conserved at a few NR in the Boomi area, however, there is as an equally large area of COF on TSRs, as is conserved in nature reserves. Other occurrences are east of Boggabilla along the Boggabilla to Yetman TSR (Northern Slopes RLPB), and west of Moree on the Watercourse Road / Gwydir Highway intersection.

4.6.1.3 Ooline

A remnant dry rainforest community characterised by *Cadellia pentastylis* (Ooline). It is only found on Berrygil Ck TSR (Moree RLPB), which adjoins Gamilaroi NR.

4.6.1.4 Native Vegetation of the Liverpool Plains

Native Vegetation on Cracking Clay Soils of the Liverpool Plains are generally the remnant grasslands which are often dominated by *Austrostipa aristiglumis* (Plains Grass), *Dichanthium sericeum* (Qld bluegrass) or *Panicum queenslandicum* (Panic sp), but can include shrubs and trees *Eucalyptus melliodora*, *Eucalyptus populnea* subsp. *bimbil*, *Eucalyptus conica* and *Angophora floribunda* and shrub species such as *Acacia pendula* may be scattered to locally common. These are solely found in the Tamworth RLPB, extending from Boggabri south to Quirindi. The TSRs with the highest quality grasslands are the Boggabri- Mullaley TSR, Mullaley- Tambar Springs TSR and the Cattle Lane TSR and associated reserves in C Division.

4.6.1.5 White Box-Yellow Box- Blakely's Red Gum Woodland

White Box-Yellow Box- Blakely's Red Gum Woodland includes those woodlands where the dominant tree species are *Eucalyptus albens* (White Box), *Eucalyptus melliodora* (Yellow Box) or *Eucalyptus blakelyi* (Blakely's Red gum). The groundcover is generally composed of grass and herbaceous species, with better quality sites having a groundcover consisting of *Poa, Themeda australis, Cymbopogon.* Shrubs are generally sparse or absent.

The main occurrences of high quality white box / yellow box are in the Inverell, Delungra and Warialda area in the Northern Slopes RLPB and the Manilla to Barraba system of TSRs in Tamworth RLPB.

The Register of the National Estate listed Somerton Rd (Klori) TSR in Tamworth RLPB is an outstanding example of this community.

Examples of remnant Yellow Box woodland are harder to find, being located on prime agricultural soils. Cobbadah TSR (Northern Slopes RLPB) and Daileys TSR (Tamworth RLPB) are structural examples of this community.

4.6.2 Preliminary Listed Endangered Ecological Communities

4.6.2.1 Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions

Brigalow is a low woodland community, occurring as pure stands, or forming associations with Belah (*Casuarina cristata*) and Poplar Box (*Eucalyptus populnea*). The understorey is composed of scattered shrubs and small trees with a sparse grass groundcover. Recent mapping has upwardly revised the

size of the community, from 5000 ha to 13 500 ha[50] remaining. TSRs and other roadside remnants form a significant portion of the surviving remnants.

4.6.3 Environmental Protection and Biodiversity Conservation Act 1999

4.6.3.1 Bluegrass (Dichanthium spp.) dominant grassland of the Brigalow Belt Bioregions (north and south)

In the determination to the national scientific committee, advice is given that there is not bluegrass-dominated grasslands in NSW. From the results of the survey, this is found to be incorrect and consequently, Boards should consider the impact of any non-routine developments upon this community. The federal listing of the community requires the NSW Scientific Committee to consider the listing of the community at a state level, which will ultimately involve some RLPBs.

Large occurrences of the community occur along the Newell Highway, north from Moree to Goondiwindi (Northern Slopes RLPB), immediately south of Moree on the Newell Highway, in the Gurley and Bee Bee TSR area and in the Kirramingley / Millie TSR system (Moree RLPB). The southern most record of the community on a TSR in the project area is from Noonamena TSR outside Narrabri (Narrabri RLPB).

4.6.3.2 Brigalow (Acacia harpophylla dominant and co-dominant)

All associations of Brigalow, with most co-dominant species are listed as an endangered community under the *EPBC Act* 1999. This community is only found in significant amounts in the Northern Slopes and Narrabri RLPB. A large area of Brigalow (200-300 ha) is situated along the Newell Highway, south of Goondiwindi. There are also large occurrences of Brigalow, between the Tantarrana area and Croppa Creek (Northern Slopes RLPB)

Approximately 1000 ha or around 7% of the NSW resource of Brigalow is found on TSRs within the project area.

In the Narrabri area, a large area occurs immediately south of Narrabri, also along the Newell Highway. Due to the infrequently used nature of both these patches, there is the possibility for conservation agreements to be developed for both these areas.

4.6.3.3 Grassy White Box Woodlands

A scattering of high quality grassy whitebox sites occur over the whole region, and most of these have been identified though this project survey and also through many other DLWC and individual studies.

The community consists of a dominant *Eucalyptus albens* overstorey and a grassy groundcover with scattered shrubs. Grass species indicative of a high quality site include Kangaroo grass (*Themeda australis*), Poa tussock (*Poa* sp.) and Native Sorghum (*Sorghum leiocladum*).

The main areas of grassy whitebox woodland are in the Manilla/Barraba area and the Inverell area. Specifically high values TSRs include:

- Hunts Gully TSR - Northern Slopes RLPB
- Bells Mountain TSRs- Tamworth and Northern Slopes RLPB
- Somerton Rd TSR (Klori)- Tamworth RLPB
- Borah TSR- Tamworth RLPB
- Greenhatch Creek (Manilla - Attunga TSR)- Tamworth RLPB

[50] NSW NPWS (2002) Threatened Species Conservation Act- Preliminary Determination p020315c (Brigalow Woodland). www.npws.nsw.gov.au/news/tscdets/p020315c.htm 19/3/02

4.6.3.4 Semi-evergreen Vine Thicket s of the Brigalow Belt

The major occurrences are in Northern Slopes RLPB and Narrabri RLPB.
In the Northern Slopes RLPB, the main occurrence is on the TSR from Bingara to Narrabri and along the Bingara to Gravesend TSR (Elcombe Rd) where there is close to 150 ha of SEVT, currently in land designated under an Annual Grazing Permit. To prevent damage to the community and to limit the spread of weeds and Coolatai grass into the community, Northern Slopes RLPB should investigate fencing off the immediate portion of SEVT, and look to initiating a joint management agreement with NPWS for the area.

4.7 Threatened Flora Species

[TSC]- Threatened Species Conservation Act 1995
[EPBC]- Environment Protection and Biodiversity Conservation Act 1999
V- Vulnerable
E- Endangered

4.7.1 Threatened Flora Species- Bertya *sp. A. (Cobar-Coolabah)* [TSC- V]

This vulnerable shrub species is similar in appearance to the common olive and was recorded from a single location south of Narrabri on the Newell Highway (Narrabri RLPB). It was recorded from a gravel pile where the plants had been translocated. It is on an unused TSR and is safe from grazing induced pressures.

4.7.2 Threatened Flora Species- Boronia ruppii *Cheel* senso stricto [TSC- E]

This species occurs on a rarely used TSR section past Woodsreef mine. Due to the extreme disturbance that the mine created, the TSR section is not very wide, and not of a nature advantageous to the movement of cattle (Tamworth RLPB).
The species is listed as *endangered* on the TSC Act and is limited to a total population statewide of three communities totalling less than 300 plants. All three communities occur at Woodsreef and two of these are on land designated as TSR. Currently, one population has been protected from grazing by a protective fence.
At the Woodsreef mine, goat and/or marsupial browsing are threatening *Boronia ruppii Cheel senso stricto*[51].
The opportunity may arise for co-operative management of the site, with regard to feral animal control and liaison with the Barraba Shire Council and NPWS Northern Zone

4.7.3 Threatened Flora Species- Bothriochloa biloba [TSC- V; EPBC-V]

Lobed-Red Grass (*Bothriochloa biloba*) is a vulnerable grass that is widely distributed across TSRs in the project area, and is found in large areas of natural grassland, woodland and derived grassland (grassland cleared of trees). It is taller and thicker stemmed than the common Pitted bluegrass (Red Grass) and is characterised by twin lobes on the seed head and the lack of a pitted seed head, common in Red grass.
Predominantly the species is found in large remnant stands in the slopes, through Tamworth and Northern Slopes RLPB, although it is found scattered on roadside TSRs in Narrabri and Moree RLPB.

[51] NSW National Parks and Wildlife Service. Final determination for *Boronia ruppii.* TSC Act 1995 NSW Scientific Committee. Online http://www.npws.nsw.gov.au/news/tscdets/f000428a.thtm

4.7.4 Threatened Flora Species- Cadellia pentastylis *(Ooline)* [TSC- V; EPBC- V]

Although Ooline is part of the Endangered Ecological Community, it is individually listed as vulnerable. It is only recorded at the Berrygil Creek TSR (Moree RLPB), adjoining Gamilaroi NR.

4.7.4 Threatened Flora Species- Desmodium campylocaulon [TSC- E; EPBC- V]

This endangered species is found at numerous sites in the Moree RLPB, Northern Slopes RLPB and Narrabri RLPB. The first recorded site was in the area adjoining Kirramingley NR[52], and the largest known population on a TSR is on the eastern side of the Newell Highway, south of Moree (>400 ha). Since then numerous surveys have found its location in many areas of the region, primarily on TSRs. This indicates that this may be an important refuge for this species. The species has a preference for grasslands and grassy communities dominated by Queensland bluegrass and White wiregrass (*Aristida leptopoda)*, and thus has been found in open grassland, Mimosa (*Acacia farneisana*) shrubland, Myall (*Acacia pendula*) woodland and open Belah (*Casuarina cristata*) woodland.
A Recovery Plan is currently being developed for the species, and may provide regulatory implications for board management of TSRs.

4.7.5 Threatened Flora Species- Dichanthium setosum [TSC- V, EPBC- V]

Dichanthium setosum is a vulnerable grass, similar to Queensland blue grass (*D. sericeum)*, but found in grassy woodlands on the slopes of the tablelands, primarily in box communities. There are two recorded locations in the Tamworth RLPB. In the Attunga area, in the vicinity of Greenhatch Reserve and Somerton RD TSRs. The species has also been recorded from the Wallanol Rd population of *Desmodium campylocaulon.* (Moree RLPB)

4.7.6 Threatened Flora Species- Digitaria porrecta [TSC- E; EPBC- E]

This endangered grass species is distributed throughout the whole four boards, on a north-south gradient. Its distribution runs from Croppa Creek, through Moree, down the Newel Highway and its largest occurrence is in the Gunnedah to Tambar Springs area. There are greater than 25 sites on TSR throughout the whole region. It only occurs in small isolated populations, with the exception of sites to the north and south of Mullaley, where it occurs across an estimated area of around 200 ha in total. It predominantly grows in open grassland or derived grassland areas of *Stipa aristiglumis, Panium* dp., and *Dichanthium sericeum.*

It is known as a Five Finger Panic Grass, and can easily be confused with another common *Digitaria* sp., and are commonly found together. Careful analysis of the seed spikelets is needed to identify the difference between the two species. The simplest distinguishing characteristic is the length of spikelet and the lower glume, which is a small leaf like structure at the base of the seed spikelet. In *D. porrecta*, the spikelet has an average length of 5.8 mm and in *Digitaria divaricatissima* the average length is 3.5 mm. The glume lengths differ, at mean 1.2mm and 0.55 mm respectively,[53].

The management of a site without a prepared management plan may be acceptable, where the population is only small and not on a frequently used route or reserve. When it forms a large proportion of the pasture, such as those in the Tamworth RLPB, a management agreement in conjunction with

[52] Clarke, P.J., Gardener, M.R., Nano, C.E. and Whalley, R.D.B. 1998 *The Vegetation and Plant Species of Kirramingley*, Division of Botany University of New England, Armidale.

[53] Hallford, D.,(1995) *Digitaria porrecta* S.T. Blake (Poaceae) *A Conservation Statement.* Queensland Herbarium

the NPWS would be prudent to ensure adequate ecological expertise was afforded to the board to aid in management decisions.

4.7.7 Threatened Flora Species- Phyllanthus maderaspatanus [TSC- V]

Grassland surveys have shown the endangered spurge to be associated in many sites that are also habitat for *Desmodium campylocaulon*. It has predominantly been recorded from survey sites in Moree RLPB, in the Garah and Mungindi areas. There has also been a possible recording from the Bingara Rd turnoff, just north of Narrabri.

4.7.8 Threatened Flora Species- Sida rohlenae [TSC- E]

A small sub-shrub species, very similar in appearance to the common Paddy's Lucerne (*Sida rhombifolia*). It is found in creekline habitats and also sandy ridges.
It has been recorded from at Pian Creek at Merah North (Narrabri RLPB) and has recently been recorded from Borongar NR at Boomi, with a high possibility of the species occurring in the neighbouring TSR system. (Moree RLPB)

4.7.9 Threatened Flora Species- Swainsona murrayana [TSC -V; EPBC- V]

The Slender Darling Pea (*Swainsona murrayana*) is commonly found in heavy clay communities,[54] and this is true from its recording in the Mungindi area in a Coolabah (*Eucalyptus coolibah*) woodland community (Moree RLPB). It has the potential to occur in most heavy clay communities through the Moree RLPB and along the Newell Highway to Goondiwindi (Northern Slopes RLPB).

4.7.10 Threatened Flora Species- Thesium australe [TSC- V; EPBC- V]

Thesium australe is commonly known as Austral Toad Flax, and is a small semi-parasitic plant on the roots of Kangaroo grass and other native grasses[55]. It has been found on TSRs in the Inverell area and on TSRs near Yetman(Northern Slopes RLPB).

4.8 Threatened Fauna Species

Although many threatened fauna species possibly occur on TSRs, the following is a list of species recorded during the period of the project.

Table 5 Record of species recorded directly from TSRs during the project and potential habitat types. (not necessarily by the author)

Common Name	Scientific Name	Reference	Predicted Habitat Type
5 Clawed Worm Skink	*Anamalopus mackayi*	NPWS Wildlife Atlas	Coolabah Woodland
Pale Headed Snake	*Hoplocephalus bitorquatus*	NPWS DRP Biodiversity Project	Coolabah Woodland
Koala	*Phascolarctus cinereus*	Author	Woodlands throughout project area
Microchiropteran bats	*Various*	NPWS Wildlife Atlas	Wooded areas, hollow trees, caves
Glossy Black Cockatoo	*Calyptorhynchus lathami*	Author	Belah woodland

[54] Cunningham, G.M., Mulham, W.E., Milthorpe, P.L. and Leigh, J.H. (1999) *Plants of Western New South Wales.* Inkata Press, Sydney
[55] Scarlett, N., Bramwell, M. and Earl, G. (1994) Action Statement No 56- Austral Toadflax (*Thesium australe*). Department of Natural Resources and Environment. Victoria. Online. http: www.nre.vic.gov.au. (Accessed March 2001)

Brolga	*Grus rubincunda*	DLWC Draft Land Assessment[56]	Lagoon areas, riparian areas
Turquoise Parrot	*Neophema pulchella*	Author	Woodland areas
Barking Owl	*Ninox connivens*	Author	Woodland areas
Hooded Robin	*Melanodryas cucullata cucullata*	Author	Woodland areas
Diamond Firetail	*Staganopleura guttata*	Author	Woodland areas
Grey Crowned Babbler	*Pomatostomus temporalis temporalis*	Author	Woodland areas
Brown Treecreeper	*Climacteris picummis victoriae*	Author	Woodland areas
Speckled Warbler	*Pyrrholaemus sagittata*	Author	Woodland areas
Black Chinned Honeyeater	*Melithreptus gularis gularis*	Author	Woodland areas
Regent Honeyeater	*Xanthomyza phrygia*	Tamworth Bird Watchers	Woodland areas- particularly Mugga Ironbark

4.9 Register of the National Estate

4.9.1 Somerton Rd TSR

Because a sizable section of the Somerton Road TSR is listed on the National Estate Register as an item of Natural heritage, this is a high conservation value TSR that should be protected for all its identified values, which includes the threatened grass *Dichanthium setosum* (**V**).

Somerton Stock Route[57] is an excellent example of grassy white box woodland (federally listed Endangered Ecological Community).

The vegetation of the area is species rich with over 200 native plant species found at the 75 ha place.

Most of the Somerton Travelling Stock Route is on sedimentary clay soils that have largely been cleared for cultivation within the district. The remaining uncleared area has a grassy understorey consisting of perennial native species such as kangaroo grass (*Themeda australis*) and Barbed Wire grass (*Cymbopogon refractus*). The grass cover is interspersed with a large number of native herbs and forbs including chocolate lily (*Dicopogon fimbriatus*) and bulbine lily (*Bulbine bulbosa*). There have been a number of species identified in the place, which have not been found elsewhere in the region. Such species include *Chrysocephalum semipapposum* s.lat, *Lepidium fasciculatum* and *Dodonea sinuolata* subsp. *sinuolata*.

The listed area of TSR, comprising about 75ha, is 8km south of Manilla, is that part of the stock route on the western side of Lower Somerton Road extending from the intersection with Top Somerton Road in the south to its intersection with AMG northing 6586800mN in the north[57].

[56] Lloyd, M., (2000) *Draft Land Assessment of Crown Lands at Boobera Lagoon*. Department of Land and Water Conservation. Inverell, NSW.

[57]Register of the National Estate Database(2000). Somerton Road Travelling Stock Route (part), Manilla NSW Database Number: 101456 File Number: 1/02/177/0008.
Online.http://www.environment.gov.au/heritage/register/easydatabase/database.html

4.10 Specific Results

Table 6 Selected survey results for individual boards

% of appropriate TSR sample	**RLPB**			
Criteria	Moree	Narrabri	Tamworth	Northern Slopes
% Nil regeneration (shrubs or trees)	**20**	**30**	**54**	**14**
% of TSRs connected to significant areas of remnant vegetation	**3**	**6**	**3**	**4**
% Presence of dieback	**19**	**25**	**33**	**5**
% Ground elements (logs, etc) present	**48**	**60**	**34**	**38**
% Extensive regrowth	**6**	**6**	**12**	**5**
% TSR with similar aged cohorts of trees	**30**	**30**	**65**	**26**
% Presence of rock outcropping and bushrock	**5**	**4**	**16**	**7**
% CSIRO habitat complexity rating >7	**83**	**60**	**60**	**75**

Additional information on the reserves can be extracted from the survey information in the individual board reports. The strength of the survey information is only based on survey counts and should only be utilised for predicting trends and would not suffer from rigorous statistical analysis.

4.10.1 Regeneration

The effect of grazing in fenced reserves is clearly evident, with 54% of TSRs with timber cover in the Tamworth RLPB, not having any significant degree of regeneration present. In comparison, only 14% of TSRs in the Northern Slopes area did not have regeneration present, with almost all of these being either small degraded TSRs or on the plains, where regeneration is not as rapid as it is on the slopes and tablelands. Regeneration occurs more freely on the slopes where conditions are more favourable for tree and shrub regeneration of some species.

4.10.2 Connectivity to remnant vegetation

Due to the sparsity of State Forests and National Parks throughout the project region and the extensive distribution of agricultural land, there are limited opportunities for TSRs to act as corridors from one large remnant patch to another. Surprisingly, Narrabri RLPB with a few TSRs connected to state Forest areas, has the greatest degree of connectivity to remnant areas.

4.10.3 Dieback

Plains dieback and its associated causal agents has the potential to further reduce the value of wooded areas, especially in the Liverpool Plains, where a third of TSRs were suffering from varying degrees of eucalypt dieback. This is a similar situation in Narrabri and Moree RLPB. The occurrence of

TSRs with dieback is often related to TSRs with heavy stock usage and is more prevalent in areas with intensely developed agriculture.

4.10.4 Ground elements

The presence of ground habitat elements such as leaf litter, logs and fallen timber is paramount to having habitat suitable for ground fauna such as reptiles, terrestrial mammals and amphibians and insects. Fallen timber and leaf litter provides foraging opportunities for insectivorous birds of which many are now listed as threatened. All timbered areas should have a certain degree of fallen timber and leaf litter, but this is affected by factors such as stocking rates, which reduces leaf litter and also hazard reduction burns which routinely remove ground elements. Firewood collection on TSRs surrounding towns, also greatly reduces the available fallen timber. In many areas, firewood collection is promoted, without regard for potential affects on biodiversity. In Northern Slopes and Tamworth RLPB, only a little over a third of timbered TSRs had significant ground elements present.

4.10.5 Extensive regrowth

Only a small percentage of TSRs had extensive regrowth (rating =4), although a number had moderate to heavy regrowth (rating=3). Although some TSRs had significant areas of pine regrowth or eucalypt regrowth, it may have only affected a few isolated reserves and sometimes only a portion of the reserve. The definition of extensive regrowth is also difficult to quantity as understandably, a landholders view of 'extensive' regrowth is different to the level of regrowth that may affect the ecological values of the area.

4.10.6 Tree age

There is a significant problem with many TSRs have single aged cohorts of old senescent trees, which have a limited lifespan and almost always a lack of effective regeneration. This affects around 65% of timbered TSRs in the Tamworth RLPB and close to a third of TSRs in other boards. This is a serious management problem for the future, as there is a lack of regeneration to replace the already senescent trees.

4.10.7 Rock Outcropping / Bushrock

Although not a physical property of TSRs affected by management actions, RLPBs should be aware of the increased habitat value of TSR with bushrock in the groundcover. Tamworth is the only RLPB with a significant proportion of TSRs with bushrock, concentrated on TSRs in the Manilla district. The lack of TSRs with bushrock in the other three boards is due to their location on areas of largely deep cracking clays.

4.10.8 Habitat ratings

The value of structure in predicting bird species diversity has been explained by Freudenberger and Drew [32], who found that in TSRs in the project area, 'declining' woodland birds were only found in areas with a habitat rating greater than or equal to 7, and that the vulnerable bird species were only found in areas with a structural rating of 9 or greater. 60-83% of TSRs in the project area had a structural rating of greater than 7, which is an indicator that TSRs are a valuable faunal habitat resource, especially for birds.

4.11 CSIRO habitat survey - general applications

As part of the CSIRO bird assessment of TSRs[32], habitat assessments were carried out to ascertain the structural value of the TSR towards its value for bird habitat. Structural diversity has been found to been an important factor in determining the species diversity within an area.[58] [59]
From Freudenberger and Drew[32]

> *At each site, a habitat complexity score, modified from one described by Catling and Burt (1995) was derived on the basis of six features: tree canopy cover, tall shrub cover (2–4 m), short shrub cover (0.5–2 m), ground herbage cover, the relative amounts of logs and/or rocks, and the relative amount of ground litter.*
>
> *Each feature was rated on a scale of 0-4, and the scores for the six features were totaled to give an overall score. For this study, a score of 6 or below represents a woodland with poor structure with no understorey shrubs, few logs on the ground, though often a complete cover of pasture (due to excellent seasonal conditions) A score of 4 or less represents a grassland without Mimosa shrubs, and greater than 4 is a grassland with shrubs. A score of 7-12 represents a grassy or shrubby woodland with moderate structure comprising > 20% shrubs and 10–50% cover of ground herbage, logs and litter. A score greater than 12 describes a structurally complex woodland.*

The assessment sheet was modified to provide extra elements, and the upper scale limit was also extended. This did not affect the rating of most communities, but allowed for a finer differentiation of the communities, especially in higher value woodland areas. Pure grassland areas still rated at 4, while the introduction of some shrub elements, especially *Acacia farnesiana*, increased the rating towards 8. A rating of greater than 12 indicated a woodland area with good structural elements and potential high value habitat for bird species.
Apart from the difficulty in separating communities apart based on their structural ratings, there is also a false representation of the value of communities, especially for grassland and shrubland areas, where there habitat ratings are between 3-8. A specific structural survey form should be developed for shrubland and grassland areas for future surveys.
The following figure is a comparison of the habitat ratings of all four boards in the project area.

[58] Freudenberger, D. (2001) Bush for the Birds: the Saltshaker Report. A report commissioned by Greening Australia, ACT &SE NSW. Canberra: CSIRO Wildlife and Ecology.
[59] Weins, J.A. (1989) *The Ecology of Bird Communities.*, Cambridge: Cambridge University Press

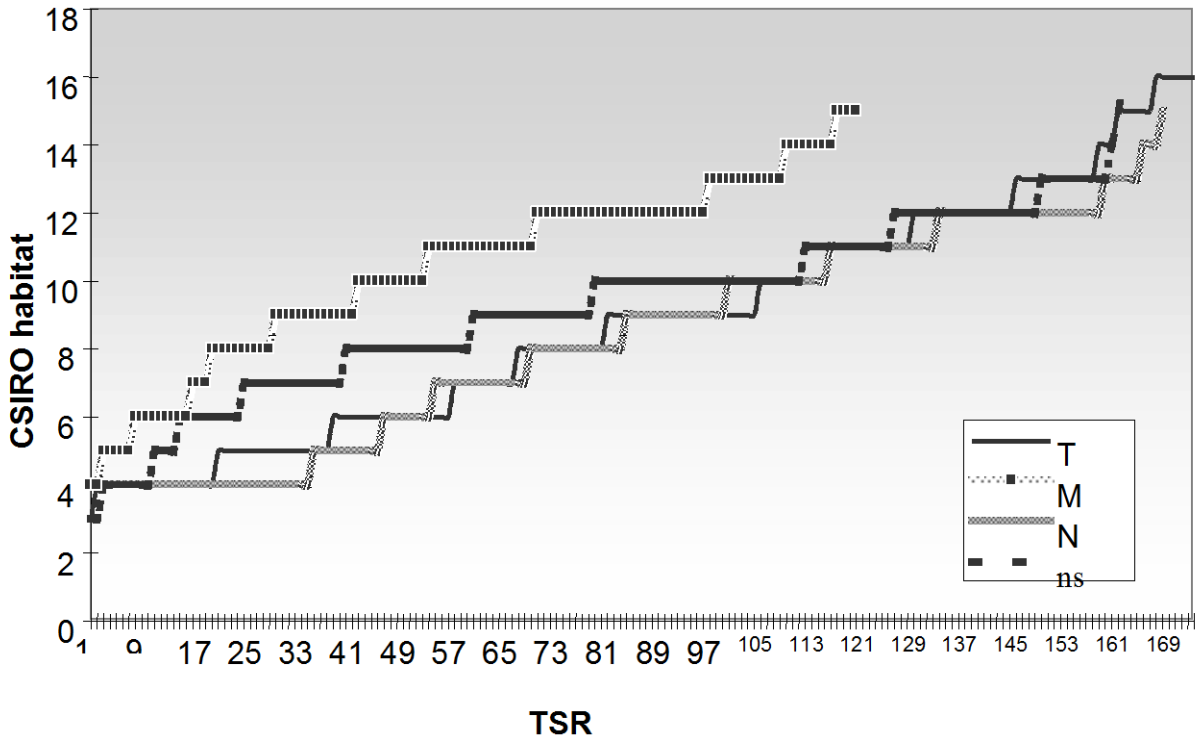
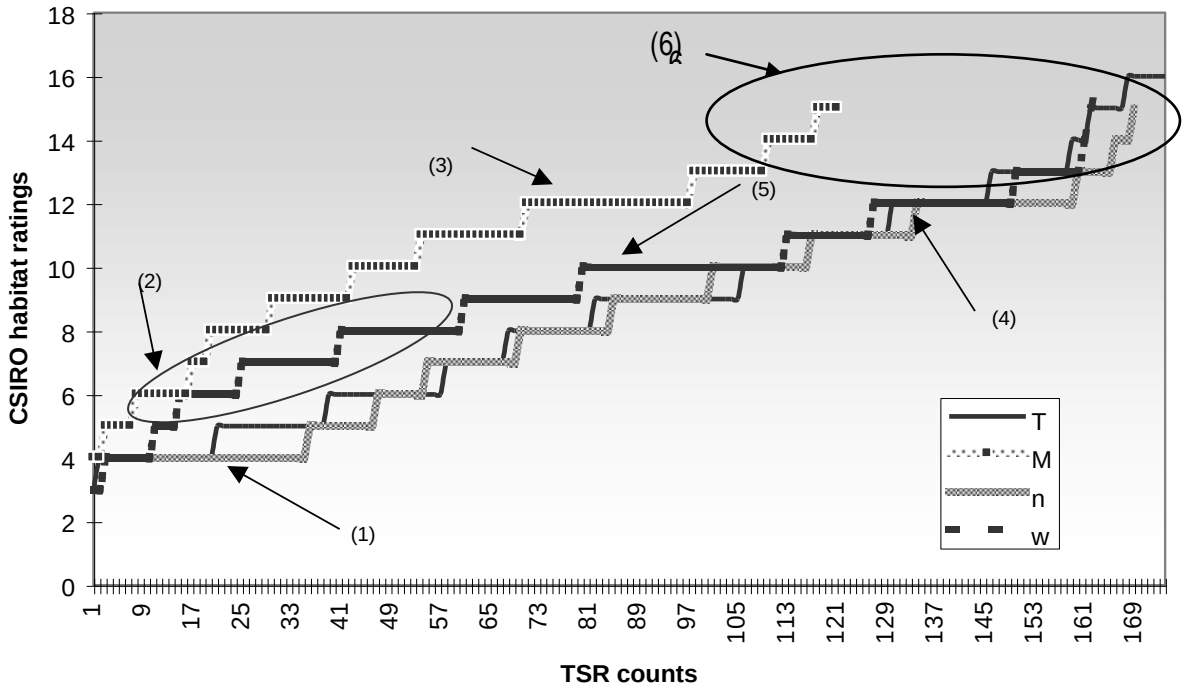


Figure 1 Comparative CSIRO habitat ratings for various RLPBs in the project area

There are six main points (1-6) to be taken from the graph:
There are a large number of TSRs within the Narrabri RLPB with a rating of 4, (1) i.e a pure grassland sward, whereas in the other boards there are far fewer. This is due to a lesser number of sites, and for the case of Moree RLPB and Northern Slopes RLPB, the influence of *Acacia farnesiana* (mimosa)



becomes apparent. Mimosa increase the structural complexity of the area (2) and this can be seen in the circled area where there area greater number of sites with a rating of 6,7 and 8 than in Narrabri RLPB.

Points (3) and (4) illustrate the relatively large number of TSRs with a rating of 12. In the CSIRO report, a rating of 12 equated with a moderately complex TSR with a few scattered shrubs in the understorey and some ground elements. This would be typical of many routinely grazed areas of TSRs.

A large section of Northern Slopes RLPB (5) woodland TSRs have a rating of 10, which indicate that they area simplified woodland areas. This coincides with many of the TSRs north of Warialda towards Yetman with a simply overstorey of white box, a few scattered shrubs, an introduced groundcover of Coolatai grass and little leaf litter or fallen timber. The regular burning off exacerbates the lack of fallen timber and leaf litter that occurs throughout the area.

The large circled area at point (6) indicates the small, but significant proportion of TSRs with a high structural complexity (>12) that are of high conservation value for birds, and by association, other fauna types.

5.0 Management Issues

5.1 Fire regime

A fire regime is a combination of three factors:

1. Intensity
2. Frequency
3. Season

The relationship between these three entities has a significant effect on the response of the native vegetation in the area.

All factors are important, as an intense fire will solicit a different response to a cool fire. Similarly, regular fires will result in different vegetation being present than in a similar area, not burnt as frequently. The use of fire at the wrong time of the year can also have ecological consequences. A spring burn will remove food sources for animals, as well as affecting the flowering of many native perennials.[60]

An autumn burn is suggested, as the fire intensity is normally lower, and at this time of the year, many perennial plant species will regenerate prior to winter, but exotic annuals will not.

5.2 Fire regimes on TSRs

The anthropological use of fire and its effect on the Australian biota is an undeniable fact[61], however the frequency at which it was used and the extent that it was used in different vegetation communities, is still largely undetermined. Scientists have long argued about the role of Aboriginal and early European fire regimes upon the environment. Discussion ranges from wide ranging yearly burns by 'firestick farming' Aboriginals, to the selected use of fire by Aboriginals to create a mosaic of burnt land around their traditional campsites, traversal zones and areas of habitation. There is also evidence from sources[62] [63] [64], that early European burning practices increased the frequency of fire in many environments. What is clear however, that fire did exist in the environment and was used as a tool to increase the productivity of grasslands and grassy woodlands. The important part however, the frequency and intensity of fire, is not yet clearly understood for many vegetation communities.

Certain communities have a negligible fire regime, with fire occurrences from decades through to hundreds of years.

To simulate the 'natural' fire frequency on TSRs across the four boards is beyond the scope of the boards, due to political, environmental and socio-economic factors.

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[60] Department of Land And Water Conservation, (2000) *Veg Notes 2: Managing Native Vegetation (2.6 Fire).* Department of Land And Water Conservation.

[61] Benson, J.S. and Redpath, P.A. (1997) The nature of pre-European native vegetation in south-eastern Australia: a critique of Ryan, D.G., Ryan, J.R. and Starr, B.J. (1995) *The Australian Landscape- Observations of Explorers and Early Settlers. Cunninghamia* 5(2) 285-328

[62] Wakefield, N.A . (1970) Bushfire Frequency and vegetational change in south-eastern Australian forests. *Victorian Naturalist,* 87: 153-158

[63] Kodela, P.G. (1977) The vegetation of the Robertson Plateau, New South Wales: historical and contemporary issues. PhD thesis., University of New South Wales: Kensington.

[64] Pulsford, I.F. (1991) History of disturbance in white cypress (*Callitris glaucophylla*) forests of the lower Snowy River Valley, Kosciusko national Park. M.Sc. Thesis. Australian National University, Canberra.

However, where fire is still a practical management tool, a thorough investigation of the correct frequency, intensity and duration should be conducted. The correct use of fire as a tool for grassland management can have a benefit for both the biodiversity values of the area, as well as the grazing and economic potential[68]. By conducting a set fire regime over a number of years, both the grazing potential and the conservation value of the reserve can be increased. It only requires informed decisions to be made, based on the latest information and consultation with other land management authorities.

Fire can be used to rejuvenate pasture, reduce the density of woody weeds and control regrowth. Where fire is used as a management tool, it should be done under the auspices of the relevant Acts.

One obvious problem with the use of fire in the different board areas is that there has not been a set policy regarding the use of fire as a management tool on TSRs. Staff changes brings different attitudes to fire. This can result in a certain fire regime being stopped, or a new one started in an area that previously was not subjected to fire. It would not be prudent to re-introduce fire, without a specific purpose) into an areas that had not been burnt for many years, without a thorough investigation of the areas specific needs.

A uniform policy within the board is required; to use fire as a tool, or to exclude it from the reserves. Both are acceptable conclusions, but each decision has management consequences that need to be addressed. The removal of fire from a TSR requires that the grazing management of the area should be regulated more intensely in order to facilitate both biodiversity conservation and increased pasture productivity.

5.3 General principles for fire management on TSRs

5.3.1 Grasslands

Ideally, in high rainfall areas without other forms of disturbance, native grasslands should be burnt annually or biennially. [65]

The factor to keep in mind is that a grazing event and a fire event are almost identical in the fact that they operate as a disturbance event. This disturbance event acts to reduce biomass, create intertussock spaces and reduce the competitive nature of grasses. Consequently, if an TSR has been undergone a grazing event/s, there is no need to instigate a burn, unless it is to meet specific aims such as weed control, to stimulate a germination event or for vegetation control reasons.

If the vegetation is dominated by summer perennial grasses (as is the case in most reserves in the NW) burn after late summer, or late winter. Burning in autumn may promote weeds to establish. The important thing to note is not to burn during periods of active growth, such as spring/early summer.

Odgers' report[66] found that fire in many instances, provided sites for exotic species to become established in the above ground vegetation of grass communities, and that it promotes a higher percentage of germinable dicotyledon seeds in the seed bank. These are the species most associated with environmental weeds in the northwest. Fire, may result in the degradation of the floristic composition of grassland vegetation, by enhancing invasion of alien species from the soil seed bank into the vegetation. After a fire event, allow sufficient time for the grass cover to build up an competitively exclude weed species. Do not allow a window of opportunity for weeds to become established, after either a fire event or a grazing event.

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[65] Barlow, T. (1998) *Grassy Guidelines- How to manage native grasslands and grassy woodlands on your property.* Trust For Nature

[66] Odgers, B.M. (1996) Fire, Buried Germinable seedbanks and Grass Species Establishment in an Urban Eucalypt Forest Reserve. *Australian Journal of Botany.* 44, 413-419.

Presently, only Tamworth RLPB, of the four boards in the project area conduct prescribed management burns in grassland or grassy shublands. These fires area conducted in Plains grass (*Stipa aristiglumis*) communities of the Liverpool plains in the Gunnedah area. It is not a widespread practice, and is conducted primarily for weed and fire hazard reduction, rather than pasture manipulation reasons.
Grazing is relied upon solely to acts as the disturbance event in the remainder of grassland areas, and this has led to the dominance in many areas of unpalatable species such as roly-poly (*Sclerolaena*), unpalatable saltbush species and mimosa (*Acacia farnesiana*). A correctly implemented prescribed burn may be able to reduce the density of unpalatable species as well as rejuvenating groundcover species.

Investigate options for the re-introduction of prescribed management burns in grassland areas to reduce the increasing density of unpalatable woody species and remove build up of dead plant biomass.

5.3.2 Grassy Woodlands

A large proportion of grassy woodland areas ecologically do not need to be subjected to repeated burning, as the photo reducing effect of the tree canopy reduces grass growth. Many of the reserves in Tamworth and Northern Slopes board, could be described as grassy woodlands, and thus the use of fire in woodlands merits a mention. Woodlands need only be burnt on 5-10 year basis and the fire should be small, as to create a mosaic of different ages amongst the woodlands.
However, if fire has been absent from a reserve for a period of more than 10-15 years[67], it would not be advisable to re-introduce a fire regime to the reserve, without investigating the impacts of a re-introduced fire regime. The burning of a whole reserve, which is often associated with tree and habitat loss, should be restricted. Mosaics of burnt areas should be created over several years.
The aim of most woodland fires is aimed at reducing the growth and abundance of unpalatable species such as, wiregrass (*Aristida)*, Coolatai *(Hyparrhenia hirta)* and Speargrass (*Stipa* sp.).
Prevent fire in areas where there are nil/slight infestations of Coolatai grass, as fire promotes the species.
A sensible practice would be to apply fire at a time which would assist in the removal of unpalatable species, whilst promoting palatable species. This follows on from the work of Lodge & Whalley[68], who utilised a floristic management regime to slowly exclude *Aristida* from degraded pasture in the New England Tablelands.

5.3.3 Restricted Fire Communities

Although fire is a part of all vegetation communities, the timescale for the appropriate interval is variable. For certain communities, the timescale is too long for board's management.
These communities include dry rainforest remnants such as:

- Vine thickets
- Ooline (*Cadellia pentatylis*) communities

[67] Prober, S.M. and Thiele K.R. (1995) Conservation of the Grassy Whitebox Woodlands: Relative Contributions of Size and Disturbance to Floristic Composition and Diversity of Remnants. *Australian Journal of Botany,* 43: 349-366.
[68] Lodge, G.M. and Whalley, R.D.B. (1985) The manipulation of species composition of natural pastures by grazing management on the Northern Slopes of New South Wales. *Australian Rangeland Journal* **7**: 6-16

In these areas, which are listed as endangered communities, steps should be taken to exclude fire from the area until the fire responses of the community are known.

5.3.4 Regulatory Implications

The Native Vegetation Act 1997 (*NVC Act* 1997) currently lists fire as a form of clearing, where it is being used to clear grassland, remove trees/shrubs or change the grass composition.[69]
If the burn is over a large area of land, and the intention is to remove an unpalatable species or to control timber regrowth, then there may be the need to consult with a DLWC Vegetation Management Officer.
Under *Rural Fires* Act 1997[70], the RLPB is obliged to prevent bush fires on lands under their control.[71] The RLPB can itself carry out the fuel reduction activity (normally grazing is the recommended form of fuel reduction), or authorise a landholder on their behalf. In both situations, the environmental assessment required, is a responsibility of the RLPB. If the burn is being conducted under the directions of an approved Bush Fire Management Plan, then it is exempt from controls under the *NVC Act* 1997.
At minimum, Rural Fire Service policy recommends that preliminary environmental assessment (eg. Draft RLPB REF) be carried out for hazard reduction activities. It is interesting to note that the DLWC conduct assessments under Part 5 of the Environmental Planning and Assessment Act 1979[72], for hazard reduction activities on Crown Land as part of their best management practice, and yet the RLPB overlook this activity.
The RFA Act 1997 does not permit destruction of threatened species, communities and populations during the construction of firebreaks, or during hazard reduction activities.[73] If it is unavoidable to disturb or destroy threatened species or communities, a Section 91 licence under the Threatened Species Conservation Act 1995 may need to be sought from the NPWS.

5.3.5 Suggested Guidelines for fire management

If fire is intended to be used as a management tool for TSR management in a board, then it is important that it is carried out according to the guidelines of a specific Fire Management Plan. This should be developed in addition to the FMP for the board and include set criteria for use of fires, such as an appropriate level of staff training, minimum equipment requirements, guidelines for fires in different vegetation communities and a set procedure for carrying out the fire. This would include- contacting neighbours, appropriate permits, firebreaks, exclusion of fire from certain areas, patch burning over a few areas, rather than a single fire event in one year. It would also include the minimum number of staff to be used and the minimum amount of equipment to be available.
(see Appendix 1- Suggested Burn Plan for TSR Prescribed burn)
In addition, boards should create a register of burnt areas in the TFS Reserves database system. This would allow planning for which areas may require a prescribed burn, or identify areas where fire events are too frequent and are having a detrimental effect. Currently, frequent fires are identified as being a Key Threatening Process for many vegetation communities under the Threatened Species Conservation Act.

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[69] *Native Vegetation Conservation Act* 1997 (NSW) s 5 (1)(a)
[70] *Rural Fires Act* 1997 (NSW)
[71] *Rural Fires Act* 1997 (NSW) s 63(1).
[72] *Environmental Planning and Assessment Act* 1979 (NSW)
[73] *Rural Fires Act* 1997 (NSW) s 66 (6)(b)

6.0 Conclusion

Conclusion

1. TSRs have found to be of general high value, with a significant number of threatened species, ecological communities and restricted vegetation types being located on TSRs. Because of the high percentage of the region that has been cleared for agriculture, TSRs are of critical importance in the regional conservation network.
2. For all non-routine activities conduct and record pre-site environmental assessments, based on RLPB REFs. RLPBs will not be able to individually locate all areas of threatened species or cultural sites and thus to ensure that developments or activities do not have a detrimental effect, the RLPBs should conduct on site environmental surveys and have a record of environmental assessments.
3. Develop a much stronger management ethos, to allow management to be tailored towards managing certain areas where appropriate. Certain parts of TSR have a much higher value than the remainder of the TSR, but presently it is difficult to separate management of the area. TSRs can and should be segregated into separate management units, especially for the purposes of biodiversity conservation.
4. Look to developing on ground TSR management to a longer timeframe. This would be management towards a 5-10 year timeframe, rather than short term reactive management.
   Eg.
   Mimosa and roly poly management (if any) only becomes a management issue and is brought to the attention of the RLPB when drovers find it too dense to move stock, or when the pasture and feed value of the area is almost totally minimised. Pine regrowth is thought of as a short-term woody weed, rather than an opportunity to alter long term planning decisions and opt for silvicultural and conservation management. Recognise potential management issues now, and implement steps to correct foreseeable problems.
5. Electric fencing is largely aimed at short-term financial gain, rather than longer-term grassland and woodland management. The consequence of this is selective grazing by stock over a large fenced area for a few months.
   The result of this is that regrowth of shrubs and trees area affected and certain species are more heavily targeted than unpalatable species. In grassland areas, large amounts of bare ground are left open for erosion, non-palatable species proliferate (such as mimosa, poverty bush and roly-poly) and areas of high quality grassland are grazed past optimal conservation levels.
   The RLPB must seriously consider implementing grazing strategies for different vegetation types, recognising that a 'one size fits all' grazing strategy is not beneficial to the productive value of the pasture. The information base on pasture and groundcover types is largely there, through the NHT survey and associated training, the decision to utilise this information and opt for vegetation community pasture management is a choice that RLPBs must make.
6. Generally, most fenced reserves have a lower conservation value with less regeneration and a largely exotic or poor quality groundcover (as shown by the survey results from Tamworth). If boards follow the trend that has been established in certain areas and look toward allowing long term leasing of TSRs (as developing in Moree RLPB), then they can expect the environmental quality of TSRs to decline.
7. In areas where tree quality is poor and regeneration is limited, be aware that to a certain degree, that it has been a combination of past management actions and grazing pressure that has

prevented tree and shrub recruitment. To ensure that TSRs have adequate tree cover for both stock productivity and for biodiversity reasons, boards may have to consider fencing areas of trees off and if natural regeneration is not forthcoming, replanting with locally sourced trees and shrubs. This would be one of the simplest ways of generally improving the environmental value of TSRs.

8. Because of the value of TSRs in the local and regional conservation context, RLPBs must become considerably more active in the local, regional and state conservation structure. The role of RLPBs as managers of TSRs purely for stock movement is being replaced by a dual role of stock movement and stock management compatible with the conservation aims of particular high conservation value TSRs.

Appendices

[Appendix 1] Burn Plan procedure for TSR Prescribed Burns

Pre-burn

- Ensure that staff are trained to an adequate level (Basic Training 1 (RFA))
- Equipment is adequate for the purposes of the prescribed burn
- Burning regime is acceptable for the identified vegetation community, significant conservation area
- All relevant resource management authorities have been notified- State Forests, NPWS, RFA FCO
- Local bush fire authorities have been notified of the burn

For each prescribed burn in an area of TSR, apart from small scale hazard reduction burns carried out in accordance of the *RFA Act 1997*, a burn plan should be developed and incorporated into annual workplan reporting.

A prescribed burn may incorporate fuel reduction activities, pest animal harbour reduction and pasture rehabilitation activities.

Each burn plan will state the objectives of the burn, including;

- Fuel management
- Pest management
- Biodiversity management
- Type of fire required to deliver objectives- cool fire, hot fire; fire to consume litter; fire to remove dead tussock material

The plan should;

- identify internal and external assets/sites etc. of importance and how they will be protected
- predict potential problems with the prescribed burn and identify control procedures
- identify hazards associated with the burn and ways to reduce these hazards
- identify prevailing weather conditions and the required wind conditions and temperature parameters.

The dynamic unpredictability of fire requires that site assessment is carried out pre-burn, with appraisals of fuel loadings in different parts of the target area, predicted weather reports, pattern and method of ignition, anticipated fire behaviour and nature of control lines.

Resources necessary for the burn are identified:

- ignition equipment that addresses fire behaviour hazards
- control/patrol and follow up work
- management and logistical support
- adjoining land manager resources in instances of fire escape- private landholders and agencies

Because many TSRs are adjoining roads and highways, smoke management must also be an integral part of the burn process and steps should be taken to address warning signage, personnel for traffic

flow and the possibility of using Police and Rural fire Service personnel to conduct traffic, whilst burn is carried out.

All prescribed burns should be recorded, the effectiveness of the burn evaluated and methods and procedures reviewed.

In instances where there are identified assets, best practice management for these areas should be instigated. The managing agency for the assets will be notified and extra measures as identified by the agency will be integrated into the prescribed burn. In addition, a review of Environmental Factors (REF) should be carried out to identify any impacts upon threatened species, cultural sites etc.
This may include such actions as contacting;

-Threatened species- contact NPWS Threatened Species Unit (Dubbo)

- Aboriginal/European sites- contact regional NPWS Sites Officer (Coonabarabran)
- Regionally significant vegetation/areas of regional conservation significance as identified in Catchment Management Plan and/or Regional Vegetation Plan- DWLC Vegetation Management Officers, Local Shire Fire Control Officer

The pre-burn plan and short report on results of prescribed burn should be recorded in the individual TSRs file and added to a developed register of burnt areas on TSRs within the individual RLPB.