

Review of statewide protective measures and forest practices

A project undertaken as part of the NSW Comprehensive Regional Assessments August 1999



REVIEW OF STATEWIDE PROTECTIVE MEASURES AND FOREST PRACTICES

Ecologically Sustainable Forest Management Group

A project undertaken for the Joint Commonwealth NSW Regional Forest Agreement Steering Committee as part of the NSW Comprehensive Regional Assessments Project number NA45/ESFM

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ISBN 1 74029 059 3

This project has been jointly funded by the New South Wales and Commonwealth Governments and managed through the Resource and Conservation Division, Department of Urban Affairs and Planning, and the Forests Taskforce, Department of the Prime Minister and Cabinet

The project has been overseen and the methodology has been developed through the Ecological Sustainable Forestry Management Technical Committee, which includes representatives from the New South Wales and Commonwealth Governments and stakeholder, groups.

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PROJECT SUMMARY

This report describes a project undertaken as part of the comprehensive regional assessments of forests in New South Wales. The comprehensive regional assessments (CRAs) provide the scientific basis on which the State and Commonwealth Governments will sign regional forest agreements (RFAs) for major forest areas of New South Wales. These agreements will determine the future of these forests, providing a balance between conservation and ecologically sustainable use of forest resources.

Project objective/s

The objective of this project was to describe, review and assess current protective measures and practices applied to forests in the Upper and Lower North East CRA/RFA Regions. It considered the effectiveness of the protective measures and forest practices in achieving the Ecologically Sustainable Forest Management (ESFM) principles, how they effect forest values, and their scientific basis. The project aimed to recommend improvements and variations to protective measures and forest practices. It also aimed to compile into one document, all the major protective measures and forest practices involved in forest conservation and management in NSW, and this document was called a Code System.

When the project was formulated it had an objective: 'Expression of the protective measures/forest practices and variations, in language compatible with their representation in an information system.' This part of the project was subsequently undertaken by another project and is covered by a separate ESFM project summary and report titled ESFM Project Area 4/2/2 – *Application of the protective measures and forest practices into a quantitative database* (NA57/ESFM).

Methods

The project was carried out by agencies involved in forest conservation and management. They, collated, identified and described their existing protective measures and forest practices and assessed how they achieved the ESFM principles and protected specific values, and suggested improvements and variations. The agencies involved included Environment Protection Agency (EPA), State Forests of NSW (SFNSW), Department of Urban Affairs and Planning (DUAP), National Parks and Wildlife Service (NPWS), and the Rural Bushfire Service.

The protective measures and forest practices were independently reviewed at a series of expert workshops that focussed on specific areas: forest uses, soil and water, biodiversity (including fire management). The comments and recommendations arising from these expert workshops do not necessarily reflect the view of Government Agencies

participating in the review, but were used to inform a revision of the protective measures in developing Conservation Protocols as part of a RFA for Upper and Lower North East Regions. The workshop proposed to review economic and social aspects was not conducted. The review assessed the overall effectiveness of protective measures and forest practices in protecting forest values and identified improvements and variations.

Finally the existing protective measures and forest practices involved in forest conservation and management in NSW, were compiled into one document and called a Code System.

Key results and products

- Description of existing or proposed protective measures and forest practices involved in forest conservation and management in NSW, including:
- Environment Protection Authority Pollution Control Licence issued to State Forests of NSW.
- State Forests of NSW Protective measures and forest practices used on State forests.
- National Parks and Wildlife Service Conservation Protocols, state-wide biodiversity measures and reserve management.
- Department of Urban Affairs and Planning Environmental Impact Statement approvals and timber plantation accreditation process.
- Various agencies involved in protecting cultural heritage values (indigenous and nonindigenous)
- Rural Bushfire Service
- Review of the protective measures and forest practices including suggested improvements at three workshops covering forest uses, soil and water and biodiversity.
- Variations to the protective measures/forest practices identified by stakeholders, experts and agencies.
- Compilation of the protective measures and forest practices into a Code System.

1. INTRODUCTION

1.1 BACKGROUND

This report describes a project undertaken as part of the Comprehensive Regional Assessments (CRAs) of forests in New South Wales. The CRAs provide the scientific basis on which the Commonwealth and the State Governments will negotiate the Regional Forest Agreements (RFAs). These RFAs will determine the future of these forests, establishing a balance between conservation and ecologically sustainable wood production. Additionally, CRAs will facilitate decisions concerning the improvement of on- and off-reserve management.

The New South Wales Ecologically Sustainable Forest Management (ESFM) Technical Framework identified a series of project areas that were needed to achieve the tasks planned in the Commonwealth-NSW Scoping Agreement. Project Area Four in the Technical Framework required the assessment of current forest practices and their impacts. Assessments were to incorporate the scale and distribution of impacts in relation to off-reserve and forest management practices and to review the prescriptions, codes of practices and guidelines, established to achieve ESFM.

This project reviewed and assessed the most important forest management protective measures related to forest practices and uses. Statewide reviews were conducted for forest uses and practices and soil and water protective measures, while biodiversity protective measures were reviewed only for the Upper and Lower North East Regions. Biodiversity incorporating species richness, ecosystem complexity and genetic variation is geographically dependent. Measures to protect these features vary between RFA Regions and will therefore be reviewed on a Regional basis.

1.2 OBJECTIVES

The objectives of this project are to:

- Review the protective measures in relation to significant forest practices on public and private land including their effectiveness in meeting the ESFM principles, affect on forest values, scientific basis and method of development; and
- provide a comprehensive collation of significant protective measures and forest practices (eg. Pollution Control Licence, State Forests of NSW Forest Practices Code, or Conservation Protocols) which are proposed for use post RFA and which can be used to develop the NSW Forest Practices Code System.

1.3 SCOPE OF THE PROJECT

Introduction

The intention of this project was to review and assess the current protective measures and practices applied to forests through out the state of NSW and to inform the integration process on impacts of particular prescriptions or protective measures. The protective measures and forest practices applied to forest conservation and management including timber harvesting will be compiled in to a code system. The project has been divided into three phases:

- The first phase will describe and review protective measures and forest practices and identify improvements. The protective measures and forest practices will be compiled into what is described as a 'Code system'. This section of the project is reported here.
- The second phase will provide expressions of these protective measures and forest practices in a language compatible with information systems. This is presented in the ESFM report: *Application of the protective measures and forest practices into a quantitative database* (NA57/ESFM).
- A third phase will occur after integration and will involve finalising the code system and ecosystem management field guides leading into the RFAs.

1.4 REPORT STRUCTURE

This report presents the outcomes of the three workshops pertaining to the review of current forest management protective measures related to forest uses and practices and soil and water quality employed across the state and the biodiversity measures used in the Upper and Lower North East Regions in 1998. Each chapter reports the outcomes of the following three workshops:

- Statewide forest uses and practices workshop
- Statewide soil and water workshop
- Upper and Lower North East biodiversity workshop

Chapters contain details of the review panel members, the invited expert scientist package, the workshop format and its outcomes. A further chapter attempts to draw together the key issues of concern identified by the respective Panel members across the three workshops. Finally the documents used to form the NSW Forest Practice Code System are described.

All appendices are contained in the *Review of Statewide protective measures and forest practices – Appendices* document.

2. STATEWIDE FOREST USES AND PRACTISES WORKSHOP

2.1 THE REVIEW PANEL

The Ecologically Sustainable Forest Management (ESFM) Project Area 4/2: Review of protective measures and forest practices - Forest uses and practices workshop was held in Sydney on the 20th to the 21st of August 1998. The Panel for this workshop consisted of representatives from a variety of agencies, members of the ESFM committee and invited independent scientists. The latter were derived from a series of nominees listed and voted on by the ESFM committee members. Experts with the highest rank were invited to attend the workshop, if unavailable, those ranked next on the list were approached, and so on until a sufficient number of independent representatives were found. The Panel was comprised of:

- Michael Davis (Chair, Department of Urban Affairs and Planning),
- Greg Roberts (Department of Agriculture),
- James Hoare (Bureau of Resource Science),
- Graeme Mitchell (Department of Urban Affairs and Planning),
- Stuart Davey (Forests Task Force of the Prime Minister and Cabinet),
- Pauline Nolan (South East Forests Alliance),
- Charlie Mackowski (Construction, Forestry, Mining and Energy Union),
- Norm Hawkes (State Forests of NSW),
- Gary King (State Forests of NSW),
- Bruce White (Department of Agriculture),
- Ross Florence (Australian National University)*,
- Graham Wilkinson (Tasmanian Forest Practices Board)*,
- Ross Smith (Department of Bush Fire Services)*,
- Bob McCormack (Commonwealth Scientific and Industrial Research Organisation)*,
- Ross Penny (Victorian Department of Natural Resources and Environment)*,
- Andrew Smith (AustEco)*,
- Jim Gould (Commonwealth Scientific and Industrial Research Organisation)*, and

- Francis Grey (Economists at Large)*.
- * Indicates the scientific experts attending the forest uses and practices workshop.

2.2 EXPERT'S PACKAGE

Independent scientists were given a background reading package providing them with an overview of the CRAs and the role of ESFM and Project Area 4/2 within this framework. The Package included:

- Review of protective measures and forest practices on National Parks and Wildlife Service reserves (Appendix C).
- The Upper and Lower North East Broad Area Licence. This document is available in the *Review of protective measures and forest practices* report, as attachment five, prepared by NSW National Parks and Wildlife Service, July 1999.
- State Forests of NSW information on forest practices and protective measures (Appendix E).
- Summary of the *Timber plantations (Harvest Guarantee) Act 1995* and the Timber Plantations (Harvest Guarantee) regulation 1997 (Appendix G).

Experts were expected to review this information prior to attending the workshop.

2.3 THE WORKSHOP FORMAT

Initially the Panel identified the various uses of forests in NSW and selected those to be reviewed during the workshop. The relationship between forest uses and practices and protective measures, as detailed in the Expert Package, were discussed by Panel members. For each forest use reviewed the Panel highlighted issues of concern and prioritized these issues were appropriate.

In an open discussion the Panel identified harvesting and silvicultural practices as the forest use of greatest concern. They suggested possible solutions to alleviate concerns and alternative directions for the future.

2.4 FOREST USES AND PRACTICES

The forest uses identified by the Panel are listed in Table 1. Time would not allow comprehensive discussion of all forest uses. The list for discussion was refined to only incorporate those issues that were considered to be most important.

Forest uses discussed	Forest uses not discussed	
Fire	Native plants and medicines	
Silviculture and harvesting	Fungi collection	
Roads	Charcoal	
Apiary	Art	
Plantations	Photography	
Grazing	Wood turning	
Tourism and recreation	Painting	
Utilities	Wild foods	

TABLE 1: FOREST USES IDENTIFIED BY THE PANEL

Forest uses discussed	Forest uses not discussed	
Military	Baskets	
Silviculture and zoning	Perfumes	
Research	Medicines	
Seed	Materials for clothing	
Gravel extraction	Matches	
Hunting	Dyes	
Firewood collection	Cellophane	
Pesticide use	Dobosia	
Feral control	Eucalypt leaves	

2.5 REVIEW OF FOREST USES AND PRACTISES

A synopsis of the comments and recommendations made by the Panel in the workshop is provided for each of the forest uses discussed. When all issues had been identified the Panel gave a priority rank to specific comments or recommendations of the highest importance.

2.5.1 Fire

In a discussion of the use of fire in forests, members of the Panel highlighted the following issues, applying priorities where appropriate:

- A standard Code of Practice for burning/fire management across all tenures, such as a Bush Fire Risk Management Plan, should be developed. The Code must balance ecological requirements with asset/life requirements and be derived from a model or matrix collating economic, ecological/scientific and logistical information. **Priority 1**
- Ecological information for input into a Bush Fire Risk Management Plan is required, but may be expensive and difficult to obtain. Priority 2
- The National Parks and Wildlife Service and State Forests of NSW forest practices and protective measures only comply with processes, their application across the landscape to achieve prescribed objectives and outcomes, or methods of performance evaluation are not defined. There is no evidence that objectives are attained. **Priority 3**
- ESFM should be incorporated, particularly effects on biodiversity, into any fire management plans. **Priority 3**
- Public and Private land managers who conduct control burns should be educated about the effects of fire and appropriate fire regimes. Priority 3
- Objectives need to be developed relating to the protection of external assets/life and biodiversity. This could be incorporated into Section 6.2.2 of the State Forests of NSW information (Appendix E).
- All controlled burning within State forests should be strategically planned and must include performance indicators, to determine the efficacy of fire regimes, and monitoring of fauna and flora species pre- and post-fire event.

2.5.2 Silviculture and harvesting

In a discussion of the use of forests for silviculture and harvesting, members of the Panel highlighted the following issues, applying priorities where appropriate:

■ The economic return and conservation requirements for different harvesting techniques should be evaluated. Some of the Panel indicated that current harvesting plan systems are

costly and complex and may be unsustainable with expenses greater than returns. There is a need to explore the trade-off between high cost/low impact harvesting and low cost/high impact harvesting. **Priority 1**

- State Forests of NSW and National Parks and Wildlife Service are focused on processes, ie. pre-harvest focus, rather than outcomes/products. Silvicultural objectives and outcomes need to be defined and a process for monitoring these established. Standards for harvesting and post-harvesting assessments in addition to pre-harvesting surveys should be prescribed. There is a need for defining what a "well stocked forest" is and systematic assessment of post logging regeneration to ensure that forests are adequately stocked for their successful regeneration. Priority 2A simple and effective harvesting system for Private land owners should be developed. Additionally a simple "one stop shop" process by which Private land owners gain permission to harvest should be implemented across agencies. Priority 2
- The effects of harvesting and various silvicultural techniques should be monitored by independent experts and results should be used to develop optimal harvesting procedures.
 Priority 2
- A silvicultural strategy is needed for each forest type describing the environmental relationship and ecological attributes of the type, silvicultural methods and intensities appropriate to the site, an outline of constraints, and the way different methods and intensities might be used to achieve a range of wood production and conservation objectives. **Priority 3**
- Silvicultural objectives, with appropriate performance indicators, should be developed.
 Priority 3
- A size class and pattern of distribution might be determined which is appropriate to a particular fauna, for example the koalas prefer more specific mixtures of tree sizes than the pattern created by the group selection harvesting method.
- The development of objectives for Harvest Planning procedures is crucial. This would require a shift in emphasis and expenditure away from harvesting processes and towards harvesting outcomes with setting and monitoring of targets to determine if objectives are achieved.

2.5.3 Roads

In a discussion of the use of roads in forests, members of the Panel highlighted the following issues:

- A Code of Practise for construction, maintenance and use of roads and trails in National Parks should be developed.
- Guidelines should be developed to manage conflicts arising over roading and associated activities, for example National Parks and Wildlife Service closing a road used by apiarists.

2.5.4 Apiary

In a discussion of the use of forests for apiary, members of the Panel highlighted the following issues:

- An apiary Code of Practice is currently being developed.
- Log dumps in State forests should be formally identified as areas of forest used by apiarists.
- A prescription could be developed to conduct post-logging burns during non-flowering seasons. The flowering of the shrub layer vegetation is particularly important for apiarists.

- Light selective logging, which maintains a significant proportion of the stand, is the silvicultural regime preferred by apiarists.
- Some members of the Panel indicated that the fiscal benefits of apiary are greater than harvesting in some situations. An economic, ecological and logistical evaluation of apiary compared to logging in State forests should be undertaken.
- The level of access for apiarists in flora reserves on State forests should be clarified. National Parks and Wildlife Service should consider allowing access to selected Reserved areas, particularly areas where *Banksia* species are abundant.
- The term 'appropriate apiary control' from the species-specific prescription in the Conservation Protocols for the regent honeyeater should be removed. Members of the Panel indicated that resource competition between this species and bees is minimal.
- The loss of mature trees, 30 to 40 years old, from harvesting, and dedication of land as Reserve are significant threats to the honey industry. Additional threats identified were restriction of road access and vandalism.
- Communication between local forest managers and apiarists must be improved.

2.5.5 Plantations

In a discussion of the use of plantations, members of the Panel highlighted the following issues, applying priorities where appropriate:

- A single Statewide Code outlining procedures for ESFM, incorporating plantations and native harvesting across tenures, should be developed. Any Statewide Code should have only generic principles and standards. **Priority 2**
- Private land holders should be required to comply with the Code of Practice for the establishment and management of plantations.

2.5.6 Grazing

In a discussion of the use of forests for grazing, members of the Panel highlighted the following issues, applying priorities where appropriate:

- Grazing can impact on biodiversity and water quality. An assessment of grazing should be conducted to determine if it is sustainable in State forests. **Priority 3**
- If grazing continues in forests an Environmental Impact Statement (EIS) should be conducted. An EIS would provide the impetus to develop measures and/or strategic plans to mitigate grazing and associated impacts such as fencing.
- State Forests of NSW should develop a Code of Practice for grazing.
- To deter grazing on Public land the cost of grazing permits could be increased and/or a ten year action plan could be developed. In developing action plans reference should be made to the paper by Christensen (1998).

2.5.7 Tourism and recreation

In a discussion of the uses of forests for tourism and recreation, members of the Panel highlighted the following issues:

- Overuse of National Parks and State forests was identified as an important management issue. Strategies are needed to protect environmental values and assets in National Parks and State forests from overuse and to rationalise demand. The current strategies relating to the management of excessive use of National Parks and State forests require review.
- Tourism in State forests should be formalised and its role as a legitimate management activity explored.
- The recreation planning, including planning tools and reference groups, and approval processes in National Parks and State forests require definition and formal development.
- The funding and use of cross tenure roads on public lands (eg. State forests, National Parks, Local Government) should be reviewed to determine who pays for the use (eg. on a *pro rata* basis) and relationship between road classification and usage (vehicle type). There is a need to promote a higher level of environmental awareness amongst four-wheel drive users to minimise impacts, particularly in sensitive areas such as wet areas and streams.
- As recreation and tourism is a cross-tenure activity (State forests and National Parks) a regionally integrated plan is required.
- In recognition of the role of State forests in servicing tourism and recreation, State Forests of NSW should receive funding for "Community Service Obligations", such as roading.
- Firewood should be provided at recreational areas, to prevent clearing of surrounding areas.
- Education programs about the use of camping/cooking fires on Public land should be developed.

2.5.8 Utilities

In a discussion of the uses of forests for utilities, members of the Panel highlighted the need to review the environmental impacts and provision of utilities on Public land and to develop a Code of Practice for their construction and maintenance.

2.5.9 Military training

Members of the Panel recommended developing a Code of Practice for Military training in Public forests, particularly in the Moss Vale, Bulahdelah, Batemans Bay and Richmond Range areas.

2.5.10 Silviculture and zoning

In a discussion of the uses of forests for silviculture and zoning, members of the Panel highlighted the following issues:

- Silvicultural and zoning objectives and targets should be defined so as to allow flexibility in land management. For example, maximising a specific practice/industry such as apiculture in a particular zone provides the framework to facilitate monitoring programs, which determine if objectives are attained.
- Planning should be at a strategic level focussing on how silvicultural methods are applied across the landscape to achieve prescribed objectives and outcomes.

2.5.11 Other uses of forests including: research, seed, gravel extraction, hunting, firewood, pesticide use and feral control.

In a discussion of the other uses of forests members of the Panel highlighted the following issues:

- The potential for hunting clubs to control vertebrate pests such as pigs, goats and rabbits should be investigated.
- The viability of baiting as a method of feral predator control requires further research, particularly of the impacts of baiting on non-target fauna such as quolls and bandicoots.
- A Species Impact Statement should be developed for wild dog control programs, all control should be suspended pending its completion.
- Cross tenure management plans to control introduced feral species should be introduced. Additionally there should be a single process through which Private land owners gain permission to implement control.
- Management plans for the conservation of the native dingo should be developed and must incorporate regulations for domestic/hunting dogs on Public forest.
- A Code of Practice for firewood collection is required, including guidelines on the amount, size and types of firewood available for harvesting. The high rates of collection on Private land are likely to prevent carbon recycling in the soil, reducing soil fertility.
- The *Mining Act 1992* should be applied to any mineral extraction on Public land.

2.6 GENERAL DISCUSSION

The Panel was greatly concerned with harvesting and silvicultural practices in forests. A general discussion of silvicultural practices followed the completion of reviews of the forest uses. During this discussion the following points were highlighted:

- A silvicultural strategy is needed for each forest type describing the environmental relationship and ecological attributes of the forest, silvicultural methods and intensities appropriate to the site, and the way different methods and intensities might be used to achieve a range of wood production and conservation objectives.
- State Forests of NSW outlines appropriate silvicultural methods, yet their application across the landscape to achieve prescribed objectives and outcomes, or the way performance might be evaluated, are not defined. To achieve this there needs to be a greater focus on strategic planning.
- There are circumstances where silviculture might be practiced with the prime intention of enhancing wildlife conservation (notably by optimising biological and structural diversity). In some circumstances this could be an appropriate alternative to placing constraints on wood production.
- Application of the single tree selection method could be prescribed in terms of the species mix and the size class distribution of trees to be retained, rather than in terms of the level of permitted removal.
- A size class and pattern of distribution might be determined which is appropriate to a particular animal species. This has been done for the koala, preferring more specific mixtures of tree sizes than the pattern created by the group selection method.
- It is necessary to retain the uneven aged-structure in forests north of Barrington Tops in order to maintain the high levels of biodiversity within these forests. Present day harvesting is very different to that of the past. The industry can accept smaller logs and a wider range of species encouraging a more even-aged regrowth forest.

- More intensive harvests (for example patch clearfelling and group selection based on large canopy gaps, harvest of 30% of an area in the one operation and a short cutting cycle) are appropriate in terms of increasing medium and long-term wood production. However, this should be done only where ecologically appropriate, where there is minimum waste of existing growing stock, and where adequate account has been taken elsewhere of other forest values (both wood production and conservation).
- Consideration could be given to increasing the interval between successive harvests where the more intensive group selection harvests are applied. This will help maintain a greater level of structural diversity within the forest.
- Restoration of degraded forest is required under ESFM principles. This should be based, in part, on enrichment with natural species mixtures, and minimal disturbance of wet sclerophyll/rainforest element understorey. This applies across tenures and includes National Parks.

3. STATEWIDE SOIL AND WATER WORKSHOP

3.1 THE REVIEW PANEL

The Ecologically Sustainable Forest Management (ESFM) Project Area 4/2: Review of protective measures and forest practices – soil and water workshop was held in Sydney on the 17th of July 1998. The Panel for this workshop consisted of representatives from a variety of agencies, members of the ESFM committee and invited independent scientists. The latter were derived from a series of nominees listed and voted on by the ESFM committee members. Experts with the highest rank were invited to attend the workshop, if unavailable, those ranked next on the list were approached, and so on until a sufficient number of independent representatives were found. The Panel was comprised of:

- Michael Davis (Chair, Department of Urban Affairs and Planning),
- Steve Beaman (Environment Protection Authority);
- Sarah Thomson (Environment Protection Authority);
- Charlie Mackowski (Construction, Forestry, Mining and Energy Union);
- Lyn Orrego (North East Forest Alliance);
- Jacky Croke (Commonwealth Scientific and Industrial Research Organisation)*;
- Steve Mackay (Sydney Water)*;
- Glen Atkinson (Department of Land and Water Conservation)*;
- Norm Hawks (State Forests of NSW);
- John McGarity (private consultant)*; and
- Pat O'Shaughnessy (private consultant)*.

* Indicates the independent scientists invited to attend the soil and water workshop.

3.2 EXPERT'S PACKAGE

Independent scientists were given a background reading package providing them with an overview of the CRAs and the role of ESFM and Project Area 4/2 within this framework. The Package included:

- The Environment Protection Authority's Pollution Control Licence (PCL) issued to State Forests of NSW. A summary of this document is contained in Appendix A, the entire Pollution Control Licence can be purchased from the Environment Protection Authority.
- Soil and water related protective measures and forest practices undertaken by State Forests of NSW (Appendix E).

Experts were expected to review this information prior to attending the workshop.

3.3 THE WORKSHOP FORMAT

The Panel reviewed the Pollution Control Licence issued to State Forests of NSW by the Environment Protection Authority and the soil and water protective measures and forest practices undertaken by State Forests of NSW. The Panel commented on the likelihood of these protective measures and forest practices protecting soil and water quality and suggested changes, deletions or additions to improve the Pollution Control Licence and State Forests of NSW protective measures.

An open discussion following the completion of reviews allowed the scientific experts to highlight concerns with, and provide general comments on, the protective measures and forest practices affecting soil and water quality.

3.4 OUTCOMES OF THE SOIL AND WATER WORKSHOP

A synopsis of the comments and recommendations made by the Panel in the workshop is provided for the sections of the Pollution Control Licence and State Forests of NSW protective measures discussed.

3.4.1 Review of Schedule two of the Pollution Control Licence: Information to be assessed during the pre-operational planning and assessment of logging or roading operations.

In a discussion of Schedule two of the Pollution Control Licence the members of the Panel highlighted the following issues, applying priorities where appropriate:

- For equity and consistency, roads conditions should apply across tenures. **Priority 1**
- Conditions and requirements for roads should include retirement of existing roads.
- Mapped and unmapped first order watercourses require a filter strip of sufficient width to prevent sediment and machine entry. Priority 4
- Higher order streams may not require wider filter strips to protect water quality. Filter strip widths should be determined by the space needed to allow sediment flows to infiltrate, soil type, slope and the machinery systems used. In accordance with this, second and third order filter strip widths could equate to those shielding first order streams. However the Panel noted the filter strips also serve to maintain biodiversity. **Priority 4.**
- Long second order streams may be fed by hundreds of hectares and have the potential to overflow. The width of strips may need to be increased to accommodate for overflows.
- Monitoring samples needs to include the 1:5 or 1:10 year storm event, with monitoring guidelines established.
- Part C. The angle of the 'V' in the 'Vee-notch Weir Equation' should be stated.

3.4.2 Review of Schedule three of the Pollution Control Licence: Methods for assessing the soil erosion and water pollution hazard associated with logging operations.

In a discussion of Schedule three of the Pollution Control Licence the members of the Panel highlighted the following issues, applying priorities where appropriate:

- All maps should be revised to incorporate recent information on soil mapping and new soil maps of the Upper and Lower North East Regions. **Priority 2**
- The Environment Protection Authority representatives advised that regolith maps are only preliminary drafts.
- Technicians mapping soils should receive appropriate training. **Priority 3**
- Module 1. Section 1.2. The definition of 'soil regolith' needs to be defined more clearly. It should be amended to include soil depth greater than 1 m as this may be exposed and requires protection.
- Module 1. Section 1.2. The definition of 'soil regolith' should be amended to include the following statement:

....which could be affected by man-made or natural events, processes or forest practices.

Priority 4

- Module 2. Section 2.2. The definition of 'mass movement' should be amended to include debris avalanches and mud flows.
- Is the new method (ie soil erosion and water pollution hazard assessment) better than obtaining soil erodibility (K factors)?
- The definition of dispersion (defined as slaking) is an improvement on past explanations.
- There should be more categories in dispersability and cohesiveness or shift the boundaries of the definitions of the R classes to give a more even distribution of soils across R classes.

3.4.3 Review of Schedule four of the Pollution Control Licence: Operating conditions for logging operations.

In a discussion of Schedule four of the Pollution Control Licence the members of the Panel highlighted the following issues, applying priorities where appropriate:

- The saturation zone should be considered when defining where a filter strip is to be implemented. **Priority 2**
- Condition 85. There are many factors/features that can affect dispersible soils that have not been considered in this condition. For example, the grade of snig tracks, factors relating to concentrated flow (including vegetated surfaces) and gully erosion. **Priority 3**
- Condition 67. A 1:20 year storm event will create significant pollution problems and should be incorporated in this condition. **Priority 4**
- Section D. Conditions 37-39. The types of forestry activities prohibited in buffer strips should be clarified in this section.
- Section B. Condition 3. Part d. This section of Schedule four states:

State Forests must achieve 70% ground cover on all disturbed areas within five days of the completion of felling trees in the area. This level of groundcover must not be achieved by:

- The respreading or retaining of slash or logging debris; or
- *The spreading of topsoil and seed.*
- The Panel recommended rephrasing this condition.

3.4.4 Review of Schedule five of the Pollution Control Licence: Operating conditions for roads.

In a discussion of Schedule five of the Pollution Control Licence members of the Panel highlighted the following issues, applying priorities where appropriate:

- Section I. Condition 34. This condition should consider the issue of diverting road drainage when there is insufficient space at stream crossings for road drainage sediment to settle.
 Priority 3
- Road drainage issues in relation to regolith should be considered in an appropriate section of the Pollution Control Licence. Priority 4
- Measures to prevent the loss of crown at stream crossings should be developed. Plans should include diverting water flow from road crossings away from streams. For example, additional crossbanks on the approach to roads can be used for this purpose. Priority 4
- Section C. Condition 8. Road drainage structure should have sufficient capacity to convey the peak flow of additional storm periods, such as 1:10 or 1:20 events.
- Section F. This section should include wording that ensures responsibility relates to design (as specified in Condition 24 of Schedule 5) and construction. Additionally, this section should include the stabilisation of spoil and clarify how spoil is disposed of if it is not used for batter material.
- Section G. This section should consider slips on the high side of roads and outline the appropriate methods to mitigate slips.
- Excavators, rather than bulldozers should be used to construct stream crossings.

3.4.5 Review of State Forests of NSW protective measure/forest practices for soil and water.

In a discussion of the protective measures and forest practices relating to soil and water implemented by State Forests of NSW, the members of the Panel highlighted the following points, applying priorities where appropriate:

- There is a need for the consistent use of Codes across all tenures and land uses. **Priority 1**
- State Forests of NSW Code of Practice should be enforceable under legislation.
- If a Code is statutory and thus inflexible it could have the following hierarchy:
- 1. Document of principles with schedules for different activities and tenures.
- 2. Local instructions for specific operations on specific tenures.
- State Forests of NSW should consider water yield from plantations. **Priority 4**
- Repeated burning can adversely affect soil organic matter and cause soil compaction changing infiltration rates within the forest.

3.5 GENERAL DISCUSSION

The independent scientists participated in a general discussion following the review of the Pollution Control Licence and soil and water protective measures implemented by State Forests of NSW. The following points present a summary of the discussion:

- Water yield and plantations issue requires consideration by the relevant authorities.
- Research on age/yield effect on water in South Africa should be considered.
- The design and construction of stream crossings should be improved.
- The placement of filter strips is critical. Filter strip widths for first order streams must be appropriately quantified.
- Despite previous suggestions, some members of the Panel stressed that the number of soil categories should not be increased as expanding categories may create complications.
- Conditions for the retirement of existing roads is inadequate.
- Soil maps must be revised and improved.
- Any proposed methods to map soils must be reviewed by independent scientific experts.
- The soil regolith definition should be revised and regolith values clarified.
- Regolith issues should be given greater credence where other hazard factors are high, such as erosivity/slope.
- Names such as Great Soil Groups or the latest Australian classifications should be used to define soil groups.
- Specific amendments to soil classifications include; structured clays may be an inappropriate soil group; solonized solonets are non-existent; add Kraznozem soils.
- Following the review of the regolith maps and tables, an expert system key could be developed.
- Additional information and data should be incorporated into the Pollution Control Licence as it becomes available.
- The Environment Protection Authority's Pollution Control Licence should adequately protect water and soil in forests.

4. UPPER AND LOWER NORTH EAST BIODIVERSITY WORKSHOP

4.1 THE REVIEW PANEL

The Ecologically Sustainable Forest Management (ESFM) Project Area 4/2: Review of protective measures and forest practices – biodiversity was held in Coffs Harbour on the 3rd to the 5th of August 1998. The Panel for this workshop consisted of representatives from a variety of agencies, members of the ESFM committee and invited independent scientists. The latter were derived from a series of nominees listed and voted on by the ESFM committee members. Experts with the highest rank were invited to attend the workshop, if unavailable, those ranked next on the list were approached, and so on until a sufficient number of independent representatives were found. The flora Panel was comprised of:

- Jason Passioura (Environment Australia);
- Christopher Turbill (Environment Australia);
- Douglas Binns (State Forests of NSW);
- Robert DeVries (National Parks and Wildlife Service);
- Paul Sheringham (National Parks and Wildlife Service);
- Peter Richards (National Parks and Wildlife Service);
- John Hunter (National Parks and Wildlife Service);
- Barbara Stewart*;
- Stephanie Horton*;
- Phil Gilmore*; and
- Andrew Benwell*.

The fauna Panel consisted of:

- Gary Davey (Chair, National Parks and Wildlife Service);
- Michael Bullen (Sub-chair, State Forests of NSW);
- Tim Clancy (State Forests of NSW)

- Andrew McIntyre (National Parks and Wildlife Service);
- Donella Anderson (National Parks and Wildlife Service);
- Michael Davis (Department of Urban Affairs and Planning);
- Catherine Bright (Environment Australia);
- James Hoare (Buearu of Resource Sciences);
- Lyn Orrego (North East Forestry Alliance);
- Dailan Pugh (North East Forestry Alliance);
- Jim Shields (State Forests of NSW);
- Glenn Hoye* a bat expert;
- Sandy Gilmore* a fauna generalist; and
- David Milledge* a fauna generalist and owl expert.

*Indicates the independent scientists invited to attend the biodiversity workshop.

4.2 EXPERTS PACKAGE

Independent scientists were given a background reading package providing them with an overview of the CRAs and the role of ESFM and Project Area 4/2 within this framework. The Package included:

- Outputs from the Response to Disturbance workshops- habitat requirements and disturbances for fauna.
- Review of protective measures and forest practices on National Parks and Wildlife Service reserves (Appendix C).
- Upper and Lower North East Broad Area Licence. This document is available in the *Review* of protective measures and forest practices report, as attachment five, prepared by NSW National Parks and Wildlife Service, July 1999.
- State forests of NSW information on biodiversity management (Appendix E).
- Various parts of Codes related to biodiversity management.
- A report of the Statewide biodiversity protective measures as prepared by National Parks and Wildlife Service (Appendix D).
- Threatened Flora workshop: management recommendations for selected threatened taxa (flora) and threatened flora expert panel review of the flora prescription component of existing Conservation Protocols applied to the Forestry activities in the North East NSW (outcomes and recommendations from the Threatened Flora Conservation Requirements Workshop).

Experts were expected to review this information prior to attending the workshop.

4.3 THE WORKSHOP FORMAT

The protective measures applicable to flora and fauna were reviewed separately in concurrent sessions.

4.3.1 Flora

The flora workshop opened with a discussion on the effectiveness of the protective measures outlined in the Upper and Lower North East Broad Area Licence for the protection of Threatened Species. The remainder of the workshop was concerned with amending the sections of the Upper and Lower North East Broad Area Licence relevant to threatened flora and was divided into three sections:

- Review of the plant species listed in the Broad Area Licence. The Panel recommended amendments to the list where appropriate.
- Developing a set of prescriptions to protect threatened flora.
- Developing a process for allocating species to revised prescriptions. Species were allocated to prescriptions in an additional workshop attended by agency and independent scientific experts. As this was considered part of the biodiversity protective mechanism review process the results of this additional meeting have been included in this report.
- The flora workshop concluded with members of the Panel highlighting the issues of greatest concern as identified throughout the workshop.

4.3.2 Fauna

The fauna workshop opened with a discussion of the effectiveness of the protective measures outlined in the Upper and Lower North East Broad Area Licence for the protection of Threatened Species. The remainder of the workshop was concerned with reviewing and making recommendations on the conditions of the Upper and Lower North East Broad Area Licence relevant to threatened fauna.

The fauna workshop concluded with members of the Panel highlighting the issues of greatest concern as identified throughout the workshop.

4.4 OUTCOMES OF THE BIODIVERSITY WORKSHOP - FLORA

4.4.1 Initial discussion of the Broad Area Licence for the protection of Threatened Species

An initial assessment of the effectiveness of the Upper and Lower North East Broad Area Licence allowed the Panel to identify the positive and negative aspects of these protocols. The positive features indicated by the Panel were:

- An attempt to recognise functional groups of species.
- An attempt to recognise reservation status of species.
- Protection of some taxa from the impacts of harvesting.

The negative features indicated by the Panel were:

- Prescriptions should be modified according to the number of species located in reserves.
- "Specified forestry activities" includes roading and therefore the re-opening of disused roads in some instances which facilitates access to forests by feral animals thereby increasing the risk of native fauna predation.

Mixed buffers, for example 10 m buffer with an additional 10 m modified harvesting zone, are difficult to implement successfully in the field.

Additionally the Panel identified aspects of the Broad Area Licence that were of concern, these included:

- New plant species not yet listed on the *Threatened Species Conservation Act 1995* (TSC Act) and at risk from harvesting and roading are not protected.
- Species that are considered to be protected by the general protocols, such as rainforest species protected by rainforest protocols, are unprotected if they are recorded outside their typical habitat.
- Original prescriptions developed by working groups were not reflected in the Broad Area Licence.
- There is no biological evidence that mixed buffers, for example 10 m buffer with an additional 10 m modified harvesting area, protect threatened species.
- Functional guilds used in the protocols do not reflect the disturbance incurred by forestry activities.
- Some species are allocated to inappropriate functional guilds.

4.4.2 Flora species

The Panel recommended the following plant species to be addressed by the Upper and Lower North East Broad Area Licence:

- Threatened plant species listed on Schedule one and two of the TSC Act considered to be potentially impacted by specified forestry activities.
- Threatened plant species recommended by the Panel for listing on the TSC Act as a result of the CRA. Many of these taxa are known from very few localities and/or have not been recorded within State forests, therefore should have minimal impact on forestry operations.

Additionally, the Panel recommended the following be applied to the plant species listed in the Broad Area Licence:

- Listed plant species that are likely to be protected by general protocols, such as prescriptions applying to rainforest, rocky outcrops, wetlands, heath, and those that are unlikely to occur in State forest should be flagged. This approach is intended to provide for species recorded in new localities or species found outside their currently known habitat.
- Listed plant species include those that have been identified as not requiring a prescription due to their conservation status and/or degree of resilience.
- Species list must be flexible to incorporate amendments to the TSC Act and should be regularly reviewed.
- Newly described or discovered species, considered to be threatened, that are not yet listed under the TSC Act cannot be included on a licence. These species should be protected by appropriate prescriptions agreed between agencies.

4.4.3 Recommended prescriptions

To develop prescriptions the Panel attempted to balance harvesting needs with conservation requirements. One primary conservation requirement is to maintain genetic variety within the range of species present across a landscape. To maintain genetic diversity the Panel agreed that the core population of species across all localities should be protected. The most viable form of protection adopted for species is to buffer populations; therefore prescriptions were grouped according to buffer type and conservation status. Further subdivisions, within groups, were defined resulting in six separate prescriptions:

Prescription 1: All individuals and populations of individuals must be buffered and specified forestry activities must be excluded. No trees are to be felled into the buffer.

- This prescription intends to protect threatened species that are naturally scattered, such as *Marsdenia longiloba* and species with critically small populations.
- The prescription is further sub-divided according to buffer size:

Prescription 1a - 20m buffers.

This prescription protects individuals and their immediate habitat but not habitat required for recruitment. These species are characterised by long distance dispersal.

Prescription 1b - 50m buffers.

This prescription protects individuals and their immediate habitat and provides an area undisturbed by forestry activities for recruitment.

Prescription 2: A minimum of 90% of all individuals must be buffered and/or protected from damage. Within the buffer, specified forestry activities must be excluded. No trees are to be felled into the buffer.

- The intent of this prescription is to protect a minimum of 90% of all individuals of a species within a compartment or planing area. It recognises the difficulty of implementing buffers around scattered individuals by protecting core populations.
- The prescription is further sub-divided according buffer size:

<u>Prescription 2a - no buffer is required, a minimum of 90% of individuals must be protected.</u> This prescription protects short-lived, disturbance-adapted species, such as *Olearia flocktoniae*, where low level disturbance in the immediate vacinity of the plant may assist with recruitment. Monitoring must be conducted to assess the species response to this prescription.

Prescription 2b - 20m buffer.

This prescription protects disturbance-tolerant species where buffers provide undisturbed habitat for recruitment. These species cope with some level of, and have intermediate response to, disturbance.

Prescription 2c - 50m buffer.

This prescription protects disturbance-intolerant species where buffers provide undisturbed habitat for recruitment and protection from exposure. These species are generally sensitive to exposure and are poor recolonisers.

Prescription 3: No specific management requirements

This prescription has no special management requirements and is aimed at species considered to be adequately conserved or which have attained a threshold level of population viability analysis (PVA) targets. These taxa must be capable of maintaining adequate populations in

production forests without specific prescriptions. Monitoring must be conducted to assess the species response to this prescription and must include initial sampling and surveys.

4.4.4 Species Management Plan

A Species Management Plan is an alternative to Prescriptions one and two. This approach targets individual taxa or groups of taxa that can be more appropriately managed by specific measures not contained in Prescriptions. A management plan provides flexibility for State Forests of NSW as well as enabling new information to be incorporated into the Prescription system. Plans prepared collaboratively between the National Parks and Wildlife Service and State Forests of NSW should be incorporated into licence conditions and should include monitoring and comprehensive surveys in potential habitat within the planning area. Specific management measures may include:

- Modified harvesting;
- control of specified burning or grazing regimes;
- weed invasion;
- reservation of a forest type or habitat; and/or
- protection from roading.

4.4.5 Allocation of species to prescriptions

A decision support process was used to allocate species to prescriptions (Figure 1). Species were classified according to their population size, PVA target information and functional guild (Figure 2). Species were initially categorised by population size. "Very scarce" species such as those considered to be widely dispersed, critically endangered or with critically low populations were allocated to Prescription 1a or 1b depending ecological requirements. For these species the protection of every individual is warranted.

Species not considered to be "very scarce" were divided depending on PVA targets. If PVA targets were not attained, or were unknown, species were classified into functional guilds according to the decision guide in Figure 2 and allocated to Prescription 2a, 2b or 2c. Depending on species requirements a Species Management Plan may also be implemented at this level.

If a species PVA target met a specified threshold the species was considered sufficiently widespread and disturbance adapted to not require specific protection measures. Such a species must have a "viable" population reserved, it must be evident that it will persist in State forests and independent experts must confirm its classification. If it is considered that the species does not meet these criteria, it should be assigned to a functional guild and Prescription 2a or 2b should be applied.



FIGURE 1. DECISION SUPPORT GUIDE FOR ALLOCATING SPECIES TO PRESCRIPTIONS FUNCTIONAL GUILDS

The Panel acknowledged that grouping of species into functional guilds is useful for determining the application of appropriate prescriptions but considered current guilds inappropriate. Existing guilds were derived from literature on plant response to fire disturbance, which, the Panel noted, is substantially different to the disturbance regime of forest management practices.

The Panel recommended an alternative classification of species to functional guilds. This incorporates the ecological concept of species resilience, which is a combination of plant species persistence, including longevity and the ability to recover from disturbance, and recolonisation (defined as the ability to recruit into habitat post-disturbance). Following a species allocation to a functional guild appropriate prescriptions were applied.



FIGURE 2. DIAGRAMMATIC REPRESENTATION OF FUNCTIONAL GUILDS (BASED ON NOBLE & SLATYER (1980) VITAL ATTRIBUTES)

For a species to be definitively placed in Guild 1 or Guild 3 it's autecological, response to disturbance and demographics should be well documented. The shaded area represents an area of uncertainty, where the appropriate guild for a species is unclear. These species are "fairly good recolonisers", have "moderately low persistence" and are "probably able to recolonise disturbed sites quickly".

4.4.6 Allocation of species to prescriptions

In an additional workshop agency and independent scientific experts allocated each of the flora species listed for the Upper and Lower North East Regions to one of the revised prescriptions. Known habitat and population information was also recorded for these taxa.

KEY:Habitat codes:H = heathR = rocky outcropsRF = rainforestRI = riparian forestW = wetlandF = open forestN = not known/not likely to occur in SF

Species	Habitat code	Prescription	Population information
Acacia bynoeana	F	2B	
Acacia courtii	F	2B	Adult population is estimated at 6500 individuals.

TABLE 1. SPECIES THAT ARE KNOWN TO OCCUR OR MAY OCCUR IN OPEN FOREST

Species	Habitat code	Prescription	Population information
Acacia pubescens	F	1A	
Acacia ruppii	F	3	
<i>Amorphospermum whitei</i> – Southern Metapopulation Unit	F	3	
Angophora robur	F	3	
Asperula asthenes	F	1B	Densities may be very low.
Asterolasia elegans	F	2B	
Boronia umbellata	F	2B	
Bothriochloa biloba	F	1A	Locality information is poorly known for this species.
Callitris baileyi	F	1A	There is one known population, Koreelah; this species requires larger informal reservation and mitigation of threats, such as weeds and grazing.
Callitris oblonga	F	2B	Populations of this species are mostly located on Private land.
Calophanoides hygrophiloides	F	2A	
Corchorus cunninghamii	F	1A	This species is known from two populations.
Cryptostylis hunteriana	F	1A	This species is known from less than 50 plants.
Cynanchum elegans	F	2B	
Cyperus aquatilis	F	1A	This species is located in Royal Camp State Forest; it is a swamp plant and is threatened by grazing.
Dendrocnide moroides	F/RF	1A	This species is threatened by weed invasion.
Dichanthium setosum	F	2B	This species is only known from a few localities in the west, it is very rare in this region.
Diuris pedunculata	F	1A	Not recently located.
Elaeocarpus sp. Minyon	F/RF	1B	This species requires undisturbed habitat for recruitment.
Eucalyptus camphora subsp. Relicta	F	1B	This species is located on tablelands and in swampy habitat.
<i>Eucalyptus glaucina</i> – Northern Metapopulation Unit	F	2A	
<i>Eucalyptus glaucina</i> – Southern Metapopulation Unit	F	1A	This species is mainly located on Private land and along roadsides.
Eucalyptus mckieana	F	2B	
Eucalyptus pumila	F	1A	All the reliable records for this species are within Pokolbin Flora Reserve.
Eucalyptus rubida subsp. Barbigerorum	F	1A	This species is very rare and has been largely cleared.
Eucalyptus tetrapleura	F	2A	
Goodenia macbarronii	F	2A	This species is mainly located in the western regions.
<i>Grevileea parviflora</i> ssp. <i>parviflora</i> (previously <i>G. linearifolia</i> form D)	F	2B	

Species	Habitat code	Prescription	Population information
Grevillea banyabba	F	2B	
<i>Grevillea guthrieana -</i> Booral Metapopulation.	F	1A	
<i>Grevillea guthrieana -</i> Carrai Metapopulation	F/R	2B	
Grevillea masonii	F	1A	This species is estimated at 250- 400 individuals, all of which are located on Private land.
Grevillea mollis	F	1A	This species is estimated at 800 plants, most of which occur at Gibraltar Range National Park.
Grevillea obtusiflora subsp. Obtusiflora	F	1B	There is only one record of this species north of the Hawkesbury River.
Grevillea quadricauda	F	3	This species is estimated at 100,000 plants.
Grevillea rhizomatosa	F	2A	This species is estimated at 6000 plants.
Grevillea scortechinii subsp. Sarmentosa	F	2B	
Hakea fraseri	F	2B	This species is estimated at 2000 plants.
Hakea sp. aff. Trineura	F	2B	
Hedyotis galioides	F	1A	This species is known from two localities. To protect this species habitat must be maintained impacts of weeds and grazing should be mitigated.
<i>Hibbertia hexandra -</i> Northern Metapopulation Unit	F	2A	
<i>Hibbertia hexandra -</i> Southern Metapopulation Unit	F	2B	
Hibbertia marginata	F	3	
Hibbertia procumbens	F	1A	There is only a single record for this species from Mangrove Mountain area.
<i>Hicksbeachia pinnatifolia</i> Northern Metapopulation Unit	F/RF	2C	
<i>Hicksbeachia pinnatifolia</i> Southern Metapopulation Unit	F/RF	1A	For this species to persist its habitat must be protected and the impacts of weed invasions mitigated.
Leptospermum deanei	F	2В	There are only a few records of this species most, of which occur in the Marramarra and Garigal National Parks.
Leucopogon confertus	F	1A	
Lindsaea brachypoda	F	1A	There are only a few old records of this species; all habitats should be protected.
Lindsaea fraseri	F	1B	This species is known from less than five records.
Lindsaea incisa	F	1B	

Species	Habitat code	Prescription	Population information
Macrozamia johnsonii	F	2B	This species has a restricted distribution but is locally common around areas such as Chandlers Creek, Chaelundi State forest.
Marsdenia longiloba	F	1A	All known habitat for this species should be protected and/or buffered.
Melichrus sp. A	F	1A	This species is estimated at 2000 individuals most of which are located on Private land.
Melichrus sp. Gibberagee	F	1B	This species is known from a single stand.
Monotaxis macrophylla	F	1A	This species is known from one locality.
Muehlenbeckia costata	F/R	1A	This species is known from only a few localities.
Olearia cordata	F	1A	
Olearia flocktoniae	F	2A	This species has a highly localised distribution.
Parsonsia dorrigoensis	F	3	This species is more common than previously believed.
Phebalium glandulosum subsp. eglandulosum	F	1A	This species is known from only one locality in this region.
Picris evae	F	1A	The regional occurrence of this species requires confirmation.
Pimelea venosa	F	1B	This species is known from only two localities.
Plectranthus nitidus	F/R	2B	This species is estimated at 3000 individuals.
Polygala linariifolia	F	2B	There are only a few records of this species, to ensure it's persistence weeds and grazing must be mitigated and habitat should be protected.
Pomaderris brunnea	F	1A	This species is only known from one small population.
Pomaderris queenslandica	F	1A	This species is known from very small populations in Torrington.
Prostanthera askania (Syn. P. sp. Strickland State Forest)	F	1B	There is only one record of this species.
Prostanthera densa	F/H	2B	This species has a restricted distribution.
Prostanthera junonis (syn. P. sp. Somersby)	F	1B	
Pterostylis cucullata (P. sp. D; P. sp. aff cucullata)	F/W	1A	This species is only known form a few sites.
Pterostylis gibbosa	F	1A	There is only one record of this species north of the Hawkesbury River.
Pterostylis nigricans	F	2B	This species has a restricted distribution.
Pultenaea campbellii	F	3	

Species	Habitat code	Prescription	Population information
Pultenaea stuartiana	F	3	This species is locally abundant in restricted areas; for example it is common in Torrington.
Quassia sp. Moonee Creek (Quassia sp. B)	F	2B	This species is estimated at 5000 individuals.
<i>Rutidosis heterogama -</i> Inland Metapopulation	F	1A	These species habitat should be protected if it is to persist.
Senna acclinis	F	1A	This species is estimated at 500; its habitat should be protected and the impacts of weeds and grazing should be mitigated.
Sophora fraseri	F/RF	1B	This species habitat must be protected and the impact of weeds and grazing mitigated if it is to persist.
Styphelia perileuca	F	2B	Although restricted to tablelands there are a good number of records for this species.
<i>Tasmannia glaucifolia -</i> Southern Metapopulation Unit	F	2B	This species is estimated at 4000 individuals.
Tasmannia purpurascens	F	3	This species has a restricted distribution but is locally common.
Tetratheca glandulosa	F	2B	
Tetratheca juncea	F	2B	
Tinospora smilacina	F	2B	
Triplarina imbricata	F	1A	This species is mostly located on Private land. Riparian habitat must be protected if this species is to persist.
Tylophora linearis	F	1A	There are no confirmed records for this species in this region.
Tylophora woollsii	F	1B	
Uromyrtus australis	F/RF	1B	
Zieria involucrata	F	2B	The distribution of this species is scattered. It is known from Wollomai/Yengo/Blue Mountains areas.
Zieria lasiocaulis	F	1A	This species is known from 500 individuals.

TABLE 2. SPECIES NOT KNOWN TO OCCUR IN OPEN FOREST OR NOT RECORDED IN STATE FOREST

Species	Habitat code	Prescription	Population information
Acacia acrionastes	N	1A	Weeds in rocky outcrops should be managed for this species.
Acacia flocktoniae	F/N	2B	There are few records for this species, most of which occur around Wollemi National Park.
Acacia macnuttiana	N	1A	This species is known from only small populations.

Species	Habitat code	Prescription	Population information
Acacia pubifolia	R	1A	This species has a very restricted distribution.
Acacia pycnostachya	R	1A	
Acalypha eremorum	RF	1B	There are only a few records for this species in NSW.
Acronychia littoralis	RF/N	1B	
Aldrovanda vesiculosa	W	1B	This species is known from only a few records.
Allocasuarina defungens	Н	2B	
Allocasuarina simulans	Н	1A	
Almaleea cambagei	R	1B	The known total population of this species is comprised of 600 individuals.
<i>Amorphospermum whitei</i> – Northern Metapopulation Unit	RF	1B	
Amyema scandens	RF/N	1B	There is only one known record for this species.
Angiopteris evecta	RF	1B	There is only one known record for this species.
Apatophyllum constablei		1B	Most of the known records for this species are within Wollemi National Park.
Arthraxon hispidus	RF/N	1A	There is only one known extant record for this species.
Arthropteris palisotii	RF	1B	
Austromyrtus fragrantissima	RF/N	1B	
Baeckea sp. Pyramids (Babingtonia granitica?)	R	1A	This species is known from only one locality.
Baloghia marmorata	RF	1B	
Bertya ingramii	R	1A	This species is known from only a few small populations.
<i>Bertya sp. A</i> Cobar-Coolabah	R	1B	This species is known from two populations in the area.
Blumea lacera		1A	This species is presumed extinct, if located its habitat should be protected and actively managed.
Boronia granitica	F/N	1A	
Boronia repanda	R	1A	This is a mainly western species.
Bosistoa selwynii	RF/N	1B	
Bosistoa transversa	RF/N	1B	
Bulbophyllum globuliforme	RF	1B	There are no recent records for this species.
Cadellia pentastylis	F/N	1B	This species is only known from two populations.
Caesia parviflora var. minor		1A	
Cheilanthes sieberi subsp. Pseudovellea		1B	This species is poorly known.
Choricarpia subargentea	RF/N	1B	There is only one record for this species and it is on Private land.
Clematis fawcettii	RF	3	

Species	Habitat code	Prescription	Population information
<i>Corokia whiteana -</i> Coastal Sands Metapopulation Unit	RF/N	2B	This species is known from Billinudgel and Tyagarah.
<i>Corokia whiteana -</i> Metasediments Metapopulation Unit	RF	2B	
Corynocarpus rupestris subsp. Rupestris	RF	1B	This species is known from one location at Glenugie Peak Flora Reserve.
Cryptocarya foetida	RF	1B	There are very few mature specimens of this species.
Darwinia biflora		2B	This species is known from north west of Sydney.
Davidsonia pruriens var. jerseyana	RF	1B	
Davidsonia sp. A	RF	1B	
Desmodium acanthocladum	RI	2A	Riparian habitat should be protected for this species.
Diospyros mabacea	RF	1B	This species is known from only a few populations with low numbers.
Diospyros major var. ebenus	RF	1B	This species is known from only a few populations with low numbers.
Diploglottis campbellii	RF	1B	This species is known from only a few populations with low numbers.
Diuris praecox		2B	This species is known from very restricted small populations.
Diuris venosa	W/F	1A	
Drynaria rigidula	F/N	1A	There are less than five records for this species.
Elaeocarpus williamsianus	RF	1B	
Eleocharis tetraquetra	F/N	1B	
Endiandra floydii	RF	1B	This species has a scattered distribution characterised by small numbers.
Endiandra hayesii	RF	1B	
Endiandra muelleri subsp. Bracteata	RF	1B	This species is known form small scattered populations.
Eriostemon ericifolius		2B	There are only a few records for this species.
Eucalyptus approximans	R	1A	
Eucalyptus caleyi subsp. Ovendenii	F/N	2B	This species has a restricted but locally common distribution.
Eucalyptus camfieldii		2B	This species is known from small populations.
Eucalyptus nicholii	F/N	1A	This species is estimated at 3000 individuals, mostly on Private and crown land.
Eucalyptus pachycalyx subsp. banyabba	F/N	1B	This species is known from two small populations, all of its habitat should be protected.
Eucalyptus parramattensis subsp. decadens	F/N	1A	This species has a restricted distribution that is being depleted. It is not known from Public land.
Euphorbia psammogeton	Н	2B	
Species	Habitat code	Prescription	Population information
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Euphrasia arguta		1B	This species is known from Hanging Rock near Nundle.
Euphrasia bella	R	1B	
Euphrasia collina subsp. Muelleri	N	1B	There is only one record of this species.
Euphrasia ruptura (E. sp. Tamworth)		1B	This species is presumed extinct.
Floydia praealta	RF	1B	
Fontainea australis	RF	2C	This species is known from only a few populations.
Fontainea oraria	RF	1B	Total known population for this species is 11 plants.
Gaultheria viridicarpa subsp. Merinoensis	R/RF	1A	There are records for this species at Mount Merino.
Gaultheria viridicarpa subsp. Viridicarpa	R	1A	
Geijera paniculata	RF	1B	This species mainly occurs on Private land.
Gentiana wissmannii	W	1B	This species is located on top of Round Mountain.
Gingidia montana	F/N	1A	This species is known from one locality.
Grammitis stenophylla	F/N	3	
Grevillea beadleana	F/N	2B	There are four known populations for this species.
Grevillea evansiana		2B	Most of the records for this species are within Wollemi National Park.
Grevillea shiressii		2B	All known records for this species are within Brisbane Water National Park.
Haloragis exalata subsp. Exalata	F/N	1A	There is only one record north of the Hawkesbury River in Marramarra National Park.
Haloragis exalata subsp. Velutina	RF	2B	This species is scattered in gorge country.
Homoranthus lunatus	R	1A	This species has been recorded at Boonoo Boonoo.
Homoranthus prolixus	R	2B	The distribution of this species is restricted, but it is locally common.
Hypolepis elegans		1B	This species is poorly known.
Isoglossa eranthemoides	RF/N	1A	There are only three known records for this species.
Knoxia sumatrensis		1A	This species is presumed extinct.
Kunzea rupestris	R	2B	
Lasiopetalum longistamineum	F	2B	
Lepidium hyssopifolium	F	1B	This species is possibly extinct in this Region.
Lepidium peregrinum	F	1B	This species is possibly extinct in this Region.
Macadamia tetraphylla	RF	1B	
Melaleuca groveana	Н	3	

Species	Habitat code	Prescription	Population information
Micromelum minutum	RF	1B	This species is presumed extinct.
Muellerina myrtifolia	RF	1B	There is only one recent record for this species.
Myriophyllum implicatum	W	1B	There are no recent records for this species.
Neoastelia spectabilis	RF/N	1B	This species has a restricted distribution.
Ochrosia moorei	RF	1B	
Olax angulata	H/N	1B	There are only one or two localised populations of this species.
Owenia cepiodora	RF	1B	
Persicaria elatior	W	1B	There are few reliable records for this species.
Phaius australis	F/W/N	1B	
Phaius tankervilliae	F/W/N	1B	
Phyllanthus microcladus	RF	1B	There are few records for this species.
Plectranthus alloplectus	R	1B	There is only one known population of this species.
Prostanthera palustris (Syn. P. sp. Bundjalung)	F/N	1B	This is a restricted endemic species.
Prostanthera staurophylla	F/N	2B	
Pseudanthus ovalifolius	R	1A	
Psilotum complanatum	RF	1B	There are less than five records of this species.
Randia moorei	RF	1B	
Rapanea sp. A	RF/RI	1B	There are only four wild plants known for this species.
<i>Rutidosis heterogama</i> – Coastal Metapopulation Unit	н	1A	
Sarcochilus fitzgeraldii	RF	1B	
Sarcochilus hartmannii	R	1B	
Sarcochilus weinthalii	RF	2C	This species has a localised distribution and is uncommon.
Symplocos baeuerlenii	RF	2C	
Syzygium hodgkinsoniae	RF	1B	
Syzygium moorei	RF	1B	
Syzygium paniculatum	RF	1B	
Tarenna cameronii	RF/N	1B	This species is only known from one location.
<i>Tasmannia glaucifolia –</i> Northern Metapopulation Unit	RF	1B	
Thesium australe	F/N	2B	This species has a scattered distribution that has possibly been overlooked in the past.
Tinospora tinosporoides	RF	1B	

Species	Habitat code	Prescription	Population information
Velleia perfoliata		2B	This species has a scattered distribution, largely restricted to lower Colo-upper MacDonald areas.
Wahlenbergia scopulicola	R/N	1A	The distribution of this species is very restricted.
Zieria floydii	F/N	1B	There are only a few known populations of this species.
Zieria prostrata	Н	1B	This species is a restricted endemic, primarily found on headlands.

TABLE 3: SPECIES PROPOSED FOR NOMINATION ON TO THE THREATENED SPECIES CONSERVATION ACT

Species	Habitat code	Prescription	Population information
Acacia bakeri		2B	This species has a localised distribution associated with moist forest/ecotone areas.
Acacia chrysotricha		1A	This species has an extremely localised population.
Acacia dangarensis		2B	
Acacia fulva		2B	
Acomis acoma		2A	
Adenostemma lavenia		1A	This species is possibly extinct.
Alexfloydia repens	N	1A	The distribution of this species is very localised.
Alloxylon pinnatum - Northern Metapopulation Unit		1B	
Amorphospermum antilogum		1B	There are less than five known populations of this species.
Amphibromus pithogastrus	N	1B	Tableland grass travelling stock reserves threatened habitat.
Amphibromus sinuatus	N	1B	Tableland grass travelling stock reserves threatened habitat.
Amyema conspicuum		2B	
Amyema gaudichaudii		2C	
Angophora exul	N	1A	This species has extremely localised populations around Torrington.
Angophora exul	Ν	1A	This species has extremely localised populations around Torrington.
Angophora inopina		1A	This species is located at Lake Macquarie.
Aponogeton elongatus		1B	
Ardisia bakeri	RF	1B	This species is located in the Tweed Valley.
Asperula charophyton		2C	
Asplenium aethiopicum		2C	

Species	Habitat code	Prescription	Population information
Astrotricha cordata		2B	
Astrotricha sp. nov (Mt Boss)		2A	
Babingtonia odontocalyx		2B	This species is locally common at Torrington.
Babingtonia prominens		1B	There are less than five known populations of this species; most are located on granite outcrops at Moses Rock, Dome Mountain.
Babingtonia silvestris		1B	This species has been recorded at Mount Neville.
Belvisia mucronata		1B	
Blechnum fluviatile		2C	
Blumea mollis		2B	
Boronia sp. aff. bipinnata Torrington	N	2B	This species is locally common.
Boronia sp. aff. Bolivia Hill	N	1A	There are two known populations of this species.
Boronia sp. aff. microphylla Torrington		2B	
Brachycome ascendens	N	1A	This species is known from cliffs, rock, and in forests along tracks.
Brachycome heterodonta var. A		1A	
Brachycome radicans	F	1B	This species is known on the Tablelands in grassy forest habitat.
Brunoniella spiciflora (?)		2C	
Buchnera gracilis		2B	
Bulbophyllum argyropus		2C	This species has rarely been recorded.
Bulbophyllum bracteatum		2C	This species has rarely been recorded.
Caesalpinia bonduc		2C	
Caladenia arenaria - Bald Rock - probably C. atroclavia		1B	This species is known form one locality.
Caladenia filamentosa var. filamentosa		1B	There are less than five records of this species.
Calocephalus citreus		2B	
Carex chlorantha		2C	
Carex lophocarpa		2C	
Cassia brewsteri var. marksiana	N	1B	This species is threatened by weed invasion.
Cassytha racemosa var. muelleri	F/H	1B	This species inhabits grassy forests and heath on sandstone.
Cenchrus sp. A		2B	
Centranthera cochinchinensis	F	1B	This species is located in grassy forests.
Chamaesyce macgillivrayi		1A	
Chenopodium erosum	N	1A	This species largely occurs in the west.
Chiloglottis anaticeps		1A	There are less than five known records of this species.

Species	Habitat code	Prescription	Population information
Chiloglottis platyptera		2B	
Chiloglottis sp. aff. formicifera (Bald Rock)		1A	There are less than five known records of this species.
Christella hispidula		2C	
Chrysopogon sylvaticus	N	1B	There are no recent records for this species.
Cleome viscosa		1B	There are less than five known records of this species.
Coprosma nitida		2B	This species is threatened by Broom invasion.
Corybas undulatus	N	2C	This species is known from small, threatened populations in coastal heath.
Corynocarpus rupestris subsp. arborescens	RF	1B	This species is known from four or five locations.
Crepidomanes walleri		2C	
Cupaniopsis serrata		1B	This species has only been recorded at a few localities.
Cyperus dietrichiae var. brevibracteatus		2B	
Cyperus odoratus		2B	
Cyperus platystylis		2B	
Cyperus rupicola		1A	
Cyperus scaber		1B	Coastal development threatens this species.
Cyperus sculptus	Ν	1A	There is only one record of this species at Moore Park.
Desmodium gangeticum		2B	
Desmodium heterocarpon var. heterocarpon		2B	
Dichrocephala integrifolia		1A	
<i>Diuris sp. aff. Ochroma</i> (New England)		1B	
Dodonaea stenophylla	Ν	1A	This species has been recorded at Torrington.
Eleocharis dulcis		1B	This species has been recorded in close proximity to the Queensland/NSW border.
Epacris purpurascens var. purpurascens		2B	
Eriostemon difformis subsp. smithianus		2B	
Erythroxylum australe		1B	This species is known from very few individuals.
Eucalyptus aenea		1A	
Eucalyptus ancophila		2A	
Eucalyptus dissita		1A	The only known population of this species is in mallee at Gibraltar Range National Park.
Eucalyptus elliptica		3	
Eucalyptus fergusonii subsp. fergusonii	NP/F	2A	
Eucalyptus fracta		2A	This species is only located on unharvestable country.
Eucalyptus largeana		2A	

Species	Habitat code	Prescription	Population information
Eucalyptus magnificata	N	2C	This species is located on the Tablelands from ten populations, the biggest of which is 100 adults.
Eucalyptus ophitica		2A	
Eucalyptus oresbia ms		1B	This species is known from Walcha/Hanging Rock.
Eucalyptus paniculata subsp. matutina		2B	
Eucalyptus rudderi		2B	
Eucalyptus scoparia		2A	This species has been recorded at two localities both on rocky escarpment.
Eucalyptus sp. aff. cypellocarpa (Hillgrove)		1B	
Eucalyptus sp. aff. cypellocarpa (Long Point)		1B	
Eucalyptus youmanii		2B	This species is known from an extremely localised population.
Euphrasia ciliolata		2A	
Euphrasia orthocheila subsp. peraspera		1B	
Fimbristylis bisumbellata		1B	
Freycinetia excelsa		1B	
Galium curvihirtum		1B	
<i>Genoplesium sp. aff. sigmoideum</i> (Gibraltar Range)		1B	
Geodorum densiflorum		1A	This species is at the southern end of its range in grassy forest.
Gingidia harveyana		1B	There are no recent records of this species.
Grevillea granulifera - Curricabark Metapopulation		2B	
Grevillea granulifera - Wollomombi Metapopulation		2B	
Grevillea hilliana	Ν	1B	
Grevillea obtusiflora subsp. fecunda	Ν	1B	This species is known from two populations occurring on Private land.
Grewia latifolia		2B	
Helichrysum boormanii		1A	
Helichrysum sp.1Mt Merino		1A	There is possibly one population of this species.
Hemisteptia lyrata	RF	1B	This species has been recorded at the edge of rainforest and is threatened by weed invasion.
Hibbertia elata		1B	This species has been recorded at Tenterfield.
Homoranthus croftianus ms		1B	This species is restricted to Bolivia.
Homoranthus darwinioides	N	1A	This species has been recorded at Goulburn Range National Park.
Homoranthus floydii		2B	
Hydrocharis dubia	W	1B	This is a water plant species.
Hypoestes floribunda var. pubescens		2C	
Hypserpa decumbens	RF	1A	This is a rainforest vine species.

Species	Habitat code	Prescription	Population information
Indigofera baileyi		1A	This species is known from one locality near Wilsons Downfall.
Indigofera linifolia		1A	
Isotropis foliosa		2B	
Jacksonia sp. Nov. Bald Knob (JBW)		2B	
Korthalsella breviarticulata		2B	
Lastreopsis silvestris	RF	2C	This is a cool temperate rainforest fern species.
Lepiderema pulchella	RF	1A	Most populations of this species are located outside the Reserve system.
Lepidium fasciculatum		1B	This is a grassland species that is poorly known and poorly dispersed.
Leptopteris fraseri		1B	
Leucopogon pilifer		2B	
Leucopogon sp. Aff. appressus		1B	
Leucopogon sp. Aff. fraseri	F	1B	This species is known from a single locality near Walcha.
Leucopogon sp.5 Echo Point Border Ranges		1B	
Lindernia alsinoides		1B	This is a coastal species that is possibly extinct.
Liparis habenarina		1B	
Liparis simmondsii		1B	
Lobelia membranacea		2B	
Macrothelypteris torresiana	N	1B	This is a big fern species located north of the Border Ranges National Park.
Macrozamia concinna		2B	This species is known from a few localities.
Macrozamia pauli-guilielmi subsp. flexuosa	Н	2B	This is a coastal heath species.
Marsdenia hemiptera	RF	1B	This is a rainforest vine/ecotonal species.
Melaleuca biconvexa	W	2B	This species is widespread and being depleted.
Melaleuca tamariscina subsp. irbyana	F	2B	This species is known from two or three stands.
Melichrus adpressus		1B	
Melicope vitiflora		1B	This species is known from four records.
Microtrichomanes vitiense		2C	This is a filmy fern species.
Mitrasacme pygmaea	R	1B	There is only one known population of this species, which is located on a rocky outcrop.
Monococcus echinophorus	RF/N	1A	This is a rainforest shrub species.
Neisosperma poweri		1B	
Niemeyera chartacea		1B	
Nymphaea gigantea	W/N	1B	
Oberonia complanata		1B	

Species	Habitat code	Prescription	Population information
Oberonia titania		2C	This species is widespread but being depleted.
Olearia sp. aff. erubescens		1A	This is a variable species.
<i>Olearia sp.2</i> Wollomombi	N	1A	There is only one known population of this species.
Ophioglossum pendulum		1B	This is a very scarce species, populations are known around Nullum State forest.
Ophioglossum reticulatum		1A	This is a dry forest species.
Panicum paludosum	RI	2C	Populations of this species are being severely depleted.
Parsonsia largiflorens		1B	
Parsonsia lilacina		1B	There are only five known populations of this species.
Pavetta australiensis		1B	There are only five known populations of this species.
Peristeranthus hillii		1B	There are only five known populations of this species.
Phebalium ambiens		2B	
Phebalium squamulosum subsp. verrucosum		2B	
Pimelea umbratica		1B	
Plantago palustris		2B	
Plectranthus sp. 3 Long Gully		2B	
Plectranthus sp. Barrington Tops (Chichester)		2B	
Plectranthus sp. Coramba Rd (Nana Creek)		2B	
Plectranthus sp. Dorrigo Mountain		2B	
Plectranthus sp. Kangaroo River		2B	
Plectranthus sp. New Italy		2B	
Plectranthus sp. Nundle		2B	
Plectranthus sp. Pinnacle		2B	
Plectranthus sp. Star Ridge (Orara West)		2B	
Pleogyne australis		1B	There are only five known populations of this species.
Plinthanthesis urvillei		1B	
Plumbago zeylanica		2B	
Pneumatopteris sogerensis		1B	
Pomaderris notata		1A	
Pomaderris precaria		2B	
Pomaderris reperta		1A	
Pomaderris sericea		1A	
Pomaderris subcapitata		2B	
Prasophyllum dossenum		1B	
Prasophyllum exilis		2C	
Prasophyllum rogersii		2B	
Prasophyllum species A		2B	
Prostanthera sp. Aff. howelliae (Sherwood Nature Reserve)		1B	

Species	Habitat code	Prescription	Population information
Pteris comans		2C	
Pterostylis chaetophora		1B	
Pterostylis cucullata (P. sp. D; P. sp. aff cucullata)		1B	
Pterostylis elegans		2B	
Pterostylis metcalfei		2B	
Pterostylis sp. aff. alata		2B	
Pterostylis sp. aff. laxa (Barrington Tops)		1B	
Pterostylis sp. aff. parviflora (Ebor)		2B	
Pterostylis torquata		2B	
Pterostylis woollsii		2B	
Pultenaea sp. aff. flexilis		2B	
Quassia sp.A		2B	
Rhizanthella slateri		1B	This species is known from records of scattered plants.
Rhynchosia acuminatissima		1B	
Rostellularia obtusa	F	1B	There is only one recent record of this species near Casino.
Rulingia procumbens		2A	
Rulingia prostrata		1A	
Sauropus hirtellus		1B	
Sarcochilus dilatatus		1B	
Schoenus calostachyus		1B	
Scleria levis		2B	
Scleria rugosa		2B	
Scleria tricuspidata		1B	
Selenodesmium elongatum		2C	
Sida cordifolia		1B	
Sophora tomentosa		1A	This is a coastal species known from scattered populations.
Stylidium uliginosum		1B	
Swainsona fraseri		1B	
Swainsona parviflora		1B	
Tephrosia baueri		1B	This species is possibly extinct.
Tephrosia rufula		1B	This species is threatened by Lantana invasion.
Teucrium sp. A		2B	
Teucrium sp. D		2B	
Thismia rodwayi		1B	
Trachymene procumbens		1B	
Trichosanthes subvelutina	RF	2B	
Turraea pubescens		1B	
Typhonium eliosurum		2C	
Uromyrtus sp. 1		1B	
Utricularia biloba		2C	
Vigna luteola		1A	There are no recent records of this species.

Species	Habitat code	Prescription	Population information
Vitex trifolia var. trifolia	Ν	1A	This species inhabits the back of dunes.
Wahlenbergia glabra	R	1A	This species is located on cliffs.
Westringia glabra		2B	
Xylosma terrae-reginae		1B	
Zieria adenodonta		1A	This species has been recorded at Mount Warning and possibly at Dorrigo.
Zieria fraseri subsp. A	R	1A	This species is located on rock/clifflines.
Zornia muriculata		2B	

4.4.7 General discussion

A number of issues relating to threatened flora conservation were highlighted during the review process. These included:

Monitoring of populations and experimental impacts

The Panel highlighted the lack of research into the response of flora taxa to disturbance. Populations need to be monitored to determine the effectiveness of the prescription for protection of threatened plants and their response to forestry-related disturbance. Where plants are disturbed either deliberately or accidentally the opportunity should be taken to monitor the response to that disturbance event. Such on-going monitoring is an important component of adaptive management.

Review of prescriptions

Where the implementation of prescriptions imposes significant and unreasonable impacts on the timber production objectives of forest management, State Forests of NSW should be able to request a review of the prescription on a case by case basis. In such instances the species management plan would more appropriately balance the requirements of conservation and timber production.

Relationship to recovery planning process

Flora protocols have been developed in an attempt to mitigate the impact of forestry activities on threatened plant species. However the recovery of taxa to a position of viability in nature is part of the recovery planning process specified in the TSC Act. The National Parks and Wildlife Service has a statutory requirement to prepare recovery plans for all Threatened Species.

Amendment to TSC Act Schedules

The Panel recommended a number of amendments to the Schedules of the TSC Act including the addition and deletion of specified taxa on the list. The listing process is independent of management agencies, therefore if a species status is considered secure it may be removed from the TSC Act list, during this time the species should be protected by a weaker prescription. Any recommendations to this effect must be forwarded to the NSW scientific committee.

Amendment of the definition of "specified forestry activities"

The Panel identified a number of forest management activities, not necessarily associated with timber production, that threaten flora, including:

- Road maintenance,
- grading,
- drain construction,
- spraying of herbicides,
- development of recreational facilities.

These activities should be considered for inclusion into specified forestry activities.

4.5 OUTCOMES OF THE BIODIVERSITY WORKSHOP - FAUNA

4.5.1 Initial discussion of the Upper and Lower North East Broad Area Licence for the protection of Threatened Species

In an initial discussion of the Broad Area Licence for the Upper and Lower North East Regions members of the Panel highlighted the following issues:

- Conditions for the management of introduced weeds and animals, grazing and burning need to be developed.
- Rocky outcrops need to be redefined to include cliff lines.
- Rare Non-commercial Forest Types should be redefined as Rare Forest Types.
- The intent of the Conservation Protocols in the Broad Area Licence should be defined.
- The relationship between the EIS determinations and the Conservation Protocols should be outlined.
- The protection of functional populations is more than what would be required to protect genetic connectivity.
- It should be emphasised that ESFM is not limited to the conservation of Threatened Species.
- Future reviews should follow the format of the scientific committees, with three independent, one State Forests of NSW and one National Parks and Wildlife Service scientists.

4.5.2 Review of the Upper and Lower North East Broad Area Licence conditions for the protection of Threatened Species

The Panel reviewed the conditions in the Broad Area Licence for the Upper and Lower North East Regions. The sections of the BAL that the Panel provided recommendations or comments on are reported below.

Condition 4. Compartments outside the Interim Deferred Forest Areas (ie non-IDFA)

The Upper and Lower North East Broad Area Licence states:

b) This licence variation does not apply to compartments or parts of compartments that have previously excluded (as potential habitat) under the Masked Owl and Powerful Owl Prescriptions 13 part d), Squirrel Glider Prescription 15 part a), Brush-tailed Phascogale Prescription 17 and Prescription 26 Rufous Scrub-bird part a).

The Panel recommended that these compartments should be mapped and guidelines established to indicate when compartments are to be re-surveyed.

Condition 6. Plantations

The Upper and Lower North East Broad Area Licence states:

a) The conditions of the licence are not required to be applied to harvesting operations conducted in Eucalypt Plantations (as defined in the Timber Plantations (Harvest Guarantee) Act) except in the case of the relevant sections of Prescriptions 25a "Koala Prescription for North Coast Forest Types".

The Panel agreed that endangered flora (disturbance species) should be protected in plantations. The Panel recommended:

- Conducting Threatened Species surveys prior to commencement of any forestry activities.
- Developing a voluntary code with State Forests of NSW to outline prescription and survey requirements for Threatened Species within plantations.
- Developing a decision support system to determine the prescriptions for Threatened Species within plantations.

Condition 8. Consideration of Threatened Species Issues

This Condition lists the fauna and flora species requiring ameliorative prescriptions. Some members of the Panel were not satisfied with these species' lists under this condition and recommended that they be reviewed.

Condition 11. Definitions

This Condition defines terms used in the Broad Area Licence. The Panel commented on the following two definitions:

The Upper and Lower North East Broad Area Licence states:

Specified forestry activities:

- Timber harvesting (including silviculture),
- construction and operation of log dumps,
- collection of firewood,
- cutting posts,
- gravel extraction,
- harvesting of tea tree oil,
- road construction (including tracks, fire trails and snig tracks),
- prescribed burning that is not undertaken in accordance with the provisions of the Rural Fires Act 1997,

- grazing that is not undertaken in accordance with the provisions of the Rural Fires Act 1997 (to the extent controlled by SFNSW), and
- *military activities (to the extent controlled by SFNSW).*

Some members of the Panel recommended considering road maintenance, apiary, construction of recreation facilities and fertiliser applications as specified forestry activities.

The Upper and Lower North East Broad Area Licence states:

Critical Weight Range Vertebrates (CWRV): In this licence variation, CWRV refers to the following threatened species: Albert's Lyrebird, Bush Hen, Bush Thick-knee, Rufous Scrubbird, Eastern Bristlebird, Black-striped Wallaby, Brush-tailed Phascogale, Common Planigale, Tiger Quoll, Rufous Bettong, Long-nosed Potoroo, Long-footed Potoroo, Parma Wallaby, Redlegged Pademelon, Brush-tailed Rock Wallaby and Hastings River Mouse.

Some members of the Panel suggested that CWRV should be limited to CWR mammals, primarily those affected by introduced feral predators, for instance potoroos. Species such as Albert's lyrebird, bush hen, bush thick-knee, rufous scrub-bird, eastern bristlebird, common planigale, hastings river mouse should be removed or grouped together as 'other'.

Condition 12. Prescriptions

The Upper and Lower North East Broad Area Licence states:

a) The carrying out of specified forestry activities must comply with the prescriptions agreed to between the NPWS and SFNSW as outlined in the Schedule below. SFNSW must incorporate the relevant prescriptions into the Harvesting Plans for areas covered by this licence and must ensure that these prescriptions are implemented.

Schedule

Prescription 1. Operational requirements

Members of the Panel made the following comments and recommendations pertaining to this Prescription:

- 'Machinery exclusion zones' should replace the term 'buffer' where appropriate.
- Few fauna features have been recorded in pre-logging and pre-roading surveys. This would indicate that features are difficult to detect, survey design is inadequate or surveyors are inappropriate.
- This section of the Condition should be rewritten to include 'qualified and trained' surveyors. There is a need for training and education of staff in "corrective" actions where breaches occur.
- A process for auditing Threatened Species Pre-logging and Pre-roading Surveys should be developed and implemented.
- Threatened Species habitat features should be amended to include flying fox dens and potoroo diggings.

Prescription 2. Old Growth Forest protection

- The entire Panel agreed that Old Growth Forests should be protected by an exclusion zone. This zone should be flexible, as often smaller areas require larger buffers.
- Any exclusion zone should be at least two tree heights in length, for example a 50 m exclusion for a 2 ha patch of Old Growth Forest.
- In paragraph four of the supporting document the retained area of Old Growth in the Tablelands should be reduced from 25 ha to 10 ha.
- Old Growth Forest should include areas identified by ground surveys, not just Aerial Photographic Interpretation.

Prescription 3. Rainforest protection

The Panel agreed that the exclusion zone protecting Rainforests should be increased from 20 m to 50 m.

Prescription 4. Rare Non-commercial Forest Type/Ecosystem protection

Members of the Panel made the following comments and recommendations pertaining to this Prescription:

- The title should be amended to 'Rare Forest Ecosystems' and they should be protected by a 50 m buffer from a mapped type boundary. Forests could be harvested providing 50% canopy cover is retained by selection, and all machinery is excluded.
- Rare Forest Types should not include Old Growth Forest and Rainforest.
- The Rainforest buffer would only apply when no other buffers have been triggered.
- Conservation requirements for the forest ecosystem vulnerability rating should be reviewed to determine if a buffer or exclusion zone is required.

Prescription 5. Tree retention

- Exceptionally large trees should be retained. The impacts of fire and grazing must be excluded to ensure these trees persist (refer to Floyd (1990)).
- Selected sections of the forest should be excluded from the Net Forest Area to allow the formation of hollows in trees.
- Suitable recruitment trees are being harvested, resulting in few trees recruited in the non-regrowth and regrowth zones.
- Regrowth/non-regrowth zones should be managed uniformly.
- Isolated, single retained trees are unlikely to survive due to wind shear and waterlogging. Retaining surrounding vegetation may provide some protection but will not ensure their survival.
- Habitat tree mortality is high. To maintain a set level of habitat trees the ratio of recruitment to habitat trees should be 2:1, 20 trees should be retained per 2 ha.
- A recruitment tree area should be delineated and sanctioned with hollow-bearing trees retained adjacent to these sites to maintain spatial linkages between habitat and habitat recruitment trees. The recruitment area should include large trees and be landscape-based linking up with adjoining compartments, particularly in the regrowth zone.

- Habitat tree prescriptions are unlikely to maintain biodiversity (species richness and abundance). An alternative conservation strategy could be 'designing' permanent habitat zones at a compartment or landscape scale.
- This prescription excludes Old Growth components that need to be retained in coastal areas for the survival of tropical species.
- Bats require habitats with a high density of localised roosts/hollows.
- Section F. Point i. The Panel disagreed on the number of crushed cones required to trigger this prescription, some members suggested ten crushed cones were sufficient, while others maintain the current prescription of 30 crushed cones was adequate. The Panel agreed that a 10 m exclusion zone around these sites was required.
- Section F. Point ii. Ten rather than two mature trees should be retained, these should include: ironbark, bloodwood, box, spotted gum, dry coastal, mountain gum, mana gum and stringbark. The selection of species should compliment existing species diversity.
- Section F. Point iii. This prescription should include tree species that produce fleshy fruit favoured by frugivores.
- Section F. Point iv. Marks made by squirrel gliders should be included in this prescription.
- Section G. Point iii. A 10 m exclusion zone should surround retained trees.
- Section G. Point iv. Retained trees should be permanently marked, particularly recruitment trees, and recorded.
- The forest should be zoned so harvesting and associated prescriptions can be flexible.

Prescription 6. Riparian buffers

Members of the Panel made the following comments and recommendations pertaining to this Prescription:

- All third or higher order streams in a Management Area should be buffered. Fourth or higher order streams and permanent water bodies should have 100 m exclusions zones on both sides; 30 m exclusion on second order and 20 m exclusion on first order streams.
- Existing buffers do not currently protect seepage zones in first order streams; measures should be developed to incorporate them into this prescription.

Prescription 7. Connection corridors.

Members of the Panel made the following comments and recommendations pertaining to this Prescription:

- Wildlife corridors at the landscape level should be considered under this prescription.
- Wet forest fauna and flora can inhabit riparian corridors, however dry forest species require wide corridors across the landscape.
- The intensity of the harvesting and the resultant forest structure at a site should be used to determine the width of corridors. Intensively harvested areas will require a more comprehensive network of wildlife corridors.
- Corridors should be strategically located to link biogeographical sub-regions and patches of refugia, particularly wet refugia. The Panel suggested referring to Scott (1994).

Prescription 8. Wetlands

Members of the Panel made the following comments and recommendations pertaining to this Prescription:

Section a. The definition of a wetland in the Upper and Lower North East Broad Area Licence states:

Wetlands are defined as areas that form a shallow waterbody when inundated cyclically, intermittently or permanently with fresh, brackish or salt water, and where the inundation determines the type and productivity of the soils and the plant and animal communities.

This should be amended to:

Wetlands are defined as areas inundated cyclically, intermittently or permanently with fresh, brackish or salt water, and where the inundation determines the type and productivity of the soils and the plant and animal communities.

- Section b. The buffer around wetlands with a surface area of between 0.1 ha to 0.5 ha. should be increased to at least 20m.
- The term 'buffer zone' should be changed to 'exclusion zone'.
- Grazing should be excluded from wetlands. The impacts of grazing on wetlands have been well documented, the Panel recommended referring to: Arnold 1977; Leigh & Holgate 1979; NPWS 1995 and in addition to similar recent publications.
- Section d. Criteria to define wetland species should be established as this determines the edge of a buffer.
- To minimise changes to hydrology only 10% of a catchment should be harvested every 40 years.

Prescription 9. Heath

Members of the Panel made the following comments and recommendations pertaining to this Prescription:

- Section a. The definition of Heath should be amended to include clay heaths that are dominated by grasses, as stated by Griffith (1993).
- Section a. The titles of forest types 223 and 224 should be used in the definition of Heath.
- Section b. The term "buffer zone" should be replaced by "exclusion zone".

Prescription 10. Rocky outcrops

Members of the Panel made the following comments and recommendations pertaining to this Prescription:

- Section a. The definition of rocky outcrops should be amended to add cliff lines.
- Section b. This section should be amended to include cliff lines.

Prescription 11. Caves, tunnels and disused mineshafts

- Section a. Caves, tunnels and disused mineshafts should be protected by a buffer zone at least 200 m wide. Entrances should be monitored over a year to determine if bats are roosting at these sites.
- Section b. Microchiropteran bat habitat is protected in the species-specific prescriptions and should be removed from this section.

Prescription 12. Nest and roost site protection

Members of the Panel made the following comments and recommendations pertaining to this Prescription:

- Section a. The Panel recommended the following buffers for the nest and roost sites of the following species:
 - a) Powerful owl: nest 200 m and roost 100 m
 - b) Masked owl, barking owl and sooty owls: nest and roost 100 m
 - c) Albert's lyrebird: nest sites 200 m, to protect surrounding foraging habitat.
 - d) Bush thick-knee: nest sites 100 m.
 - e) Glossy black cockatoo: nest sites 100 m.
 - f) Turquoise parrot: nest sites 100 m.
- The species listed in this prescription should be revised to include bats.

Prescription 13. Burning

Members of the Panel made the following comments and recommendations pertaining to this Prescription:

• Section a. This section of the Upper and Lower North East Broad Area Licence states:

Prescribed burning regimes should take account of wildfire history and reflect the ecological requirements of any threatened species, or their habitat, known or likely to occur in the area. Burning should be varied by season, intensity and interval.

■ The Panel recommended that this be amended to:

Prescribed burning regimes should take account of wildfire history, intensity, frequency and seasonality and reflect the ecological requirements of any threatened species, or their habitat, known or likely to occur in the area.

- Sections a, b and c. These sections should be incorporated as principles in the Conservation Protocols.
- Principles for fire management should be developed with reference to related literature.

Prescription 14. Ground habitat protection

- The forest litter layer is the most productive level of the forest and should be protected against detrimental disturbances.
- Harvesting causes a temporary increase in litter altering the forest ecosystem equilibrium.
- This section of the Upper and Lower North East Broad Area Licence states:

SFNSW should take reasonable measures to protect ground habitat (understorey, ground cover, large logs on the forest floor) from specified forestry activities.

The Panel recommended this be amended to:

SFNSW should take reasonable measures to protect ground habitat (understorey and ground cover vegetation, fine litter and large logs) from specified forestry activities.

Prescription 15. Powerful owl and masked owl

Members of the Panel made the following comments and recommendations pertaining to this Prescription:

- Section b. Criteria for the selection of exclusion zones should be established. The Panel recommended applying exclusion zones around predicted habitat from CRA models. Category one habitat as predicted by models should be chosen first, followed by category two, then three and finally old growth forest as identified by the CRA model.
- Section b. The area of potential habitat to be permanently retained should be increased to at least 500 ha. The location of exclusion areas should be able to shift to incorporate new records of nest and/or roost sites.
- Section b. The Panel recommended an alternative method to trigger this section of the prescription. The new method uses an ecological planning unit of 5000ha within which 1000ha of land is retained for Powerful Owls and Masked Owls; 500ha for Sooty Owls and 200ha for Barking Owls. Guidelines for the design of these units should be developed, and should be based on home range, known nest and roost sites and level of fragmentation.
- Members of the Panel noted that owls prefer even landscapes. Flat terrain on Private land has been extensively cleared, therefore any existing areas on State forest are extremely important.

Prescription 18. Critical weight range vertebrates (CWRV)

- The term 'Critical weight range' (CWR) should be defined.
- Section a. In addition to firewood collection, grazing licences should be terminated as soon as legally possible, as grazing associated with burning was identified as the main threat to CWR species. State Forests of NSW representatives noted that exclusion of grazing by removal of licences resulted in illegal grazing over which State Forests of NSW has no control.
- CWRV should be limited to CWR mammals, primarily those affected by introduced feral predators, for instance potoroos.
- Section b. Feral predator surveys must be conducted immediately after, or within at least three weeks of, harvesting operations.
- Various methods of feral animal control should be investigated to optimise CWRV protection.
- Control should be conducted simultaneously with harvesting operations so that feral predators are removed prior to ground cover disturbance. State Forests of NSW representatives supported this suggestion in principle but indicated that it could be impractical in the field.

- Section d. The area covered by fuel reduction burns should not exceed 25%, rather than 75%, of the Net Harvest Area of any one compartment.
- Section f. Species-specific prescriptions for CWRVs should include the rufous bettong and the brush-tailed rock wallaby.
- Section f. The following amendments were suggested by the Panel for species specific prescriptions:

Tiger quoll

Members of the Panel made the following comments and recommendations pertaining to this section of Prescription 18:

- Where there is a record, 100 ha of potential/modelled habitat must be retained within 1 km of the record until a den site is located. State Forests of NSW representatives oppose this suggestion based on a different interpretation of scientific literature.
- Section a. To provide a protected area for foraging, maternal and permanent den sites should be protected by a 1 km radius exclusion zone or a 500 m radius exclusion zone surrounded by a further 500 m radius zone of 50% tree retention.
- Den sites are rarely recorded, survey methods should be revised and more appropriate techniques devised.

Long-nosed potoroo

Members of the Panel suggested that this section of Prescription 18 should be revised. This section currently states:

Where there is a record of the Long-nosed Potoroo in the compartment or within two kilometres of the compartment boundary, harvesting and burning must be excluded for five metre radius buffer around six trees per hectare. These six trees can include trees retained under Prescription 1.

This should be amended to:

Minimise disturbance of the understorey and ground cover vegetation, grazing and burning should be excluded within 500 m of a record.

The Panel recommended restricting harvesting to light selective logging within compartments that contain records of long-nosed potoroos. State Forests of NSW representatives oppose these amendments based on the lack of scientific evidence that harvesting or burning affect the long-nosed potoroo.

Brush-tailed Phascogale

Members of the Panel suggested that section d of Prescription 18 should be revised. This section currently states:

Areas of retained habitat must maximise the inclusion of known records.

This should be amended to:

Areas of retained habitat must include the known record triggering prescriptions and in the case of multiple records must include the maximum number of records.

Prescription 19. Threatened frogs

Members of the Panel made the following comments and recommendations pertaining to this Prescription:

- Regrowth reduces surface water in absorbing moisture from the ground. Changes in surface water affect many frog species, in particular *Mixophyes fleayi*, *M. itealtus*, *M. balbus* and *Philoria* spp.. To maintain the hydrological regime of compartments at least 25% of the Net Harvest Area should be retained. Rare frog reserves should include a stream of each order and, if possible, retain one continuous area across a series of compartments. State Forests of NSW representatives noted that there was a lack of scientific evidence to support this suggestion.
- Section a. A 30m, rather than 10m, buffer excluding machinery must be established around all ponds and dams.
- Section b. Currently states:

Grazing and associated burning should be excluded from swamps and ephemeral wetlands.

The Panel recommended that this be amended to:

Grazing and associated burning must be excluded, where legally possible, from swamps, ephemeral wetlands and streams where a threatened frog has been recorded.

• Section d. This section of Prescription 19 states:

Where more than ten male threatened frogs per hectare are detected, stream crossings should be bridged if possible.

The Panel recommended that this be amended to:

Where more than five male threatened frogs per hectare are detected, stream crossings must be bridged if possible.

Section e. The rare frog prescription, of retaining 20% of the adjoining first order streams in catchment above records, should be added to all *Mixophyes spp.* and *Philoria spp.* specific prescriptions. Species-specific prescriptions for *Litoria subglandulosa* should be developed. The following amendments were suggested by the Panel for existing species specific prescriptions:

<u>Mixophyes fleayi</u>

Members of the Panel recommended that where there is a record of this species in the compartment or within 500 m, rather than 200 m, of the compartment boundary a 50 m, rather than 40 m, wide exclusion zone must be established on both sides of all streams.

Mixophyes iterrratus and Mixophyes balbus

Members of the Panel made the following comments and recommendations pertaining to this section of Prescription 19:

■ Section a. Currently states:

Where there is a record of this species in the compartment or within 200 metres of the compartment boundary a 40 metre wide buffer must be established on both sides of the stream closest to the record. The buffer must extend 200 metres upstream and 200 metres downstream of the record or that point closest to the record.

The Panel recommended that this be amended to:

Where there is a record of this species in a compartment, or within 200 m of the compartment boundary, on a first or second order stream, a 50 m wide exclusion must be established on both sides of the stream closest to the record. The buffer must extend 300 m upstream and 30 0m downstream of all streams.

■ Section b. This section should be removed.

<u>Litoria aurea</u>

Members of the Panel recommended that all buffers should be amended to exclusion zones for prescriptions pertaining to this species.

Litoria brevipalmata

Members of the Panel made the following comments and recommendations pertaining to this section of Prescription 19:

■ Section a. Currently states:

Where there is a record of this species in the compartment or within 500 metres of the compartment boundary a 50 metre radius buffer must be established around the waterbody where this species has been recorded or site of the record.

The Panel recommended this should be amended to:

Where there is a record of this species in the compartment of within 100 m of the compartment boundary a 100 m radius buffer must be established around the waterbody where this species has been recorded or site of the record.

■ The following section of this prescription should be removed:

When ten records of either Litoria aurea or Litoria brevipalmata, separated by 2 km or more, are accumulated over a two year period in any one SFNSW Management Area, SFNSW may apply to the NPWS for a review of the prescription for the relevant species for that Management Area.

Prescription 20. Threatened bats

Members of the Panel made the following comments and recommendations pertaining to this Prescription:

■ Section a. This section of Prescription 20 states:

Likely multiple microchiropteran bat roost trees must be inspected prior to operations commencing within 100 m of such trees. Likely roost trees are dead stags greater than 100 cm dbh; or large trees with accessible base hollows.

The Panel recommended that this be amended to:

Likely multiple microchiropteran bat roost trees must be inspected prior to operations commencing within 200 m of such trees. Likely roost trees are dead stags greater than 30 cm dbh; or large trees with accessible base hollows.

- Section b. Various species require different fire regimes. Post-logging burning should cover no more than 25%, rather than 75%, coverage of the harvesting area in areas where threatened bats have been detected.
- A prescription should be developed to protect the man-made structures, such as bridges, used by bats as roost sites.
- Section c. Species-specific prescriptions should be developed for Nyctimene robinsoni and Syconycteris australis. Nyctimene robinsoni should be protected by a 100 m exclusion zone on either side of a stream for 500 m up and down stream of a known record. Syconycteris australis roost sites should be protected by a 200m radius exclusion zone and a 500 m buffer around any record to prevent disturbance of the understorey,
- Section c. The following amendments were suggested by the Panel for existing species specific prescriptions:

Pteropus alecto black flying-fox

Members of the Panel made the following comments and recommendations pertaining to this section of Prescription 20:

- Section b. Where roosting camps contain a black flying-fox a 200 m, rather than a 50 m, radius buffer must be established around the roosting camp.
- All prescriptions for the black flying-fox should include the grey headed flying-fox.

Saccolaimus flaviventris, Mormopterus beccarii, Mormopterus norfolkensis, Scoteanax rueppellii, Chalinolobus nigrogriseus, Falsistrellus tasmaniensis, Chalinolobus dwyeri, Vespadelus troughtoni, Nyctophilus bifax and Nyctophilus timoriensis.

Members of the Panel made the following comments and recommendations pertaining to this section of Prescription 20:

- Where there is a record of *S. flaviventris, M. beccarii, M. norfolkensis, S. rueppellii, C. nigrogriseus* and *F. tasmaniensis* at least 25% of modelled habitat in compartments containing a roost site should be retained for foraging.
- A 200 m exclusion zone around the roost sites of *C. dwyeri*, *V. troughtoni*, *N. bifax* and *N. timoriensis* should be established.

Kerivoula papuensis Golden-tipped bat

Members of the Panel recommended that a 50 m, rather than 40 m, wide exclusion should be established on both sides of the streams within modelled habitat or around the record where suitable survey methodology is used for detection.

Myotis adversus

Members of the Panel recommended that a 40 m wide buffer should be established on both sides of all third order streams, a 100 m buffer on all fourth order streams, and all other natural water bodies within the compartment.

Miniopterus australis, Miniopterus schreibersii, Chalinolobus dwyeri and Vespadelus troughtoni

- *M. australis* and *M. schreibersii* should have a 1 km exclusion zone around non-maternity roost sites; single or multiple species colonies of greater than 100 individuals should have an exclusion zone of between one and 1.5 km radius and 25% of first to third quality modelled habitat retained.
- A 500 m radius exclusion zone must be established around entries to known major subterranean roosting sites, shallow caves and cliffs used by *C. dwyerii* and *V. troughtoni*.

Prescription 32. Pre-roading and pre-logging surveys

Members of the Panel made the following comments and recommendations pertaining to this Prescription:

- Part 2.2. Section a. Point ii. Surveyors must have proven field identification abilities.
- Part 2.3. Section a. Point i. The Threatened Species Pre-logging and Pre-roading Survey Report should be prepared by the surveyor. State Forests of NSW representatives opposed this suggestion.
- Part 2.4. If the survey can not be conducted during the designated period then known or modelled potential habitat can trigger prescriptions.
- Part 2.4.2. Section e. This section should be removed.
- Part 2.5. The desktop review of the compartment(s) should be conducted prior to the prelogging and pre-roading survey and provided to the surveyor.
- Part 2.6. Section b. The species name, type of record (for example direct observation or scat), and data reliability should be included in the data to be recorded in the incidental threatened flora and fauna records.
- Part 2.7. Section c. The person to conduct these surveys should have similar qualifications as those outlined in Part 2.2. Surveyor Experience.
- Part 2.7. Section d. Point ii. The range of habitats, forest types and environmental gradients traversed throughout the compartment should be mapped and included in the Survey Report.
- Part 2.7. Section e. Point i. Surveys should be conducted over a two day period, dependent upon terrain, with a minimum of 16 hours for every 200 ha.
- Part 2.7. Section e. Point i. The search features identified in this section of Prescription 32 includes:

Threatened hollow-dependent fauna nests and dens.

The Panel recommended amending this to:

Potential hollow-dependent threatened fauna nests, roosts and dens.

- Part 2.7. Section e. Point i. Microchiropteran bats should be included in the examples of threatened hollow-dependent fauna.
- Part 2.7. Section e. Point i. The search feature of 'distinctive scats' should include predator scats.
- Part 2.7. Section f. This section should indicate that additional surveys are required for specific species.
- Part 2.8. The following amendments were suggested by the Panel for Threatened Species Pre-logging and Pre-roading targeted fauna surveys:

Spotlight survey

Members of the Panel made the following comments and recommendations pertaining to this section of Prescription 32:

- Section a. In addition to the species listed, spotlight surveys should also target koalas and black-striped wallabies.
- Section b. Call playback surveys should be conducted prior to disruptive spotlight surveys.
- Nights with a full moon should be avoided.

Nocturnal call playback

Members of the Panel made the following comments and recommendations pertaining to this section of Prescription 32:

- Section a. In addition to the species listed, nocturnal call playback should also target koalas and barking owls.
- Section b. Calls for specific species should be played in modelled and/or potential habitat.
- Compact discs are preferable to tapes for conducting call playback surveys.

Hairtubes

Members of the Panel recommended that section b should contain guidelines for further survey work triggered by a tiger quoll record. Guidelines should be established in consultation with Chris Belcher.

Scat and track survey

Members of the Panel made the following comments and recommendations pertaining to this section of Prescription 32:

- Section a. In addition to the species listed, scat track surveys should also target foxes.
- Section b. Surveys should be conducted, in modelled habitat, along a 2 km, rather than 1 km, road transect per 200 ha of Net Harvesting Area.

Microchiropteran bat surveys

- Microchiropteran bat cave, tunnel and disused mineshaft roost surveys
- Flying-fox (megachiropteran) camps should be included as a search feature in preharvesting surveys.
- To optimise the detection of targeted species additional trapping techniques should be used. Eight harpsites for two nights or eight detectors for one night were recommended. To detect *C. dwyerii* and *V. troughtoni* two of the eight harptraps or detectors should be placed on cliff lines or rocky outcrops.
- Pre-logging surveys could be used as a basic level of inventory for poorly known fauna groups such as bats. Bats could be used to determine adequacy of Rainforest and Old Growth prescriptions.

Golden-tipped bat, Kerivoula papuensis and large-footed mouse-eared bat Myotis adversus

To optimise the detection of *M. adversus* the Panel recommended that at least one all night detector should be used during each survey.

Small mammal survey

Members of the Panel made the following comments and recommendations pertaining to this section of Prescription 32:

- Prescriptions and species specific surveys, including pitfalling and elliott trapping, should be developed for the eastern chestnut mouse and common planigale.
- Although not a small mammal, species-specific surveys should be developed for the blackstripped wallaby. Surveys should involve surveyors sitting, for at least one hour, at the grassy ecotone of forest within potential habitat, and listening/watching for the target species.

Diurnal birds

Members of the Panel made the following comments and recommendations pertaining to this section of Prescription 32:

Bush thick-knee

Call playback surveys for this species should be incorporated into the nocturnal call playback surveys. Surveys for this species should triggered by a predicted model.

Olive whistler

Call playback should be conducted in potential habitat determined by the CRA model.

Black-breasted button-quail

Surveys for this species should be conducted in potential habitat within the net logging area, and in areas beyond 200 m, rather than 50 m, of the boundary of the net logging area.

Other diurnal birds

- Section c. In addition to the species listed, surveys for other diurnal birds should include some frugivores such as fruit doves and cuckoo shrikes, Alberts lyrebird, red-tailed black cockatoo and the black bittern.
- Records of the black bittern should trigger prescriptions to retain 20% of the adjoining first order streams in catchments above records.
- Surveys for Albert's lyrebird should involve walking through potential habitat in search of intensively disturbed leaf litter (indicating proximity to nest sites). Surveys should be conducted in the early morning and/or late afternoon. Successful searches should trigger prescriptions to reserve habitat surrounding nest sites.
- Section c. Part i. There should be no specific survey season for the red goshawk.
- Section c. Part iv. Surveys for the swift parrot should be conducted in winter.

Reptile survey methods

Members of the Panel made the following comments and recommendations pertaining to this section of Prescription 32:

- Species specific surveys should be developed for Stephens' banded snake. Surveys should involve conducting road transects on moist nights during October through to March. Records should trigger prescriptions excluding forestry activities from known habitat in order to protect the specific microclimate critical to this species.
- Species specific surveys should be developed for *Coeranoscincus* spp. Surveys should involve searching through litter around logs and over-turning logs. Records should trigger prescriptions similar to those recommended for Stephens' banded snake.
- A standard survey technique should be developed for all threatened reptiles. This should involve searching through leaf litter around logs and under logs in predicted habitat for one hour per 200 ha.
- Particular attention should be given to incidental records of reptiles.

Monitoring

- Although not currently considered in the Upper and Lower North East Broad Area Licence, the Panel highlighted the need to monitor the effectiveness of prescriptions and conditions to optimise ESFM. The Panel provided the following comments and recommendations:
- A monitoring strategy, program and timetable (eg. for Conservation Protocols, indicator species, and validation of predictive models) is required before undertaking any monitoring.
- Monitoring programs should not be limited to only assessing the effectiveness of Conservation Protocols, but should also include validation of predictive models/assumptions for the future status of forests.
- Monitoring plans should involve the testing of predictions of performance indicators and would more readily facilitate adaptive management than monitoring alone.
- Monitoring should be conducted before and after harvesting events and in conjunction with control sites to determine effects of harvesting, a 'deterministic' event, on 'stochastic' disturbance-adapted flora species.
- Threatened species that have evolved persistence to 'stochastic' disturbance events through seed-banks need to be monitored to determine their response and population trends to "deterministic" disturbance events such as logging and burning.
- Pre-logging surveys may provide a basis for monitoring with appropriate modification on methodology based on the work of current literature. This could include identifying the location and abundance of species to provide a baseline information for monitoring.
- The Flora Experts recommend it is important for rare plants to estimate the abundance and demography before and (three months) after logging with follow-up regular monitoring to ensure that recruitment is occurring. If not, further recovery action should be triggered.
- Where monitoring is part of a prescription, the methodology needs to be specified in the form of a plan and guidelines. Schedule three species require monitoring of populations where protective measures are not in place.
- Conservation Protocols, as implemented through the Broad Area Licence, can be unwieldy and inefficient. Details should be incorporated into the Regional ESFM plan or Species Management Plans to improve efficiency. If Conservation Protocols are not effective, a Species Management Plan could be initiated prior to a Recovery Plan being developed, if required. A Species Management Plan will allow more detailed monitoring to be built into it and avoid the need for including the information in the Conservation Protocols.

- Because of the expense and complexity of statistical design to ensure that outcomes of monitoring are a true indication of the impacts of management, a cost/benefit analysis should be conducted when developing a monitoring plan, including consideration of the use of surrogates, eg. monitoring of arboreal fauna through measuring changes in habitat structure. This analysis may indicate that a more cost effective alternative is the retention of important habitat.
- Analyses of cost effectiveness of (a) species-specific monitoring, including population dynamics based on life history characteristics, and (b) effectiveness of prescriptions, eg. effectiveness of buffer widths on species survival, is recommended.
- A monitoring protocol for long-term data collection is required, including identification of critical spatial and temporal data essential to development of performance indicators for sustainable management of any value. A key gap in knowledge relating to habitat trees is growth rates and hollow-forming processes, habitat tree recruitment, and dynamics, given that small hollows are formed over 150 year period and large hollows over 200-250 years.
- Research into determining the rate of hollow formation and growth of habitat trees was considered a high priority by all agency representatives and independent scientists.

4.5.3 Review of the protective measures and forest practices on National Parks and Wildlife Service reserves

Members of the Panel provided the following comments and recommendations for the protective measures and forest practices on National Parks and Wildlife Service reserves:

- Guidelines should be established to identify how existing facilities, such as roads, are incorporated into a newly formed National Park.
- Section 3.1. Part of this section states:

The 1977 Coastal Policy led to the creation of large coastal reserves (such as Crowdy Bay, Bundjalung and Yuraygir).

The Panel indicated that this statement is incorrect, these reserves are not large.

- Section 3.2 This section should include control of introduced weeds.
- Section 3.3. The information used for assessments should be defined, for example models used and/or the wildlife atlas.
- Information should be transferred from the zone to the district on important specific issues, for example, the location of a rare plant growing on a track should be communicated to the district managers so as to prevent disturbance through track maintenance.
- Section 3.3. Standards for Species Impact Statements preparation should be outlined.
- Monitoring of impacts of specific activities on threatened species in National Parks should be undertaken and incorporated into the approval process.
- It should be a condition of Review of Environmental Factors that officer undertaking surveys are properly qualified and experienced
- Section 3.5. The relationship between reserve fire management plans and the *Rural Fires Act* 1997 should be clarified.
- Section 4.4. National Parks and Wildlife Service should investigate biological control of weeds. Members of the Panel noted that mist flowers are particularly problematic invading undisturbed areas and critical habitat for rare plants.
- Section 4.4. Feral animal control measures should be coordinated across tenures.

- Section 5.1. All surveys should be conducted by a suitably qualified person/s.
- Section 5.1. Monitoring the response of native species populations to disturbance, such as fire, should include monitoring of Threatened Species and should be conducted in collaboration with State Forests of NSW.
- Section 5.1. The effects of road closures require monitoring, for example road closures can impact on fire control, feral animal control and weed control.
- An Environmental Impact Assessment should be undertaken for bee keeping.

4.5.4 Review of the protective measures and forest practices for use in State Forests in NSW

Members of the Panel provided the following comments and recommendations on the protective measures and forest practices for use in State Forests in NSW:

- Part 1. Section 3. Protection of specific-species needs to be prescription-based due to the complexity of forest ecosystems.
- Procedures to predict the future trends of forest components other than timber, such as flora and fauna populations, should be developed.
- In addition to the Threatened Species Pre-logging and Pre-roading surveys outlined in the Upper and Lower North East Broad Area Licence, State Forests of NSW should conduct wildlife surveys at the landscape, rather than compartment, level.
- EP.2.1. This section states:

The threatened species protocol covers eighteen identified general measures supported by 62 detailed prescriptions and 59 detailed measures for individual and groups of threatened fauna species.(CP 27-86).

Members of the Panel recommend this be amended to include threaten flora species.

■ EP.2.2. This section states:

Several sections of the general part of the protocol refer to forest practices that are arguably outside the scope of the protocol's main purpose in protection of threatened species during timber harvesting.

Members of the Panel refuted this statement indicating that the Conservation Protocols were established to deal with aspects broader than timber harvesting.

- Principle-based approach to the Conservation Protocols is too broad; prescriptions should be more ecologically-specific and linked to objectives and outcomes to achieve sustainable management of particular values.
- SFNSW noted that the mechanism for approval is, of necessity, to provide a basic safety net for environmental values, and that if Conservation Protocols are to be applied at a detailed ecological scale they will become impractical and un-enforcible. Experts disagreed with this.
- Models are required to predict species and ecosystem responses to impacts of management. Models that can account for changes in populations over time are required. Data from prelogging suverys can be used to assist model validation.
- Data acquisition is critical to sustainable management of values. Information systems need to be significantly upgraded, particularly for monitoring purposes, with an ongoing

commitment to database maintenance at an accurate level of detail that can inform survey efforts and maintain Conservation Protocols.

- Grazing should be actively excluded from flora reserves in State forests, this is particularly important if State Forests of NSW are proposing to classify flora reserves as IUCN Protection Category one and two.
- The objectives for dedicating land to flora reserves require outlining. These outlines should indicate the level of protection reserves offer fauna as well as flora.
- State Forests of NSW should be independently audited at regular intervals to determine their compliance with forest practices and protective measures. State Forests of NSW representatives noted that they are externally reviewed by the Environment Protection Authority and National Parks and Wildlife Service and internally by Regional and Head offices. Additionally, National Parks and Wildlife Service representatives indicated that they are establishing an auditing program for the Broad Area Licence.
- Predictive and simulation models for water quality, wood production and wildlife persistence should be developed and a timetable for their development devised. Data from pre-logging and pre-roading surveys should be entered into an information system and used to validate these models.
- State Forests of NSW representatives acknowledged that the pre-logging and pre-roading surveys do not take into consideration environmental variables and are not controlled or replicated. Designed experiments are required to determine the success of, and to optimise, protective measures.

4.6 BIODIVERISTY WORKSHOP DICUSSION

In a general discussion members of the Panel identified the most important issues highlighted throughout the biodiversity workshop, these were:

- The number and type of features searched for in the Compartment Traverse of the Broad Area Licence should be revised. The Panel was concerned that present surveys are not detecting listed search features, they recommended reviewing the listed features and the survey design.
- Prescriptions to retain trees within the non-regrowth and regrowth zones are not adequate. The Panel emphasised the need to review prescriptions regarding the ratio of hollow bearing trees to recruitment trees and the selection procedure for trees.
- Riparian habitats are critical for many threatened frog species. The Panel was concerned that current riparian buffers would not adequately protect the specific microclimate required by frogs. They recommended that riparian prescriptions should be revised to take into consideration the requirements of threatened frog species.
- Nest and roost protection for specific Threatened Species is inadequate. The nest and roost sites of additional species should be considered for protection, particularly bat species and the buffers implemented to protect these features should be reviewed.
- Changes in the hydrology of harvested compartments results from the loss of vegetation, soil compaction and burning associated with forestry operations.
- Research is required to determine the effects of apiary, road maintenance, fertilisers and pesticides. Management guides and prescriptions should be revised to incorporate these issues.
- The Threatened Species issues listed for consideration in the Upper and Lower North East Broad Area Licence should be revised to include regionally significant protected species.

- Foraging resources and areas require protection.
- Harmonising the specific fire requirements these Threatened Species should be considered, although it may be difficult as species occupy the same localities may have different fire tolerances and requirements.
- Research should contribute information towards Recovery Planning.
- Species should be ranked according to priority for conservation. Conservation efforts should be directed to those species that are considered to be most threatened. Criteria for prioritising species will need to be developed and include life history strategy, critical habitat requirements and threatening processes.
- Guidelines of how to nominate species for the TSC Act schedules should be developed.

5. WORKSHOPS CONCLUSION

The outcomes of the forest uses, soil and water and biodiversity workshops, reported in this document, have provided a comprehensive assessment and review of the most important forest management protective measures and forest practices employed in NSW in 1998. Panel members provided numerous comments and recommendations, which could facilitate improvements to on- and off-reserve management and will assist in the development and implementation of ESFM. Several issues were consistently raised by the Panel members across the three workshops, these included:

- The need to develop cross-tenure legislation for the management of issues such as wildfire and hazard reduction burns and introduced species control.
- The need to monitor the effectiveness of all protective measures. Members of the Panel in all workshops emphasised that protective measures must be monitored to not only determine their efficacy but also for adaptive management.
- Research into the effects of various disturbances on a range of issues such as hydrology and biodiversity.
- Investigating the ecological and financial role apiary plays within State forests.

6. FOREST PRACTICES CODE SYSTEM

An objective of Project area four was to collect and collate the documents that were to form a NSW Forest Practices Code system. These documents may have been revised since the development of the Code system in 1998. The Code System contains:

- The Environment Protection Authority's POLLUTION CONTROL LICENCE for State Forests of NSW. The entire POLLUTION CONTROL LICENCE may be purchased from the Environment Protection Authority, a summary has been included in Appendix A.
- The Conservation Protocols as part of the project for the Upper and Lower North East Regions. The Conservation Protocols were revised into a Threatened Species Licence (Appendix B). This also includes a summary table with the revisions.
- Review of the protective measures and forest practices on National Parks and Wildlife Service reserves (Appendix C).
- The statewide biodiversity protective measures as prepared by National Parks and Wildlife Service (Appendix D).
- Forest practices and protective measures for use in State Forests of NSW (Appendix E).
- Environmental Impact Statement approvals for State Forests of NSW (Appendix F).
- Timber Plantations (Environment Protection) Harvesting Code 1997 (Appendix G).
- Cultural heritage protective measures. This document is not contained in this report but is part of the CRA/RFA process.
- The relevant documents from the Rural Bushfire Service. These documents are not contained in this report but can be obtained from the Rural Bushfire Service.
- The vegetation management plans adopted by the Department of Land and Water Conservation. Plans are not contained in this report but can be obtained from the Department of Land and Water Conservation.
- The relevant documents from Local Governments. These documents are not contained in this report but can be obtained form the relevant Government bodies.

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8. ACRONYMS

BAL	Broad Area Licence
CRA	Comprehensive Regional Assessment
CWR	Critical Weight Range
CWRV	Critical Weight Range Vertebrates
dbh	depth by breast height
DUAP	Department of Urban Affairs and Planning
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
ESFM	Ecologically Sustainable Forest Management
NPWS	National Parks and Wildlife Service
NSW	New South Wales
PCL	Pollution Control Licence
PVA	Population Viability Analysis
RFA	Regional Forest Agreement
SFNSW	State Forests of New South Wales
TSC Act	Threatened Species Conservation Act 1995



Review of statewide protective measures and forest practices

Appendices


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APPENDIX A

FOREST USES CODE SYSTEM – SUMMARY OF THE POLLUTION CONTROL LICENCE FOR STATE FORESTS OF NSW

STATE FORESTS POLLUTION CONTROL LICENCE

1. Introduction and Overview of the State Forests Pollution Control Licence

1.1 Introduction

Soil erosion and sedimentation associated with forestry activities need to be controlled by careful management of the logging and roading activities that cause soil disturbance, and restrictions placed on both the areas and times during which logging activities may occur. Logging and roading activities have the potential to result in diffuse (or nonpoint) source water pollution, and the management of these activities is an essential part of sound forest management.

State Forests has applied for, and has been issued with, a pollution control licence from the Environment Protection Authority (EPA). This licence is different from other licences issued by the EPA due to the diffuse nature of the pollution resulting from logging operations. The EPA is not able to place an effluent limit on specified discharge points for a logging or roading operation, because pollution may enter different sections of the drainage system at many varying points. This has been addressed by the development of a best management practice (BMP) licence, which seeks to implement management practices and strategies that are designed to mitigate the impacts of logging operations on the aquatic environment. This approach has been incorporated into State Forests' pollution control licence since April 1995.

The pollution control licence issued to State Forests is designed to ensure that '*effective and practical measures*' are taken to protect the aquatic environment from water pollution caused by logging operations, by either preventing the generation of sediment, or by trapping them as close to the source as possible. Operations covered by the licence include the harvesting of pulplogs and sawlogs, and any roading or burning activities associated with this harvesting.

Where State Forests seeks coverage under the pollution control licence, its logging and roading operations must be conducted in accordance with the licence. The licence addresses the following areas:

- Site-specific pre-operational planning;
- Site and soil assessments;
- Determining the inherent soil erosion and water pollution hazard (including mass movement, soil dispersibility and seasonality assessments);
- Developing site-specific techniques and management practices in accordance with the performance objectives and conditions for harvesting, roading and burning operations;
- Carrying out water quality monitoring to determine if logging operations are having an effect on water quality and the aquatic environment;
- Maintaining both an operational register, and a complaints register; and
- Developing and implementing a strategy to train State Forests and industry staff in soil and water management.

1.2. Recent Strategic Review & Improvement of the Licence

The EPA has recently undertaken a strategic review of the pollution control licence held by State Forests. The purpose of this review was to ensure that the licence remains current in a changing regulatory and operational environment, and that the community remains confident that the protection of soil and water values are key components of forest management in New South Wales.

The licence issued to State Forests in March 1998 is the result of approximately 18 months of development and negotiation between State Forests and the EPA. This review and analysis of the pollution control licence examined all the key components, including:

- Site-specific planning and assessment protocols;
- Soil erosion and water pollution hazard assessment;
- Management practices for the General Harvest Area (GHA);
- Management practices for roads and drainage feature crossings; and
- Administration requirements and protocols.

Technical review of the forestry best management practices and strategies has formed an integral part of the licence revision process, particularly the development of a new system for assessing the inherent soil erosion and water pollution hazard and the best management practices that underpin the licence.

The development of the revised licence was undertaken by a technical working group with officers from the EPA, State Forests, and the Department of Land and Water Conservation (DLWC). During development and review of the licence, the EPA undertook a comprehensive review of the available technical and scientific literature relating to the impacts of logging operation on water quality, and the management practices that can be implemented to mitigate these impacts. Where required, the EPA sought independent technical advice from land management specialists.

The EPA also held briefing sessions involving other forestry stakeholders. In August 1997 the EPA briefed conservation groups, industry and union representatives on the development of the hazard assessment model in Sydney. A second briefing was provided to conservation groups in Coffs Harbour in January 1998. The purpose of this second briefing session was to advise conservation stakeholders of the process for and development of the revised licence.

1.3. Objectives of the Pollution Control Licence

The primary objective of the licence is to require that *practical measures* be taken to protect the aquatic environment from water pollution caused by logging operations.

In formulating the licence, the environmental goals that have been adopted by the EPA for all forests in NSW are protection of *aquatic ecosystems and primary contact recreation*. These goals are defined in the "Australian Water Quality Guidelines for Fresh and Marine Waters" (Australian and New Zealand Environment and Conservation Council, 1992). The goals were identified as applying to all forested catchments in Australia by the Joint Australian and New Zealand Environment and

Conservation Council – Ministerial Council for Forestry Fisheries and Aquaculture National Forest Policy Statement Implementation Sub-Committee.

For areas where the quality of water extracted for agricultural water supply or drinking water supply may be affected by logging operations upstream, the EPA has adopted these environmental values as additional goals for protection.

The second objective of the licence is to ensure monitoring of the effectiveness of the licence conditions in achieving the relevant environmental goals.

1.4. Audit Program

The EPA is committed to conducting an active audit program of State Forests' logging operations. This audit program will provide a strategic compliance approach to ensure that State Forests is taking the required practical measures to protect the aquatic environment.

The audit and enforcement program will be carried out in an integrated and planned manner, with pre-determined audit objectives and outcomes. The aims of the EPA's audit and enforcement program are to:

- Assess State Forests compliance with the relevant environmental legislation and instruments;
- Review the usefulness of existing statutory instruments in terms of their:
 - Appropriateness to the site or operation type;
 - Consistency of interpretation and implementation by State Forests;
 - Legal enforceability; and
 - Environmental effectiveness.
- Ensure that the monitoring and enforcement activities of the EPA Forestry Unit are open and accessible to forest stakeholders; and
- Provide a feedback mechanism for the continued development and improvement of the licence.

In addition to auditing State Forests' compliance with licence conditions, the EPA will also be examining logging operations where State Forests has not sought coverage under the pollution control licence to ensure that such operations are not resulting in breaches of the *Clean Waters Act 1970*.

An effective audit strategy will allow the EPA to demonstrate to forestry stakeholders that the licence is operating effectively, and that State Forests is adhering to the conditions of the licence and is operating in accordance with the Clean Waters Act.

2. COMPONENTS OF THE 1998 STATE FORESTS POLLUTION CONTROL LICENCE

The pollution control licence sets the administrative, legislative, planning and operational context in which State Forests must operate when under the coverage of the licence. The key management procedures and measures specified in the licence are:

- Site-specific planning and assessment protocols (Schedule 2);
- Soil erosion and water pollution hazard assessments (Schedule 3);

- Management practices for the General Harvest Area (Schedule 4); and
- Management Practices for roads and drainage feature crossings (Schedule 5).

2.1. Site-specific planning and assessment protocols (Schedule 2)

2.1.1. Schedule 2 (Part A)

Appropriate pre-operational planning and assessment must support effective implementation of a BMP licence. In accordance with the licence, State Forests must develop site-specific management prescriptions to mitigate against water pollution resulting from logging operations. The development of these site-specific management prescriptions, including the factors considered in the planning process, must be documented and recorded by State Forests. The environmental and operational factors that must be considered are described below.

Environmental Features

The environmental features to be considered (where applicable) by State Forests during pre-operational planning are grouped into the following categories:

- Climate;
- Geology;
- Soil regolith;
- Landform;
- Hydrology; and
- Vegetation and ground cover management.

Operational Systems

The operational systems to be considered (where applicable) by State Forests during pre-operational planning are grouped into the following categories:

- New Road Construction: includes planning information relevant to new road construction, such as the length of new road to be constructed, width of the road, ground slope and grade of the road, batter heights, sediment trapping or soil erosion and sediment control devices to be used, stabilisation techniques, stabilisation assessment interval, etc.
- **Existing Roads**: includes the length of roading to be used in the operation, an assessment of past or present erosion, road width and clearing, road drainage structures, batter heights, etc.
- Construction of New Drainage Feature Crossings: including crossing type, location, techniques to prevent the deposition of spoil material into the drainage feature, stabilisation techniques, soil erosion and sediment control techniques, etc. Specific planning requirements are specified for culverts, bridges and causeways.
- Existing Drainage Feature Crossings: includes crossing type, location, approach reforming and location of drainage structures, soil erosion and sediment control techniques, etc. Specific planning requirements are specified for existing culverts, bridges and causeways.

- **Borrow Pits & Gravel Pits**: includes location, stabilising, proximity to drainage features and techniques to drain the pits.
- **Harvesting Factors**: includes basic operational planning data, such as timber removal rate (volume/ha), gross, net and harvestable area of the compartment, canopy retention rates, method of felling and extraction, exclusion areas and seasonal restrictions.
- Log Dumps & Log Landings: location and loading method.
- **Post-logging Burning**: seasonal timing and method of ignition of the burn.

Based on this information, State Forests must develop site-specific conditions to mitigate soil erosion and water pollution associated with the proposed operation. These site-specific conditions must deal with issues such as crossing of drainage features, road construction, upgrading, maintenance and drainage, filter strips and buffer strips, log dumps and log extraction, and soil stability, soil erosion and sediment controls, etc.

2.2. Schedule 2 (Part B)

Determination of Stream Order for Drainage Feature Protection

This section describes the process by which stream order is to be determined within the area of the proposed logging operations. Determination of stream order is an essential step in setting the level of filter strip protection around drainage lines and watercourses. The method for assigning stream order is based on the system prosed by Strahler (1964). This method of stream order determination is the same system required by the National Parks and Wildlife Service (NPWS) under the conservation protocols.

2.3. Schedule 2 (Part C)

Design Methods for Crossings and Drainage Structures

The pollution control licence requires that State Forests design roads, drainage feature crossings and drainage structures to be stable and effective for the peak discharge for a specified recurrence interval. The design specifications required in the licence are consistent with those required in the Standard Erosion and Mitigation Guidelines for Logging (Department of Conservation and Land Management, 1993).

- **Design of Bridges, Culverts and Causeways**: specifies the method for determining the design calculation for bridge, culvert and causeway crossings.
- **Design of Road and Snig Track Drainage Structures**: specifies the method for determining the design calculations and equations to be used for determining the capacity of road and snig track drainage structures.

2.4. Soil erosion and water pollution hazard assessments (SCHEDULE 3).

This schedule specifies the methods to be used by State Forests for assessing the soil erosion and water pollution hazard associated with logging operations. The methods and procedures contained in this schedule include the data requirements, data sources, and the method of calculating soil erosion and water pollution hazard. The four assessment modules contained in this schedule are:

- Inherent soil erosion and water pollution assessment;
- Mass movement assessment;
- Dispersibility assessment, and
- Seasonality.

All four modules must be applied by State Forests prior to the commencement of logging operations. State Forests must take an environmentally conservative approach when undertaking these assessments. This schedule also includes the updating procedure to be used for operations approved under previous versions of this licence.

2.5. Management practices for the General Harvest Area (SCHEDULE 4).

This schedule specifies the operating conditions for logging operations. The schedule is structured to provide environmental outcomes that State Forests must achieve, and site-specific techniques that must be developed and applied by State Forests to ensure that the environmental outcomes are achieved. The operating conditions are grouped into the following eight sections:

- **Site-specific Conditions**: prior to the commencement of logging operations, State Forests must develop site-specific conditions to achieve the environmental outcomes specified in this schedule. These site-specific conditions must be changed if, during logging operations, it becomes apparent that the environmental outcomes specified in this schedule are not being achieved.
- **Maximum Slope Limits**: specifies the maximum slope limits for harvesting, and for machinery entry into harvest areas.
- **Seasonality Restrictions**: specifies the periods during which logging is not permitted in areas that have seasonally high rainfall erosivities.
- **Protection of Drainage Features**: specifies the minimum filter strip widths that must be retained along all drainage lines, swamps, wetlands, prescribed streams and watercourses, and the minimum buffer strip width for drainage depressions.
- **Operations within Native Forest Filter Strips**: specifies the operations that must be excluded from filter strips. This includes the prohibition of felling trees in or into filter strips and the exclusion of harvesting machinery unless for the construction and use of a drainage feature crossing.
- **Operations within Native Plantation Filter Strips**: specifies the operations that may occur in filter strips. This includes canopy retention of 50% within the filter strip, and thinning of plantation in the filter strip. Trees must not be felled into filter strips, and machinery must not enter except for the construction or use of a drainage feature crossing.
- **Operations within Softwood Plantation Filter Strips**: specifies the operations that may occur in softwood plantation filter strips, including felling trees within filter strips. State Forests must act to prevent felling of trees into drainage features, and remove substantial debris from watercourses.
- Operations within Buffer Strips for Native Forests, Native Plantation & Softwood Plantations: specifies the requirements for earthworks and machinery operating in the buffer strips.
- Borrow Pits and Gravel Pits: specifies the management and location of the pits.

- **Log Dumps**: specifies the management of surface runoff from the dumps, together with the locating of log dumps in relation to drainage features etc, debris management around log dumps, and restrictions on the use of log dumps during wet weather.
- **Burning**: criteria for appropriate timing of post-harvest burning.
- Snig Tracks and Extraction Tracks: specifies the management of extraction tracks, including the placement of spoil, crossing of drainage features, and soil and gravel management around bridges, culverts and causeways. Temporary crossings, drainage of extraction tracks, management of dispersible soils, wet weather restrictions and downhill snigging are also covered.
- Storage and Handling of Hazardous Substances and Waste: specifies the management of wastes other than logging slash generated during logging operations.

2.6. Management practices for the Roads and Crossings (SCHEDULE 5).

This schedule sets out the operating conditions for roads associated with logging operations. In a similar manner to Schedule 4, this schedule is structured to provide environmental outcomes that State Forests must achieve, and site-specific techniques that must be developed and applied by State Forests to ensure that the environmental outcomes are achieved. The operating conditions are grouped into the following eight sections:

- **Site-specific Conditions**: prior to the commencement of logging operations, State Forests must develop site-specific conditions to achieve the environmental outcomes specified in this schedule.
- **Roads**: considers various physical parameters of road planning, including the location of roads, maximum grade, clearing either side, and the management of debris associated with road construction.
- **Road Drainage**: includes the minimum capacity for drainage structures, maximum distance of water flow along road surfaces and table drains, minimum routine inspection periods, and documentation of remedial action. Guidance notes are provided.
- Wet Weather Restrictions: haulage must cease where there is runoff from the road.
- **Blading Off Roads**: specifies conditions for carrying out blading off of roads.
- Maximum Slopes for Roads: specifies the maximum ground slopes for roads.
- **Mass Movement Hazard**: specifies additional management techniques that must be followed where road construction is proposed in an area identified in Schedule 3 as having a mass movement hazard.
- **Road Batters**: specifies the stabilisation of road batters, and management of batters that intrude into filter strips. Guidance notes are given.
- **Road Crossings within 30 Metres of Drainage Features**: specifies the management of road drainage between 5 and 30m from the crossing. Guidance notes are given.
- **Drainage Feature Crossings**: specifies the minimum design capacity and types of crossings is given, together with the management of disturbed areas around crossings, spoil disposal, soil stabilisation, and maximum times to complete

stabilisation work. Additional management techniques are given for bridges, culverts and causeways.

3. CONCLUSION

The revised pollution control licence represents a significant shift from detailed prescriptive licensing towards a more performance focussed licence. This revised approach provides the basis of an environmental management regime within which State Forests has greater accountability and responsibility for the planning and implementation of its logging operations.

The main advantages of this shift is that it allows State Forests to focus its resources on the implementation of BMPs in the field and for the EPA to spend an increased amount of time auditing State Forests' environmental performance.

The EPA is committed to reviewing the key components as specified in the licence including the hazard assessment model, the water monitoring program and the BMP conditions to ensure that practical measures are being undertaken to protect the aquatic environment from water pollution caused by logging operations. In particular, the EPA and State Forests have also agreed to do a study of the efficiency and effectiveness of the filter strip provisions in the licence.

APPENDIX B

FOREST USES CODE SYSTEM – CONSERVATION PROTOCOLS AS PART OF THE PROJECT FOR THE UPPER AND LOWER NORTH EAST REGIONS

DRAFT

CONSERVATION PROTOCOLS

as part of a REGIONAL FOREST AGREEMENT FOR UNE AND LNE REVISED PROTECTIVE MEASURES

NPWS AUGUST 1998

Conservation protocols

Condition 1. Definitions and Abbreviations

ASL: above sea level

Buffer zone: An area where modified harvesting is conducted as per the relevant prescription.

CRA: Comprehensive Regional Assessment.

Critical Weight Range (CWR): In this licence variation, CWR refers to the following threatened species: Black-striped Wallaby, Brush-tailed Phascogale, Tiger Quoll, Eastern Quoll, Rufous Bettong, Long-nosed Potoroo, Parma Wallaby, Red-legged Pademelon and Brush-tailed Rock Wallaby.

dbh: Diameter at breast height.

dbhob: Diameter at breast height over bark

Exclusion Zone: An area of forest where specified forestry activities are permanently excluded.

FT: Forest type as defined by SFNSW Research Note number 17.

Hazard reduction work: Has the same meaning as "bush fire hazard reduction work" as defined in the *Rural Fires Act* 1997.

NPWS: New South Wales National Parks and Wildlife Service

Net logging area: The gross area of a compartment less Preferred Management Priority exclusion areas, Riparian Exclusion Zones, Ridge and Headwater Habitat Corridor exclusion zones, Rainforest exclusion zones, Old Growth Forest exclusion zones and Rare Non-commercial Ecosystem exclusion zones.

RFA: Regional Forest Agreement.

SEPP 14: State Environment Planning Policy No. 14 - Wetlands.

Specified forestry activities:

- Timber felling (including the cutting of posts),
- Construction and operation of log dumps,
- Construction and operation of snig tracks,
- Road and track construction (NB. routine road and track maintenance are not specified forestry activities unless otherwise stated),
- Road or track re-opening (ie. the clearing, scraping or treating of an existing revegetated road or track where there has been no logging operations in the compartment or area accessed by the road or track for 15 years or more),
- Commercial collection of firewood,
- Opening of new quarries that do not require an Environmental Impact Statement to be prepared,
- Harvesting of tea tree oil,
- Bush fire hazard reduction work that is not undertaken in accordance with the statutory requirements of the *Rural Fires Act* 1997,
- Grazing activities that are not undertaken in accordance with the statutory requirements of the *Rural Fires Act* 1997,
- military activities (to the extent controlled by SFNSW).

SFNSW: State Forests of NSW

Streams: Streams as shown on the relevant topographic map as published by the Central Mapping Authority at a scale of 1:25 000. A first order stream is defined as that part of a stream between its point of origin and the first junction with another stream, whereupon it becomes a second or higher order stream. A third order stream commences at the junction of two second order streams.

Threatened species: Any species of flora or fauna listed in Schedule 1 Part 1 (endangered species) and Schedule 2 (vulnerable species) of the *Threatened Species Conservation Act* 1995.

TSC Act: Threatened Species Conservation Act 1995

Condition 2. Replacement of previous s120 licence conditions and schedules

- a) This licence variation replaces all conditions on previous variations to licence number xxxx. This licence variation replaces all previous Prescriptions contained in the Schedule of Condition 5 of previous licence variations.
- b) This licence variation does not cover endangered populations or endangered ecological communities as detailed in TSC Act Schedule 1, Parts 2, 3 or 4. Generally, species presumed extinct are not considered.
- c) This licence variation does not apply to compartments or parts of compartments that have been previously excluded (as potential habitat) under the Masked Owl, Powerful Owl, Hastings River Mouse, Tiger Quoll, Squirrel Glider and Brush-tailed Phascogale prescriptions of previous licence variations.

Condition 3. Notification and Duration for which this licence variation applies

DURATION OF FIRST LICENCE ISSUED POST-RFA WILL DEPEND ON NEGOTIATIONS, REVIEW PERIODS ETC.

- a) This licence variation applies to the period XX to XX.
- b) Where a condition of this licence requires a matter to be notified to the NPWS, approved by the NPWS, or some other action by the NPWS, then NPWS means the Manager of the NPWS Northern Zone or his or her delegate unless stated otherwise.

Condition 4. Plantations

- a) The conditions of the licence are not required to be applied to harvesting operations conducted in Eucalypt Plantations as defined in the *Timber Plantations (Harvest Guarantee) Act*.
- b) "Prescription 19A: Koala" must be applied in all non-accredited eucalypt plantations.

Condition 5. Harvest Planning

- a) All Harvesting Plans must include the following:
 - i. Definitions as they appear in Condition 1.
 - ii. All General Prescriptions (Prescriptions 1 to 14) as they appear below.
 - iii. All Species-specific Prescriptions (Prescription 15 to 24) relevant to the compartment as they appear below.
 - iv. The operational section of Harvesting Plans must include all Site-specific Prescriptions as approved by and provided in writing by NPWS.

- v. A list of threatened species occurring within the compartment and within 5 kilometres of the compartment boundary.
- vi. The Harvesting Plan Operational Map must present, as clearly as possible at the standard scale used, the following features:
 - all exclusion zones shown as excluded from specified forestry activities,
 - all buffer zones,
 - all identified old growth shown as excluded from specified forestry activities,
 - all identified rainforest shown as excluded from specified forestry activities,
 - all identified rare forest ecosystems shown as excluded from specified forestry activities.
- vii. The Harvesting Plan text must clearly document the occurrence of the features listed in part vi. above, where relevant.
- viii. The location of all threatened species records must be shown on an appropriate map attached to the Harvesting Plan.
- b) All the requirements in a) above must be included in the relevant section of the Harvesting Plan prior to specified forestry activities commencing in the compartment.

Condition 6. Reporting and Information Requirements

SFNSW must provide the NPWS with:

- i. Harvesting Plans and Pre-logging and Pre-roading Survey Reports, approved by the relevant SFNSW Regional Manager or his or her delegate, as requested by NPWS within 10 working days of request.
- ii. Harvesting Plans and Pre-logging and Pre-roading Survey Reports, approved by the relevant SFNSW Regional Manager or his or her delegate for all of those compartments which require consideration by the Regulatory and Public Information Committee (RaPIC) at least ten working days prior to the meeting of RaPIC.
- iii. A list of compartments in which State Forest of NSW is operating must be provided on the first day of each month or the next working day. This list must detail the following: SFNSW region; SFNSW management area; state forest; compartment number; date (including day and month) operations commenced; date operations finished; date operations proposed to commence; whether operations current. This list should be supplied in digital format.
- Maps showing the 80% of third order stream Riparian Exclusion Zones within each SFNSW Management Area which have been designated a 40 metre wide exclusion zone as per the requirements of Prescription 6 section c) must be provided to NPWS by 30 June 1999.
- v. Maps showing the location of Ridge and Headwater Habitat Corridors within each SFNSW Management Area as required by Prescription 7 must be provided to NPWS by 30 June 1999.
- vi. Maps showing Barking Owl, Powerful Owl, Masked Owl, Brush-tailed Phascogale, Squirrel Glider, Yellow-bellied Glider, Hastings River Mouse, *Miniopterus australis* and *Miniopterus schreibersii* exclusion or buffer zones or both, where relevant, must be provided at least ten days prior to the commencement of specified forestry activities in the compartment.
- vii. Records suitable for NPWS Atlas purposes for all threatened species recorded on state forest must be forwarded by agreed electronic means to NPWS Head Office GIS Unit within 20 working days of the record being made by SFNSW.
- viii. SFNSW must report all known breaches to NPWS within 20 working days of detection of the breach.

Condition 7. Consideration of Threatened Species Issues

THE TYPE OF PRESCRIPTION FOR SPECIES LISTED BELOW MAY CHANGE AS A RESULT OF THE RFA NEGOTIATIONS - SOME SPECIES LISTED MAY NOT REQUIRE SPECIES-SPECIFIC PRESCRIPTIONS POST-RFA; WHILE SOME SPECIES NOT LISTED MAY REQUIRE PRESCRIPTIONS. THE LISTS WILL BE AMENDED POST-RFA NEGOTIATIONS. HOWEVER, IN GENERAL THERE WILL BE A REQUIREMENT FOR GENERAL PRESCRIPTIONS, AND SOME SPECIES-SPECIFIC PRESCRIPTIONS AND SITE-SPECIFIC PRESCRIPTIONS.

7.1 Threatened fauna species requiring ameliorative prescriptions

- a) The threatened species of fauna listed in section 7.1 c) occur or are likely to occur in the area and may be affected by specified forestry activities. Prescriptions as they appear in the Condition 8 are necessary to ameliorate the effects of forestry activities on these species. In Section 7.1 c) "prescription type" indicates which type of prescription is necessary for each species. Those species listed as "General" are considered adequately covered by the General Prescriptions 1 to 14). Other species are not considered to be adequately covered by the General Prescriptions and require additional ameliorative measures. These are separated into two groups: 1) "Species" referring to threatened species that require a species-specific prescription; and 2) "Site" referring to threatened species that require the development of a site-specific prescription by NPWS in consultation with SFNSW.
- b) If threatened species other than those listed in section 7.1 c) are known from within five kilometres of the compartment boundary and are likely to be affected by specified forestry activities, NPWS must be notified at least 10 days prior to operations commencing in the compartment to assess whether a prescription is necessary.
- c) Threatened fauna species which occur, or are likely to occur in the area and which may be affected by forestry operations are listed in the following tables:

Fauna group / Common name	Scientific name	Prescription type
Frogs (alphabetic by scientific name)		
Pouched Frog	Assa darlingtoni	General
Wallum Froglet	Crinia tinnula	General
Giant Burrowing Frog	Heleioporus australiacus	Site
* Green and Golden Bell Frog	Litoria aurea	Species
Green-thighed Frog	Litoria brevipalmata	Species
* Yellow-spotted Tree Frog	Litoria castanea	Site
Olongburra Frog	Litoria olongburensis	General
Peppered Frog	Litoria piperata	Site
Glandular Frog	Litoria subglandulosa	General
Stuttering Frog	Mixophyes balbus	Species
Fleay's Frog	Mixophyes fleayi	Species
Giant Barred Frog	Mixophyes iteratus	Species
Mountain Frog	Philoria kundagungan	Species
Loveridge's Frog	Philoria loveridgei	Species
Sphagnum Frog	Philoria sphagnicolus	Species
Red-crowned Toadlet	Pseudophyrne australis	Site

Reptiles

(alphabetic by scientific name) White-crowned Snake	Cacophis harriettae	Species
Three-toed Snake-toothed Skink	Coaranoscincus raticulatus	General
Dala handad Spaka	Hoplocophalus hitorauatus	Spacios
* Drood hooded Spoke	Hoplocephalus bilorqualus	Site
	Hopiocephalus bungarolaes	
Stephen's Banded Snake	Hoplocephalus stephensu	General
Border Thick-tailed Gecko	Underwoodisaurus sphyrurus	General
Rosenberg's Goanna	Varanus rosenbergi	Species

Birds

(alphabetic by common name) Albert's Lyrebird

Australasian Bittern Barking Owl Barred Cuckoo-shrike Black Bittern * Black-breasted Button-quail * Black-throated Finch * Bush Stone-curlew Bush-Hen Collared Kingfisher Comb-crested Jacana * Double-eyed Fig Parrot

Glossy Black Cockatoo

Menura alberti
Botaurus poiciloptilus
Ninox connivens
Coracina lineata
Ixobrychus flavicollis
Turnix melanogaster
Poephila cincta
Burhinus grallarius
Amaurornis olivaceus
Todiramphus chloris
Irediparra gallinacea
Cyclopsitta diophthalma coxeni
Dasyornis brachypterus
Calyptorhynchus lathami

Species & nest General Species, nest & roost General General Site Site Species & nest General General General Site Site General

		(nest)
Mangrove Honeyeater	Lichenostomus fasciogularis	General
Marbled Frogmouth	Podargus ocellatus	Species, nest & roost
Masked Owl	Tyto novaehollandiae	Species, nest & roost
Olive Whistler	Pachycephala olivacea	General
Osprey	Pandion haliaetus	General (nest)
Painted Honeyeater	Grantiella picta	General
Powerful Owl	Ninox strenua	Species, nest & roost
Red Goshawk	Erythrotriorchis radiatus	Site & nest
Red-tailed Black Cockatoo	Calyptorhynchus banksii	Site
* Regent Honeyeater	Xanthomyza phrygia	Site
Rose-crowned Fruit-dove	Ptilinopus regina	General
Rufous Scrub-bird	Atrichornis rufescens	Species
Sooty Owl	Tyto tenebricosa	Species, nest & roost
Square-tailed Kite	Lophoictinia isura	General (nest)
Superb Fruit-dove	Ptilinopus superbus	General
Swift Parrot	Lathamus discolor	Species
Turquoise Parrot	Neophema pulchella	Species & nest
White-eared Monarch	Monarcha leucotis	General
Wompoo Fruit-dove	Ptilinopus magnificus	General

Non-flying mammals (alphabetic by common name) * Black-striped Wallaby	Macropus dorsalis	CWR & Site
Broad-toothed Rat	Mastacomys fuscus	Site
Brush-tailed Phascogale	Phascogale tapoatafa	CWR &
Brush-tailed Rock Wallaby	Petrogale penicillata	Species Species (CWR)
Common Planigale	Planigale maculata	General
Eastern Chestnut Mouse	Pseudomys gracilicaudatus	General
* Eastern Quoll	Dasyurus viverrinus	CWR & Site
* Hastings River Mouse	Pseudomys oralis	Species
Koala	Phascolarctos cinereus	Species
Long-nosed Potoroo	Potorous tridactylus	CWR &
Parma Wallaby	Macropus parma	Species Species (CWR)
Red-legged Pademelon	Thylogale stigmatica	Species
Rufous Bettong	Aepyprymnus rufescens	(CWR) Species (CWR)
Squirrel Glider	Petaurus norfolcensis	Species
Spotted-tailed Quoll	Dasyurus maculatus	CWR &
Yellow-bellied Glider	Petaurus australis	Species

Flying mammals

(alphabetic by scientific name) Large-eared Pied Bat

Chalinolobus dwyeri

Species (roost

		only)
Hoary Wattled Bat	Chalinolobus nigrogriseus	Species (roost only)
Eastern False Pipistrelle	Falsistrellus tasmaniensis	Species (roost only)
Golden-tipped Bat	Kerivoula papuensis	Species
Little Bentwing-bat	Miniopterus australis	Species
Common Bentwing-bat	Miniopterus schreibersii	Species
Beccari's Freetail-bat	Mormopteris beccarii	Species (roost only)
Eastern Freetail-bat	Mormopterus norfolkensis	Species (roost only)
Large-footed Myotis	Myotis adversus	Species
Eastern Tube-nosed Bat	Nyctimene robinsoni	General
Eastern Long-eared Bat	Nyctophilus bifax	Species (roost only)
Greater Long-eared Bat	Nyctophilus timoriensis	Species (roost only)
Black Flying-fox	Pteropus alecto	Species (roost only)
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	Species (roost only)
Greater Broad-nosed Bat	Scoteanax rueppellii	Species (roost only)
Common Blossom-bat	Syconycteris australis	Species
Eastern Case Dat		G • ()

* designates TSC Act Schedule 1 species

Common and scientific names used are those in the *Threatened Species Conservation Act 1995*, Schedules 1 and 2.

7.2 Threatened flora species requiring prescriptions

- a) The threatened species of flora listed in section 7.2 c) may be affected by specified forestry activities. Prescriptions as they appear in the Condition 8 are necessary to ameliorate the effects of forestry activities on these species.
- b) If threatened species other than those listed in section 7.2 c) are known from within five kilometres of the compartment boundary and are likely to be affected by specified forestry activities, NPWS must be notified at least 10 days prior to operations commencing in the compartment to assess whether a prescription is necessary.
- c) Threatened flora species that occur, or are likely to occur in the area and may be affected by forestry operations are listed in the following table:

Acacia bynoeana	Hicksbeachia pinnatifolia
Acacia courtii	Leptospermum deanei
Acacia pubescens	* Leucopogon confertus
* Acacia ruppii	* Lindsaea brachypoda
Amorphospermum whitei	* Lindsaea fraseri
Angophora robur	* Lindsaea incisa
Asperula asthenes	Macrozamia johnsonii
* Asterolasia elegans	* Marsdenia longiloba
Boronia umbellata	Melichrus hirsutus
Bothriochloa biloba	* Melichrus sp. Gibberagee (provisional)
* Callitris baileyi	* Monotaxis macrophylla
Callitris oblonga	Olearia cordata
* Calophanoides hygrophiloides	* Olearia flocktoniae

* Corchorus cunninghamii	Parsonsia dorrigoensis
Cryptostylis hunteriana	* Phebalium glandulosum subsp. eglandulosum
* Cynanchum elegans	Picris evae
* Cyperus aquatilis	* Pimelea venosa
* Dendrocnide moroides	* Plectranthus nitidus
Dichanthium setosum	* Polvgala linariifolia
* Diuris pedunculata	Pomaderris brunnea
* <i>Elaeocarpus sp.</i> Rocky Creek (syn. E. sp. Minyon)	* Pomaderris queenslandica
* Eucalyptus camphora subsp. relicta	Prostanthera askania
Eucalyptus glaucina	Prostanthera densa
Eucalyptus mckieana	* Prostanthera sp. Somersby
Eucalyptus pumila	Pterostylis cucullata
Eucalyptus rubida subsp. barbigerorum	* Pterostylis gibbosa
Eucalyptus tetrapleura	Pterostylis nigricans
Goodenia macbarronii	Pultenaea campbellii
Grevillea parviflora ssp. parviflora	Pultenaea stuartiana
Grevillea banyabba	* Quassia sp. Moonee Creek
* Grevillea guthrieana.	Rutidosis heterogama
* Grevillea masonii	* Senna acclinis
* Grevillea mollis	Sophora fraseri
* Grevillea obtusiflora	Styphelia perileuca
Grevillea quadricauda	Tasmannia glaucifolia
Grevillea rhizomatosa	Tasmannia purpurascens
Grevillea scortechinii subsp. Sarmentosa	Tetratheca glandulosa
Hakea fraseri	Tetratheca juncea
Hakea trineura	* Tinospora smilacina
* Hedyotis galioides	* Triplarina imbricata
* Hibbertia hexandra	* Tylophora linearis
Hibbertia hexandra	* Tylophora woollsii
Hibbertia marginata	* Uromyrtus australis
* Hibbertia procumbens	Zieria involucrata
Hicksbeachia pinnatifolia	* Zieria lasiocaulis

c) Threatened flora species listed below are either not currently known from state forest estate or are only known from non-production areas (eg. flora reserves). However, should they be found in production areas of State Forest they are considered likely to be affected by forestry operations:

* Acacia acrionastes	* Euphrasis sp. Tamworth
Acacia flocktoniae	Floydia praealta
* Acacia macnuttiana	Fontainea australis
* Acacia pubifolia	* Fontainea oraria
Acacia pycnostachya	Gaultheria viridicarpa subsp. merinoensis
* Acalypha eremorum	Gaultheria viridicarpa subsp. viridicarpa
* Acronychia littoralis	* Geijera paniculata
* Aldrovanda vesiculosa	Gentiana wissmannii
* Allocasuarina defungens	* Gingidia montana
Allocasuarina simulans	* Grammitis stenophylla
* Almaleea cambagei	* Grevillea beadleana
* Amyema scandens	Grevillea evansiana
* Angiopteris evecta	Grevillea shiressii
* Apatophyllum constablei	Haloragis exalata subsp. exalata
Arthraxon hispidus	Haloragis exalata subsp. velutina
* Arthropteris palisotii	Homoranthus lunatus

* Austromyrtus fragrantissima	Homoranthus prolixus
Baeckea sp. Pyramids	* Hypolepis elegans
Baloghia marmorata	* Isoglossa eranthemoides
* Bertya ingramii	* Knoxia sumatrensis
Bertya sp. A Cobar-Coolabah	* Kunzea rupestris
* Blumea lacera	Lasiopetalum longistamineum
* Boronia granitica	* Lepidium hyssopifolium
* Boronia repanda	* Lepidium peregrinum
Bosistoa selwynii	Macadamia tetraphylla
Bosistoa transversa	Melaleuca groveana
Bulbophyllum globuliforme	* Micromelum minutum
Cadellia pentastylis	* Muellerina myrtifolia
* Caesia parviflora var. minor	Myriophyllum implicatum
* Cheilanthes sieberi subsp. Pseudovellea	Neoastelia spectabilis
* Choricarpia subargentea	* Ochrosia moorei
Clematis fawcettii	Olax angulata
Corynocarpus rupestris subsp. Rupestris	Owenia cepiodora
Cryptocarya foetida	Persicaria elatior
Darwinia biflora	Phaius australis
* Davidsonia pruriens var. jerseyana	* Phaius tankervilliae
Davidsonia sp. Mullumbimby Currumbin Creek	* Plectranthus alloplectus
* Desmodium acanthocladum	Prostanthera sp. Bundjalung
* Diospyros mabacea	Prostanthera staurophylla
* Diospyros major var. ebenus	* Pseudanthus ovalifolius
* Diploglottis campbellii	* Psilotum complanatum
Diuris praecox	* Randia moorei
Diuris venosa	* Rapanea sp. A Richmond River
* Drynaria rigidula (provisional)	Sarcochilus fitzgeraldii
* Elaeocarpus williamsianus	Sarcochilus hartmannii
* Eleocharis tetraquetra	Sarcochilus weinthalii
* Endiandra floydii	Sauropus albiflorus subsp. microcladus
Endiandra hayesii	Symplocos baeuerlenii
Endiandra muelleri subsp. Bracteata	Syzygium hodgkinsoniae
Eriostemon ericifolius	Syzygium moorei
* Eucalyptus approximans	Syzygium paniculatum
Eucalyptus caleyi subsp. Ovendenii	* Tarenna cameronii
Eucalyptus camfieldii	Thesium australe
Eucalyptus nicholii	Tinospora tinosporoides
* Eucalyptus pachycalyx	* Velleia perfoliata
Eucalyptus parramattensis subsp. Decadens	* Wahlenbergia scopulicola
* Euphrasia arguta	* Zieria floydii
Euphrasia bella	* Zieria prostrata
* Euphrasia collina subsp. Muelleri	

Condition 8. Prescriptions

a) The carrying out of specified forestry activities must comply with the prescriptions detailed below.

Prescription 1. Operational Requirements

- c) For all exclusion zones established under the following prescriptions the following must apply (except where indicated otherwise):
 - i. All specified forestry activities must be permanently excluded from exclusion zones;

- ii. Trees must not be intentionally felled into exclusion zones. If a felled tree accidentally falls into an exclusion zone, the tree should be removed from within the zone, but machinery must not enter the zone.
- d) Buffer zones must be managed in accordance with the relevant prescriptions below.
- e) All distances must be measured on the ground.
- f) All exclusion zone and buffer zone boundaries must be marked in the field, except where specified forestry activities will not come within 50 metres of such boundaries.
- g) An appropriately trained person must search for, record and appropriately mark the threatened species habitat features listed below while marking up a compartment. Marking-up must be conducted at least 100 metres in advance of harvesting and road construction and road re-opening operations so relevant exclusion and buffer zones can be established appropriately. Searches for these features must be conducted throughout the net logging area and areas 50 metres beyond the boundary of the net logging area. Where any of these features are found, the feature must be recorded, the Harvesting Plan must be amended accordingly and the appropriate prescription applied.
 - i. Nest and roost sites of threatened birds;
 - ii. Threatened owl pellets;
 - iii. Den and roost sites of threatened mammals;
 - iv. Flying-fox camps;
 - v. Latrine and den sites of the Tiger Quoll;
 - vi. Distinctive scats (eg. Tiger Quoll, Koala and Brush-tailed Rock Wallaby);
 - vii. Allocasuarina spp. with more than 30 crushed cones beneath;
 - viii. Yellow-bellied Glider "v-notch" trees and trees with other incisions made by Yellow-bellied Glider or Squirrel Glider;
 - ix. Trees with chew balls made by Yellow-bellied Glider or Squirrel Glider beneath them;
 - x. Caves, tunnels and disused mineshafts;
 - xi. Other evidence of threatened species.

Prescription 2. Old Growth Forest Protection

Old Growth Forest requiring protection will be identified during the RFA negotiations.

- a) Specified forestry activities, except road and track re-opening, must be excluded from all areas of identified Old Growth Forest.
- b) A buffer zone of 20 metres must be permanently established around all areas of identified Old Growth Forest. Within this buffer zone, the following must apply:
 - i. Only light and moderate single tree selection silviculture can be practised;
 - ii. No heavy single tree selection silviculture or group selection silviculture can be conducted;
 - iii. There must be a minimum 50% canopy retention.
- c) Trees must not be intentionally felled into identified Old Growth Forest. If a felled tree accidentally falls into identified Old Growth Forest, the tree must be removed from within the area, without machinery entering the Old Growth Forest.

Prescription 3. Rainforest Protection

Rainforest requiring protection will be identified during RFA negotiations.

- c) Specified forestry activities, except re-opening of roads or tracks, must be excluded from all areas of Rainforest.
- d) A 20 metre wide exclusion zone must be permanently established around all areas of CRA mapped 'r' coded rainforest.
- e) A 20 metre wide buffer zone must be permanently established around all areas of CRA mapped 'rb', 're' and 'rm' coded rainforest. Within the buffer zone the following must apply:
 - i. Only light and moderate single tree selection silviculture can be practised;
 - ii. No heavy single tree selection silviculture or group selection silviculture can be conducted;
 - iii. There must be a minimum 50% canopy retention;
 - iv. Machinery must not enter the buffer zone.
- d) Trees must not be intentionally felled into identified Rainforest. If a felled tree accidentally falls into identified Rainforest, the tree must be removed from within the area, without machinery entering the Rainforest.

Prescription 4. Rare Non-Commercial Forest Ecosystem Protection

Rare non-commercial forest ecosystems requiring protection will be identified during the RFA negotiations.

- a) Specified forestry activities, except road or track re-opening, must be excluded from all identified Rare Non-Commercial Forest Ecosystems.
- b) Trees must not be intentionally felled into Rare Non-Commercial Forest Ecosystems. If a felled tree accidentally falls into an area of excluded forest type, the tree must be removed from the area, without machinery entering the area.
- c) A 20 metre wide buffer must be permanently established around all areas of forest ecosystems identified by the RFA as particularly vulnerable. Within this buffer zone the following must apply:
 - i. Only light and moderate single tree selection silviculture can be practised;
 - ii. No heavy single tree selection silviculture or group selection silviculture can be conducted;
 - iii. There must be a minimum 50% canopy retention;
- c) Trees must not be intentionally felled into identified Rare Non-Commercial Forest Ecosystems. If a felled tree accidentally falls into identified Rare Non-Commercial Forest Ecosystems, the tree must be removed from within the area, without machinery entering the Rare Non-Commercial Forest Ecosystem.

Prescription 5. Tree Retention

The following prescription must be applied for those compartments that lie within the non-regrowth zone as shown on Map 1 attached to this licence variation.

- c) <u>Non-regrowth Zone Hollow-bearing Tree Retention</u>
 - i. A minimum of ten hollow-bearing trees must be retained per two hectares. Where this density is not available, the ten largest trees in the two hectare area must be retained.

- ii. Retained, hollow-bearing trees must be selected from the largest trees within the two hectare area and must be live trees with good crown development and should have minimal butt damage.
- iii. Retained hollow-bearing trees must represent the range of hollow-bearing species that occurs in the area. Preference should be given to selecting those species or trees which are most suitable for the threatened species known or likely to occur in the area.
- iv. Trees retained outside the net logging area must not be counted as hollow-bearing trees. Stags must not be counted as hollow-bearing trees.
- v. Hollow-bearing trees must be scattered throughout the net logging area.

d) <u>Non-regrowth Zone Recruitment Tree Retention</u>

- i. A minimum of ten recruitment trees must be retained per two hectares.
- ii. Retained recruitment trees must show potential for developing into hollow-bearing trees. Retained recruitment trees must have good crown development and should have minimal butt damage and should not be suppressed. Where available, trees in the mature and late mature growth stages must be retained as recruitment trees.
- iii. Retained recruitment trees must represent the range of species in the mature and late mature growth stages that occurs in the area. Preference should be given to selecting those species or trees which are most suitable for the threatened species known or likely to occur in the area.
- iv. Trees retained outside the net logging area must not be counted as recruitment trees.
- v. Recruitment trees must be scattered throughout the net logging area.

The following prescription must be applied for those compartments that lie within the regrowth zone as shown on Map 1 attached to this licence variation.

- c) <u>Regrowth Zone Hollow-bearing Tree Retention</u>
 - i. A minimum of ten-hollow bearing trees must be retained per two hectares. Where this density is not available then those hollow-bearing trees present must be retained.
 - ii. Retained, hollow-bearing trees must be selected from the largest trees within the two hectare area and must be live trees with good crown development and should have minimal butt damage.
 - iii. Retained hollow-bearing trees must represent the range of hollow-bearing species that occurs in the area. Preference should be given to selecting those species or trees which are most suitable for the threatened species known or likely to occur in the area.
 - iv. Trees retained outside the net logging area must not be counted as hollowingbearing trees. Stags must not be counted as hollow-bearing trees.
 - v. Hollow-bearing trees must be scattered throughout the net logging area.
- d) <u>Regrowth Zone Recruitment Tree Retention</u>
 - i. For each hollow-bearing tree retained as part of the <u>Regrowth Zone Hollow-</u> <u>bearing Tree Retention</u> prescription above, one recruitment tree must be retained.

- ii. Retained recruitment trees must show potential for developing into hollow-bearing trees. Retained recruitment trees must have good crown development, and should have minimal butt damage and should not be suppressed. Where available, trees in the mature and late mature growth stages must be retained as recruitment trees.
- iii. Retained recruitment trees must represent the range of species of mature and late mature growth stages that occurs in the area. Preference should be given to selecting those species or species which are most suitable for the threatened species known or likely to occur in the area.
- iv. Trees retained outside the net logging area must not be counted as recruitment trees.
- v. Recruitment trees must be scattered throughout the net logging area.

The following prescriptions must be applied in both the regrowth and non-regrowth zones:

- e) <u>Stag Retention</u>
 - i. Where more than ten stags per two hectares occur in the net logging area, a minimum of ten stags must be retained per two hectares of net logging area. If there are less then ten stags per two hectares, then all stags should be retained where it is safe to do so.
 - ii. Stags must also be retained in areas outside the net harvesting area, within visual protection strips, and elsewhere it is safe to do so.
 - iii. Stags must not be counted as hollow-bearing trees or recruitment trees.
- f) <u>Significant Food Resources</u>
 - i. Where more than 30 crushed cones have been found beneath individuals of *Allocasuarina* spp., indicating intensive use by the Glossy Black Cockatoo, the tree must be retained and protected from specified forestry activities. Specified forestry activities should aim to minimise damage to stands where *Allocasuarina* spp. dominate the canopy, sub-canopy or understorey.
 - ii. At least 10 mature (>40 cm dbh) individuals of any of the following eucalypt species must be retained per two hectares where they occur: tallowwood, ironbark species, swamp mahogany, forest red gum, bloodwood species, box species (including yellow box and white box), spotted gum species, mountain gum, manna gum, needlebark stringybark, Tyndale stringybark, red stringybark and dry coastal blackbutt. Trees selected must be those with the largest and most vigorous crowns. Where a retained eucalypt food tree also meets the requirements of a hollow-bearing or recruitment tree, the eucalypt food tree can be counted as a hollow-bearing or recruitment tree.
 - iii. Damage to mature banksias and *Xanthorrhoea* spp. should be avoided during forestry operations.
 - iv. All trees with "V-notch" incisions or other incisions made by Yellow-bellied Glider or Squirrel Glider must be retained. Trees which have chew balls made by Yellowbellied Glider or Squirrel Glider beneath them must be retained. Where a retained incised tree also meets the requirements of a hollow-bearing or recruitment tree, the incised tree can be counted as a hollow-bearing or recruitment tree.
 - v. Within coastal forests below 400 metres ASL, all precautions must be taken to protect mature rainforest trees where they occur (including native laurels, figs and palms) within 100 metres of either side of gully lines which adjoin areas of SFNSW Research Note 17 forest typed tallowwood-Sydney blue gum (FT 47), flooded gum (FT 48) and brush box (FT 53).

g) <u>Protection of retained trees</u>

- i. Specified forestry activities and post-logging burning must aim to minimise damage to trees retained under sections a), b), c), d), e) and f) of this prescription.
- ii. The potential for damage to these trees must be minimised by techniques of directional felling.
- iii. Where felled tree heads have accidentally fallen within five metres of a retained hollow-bearing tree, recruitment tree, stag, *Allocasuarina* with more than 30 crushed cones beneath, eucalypt food tree, or Yellow-bellied Glider or Squirrel Glider incised tree or chew ball tree, the felled tree heads must be flattened to a height of 25cm to 50cm *in situ* using a chainsaw or removed from within a five metre radius of the retained tree. Ground and understorey disturbance must be minimised within this five metre radius.
- iv. Retained trees referred to in part iii) above must be marked for retention. The only exception to marking retained trees can occur where the understorey consists of thick lantana greater than one metre high or other impenetrable understorey. The Harvesting Plan must clearly document such situations.

Prescription 6. Riparian Exclusion Zones

- a) Exclusion zones at least ten metres wide must be established on each side of all first order streams.
- b) Exclusion zones at least 20 metres wide must be established on each side of all second order streams.
- c) Exclusion zones at least 40 metre wide must be established on each side of 80% of third and higher order streams in a Management Area. Exclusion zones at least 20 metres wide must be established on the remaining 20% of third and higher order streams in a Management Area.
- d) Specified forestry activities, with the exception of road construction and road re-opening where there is no other practical means of access, must be excluded from exclusion zones established in a), b) and c). Road construction and road re-opening through these exclusion zones should avoid sites where threatened species have been recorded.

Prescription 7. Ridge and Headwater Habitat Corridors

- a) Each 500 hectares of production state forest must include a minimum two exclusion zones at least 40 metres wide which connect second order streams, OR one exclusion zone at least 80 metres wide which connects third order streams, or a combination of the two. These connection corridors should not be cut by roads if possible.
- b) Exclusion zones established under a) must establish links between different drainage systems. These exclusion zones should connect the relevant second or third order stream via the associated lower order stream(s). Areas of identified Old Growth Forest, Rare Non-commercial Forest Ecosystems and Rainforest may be used as the basis of exclusion zones.
- c) Specified forestry activities, with the exception of road construction and road re-opening where there is no other practical means of access, must be excluded from these exclusion areas.

Prescription 8. Wetlands

- a) Wetlands are defined as areas that are inundated cyclically, intermittently or permanently with fresh, brackish or salt water, and where the inundation determines the type and productivity of the soils and the plant and animal communities. Wetlands also include all areas of SEPP 14 wetlands and all areas of SFNSW Research Note 17 forest typed swamp mahogany (FT 30), paperbark (FT 31), swamp oak (FT 32), mangrove (FT 33), swamp (FT 231), and water surfaces (FT 235).
- b) Exclusion zones at least 10 metres wide must be established around all wetlands of between 0.1 hectare (approx. 30m x 30m) and 0.5 hectare (approx. 70m x 70m) surface area.
- c) Exclusion zones at least 20 metres wide must be established around all wetlands greater than 0.5 hectare (approx. 70m x 70m) and 2.0 hectares (approx. 150m x 150m) surface area.
- d) Exclusion zones at least 40 metres wide must be established around all SEPP 14 wetlands and other wetlands greater than 2.0 hectares surface area.
- e) Exclusion zones must be measured from the edge of the forest community.
- f) Specified forestry activities must be excluded from all wetlands, irrespective of their size, and must be excluded from wetland exclusion zones.

Prescription 9. Heath and Scrub

- a) Heath and scrub are defined as areas dominated by woody shrubs and graminoids generally less than 2 metres tall at maturity, but up to 6 metres tall. Heath and scrub also includes all areas of SFNSW Research Note 17 forest typed heath (FT 223) and scrub (FT 224).
- b) Exclusion zones at least 20 metres wide must be established around all heath of more than 0.2 hectare (approx. 45m x 45m) surface area.

Prescription 10. Rocky Outcrops and Cliffs

- a) Rocky outcrops are defined as areas characterised by a high proportion of exposed rock or boulders relative to the surrounding area, OR, areas with skeletal soils, supporting heath or shrub communities (sometimes with occasional emergent trees). These sites can occur where the geology varies from the surrounding area (eg. rhyolite outcrops). Rocky outcrops also include all areas of SFNSW Research Note 17 forest typed rock (FT 234).
- b) Exclusion zones at least 20 metres wide must be established around all rocky outcrops more than 0.1 hectare (approx. 30m x 30m) and all cliffs or cliff lines.

Prescription 11. Caves, Tunnels and Disused Mineshafts

- a) All caves, tunnels, disused mineshafts (with the exclusion of open pits of less than three meters in depth), rock overhangs and rock crevices must be protected by an exclusion zone of least 100 metre radius until surveys for the presence of threatened bats have been conducted in accordance with Prescription 25.
- b) Where no threatened bats or evidence threatened bats have been recorded, these exclusion zones may be reduced to 10 metre radius.
- c) Where threatened bats or evidence of threatened bats have been recorded the relevant species-specific prescription must be applied in accordance with Prescription 20.

Prescription 12. Nest and Roost Site Protection

a) The following exclusion zones must be applied around nest and roost sites:

Powerful Owl nest, or likely nest site ¹	50m radius
Powerful Owl regular roost ²	
Masked Owl nest, or likely nest site	50m radius
Masked Owl regular roost	
Sooty Owl nest, or likely nest site	50m radius
Sooty Owl regular roost	
Barking Owl nest, or likely nest	
Barking Owl regular roost	
Bush Thick-knee nest	100m radius
Albert's Lyrebird nest	100m radius
Glossy Black-Cockatoo nest ³	50m radius
Turquoise Parrot nest	
Osprey nest	
Square-tailed Kite nest	100m radius

- b) Nests and roost sites of Powerful Owl, Masked Owl and Barking Owl must be included within areas of retained habitat established in Prescription 17A Large Forest Owls.
- c) Nest exclusion zones for the following species must be permanently established: Powerful Owl, Masked Owl, Sooty Owl, Barking Owl, Bush Thick-knee and Osprey.
- d) Nest exclusion zones for the following species may be removed where surveys conducted during two consecutive breeding seasons establish that the nest is not being used: Square-tailed Kite, Albert's Lyrebird, Glossy Black-Cockatoo and Turquoise Parrot.

¹ a "likely nest" is defined as situations where there is clear evidence of breeding and it is considered highly likely that a nest occurs in an area (as a guide about a hectare), however the exact location of the nest site can not be confirmed. For example, when calls of both adult and young are heard coming from the same area.

 2 a "regular roost" is defined as a site where an owl has been observed roosting; or a site where there is clear evidence that an owl is roosting; such as where are owl pellets, remains of prey or owl white wash, or both.

³ When ten of these sites, separated by two kilometres or more, are retained over a two year period in any one SFNSW Management Area, SFNSW may apply to the NPWS for a review of this section of the prescription.

Prescription 13. Burning

When fulfilling its responsibilities under the *Rural Fires Act* 1997, SFNSW should take account of the following principles.

- a) Hazard reduction work should take account of wildfire history, intensity, frequency and seasonality, and reflect the ecological requirements of any threatened species, or their habitat, known or likely to occur in the area.
- b) Hazard reduction work should be conducted in a manner which promotes and maintains an understorey mosaic which includes significant areas of dense understorey vegetation, particularly within the habitat of CWR species.
- c) In areas where intervals between fires are less than five years, hazard reduction work should be conducted in a manner that minimises the impact on understorey vegetation and large fallen logs (>40 cm dbh and 5m in length).
- d) It is acknowledged that hazard reduction work will be covered by a Bush Fire Risk Management Plan and that this plan is required to take into account the impact of burning activities on threatened species.
- e) Notwithstanding any of the above conditions in this licence, SFNSW may carry out activities necessary for its compliance with the provisions of the *Rural Fires Act* 1997.

Prescription 14. Ground Habitat Protection

a) SFNSW should take reasonable measures to protect ground habitat (understorey vegetation, ground cover vegetation, fine litter, large logs) from specified forestry activities.

Prescription 15A. Threatened Frog General Protection Measures

Where there is a record of a threatened species of frog, in a compartment or within two kilometres of the compartment boundary, the following must apply:

- a) Buffer zones at least 10 metres wide must be permanently established around all ponds and dams (as separate from streams and wetlands detailed in other prescriptions). All practical precautions should be taken to avoid felling trees into this buffer zone. Machinery must not enter this buffer zone.
- b) Grazing and associated burning should be excluded from swamps and ephemeral wetlands.
- c) Subject to the statutory requirements of the *Rural Fires Act* 1997, hazard reduction work should be conducted in a manner which precludes its encroachment into any buffer zones or exclusion zones established under Prescriptions 15A, 15B and 15C; or in a manner consistent with continued wetland management.
- d) Where more than 10 male threatened frogs per hectare are detected, stream crossings should be bridged if possible. This principle is to be applied within 500 metres of the perimeter of the concentration of frogs.

Prescription 15B. Threatened Frog Species-specific Management

In addition to the requirements of Prescription 15A, the following species-specific prescriptions must be applied where specified.

Green and Golden Bell Frog Litoria aurea

Where there is a record of *Litoria aurea* in a compartment or within 50 metres of the compartment boundary, the following must apply:

a) An exclusion zone of at least 50 metre radius must be established around the waterbody where this species has been recorded or the site of the record.

Green-thighed Frog Litoria brevipalmata

Where there is a record of *Litoria brevipalmata* in a compartment or within 50 metres of the compartment boundary, the following must apply:

a) a) An exclusion zone of at least 50 metre radius must be established around the waterbody where this species has been recorded or the site of the record.

When 10 records of either *Litoria aurea* or *Litoria brevipalmata*, separated by 2km or more, are accumulated over a 2 year period in any one SFNSW Management Area, SFNSW may apply to the NPWS for a review of the prescription for the relevant species for that Management Area.

Fleay's Frog *Mixophyes fleayi*

Where there is a record of *Mixophyes fleayi* in a compartment or within 500 metres of the compartment boundary, the following must apply:

a) Exclusion zones at least 40 metres wide must be established on all streams within 500 metres of the record.

Giant Barred Frog Mixophyes iteratus Stuttering Frog Mixophyes balbus

Where there is a record of *Mixophyes iteratus* or *Mixophyes balbus* in a compartment, or within 300 metres of the compartment boundary, the following must apply:

- a) Exclusion zones of at least 30 metres wide must be established on all first and second order streams within 300 metres of the record.
- b) Exclusion zones of at least 40 metres wide must be established on all third and higher order streams within 300 metres of the record.

Philoria spp.

Where there is a record of *Philoria* spp. within a compartment, the following must apply:

- a) An exclusion zone must be established on all first order stream catchments upstream of, or encompassing, the record(s). The area included in the catchment exclusion zones will be capped at a maximum of 20% of the gross area of the compartment.
- b) Where there are multiple records of *Philoria* spp. in a compartment, exclusion zones should encompass adjacent catchments where possible.

Prescription 15C. Threatened Frog Site-specific Management

In addition to the requirements of Prescription 15A, the following Site-specific prescriptions must be applied where specified.

Giant Burrowing Frog Helioporous australiacus

Yellow-spotted Tree Frog Litoria castanea Peppered Frog Litoria piperata Red-crowned Toadlet Pseudophyrne australis

If a record of *Helioporous australiacus*, *Litoria castanea*, *Litoria piperata* or *Pseudophyrne australis* is found during the desktop review component of the Pre-logging and Pre-roading Surveys, the following must apply:

- a) The NPWS must be notified within 48 hours of finding the record to develop an appropriate site-specific prescription.
- b) Specified forestry activities must not commence in the compartment until a sitespecific prescription has been developed and a licence variation issued.

If a *Helioporous australiacus, Litoria castanea, Litoria piperata* or *Pseudophyrne australis* is recorded during the carrying out of specified forestry activities in a compartment, or within 100 metres of the compartment boundary, the following must apply:

- a) Specified forestry activities must immediately cease within the compartment and within 100 metres of the compartment boundary.
- b) The NPWS must be notified within 24 hours of the record being made in order to develop an appropriate site-specific prescription.
- c) Specified forestry activities must not re-commence in the compartment until a sitespecific prescription has been developed and a licence variation issued.

Prescription 16A. Threatened Reptile Species-specific Management

White-crowned Snake Cacophis harriettae

Where there is a record of *Cacophis harriettae* in a compartment or within 100 metres of the compartment boundary, the following must apply:

- c) An exclusion zone of at least 50 metres radius must be established around the record.
- d) An additional 50 metre wide buffer zone must be established around the exclusion zone established in a). Within the buffer zone:
 - i. All logs and fallen trees (excluding those felled in the course of forestry operations) greater than 20 cm diameter must be retained *in situ*,
 - ii. Elsewhere within the buffer zone specified forestry activities may occur. Trees may be felled where directional felling techniques allow them to be snigged with minimal disturbance to the ground cover and understorey.
- e) Within a 200 metre radius of the record all practical precautions must be taken to minimise disturbance to ground cover.
- f) Subject to the statutory requirements under the *Rural Fires Act* 1997, hazard reduction work should not be conducted in exclusion zones and buffer zones established in a) and b) above.

Pale-headed Snake Hoplocephalus bitorquatus

Where there is a record of the *Hoplocephalus bitorquatus* in a compartment or within 300 metres of the compartment boundary, the following must apply:

a) An exclusion zone of at least 100 metres radius must be established around the record.

- b) An additional 200 metre wide buffer zone must be established around the exclusion zone established in a). Within the buffer zone:
 - i. All hollow bearing trees must be retained;
 - ii. For each hollow-bearing tree retained in i., two recruitment trees must be retained.
 - iii. All stags must be retained where it is safe to do so;
 - iv. All logs and fallen trees (excluding those felled in the course of forestry operations) greater than 40cm diameter must be retained *in* situ.
 - v. All Riparian Exclusion zones established under Prescription 6 must be increased by 10 metres width. Specified forestry activities, with the exception of road construction and re-opening, where there is no other practical means of access, must be excluded from the buffer zone.
- d) Subject to the statutory requirements under the *Rural Fires Act* 1997, hazard reduction work should not be conducted in exclusion zones and buffer zones established in a) and b) above.

Sand Goanna Varanus rosenbergi

Where there is a record of *Varanus rosenbergi* within a compartment, the following must apply:

- a) Subject to statutory requirements under the *Rural Fires Act* 1997, hazard reduction work should aim to ensure a mosaic of fire regimes, to maintain an open understorey and to minimise the loss of logs.
- b) Firewood collection (both commercial and domestic) must not be permitted in the compartment.
- c) Grazing of domestic stock should be avoided in the compartment.
- d) A predator control program targeting the control of fox and wild dog populations should be developed and implemented for the compartment and the surrounding area within three months of operations finishing in the compartment.

Prescription 16B. Threatened Reptile Site-specific Management

Broad-headed Snake Hoplocephalus bungaroides

If a record of *Hoplocephalus bungaroides* is found during the desktop review component of the Pre-logging and Pre-roading Surveys, the following must apply:

- a) The NPWS must be notified within 48 hours of finding the record to develop an appropriate site-specific prescription.
- b) Specified forestry activities must not commence in the compartment until a sitespecific prescription has been developed and a licence variation issued.

If a *Hoplocephalus bungaroides* is recorded during the carrying out of specified forestry activities in a compartment, or within 200 metres of the compartment boundary, the following must apply:

- a) Specified forestry activities must immediately cease within the compartment and within 200 metres of the compartment boundary.
- b) The NPWS must be notified within 24 hours of the record being made in order to develop an appropriate site-specific prescription.
- c) Specified forestry activities must not re-commence in the compartment until a sitespecific prescription has been developed and a licence variation issued.

Prescription 17A. Threatened Bird Species-specific Management

Albert's Lyrebird Menura alberti

Where there is an Albert's Lyrebird record (eg. observation, call detection or male calling site) within a compartment or within 50 metres of the compartment boundary, the following must apply:

- a) An exclusion zone of at least 20 metres wide must be established on all first order streams within the compartment.
- b) An exclusion zone of at least 50 metres wide must be established on all second and higher order streams within the compartment.
- c) Specified forestry activities, with the exception of road construction and road reopening where there is no other practical means of access, must be excluded from exclusion zones established in a) and b).
- d) A predator control program targeting the control of fox and wild dog populations should be developed and implemented for the compartment and the surrounding area within three months of operations finishing in the compartment.

Bush Stone-curlew Burhinus grallarius

Where there is a record of Bush Stone-curlew within a compartment or within 50 metres of the compartment boundary, the following must apply:

- a) Subject to statutory requirements under the *Rural Fires Act* 1997, hazard reduction work should aim to ensure a mosaic of fire regimes, to maintain an open understorey and to minimise the loss of logs.
- b) Firewood collection (both commercial and domestic) must not be permitted in the compartment.
- c) Grazing of domestic stock should be avoided in the compartment.
- d) A predator control program targeting the control of fox and wild dog populations should developed and implemented for the compartment and the surrounding area within three months of operations finishing in the compartment.

Marbled Frogmouth Podargus ocellatus

Where there is a record of Marbled Frogmouth within a compartment or within 50 metres of the compartment boundary, the following must apply:

- a) Exclusion zones at least 20 metres wide must be established on all first order streams in the compartment.
- b) Exclusion zones at least 50 metres wide must be established on all second and higher order streams in the compartment.
- c) Specified forestry activities, with the exception of road construction and road reopening where there is no other practical means of access, must be excluded from exclusion zones established in a) and b).
- d) An exclusion zone of at least 20 metres wide must be established around all areas of rainforest within the compartment.

Powerful Owl	Ninox strenua
Masked Owl	Tyto novaehollandiae
Barking Owl	Ninox connivens

SFNSW has two options for protecting large forest owls in State Forest. SFNSW must apply either approach: "Site Based Approach" or "Landscape Approach".

- State Forests of NSW must notify NPWS within 6 months of the date of this licence variation which approach will be applied to each area of State Forest subject to harvesting.
- Generally speaking SFNSW can choose to change from the site based to the landscape approach after that date, however SFNSW cannot change from the landscape to the site based approach.
- Where a change from the site based to the landscape approach has occurred SFNSW must take all reasonable attempts to retain habitat previously retained in the site based approach, where it is suitable habitat as defined in the Landscape Approach g) i) and ii) below.

The landscape prescription is most suitable for large forested areas, especially with numerous records of large forest owls. The site based prescription is most appropriate for single records or small scattered patches of forest or both.

Large Forest Owls Site Based Approach

Where there is a record (eg. observation, call detection, roost or nest) of Powerful, Masked or Barking Owl or some combination of the three within a compartment or within two kilometres of the compartment boundary, the following must apply:

- a) A 300 hectare exclusion zone must be established within a two kilometre radius planning area centred around the record or records.
- b) Exclusion zones must contain locations of nest and roost records, and should maximise the inclusion of other records.
- c) The exclusion zone must encompass the highest category habitat available in the planning area. Habitat categories are ranked as follows (from highest to lowest):

Category 1: CRA predicted habitat quality class 1;

Category 2: CRA predicted habitat quality class 2;

Category 3: identified Old Growth Forest (identified OG need not pass any disturbance test, such as stump counts.);

Category 4: CRA predicted habitat quality class 3; and then

Category 5: any other areas of suitable habitat.

- d) CRA predicted habitat and identified Old Growth Forest occurring in existing statutory reserves within the two kilometre radius may be used to meet the exclusion zone requirements, where it is consistent with the requirements of section c) above.
- e) Exclusion areas should aim to minimise the boundary to area ratio.
- f) Where there are records of more than one species of owl within the two kilometre planning area, a 300 hectare exclusion zone must be established for each species consistent with the requirements of sections b) and c) above. These areas may overlap.
- g) Where there is more than one record of the same species within two kilometres of each other then they can be treated as one record. The location of the two kilometre planning area must be centred around the records.
- h) Where there is a number of records consecutively less than two kilometres apart but collectively spreading over an area greater than two kilometres in any direction then advice on the application of the prescription must be sought from the NPWS.
- i) If a record is on private property within two kilometres of state forest, then the 1200 hectare (equivalent to two kilometre radius) planning area must be located on public land.

Large Forest Owls Landscape Approach

The landscape prescription is to provide for a network of retained habitat across the forest landscape. Large patches of suitable habitat are to be retained within production forest areas.

- a) When applying the landscape prescription both the Powerful and Masked Owl must be catered for. Where there is either a record of a Barking Owl or CRA Barking Owl predicted habitat quality Class 1 or Class 2 within the planning area, or both, then the Barking Owl must be catered for in addition to Powerful and Masked Owl.
- b) The planning area may be between 5,000 to 15,000 hectares in size. Smaller or larger planning areas should be avoided, but may be appropriate in particular circumstances.
- c) The planning areas can only contain public lands, private land must not be included.
- d) A minimum of 25% of the planning area must be retained as exclusion zones.
- e) Of the areas to be retained as exclusion zones, in section d) above, a minimum of 30% must be permanently retained in production state forest. Where existing statutory reserves comprise 25% or more of the planning area, then the minimum area to be retained in production state forest must be 12.5% of the area of production state forest.
- f) Of the areas to be retained in production state forest, referred to section e) above, a minimum of 30% must be retained in large patches. Large patches are considered patches of at least 50 hectares in size. The shape of these large patches must aim to minimise the boundary to area ratio; long linear strips of habitat must not be counted towards meeting the requirement to retain large patches.
- g) In selecting areas to be retained as exclusion zones within the planning area the following design rules must be followed:
 - i. Where the three species of large forest owls are being planned for (Masked, Powerful and Barking Owl) the retained habitat must comprise 45% Powerful Owl habitat, 45% Masked Owl habitat and 10% Barking Owl habitat. Where only two species are being planned for (Masked and Powerful Owl) the retained habitat must comprise 50% Masked Owl and 50% Powerful Owl habitat.
 - ii. The area of retained habitat for each of the species must be selected from CRA predicted habitat on the basis of the proportion of each CRA predicted habitat class that is present within the planning area.
 - iii. Areas of statutory reserves (National Parks, Nature Reserves, State Recreation Areas and Flora Reserves) can be used to meet the retention targets, where consistent with the requirements of sections g) i) and ii) above.
 - iv. Other exclusion zones within production state forest (eg. old growth forest, riparian buffers etc) can be used to meet the exclusion zone targets for production state forest, where consistent with the requirements of sections g) i) and ii) above.
 - v. Exclusion zones must include locations of nest and roost records of the species being planned for, and should maximise the inclusion of other records for the species being planned for.
- h) The worked example of the application of the landscape prescription in Attachment 1 should be followed when applying this prescription.

Rufous Scrub-bird Atrichornis rufescens

If there is a record of Rufous Scrub-bird in a compartment or within 300 metres of a compartment boundary, the following must apply:

- c) Within a 300 metre radius of the record, an exclusion zone must be established which encompasses all CRA Rufous Scrub-bird predicted habitat.
- d) An additional exclusion zone of at least 20 metres wide must be established around all predicted habitat referred to in a).

e) Subject to the statutory requirements of the *Rural Fires Act* 1997, all practical precautions should be taken to avoid hazard reduction work in the exclusion zones referred to in a) and b).

Sooty Owl Tyto tenebricosa

May require additional habitat retention post RFA.

Swift Parrot Lathamus discolor

Where there is a record of Swift Parrot in a compartment, the following must apply:

a) At least 10 eucalypt food trees as defined in Prescription 5, f), ii., per two hectares must be retained within the net logging area. These trees must be marked for retention. Where retained eucalypt food trees also meet the requirements of hollow-bearing or recruitment trees, the retained eucalypt food tree can be counted as a hollow-bearing or recruitment tree.

Prescription 17B. Threatened Bird Site-specific Management

Red Goshawk Erythrotriorchis radiatus Regent Honeyeater Xanthomyza phrygia

If a record of Red Goshawk or Regent Honeyeater is found during the desktop review component of the Pre-logging and Pre-roading Surveys, the following must apply:

- a) The NPWS must be notified within 48 hours of finding the record to develop an appropriate site-specific prescription.
- b) Specified forestry activities must not commence in the compartment until a sitespecific prescription has been developed and a licence variation issued.

If a Red Goshawk or Regent Honeyeater is recorded during the carrying out of specified forestry activities in a compartment, or within five kilometres of the compartment boundary, the following must apply:

- a) Specified forestry activities must immediately cease within the compartment.
- b) The NPWS must be notified within 24 hours of the record being made in order to develop an appropriate site-specific prescription. NPWS may require that all, or some operations cease within five kilometres of the compartment boundary.
- c) Specified forestry activities must not re-commence in the compartment until a sitespecific prescription has been developed and a licence variation issued.

Black-breasted Button-quail Turnix melanogaster Black-throated Finch Poephila cincta Double-eyed Fig Parrot Cyclopsitta diophthalma coxeni Eastern Bristlebird Dasyornis brachypterus Red-tailed Black-Cockatoo Calyptorhynchus banksii

If a record of any of these species are found during the desktop review component of the Prelogging and Pre-roading Surveys, the following must apply:

- a) The NPWS must be notified within 48 hours of finding the record to develop an appropriate site-specific prescription.
- b) Specified forestry activities must not commence in the compartment until a sitespecific prescription has been developed and a licence variation issued.
If any of these species are recorded during the carrying out of specified forestry activities in a compartment, or within one kilometre of the compartment boundary, the following must apply:

- a) Specified forestry activities must immediately cease within the compartment.
- b) The NPWS must be notified within 24 hours of the record being made in order to develop an appropriate site-specific prescription.
- c) Specified forestry activities must not re-commence in the compartment until a sitespecific prescription has been developed and a licence variation issued.

Prescription 18A. Critical Weight Range Species General Protection Measures

Where there is a record of a CWR species in the compartment or within two kilometres of the compartment boundary (or for Tiger Quoll within five kilometres of the boundary), the following must apply:

- a) Commercial and private firewood licences should specify that fallen hollow logs over 40 cm diameter must not be removed.
- b) Feral predator surveys must be conducted within 3 months of the completion of harvesting operations using appropriate survey techniques approved in writing by NPWS. Species-specific control measures must be undertaken to remove feral predators as required and reasonable, using the results of the surveys to justify the action taken.
- c) Results of feral predator surveys and details of control measures must be provided to the NPWS within 6 months of the implementation of control measures.
- d) Subject to the statutory requirements under the *Rural Fires Act* 1997, hazard reduction work should not be conducted in exclusion zones and buffer zones established for CWR species. Any burning should aim to ensure that a mosaic of fire regimes occurs.
- e) Grazing regimes should aim to minimise adverse impacts on CWR species.

Prescription 18B. Critical Weight Range Species-specific Management

a) In addition to the requirements of Prescription 28A, the following species-specific prescriptions must be applied where specified.

Brush-tailed Phascogale tapoatafa

Where there is a Brush-tailed Phascogale record (eg. observation, hair sample, scat sample, den site) in a compartment or within 500 metres of the compartment boundary, the following must apply:

- a) Within a 500 metres radius of the record, a 50 hectare exclusion zone must be established. Exclusion zones must contain locations of den sites, and must maximise the inclusion of other records.
- b) The exclusion zone must encompass the highest category habitat available in the planning area. Habitat categories are ranked as follows (from highest to lowest):

Category 1: CRA predicted habitat quality class 1;

Category 2: CRA predicted habitat quality class 2;

Category 3: identified Old Growth Forest (identified OG need not pass any disturbance test, such as stump counts.);

Category 4: CRA predicted habitat quality class 3; then

Category 5: any other areas of suitable habitat.

- d) CRA predicted habitat and identified Old Growth Forest occurring in existing statutory reserves within the 500 metre radius may be used to meet the exclusion zone requirements, where it is consistent with the requirements of section c) above.
- e) Exclusion areas must aim to minimise the boundary to area ratio; long linear strips of habitat must not be counted towards meeting the requirements of this prescription.
- f) Where there is more than one record of the Brush-tailed Phascogale within 500 metres of each other then they can be treated as one record. The location of the 500 metre radius planning area must be centred around the records.
- g) Where there is a number of records consecutively less than 500 metres apart but collectively spreading over an area greater than 500 metres in any direction then advice on the application of the prescription must be sought from the NPWS.
- h) If a record is on private property within 500 metres of state forest, then the equivalent of a 500 metre radius planning area must be located on crown land.
- i) When 10 of these areas, separated by three kilometres or more, are retained over a two year period in any one SFNSW Management Area, SFNSW may apply to the NPWS for a review of this prescription

Long-nosed Potoroo Potorous tridactylus

Where there is a record (eg. observation, hair analysis) of Long-nosed Potoroo in the compartment or within 200 metres of the compartment boundary, the following must apply:

- a) A buffer zone of at least 200 metres radius must be permanently established around all records. Within this buffer zone, the following must apply:
 - i. Only light and moderate single tree selection silviculture can be practised;
 - ii. No heavy single tree selection silviculture or group selection silviculture can be conducted;
 - iii. Disturbance to understorey and ground vegetation must be minimised.

Tiger Quoll Dasyurus maculatus

Where there is a record (eg. observation, latrine site, den site, hair analysis, scat or track) of Tiger Quoll in the compartment or within five kilometres of the compartment boundary, the following must apply:

- An exclusion zone of at least 12 hectares must be established around maternal den sites. This exclusion zone must be linked to Riparian Exclusion Zones established in Prescription 6.
- d) An exclusion zone of at least 3.5 hectares must be established around permanent den sites. This exclusion zone must be linked to Riparian Exclusion Zones established in Prescription 6.
- e) An exclusion zone of at least 12 hectares must be established around latrine sites.
- f) Placement of exclusion zones established in a), b) and c) must maximise the inclusion of Tiger Quoll records.

Prescription 18C. Critical Weight Range Site-specific Management

Black-striped Wallaby Macropus dorsalis Eastern Quoll Dasyurus viverrinus

If a record of Eastern Quoll or Black-striped Wallaby is found during the desktop review component of the Pre-logging and Pre-roading Surveys, the following must apply:

- a) The NPWS must be notified within 48 hours of finding the record to develop an appropriate site-specific prescription.
- b) Specified forestry activities must not commence in the compartment until a sitespecific prescription has been developed and a licence variation issued.

If an Eastern Quoll or Black-striped Wallaby is recorded during the carrying out of specified forestry activities in a compartment, or within five kilometres of the compartment boundary, the following must apply:

- a) Specified forestry activities must immediately cease within the compartment and within two kilometres of the compartment boundary.
- b) The NPWS must be notified within 24 hours of the record being made in order to develop an appropriate site-specific prescription. NPWS may require that all, or some operations cease within five kilometres of the compartment boundary.
- c) Specified forestry activities must not re-commence in the compartment until a sitespecific prescription has been developed and a licence variation issued.

Prescription 19A. Threatened Non-flying Mammal Species-specific Management

Hastings River Mouse Pseudomys oralis

This prescription or elements of this prescription may be revised subsequent to the finalisation of the Hastings River Mouse Recovery Plan.

This prescription applies to all areas of Hastings River Mouse CRA predicted habitat (Classes 1, 2 and 3) that have topographical and vegetation characteristics outlined in NPWS (1993) *Interim Hastings River Mouse Identification Guide* and Read (1993) "Prescriptions for the identification of habitats of the Hastings River Mouse *Pseudomys oralis* (Rodentia: Muridae)". *For. Comm. NSW Tech. Pap. No. 58.*

For areas of habitat assessed as "low quality" (L1 to M2) the following prescription must be applied.

a) An exclusion zone at least 20 metres wide must be established around all sedge areas within the compartment.

For areas of habitat assessed as "moderate / high quality" (M3 to H5) the following prescription must be applied.

a) An exclusion zone at least 100 metres wide must be established around all areas of identified High Quality Habitat.

Where there is a known record of Hastings River Mouse within the compartment or within 800m of the boundary of the compartment, the following prescription must be applied.

a) An exclusion zone of at least 800 metres radius must be established around all records of Hastings River Mouse.

Koala Phascolarctos cinereus

THE FOLLOWING KOALA PRESCRIPTION IS CURRENTLY BEING REVIEWED BY NPWS. THE REVIEW WILL AIM TO INCLUDE THE SECTIONS RELATING TO PRE-LOGGING SURVEYS IN THE SURVEY PRESCRIPTION. THERE WILL BE MINOR CHANGES TO CONTENT AND MAJOR CHANGES TO FORMATTING TO ENSURE THE PRESCRIPTION IS CONSISTENT WITH OTHER PRESCRIPTIONS. THIS REVIEW IS BEING CONDUCTED AT PRESENT AND WILL BE FINALISED BY THE END OF AUGUST 1998.

Koala Prescription A: for North Coast Forest Types

This prescription applies north of Sydney to the following forest types listed in Research Note 17:

- · Rainforest Group
- · Maritime, Blackbutt, Sydney Blue Gum and Spotted Gum Leagues
- \cdot Grey Gum Grey Ironbark, Grey Box-Ironbark and Red Gum Leagues
- · Eucalypt Plantations

Planning

At the beginning of the harvest planning process, locally compiled records will be consulted to determine if there is a reliable record of a Koala within 2 km of the boundary of the logging compartment boundary. Due recognition will be taken of local and historical knowledge with regard to koala distribution. If a record exists as described, or consideration of historical and local knowledge (including suitability of habitat) indicates that koalas are likely to occur, a methodical survey for koala or signs of koala presence will be undertaken during inspections of the proposed logging area prior to compiling the harvesting plan.

Community dialogue about Koalas should be initiated and maintained at an early stage. This need not be high profile and time consuming, but as a minimum should include contact and exchange of information with neighbours, and local animal welfare and conservation groups. Many interest groups, and the general public, have a knowledge of Koala populations in their area. In some situations, animal care groups may be notified in case of accidental injury to a Koala.

The following procedures will be applied to <u>EUCALYPT PLANTATIONS</u> on State forest lands <u>ONLY</u> where there are more than twenty stems per hectare of primary browse <u>species</u> (greater than fifteen centimetres dbhob).

The first step in planning the Koala survey will be to review a forest type map (where available) and other habitat assessments of the logging area to: i) to determine and document which forest types to select as priorities for sampling, and ii) to decide which forest types may carry these species, or are used locally by Koalas. The planning documents will be available on request.

Survey Method

The survey will proceed according to the following guidelines:

• A walk transect of the logging area will be done to sample modeled or likely habitat within the net logging area at a minimum rate of one kilometre for each 100 ha of the logging area. The transect may contain infrequent bends and may be broken into segments. The transect may cross small patches or narrow linear strips of non-logging area or unlikely habitat but unsuitable habitat must not be counted towards the survey requirements for this species.

• During the walk transect, the area beneath preferred feed trees within 20m of the transect will be searched for dung at a rate of five trees or more (where available) on each fifty metre segment of the transect.

• Primary browse species, preferably within the 30-80 cm dbhob size range will be targeted for dung searches. Secondary and then other species will be used in that priority to make up the numbers per fifty metres of transect. (When choosing trees to be sampled, those with interlocking crowns should be avoided wherever possible).

• If trees as defined above are not available, those tree species and size classes which are present will be sampled if required.

• Indicative primary browse species for the Coastal zone are: tallowwood, sydney blue gum, grey gum, all red gums, and swamp mahogany. Most other eucalypts, plus larger Casuarinaceae and broadleaf paperbark are commonly considered secondary browse species. Brushbox, turpentine, apple, and bloodwood can be considered incidental browse.

• A search of one minute per tree, within two metres concentrated around the base of the tree, will comprise the basic search unit. A scan of the area below the crown of the tree and along the transect between the trees should also be carried out.

• Scats will be left other than small samples taken for identification or other analyses.

• Fire events on the compartment within the past year will be recorded.

• Sampling should not be undertaken within one month following fire events or after periods of heavy rain.

Recording Results

• The results of this survey will be recorded on the standard format data forms. (See "Reporting" section for further requirements).

• The actual transect route taken will be accurately recorded on a map and justification given for the route taken.

• The locality of apparent runway trees found, and any Koala found (with special annotation for mother Koala with young), shall be accurately recorded on the same map.

• The number of scats beneath each tree should be counted and must be recorded where there is a very high number (ie close to 20) or they are of distinctly different sizes, or both.

• The approximate locality of any transect section having three trees with Koala dung pellets out of any ten consecutive trees searched will be shown on this map as a transect section showing high use by Koala.

• "High use areas" in subsequent intensive walk surveys will be identified by this same criterion - ie. areas with Koala dung pellets under three out of any ten consecutive trees searched.

• Subsequent intensive surveys by walk transect will be done to (i) map the extent of high use areas indicated by high use sections of transect and (ii) to determine the importance of areas adjacent to reported runway trees or mother Koalas (where these areas are not associated with high dung pellet counts).

STAR Methodology

• When high use areas, or localities odf scats of different size classes or runway trees or some combination of these are found the STAR methodology must be applied. Walked transects must be carried out and must consist of six additional radiating transects, centred on the abovementioned features, to determine the high use area, sampled at the same rate as above, with primary and then secondary browse species as targets for tree searches. These will start in the centre of the high use area on the original transect. Two of these will be established perpendicular to the original. The remaining four additional transects will be done on the diagonal between the perpendicular and the original transects. These transects will thus form a STAR pattern. These transects shall be carried out for at least 100 metres beyond any delineation of the high use area. Where the person undertaking the transects is satisfied that

Koala habitat is present they may choose to forego the interior parts of the additional transects and commence survey near what they consider to be the edge of the high use area.

• Intermediate use compartments will be defined as compartments in the dot point following and compartments which have Koala dung under two out of ten trees in any one 100 m segment.

• Where high use by Koalas is identified on a transect by only 3 to 4 trees with dung and where the subsequent radiating six transects fail to show high use, this area will not be mapped to the Harvesting Plan as a high use Koala area, but defined as an intermediate use area.

• The high use area boundary will be checked by inspection around the perimeter defined by the points above. The results of this inspection will be recorded as a concise narrative on the data sheet and mapped to the Harvesting Plan. Any data collected will be clearly reported on the data sheets.

• Where high usage is detected near the boundary (within 50 m) of the proposed logging area, minor but appropriate and indicative sampling of relevant adjacent habitat - up to 100 m into adjacent State Forest or National Park - will supplement the walk transect. This sampling will consist of inspection for Koalas, Koala dung and Koala habitat.

• Where this situation occurs adjacent to private lands a comment is required on the survey record and any associated report as to whether suitable Koala habitat, and possible Koala populations, extends into that land.

• Concise notes about adjacent habitat will be made on the data form, where relevant.

• Areas identified on forest type maps larger than about 10 hectares of forest types that carry primary browse species that were not sampled by transect must be inspected for koala evidence and results recorded as concise narrative on the data sheet. Information which should be used to identify these areas include Research Note 17 and local knowledge.

At the harvest planning stage, reserves, exclusions, and retention rates for high use and intermediate use areas will be planned and designed according to the following section.

Reserves and Exclusions

Special conditions for this species:

Individual Koalas will be protected from tree felling operations wherever detected. A tree containing a Koala will not be felled or damaged while the Koala is known to be in the tree.

Detection of a Koala will trigger actions listed below (see Operations).

Logging will be excluded from within fifty metres of high use areas. This will be documented and mapped in the Harvesting Plan.

In intermediate use areas, the following prescriptions apply:

1. Ten primary browse trees (or secondary browse species if primary are unavailable)will be retained per hectare in the compartment. These may include habitat trees if they meet the browse requirements.

2. Gap creation for silvicultural purposes will not take place in preferred forest types.

Where a high use area is identified in a eucalypt plantation, specific management of the area will be negotiated with NPWS.

Particular to this compartment:

Other reserves and exclusions will be planned by the District at this harvest planning stage. See box concerning plantations.

Extra measures required:

Proactive dialogue with contractors will be essential to ensure knowledge and attitude is compatible with compliance with this prescription. This should be initiated during the pre-logging joint inspection stage when going into known Koala areas.

Retained Habitat

Special conditions for this species:

Isolated individual trees with more than twenty Koala dung pellets beneath shall be marked and retained undamaged by logging, and logging debris shall be removed at least 10 metres from their base.

Particular to this compartment:

To be completed by District at Harvest Plan compilation.

Extra measures required:

Near koala high use areas, primary and secondary browse trees will be retained as habitat trees where available.

Operations

Compartment Marking:

Exclusion zones will be marked to clearly exclude logging from those areas of compartments with positive Koala records and where survey results show high use. If koalas are encountered during this phase of operations the prescriptions set in harvesting (below) will be followed.

Trees to be retained in intermediate use areas will be clearly marked for retention.

During tree marking, primary browse trees should be briefly scanned for Koalas and Koala pellets (see next section for description of required action if a koala is detected).

<u>Harvesting</u>:

Continued dialogue with contractors is needed to ensure knowledge and attitude is compatible with compliance with this prescription on all compartments. A planned and documented process for inspection of operations will be required in those compartments with exclusion zones for the protection of Koala habitat.

If a Koala is observed during marking or logging (in an area that has not previously been found to be a high use area), numerous dung pellets (more than twenty below a tree) are found, or where less than twenty pellets of two markedly disparate sizes (medium plus about half sized) are found the following procedure will be followed:

• Walk transects will be initiated consisting of eight transects in the cardinal and sub-cardinal directions, and centred on the observation, to determine the extent of any high use area that may occur. The sampling will be at the same rate as the transect method described previously, with primary and then secondary browse species as targets for dung searches. These transects shall be carried out for at least 100 metres beyond any delineation of a high use area. Where the person undertaking the transects is satisfied that Koala habitat is present they may choose to

forego the interior parts of the transects and commence survey near what they consider to be the edge of the high use area.

• Any high use area boundary found will be checked by inspection around the perimeter defined by the transects. The results of this inspection will be recorded as a concise narrative on the data sheet and mapped to an Amendment to the Harvesting Plan.

The results and maps will be promptly forwarded to NPWS (see Reporting Section).

All tree felling will immediately and subsequently be excluded from within fifty metres of a high use area, or modified within intermediate use areas.

Post-log Burning (associated with this operation):

As far as practicable post logging fire is to be kept out of the area reserved from logging for the protection of Koala habitat.

Monitoring:

Koala monitoring will be conducted as part of the general monitoring procedures planned by State Forests. Compartment monitoring may be advantageous to Districts for future planning in areas that have positive Koala records and prior management.

At the initial stage the state wide monitoring of Koala populations will require a comprehensive compilation of the location and extent of high use areas. The monitoring program will be designed to give information on the effectiveness of these prescriptions in meeting their objectives.

The survey methodology for detecting Koalas and determining high use areas (contained in these prescriptions) may be reviewed in the light of findings from the monitoring program.

Reporting:

"Hard copy" of all survey results (including Amendments to Harvesting Plans) will be archived by the District on the compartment history. All Koala sightings will be incorporated into SFNSW database with subsequent prompt transfer to NPWS. Survey records (including Amendments to Harvesting Plans) will be reported in the same manner.

Maps will accompany survey results in relevant communications in either digital format (GIS) or as a clear paper copy. This will include the actual transect route taken, accurately recorded on a map. The locality of relevant Koala or Koala sign (including that of relevant adjacent areas) will be recorded on the same map. (Positive and negative results are both important.)

OR

USE THE PRESCRIPTION BELOW FOR FOREST TYPES NOT COVERED BY COASTAL KOALA PRESCRIPTION IN EVERY MANAGEMENT AREA EXCEPT GLOUCESTER-(SEE SEPARATE PRESCRIPTION FOLLOWING FOR THIS MA)

Koala Prescription B: for Forest Types not covered by the coastal Koala prescription Definitions:

Koala food trees: trees that are leafy, with broad crowns and represent the range of sizes greater than 40 cm dbhob present and be selected in the first instance with preference to: Tallowwood *Eucalyptus microcorys*, Small-fruited Grey Gum *E. propinqua*, Grey Gums *E. biturbinata*, and *E. punctata*, Large-fruited Grey Gum *E. coraliculata*, Forest Red Gum *E. tereticornis* and Sydney Blue Gum *E. saligna*. Should these species not be present in adequate

numbers food trees should then be selected from the following species: Blackbutt *E. pilularis,* Flooded Gum *E. grandis,* White Mahogany *E. acmenoides* and Red Mahogany *E. resinifera.*

In the Gloucester Management Area Koala food trees are: trees that are leafy, with broad crowns and represent the range of sizes greater than 40 cm dbhob present and be selected with preference to: Manna Gum *Eucalyptus viminalis*, Messmate *E. obliqua*, Snow Gum *E. pauciflora*, Mountain Gum *E. dalrympleana*, Sydney Blue Gum *E. saligna* and New England Blackbutt *E. andrewsii*.

Regular Koala activity: is indicated by the presence of Koala pellets beneath trees or by characteristic scratch claw marks on the trunks of trees.

Prescription:

Where there is a record of koala or signs of koala in the compartment or within 100 metres of the compartment boundary the following presciptions will apply

a) forestry operations will be excluded within 100 metres of the record until the assessment is completed. The assessment is to use the modified asterisk method to determine the extent of habitat use and preferred food trees within a 100 metre radius of the original record;

b) If the results of the assessment find no futher evidence of Koala then a minimum of five Koala food trees must be retained within 100 metres of the original record. These trees must be marked for retention;

c) If the results of the assessment show regular Koala activity, but less than 20% of trees examined have Koala pellets and no further Koalas are observed then:

i) all trees with evidence of regular koala activity shall be retained;

ii) a minimum of 15 koala food trees per hectare must be retained within 100 metres of the orginal record referred to in a);

iii) if the density of Koala food trees does not permit the above specified numebr of trees to be retained all existing Koala food trees must be retained; and

iv) all trees to be retained in i,ii and iii above must be marked for retention. These trees can be counted as retained habitat trees (hollow bearing, recruit or others).

d) If regular koala activity is detected and more than one Koala is observed or more than 20% of trees examined have Koala pellets or both, forestry operations must be excluded from within 100 metres of the original record referred to in a) and the Manager, Threatened Species, Northern Zone must be notified.

Squirrel Glider Petaurus norfolcensis

Where there is a Squirrel Glider record (ie. observation, call detection site, den site, incised tree or chew ball tree) in a compartment or within 400 metres of the compartment boundary, the following must apply:

- a) For each record, an eight hectare exclusion zone, which encompasses the Squirrel Glider record, must be established. This eight hectare exclusion zone must maximise inclusion of CRA predicted Squirrel Glider habitat, where available. In the absence of CRA predicted habitat the exclusion zone should cover gully, midslope and ridgetop areas.
- b) When ten of these areas, separated by two kilometres or more, are retained over a two year period in any one SFNSW Management Area, SFNSW may apply to the NPWS for a review of this prescription.

Yellow-bellied Glider Petaurus australis

Where there is a Yellow-bellied Glider record (observation, call detection site, den site, incised tree or chew balls beneath a tree) in a compartment or within 750 metres of the compartment boundary, the following must apply:

- a) A 50 hectare exclusion zone must be established within a 750 metre radius planning area centred around the record or records.
- b) Exclusion zones must encompass known den sites and incised trees, and must maximise the inclusion of other records.
- c) The exclusion zone must encompass the highest category habitat available in the planning area. Habitat categories are ranked as follows (from highest to lowest):

Category 1: CRA predicted habitat quality class 1;

Category 2: CRA predicted habitat quality class 2;

Category 3: identified Old Growth Forest (identified OG need not pass any disturbance test, such as stump counts.);

Category 4: CRA predicted habitat quality class 3; then

Category 5: any other areas of suitable habitat.

- d) CRA predicted habitat and identified Old Growth Forest occurring in existing statutory reserves within the 750 metre radius may be used to meet the exclusion zone requirements, where it is consistent with the requirements of section c) above.
- e) Exclusion areas must aim to minimise the boundary to area ratio; long linear strips of habitat must not be counted towards meeting the requirements of this prescription.
- g) Where there is more than one record of Yellow-bellied Glider within 750 metres of each other then they can be treated as one record. The location of the 750 metre radius planning area must be centred around the records.
- h) Where there is a number of records consecutively less than 750 metres apart but collectively spreading over an area greater than 750 metres in any direction then advice on the application of the prescription must be sought from the NPWS.
- i) If a record is on private property within 750 metres of state forest, then the equivalent of a 750 metre radius planning area must be located on crown land.

Prescription 19B. Threatened Non-flying Mammal Site -specific Management

Broad-toothed Rat Mastacomys fuscus

If a record of Broad-toothed Rat is found during the desktop review component of the Prelogging and Pre-roading Surveys, the following must apply:

- a) The NPWS must be notified within 48 hours of finding the record to develop an appropriate site-specific prescription.
- b) Specified forestry activities must not commence in the compartment until a sitespecific prescription has been developed and a licence variation issued.

If a Broad-toothed Rat is recorded during the carrying out of specified forestry activities in a compartment, or within 500 metres of the compartment boundary, the following must apply:

- a) Specified forestry activities must immediately cease within the compartment.
- b) The NPWS must be notified within 24 hours of the record being made in order to develop an appropriate site-specific prescription.

c) Specified forestry activities must not re-commence in the compartment until a sitespecific prescription has been developed and a licence variation issued.

Prescription 20. Threatened Bat Species-specific Management

Hoary Wattled BatChalinolobus nigrogriseusEastern False PipistrelleFalsistrellus tasmaniensisBeccari's Freetail-batMormopterus beccariiEastern Freetail-batMormopterus norfolkensisLarge-footed MyotisMyotis adversusEastern Long-eared BatNyctophilus bifaxGreater Long-eared BatNyctophilus timoriensisYellow-bellied Sheathtail-batScoteanax rueppellii

Where there is a record of any of these species in a compartment or within five kilometres of the compartment boundary, the following must apply:

- a) Likely multiple microchiropteran bat roost trees must be inspected prior to operations commencing within 100 metres of such trees. Likely roost trees are stags greater than 30 cm dbh, large trees with accessible base hollows, or hollow-bearing trees.
- b) If roosts are located (either visually or by distinctive scent) an exclusion zone of at least 50 metre radius must be established around the tree:
- c) Subject to the statutory requirements under the *Rural Fires Act* 1997, hazard reduction work should not be conducted in exclusion zones established in b) above. Hazard reduction work should plan for no more than 50% coverage of the net logging area.

Large-eared Pied Bat Chalinolobus dwyeri

Eastern Cave Bat Vespadelus troughtoni

Where there is a record or roost of *Chalinolobus dwyeri* or *Vespadelus troughtoni* or both in a compartment, or within five kilometres of the compartment boundary, the following must apply:

- a) An exclusion zone of at least 50 metre radius must be established around roost sites of *Chalinolobus dwyeri* or *Vespadelus troughtoni* or both.
- b) Within 50 and 100 metres of roost sites, a buffer zone must be established. Within this buffer zone the following must apply:
- i. No group selection silviculture can be conducted;
- ii. There must be a minimum 50% canopy retention.
- c) Subject to the statutory requirements under the *Rural Fires Act* 1997, hazard reduction work should not be conducted in exclusion zones and buffer zones established in a) and b) above. Hazard reduction work should plan for no more than 50% coverage of the net logging area.

Gold-tipped Bat Kerivoula papuensis

Where there is a record of *Kerivoula papuensis* within a compartment or within 500 metres of the compartment boundary, the following must apply:

- a) An exclusion zone must be established which encompasses all CRA predicted habitat that occurs within 40 metres of either side of the stream closest to the record. The exclusion zone must be a minimum one kilometre in length and, where possible, be centred on the record.
- b) Little Bentwing-bat Miniopterus australis

Common Bentwing-bat Miniopterus schreibersii

Management of records:

Where there is a record of *Miniopterus australis* or *Miniopterus schreibersii* or both in a compartment, or within five kilometres of the compartment boundary, the following must apply:

a) Subject to the statutory requirements under the *Rural Fires Act* 1997, hazard reduction work should plan for no more than 50% coverage of the net logging area.

Management of non-maternity roost sites:

The following must apply to all *Miniopterus australis* or *Miniopterus shreibersii* or both nonmaternity roost sites:

- a) An exclusion zone of at least 100 metres radius must be established around the entrance to the roost.
- b) Notwithstanding a), within 15 kilometres of the roost, a buffer zone must be established which encompasses at least 25% of CRA predicted habitat (Class 1, 2 and 3) on public lands within this area. The buffer zone must encompass the highest category habitat available in the planning area. Habitat categories are ranked as follows (from highest to lowest):

Category 1: CRA class 1 predicted habitat;

Category 2: CRA class 2 predicted habitat;

Category 3: CRA class 3 predicted habitat; and then

- c) Within the buffer zone established in b) the following must apply:
 - i. Timber felling must not be conducted;
 - ii. Log dumps and snig tracks must not be constructed;
 - iii. Subject to the statutory requirements under the *Rural Fires Act* 1997, hazard reduction work should not be conducted.
- d) CRA predicted habitat occurring in existing statutory reserves within the 15 kilometre radius may be used to meet the buffer zone requirements, where it is consistent with the requirements of section b) above.
- e) Buffer zone areas must aim to minimise the boundary to area ratio.
- h) Where there is more than one roost within the 15 kilometre radius planning area, then advice on the application of the prescription must be sought from the NPWS.
- i) Where 10 non-maternity roost sites separated by two kilometres or more are accumulated within a two year period within a SFNSW Management Area, SFNSW can apply to the NPWS for a review of this prescription.

Management of maternity roost sites:

- a) For all known maternity roosts of *Miniopterus australis* or *Miniopterus schreibersii* or both a joint NPWS / SFNSW Management Plan must be prepared and implemented by December 1999. There is currently one such site known within UNE and LNE.
- b) If other maternity roosts of *Miniopterus australis* or *Miniopterus schreibersii* or both are located within state forest, all specified forestry operations must cease within one kilometre of the roost and NPWS must be notified within 24 hours.

Large-footed Myotis Myotis adversus

Where there is a record or roost of *Myotis adversus* in a compartment, or 500 metres of the compartment boundary, the following must apply:

- a) Exclusion zones at least 40 metres wide must be established on both sides of permanent water bodies and third and higher order streams closest to the record. The exclusion zone must be a minimum one kilometre in length and, where possible, be centred on the record.
- b) An exclusion zone of at least 50 metre radius must be established around roost sites of *Myotis adversus*.
- c) Subject to the statutory requirements under the *Rural Fires Act* 1997, hazard reduction work should not be conducted in exclusion zones and buffer zones established in a) and b) above. Hazard reduction work should plan for no more than 50% coverage of the net logging area.

Black Flying-fox Pteropus alecto

- a) If a flying-fox roosting camp is detected during pre-harvest inspections, specified forestry activities must be excluded from the full extent of the roosting camp.
- b) Where the roosting camp contains Black Flying-fox an exclusion zone at least 50 metres wide must be established around the roosting camp.

Common Blossom Bat Syconycteris australis

In areas of Syconycteris australis CRA predicted habitat the following must apply:

a) All mature *Banksia integrifolia*, *Melaleuca quinquenervia*, *Grevillea robusta* and *Callistemon viminalis* must be protected from damage by specified forestry activities. Trees must not be felled onto any of these species.

Prescription 21A. Threatened Flora Management: all individuals

Where there is a record of any of the species listed in Table 1 or Table 2 below within the compartment or within 20 metres of the compartment boundary, the following must apply:

a) An exclusion zone of at least 20 metres radius must be established around all records of individuals or populations of the species.

Table 1: Threatened plants to which this prescription must be applied that are known to occur, or considered likely to occur, in areas subject to timber harvesting.

Acacia pubescens	Leucopogon confertus
Bothriochloa biloba	Lindsaea brachypoda
Callitris baileyi	Marsdenia longiloba
Corchorus cunninghamii	Melichrus hirsutus
Cryptostylis hunteriana	Monotaxis macrophylla
Cyperus aquatilis	Olearia cordata
Dendrocnide moroides	Phebalium glandulosum subsp. eglandulosum
Diuris pedunculata	Picris evae
Eucalyptus glaucina - Southern Metapopulation Unit	Pomaderris brunnea
Eucalyptus pumila	Pomaderris queenslandica
Eucalyptus rubida subsp. barbigerorum	Pterostylis cucullata
Grevillea guthrieana - Booral Metapopulation.	Pterostylis gibbosa
Grevillea masonii	Rutidosis heterogama - Inland Metapopulation
Grevillea mollis	Senna acclinis
Hedyotis galioides	Triplarina imbricata
Hibbertia procumbens	Tylophora linearis
Hicksbeachia pinnatifolia - Southern	Zieria lasiocaulis
Metapopulation Unit	

Acacia acrionastes	Drynaria rigidula
Acacia macnuttiana	Eucalyptus approximans
Acacia pubifolia	Eucalyptus nicholii
Acacia pycnostachya	Eucalyptus parramattensis subsp. decadens
Allocasuarina simulans	Gaultheria viridicarpa subsp. merinoensis
Arthraxon hispidus	Gaultheria viridicarpa subsp. viridicarpa
Baeckea sp. Pyramids	Gingidia montana
Bertya ingramii	Homoranthus lunatus
Blumea lacera	Isoglossa eranthemoides
Boronia granitica	Knoxia sumatrensis
Boronia repanda	Pseudanthus ovalifolius
Caesia parviflora var. minor	Rutidosis heterogama - Coastal Metapopulation
	Unit
Diuris venosa	Wahlenbergia scopulicola

Table 2: Threatened plants to which this prescription must be applied that are not currently known, or not considered likely to occur, in areas subject to timber harvesting.

Prescription 21B. Threatened Flora Management: all individuals

Where there is a record of any of the species listed in Table 3 or Table 4 below within the compartment or within 50 metres of the compartment boundary, the following must apply:

a) An exclusion zone of at least 50 metres radius must be established around all records of individuals or populations of the species.

Table 3: Threatened plants to which this prescription must be applied that are known to occur, or considered likely to occur, in areas subject to timber harvesting.

Asperula asthenes	Pimelea venosa
Elaeocarpus sp Rocky Creek (syn. E. sp minyon)	Prostanthera askania
Eucalyptus camphora subsp. relicta	Prostanthera sp. Somersby
Grevillea obtusiflora	Sophora fraseri
Lindsaea fraseri	Tylophora woollsii
Lindsaea incisa	Uromyrtus australis
Melichrus sp. Gibberagee	

Table 4: Threatened plants to which this prescription must be applied that are not currently known to occur, or not considered likely to occur, in areas subject to timber harvesting.

Acalypha eremorum	Floydia praealta
Acronychia littoralis	Fontainea oraria
Aldrovanda vesiculosa	Geijera paniculata
Almaleea cambagei	Gentiana wissmannii
Amorphospermum whitei - Northern	Hypolepis elegans
Metapopulation Unit	
Amyema scandens	Lepidium hyssopifolium
Angiopteris evecta	Lepidium peregrinum
Apatophyllum constablei	Macadamia tetraphylla
Arthropteris palisotii	Micromelum minutum
Austromyrtus fragrantissima	Muellerina myrtifolia
Baloghia marmorata	Myriophyllum implicatum
Bertya sp. A Cobar-Coolabah	Neoastelia spectabilis
Bosistoa selwynii	Ochrosia moorei
Bosistoa transversa	Olax angulata
Bulbophyllum globuliforme	Owenia cepiodora
Cadellia pentastylis	Persicaria elatior
Cheilanthes sieberi subsp. pseudovellea	Phaius australis
Choricarpia subargentea	Phaius tankervilliae
Corynocarpus rupestris subsp. rupestris	Plectranthus alloplectus

Cryptocarya foetida	Prostanthera. sp. Bundjalung
Davidsonia pruriens var. jerseyana	Psilotum complanatum
Davidsonia sp. A Mullumbimby Currumbin Creek	Randia moorei
Diospyros mabacea	Rapanea sp. A Richmond River
Diospyros major var. ebenus	Sarcochilus fitzgeraldii
Diploglottis campbellii	Sarcochilus hartmannii
Elaeocarpus williamsianus	Sauropus albiflorus subsp. microcladus
Eleocharis tetraquetra	Syzygium paniculatum
Endiandra floydii	Syzygium hodgkinsoniae
Endiandra hayesii	Syzygium moorei
Endiandra muelleri subsp. bracteata	Tarenna cameronii
Eucalyptus pachycalyx subsp. banyabba	Tasmannia glaucifolia - Northern Metapopulation Unit
Euphrasia arguta	Tinospora tinosporoides
Euphrasia bella	Zieria floydii
Euphrasia collina subsp. muelleri	Zieria prostrata
Euphrasia sp. Tamworth	-

Prescription 22A. Threatened Flora Management: 90% of individuals

Where there is a record of any of the species listed in Table 5 or Table 6 below within the compartment the following must apply:

- a) Where there are few individuals within the compartment and the individuals are widely dispersed within the compartment, 90% of individuals must be protected from specified forestry activities.
- b) Where there are a large number of individuals within the compartment and they have a clumped distribution such that protecting individual plants would be operationally difficult, 90% of the population must be protected from specified forestry activities. For the purpose of this prescription the population within the compartment is considered to be the mapped distribution of the relevant plant species within the compartment.

Table 5: Threatened plants to which this prescription must be applied that are known to occur, or considered likely to occur, in areas subject to timber harvesting.

Calophanoides hygrophiloides Eucalyptus glaucina - Northern Metapopulation Unit Eucalyptus tetrapleura Goodenia macbarronii Grevillea rhizomatosa Hibbertia hexandra - Northern Metapopulation Unit Olearia flocktoniae Pultanaea campbellii Tasmannia purpurascens

Table 6: Threatened plants to which this prescription must be applied that are not currently known, or not considered likely to occur, in areas subject to timber harvesting.

Desmodium acanthocladum

Prescription 22B. Threatened Flora Management: 90% of individuals

Where there is a record of any of the species listed in Table 7 or Table 8 within the compartment or within 20 metres of the compartment boundary, the following must apply:

a) Where there are few individuals within the compartment and the individuals are widely dispersed within the compartment, an exclusion zone of at least 20 metres radius must be established around at least 90% of individuals.

b) Where there are a large number of individuals within the compartment and they have a clumped distribution such that protecting individual plants would be operationally difficult, an exclusion zone of at least 20 metres radius must be established around 90% of the population. For the purpose of this prescription the population within the compartment is considered to be the mapped distribution of the relevant plant species within the compartment.

Table 7: Threatened plants to which this prescription must be applied that are known to occur, or considered likely to occur, in areas subject to timber harvesting.

Acacia bynoeana	Hibbertia hexandra - Southern Metapopulation Unit
Acacia courtii	Leptospermum deanei
Asterolasia elegans	Macrozamia johnsonii
Boronia umbellata	Plectranthus nitidus
Callitris oblonga	Polygala linariifolia
Cynanchum elegans	Prostanthera densa
Dichanthium setosum	Pterostylis nigricans
Eucalyptus mckieana	Quassia sp. Moonee Creek
Grevillea parviflora ssp. parviflora	Styphelia perileuca
Grevillea banyabba	Tasmannia glaucifolia - Southern Metapopulation
	Unit
Grevillea guthrieana - Carrai Metapopulation	Tetratheca glandulosa
Grevillea scortechinii subsp. sarmentosa	Tetratheca juncea
Hakea fraseri	Tinospora smilacina
Hakea trineura	Zieria involucrata

Table 8: Threatened plants to which this prescription must be applied that are not currently known to occur, or not considered likely to occur, in areas subject to timber harvesting.

Acacia flocktoniae	Grevillea evansiana
Allocasuarina defungens	Grevillea shiressii
Corokia whiteana - Coastal Sands Metapopulation Unit	Haloragis exalata subsp. velutina
Corokia whiteana - Metasediments Metapopulation Unit	Homoranthus prolixus
Darwinia biflora	Kunzea rupestris
Diuris praecox	Lasiopetalum longistamineum
Eriostemon ericifolius	Prostanthera staurophylla
Eucalyptus caleyi subsp. ovendenii	Thesium australe
Eucalyptus camfieldii	Velleia perfoliata
Grevillea beadleana	

Prescription 22C. Threatened Flora Management 90% of individuals

Where there is a record of any of the species listed in Table 9 or Table 10 within the compartment or within 50 metres of the compartment boundary, the following must apply:

- a) Where there are few individuals within the compartment and the individuals are widely dispersed within the compartment, an exclusion zone of at least 50 metres radius must be established around at least 90% of individuals.
- b) Where there are a large number of individuals within the compartment and they have a clumped distribution such that protecting individual plants would be operationally difficult, an exclusion zone of at least 50 metres radius must be established around 90% of the population. For the purpose of this prescription the population within the compartment is considered to be the mapped distribution of the relevant plant species within the compartment.

Table 9: Threatened plants to which this prescription must be applied that are known to occur, or considered likely to occur, in areas subject to timber harvesting.

Hicksbeachia pinnatifolia - Northern Metapopulation Unit

Table 10: Threatened plants to which this prescription must be applied that are not currently known to occur, or not considered likely to occur, in areas subject to timber harvesting.

Fontainea australis Sarcochilus weinthalii Symplocos baeuerlenii

Prescription 23. Threatened Flora Management: monitoring

Where there is a record of any of the species listed in Table 11 or Table 12 within the compartment, the following must apply:

- a) SFNSW must prepare a monitoring program for the species with the objective of assessing the response of the species to disturbances associated with specified forestry activities.
- b) The monitoring program must be approved in writing by the NPWS prior to its implementation and prior to the commencement of specified forestry activities in the compartment.

Table 11: Threatened plants to which this prescription must be applied that are known to occur, or considered likely to occur, in areas subject to timber harvesting.

Acacia ruppii Amorphospermum whitei - Southern Metapopulation Unit Angophora robur Grevillea quadricauda Hibbertia marginata Parsonsia dorrigoensis Pultenaea stuartiana

Table 12: Threatened plants to which this prescription must be applied that are not currently known to occur, or are considered not likely to occur, in areas subject to timber harvesting.

Clematis fawcettii Grammitis stenophylla Melaleuca groveana

Prescription 24. Threatened Flora Alternative Prescription

- a) As an alternative to applying Threatened Flora Prescriptions 21 or 22, SFNSW may choose to develop a Species Management Plan. Species Management Plans are to apply to a single species, however multiple species plans may be appropriate where species co-occur.
- b) Species Management Plans are to apply to areas generally larger than a single compartment and generally smaller than a State Forest in extent.
- c) Species Management Plans are aimed at individual taxa or groups of taxa where it is considered that they can be more appropriately managed by specific measures not included in prescriptions 21 or 22.
- d) Species Management Plans must be based on a comprehensive survey of potential habitat within the planning area. Species management plans must document the species distribution and abundance in the planning area.
- e) Species Management Plans must clearly document management measures to be undertaken. Such measures may include modification to timber harvesting practices, control of specified burning or grazing regimes, measures to mitigate weed invasion,

weed control measures or reservation of forest types or species habitat from specified forestry activities.

- f) Species Management Plans must include a monitoring program that determines the effect of specified forestry activities on the species and assesses the effectiveness of the management measures in providing for the species conservation.
- g) Species Management Plans must be prepared in consultation with, and approved in writing by the NPWS. The implementation of species management plans will form a condition of a licence variation.
- h) The Species Management Plan must be approved in writing by the NPWS prior to its implementation and prior to the commencement of specified forestry activities in the compartment.

ATTACHMENT 1: Worked example of the large forest owl Landscape Prescription

Step 1. Delineate a Planning Area of approximately 10,000 hectares +/- 50% (ie. 5,000 to 15,000).

A Planning Area of 10,000 hectares has been delineated.

Step 2. A permanent exclusion zone encompassing a minimum of 25% of the Planning Area must be established using the following rules.

Based on a 10,000 hectare planning area, a permanent exclusion zone of 2,500 hectares must be established.

- i. Of the retained 25% of the Planning Area:
 - 45% (or 11.25% of the Planning Area) must be Powerful Owl habitat,
 - 45% (or 11.25% of the Planning Area) must be Masked Owl habitat, and
 - 10% (or 2.5% of the Planning Area) must be Barking Owl habitat.

Of the retained 2,500 hectares:

- 1,125 hectares must be Powerful Owl habitat,
- 1,125 hectares must be Masked Owl habitat, and
- 250 hectares must be Barking Owl habitat.
- ii. Exclusion areas for each species must be selected on the basis of the proportion of each predicted habitat Class for each species occurring in the Planning Area (this excludes areas not identified as predicted habitat).

Owl species	CRA modelled habitat class	Area of CRA modelled habitat in Planning Area	Proportion of each habitat class to be in exclusion zone	Area of each habitat class to be in exclusion zone
Powerful Owl	class 1	2,000 ha	22% ¹	247 ha ²
	class 2	4,000 ha	44%	495 ha
	class 3	3,000 ha	34%	382 ha
	total	9,000 ha		
Masked Owl	class 1	2,000 ha	31%	349 ha
	class 2	3,000 ha	46%	517 ha
	class 3	1,500 ha	23%	259 ha
	total	6,500 ha		
Barking Owl	class 1	500 ha	50%	125 ha
	class 2	500 ha	50%	125 ha
	total	1,000 a		

 1 2,000 / 9,000 x 100 = 22

 2 0.22 x 1,125 = 247

Where there are no Barking Owl records or CRA predicted habitat in the Planning Area, 50% must be Powerful Owl habitat and 50% must be Masked Owl habitat.

Summary table of the revised Conservation Protocols, as expressed as licence conditions.

This table documents the changes made to the Conservation Protocols for the purpose of facilitating any amendments to the net harvesting project.

As a general rule this table documents those elements of the conservation protocols, as expressed as licence conditions, that have the potential to impact upon timber volume such as exclusion zones, buffers, habitat retention, retention of trees etc. Management elements of prescriptions are generally not documented here or are given superficial coverage. Refer to the revised set of prescriptions for the detail.

The table has 4 columns:

Column 1 **modifications** indicates which prescriptions have been "changed", "no change", or "new".

Column 2 **existing conservation protocol prescription** briefly documents the existing prescription focusing on those elements that potentially impact on volume. Column 3 **new conservation protocol prescription** briefly documents the new prescription usually where there has been a change. Bold text indicates sections changed.

Column 4 additional comments provide further explanation to the changes.

General changes to the wording of prescriptions: previously prescriptions applied "buffers" to features, with specified forestry activities excluded from the buffer. To avoid confusion the term exclusion zone is now used to indicate those areas where specified forestry activities are excluded and the term buffer is used to indicate that the area is subject to modified harvesting e.g. machinery excluded or group selection not permitted. As a general rule where the term buffer was previously used it is now exclusion zone, except where in the new prescriptions it is specified as a modified harvesting buffer.

The format of the revised Conservation Protocols has been substantially changed. The order in which the prescriptions appear follows the existing licence conditions. The revised prescription appears adjacent to the existing prescription but not in the order of the proposed licence condition. The prescription number is provided so as to facilitate the reading of the licence.

modifications	existing	new conservation	additional comments
	conservation	protocol	
	protocol	prescription	
	prescription	(sections in bold type	
		indicate changes)	
	1. tree retention	5. tree retention	recognized that the
	regrowth zone		regrowth/non regrowth
changed	• up to 10 hollow	• largest trees to be	zones appear artificial
	bearing trees per 2	selected	given the outputs of
no change	ha where		CRAFTI growth staging.
	available.		Recommend doing away
	(selected from		with regrowth/non
	largest 30% of		regrowth zones and
changed	stand)		possibly have separate
	• one recruit tree for	• largest trees to be	patches of even aged
	every hollow	selected	regrowth vs mixed aged
no change	bearing tree		structure forest to apply
	retained. (selected		the different tree
changed	from mature and		retention prescriptions.
	intermediate		
	growth stages)	dead stags must be	
	non-regrowth zone	retained where they	
	• 10 hollow bearing	occur in areas outside	
	trees per 2 ha,	the net logging area.	
	where there is not	Up to 10 dead stags	
	10/2 ha then select	must be retained	
	additional trees	per 2 ha where they	
	from trees with	occur in the net	
	diameters in top	logging area.	
	30% of stand		
	• 10- recruit trees		
	per 2 ha, (selected		
	from mature and		
	intermediate		
	growth stages)		
	dead stags must be		
	retained where they		
	occur in areas outside		
	the net harvest area		D 1111
	2. Significant food	5. t significant food	Prescription added to
no change	resources	resources	tree retention
	• stands of		prescription.
ah an1	allocasuarina		spp listed sign.
changed	should be	. 10.4	nowering eucs:
no ohongo	protected,	• 10 trees per 2 ha	ann auguann mahagana
no change	intensively used	must be retained,	spp., swamp manogany,
changed	allocasuarina (>30	comprising spp.	bloodwood ann hav
changed	crusned cones)	listed in notes	spp. spotted gum spp.
	nust be protected.		spp, spoueu guin spp.,
	• at least 4 winter	• Vollow hall:	gum needle bark
	nowering	• Yellow bellied	stringy Typdala stringy
	eucarypts per 2 ha	Glider and	sumgy, i yndaie sumgy,

This table is only a summary of changes and must be read in conjunction with the revised licence document to ensure all details of the prescriptions are understood.

modifications	existing	new conservation	additional comments
mounications	cansemustion	new conservation	additional comments
	conservation		
	protocol	prescription	
	prescription	(sections in bold type	
		indicate changes)	
		Squirrel Glider	red stringy, dry coastal
	• damage to mature	feed trees. Feed	blackbutt.
	banksia and	tree indicated by	
	Xanthorrhoea	notches in bark or	
	should be avoided	chew balls at	
	• vellow bellied	base	
	glider feed trees		
	glider feed trees		
	(v-noten) must be		
	retained		
	3. Riparian buffers	6. riparian exclusion	
no change	• 10 metre buffers	zones	
no change	on 1st order		
no change	streams		
-	• 20 metre buffer on		
	2nd order streams		
	• 10 metre buffer on		
	80% of third or		
	80% Of tille of		
	nigher order		
	streams, the		
	remaining 20% of		
	these streams gets		
	20 metre buffer.		
	4. Connection	7. ridge and	changed feature title
no change	corridors	headwater habitat	from connection
	for every 500 ha of	corridors	corridors to ridge and
	state forest there must		headwater habitat
	be either 2 x 40 metre		corridors.
	wide corridors, or 1 x		
	80 metre wide		
	corridors Corridors		
	must connect		
	strooms		
	5 Wether dr	0 1	
	5. wetlands	8. wetlands	wetland definition
		specified forestry	changed to include forest
		activities must be	types: 30, 31, 32, 33,
no change	• 10 meature hauffan	avaluded from all	001 1005
	• 10 metre buller	excluded from an	231, and 235.
	• 10 metre buller wetlands from 0.1	wetlands regardless	introduced three size
changed	• 10 metre buller wetlands from 0.1 to < 0.5 ha	wetlands regardless of size.	231, and 235. introduced three size classes for application of
changed	• To metre buller wetlands from 0.1 to < 0.5 ha	wetlands regardlessof size.10 metre	231, and 235. introduced three size classes for application of exclusion zones 10m:
changed	 10 metre buller wetlands from 0.1 to < 0.5 ha 40 metre buffer 	 excluded from an wetlands regardless of size. 10 metre exclusion zones 	231, and 235. introduced three size classes for application of exclusion zones 10m: 0.1-0.5 ha, 20 m: 0.6-
changed	 10 metre buller wetlands from 0.1 to < 0.5 ha 40 metre buffer wetlands >0.5 ha 	 excluded from an wetlands regardless of size. 10 metre exclusion zones on wetlands 0.1 ha 	231, and 235. introduced three size classes for application of exclusion zones 10m: 0.1-0.5 ha, 20 m: 0.6- 2.0 ha and 40m: >2.0 ha
changed	 10 metre buller wetlands from 0.1 to < 0.5 ha 40 metre buffer wetlands >0.5 ha and all SEPP 14 	 excluded from an wetlands regardless of size. 10 metre exclusion zones on wetlands 0.1 ha to 0.5 ha 	231, and 235. introduced three size classes for application of exclusion zones 10m: 0.1-0.5 ha, 20 m: 0.6- 2.0 ha and 40m: >2.0 ha
changed	 10 metre buller wetlands from 0.1 to < 0.5 ha 40 metre buffer wetlands >0.5 ha and all SEPP 14 wetlands 	 excluded from an wetlands regardless of size. 10 metre exclusion zones on wetlands 0.1 ha to 0.5 ha 20 metre 	231, and 235. introduced three size classes for application of exclusion zones 10m: 0.1-0.5 ha, 20 m: 0.6- 2.0 ha and 40m: >2.0 ha
changed	 10 metre buller wetlands from 0.1 to < 0.5 ha 40 metre buffer wetlands >0.5 ha and all SEPP 14 wetlands 	 excluded from an wetlands regardless of size. 10 metre exclusion zones on wetlands 0.1 ha to 0.5 ha 20 metre exclusion zones 	231, and 235. introduced three size classes for application of exclusion zones 10m: 0.1-0.5 ha, 20 m: 0.6- 2.0 ha and 40m: >2.0 ha
changed	 10 metre buller wetlands from 0.1 to < 0.5 ha 40 metre buffer wetlands >0.5 ha and all SEPP 14 wetlands 	 excluded from an wetlands regardless of size. 10 metre exclusion zones on wetlands 0.1 ha to 0.5 ha 20 metre exclusion zones on wetlands 0.6 	231, and 235. introduced three size classes for application of exclusion zones 10m: 0.1-0.5 ha, 20 m: 0.6- 2.0 ha and 40m: >2.0 ha
changed	 10 metre buller wetlands from 0.1 to < 0.5 ha 40 metre buffer wetlands >0.5 ha and all SEPP 14 wetlands 	 excluded from an wetlands regardless of size. 10 metre exclusion zones on wetlands 0.1 ha to 0.5 ha 20 metre exclusion zones on wetlands 0.6 ha to 2.0 hs 	231, and 235. introduced three size classes for application of exclusion zones 10m: 0.1-0.5 ha, 20 m: 0.6- 2.0 ha and 40m: >2.0 ha
changed	 10 metre buller wetlands from 0.1 to < 0.5 ha 40 metre buffer wetlands >0.5 ha and all SEPP 14 wetlands 	 excluded from an wetlands regardless of size. 10 metre exclusion zones on wetlands 0.1 ha to 0.5 ha 20 metre exclusion zones on wetlands 0.6 ha to 2.0 ha 	231, and 235. introduced three size classes for application of exclusion zones 10m: 0.1-0.5 ha, 20 m: 0.6- 2.0 ha and 40m: >2.0 ha
changed	 10 metre buller wetlands from 0.1 to < 0.5 ha 40 metre buffer wetlands >0.5 ha and all SEPP 14 wetlands 	 excluded from an wetlands regardless of size. 10 metre exclusion zones on wetlands 0.1 ha to 0.5 ha 20 metre exclusion zones on wetlands 0.6 ha to 2.0 ha 40 metre 	231, and 235. introduced three size classes for application of exclusion zones 10m: 0.1-0.5 ha, 20 m: 0.6- 2.0 ha and 40m: >2.0 ha
changed	 10 metre buller wetlands from 0.1 to < 0.5 ha 40 metre buffer wetlands >0.5 ha and all SEPP 14 wetlands 	 excluded from an wetlands regardless of size. 10 metre exclusion zones on wetlands 0.1 ha to 0.5 ha 20 metre exclusion zones on wetlands 0.6 ha to 2.0 ha 40 metre exclusion zones 	231, and 235. introduced three size classes for application of exclusion zones 10m: 0.1-0.5 ha, 20 m: 0.6- 2.0 ha and 40m: >2.0 ha

modifications	existing	new conservation	additional comments
mouncations	conservation	nrotocol	
	protocol	prescription	
	prescription	(sections in hold type	
	preseription	indicate changes)	
		ha	
	6 Heath	9 heath and scrub	Broadened definition to
	• 20 matra huffar on	9. ficalif and scrub	include scrub graminiod
ahangad	• 20 metre burier on	• 20 metre	heaths and includes
changeu			forest types 223, 224
	IIa A A A A A A A A A A A A A A A A A A A	on an neaths >0.2	rotionalized evolusion
	• 40 metre buffer on 1×0.51	na	zona to 20 matras
	neath > 0.5 na		zone to zo metres
			0.2 ha
	7 Dealey Outerang	10 Poola outerone	0.2 lid
ahangad	7. Rocky Outcrops	and aliffa	bloadened definition to
changed	• 20 metre buller		lines and forest type 224
	on rocky	• 20 metre	nnes and forest type 254
	outcrops 0.1 ha to	exclusion zone on	
	<0.5 ha	all rocky	zone to 20 metres
	• 40 metre buffer	outcrops and	regardless of size above
	on rocky	cliffs >0.1 ha	
	outcrops >0.5 ha	11. 0. 1	· · · ·
	8. Caves, tunnels	11. Caves, tunnels	Increased exclusion
changed	and disused	and disused	zone. Conditions for
	mine shafts	mineshafts	known roost sites dealt
	• All caves tunnels	• 100 metre	with in revised
	and disused mine	exclusion zone	prescription 20.
	shafts buffer 50	around all caves,	
changed	metres until	tunnels and	
	surveys	disused mine	
	demonstrate not	shafts. Where	
	occupied by	surveys	
	threatened bats.	demonstrate no	
	Where surveys	threatened bats	
	show not	then reduce	
	threatened bats	exclusion zone to	
	buffer reduced to	10 metres.	
	10 metres.		
	• Known maternity		
	sites buffered 50		
	metres, 50-100		
	metres maximum		
	50% canopy		
	reduction		
	allowed		
no change	9. Burning	13. Burning	the relationship between
			TSC Act and the Rural
			Fires Act unclear
	10. Prelogging	see prescription 1	conditions for the
	inspections		prelogging inspections
			(as opposed to pre-
			harvest surveys)
			incorporated into new
			prescription 1

modifications	existing	new conservation	additional comments
	conservation	protocol	
	protocol	prescription	
	prescription	(sections in bold type	
	r in ri	indicate changes)	
no change	11. Ground habitat	14. Ground habitat	
8-	protection	protection	
	13&14. Powerful	17A. Powerful.	prescription deals with
changed	and Masked and	Masked and Barking	Barking Owl, which has
8	Sooty Owl	Owl	only recently been listed
	• 300 ha within 2	• 300 ha with 2 km	as Vulnerable.
	kilometres of	of record. Areas	Retained habitat to be
changed	record of either	to be retained	identified using latest
e	Masked or	identified using	CRA models.
	Powerful Owl, or	CRA models.	Nest and roost sites must
		Retained areas	be included in areas of
		must include	retained habitat
	• apply landscape	roost and nest	
	approach	records, or	
changed	retaining	• apply landscape	
	minimum of 25%	approach retaining	
	of landscape,	a minimum of	
changed	with minimum	25% of planning	
	x% in State	area, with	
	Forest	minimum of 30%	
		in state forest,	
		areas to be	
		retained	
	• 30 metre buffer	identified using	
	around all roost	CRA models.	
	sites for Masked,	Retained areas	
	Powerful and	must include	
	Sooty Owls	roost and nest	
		records	
	• 50 metre buffer	 nest and roost 	
	around all nest	protection dealt	
	sites for Masked,	with new	
	Powerful and	prescription 12	
	Sooty Owls	detailed at end of	
		table	
1 1	15. Squirrel Glider	19A. Squirrel Glider	Feed trees identified and
changed	• Harvesting	(in addition to	protected
	excluded in 8 ha	protection of feed	using fatest CRA habitat
	around record of	urees (5))	to be retained
	Squirrel Glider	• 8 na exclusion	to be retained
		area around	
		CRA models	
	16. Yellow-bellied	19A Yellow-bellied	Retention of 50 ha
	Glider (in	Glider (in addition to	around records use of
changed	addition to	protection of feed	CRA models to identify
	protection feed	trees (5))	areas to be retained.
	trees (2)).	• 50 ha exclusion	The requirement to
	• Within 100	zones within 750	retain additional feed

modifications	existing	new conservation	additional comments
	conservation	protocol	
	protocol	prescription	
	prescription	(sections in bold type	
		indicate changes)	
	metres of feed	m of record.	trees in vicinity of v-
	trees and records	retained areas to	notch trees is removed.
	additional 15	be identified	
	trees must be	using CRA	
	retained	models, retained	
	• 50 metre buffer	areas to	
	around den sites	encompass den	
		sites and incised	
		trees.	
	17. Critical weight	18B. Critical weight	List of species
changed	range vertebrates	range vertebrates	considered CWRV
	• 20 metre	• 50 ha exclusion	reduced to medium to
na	machinery	zone within 500	large mammals: Black-
	exclusion zone	metres of record	striped Wallaby, Brush-
na	around all	of Brush-tailed	tailed Phascogale, Tiger
	category a & b	Phascogale	Quoll, Eastern Quoll,
no change	rainforest	• 200 metre	Rufous Bettong, Long-
	• 20 metre buffer	modified	nosed Potoroo, Parma
	around Bush	harvesting buffer	Wallaby, Red-legged
	Thick-knee nests	around all	Pademelon and Brush-
	• 10 metre buffer	records of Long-	tailed Rock Wallaby
changed	around Albert's	nosed Potoroo	Machinery buffer on
	Lyrebird nests	(light to	rainforest taken out of
	• Tiger Quoll: 12	moderate single	this section. Rainforest
	ha exclusion	tree selection	prescription provides for
	around maternity	(sts) only, no	butters on rainforest.
	den sites; 3.5 ha	heavy sts or	Prescriptions for ground
	exclusions	group selection	dwelling birds taken out
	around	allowed,	of CWRV prescription -
	permanent den	disturbance to	dealt with separately
	sites; 12 ha	ground	modified harvesting
	exclusion around	vegetation and	around Long footed
	latrine sites	understorey	Potoroo records.
	• Brush-tailed	minimised).	
	Phascogale 50 ha		
	within 3 km of		
	Phascogale		
	record.		
	18. Threatened	15A and B.	exclusion zones on
no change	irogs	Inreatened Frogs	streams within a circle
changed	• 10 metre butter	• 10 metre	on 200 m for M Heavi
	around all dams	exclusion around	and 500 m for M iteratus
ahangad	and ponds	ponds and dams	a bailous records
changed	• Mixophyes fleayi	• 40 metre	Philoria to protect
	40 metre wide	exclusion zones	hydrology of upper
	of stream 200	either side of all	catchments
	of stream 200	streams within	L gurea & bravinglmoto
	metre upstream	SUU metres of	L. aurea & Dievipannata

modifications	existing	new conservation	additional comments
mounications	conservation	protocol	
	protocol	protocol	
	protocol	(sections in hold type	
	prescription	indicate changes)	
	and down stream	records of M	changed zone to distance
ahangad	and down stream	floovi	from area
changed	of fecolu	11eayi	nom area.
	• Mixophyes	• 30 metre wide	
ahanaad	iteratus and	exclusion zones	
changed	balbus 30 metre	either side of 1st	
	wide buffer either	and 2nd order	
	side of 1st and	streams and 40	
changed	2nd order stream	metre wide either	
	200 metres	side of 3rd order	
	upstream and	and higher	
	down stream of	streams within	
	record; 40 metre	300 metres of	
	wide buffer either	records of M	
	side of 3rd order	iteratus and balbus	
	and higher		
	streams 200	 exclusion zones 	
	metres upstream	established on	
	and down stream	first order stream	
	of record.	catchments above	
	Philoria spp	or including	
	connection	records of	
	corridors placed	Philoria un to	
	to cover streams	20% of gross area	
	where Philoria	of compt	
	recorded other	50 motro	
	records of	• 50 metre	
	Dhilorio cot 50	exclusion zone	
	matra huffar	around waterbody	
		containing record	
	• Litoria aurea 5 ha	Litoria aurea	
	buffer around any	• 50 metre	
	waterbody where	exclusion zone	
	this species is	around waterbody	
	recorded	containing record	
	 Litoria 	Litoria	
	brevipalmata 5 ha	brevipalmata or	
	buffer around any	the record of L.	
	record of this	brevipalmata	
	species		
	19. Threatened	20. Threatened bats	rationalised tree roosting
no change	Bats	• 50 metre	microchiropteran bat
	• 50 metre buffer	exclusion zones	protection into one
changed	around Black	around Black	condition.
-	Flying Fox	Flying Fox camps	provide greater
	camps	microchiroptera	protection of roost sites.
	• for \hat{S} .	n bat roosts (increased length of
no change	flaviventris M	stags>30cm dhb	exclusion zones on
	beccarii M	large trees a with	streams for Myotis and
	norfolkensis S	accessible base	Kerivoula
changed	rueppellii C	hollows and	protection and

modifications	ovisting	now concorrection	additional commonts
mouncations	consorvation	new conservation	auunonai comments
		prescription	
	prescription	(sections in bold type	
		indicate changes)	
	nigrogriseus and	hollow bearing	management of
	F. tasmaniensis	trees) 50 m	Miniopterus maternity
	50 m buffer	exclusion zone	and non maternity sites
changed	around roosts of		requires special attention
	more than 3		
	individuals	• 50 metre	
	• N. bifax, N.	exclusion zone	
changed	timoriensis: 50 m	around roost sites	
	buffer around all	for C. dwyeri and	
	roosts	V. troughtoni,	
	• 50 metre buffer	modified	
changed	around	harvesting zone	
	subterranean	50-100 m (no	
	roosting sites for	group selection,	
	Chalinolobus	50% canopy	
	dwyeri and	retention)	
	Vespadelus	• 40 metre	
	troughtoni	exclusion zone of	
		modelled habitat	
	• 40 metre wide	either side of	
	buffer either side	stream closest to	
	stream 200	record of Golden	
	metre unstream	tipped bat zone to	
	and down stream	extend for 1 km	
	of record of	in length	
	Golden tinned bat	• 10 metre	
	Golden tipped bat	• 40 metre	
	Mustic advarsus	either side of	
	• Wryou's adversus	permanent water	
	40 metre burrer	bodies and third	
	around an	order and	
	permanent	oruer anu	
	succarls allo	gleater streams	
	the comportment	of Myotic	
	with record	of Myous advarsus zona ta	
	with record	auversus, zone to	
		in longth	
	• Iviiniopterus	nn religill.	
	australis, M.	• non maternity	
	schreibersii, C	roosts sites for	
	dwyeri, v	M. australis and	
	troughton1. Site	M. schreibersii:	
	specific	• 100 metre	
	management plan	exclusion zone	
	tor hibernation	around entrance	
	and maternity	to non-maternity	
	sites	roost sites	
		• within 15	
		kilometres of the	
		roost 25% of	

modifications	existing	new conservation	additional comments
	conservation	protocol	
	protocol	prescription	
	prescription	(sections in bold type	
	preseription	indicate changes)	
		CRA class 1 2&3	
		habitat on nublic	
		land must be	
		ratainad No	
		timbor folling to	
		timber tening to	
		occur, no	
		establishment of	
		operation of log	
		dumps and snig	
		tracks.	
		 maternity roost 	
		sites for M	
		australis and M.	
		schreibersii: one	
		site currently	
		known,	
		management	
		plan for the site	
		be prepared by	
		December 1999.	
		Where new sites	
		are found all	
		operations to	
		cease within 1	
		km of the site	
		and SFNSW	
		notify NPWS	
		within 24 hrs	
	20 Olive Whistler	no specific	buffers and exclusions
changed	20. Onve winster	no specific prescription for this	zones applied to
changeu	• 20 metre burier	species	zones applied to
	around category	species	rannoiest and old $(2 \text{ s} 2 \text{ solary})$
	a&b rainforest in		growth (2&3 below)
	compartment		should cater for this
1			species
no change	21. Glossy Black	this prescription	new prescription 12
		merged in	below contains all
	• 50 metre buffer	prescription 12	exclusion zone for nests
	around nest sites		and roosts for birds
	22. Gilbert's	17A. Gilberts	not applicable to LNE
changed	Whistler	Whistler	and UNE
	• retain 4 ha block	• 100 metre	prescription changed
	around territory	exclusion zone	from 4 ha area to 100 m
		around record of	exclusion zone $= 3.15$
		species	ha.
no change	23. Turquoise	this prescription	
-	Parrot	merged in	
	• 20 metre buffer on	prescription 12	
	nest sites	· ·	
	24. Swift Parrot	17A Swift Parrot	increased retention of

modifications	ovicting	now conconnetion	additional comments
mounications	existing	new conservation	auunuonai comments
	conservation		
	protocol	prescription	
	prescription	(sections in bold type	
		indicate changes)	
changed	 harvesting to be 	 where species 	preferred food trees but
	temporarily	detected retain	not additive.
	excluded from	10 food eucs	
	winter flowering	(listed in 5f	
	Eucalypts where	above) per 2 ha.	
	species is detected	Can be used to	
	in the	meet habitat tree	
	compartment	retention	
		requirements	
	25 a Koala, North	19A. Koala	Minor amendments to
likely to	Coast Forest types		the Koala prescription
change	• high use areas to		are likely though it is not
8-	excluded from		likely to substantially
	harvesting and 50		increase exclusion
	metre buffer		zones buffers or
	applied		retention rates
	• In intermediate		retention rates.
	primary browse		
	species relained		
	per nectare		
	• Trees with greater		
	than 20 koala		
	pellets must be		
	retained		
	 Koalas must be 		
	protected from		
	felling operations		
	where-ever		
	detected.		
	25 b Koala, non	19A. Koala	as above
likely to	North Coast Forest		
change	types		
	 forestry operations 		
	must be excluded		
	from within 100		
	metres of a record		
	until an		
	assessment is		
	done		
	• in high use areas		
	harvecting is		
	excluded from		
	with 100 matrix of		
	the record		
	• In Intermediate		
	use areas then all		
	trees with signs of		
	koala use must be		

modifications	existing	new conservation	additional comments
	conservation	protocol	
	protocol	prescription	
	prescription	(sections in bold type	
		indicate changes)	
	retained and 15		
	reed trees per na		
	must be retained		
	record		
	where there is no		
	• where there is no		
	of regular koala		
	activity then a		
	minimum of 5		
	koala food trees		
	must be retained		
	within 100 metres		
	of the record.		
	26. Rufous Scrub-	17A. Rufous Scrub-	focus on protecting
changed	bird	bird	modeled habitat within
	• 300 metre	• Specified forestry	vicinity of record.
	exclusion zone	activities must be	
	around all	excluded from	
	identified Rufous	CRA modeled	
	Scrub-bird habitat	habitat within	
	• 20 metre	300 metres of a	
	machinery	record	
	exclusion around	• retained nabitat	
	within 2	avaluation zono	
	kilometres of	around modeled	
	Rufous Scrub-bird	habitat	
	record.	nabitat	
	27. Hastings River	19A. Hastings River	new prescription subject
changed	Mouse	Mouse	to discussions in the
U	In the Tenterfield,	prescription applies	recovery team and draft
	Dorrigo, Casino,	to area covered by	recovery plan
	Grafton,	CRA modeled	
	Kempsey/Wauchope	habitat	
	and Mount Royal		
	Management Areas		
	(appropriate forest		
	types above 400m):		
	• 20 metre butter on		
	the compartment		
	• 100 metre buffer		
	on all identified		
	medium to high		
	class habitat		
	• 800 metre buffer		
	on all records of		
	Hastings River		

modifications	existing	new conservation	additional comments
mounications	conservation	nrotocol	uuunonui comments
	protocol	protocol	
	protocol	(sections in hold type	
	preseription	indicate changes)	
	Mouse	mulcate enanges)	
no change	28. Osprev	this prescription	new prescription 12
no enange	 100 metre buffer 	merged in	below contains all
	around nests	prescription 12	exclusion zone for nests
	around nests	presemption 12	and roosts for birds
changed	29. Threatened	see comments	the flora prescriptions
C	Flora prescription A	prescriptions	have substantially
	• 10 metre buffer +	21A&B, 22A,B&C,	changed and are
	additional 10	23	documented in new
	metre modified		prescriptions 21, 22 and
	harvesting zone		23 below
	(50% canopy		
	retention) around		
	50% of		
	individuals in the		
	compartment		
changed	30. Threatened	see comments	the flora prescriptions
8	Flora prescription B	prescriptions 21A. B	have substantially
	 no buffer required 	22 A.B&C and 23	changed and are
	damage to	,	documented in new
	individuals must		prescriptions 21, 22 and
	be avoided		23 below
changed	31. Threatened	see comments	the flora prescriptions
8	Flora prescription C	prescriptions 21A. B	have substantially
	• 10 metre buffer +	22 A.B&C. 23	changed and are
	additional 10	, ,	documented in new
	metre modified		prescriptions 21, 22 and
	harvesting zone		23 below
	(50% canopy		
	retention) around		
	all individuals		
	33. Rainforest	3. Rainforest	the identification of
changed	protocol	protection	rainforest will be based
0	 forestry activities 	• forestry activities	on the mapping by
	excluded from	excluded from	CRAFTI. Exclusion
	category A	rainforest	zones and modified
	rainforest (FTs 1	(rainforest to be	harvesting buffers apply
	to 26) and	determined	to various types of
	category B	during RFA	rainforest
	rainforest	negotiations).	
	(BOGMP up to	• 20 m exclusion	
	and including	zone around all	
	30% pyrophytic	"r" rainforest	
	cover over	• 20 metre	
	rainforest)	modified	
	• 20 metre buffer on	harvesting buffer	
	warm temperate	around all "rb",	
	rainforest (FTs	"re" and "rm"	
	10-15)	rainforest (light	

modifications	existing	new conservation	additional comments
mounications	conservation	nrotocol	
	nrotocol	protocol	
	protocol	(sections in hold type	
	prescription	indicate changes)	
	a 20 matrix huffan an	to moderate	
	• 20 metre buller on	single tree	
	category A and B	single tree	
	International In	only with 50%	
	IDFAS	omy with 50 %	
		callopy retention,	
		no neavy sis or	
		group selection	
	24 0114	allowed).	the identification of old
ahanaad	54. Oldgrowth	2. Old Growin Forest	the identification of old
changed	protocol	Protection	growth based on latest
	• forestry activities	• forestry activities	CRAF II growth stage
	excluded from	excluded from	mapping, no size limits
	identified Old	identified old	to patches protected. No
	Growth (BOGMP	growth forest	field disturbance test.
	candidate old	(identified old	Buffers applied to old
	growth that passes	growth will be	growth forest
	disturbance test	determined	
	(stump count)).	during RFA	
	• minimum patch	negotiations,	
	size to be	likely to be based	
	protected 25 ha in	on CRAFTI for	
	non-regrowth	UNE, at least)	
	zone, 10 ha in	• 20 metre	
	regrowth zone.	modified	
		harvesting buffer	
		around all	
		identified old	
		growth (light to	
		moderate single	
		tree selection	
		(sts) only with	
		50% canopy	
		retention, no	
		heavy sts or	
		group selection	
		allowed).	
	35. Rare, non-	4. Rare non-	the identification of
changed	commercial forest	commercial Forest	ecosystem types based
	types	Type (RNCFTs)/	on work done in CRA.
	• forestry activities	Ecosystem Protection	Buffers applied to
	excluded from	 forestry activities 	vulnerable communities
	listed forest types	excluded from	
		RNCFTs or	
		ecosystem types.	
		(These	
		forest/ecosystem	
		types to be	
		identified during	
		RFA	

modifications	existing	new conservation	additional comments
	conservation	protocol	
	protocol	prescription	
	prescription	(sections in bold type	
		indicate changes)	
		negotiations.)	
		• 20 metre	
		modified	
		harvesting buffer	
		to applied to	
		forest/ecosystem	
		types identified	
		as vulnerable	
		during RFA	
		negotiations	
		(light to	
		moderate single	
		tree selection	
		(sts) only with	
		50% capony	
		retention no	
		heavy sts or	
		group selection	
		allowed)	
new		12 Nest and roost	protective measures for
		protection	nest and roost sites taken
		exclusion zones	out of species specific
		around the following:	prescriptions and put
		powerful owl nest 50	into general
		m roost 30 m	prescriptions
		masked owl nest 50	
		m roost 30 m	
		sooty owl nest 50 m	
		roost 30 m	
		barking owl nest 50	
		m roost 30 m	
		bush thick knee nest	
		100 m	
		Albert's Lyrebird	
		nest 100 m	
		Glossy Black	
		Cockatoo nest 50 m	
		Turquoise Parrot 20	
		m	
		Osprey nest 100 m	
		Square-tailed Kite	
		nest 100 m	
new		21A&B. Threatened	substantially revised
		Flora (1A&B)	prescription based on
		A. 20 metre	work of expert flora
		exclusion zone	panel (EFP).
		around all	Prescription corresponds
		records of species	to prescription 1 A&B
		in tables 1 and 2	EFP.

modifications	existing	new conservation	additional comments
	conservation	protocol	
	protocol	prescription	
	prescription	(sections in bold type	
		indicate changes)	
		in licence	
		B. 50 metre	
		exclusion zone	
		around all	
		records of species	
		in tables 3 and 4	
		in licence	
new		22A,B&C.	substantially revised
		Threatened Flora	prescription based on
		(2A,B&C)	work of expert flora
		A. 90% of	panel. This prescription
		individuals or	corresponds to
		population of	prescription 2 A, B & C
		species listed in	(EFP).
		tables 5 and 6 in	
		licence must be	
		protected from	
		specified forestry	
		activities - no	
		exclusion zone or	
		buffer.	
		B. 20 metre	
		exclusion zone	
		must be	
		established	
		around 90% of	
		individuals or	
		population of	
		species listed in	
		tables 7 and 8 in	
		licence.	
		C. 50 metre	
		exclusion zone	
		must be	
		established	
		around 90% of	
		individuals or	
		population of	
		species listed in	
		tables 9 and 10 in	
		IICENCE	
new		25. Inreatened Flora	substantially revised
		(3)	prescription based on
		no protection	work of expert flora
		required for species	panel. This prescription
		instea in tables 11	corresponds to
		and 12 in licence,	prescription 3 (EFP).
		monitoring program	
		24 Threatered Eleve	aubstantially resident
new	1	24. I nreatened Flora	substantially revised

modifications	existing	new conservation	additional comments
	conservation	protocol	
	protocol	prescription	
	prescription	(sections in bold type	
		indicate changes)	
		(management plan)	prescription based on
		as an alternative to	work of expert flora
		application of	panel.
		prescriptions 21 and 22 above SFNSW	
		may prepare a	
		snecies management	
		nlan.	
new		16A White-crowned	new prescription for
iie w		Snake	species previously not
		• 50 metre	dealt with. very few
		exclusion zone	records in LNE and
		around record	UNE
		 additional buffer 	
		50-100 m around	
		record: protect	
		all logs and fallen	
		trees, minimize	
		ground	
		disturbance.	
new		16A. Pale-headed	new prescription for
		Snake	species previously not
		• 100 metre	dealt with. very few
		exclusion zone	records in LNE and
		around record	UNE
		• additional buffer	
		100-300 m	
		all hollow	
		bearing trees, all	
		stags where safe,	
		all logs and fallen	
		trees, to be	
		retained	
new		16A. Sand Goanna	new prescription (in
			addition to nest site
			protection prescription
			12), management issues,
		1.7.4 4.11	but no impact on volume
new		I/A. Albert's	new prescription,
			previously site specific
		• 20 metre	
		exclusion zone	
		1 st order	
		streams 50	
		metre evolusion	
		zone either side	
		of all 2nd order	

modifications	existing	new conservation	additional comments
mouncations	conservation	new conservation	authonal comments
	nrotocol	protocol	
	protocol	(sections in hold type	
	prescription	(sections in bold type	
		indicate changes)	
		and greater	
		streams within	
		compt.	
new		17A. Bush Stone	new prescription (in
		Curlew	addition to nest site
			protection prescription
			12), management issues,
			but no impact on volume
new		17A. Marbled	new prescription,
		Frogmouth	previously site specific
		• 20 metre	
		exclusion zone	
		either side of all	
		1st order	
		streams, 50	
		metre exclusion	
		zone either side	
		of all 2nd order	
		and greater	
		allu greater	
		su cams within	
		compt.	
		• 20 metre	
		exclusion zones	
		around all areas	
		of rainforest	
		within compt.	
new		20. Common	new prescription,
		Blossom Bat	protection of non-timber
		 mature Banksia 	spp. minimal impact on
		integrifolia,	volume
		Melaleuca	
		quinquinervia,	
		Grevillea	
		robusta,	
		Callistemon	
		viminalis must be	
		protected from	
		damage	
site specific		various prescriptions	
I		have requirements for	
		site specific	
		prescriptions for	
		exceptionally rare	
		species	
		15C Giant hurrowing	
		From Vallow spotted	
		frog Doppored From	
		Red growned	
		Kea crowned	
	1	Toadlet.	
modifications	existing conservation	new conservation	additional comments
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	protocol	prescription	
	prescription	(sections in bold type	
		indicate changes)	
		16B Broad headed	
		Snake	
		17B Red Goshawk,	
		Regent Honeyeater,	
		Black-breasted	
		Button-quail,	
		Double-eyed Fig	
		Parrot, Eastern	
		Bristlebird, Red	
		tailed Black	
		Cockatoo.	
		18C Eastern Quoll,	
		19B Black-striped	
		Wallaby, Broad	
		toothed Rat	

APPENDIX C

FOREST USES CODE SYSTEM – REVIEW OF PROTECTIVE MEASURES AND FOREST PRACTICES ON NATIONAL PARKS AND WILDLIFE SERVICE RESERVES

CRA/RFA PROJECT REPORT PA4/2: Review of protective measures and forest practices on NPWS reserves

1. INTRODUCTION

This report has been completed as part of the Comprehensive Regional Assessments for the Upper North East and Lower North East regions. It documents current and proposed protocols and land use practices on reserved lands managed by the NSW National Parks and Wildlife Service (NPWS) and evaluates their success in meeting Ecologically Sustainable Forest Management (ESFM) objectives.

Tenures managed by the NPWS include national parks, nature reserves, state recreation areas (SRAs), historic sites and Aboriginal areas. Within the UNE region, this amounts to approximately 375 000 ha in 70 individual protected areas, including 23 national parks and 41 nature reserves. In the LNE region, the NPWS manages over 900 000 ha in 81 individual protected areas, including 27 national parks and 47 nature reserves. Over 80% of these lands sustain forest or woodland cover.

The NPWS has statutory responsibilities under the National Parks and Wildlife Act (NPW Act) for the protection and care of Aboriginal sites and native plants and animals throughout the State (including its own estate). As a land management agency, the primary role of the NPWS is the conservation of natural and cultural heritage. The NPWS must ensure that any activity on its estate is permissible under the NPW Act, as well as any other applicable act, including the Threatened Species Conservation Act 1995, the Wilderness Act 1987, the Environmental Planning and Assessment Act 1979 (EP&A Act), the Soil Conservation Act 1938 and the Protection of Environment Administration Act 1991. In managing its reserves, the NPWS operates under a framework of NSW legislation, and international, national, State and corporate policies and agreements, shown on the following table. These all influence planning and management activities at the region, district and reserve level. The NPWS's goal for park and reserve management is to ensure that this management is consistent with best environmental management practices, is well planned, effectively carried out and has community support. Day-to-day management of NPWS reserves is the responsibility of district staff. In the UNE/ LNE regions there are nine districts (with main offices located at Alstonville, Glen Innes, Grafton, Dorrigo, Armidale, Port Macquarie, Raymond Terrace, Muswellbrook and Gosford), most of which are organised into sub-districts which concentrate staff closer to individual reserves but are still administered by the district offices. The districts in turn answer to two regions (based in Grafton and Sydney). Specialist advice and regulatory oversight are provided by the relevant zone offices which also evaluate the environmental impact assessments (EIAs) for on park activities. The majority of the two CRA regions lie within the boundaries of Northern Zone, based in Coffs Harbour, while the southern-most part of LNE region is in Sydney Zone.

Reservation of land under the NPW Act itself promotes many of the primary aims of ESFM through protection of native forests from resource extraction (except for some minor interests in SRAs). In addition, the NPWS has programs and protocols in place to manage fire, to control weed and pest species, to minimise the number of roads and trails that are constructed and maintained, and to mitigate environmental impacts from activities. All of these programs aim to ensure ESFM.

This report outlines the major practices carried out by the NPWS on its lands, and the key protective measures in place which aim to ensure ESFM principles are met. These principles are given in Appendix 1.

2. STRATEGIC FRAMEWORK

NPWS Policies

- *NPWS Mission:* "working with the community to conserve and foster appreciation of nature, Aboriginal heritage and historic heritage in NSW"
- *Corporate Plan* sets out priorities for NPWS (in key program areas, such as conservation policy, assessment and planning, and protection of conservation assets) to meet mission.
- *Field Management Policies* provide a broad framework for decision-making regarding onground management actions
- Procedural Guidelines
- Draft Public Access Strategy aims to meet the range of visitor needs in a manner consistent with core responsibilities of conserving, and fostering appreciation of, natural and cultural heritage
- Draft Nature Tourism and Recreation Strategy aims to provide for increased commercial tourism and recreational activity in reserves (mostly national parks) while upholding the primacy of nature conservation and ensuring ecologically sustainable use
- *NPWS Environmental Policy (draft)* seeks to ensure that the NPWS is exemplary in environmental performance, through avoiding, reducing or controlling pollution, adopting best practice and complying with the PEA Act

Regional

- *Strategic Overview* for the Central Eastern Rainforest Reserves World Heritage property
- NSW Far North Coast Nature based and Eco-tourism Plan
- Northern Rivers Regional Strategy

NPWS Manuals

- Environmental Planning and Assessment Manual
- Fire Management Manual
- *Guidelines for Park Facilities* have been adopted for the construction and maintenance of roads, walking tracks, park furniture and toilet systems within NPWS estate
- Chemical Handling Manual
- Infectious Diseases Manual
- Sign Manual
- Concessions and Leasing Manual
- Dangerous Goods Manual
- Management Planning Manual

Other manuals

NSW Agriculture's Vertebrate Pest Control Manual

District/LGA

Bushfire Risk Plans and Fire Management Plans

NPWS Planning

Regional

- Operational Plan
- Regional Recreation and Tourism Strategy uses a zoning system to provide direction on how and where to accommodate growing recreation pressures

District

- Operational Plan
- Pest species strategy prioritises and focuses efforts and available funds to pest control
 programs across the district
- *Fire strategy* focuses efforts for fire management across the district's reserves in line with obligations to promote native biodiversity and protect life, property and cultural heritage

Reserve

- Plan of Management
- Fire Management Plan
- Pest Species

3. MAJOR PROTECTIVE MEASURES

3.1 Absolute Reservation

Description

The NPWS manages lands under the following levels of reservation:

National Parks

- IUCN category II (or, where zoned wilderness, Ib)
- set aside for the conservation of nature and Aboriginal and historic heritage, as well as the provision of appropriate recreational, educational and research opportunities which are compatible with those conservation objectives
- numbers in each CRA region: 23 in UNE; 27 in LNE

Nature Reserves

- mostly IUCN category Ia or II (where recreation use is encouraged, and facilities are provided) or III (where the primary aim is to protect a geological feature)
- set aside primarily for nature conservation purposes; some also protect unique geological features
- numbers in each CRA region: 41 in UNE; 47 in LNE

State Recreation Areas

- technically IUCN category VI as this reservation allows for multiple use (e.g. mining and grazing, but not timber harvesting); in practice most SRAs are managed consistent with IUCN category II
- set aside to provide a range of outdoor recreational opportunities in a natural or rural setting.
- numbers in each CRA region: 2 in UNE; 3 in LNE

Historic Site

- set aside for cultural heritage conservation purposes.
- numbers in each CRA region: 1 in UNE; 1 in LNE
- there is also the provision of designating 'historic places' within other reserves such as national parks, e.g. mine race in Boonoo Boonoo NP

Aboriginal Area

- dedicated for the protection of Aboriginal sites
- numbers in each CRA region: 2 in UNE; 2 in LNE

Rationale

Initially, national parks were established under the *Crown Lands Act 1913* to provide for recreational opportunities and preserve significant natural habitats and view points. Some nature reserves were established under the *Fauna Protection Act 1948* to protect locally significant faunal habitat. These parks and reserves were managed by local trusts. Creation of the NPWS in 1967 provided an organisation to ensure coordinated and integrated management of these reserves.

In the 1970s and early 1980s, new reservation focused on areas of vacant Crown land not required for other purposes. The 1977 Coastal Policy led to the creation of large coastal reserves (such as Crowdy Bay, Bundjalung and Yuraygir National Parks). The 1982 'Rainforest Decision' created large rainforest reserves in the Border Ranges and the Washpool area, and large additions to Werrikimbe, Dorrigo, New England and Barrington Tops National Parks, all of which were inscribed on the World Heritage list in 1986.

The Interim Forest Assessment (IFA) in 1996, led to the creation of seven new national parks and one nature reserve in the UNE/LNE CRA regions. Large additions were also made to wilderness parks, in line with the Government's commitment to protect wilderness. As a signatory to the international Convention on Biological Diversity, Australia has an obligation to ensure that a comprehensive and representative reserve system is created.

Variation in application of measure

Reservation under one of the above categories is meant to provide broad management direction and conservation philosophy. In the past, there have been some inappropriately chosen classes, usually as an artefact of management prior to reservation. For example, major recreation facilities are provided in some nature reserves, while some national parks have no public access and are managed as nature reserves.

Proposed changes

A review of the appropriateness of current classes of protected areas has been flagged.

How does this measure ensure ESFM principles?

Protection of forest values

• reserves provide maximum protection from almost all human-induced disturbances, subject to appropriate fire management and control

Public participation, openness and transparency in the decision making process

- creation of additional reserves is a Government decision; however recent wilderness park additions and the new parks created in the IFA followed extensive opportunities for public comment, and some new reserves have followed public proposals
- opportunities for joint management with Aboriginal communities for parks transferred to Aboriginal ownership (in these regions, only Mount Yarrowyck NR is so far planned for transfer to Aboriginal ownership)
- SRAs can have boards of trustees responsible for the care, control and management of SRAs (e.g. Cape Byron SRA)
- each NPWS District has an Advisory Committee made up of 9-13 community members representing a range of interests; Advisory Committees advise on the care, control and management of reserves within each District
- the National Parks and Wildlife Advisory Council also provides opportunity for community and stakeholder input to the management of reserves

Provision of incentives for ecologically sustainable management

• reserve management is primarily focused on the conservation of nature and natural ecological functions

Application of the precautionary principle

• creation of reserves in part is driven by the precautionary principle as it minimises many impacting land use practices

Adaptive management processes

- bioregional planning of new conservation reserves is aiming to ensure a comprehensive, adequate and representative reserve system; the NPWS Acquisitions Policy prioritises funds to bioregions with low levels of reservation
- new classes of reserves have been created over time (e.g. 1996 amendments to NPW Act to allow for Aboriginal ownership)

3.2 Field Management Policies

Description

- compiles all management policies for use by field managers
- policies exist for
- * nature conservation (including protection of environmental integrity, introduced animals, beekeeping, shooting, wild dogs)
- * general conservation management (such as bushfires, use of fire retardants, soil conservation and rehabilitation, wilderness conservation, visitor use of firewood, boundary fencing)
- * Aboriginal site and historic resources conservation and management
- * nature tourism and recreation policies
- * community information and extension/ education
- * research in NPWS reserves
 - *Procedural Guidelines* have been adopted for some of the *Field Management Policies* to improve consistency in application

Location

• all lands managed by NPWS, including areas not yet gazetted as reserves

Rationale

• to ensure consistency in approach to major issues facing field managers and that on park works meet requirements of NPW Act and best management practices

Variation in application of measure

• there is some variation in actions flowing on from the policies according to local circumstances

Proposed changes

• on going changes are planned, as new or improved practices are adopted in light of better information and in light of feedback from current management

How does this measure ensure ESFM Principles?

Protection of forest values

- ensures management is focused on corporate objectives; these include, as a high priority, the conservation of natural and cultural heritage in protected areas
- nature conservation policies aim to ensure the survival of free living populations of native animals and plants, and maintaining natural environments, including geological sites

Public participation, openness and transparency in the decision making process

- policies are published and available to the public
- policies include guidelines for Aboriginal consultation and provision of information to the broad community

Provision of incentives for ecologically sustainable management

• principal policies for nature conservation include avoidance of disturbance in reserves except where developments have been approved; approval of developments follows EIA processes (see below) which contain incentives for ESD

Application of the precautionary principle

• approval of developments follows EIA processes (see below) which encourages decisions being guided by the precautionary principle

Adaptive management processes

• as better information comes to hand, new practices are adopted or changes in practices become standard

3.3 EIA on park

Description

- State Environmental Planning Policy No. 4 (SEPP4) Development without consent ensures that NPWS has development control in all its reserves and that development applications do not have to be approved by councils. This means that activities on NPWS lands are covered by Part 5 of the EP&A Act
- NPWS *EP&A manual* provides principles for EIA, including integrating the principles of ecologically sustainable development (ESD) into the environmental assessment process
- different levels of EIA for on park activities:
- * EIA1 outlines proposed activity, describes existing natural, cultural and social environment, outlines alternatives and management issues, and assesses if impacts will be more than negligible
- * REF/ EIA2 includes all the information in an EIA1, plus a threatened species 8 part test, outlines monitoring programs and environmental safeguards, and assesses if an EIS is required. REFs may be placed on public exhibition and, if a prescribed development under SEPP4, is referred to council for comment.
- * EIS/ SIS provides the level of detail needed to make an informed decision whether to proceed with a proposal development which has environmental impacts, and details mitigative measures.
 - except where the proponent is NPWS and an EIS is required, EIAs are assessed and determined internally by NPWS Managers, EIA1s by District Managers, REFs by Zone Managers; NPWS structure ensures independence of zones from districts

Location

• all lands dedicated under the NPW Act, with the exception of developments by existing interests (e.g. expansion of existing mines in Torrington SRA; continued use of bombing range in Bundjalung NP); NPWS has negotiated with these interests to ensure appropriate EIAs are conducted with NPWS input

Rationale

- legislative requirements, from EP&A Act, NPW Act and TSC Act
- to ensure that impacts from activities are highlighted and mitigated where possible
- to meet community expectations of best practice

Variation in application of measure

- level of EIA requirements currently determined by individual District Managers, not always uniform over the CRA regions
- there is also some inconsistency in the quality of preparation of REFs, in the Zone requirements for level of detail and the Zone's level of scrutiny of the completed REF
- project timetables sometimes mean that the EIA preparation and evaluation is rushed and the necessary detail is not sought or considered

Proposed changes

- review completed in February 1998 recommended changes to process to reduce variation in application of measure; implementation of recommended actions will take to June 1999, but most actions will be implemented by December 1998
- project proposals (for capital works funds, etc) will in future include an EIA1 by the relevant District before funding is sought and an indication of the level of EIA that may be required before the project proceeds; EIA preparation is to be included in the project's timetable
- best practice guidelines are in preparation for routine activities
- guidelines for determining the appropriate level and detail of EIA are also in preparation; sample model REFs are being developed as a guide to the level of detail and format, which will include better incorporation of Aboriginal and historic heritage issues into EIA
- better links to *plans of management* including greater community participation in the planning process are being considered
- auditing of compliance will be introduced

How does this measure ensure ESFM Principles?

Protection of forest values

- have established a process for ensuring consideration of environmental factors and potential impacts in decision making
- have achieved positive outcomes in protection of forest values by raising awareness of potential impacts on water quality, biodiversity, cultural heritage, etc, and causing projects to be modified to limit or avoid these.

Public participation, openness and transparency in the decision making process

• limited opportunities for public participation and consultation except for major and controversial projects for which EIAs are placed on public exhibition or EISs are completed

Provision of incentives for ecologically sustainable management

• ESD needs to be considered and is integral to the assessment process

Application of the precautionary principle

• explicitly recommended in internal EP&A manual for both the preparation and determination of EIAs

Adaptive management processes

- for most areas, there is incomplete pre-existing information to incorporate into a REF and this may prompt further survey effort, investigations and/ or consultation with experts
- projects often modified in response to identification of potential impacts
- EIA process undergoing modifications following internal review and in line with legislative changes

3.4 Plans of Management (POMs)

Description

- statutory public planning documents under the NPW Act which describe management objectives and activities which are proposed for an area, so that the objects of the NPW Act can be met.
- usually contain the following heads of consideration:

- * wildlife conservation
- * protection of the special features, including landscapes of high value
- * preservation of any historic or Aboriginal place
- * public enjoyment and appropriate use of national parks and SRAs
- * appropriate use of nature reserves
- * prohibition of activities which may adversely affect a reserve's natural condition or special features
- * protection of catchment values
- * protection against accelerated erosion
- * fire management
- * zoning of areas, including identification of wilderness areas or designation of remote areas
 - Interim Management Guidelines may be developed for reserves to allow implementation of management strategies in the absence of a POM; this is an interim measure until a POM is prepared
 - POM manual has been prepared to ensure consistency in content

Rationale

- required by NPW Act for national parks and historic sites
- publicly demonstrates a commitment to the management of an area, and informs the public of what management objectives and actions are proposed
- involves the public in decisions regarding management of the area

Location

- all lands managed by NPWS, including areas not yet gazetted as reserves can be covered by POMs; also, with the agreement of the relevant agency, other areas of public land adjacent or near to NPWS reserves
- a large number of NPWS protected areas (mostly nature reserves) do not have POMs

	number of reserves			
CRA	plan adopted	draft plan exhibited and	draft plan in	no plan in
region		being prepared for adoption	preparation	preparation
UNE	19 (28%)	7 (10%)	11 (15%)	33 (47%)
LNE	15 (19%)	8 (10%)	11 (14%)	46 (57%)

number of reserves

• for a list of reserves with POMs, draft POMs or POMs in preparation see Appendix 2a

Variation in application of measure

- there is no statutory requirement to prepare POMs for SRAs and nature reserves; however POMs are being progressively prepared for these
- perceived inconsistency in effort across state, with some delays in adopting plans following exhibition, or delays in approving draft plans for release
- public involvement in early stages of plan preparation is sought for most high profile reserves, but the level of involvement varies across the regions

Proposed changes

• a review of the process for preparing, exhibiting and adopting POMs has commenced; it is likely that changes to the process will be recommended to make it more transparent, streamlined and relevant

- the plans themselves are changing, with more use of zoning maps, so that the POMs can incorporate a role similar to that of Local Environmental Plans under the EP&A Act
- more use is being made of a regional recreational planning approach to limit duplication of visitor facilities, particularly those that are highly impactive

How does this measure ensure ESFM principles?

Protection of forest values

- conservation of values (including landscape and social values) is a major objective of all plans
- major values for which the reserve is managed are described in the plans, and appropriate policies and actions linked to the conservation of these values in a transparent, logical manner
- threatening processes are identified in the POM and management procedures put in place to protect values

Public participation, openness and transparency in the decision making process

- guidelines for public consultation have been developed; not consistently applied, because different reserves need different levels of consultation.
- at initial stages, consultation is achieved through:
- * the relevant District Advisory Committee(s)
- * notification of plan's imminent preparation through the media
- * circulation of issues papers to targeted stakeholders and the broader community, and analysis of submissions
- * stakeholder workshops
 - there is a statutory requirement for exhibition of draft plans; all comments summarised, issues analysed, plan modified and justification of final draft presented to Advisory Council before submission to Minister for adoption
 - plans ensure transparency by providing all necessary information to justify proposed management actions and zonings

Provision of incentives for ecologically sustainable management

- nature conservation through ecologically sustainable use (e.g. nature-based recreation and tourism) and management is the desired outcome of plans, and this results through addressing all the heads of consideration (see above)
- •
- Application of the precautionary principle
- plans often require further investigation and surveys before proposed works are carried out
- all works and development must be carried out in accordance with the POM, but only following EIA requirements; for matters not addressed in the POM, detailed EIA and amendments to the plan are required

Adaptive management processes

- amendments to plan are possible in a process that involves exhibition of the amendment and consideration by the relevant District Advisory Committees and Advisory Council
- adopted plans subject to review and rewriting as required, but usually every 10-15 years

3.5 Reserve Fire Management Plans (RFMPs)

Description

- reserve planning document which provides direction for fire management activities including bushfire suppression
- sets out bushfire management zones to enhance biodiversity and control threats to life and property, and responses to fire and level of hazard reduction in these zones
- RFMPs are generally prepared in conjunction with an EIA. Depending on the level of potential impacts from implementation of plan, the appropriate level of EIA may be a detailed EIS. The EIA considers the potential impacts on biodiversity and other values of: fire management access, utilities and facilities; prescribed burning; fire zones; and fire management research.

Location

- all lands managed by NPWS which are perceived to have a wildfire risk
- not all reserves currently have RFMPs:

	number of reserves				
CRA region	plan adopted	draft plan ready for exhibition or exhibited	draft plan currently in preparation	no plan required (low risk reserves)	plan required but not yet in preparation
UNE	1 (1%)	2 (3%)	25 (36%)	17 (24%)	25 (36%)
LNE	1 (1%)	6 (7%)	24 (30%)	13 (16%)	37 (46%)

• list of reserves with adopted and draft RFMPs, RFMPs in preparation or for which RFMPs are not required is given in Appendix 2b

Rationale

- to ensure fire management of NPWS reserves meets requirements of NPW Act and Rural Fires Act, and best practice management
- clearly sets out for public scrutiny the fire management objectives, and actions to achieve these objectives, over the whole reserve
- EIA ensures that environmental impacts of fire management are considered

Variation in application of measure

• RFMPs are a relatively recent NPWS initiative and only a few reserves have plans

Proposed changes

- further preparation and adoption of plans, in line with NPWS policy and financial commitment to prepare RFMPs for all fire-prone reserves by 2001
- continued evaluation of RFMP process

How does this measure ensure ESFM Principles?

Protection of forest values

- zoning highlights areas where protection from fire is necessary (assets, visitor facilities, neighbouring lands, known locations of fire-sensitive communities and threatened species)
- zoning also maps areas requiring different fire regimes; the minimum and maximum acceptable fire interval is usually estimated for each zone to ensure a diversity of communities and species, and naturally functioning ecosystems, continue

Public participation, openness and transparency in the decision making process

• consultation with neighbours, local Bush Fire Committees and the relevant District Advisory Committee during plan preparation

• it is NPWS policy to publicly exhibit draft plan and EIA for three months, and to consider all submissions when finalising RFMP

Provision of incentives for ecologically sustainable management

- aim of zoning is to strategically plan fire management; assessment of the zones' vegetation and assets determines the appropriate fire regime for each and the necessary response to fire according to fire history and desired fire regime
- EIA process ensures that individual activities are consistent with RFMP

Application of the precautionary principle

• plans often require further survey and assessment before on ground works are carried out

Adaptive management processes

- priority areas for research into fire ecology are identified in the RFMPs; the plans are then amended according to results of further research
- identify key performance indicators to feed back into management

3. MAJOR FOREST PRACTICES

The philosophy of conservation of natural and cultural resources underlies all of NPWS practices. This results in a commitment to use best environmental practice in all aspects of on ground management.

4.1 Natural resource management

Description

- practices include:
- * fauna and flora surveys
- * maintenance of Wildlife Atlas to store records from surveys and other observations
- * implementation of recovery plan actions
- * encouraging research into population dynamics and fire responses of threatened species
- * revegetation using local stocks of plant and soil material
- * protection of riverine vegetation
- * protection of natural viewscapes

Rationale

• NPWS obligations to protect natural resources and manage for nature conservation

Location

• all NPWS lands are managed primarily for nature conservation

Impacts associated with practice and how these are ameliorated

- use of cage, harp and Elliot traps, etc, during surveys may harm protected fauna; approval of NPWS Ethics Committee required for all research projects which may impact on fauna and personnel are trained in procedures to minimise distress to animals
- where projects may impact on threatened fauna, appropriate licence under NPW Act required
- use of vehicles and trailers to transport survey equipment can disturb animals and vegetation; off-trail use is generally not permitted
- EIA required for projects to determine potential impacts and mitigative measures

Intensity

- surveys only occur when sufficient funds allow; some areas subjected to minimal surveys.
- surveys focused on areas close to existing trails, which localises impacts

Variables associated with practice

• smaller reserves, especially remnants surrounded by modified landscapes, require more intensive work to ameliorate edge effects

Key protective measures applied to practice

- NPW Act (protection of all native flora and fauna on NPWS lands); TSC Act (protection of threatened species and their habitat); Wilderness Act (management principles to ensure natural evolutionary processes continue with minimal human interference); EP&A Act (protection of environmental values)
- relevant Field Management Policies include:

- * soil conservation and rehabilitation
- * protection of environmental integrity (such as using local plant and soil material)
- * research on NPWS areas

Proposed changes

- more involvement in monitoring of water quality in conjunction with local councils or other bodies (e.g. to check on water quality from urban run-off and concentrated storm-water run-off in reserves)
- increased use of flora and fauna surveys prior to management projects

Practices in natural resource management currently meet the ESFM principles through:

- protection of natural forest values
- protection of viewscapes from popular lookouts to preserve social values

Critique of practice

- landscape considerations applied haphazardly in the absence of clear guidelines, especially regarding major access roads and viewsheds
- tightly linked to other practices on NPWS lands, especially regarding fire management, pest species management and road construction
- there is an absence of baseline data on the natural resources with which to compare monitoring data
- no systematic follow-up surveys to monitor progress; monitoring at the moment is piecemeal and project driven (see section 5)
- lack of resources for research into key management areas; for example, survey work on threatened species is only resourced where this is an action in a prepared Species Recovery Plan

Recommended improvements

- better resourcing of this key area, not just as an adjunct to other practices (such as fire or pest species management)
- systematic collection of baseline and monitoring data for all NPWS reserves

4.2 Fire management

Description

- practices include:
- * fuel management (through slashing or control burning of radiation and asset protection and strategic fire management zones)
- * backburning to control bushfires
- * prescribed burns using ground or aerial ignition
- * airborne infra-red scanning to record and map fire fronts and extent of burnt areas
- * water-bombing from helicopters and use of wetting agents
- * research into threatened species' fire responses; this may lead to ecological use of prescribed fire to trigger key parts of life cycle

Rationale

- to promote native biodiversity, including threatened species, while protecting life, neighbours' properties, assets and sites of cultural significance
- to meet requirements of Rural Fires Act

Location

• as determined by the zoning of RFMPs and the NPWS District's fire strategy

Impacts associated with practice and how these are ameliorated

- accelerated erosion following hot fires; ameliorated by locating control lines away from steep drainage lines
- clearing of native vegetation or other methods of fuel management (such as hazard reduction burns) which may be required for asset protection, can lead to changes in forest structure, species distribution and abundance; ameliorated by ensuring these zones are strategically located, conducting EIAs and relocating the zones where possible to achieve both conservation and asset protection goals
- wetting agents and foam may impact on native wildlife; ameliorated by the ban on fire retardants and adoption of minimal operational guidelines for use of foam in wetlands
- smoke hazards; ameliorated by not burning on high pollution hazard days in urban areas and placing warning signs on roads

Intensity and variables associated with practice

• as determined by the zonings delineated in the relevant RFMP and the NPWS District's fire strategy

Key protective measures applied to practice

- NPWS Fire Management EIA Protocol ensures compliance with the EP&A Act
- RFMPs and relevant EIAs are progressively being completed for all fire prone reserves
- NPWS Hazard Reduction Protocol ensures that, in absence of fire management plan, fire management works are approved only if they are consistent with interim fire management zones and an EIA has been completed
- minimal operational guidelines exist for: fire management access, utilities and facilities; use of heavy earthmoving equipment; use of foam in wetlands; prescribed burning; fire radiation zones; and fire management research

Proposed changes

- a policy on fire management practices in declared wilderness areas is in preparation
- every prescribed burn to have a clear set of objectives (including type of fire behaviour required), taking into account fuel management and biodiversity requirements
- principles and practices of managing big fires will be documented at the end of each fire season to provide guidelines for the next fire season
- specialised fire incident control training to be introduced for key personnel

Practices in fire management currently meet the ESFM principles through:

• protection of life and property while minimising impacts on natural and cultural values

Critique of practice

- lack of information on appropriate or pre-European 'natural' fire regimes
- unable to fully address all influences on fire regimes, such as arson and unplanned fires
- lack of systematic fire monitoring in most reserves

Recommended improvements

• ongoing research into fire behaviour variables in fire prone vegetation communities to improve basis for using fire as a management tool

- establishment of fire monitoring sites
- ongoing refinement of RFMP process

4.3 Cultural resource management

Description

- practices include:
- * protection and joint management of Aboriginal sites in conjunction with local Aboriginal land councils
- * protection and curation of historic cultural sites through maintenance and restoration works
- * surveys for further sites
- * maintenance of register of sites
- * provision of permits for research
- * providing Consents to Destroy sites under section 90 of NPW Act

Rationale

• NPWS statutory responsibilities to conserve cultural resources on its lands (and Aboriginal sites throughout the state)

Location

- site management prompted by discovery through survey, oral history projects or when divulged by communities
- Consents to Destroy only issued following EIA on park processes and consultation with Aboriginal community

Impacts associated with practice and how these are ameliorated

• sourcing rare raw materials for restoration works (e.g. rainforest timbers in restoring historic houses); ameliorated through choosing sustainable or second hand sources or using different materials

Intensity

• as determined by plan of management or conservation plans

Variables associated with practice

• dependent largely on available resources, e.g. management of historic cultural resources is poorly resourced in some reserves

Key protective measures applied to practice

- Field Management Policies require adherence to Burra Charter and provide direction on liaison with Aboriginal communities regarding Aboriginal site management, historic resources conservation and management, and permitting research in historic and Aboriginal sites
- Field Management Policies also provide direction on process to follow when issuing a Consent to Destroy for a site

Proposed changes

- recent restructure of cultural heritage division in NPWS may improve level of consultation with Aboriginal communities and resources for site management
- ongoing devolution of statutory responsibility for Aboriginal sites to the local Aboriginal community

Practices in cultural resource management currently meet the ESFM principles through:

- protection of cultural sites and places which are valued by community
- public consultation with local Aboriginal community regarding joint management of Aboriginal sites

Critique of practice

- no strategic review of cultural sites on all NPWS lands, and prioritising them for future management on the basis of their local and regional significance
- plans of management often recommend the development of conservation plans for important sites found in a reserve, but insufficient funds are provided to complete these

Recommended improvements

• development of District and Regional level cultural resource strategies to prioritise and focus management action and funding

4.4 Introduced species management

Description

- pest species management, coordinated at the District and reserve level, includes:
- * feral animal control
- * weed control
- * NPWS participation in development of new control techniques and programs
 - other practices include:
- * stray animal control
- * apiary management
- * permitted grazing

Rationale

- introduced pest plants (weeds) and animals (ferals) are key threats to NPWS's conservation objectives
- leglislative responsibilities under Rural Lands Protection Act and Noxious Weeds Act to control designated noxious and pest species
- leglislative responsibilities under NPW Act and Wilderness Act, to conserve nature and restore natural plant and animal communities

Location

- control of pest species may be carried out on all reserves, according to the district's priorities
- grazing is only permitted in Torrington SRA and one perpetual Crown lease in Border Ranges NP (all Occupational Permits in previous State forests inherited during IFA have been terminated)
- bee keeping is only permitted in those reserves where there were active hive sites and licences at the time of the reserve's gazettal
- fencing assistance to exclude stock determined on a needs basis and strategic view of protection of key conservation values from straying animals

Impacts associated with practice and how these are ameliorated

• use of poison baits may lead to death of non-target species; ameliorated through phasing out aerial baiting in preference to burial of baits and monitoring species

which visit bait stations, selecting the bait material to reduce the chances of nontarget species taking baits, and monitoring native predator populations following aerial baiting

- use of herbicides may lead to death of non-target species and pollution of water courses; ameliorated through training all personnel in safe handling and disposal of chemicals, use of die markers, and use of herbicides or herbicide concentrations which minimise impacts on native species
- weeding may lead to accelerated erosion; ameliorated through follow-up planting of quick growing native pioneer species and mulching the weeded areas
- weeding may also reduce habitat and food resources for threatened species and further research is required to assess these impacts; mitigated in the meantime by suitable supplementary plantings
- providing access to bee sites and clearing of sites increases fragmentation of reserves and may lead to accelerated erosion in certain areas; ameliorated by relocating sites to periphery of reserves (well away from visitor facilities) or on major fire trails
- managed bee hives and stock may compete with native species for food resources; ameliorated through setting stocking levels as condition of permit (no such condition on apiary licences)

Intensity

- as determined by District pest species strategy, which prioritises communities most at risk and ferals most in need of control
- grazing intensity usually set at low level as condition on permit
- bee foraging is generally concentrated to approx. 2 km immediately surrounding hives

Variables associated with practice

- volunteers and neighbours have greatly assisted weeding programs and pest animal control programs; this effort tends to be greatest in those reserves located near townships and urban centres
- problems with straying stock is variable, depending on topography and condition of boundary fences
- wild dog and dingo control is focused on reserve boundaries to reduce neighbours' stock losses
- weed control is usually restricted to easily accessible areas

Key protective measures applied to practice

- EIA on park for large pest programs
- preparation of District wide Pest Management Strategies and species/reserve pest plans
- Field Management Policies provide a commitment to the control of exotic plants and eradication of invasive exotic species, and for fencing assistance to reduce straying of stock
- training and certification of staff using herbicides and baits
- promotion of biological control methods

Proposed changes

- listing of some pest species as 'key threatening processes' under TSC Act may require more focus on these species; it is likely however that these pests are already considered a high priority for action
- phasing out of aerial baiting for wild dogs in these CRA regions
- as new control methods become available (including biological control), guidelines for pest control may change

• transfer of apiary licences to family members on retirement of licensee has recently been promised by Minister

Practices in introduced species management currently meet the ESFM principles through:

- EIA on park ensures that impacts of new control techniques and large scale operations are considered and minimised
- consultation and cooperation with neighbours regarding boundary fencing and pest control programs
- maintaining bee hive licences reduces social impacts
- very high priority given to pests which threaten populations of threatened species; high priority given to pests which threaten other conservation and recreational values

Critique of practice

- works concentrate on those high profile, easily accessible reserves where funding is available
- there is usually a lack of public interpretation to accompany works, to educate on the need to control garden escapees that are major environmental weeds
- no consideration of carrying capacity or impacts of bee hives; previous application of the precautionary principle meant that bee hives would be phased out over time as licensees retired, however this is no longer the case
- in some areas, apiarists maintain clearings and even access tracks; where NPWS maintains these, there is no reimbursement of costs from apiarists, even when the tracks and clearings serve no other purpose

Recommended improvements

- NPWS should control, carry out or closely supervise what additional clearing takes place for hive and access maintenance, and ensure that EIA is carried out for these works; as an initial step, surveys for rare and threatened species need to be carried out in the vicinity of the hive sites and hives moved to protect threatened species
- greater cooperation with neighbours to ensure a coordinated and more effective approach to pest management

4.5 Visitor management

Description

- provision of facilities at day-use/ picnic areas and camping/ rest areas (lookout platforms, fire places, gas barbeques, picnic tables and toilets), primarily in national parks and SRAs
- licensing of tourist operators
- Discovery Ranger guided tours and other extension programs
- provision of interpretive displays
- provision of access and walking tracks considered in section 4.6

Rationale

• legislative responsibility under NPW Act to provide for appropriate recreation in national parks and SRAs

Location

- as determined by POM or past (traditional) use where not covered by a POM
- consistent with relevant acts and policies (including protection of threatened species habitat the known presence of a threatened species may cause the relocation of facilities)

• as dictated by the class of protected area (e.g. nature reserves generally should not be promoted for recreation and usually do not have visitor facilities)

Impacts associated with practice and how these are ameliorated

- localised impacts at main visitation points from site clearing, effluent disposal, litter, soil erosion, collection of firewood, etc; ameliorated through education, appropriate design and maintenance of facilities, and hardening of surfaces
- broader impacts include *ad hoc* tracks, fire escapes, landscape intrusion; mitigated through signage of tracks, provision of fire places or gas /electric barbeques and locating new facilities away from prominent points in the viewscape

Intensity

- localised to main visitation points, access roads and walking tracks
- seasonal variation in intensity (greatest impacts during school holidays)
- reduction in impacts through:
- * the use of contractor-supplied firewood and the provision of gas or electric barbeques, rather than relying on-park supplies for firewood
- * the replacement of pit toilets with composting toilets where justified by levels of use, recreational setting and potential environmental contamination
- * the removal of rubbish pits, and the use of contractor dumpsters or 'take your rubbish home' policy for all day visitors
- * hardening surfaces where use is high and would otherwise lead to vegetation trampling or erosion

Variables associated with practice

- levels of development are highly variable; there is a recreational opportunity spectrum (ROS) in the reserves across the regions as a result of zoning, traditional use and visitor demand: from wilderness areas to information centres and caravan parks
- tour operators are only licensed for a selection of high profile parks and reserves, reflecting demand by the operators rather than an overall plan by NPWS

Key protective measures applied to practice

- education/ interpretation is important to encourage suitable visitor behaviour, such as adoption of Minimum Impact Bushwalking practices
- closure of visitor areas and facilities (including walking tracks and roads) may be necessary due to unacceptable environmental impacts or visitor risk
- *Guidelines for Park Facilities* document performance requirements for rubbish receptacles, fireplaces and toilets, and detail performance specifications for toilets
- previous policies (reinforced by the draft *Nature Tourism and Recreation Strategy* and *Regional Recreation Strategy*) recommend the concentration of visitors and their impacts to hardened localities, ensuring minimum human interference and artificial disturbance to the core of reserves
- relevant *Field Management Policies* include recreation policies (such as ROS planning framework, visitor accommodation, camping, commercial activities and safety) and communication policies (Discovery programs, interpretation of NPWS areas and signage; consistent signage ensured through use of *Sign Manual*)
- *Concessions and Leasing Manual* set out conditions for tour operators to ensure public safety and conformity with NPWS management objectives
- visitor surveys provide feedback

Proposed changes

- *Nature Tourism and Recreation Strategy* has flagged changes to commercial tour operator licensing system
- implementation of the *Regional Recreation Strategy* will ensure that new facilities will only be provided or upgraded where zoning allows, or removed where necessary, as determined by the ROS over all public land tenures
- risk assessment of all existing facilities will be carried out and will be a consideration in construction of new infrastructure

Practices in visitor management currently meet the ESFM principles through:

- containing and minimising visitor impacts on the environment
- providing opportunities for enjoyment of the natural environment
- ensuring only nature-based recreation and tourism is encouraged
- educating the public in an appreciation of the values of the natural environment, thereby encouraging appropriate visitor behaviour
- permitting and licensing a number of recreational activities, and all commercial operators, subject to appropriate conditions to protect values
- minimising the environmental impacts of facilities (through use of composting toilets and solar power where possible, and use of sustainable sources of materials for new construction)

Critique of practice

- visitor surveys indicate a need for more information
- sites have been hardened in the past to accommodate greater numbers of visitors, leading to recreation spectrum creep

Recommended improvements

- installation of visitor counters at most locations to determine levels of use
- more systematic monitoring of impacts, and amelioration of impacts

4.6 Access management

Description

- constructed access routes:
- * public access roads and 4WD trails
- * management trails
- walking tracks
 - provision of access for 4WDs, horses and mountain bikes
 - extraction of gravel located on NPWS lands (limited extent)

Rationale

- to allow safe access for appropriate recreational pursuits and enjoyment of the parks
- to ensure access for management purposes

Location

- as determined by plan of management or traditional use, and demonstrated to be of minimal environmental impact through EIA
- public access roads, management trails and most walking tracks digitised.

Impacts associated with practice and how these are ameliorated

• road kills, disturbance of fauna; ameliorated by low design speed criteria in road design

- clearing of vegetation and changes to micro-climate (of concern for threatened flora); ameliorated by adopting minimum width design criteria
- accelerated erosion and downstream sedimentation; ameliorated through construction and stabilisation of batters and drains, maintaining vegetation buffers between trails and streams, and use of gabions, gating most internal management trails to prevent unauthorised use and use of boardwalks
- providing preferential access routes for feral predators, such as dogs and foxes; ameliorated by monitoring dog and fox prints on trails and using trails for baiting programs
- introduction of exotic weed species in horse manure; ameliorated through limiting horse access to non-sensitive vegetation communities and use of pelleted feed during overnight trips
- introduction of weeds, diseases and nutrients with equipment and materials; ameliorated by development of a Code of Practise to clean machinery before entering site and to use gravel materials only from similar geologic sources

Intensity

- localised to the immediate surroundings of the limited number of roads/ trails/ tracks maintained in NPWS estate and downstream from these
- varies according to demand, with popular public routes requiring more upkeep and maintenance, and so often are hardened to avoid vegetation damage, erosion or downstream sedimentation
- also varies according to rainfall intensity and usage patterns (e.g. higher use during school holidays and long weekends)
- management trails closed to public generally have very low impacts and low maintenance requirements, but closure of trails traditionally used by the public can be costly to enforce

Variables associated with practice

- road/ trail/ track standard varies according to level of use, available funds and local conditions
- some inconsistency between districts in the level of training for work crews and contractors regarding measures to limit impacts on surrounding vegetation and to mitigate erosion hazards
- variation in access allowed for horses to individual reserves based on local conditions; horses are only permitted in certain parks and overnight camping with horses is restricted

Key protective measures applied to practice

- *plan of management* determines zones where road or track construction is acceptable
- *reserve fire management plans* determine which fire trails are required for fire management and which existing trails can be closed and rehabilitated
- *EIA on park* means that the environmental impacts of any construction or major upgrade and the continued use of the road/ track is assessed and considered when determining whether works should proceed
- *Guidelines for Park Facilities* document the aesthetic and technical aspects involved in the construction of public roads, fire trails and walking tracks in a range of vegetation types, soil types and landforms; included in these guidelines is advice on design for safety, use of surfacing materials, drainage, erosion mitigation, earthworks, maintenance and revegetation
- *Field Management Policies* require that all quarries receive development consent following EIA, that materials can only be used by the NPWS on the park and that rehabilitation must occur using local plants and soil

- *Field Management Policies* provide guidelines on access by 4WD vehicles, horses and bicycles (interim policy only)
- *pest management strategies* determine appropriate controls for weeds and feral animals along trails in reserves

Proposed changes

- wider adoption and implementation of Environmental Code of Practice for construction works (similar to that adopted in Snowy Mountains Region)
- adoption of erosion mitigation guidelines for all road works
- training of all plant operators and supervisors in erosion mitigation and appropriate handling of materials (including dangerous goods such as fuels)

Practices in access management currently meet the ESFM principles through:

- minimising and localising impacts on the environment through construction and maintenance of a minimum number of roads/ trails/ tracks and suitable location of new ones
- public input into road/ trail/ track location and standards through POM process

Critique of practice

- current EIA requirements ensure that future access developments only proceed following full consideration of environmental impacts; there are currently however some inconsistencies in the level of EIA performed for track/ trail upgrades; action is in place to reduce inconsistency
- in the past, there have been roads, trails and tracks constructed with little consideration of what future role they may perform and what the maintenance requirements may be
- 'traditional use' often over-rides environmental considerations and makes closure and rehabilitation of some environmentally damaging trails difficult to achieve
- maintenance work is often contracted out, without clear directives to contractors on the appropriate level of soil and vegetation disturbance and best practice
- insufficient funds exist for maintenance of existing network of roads, tracks and trails
- without an adopted strategic zoning of reserves within the broader public lands system, there is pressure to allow for recreational spectrum creep, because popular sites require hardened 2WD access and more development of tracks

Recommended improvements

- clear justification of existing (or proposed upgrades of) management trails through POM and RFMP processes
- better documentation in EIAs and protocols for routine management activities of mitigative measures and communication of these to work crews, through a site-specific environmental management plan
- adoption of strategic recreation planning over all public lands to prevent recreation spectrum creep and unnecessary upgrades of access roads
- progressive review of all existing roads/ trails/ tracks and closure/ relocation to reduce environmental impacts

4.7 Management of alien tenures

Description

- powerlines, optical fibre routes, other easements
- telecommunications towers
- RAAF bombing range (in Bundjalung NP)
- mineral exploration licences and mining in SRAs

• residences (including houses and permanent caravan sites)

Rationale

- alien tenures are usually pre-existing interests at the time of gazettal of reserve
- new alien tenures are usually not permissible if there is no direct link with park management objectives (e.g. powerline easements are usually only granted as part of an upgrade and electrification of a major camping area)
- location of recent telecommunications easements however have been determined by the need to minimise line costs

Location

most above-ground easements have been digitised as assets requiring protection from fire

Impacts associated with practice and how these are ameliorated

- accelerated erosion and fragmentation of native vegetation; ameliorated by revegetation of corridors or (if clearing has to be maintained) by reducing vehicular access along easement
- impacts on visual amenity; ameliorated by painting of towers
- use of herbicides to kill trees under powerlines; ameliorated through use of nonresidual herbicides and guidelines on other control measures (such as slashing, etc)
- closure of some sections of reserves to visitors; ameliorated by locating access and visitor facilities away from alien tenures and ensuring that safety signs are installed

Intensity

• localised to immediate easement

Variables associated with practice

• width of easement and associated clearing depends on the type of easement

Key protective measures applied to practice

- *Field Management Policies* stress that alien tenures are not an appropriate use of lands set aside for conservation, however licences or easements may be granted by the Minister on the requirements that:
- * a full scale EIS is completed to the satisfaction of the NPWS (not required for telecommunications facilities and optical fibre cables due to over-riding Commonwealth legislation),
- * conditions will minimise impacts on appropriate uses, and natural and cultural features of the area, and compliance with these conditions will be monitored, and
- * the operation of the easement will be reviewed to ensure conformity with set conditions
 - the Electrical Supply Industry's Guidelines for Powerline Easements in National Parks provides measures to mitigate impacts on the environment

Proposed changes

•

Practices in access management currently meet the ESFM principles through:

• ensuring EIA is addressed in most instances to minimise environmental impacts

Critique of practice

• maintenance of easements can be inconsistent with park management objectives

- attempts to minimise impacts by relocating easements or by replacing overhead powerlines with underground lines have usually been unsuccessful
- recommendations to revoke the land on which pre-existing private residences or other major alienations occur have not been acted upon

Recommended improvements

• review of guidelines for managing the impacts of alien tenures

5. DISCUSSION OF INDICATORS AND MONITORING METHODS

5.1 Current monitoring on NPWS lands

Currently, monitoring on NPWS reserves is not focused on priority areas and tend to be project driven. For example, monitoring is sometimes required as a condition of an EIA determination. Current monitoring efforts can be divided into monitoring of biodiversity, visitor satisfaction, and access.

Biodiversity

Monitoring of native species populations includes:

- <u>frog populations/ frog mortality</u>: conducted in the 97-98 summer, focused on NPWS reserves in the area north of the Richmond River, but also carried out work in other areas (including State forests) north of Barrington Tops; report not yet complete; funds not yet allocated for further years. NPWS reserves visited in this monitoring study included: Nightcap NP, Border Ranges NP, Mount Warning NP, Toonumbar NP.
- <u>eastern bristlebird</u>: targeted surveys for the northern, critically endangered population will shortly commence in Border Ranges NP to follow-up a detailed survey conducted a decade ago.
- <u>attempts to locate possibly extinct taxa</u>, including: Coxen's fig parrot (Richmond Range NP, Nightcap NP); *Litoria piperata* (Washpool NP, Mann River NR); and *Litoria castanea* (Little Llangothlin NR).
- recovery plan implementation: includes monitoring the health of populations (weed encroachment and population size) for several species, many since 1993. Species include Zieria prostrata (Moonee Beach NR), Acronychia littoralis (Broken Head NR, Brunswick Heads NR, Bundjalung NP, Cape Byron SRA); Elaeocarpus williamsianus (Inner Pocket NR); Elaeocarpus sp. minyon (Snows Gully NR); Grevillea beadleana (Torrington SRA, Guy Fawkes River NR); Olearia flocktoniae (Chaelundi NP, Dorrigo NP); Thesium australe (Kattang NR).

Similar actions may be proposed in recovery plans which are in the latter stage of preparation for the following species: square-stemmed rush (*Eleocharis tetraquatra*) (Fortis Creek NP); *Phaius australis* (Bundjalung NP, Yuraygir NP); *Allocasuarina defungens* (Khappinghat NR); *Quassia* sp. B (Moonee Beach NR); endangered flora of the Banyabba-Glenreagh sandstone belt (Banyabba NR; Fortis Creek NP; Sherwood NR); *Tylophora woollsii* (Bald Rock NP).

Possible monitoring actions on NPWS reserves will also arise out of the recovery plans in preparation for: forest owls; barred frogs; osprey; and forest bats.

Monitoring of exotic species populations includes:

- <u>populations of exotic species</u> (e.g. goats, stray cattle and brumbies) are regularly monitored in a number of reserves (such as Guy Fawkes River NP and Oxley Wild Rivers NP) using aerial mapping techniques.
- <u>pest species</u>: monitoring occurs as part of implementation of Pest Management Strategies. For example, the success of weeding programs is monitored to determine when follow-up work is required, and surveys to determine impacts on non-target species are carried out following aerial baiting for wild dogs and aerial spraying for bitou bush.

Visitor use

Visitor surveys are carried out in several parks (e.g. Mount Warning, Gibraltar Range, Dorrigo and Myall Lakes NPs) to determine visitor satisfaction and to identify recreational opportunities and facilities not adequately provided while preserving the desired recreation setting. Visitor usage of tracks and trails is being monitored through infra red counters, pressure pad counters (tracks) and pressure cable counters (trails) in an increasing number of parks (e.g. Dorrigo NP, Mount Warning NP and Border Ranges NP). In Dorrigo NP monitoring points have been established for walking track erosion and compaction.

Access

Trails and roads open to the public are subject to regular monitoring and upkeep to ensure they are safe and that they pose minimal erosion hazard. Fire trails (and fire-fighting utilities - such as views from natural and made lookouts, access to water points) are checked before the start of each fire season.

Walking tracks are checked and maintained as necessary. High usage tracks (Mount Warning NP; Border Ranges NP; Yuraygir NP) are checked and repair track work carried out regularly.

5.2 Proposed monitoring for NPWS

Further monitoring in NPWS reserves is likely. Recovery plans are being prepared as a priority for all species listed on Schedule 1 (Endangered) of the TSC Act; most of these will include monitoring as a vital element and the NPWS has a policy of implementing recovery plans for the species known from its reserves.

In addition, monitoring is now being incorporated into reserve plans of management (as per National Biodiversity Strategy and requirements for monitoring reports for World Heritage properties) and into reserve fire management plans.

The NPWS is setting in place a hierarchy of indicators from the corporate down to the reserve level. Key components of this are:

Corporate Performance Indicators

The Corporate Performance Indicators are still at an early stage of development, although the overall approach (which is a Balanced Scorecard performance-based framework) and the various goals and some proposed indicators have been drafted. These indicators fit under broad objectives such as nature conservation, and sustainable recreation and tourism.

The focus of this process is to determine how well we are achieving corporate objectives. Although they will eventually influence the on-ground indicators, they are limited to a wholeof-agency perspective and hence provide only a broad performance-based management framework.

At the moment, each of the proposed indicators are being investigated to ensure their intent and the nature of the indicator is clear, and to examine the logistics of collecting, analysing and reporting on the data. Implementation will be carried out over the next 3-4 years.

Environmental Management

A gap analysis in NPWS's performance and awareness of environmental management is currently underway. This will assess the NPWS's current performance and outline specifications for the preparation of an NPWS Environmental Management System (EMS).

The EMS will guide actions and priorities to improve the NPWS's environmental performance over time, in line with the NPWS Environmental Policy. This will be measured through indicators, such as training/ awareness in pesticide and waste management. The EMS may be completed by the end of 1998. Its application will be NPWS wide.

State of the Parks

A State of the Parks (SoP) report is a component of the Government's Park Restoration and Improvement Program, an initiative of the *Nature Conservation Strategy*.

The State of the Parks performance indicators are currently being selected in consultation with park managers and influenced by the ANZECC's recent recommendations on best practice indicators for reserve management.

World Heritage monitoring report

The World Heritage Committee has requested regular monitoring reports on the health of each World Heritage property, in order to determine whether the World Heritage values for which the property is listed are being conserved for transmission to future generations. The only World Heritage property in the UNE/LNE CRA regions is the Central Eastern Rainforest Reserves (Australia) which comprises several national parks including all or part of the following national parks: Border Ranges, Nightcap, Mount Warning, Toonumbar, Tooloom, Richmond Range, Washpool, Gibraltar Range, New England, Dorrigo, Oxley Wild Rivers, Werrikimbe, Willi Willi and Barrington Tops; and all of Limpinwood, Numinbah, Iluka, Mount Hyland and Mount Seaview Nature Reserves.

No indicators have yet been established, though draft indicators will be developed over the next 12 months in consultation with SFNSW, Qld Department of Environment and Qld Department of Natural Resources.

6. CONCLUSIONS

The NPWS is a major conservation agency in NSW. Ecologically sustainable management has two dimensions for the NPWS - as a functional responsibility which stems from the NPWS's legislative basis, and as an operational management obligation.

The existence of public advisory committees for each NPWS District and targeted stakeholder and neighbour meetings over specific issues allows a greater level of public consultation at an earlier stage of policy and operational planning than for any other NSW Government agency. Regional planning across public land tenures, as in the recently completed Recreation and Tourism Strategy for the Northern Region, allows for a spectrum of opportunities for recreation within the region.

In line with major environmental corporate objectives, the NPWS has established a system of ecologically based planning and operational practices in all lands under its management. These achieve the desired outcomes of ecologically sustainable management of the forests and other biomes present.

The implementation of the system is however at present not necessarily comprehensive and it is not currently subjected to systematic or regular audits.

Some opportunities for further improvement exist, all of which have been acknowledged by the NPWS:

- 1. increasing the opportunities for public participation in reserve and wider planning;
- 2. making the strategies and actions outlined in plans of management less open-ended;
- 3. reducing the state-wide inconsistencies that currently exist in the level of environmental impact assessment of activities within NPWS reserves;
- 4. increasing the training opportunities for staff regarding pollution control, chemical use, environmental planning and assessment, and public communication;
- 5. formulating generic codes of practice and site-specific environmental action plans to provide for systematic communication to park field workers regarding the on-ground constraints within which they must complete their operations; and
- 6. incorporating targets and monitoring performance indicators into plans of management, fire management plans and operational plans.

Several internal reviews have been initiated by the NPWS to recommend and implement the necessary changes. For example, most of the recommendations from the review of EIA procedures will be implemented by December 1998. The first State of the Parks reporting for the health of each NPWS reserve will be initiated in the next 12 months.

Appendix 1: ESFM Principles

Five ESFM principles have been established:

- 1. To maintain or to increase the full suite of forest values for present and future generations across the NSW native forest estate. These values include:
 - biodiversity (at the community, species and genetic level, including threatened species and endangered populations);
 - the productive capacity and sustainability of forest ecosystems and ecological processes;
 - forest ecosystem health and vitality;
 - soil stability and functions, and water quality;
 - a positive contribution to global geochemical cycles;
 - long-term social and economic benefits; and
 - other natural and cultural values, including aesthetic, landscape, historic, cultural, educational, scenic, spiritual and scientific values.
- 2. to ensure public participation, access to information, accountability, openness and transparency in the decision making process leading to and delivery of ESFM.
- 3. to ensure legislation, policies, institutional framework, codes, standards and practices related to forest management require and provide incentives for ecologically sustainable management of the native forest estate.
- 4. to apply precautionary principles for prevention of environmental degradation, including careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and an assessment of the risk-weighted consequences of various options.
- 5. to apply adaptive management processes with continuous improvement based on best science and expert advice and targeted research on critical gaps in knowledge, monitoring or evaluation.

Appendix 2a. Geographic extent of NPWS Plans of Management (Protective Measure/ Protocol)

ADOPTED PLAN	PLAN EXHIBITED	PLAN IN PREPARATION
Andrew Johnston Big Scrub NR	(AWAITING ADOPTION)	Bald Rock NP
Boatharbour NR	Cudgen NR	Billinudgel NR
Border Ranges NP	Dorrigo NP	Bongil Bongil NP
Broadwater NP	Little Llangothlin NR	Boonoo Boonoo NP
Broken Head NR	Tweed Heads Historic Site	Cathedral Rock NP
Brunswick Heads NR	Ukerebagh NR	Chaelundi NP
Bundjalung NP	Washpool NP	Demon NR
Davis Scrub NR	Yuraygir NP	Mount Jerusalem NP
Gibraltar Range NP		Tooloom NP
Hayters Hill NR		Toonumbar NP
Iluka NR		Torrington SRA
Limpinwood NR		
Mount Warning NP		
New England NP		
Nightcap NP		
Numinbah NR		
Tyagarah NR		
Victoria Park NR		
Wilson NR		

Upper North East CRA region

Lower North East CRA Region

ADOPTED PLAN	PLAN EXHIBITED	PLAN IN PREPARATION
Arakoon SRA	(AWAITING ADOPTION)	Bellinger River NP
Booti Booti NP	Barrington Tops NP	Bongil Bongil NP
Bouddi NP	Dorrigo NP	Cathedral Rock NP
Brisbane Water NP	Hat Head NP	Dooragan NP
Burning Mountain NR	Hexham Swamp NR	Goulburn River NP
Crowdy Bay NP	Kooragang Island NR	Kattang NR
Dharug NP	Lake Innes NR	Oxley Wild Rivers NP
Glenrock SRA	Tomaree NP	Parr SRA
Limeburners Creek NR	Wollemi NP	Popran NP
Munmorah NR		Werrikimbe NP
Myall Lakes NP		Yengo NP
New England NP		
Sea Acres NR		
Wamberal Lagoon NR		
Wyrrabalong NP		

Appendix 2b. Geographic extent of NPWS Fire Management Plans (Protective Measure/ Protocol)

ADOPTED	PLAN IN PREPARATION		NO PLAN
PLAN			REQUIRED
Bundjalung	Bald Rock NP	Nymboida NP	Andrew
NP		-	Johnston Big
	Banyabba NR	Richmond Range NP	Scrub NR
	Billinudgel NR	The Basin NR	Boatharbour NR
DRAFT PLAN EXISTS	Boonoo Boonoo NP	Toonumbar NP	Broken Head NR
Bongil Bongil	Border Ranges NP	Torrington SRA	Brunswick
NP		-	Heads NR
Broadwater NP	Cathedral Rock NP	Tyagarah NR	Davis Scrub NR
	Chaelundi NP	Washpool NP	Hayters Hill NR
	Cudgen NR		Iluka NR
	Demon NR		Lennox Head
			AA
	Fortis Creek NP		Moore Park NR
	Gibraltar Range NP		Numinbah NR
	Guy Fawkes River NP		Richmond River NR
	Guy Fawkes River NR		Snows Gully NR
	Hortons Creek NR		Stotts Island NR
	Limpinwood NR		Susan Island
	-		NR
	Moonee Beach NR		Tucki Tucki NR
	Mount Neville NR		Ukerebagh NR
	Nymboi-Binderay NP		Victoria Park
	-		NR

Upper North East CRA Region

Lower North East CRA Region

ADOPTED PLAN	PLAN IN PREPARATION		NO PLAN
			REQUIRED
Crowdy Bay NP	Bellinger River N P	Mount Royal NP	Bandicoot
			Island NR
	Bowraville NR	Mount Yarrowyck NR	Coocumbac Is
			NR
	Brisbane Water NP	Munmorah SRA	Coolongolook
			NR
	Cathedral Rock NP	Oxley Wild Rivers NP	Macquarie NR
DRAFT PLAN	Clybucca Historic Site	Popran NP	Mills Island NR
EXISTS			
Bongil Bongil	Cockle Bay NR	Serpentine NR	Moffats Swamp
NP			NR
Bouddi NP	Dooragan NP	The Basin NR	Nambucca AA
Kattang NR	Dungirr NP	Tomaree NP	Sea Acres NR
Limeburners Ck	Goulburn River NP	Werrikimbe NP	Snapper Island
NR			NR
Myall Lakes NP	Hat Head NP	Wollemi NP	Weelah NR
Willi Willi NP	Howe Aboriginal Area	Wyrrabalong NP	Willi Willi
		-	Caves NR
	Lake Innes NR		Yarravel NR

Manobalai NR Yessabah	n NR
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APPENDIX D

FOREST USES CODE SYSTEM – STATEWIDE BIODIVERSITY PROTECTIVE MEASURES
REVIEW OF PROTECTIVE MEASURES AND FOREST PRACTICES.

STATEWIDE PROTECTIVE MEASURES.

Report prepared by the new South Wales National Parks and Wildlife Service July 1998.

This report forms part of the NSW NPWS input to the CRA/RFA Project report PA4/2 " Review of protective measures and forest practices and application of these into language for information systems".

The *Threatened Species Conservation Act* 1995 (TSC Act), introduced on 1 January 1996, provides the legislative framework for the protection and conservation of threatened species in NSW. The Act covers both plants and animals and differentiates two levels of threatened: endangered and vulnerable.

The objects of the Act, broadly, are to conserve biological diversity and promote ecologically sustainable development. The Act also seeks to prevent the extinction and promotes the recovery of threatened species, populations and ecological communities. Further, the Act seeks to ensure that the impact of any action affecting threatened species, populations and ecological communities is properly assessed and that appropriate ameliorative measures are applied to mitigate the impact of such actions.

Nonetheless, the TSC Act recognises that, in some circumstances, an action may result in harm or pick of a threatened species or its habitat. As such, the Act provides for the issuing of a licence if the action is likely to be significant or a certificate if the impact is not significant. An alternative to a licence is a property management plan, which must be approved by the Director-General of National Parks and Wildlife. An approval under the TSC Act is not required if the activity is conducted in accordance with an approval under either Part 4 or Part 5 of the *Environmental Planning and Assessment Act* 1979.

The TSC Act provides a number of mechanisms to conserve threatened species and promote their recovery. These include the requirement for the preparation and implementation of recovery plans, the declaration of critical habitat, the preparation and implementation of threat abatement plans to manage key threatening processes and the preparation of a biological diversity strategy. Each of these is described briefly below. However, together these form the basis of the statewide protective measures that can be applied to forestry practices within NSW.

CRITICAL HABITAT.

The TSC Act provides for the declaration of habitat that is critical to the survival of endangered species, endangered populations and endangered ecological communities. Critical habitat cannot be declared for vulnerable species.

The Director- General of NPW must consult with the Scientific Committee in preparing nominations for critical habitat. In turn, the Director- General must refer any recommendations for consideration by the Minister. Where a nomination may affect a public authority, the Minister for the Environment is to consult with the Minister responsible for that public authority.

At this time, there is no critical habitat declared in NSW. The current direction within NPWS is that the recovery planning process will drive the nomination of critical habitat. A consequence of declaring critical habitat is that a species impact statement is required for any application for approval of an activity which may affect critical habitat.

Critical habitat applies across land tenures and could be used to conserve areas on and off NPWS estate for threatened species, ecological communities and populations. While the Minister for the Environment must consult with affected Ministers, the concurrence of those Ministers is not essential for the declaration of critical to be approved

RECOVERY PLANS.

Recovery plans must be prepared for all threatened species, endangered populations and endangered ecological communities. The TSC Act specifies timeframes for developing recovery plans which are consistent with corresponding Commonwealth legislation.

Where a public authority is responsible for the implementation of a measure to be included in a recovery plan, the Minister for the Environment must consult with the Minister responsible for that public authority. Furthermore, a measure must not be included in a recovery plan for implementation by a public authority unless the Minister responsible for that public authority approves the inclusion of the measure.

The TSC Act currently lists over 700 species as threatened in NSW. Many of these are forest dwelling species, of which a significant proportion may be affected by specified forestry or associated impacts, such as weed or feral predator invasion.

In view of this, the recovery planning process provides for an effective mechanism to address ameliorative measures which may reduce the impact of forestry activities on susceptible threatened species, populations and ecological communities. Ideally, the relevant actions set down in the recovery plan should be implemented by way of licence condition. Nonetheless, the requirement of the TSC Act that the relevant Minister approves the measures to be implemented by the public authority for which that Minister is responsible, ensures that a cooperative approach applies to the implementation of recovery actions.

Given the potential role of recovery planning in defining protective measures, the RFA should include a process to enable agreed measures set down in recovery plans to be incorporated into the agreement. Field experience and ongoing research and monitoring will provide information to refine the ameliorative measures expressed as licence conditions by NPWS. In some cases, this may result in a relaxation of licence conditions while in others the licensing requirements may need to be strengthened. Any change to licence conditions (that is , ameliorative measures) will need to be balanced with the impacts on quota sawlog supply.

It is important then, that the recovery planning process and the protective measures are interactive. The RFA should recognise tis position.

To date, no recovery plans have been formally adopted under the TSC Act. A number of recovery plans, prepared under Commonwealth guidelines, have been implemented in NSW and are being modified to meet TSC Act standards. In all, 71 recovery plans, incorporating approximately 100 species, are under preparation. Recovery plans under preparation are listed in Attachment 1.

The draft recovery plans for *Quassia* and *Olearia* are attached as examples for consideration. These plans, while in draft form, demonstrate the manner in which ameliorative measures may reduce the impact of forestry activities and how such measures could be used to develop licence prescriptions.

The TSC Act requires that the draft recovery plans must be advertised and submissions sought from affected parties and the general public. The Director-General **must** consider all submissions received and **may** amend the draft recovery plan to take into account matters raised in submissions and/or advice given by the Scientific Committee. In addition, the Director- General must have regard to the likely social and economic consequences of making the plan and minimising any significant social and economic consequences.

A recovery plan must consider the full range geographic range of the threatened species, population or ecological community in NSW. Consequently, a recovery plan may propose different ameliorative measures in different parts of the range of threatened species to reflect the different threatening processes operating in these regions.

An adopted and approved recovery plan will have a monitoring program specified and provision for review after a period (usually five years). This enables an assessment of the effectiveness of the recovery actions and the opportunity to refine and amend these actions as necessary.

In summary, a recovery plan provides an effective mechanism to detail appropriate protective measures to mitigate the impacts of forestry activities on threatened species. As recovery plans will continue to be produced into the future, and periodically reviewed, it is important that the RFA provides a mechanism for these measures to be incorporated into SFNSW's operations, either by cooperative arrangements or regulatory approach as per licence conditions.

Threat Abatement Plans and Key Threatening Processes.

The TSC Act provides for a threatening process to be listed as a key threatening process if, in the opinion of the Scientific Committee, it adversely affects two or more threatened species, endangered populations or endangered ecological communities or could cause species, populations or communities to become threatened. It is the Scientific Committee's responsibility to determine which processes should be listed. Having listed a key threatening process, the TSC Act requires the Director- General to prepare a threat abatement plan. When preparing a threat abatement plan, The Director-General must have consideration of the likely social and economic consequences of making the plan, the most efficient and effective use of resources for the conservation of the affected species, populations and communities and the desirability of minimising any significant adverse social and economics consequences.

As with recovery plans, the Minister for he Environment must liaise with the relevant Minister if a public authority is to be responsible for implementing any action or measure in a threat abatement plan. Further, such a plan must not include any measure for implementation by a public authority unless the relevant Minister approves the inclusion of the measure. Threat abatement plans are required to be reviewed and public authorities responsible for implementing actions in such a plan must report on progress with its implementation.

To date, the European Fox has been listed as a key threatening process and a draft threat abatement plan has been prepared. Clearly, this plan, when finalised, should complement the feral animal control programs required of SFNSW by the Conservation Protocols.

As with recovery planning, there should be strong links between the measures and actions in the threat abatement plan and the protective measures applied in the forest estate. The RFA should include a mechanism to enable the inclusion of measures specified in threat abatement plans.

Biological Diversity Strategy

The TSC Act requires the Director- General to prepare a biological diversity strategy. The strategy will include proposals for ensuring the survival and evolutionary develop The strategy will contribute to ecologically sustainable development and include the integration of biological diversity conservation and natural resource management.

A draft strategy has been prepared and placed on exhibition for comment. As yet, the draft strategy has not been finalised.

The draft strategy specifically addresses forestry management strategies and encourages the establishment of plantations, promotes the undertaking of strategic research, seeks to ensure that biodiversity conservation is fully considered during strategic and operational planning, calls for the development of codes of logging practice that require logging on public and private land to fully account for the conservation of biodiversity and seeks the rehabilitation of harvesting sites at the completion of logging. The draft strategy also proposes the need to effectively manage weeds and pest animals and to improve fire management regimes.

The biological diversity strategy, then, complements the TSC Act and sets the broad context under which forestry operations should be conducted and protective measures applied.

Documents prepared under the TSC Act

A. Identified Critical Habitat

Nil

B. Threat Abatement Plans

A draft European fox threat abatement plan has been prepared, no other formal plans have been developed, although Bitou bush (*Chrysanthemoides monilifera* spp. *rotundata*) and the Mosquito Fish (*Gambusia affinis*) have been proposed.

C. Recovery Plans

Proposed exhibition dates, expected draft completion dates and amendment datas for Recovery Plans. Please note all dates are **indicative only**.

NSW Recovery Plans				
Recovey Plan Name	Responsibility Centre	Expected draft completion		
Little Term	TELLCADD	uate		
	ISU-CAPD	D 1 1000		
Allocasuaria defungens	Northern Zone	December 1998		
Angiopteris evecta	Northern Zone	August 1998		
Astrotricha roddii	Northern Zone	October 1998		
Callitris oblonga	Northern Zone	February 1999		
Coaldale-Sandstone	Northern Zone	December 1998		
species				
Acacia ruppii, Eucalyptus				
pachycalyx, Grevillea				
masoni, Lindsea incisa,				
Melichrus sp. A 'hirsutus'				
and Triplarina imbricata).				
Coxen's Fig Parrot	Northern Zone	October 1998		
Diospyros mabacea	Northern Zone	November 1998		
Eleocarpus minyon	Northern Zone	December 1998		
Eleocharis tetraquetra	Northern Zone	August 1998		
Forest Bats	Northern Zone	December 1998		
Grevillea beadleana	Northern Zone	October 1998		
Large forest Owls	Northern Zone	December 1999		
Litoria castenea	Northern Zone	August 1998		
Litoria piperata				
Mixophyes spp	Northern Zone	November 1998		
Olearia flocktoniae	Northern Zone	October 1998		
Owenia cepiodora	Northern Zone	February 1999		
Pandion haliaetus	Northern Zone December 1998			
(Osprey)				

Table 1: Recovery Plan status report

NSW Recovery Plans				
Recovey Plan Name	Responsibility Centre	Expected draft completion date		
Phaius orchids	Northern Zone	October 1998		
Pseudomys oralis	Northern Zone	December 1998		
Quassia sp B	Northern Zone	November 1998		
Tylophora woollsii	Northern Zone	November 1998		
Zieria Prostrata	Northern Zone	Exhibited		
Acacia pubescens	Sydney Zone	June 1998		
Allocasuarina portuensis	Sydney Zone	March 1998		
Bathurst Copper Butterfly	Sydney Zone	December 1998		
Cumberland Plain Woodland	Sydney Zone	September 1998		
Darwinia biflora	Sydney Zone	June 1998		
Epacris hamiltonii	Sydney Zone	April 98		
Goulds Petrel	Sydney Zone	June 98		
Green and Golden Bell	Sydney Zone	December 98		
Frog		X 00		
Little Penguin (Manly Endangered population)	Sydney Zone	June 98		
Long-nosed Bandicoot	Sydney Zone	July 98		
Persoonia mollus	Sydney Zone	September 98		
Phebalium lachnoides	Sydney Zone	April 98		
Prostanthera sp 8	Sydney Zone	June 98		
Pterostylis gibbosa	Sydney Zone	September 98		
Squirrel Glider (Barrenjoey Endangered population)	Sydney Zone	December 98		
Tetratheca glandulosa	Sydney Zone	December 98		
Tetratheca juncea	Sydney Zone	December 98		
Wollemi Pine	Sydney Zone	Exhibited		
Black eared Miner	Western Zone	April 98		
Cadellia pentastylis	Western Zone	June 98		
Caladenia arenaria (replaces Sting wacoolica	Western Zone	June 98		
Grevillea kennedvana	Western Zone	April 98		
Hakea nulvinifera	Western Zone	Iune 98		
Regent Honeyeater	Western Zone	May 98		
Regent Parrot	Western Zone	Inne 98		
Stipa nullanulla	Western Zone	June 98		
Superb Parrot	Western Zone	Iune 98		
Yellow Footed Rock	Western Zone	May 98		
Wallaby				
Zieria obcordata (replaces Lepidium monoplociodes	Western Zone	June 98		
Ammobium craspedioides	Southern Zone	Dec 1998		
Bomaderry Zieria	Southern Zone	Apr 1999		
Broad-toothed Rat	Southern Zone	New addition		
Crimson Spider Orchid	Southern Zone	TBD		
Eastern Bristlebird	Southern Zone	June 1998		
Eastern Lined Earless	Southern Zone	May 1998		
Dragon		-		

NSW Recovery Plans			
Recovey Plan Name	Responsibility Centre	Expected draft completion	
		date	
Erythranthera pumila	Southern Zone	New addition	
Golden Sun Moth	Southern Zone	December 1998	
Grevillea iaspicula	Southern Zone	June 1998	
Grevillea rivularis	Southern Zone	Aug 1998	
Grevillea wilkinsonii	Southern Zone	June 1998	
Ground Parrot	Southern Zone	June 1998	
Hooded Plover	Southern Zone	New addition	

Long-footed Potoroo	Southern Zone	June-1998 ¹
Multi -Species Recovery	Southern Zone	New addition
Plan: (<i>Caladenia rosella</i> ,		
Cullen parvum, Euphrasia		
<i>collina</i> ssp <i>muelleri</i> ,		
Euphrasia scabra,		
Gentiana baeuerlenii,		
Irenepharsus magicus,		
Pultenaea parrisiae subsp.		
Elusa, Viola		
cleistogamoides)		
Pseudophryne corroboree	Southern Zone	June 1998
Pseudophryne pengilleyi	Southern Zone	New addition
Pygmy Possum	Southern Zone	Dec 1998 ²
Rutidiosis	Southern Zone	June 1998
leptorrhynchoides		
Southern Brown	Southern Zone	June 1998
Bandicoot		
Striped Legless Lizard	Southern Zone	May 1998
Swainsona recta	Southern Zone	Oct 1998
Swift Parrot	Southern Zone	Oct 1998
Triplarina nowraensis	Southern Zone	Apr 1999

Northern Zone Recovery Plans

1. Zieria prostrata

Final plan submitted for Ministerial approval.

2. Angiopteris evecta (Giant Fern)

The Giant Fern recovery plan is currently with the Director-General awaiting sign-off. Assuming the document is endorsed within the next few days the public consultation phase will commence on the 31 July.

¹ Dependant upon outcomes of Eden RFA

 $^{^2}$ The original date is technically possible, however it is expected that the plan will take some time getting through the recovery team

3. *Litoria castanea* (Yellow-spotted Bell Frog) and *Litoria piperata* (Peppered Tree Frog).

Draft Recovery Plan being forwarded to the Director-General on the 27 July 1998. The public consultation phase is expected to commence on the 31 August 1998.

4. Eleocharis tetraquetra (Square-stemmed Spike-rush)

The consultation phase with public authorities is in its final stages, once agreement has been reached a copy will be forwarded to the Director-General on the 11 August with an expected release for public consultation on the 31 August 1998.

5. (*Psittaculirostris [Cyclopsitta] diophthalma coxeni*) Coxen's Fig-Parrot

Draft plan complete and endorsed by the Recovery Team. A very large number of public authorities will need to be consultated and agreement reached on the actions before a copy of the draft plan is forwarded to the Director-General. Draft plan expected to be released for public consultation in October 1998.

6. Olearia flocktoniae (Dorrigo Daisy)

Draft plan requires minor modification but is essentially complete, consultation with public authorities required (State Forests of NSW), before the document is forwarded to the Director-General for his endorsement. Draft plan expected to be released for public consultation in October 1998.

7. Phais australis and Phais tankervilliae (Swamp Orchids)

Draft plan requires minor modification but is essentially complete, consultation with a number of public authorities required, including Local Government, before the document is forwarded to the Director-General for his endorsement. Draft plan expected to be released for public consultation in November 1998.

8. *Diospyros mabacea* (Red-fruited ebony)

Draft plan requires minor modification but is essentially complete, consultation with public authorities required, before the document is forwarded to the Director-General for his endorsement. Draft plan expected to be released for public consultation in November 1998.

9. Quassia sp. B "Mooney Creek'

Draft plan requires minor modification but is essentially complete, consultation with public authorities (State Forests of NSW, Local Government) required, before the document is forwarded to the Director-General for his endorsement. Draft plan expected to be released for public consultation in November 1998.

10. Grevillea beadleana

Draft plan requires minor modification but is essentially complete, consultation with public authorities (State Forests of NSW, Local Government) required, before the document is forwarded to the Director-General for his endorsement. Draft plan expected to be released for public consultation in November 1998.

11. Tylophora woollsii

Draft plan requires minor modification but is essentially complete, consultation with public authorities (State Forests of NSW, Local Government) required, before the document is forwarded to the Director-General for his endorsement. Draft plan expected to be released for public consultation in November 1998.

12. Astrotricha roddii (Rod's Star-hair)

Draft plan requires minor modification but is essentially complete, consultation with public authorities (State Forests) required, before the document is forwarded to the Director-General for his endorsement and release for public consultation. Plan expected to be released for public consultation in November 1998.

13. Mixophyes balbus, Mixophyes fleayi, Mixophyes iteratus (Great Barred Frogs).

Draft plan requires some revision, most of the background information has been compiled, however the actions and costing tables need to be either incorporated or revised. A very large number of public authorities will need to be consultated and agreement reached on the actions before a copy of the draft plan is forwarded to the Director-General.

14. Flora of the Glenreagh - Coaldale Sandstone belt (Acacia ruppii, Eucalyptus pachycalyx, Grevillea masoni, Lindsea incisa, Melichrus sp. A 'hirsutus' and Triplarina imbricata)

Background information for the plan has been prepared, further information is required on biology and ecology, implementation, actions and costings sections. Plan not expected to be completed until December 1998.

15. *Pseudomys oralis* (Hastings River Mouse)

Background information for the plan has been prepared, further information is required on biology and ecology, social and economic consequences, implementation, actions and costings sections. Plan not expected to be completed until December 1998.

16. Large Forest Owls (Powerful Owl Ninox strenua, Masked Owl Tyto novaehollandiae, Sooty Owl Tyto tenericosa) (Northern Regional Recovery Plan).

Background information prepared by Stephen Debis. This plan will not be progressed until a state wide recovery plan has been prepared.

17. *Pandion haliaetus* (Osprey)

Background information for the plan has been prepared by Greg Clancy, further information is required on biology and ecology, implementation, actions and costings sections. Plan not expected to be completed until December 1998.

18. Allocasuarina defungens

Background information for the plan has been prepared, further information is required on biology and ecology, implementation, actions and costings sections. Plan not expected to be completed until December 1998.

19. Forest Bats of NSW (17 schedule 2 species)

Background information currently being prepared by Brad Law. Final draft due on the 1 September.

20. Callitris oblonga

Species management plan available, however, no plan has been prepared under the TSC Act.

21. Elaeocarpus sp. 2 'minyon'

Preliminary draft available, however, the document requires the incorporation of survey results and major modifications to mirror the TSC Act requirements.

APPENDIX E

FOREST USES CODE SYSTEM – FOREST PRACTICES AND PROTECTIVE MEASURES FOR USE IN STATE FORESTS OF NSW

Ecologically Sustainable Forest Management

NSW CRA/RFA PROJECT #4/2

FOREST PRACTICES CODE PROTECTIVE MEASURES AND FOREST PRACTICES FOR USE IN STATE FORESTS IN NSW

PART 1 PROTECTIVE MEASURES USED BY USED BY STATE FORESTS NSW

1. DEFINITIONS

3. SPECIFIC VALUES

4. SIGNIFICANT PROTECTIVE MEASURES USED BY STATE FORESTS

- P.1 Forestry Act
- P.2 Forestry Regulation
- P.3 Environmental Policy Statement
- P.4 Policies for fuel management in native forests and other fire management policies
- P.5 Policy on native forest preservation
- P.7 Policy on hunting on state forests
- P.8 Policy on firewood harvesting from State forests
- P.9 Draft policies and instructions for native forest management systems
- P.10. Management Classification Zoning System
- P.11 Forest Practices Code Part 1 Harvesting State forest plantations
- P.12 Forest Practices Code Part 2 Harvesting native forests State forests and Crowntimber lands
- P.13 Forest Practices Code Part 3 Plantation establishment and maintenance
- P.14 Forest Practices Code Part 4 Forest roads and fire trails construction, use and maintenance
- P.15 Ecosystem Field Guides
- P.16. Silvicultural instructions

5. SIGNIFICANT PROTECTIVE MEASURES DEVELOPED BY OTHER AGENCIES IN CONSULTATION WITH STATE FORESTS AND USED BY STATE FORESTS

- EP.1 Standard Erosion Mitigation Guidelines for Logging in NSW
- EP.2 Conservation Protocols
- EP.3 Soil Erosion and Sedimentation Control Strategy for the Establishment of Eucalypt Plantations in Northern NSW(Plantation SCS)
- EP.4 1998/99Pollution Control Licence
- EP.5. Timber Plantation (Environment Protection) Harvesting Code 1997

1. **DEFINITIONS**

A "**current practice**" means any forest practice that is in use, or has been in use within the past ten years, and from which the results of that practice can be clearly demonstrated in the field.

A "**specific value**" means any resource, species, naturally occurring ecological association, process or system in the forest environment that requires sufficient protection from human activities in the forest to ensure its adequate survival or continuation.

A "**protective measure**" means any rule, condition, process or activity that is required to protect the attributes of an entity. Some protective measures may be forest practices in their own right (eg forest practices associated with conservation). Others will either exclude certain forest practices or modify others.

A "**forest practice**" means any organised human activity undertaken in the forest environment and may be composed of a number of different tasks that are required to implement the practice.

For example major road construction is a forest practice that involves the tasks of survey, design, earthworks, drainage structure installation, etc. Tasks should not be considered practices unless they have significant impacts or are considered practices in protective measures.

Forest practices support the following broad activities in forest management:

- Survey;
 - Strategic planning for land use and resource allocation;
- Conservation of natural and cultural attributes of the forest; Operational planning;
- Provision of forest access;
- Harvesting of timber and other consumable and renewable forest resources, goods and services;
- Control of non-consumptive forest uses;
- Protection of the forest environment against wild-fire, pests and diseases; and,
- Sustention of social and economic forest values within an ecologically sustainable framework.

3. SPECIFIC VALUES

The National Forest Policy Statement and the National and NSW Biodiversity Strategies are the underpinning basis which State Forests NSW, as a state public land management agency, is committed to identify and protect specific values found in the forest environment.

The National Forest Policy Statement commits State Forests to adoption of the Principles of Environmental Care while various sections of the goals and objectives of the NSW Biodiversity Strategy nominate State Forests as the lead agency in the implementation of ecologically sustainable forestry management practices (Objective 4.5).

State Forests has adopted the schedule of specific values set out in Appendix 3 but has amalgamated these into more generic groupings where the actual protective measures required can be applied overall to a set of specific values rather than individual attributes.

For example, the protection of specific species of threatened flora or fauna is not dealt with in detail. In this instance, State Forests and NPWS are already reviewing the Conservation Protocols and the associated Survey protocols for specific species. In the context of this project, State forests considers that outcomes should be principle based rather than overly prescriptive and detailed. A similar approach has been made to soil and water protective measures.

SIGNIFICANT PROTECTIVE MEASURES USED BY STATE FORESTS

In this section discussion is centred on the descriptions and rules concerning protective measures that are set out in various instructions. The role of certain forest practices as protective measures more fully discussed under each forest practice where applicable.

The protecting measures used by State Forests are a hierarchical set of instructions that interpret and expand on the basic objectives of the Forestry Act. The Act itself specifies broad measures for the conservation and protection of the forest estate and for the utilisation of timber and provision of supply of other goods and services in a sustainable manner.

Supporting instructions include a *Forest Practices Code* of which four parts are currently published or are in preparation, and a number of other policies, operational circulars, protocols and guidelines prepared and approved jointly with other agencies through memoranda of understanding.

It is important to note that the *Forest Practices Code* has two characteristics as a document that nominates protective measures. It is a *secondary* document that which draws from other documents that nominate protective measures and frequently cross-references with those documents. It is also a *holistic* Code that not only describes environmental and ESFM protective measures but also prescribes protective measures for occupational health and safety, timber and product utilisation standards, and safeguards against theft, fraud in relation to timber and revenue.

In this report, only matters pertinent to ESFM are dealt with. The same applies to other State Forests instructions that have similar holistic functions.

The question of consolidation of all instructions into one Forest Practices Code for NSW is discussed in the Appendix to Volume 2 Forest Practices. A proposed format for such a code is set out in Volume 3.

Since 1992, State Forests has adopted an inclusive approach to protective measures prescribed through other agencies' own documents. This has lead to significant overlap and often to variations in perceived intent. For example, conditions set out in the *Pollution Control Licence* issued to State Forests which are similar to guidelines set out in the *Standard Erosion*

Mitigation Conditions for Logging in NSW but which do not quite align, have given rise to confusion. In this report, reference will be made to some of these variations where they affect State Forests' own instructions.

All specific values are all in one way or another subjected to protective measures included in State Forests' instructions either as a secondary measure, or at a more general level. There is difficulty in assessing the appropriate level of prescription required to protect some specific values without compromising protection of other values or requiring an unachievable level of control.

P.1 Forestry Act

P.1.1 DESCRIPTION

The Forestry Act underpins the management of those public forests in New South Wales that are dedicated as State forests or designated as Crown-timber land. The Act includes the following directives relevant to ESFM.

- To conserve and utilise the timber on Crown-timber lands to the best advantage of the State. (FA1)
- To provide adequate supplies of timber from Crown-timber lands for building, commercial, industrial, agricultural, mining and domestic purposes. (FA2)
- To preserve and improve, in accordance with good forestry practice, the soil resources and water catchment capabilities of Crown- timber lands. (FA3)
 - To take all practicable steps considered necessary to ensure the preservation and enhancement of the quality of the environment. (FA4)
 - To maintain an area of not less than 3 600 000 hectares dedicated as State forest (FA5)
 - To dedicate land as flora reserve for the preservation of native flora and prepare working plans for flora reserves to receive ministerial approval.(FA6)
 - To promote and encourage the use of State forests and Flora reserves as a recreation and to conserve birds and animals thereon. (FA7)
 - To maintain an area not less than 600 000 hectares for the purposes of afforestation with trees of the exotic coniferous species. (FA8)

P.1.2 REVIEW

The directives set out in the Forestry Act have been very effective in determining the framework for the introduction of ESFM into State forest management in NSW. These general directives derived from the Act form the basis for the more detailed protective measures set out in other instructions. They are important because they provide the legislative justification for State Forests to determine it own approach to protective measures, they have been rigorously debated at various times when the Act has been amended, and have a substantial rational and scientific basis.

The extent of the State forest and Crown-timber land estate is legally defined and mapped. Summaries of the extent of these and Flora reserves are maintained on registers on a forestry region and management area basis for the whole of NSW. The Forestry Act has been considered for legislative review. However, the principles set out in these key measures should be retained and are retained in more detailed protective measures. Whether they are left in the Act or dealt with by way of policy is largely a matter for the

legislative debate. The actual wording of some of the measures needs to be updated to make it understandable in contemporary terms.

There is a need to extend the scope of the reserve (Flora Reserve) system within State Forests to compliment off reserve measures now in place under the Threatened Species Conservation Act. The functions and planning of flora Reserves need to take account of faunal protection.

These protective measures target and ameliorate:

- Biodiversity in general;
- Functional, endangered and key flora species and ecosystems and forest ecosystems generally;
- Soil and water quality and catchment values;
- Economic and social values; and,
- Natural and cultural heritage values.

The target figures for determining the minimum size of the productive public native forest and plantation estate are a major contribution to the carbon cycle.

There are linkages to the management classification zoning system and other protective measures used by State Forests.

P.2 Forestry Regulation

P.2.1 DESCRIPTION

The Forestry Regulation (1994), which is currently under review under the provisions of the Subordinate Legislation Act 1989 does not include any specific protective measures but includes clauses which set out the situations whereby State Forests officers can:

- Control access by people and vehicles to forest areas;
- Take corrective action for offences relating to damage to forests;
- Sanction responsible persons for the unauthorised destruction or removal of timber;
- Sanction persons who obstruct watercourses;
- Control of fire and deal with misuse of fire by others;
- Ensure protection of the forest against damage by machinery or the use of fire; and
- Issue licences and permits.

These parts of the Forest Regulation are pertinent to ESFM. The Regulation or an additional Regulation may be used as a way in which a formal Forest Practices Code can be promulgated with more formal authority than present Codes and instructions.

The Regulation does not rely on any spatial data. It has linkages to prescriptions set out in the Forest Practices Code.

P.2.2 REVIEW

The Forestry Regulation could be used as a vehicle for the promulgation of a Forest Practices Code that was specific to State Forests activities.

P.3 Environmental Policy Statement

P.3.1 DESCRIPTION

A major policy developed under the auspices of State Forests Corporate Plan as a precursor to the introduction of an Environmental Management System. The policy presents similar generic directives to those set out in the Forestry Act on which authority other protective measures may be established. The policy makes three statements relevant to ESFM:

To protect and maintain healthy and productive forests to provide enhanced community benefits in perpetuity. (EPS1)

To conserve biodiversity, heritage and cultural values in our native forests. (EPS2)

To adopt environmentally sensitive land management's for commercial plantations (EPS3)

P.3.2 PROTECTIVE MEASURE REVIEW

The policy is now supported by a number of other policies which have been developed during the preparation of a native forest management system and are more finely tuned to operational practices.

P.4 Policies for fuel management in native forests and other fire management policies

P.4.1 DESCRIPTION

The policies give broad directions for prescribed burning in the context of State forests statutory obligations under the Rural Fires Act and the necessity to use prescribed burning to achieve natural regeneration and to protect forest crops against damage from high intensity wild fires.

The identifiable protective measures are:

The planning and use of fire under appropriate burning prescriptions to:

- Protect life, property and other high value assets;
- Provide barriers against: the progress of substantial wild fires;
- Reduce fire hazards produced by harvesting and other forest activities;
- To produce seedbed and site conditions necessary for forest regeneration; and
- Maintain specific ecological values. (FMP1)

Broad area prescribed burning only to be undertaken in sclerophyll forest to achieve a spatial and temporal mosaic. (FMP2)

No prescribed burning in rainforest. (FMP3)

Pre-harvest burning must only be used where post-harvest burning is inappropriate. It is not to be used where:

- Sensitive advanced growth may be damaged or killed;
- It will pre-empt post-harvest burning;
- Weed invasion may result. (FMP4)

Prescribed burning in commercial sub-alpine forest associations must be confined to narrow defined firebreaks. Broad area burning is not allowed. (FMP5)

Strategic firebreaks are to be established using non-burning methods if necessary. (FMP 6)

Grazing may be used to compliment broad area burning. (FMP 7)

All wild fires on State forests likely to cause damage will be controlled. Control action will be given priority over all other activities. (FMP 8)

P.4.2 REVIEW

These measures need to be incorporated into an appropriate section of the Forest Practices Code. A further review of fire associated measures is required.

P.5 Policy on native forest preservation

P.5.1 DESCRIPTION

A policy which sets directives for the Flora Reserve establishment program. The program is ongoing. The main directive measures are:

Sites in State forests that are representative of forest conditions of the State or which have scientific, cultural, historical or other features that are best maintained by their long-term preservation will be set aside as for dedication as Flora Reserves. The sites will be large enough to ensure the survival of the features within them. (NFPP1)

Flora Reserves will be managed to aim generally at preserving the area with minimal human disturbance and the extent of permissible disturbance will be prescribed in the working plan for the Reserve. (NFPP 2)

Recreational use of Flora Reserves will not normally be encouraged but where such use is already established, working plans will be implemented to minimise disturbance to the area as a whole. (NFPP 3)

Limited provision may be made for educational or interpretative use. (NFPP 4)

P.5.2 REVIEW

The directives set out in the policy need to be incorporated into the Code. Note needs to be taken of the management classification zoning system. Flora Reserves are gazetted and shown on legal plans.

P.7 Policy on hunting on state forests

P.7.1 DESCRIPTION

A general policy including:

Hunting is prohibited within flora Reserves unless specifically approved. (HUNTP 1)

Hunting of Scheduled species under the NPW Act must be subject to a Game licence under that Act. (HUNTP 2)

P.7.2 REVIEW

These measures should be incorporated into an appropriate section of a Code.

P.8 Policy on firewood harvesting from State forests

P.8.1 DESCRIPTION

The policy makes two protective measure directives

Firewood harvesting must be on a sustainable basis consistent with sound ecological and economic principles. (FWDP 1)

Supply of firewood should be specifically met from other harvesting residues or from silvicultural treatment. (FWDP 2)

P.8.2 REVIEW

The provisions of amendments to the Conservation Protocols have made firewood harvesting an almost untenable activity which may lead to illegal removals where firewood collection is no longer allowable. There is a need to assess the regulatory impact of reduction in firewood availability.

P.9 Draft policies and instructions for native forest management systems

P.9.1 DESCRIPTION

State Forests is currently preparing and reviewing comprehensive instructions to support a native forest management system. The proposal, once prepared and reviewed, will consolidate current instructions, reflect ESFM principles and become the principle policy, strategic and operational document for native forest management undertaken by State Forests.

All the other State Forests' instructions described here will be incorporated into the total forest management document at appropriate places. The *Forest Practices Code, Parts 1-4* currently used by State Forests will be extended to include additional sections on other forest management matters, and amalgamated in the native forest management framework as a consolidated instruction.

The proposed management system is inclusive and will be sufficiently detailed to meet all levels of responsibility and authority given to State Forests planners, managers, supervisors and workers.

The approach will include a major policy statement on ESFM and is in fact totally ESFM driven.

The comments on the Forest Practices Codes in this review reflect the initial draft policy on the Code as set out in submissions to State forests staff engaged in preparing the total forest management system document.

P.9.2 REVIEW

For the purposes of this project, State Forests considers that there should be linkages to ensure that the agency initiative taken State Forests should not be compromised by any pre-emptive external decisions before this proposal has a fair chance of public hearing.

P.10. Management Classification Zoning System

Note that the acronym MCZ has been used in this report to describe the system because the draft proposal has not yet been approved.

P.10.1 DESCRIPTION

This description refers to forest management classification zoning documentation. See Forest Practice description A.1 for implementation. Forest management classification zoning is being reviewed to consider transition from the PMP classification to a refined version that more readily reflects current initiatives in forest management. Both systems are similar.

In the review, State Forests recognises the need to coequally maintain all forest values, both those supporting conservation values and those supporting timber production and other activities.

For the purposes of this project, the structure of the proposed revision has been loosely adopted. However, as with the native forest management system, further development and consultation needs to be undertaken before the revised system is available.

There are 7 classifications with associated protective measures which prohibit or allow other forest practices as the case may be. See Table 2.

The review has been ongoing over some years to refine the PMP system and has been subjected to exhaustive consultation and review by other agencies. The JANIS process is considered as an important element in relation to conservation measures in redesigning the classification system, along with current approaches to forest management, harvesting and silviculture and the provision of other goods and services.

Further separate review of this system is therefore considered unnecessary but the operational aspects of the classification system must be incorporated into the Code. The adoption of similar yet compatible forest land management zoning systems by all other agencies, eg. NPWS, DLWC and local government for public reserves, is strongly recommended.

	Special Protection	Special Management	Special Prescription	General Management	Hardwood Plantation*	Softwood Plantation*	Non Forest*
Forest Practice	Forest*	Forest*	Forest*	Forest*	Tantation	Tiantation	Aitas
Maintain roads/trails	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Harvest timber	No	No	Under special prescriptions	Yes – Protocols apply	Yes-Protocols apply	Yes-Protocols apply	Does not apply
Undertake silviculture	No	No	Under special prescription	Yes – Protocols apply	Yes	Yes	Does not apply
Harvest forest products	No	No	Under special prescription	Yes – Protocols apply	Yes-Protocols apply	Yes-Protocols apply	Does not apply
Remove materials or operate hard rock quarries	No	No	Under special conditions	Yes - Standard conditions apply	Yes-Standard conditions apply	Yes-Standard conditions apply	Standard cond'ns apply
Manage prescribed burning	Under special prescriptions	Under special prescriptions	Under standard prescriptions	Under standard prescriptions	Under standard prescriptions	Under standard prescriptions	Under std prescrip- tions
Graze forest by domestic animals	No	Existing tenured lessees only	Under special conditions	Under standard conditions	Under standard conditions	Under standard conditions	Under standard condit'ns
Manage apiary sites	Existing sites only	Existing sites only	Yes	Yes	Yes	Yes	Yes
Provide recreational facilities	Existing facilities only	Existing facilities only	Yes	Yes	Yes	Yes	Yes
Manage recreation	Special conditions	Special conditions	Yes	Yes	Yes	Yes	Yes
Control weeds	Special conditions	Special conditions	Yes	Yes	Yes	Yes	Yes
Control feral animals	Special conditions	Special conditions	Yes	Yes	Yes	Yes	Yes
Undertake scientific research	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Allow mineral exploration	No	Special conditions	Yes	Yes	Yes	Yes	Yes
Establish plantations	No	No	No	No	Yes	Yes	No
Manage utilities	No	No	No	No	No	No	Yes

N=No, Y=Yes, P = prescription, SP=Special prescription, NA= not applicable.

* Brief description only

P.11 Forest Practices Code Part 1 – Harvesting State forest plantations

P.11.1 DESCRIPTION

Part 1 of the Code applies to all timber harvesting operations conducted in State forest plantations. Like other parts of the of the Code, it describes procedures including those designed to ensure:

- Protection of the forest and its environment;
- Maintenance of the productive capacity of the forest.

Part 1 of the Code applies to the harvesting of both native hardwood and exotic and native conifer plantations which have been established on sites of varying origin, but are now principally second rotation conifer plantations or plantations established on cleared agricultural land that has been purchased for the purpose.

The key ESFM protective measures relate to:

- Control of fire (11 key measures taken from the Forest Regulation) (FPC1/1);
- Control of harvesting operations during wet weather (4 key measures relating to automatic and notified closures for specified machinery and allowable soil disturbance limits) (FPC1/2);
- Pollution control (5 key measures relating to waste disposal and reporting pollution incidents which are taken from standard conditions in the Pollution Control Licence) (FPC1/3);
- Protected flora and fauna considerations (3 standard references to protected flora and fauna) (FPC1/4);
- Operational constraints during tracking, timber felling and extraction, landing management and road haulage (21 key measures based on Pollution Control Licence conditions to reduce soil erosion and water pollution from turbidity during the exposure of soil on extraction tracks, landings and roads) (FPC1/5);
- Drainage feature protection (5 measures taken from negotiated conditions set out in the Pollution control Licence) (FPC1/6); and,
- Noxious weed and forest pest and disease control (2 key measures relating to machinery hygiene during harvesting) (FPC1/7).

P.11.2 REVIEW

Part 1 of the Forest Practices Code was prepared in conjunction with wide community and interagency consultation. Part 1 was reviewed by industry and underwent scientific scrutiny after publication.

In plantation harvesting, the main ESFM principles to be addressed concern productivity and soil and water protection. Plantation harvesting protective measures that emphasise soil and water protection are very successful and adequate. Harvest inspection reporting over the past five years has shown a high level of improvement where the provisions of the Code have been strengthened in this area. The Code provisions were derived from Pollution Control Licence in forces at the time. There has always been a pervasive difficulty where incremental changes to conditions are not reflected or are contradicted in the Code. In this sense, the Code could be seen by some as too detailed.

The conditions are however based on basic scientific principles for control of soil erosion and water pollution that can be summarised as:

• Avoid susceptible soils and landforms;

- Minimise soil exposure;
- Maintain adequate drainage for extraction tracks, landings and roads; and,
- Protect streamside areas and road crossings.

The Code only addresses flora and fauna issues where these are significant and the site-specific conditions in a harvest plan form the basis for protective control. Any Code would only be able to deal with threatened species requirements at the planning level and rely on site-specific plans for the detail for protection. The Conservation Protocol is seen as complimenting other instructions in this regard.

The Timber Plantation (Harvest Guarantee) Act has defined a Code of Practice for private plantation harvesting under a regulation to the Act. This latter Code, which underwent extensive scrutiny and inter-agency consultation is less complex than State Forests' Code. For ESFM purposes, there is merit in having one approach to a Code that is generic enough to be understood but allows for further more detailed information where required.

P.12 Forest Practices Code Part 2 – Harvesting native forests – State forests and Crown-timber lands

P.12.1 DESCRIPTION

Part 2 of the Code applies to all timber harvesting operations conducted in all native forests controlled by State Forests as dedicated State forest or Crown-timber land. Like other parts of the of the Code, it describes procedures including those designed to ensure:

- Protection of the forest and its environment;
- Maintenance of the productive capacity of the forest.

Timber harvesting activities are also bound by the specific requirements and prescriptions of management plans, EIS determinations for various management areas in NSW and site-specific harvesting plans prepared for the compartments in which the harvesting operations are conducted.

The key ESFM protective measures relate to:

- Compliance with the SEMGL (1993) (FPC2/1);
- Control of fire (11 key measures taken from the Forest Regulation) (FPC2/2);
- Control of harvesting operations during wet weather (4 key measures relating to automatic and notified closures for specified machinery and allowable soil disturbance limits) (FPC2/3);
- Pollution control (5 key measures relating to waste disposal and reporting pollution incidents which are taken from standard conditions in the Pollution Control Licence) (FPC2/4);
- Protected flora and fauna considerations (3 standard references to protected flora and fauna) (FPC2/5);
- Compliance with harvest plan requirements (3 directives) (FPC2/6);
- Operational constraints during tree marking tree felling, extraction, log dump management and road haulage (10 key measures based on Pollution Control Licence conditions and others to reduce damage to the retained forest stand, minimise soil erosion and water pollution from turbidity during the exposure of soil during harvesting operations and road haulage) (FPC2/7);
- Noxious weed and forest pest and disease control (2 key measures relating to machinery hygiene during harvesting) (FPC2/8).

P.12.2 REVIEW

The present revision of Part 2 of the Forest Practices Code was prepared in conjunction with wide community and inter-agency consultation. It also underwent scientific scrutiny after publication as part of a review associated with Commonwealth review of export wood supply arrangements with the States.

Part 2 of the Forest Practices Code has its origins as a supplementary set of rules for the guidance of harvesting operatives licensed by State Forests. The original codes of Logging Practice did not address ESFM issues and the present Part 2 still reflects a more holistic role. Harvest inspection reporting indicates that Part 2 does adequately support ESFM principles in providing the complimentary directives to those set out in individual harvesting plans. Part 2 does not however set protective measures for the planning phase of harvesting nor sets parameters for silvicultural aspects of harvesting.

The specific values protected generally by the measures in Part 2 include:

- Endangered species (as identified through the Conservation Protocol);
- Soil and water protection;
- Productive capacity of ecosystems (especially sustainable removal of products);and
- Control of forest diseases and pests through machinery hygiene.

As with Part 1, other instructions compliment this Code and there is a strong case for integration.

With other parts of the Code and with other similar processes pursued by other agencies

P.13 Forest Practices Code Part 3 – Plantation establishment and maintenance

P.13.1 DESCRIPTION

Part 3 deals with all aspects of plantation establishment including planning, subdivision road construction, and site preparation for both native forest hardwood plantations and exotic conifer plantations. It is aimed at State Forests staff who may involved in any aspect of plantation establishment and applies to all operations of this kind on State forest lands in New South Wales.

The ESFM protective measures included in this Part of the Code include:

- Compliance with pollution control legislation (9 key measures derived from Pollution Control Licence conditions and other sources) (FPC3/1);
- Control of soil protection during plantation site preparation (3 key measures derived from SEMGL and other sources) (FPC3/2);
- Control of operations to protect drainage feature areas during plantation establishment (6 key measures derived from consultations with EPA and other advisory sources) (FPC3/3);
- Control of fertiliser and biosolid applications (1 key measure) (FPC3/4);
- Plantation site evaluation and design (7 key measures dealing with assessment of site location, including native vegetation and catchment values) (FPC 3/5);
- Subdivision road construction and maintenance (2 key measures dealing with roads in relation to location, drainage and wet weather operations) (FPC 3/6);
- Selection of plantation species (1 key measure related to suitable species and provenance for plantation establishment) (PFC3/7);
- Use of agricultural chemicals (1 key measure controlling their use derived from standard guidelines for application) (FPC3/8);
- Control of pests diseases and noxious weeds (3 key measures) (FPC3/9); and,
- Control of fire (2 key measures) (FPC3/10).

P.13.2 REVIEW

Part 3 of the Forest Practices Code was prepared in conjunction with wide community and interagency consultation and drew upon a wide range of scientific sources and other codes of practice in determining appropriate protective measures.

Part 3 uses the National Forest Policy Statement as a foundation. It also follows the conventions of recent standards for EMS in layout and consideration of content. The main omission in the present version is the lack of reference to the provisions of the Native Vegetation Management Act (which are still not resolved in terms of a Forest Practices Code. In addition, the Threatened Species Conservation Act which was not enacted at the time the Code was published. However, plantation establishment proposals are subject to the EP & A Act. Part 3 was especially developed with the concept that it could, with minor modification become a suitable Code to be used for both development application purposes and to address the deficiency in the Timber Plantation (Harvest Guarantee) Act in respect of plantation accreditation for plantations established since the enactment of that legislation.

P.14 Forest Practices Code Part 4 – Forest roads and fire trails - construction, use and maintenance

P.14.1 DESCRIPTION

Forest Practices Code Part 4 applies to all roads and fire trails located within State forests in NSW. The Code was developed in consultation with a wide number of agencies and has been subjected to public review and comment.

Part 4 broadens the scope of protective measures for use of timber haul roads for harvesting forests to all other forest roads and road users.

The ESFM protective measures included in the Code are:

- Control of traffic in relation to road conditions and wet weather (4 key measures) (FPC4/1);
- Exclusion of traffic from Flora Reserves (1 measure) (FPC 4/2);
- Military use of roads and trails (1 measure) (FPC4/3);
- Compliance with pollution control legislation (9 key measures derived from Pollution Control Licence conditions and other sources) (FPC4/4);
- Environmental Assessment (2 key measures) (FPC4/5);
- Road location (2 key conditions describing flora and fauna and soil and catchment conditions to be avoided when locating roads) (FPC4/6);
- Road construction and maintenance standards (including 9 key measures aimed at soil and water protection) (FPC 4/7);

P.14.2 REVIEW

Part 4 of the Forest Practices Code was prepared in conjunction with wide community and interagency consultation and drew upon a wide range of other sources (including Pollution Control Licence conditions) and other codes of practice in determining appropriate protective measures.

Part 4 at the present time represents the best set of protective measures that can be applied to this aspect of forest management in production forests and for fire protection trail networks. It could however, be assimilated into a more comprehensive Code.

Part 4 of the Code aims at ameliorating a wide range of on forest activities associated with roads and trails by managing all forest road users. Its success will depend partly on the review of the Forestry Regulation in relation to authority for the closure of access to State forests when environmental conditions require soil and water protection.

P.15 Ecosystem Field Guides

P.15.1 DESCRIPTION

SFNSW ecosystem field guides are information manuals designed for field use. Forest survey and planning personnel use the ecosystem field guides to:

- identify forest types and structure, native flora and fauna species and habitat and soil and catchment characteristics;
- interpret ecological field conditions; and,
- use the prescriptions and conditions set out in other protective measures to determine site-specific constraints for forest activities.

The field guides themselves do not set out protective conditions but rather indicate where they should be applied. Therefore, standard or generic protective measures may not necessarily be included in a field guide.

P.15.2 REVIEW

Ecosystem field guides should be used as the principal aid for forest surveys prior to planning for any forest activity. The format and content of field guides should be as flexible as possible to accommodate changes to species descriptions, re-interpretation of field conditions and the inevitable amendment and improvements to other protective measures.

P.16. Silvicultural instructions

P.16.1 DESCRIPTION

Silvicultural instructions include about eighty State Forests' *Silvicultural Bulletins*, *Silvicultural Notes* and *Operational Circulars* which give field prescriptions for the implementation of silvicultural systems for native forests and native hardwood and exotic conifer plantations. These instructions are based on several decades of research and management observations of responses by different forest type and forests in different structural condition to various forms of regenerative and thinning treatments, and the control of competing vegetation or forest weeds.

Silvicultural research which is being used to extend State Forests knowledge of stand dynamics, growth responses to treatment, and natural competition in unthinned native forest stands continues. In addition there is some research which investigates the interaction between stand disturbance such as thinning or regenerative fellings and native wildlife habitat. Some of these have been modelled to ascertain habitat changes and availability following changes to forest structure.

The most recent instruction is Operational Circular 97/9 which prescribes an interim group selection procedure during the imposition of a general moratorium on the use of Gaps and Clusters (Group Selection) silviculture to overcome the high risk of regeneration failure in forest stands which are being harvested during the imposition of the moratorium.

16.2 REVIEW

Clear prescription of silvicultural systems that will deliver ESFM outcomes for both biodiversity and productivity an essential component of any forest management system. A Forest Practices Code should indicate the generic guidelines for silvicultural system or treatment selection. State Forests proposes that such a set of rules be included in a Code and detailed instructions for application set out in the *Eco-field Guides* and other *Silvicultural Bulletins*.

5. SIGNIFICANT PROTECTIVE MEASURES DEVELOPED BY OTHER AGENCIES IN CONSULTATION WITH STATE FORESTS AND USED BY STATE FORESTS

EP.1 Standard Erosion Mitigation Guidelines for Logging in NSW

EP.1.1 DESCRIPTION

The *Standard Erosion Mitigation Guidelines for Logging in NSW* are protective measures jointly developed by SFNSW and DLWC to relate the requirements of the Soil Conservation Act to timber harvesting operations on State forests. Although use of the Guidelines forms part of a number of EIS determinations for certain forest management areas, the principles used in them have been largely incorporated into current Pollution Control Licence requirements.

The guidelines deal exclusively with the minimisation of soil erosion and do not explicitly address control of water pollution.

There are 48 guidelines or protective measures and instructions in the SEMGL

One deals with the minimum distance from water storage areas for timber harvesting operations (SEMGL 1)

One is a generic statement limiting fuel reduction burning to maintain filter strip function (SEMGL2)

14 guidelines deal with road location, construction, clearing, batters, borrow pits, maximum grades, road drainage, watercourse crossings, and ground-cover protection. These have been incorporated into Parts 1, 2 and 4 of the Forest Practices Code where relevant.(SEMGL3)

14 guidelines deal with timber extraction including snig track drainage in relation to soil erosion hazard. (SEMGL 4)

6 guidelines deal with log dump (log landing) management including bark disposal, dump drainage and rehabilitation.(SEMGL 5)

5 guidelines deal with defining filter strip, protection strip and drainage line protection along drainage lines and watercourses. (SEMGL 6)

7 guidelines deal with the felling of trees in relation to drainage feature protection. (SEMGL 7)

EP.1.2 REVIEW

The SEMGL are virtually redundant in application to State forest operations for two reasons. First, they have been incorporated into Pollution Control Licence conditions that now include a greater level of specified protective control. Second, DLWC was unable to complete a revision of the SEMGL in 1995. The review panels included a broad cross section of scientific expertise and had significant community input. Elements of the SEMGL have been incorporated into the Forest Practices Code where relevant although the conditioning set out in the Pollution Control Licence has been used where it is available.

The SEMGL should now be discarded for Code preparation purposes.

Ecologically Sustainable Forest Management

NSW CRA/RFA PROJECT #4/2

FOREST PRACTICES CODE PROTECTIVE MEASURES AND FOREST PRACTICES FOR USE IN STATE FORESTS IN NSW

PART 2 FOREST PRACTICES USED BY STATE FORESTS NSW

6. INTRODUCTION

FOREST PRACTICE TYPES

- A. Strategic planning for forest use
- A.1 Apply forest management classification zoning to State forest areas
- A.2 Manage conservation reserves within State forests
- A.3 Plan local/regional timber, goods and services production from State forests and Crowntimber lands
- B. Conserve and protect intrinsic forest values
- B.1. Assess, plan and manage water supply catchment protection
- B.2 Manage cultural heritage sites
- B.3 Manage protection of forest against pests and diseases
- C. Provide access to forests
- C.1 Plan forest roads and fire trails
- C.2. Construct forest roads and fire trails
- C.3 Use and control use of forest roads and fire trails
- C.4 Maintain forest roads and fire trails
- C.5 Manage watercourse crossings on forest roads and trails
- C.6 Close and rehabilitate forest roads, fire trails and crossings
- D. Public use of forests
- D.1 Manage public utilities on dedicated State forests
- D.2 Manage and control military training exercises on State forests
- D.3 Plan and manage recreational facilities and trails on dedicated State forests
- E. Harvest timber in native forests
- E.1 Plan scheduled order of working (Plan of Operations)
- E.2. Survey harvest area for harvesting
- E.3 Prepare harvest plan
- E.4 Prepare and mark harvest area [A protective practice]
- E.5 Manage construction and use of temporary timber haul roads
- E.6 Manage construction and use of log dumps
- E.7 Manage timber felling and extraction
- E.8 Undertake post harvest survey and assessment
- F. Native forest silviculture and forest establishment
- F.1. Undertake forest stand inventory
- F.2. Select silvicultural system for harvest
- F.3 Apply the single tree selection silvicultural system
- F.4 Apply the group selection silvicultural system
- F.5. Apply alternate coupe harvest silvicultural system
- F.6 Apply clearfell silvicultural system
- F.7 Apply shelterwood silvicultural system
- F.8 Apply thinning
- G. Forest fire protection

- G.1 Plan fire protection strategy
- G.2 Remove fuel hazard using prescribed burning methods
- G.3 Remove fuel hazard using non-burning methods
- G.4 Control forest activity and wildfire ignition risk during high fire danger periods
- G.5 Manage wild fire suppression
- G.6 FOREST PRACTICE NAME

Assist stand regeneration – post harvest burning

- H. Plantation establishment and maintenance
- H.1 Select plantation site and species
- H.2 Plan and construct plantation subdivision road system
- H.3 Undertake plantation establishment and maintenance
- H.4 Manage plantation harvest
- I. Grazing of forests
- I.1 Assess, plan and graze State forest areas
- J. Harvesting and utilisation of forest products and forest materials
- J.1 Plan and manage forest materials extraction (including quarry operations)
- J.2 Assess, plan and manage harvesting of non-timber products
- J.3 Plan and manage apiary sites on dedicated State forests and Crown-timber lands

APPENDIX 1. COMMENTS ON A FOREST PRACTICES CODE

- 1. Discussion
- 2. Proposal
- 3. Objective
- 4. Outcomes
- 5. Strategy
- 6. What the Code should provide

6. INTRODUCTION

The forest practices reviewed in this Section of the report are identified in sequence with the National Forest Policy Statement (1992), with emphasis on those that have a direct impact on the availability of the forest resource (both timber supply and for other non-timber benefits). Some of the practices are in themselves active protective measures or include active protective measures among the tasks performed.

FOREST PRACTICE TYPES

A. Strategic planning for forest use

A.1 Apply forest management classification zoning to State forest areas

[A protective practice]

A.1.1 DESCRIPTION

The application of a forest management classification zoning system by forest planners to allocate State forest areas and sites to specified management objectives.

A.1.2 OBJECTIVE

To achieve broad management objectives for conservation, protection of biological diversity, natural and cultural heritage, multiple forest use and timber production by:

- separating conservation reserve zones from timber production zones;
- holistic assessment of forest stand values;
- addressing relevant ESFM principles for a forest stand;
- *application of appropriate protective measures to each zone or special value.*

Forest management zoning classification clearly allocates specific State forest areas and sites to meet forest management objectives. It is based on an assessment of the physical and biological attributes of forest stands including their specific values where known, their accessibility, present forest use and superimposed requirements over the area for protection of specific values.

An important objective forest zoning classification is to clearly separate those areas of State forest managed as conservation reserves from those areas managed for timber production. This will ensure that State Forest's management objectives to contribute to both regional biodiversity and to provide a constant and sustainable supply of timber to industry.

Forest management classification zone maps form a primary strategic layer in the GIS system for other more detailed operational planning such as the preparation of harvesting plans. Other key GIS data layers are used to identify forest values to assist in determining Forest Management zones and special values. Field inspections and reports also form the basis for initial classification zoning recommendations.

Forest management classification allows for amendment or modification to take into account improved knowledge or improved management practices. There are significant safeguards in the system to prevent unauthorised re-classification that may compromise conservation values.

Forest management zoning is enforced on all dedicated State forests as a uniform state-wide system but is not enforced on timber reserves or other Crown-timber land, or other public and private forested lands.

A.1.3 APPLICATION

Forest management classification zoning is an current protective practice.

The present Preferred Management Priority Classification (PMP) system is currently under review.

The review and revision process has: Involved peer review by a reference group of stakeholders and scientific experts; Included consultation with NPWS and DUAP; Incorporates JANIS and IUCN parameters; Defines explicit allowable practices within various zones.

The proposed revision aims to use the JANIS reserve criteria to better differentiate between those areas of State forests which are specifically set aside for conservation purposes (and to provide statutory protection in some cases) and those areas which are available for timber harvesting and other activities. It also aims to take account of the IUCN Protected Area Categories for reservation and protection of land especially dedicated to the management of biological diversity, natural and associated cultural resources. The revision proposes to adopt seven zones and twelve special values. There are no regional distinctions.

Management classification zoning has no regional variations.

A.1.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

The application of the forest management classification zoning system is a key protective measure which underpins and controls all other forest practices to some degree or another. FMZ itself relies heavily on some aspects of the Conservation Protocols and the extrapolation of previous EIS determinations for State forest areas in determining the conservation zones and special values identified in the system.

It addresses the full range of ESFM principles as set out in Table A.1

ADDRESSED	COMMENT		
BY PRACTICE			
Very high	A major objective of FMZ.		
Very high	FMZ has been designed around JANIS criteria.		
Very high	FMZ has been designed around JANIS criteria.		
Very high	FMZ has been designed around JANIS criteria.		
Very high	FMZ has been designed around JANIS criteria.		
Significant			
High	FMZ has sustainable timber production as a key		
	objective.		
Very high	FMZ take special account of indigenous		
	confidentiality in recording their occurrence.		
Very high	Recent reviews of the zoning system take into		
	account the need to consult with stakeholders and analyse scientific information to help		
	determine zoning categories to be applied.		
High	FMZ uses legal and regulatory measures to		
	protect conservation values where necessary.		
Significant			
High	FMZ can be amended to increase protection if required.		
	ADDRESSED BY PRACTICE Very high Very high Very high Very high Significant High Very high Very high High Significant High		

TABLE A.1

The practice is readily applicable to all forests on other tenures. The Forest management Zoning System is commended as an essential guideline for determining zones for development and conservation under the EP & A Act. It is immediately capable of application to other Crown-timber land and other Crown lands and reserves. For documentation see Volume 1.

A.2 Manage conservation reserves within State forests

[A protective practice]

A.2.1 DESCRIPTION

The identification and reservation of significant conservation areas within State forests and the preparation and implementation of working plans for those areas.

A.2.2 OBJECTIVE

To:

- *Meet the requirements of the Forestry Act in relation to reserved areas;*
- Ensure that areas with scientifically identified significant ecological and other specific values are protected;
- Reserve formally recognised areas such as Flora Reserves and Forest Preserves and controlling other forest practices within them.

Conservation reserve management is applied to State forest areas where flora, fauna and other values have been identified and considered for protection. Management is a staged process, the initial survey and reporting process leading to reservation as a Forest Preserve; followed by formal dedication as a Flora Reserve under the Forestry Act. Following dedication, a working plan is drawn up and its implementation may be overseen by an advisory committee which includes local government and local community interests.

A wide range of scientific and other information is used to establish the need for reservation including flora and fauna surveys, identification of representative forest ecosystems or rare ecological associations. These considerations have now been augmented by consideration of the presence of old growth forest stands, rainforest and the more recent listing included in the threatened species legislation. Various State Forests' policies and *Forest Research Note 46* and *Forest Research Note 47* form the present basis for conservation reserve management.

The practice is not applied to land purchased for plantation establishment and subsequently dedicated as State forest since 1986.

Managed conservation reserves vary in size and shape as determined by the extent of the significant features, the surrounding topography, present access and protective zoning requirements.

Supporting tasks include flora and fauna survey, scientific and educational uses, establishing management advisory committees, integrating needs for protective measures, with other forest practices eg fire hazard reduction planning, weed and feral animal control, and recreation.

A.2.3 APPLICATION

Conservation reserve management is key current protective measure for several specific values. As such, it relies heavily on the selection of a limited number of representative sites of significant value based on forest types rather than other approaches to ecosystem/specific value selection.

The new approach to determine conservation reserves within State forests which takes account of the JANIS criteria and the other approved processes in the reserve identification process needs to be included in this management process. Revision of the management classification zoning system will assist.

Once reserved, these areas may need additional measures to recognise fauna values. The role of working plans for specific reserves should be augmented by using a selection of more general

protective measures that can be applied over the reserved parts of the State forest estate with a greater degree of uniformity. Non-consumptive activities which still have the potential to cause significant disturbance to conservation reserves need to be controlled.

A.2.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Because management of conservation areas is a protective measure in itself, there are no other restrictive protective measures that over-ride its use.
A.3 Plan local/regional timber, goods and services production from State forests and Crown-timber lands

A.3.1 DESCRIPTION

The preparation, implementation and monitoring by forest planners of strategic plans for the long-term control of timber harvesting and the supply of other goods and services from State forest areas and to a lesser extent from Crown-timber lands.

A.3.2 OBJECTIVE OF THE PRACTICE

To ensure the even flow and ecologically sustainable supply of timber and other goods and services from State forests based on an appropriate local or regional scale of supply.

Strategic timber supply management plans and other strategic management plans are prepared at a management area scale (A management area may include State forests and Crown-timber lands in aggregated units of 20 000-300 000 hectares). Present management plans cover some fifty management areas. Future plans may cover identified RFA areas (200 000 – I million hectares) and will address broad species groupings such as river red gum, white cypress pine, north coast hardwoods, etc.

Strategic management plans currently address quota sawlog supplies and other high volume timber products or commodities. The supply of other timber products is usually a by-product of the quota sawlog production except where integrated operations to supply pulpwood may occur.

Strategic timber supply management plans analyse and the following factors:

- Timber yields from the regional species mix, extent and condition of the resource;
- Present and future market requirements;
- Impact of conservation protection on resource availability.
- Application of a balanced long term approach to stable silvicultural and harvesting methods;
- Recognition of competing active uses of the forest.

Critical supporting tasks include:

- Inventory;
- Preparation of subordinate Plans of Operation (which form the basis for annual harvesting of timber and products);
- Separate plan preparation for the supply of other products and services from the State forest estate.

A.3.3 PRESENT AND FUTURE APPLICATION

The traditional integrated management plan has largely been as a strategic plan by individual environmental impact determinations for a number of management areas and the intervention of the IFDA and CRA/RFA strategies. The management scale for this kind of strategic planning will in the future need to focus on timber production at a broad regional/forest type scale (as alluded to above) and allow other forest uses to be considered in similar but complementary plans for conservation, recreation, and forest occupancy.

Future planning for timber supply will come within the ambit of various forest advisory boards where all stakeholders will have statutory representation. See recent amendments to the Forestry Regulation.

A.3.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

All protective measures implemented between 1990 and the present time have altered the planning process and will need to be given recognition in the preparation of new strategic plans for timber supply.

B. Conserve and protect intrinsic forest values

B.1. Assess, plan and manage water supply catchment protection *[A protective practice]*

B.1 DESCRIPTION

The assessment and determination of protective measures by forest planners that apply to the conduct of other forest practices within forest areas dedicated for water supply catchment purposes.

B.1.2 OBJECTIVE

To protect water supply sources that are fed from State forest areas.

This is a protective practice that is applied to identified gazetted catchment areas within or adjacent to State forest areas. Management classification zoning is used to determine the activities that may be undertaken within the catchment zone and to determine the way in which those activities should be modified.

B.1.3 APPLICATION

Catchment protection activities are currently confined to water supply catchment where gazetted boundaries have been determined. It may be necessary in the future to consider extension of catchment protection to other State forest areas that border significant non- water supply watercourses and lakes.

B.1.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED This is a protective measure and no impacts apply.

B.2 Manage cultural heritage sites

[A protective practice]

B.2.1 DESCRIPTION

The identification by State forests managers of cultural heritage sites (indigenous and nonindigenous) within State forest areas and the determination of protective measures that apply to the conduct of other forest practices within those areas.

B.2.2 OBJECTIVE

To protect cultural heritage values.

The practice includes the following tasks:

- Survey by qualified field personnel to identify and locate cultural heritage sites;
- Establishment of appropriate field markings and documentation;
- Determination of prescriptions;
- Inclusion of prescriptions into forest zoning and operational plans.

The practice is applied to all forest areas and is usually undertaken in conjunction with compartment surveys for harvesting and other operational planning. A number of internal instruction give guidance on heritage value protection. Heritage values are documented and recorded on maps and in registers. The management classification zoning system identifies both areas and site-specific heritage attributes.

B.2.3 APPLICATION A current practice.

B.2.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED The practice is in itself a protective measure.

B.3 Manage protection of forest against pests and diseases

[A protective practice]

B.3.1 FOREST PRACTICE DESCRIPTION

The survey, planning and implementation of pest and disease control programs by State Forests' managers and staff.

B.3.2 OBJECTIVE OF THE PRACTICE

To ensure the health and vigour of the forest estate is maintained and protected against damage.

Managing pest and disease control involves the pro-active survey inspection of forests for pests and disease and the preparation and conduct of protection programs to remove pests and ameliorate the adverse effects of disease against the forest crop and other forest values. Pest and disease management may include:

- Feral animal control (poisoning, baiting, shooting);
- Forest hygiene control during harvesting and other forest works;
- Quarantine of forest areas;
- Application of pesticides onto forest crops;
- Noxious weed control;
- Hunting.

Various specified control programs against forest pests are being conducted on a continuous basis using guidelines developed by NSW Agriculture and other agencies. State Forests is represented on several interdepartmental and regional community for a that deal with pest control matters.

B.3.3 APPLICATION

This practice is ongoing. It needs to be recognised as a protective measure by inclusion in the Forest Practices Code.

B.3.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Pest animal control may have adverse affects on non-target species whilst pest and disease operations often involve the use of pesticides which require protective measures for their handling in relation to non-target organisms and waterways. The protective measures followed include NSW Agriculture's *Vertebrate Pest Control Manual, Forest Practices Code Part 3*, State Forests' *Manual for Chemical Use*, and selected draft guidelines prepared by the EPA.

C. Provide access to forests

C.1 Plan forest roads and fire trails

C.1.1 DESCRIPTION

The preparation of a forest road network plan for all State forests within a forest region or subregion, and the preparation of specific road construction and maintenance plans on a project by project basis.

C.1.2 OBJECTIVE

To provide access to State forests for harvesting, forest management and protection and public or recreational use.

Generally road location and construction adopts the most economic route for access to the timber resource provided environmental and other constraints are met. Road construction and maintenance is also aimed at meeting strategic protection requirements, and/or supporting rural road access infrastructure that has wider community benefit.

New roads and fire trails are located to avoid significant conservation areas such as rainforest, flora reserves and other protected areas.

Planning and design standards are set out in a number of internal SFNSW manuals. Forest roads are generally designed to principles developed for natural surface and unsealed roads in the Australian rural environment.

Road density varies according to the value of the timber resource, the nature of the terrain, the distribution of State forest in relation to other land uses and rural road infrastructure.

Forest road planning relies heavily on resource assessment and on economic justification for construction. The assessment of environmental and conservation factors is coequally important.

C.1.3 APPLICATION

A current practice. As the State forest road system is now largely complete, planning now focuses on major road realignment requirements associated with new protective measures, especially in relation to watercourse crossings, and to changed vehicle usage associated with timber haulage.

CB.1.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

New road construction may be excluded from forest types with high conservation values. Prescriptions for old growth forest, rainforest stands and areas reserved under management classification zoning and Conservation Protocols specify issues to be taken into account when locating roads. In some situations, access to otherwise viable commercial forest may be compromised where major road access is not permitted.

New roads may have their location and alignment modified by prescriptions for fauna and flora habitat, soil and water protection and protection in the vicinity of drainage feature crossings. Survey information gathered during planning is aimed at avoiding the intervention of interactive factors once construction of a road is commenced.

C.2. Construct forest roads and fire trails

C.2.1 DESCRIPTION

Forest road construction by State forests employees, private contractors and timber harvest licensees.

C.2.2 OBJECTIVE

To provide reliable access to State forests through provision of natural surface and other roads.

Forest road construction uses the general principles developed for natural surface and unsealed road building in the Australian rural environment. Standard road construction practices are used in all managed dedicated forests. Protective measures and technical improvements to construction practices have been reviewed recently in the preparation of the draft *Forest Practices Code -Part 4* for road construction, use and maintenance.

Where forest traffic usage is sufficient, major primary or secondary access roads may be built to sealed road standards. At the other end of the scale, forest access may only require temporary access or fire trail access for fire protection purposes. In these situations, the general standard practices are followed. Construction practices may be modified according to terrain, soil conditions and rainfall zone. Temporary roads are built to enable minimal disturbance to the environment when they are closed and rehabilitated

Construction standards for permanent roads are set out in a number of internal SFNSW manuals. These are based on those accepted by the national road and transportation authorities. CAD (PC based) designed road plans are used to located and mark out road construction in the field. The plans also include annotation regarding the location and type of road drainage and drainage feature crossing structures and other specifications arising from protective measure requirements. The most important supporting tasks include:

- Clearing;
- Earthwork construction;
- Permanent road surface drainage;
- Permanent minor pipe culverts and bridges over drainage features;
- Revegetation of and/or reseeding of exposed soil surfaces;

Performance of these tasks are heavily prescribed by protective measures relating to forest soil and water protection.

C.2.3 APPLICATION

This is a current practice. Present construction standards are well established. There are some difficulties where protective measures conflict with engineering standards or are based on uncertain parameters.

The requirements to apply present protective measures particularly in relation to road surface drainage and replacement of aging drainage feature crossing structures, sometimes leads to difficult and expensive re-construction solutions. There are sometimes conflicting standards between eg the Pollution Control Licence as used by State Forests for road construction on dedicated public forests and the various SEMGL guidelines prepared and used by DLWC for determining harvest road construction on protected lands.

The standards adopted by State Forests, that reflect all protective measures, should continue to be used.

C.2.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Forest road and trail construction has a major impact on forest environmental values.

Through the one time removal of vegetation and forest structure, introduction of discontinuity to the immediate ecosystem in the vicinity of the road location, and thereafter a temporary or permanent change to the natural features within the area appropriated by the road. The key protective measures used to minimise disturbance of this nature through road construction include:

Management classification zoning considerations to protect sensitive areas through prohibiting road construction within them (derived from forest zoning, conservation protocols, etc); and, Restrictions on road widths and the degree of clearing required (eg through rainforest).

Roads create changes to natural drainage patterns and increase the potential for soil erosion and water pollution unless road surface is installed and drainage features such as drainage lines and watercourses are traversed by adequately designed structures. Control of soil erosion and water pollution is an ongoing maintenance task once a road has been completed.

Key protective measures which should continue to be used include: State Forests road design standards; Pollution Control Licence schedule conditions applicable to road construction.

C.3 Use and control use of forest roads and fire trails

[A protective practice]

C.3.1 DESCRIPTION

The regulation of permanent forest road use by forest managers and supervisors to ensure; safety and the prevention of environmental damage and damage to the road as a capital asset.

C.3.2 OBJECTIVE

A protective practice aimed at preventing damage to forest roads and their immediate forest environment

The controls used include;

- Wet-weather restrictions and road closure procedures;
- Fire-weather restrictions and closures;
- Weight limits;
- Vehicle and plant size and configuration restrictions.

The practice is principally concerned with soil and water protection It combines the user controls set out in other protective measures imposed by regulators with State Forests own requirements for protecting forest roads against abuse and damage by all road users.

It applies to all forest roads and fire trails on all dedicated State forests. The controls also apply to those sections of roads associated with watercourse crossings, to temporary timber haul roads, and to fire trails. Some controls would be lifted or exempted where an emergency situation threatened human life or significant property values. The provisions of the Rural Fires Act and the Emergency Services Act would override these controls in some circumstances.

C.3.3 APPLICATION

A current practice mainly applied to roads associated with timber haulage. Application of controls to road usage for timber harvesting in State forests has been uniformly and diligently applied. Application of the same controls to other forest road users has been less successful as there is a conflict of interest between State Forests right to control access and the public's right to have unfettered access to roads on State forests at all times.

A large number of rural land holders also rely on roads within State forests for physical access to their private property where the legal access provided to them is inadequate or does not exist. To allow State Forests to protect the forest road and trail network against damage from this source will require significant changes to present regulatory conditions under the Forestry Act.

C.3.4 IMPACTS KEY PROTECTIVE MEASURES APPLIED

The practice is itself a protective measure and as such it may have locally significant impact on timber production (timber haulage) in some regions and at certain times of the year.

C.4 Maintain forest roads and fire trails

C.4.1 DESCRIPTION

The cyclical and periodic maintenance and repair of forest roads and trails by State Forests staff.

C.4.2 OBJECTIVE

To sustain reliable access to State forests, safeguard State Forests investment in access infrastructure, and to minimise environmental damage to the forest from natural surface roads and drainage structures that are damaged or are in poor non-functional condition.

Forest road and fire trail maintenance includes most of the following tasks:

- Road inspection and assessment for maintenance and repairs;
- Clearing of debris from drainage structure inlets and outlets;
- Removal of encroaching overgrowth of weeds and vegetation;
- Grading;
- Gravelling;
- Reshaping, cleaning and re-instatement of road surface drainage structures;
- Repair and rehabilitation of land slips from batters;
- Re-compaction of road surface;
- Repair of drainage feature crossing structures including watercourse crossing structures.

Forest road maintenance for State Forests 41 000 kilometres of roads and fire trails uses commonly known and well-proven techniques to keep roads and trails in good condition. The practices associated with maintenance have been reviewed recently in the preparation of the draft *Forest Practices Code, Part 4* for road construction, use and maintenance.

Maintenance standards for permanent roads are set out in a number of internal SFNSW manuals. These are based partly on those used for other natural surface roads but use guidelines developed and approved by other agencies in NSW such as DLWC. The most important supporting tasks for road and fire trail maintenance include:

- Cleaning and repair of road drainage structures;
- Grading of road surfaces and removal of surface vegetation;
- Maintenance and repairs to watercourse crossing structures.
- Gravelling prior to major traffic use in some situations.

These tasks are performed in accordance with protective measure conditions for forest soil and water protection. Road maintenance is scheduled on a local basis to meet traffic requirements and asset protection through regular preventative maintenance.

C.4.3 APPLICATION

A current practice. Road and fire trail maintenance is largely driven by immediate requirements for use and limited access to resources. New maintenance planning and scheduling approaches set out in State Forest's draft Code give more attention to regular scheduling of cyclical maintenance and reporting of road failure and repair needs.

C.4.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Control of soil erosion and water pollution requires ongoing maintenance.

Key protective measures relating to road maintenance should include consideration of: State Forests road design standards; Pollution Control Licence schedule conditions.

C.5 Manage watercourse crossings on forest roads and trails

C.5.1 DESCRIPTION

The location, construction and maintenance by State Forests staff and others of watercourse crossing structures for forest roads and fire trails.

C.5.2 OBJECTIVE

To enable forest roads and fire trails to be built across drainage features.

Watercourse location and crossing construction includes the following key tasks:

- Assess catchment flow, and select structure required;
- Clear crossing site and approach road corridor;
- Install erosion control and temporary watercourse protection;
- Prepare streambed for installation of structure (pipes, box culverts);
- Install crossing structure;
- Install permanent surface protection to earthworks;
- Construct streamside protection where required (eg gabions, wing walls, etc);
- Paved or gravel crossing surface (open crossings).

The choice of structure is dictated by type of watercourse to be crossed, the terrain and the type of road being built. Bridges, pipe and box culverts are commonly used on permanent and major roads. Open crossings are used for minor crossings and for the majority of temporary roads and trails. Standard designs for all types of crossing have been developed through the years.

In areas of high soil erosivity, and high rainfall, bridges and culverts are preferable to open crossings. More recent approaches to road construction in these areas aim to minimise the number of crossings required through ridge top and ridge side access

C.5.3 APPLICATION

A current practice. The use and management of waterway crossings is an integral part of road and trail access to forests.

C.5.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Waterway crossings are a major source of sediment into waterways from exposed surfaces on natural surface roads and through potential disruption of drainage. In some situations macro-aquatic life may be affected by the presence of bridge and culvert components in the stream bed.

A large number of protective measures are adequately prescribed by different agencies to minimise sediment and turbidity from waterway crossings. The major ones include: Pollution Control Licence conditions;

SFNSW road construction notes and instructions.

These deal with filter strip and road surface drainage diversion, ground cover retention adjacent to structures and other measures to trap sediment before it enters the waterway. There is a need to simplify and consolidate overlapping prescriptions

C.6 Close and rehabilitate forest roads, fire trails and crossings

[A protective practice]

C.6.1 DESCRIPTION

The removal by State forests staff of road formations and waterway crossing structures, and the regeneration of areas formerly occupied by roads and trails that have been de-commissioned.

C.6.2 OBJECTIVE

To restore forest areas to natural vegetation and tree crop cover and minimise subsequent unauthorised access and damage to exposed soil and drainage.

Rehabilitation includes:

- Replacement of pipe drainage by crossfall and crossbank drainage;
- Shaping of road surface and respreading of top soil;
- Sowing of cover crops and use of protective materials on exposed soil surfaces.
- Removal of bridges and culverts from crossing sites.

The practice applies especially to temporary log haul roads following harvesting to ensure that soil and water values within a harvested area are restored to equilibrium following harvesting and that optimum conditions for regeneration of the new forest crop and ground-cover vegetation are in place following road closure.

Local variation to standard rehabilitation methods occurs. On some sites, stockpiling and subsequent respreading of topsoil is undertaken where shallow soils occur. Treatment of dispersible soil sites where roads have been armoured by gravelling requires special low level disturbance. Ripping is commonly practiced to reduce compaction and encourage germination whist, in some special instances, tree planting or seeding may be prescribed.

Generally, rehabilitation of timber haul roads is undertaken at the same time as extraction track rehabilitation. The practice of timber haul road rehabilitation on private forests is commended.

C.6.3 APPLICATION

Road and trail closure is a current practice.

C.6.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Road and trail closure and rehabilitation is itself a major protective measure but requires careful implementation to ensure that rehabilitation does not fail. Similar protective measures to those for road construction and maintenance are applied.

D. Public use of forests

D.1 Manage public utilities on dedicated State forests

D.1.1 DESCRIPTION

The assessment and approval by State forests managers of public utility easements which traverse State forests.

D.1.2 OBJECTIVE

To provide sites and corridors for public utilities where no alternative sites or locations on other lands exist.

Public utilities occupy forest areas permanently for the provision of power transmission lines, pipelines and communications facilities. Management of these utilities involves:

- Assessment of availability of suitable sites or routes for proposed utilities;
- Determination of easement corridors and conditions for installation (including clearing);
- Environmental Impact Assessment and review;
- Granting of permits and conditions;
- Supervision of easement maintenance.

State Forests managers are responsible for management of the other uses of the sites or easements but are not, after granting the initial approval for maintaining easements in relation to weed control, access trail maintenance, etc. The conditions for issuing Occupation Permits for each type of utility are standard. Applications for occupation Permits in recent years have had to be supported by an EIA or an EIS. State Forests has had to give its consent to such applications where EIS determinations are required under the EP&A.

D.1.3 APPLICATION

A current practice. Provision of utility corridors, and to a lesser extent, communications facilities has been a well entrenched practice in relation to State forests.

The threatened species conservation and native vegetation management legislation now make it imperative that this practice be discontinued and that new public utility requirements be met through the use of easements across cleared private land

D.1.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Provision of utility sites on State forests involving clearing has a totally adverse impact on all ecological values. Protective measures associated with clearing are written into Occupation Permit conditions where soil and water values are concerned. The Conservation Protocols and the provisions of the Native Vegetation Management Act will have an major impact on future applications for easements, as will the provisions of the commonwealth and state native title legislation.

D.2 Manage and control military training exercises on State forests

D.2.1 DESCRIPTION

The approval and determination of conditions by State Forest managers for the conduct of military training exercises on State forests.

D.2.2 OBJECTIVE

To fulfil part of the NSW State government obligation to provide facilities for off-reserve training in accordance with the Defence Act (Commonwealth).

Defence forces have used State forests for military training and other defence purposes since before the first World War. Management by State Forests of military training exercises involves:

- Cooperative assessment of suitable forest areas for training;
- Assessment of impacts on other forest values;
- Determination of permit/authorisation conditions;
- Post- exercise monitoring for damage to the forest and remedial action required.

Defence training takes place throughout all regions. Authorisations for defence exercises are standard and include standard conditions that have been negotiated with the Defence Department. Defence is itself subject to Commonwealth legislation in respect of environmental protection. Defence Department environmental conservation officers vet all training exercise proposals prior to military approval to proceed.

D.2.3 APPLICATION

This is a current practice.

State Forests has some difficulties caused by the frequency and impact of defence training on certain limited areas of State forest. Now that some other public forest lands in NSW are no longer available for military exercises, State Forests is now a major provider of training sites. There is also a dual standard in that constraints on normal forest activities are not matched by similar constraints on military exercises or other public use.

There is a need to amend the Forestry Regulation to give State Forests more discretion in controlling and limiting usage of areas for this purpose.

D.2.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Military exercises very in impact but are mainly associated with soil erosion and water pollution from the excessive use of roads and trails, particularly in wet weather.

The protective measures set out in the draft *Forest Practices Code, Part 4* that reflects pertinent sections of the Pollution Control Licence are the basis for authorisation conditions.

Exercises may be cancelled during periods of intensive rainfall or high bush fire danger.

D.3 Plan and manage recreational facilities and trails on dedicated State forests

D.3.1 FOREST PRACTICE DESCRIPTION

The provision by forest managers of recreational facilities constructed by State forests staff in areas of natural amenity within State forests.

D.3.2 OBJECTIVE OF THE PRACTICE

To provide recreational and social opportunities within State forests for the Australian public and control the usage pattern of people and vehicles using recreational facilities to minimise irreversible environmental damage.

Public forests are freely available for passive recreation and for the use of the forest road network for touring and sightseeing. Recreational facility management includes the following aspects:

- Identification of sites and locations of high cultural and scenic/recreational significance;
- Survey and assessment of public demand for recreational facilities;
- Planning and location of barbecue facilities, campsites, toilet and ablution facilities, and walking trails;
- Assessment of public impact on proposed facilities;
- Construction and maintenance of recreational facilities;
- Policing and control of facilities to protect other forest values.

Standards for access are set out in the draft *Forest Practices Code*, *Part 4* and the associated recreational vehicle code.

D.3.3 PRESENT AND FUTURE APPLICATION

This is a current practice.

State Forests is concerned that, as in the case with general public access to State forests, there are situations where conservation and environmental protection cannot be implemented because the Forestry Act and Regulation do not exclude the public unless otherwise advised.

SFNSW needs to be in the same situation with NPWS in relation to restriction of access if adequate protective measures can be put in place.

D.3.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

The main impacts of public recreational use concern littering, soil erosion and water pollution through excessive use of roads during wet weather, damage to facilities. To a lesser extent, unauthorised use of fire and illegal use of firearms also occurs. The protective measures to counter these are set out in the draft *Forest Practices Code Part 4* and other State Forests' policies and instructions.

E. Harvest timber in native forests

E.1 Plan scheduled order of working (Plan of Operations)

E.1.1 DESCRIPTION

The identification by forest planners of compartments available for harvesting within a State Forests Region on a rolling two-year basis by preparing a Plan of operations.

E.1.2 OBJECTIVE

To provide:

- Details of available compartments from which timber and timber products will be harvested;
- Accurate forecasts of harvest volumes;
- A medium term planning horizon for industry and State Forests at the regional *level;*
- Timely preparation of harvesting plans including consultations and approvals;
- Necessary linkages in ensuring the orderly timber production on a state-wide basis;
- Meets Term Agreement requirements to provide a draft two year Plan of operations before the end of October each year for the ensuing two year period .

The Plan of Operations is compiled on a two-stage basis which give definitive forecasts of timber production for the first year and indicative forecasts of timber production for the second year. The plan of operations would not apply to situations where emergency or salvage harvesting as a result of a natural catastrophe occurred. The plan does not apply to the production of minor timber or other forest products. However, it is intended that the Plan will include these at a future date.

Plan of operations make extensive use of GIS data basis and inventory information.

E.1.3 APPLICATION

This is a current practice.

Plans of Operation in one form or another have been a standard feature of forest management for long periods of time, although their application has varied from one forest region to another. The effectiveness of Plans of Operation have been diminished in the past few years by the unexpected impacts of protective measures on actual volumes of available timber, especially where the timing of implementation of the measure came into effect after a Plan of Operations had already been prepared. A new approach, together with the use of new inventory aids, should overcome this difficulty and hopefully the full suite of protective measures will stabilise post RFA.

E.1.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

The Plan of Operations has no direct impact on specific values as any exclusion, modifying, or interactive measures are taken into account when the plans are prepared.

E.2. Survey harvest area for harvesting

E.2.1 DESCRIPTION

The comprehensive database and field survey and assessment of a harvest area by qualified survey staff and forest planners.

E.2.2 OBJECTIVE

To provide:

- Consistent and accurate data from recorded information (desktop database review);
- Determine the availability of the area for harvesting;
- Identify old growth and other flora and fauna and threatened species requirements as set out in the conservation protocols;
- Identify forest soil and water protection requirements;
- Identify cultural and natural heritage requirements; and,
- Generate prescriptions for harvest plan preparation;
- *Provide supporting documentation that meets legislative, regulatory and due diligence requirements.*

Harvest survey is used to prepare harvesting plans for all significant harvesting operations within dedicated State forests and other Crown-timber lands in NSW and applies to all native forest harvesting on all State forests and Crown-timber land on a state wide basis. It is not used for private property harvest planning. Harvest survey may coincide but is not necessarily undertaken in conjunction with stand inventory (See D.1).

Harvest survey relies on a large number of GIS data layers and inventory statistics. Results of the field data gathering component of harvest surveys are plotted to GIS data layers where appropriate, subject to cartographic and other data verification procedures.

The extent of harvest area surveys varies according to the degree of regulatory requirement imposed and the overall environmental framework. The main variations in survey input relate to:

- The presence of absence of an EIS determination for the State Forests Management Area concerned;
- The inclusion or omission of the State Forests Management Area in the schedule listed in the Timber Industry (Interim Protection) Act;
- The inclusion of the harvest area within the provisions of the Pollution Control Licence issued to State Forests;
- The relevant application of other guidelines such as the SEMGL 1993 to the harvest area;
- The overall range of threatened species likely to be found in the harvest area under the Threatened Species Conservation Act.

E.2.3 APPLICATION

This is a current practice.

Harvest area survey is a protective measure designed to ensure that all environmental and conservation attributes for the area, within the context of the wider landscape, are identified before the harvest planning process commences.

E.2.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Harvest area survey takes into account those exclusive, modifying and potentially interactive protective measures that may influence the harvest operation and the determination of site-specific conditions for specific value protection.

E.3 Prepare harvest plan

E.3.1 DESCRIPTION

The preparation of a plan for a harvest area by forest planners using previously recorded and survey field data.

E.3.2 OBJECTIVE OF THE PRACTICE

To provide an instruction to all harvest operatives that:

- Clearly defines the harvest operation;
- Takes account of all regulatory and licensing requirements;
- *Prescribes site-specific protective measures that will apply to the conduct of harvest operations.*

A road plan often forms part of a harvest plan. Additional prescriptions for post harvest burning are also often included.

The present harvest plan process has evolved from close consultation with other regulatory agencies, the timber harvesting industry generally and has received other input from the community at large.

Harvest plans are prepared for all significant harvesting operations within dedicated State forests and other Crown-timber lands in NSW. Harvest planning applies to all native forest harvesting on all State forests and Crown-timber land on a state wide basis but not for harvesting on private property (including or excluding protected lands).

Harvest plan preparation makes extensive use of GIS data layers through the preparation of PC based harvest plan maps.

Harvest planning relies on close attention to consultation with regulators and stakeholders, a checklist approach to ensuring regulatory and protective measure compliance, and careful follow up recording of harvest progress.

E.3.3 APPLICATION

Harvest plan preparation is a current practice.

Harvest plan preparation and the distribution of harvest plans are the principle documented pathway through which all stakeholders are informed of harvesting and associated operations. The harvest plan preparation is therefore a major practice that needs to be formally recognised. The present harvest planning system is commended for adaptation to private forest harvesting in NSW.

E.3.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Harvest plans identify areas within a harvest area that should be to be excluded from the net harvest area and plan instruction prescribe site-specific modifying measures where required.

E.4 Prepare and mark harvest area [A protective practice]

[A protective practice]

E.4.1 DESCRIPTION

The field marking and other field based identification of features by a harvest supervisor (supervising forest officer) of trees, boundaries and other features within a compartment to identify the location of features and conditions associated with the harvest operation.

E.4.2 OBJECTIVE OF THE PRACTICE

To ensure that the harvest operation is controlled according to the harvest plan and other generic requirements such as those set out in Codes of Practice, the Conservation Protocols, the Pollution Control Licence, etc.

Features marked to control the harvest operation may include:

- Trees to be removed;
- Trees to be retained;
- Trees to be retained for wildlife habitat or habitat recruitment;
- Filter strips;
- Wildlife and rainforest or protected vegetation buffer strips and offsets;
- Areas excluded from harvesting;
- Boundaries with private property;
- Log dump sites;
- Temporary log haul road locations.

Tree marking is applied to all significant harvest operations on a state-wide basis but may not be used in certain circumstances (eg. where salvage harvesting following a natural catastrophe such as a wildfire is in progress)

Standard tree marking prescriptions are issued on a State Forests region by region basis. Net harvest area marking may vary according to the most efficient means for tree marking. The two most common variations are:

- marking for retention; and,
- marking for removal.

The Supervising Forest Officer responsible for tree marking relies on close inspection of drainage features and harvest plan interpretation to assist him in marking or identifying the location of temporary harvest roads, log dumps, and major snig tracks, and marking for habitat tree and specific threatened species protection..

E.4.3 APPLICATION

This is a current practice.

Tree marking is an essential tool in applying protective measures to harvest operations but is highly labour intensive and expensive, especially in regrowth forests where the value of the timber or product may be lower. However, the adaptation of tree marking techniques to private forest harvesting operations is commended as a means of implementing threatened species protocols where these are needed.

E.4.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Tree marking is important in identifying the boundaries of the net harvest area and ensuring that exclusion measures are correctly positioned on the ground, especially where a slope limit or buffer zone (eg. against a rainforest boundary) applies.

Tree marking is also important to ensure that modifying measures (eg. overall residual basal areas) are maintained during harvesting.

Tree marking is strongly influenced by the inspection, discovery and verification of interactive measures related to the Conservation Protocols and the actual field location of drainage features in relation to Pollution Control Licence conditions. Itinerant inspection and discovery may lead to the need to re-mark an area within a compartment.

E.5 Manage construction and use of temporary timber haul roads

E.5.1 DESCRIPTION

The location, survey, and construction of a temporary timber haul road by timber harvesting licensees to a prepared road construction plan.

E.5.2 OBJECTIVE

To provide temporary access to a forest compartment for harvesting.

Timber haul roads are constructed to principles aimed at protecting the forest environment during and after the harvest operation. See also practices C.1-C.6.

Temporary timber haul road construction includes the same tasks as those for other road construction. Temporary log haul roads are used for all harvest operations where extraction distances to log dumps at roadside on permanent roads exceeds 500 metres and no permanent trails or tracks exist within the compartment area. They are used to obtain the most economic access to the timber being harvested and to avoid the excessive use of extraction machinery, especially for snigging.

Temporary roads are not used where permanent roads provide a sufficiently high density to allow direct extraction to the perimeter of the net harvest area or where intervening significant conservation areas such as rainforest, flora reserves and other protected areas may occur.

Planning and design for timber haul roads is set out in a number of internal SFNSW manuals. Road construction standards are integrated with those for higher classification permanent roads. CAD facilities can be used to design timber haul roads and locate them on forest maps.

The temporary harvest road network density varies according to the value of the timber resource, the nature of the terrain in relation to road construction costs. Timber haul roads usually occupy ridge top locations, wherever practicable, to reduce earthworks and drainage costs, and environmental impact. Road construction in steeper terrain requires greater physical and protective standards than in flatter areas.

Timber haul roads rely heavily on economic justification for construction. The assessment of environmental and conservation factors is coequally important but is normally integrated with harvest planning.

E.5.3 APPLICATION

Temporary timber harvest road construction and use is a current practice.

E.5.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Temporary timber haul roads may not be constructed in a number of high conservation value forest types. Prescriptions for old growth forest, rainforest stands and areas reserved under the management classification zoning system specify the parameters to be taken into account when locating roads. In some situations, access to otherwise viable commercial forest may be compromised where major road access is not permitted. See Conservation Protocols.

Temporary timber haul roads may also have their location and alignment modified by prescriptions for fauna and flora habitat, soil and water protection and protection in the vicinity of drainage feature crossings.

Survey information gathered during planning is aimed at avoiding the intervention of interactive factors once construction of a road is commenced.

E.6 Manage construction and use of log dumps

E.6.1 DESCRIPTION

The location and clearing of log dumps (log landings) by harvest operatives as specified in a harvest plan, installation and maintenance of drainage, management of bark and logging debris, and final drainage and revegetation operations following cessation of use.

E.6.2 OBJECTIVE

To facilitate the extraction, collection, servicing segregation, and loading of logs prior to haulage to a sawmill of processing plant.

Log dumps are used for nearly all harvest operations. Log dump locations are indicated on harvest plan maps. Log dump management varies according to the type of extraction and loading equipment used.

Ramped dumps which enable a bulldozer to load a log truck directly without other machinery are still used but loading using a dedicated excavator based crane is now more common.

Excavators and bulldozers are also used for removal and management of bark and logging debris left at dumps. Dumps size varies according to the scale of operations within a compartment. Dumps may vary between 0.5 and 1.5 hectares in size. In long managed regrowth forests, a series of permanent dumps (sometimes with gravelled surfaces) may be present.

E.6.3 APPLICATION

Extraction, loading and haulage using log dumps is a current practice. Log dumps continue to be will be used to facilitate timber harvesting operations.

E.6.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Log dumps are focal points within harvesting operations where a high degree of disturbance occurs. Protective measures are mainly aimed at ensuring that soil erosion and sedimentation leading to water pollution are controlled through the provision of adequate drainage, and subsequent provision of ground cover following the cessation of operations. In association with access constraints, some dumps may be identified for dry weather only use.

A large number of protective measures are prescribed by different agencies to minimise sediment and turbidity from log dumps. The three major ones include: Pollution Control Licence conditions; SFNSW *Forest Practices Code Part 2*.

E.7 Manage timber felling and extraction

E.7.1 DESCRIPTION

The felling and cross-cutting of merchantable trees by a harvest operative and their removal to a log dump.

E.7.2 OBJECTIVE

To facilitate the removal of timber and timber products from stump to dump for loading.

Timber felling and extraction methods vary according to the type and nature of the operation. Felling is usually a motor-manual buy a chainsaw operator although mechanical felling using feller/bunchers and processor machines may take place in native forest regrowth stands and hardwood plantation.

Extraction methods include:

- Harvesting using a bulldozer or wheeled skidder for extraction by snigging;
- Harvesting using a forwarder (walkover extraction);
- Skyline harvesting using cable techniques (not yet applied to native forests in NSW).

The intensity of the operation depends on the proportion of the stand to be removed and the nature of the silvicultural system or technique applied.

- Significant supporting tasks include:
- Snig track construction and drainage;
- Placement of logging slash and restoration following track use;
- Installation of cross fall and cross bank drainage as required.

E.7.3 APPLICATION

Current felling and extraction techniques will continue to be used for the foreseable future.

E.7.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Tree felling has an important impact on the immediate physical condition of the forest stand By creating a gap in the stand canopy, causing slight damage to adjacent retained trees when falling, and accumulating debris on the forest floor. Protective measures are aimed at directing the way which trees will be felled to avoid excessive damage to other components of the forest stand and to water pollution potential.

Snig tracks and other extraction tracks are a potential source of erosion and water pollution and most protective measures are aimed at avoiding unchecked surface drainage from tracks both during use and after closure.

Timber extraction routes may be modified by the presence of non-harvest areas that cannot be entered. Various combinations of soil erodibility and rainfall erosivity may require the seasonal closure of snigging operations while adverse weather conditions may require cessation of operations on a day to day basis. The identification of threatened species habitat or presence during harvesting operations may require alteration of snigging patterns.

E.8 Undertake post harvest survey and assessment

E.8.1 DESCRIPTION

The measurement and checking by harvest supervisors and others of the success of regeneration seedbed preparation, compliance in retention of habitat trees and other conservation protocol requirements, and recovery of ground-cover vegetation following harvesting.

E.8.2 OBJECTIVE

To ensure that:

- Harvesting has achieved planned outcomes;
- The forest stand is capable of growing successfully towards the next harvest event;
- *Restoration of other forest values will achieve an acceptable equilibrium with the new stand structure.*

Post harvest survey is undertaken for all harvest operations state-wide although it may be integrated with other survey requirements. In some situations, survey for compliance only may be required (eg. where the harvest is not completed but has been interrupted or where further silvicultural treatment is proposed).

Instructions on post-harvest survey are included in various State Forests instructions. Reporting from the post-harvest survey and the annotated harvest plan returned by the SFO form the basis for amendments and progress reports within the GIS database. Not all parameters will be surveyed and will relate to the level of regulatory compliance prescribed.

E.8.3 APPLICATION

Post-harvest survey is an important protective measure that gives early warning of deficiencies in silvicultural treatment and or failures in compliance where these will have a deleterious impact on forest values. There is a need to standardise reporting methods for this survey and those used for forest inventory or pre-harvest survey to ensure that all parameters and indicators are measured in the same way to the same criteria.

E.8.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

There are no protective measures required although the survey will generate data that will be used to service some reporting requirements.

F. Native forest silviculture and forest establishment

F.1. Undertake forest stand inventory

F.1.1 DESCRIPTION:

The measurement, recording and assessment by forest planners of a forest stand's condition in relation to stand species composition, size class distribution, growth characteristics and previous stand history in relation to proposed harvest or other silvicultural operations.

F.1.2 OBJECTIVE

To monitor the condition of a forest stand for growth, health and future prospects, to enable appropriate silvicultural decisions to be made, and to forecast timber yields.

At a broad regional or state level, *strategic* stand inventory consists of a determination of broad strata in forest types and the evaluation of sample plots within strata to generate estimates of present and future timber volumes according to the intensity and type of silvicultural system adopted.

At a forest area or compartment level, *operational* inventory is focused on a more location specific assessment of timber volumes and stand condition to enable an appropriate silvicultural treatment to be selected.

While much of the data collected is similar, the two levels of inventory have quite different objectives and levels of resolution.

Operational inventory is used in all native forests as an ongoing function of continuous inventory data collection to maintain State Forests' resource information.

Strategic inventory measures forest stand characteristics that are used in the Forest Resources and Management System (FRAMES). These are described in the FRAMES specification.

Inventory standards for both levels have state-wide application but with adaptation to specific local requirements.

Data collected during inventory includes: Measurement of stand structure attributes; Growth parameters for timber volumation and yield estimation; Some tree and site biophysical information; and, Geomorphological site attributes;

and their cross verification with other data base information held by State Forests.

F.1.3 APPLICATION

Strategic inventory standards and resources have been developed explicitly to meet CRA and RFA requirements for comprehensive data on all forest attributes. The overall FRAMES project has been comprehensively developed in consultation with a wide range of stakeholders and scientific advice and the inventory standards represent world's best practice.

Standards are fine tuned as part of the feedback from field application and to meet further modelling requirements for yield and other predictive models.

F.1.4 IMPACTS AND KEY PROTECTIVE MEASURES

Inventory activities have no impact on forest values. However inventory standards reflect the various impacts of protective measures, notably the Conservation Protocols, in providing interpretive information for stand modelling the availability of different species and stand tree components for different purposes according to the exclusive, modifying and interactive measures that may be applied.

F.2. Select silvicultural system for harvest

F.2.1 DESCRIPTION

The selection by forest planners of an appropriate silvicultural system which uses harvesting for its implementation. The silvicultural system selected may include supporting silvicultural treatments which may be undertaken independently of harvesting.

F.2.2 OBJECTIVE

To induce the successful regeneration for a new forest crop or to achieve adequate or enhanced growth potential, health and vigour, or to maintain ecological structural diversity within the treated stand.

The application of consistent silvicultural treatments to managed forest stands is essential for sustaining their future productivity, health and vitality, and ecological function. All silvicultural systems include a regenerative phase and a stand improvement phase depending on stand condition. The actual implementation of silvicultural treatments is achieved through harvesting operations, although some treatments within a silvicultural system may be undertaken at different time.

There are about sixty combinations of forest stand condition in native forest currently recognised, based on around twelve broad native hardwood forest associations (and one conifer association) and around five forest structure classes. Selection of a silvicultural system and supporting silvicultural treatments, timing and intensity depends on consideration of the following factors:

- Objective of management for the forest stand or forest zone;
- Present stand condition;
- Maintenance of biodiversity;
- Desired future condition;
- Seed-bed requirements;
- Seed source requirements;
- Site-specific environmental constraints;
- Rotation age;
- Cutting cycle phase and length;
- Available timber and/or timber products;
- Available markets or forest-wide wood supply balance.

Selection of silvicultural practice considers the full suite of forest values when making the silvicultural decision. Silviculture generally aims to improve stand condition and the prospects for growth although this must be tempered by the economic cost of felling trees that may improve growth but for which there is no market. Silvicultural systems underpin all harvesting operations. The identification of pre-harvest stand condition in relation to maturity, vigour and available seed source is therefore important.

Silvicultural treatments favouring on-going or long term production of future logs are generally not applied to Crown-timber land operations where the land is likely to be alienated from the permanent forest estate.

Detailed information on silvicultural systems is found in State Forests' *Silvicultural Notes*, *Silvicultural Bulletins* and various *Research Notes*. Forest types as described in *Research Note* 17. and other stand condition information are used in maps and GIS data bases to assist forest planners assess silvicultural requirements. The silvicultural selection process will be progressively incorporated into the *Ecosystem Field Guides* in preparation for all regions.

The main silvicultural system selected may be augmented by other silvicultural practices. The principal ones are: Seedbed cultivation; Enrichment planting; Post harvest burning (See G.6); Thinning (including culling and spacing) (See F.8).

Seedbed cultivation may be in the form of ripping (along the contour), or scarification. Guidelines for seedbed cultivation are determined locally according to forest types and the type of harvesting operations.

Enrichment planting or seeding within harvested areas is aimed at increasing the number of seedlings growing within a regenerating area to supplement natural seed-fall regeneration. Planting may be used to regenerate log dumps, snig tracks and closed timber haul roads and other sites where timing of sufficient natural seed-fall is unreliable.

F.2.3 APPLICATION

Silvicultural system selection is a current practice.

The development and choice of silvicultural systems and supporting practices that have been used and are available has been subjected to long and detailed research under Australian and especially NSW conditions, and have been recently reviewed by a number of scientific committees and other groups. Information on silvicultural systems used in Australia is readily available in published reports and textbooks(eg Florence 1996). A review of application of various systems to different forest types is in progress.

SFNSW recommends the use of the silvicultural practices listed in private and other public reserve native forests where commercial harvesting may take place. However, there is a risk that some current constraints on the application of some silvicultural practices reduces State Forests capacity to meet ESFM targets for a wide range of specific values including sustainable replacement of forest crops, biomass production, carbon fixation and carbon sink sequestration, and other ESFM values that cannot be met from conservation reserves.

Harvest based silviculture is not applied to non-commercial forests.

F.2.4 IMPACTS AND PROTECTIVE MEASURES

Silvicultural system selection takes account of all relevant protective measures, including the Conservation Protocol and Pollution Control Licence conditions in making the silvicultural decision. These measures may exclude the application of some silvicultural systems to certain forest stands or constrain their full implementation in others.

These constraints may compromise by rendering conditions for successful regeneration inadequate. (See F.3 – F.8). The presence of threatened flora and fauna discovered during harvesting operations can also compromise the planned spatial redistribution of stand structure and lead sub-optimal opening of the forest canopy for regeneration. Inability to select potentially useful silvicultural systems that enhance wildlife habitat in the medium term may lead to degradation of fauna habitat, especially for niche species that are rare and dependent upon exploiting stand disturbance.

F.3 Apply the single tree selection silvicultural system

F.3.1 DESCRIPTION

A regenerative silvicultural system where harvested trees are selectively felled as scattered individuals over all or part of the net harvest area.

F.3.2 OBJECTIVE

To maintain a distinctly uneven-aged forest and desirably, improve the silvicultural characteristics of the residual stand.

Single tree selection enhances the growth of residual trees in the stand by releasing them from competition. The disturbance caused by tree removal allows the recruitment of trees into the smaller size classes of the stand.

Gap size is determined by the crown diameter of trees removed. Gap arrangement is influenced by the condition of the forest stand being harvested. Generally, the minimum separation between gaps created by removal of single trees is one (1) tree height unless heavy tree selection is practised.

Three intensities for harvesting removal are recognised:

Light single tree selection

Remove 20% of stocking > 10cm dbhob within the net harvest area in each harvest event. *Moderate single tree selection*

Remove 35% of stocking > 10cm dbhob within the net harvest area in each harvest event. *Heavy single tree selection*

Remove 50% of stocking > 10cm dbhob within the net harvest area in each harvest event.

Tree Quality Type	Maximum Pro	Maximum Yield Constraint			
	10-30	30-50	50-70	70+	
High Quality	0%	20%	30%	80%	n/a
Low Quality	0%	80%	80%	80%	50 m³/ha

For Moist Yield Associations the following parameters apply:

Pulpwood and waste are assumed not to be harvested; target residual BA is 15 m²/ha

For Dry Yield Associations the following parameters apply:

Tree Quality Type	Maximum Pro	portion Remove	ed by Diameter C	Maximum Yield Constraint	
	10-30	30-50	50-70	70+	
High Quality	0%	20%	80%	80%	n/a
Low Quality	0%	80%	80%	80%	50 m³/ha

Pulpwood and waste are assumed not to be harvested; target residual BA is $12 \text{ m}^2/\text{ha}$

Explanatory Notes for Single Tree Selection Definition

The specification makes no presumptions about which silvicultural system is put into practice. It simply defines how a particular silvicultural system would be specified if it was implemented.

• The intensity specifications are based on SFNSW estimates. They recognise that a harvesting intensity removing greater than 50% of the stocking is starting to cross the line into gapping type silviculture.

- Pulpwood and waste are assumed not to be deliberately harvested in single tree selection (STS). Some will arise from incidental production when harvesting for higher value products. Where markets for such products are available, STS would be unlikely to be practised.
- The trigger points for harvesting $(x m^3/ha of high quality logs \ge y cm dbhob)$ will require review as performance of the system is evaluated and in any case are likely to vary at least somewhat between areas. In some cases the triggers may need to be varied with the availability of particular markets.
- The proportion removed in the 30-50 cm diameter class is set relatively lower than for larger diameter classes in the expectation that such trees will be the "growers" and 60% would be retained for a future harvesting operation as they would grow into a higher value (especially quota sized) product.
- The original version of STS set the proportion removed in the 50-70 cm diameter class at 30%, on the assumption that a significant proportion of those trees would be retained to grow on to larger sizes. Preliminary runs of FRAMES have suggested that such a rule leaves too much of the stand unharvested. Consequently, this is set at 70%. There is less reason to retain trees as growers in dry yield associations because growth rates are too slow to justify a return harvesting operation within a reasonable time (say 20 years).
- The maximum proportion of high or low quality that is harvested is set at 70% or 80% because a proportion of such trees will always remain unharvested even if they are actively pursued. All unharvested trees are pooled with any recruitment trees for future harvests.
- A maximum harvest volume for low quality is set to ensure that unmanageable volumes of low quality products are not produced. If there are market opportunities for low value products, it is unlikely that STS would be practiced.

If there are sufficient or a marginally high number of habitat trees, they are all retained and computations of basal area and volume removal are ignored. If there is a significant component of habitat trees (above the required number to be retained) with high quality logs it may be necessary to reduce the number of habitat trees to the required level. Where the number of habitat trees is reduced to below the required level through mortality, then recruitment trees need to be nominated.

Single tree selection is applied to:

- Moist and dry sclerophyll forest and dry tablelands forest types;
- Other forest types where conservation values warrant special prescriptions;
- Where regeneration from lignotuber replacement from advanced growth is expected to succeed;

Single tree selection is not desirably used:

- Where high levels of disturbance are required to ensure regeneration;
- Where heavy understory or ground cover precludes adequate regeneration.

However, lack of market availability for products may limit choices at some sites.

F.3.3 APPLICATION

Single tee selection is a current practice. A review of silvicultural systems in NSW has recognised single tree selection silviculture as an acceptable practice notwithstanding its limitations in optimising the productivity of the forest in the long term.

F.3.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Single tree selection has limited short-term impact on specified values. It has wide application where conservation protective measures preclude the use of other silvicultural systems and treatments. Modifying measures include general habitat tree retention and other species-specific food and habitat requirements for fauna.

F.4 Apply the group selection silvicultural system

F.4.1 DESCRIPTION

A regenerative silvicultural system where trees are felled in groups which are scattered over all or part of the net harvest area. Seedbed preparation within the group relies on mechanical disturbance and sometimes the use of fire. The creation of groups may be accompanied by thinning of adjacent regrowth components of the stand where necessary.

F.4.2 OBJECTIVE

To maintain a distinctly multi-aged forest by encouraging periodic establishment of regeneration.

Group selection involves the removal during harvest of all trees within marked gaps in a forest stand. Thinning of the retained stand between the gaps is also sometimes undertaken, with a particular focus on thinning of previously regenerated gaps.

The group selection system is applied to those areas within a forest stand when field assessment indicates that the current forest stand is mature, is unresponsive to further thinning from below and the timber productive end point (reset point) in the stand's rotation has been reached.

Gap size for successful regeneration is influenced by:

the height of trees surrounding the gap;

tolerance of the species to competition for light and moisture;

stocking and condition of trees surrounding the gap;

harvest damage which may be caused to adjacent regrowth created by the gap.

Generally gap diameter should be twice stand dominant height. The arrangement of gaps is influenced by the condition of the forest in the area being harvested. The minimum distance between gaps should be one (1) tree height. Within the net harvest area the total gap area created by all the gaps in any particular harvest operation should not exceed 30% of the area.

Three intensities for the application of group selection are recognised:

Light:

Gaps ≤ 40 m; retain 20% of Net Harvest Area untouched; 10% gaps in each harvesting event. *Moderate:*

Gaps ~ 70 m; retain 20% of Net Harvest Area untouched; 20% gaps in each harvesting event. *Intensive:*

Gaps ~ 100 m; retain 10% of Net Harvest Area untouched; 30% gaps in each harvesting event.

The following parameters apply to species association:

Yield	Struct	Operation	Min Vol.	Products Harvested	Residual Basal
Assoc.	•	- F	Harv.*		Area
Moist BBT	A,B,C	Reset	15 m ³ /ha	$HQ \ge 70 \text{ cm dbhob}$	-
		T1	35 m ³ /ha	All	12 m ² /ha
		T2	$25 \text{ m}^3/\text{ha}$	All HQ + LV	15 m²/ha
		Reset	15 m ³ /ha	$HQ \ge 70 \text{ cm dbhob}$	-
	e1	T1	35 m ³ /ha	All < 70 cm dbhob	$15 \text{ m}^2/\text{ha for} < 70$
			2		cm
		T2	25 m³/ha	All HQ+LV < 70cm	$15 \text{ m}^2/\text{ha for} < 70$
			4 - 3 -		cm
		Reset	$15 \text{ m}^{3}/\text{ha}$	$HQ \ge 70 \text{ cm dbhob}$	-
	e2	DT1	$35 \text{ m}^3/\text{ha}$	All $< 70 \text{ cm dbhob}$	$15 \text{ m}^2/\text{ha for} < 70$
		Deset	15 m ³ /h a		cm
Malat		Reset	15 m /na	$HQ \ge 70 \text{ cm dbhob}$	-
MO1St	A,B,C	Reset	AS IOT MOISU	$HQ \ge 60 \text{ cm dbhob}$	-
Coastal;		All others	DDI	As for Moist PDT	As for Moist BBT
Moist &		All others	As for Moist	AS IOF MOIST DD I	AS IOI MOIST DD I
Taller Dry			BBT		
Moist			bbi		
Tableland					
	e1, e2	All	As for Moist	As for Moist BBT	As for Moist BBT
			BBT		
Dry BBT	A,B,C	Reset	As for Moist	As for Moist Coastal	-
& SG			BBT		2
		T1	As for Moist	As for Moist BBT	$10 \text{ m}^2/\text{ha}$
		-	BBT		10 20
		12	As for Moist	As for Moist BBT	$12 \text{ m}^2/\text{ha}$
		Poset	BB1 As for Moist	As for Moist Coastal	
		Reset	RRT	AS IOI MOIST COASTAI	-
	e1	Т1	As for Moist	As for Moist BBT	$12 \text{ m}^2/\text{ha for} < 70$
	01	11	BBT	As for moist DD1	r_2 m /m for < 70
		T2	As for Moist	As for Moist BBT	$12 \text{ m}^2/\text{ha for} < 70$
			BBT		cm
		Reset	As for Moist	As for Moist Coastal	-
			BBT		
	e2	DT1	As for Moist	As for Moist BBT	$12 \text{ m}^2/\text{ha for} < 70$
			BBT		cm
		Reset	As for Moist	As for Moist Coastal	-
6			BBT		
Dry	All	N/A			
Scierophyl					
1 Dry	Δ11	N/Δ			
Tableland	7 111	10/21			

*Where no market for pulp is available, reduce T1 and DT1 minimum volume from 35 m³/ha (all products) to 25 m³/ha (HQ+LV).
Explanatory Notes for Group Selection Definition

The specification makes no presumptions about which silvicultural system is put into practice. It simply defines how a particular silvicultural system would be specified if it was implemented.

The intensity of a group selection (GS) system is implemented through adjustments to the net harvestable area (for the proportion left unharvested) and through the number of events taken to complete a cycle. Thus intensive GS leaves 10% of the area within the net harvestable area (NHA) over a complete gapping sequence and resets the remainder in three events that are 10 years apart (100%-10% = 90%; thus 3 events of 30% each complete the cycle), compared to a light GS that leaves 20% of the NHA unharvested and resets the remainder over eight events that are 10 years apart (100%-

20% = 80%, requiring 8 events if 10% gaps in each harvesting event).

Gap size was driven by silvicultural considerations discussed in Florence (Ecology and Silviculture of Eucalypt Forests, 1996).

A 10 year return period is set between gapping events. T1, T2 and second reset are driven by stand parameters rather than explicit time periods.

The proportion of NHA left unharvested reflects the fact that, in any gapping sequence, the simple geometry of gaps, retention of advance growth, habitat trees and so on all combine to leave a proportion of the intended harvest area unharvested over the gapping cycle.

Harvesting events following a stand "reset" by gapping (the first line of each prescription) comprise two thinning operations before another "reset". These thinning operations are plainly not group selection but rather are thinning from below for T1 and from below and beside for T2. Minimum residual basal areas ensure retention of adequate growing stock. There is no explicit specification for high quality in residual BA because the thinning operation targets lower quality trees, leaving predominantly higher quality trees remaining.

The trigger points for harvesting $(x m^3/ha of high quality logs \ge y cm dbhob)$ will require review as performance of the system is evaluated and in any case are likely to vary at least somewhat between areas. In some cases the triggers may need to be varied with the availability of particular markets. User input variables accommodate this.

The simulation of GS assumes no "thinning" in the net harvestable area outside the gap (other than for T1 and T2 of already created gaps). Although this could be modelled, the net effect would be minimal because these "thinned" areas are subject to gapping at a future point (within 30 years for moderate intensity GS and 20 years for intensive GS); any "thinning" simply reduces the available volume at the later gapping operation.

Group selection is used in a wide range of coastal and tableland foothills forests where:

timber values are moderate to high (blackbutt, stringybark, flooded gum, some dry and moist hardwood forest types);

regeneration from seed bearing species requires exposure of mineral soil and strong light conditions to promote germination;

The group selection silvicultural system is not generally applied to poor site quality sites, nor those generally over 20 degrees of slope.

F.4.3 APPLICATION

A review of silvicultural systems in NSW has recognised group selection silviculture as an acceptable practice that is effective to maintaining the productivity of significant moist and dry forest types in the long term.

F.4.4 IMPACTS AND KEY PROTECTIVE MEASURES

Group selection causes short-term soil disturbance in gaps necessary for successful regeneration and renewed productivity in the forest stand. There are a number of DLWC guidelines that should be considered as protective measures for areas exposed as gaps.

The simultaneous creation of gaps in the forest stand along with the retention of thinned and unthinned areas has the impact of creating a more diverse forest stand structure at a small scale. This structure can have a beneficial effect on the biodiversity of the forest that is complimented by the protective measures that apply. Group selection can accommodate those modifying measures for general habitat tree retention and other species-specific food and habitat requirements for fauna.

F.5. Apply alternate coupe harvest silvicultural system

F.5.1 DESCRIPTION

A regenerative silvicultural system where compartments are subdivided into harvest areas called coupes, which are harvested in an alternating pattern over time.

F.5.2 OBJECTIVES

To create areas of even aged forest within an uneven aged forest matrix.

Harvest areas are planned at the landscape level with boundaries being defined by major topographic features wherever practicable. Significant supporting tasks may include post-harvest burning and retention of seed trees. Within the net harvest area, subset treatments using the other silvicultural systems may be applied, eg single tree selection, group selection, or clearfell.

Harvest area size is influenced by:

- operational, environmental and aesthetic objectives;
- previous stand history (especially the size of harvest areas established in earlier cutting cycles).

Future harvesting following alternate coupe silviculture may use other silvicultural systems or to a different harvest area size and arrangement. Increases in harvest area size can only be achieved over periods approximating the stand rotation.

The alternate coupe system is used in a limited number of forest types where:

- Regeneration is mainly through seedfall;
- Severe wildfire is a major recurring event;
- Species regenerate naturally in large uniform stands following wildfire;
- Markets are available for the full range of timber products harvested.

Ash forests, coastal moist and dry hardwood forests in southern regions are amenable to to alternate coupe silviculture.

F.5.3 APPLICATION

Alternate coupe silviculture is a current practice. A review of silvicultural systems in NSW has recognises it an acceptable practice for application to seed regenerating eucalypt stands where frost is not a problem, uncontrolled natural fire events are severe and there are opportunities to utilise low quality timber resources.

F.5.4 IMPACTS AND KEY PROTECTIVE MEASURES

The general impacts from alternate coupe silviculture affect on-site soil and water values in the short term and other site-species values in the medium term. These effects are not so drastic as those induced by high to severe intensity wildfires in unmanaged areas or reserves. The retention of a matrix of undisturbed forest in the alternate coupe and in the form of riparian buffers further reduces this impact. Retained areas should fit readily into the modifying measures for habitat tree retention and other species-specific requirements.

F.6 Apply clearfell silvicultural system

F.6.1 DESCRIPTION

A silvicultural system in which all merchantable trees within the net harvest area of a compartment are felled. A limited number of trees required for environmental purposes are retained. Clearfall silviculture may be accompanied by a thinning regime for intermediate regenerated or planted stands and use a defined rotation age.

F.6.2 OBJECTIVE

To create an even aged forest stand or to rehabilitate an even aged stand from a forest area that has been damaged or destroyed by disease, fire or windstorm

The size of a harvest area may vary depending on the size of the management unit and the rotation age of the silvicultural regime. Where damaged forests are being rehabilitated, harvest area size will reflect the severity and extent of the damage event.

The clearfall system may be used:

- For native species plantations;
- For even-aged regrowth stands with plantation growth characteristics, or where high productivity and short rotation are required to meet high volume production;
- To rehabilitate damaged stands.

The clearfell system should not be considered where assessed stand structure is such that regeneration and new crop growth and productivity can be satisfactorily achieved through the use of one of the other silvicultural systems. Similarly it may not be required where significant losses in timber resource or other forest values following a damage event are not expected.

The criteria for clearfall in severely damaged stands are determined by an assessment that stand condition is moribund or post catastrophic event damage is severe. Such assessment also indicates that other silvicultural systems would not achieve satisfactory regeneration for rehabilitation of the forest.

The practice may rely on records of previous treatments to determine its suitability for the site or to remedy a catastrophic event and prescriptions for implementation.

F.6.3 APPLICATION

Clearfall is a current practice with particular application to the forest stand conditions described above. The adoption of clearfall is subject to specific approvals on a management unit by management unit basis.

F.6.4 IMPACTS AND KEY PROTECTIVE MEASURES

Clearfall has the same impacts as plantation silvicultural regimes on soil and water. It is also important in sequestering and biomass recovery cycles through the salvage of timber. Its immediate impact on soil and water during operations is controlled through forest soil and water protection measures.

The impact of clearfall on other values is significant and protective measures need to take account of the previous history of site biodiversity. The definitive presence or absence of threatened species or potential for their ingress into the stand from other forest areas should be determined before protective measures are fully applied.

The role of clearfall in assisting rehabilitation of severely damaged or destroyed forest stands has a major impact in shortening the recovery process in recreating forest structure and ecosystems. Where clearfall is prescribed, these and the Conservation Protocols may require modifying implementation to protect ground cover and ground cover habitat recovery.

F.7 Apply shelterwood silvicultural system

D.7.1 DESCRIPTION

A regenerative silvicultural system where trees are removed in two fellings.

The first felling removes most trees from the stand except seed trees to create suitable regeneration conditions where some degree of seedbed shelter is needed. The second felling removes the seed trees to release the successful regeneration from competition.

F.7.2 OBJECTIVE OF THE PRACTICE

To create an even aged forest stand with a definitive rotation length.

The first felling reduces the stand stocking to a given residual basal area. The second felling removes the overstory following successful regeneration. The residual basal area and the time between fellings will vary from species to species and according to management objectives.

The shelterwood system is applied to forest stands where:

- the species present rely exclusively on timely seedfall for regeneration and seed production is intermittent (e.g ash; white cypress pine);
- where regeneration needs protection from cold weather conditions (e.g. at high altitudes alpine ash, shining gum, brown barrel).

F.7.3 APPLICATION

A current practice. Shelterwood is recognised as an acceptable but limited practice that is essential to the regeneration of certain forest types.

F.7.4 IMPACTS AND KEY PROTECTIVE MEASURES

Shelterwood silviculture has a similar impact on specific values as group selection and is best if only applied to prescribed species growing in general management zones where conservation protective measures would normally be met through application of group selection. The value of shelterwood in protecting young regeneration against adverse conditions cannot be underestimated. Modifying measures may include general habitat tree retention and other species-specific food and habitat requirements for fauna.

F.8 Apply thinning

F.8.1 DESCRIPTION

An intermediate silvicultural practice in which the trees with the poorest growth or commercial potential are sequentially removed during harvest to promote the growth of retained trees. In some instances high value trees are selectively removed from the co-dominant or dominant strata of the forest stand. Thinning may include spacing (non or pre-commercial thinning) or culling.

F.8.2 OBJECTIVE

To promote the growth of retained trees so as to realise some higher value product or to produce trees of a specified size in a shorter period of time (thinning from below); or, To ensure the production of high values timber products ((eg transmission poles, girders, plywood veneer logs, sawlogs) thinning from above).

Thinning is applied to forest regrowth stands where group selection, alternate coupe or clearfall systems have created regeneration at the previous harvesting event. Specific prescriptions are determined for each thinning operation based on the intensity of the silvicultural system being used, the current basal area of the stand, species composition and market opportunities for timber or product. The size of the thinning unit will be determined by the condition of the regrowth stand being thinned.

Thinning is usually from below to remove trees with the poorest growth. Thinning is not applicable to forest stands within the single tree selection system, poor quality stands which are not economic or where the quality and vigour of the future forest stand may be compromised.

The level of thinning applied may vary by leaving a residual stand basal area that reflects the growth potential of the stand being treated, its diameter distribution and present stand conditions. Thinning generally aims for the residual stand to have:

 Moist hardwood yield associations Residual basal area 15m2/her 	tare
------------------------------------------------------------------------------------	------

• Dry hardwood yield associations Residual basal area 10-12 m2/hectare

Thinning uses silvicultural guidelines, forest type maps and GIS layer equivalents and compartment histories and records of previous treatments to guide in its application.

Spacing is a form of thinning where trees are removed from regrowth stands and the trees removed are too small for timber production. Spacing promotes the growth of retained trees by reducing competition for light, water and nutrients and prevents the onset of stagnation and sometimes disease in overstocked young regrowth stands. Spacing is also called non-commercial thinning or pre-commercial thinning.

Culling is undertaken to remove non-commercial trees from any forest stand that are moribund and have no future conservation value. Culling may also include the removal of dangerous or fire hazardous trees.

F.8.3 APPLICATION

Thinning is a current and universally recognised practice for application in regrowth and other forest stands of intermediate age which have resulted from previous harvesting operations.

F.8.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Thinning has similar short-term effects in a forest stand as single tree selection. Thinning has beneficial impacts on all specific values through the release and recycling of nutrients, moisture and growing space for the retained stand including vegetation retained to meet conservation

requirements. Protective measures may require a modification in the level of thinning eg to protect threatened flora and fauna found present. The Conservation Protocols are the principal protective measures to be considered. However, undue restriction on thinning may require the application of another silvicultural system such as single tree selection.

G. Forest fire protection

G.1 Plan fire protection strategy

[A protective practice]

G.1.1 DESCRIPTION

Strategic planning by forest managers for the protection of a forest area.

G.1.2 OBJECTIVE

To provide comprehensive planing to protect the State forest estate against damage by wildfire using strategies that are integrated with general community fire protection strategies and measures.

Strategic fire protection planning includes:

- Assessment of the overall fire threat to the forest area, internal and external;
- Determination of critical areas of high fire significance within the forest.
- Planning for strategic access (fire trail systems);
- Strategic fuel reduction programs(areas and fuel reduction cycles);and,
- Strategic response to wildfire threat (operational fire plan).

Strategic fire planning applies to all State forest areas in all forest regions throughout NSW and is driven by State Forests fire management policy. Cooperative arrangements between State Forests and other organisations in strategic planning are locked in by the provisions of the Rural Fires Act. District Fire Committees play an important role in appraising and State Forests proposals for strategic fuel reduction programs.

Fire management planning relies heavily on past records of fire occurrence, mapping of fire hazards and post and pre-seasonal fire management data for operational fire plans.

G.1.3 APPLICATION

Strategic planning is an ongoing protective practice. The present arrangements for strategic planning have been developed in close consultation with the Rural fire Service, other government agencies and stakeholders and there is little need to change them in the near future. Strategic fire management planning will continue to be an essential protective practice.

G.1.4 IMPACTS AND KEY PROTECTIVE MEASURES

Fire planning takes account of all protective measures that apply to forests and makes appropriate decisions on areas to be hazard reduced, afforded higher degrees of protection, etc, during the planning process. The present measures set out in the Forest Regulation and the SFNSW Fire management policy suffice.

G.2 Remove fuel hazard using prescribed burning methods

[A protective practice]

G.2.1 DESCRIPTION

The removal of flammable vegetative material from forest areas by State Forests staff using controlled low-moderate intensity fires contained within prepared control lines.

G.2.2 OBJECTIVE

To protect State forest areas by;

- *Preventing inappropriate levels and frequencies of damage to forest ecosystems of high conservation value;*
- *Reducing damaging wildfire ingress into areas of high economic value;*
- Preventing the escape of wildfire from State forest areas, regardless of origin;
- Avoiding damage to human life and property;
- Enhancing the protection of regeneration and advance growth after harvesting.

Hazard reduction burning involves;

- Selecting the area to be treated, the fire intensity required, and the timing of the burn;
- Assessment of impacts;
- Burn preparation including cooperative arrangements with neighbours and community;
- Conduct of burn and post-burn safety check;
- Assessment of effectiveness of the burn.

The guidelines and parameters for fuel reduction burning have been well established and approved by a number of state agencies and others. The intensity and timing of fuel reduction burning varies according to location, seasonal weather patterns, fuel loads and the risk of escape into adjacent areas that are not to be burnt. Precautions and methods for achieving adequate but safe burns are well documented. State Forests recognises a number of State forest areas that are inimical to fuel reduction burning. These areas include rainforests, sensitive plant species sites and ecological associations and wildlife habitats, young regenerating native forest and conifer plantations.

Seasons for burning vary throughout the State but generally fuel reduction burning has to take advantage of windows of opportunity throughout autumn and spring. Burning methods include ground, perimeter and aerial ignition depending on the size of the area to be burnt and the burning pattern desired. In native forests, a mosaic of burnt and unburnt forest at various scales is desirable.

G.2.3 APPLICATION

A current protective practice. Both public safety and forest conservation and timber production management require protection of the forest through this practice.

The *SFNSW Fuel Management Planning Framework* gives an overview of fuel management and other aspects of fire management while the regional fuel management plans gives both general and specific guidance on fuel management at the local level.

G.2.4 IMPACTS AND KEY PROTECTIVE MEASURES

Fuel reduction burning has a limited impact on both wildlife, flora and soil erosion values. Both the Conservation Protocol and the Pollution Control Licence include adequate conditions that prescribe exclusions and parameters for burning operations.

G.3 Remove fuel hazard using non-burning methods

[A protective practice]

G.3.1 DESCRIPTION

The removal of flammable vegetative material from forest areas by State forests staff using mowing, grazing or other non-fire methods.

G.3.2 OBJECTIVE

To protect State forest areas by;

- *Preventing inappropriate levels and frequencies of damage to forest ecosystems of high conservation value;*
- *Reducing damaging wildfire ingress into areas of high economic value;*
- *Preventing the escape of wildfire from State forest areas, regardless of origin;*
- Avoiding damage to human life and property;
- Enhancing the protection of regeneration and advance growth after harvesting.

Non-burning fuel reduction reduction;

- Selecting the area to be treated and the method to be used;
- Assessment of impacts;
- Assessment of effectiveness of the treatment.

This practice is used where normal burning methods would be unsafe, difficult to control or the economic value of an asset to be protected justifies the cost. Domestic grazing as a non-burning method is discussed further under I.1. Non-burning fuel reduction would not be used where costs are prohibitive. Mechanical methods are usually confined to roadside areas and public recreation areas with good access.

G.3.3 APPLICATION

A current practice. Non-burning fuel reduction will always have limited application due to its high cost.

G.3.4 IMPACTS AND KEY PROTECTIVE MEASURES

The practice has little impact on specific forest values. No protective measures are prescribed for the practice.

G.4 Control forest activity and wildfire ignition risk during high fire danger periods

[A protective practice]

G.4.1 DESCRIPTION

The invocation of restrictions or prohibitions on some or all other activities within a forest area by forest managers and supervisors during periods of high to extreme fire danger, or over longer periods of time when a Fire Danger period exists (Normally October to march in NSW). This includes the patrolling and surveillance of forest areas at risk.

G.4.2 OBJECTIVE OF THE PRACTICE

To protect State forest areas and assets during periods of high fire danger.

Control of forest activities during high fire danger weather periods is a major practice that takes precedence over all other forest management and operations for the duration of any periods of adverse fire weather conditions. The actual development of control measures has been well advanced over a long period of time and implemented in consultation with a large number of stakeholders. The rules for control are based on the Forestry Act and Regulation, the Rural fires Act, and are dealt with in detail in the Forest Practices Code

G.4.3 APPLICATION

The practice is ongoing. The Fire suppression plan format gives an overview of the procedures for both fire preparedness and for actual on –ground suppression activities.

Example of content for a Regional Fire protection and suppression plan

Part 1 – Objectives and Strategies

This Plan prescribes the detailed operational planning for fire protection and suppression for the State Forests of the Mid North Coast Region.

The Plan will be subject to the provisions of any approved Section 52 Bush Fire Management Committee Plan (as per Rural Fires Bill, 1997) for any Local Government Area within the Region.

FIRE SUPPRESSION PLAN

This Plan is presented in two parts:

PART ONE

Details suppression Objectives and Strategies.

PART TWO

Comprises primary of detailed contact lists required in times of fire emergency. Also known as the Operational Plan.

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G.3.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED The practice is a protective measure in its own right and adopts an exclusive approach to forest activities dependent on the prevailing fire weather conditions at the time. The Forest Regulation, SFNSW Fire Management Policy and various State forests Operational Circulars give sufficient direction to the use of this practice.

G.5 Manage wild fire suppression [A protective practice]

G.5.1 DESCRIPTION

The use of normal and specialist fire-fighting equipment by State forests and other personnel to contain and control outbreaks of wildfire.

G.5.2 OBJECTIVE

To protect State forest and other areas from wildfire damage in accordance with State Forests policy by;

- *Preventing danger and damage to human life and property;*
- Preventing the escape of wildfire from State forest areas, regardless of origin;
- Minimising the damage impact of the wildfire on the rest of the State forest estate.

Wildfire containment and control strategies and detailed operational fire fighting plans are prepared and implemented in cooperation with other fire fighting agencies. The Rural Fires Act and supporting cooperative fire fighting arrangements are important in managing wildfire suppression where the scale of the incident transcends the ability of State Forests local resources or the combined resources of State Forests employees and local Rural fire brigade volunteers to contain the fire.

Fire control methods include both direct and indirect attack methods. Techniques used to control wild-fires vary with the intensity of the fire and its size. These may include:

- Hand raking of trails to cut the fire off;
- Machine raking and clearing of trails or firebreaks to cut the fire off;
- Back burning from prepared trails and boundaries;
- Spraying of water and/or foam on the fire by hand or from tankers;
- Aerial dropping of water onto fires.

Fire fighting methods are universally applied to all wild fire situations, but strategic decisions may be made to keep wildfire out of sensitive forest types and areas where practicable during control operations.

G.5.3 APPLICATION

Fire fighting will continue to be a major forest practice.

G.5.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Fire suppression activities cause an unavoidable but varying degree of disturbance to forest ecosystems and to soil and water values. A common post-fire suppression situation is one where firebreak clearings and temporary trails require urgent provision of drainage structures and ground cover re-establishment to avoid soil erosion and water pollution. The draft Forest Practices Code for roads includes conditions which are applicable to this situation.

G.6 FOREST PRACTICE NAME

Assist stand regeneration - post harvest burning

G.6.1 DESCRIPTION

The controlled burning of a harvested area to remove logging debris and to expose seedbed topsoil to promote regeneration.

G.6.2 OBJECTIVE

To:

- To create adequate seedbed conditions for germination through removal of inhibiting litter layers;
- *Reduce likelyhood of future damage to retained habitat trees and advance growth regeneration through wildfire;*
- *Remove logging waste to reduce overall stand fuel levels.*

Post harvest burning is used as a supporting practice to all major regenerative silvicultural systems. The planned conduct of burning operations is closely controlled and monitored depending on:

Seed bed requirements;

Seed source requirements;

Environmental/regulatory constraints must be provided for;

Post harvest burning is not used where residual harvesting debris is low, (eg. gum types) or where secondary timber products may be obtained from material left behind after the initial harvest operation (eg. firewood, fencing material.)

The level and intensity of burning depends upon the amount of fuel generated by the operation, the length of time since operations ceased, and proximity to protected zones such as other groups of advanced growth, special use areas and plantations.

Post harvest burning uses prescribed burning guidelines and regional fire prevention plan prescriptions, forest type maps and GIS layer equivalents and compartment histories and records of previous treatments to guide in its application. Consent to post harvest burning is processed through both internal and external committees.

G.6.3 APPLICATION

Post harvest burning is a current and necessary practice.

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G.6.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Post harvest burning may have adverse impacts on soil erosion and drainage feature protection if undertaken in an unchecked manner. It also impacts on understory habitat and trees and areas retained for habitat purposes if protective measures in the conservation protocol are not applied. The Conservation Protocol and the Pollution Control Licence prescribe limiting conditions for post harvest burning. Exclusion zones are largely associated with riparian buffers, filter strips, threatened flora species occurrences and site specific habitat areas. Some prescriptions which modify the intensity of burning are not necessarily practicable.

H. Plantation establishment and maintenance

H.1 Select plantation site and species

H.1.1 FOREST PRACTICE DESCRIPTION

The appraisal by State Forests planners and managers of land potentially available for plantation by and the selection of suitable land for acquisition (including purchase or joint venture partnerships with landowners) and the appropriate species for planting.

H.1.2 OBJECTIVE OF THE PRACTICE

To acquire land for forest plantation establishment that meets State Forest's criteria for environmentally acceptable and economic plantation forestry purposes.

The practice involves:

- Identification of constraints to plantation establishment;
- Potential for plantation timber yield and other opportunities;
- Assessment of commercial viability;

The practice is well described in the *Forest Practices Code Part 3* that sets out the principles and procedures for State forest plantation establishment. The Code was reviewed by a number of regulatory agencies and underwent went public scrutiny and comment. This practice and others associated with plantation establishment are fully covered in the Code.

Plantation site and species selection is practiced uniformly throughout NSW with some important variations. Exotic conifer plantations are confined to tablelands sites for radiata pine and coastal areas in upper north eastern NSW for southern pines. Hoop pine sites are selected from areas in upper north eastern NSW while eucalypt (native hardwood) plantations may be established on a wide range of coastal and tableland sites according to species and opportunity in all regions.

Site and species selection for eucalypts is more site- specific than for conifers.

Site selection is aimed exclusively at utilising previously cleared agricultural land to avoid clearing native vegetation but removal of some remnant tree cover may be required in some situations.

Site selection according to formal procedures is only partially followed by private forest growers.

Both map (GIS) and property records are used to assist in site selection for purchase for plantations.

H.1.3 APPLICATION This is a current practice.

Plantation site selection will continue to be an important practice to support the NSW government's forestry policy in establishing eucalypt hardwood plantations. The site selection process is made difficult by application of a number of external regulatory procedures. The two main ones are:

Development Applications to local government under the EP & A Act (where forestry is not a land use without consent);

Applications under the Native Vegetation Conservation Act.

The procedures involved may cause delay to any planning or project follow up on site selection, and in some cases, make plantation development economically non-viable.

This aspect of planning needs streamlining.

One of the deficiencies associated with the Timber Plantation (Harvest Guarantee) Act is the absence of a suitable protocol or code of practice which allows for certification of new plantations. The *Forest Practices Code Part 3* is commended as a suitable Code of Practice for this purpose.

H.1.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED There are no impacts associated with this practice.

H.2 Plan and construct plantation subdivision road system

H.2.1 DESCRIPTION

The location, design and construction of plantation subdivision roads by State Forests staff and contractors prior to plantation establishment.

H.2.2 OBJECTIVE

To provide access to the plantation area for establishment, maintenance, protection and later harvesting.

The parameters and conditions for plantation road construction are the same as those for roads in native forests. The major differences are that little or no clearing is involved and that drainage structures and drainage feature crossings are constructed to a permanent standard. See practices C.1-C.5 for details.

H.2.3 APPLICATION

This is a current practice. Subdivision road construction will continue to be a major practice.

H.2.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED These impacts are described in practices C.1-C.5.

H.3 Undertake plantation establishment and maintenance

H.3.1 FOREST PRACTICE DESCRIPTION

The on-site activities and tasks associated with growing a forest plantation crop by State forests staff and contractors from initial site preparation through to an initial harvest (thinning).

H.3.2 OBJECTIVE OF THE PRACTICE

To create and maintain a successful and economically viable plantation resource.

Plantation establishment includes the following major tasks that are undertaken in the early years of the plantation's life.

Plantation site preparation:

- Site clearing and cultivation
- Pre-planting weed control
- Planting and fertilising of seedlings
- Post-planting weed control

- Seedling protect plantation against animal damage
- Post-establishment assessment and reporting

Plantation maintenance:

- Routine follow-up weed control;
- Pruning plantation trees;
- Application of later age fertiliser treatments;
- Protection against pests and diseases.

All plantation activities have been well established and subject to scientific and regulatory improvement through the years. The *Forest Practices Code Part 3* describes the standards that are used state-wide to ensure that plantation crops are uniformly cared for.

Actual practices vary for each of the major tree crop groups, exotic conifers, native hardwood species and native conifers.

H.3.3 APPLICATION A current practice.

H.3.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Plantations principally impact on forest soil and water values, often ameliorating soil conditions in comparison with previous agricultural or pastoral use. Native hardwood plantations enhance the prospects for native flora and fauna by reintroducing forest conditions to cleared land. This may be followed by the re-colonisation of former agricultural sites by some threatened species. In this sense, plantation establishment is a protective measure.

However, the use of chemicals for fertilising and early plantation weed control may lead to potential contamination of watercourses. Protective measures to control spraying of herbicides, and fertiliser application are set out in various Codes of Practice including *TGN 97-1 Aerial application of sprays and solids to forests* produced by SFNSW.

H.4 Manage plantation harvest

H.4.1 DESCRIPTION

The planning, supervision and conduct of plantation harvesting operations by State forest staff and licensees.

H.4.2 OBJECTIVE

To facilitate the removal of plantation timber and timber products from stump to landing for haulage to customers.

Management of plantation timber harvesting mirrors the activities set out in detail in practices E.2-E.8. that apply to native forests.

The main differences between plantation harvesting and harvesting in native forests are:

- The absence of road construction activities (the subdivision road system is planned and built at the time of establishment);
- Road maintenance is almost exclusively carried out by State Forests staff or contractors prior to commencement of harvesting;
- Tree felling and product processing is mechanised and often takes place at stump;
- Timber extraction is undertaken using walkover techniques and tree slash is used to protect extraction tracks against soil erosion;

Plantation harvesting techniques are standardised and are governed by the rules set out in Forest Practices Code Part 1. This part of the Code was reviewed by all regulatory agencies and subjected to public scrutiny and comment before being published.

H.4.3 APPLICATION

Plantation harvesting management is a current practice.

There is a need to review the present Code in conjunction with the Code gazetted under the Timber Plantation (Harvest Guarantee) Act to ensure that there is a commonality in the application of practices.

H.4.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Plantation harvesting principally impacts on forest soil and water conditions. These are covered by application of protective measures such as the Pollution Control Licence and the *Forest Practices Code Part 3*.

I. Grazing of forests

I.1 Assess, plan and graze State forest areas

I.1.1 DESCRIPTION

The appraisal by forest managers and planners of grazing potential for a State forest area and the preparation of grazing plans leading to the leasing or agistment of State forest areas by primary producers for feeding domestic stock.

I.1.2 OBJECTIVE OF THE PRACTICE

To optimise the grazing potential of State forest areas and its incidental benefits for fire protection, subject to conservation and environmental constraints.

Grazing a forest includes all the normal activities associated with grazing stock such as fence construction, provision of stockyards, salt licks and other necessary facilities, socking, mustering, stock health and hygiene activities, and pest animal control.

Grazing on State forests is undertaken for a number of reasons to:

- Fulfil legal obligations under grazing rights granted to Crown lease-holders of leases held within dedicated State forests;
- Reduce fire hazard in State forest areas;
- Control excessive competing natural regeneration in certain forest types;
- Provide long and short term agistment to the rural sector, particularly in times of drought.

Most grazing within State forests is undertaken on a long-term basis, usually under lease or occupation permit. The degree to which forest is grazed is now declining in relation to permits issued by State Forests.

Assessment of areas for potential grazing is based on carrying capacity for domestic cattle or sheep. Planning for grazing is based on the requirements of the lessee or permittee and deals with fencing, pasture improvement (where non-forested State forest may be involved) and the grazing operation in relation to other forest activities.

The plan also now evaluates grazing impacts on other forest values and, in some instances, the benefit of grazing in assisting fire protection. A grazing plan will include the conditions under which grazing will be permitted.

I.1.3 PRESENT AND FUTURE APPLICATION Grazing is a current practice.

Grazing has been associated with forest management for a long time and some grazing rights in forest areas precede State forest dedication. State Forests has no discretion under present legislation to vary the conditions of grazing attached to Crown-leasehold tenures within dedicated forests, and grazing of these areas is a permanent feature of the forest area concerned.

Occupation Permits and Grazing Permits issued under the Forestry Act are now subject to threatened species legislation. However there is a long history of rural interest in grazing and any abrupt removal of grazing as a forest practice could result in increased illegal grazing activity. There is a need to review the complete extent to which grazing adversely impacts specific conservation values and forest ecosystems and then to make priority strategies in relation to individual forest sites.

I.1.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

Grazing has a significant impact on the vegetation and habitat of the forest floor. The Conservation Protocol is the current major protective measure.

J. Harvesting and utilisation of forest products and forest materials J.1 Plan and manage forest materials extraction (including quarry operations)

J.1.1 DESCRIPTION

The survey, assessment operational planning and supervision by State Forests managers and licensees for extraction of hard rock or sand and gravel from a deposit found in a forest area.

J.1.2 OBJECTIVE

To provide forest materials for sale and internal use of forest roads and other infrastructure.

Forest materials are won from State forests sites, both for sale and for forest use. Some longterm operations have been inherited from previous occupancies now brought under state forests control through State forest dedication of the site. Others are associated with a long-standing obligation from State Forests to make forest materials available for local government authorities to use for shire road construction and repairs in rural areas.

Forest materials operations include the opening, operation and maintenance, and closure when exhausted, of a quarry or other extractive materials deposit. Sequential tasks involved include:

- Construct access road;
- Strip and stockpile topsoil;
- Strip and stockpile overburden;
- Install pit drainage;
- Blast ,excavate and remove material;
- Crush material on-site if required;
- Load and haul material;
- Close and drain pit;
- Respread overburden and topsoil;
- Revegetate topsoil.

Standard operating conditions apply to existing operations and EP &A Act requirements are met where new operations are likely to be required. State Forests is exempted from some regulatory procedures where the forest material operations is for forest road construction.

New operations are subject to the preparation of level of EIA/EIS and EIS determination appropriate to the scale of the operation and its location.

J.1.3 APPLICATION

This is a current practice.

Forest materials will continue to be won, used and sold from State forest sites. The control of these sites and the processing of proposals for forest material operations on new sites are appropriately covered by the EP &A Act and other legislation.

J.1.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

The impacts of forest materials sites are limited to small locations but represent major aesthetic and soil and water protection impacts. These are controlled mainly by protective measures incorporated specifically into operating conditions or EIS determinations for the facility being used.

A total embargo is in force on the sale of bush rock from State forests.

J.2 Assess, plan and manage harvesting of non-timber products

J.2.1 DESCRIPTION

The licensed harvesting by State forest managers for harvesting of non-timber products.

J.2.2 OBJECTIVE

To provide a source of non-timber products from appropriate State forest resources.

Non-timber products include tree derived material such as tea-tree leaves for tea-tree oil production, *Duboisia* for rutin production, eucalypt leaf for oil production, and native plants by collection, and seed from native trees and other plants.

Collection is governed by availability, location of dependant industries and other environmental constraints. In the case of protected native plants, concurrent licensing for removal is required under the NPW Act and removal is confined to those specimens that are likely to be damaged or destroyed during the course of other forest operations, eg road construction.

J.2.3 APPLICATION

This is a current practice. Conditions need to be included in a Code of Practice

J.2.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

The impacts of some non-timber harvesting has been identified as having a significant impact on conservation values. The conservation protocols indicate a number of operations that require prior assessment before being applied.

J.3 Plan and manage apiary sites on dedicated State forests and Crown-timber lands

J.3.1 DESCRIPTION

The management of apiary site on State forests by forest managers through the issue of Occupation Permits.

J.3.2 OBJECTIVE

To provide for the assessment, identification and allocation of apiary sites within the forest for the production of honey and wax from non-indigenous honey bees.

Apiary sites occur in all forest regions in NSW but are concentrated in some major forest types in coastal and western areas. Spotted gum is a major honey flora for bees. All apiary sites are controlled by the issue of standard conditions. The location of sites depends on physical access from forest roads and trails and the presence of appropriate flora.

Beekeeping in native forest areas generally has been closely debated by stakeholders but the impact of domesticated european bees and feral european honey bees on native flora and fauna is only circumstantially observed. There is no conclusive evidence on impacts and research is continuing.

Apiaries are not established in pine plantations.

A survey conducted during 1997 has identified the extent of apiary activity on State forests.

J.3.3 APPLICATION This is a current practice. Apiary activities continue on State forests. Eventual cancellation of apiary sites once they have been absorbed into the National Park system from previously dedicated State forests has placed some pressure on the remaining sites on State forests. Although the activity is not so significant as other forest activities, there is an obligation under the Forestry Act to continue to make sites available to the apiary industry.

J.3.4 IMPACTS AND KEY PROTECTIVE MEASURES APPLIED

The potential or perceived impact of bees on specific values is not clear although some qualitative research has been undertaken. Withdrawal of most or all forest areas from apiary production to protect native biota has to be weighed up against the present scientific evidence of the impact of european bees and the micro-social affects closure could have on the apiary industry.

APPENDIX 1. COMMENTS ON A FOREST PRACTICES CODE

1. DISCUSSION

An objective of ESFM Project #4/2 is to formulate an effective Forest Practices Code for all forested lands in New south Wales. It is necessary to ask why this is necessary even if all agencies and stakeholders are in favour.

The advantages of a Forest Practices Code that covers all tenures are:

It could meet CRA, RFA and other state and commonwealth legal requirements; It could provide a set of comprehensive guidelines/protective measures that will apply to all forest tenures with customised sub-sets of protective measures that will apply to specific regions, agencies, tenures and purposes (forest practices);

It could be enshrined in legislation;

It could be used to justify internal and external trade provisions through proof that Australian (NSW) forests are sustainably managed for all purposes including tourism, conservation and the provision of consumable and non-consumptive goods and services.

What disadvantages does a Forest Practices Code have?

It may become out of date or irrelevant. The more comprehensive the Code, the more likelyhood that sections become redundant. (This has been the experience in British Columbia). A Code needs to be capable of revision and adaptation to meet changing circumstances.

It may not satisfy all stakeholders and lead to non-compliance or difficulties for different agencies in undertaking their responsibilities to enforce and police the Code. If a Code is going to be effective, it must have a major stakeholder consent and safeguard legitimate consumptive and non-consumptive uses of forests.

The Code may not be understood by those who are obliged to comply with it. There is a danger that Code conditions may be described with such wording that the conditions are misunderstood or misinterpreted.

A Code may not be capable of revision.

A Code may not meet stakeholder expectations of a holistic document or guide that deals with safety, occupational health and safety or other parameters that are important to the control of forest activities. Traditionally Forest practice Codes in NSW have adopted such a holistic approach and without this, there is a potential for conflict between environmental and OH & S requirements.

As a principle, a Code should not mix conditions or generic prescriptions with instruction on how to implement the Code. These should be developed separately and the guidelines or prescriptive manuals where these are dealt with in detail should be the arena where flexibility on revision according to adaptive management principles should apply. A Code that is too detailed is more likely to become unworkable. There is a fine balance between creating a Code that is too generic and therefore meaningless in application, and a Code that creates benchmarks that are over-prescriptive.

If a Forest Practices Code is to be prepared and adopted, the following principles should apply:

• Simplicity in wording and intent;

- Clear identification of the target audience and the appropriate level of accountability with appropriate attention to the comprehension level by which clauses in the code are written (see O'Shaunessey 1996);
- A straightforward approach to content using the National Forest Policy and Wood Production Principles Statements and the Commonwealth and NSW Biodiversity Strategies as index markers for content;
- Identification of linkages to, or inclusion of, other protective measures associated with OH & S, Safety, community use of forests, revenue and other safeguards.

State Forests currently maintains a multipurpose Forest Practices Code and reviews and revises the Code on a regular basis. The review process includes external review by relevant government agencies and public comment following public exhibition. State Forests proposes that this process will continue with the amalgamation of current parts of the Code into a single document.

2. PROPOSAL

The preparation of a *Forest Practices Code* is required that incorporates legal, regulatory, policy and best practice standards for the environmental and biodiversity aspects of all forest operations and other forest uses on public and private forests. The Code should use the National Forest Policy Statement and the National and NSW Biodiversity Strategies as the basis for Code principles where appropriate.

- The key source documents for the preparation of standards for this Code will be those identified in this report as relevant to the Code, namely;
- Appropriate sections of the Pollution Control Licence issued to State Forests, for best practice in forest soil and water protection;
- the management classification zoning MCZ (PMP- FMZ) system currently being reviewed, which includes recognition of JANIS reserve criteria;
- elements of the proposed native forest management system which is currently under development by State forests specifically to meet post-RFA requirements and includes monitoring, recording, reporting and review policies and directives to meet biodiversity strategy expectations;
- the Conservation Protocol developed by NPWS in consultation with SFNSW, subject to further assessment of the efficacy and degree of detail required to include protocol intentions into an Environmental Forest Practices Code.

3. OBJECTIVE

The objective should be to ensure that all forest management and operational practices on National Parks, State forests and other Crown-timber lands, and other forested public lands meet legal and regulatory requirements and best practice standards.

To facilitate the application of similar standards to the conduct of forest practices and operations on private property and other public tenure land in New South Wales.

4. OUTCOMES

- The Forest Practices Code will provide a clear standard for best forest practice in New South Wales and will have the facility to be updated or amended when necessary.
- The Code will cover all forest practices including those that deal with biological conservation and non-consumptive uses of forests. The Code will indicate broad regional,, agency or tenure variations to forest practices and protective measures where these are relevant.
- The Code will apply to forest management on lands of all tenures including dedicated conservation reserves. It will be a mandatory standard for forest practices and operations on National Parks, State forests and Crown-timber lands, and may be used as a prescribed standard, where applicable, to forest operations on other lands including parcels of private forested lands larger than 2 hectares.
- Revision of the Code will adopt a program that incorporates and replaces duplicating conditions and prescriptions found in other licensing and contract documents where appropriate.
- The Code will fulfil government and other NSW forest owner obligations under the National Forest Policy Statement in relation to regional forest agreements.
- The Code will meet national requirements for sustainable forest management in relation to the export of timber and timber products from NSW forests.
- Forest owners, growers and the timber harvesting industry may enter negotiated agreements with other regulatory authorities as required, using this Code as a basis for forest operation standards.

5. STRATEGY

- The Code should be consolidated, developed and refined using the best available practical and technical research knowledge, and amended following wide consultation with involved parties.
- The Code should be printed in a form suitable for field application and distributed widely amongst all forest managers and planners, harvesting operatives and other forest operations operatives.
- The Code should be referred to in and form part of licence and/or contract conditions, and to that extent will be binding on all harvesting and forest works operatives and employees.
- The Code should set a standard for best practice monitoring and reporting
- The Code should adopt National Forest Policy Statement, ISO 14001 and current ESFM nomenclature where appropriate.

6. WHAT THE CODE SHOULD PROVIDE

The Forest Practices Code should enable all forest managers ensure that:

:

- objectives of ecologically sustainable forest conservation or active resource management;
- safety of employees and the public;
- sustainable integrity of the forest environment
- due diligence principles;
- total quality management ethos; and,
- principles of environmental care;

are maintained and safeguarded through proper planning and operational control of all activities by all owners, managers, employees, contractors, licensees and other users of forest areas in NSW.

The different documented protective measures published by agencies should be reviewed to develop a strategy for integrating the common elements of each into a unified single document. The revised Forest Practices Code will include the contents listed in Section 7.

The Code will act as an internal benchmark for the conduct of forest operational activities.

The Code will need to harmonise the intent of the ESFM requirements of the CRA/RFA processes currently being negotiated. The Code may require modification to allow its acceptance as the definitive expression of a Code as required by the Commonwealth.

EP.2 Conservation Protocols

EP.2.1 DESCRIPTION

The Conservation Protocols are protective measures negotiated and agreed to between SFNSW and NPWS to enable a consistent and uniform approach to be taken for SFNSW to meet its licensing obligations under the Threatened Species Conservation Act, the National Parks and Wildlife Act and the Environmental Planning and Assessment Act. The Protocols apply to all forest practices, especially those associated with access road construction and timber harvesting in native forests. The NSW Biodiversity Strategy is a source for the protocols.

There are six broad protocols and 86 prescriptions (embracing 140 more detailed prescriptions) covering:

- Rare non-commercial native forest types;
- Old growth native forest;
- Rainforest;
- Threatened species;
- Special sites.

Each of the protocols deals with the identification and survey of the specific values under investigation (location, extent, condition), and then prescribes protective and monitoring measures for each. Each protocol includes directives that impact on a number of forest practices either to exclude their use, or to significantly modify their application. Iterative protective measures are a significant element in protection and may cause cessation of forest activities.

Ten principles give direction on the preparation of valid prescriptions under the protocols.

Two measures deal with protection of rare non-commercial forest types which specify that: Exclusion prescriptions will be included in harvest plans. (CP!) Road construction should avoid these forest types where possible.(CP2) One protective measure for old growth forest specifies that timber harvesting must be excluded from areas so identified.. (CP3)

Four measures and seven detailed prescriptions apply to the protection of rainforest during timber harvesting for native hardwood species, which specify that:

- Rainforest be ranked into rainforest Categories A,B,C. (CP4)
- Require exclusion through existing harvesting prescriptions for Category A and B rainforest. (CP5)
- Warm temperate rainforest to be protected by a 20 metre buffer. (CP6)
- Category C rainforest to be excluded from timber harvesting as for old growth forest. (CP7)

The threatened species protocol covers eighteen identified general measures supported by 62 detailed prescriptions and 59 detailed measures for individual and groups of threatened fauna species.(CP 27-86) The general prescriptions cover:

- Hollow bearing-trees (habitat trees) (CP 9);
- Recruitment hollow-bearing trees (CP 10);
- Trees in regrowth zones (CP 11);
- Protection of hollow-bearing trees (CP 12);
- Retention of stags (dead trees) (CP 13);
- Significant food sources for selected threatened species (CP 14);
- Riparian buffers (CP 15);
- Connection corridors (CP 16);
- Wetlands (CP 17);
- Heath (CP 18);
- Rocky outcrops (CP 19);
- Caves, tunnels and disused mine shafts (Cp 20);
- Prescribed burning (CP 21);
- Grazing (CP 22);
- Weeds (CP 23);
- Feral animals and bees (CP 24);
- Surveys (CP 25);
- Ground habitat protection (CP 26);

The special sites protocol recognises the protection of forest preserves, Flora Reserves, other reserved vegetation sites, aboriginal sites, european cultural heritage sites and other general scientific reserves through application of the forest management zoning system.

The protocols were carefully drafted by SFNSW and NPWS using a number of source documents and information. The submissions and determinations of several EIS for native forest harvesting formed a basis for the generation of some of the Protocols. They were carefully scrutinised by a number of stakeholder groups before being approved by the Cabinet of the NSW Government. Since their approval, which includes directives for monitoring, consultation and review by June 1999, there have been a number of ongoing changes and supplements to the protocols to cover survey techniques for threatened plant and animal species.

EP.2.2 MEASURE REVIEW

The protocols vary in their intensity of application. The protocols for rare non-commercial native forest types, rainforest and special sites are straightforward, substantially reflect long term forest practices and their constraints. The use of forest management zoning to protect these attributes is recognised in the protocols and appears to be a better means of delivering protective measures. The old growth forest protocol less straightforward.

The threatened species protocol is even more difficult. It includes unduly detailed procedures that should be dealt with at a lower order of instruction. The protocol should keep more to principles rather than prescriptions.

Several sections of the general part of the protocol refer to forest practices that are arguably outside the scope of the protocol's main purpose in protection of threatened species during timber harvesting.

Other protocols relating to grazing, apiary sites and firewood should be integrated into a forest practices code along with other protective measures. However, they need to be fully reconsidered in relation to their impact on the other ESFM values that State Forests has to deliver though these goods and services to primary industry and the community.

State Forests and NPWS are reviewing these protocols at the present time.

Finally, some protocols are insufficiently generic, have a short life span before modification or amendment, or are unproven as to their success. As such, they should be supported in a Code by a set of principles such as the ones set out in the preamble to the protocols or derived from the NSW Biodiversity Strategy.

EP.3 Soil Erosion and Sedimentation Control Strategy for the Establishment of Eucalypt Plantations in Northern NSW(Plantation SCS)

EP.3.1 DESCRIPTION

The Plantation SCS is a guideline document for soil and water protection during plantation establishment site preparation. It is a result of consultation between SFNSW and DLWC and deals with protective measures to be implemented during the site preparation process. The Plantation SCS is also used by DLWC in consultation with private land-holders wishing to establish plantations and is used in conjunction with clearing applications under the NVM Act..

Key protective measures described in Part 2 of the Plantation SCS include;

- Clearing operations to be timed to use existing ground cover (PSCS 1).
- Temporary sediment traps to be used until vegetation on cleared areas has become established. (PSCS 2).
- Machinery activity to be suspended when soils are saturated and run-off is occurring (PSCS 3).
- Drainage features to be protected by filter strips and buffer strips (PSCS 4).
- Nine guidelines cover road construction during plantation establishment. (PSCS 5-13).
- Three guidelines cover ground cover management (PSCS 14-16).

In Section 3, limits to cultivation and planting are identified in relation to seasonal rainfall intensity, retention of ground cover (70% retention as a minimum), minimum widths for filter and buffer strips along watercourses and prescribed streams, ground cover (pasture) sowing programs, and fire protection.. (PSCS 14-21).

The remainder of the Plantation SCS is concerned with "how-to" application of the guidelines.

EP3.2 REVIEW

The Plantation SCS is a useful guideline for private plantation establishment but some of the protective measures described in it are at variance with other conditions and prescriptions set out in the Forest Practices Code and the Pollution Control licence. The Plantation SCS is also only concerned with native eucalypt plantations on the North Coast of NSW but could be extended to other areas for private growers. It does not deal with the intricacies of NVM Act requirements, nor does it deal with conservation issues.

Although the SCS applies to essentially cleared agricultural land, the presence of native vegetation and the likely-hood that some threatened species may be affected by plantation

establishment operations make it an incomplete documentation of all protective measures. FPC 3 is more explicit in this respect. There is a strong case to review the Plantation SCS in relation to FPC 3 and extend the application of both to private plantation establishment as a precursor requirement for plantation certification under the TP(HG)Act.

EP.4 1998/99Pollution Control Licence

EP.4.1 DESCRIPTION

A Pollution Control Licence has been issued to State Forests to cover timber harvest operations. The current single licence, issued in April 1998, replace five licences which covered the five former State Forest's regions. The present licence allows for State Forests to determine whether an individual timber harvesting operation requires coverage under licence conditions or not. Generally State Forests considerers it prudent that all harvesting operations must be covered by the licence where high rainfall erosivity and high soil erodibility factors prevail. Licence conditions are not applied to harvesting operations in western NSW where other guidelines developed by State forests and DLWC are currently used.

The 1996-1998 review of the licence and the attached schedule conditions for planning harvest operations and on-site practices for harvesting and timber haul road use has resulted in a comprehensive and up-to-date set of protective conditions. Technical advice from CSIRO and a number of other expert sources and assistance from DLWC were both used in developing the conditions.

The licences prescribes practices for planning and survey assessment of forest soils in relation to water pollution, on-site implementation of protective measures during harvesting and other operations and concurrent and post harvest recording of satisfactory implementation practices and non-compliance events and remedial action where necessary.

Some conditions are general and other conditions require the determination of further site-specific conditions.

The key soil survey and planning conditions are found in Schedules 2- 3 of the licence. They are very detailed and are instructions in the method of assessment and planning to be followed rather than protective prescriptions. Schedules 4 to 6 of the licence include 174 operational conditions dealing with harvesting (110), road construction and maintenance (59) and supervisory reporting (5).

Not all of these conditions apply to all harvesting operations. They parallel to some extent, and are partly derived from other protective measures such as the SEMGL and those found in the Forest Practices Code.

EP.4.2 REVIEW

The Pollution Control Licence conditions are legally drafted because of the nature of the licence. They also tend to be duplicated by prescriptions and conditions set out elsewhere. Until conclusion of the recent review, the licence conditions were in a state of continual change. This has created for discrepancies between other protective measures and licence conditions. Nonetheless, the licence conditions could form the basis for a unified best practice approach to timber harvesting (and other forest operations) in relation to soil and water protection.

In the future, it would be beneficial to amalgamate all general prescriptive measures described in the licence into the Forest Practices Code and discard similar conditions from other sources that are now redundant.

EP.5. Timber Plantation (Environment Protection) Harvesting Code 1997

EP.5.1 DESCRIPTION

The TP(EP) Code is a Code of Practice for the harvesting of accredited timber plantations under the *Timber Plantations (Harvest Guarantee)* Act 1995. Compliance with the Code during the planning and undertaking of harvesting operations is a requirement of all owners of plantations accredited under the Act.

The Code requires that a harvesting plan be prepared for the area to be harvested (TP (EP) 1). The Code requires the manager to ensure that soil erosion is minimised during harvesting (TP (EP) 2-3).

Drainage structures must be installed on roads and tracks used in harvesting (TP (EC) 4-6). Drainage structures must be installed and used (TP (EP) 7-8)

Extraction tracks must be drained within a specified time of completion of harvest. (TP (EP) 9). Firebreaks used during harvesting must be maintained to minimise soil erosion (TP (EP) 10-11). Watercourse crossings must observe sediment control and drainage conditions (TP (EP) 12-15). Road and track construction conditions (TP (EP) 16).

Other conditions relate to trees on protected lands, felling retained native trees, protecting watercourses and drainage lines, operation of harvesting machinery, log dumps and landings, wet weather, storage of fuel and oils, requirements for re-establishment and special requirements for areas north of Sydney. (TP (EP) 17-37).

Native animals and plant habitat must not be damaged by operations if identified and reserved at the time of plantation establishment. (TP (EP) 38).

EP.5.2 REVIEW

The TH (EP) Code represents an adequate code for accredited private plantations, although some private forestry sector stakeholders do not consider that a plantation needs to be accredited prior to harvesting. For established plantations, accreditation is relatively easy because of the prior lack of control in respect of wildlife protection consideration during approval processes undertaken by local government. Recent development applications for plantation establishment now require the Threatened Species Conservation and the EP&A Act to be taken into consideration, prior to approval for plantation establishment to be granted.

From a SFNSW perspective, FPC 3 fulfils most of the requirements for the planning and accreditation of a plantation. For harvesting purposes, this Code is less demanding than FPC 1, the Pollution Control Licence or the Conservation Protocols in respect of protective measures for harvesting. There is a need to consider amalgamating these Codes to ensure that the same generic protective measures apply to all plantations.

The conditions set out in this Code are much more easily understood than in other Codes.
Ecologically Sustainable Forest Management

NSW CRA/RFA PROJECT #4/2

FOREST PRACTICES CODE PROTECTIVE MEASURES AND FOREST PRACTICES FOR USE IN STATE FORESTS IN NSW

PART 3 REVIEW OF CONDITIONS FOR A NSW FOREST PRACTICES CODE

August 1999

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0.	
0	REPERENCES
9.	KEFEKENUES
10.	ABBREVIATIONS

7. REVIEW OF FOREST PRACTICES CONDITIONS

7.1 INTRODUCTION

This section should include references to these policies and statements and if necessary include them as Appendices.

National Forest Policy Statement(Part)National Biodiversity Strategy(Part)NSW Government Forest Policy(Part)NSW Government Conservation Policy(Part)NSW Biodiversity Strategy(Part)

7.2 GENERAL [AUTHORISATION]

This section should address the NPFS principles for authorisation, and the need for a Code of Practice.

Legal requirements Policy and other requirements Responsibilities of agencies, departments and others for conservation and resource management of forested lands in NSW. Department of Aboriginal Affairs Department of Urban Affairs and Planning Department of Land and Water Conservation Department of Mineral Resources Local Government Councils National Parks and Wildlife Service Rural Fire Service State Forests of NSW

Aboriginal Land Councils Catchment Management Committees Committees established under agency policy arrangements (eg Pest Animal Council) Recognised Consultative Committees

Agency licensees, permittees, lessees, tenants and other authorised persons Other public forest owners (eg. Sydney Water, Western Lands Commission) Private forest owners

Public responsibilities

7.3 SECTION X - STATE FORESTS AND OTHER CROWN-TIMBER LANDS

This section meets general prescriptions for soil and water functions and quality, and pollution requirements in accordance with NFPS principles; [Environmental Care]

7.4 POLLUTION CONTROL

Not covered in the matrix. The following rules gives general definitive prescriptions for protection of geo-chemical cycles, climate, air quality, water quality and water supply.

Need to amalgamate Pollution Control Licence Sch 4. Sec I.99-110, FPC1 9.1-9.5, FPC2 8.1 – 8.5, FPC3 9.1-9.5, FPC4 4.1-4.5, and add FPC3 6.1-6.2 (abbreviated (use of dangerous and hazardous materials)), FPC3 7.1-7.2 (abbreviated (agricultural chemicals))

6.5 SOIL PROTECTION

Covered in the matrix. The following rules give general definitive prescriptions for soil protection.

Forest Practices Code, Parts 1- 4 deal with aspects of soil protection on an item by item, operational basis. The SEMGL and the PCL are general source documents. Suggest that soil protection is dealt with as a theme rather than separated out to avoid duplication. PCL Sch 4 and 5 are key sources for conditions. See NFMS 3.1.6

Wet weather controls need to be dealt with generically for all forest practices including public use and recreation. The following need to be amalgamated FPC18.1- 8.4, FPC2 7.1-7.5, FPC4 2.5 (e), SEMGL 3, PCL Sch 4.F.49, 5.D.19

Wet weather controls should be extended to natural surface roads and trails in all public tenure forests.

7.6 THREATENED SPECIES CONSERVATION

State Forests' instructions make reference to a requirement to comply with threatened species conservation in support of biodiversity protection generally. The references are secondary.

The following rules need to be amalgamated and updated to refer to new legislation, themes, etc, and reference the Conservation Protocols. FPC1 10.1-10.3, FPC2 9.1.9.3, FPC8.1 (part), draft FPC4 6.2.c, draft NFMS 3.1.7, EPS2, TPHC Pt 5 27. Actual more detailed operational precautions for threatened species conservation should be dealt with thematically on forest practice by forest practice basis. CP 7-86, CP11 (regrowth zones), CP 12-14 (hollow bearing trees, stags and food source trees), and CP 18 (heath) are key examples.

7.7 ENVIRONMENTAL IMPACT ASSESSMENT

Environmental impact assessment is currently identified in the Forest Practices Code and addresses all relevant forest practices at the planning phase in relation to all specified values.

References need to be amalgamated and updated to reflect any proposed changes as a result of the RFA process. FPC3 8.1, draft FPC4 7.1-7.2, draft NFMS, Operational Circulars, DUAP instructions.

7.8 OPERATIONAL PLANNING

Operational planning needs to take account of all specific values. The Forest Practices Code and the draft NFMS take account of this.

The following references need to be reviewed to provide a consolidated thematic planning approach for all forest operations. FPC111.1-11.6, FPC2 10.1-10.6, FPC3 11.1-11.2, FPC4 6.1-6.6, NFMS 3, TPPC Pt 2.5-10.

7.9 ENVIRONMENTAL PERFORMANCE MONITORING AND AUDITING

This section meets the NFPS principle requirements for monitoring and review. State Forests is developing a number of performance monitoring and auditing systems which are identified in the Forest Practices Code which, once fully developed, will meet all specific values as a record of adequacy of protection.

The following instructions need to be consolidated in to generic rules. FPC3 11.2, 12.1-12.2, FPC 6.5, NFMS 4, Draft environmental accounting reports, PCL Sch 6, Conservation Protocol reporting requirements.

7.10 STRATEGIC PLANNING FOR FOREST USE

This meets the NFPS principle requirements for planning. Not all planning aspects are discussed here. State Forests' management classification zoning system is the key protective measure for the absolute and prescriptive reservation of forest areas from certain forest practices and provides the principle protective constraint on all forest practices. It addresses all specific values related to the allocation of forest ares and especially addresses JANIS criteria for reservation. MCZ underpins exclusion rules for biodiversity, catchment protection, allocation of areas for recreation, water supply, plantations, natural and cultural heritage values, and, provides state-wide forest zoning standards

Practice: A.1 Apply forest management classification zoning to State forest areas

The draft MCZ (PMP-FMZ) proposal should be included in the Code in its entirety. The Conservation Protocol rules for forest practices within non-commercial forest types, rainforest stands, and definitively identified and agreed old growth areas should be included in the MCZ. NFMS 3.1.1 gives policy. Maps and GIS are available.

Extension of the MCZ to other public forests including conservation reserves should be considered. Extension to include other zones for other purposes (eg grazing crown leaseholds outside dedicated State forests) should also be considered.

7.11 STRATEGIC CONSERVATION PLANNING

This is aimed at ensuring the JANIS and biodiversity attributes within reserved areas within State Forests are adequately protected and not impacted by forest practices that may be allowable within those reserves

Practice A.2 Manage conservation reserves within State forests

Need to consolidate the conditions set out in NFPP1-4, *Forest Research Notes 45 and 46*, the Forestry Act (S.8A and S. 25A) and Forest Regulation for Flora Reserve and Forest Preserve management. Conditions to include control of use and traffic. (Cross check with FPC4 2.8) Extend Flora Reserve justification to include fauna considerations. Include control of use, education and hunting prohibitions (HUNTP1)

7.12 CATCHMENT MANAGEMENT

Catchment management addresses specific soil and water values in relation to water supply.

There is an overlap between external regulation, harvesting constraints and other instruction in relation to catchment management. There are two levels of catchment management – specific protection for town water supply, irrigation and gazetted areas, and general catchment management as an underlying protective theme for other forest practices. This deals specifically with gazetted catchments but should include other generic measures in

This deals specifically with gazetted catchments but should include other generic measures in line with TCM principles.

Practice B.1 Assess, plan and manage water supply catchment protection

Need to consolidate instruction from Forestry Act S8A, EFMS 3.1.6, MCZ, FPC1 14.1-14.4, 2FPC3 4.1-4.3, 8.1.4, FPC4 9.8, SEMGL 1, PCL Sch 5 I.34-59, CP15 (riparian buffers), CP17 (wetlands)

7.13

CULTURAL HERITAGE PROTECTION

Various existing State Forests instructions protect these values.

Practice B.2 Manage cultural heritage sites within State forests

There is a need to consolidate instruction from draft EFMS 3.1.8, 3.1.9, draft MCZ, and NPWS instructions where relevant.

7.14 PROTECT AND MAINTAIN FOREST HEALTH

This addresses native forest protection [forest protection] as set out in the NFPS Principles for Wood production This also addresses ecosystem capacity and sustainability, forest health and vitality and meets some economic and social values that are dependent on the health of the forest. Fire protection is not considered here

Practice B.3 Manage protection of State forests against pests and diseases

Need to consolidate statement EPS1, FPC3 15.1-15.3, 16.1-16.3, Forest health policy Research and Development Division instructions on forest health surveys and quarantine in native forests, elements of the NSW Agriculture Vertebrate Pest Control Manual, and Operational Circular 96/15 Wild Dog Strategy. FPC1 25.4, FPC2 17.4, AQIS Disease control plans and emergency contingency plans, CP 23, CP 24

7.15 PROVIDE ACCESS TO FORESTS

This addresses the NFPS Principles for access to forests. Protective measures to protect soil, water, catchment values and to minimise intrusion into conservation reserve areas within State forests are included in the Forest Practices Code.

Draft FPC4 includes all the necessary rules for road and fire trail construction, use and maintenance [access] but needs to harmonise with the provisions of the new Pollution Control Licence and the draft MCZ. The Code now consolidates with PCL Sch 5 (general rules), CP3, SEMGL 3 (planning forest road systems, location, design and survey standards), SEMGL 3 (road construction standards, fire trail construction standards, SEMGL 3, PCL I-J (34-59) (drainage feature crossing standards).

Control of use protective measures and issues are dealt with under harvesting, wet weather, fire and public use.

Practice C.3 Use and control use of forest roads and fire trails

Practice C.5 Manage watercourse crossings on forest roads and trails

Practice C.6 Close and rehabilitate forest roads, fire trails and crossings

6.16 RECREATION AND PUBLIC USE OF FORESTS

Recreation and public use are themselves socio-economic values that impact on the other – conservation values.

The Forest Practices Code for these activities have not been prepared. This part of the code should consolidate State Forests' current and draft policies on public use, the Forest Regulation, MCZ, and other instructions on military and other uses.

The Code should address:

- Recreational planning
- Construction and maintenance of recreational facilities
- Control of recreational use
- Designated special event/special purpose areas (Special purposes permit conditions)
- Hunting and use and of firearms in public forests (Hunting Permit Conditions, HUNTP1 (Flora Reserves), HUNTP2 (NPWS game licences))
- Research (Special Purposes Permit Conditions)
- Public utilities and easements (Occupation Permit conditions)
- Military use of forest areas (OC 96/16, FPC4 2.10, Defence training permit conditions)
- Temporary residing on public forests (Residence must be authorised FPC1 25.2, FPC2 17.2)

7.17 HARVEST TIMBER IN NATIVE FORESTS

This addresses timber harvesting in native forests as set out in the NFPS Principles. The impact of timber harvesting in native forests is controlled by a range of protective measures that address biodiversity, productive capacity, disturbance and soil and water values.

The present *Forest Practices Code Part 2* is focused on the supervision and on-site conduct of harvesting operations and designation of responsibility and accountability to licensees, contractors and workers. The Code should be consolidated with and supported by other instructions that deal with harvest planning, monitoring and recording of harvest performance. The draft NFMS includes provision for revision of this part of the code to include these items. Relevant other documents include PCL Sch 1-7, draft NFMS 3.1.12, (planning and evaluation), PCL Sch 2-3 (soils and water assessment), NFMS 3.2 (harvest performance, and compliance) SEMGL 4, SEMGL 7, PCL Sch4 (snigging and timber extraction) SEMGL 4, SEMGL 6 (protection of native forest drainage features), SEMGL4, 5 (log dumps and loading), SEMGL 4, PCL Sch 5 (use of timber haulage roads)

Practice E.4 Prepare and mark forest area

7.18 NATIVE FOREST SILVICULTURE AND FOREST ESTABLISHMENT

This addresses forest establishment as set out in the NFPS Principles. The impacts of native forest silviculture on biodiversity or productivity of forests are widely known and understood. Silvicultural treatments affect flora and fauna values by disturbance to site and habitat, by producing fluctuations in the location and population of individual plants and animals within species through temporary changes forest structure and seral stage conditions. Silvicultural treatments also influence forest growth cycles in the short and long term by redistributing moisture and nutrients through recycling processes.

The socio-economic benefits of silviculturally based timber harvesting also have impacts on other values and forest uses depending on the level of harvesting and the interaction of harvest activity with other forest uses.

There are no concise rules for the application of silvicultural systems and treatments and there is a need for the Forest Practices Code to set out some guidelines which clarify the relationship

between the selection of a silvicultural system or treatment and the other rules set out in the Code. The MCZ should be used as the basis on which selection rules are based, supplemented by other considerations from the PCL and the Conservation Protocols. EFMS 3.1.5, OC97/9, Silvicultural Bulletins should be referred to.

7.19 FOREST FIRE PROTECTION

This partly addresses the forest protection requirements set out in the NFPS principles. All agencies recognise the dual role of fire in the forest environment, with natural ecological impacts in native hardwood forest ecosystems under certain conditions, and its unnatural and uncontrollable impact under other conditions. All forest values are affected in the short or long term.

State Forest's policies and instructions are well defined but not consolidated into a single Code. This should be done with reference to the Fire Management Policy and related policies, the Forest Regulation as interpreted by FPC1 6.1 – 7.4, FPC2 6.1-6.15, FPC 13.1, 17.1-17.5, FPC4 10.1-10.3 FMP 1 (rainforest protection), FMP 5 (sub-alpine forest types), FMP6 (non-burning fuel reduction methods), FMP7 (grazing), SEMGL 2 (filter strips), CP 21, FMP4 (pre-harvest burning), FMP 8 (fire fighting control plans), Manual for use of Chemicals, Safety Standards Manual (use of chemicals to control fire), PCL Sch 4 G. 50-53.

Other issues that should be dealt with include:

- District Rural Fire Protection committees
- Fire prevention planning
- Operational fire prevention and control of forest use

Practice	G.1	Plan fire protection strategy
Practice	G.2	Remove fuel hazard using prescribed burning methods
Practice	G.3	Remove fuel hazard using non-burning methods
Practice periods	G.4	control forest activity and wildfire ignition risk during high fire dange
Practice	G.5	Manage wildfire suppression
Practice	G.6	assist stand regeneration – post harvest burning

6.20 PLANTATION ESTABLISHMENT AND MAINTENANCE

This addresses the NFPS principles for plantations. All the impacts of plantation establishment and maintenance are recognised in the Forest Practices Code Part.3. Present policy is to establish plantations only on cleared agricultural land, or sites that have previously been planted under plantation conditions and, having been clearfelled at the end of a rotation, now require re-establishment.

Remnant areas of native vegetation pose a dilemma for the plantation grower during plantation site preparation. The impact of removing small areas of vegetation from otherwise cleared land has to be weighed up against the value of that land as a viable site for the retention of small but representative plant and animal species populations.

The present FPC3 needs minor amendment to reflect new changes to government policy on plantations, encapsulate the requirement of S 17 (1) of the Forestry Act. It also needs to include

the draft code being prepared under the Native Vegetation Management Act which will reduce the burden of dealing with remnant native vegetation in a more straightforward way.

This Code is commended as a starting point for application of a Code for private plantations.

6.21 TIMBER HARVEST IN PLANTATIONS

This addresses the NFPS principles for plantations. All the impacts of plantation timber harvest are recognised in the Forest Practices Code Part.1.

This Code needs to consolidate some minor additional rules that are found in other documents, including the PCL and the THPC.

6.22 OCCUPANCY AND GRAZING OF FORESTS

Grazing has a major impact on lower stratum biodiversity in native forests and to a lesser extent in plantations. It has beneficial effects on the removal of fire hazardous material, subject to close control of the use of fire to improve native pasture growth.

No consolidated Code section has been prepared for native forest grazing although a grazing strategy has been developed for cypress pine forests. This should now be prepared with reference to the following topics;

- Grazing policy;
- Grazing plans;
- Crown leasehold lands within state forests (lease conditions);
- Occupation Permit conditions for grazing;
- Grazing permit conditions,
- Noxious weed control (see also B.3)

Conservation Protocol CP22, CP23 refer.

6.23 USE OF EXTRACTIVE FOREST MATERIALS

Sites on State forests used for extractive material operations have a total impact on their immediate surroundings for all values. The assessment of impact at each site requires assessment on a case by case basis and the management of the site controlled by site- specific prescriptions

The Forest Practices Code does not yet extend to this activity. The Code should include some generic guidelines on quarry and site management based on FPC4, PCL Sch 5, Forest Material Licence conditions, and other information.

6.24 HARVESTING OF NON-TIMBER PRODUCTS

The impacts caused by harvest of non-timber products are variable and not easy to define. Products may include seed, foliage, protected plants, leaves of trees and other species for medical purposes, drug and firewood, each of which has its own specific effect on specific values.

The Forest Practices Code needs to be extended to include rules for the gathering of non-timber products, using forest products licence conditions, and other relevant sources. The protocol for sale of protected plants, which might otherwise be damaged in other forest operations, is one example.

Firewood is a special case and FWDP1, FWPD 2 and the conservation protocols should be consulted.

6.25 APIARY MANAGEMENT

The uncertainty of the impacts of exotic beekeeping in native forest areas has been identified.

The generic rules that apply to beekeeping and apiary sites should be included in the Code, with reference to present permit conditions, FPC4 2, CP24 and filed determinations made by State Forests and NPWS.

8. SUGGESTED OTHER SECTIONS TO THE CODE

MINING AND EXPLORATION IN PUBLIC FORESTS [DMR]

MANAGMENT OF FORESTED LEASEHOLD AND VACENT CROWN LANDS [DLWC]

MANAGEMENT OF FORESTED PUBLIC RESERVES [Local government]

MANAGEMENT OF FORESTED LANDS WITHIN NATIONAL PARKS, NATURE RESERVES, HISTORIC SITES, STATE RECREATION AREAS, DEDICATED WILDERNESS AND WILD RIVERS [National parks and Wildlife Service]

MANAGEMENT OF FORESTED AND WOODED WESTERN LANDS [Western Lands Commission]

MANAGEMENT OF PRIVATE FORESTED LANDS [Department of Urban Affairs and Planning, local government]

9. **REFERENCES**

Forest Practices Related to Wood Production in Native Forests: National Principles (1992)

Forest Practices Related to Wood Production in Plantations: National Principles (1996) Legislation applying to forest management and forest operations in New South Wales Pollution Control Licence (1998)

Standard Erosion Mitigation Guidelines for Logging in NSW (1993)

Soil Erosion Mitigation Guidelines for Inland Forests in NSW (1996)

Soil Conservation Measures for the Logging of River Red Gum Forests in NSW (1995) SFNSW/NPWS Conservation Protocol (1996)

Regulation to the Timber Plantation (Harvesting Guarantee) Act – Code of Practice (1997)

Best Practice Guidelines for Pt 5 of the EP & Act 1978 (1995) [abridged]

Erosion and Sediment Control Strategy for Eucalypt Plantation Establishment on the North Coast of NSW (1997)

10. ABBREVIATIONS

CP Conservation Protocols

- EPS SFNSW Environment Policy Statement
- FA Forestry Act

FPC1 Forest Practices Code Part 1

FPC2Forest Practices Code Part 2

FPC3Forest Practices Code Part 3

FPC4Forest Practices Code Part 4

- FWDP Firewood Policy
- Florence R.G. *Ecology and silviculture of Eucalypt Forests* CSIRO Collingwood (1996) 413pp

HUNTP Hunting Policy

NFPP Native Flora Preservation Policy

OC Operational Circular

PCL Pollution Control Licence

MCZ Preferred Management Priority Classification (Forest Management Zoning) System

PSCS Erosion/ Sediment Control Strategy for Eucalypt Plantation Establishment on the North Coast of NSW

SEMGL Standard Erosion Mitigation Guidelines for Logging in NSW

NFMS Draft Native Forest Management System (not yet available)

TPPC Regulation to the Timber Plantation

APPENDIX F

FOREST USES CODE SYSTEM - ENVIRONMENTAL IMPACT STATEMENT APPROVALS FOR STATE FORESTS OF NSW

EIS Approvals for State Forests of NSW

Department of Urban Affairs and Planning

5.1 EIS Approvals for SFNSW

In Eden Management Area and ???, SFNSW had prepared EISs according to Part 5 of the *Environmental Planning and Assessment Act* 1979 (EP&A Act)in ???, 1988 and 1992. The requirement to prepare environmental impact statements for harvesting activities in State Forests of other management areas resulted from a decision in Corkill *v* Forestry Commission of NSW. The implications of this decision was that no harvesting could be undertaken until an EIS was approved according to Part 5 of the EP&A Act. This resulted in the Government passing the Timber Industry (Interim Protection) Act 1992, which allowed harvesting and associated activities to continue in most of the management area until the EIS is approved. The Act was passed with the intention that all EISs would be approved by initially the ??? of 199? and then this date was amended to October 1998.

Several forestry EISs have been previously prepared for HDA and SFNSW including: Margules for HDA for 1989-2009; Eden MA 1988 and then 1990 and then 1991; Wandella-Dampier 1983; Washpool 1980; Mistake SF 1991; Chaelundi compartments 180, 198, ????; and rainforest logging in Hasting Catchment 1991.

Table 5.1 illustrates what has occurred with the EISs. In 199? the Mount Royal EIS was rejected by the Department of Planning, the Dorrigo and ???? EISs were withdrawn by SFNSW in 199?? and four EISs have been approved with amendments (Wingham in March 1993, Glen Innes in July 1993, Kempsey/Wauchope in March 1994 and Eden in ??????). As indicated by Table 5.1 various other management areas have yet to be approved.

	XX 71 1	XX 71	•	
Management Area	When prepared	When	Any	Relevant for
		approved/reject	amendment	which RFA
		ed	S	region
Mount Royal		Rejected in ???	-	
		199??		
Dorrigo		Withdrawn	-	
Wingham	August 1992	Approved	No	
	-	March 1993		
Glen Innes	May 1993	Approved July	No	
		1993		
Kempsey/Wauchope	October 1992	Approved	Yes	
		March 1994	November	
			1994	
Eden	????	Approved	Yes ?????	
		?????		
Grafton				
Casino/Casino West/				
Murrillumbah				
Gloucester/Chichest				
er				

Table 5.1: The progress of EISs and their relevance for the RFA/CRA region.

Tontonfield		
Tenterneid		
Urbanville		
Dorrigo		
Urunga		
Walcha-Nundle/Styx		
Warung		
Queanbeyan/Badja		
Wyong		

The following outlines the approvals except for Eden.

5.1.1 Wingham Management Area Environmental Impact Assessment Proposed Forestry Operation

According to the Timber Industry (Interim Protection) Act 1992 section 9(1), the Minister for Planning granted approval to the Forestry Commission to continue the logging operations outlined in the Wingham Management Area EIS, subjected to 57 conditions. The approval limited the activities to State Forests within the Wingham Management Area EIS for 10 years and the procedures and conditions described in the EIS, with amendments or additions required by the 57 conditions in the approval.

The Wingham Management Area EIS covered 58 000 hectares of State Forests north-west of Wingham. The management activities that were approved include timber harvesting, silviculture, roading, fire management, fauna and flora conservation, management of recreation, scenic resources, Aboriginal and European heritage, weed and pest control, grazing and beekeeping.

5.1.1.1 Harvesting

The harvesting included:

- Logging of 10 750 ha of old growth (the conditions defined old growth as unharvested) for quota sawlogs at a rate of 400 ha/yr.
- Thinning 14 650 ha of regrowth forest at a rate of 150-300 ha/yr.
- Harvesting 13 400 ha of recut forest at a rate of 50 ha/yr.

While some logging of rainforest was proposed the approval restricted rainforest logging to limited felling for roading purposes.

The EIS indicated the products described in Table 5.2. It provided for 32 066 m^3/yr of sawlogs, 6 706 m^3/yr of small sawlogs, 529 m^3/yr of veneer logs, 376 m^3/yr of poles, 87 059 m^3/yr of pulpwood residue/thinning. The conditions in the approval limited logging of sawlogs from unharvested areas in the last 5 years to 27 000 m^3/yr but allowed an additional 25 000 m^3 of quota sawlogs spread over the first five years. It also allowed integrated harvesting for pulpwood but when it is sourced from unharvested areas it is limited to butt and head salvage from trees logged for sawlogs and other purposes.

Product	Source	Volume m³/yr	Percentage
Quota sawlogs	Unharvested	27 154	21%
	Recut	3 971	3%
	Regrowth	941	1%
	Sub-total quota sawlogs	32 066	25%
Small sawlogs	Regrowth	6 706	5%
Veneer logs	Regrowth	529	1%

Table 5.2. Volumes of products produced each yea	Table 5.2:	iced each year	products produce	Volumes of	Table 5.2:
--------------------------------------------------	------------	----------------	------------------	------------	------------

Poles	Unharvested	35	1%
	Regrowth	200	1%
	Sub-total poles	235	2%
Miscellaneous/Silviculture	ellaneous/Silviculture Pulpwood sawlog residue		21%
	Pulpwood silviculture residue	46 471	37%
	Pulpwood regrowth thinnings	14 118	11%
	Total pulpwood	87 060	69%
TOTAL		126 596	100%

5.1.1.2 Roading and soil erosion

The EIS described the need for 134.4 km of roads over the next 20 years. The approval required a erosion hazard and sedimentation strategy to be prepared.

5.1.1.3 Conservation strategy

The EIS described the reservation of the following land for conservation:

- 5% of the 22 unharvested productive forest types with at least half being productive accessible forest.
- Flora reserves.
- Areas inaccessible to logging.
- Non-productive hardwood forest types.
- Total 7 814 ha

All 10 677 ha of rainforest within State Forests will be excluded from general purpose logging.

The conditions restricted logging in certain compartments until further assessment of conservation value including old growth. These compartments shall not be logged if they process values that warrant their protection. It required the establishment of the wildlife corridor shown on Map 18 and for it to be extended to connect up with the Weelah Nature Reserve. The conditions required the conservation strategy to consider the areal extent of reserves and the contiguity of the areas reserved to enable the minimising of edge to area ratios and ensure a contiguous reserve.

5.1.1.4 Fauna

The EIS and approval contained prescriptions for the management of fauna. The prescriptions include:

- Habitat tree/recruitment retention between 4-6 habitat tress to be retained
- Yellow-bellied Gliders v-notched trees, 10 feed trees and 5 mature bark shedding trees/ha
- Refugia reservation of areas of significance for species listed in Schedule 12 and shall be 100mx300m in size
- Hastings River Mouse filter strips and areas retained containing Cyperaceae and Juncaceae
- Cave roosting bats areas surrounding roost sites shall not be disturbed; access into roost sites should be prevented and unknown roost sites should be identified
- Koala trees used by koalas shall be retained and these will be identified by a person trained to identify such sites
- Monitoring fauna monitoring contained in the EIS and FIS shall be undertaken including post logging inspections to monitor the implementation of the fauna prescriptions, impact of feral animals and reporting of the findings.

5.1.1.5 Flora

The EIS and approval contained prescriptions for the management of flora. The prescriptions include:

- Rare species pre-logging surveys for *Cynanchum elegans* and buffer when found; research to confirm status of *Papillilabium beckleri* and to study the impacts of logging on *P. beckleri* and *Schistotylus purpuratus*; modify fuel reduction burning in a 20 m area around *C. elegans*, *S. purpuratus*, *P. beckleri* and *Gahnia insignis*; reserve 5 % of forest types 47 and 53 particularly old growth areas and that containing *S. purpuratus* and *P. beckleri*; *G. insignis* at the Bluff on the escarpment of bobbin Creek Gorge shall be reserved from logging and be protected by a 20m buffer
- Rainforest no logging or felling into or within rainforests except that required for roading operations through rainforest approved by this approval but no roads shall be constructed through warm temperate rainforest
- Significant plant communities no logging in unlogged areas of messmate and messmate-Diehard Stringbark communities and unlogged forest type 48; no logging in 10% of old growth forest type 64, 122, 168 and reservation of all of forest type 138; and reservation of 5% of forest type 35, 37 and 60 and accessible areas to be reserved should include old growth and areas with *Eucalyptus brunnea*

5.1.1.6 Monitoring

The EIS indicated the sorts of issues requiring monitoring included:

- Inspections to ensure the objectives of the Plan of Management are achieved.
- Checking operations to ensure compliance with the SEMCL.
- Monitoring of regeneration.
- Monitoring regrowth and harvesting volumes to confirm timber yield.
- Maintaining Compartment History records.
- Recording extent and impact of wildfires and the extent and intensity of fuel reduction burning.
- Monitoring the impact of logging on Schistotylus purpuratus and Papillilabium beckleri.
- Monitoring the impact of psyllid attack.
- On-going fauna population monitoring particularly Tiger Quoll, Long-nosed Potoroo, Squirrel Glider, Hastings River Mouse, Parma Wallaby and bat populations.

The approval required:

- Monitoring of the erosion hazard and sedimentation strategy and seedling establishment on closed roads and log dumps. If seedling establishment does not reach 125 seedlings/ha then planting of closed roads and log dumps must be done with local indigenous species.
- SFNSW shall undertake all monitoring in the EIS and FIS and required by the conditions in the approval.
- The monitoring should be put into a report which is released every three years from the date of the approval (March 1996, March 1999 and March 2002) and shall be available to the public.

5.1.1.7 Cultural heritage

Aboriginal sites

The EIS identified 21 previously unknown Aboriginal sites including a quarry and important routes used to travel between coastal river valleys and tablelands. Seven identified sites will be subjected of Consent to Destroy applications. Another seven sites will be protected by management prescriptions. Four sacred trees will be protected by 50m buffers and two other sites will be further surveyed after fire.

The conditions require a suitably qualified person to survey spurs and lower slopes along the southern edges of the management area readily accessible from gentle river flats; ridges

connecting the Blue Knob Ceremonial Area and ridges used as pathways in the northern portion of the management area. Additionally pre-roading surveys shall be conducted to identify Aboriginal sites and new roads shall avoid identified Aboriginal sites, unless NPWS have issued a Consent to Destroy.

European heritage

Sites of European cultural value are known and already protected such as Convict Road on Old Oxley Highway and extended to include two stone cairns in the area, old gold mining area at Cells Creek and timber trestle bridge and surrounds.

5.1.1.8 Prescribed burning

The EIS will continue to burn to reduce the threat (i.e occurrence, intensity and spread) of wildfires. Fire management will maintain fuel loads at low levels at strategic sites such as major roads, ridgelines and broad areas of dry forest types. The area burnt is 600-800 ha/yr on a four to eight year cycle and generally restricted to dry hardwood forest types.

The conditions indicated that SFNSW shall investigate the environmental impact of prescribed burning and research into alternative methods for broad area reduction burning. SFNSW shall prepare a detailed plan for prescribed burning, which should consider species composition, ignition sources, past fire spread patterns and fire history in relation to forest types and topographic features.

5.1.1.9 Recreation and tourism

SFNSW will retain its current recreation facilities and level of use with possibility of additional facilities being opened but it does not specify what these will be.

5.1.1.10 Weed and pest control

Annual mechanical and chemical weed control, focusing on roadsides, recreation areas and areas identified by neighbours and public authorities. The EIS did not provide details on vertebrate pest control but SFNSW indicated that 1080 aerial baiting is done for wild dog control.

5.1.1.11 Grazing and bee-keeping

Grazing leases cover 3 646 ha of State Forests in the WMA and these will continue. The EIS stated that beekeeping permits will continue to be issued in response to demand.

5.1.2 Glen Innes Management Area Environmental Impact Assessment Proposed Forestry Operation

According to the Timber Industry (Interim Protection) Act 1992 section 9(1), the Minister for Planning granted approval to the Forestry Commission to continue the logging operations outlined in the Glen Innes Management Area EIS, subjected to 60 conditions. The approval limited the activities to State Forests within the Glen Innes Management Area EIS for 10 years and the procedures and conditions described in the EIS, with amendments or additions required by the 60 conditions in the approval.

The Glen Innes Management Area EIS covered 68 234 hectares of State Forests east of Glen Innes. The activities that were approved include harvesting, roading, post-harvest operations, fuel management burning, silviculture and other uses such as grazing, beekeeping, tourism and recreation.

5.1.2.1 Harvesting/Silviculture

The EIS indicated that the harvesting included:

- Logging of alternate sub-compartments in Oakwood, Glen Nevis and London Bridge State forests by 2002. Following this harvesting would commence in Butterleaf and Curramore State forests. Then the remaining sub-compartments in Oakwood, Glen Nevis and London Bridge State forests would be harvested by 2010. The yield would be about 13 600 m³/yr of quota quality sawlogs and 2000-4000 m³ of low quality (ex-quota) sawlogs.
- Harvesting of regrowth forest beginning in Gibraltar Range Forests, with a yield of 13 600 m³/yr (based on av. annual growth increment of 0.48 m³/ha/yr and a net harvest area of 28 400 ha).

Allowable annual quota cut for first cutting cycle (1992-2009) was 13 600 m³ gross per annum, with an area of productive/accessible forest of 13 790 ha. The second cutting cycle has an allowable annual cut for the second cutting cycle (2010-2040) of 13 600 m³ gross per annum, with an area of productive/accessible forest of 28 421 ha.

For moist coastal hardwoods (1.5% of the GIMA), successful regeneration requirements seed source, suitable seed bed, reduction from overstorey and understorey competition and protection of regeneration after establishment. I assume this means that extensive disturbance must occur but this does not seem to be outlined in the EIS.

Dry coastal hardwoods (2.5% of the GIMA), will regenerate in gaps created in the canopy by selective logging.

Tableland hardwood forests with grassy understorey provide good conditions for regeneration when selective logging creates small gaps in the canopy. In other places where understorey is dense, regeneration can be restricted. Regeneration needs seed source, suitable seed bed, reduction from understorey competition and protection of regeneration after establishment.

The EIS indicated that the proposed harvesting prescriptions in London Bridge State Forest would have an adverse impact on silviculture and reduced logging intensity would affect the changes of regeneration and increase overstorey competition.

The conditions indicate that:

- Old growth is defined as unlogged.
- No trees can be felled for the sole purpose of pulp or woodchips in old growth forests.
- In regrowth forests only regrowth stems can be felled fro woodchips.
- No timber stand improvement can be undertaken.
- In London Bridge State Forest, 50% of the canopy to be retained.
- Quota sawlogs shall be reduced to an average annual gross yield of 13 600m3 by 1 January 1996.
- SFNSW shall monitor the long-term monitoring of the cumulative impacts of logging operations on tableland forest types.

5.1.2.2 Roading

The EIS indicate that 12 km of roads will be constructed in Oakwood State Forest and reconstruction and rerouting of some roads in Butterleaf, Curramore and Warra State Forests. Maintenance of 138 km of Class III roads will occur. Logging tracks would be constructed as Class IV roads.

The conditions in the approval allow roads to be constructed in the area of Blackhole Trail in the south-east corner of Blackhole Creek Reserve and in the buffer on the north side of London Bridge Road. The EIS indicates that roading would occur through Butterleaf Creek Reserve.

5.1.2.3 Soils and hydrology

The EIS indicates the SEMCLs will be followed and additional measures will be undertaken, including:

- Filter strips 40m wide in catchments in excess of 100ha and 20m in other places
- Access roads located on ridges; max. gradient of 10 degrees; filter fences; revegetation
- Snig tracks cross drainage; minimising downhill snigging; adherence to wet weather controls; minimising time on snig tracks
- Log dumps at least 10m from filter strip or drainage line and drainage directed to surrounding vegetation; relevelling and ripping to encourage revegetation and rainfall percolation

The conditions indicate that:

- Logging operations shall conform with any harvesting plan (and one must exist) which has assessed site specific characteristics of that compartment and a erosion hazard and sedimentation strategy.
- The approval required a erosion hazard and sedimentation strategy to be prepared in consultation with CaLM, after identifying erosion hazards and taking various issues into account, it must conform with the SEMGL and be consistent with the terms and conditions of this approval..
- Persons trained in soil conservation shall determine erosion hazard and supervise the implementation of the erosion hazard and sediment control strategy.
- Monitoring shall be undertaken on implementation and compliance with the erosion hazard and sediment control strategy, effectiveness of the strategy to control erosion and the impacts of logging operations on turbidity, water chemistry, water yield key aquatic species and the interaction of these with storms. The monitoring shall be designed in conjunction with CaLM and EPA.
- The results of the monitoring program shall be put into a report every three years and shall be made available to the public.
- Filter strips shall be retained along all streams greater then 20ha.
- The minimum filter strips will be 20m or 30m when the catchment area exceeds 100ha (or 40 ha where erosion hazard is high).
- No logging operations shall be conducted in filter strips.

5.1.2.4 Conservation strategy

As the EIS chose an increase in conservation areas as the proposal, 1 922 ha of forest is indicated as not being available for logging. This area is comprised of the following:

- Reserves new reserves (645 ha) and buffers and existing forest preserves in London Bridge State Forest; new forest preserve (82 ha) in Oakwood State Forest and new forest preserve (230 ha) in Brother State Forest; two forest preserves (89 and 273 ha) in Butterleaf State Forest; new forest preserve in the vicinity of Scott Trig on Butterleaf State Forest; new reserve (1 180 ha) in Curramore State Forest; two new forest preserves (468 ha) in Torrington State Forest and the remaining forest area would be excluded from supplying the sawmill but parcel sales or other forest products for local uses could still be obtained; minor additions and modifications to Crown Mountain Forest Preserve; new forest preserve (4 ha) in Moogem State Forest; two new forest preserves (12 and 15 ha) in Gilbraltar Range State Forest and a new forest preserve (7 ha) in Glen Elgin State Forest.
- Wildlife corridor system 470 ha around the rim of Glen Nevis State Forest; wildlife corridor system throughout the GIMA in all forests available for logging
- Increase in filter strips to 20m, where logging is excluded however trees can be felled.
- No culling of dead trees.

London Bridge State Forest will be logged by a 50% canopy retention harvesting perspiration. Three areas in Gibraltar Range State Forest which link gorge country and forest areas will be

classified PMP 1.1.7 (natural Forest Special Emphasis for Flora and Fauna) however logging will be allowed but further investigation into values and impacts will be undertaken.

Also grazing will be reduced or excluded in certain State Forests; logging will be excluded 100 m around wombat burrows; burning will be modified in some State Forests and no 1080 baiting in certain State Forests until the impact on critical weight-range species.

The conditions require that:

- Roading or logging can not be undertaken in reserves except for that identified in section 5.1.2.2.
- The order of working shall be arranged so that the area of London Bridge State Forest not already reserved by the approval, is not logged or roaded until an regional assessment of conservation value including old growth is undertaken on an area bounded by Bryon Bay, Gloucester, Tamworth and Tenterfield.

5.1.2.5 Wilderness

The EIS indicated that overall about 40% of the forests (??only State Forests??) and 31% of the leases of the GMA lie within four wilderness areas, as indicated by Table 5.3. The EIS does not indicate if no logging is to occur in these identified wilderness areas. Since an alternative covered not logging wilderness and since this rejected, it is assumed that logging of identified wilderness is part of the proposal.

WILDERNESS AREAS	AREA (HA) OF	% OF
AND STATE FORESTS	STATE FORESTS	STATE
AFFECTED		FOREST
Bindery Wilderness		
Gibraltar Range	5 410	31
Crown Lease 22/2	2 730	
Guy Fawkes Wilderness		
Glen Nevis	6 208	100
Oakwood	3 100	34
London Bridge	3 063	100
Brother	100	1
Crown leases	1 129	
Binghi Wilderness		
Torrington	500	31
Washpool		
Curramore	8 200	85
Moogem	500	25
TOTAL STATE FORESTS	27 081	40
TOTAL LEASES	3 859	31

Table 5.3: State Forest affected by Wilderness Areas.

5.1.2.4 Fauna

The EIS indicated that :

Birds

- Nest sites of Sooty Owls will be protected by a 200m radius disturbance free zone.
- Retention of 50% of the canopy in London Bridge State Forest.
- Logging and burning would be confined to areas 300m from mapped territories of Rufous Scrub Bird.

- Known sites of Square-tailed Kite would be protected by a 200m radius disturbance-free zone.
- Reporting of sighting of Regent Honeyeater; protection of nest sites by a 100m disturbance free zone; retention of 10 Mugga Ironbark or all Mugga Ironbark if this then 10 exist and possible retention of Yellow and White Box.
- Prescriptions for Powerful Owl, Masked Owl, Crested Shrite-tit, Cicadabird, Lewin's Rail, Pacific Baza, Chrestnut Rumped hylacola and Forest Ravin.

Reptiles

- Alternate sub-compartment harvesting practice in high site quality forest.
- Protection of gully areas and refuge areas along wildlife corridors to allow re-colonisation.
- Natural regeneration with no burning in 33% of high site quality hardwood and moist hardwood forests.
- Provision for recruitment of large log cover in high site quality hardwood and moist hardwood forests by retention of defective stems and habitat trees.
- Regional network of unlogged reserves.
- No specific measures were proposed for Schedule 12 species.

Amphibians

- Stream side corridor reserve system (filter strips).
- No specific measures were proposed for Schedule 12 species.

Arboreal Mammals

- A habitat tree prescription of four well spaced habitat trees/ha in low site quality forests and six well spaced habitat trees/ha in high site quality forest.
- Protect feed trees for the yellow-bellied glider.
- No specific prescriptions for kangaroos, wallabies and potoroos.
- For bats the habitat tree retention; mapping of permanent water bodies and retention of adjoining old growth to a distance of 50-100m.
- Investigate the conservation status of wombats; grazing intensity reduced by 50% in Butterleaf State Forest; 100m radius disturbance-free zone around wombat burrows; minimum 100m wide unlogged riparian corridor in sandy soils in areas used by wombats.

Invertebrates

- Research to identify indicator taxa.
- Monitoring of invertebrate pest species.

The EIS indicated that to correct deficiencies on biodiversity information there would be eight programs of survey and monitoring.

The conditions indicated that:

- Four habitat trees should be retained in low quality old growth dry hardwood and six in old growth moist hardwood forest and high quality old growth dry hardwood forest.
- Sufficient recruitment habitat trees shall be retained to maintain the density of habitat trees.
- All pre-logging surveys should assess the number of habitat trees.
- Clusters of vegetation shall be retained around habitat trees, in clusters trees can be felled but no machinery can enter.
- Pre-logging inspections shall be undertaken to identify all habitat features needed for amelioration.
- SFNSW shall devise a prescription to ameliorate the impacts of grazing on Hastings River Mouse and survey HRM habitat within areas under occupational permits.
- SFNSW shall devise a special prescription to ameliorate the logging impacts on Koala.

- For glossy black cockatoo the areas excluded for post-harvest burning shall be those areas where damage could be excessive or where mature *Casuarine* sp. exist.
- Monitoring fauna monitoring contained in the EIS and FIS shall be undertaken including post logging inspections to monitor the implementation of the fauna prescriptions, results of monitoring shall be recorded in Harvesting Plans and be contained in a monitoring report every three years.

5.1.2.5 Flora

The EIS proposed reservation of species and communities which have conservation significance in four State Forests. The additional reserves and forest preserves are discussed in section 5.1.2.4. Also alteration of grazing practices in some areas.

The conditions indicate that:

- Exclude from logging, 10% of the following communities: *E. obliqua/E. brunnea*, *E. obliqua/E. campanulata*; *E. laevopinea*, *E. laevopinea/E. microcorys* and *E. dorrigoensis*.
- Exclude from logging, all known occurrences of the following comminity: *E. prava*, *E.dalrympleana*, *E. dalrympleana* (swamp form), *E. nova-anglica* and *E. moluccana/E. tereticornis*.
- Exclude from logging, areas where *E. amplifolia* is the predominant overstorey species.
- Exclude from logging, all known occurrences of the following: *Grevillea scortechinii* ssp. sarmentosa, Eucalyptus camphora ssp relicta, Dodonaea rhombifolia, Dodonaea serratifolia, Mirbelia confertiflora and Persoonia procumbens, Muehlenbeckia sp aff rhyticarya ('costata' ms).
- Exclude from logging, areas in Torrington State Forest classified as PMP 1.1.7.
- Pre-logging surveys for *Callitris oblonga* shall be conducted in Warra State Forest and any places where it is found logging will be excluded.
- Burning shall be designed to favour the germination and propagation of rare or significant plant species in areas reserved or where such species exist.
- No trees shall be felled into or within rainforests.
- All warm temperate rainforest shall be protected by a 20m buffer and no trees shall be felled within this buffer.
- Burning shall avoid burning in rainforest.

5.1.2.6 Monitoring

The EIS indicated that monitoring of regeneration after logging will be undertaken.

The approval required:

- SFNSW shall undertake all monitoring in the EIS and FIS and required by the conditions in the approval.
- The monitoring should be put into a report which is released every three years from the date of the approval (March 1996, March 1999 and March 2002) and shall be available to the public.

5.1.2.7 Cultural heritage

Aboriginal sites

The EIS indicated that seven stone artifact sites were reported from the GIMA which were considered to of low archaeological value. Boras are known to occur at Crayfish Creek and Derby Creek. Mitigation measures include: training of SFNSW staff in the recognition of sites, assessment of the representativeness of archaeological sites in reserves, testing of the site location model by further surveys, assessment of the need to supplement the reserve system with archaeological sites, on-going consultation between SFNSW and local Aboriginal Land Councils.

The conditions indicate that:

- Prior to logging each compartment shall be investigated for any obtrusive sites.
- Any sites shall be marked on the ground and on harvesting plans.
- A site shall not be disturbed by logging machinery unless Consent to Destroy has been granted by NPWS.
- Before salvaging or destroying the seven identified sites or any sites discovered by surveys consultation shall happen with the relevant Aboriginal Land Council and permission of the NPWS.
- Training of SFNW to identify obtrusive sites such as stone arrangements, bora rings, rock shelters and quarries.
- Investigate the representativeness and adequacy of the archaeological record, to test the general model of site location and assess the need to supplement the reserve system with archaeological land form reserves.
- Pre-roading surveys shall be conducted to identify Aboriginal sites and new roads shall avoid identified Aboriginal sites, unless NPWS have issued a Consent to Destroy.

European heritage

The EIS indicate that various heritage sites are located in the GIMA. It proposed to:

- Place a conservation order on Fielders Hill Torrington State Forest.
- Record Wade's, McLeod's Hut and Mangleson's sawmill sites, Bayly's house and Miller's hut.
- Strategic hazard reduction burning to protect sites liable to damage by fire.
- Preservation of good examples of ringbarked tree, notched stump and a log ramp.
- Permanent identification of several sites and restrictions on heavy machinery near disused mines, water race lines and other sites to reduce damage by such equipment.
- All sites identified will be given an appropriate PMP classification.

The conditions indicate that within one year SFNSW shall assess McLeod's, Mangleson's and Wade's sawmill sites, Fielder's Hill Mine and Miller's hut and the all other sites identified in the Historical Survey in the EIS, in order to determine their suitability for classification as PMP 1.1.8 (Special Emphasis: Historical Values).

5.1.2.8 Prescribed burning

The EIS indicated that:

- After harvesting a post-logging burn would occur.
- Fuel reduction burning will occur up to 10% of the GIMA in any one year. Burning would occur in late winter or early spring. The frequency of burning is shown in Table 5.3.
- Exclusion of burning from London Bridge State Forest.
- Modify burning in Brother State Forest.
- Reduce burning in 33% of areas logged in high site quality moist forest.

Table 5.3: The frequency of burning in certain areas of the GIMA

AREA/FOREST	FREQUENCY (YRS)
Boundary of Mt Mitchell Plantation	1-3
Gwydir Highway near Gibraltar Range	3
SF	
Curramore SF	3-5
Butterleaf SF	
Gorges	3+
Accessible Forest	3
Some areas less frequently	3-10+
Mt Mitchell SF	3-5+

Brother SF	
Southern half	3-5+
Northern half	5-10+
London Bridge SF	
Small parts only	3-5
Remainder	10+
Oakwood and Glen Nevis SFs	3-5
Warra SF	5-10 infrequent
Torrington SF	5+

The conditions indicate that:

- SFNSW shall prepare an Interim Fuel Management Plan within one year.
- SFNSW shall continue its research into the long-term and cumulative impact of hazard reduction burning on the floristic composition and structure of tableland forest types.

5.1.2.9 Recreation and tourism

The EIS indicated the there was potential for expansion of recreational opportunities in several State Forests including the gorge country of the eastern escarpment. Walking tracks and viewing platform proposed at Lyrebird Falls on the boundary of Gibraltar Range National Park and Moogem State Forest.

5.1.2.10 Weed and pest control

5.1.2.11 Grazing and bee-keeping Grazing

The EIS indicates that:

- Exclusion of grazing from London Bridge State Forest, Blackhole Creek catchment, Gilbraltar Range East, Warra State Forest, Glen Nevis State Forest.
- Reduce grazing intensity by 50% in Butterleaf State Forest.

The conditions indicated that:

- After 1995 if it can not be demonstrated that unauthorised burning by grazers, has been halted then the reduction proposed in the EIS should be implemented.
- If grazing is permitted to continue then there shall be triennial reviews to see if unauthorised burning has recommenced.
- No grazing in Warra State Forest.

Beekeeping

The EIS indicates that there are over 100 apiary licenses in the GIMA but seven bee sites will be removed from proposed flora reserves. The conditions indicate that no trees shall be felled for the purpose of apiary activities.

5.1.2.12 Fossicking

SFNSW shall ensure all fossicking is effectively regulated to avoid adverse impacts on forest flora, soils and watercources.

5.1.3 Kempsey/Wauchope Management Area Environmental Impact Assessment Proposed Forestry Operation

According to the Timber Industry (Interim Protection) Act 1992 section 9(1), the Minister for Planning granted approval to the Forestry Commission to continue the logging operations outlined in the Kempsey/Wauchope Management Area EIS, subjected to 100 conditions. The

approval limited the activities to State Forests within the Kempsey/Wauchope Management Area EIS for 10 years and the procedures and conditions described in the EIS, with amendments or additions required by the 100 conditions in the approval.

The Kempsey/Wauchope Management Area EIS covered 207 887 hectares of State Forests north west of Wauchope. The activities that were approved include forest management, harvesting, resource investigation, road construction and maintenance, fire management, silviculture, conservation, cultural resources management and other uses such as grazing, beekeeping, non-timber proucts, tourism, recreation and environmental education, research and monitoring.

5.1.2.1 Harvesting/Silviculture

The EIS indicate that harvesting would include:

- Harvesting of 24 040ha of old growth forest which will convert this to regrowth, which includes logging of 17 620 ha until 2008 in Kempsey/Wauchope MA at a rate of 1 175ha/yr and logging of 6 425ha from 2008-2020 in Wauchope MA at a rate of 515ha/yr.
- Harvesting of 18 075ha of recut forest to establish regeneration.
- Thinning of 25 220ha of existing regrowth at a rate ranging from 590ha/yr to 1 529ha/yr.
- Cutting cycles will end in 2020 in Wauchope MA and 2008 in Kempsey MA.
- Periodic assessment of forest resources to ensure sustained yield objective is achieved.
- Table 5.4 outlines the products to be obtained.

Product	Source	Wauchope MA Volume m ³ /yr	%	Kempsey MA Volume m ³ /yr	%
Hardwood quota sawlogs	Unharvested	20 963		15 933	
0	Recut &	8 481		1 367	
	Coastal				
	Regrowth	556		2 887	
	Sub-total	30 000	49.5%	20 187	51%
	quota sawlogs				
Small sawlogs	Recut &	111		0	
	Coastal				
	Regrowth	1 037		767	
	Subtotal	1 148	2%	767	2%
	small sawlogs				
Veneer logs	Regrowth	519	1%	187	0.5%
Poles, Piles & Girders	Unharvested	185		700	
	Recut &	1 037		0	
	Coastal				
	Regrowth	1 667		953	
	Sub-total	2 889	5%	1 653	4%
	poles				
Miscellaneous	All	259	0.5%	133	0.5%
Products					
Pulpwood	Sawlog	1 778		0	
	residues				
	Silviculture	4 259		0	
	Regrowth	8 852		5 000	
	thinnings				
	Sub-total	14 889	24.5%	5 000	13%
	pulpwood				
Ex-quota sawlogs	Unharvested	6 296		6 933	

Table 5.4: Volumes of products produced each year.

including salvage,	Recut &	2 556		933	
sleeper	Coastal Regrowth Sub-total	1 778 10 630	17.5%	3 467 11 333	29%
	poles				
TOTAL		60 333	100%	39 260	100%

The conditions indicate that:

- A order of working with specific compartments that must be logged first, was outlined for both Kempsey and Wauchope Management Area. An amendment in 21 November 1994, allowed variations to this order of working under certain circumstances.
- Over the first five years any quota reductions must be implemented. This reductions could result from implementation of the conservation strategy or logging in conformity with the SEMGL.
- Monitoring the long-term cumulative impacts of logging operations on the major forest types common to KWMA must be undertaken.
- Thinning of regrowth forests must be planned and executed so as to create heterogeneous stands with diverse range of habitats.
- To allow for transitional arrangements the approval does not need to be complied with for 3 months in any compartment: listed exclusively in Schedule 4 of the Timber Industry (Interim Protection) Act 1992; harvesting plan approved by the District Forester; licence under s.120 of the NPWS has been sought or issued prior to the date of this approval.

5.1.2.2 Roading

The EIS indicates that approximately 139km of access roads and tracks over the next 10yrs. After this period another 101km of access roads and tracks will be constructed until the end of the cutting cycle.

The conditions in the approval allow:

- No roads through conservation areas except for the following:
- A road through the eastern section of Banda Banda Flora Reserve.
- An upgrade of Banda trail.
- Road deviations through Banda Banda/Marowin Wildlife Corridor.
- New roads to damage or destroy unprotected areas of poorly known, rare (Briggs and Leigh 1988) or significant (Binns and Chapman 1993) plant species in situations where there is no other topographic alternative on which to locate the road.

5.1.2.3 Soils and hydrology

The EIS indicates

The conditions indicate that:

- Logging operations shall conform with any harvesting plan (and one must exist) which has assessed site specific characteristics of that compartment and a erosion hazard and sedimentation strategy.
- The approval required a erosion hazard and sedimentation strategy to be prepared in consultation with CaLM, after identifying erosion hazards and taking various issues into account, it must confrom with the SEMGL and be consistent with the terms and conditions of this approval.
- Persons trained in soil conservation shall determine erosion hazard and supervise the implementation of the erosion hazard and sediment control strategy.
- Monitoring shall be undertaken on implementation and compliance with the erosion hazard and sediment control strategy, effectiveness of the strategy to control erosion and the impacts of logging operations on turbidity, water chemistry, water yield key, aquatic species

and the interaction of these with storms. The monitoring shall be designed in conjunction with CaLM and EPA.

5.1.2.4 Conservation strategy

The EIS indicated that:

• 9 500ha of hardwood including 2 725ha of old growth will be included in a Conservation Reserve System increasing it from 39 900ha to 49 400ha.

The conditions require that

- The conservation strategy in the EIS must be amended in accordance with these conditions.
- When amending the conservation strategy in the EIS consideration should be given to the areal extent of reserves and the contiguity of the reserve system so as to minimise edge to area ratios and ensure a continuous reserve system.

5.1.2.5 Wilderness

The EIS indicated that three wilderness areas are located within the Kempsey/Wauchope Management Areas. Werrikimbe Wilderness Area contains 20 000ha of State Forests and 13 000ha of other Crown-timber lands, with an estimated 208 000m³ of quota logs and 23 000 m³ of other sawlogs. New England Wilderness Area contains 20 000ha of State Forests with approximately 175 000 m³ of quota quality sawlogs and 107 000 m³ salvage sawlogs and other timber products.

5.1.2.4 Fauna

The EIS indicated that :

The conditions indicate that:

- In Moist, New England and high quality Dry Hardwood forest an average of six habitat trees/ha, that are well spaced. Habitat trees are defined as hollow-bearing trees.
- In low quality Dry Hardwood forest (i.e less than 30m) an average of four habitat trees/ha, that are well spaced.
- The spacing of habitat trees can be adjusted to allow creation of canopy gaps but such gaps are not to exceed 25% of the net harvestable area of each compartment.
- Retention of recruitment trees to ensure the retained density of habitat trees is maintained.
- Habitat trees can be removed for log dumps and roads.
- Pre-logging inspections must mark habitat and recruitment trees and this must be done be a trained person.
- Clusters (including understorey and ground logs) shall be retained around habitat and recruitment trees and trees can be felled in clusters but no machinery must enter the vegetation clusters.
- Logging debris must be removed from habitat trees if top-disposal burning is done.

Yellow-bellied glider

- When a sap feed tree (i.e feeding scars) is located then all other sap trees within 100m shall be retained, as well as an additional 30 trees (<10cm dbh) of sap tree species and a minimum of 15 mature bark shedding trees must be retained.
- Within 50 ha of a sap tree or a record of yellow-bellied glider then 10 trees (<10cm dbh)/ha of sap feed tree species and 5 mature tree shedding trees must be retained.
- SFNSW must monitor situations where normal logging operations results in the required retention in the 50ha, this monitoring should be done by random post logging assessments and if it shows that fewer trees then required is happening then marking of trees will need to occur.

Koala

- Trees with evidence of koala use must be retained.
- SFNSW must develop within two years, a prescription to ameliorate the impacts of logging.

Hastings River Mouse

- An area is shown within Carrai State Forest as not being available for logging until its significance for habitat for the Hastings River Mouse is determined.
- The proposed Bungawarrah Flora Reserve must be extended to the boundary of Carrai State Forest.
- The prescription in the EIS must be implemented.
- Where potential habitat is found then a 20m retention strip must be placed along all gullies upstream to the ridge tops within the compartment.

Terrestrial Mammals

- Unused roads must be revegetated except if they are needed for fire control.
- 1080 baiting must be conducted on a perimeter basis, within 10km of wild dog attacks with 12 months and use methods which minimise the risk to non-target animals.
- Need to consider the impacts of unauthorised burning when reissuing grazing permits or leases.
- Stags must not be felled unless they create a hazard.

Rufous Scrub Bird

- Areas within compartment 12-8 of Styx River SF and 119-121 of Nulla-Five Day SF which exhibit potential habitat for Rofous Scrub Bird must not be burned or logged. Potential habitat is defined as extremely dense cover 2-50cm above ground, moderate cover 50-100cm above ground, a moist microclimate at ground level and abundant leaf litter.
- Pre-logging survey must be conducted between August and October of the preceding year before logging, in the predicted range where the bird may occur.
- Known territories must be protected by a disturbance free zone of 250m from the centre.
- Post harvest burning must be carried out so that fire does not enter this zone.

Large Owls

• Certain unlogged forests must be surveyed before logging for Powerful and Sooty Owls at an intensity of one sampling site/ha.

Bats

• Permanent water bodies greater than 10m in length must be surrounded by unlogged strips of 100m wide where they are not already required.

Reptiles

• One in four logging sub-compartments (being those areas served by a single log dump) must have no post-harvest burns carried out in them.

Glossy Black Cockatoo

- When chosing the sub-compartments in the preceding condition, they should be chosen in the following order: firstly sub-compartments where burning would cause excessive damage should be chosen and secondly those sub-compartments with mature Casuarinaceae stands.
- Damage to mature Casuarinaceae stands must be avoided by all reasonable means.

Amphibians

• In areas where no prescriptions or conditions protects potential habitat for the following amphibians, pre-logging surveys must be carried out: Sphagnum, Barred Frog, Giant Barred Frog, Green and Golden Bell Frog, Green-thighed Frog, Glandular Frog, Peppered Frog.

Rare, Poorly Known and Sensitive Species

- The known occurrences of various species must be surrounded by a radius of disturbance free zone of 100 or 200m.
- When ten such records are obtained for any species then SFNSW may reassess the status of the species and ask the Minister for Planning to revoke or alter the condition.

Refugia

• In old growth forest refugia must be retained where pre-logging surveys identify habitat areas of significance to species on Schedule 12 of the NPW Act 1974. The refugia must be 100m by 300m and will not be logged.

Pre-logging inspections

- Pre-logging surveys must be carried out to identify habitat features which are the subject of prescriptions.
- The pre-logging surveys must be done by suitably trained person.
- The results of the surveys and prescriptions must be recorded in harvesting plans.

Monitoring

• The impacts of feral animals, logging, burning and grazing on native fauna must be monitored.

5.1.2.5 Flora

The EIS proposed

The conditions indicate that:

Rare species

- SFNSW must conduct pre-logging surveys to identify poorly known, rare, vulnerable and endangered plants species (Briggs and Leigh 1988) in: Forest Types 32, 39, 45, 48, 49, 70, 73, 74 (include. 62/74), 85, 87, 92, 97, 101, 117, 122, 126, 168 and Dyke, Cowarra, Mount Skillion, Old Station, Skillion Flat, Mount Seaview and Pee Dee State Forests. However no surveys are required for rare or poorly known species if they have been afforded protection by the EIS or conditions of the approval.
- For all pre-logging surveys for poorly known or rare, vulnerable and endangered plants species then: the first location of any discovered rare or vulnerable plants must be protected from logging, new roads and gravel extraction but subsequent locations do need; when a discovery of vulnerable and endangered plants species must be protected from logging, new roads and gravel extraction.
- No logging, new roads or gravel extraction can occur in: Compartment 264-272 and 304 of Mount Boss State Forest; areas mapped by SEPP 14; or conservation areas shown on Map 17 of the EIS except for a road through the eastern section of Banda Banda Flora Reserve; an upgrade of Banda trail and road deviations through Banda Banda/Marowin Wildlife Corridor.
- No logging, new roads or gravel extraction can occur in: areas where *Amorphospermum* whitei within Nulla-Five Day SF; areas where *Boehmeria platyphylla* var. austroqueenslandica within Birdwood PMP 1.1.7; area where *Dodonaea serratifolia*, *Melaleuca groveana* and *Sarcochilus hartmannii* is known to occur; areas where *Callistermon* sp.aff. *linearifolius*, *Pseudanthus pimeleoides*, *Pultenaea petiolaris* and *Boronia chartacea* occur within Bril Bril Creek PMP 1.1.7.
- SFNSW shall investigate the occurrence of *Goodenia fordiana* in Broken Bago State Forest and protect the least disturbed populations from logging, new roads and gravel extraction.
- SFNSW shall create a conservation area in either Ingalba or Tamban SF to protect least disturbed area of both *Eucalyptus ancophila* and *Eucalyptus fusiformis* or if these species do

not occur together then a least disturded population of *Eucalyptus fusiformis*. No logging, new roads or gravel extraction are to occur in these areas.

- Survey must occur to find and protect a viable population of *Marsdenia liisae* in Banda Banda Flora Reserve or if it is not found there then in Mount Boss SF. When it is found then no logging, new roads or gravel extraction are to occur.
- Survey must occur to find and protect a viable population of *Callistemon accuminatus* in Broken Bago SF. When it is found then no logging, new roads or gravel extraction are to occur.
- Prior to logging, new roads or gravel extraction in Old Station, Mount Skillion and Skillion Flat SFs SFNSW must conduct spring surveys to identify *Diuris disposita*. Any populations must be protected from logging, new roads or gravel extraction.
- SFNSW must conduct pre-logging/roading surveys for *Asperula asthenes* and *Diuris pedunculata* in Mount Boss SF within 5km of Mount Boss Trigonometrical Station and only in habitat likely to these species with moist grassy areas in sclerophyll forest for *Diuris pedunculat* and damp sites for *Asperula asthenes*. Any sites with these species must be reserved from logging, new roads or gravel extraction.
- Logging, new roads or gravel extraction must not occur within 20m of locations of poorly known, rare, vulnerable and endangered plants species (Briggs and Leigh 1988) or significant species afforded protection by the EIS or these conditions.

Forest types

- No logging, new roads or gravel extraction can occur in a State Forest that have not been typed according to Research Note 17 and examined for critical forest types and flora communities according to the above conditions.
- Forest typing must be revised for Forest types 62, 62/74, 73 and 74 in Ballengarra SF; Forest Types 111, 167 and 168 in Doyles SF; and Forest Types 62 and 74 in Tamban, Ingalba and Collombatti SFs.
- Forest Type 41 must be reserved from logging.
- 10% of the areal extent of Forest Type 101 must be reserved from logging, 8ha of which be located in Carrai SF; 10% of Forest Type 87, 3ha of which must be located in Styx River SF; 10% of the areal extent of Forest Type 87, 1ha of which must be located in Yessabah Flora Reserve; 10% of the areal extent of Forest Types 39, 48, 49, 70, 73, 74, 62/74, 85, 92, 111 and 117 and 10% of the areal extent of Forest Type 46, 54, 60, 62, 119, 152, 159 and 164. In reserving these areas preference should be to old growth forest.
- 10% of the areal extent of Forest Types 167 and 168 giving preference to old growth areas on basalt geology, second preference to old growth and third preference to regrowth/recut areas on basalt geology.
- 5% of the areal extent of Forest Type 37 giving preference to old growth.
- All Forest Type listed between Forest Type 30 and 215 must be protected from logging, new roads and gravel extraction.

Significant plant communities

- Before logging, roading or gravel extraction in Skillion Flat, Mount Skillion and Old Station SFs, surveys must determine the presence or absence of the following communities: *Eucalyptus amplifolia spp. amplifolia-E. tereticornis-Angophora subvelutina, E. maculata-E. moluccana*, and *E. moluccana-E. siderophloia-E. propinqua*. If found 10% must be reserved from logging, giving preference to old growth.
- All areas of *E. grandis-E. ancophila* communities must be protected from logging.
- A conservation area with no logging must be created in Broken Bago SF to reserve the least disturbed population of *Eucalyptus pyrocarpa-E. agglomerata* community.
- Pre-logging surveys in Cowarra SF to identify E. bancroftii-E. seanna communities and they must be reserved from logging.
- 10% of *E. nobilis* community must be protected from logging giving preference to old growth.

Rainforest

- Trees must not be felled into or within rainforests other then for roads permitted by the approval.
- All unlogged warm temperate and cool temperate rainforest must be protected by a buffer strip of 20m width and trees in the buffer must not be felled other then for roads permitted by the approval.
- Snig tracks must not enter or cross rainforest or rainforest buffer strips.
- New roads must avoid rainforest wherever possible but when there is no feasible topographic alternative then they must be constructed so they: cross rainforest at its narrowest point; pre-logging inspections; road canopy must be disturbed as little as possible; clearing should be to a minimum i.e in flat areas 6m max. and steep areas 18m max.; large trees (<80cm dbhob) should be avoided; felled trees should be removed along the road; upon completion of construction each rainforest crossing must have earthworks or formations drained so not to hold water and to facilitate vegetation establishment and be planted with shade tolerate rainforest shrub and tree species to a density which reflects that of the surrounding rainforest area.
- When carrying out prescribed burning (fuel reduction or post-harvest) SFNSW must avoid burning in rainforests.

Weeds

• SFNSW must liaise with NSW Agriculture to develop a weed control plan for *Lantana camara* giving consideration to mechanical chemical and land management means of control. This must be done within two years and incorporated into Kempsey and Wauchope Management Plans.

5.1.2.6 Monitoring

The EIS indicated that

The approval required:

- All monitoring required in the approval must be implement.
- Monitoring design and implementation must have regard to the discussion of monitoring in the Director's Report.
- The monitoring should be put into a report which is released every three years from the date of the approval (March 1997, March 2000 and March 2003) and shall be available to the public.

5.1.2.7 Cultural heritage

Aboriginal sites

The EIS indicated that

The conditions indicate that:

- Prior to roading and before the construction of gravel pits there must be surveys to identify Aboriginal sites.
- A site shall not be disturbed by roading or gravel pit unless Consent to Destroy has been granted by NPWS.
- Trained staff must determine the significance of sites discovered during logging and unusual or potentially significant sites should be referred to a specialist archaeologist for detailed investigation and determination of management actions i.e PMP classification.
- Aboriginal stone arrangements sites in Lower Creek and Nullia-Five Day SFs must be classified PMP Special Emphasis Aboriginal sites.
- Of the 13 sites identified in the EIS in Yarrahapinni and Way Way SFs, the number in Kempsey Management Area must be determined.

- Sites in that part of Way Way SF within Kempsey MA and 11 sites within the Kempsey/Wauchope MAs which are on NPWS register but not given a PMP classification must be reviewed and any judged to significant for scientific or cultural reasons must be given a PMP classification.
- The recommendations regarding the 8 scientifically significant sites identified in the archaeological supplementary report to the EIS must be reviewed by a specialist archaeological for there relevance and whether a third stage PMP classification is warranted.

European heritage

The EIS indicated that various heritage sites are located in the management areas and these would be protected by a suitable PMP classification.

The conditions indicate that:

• Statements of conservation policy must be prepared for the Pipers Creek lime kilns and Gundle tin mine and these must be incorporated into the Management Plan together with any prescriptions necessary to give them effect.

5.1.2.8 Prescribed burning

The EIS indicates that:

- Implementation of a Fire Management Plan including fuel reduction burning to average 4 700ha/yr. The amount of area burnt each year each given in Table 5.5.
- The MA has been divided into 3 zones and these zones are burnt differently depending on the assessment of the areas bushfire hazard.

CATEGORY	WAUCHOP	KEMPSEY	TOTAL
	E		
Strategic Areas	200ha	1 400	1 600
Broad Areas	2 300ha	800	3 100
Total	2 500ha	2 200	4 700

Table 5.5: Area burnt in each management area.

The conditions indicate that:

- Within 12 months there must be Fire Management Plans prepared and implemented in both Kempsey and Wauchope Management Areas including for Flora Reserves and the 13 conservation areas in the EIS and these plans must comply with section 4 of SFNSW Fire Manual.
- The Fire Management Plan must outline a fuel management strategy which defines the burning prescriptions, monitoring methods and operational procedures needed to achieve it's aims and it needs to take various factors and features into account including not to compromise the generation and propagation of sites (protected by the EIS or the approval) and 20m buffer of poorly known, rare, vulnerable, endangered (Briggs and Leigh 1988) or significant plant species (Binns and Chapman 1993).
- The protection of human life and property will take precedence in fuel management planning and implementation.
- Fuel management prescriptions in Working Plans for existing Flora Reserves must be reviewed within 12 months and they must conform with the guidelines in the Fire Manual.
- •

5.1.2.9 Recreation and tourism

The EIS indicated that

5.1.2.10 Weed and pest control

5.1.2.11 Grazing and bee-keeping

Grazing

The EIS indicates that:

The conditions indicated that:

• No expansion is the area of State Forest grazed except where Crown-timber lands with preexisting grazing leases granted under the Crown Lands Acts are dedicated as State Forests.

Beekeeping

The conditions indicated that:

- Beekeeping is not permitted in Flora Reserves.
- If alternative sites for current holders in Boogoolum Flora Reserve can not be found, then they can retain sites until the duration of this approval but only current permittees shall be eligible to renew and no new permits can be issued.

5.1.2.12 Salvage logging after wildfire

The conditions indicate that:

- After wildfire the order of working for unlogged forest may be different if there is substantial diminution of old growth values.
- After wildfire the order of working for recut/regrowth forest may be different should damage by wildfire have occurred.
- Salvage logging must comply with conditions of the approval except that dead hollowbearing trees must be retained to make up the prescribed number of habitat trees; trees used by koala do not need to be retained; Yellow-bellied Glider sap feed trees need only be retained when there is postfire feeding trees and any other fauna conditions are changed to the extent that the habitat is changed.

5.1.2.13 World Heritage

The conditions indicate that:

• No harvesting is to occur within 20m of unlogged rainforest shown on a map as an area within Carrai State Forest (No. 909) and adjoining Werrikimbe National Park.

APPENDIX G

FOREST USES CODE SYSTEM – TIMBER PLANTATIONS (ENVIRONMENTAL PROTECTION) HARVESTING CODE 1997

Timber Plantations (Environment Protection) Harvesting Code 1997

Power to make a Code or Codes

The Timber Plantations (Environment Protection) Harvesting Code is adopted by and set out in the Timber Plantations (Harvest Guarantee) Regulation 1997 which in turn is made under s.27 of the Timber Plantations (Harvest Guarantee) Act 1995. Although s.19 of the Act allows for more than one Harvesting Code, drafting of additional Codes is unlikely to be necessary in the short term as the Code already adopted was developed to meet the broad range of conditions likely to be encountered in harvesting operations in plantations in New South Wales.

Guiding principles

The Code contains key good practices for plantation harvesting throughout New South Wales. It is based upon numerous existing codes from Australian and from overseas, upon the advice of specialists in the field of environmental protection and upon information gathered from plantation managers and environmental regulators during inspections of hardwood and softwood plantations. The safeguards it establishes are consistent with current environmental standards.

The Code intentionally focuses on the major issues. Those that are of lesser consequence or are judged not to be a potential problem have been omitted. Also omitted are issues that are not directly relevant to the *Timber Plantations (Harvest Guarantee)* Act such as plantation establishment, silviculture, landscape values, safety and training. However, as accreditation continues for the period between harvesting of one crop and the establishment of the next, clearfall and re-establishment are included. Further, because the Code is focused on environmental outcomes, it gives little direction as to *how* owners or managers should manage their plantations or satisfy the various requirements. Thus, while management plans, harvesting plans and capability plans may serve a very useful purpose, it is appropriate that they be developed by industry or by landowners to suit particular needs and circumstances rather than being made mandatory by the Code.

An overriding aim in the preparation of the Code has been to produce a document that is simple for plantation owners and managers to understand and implement and straightforward for the Department of Urban Affairs and Planning to administer and enforce.

Soil and water

The most likely sources of erosion and subsequent pollution are **areas of bare ground resulting from the construction and use of roads, from snig and extraction tracks, from fire breaks and from furrows caused by dragging logs**. The Code prescribes a range of measures to minimise the risk of erosion, ranging from the maintenance of existing cover to constructing drains in order to limit the length of bare ground over which water may run. The literature reports that soil erosion is minimised where at least a 70% cover remains to intercept raindrops and to protect against damage from overland flow. Likewise, outfall drainage is commonly reported as the preferred technique for removing runoff water from roads and snig tracks. Because of the short distance and low grade, water flowing across the road or track has little energy to cause erosion of the road or track surface or of the road batter or disposal area. Each site has its own unique characteristics which should be taken into account in planning an efficient network that minimises the length of roads and the number of crossings.

The peak flow from a **1 in 5 year storm event** is selected as the minimum design criterion for cross-drains, mitre drains or relief pipes in accordance with the literature. Such a criterion provides a structure of practical size while affording a reasonable level of protection.

It is reasonable to expect that **spacing of drainage structures** should vary with the grade of the road, the erodibility of the road surface and the expected rainfall intensities. The standard specifications are typical of those used elsewhere in NSW and are similar to those used in other States and overseas. Compliance with the standard specification, even allowing for up to 50% variation, may be expected to provide adequate erosion control in NSW.

Crossbank capacity is expressed as effective bank height for ease of use. It is based on the assumptions that:

- crossbanks will have batter grades of 1 vertical to 2 horizontal or flatter;
- there is no fall across the channel;
- crossbanks are constructed with minimal effort;
- loss of capacity will result from disturbance by animals and vehicles and from sediment deposition over time;
- the road surface is bare;
- there is no infiltration of water; and
- maintenance is undertaken no more frequently than once a year.

Calculations of the peak flow from a 1 in 5 year storm event at Grafton, a high storm intensity area in northern NSW, indicate that the maximum depth of flow in such a channel is 10 centimetres. As a consolidated effective bank height of 10 centimetres would be adequate for the Grafton region, it follows that the bank heights proposed are more than adequate for all of NSW, especially as most crossbanks will have batters less than 1:2, some fall across the channel, some infiltration of rainfall will occur; groundcover will return after the operation ceases; and most areas in the State have a lower rainfall intensity than that at Grafton.

Little erosion is expected on roads, tracks and trails that are adequately drained. To ensure that drainage is implemented promptly, the Code requires that roads and firebreaks must be drained during construction and maintained during use and that extraction and snig tracks **must be drained within 7 days of completion of log extraction on that track.**

Conditions for the control of erosion on **cut and fill batters** are limited to keeping them away from drainage features and establishing cover on them at drainage feature crossings. Conditions for stable batter grades have not been included as no clear prescriptions have been cited. Techniques to maintain stable batters include constructing batter grades suitable for the material to reduce slumping and covering unstable material with topsoil and establishing a vegetative cover to reduce erosion.

Satisfactory **disposal of runoff water** from drains and relief pipes is also difficult to explain clearly. Draining runoff into undisturbed or well vegetated areas minimises the risk of erosion and provides efficient sediment trapping. Considering the areas likely to be developed as plantations would be lower slopes and that roads would tend to be located on ridge tops, there is unlikely to be many large fill batters which would be unsatisfactory water disposal areas. Even where this situation occurred it would be unlikely that a manager would accidentally or intentionally use it. Most log extraction would be by forwarding machinery which does not create fill batters or concentrated runoff that requires drains to be constructed. Side cut snig tracks on steeper land (greater than 20 degrees) are the only likely risk but because of the lack of clear prescriptions it was decided to leave this decision to the manager.

As soil erosion on roads and snig tracks **near water courses** is most likely to result in water pollution, the length of roads and the number of watercourse and drainage line crossings should be minimised. The location of roads on ridges, spurs and gentler slopes, where practical, is recommended practice. The Code requires that roads, snig tracks and their fill batters should not be constructed within 20 metres of a watercourse to allow adequate distance for filtering of sediment. Drainage lines are also sensitive as erosion nearby could result in soil being deposited in the drainage lines, from where it may be washed into a downstream watercourse. The Code requires that roads and snig tracks are constructed at least 10 metres away from a
drainage line. The narrower width of 10m is proposed because soils near drainage lines would be expected to be drier than soils near water courses and therefore allow greater infiltration of runoff water. Also some of the sediment that reaches drainage lines would be trapped in natural sinks before it reaches a water course. If it is not practical to meet this condition the Code requires that this area be covered with logging debris or sown to a suitable grasscover. This may result in a potentially higher initial risk but provide adequate protection in the medium to longer term.

Watercourse and drainage line crossings must have the capacity to convey runoff from a 1 in 5 year storm which is a standard recommendation for bridges, culverts or causeways. Pipe culverts in watercourses are required to be placed at stream bed level to allow fish to move past the crossing and to avoid undercutting or scouring caused by water falling from the pipe onto the channel bed. As excessive disturbance and loose soil within the channel are likely to cause water pollution, the Code requires that disturbance is minimised and that loose soil is removed. The flow of runoff water from roads and snig tracks into watercourses or drainage lines should be minimised by draining them within 20 metres of the crossing. This will provide some filtering of sediment from the runoff before it reaches the watercourse or drainage line.

Maintenance of permanent cover near water courses and drainage lines is preferred. Gentle banks may be protected by grass cover while, on banks greater than 2 metres in height, trees reduce the risk of slumping. Establishing plantation trees near a watercourse where no trees are present is likely to improve its stability for as long as the trees are growing there. Harvesting is permitted on the basis that an area that is allowed to be planted should be allowed to be harvested provided erosion and pollution can be minimised, especially as harvesting such trees at the end of the rotation provides a better environmental outcome than not planting the area at all. Crop trees left near watercourses after a clearfall operation are prone to damage and windthrow which could reduce bank stability. The preferred option is to establish bare areas along watercourses and harvest them at the end of the rotation.

The Code requires that harvesting and extraction **must minimise damage and disturbance to the channels and banks** of watercourses and drainage lines. The condition may only be enforceable in the event of substantial disturbance however the risk of this happening is low with logging practices in current use. Entry of machinery into such areas should be confined to conditions when the soil is firm and dry. Utilising a bed of logging slash will also minimise and reduce damage and disturbance caused by machines. Directional felling is required to direct trees away from watercourses and drainage lines. Where trees are felled into a water course the **heads must be removed** to minimise the impact on water quality. Smaller branches and leaves which may have come to rest in the water are likely to have only a minor impact on water quality and do not need to be removed. Vegetative material which falls into a drainage line will not have an immediate effect on water quality, however an excessive number of tree heads in the flow path may restrict water flow and lead to scouring. Tree heads must be removed if this is likely to occur.

Log dumps or landings are sites of machine activity and thus soil disturbance. In order to avoid soil washing into drainage features, the Code specifies that they must be a minimum distance of 20 metres from watercourses and 10 metres from drainage lines although the further away the better.

Harvesting during **wet weather conditions** may result in excessive soil disturbance and rutting which in turn may lead to increased erosion by channelling of water. The Code requires operations to cease where this is likely to occur. In practice, managers are unlikely to operate in such conditions as it would cause damage to roads which may be costly to repair.

Water pollution may be caused by **fuel or oil** escaping from machinery or from drums or other containers. This is most likely to occur during servicing. The Code specifies that machinery

must not be serviced within 20 metres of a water course or within 10 metres of a drainage line. Increasing these distances further reduces the risk of pollution.

Ground disturbance at the time of re-establishment poses risks that must be carefully managed, especially in the higher rainfall areas of northern NSW. Simple precautions such as lifting ripper types where cultivation lines cross drainage depressions ensures the integrity of these important landscape features. While it may result in a minor decrease in the plantation area, the creation of permanent buffers along watercourses and in other sensitive areas at reestablishment is worth serious consideration. The establishment of grass cover or perhaps even a range of native shrubs and ground covers in such areas has many advantages. Timbered catchments have a lower water yield than grassed catchments, all else being equal. Clearfalling a plantation increases water yield while plantation establishment and reestablishment reduces water yield. The significance of these impacts, however, depends on the proportion of the catchment that is timbered and the proportion of the timbered area that is plantation. Because these issues are most appropriately considered at the time approval is sought to establish the plantation, they are not dealt with in the Code. Nonetheless, where water supply is critical and a plantation covers a significant proportion of the catchment, the impact of harvesting and re-establishment may be controlled by limiting the extent of operations in any particular year.

Harvesting operations on land susceptible to **mass movement** have not been addressed in the Code. It is generally accepted that trees reduce the susceptibility of land to mass movement. If plantation trees on a hill side are clearfelled, the land could be more susceptible to mass movement if prolonged wet weather occurred. Techniques that could protect land susceptible to mass movement include managing the proportion of forested land clearfelled each year, the extent of the area cleared and replanting the cleared area to trees. However, because techniques cannot be specified at this time it is more appropriate for the plantation managers to seek assistance from local experts.

Native animals and plants

The principal object of the Act is to remove restrictions on harvesting of plantations that otherwise may arise because of the presence of native plants or animals. Nonetheless, there remains an obligation upon plantation owners or managers **to comply with any conditions made at the time of plantation establishment.** If, for example, an approval to establish required that areas be set aside as wildlife corridors, the plantation owner or manager must ensure that roading or burning operations do not destroy the habitat value of such corridors. Thus, while harvesting operations may not be restricted by the presence of native plants and animals, it will often be possible to continue these operations with little impact on plants and animals.

Compensation

Section 20 (2) of the *Timber Plantations (Harvest Guarantee) Act* includes compensation in a list of matters that may be dealt with in the Code, indicating that it will be available in order to protect **'unique or special wildlife values'**. Although 'unique or special wildlife values' are not defined in the Act, the intent is that plantation owners or managers be protected against financial loss should harvesting be delayed or prevented entirely by the discovery within the plantation of flora or fauna so remarkable that it would be imprudent to place it at risk. The glossary accompanying the Code defines 'unique or special' in terms of the *Threatened Species Conservation Act 1995.* It includes populations and communities as well as individual species. The Code allows for the payment of compensation wherever plantation management and harvesting activities are 'delayed, restricted or precluded altogether', including the period during which the existence of unique or special wildlife values is being assessed by the Department of Urban Affairs and Planning. Payment of compensation is limited, however, to plantation owners and managers and does not include sawmillers or the logging industry.

Compliance with the Harvesting Code

Section 23 of the Act places upon owners and managers of accredited timber plantations an obligation to ensure that harvesting operations are carried out in accordance with the Harvesting Code. Section 24 grants the Director-General of the Department of Urban Affairs and Planning power to appoint appropriately qualified public servants (or other qualified persons as may be prescribed by the regulations) as timber plantation officers 'to investigate and report to the Director-General on whether a Code is being complied with.'