Southern CRA/RFA Backgroun

NSW GOVERNMENT

COMMONWEALTH GOVERNMENT

SOUTHERN CRA/RFA

BACKGROUND REPORT

New South Wales Government

Sydney

Commonwealth Government

Canberra

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The assessments that form the basis of this Background Report have 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 assessments that form the basis of this Background Report were undertaken and the methodology has been developed through the Environment and Heritage, Economic and Social, ESFM and FRAMES Technical Committees which include representatives from the New South Wales and Commonwealth Governments and stakeholder groups.

Disclaimer

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1. BACKGROUND

1.1 INTRODUCTION

Over the past three years the Commonwealth and New South Wales Governments have been conducting comprehensive regional assessments (CRAs) of New South Wales forest regions. The assessments cover the range of environmental, biological, economic, social and cultural values of forests. Their results will be used by Governments to reach Regional Forest Agreements on forest conservation and use over the next twenty years.

The assessments for the Southern region are now being completed. Summaries of key results will be placed on the Internet at www.rfa.gov.au as they become available.

This report provides the background to the issues for public consultation on the Southern region RFA. Your views are invited on issues you consider should be addressed in the RFA. You can send written **submissions** to:

RFA Steering Committee
PO Box 489
BELCONNEN ACT 2616

Submissions close on 5 November 1999. This will allow the State and Commonwealth Governments to take your views into account before finalising the RFA by the end of December 1999.

1.2 TOWARDS A REGIONAL FOREST AGREEMENT

1.2.1 National Forest Policy Statement

The 1992 National Forest Policy Statement (NFPS), an agreement signed by the Commonwealth and State and Territory Governments, sets out broad environmental and economic goals for the conservation and management of Australia's forests. These include :

- to maintain an extensive and permanent native forest estate in Australia;
- to manage that estate in an ecologically sustainable manner so as to conserve the suite of values that forests can provide for future generations; and
- to develop internationally competitive and ecologically sustainable forest-based industries that maximise value-adding opportunities and efficient use of resources.

The NFPS also outlines a national basis for satisfying the long-term requirements of conservation and industry. A vital element of the Statement is that joint Commonwealth-State comprehensive regional assessments of the environmental, heritage, economic and social values of Australia's forests are undertaken. These assessments would form the basis for negotiation of RFAs between the Commonwealth and individual State or Territory governments.

1.2.2 The Scoping Agreement

The Scoping Agreement between the Commonwealth and State Governments was signed on 25 January 1996. The agreement confirms the intention of the two governments to proceed to negotiation of RFAs and to establish processes and timetables for their completion. It specifies the broad objectives of the RFA process as ensuring:

- the protection of conservation values;
- the basis for long term ecologically sustainable management of forests; and
- the basis for an internationally competitive forest products industry.

1.2.3 Deferred Forest Agreement

Following the Commonwealth's Deferred Forest Areas report of December 1995, the Commonwealth and State governments signed an agreement covering commercial timber harvesting in New South Wales until 31 December 1999.

1.2.4 Interim Forest Assessment

The Interim Forest Assessment (IFA) of NSW forest regions was undertaken in 1995/96 by the NSW Government. Its purpose was to identify, on a regional basis, those forests that needed to be set aside from logging for possible inclusion in the comprehensive, adequate and representative reserve system of high conservation value forests.

The NSW Government deferred a total of 816 000 hectares of State forest across New South Wales from timber production and reduced sawlog quotas while guaranteeing the security of sawlog supply for ten years through term agreements with sawmillers.

1.2.5 Criteria

The RFA must be consistent with relevant Commonwealth and State policies and legislation, as outlined below.

JANIS Criteria

Following the signing of the NFPS, in 1993 an inter-governmental technical working group on reserve criteria was established under JANIS[1]. This working group drafted criteria which have now been adopted for the CRA process. The Criteria are summarised at appendix 1.

Other policies

The RFA will be developed in a way which is consistent with other relevant policies including the:

- National Strategy for Ecologically Sustainable Development;
- Intergovernmental Agreement on the Environment.

1.2.6 Legislation

A range of Commonwealth and State legislative requirements are relevant to forests. The major acts taken into consideration in developing RFAs are listed below.

- Commonwealth:
  - *Environment Protection (Impact of Proposals) Act 1974*

[1] The Joint Australian and New Zealand Environment and Conservation Council (ANZECC)/Ministerial Council on Forestry, Fisheries and Aquaculture (MCFFA) NFPS Implementation Sub Committee.

- *Australian Heritage Commission Act 1975*
- *Endangered Species Protection Act 1992*
- *World Heritage Properties Conservation Act 1983*
- *Export Control Act 1982*
- *Native Title Act 1993*
- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*

- New South Wales:
  - *Environmental Planning and Assessment Act 1979*
  - *Forestry and National Park Estate Act 1998*
  - *Heritage Act 1977*
  - *NSW Native Title Act 1994*
  - *NSW Aboriginal Land Rights Act 1983*
  - *National Parks and Wildlife Act 1974*
  - *National Parks and Wildlife Amendment (Aboriginal Ownership) Act 1996*
  - *Wilderness Act 1987*
  - *Timber Industry (Interim Protection) Act 1992*
  - *Threatened Species Conservation Act 1995*
  - *Clean Waters Act 1970*

The Native Title Act 1993

Under the *Native Title Act 1993* the Commonwealth has obligations relating to the protection of native title rights and interests. It is not intended that the RFA will in any way influence any native title claims that may arise: if any Government action to implement the Agreement might affect native title, that action will be taken in accordance with the Native Title Act.

The NSW Forestry and National Park Estate Act 1998

The *Forestry and National Park Estate Act 1998* provides a framework for future management of forests in NSW. The Act provides for NSW Forest Agreements to be made between NSW Ministers and for Integrated Forestry Operations Approvals to be issued by relevant Ministers.

Forest Agreements include provisions with respect to ecologically sustainable forest management, sustainable timber supply from forestry operations, community consultation, native title rights and interests or Aboriginal land claims and other relevant provisions. A Forest Agreement will be developed for the Southern region following the completion of a Regional Forest Agreement.

Integrated Forestry Operations Approvals are established in connection with a Forest Agreement and include licences and other conditions under which specified forestry operations can occur. Integrated Forestry Operations Approvals will be issued for the Southern region following completion of a NSW Forest Agreement under the Act.

1.3 THE SOUTHERN REGION

An area of about six million hectares from the edge of the Sydney basin to the Victorian border and west almost to Albury has been studied for the comprehensive regional assessment. (It excludes the Eden Region which is covered by its own Regional Forest Agreement.)

The Southern RFA will cover the 4,513,000 hectares in the lower part of this region (see enclosed map). The information in this report relates to this RFA region unless otherwise specified. (Following completion of the Southern RFA, the assessments undertaken for the northern area will be used in a process designed to achieve similar levels of certainty for industry and conservation.)

About 45 per cent of the RFA region is public land, of which about 80 per cent is forested. The remaining 55 per cent is private land, about 30 per cent of which is forested.

National parks (1,032,500 hectares), State forest (643,200 hectares) and Crown reserves (including leasehold) managed by the Department of Land and Water Conservation (361,500 hectares) currently total 2,037,200 hectares.

There were approximately 118,000 people employed in the Southern RFA region in 1996. The main employers were retail, manufacturing and health and community services.

1.4 COMPREHENSIVE REGIONAL ASSESSMENTS

The Southern comprehensive regional assessments were carried out through the joint Commonwealth/State Steering Committee and its various technical committees.

There are four broad assessment streams:

- environment and heritage;
- economic and social;
- ecologically sustainable forest management; and
- Forest Resource and Management Evaluation System (FRAMES).

Technical committees made up of Commonwealth and State Government officials and non-Government stakeholders were established to manage the assessments. These committees review existing data, identify data gaps, develop and implement projects, monitor progress, and ensure appropriate standards of information gathering. Over 50 technical projects were undertaken over three years, many of which are continuing.

2. ENVIRONMENT AND HERITAGE

2.1 BACKGROUND

The major themes for the environment and heritage assessments are:

- biodiversity;
- old growth;
- wilderness;
- endangered species;
- Indigenous heritage;
- non-Indigenous cultural heritage;
- national estate; and
- World Heritage.

The criteria used for these assessments were drawn primarily from the New South Wales CRA/RFA Scoping Agreement, but also from the nationally agreed reserve criteria (JANIS 1997) and relevant Commonwealth and State legislation.

2.2 BIODIVERSITY

The environment and heritage projects for the Southern region:

- identify biodiversity at both the species and ecosystem level; and
- review key disturbances and threatening processes (for example, fire, feral animals and weeds).

The findings from these projects will be used in the process of developing a comprehensive, adequate and representative (CAR) reserve system and are also fundamental to the development of ecologically sustainable forest management practices.

The biodiversity assessment conforms with the requirements of *The National Strategy for the Conservation of Australia's Biological Diversity* (1996) and, where appropriate and feasible, the *NSW Biodiversity Strategy* (1999).

The JANIS reserve criteria report defines biodiversity as:

> *'the variety of all life-forms, the genes they contain, and the ecosystems of which they are a part. Biodiversity is generally considered at three levels: genetic diversity, species diversity and ecosystem diversity. It is sometimes considered at the landscape diversity level'.*

A number of broad groups of organisms constitute biodiversity: vascular plants, non-vascular plants, vertebrate fauna, invertebrate fauna, fungi and micro-organisms. Priority has been given to those elements of biodiversity – vertebrate fauna and vascular plants – for which most scientific information is available.

Information was produced to cover two main fields of interest:

- forest ecosystems, which serve as a broad surrogate for biodiversity; and
- species and other known aspects of biodiversity that warrant special consideration (including rare, vulnerable or endangered species, areas of high species diversity, natural refugia for flora and fauna, and centres of endemism).

The information generated for these includes:

- data on the spatial distribution of features (forest ecosystem, species or other particular aspects of biodiversity); and
- information on the conservation requirements of each feature, including types of reservation and/or mechanisms for protection appropriate for each feature.

A data audit and review process was undertaken to summarise available information on species, ecosystems/communities and threatening processes. The audit also identified gaps where additional data collection was required. In addition, field surveys were undertaken to collect:

- point location habitat data and selected habitat data for fauna; and
- site attributes for defining forest ecosystems and communities.

The subsequent data were analysed to produce descriptions of forest ecosystems and communities, and to model distributions of flora and fauna species with the purpose of identifying conservation requirements.

2.2.1 Forest ecosystems

A forest ecosystem is defined in the JANIS criteria as an indigenous ecosystem with an overstorey of trees that are greater than 20 per cent canopy cover. A forest is defined as a vegetation type dominated by woody vegetation having a mature or potential mature stand height exceeding 5 metres, with an overstorey canopy cover greater than 20 per cent.

The forest ecosystems are identified by canopy species, broad understorey species, and other environmental factors such as soil and climate. The forest ecosystem mapping project will produce a pre-1750 distribution and current distribution map of forest ecosystems for the Southern region.

Assessments in the Southern region have identified approximately 130 forest ecosystems. Mapping of the forest ecosystems is nearing completion.

2.2.2 Fauna and flora

Species are selected on the basis of their national, State and regional rareness, vulnerability and endangered status and assessed by expert reviewers observed by stakeholders in the Southern CRA process. Examples of regional vulnerability include species that are isolated, at the northern or southern extent of their ranges, and/or serve as core habitat for other important species.

More than 130 priority plant species and 61 animal species were assessed in the Southern region.

Animals include the tiger quoll, the powerful owl and the eastern false pipistrelle bat, (very little is known of its habits and it is in low numbers throughout its range). The Booroolong frog, once common in rocky creeks flowing west of the Great Divide, has suffered a major decline in population and is now considered one of the most highly threatened frogs in NSW.

Plants include the rare eucalypt *Eucalyptus langleyi*, and *Pimelia humilis* which was found in the Southern CRA survey for the first time since its only previous documented record early this century.

Reservation priority ranks between 1 and 5 were agreed upon by experts within each species group, with 1 receiving the highest priority. Priority was based on the extent to which a change in tenure of forested land would aid the conservation of the species, the ability of prescriptions and conservation protocols to ameliorate threats to the species, the vulnerability of the species to off-reserve disturbance, and the intrinsic risk of extinction of the species. Areal reservation targets will be developed for priority flora and fauna species. A list of priority fauna species for the CRA region is provided at appendix 2, and priority flora species at appendix 3.

2.3 OLD GROWTH

The *National Forest Policy Statement* (NFPS) defines old growth forest as:

> *'forest that is ecologically mature and has been subjected to negligible unnatural disturbance such as logging, roading, and clearing.'*

The definition focuses on forest in which the upper stratum or overstorey is dominated by the late mature to overmature growth phases. In the JANIS reserve criteria this has been interpreted for operational purposes as ecologically mature forest where the effects of disturbances are now negligible.

In the Southern region, this was applied using the following principles:

- ecological maturity is defined by the characteristics of the older growth stages present;
- if data are available on the structural, floristic and functional qualities that would be expected to characterise an ecologically mature forest ecosystem, these data should be used in assessing the significance of disturbance effects; and
- negligible disturbance effects will be evident in most forests that have a significant proportion of trees with age-related features and that have a species composition characteristic of the ecologically mature forest ecosystem.

So that the JANIS old growth criteria can be applied, the areas of old growth and other successional stages are being mapped for each forest ecosystem in the Southern region. The categories of forest successional stage being mapped are:

- old growth;
- disturbed old forest;
- mature forest;
- disturbed mature forest;
- young forest;
- recently disturbed forest; and
- rainforest.

The most extensive tracts of old growth forest are in existing reserves. Mapped old growth forest outside reserves, particularly in the coastal environments, is fragmented. Detailed old growth mapping is still underway.

2.4 WILDERNESS

An assessment of wilderness is to identify those areas that would meet the wilderness criteria under the provisions of the New South Wales *Wilderness Act 1987* in addition to the *National Wilderness Inventory* analysis of wilderness in the region. The JANIS reserve criteria specify that 90 per cent (or more if practicable) of the area of high quality wilderness according to the *National Wilderness Inventory* that meets minimum area requirements should be protected in reserves.

Wilderness assessments in the region under the *NSW Wilderness Act 1987* are nearing completion within 16 study areas totalling 316,400 hectares. Areas that meet the wilderness criteria will be termed Provisionally Identified Wilderness for consideration during negotiations towards a Regional Forest Agreement. NSW Government decisions on wilderness declaration will follow public exhibition of the assessment results including wilderness declaration options.

For the RFA, wilderness is being mapped according to the nationally agreed criteria to determine the proportion to be placed in reserves.

The State's provisionally identified wilderness will also be considered in finalising the RFA.

2.5 HERITAGE

The heritage assessments in Southern are based on the Commonwealth/State Scoping Agreement. It requires both Governments to address heritage consistent with State and Commonwealth legislation. This includes the identification and documentation of National Estate natural and cultural heritage and State cultural heritage values to satisfy Commonwealth obligations under the *Australian Heritage Commission Act 1975*, and State obligations under the *NSW Heritage Act 1977* and the *National Parks and Wildlife Act 1974*.

The identification, assessment and documentation of National Estate values in Southern included assessment of cultural and natural heritage values.

The National Estate is defined in the *Australian Heritage Commission Act 1975* as:

> *'those places, being components of the natural environment of Australia, or the cultural environment of Australia, that have aesthetic, historic, scientific or social significance or other special value for future generations as well as for the present community. '*

The Australian Heritage Commission's responsibility is to identify the National Estate and, under section 30 of the Act, to advise the Commonwealth Government on the conservation of National Estate places and the potential impact on National Estate values of proposals relating to those places. The act also requires the establishment of the Register of the National Estate. The Register includes places of importance at a local, regional or national level. The identification and assessment of places for listing in the Register is guided by the National Estate Criteria.

In a regional context, assessment of the National Estate requires a comparative appraisal of the significance of places identified as having one or more attributes or values. The values are derived from the National Estate Criteria. The development of thresholds to establish National Estate significance vary depending on the level of current knowledge about the nature and extent of National Estate values and their distribution in the landscape at a local, regional or national level. A threshold is developed specifically for each National Estate value.

2.5.1 Natural heritage

National Estate natural heritage assessments for the Southern CRA are assessing areas according to their significance in terms of values such as evolutionary history, current natural processes, uniqueness and significance to education and research. This work is undertaken, where possible, in conjunction with other projects addressing the JANIS reserve criteria, including old growth, wilderness and biodiversity. Separate assessments were undertaken for other National Estate values, including endemic flora and fauna species, refugia and species at the edge of their distribution range. Natural Heritage Studies being conducted across the region include places such as Kosciuzsko National Park and Morton National Park.

The assessment work undertaken in the Southern CRA process is identifying areas as having potential National Estate value and will form the basis of the determination by the Australian Heritage Commission as to which places are entered onto the Register of the National Estate.

2.5.2 Cultural heritage

Projects assessing cultural heritage values were undertaken jointly by State and Commonwealth to meet obligations under State and Commonwealth legislation.

The term 'cultural heritage' generally refers to places of historic, social, aesthetic or scientific value (cultural heritage values). A cultural heritage place can be a site, area, landscape, building or other work, group of buildings or other works, together with associated contents and surroundings, that is significant for its historic, social, aesthetic or scientific value. A place of cultural heritage is determined by its significance according to a set of criteria which reflect the values outlined above. In the forest environment these values can, for example, exist:

- in the tangible fabric of an archaeological or historic site;
- intangibly, through spiritual associations with particular places; or
- within a landscape which combines tangible and intangible elements.

In addition to the Southern cultural heritage assessments a Statewide project has examined the protection and management of Indigenous and non-Indigenous cultural heritage values and places. The aim of this project is to produce a workable set of principles and guidelines for forest land managers to ensure the protection of cultural heritage values through Regional Forest Agreements.

Aboriginal cultural heritage and National Estate

The assessment of Aboriginal cultural heritage values in Southern is being guided through an Aboriginal Consultation project. This involves regional workshops coordinated by two Aboriginal Management Committees established as part of this project.

The work being undertaken is focussing on identifying Aboriginal community interests regarding ownership, management and protection of cultural heritage values in forested areas. Forested landscapes contain much evidence of Aboriginal use of and spiritual link to the land. Aboriginal interests in the Southern region are diverse and include not only areas of cultural significance but also areas of economic and social importance.

The RFA will address Aboriginal custodianship and control of cultural items, places and landscapes. This can involve:

- a review of current management of Aboriginal heritage by agencies;
- joint management of public forest lands with State agencies;
- ownership of land under the *NSW Aboriginal Land Rights Act 1983*; and
- Aboriginal ownership and leaseback of National Parks under the NSW *National Parks and Wildlife (Aboriginal Ownership) Act 1996*.

In an ongoing process the NSW National Parks and Wildlife Service and State Forests of NSW are reviewing Indigenous cultural heritage management in consultation with Aboriginal communities, aiming to develop systems that better consider the landscape context of sites and that provide for efficient protection and greater involvement of Aboriginal communities in decision making.

Non-Indigenous cultural heritage and National Estate

A Cultural Heritage Working Group developed a series of projects to identify, assess and document non-Indigenous cultural heritage values in the Southern region. These projects, comprising the Statewide Cultural Heritage Data Audit, Integration and Analysis (Non-Indigenous) project, Southern region Forest History and Heritage Assessment (Non-Indigenous) and the Assessment of Places of Aesthetic Significance in NSW included:

- a data audit of existing cultural heritage data;

- a thematic history;
- a community heritage assessment;
- an assessment of historic places; and
- an assessment of the aesthetic values of the region.

As part of the Southern History and Heritage project, community heritage and historic values were assessed. Community heritage workshops were held at locations within the Southern region to identify places the local community felt were of special value to them. All information was entered into the CRA Heritage Inventory database, and this information and a short report on the workshop was returned to workshop invitees for comment. Social value research was then conducted by means of questionnaires in each workshop locality, followed by field inspection and documentation of a range of sites.

The history of the Southern forests over the last two hundred years was traced in a series of thematic frameworks. The overview thematic report describes the landscape and topography of the forests. A sample of sites was chosen for further research and field validation on the basis of likely significance given the early desktop study and an understanding of the history of the area.

Forestry, pastoral and other activities have left their mark on the forest landscape with sawmills, sleeper cutter sites, gold mines and bullock tracks. Assessments also identified sites in the Southern region that are of particular significance to regional communities, including the Snowy River, Pilot Hill Arboretum and the Bombay Picnic Area.

The assessment of aesthetic values used information from the community heritage workshops and State agency land managers in the Southern region to determine areas of aesthetic significance.

2.5.3 World heritage

In accordance with the New South Wales CRA/RFA Scoping Agreement and the Commonwealth's obligations under the World Heritage Convention, there is a commitment by both Governments to identify and assess World Heritage values in the Southern region as part of the Regional Forest Agreement process.

Places on the World Heritage List are defined as those which have outstanding universal value. The methodology used in the Regional Forest Agreement process to identify and assess places which are the most outstanding of their kind in the world is based on a thematic approach being applied to forested areas. The methodology assesses significance by developing themes of outstanding universal value, and then testing places against these themes by working through a series of steps. This approach is only one of those being used by the Commonwealth to ensure the protection of Australia's World Heritage.

The thematic methodology involves the use of a panel of experts and provides a systematic means of identifying a list of places that meet the criteria and operational guidelines of the World Heritage Convention. The first step (step A) of the thematic methodology involves the panel of experts providing advice to Governments on themes of outstanding universal value relevant to Australia. These themes are then used in the second step (step B) to develop a list of places that might include those that best represent the identified themes in a global context.

These potential places are then further examined against the Operational Guidelines for the World Heritage Convention to determine whether they have World Heritage value. They are tested using a series of sieves where the places identified at step B are assessed for authenticity and integrity (step C), and adequacy of management and legal protection (step D), prior to formal assessment against the World Heritage criteria in the final step (step E). Places that do not meet the required criteria are eliminated at each step of the assessment process.

The panel of experts met in October 1997 to undertake steps A and B of the methodology for New South Wales, including the Southern region. Two of the sub-themes identified by the Expert Panel are potentially relevant to the Southern region: eucalyptus-dominated vegetation and Aboriginal dreaming sites.

The panel noted that a potential nomination focused on eucalyptus evolution and diversity would include a series of places across the continent, most of which could be expected to already have protected area status, rather than a single contiguous area. The panel identified the natural forest areas extending from the sea to the alps and inland slopes in south-east NSW (also eastern Victoria and ACT) as a potential forested area of relevance to this theme.

The panel considered its discussion and consideration of the Aboriginal dreaming sites and artistic expression sub-themes to be tentative and that these themes would require a comparative, continent-wide study of forest sites of possible religious significance or artistic expression, including dreaming tracks. The Gulluga-Nadjanuka (Mt Dromedary-Little Dromedary) mountains and Sydney Basin Rock Art sites were tentatively identified as warranting further investigation.

3. ECONOMIC AND SOCIAL

3.1 BACKGROUND

Economic and social considerations are among the key goals of the National Forest Policy Statement. The nationally agreed criteria for a CAR reserve system, JANIS, state that in assessing CAR reserve options, the principle of least cost to the community should be used.

In broad terms the economic and social assessments are being undertaken to:

- firstly, establish the nature of industry and the social structure, resources and linkages of the Southern region; and
- secondly, as neither the regional economy nor the communities within it are static, to provide the basis for assessing possible developments (including the direct impact of any proposed changes to forest land allocation and management).

3.2 ECONOMIC ASSESSMENT

The economic assessment places emphasis on the forest industry and forest-related industries but also includes the economy of the Southern region as a whole. Further, it places forest-based industries in the context of the broader economy of New South Wales. In addition to the timber processing industry the assessments cover the following other forest uses:

- apiary;
- grazing;
- minerals exploration, mining and quarrying;
- other forest products such as firewood, craftwood, poles and seeds;
- plantations, both hardwood and softwood, including the potential for plantation establishment; and
- tourism and recreation.

Information derived from these assessments will provide a basis for evaluation of the economic and social implications of various land use, forest management and industry development outcomes in the Southern region.

3.2.1 Economic assessment models

A set of models will be applied to analyse the economic implications of land allocation decisions. They include:

- Forest Resource Use Model (FORUM);
- Industry Response Model for the hardwood processing industry; and
- Regional Economic Impact Assessment.

It should be noted that these models will only provide an indication of the possible effects of changes to land allocation and any consequent impact on wood resource availability for a given set of assumptions. Actual outcomes may differ as decisions will reflect the full range of factors on which commercial decisions are based.

Inputs to these models include hardwood mill survey data (base year of 1997/98), Australian Bureau of Statistics data and other data obtained through the CRA process.

The Forest Resource Use Model (FORUM) will enable estimates to be made of the direct economic impacts to wood based industries resulting from changes to wood resource availability (and/or quality), industry structure and market outlook. FORUM takes these variables and optimises land rent[2] under different industry options (eg including new development opportunities).

Industry Response Model will allow for analysis of the industry's ability to adjust to changes in resource supplies, including an assessment of the impact on industry structure, markets and levels of value adding. This model complements the FORUM model taking into account variables that don't necessarily reflect an outcome based on optimising land rent. It can, for example, take into account existing contractual supply agreements between State Forests of NSW and individual mills.

The Regional Economic Impact Assessment entails building an economic data base of the region, with details of the financial transactions among all sectors in the region. This data base will then be used to construct an input-output model for the regional economy, reflecting the inter-industry relationships for all sectors in the regional economy.

The primary aims in building and applying the input-output model in the economic assessments will be to:

- identify the current status of the timber industry and its contribution to the regional economy;
- assess the regional economic impacts of land management scenarios; and
- assess the contribution of development options in other industry sectors for the regional economy.

Input-output models can simulate the flow-on effects of direct changes in the industry structure (such as may be anticipated for the timber industry) to other industry sectors.

3.2.2 Threshold values analysis

This study will assess the opportunity costs or threshold values of land management scenarios, with particular focus on the foregone net values of timber production.

The study was commissioned because of the difficulties involved in deriving monetary estimates for conservation and non-commercial uses of forests that are considered to be incompatible with timber production.

Instead of assessing non-market values directly, the threshold value model puts the question: is the present value of the benefits of protecting the forests under a particular scenario worth more than the value of the timber production foregone? By projecting potential rates of change in population, income, environmental preferences and technology in the timber industry, it is possible to convert this estimate to a yearly payment (in current dollar terms).

3.3 THE REGION'S TIMBER INDUSTRY

The following summarises some of the findings of the economic assessments.

[2] Land Rent: an estimate of the value of the wood on stump and represents the inclusive price that would be received by the grower for the sale of the standing resource.

3.3.1 Wood supply

The Southern region produces about 28 per cent of the State's hardwood sawlogs and 17 per cent of pulp logs.

In total, hardwood log purchases in the region were around 166,400 cubic metres in 1998/99, with 127,400 cubic metres from the south coast subdivision and 39,000 cubic metres from the Tumut subdivision. Wood supply contracts between State Forests of NSW and the timber industry currently provide 83,603 cubic metres per annum of quota quality sawlog. Total log supply commitments for the region are of the order of 180,000 cubic metres for 1999/2000.

In addition to the supply of timber from State forest, approximately 15,000-20,000 cubic metres of sawlog comes from the region's private forests.

3.3.2 Timber industry

In 1997/98, there were 22 hardwood mills sourcing logs from the Southern region. Two of these mills were outside the region, but sourced a significant proportion of their timber from forests in the Southern region. Seven small mills source exclusively from private land. Nine mills, each of which processes more than 5,000 cubic metres of logs per annum, accounted for 93 per cent of the region-sourced logs processed that year. These mills source principally from State forests.

The value of production of the 22 mills in 1997-98 was over $31 million, of which approximately $7 million is estimated to have been attributable to Southern-region sourced timber processed in the two mills located outside the region. Direct employment in the 22 mills was estimated at 250 people in the same year. Employment in the harvesting and transport sectors is being estimated will also be taken into account in the economic and social assessment.

Hardwood processing within the region is located primarily in two areas – the South Coast and the Tumut/ Tumbarumba area. There is negligible transfer of timber between these two areas. Some sawmill residues and pulplogs from the South Coast area are chipped for export through Eden and some sawmill residues from Tumut/Tumbarumba are exported through Geelong in Victoria.

The range of products based on hardwood sourced from the Southern region includes: pallets, fencing and building materials – from framing to kiln dried flooring and joinery timbers - and furniture. Small amounts of poles and mining struts are also sourced. Exported woodchips are used in the manufacture of pulp and high quality paper products. An increasing amount of resource is being value added in the region or onsold for value-added processing in other centres.

Sydney, Wollongong and Melbourne are the main markets, outside the region itself, for the products processed in the region.

The softwood industry is also significant in the Southern RFA region. Seven mills and processing centres purchased around 715,000 cubic metres of softwood logs and 235,000 tonnes of pulpwood in 1997/98. The industry employs 1,300 people at the main processing centre at Tumut.

3.3.3 Timber industry development

The certainty provided by the RFA will encourage investment in new technologies and promote value-adding initiatives to make better and more efficient use of the timber resource.

At the time of the Eden region CRA, consultants were engaged to examine, in consultation with industry, the development opportunities for the wood-based industry of southern New South Wales (consisting of the Southern CRA and Eden CRA Regions). This work is being complemented by a more recent study examining possible developments in bio-energy production, veneer production and strategic marketing of Southern region-sourced sawn timber.

A further consultancy is examining possible forest-based industry opportunities extending beyond the timber industry including non-timber based products and investment opportunities.

3.4 OTHER FOREST-BASED INDUSTRIES

3.4.1 Apiary

The Southern apiary industry is located in a major beekeeping and honey producing area. The industry is characterised by its size, mobility and its eucalypt dependency.

The figures below are for the wider comprehensive regional assessment area. As described in section 1.5, the Southern RFA will cover approximately two thirds of this area.

The industry in the CRA region produces almost 16 per cent of the NSW production of honey from an estimated 2,000 sites carrying up to 220,000 hives. Approximately 40 per cent of the industry is located on State Forest sites inside the region boundaries.

The Southern CRA Region, on average, supplies approximately 2,400 tonnes of honey with a wholesale value of $3.9 million. Wax and other product sales add another $200,000. Value added is equivalent to $5.1 million and labour income some $2.1 million.

The key values of the industry in the Southern CRA region to the New South Wales industry, other than product value, are:

- its value for resting bees prior to their use in crop pollination;
- its capacity as a drought reserve;
- its relative importance at a time when alternative viable eucalypt and non eucalypt resources are in short supply; and
- its importance for regular honey flows from eucalypt forest such as Spotted Gum and Yellow Stringybark.

Areas used for apiary are being mapped, and will be considered in developing the Southern RFA.

National Parks and Wildlife Service policy to allow continuing access to apiary sites means that changes in land tenure from State forests to national parks will have minimal, if any, initial impact on apiary.

3.4.2 Grazing

Grazing in the State forest areas of the Southern region is conducted under either grazing leases or occupation permits issued by State Forests of NSW. State Forests of NSW records show that there are approximately 100 occupational permits covering approximately 56,000 hectares of mostly hardwood forest in the Southern region.

3.4.3 Minerals and mining

Current quarrying and mining in the region operates mainly on unforested land. The South Marulan limestone quarry is the biggest operation, with an annual production of some 2.7 million tonnes of limestone. The Southern Coalfield, partly within the region, is the only source of hard coking coal in New South Wales and supplies both the domestic steel industry and the export market.

Minerals potential will be assessed by determining the types of mineral deposits likely to be found under the geological conditions known or believed to exist in the region. The area has potential for a variety of commodities, including coal, gold, silver, copper-lead-zinc, limestone, gemstones and construction materials.

No quantitative assessment of actual mineral resources will be undertaken for the region.

3.4.4 Tourism and recreation

The majority of forest-based recreation sites in the Southern region are managed by the NSW National Parks and Wildlife Service and State Forests of NSW. The coast and its beaches, the forests, mountains and the alpine areas and snowfields are major tourism destinations in the region.

Expenditure in the region associated with both nature-based and other tourism and recreation activities was estimated to be approximately $1 billion in 1996/97.

Work on profiling, impact assessment and management recommendations for the region's tourism and recreation industry is currently underway.

3.4.5 Minor forest products

A range of minor forest products are sourced from the region including firewood, fencing materials, poles and posts, mine props, landscape timber and eucalypt seed, with firewood having the highest value. State Forest royalties from all these activities were approximately $110,000 in 1998/99.

3.4.6 Plantations potential

There are 92,040 hectares of commercial plantations in the Southern region, of which 40 hectares are hardwood.

A study is being undertaken by the Bureau of Rural Sciences (BRS) and State Forests of NSW to examine capability and suitability for plantation development of cleared private land.

Capability refers to the physical capacity of the land to establish a plantation. Suitability takes into account the economic feasibility of such a plantation. Two species, one softwood (*Pinus radiata)* and one hardwood, (*Eucalyptus nitens)* have been selected for appraisal. A second hardwood species, *Eucalyptus botryiodes* may be considered if appropriate growth models can be derived.

This study is continuing. Outputs will include a series of GIS layers indicating existing plantations and potential plantation sites by capability class within the region.

3.5 SOCIAL ASSESSMENT

Social assessment and impact assessment builds a picture of the types of changes that may occur at the community level as a result of changes to land use and management.

3.5.1 Scope of social assessment

The social assessment for the Southern CRA included the following elements:

- Literature review;
- Regional profile;
- Social catchments and socio-demographic profiles; and
- Social values of forests;
  - community workshops;
  - surveys of occupational communities; and
  - community attitudes survey.

3.5.2 Social indicators

Key social indicators will be used to define the sensitivity of communities to changes in forest use. These indicators are based upon the Social Indicators Workshop Outcomes agreed at the November 1996 Montreal Process National Conference, with the involvement of national stakeholders. The indicators are:

- Socio-demographic structure of communities;

- Economic structure of communities;
- Employment and labour force characteristics;
- Community services and infrastructure;
- Additional qualitative stressors;
- Community vitality;
- Social well being;
- Mitigative change factors; and
- Community attitudes.

The measures include a range of both quantitative data from published sources and surveys and qualitative data collected for this assessment.

3.6 KEY SOCIAL ASSESSMENT FINDINGS

The information below is for the wider comprehensive regional assessment area. As described in section 1.5, the Southern RFA will cover approximately two thirds of this area.

3.6.1 Literature review

Significant environmental, economic and social studies have been conducted in the region since the early 1970s. The literature review involves scanning the literature of the region as it links the social conditions of communities to forest use and management over recent history, and recording as baselines appropriate detailed social assessments or social impact assessments within the region.

The most significant studies regarding the social context included the NSW Interim Forest Assessment Report, 1996. The Southern Regional Forest Forum, in one of its early meetings, created a table depicting the history of land use in the region which will be included in the literature review.

3.6.2 Regional profile

The study area covered 27 local Government areas (LGAs) and includes the following areas: Cooma-Monaro, Crookwell, Eurobodalla, Goulburn, Gunning, Holbrook, Kiama, Mulwaree, Oberon, Queanbeyan, Shoalhaven, Snowy River, Tallanganda, Tumbarumba, Tumut, Yarrowlumla and Yass. The remaining 10 LGAs (Bega Valley, Bombala, Culcairn, Greater Lithgow, Gundagai, Hume, Shellharbour, Wagga Wagga, Wingecarribee and Wollondilly) were excluded from the study because they were either covered in the Eden RFA, because they contained no hardwood forests, and or because no major population centres fell within these LGAs.

There are approximately 290,000 persons in the Southern region, with over 60 per cent of the population residing in four LGAs; the Shoalhaven, Eurobodalla, Queanbeyan and Goulburn Shires. The Shoalhaven LGA recorded the largest population at 76,726 persons more than twice that of Eurobodalla and around three times that of Queanbeyan and Goulburn LGAs.

The greatest population change between 1991 and 1996 occurred in the Yarrowlumla LGA which grew by 14.9 per cent.

The population in the study area is aging. A number of LGAs had significant populations of persons aged 65 and over. These were Eurobodalla (21.7 per cent), Shoalhaven (17.7 per cent), Kiama (16.8 per cent), Holbrook (15.9 per cent), Crookwell (15.9 per cent) and Tallaganda (14.4 per cent).

The major employer in the region is retail trade, followed by manufacturing, health and community services and agriculture, forestry and fishing.

In 1996 approximately 1921 persons were employed in forestry and related industries (both hardwood and softwood). Employment in the softwood processing industry is increasing, particularly in Tumut and Oberon.

In 1996 the unemployment rate for the region was 8.7 per cent, approximately the same as that of NSW. There has been a decrease of 1.1 per cent in unemployment since the 1991-1996 census period.

Shoalhaven and Eurobodalla LGAs recorded the highest unemployment rates at 14.43 per cent and 16.29 per cent respectively.

Median weekly personal incomes for persons aged 15 years and over in the region ranged from $228 in Eurobodalla to $506 in Yarrowlumla. The NSW median personal weekly income is $336.

Median weekly household income figures in 1996 reflected differences in median personal weekly incomes, and ranged from $431 in Eurobodalla to $983 in Yarrowlumla.

Public and private health sectors in the region include nine hospitals, three combined hospitals and health services, two stand-alone health services, three multi-purpose centres, and 13 nursing homes.

3.6.3 Social values of forests

Case study community profiles

Six communities were selected as case studies for the Southern RFA. These are Batemans Bay, Narooma, Tumbarumba, Tumut, Ulladulla and Wandandian. They were selected on the basis of:

- diversity of size, industries, infrastructure;
- if they were in growth or decline and if urban or rural; and
- the likelihood of significant social impacts as a result of changes to forest tenure and management.

A variety of methods was used to develop a profile of each case study area, including an assessment of the social and economic structure of communities. The analysis drew upon data collected using workshop, interview, focus group and participant observation methods. Data were also collected through secondary data sources such as ABS statistics, shire reports, government publications, community service directories, and extensive fieldwork.

Community workshops were conducted in these communities to explore community issues such as significant events in the community in the recent past, "community attachment" and community aspirations.

Surveys of occupational communities

Data were collected from forest-related workers and businesses to develop a profile of each occupational community. "Occupational communities" in the Southern region are those:

- directly employed in transport, harvesting and milling; and
- other forest users including apiarists, small mobile and fixed mills, graziers, specialty timber users and licensed tourism operators.

The surveys allowed an analysis of "occupational" and "personal" flexibility within and across occupational groups. Occupational flexibility is reflected in the number of years in current occupation, level of education attained, transportability of skills and experience in other industries. The degree of "personal flexibility" is assessed on the basis of housing status (own/rent), length of residence and family attachment.

Sawmill workers

One hundred and forty two timber workers in sawmills that access resource from hardwood public forests responded to the surveys. Of these 93 per cent were male. Approximately seven per cent of respondents identified as Aboriginal or Torres Strait Islander. The degree of occupational flexibility for the respondents

was assessed as low, with more than 80 per cent leaving school at or before Year 10. Respondents had on average been in the same job for 11 years.

Respondents were concentrated in Tumut (18.3 per cent), Nowra (9.2 per cent) and Batemans Bay and Bomaderry (9 per cent). Respondents have been in their current home on average for 24 years. Family networks are strong, with 60 per cent of workers in direct employment having family living in the area.

Forest contractors and forest user businesses

Of the 50 forest-related businesses that responded to the survey, the highest percentage were in the native timber transport sector and grazing sectors at 15 per cent each. Other respondents included native sawlog harvesting and sawmilling (12 per cent), timber processing (12 per cent), native forest commercial firewood cutters (10 per cent), sleeper/fencing timber cutters (10 per cent). The remaining respondents included seed collectors, apiarists, wildflower collectors, forestry road builders and plantation timber producers.

More than 92 per cent of respondents employed one or more workers full time, with 20 per cent employing 2 or more workers. Forty per cent employed 1 person full time and over 50 per cent of businesses employed 1 or more workers on a part time basis. Fifty per cent have employed a subcontractor during the last 12 months.

The majority of business respondents were located in Nowra (16 per cent). Other major centres were Tumut (10 per cent), Ulladulla and Batemans Bay at 8 per cent each. Eighty-four per cent of these businesses depended on resource from public native forests.

Community attitudes survey

A random sample telephone survey was undertaken in 1997 to gauge community attitudes in the region. Participants were given a choice to nominate two issues out of eleven as the most important issues currently facing Australia. Respondents ranked the following social issues as the most important currently facing Australia:

- unemployment (44 per cent);
- education (38 per cent);
- the health system (36 per cent); and
- the environment (34 per cent).

Social impact modelling

A computer-based dynamic systems model has been developed to assess potential social implications of land use outcomes. A ‘base flow’ of timber jobs in each community has been established from survey results. Impacts, such as job losses or gains, will be calculated using data provided by the FORUM model on timber industry employment changes over time. The model will provide an analysis of occupational flexibility, personal flexibility characteristics and also incorporates any timber or other industry or mitigative measures which could result in additional jobs.

A social catchment model will provide a broader analysis of the relative community sensitivity to change in the study region using selected social indicators.

4. ECOLOGICALLY SUSTAINABLE FOREST MANAGEMENT

4.1 BACKGROUND

The primary goals of ecologically sustainable forest management (ESFM) are to restore, maintain or enhance:

- ecological processes within forests (such as the formation of soil, energy flows and the carbon, nutrient and water cycles);
- biological diversity of forests at the ecosystem, species and genetic levels (which includes natural patterns of ecosystems, species and gene pools in time and space);
- natural and cultural heritage and Indigenous forest values;
- long-term social and economic benefits on an ecologically sustainable basis;
- intangible benefits of forests and the maintenance of options for the future; and
- other identified forest values.

4.2 KEY ISSUES FOR ESFM IN THE SOUTHERN CRA/RFA PROCESS

To achieve ESFM for an RFA it is important to identify an acceptable balance between regional environmental, social and economic values. As forest values vary from place to place and time to time, not all parts of the forest can contribute equally to the maintenance of all forest values. Therefore, balance between values must be understood in this light and in terms of their location, tenure, management practices and appropriate systems for management.

One of the greatest challenges for the Southern RFA is to allocate land use and develop management practices for the full range of forest values according to ongoing community expectations, whether on protected areas, State forests or private land. A further challenge is to achieve continuous improvement in forest management on all tenures over time. This requires a forest management system that incorporates performance indicators and targets for indicators. When these indicators are applied, the results of forest management and the condition of the forest can be assessed and continual improvement and adaptive management mechanisms developed.

4.3 ESFM PROJECTS

The ESFM Group established the following projects to provide the basis for developing ESFM for the Southern RFA.

4.3.1 Definition and principles of ESFM

For the purpose of the NSW comprehensive regional assessments ecologically sustainable forest management was defined as

> *'managing forests so that they are sustained in perpetuity for the benefit of society by ensuring that the values of forests are not lost or degraded for current and future generations.'*

A set of five principles was developed based on this definition. The principles are summarised below:

Principle 1

Maintain or increase the full suite of forest values for present and future generations across the NSW native forest estate. Values include:

- biodiversity;
- productive capacity and sustainability of forest ecosystems;
- forest ecosystem health and vitality;
- soil and water;
- positive contribution of forests to the global geochemical cycle;
- long-term economic and social benefits; and
- natural and cultural heritage values.

Principle 2

Ensure public participation, access to information, accountability and transparency in the delivery of ESFM.

Principle 3

Ensure legislation, policies, institutional framework, codes, standards and practices achieve ecologically sustainable forest management of the native forest estate through requirements and/or by providing incentives.

Principle 4

Apply precautionary principles for the prevention of environmental degradation.

Principle 5

Apply best available knowledge and adaptive management processes.

4.3.2 Statewide and regional assessment of NSW management systems and processes for ESFM

This project undertaken in 1997 involved an independent assessment of current forest management arrangements in NSW in relation to the five principles for ESFM and the key components of an environmental management system - policy and commitment (including legislation), planning, implementation, monitoring and evaluation and review and improvement. The assessment provided recommendations on how NSW forest management arrangements at that time could be improved to achieve ESFM. It was undertaken on a Statewide basis, covering all land tenures and land uses for forested areas.

A general approach to ecologically sustainable forest management for RFAs was agreed at the Commonwealth-State Comprehensive Regional Assessments Implementation Forum (CRAIF) in April 1996. To establish its approach and develop a framework for ESFM CRAIF used the National Forest Policy

Statement, Montreal Process Criteria and Indicators, outcomes of the United Nations Conference on Environment and Development (UNCED), Forest Stewardship Council Principles and Criteria, and the principles and guidelines of ISO (International Standards Organisation) 14001/4 Environmental Management System.

An Expert Working Group (EWG) was appointed to assess the various components of the management system. The group consisted of independent specialists in legislation, forest management and planning, flora and fauna conservation, hydrology, soil and site productivity, silvicultural and environmental management systems. The EWG was provided with documentation outlining the current management arrangements and was involved in a series of briefings by NSW agencies on their roles and functions. Issues relating to ESFM raised by stakeholders through the NSW ESFM Group and Regional Forest Forums were considered by the EWG in developing its recommendations for improvements to 1997 management systems and practices.

4.3.3 Criteria, indicators, targets and monitoring processes for the Southern region

This project is defining a set of measurable indicators and targets for key ecological, cultural, economic and social values identified within the NSW ESFM principles.

At an international level, a Working Group on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests proposed a framework of indicators to be used at a national level (The Montreal Process 1995). These indicators have been endorsed by countries with the great majority of non-tropical forests, including Australia. Australia established a national working group to facilitate the implementation of these indicators at a regional level. The agreed national indicators for forests are contained in *A Framework of Regional (sub-national) Level Criteria and Indicators of Sustainable Forest Management in Australia, August 1998*. These indicators are ratified as the core set of indicators for forestry by the Ministerial Council on Forestry, Fisheries and Aquaculture and the Australian and New Zealand Environment and Conservation Council.

At a national and NSW State level, the *State of the Environment Reports* include environmental indicators, and the CRA/RFAs Environment and Heritage and Economic and Social Technical Committees have both identified potential indicators.

The ESFM Group used the agreed national indicators and also looked at existing indicators for other CRA regions and other national and international work in this area in order to propose a set of ESFM indicators for the Southern CRA. The indicators are being finalised taking into account issues raised by the Southern Regional Forest Forum. They are being designed to serve two main purposes:

- to identify the consequences of a given land use decision and wood supply commitment; and
- to monitor the implementation of the RFA over its 20 year lifetime.

The indicators will be identified in three categories:

- Category A indicators have data currently available.
- Category B indicators have data available, but their response to management was not sufficiently well known to be usable during the development of scenarios. These indicators are intended to be monitored during the life of the RFA and used to evaluate performance in management.
- Category C indicators reflect issues for which data is currently lacking or incomplete. These indicators will be further developed and implemented during the RFA period.

These indicators will be the basis for performance measures for the future assessment of the implementation of the RFA.

4.3.4 Review of protective measures and forest practices for the Southern region

The aim of this project was to describe, review and assess current protective measures and practices applied to forests in NSW including the Southern region. Protective measures and practices studied included the Environment Protection Authority's Pollution Control Licence issued to State Forests of NSW, State Forests

of NSW Protective Measures and Forest Practices, Conservation Protocols for application on State forest, National Parks Reserve Management and Statewide Biodiversity Protective Measures. It considered the effectiveness of the protective measures and forest practices in achieving the ESFM principles, how these practices affect forest values, and their scientific basis. The protective measures and forest practices were compiled into a Code System.

4.3.5 Application of protective measures and forest practices (including net harvestable area)

A project was undertaken to identify State forests land in the Southern region that would be unavailable for logging due to operational reasons, conservation reasons or regulatory requirements. It involved building a geographic information system (map based system) and associated quantitative database describing current and proposed protective measures, operational factors and management practices and the restrictions they place on the area available for harvesting and the timber yield.

An outcome of this project is a geographic information system (map based system) that identifies State forest land that is available for harvesting. This 'net harvestable area' is used in the Forest Resource and Management Evaluation System (FRAMES) described in the next chapter.

4.3.6 Water quality and quantity for the Southern region

An assessment of water quality and quantity (including a survey of available literature and the collation of relevant baseline resource information) was undertaken to develop and apply a methodology for modelling the impact of possible logging activities on water quality and quantity.

While results are being obtained for nine trial catchments, including three from the Southern region, the methodology is applicable to all forested catchments in the NSW CRA regions. The models were used to assess the impact of logging activities for a site immediately downstream of each forest as well as for a site further downstream that included a mixture of land uses. A further examination of three trial catchments will be undertaken in the Southern region.

The developed model is only at a preliminary stage and is not suitable for accurate forecasting of impacts on water quality and quantity from forest activities. It is hoped that the preliminary model developed through the CRA process can be further developed for strategic planning during the life of the RFA.

4.3.7 Knowledge and information gaps for the Southern Region

The aim of this assessment was to review and analyse the knowledge and information needed to ensure the delivery of ecologically sustainable forest management (ESFM) in New South Wales; to identify critical questions and important areas requiring further research and development (key subject areas); what action was required to undertake the research or investigation; and to provide an indication of their priority.

The list of key subject areas was discussed at the Southern Regional Forest Forum in order to achieve a regional perspective.

The key subject areas were identified as:

- Biodiversity/forest ecosystem health and vitality;
- Global geochemical cycles;
- Indigenous heritage;
- Indigenous values - other than heritage;
- Non-indigenous cultural heritage;
- Natural heritage;
- Soil and water;

- Productive capacity and sustainability of forest ecosystems; and
- Economic and social.

An expert workshop was held for each of the subject areas. Experts identified high priority areas for further research and actions required to address knowledge and information gaps.

5. FOREST RESOURCE AND MANAGEMENT EVALUATION SYSTEM

5.1 BACKGROUND

To develop an RFA for the Southern region it is necessary to understand the currently available wood resources in the Southern region's forests, and the expected future yields which can be sustained over time.

The Forest Resource and Management Evaluation System (FRAMES) assessments were overseen by the FRAMES Technical Committee which identified its aims as ensuring the FRAMES tools were capable of :

- determining ecologically sustainable wood flows by quality class for a range of management options and a varying resource base for use in RFA integration;
- providing reliable ecologically sustainable yield figures as a basis for an RFA between the Commonwealth and NSW;
- providing a basis for ongoing ecologically sustainable management of wood flows by State Forests of NSW;
- providing information on resource characteristics for use in long term planning by wood-based industries in NSW; and
- providing information on and validation of the modelled effects of environmental and silvicultural options for use in developing proposals for ecologically sustainable forest management.

Some elements for determining the ecological sustainability of wood flows were addressed by the ESFM Technical Committee.

5.2 FRAMES AND THE SOUTHERN CRA

A detailed Forest Resource and Management System (including detailed inventory) has been applied to forested areas which are included in the New South Wales Comprehensive Regional Assessments (CRAs).

The FRAMES System includes five project areas:

- Strategic inventory;
- Biometric Models;
- Yield Simulator;
- ESFM Net Harvestable Area Determination System (refer to section 4.3.5, application of protective measures and forest practices); and

- Strategic Yield Scheduler.

The outputs of these projects will be combined to form the FRAMES system for the Southern region.

5.3 DATA COLLECTION

The FRAMES Technical Committee reviewed methods and oversaw projects as follows.

5.3.1 Strategic inventory

The objectives of the FRAMES Strategic Inventory were to:

- provide estimates of timber volumes by product class (size and quality) at the stratum level (strata being areas with homogeneous growth and structure characteristics);
- provide data for the prediction of long-term wood flows; and
- provide spatial linkages between the estimates of timber volumes and ESFM net harvestable area data.

Volumes per hectare at the stratum level were to be estimated with a target accuracy of ±30 per cent of the true value, at the 95 per cent confidence level.

The native forest area to be sampled was defined as the net State forest harvest area within the Southern region. That is areas on State Forests that are not excluded from harvesting for operational reasons, conservation reasons or regulatory requirements. In the Southern region the net State forest harvest area includes negligible areas of hardwood plantations. The native forest was stratified based on a matrix of yield associations (amalgamations of forest types containing species with similar growth and wood yield characteristics) by stand structure. Sample plots were selected with a random-start grid. At each plot, a range of standard parameters were measured, including tree species, height, diameter, log quality and the presence of hollows. All inventory data was processed with the MARVL software package which allows product classes to be derived from plot tree measurements.

Results from the Upper North-East and Lower North-East strategic inventory for native forests showed that the accuracy target for total volume within a stratum could be met with a sample of around 20 plots. This figure was used as a minimum sample size for the Southern CRA.

Strategic Inventory data passes to the FRAMES Yield Simulator for calculation of the range of future yields that then underpin the sustainable yield calculations performed by the FRAMES Strategic Yield Schelduler.

All plot locations and associated strata are stored in a GIS database.

5.3.2 Growth and other biometric models

Project objectives were :

- to develop tree diameter and height growth models;
- to develop tree mortality and recruitment models for inclusion in the growth model; and
- to develop volume and taper (tree shape) functions for key commercial tree species to enable volumes to be calculated from plot measurements.

A database of growth information was collated from State Forests' Permanent Growth Plot (PGP) System and research data. A total of 187 plots with over 19,000 individual tree growth measurements were used for the biometric models.

Tree shape data was collected independently from the direct measurement of over 5,000 trees.

Statistical analysis and modelling work was undertaken with the SAS statistical analysis software.

The project produced taper (tree shape) and volume models for estimating timber volumes in the FRAMES Strategic Inventory and Yield Simulator, and growth models (diameter growth, stand growth, height prediction, mortality and recruitment) for predicting future yield and woodflow through the FRAMES Yield Simulator and Strategic Yield Scheduler.

5.3.3 Yield models and yield simulation

The FRAMES Yield Simulator was developed to provide a computerised system that would predict future growth and timber yields for native forest areas. The system uses strategic inventory data as the primary input to the simulation process. The system was also designed to incorporate and be responsive to a range of silvicultural prescriptions and management strategies.

The simulator project involved the combination of field studies and computer software programming. The primary outputs were a series of algorithms to permit the following to be developed:

- Net harvest area modifiers (determining the physical impediments to harvesting that were not already captured in GIS data developed by the ESFM project described in section 4.3.5);
- Tree availability modifiers (determining the level of damage caused by harvesting events as well as mortality);
- Tree defect modifiers (determining the difference between standing tree quality estimates and the actual harvested log quality);
- Standardised silvicultural prescriptions (defining the parameters used to model the silvicultural options used in forest management); and
- Computer software to manipulate and report on the data (systems to apply the models and prescriptions to data captured in the strategic inventory project and summarise the results in a form useable by the strategic yield scheduling project).

Models developed from the above are combined with the Biometric models to produce the Yield Simulator System.

The Yield Simulator provides estimates of future timber volumes from strategic inventory data in response to a range of silvicultural prescriptions and management strategies. The Yield Simulator incorporates many user-defined variables, which can be used to model a large number of silvicultural and management options. Once an acceptable mix of future yield options is obtained for each stratum of the forest, the yield estimates are then combined with area calculations to produce sustainable wood flow projections over time in the Strategic Yield Scheduler.

5.3.4 Yield scheduling

Project objectives were :

- To provide a tool that determines sustainable wood flow volumes by quality class, size and species group for a range of management options and a varying resource base; and
- To develop an effective system that is interactive and sufficiently responsive for RFA negotiations.

A yield scheduling framework was developed around the linear programming forest yield scheduling model SPECTRUM.

Development of the framework involved three broad stages:

- Development of area and yield input databases;
- Model template construction, including definition of objectives, management actions and constraints; importing databases, and custom report development; and
- Model testing and validation.

Development of a semi-automated and integrated yield scheduling framework and modelling approach centred on SPECTRUM, which enables the rapid and repeated determination of wood flows and wood supply capacity under a range of silvicultural options and for varying resource bases.

5.4 WOOD FLOWS

The combination of the FRAMES tools will provide the following key outputs:

- resource data in terms of standing volume;
- prediction of future yields by product; and
- gross and net harvestable areas of forest under specified prescriptions.

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GLOSSARY

Comprehensive, Adequate and Representative (CAR) Reserve System – a reserve system to conserve all native forest types and old growth as well as the plants and animals that depend on them.

Comprehensive - the full range of forest communities recognised by an agreed national scientific classification at appropriate hierarchical levels; Adequate - the maintenance of the ecological viability and integrity of populations, species and communities; Representative - those sample areas of the forest that are selected for inclusion reserves which should reasonably reflect the biological diversity of the communities.

Comprehensive Regional Assessment (CRA) – a joint scientific assessment of all forest values - environmental, heritage, economic and social - by the Commonwealth and State leading to the establishment of a Comprehensive, Adequate and Representative Reserve system, agreements on forest management, and the signing of a Regional Forest Agreement (RFA).

Compartment – an area of forest with established boundaries which has been set aside for commercial forestry activities.

Deferred Forest Areas (DFAs) – current wood production areas that may need to be set aside from logging in the interim to allow their possible inclusion in a Comprehensive, Adequate and Representative Reserve System.

Ecologically Sustainable Forest Management (ESFM) – managing forests so that they are sustained in perpetuity for the benefit of society by ensuring that the values of forests are not lost or degraded for current and future generations.

Export woodchip licence – a licence issued by the Commonwealth Government authorising the export of woodchips.

Forest estate – all forests growing on public or private lands.

Hardwood– timber from broad-leaved, flowering trees, irrespective of physical hardness. Includes eucalypts, wattles and rainforest species.

Interim resource area – areas in which commercial logging operations, including harvesting and associated roading activities, are permitted during the period of a DFA agreement.

JANIS – a joint Commonwealth-State sub-committee responsible for preparing reports on the implementation of the National Forest Policy Statement for the information of the relevant Ministerial councils (the Australian and New Zealand Environment Conservation Council and the Ministerial Council on Forestry, Fisheries and Aquaculture).

National Estate Places – those places, being components of the natural environment of Australia, or the cultural environment of Australia which are listed on the Register of the National Estate as having National Estate values i.e. aesthetic, historic, scientific or social significance or other special value for future generations as well as for the present community.

Native forest – any locally Indigenous forest community containing the full complement of native species and habitats normally associated with that community, or having the potential to develop these characteristics.

National Forest Policy Statement – a joint Commonwealth, State and Territory Government response which outlines agreed objectives and policies for Australia's public and private forests.

Old growth – forest that is ecologically mature and has been subjected to negligible unnatural disturbance such as logging, roading and clearing. The definition focuses on forest in which the upper stratum or overstorey is in the late mature to over-mature growth phase.

Plantations – intensively managed stands of either native or exotic tree species, created by the regular placement of seedlings or seeds.

Pulp logs (or pulpwood) – logs that are processed for the purposes of producing wood based panels, pulp and paper products.

Regional Forest Agreement (RFA) – an agreement between the Commonwealth and a State Government about the long-term management and use of forests in a particular region. Its purpose is to reduce uncertainty, duplication and fragmentation in government decision-making by producing a durable agreement on the management and use of forests.

Regrowth forest – native forest containing a substantial proportion of trees that are in the younger growth phase and are actively growing in height and diameter. Regrowth forests may contain scattered individuals or small occurrences of ecologically mature, or old growth, trees.

Reserves – areas such as national parks and nature reserves which are subject to an established degree of protection from disturbance.

Sawlogs – logs for processing into sawn timber, veneer, poles and sleepers.

Sawmill residue – material left following the processing of logs into sawn timber.

Softwood – timber of coniferous trees, irrespective of physical hardness. Includes pines and cypresses.

Sustained yield – the sustained yield of a forest is the maximum level of commercial timber which can be maintained in perpetuity under a given management regime.

Value adding – an economic term which describes how a raw product is processed into a product which is of more value than the material in its raw state. In the forest and wood industry context, examples of this include the kiln-drying of sawn timber and the manufacturing of wood veneers.

Vulnerable or *threatened species* – species which may soon move into the 'endangered' category if causal factors affecting their numbers continue. Included are species of which all or most populations are decreasing because of over-exploitation, extensive destruction of habitat; species which are seriously depleted; under threat and dependent upon a limited habitat which would be vulnerable to further threats.

Wilderness – land that, together with its plant and animal communities, is in a state that has not been substantially modified by, and is remote from, the influences of European settlement or is capable of being restored to such a state; is of sufficient size to make its maintenance in such a state feasible; and is capable of providing opportunities for solitude and self-reliant recreation.

Woodchips – forest product created by processing timber and residues. Most commonly used in wood panels, pulp and paper making.

Wood pulp – processed wood fibre used for manufacture of paper and paper products.

World heritage – areas deemed to have universal value for humankind under an international convention to which Australia is a signatory.

APPENDIX 1

THE JANIS RESERVE CRITERIA

The JANIS reserve criteria are nationally agreed criteria for the establishment of a comprehensive, adequate and representative reserve system for forests in Australia. The criteria were developed by the Joint ANZECC–MCFFA National Forest Policy Statement Implementation Subcommittee.

Regional conservation strategies

Conservation objectives will be best achieved through the development of integrated regional conservation strategies that provide for the establishment and effective management of conservation reserves (the CAR reserve system) and complementary management of adjoining forest areas.

IBRA

The Interim Bioregionalisation of Australia should be used as a basis for nature conservation planning, especially to comply with the principles of representativeness.

Components of the comprehensive, adequate and representative reserve system

All reasonable efforts should be made to provide for biodiversity, old-growth and wilderness conservation in the dedicated reserve system on public land. The components of the CAR system are dedicated reserves, informal reserves, and values protected by prescription on public land as well as conservation arrangements on private land.

Biodiversity criteria

(1) As a general criterion, 15 per cent of the pre-1750 distribution of each forest ecosystem should be protected in the CAR reserve system, with flexibility applied according to regional circumstances and recognising that as far as possible and practicable the proportion of dedicated reserves should be maximised.

(2) Where forest systems are recognised as vulnerable, at least 60 per cent of their remaining extent should be reserves.

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

(4) Reserved areas should be replicated across the geographic range of the forest ecosystem.

(5) Wherever practicable, the reserve system should seek to maximise the area of high-quality habitat for all known elements of biodiversity.

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

(7) To ensure representativeness, the reserve system should, as far as possible, sample the full range of biological variation within each forest ecosystem.

(8) In fragmented landscapes, remnants that contribute to sampling the full range of biodiversity are vital parts of a forest reserve system.

Old-growth forest criteria

It is necessary to approach old growth in a flexible manner according to regional circumstances. Wherever possible , areas of old growth requiring protection should be included in the area identified to meet biodiversity criteria.

(1) Where old-growth forest is rare or depleted (generally less than 10 per cent of the extant distribution) within a forest ecosystem, all viable examples should be protected, wherever possible.

(2) For other forest ecosystems, 60 per cent of the old-growth forest identified at the time of assessment should be protected, consistent with a flexible approach, where appropriate increasing to the levels of protection necessary to achieve conservation, recreation and tourism objectives.

Wilderness criteria

Ninety per cent, or more if practicable, of the area of high-quality wilderness that meets minimum-area requirements should be protected in reserves.

Application of the criteria

Flexibility in the application of reserve criteria is needed in consideration of differing regional circumstances. Where different configurations of reserves are identified as meeting the criteria, the option which imposes the least cost on the community should be adopted.

PROTECTING BIODIVERSITY USING RESERVATION PRINCIPLES

The JANIS biodiversity criteria provide a basis for establishing a forest reserve system that satisfies the reservation principles specified in the *National Forest Policy Statement* (NFPS), namely comprehensiveness, adequacy and representativeness.

The principle of **comprehensiveness**, as defined in the NFPS and the JANIS reserve criteria report, adopts forest communities or forest ecosystems as a general surrogate for all elements of biodiversity. By mapping forest ecosystems, and then ensuring that all ecosystems are appropriately included in the reserve system, it is presumed that other elements of biodiversity (eg. species, genetic diversity) will also be protected.

The **adequacy** principle addresses the issue of the viability and integrity of reserves. While the principles of comprehensiveness and representativeness are applied to maximise the extent to which a reserve system samples the full range of biological variation in a region, the principle of adequacy is applied to ensure that the reserve system will maintain long-term viability and integrity of communities and populations of species contained within. Two of the JANIS biodiversity criteria deal specifically with the adequacy principle. Criterion 6 specifies that reserves should be large enough to sustain the viability, quality and integrity of populations. Criterion 4 specifies that reserved areas should be replicated across the geographic range of forest ecosystems to guard against the impact of chance events.

The principle of **representativeness** addresses shortcomings inherent in the use of forest ecosystems as a general surrogate for all elements of biodiversity and is applied to ensure that the diversity *within* each broad forest ecosystem is represented in the reserve system. Even though all forest ecosystems may be reserved under the principle of comprehensiveness, there will still be biological variations across geographical, environmental and disturbance gradients for each ecosystem type. Furthermore, many species will have distributions that are not well correlated with forest ecosystems and hence there will be differences in the suite of species present between examples of the same ecosystem type. This means that all variations of a given forest ecosystem are unlikely to be sampled within a single patch. Therefore, as far as possible, several examples of each forest ecosystem should be protected across its geographical and environmental range to ensure a representative reserve system.

APPENDIX 2

PRIORITY RANKING OF FAUNA SPECIES FOR THE SOUTHERN REGION

Common name	Priority Rank
Smoky Mouse	1
Southern-brown Bandicoot	1
Spotted-tailed Quoll	2
Tiger Quoll	2
Long-nosed bandicoot	3
Long-nosed potoroo	3
Broad-toothed Rat	3
Brush-tailed rock Wallaby	2
White-footed Dunnart	4
Koala	1
Greater Glider	2
Yellow-bellied Glider	2
Squirrel Glider	2 (1)
Eastern Pygmy Possum	3
Sooty Owl	1
Powerful Owl	2
Masked Owl	2
Barking Owl	1
Dollar Bird	2/3
Swift Parrot	1
Hooded Robin	1
Superb Parrot	1
Regent Honeyeater	1
Painted Honeyeater	2
Black-chinned Honeyeater	2
Glossy Black Cockatoo	2
Brown Treecreeper	2
Crested Shrike-tit	2
Turquoise Parrot	2
Spotted Quail-thrush	3
Red-browed Treecreeper	3
Square-tailed Kite	3
Yellow-tailed Black Cockatoo	4
Eastern Bristlebird	4
Pink Robin	4

Yellow-throated scrub wren	4
Olive Whistler	5
Bush Stone-curlew	
Common Bent-wing Bat	1 (foraging 3)
Golden Tipped Bat	2
Grey Headed Flying-Fox	2
Eastern Horseshoe Bat	2
Greater Broad-nosed Bat	2
Large Pied Bat	3
Eastern False Pipistrelle	3
Eastern Little Mastiff Bat	3
Unnamed Mastiff Bat	3
Unnamed Broad-nosed Bat	
Yellow-bellied Sheathtail Bat	
Little Red Flying Fox	4
Large-footed Myotis	3
Carpet Python	1
Heath Monitor – southern	1
Common Death Adder	2
Broad-headed Snake	2
Maccoy’s Skink	2
Diamond Python	3
Heath Monitor – northern	3
Spencer’s Skink	4
Giant Burrowing Frog	1
Highlands Tree Frog	1
Stuttering Barred Frog	1
Booroolong Frog	2 (1)
Northern Corroboree Frog	3
Brown Toadlet	4
Red-crowned Toadlet	5
Australian Grayling	1
Macquarie Perch	2
Lamprey	3
Murray River Crayfish	4
Trout Cod	5

APPENDIX 3

VULNERABILITY RANKING FOR FLORA SPECIES IN THE SOUTHERN REGION

Species	Reservation Rank
Acacia chalkeri	R1
Acacia costiniana	R2
Acacia dallachiana	R3
Acacia flocktoniae	R3
Acacia jonesii	R3
Acacia lucasii	R3
Acacia phasmoides	R1
Ammobium craspedioides (Forest ecotype)	R3
Ammobium craspedioides (Grassy ecotype)	R1
Astrotricha sp nov Deua	R2
Bertya brownii	R3
Burnettia cuneata	R2
Caladenia aestiva	R2
Caladenia clarkiae	R1
Caladenia ssp Burrinjuck (concolor)	R1
Caladenia tessellata	R1
Callitris oblonga ssp corangensis	R1
Calotis glandulosa	R3
Chionogentias sylvicola	R3
Correa baeuerlenii	R4
Corybas undulatus	R2
Cryptostylis hunteriana	R2
Cynanchum elegans	R1
Dampiera scottiana	R2
Daphnandra sp C (sp 1 Illawarra)	R1
Darwinia briggsiae	R3
Deyeuxia microseta	R2
Dillwynia glaucula	R2
Dillwynia stipulifera	R3
Discaria nitida	R3
Diuris aequalis	R1
Drabastrum alpestre	R4
Drabastrum alpestre (low-altitude meta-pop)	R4
Epacris coriacea	R4
Eriostemon scaber ssp latifolius	R4

Eucalyptus aggregata	R2
Eucalyptus aquatica	R1
Eucalyptus badjensis	R3
Eucalyptus gregsoniana	R3
Eucalyptus kartzoffiana	R1
Eucalyptus langleyi	R1
Eucalyptus macarthuri	R2
Eucalyptus parvula	R1
Eucalyptus pulverulenta	R2
Eucalyptus recurva	R1
Eucalyptus saxatilis	R3
Eucalyptus sturgissiana	R2
Eucalyptus triflora	R4
Genoplesium despectans	R2
Genoplesium plumosum	R1
Genoplesium vernalis	R2
Gentiana wingecarribiensis	R2
Geranium graniticola	R4
Gonocarpus longifolia	R2
Goodenia glomerata	R4
Grevillea alpina	R3
Grevillea barklayana ssp macleayana	R3
Grevillea baueri ssp asperula	R4
Grevillea brevifolia var brevifolia	R2
Grevillea iaspicula	R1
Grevillea imberbis ms.	R2
Grevillea molyneuxii	R2
Grevillea oxyantha ssp ecarinata	R4
Grevillea rhyolitica ssp rhyolitica	R3
Grevillea rhyolitica ssp semivestita	R2
Grevillea rivularis	R1
Grevillea wilkinsonii	R1
Hakea dohertyi	R3
Haloragis exalata ssp exalata var exalata	R1
Helichrysum calvertianum	R1
Irenepharsus trypherus	R1
Kunzea cambagei	R2
Leptospermum epacridoideum	R3
Leptospermum sejunctum	R1
Leptospermum thompsonii	R3
Lindsaea trichomanoides	R2
Melaleuca biconvexa	R1
Monotaxis macrophylla	R3
Monotoca rotundifolia	R1
Myoporum bateae	R4
Myoporum floribundum	R2
Olearia burgessii	R1
Olearia lasiophylla	R3
Ozothamnus adnatus	R2
Persoonia glaucescens	R1

Persoonia microphylla	R2
Persoonia mollis ssp caleyi	R4
Persoonia oxycoccoides	R2
Persoonia subvelutina	R4
Phebalium ellipticum	R3
Phyllota humifusa	R1
Pimelea bracteata	R4
Platysace stephensonii	R2
Plinthanthesis rodwayi	R1
Pomaderris betulina ssp actensis	R3
Pomaderris brogoensis	R2
Pomaderris costata	R3
Pomaderris cotoneaster	R2
Pomaderris delicata	R1
Pomaderris gilmourii var cana	R2
Pomaderris gilmourii var gilmourii	R2
Pomaderris pallida	R2
Pomaderris parrisiae	
Pomaderris pauciflora	R2
Pomaderris sericea	R1
Pomaderris subcapitata	R3
Pomaderris virgata	R3
Prasophyllum affine	R1
Prasophyllum petilum	R1
Prostanthera densa	R2
Prostanthera rugosa	R2
Prostanthera rugosa (Two Sticks meta-population)	R1
Prostanthera sp E	R1
Pterostylis gibbosa	R1
Pterostylis hians	R1
Pultenaea humilis	R1
Pultenaea rosmarinifolia	R3
Pultenaea sp D	R3
Restio longipes	R2
Rulingia prostrata	R1
Rutidosis leiolepis (Cooma-Adamininby meta-popn)	R1
Rutidosis leiolepis (Kosciusko meta-popn)	R2
Rutidosis leptorrhynchoides	R1
Senecio macranthus	R4
Styphelia adscendens	R1
Syzygium paniculatum	R1
Telopea mongaensis	R2
Telopea oreades	R2
Tetratheca neglecta	R4
Thesium australe	R2
Trachymene saniculifolia	R1
Triplarina nowraensis	R1
Westringia kydrensis	R1
Zieria adenophora	R1
Zieria baeuerlenii	R1

Zieria citriodora	R1
Zieria granulata	R1
Zieria murphyi	R2
Zieria tuberculata	R1