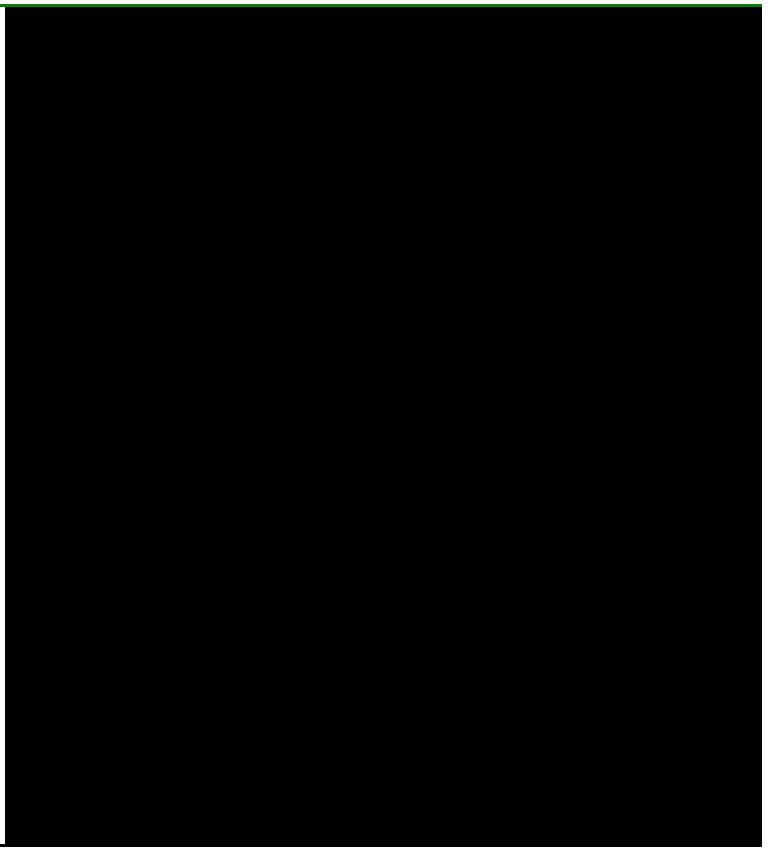
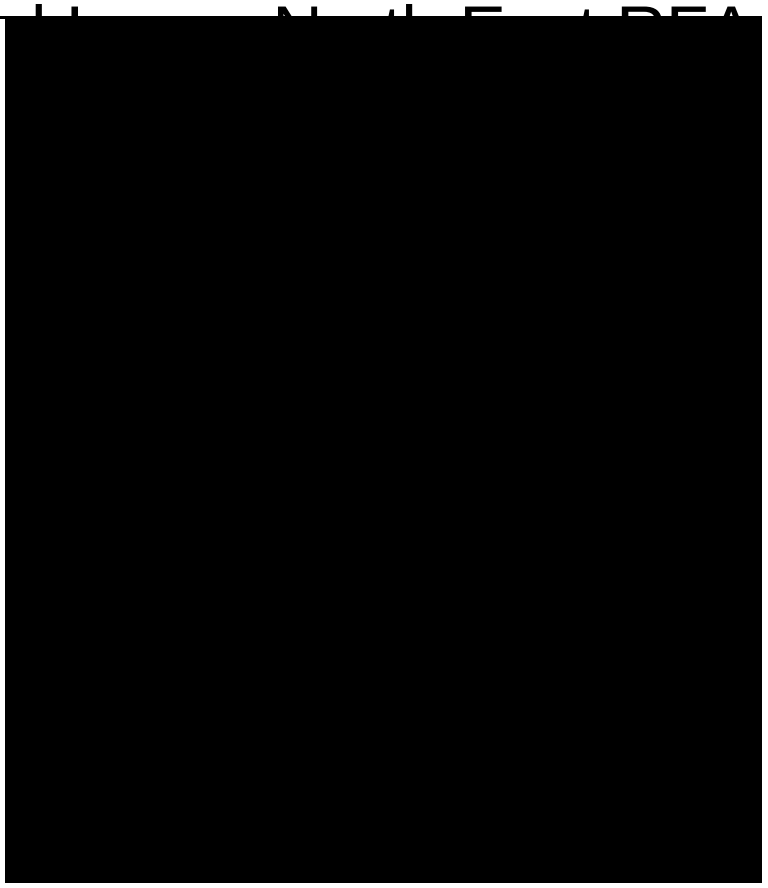


Criteria, Indicators, Targets and monitoring processes of Ecologically Sustainable Forest Management for the



CRITERIA, INDICATORS, TARGETS AND MONITORING PROCESSES OF ECOLOGICALLY SUSTAINABLE FOREST MANAGEMENT FOR THE UPPER NORTH EAST AND LOWER NORTH EAST RFA REGIONS

ESFM TECHNICAL COMMITTEE

A project undertaken as part of the NSW Comprehensive Regional Assessments project number NA41/ESFM

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For more information and for information on access to data contact the:

Resource and Conservation Division, Department of Urban Affairs and Planning

GPO Box 3927
SYDNEY NSW 2001

Phone: (02) 9228 3166
Fax: (02) 9228 4967

Forests Taskforce, Department of the Prime Minister and Cabinet

3-5 National Circuit
BARTON ACT 2600

Phone**:** 1800 650 983
Fax: (02) 6271 5511

ISBN 1 74029 058 5

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The project is the work of ESFM PA3 Working Group, assisted by officers of NSW State Agencies and Commonwealth Government Departments. Information and input from stakeholders, through the Upper North East and Lower North East Regional Forest Forums, and expert panels, is also acknowledged.

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EXECUTIVE SUMMARY

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

Project objective/s
This document recommends Criteria, Indicators Objectives and IndicativeTargets for the Upper North East and Lower North East RFA regions for use in guiding and measuring ecological sustainable forest management (ESFM). ESFM aims to maintain, in perpetuity, a full range of forest values. In this project, forest values are represented by the 7 Criteria. Each Criterion is characterised by a set of related Indicators, which are measured in quantitative or narrative terms, and are monitored periodically to assess change. For each Indicator, indicative targets have been set at the levels required to achieve ESFM. Details of data availability, monitoring methodology, reporting requirements and research and development requirements are also provided. Systematic measurement and assessment of each Indicator will show if our indicative targets for ESFM are being met. If necessary, our forest management practices can then be adapted to better meet our goals.

Methods
The Criteria and Indicators recommended here were developed from "A Framework of Regional (Sub-National) Level Criteria and Indicators of Sustainable Forest Management in Australia" (Montreal Implementation Group 1998), and tailored to the UNE and LNE RFA regions by consultation with independent experts, relevant government agencies and stakeholders through the UNE and LNE Regional Forest Forums.

Key results and products
Twenty-one Indicators that are immediately implementable (Category A), supplemented by 3 Indicators that require research and development before implementation immediately after the first 5 year review of the RFAs (Category B), have been identified. Short-term interim Indicators or reporting mechanisms for some Category A Indicators have also been included until mechanisms for their full implementation have been determined. The indicators for ESFM in the UNE and LNE regions are listed below:

INDICATORS OF EFSM FOR THE UNE AND LNE RFA REGIONS
ALL INDICATORS ARE CATEGORY A (IMPLEMENTABLE IMMEDIATELY) UNLESS OTHERWISE SPECIFIED.

1.1.a Extent of area by forest type and tenure.
1.1.a.1 Understorey vegetation layer (Category B).
1.1.b Area of forest type by growth stage distribution by tenure.
1.1.e Fragmentation of forest types.
1.2.a A list of forest dwelling species
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1.2.b.1 The status of endangered populations and ecosystems as determined by legislation or scientific assessment (sub-indicator of 1.2.b).
2.1.a Area of forest land and net area of forest land available for timber production.
2.1.b Total growing stock of both merchantable and non-merchantable tree species on native forest land available for timber production.
2.1.d Annual removal of wood products compared to sustainable volume.
2.1.f Area and percent of plantation established meeting effective stocking one year after planting.
2.1.g Area and percent of harvested area of native forest effectively regenerated.
3.1.a Area and percent of forest affected by processes or agents that may change ecosystem health and vitality (narrative as interim)
4.1.a Area and percent of forest land covered by comprehensive Road Management Plans, which include;

- an assessment of the extent of existing road infrastructure,
- processes for ongoing improvement,
- targets and milestones.

4.1.a Area and percent of forest land systematically assessed for soil erosion hazard, and for which site-varying scientifically-based measures to protect soil and water values are implemented (Interim).
5.1a Total forest ecosystem biomass and carbon pool, and if appropriate, by forest type, age class, and successional stages (Category B).
5.1c Contribution of forest products to the global carbon budget (Category B).
6.2.c Number of visits per annum.
6.4.c Change in condition and number of recorded places, artefacts, sites, buildings or other structures.
6.5.a Direct and indirect employment in the forest sector and forest sector employment as a proportion of total employment.
7.1 Extent to which the legal framework (laws, regulations, guidelines) supports the conservation and sustainable management of forests (Narrative).
7.2 Extent to which the institutional framework supports the conservation and sustainable management of forests (Narrative).
7.4 Capacity to measure and monitor changes in the conservation and sustainable management of forests (Narrative).
7.5 Capacity to conduct and apply research and development aimed at improving forest management and delivery of forest goods and services (Narrative).

INTRODUCTION

Ecologically Sustainable Forest Management (ESFM) will be the guiding philosophy of forest management in the Upper North East (UNE) and Lower North East (LNE) regions of NSW. ESFM is founded on a set of basic principles (see Introduction to the ESFM document) that have been developed in the Regional Forest Agreement (RFA) process and which ensure fulfilment of the international commitments of Australia, the National Forest Policy Statement, State Government Policies and the concerns and interests of stakeholders in the forests of the UNE and LNE regions.

In ESFM, the use of indicators is an attempt to reflect the key environmental, social and economic aspects of a healthy regional society. These different aspects are reflected as different criteria under which specific indicators will measure our success at reaching ESFM goals. Indicators are designed to provide information in an understandable way. We have long used indicators for assessing economic performance such as Gross National Product or Per Capita Income, and social indicators like employment rates, life expectancy and birth rates. In ESFM, a 'basket' of indicators has been chosen that will help portray the regional quality of life relating to the forests of North East NSW. These indicators will assess our performance in implementing the UNE and LNE RFAs and demonstrate over time whether we are achieving what we set out to do.

A set of regional criteria and indicators of ESFM were developed by the Montreal Implementation Group (MIG) and endorsed by State agencies and Ministers for use as a core set of indicators of ESFM across Australia. MIG identified Category A indicators which are implementable immediately, Category B Indicators which require some development but will be implementable within 5 years, and additional indicators that require substantial research and development before they can be utilised. In the development of regional indicators for the UNE and LNE regions, MIG Category A indicators were adopted and further developed for application. Input from experts and stakeholders in the RFA process was sought to tailor the MIG indicators specifically to the UNE and LNE RFA regions. In some cases, Interim indicators have been suggested for Category A indicators that require the development of specific management plans before implementation. In addition, some Category B indicators have been developed where no Category A Indicators were available, and where supplementation of the Category A indicators was necessary. The indicators listed in this document are Category A indicators unless otherwise indicated.

The objectives and indicative targets for each indicator will be finally determined by the RFAs, agency's policies and expert opinion. Objectives and indicative targets are intended to set a broad direction for conservation efforts, protection of catchments, industry development and

other aspects of forest management. Some indicative targets are not concrete numerical targets as due to lack of information or data these are too difficult to forecast. In these cases broad objectives have been identified which rely on continuous improvement and indicative targets can be set as the appropriate information becomes available.

Standard repeatable monitoring and reporting systems will be established for each indicator. Monitoring will require a commitment to data collection by management agencies, communities and forest-dependant businesses.

An annual report on our performance in achieving ESFM in each region will be presented to NSW parliament as part of the Forest Agreements, and a 5 yearly review will assess the success of the RFAs in implementing ESFM in each region. If the reviews indicate that ESFM objectives and indicative targets are not being met, there will be an opportunity to adapt forest management practices to better meet these aims. Successful implementation of ESFM will require a collective commitment by stakeholders and forest conservation and management agencies to monitor and interpret the trends in the indicators over time. Public participation in the review process will be encouraged.

CRITERION 1: BIODIVERSITY

ECOSYSTEM DIVERSITY

Indicator 1.1.a Extent of area by forest type and tenure.

Rationale

This indicator is one of a set of indicators to assess ecosystem diversity and should be examined with regard to the full suite of ecosystem diversity indicators. The rationale is to monitor the change in **forest type** [*] cover for the entire forest estate within the RFA area against targets set for retention of forest types. This indicator aims to identify which forest types are increasing or decreasing in area, as a basis for adaptive management.

Objectives

- To monitor the change in extent of forest type by tenure.
- To ensure the distribution and extent of forest types do not fall below a precautionary minimum level, to be specified, to ensure their long term viability.

Indicative target

- All tenures to be managed to maintain or increase the extent of forest ecosystem type (as per CRA data systems).
  - Public tenures to be managed to maintain or increase the extent of pre-1750 native forest type.
  - Private tenures to be managed to maintain regional targets (by Local Government Areas or bio regions) being not less than 25% of estimated pre-1750 cover, or as determined under Regional Vegetation Management Plans.

Data requirements and Monitoring methodology.

- Baseline data from the CRA forest type data sets.
- Ongoing data from SFNSW tenure will be provided through operational updates to a forest management database. Ongoing data from NPWS will be provided by mapping disturbance (e.g., fire).
- Regional Vegetation Management Plans and applications for clearing licences may provide relevant information for private and leasehold land.

[*] **Bold type** within the text indicates that the word or phrase appears in the glossary.

- Re-inventory using remotely sensed imagery may be possible across all tenures if appropriate resourcing is available.
- Ecosystem types or other community association types may be reported upon at the local level and must fit into regional and national reporting requirements.
- State Forest and NPWS management plans and zoning systems will provide information of changes to forest area under these tenures.
- Plantations should be distinguished and **non-treed elements** of forest ecosystems are to be recognised.
- For CAR reserves identify separately areas:
  - in dedicated reserves;
  - in informal reserves;
  - where values are protected by prescription;
  - private land managed to protect values.
- Ground surveys may also be used to assess expansion/contraction of forest cover.
- Consultation with local Indigenous communities may provide information regarding pre-1750 forest type distributions, or indicate where such information may be found.

Reporting

- Area (ha) for each forest type by tenure (where available). Add narrative to describe how much of the total forest area the data refers, and to identify tenures that are not mapped or poorly known.
- The methodology, including the scale and the level of confidence at which the area of forest type is to be reported, will be specified. Changes in forest types are likely to be small and reporting at too coarse a scale will not detect changes.
- Area actively restored and managed of forest ecosystem types previously reduced below a state-wide level that was less than 15% of pre-1750 levels.
- Methodologies for obtaining information for private lands will be developed in accordance with the RFA.
- Tenures need to be reported upon in the following categories: private land (freehold and leasehold), State Forest, conservation reserves, other crown tenures (by management classification such as production, conservation, protection/water, special management), Commonwealth land and other land.
- Changes in this indicator need to be interpreted in relation to indicator 1.1.b

TABLE A: SUGGESTED FORMAT FOR REPORTING INDICATOR 1.1A

Forest type by tenure	% of extant	% pre-1750	target	% target met

This table to be completed with data layers from the CRA and RFA outcomes (targets).

Research and Development

- A standardised state-wide vegetation and age class mapping system is required.

- A state-wide (private lands) clearing monitoring program is required.
- Government to initiate private land vegetation survey and mapping program.
- Development of monitoring and reporting methodologies to assess any reduction in forest type resulting from **human induced disturbance**.
- Development of effective classification of 'ecosystem types' for mapping and monitoring purposes.

Indicator 1.1.a.1 Understorey vegetation layer (Category B).

Rationale
This indicator provides an indication of the diversity of the understorey vegetation layer. The management and maintenance of shrub and ground vegetation should be based upon the same principles devised for tree cover.

Objective
- To manage native forest to achieve a proportion of forest with a natural range of shrub understorey.

Indicative target

Data requirements and Monitoring methodology

Reporting

Research and Development
- Development of a methodology to classify, map and monitor the understorey vegetation types.
- To identify sources of shifts in species composition.

Indicator 1.1.b Area of forest type by growth stage distribution by tenure.

Rationale
Ecological processes and the species associated with those processes, within any forest ecosystem or forest type, are associated with vegetative structures and developmental stages. This indicator should make allowances for certain areas to get older (National Parks) and others (State Forests) to be maintained at a range of growth stages while minimising the loss of old growth from threatening processes.

Objective
- To maintain a range of growth stages and forest types across the landscape.

Indicative targets
- Increase the proportion of mixed aged forest in a balance of growth stages that broadly reflects natural disturbance regimes and silvicultural regimes.
- Manage native forests to ensure that growth stages are fully represented within each forest type across the regional landscape. No one growth stage should be allowed to dominate the forest landscape.
- Maintain a spatial arrangement of age classes to ensure the maintenance of threatened species, where appropriate.

Data requirements and Monitoring methodology

- Baseline data will be used from the CRA forest type data sets.
- Ongoing data from SFNSW tenure will be provided through operational updates to a forest management database. Ongoing data from NPWS will be provided by mapping disturbance (e.g., fire).
- Regional Vegetation Management Plans and applications for clearing licences may provide relevant information for private and leasehold land.
- Re-inventory using remotely sensed imagery may be possible across all tenures if appropriate resourcing is available.

Reporting

- Report on the percent of forest estate with a mix of early, mid and late age classes. Record by the same forest types as used in Indicator 1.1.a. Report forest stands as:
  - regeneration stands - defined as stands where the most abundant crown form is regeneration and or the year of origin indicates that the majority of trees within the stand are less than 20 years of age;
  - regrowth stands - defined as stands where the most abundant crown form is regrowth and or the year of origin indicates that the majority of trees within the stand are between 20 and 80 years of age;
  - mature stands - defined as stands where the most abundant crown form is regular and or the year of origin indicates that the majority of trees within the stand are greater than 80 years of age;
  - overmature stands - defined as stands where the most abundant crown form is irregular and this has been determined to be due to age.
- Report forest stands as per data layer (disturbance) categories in CRAFTI.
- Changes in area over time related to forest management objectives.
- Implications of changes in the indicator for flora and fauna dependent upon particular growth stages need to be considered.

Research and Development

- Development of specific target levels for an appropriate balance of growth stages.
- A clear understanding of successional processes in different forest types needs to be developed.
- Natural disturbance regimes need to be defined.
- Spatial arrangements of growth stages, within plots at the local scale, should be identified.

Indicator 1.1.e Fragmentation of forest types.

Rationale

To provide information on the loss of forest cover and the spatial configuration of that loss within a region. Fragmentation can have the following effects on the gene pools of formerly continuous populations:

- small populations become demographically vulnerable through inbreeding;
- loss of variability from local populations can limit adaptations to environmental change.

The extent of connectivity on the forest landscape should be considered in relation to threatened species habitat, **general retained habitat** on public and private land, and conservation reserves.

Objectives

- To ensure **functional connectivity** through implementation of conservation protocols, planning and connectivity between reserves and retained habitat.
- To ensure that clearing does not increase the degree of fragmentation across tenures.
- To ensure that reserves and retained habitat incorporate the full suite of topographic and physical landscape properties, as well as biotic habitat and forest types.
- To identify where connectivity needs to be restored across the regional landscape.
- To optimise road surfacing and construction and easement construction to reduce restrictions to animal movement.

Indicative targets

- Ensure connectivity at the regional, catchment and sub-catchment scales.
- Ensure connectivity supports **functional populations** of target species between reserves and retained habitat (see Research and Development).
- Minimisation of the number and width of roads and other easements through retained habitat and connection corridors.

Data requirements and Monitoring methodology

- Maps of the area of interest at an appropriate scale and level of accuracy derived from sources including API, remote sensing, CRA tenure maps and conservation protocol connection corridor maps.
- Each agency to develop a road management plan that itemises future road construction and road closure over retained habitat patches and connection corridors over its estate (see Indicator 4.1.a).

Reporting

- During the first five-year term of the Regional Forest Agreements, maps will be used to assess connectivity among the key features identified by targets. Reporting will be narrative until mathematical approaches are developed.
- Quantify proportion of connection corridors that are dissected by roads and easements.

Research and Development

- Research and development should follow the guidelines outlined in the BRS Scoping study on MIG Fragmentation 1.1.e.
- Research needs to assess the adequacy of fragmentation indices to see if they can be used in remote sensing.
- Develop mathematical approaches to assessing connectivity.
- Investigate connectivity requirements to meet functional requirements of selected species.
- Establish Codes of Practice for connection corridor design and management that adopt standards for maintaining habitat and population connectivity for all regions and tenures.

SPECIES DIVERSITY

Indicator 1.2.a A list of forest dwelling species

Rationale

This indicator measures the change in species richness and composition over time and provides a list of species that should be managed for. It is recognised that this list would never be comprehensive. The list should discriminate between indigenous and non-indigenous species. **Forest dwelling** is taken to include forest dependent species. This indicator has limited application to plantations.

Objectives

- To maintain the extent and quality of species habitat at levels that support **functional populations** across landscapes.
- To maintain or restore the species composition, richness and abundance (of representative species) of forest dwelling species.
- To prevent the endangerment of indigenous species.
- To, where possible, fill survey gaps.
- To identify representative species, within guilds, in representative habitats, to monitor over time.

Indicative targets

- Prevention of the loss of species.
- Maintenance of species abundance at **viable and functional population levels** across the regional landscape.
- Maintenance of regional species composition.

Data requirements and Monitoring methodology

- Baseline data from CRA flora and fauna data layers, research data and agency databases.
- SF collects survey records during harvest planning. Survey records are collected by NPWS during research or planning. NPWS get additional information from external sources (e.g., universities and the public) which is collated in the Wildlife Atlas.
- Work is required to develop a complimentary sampling scheme to cover sampling gaps and facilitate comparative studies. Integration of records across agencies is also required.
- Populations of a known subset of species, possibly representative species from functional guilds, should be monitored to indicate patterns of abundance.

Reporting

- The names of all vertebrate animal and vascular plant species, and their habitat, conservation status and distribution, are to be recorded for each region.
- Trends in abundance of representative species to be interpreted with respect to management practices and environmental influences.

TABLE C: SUGGESTED FORMAT FOR REPORTING FOREST DWELLING SPECIES (BY FOREST TYPE, MANAGEMENT ZONE, DISTURBANCE HISTORY, LAND TENURE AND GROWTH STAGE).

Species name	Guild	Conservation Status	Abundance	Habitat

- Interpretation should separate species richness and species composition.

Research and Development

- Establish a network of sites, possibly using some of the long term study sites from Dr Martin Denny's report for Environment Australia. New sites could be biological equivalents to State Forests' growth plots (habitat structure, seral disturbance, fire history etc.).
- Develop a highly systematic, standardised and stratified survey methodology applicable across tenures and management systems.
- Develop appropriate analytical procedures.
- Develop a standardised habitat assessment description.
- Develop a single publicly accessible fauna and flora information database.
- Develop a recognised system for classification of species' status based on survey data.
- Identify representative species within guilds.
- Research the biology of species so that minimum viable and functional population levels can be estimated.

Indicator 1.2.b The status (threatened, rare, vulnerable, endangered, or extinct) of forest dwelling species at risk of not maintaining viable breeding populations, as determined by legislation or scientific assessment.

Rationale

To manage threatened species so as to improve their **conservation status** and formal designation. This is essential to the conservation of biodiversity. Changes in designated classification can be used as a crude indicator. However, these changes may be based on primary data, which should be used as early indicators of change if available. Some threats to species may be beyond the control of forest managers. Changes in status should be reported and reviews undertaken to develop risk management strategies for the future.

Objectives

- To improve the conservation status of **scheduled forest dwelling species**.
- To maintain non-endangered species at their current status.

Indicative targets

- Improvement of the status of scheduled forest dwelling species.
- Protect habitat where endangered species occur.

- Development and implementation of recovery plans for listed species. Recovery plans to conform to agreed standards and include clear indicators of success and performance criteria.

Data requirements and Monitoring methodology
- Commonwealth and State lists of threatened (rare, vulnerable, endangered or extinct) species, under whatever terminology is used, and their rationale for listing.
- Data on the range and abundance of threatened taxa from pre-logging surveys, other surveys, research and incidental reports.
- Data from Recovery Planning and related performance indicators.

Reporting
- Changes to the status of species to be interpreted with regard to the cause of the change in listing.
- Systematic and periodic scrutiny of recovery plans and threatened species licence conditions for forest activities (under the Threatened Species Conservation Act 1995, National Parks and Wildlife Act 1972, and the Fisheries Management Act 1994), and their performance success.

Research and Development
- Research and development issues are identified in Recovery Plans and should be considered.

Sub-indicator 1.2.b.1 The status of endangered populations and ecosystems as determined by legislation or scientific assessment.

Rationale
To manage endangered populations and ecosystems so as to improve their **conservation status** and formal designation. This is essential to the conservation of biodiversity. Changes in designated classification can be used as a crude indicator. However these changes may be based on primary data which should be used as early indicators of change if available. Some threats to endangered populations and ecosystems may be beyond the control of forest managers. Changes in status should be reported and reviews undertaken to develop risk management strategies for the future.

Objectives
- To improve the conservation status of scheduled endangered populations and ecosystems.
- To maintain non-endangered populations and ecosystems at their current status.

Indicative targets
- Improvement of the status of scheduled endangered populations and ecosystems.
- Protect habitat where endangered populations and ecosystems occur.
- Development and implementation of recovery plans for endangered populations and ecosystems. Recovery plans to conform to agreed standards and include clear indicators of success and performance criteria.
- Changes to the number of listed endangered populations and ecosystems, interpreted with regard to the cause of change in listing.

Data requirements and Monitoring methodology

- Commonwealth and State lists of threatened (rare, vulnerable, endangered or extinct) populations and ecosystems, under whatever terminology is used, and their rationale for listing.
- Data on the range and abundance of endangered populations and ecosystems from pre-logging surveys, other surveys, research and incidental reports.
- Data from Recovery Planning and related performance indicators.

Reporting

- Changes to the status of populations and ecosystems to be interpreted with regard to the cause of the change in listing.
- Systematic and periodic scrutiny of recovery plans and their performance success.

Research and Development

- Research and development issues are identified in Recovery Plans and should be considered.

CRITERION 2: MAINTENANCE OF PRODUCTIVE CAPACITY OF FOREST ECOSYSTEMS

Indicator 2.1.a Area of forest land and net area of forest land available for timber production.

Rationale
This indicator is a measure of the capacity of forests to meet society's demand for timber products. Plantations are to be included in this indicator.

Objectives
- To maintain the net area of native forest available for ecologically sustainable timber production.
- To increase area of land under plantation from existing cleared land.

Indicative targets
- Maintenance or increase of the net area of native forest available for timber production.
- Establishment of a minimum of 10 000 ha of plantations on cleared land, across the UNE and LNE regions combined, for the first 5 years of the RFA.
- Ongoing program of acquisition of cleared private land for the establishment of planted forests.

Data requirements and Monitoring methodology
- CRA databases provide baseline data for SFNSW.
- FRAMES provides the relevant data for State forests. This database will be updated and maintained as part of ongoing management practices.
- Regional Vegetation Management Plans may provide relevant information for private tenures.

Reporting
- Report area (ha) of forest land, and area (ha) available for timber production across all land tenures and forest types, including secondary forest on private land and plantations separately.

Research and Development
- [none identified]

Indicator 2.1.b Total growing stock of both merchantable and non-merchantable tree species on native forest land available for timber production.

Rationale
This indicator shows the total growing stock of both merchantable and non-merchantable tree species on forest land available for timber production.

Objective
- To maintain or increase the total growing stock, and growing stock of merchantable tree species, in native forest available for timber production.

Indicative target
- Maintenance or increase of the total growing stock, and growing stock of merchantable tree species, in native forest available for timber production.

Data requirements and Monitoring methodology
- CRA databases provide baseline data for State forests.
- FRAMES provides the relevant data for State forests. This database will be updated and maintained as part of ongoing management practices.
- Regional Vegetation Mapping Plans may provide relevant information for private tenures although yield relationships will need to be quantified.

Reporting
- Total growing stock of merchantable and non-merchantable tree species in native forest reported separately for private land and State Forest.

Research and Development
- FRAMES requires further development to incorporate data on species and quality.
- Mechanisms for appropriate reporting for private land need to be developed.

Indicator 2.1.d Annual removal of wood products compared to sustainable volume.

Rationale
This indicator is a measure of the actual harvest, to meet society's demand for wood products, against the sustainable level of production.

Objective
- To ensure consistent and ecologically sustainable supply of wood products from production forest across all tenures.

Indicative target
- That the quota sawlog removal does not exceed the **allowable timber cut** by ± 25% within any 1 year and ± 5% over a 5 year RFA period.

Data requirements and Monitoring methodology

- CRA databases provide baseline data for State forests.
- FRAMES provides the relevant data for State forests. This database will be updated and maintained as part of ongoing management practices. The SFNSW Forest Management Plan will also contain this data.
- Regional Vegetation Mapping Plans may provide relevant information for private tenures although yield relationships will need to be quantified. Returns from sawmills could supplement this data.
- Actual yield will be calculated by aggregating information from coupes across an appropriate geographic scale, compared to annual targets, and reported on an annual basis.
- All monitoring procedures should be reviewed in the second year of reporting. This review should consider the reliability and magnitude of changes reported for harvested compartments against other changes in State Forest and other tenures. A full accounting of timber harvest and log stocks will be undertaken in the fifth year review of the RFA.

Reporting

- Report species, size and type of wood products removed during forestry operations.
- Annual and 5 yearly reporting of volume removed against allowable timber cut.
- Report for public and private tenures separately, and plantations and native forests separately.

Research and Development

- Improve the collection of data relating to private land.
- Develop a methodology for assessing sustainable yield on private land.

Indicator 2.1.f Area and percent of plantation established meeting effective stocking one year after planting.

Rationale

To determine the extent and efficacy of the planting effort.

Objective

- To increase the area of effectively stocked plantation.

Indicative targets

- Increase stocking success.
- Increase area of plantations by a minimum of 10 000 ha, across the UNE and LNE regions combined, over the first 5 years of the RFA.

Data requirements and Monitoring methodology

- Each plantation manager/owner to define **effective stocking** levels for each plantation.
- Data provided for new plantations and re-planting after clearfelling.
- SFNSW has existing information systems that report on plantation performance. Further information may also be available from the Hardwood Plantation Strategy and the SFNSW Information Memorandum.
- Additional data will be required from private plantation owners/managers.

Reporting
- Success of plantation establishment measured against the defined effective stocking level.

Research and Development
- [none identified]

Indicator 2.1.g Area and percent of harvested area of native forest effectively regenerated.

Rationale
To determine the success of regeneration effort. It is acknowledged that after some practices, such as thinning, regeneration may not be required.

Objective
- To effectively regenerate all areas of harvested native forest.

Indicative target
- 100% of harvested native forest **effectively regenerated**.

Data requirements and Monitoring methodology
- SFNSW collect this data in post-harvest surveys, and maintain records as part of their ongoing management program.
- Data on private lands is not currently available and will require the development of methods for the collection of data.
- Field surveys will be undertaken to determine the success of regeneration.

Reporting
- Areas and percent of area by forest type that have been effectively regenerated, and have not been effectively regenerated, are to be reported on.

Research and Development
- [none identified]

CRITERION 3: MAINTENANCE OF ECOSYSTEM HEALTH AND VITALITY

Indicator 3.1.a Area and percent of forest affected by processes or agents that may change ecosystem health and vitality (narrative as interim).

Rationale

A number of agents can affect ecological processes in forests and may produce significant changes to the condition of the forest. This indicator measures the areas affected by those processes, and the level of impact within those areas. This indicator should be considered together with indicators under Criterion 1 to give an overall picture of forest health and vitality.

Objectives

- To maintain **ecosystem health and vitality**.
- To control outbreaks of disease, pests or other agents affecting ecosystem health and vitality, through cooperative planning and management.
- To minimise the risk of outbreaks of disease, pests or other agents affecting ecosystem health and vitality.

Indicative target

- Minimisation of the area and percent of forest affected by processes or agents that reduce ecosystem health and vitality. Note that on the level of individual agents, specific targets may be generated with further research.

Data requirements and Monitoring methodology

- Processes and agents that may change ecosystem functioning need to be identified on a regional basis. These include interactions between natural events and management actions in the following areas; fire, **climatic events**, river regulation, salinisation, grazing, introduction of exotic biota, logging, clearing, roading, bell-miner dieback, insects and diseases.
- CRAFTI data should be considered as baseline data, e.g., disturbance codes.
- Data is available from agency fire monitoring, pest control programs and pest survey and research. Data may be generated out of local observation.

Reporting

- Narrative, and where possible quantitative, reporting of the area and percent of forest affected by given processes or agents considered important at a regional level.
- Narrative, and where possible quantitative, reporting of the area and percent of forest where given processes or agents are controlled or their effects are countered by rehabilitation.
- Reporting processes should distinguish between natural and human induced effects.

Research and Development

- Research and development required to establish if increases or decreases in processes are affecting ecosystem health and vitality.
- Methodology required to link processes with outcomes and the type of interaction between them.

CRITERION 4: CONSERVATION AND MAINTENANCE OF SOIL AND WATER RESOURCES

Indicator 4.1.a Area and percent of forest land covered by comprehensive Road Management Plans, which include, an assessment of the extent of existing road infrastructure, processes for ongoing improvement, targets and milestones.

Rationale

To asses and manage the impact of roading in forests in regards to the conservation of soil and water resources.

Objectives

- To ensure the conservation and maintenance of soil and water resources.
- To optimise road type and density to meet soil and water protection controls and adequate access for forest use and management.
- To optimise the type and density of drainage line crossings to meet soil and water protection controls and adequate access for forest use and management.

Indicative target

- Road Management Plans are to be completed for all RFA regions within 5 years of the signing of the relevant RFA.

Data availability and Monitoring methodologies

- Each agency to develop a Road Management Plan that details road lengths, regolith class, road category density, stream crossing density, future road construction and road closure etc. over its estate. Road Management Plans should consider road and crossing density by catchment.
- The Ecologically Sustainable Roading Index and Ecologically Sustainable Crossing Index may be used to test the efficacy of Road Management Plans at meeting targets.

Reporting
- Reporting against targets and milestones built into Road Management Plans.

Research and Development
- Development and trial of the Ecologically Sustainable Roading Index and Ecologically Sustainable Crossing Index proposed by the EPA.
- Cooperative approach between relevant agencies to developing system targets.

Indicator 4.1.a (Interim) Area and percent of forest land systematically assessed for soil erosion hazard, and for which site-varying scientifically-based measures to protect soil and water values are implemented.

Rationale
This indicator aims to demonstrate that soil erosion risk has been explicitly addressed in forest management planning and field operations. The percentage of area effected by soil erosion may be very small but can still produce a significant effect, e.g. a picnic area in a pristine catchment.

Objective
- To ensure all areas where forest activities/operations are occurring are systematically assessed for soil erosion hazard.
- To ensure that appropriate site-specific scientifically-based measures to protect soil and water values are implemented.

Indicative targets
- All areas where forest activities/operations are occurring are systematically assessed for soil erosion hazard.
- Site-specific scientifically-based measures to protect soil and water values are implemented in all areas where forest activities/operations are occurring.

Data requirements and Monitoring methodology
- Data on the area and percent of forest land systematically assessed for soil erosion hazard, and the site-specific scientifically-based measures to protect soil and water values implemented, are to be derived from management and operation plans.
- EPA to provide data on SFNSW compliance with licence conditions as specified in the regional Integrated Forestry Operations Approval.

Reporting
- The effectiveness of protective measures, including Licence conditions and Codes of Practice, in preventing soil erosion and water pollution need to be assessed.

Research and Development
- Indicators need to be developed regarding the conservation of organic matter, nutrients and site quality.

CRITERION 5: MAINTENANCE OF FOREST CONTRIBUTION TO GLOBAL CARBON CYCLES

There are no MIG Category A indicators for Criterion 5 at present.
The following Criterion 5 indicators are Category B.

Indicator 5.1a: Total forest ecosystem biomass and carbon pool, and if appropriate, by forest type, age class, and successional stages.

Rationale

Forests can maintain their contribution to global carbon cycles by maintaining or increasing the amount of carbon stored within them. At a local scale, forests can undergo significant changes of carbon storage associated with natural mortality, thinning, fire, harvesting and regrowth, but for a larger forest area the harvest loss from one area can be balanced by regrowth in a number of other areas. The age class distribution and successional stage of forests provides information on the changing structure of forests and determines whether they are in a predominantly regenerating or mature stage.

The National Greenhouse Response Strategy includes the National Greenhouse Gas Inventory (NGGI) which estimates for each State the annual changes in C-stocks in native and plantation forests, be it with wide bands of uncertainty. The Kyoto Protocol requires Australia to track changes in national C stocks from deforestation, reforestation and afforestation activities initiated since 1990. The National Carbon Accounting System is currently being established in the Australian Greenhouse Office to conduct such accounting. Indicators for Criterion 5 should be compatible with and contribute to that internationally binding requirement.

Objective

- To ensure that the total carbon stored across the regional forest area is not reduced.

Indicative target
- Maintenance of the total carbon stored in the forest.

Data requirements and Monitoring methodology
- Data on wood loss by natural mortality, thinning, fire and harvesting can be balanced against regrowth data to indicate positive or negative changes to carbon across the region.
- Partial reporting of this indicator can be derived from wood volume and age class data in Indicators 1.1.a and 1.1.b, provided that appropriate biometric relationships have been established. SFNSW will develop these biometric relationships based on FRAMES and will provide these to other agencies.

Reporting
- Changes in Carbon held in above-ground wood volumes will be reported once biometric relationships are established. This must be interpreted as a surrogate for total forest contribution to global carbon.

Research and Development
- Biometric relationships between wood volume, age classes and carbon storage need to be developed.
- The relationship between wood volume and total carbon storage needs to be confirmed for subtler shifts in management.
- If forest types change over time, research will be necessary to establish the relationship between wood volumes and total carbon storage.
- Collation of ground-based records will be gradually augmented with verification by interpretations of satellite imagery.

Indicator 5.1c: Contribution of forest products to the global carbon budget.

Rationale
Different forest products decay at varying rates. The rate at which carbon is removed, albeit temporarily, from the system, can be assessed by accounting for the different end-products from forest industries. By increasing the proportion of wood converted to long-lived products, such as building materials and furniture, the quantity of carbon held in storage will be increased.

Objectives
- To measure the amount of carbon stored in forest products and therefore not in the atmosphere contributing to changes in atmospheric conditions.

Indicative target
- Increase the average longevity of forest products.

Data requirements and Monitoring methodology
- Quantify the relative proportions of wood used for different products. The decay rates of these products also need to be quantified.
- Data may be available from a variety of sources including the Australian Bureau of Statistics and industry sources. Integration of data will involve desktop analysis and synthesis of different data formats.

Reporting
- Data from different sources will be integrated using an agreed classification system.

Research and Development

- [none identified]

CRITERION 6: MAINTENANCE AND ENHANCEMENT OF LONG TERM MULTIPLE SOCIO-ECONOMIC BENEFITS TO MEET THE NEEDS OF SOCIETIES

RECREATION AND TOURISM

Indicator 6.2.c Number of visits per annum.

Rationale

This indicator provides an indication of the amount of overall recreation use and suggests the amount of demand for forest based tourism and recreation. It is a key variable in determining the sustainability of recreation and tourism. Tourism and recreational demand must be balanced against the conservation of forest by determining ecologically sustainable levels of use.

Objective

- To integrate tourism and recreation demands with ecological sustainable forest management.

Indicative target

- Area and percent of forest lands covered by comprehensive cross-agency Integrated Tourism and Recreation Plans, including information on;
  - the management of visitation to State Forest and National Parks,
  - the maintenance of opportunities for visits in response to demands,

– mitigation measures in place in high-use areas.

Data requirements and Monitoring methodologies

- NPWS to supply data on the number of visits per annum to identified areas from vehicle counters, track counters, registration books, booking systems and license allocations. SFNSW to provide additional data where available.
- Narrative information from Agency staff and public survey, where available, about 'overuse' of particular sites by visitors.
- Inter-agency working group to develop an Integrated Tourism and Recreation Plan for the forest estate.

Reporting

- Report on trends in annual recreation and tourist use and compare with area available.
- Report on area and percent of land suffering material damage from overuse, and effectiveness of damage mitigation and rehabilitation measures.

Research and Development

- Monitor the impact of different tourism and recreation uses to identify the **carrying capacity** and ecologically sustainable recreation and tourism levels for State Forests and National Parks. The relationship between visitor numbers, visitor value and ecological impact should be determined
- Development of mechanisms for community consultation and involvement in the decision making process.

CULTURAL, SOCIAL AND SPIRITUAL NEEDS AND VALUES

Indicator 6.4.c Change in condition and number of recorded places, artefacts, sites, buildings or other structures.

Rationale

The protection and enhancement of cultural heritage features within the forest estate. This indicator measures the degree of management of **recorded places**, artefacts and structures within the forest estate. This indicator should make allowances for the changing condition of sites being managed, and for the number of sites being added to (or deleted from) site records. This indicator specifically recognises both indigenous and non-indigenous cultural heritage.

Objectives

- To manage forests such that indigenous and non-indigenous heritage values are protected.
- To minimise threats to the condition of sites.
- To ensure that site integrity, function and meaning is maintained within the landscape.
- To ensure that appropriate mechanisms are in place to protect heritage features and that threatening processes are managed with regards to cultural values.
- To ensure Indigenous groups are involved in the monitoring and rehabilitation of their sites.
- To increase the number of Indigenous people involved in managing culturally important sites and the forest estate.
- To preserve sites with Indigenous peoples' cultural resource management.
- To enhance cultural values through public awareness.

Indicative targets

- Maintenance and promotion of cultural heritage values, places, sites and other items in forests.
- Increase in the number of Indigenous peoples' involved in site protection and rehabilitation.
- Increase in the proportion of heritage places, sites and other items managed in accordance with established heritage management principles and endorsed Conservation Management Plans.
- Increase the protection of places, sites and other items from threats to their physical condition.

Data requirements and Monitoring methodology

- The Aboriginal Sites Register for New South Wales and Agency Section 170 registers to be used as a collection point for data concerning Aboriginal places, sites and other items. The Aboriginal Sites Register could be modified to include appropriate fields to incorporate information on maintenance or protection works on Aboriginal sites.
- Records of non-indigenous heritage sites and Section 170 registers are maintained separately by each agency.
- Information from consultation with Indigenous community and Native Title Representative Bodies.

Reporting

- Each agency to monitor and report on the condition of known places, sites and other items and any changes in the condition of places, sites and other items within its own tenure. Narrative information as to the reason for change in condition.

TABLE D: SUGGESTED FORMAT FOR REPORTING INDICATOR 6.4C

Heritage Feature (Place Name)	National Estate/ State Heritage Value	Location	Tenure	Threatening Processes	Current Protective Mechanisms	Management and timber resource Implications for SFNSW

- Compliance of management practices with endorsed Conservation Management Plans to be reported.
- Number of Indigenous people employed in the monitoring, rehabilitation or management of their places, sites or artefacts, and the forest estate, be monitored and reported by each agency.

Research and Development

- Establish standard protocols for surveying and protection of sites, applicable across tenures.
- Systematic survey of the forest estate to identify so-far unrecorded cultural heritage sites.
- Determination of potential threats to cultural heritage sites.

- Development of a register of sites, taking into consideration intellectual, cultural and property knowledge.

EMPLOYMENT AND COMMUNITY NEEDS

Indicator 6.5.a Direct and indirect employment in the forest sector and forest sector employment as a proportion of total employment.

Rationale
Employment is an important measure of the economic contribution of forests in meeting the needs of the whole community.

Objective
- To sustain and enhance the contribution that the forest sector makes to employment and community needs.

Indicative target
- Increase or maintain direct and indirect employment in the forest sector.

Data requirements and Monitoring methodology
- Data from the Australian Bureau of Statistics, Agency and industry sources to be collated to provide employment data for the forest industry (production and tourism) and associated industries. Data may also be available from the Community Development Employment Program (CDEP) scheme from local Indigenous communities.
- FISAP may also provide data at a regional level.

Reporting
- Employment trends to be considered in context of community expectations and industry developments in and close to the region.
- Reporting will be via desktop analyses, possibly supplemented by economic models.

Research and Development
- Develop multipliers for calculating indirect employment in the forest sector.
- Develop and implement a strategy to account for indirect and direct Indigenous employment and management in the forest sector.
- Determine social and ecological goals for employment in forest and forest related industries.

CRITERION 7: LEGAL, INSTITUTIONAL AND ECONOMIC FRAMEWORK FOR FOREST CONSERVATION AND SUSTAINABLE MANAGEMENT

Indicator 7.1 (Narrative) Extent to which the legal framework (laws, regulations, guidelines) supports the conservation and sustainable management of forests.

Rationale

Under the Montreal Implementation Group framework, this indicator has a number of sub-indicators that are incorporated in the one indicator here:

- Sub-indicator 7.1(a) Clarifies **property rights**, provides for **appropriate land tenure arrangements**, recognises customary and traditional rights of Indigenous people and provides a means of resolving property disputes by due process. It identifies changes to the legal system and frameworks for land ownership and management, the legal system and frameworks for Indigenous land, and ownership and other inherent rights relating to land, particularly the rights and interests of Indigenous peoples. It aims to recognise, respect and integrate Indigenous Peoples' rights into all aspects of the management process.
- Sub-indicator 7.1(b) Provides for periodic forest–related planning, assessment and policy review that recognises the full range of forest values, including coordination with relevant sectors. This shows how the legal framework demonstrates a regional commitment to achieving ecologically sustainable forest management.

- Sub-indicator 7.(c) Provides opportunities for public participation in public policy and decision making related to forests and public access to information. This enables the legal framework to be assessed for transparency and participation in public policy and decision making at the regional level.
- Sub-indicator 7.1(d) Encourages the development and application of best practice codes, licences and regional prescriptions for forest management.
- Sub-indicator 7.1(e) Provides for the conservation and management of environmental, cultural, social and/or scientific values in forests and ensures the participation of Indigenous peoples in all aspects of forest planning and management processes

Objectives (as related to MIG sub-indicators)

- To show the adequacy of the legal framework in providing mechanisms for clarifying property rights, establishing appropriate land tenure arrangements that recognise **traditional management practices** and **self management** as well as the customary and traditional rights of Indigenous people, and providing a means of resolving property disputes by due process.
- To demonstrate a commitment to ecologically sustainable management of all forest values and the extent to which ecologically sustainable forest management is met by the current legal framework, including relevant legislation, management plans, licences, regional prescriptions and codes of practice.
- To ensure an effective public participation and information process involving all parts of the community, recognising the special heritage associated with forested landscapes, the need for informed participatory decision-making, legal rights (especially Native Title rights) and legitimate aspirations for economic development.
- To ensure that environmental controls and regulations over forest operations and management activities through codes of practice, licences, and regional prescriptions address ecologically sustainable forest management, are best practice, and are subject to regular review and improvement where necessary.
- To ensure the adequacy of the legal framework in conserving special environmental, cultural, social and/or scientific values, including the recognition and inclusion of Indigenous peoples perspective's and value systems.

Indicative targets

- A legal framework that:
  - addresses property rights, appropriate land tenure arrangements, recognises traditional management practices and self management as well as the customary and traditional rights of Indigenous people, and provide means of resolving property disputes by due process;
  - demonstrates a commitment to and addresses the ecologically sustainable management of all forest values, as defined within the NSW ESFM Principles, through appropriate legislation, management plans, licences, regional prescriptions, and codes of practice;
  - conserves special environmental, cultural, social and/or scientific values, including the recognition and inclusion of Indigenous peoples perspective's and value systems.
- Environmental controls over forest operations and management activities through Integrated Forestry Operations Approvals, Codes of Practice and regional prescriptions that address ecologically sustainable forest management, are best practice, and are subject to continuous improvement.

Data requirements and Monitoring methodology

- An inventory of relevant legislation, Integrated Forestry Operations Approvals, SFNSW and NPWS management plans, regional prescriptions, and codes of practice for the full range of forest values, public and Indigenous participation and consultation processes, periodicity of review and availability of information.
- Assessment and evaluation of the outcomes of relevant legislation, management plans, Integrated Forestry Operations Approvals, regional prescriptions and codes of practice, in relation to the achievement of ecologically sustainable forest management.

Reporting

- Compare the status of the legal framework and its various elements in addressing ecologically sustainable forest management at the start of the Regional Forest Agreement with changes in the legal framework at appropriate intervals over the period of the Regional Forest Agreement to determine whether targets are met.

Research and Development

- Develop a process for timely conflict resolution.
- Develop appropriate mechanisms to implement management strategies that recognise Indigenous rights.
- Develop a process for review and improvement of the legislative framework and its elements to achieve ecologically sustainable forest management.

Indicator 7.2 (Narrative) Extent to which the institutional framework supports the conservation and sustainable management of forests.

Rationale

To assess whether effective processes are in place to foster an institutional commitment to building community awareness and support for the ecological sustainable management of forests, including:

- public involvement activities and public education, awareness and extension programs and making available forest information;
- undertaking and implementing periodic forest related planning, assessment, and policy review including cross-sectoral planning and coordination;
- developing appropriate levels of human resource skills to implement sustainable forest management;
- enforcing laws, regulations and guidelines to ensure the effective implementation of plans.

Objectives

- To improve the extent to which sustainable management of forest is met by the current institutional framework through:
  - enhancing public involvement activities and public education, awareness and extension programs;
  - enhancing availability of forest-related information;
  - better education of the broader community on the need for the recognition of Indigenous rights;
  - reviewing and evaluating regional plans and processes;

- maintaining and improving competency and currency of skills;
- ensuring compliance with plans, codes, prescriptions and licences.

Indicative targets

- Maintain or increase public involvement activities and public education, awareness and extension programs, including increased public awareness of Indigenous peoples' rights in forest-related information, such as the number of Regional Forest Forum and Committees of Advice on Forest Landscape Management meetings, throughout the life of the RFA.
- Maintain or increase the numbers, competency and currency of skills required to deliver ecologically sustainable forest management
- Updating and adapting regional management plans and policies in the light of changing environmental, social and economic circumstances and new information
- Reduction of the number of forest management related breaches and prosecutions for a region.

Data requirements and Monitoring methodology

- Current levels and funds expended on public involvement activities and public education, awareness and extension programs.
- Regional Agency management plans, policy documents, State Of the Environment reporting and State Of the Parks reporting.
- Number of employees by qualification category (graduate, diploma/certificate, trade skill) by agency, total number of training days per year by type of training, total number of staff undertaking natural resource management courses. Data to be provided by agencies.
- Number of forest related breaches and prosecutions from regulatory agencies.
- Funds expended on forest related public involvement activities and public education, awareness and extension programs.
- Status of forest management based on annual ESFM reports to Parliament under the Forestry and National Parks Estate Act 1998.
- Number of forest management related breaches and prosecutions for a region.

Reporting

- Report on forest-related public involvement activities and public education, awareness and extension programs.
- Report on the presence and currency of forest-related regional management plans including reporting on performance indicators and targets associated with these plans.
- Report on the number of employees by qualification category (graduate, diploma/certificate, trade skill, other) and training days, by agency/institution/company in forest management.
- Report on industry self-regulation and enforcement strategies used by industry.
- Report addressing monitoring and enforcement effort.

Research and Development

- Develop an appropriate strategy for Indigenous participation in the institutional framework.

Indicator 7.4 (Narrative) Capacity to measure and monitor changes in the conservation and sustainable management of forests.

Rationale
To ensure a regional framework monitoring system and sufficient current data is available to measure and monitor changes in the full range of forest values and ensure ecological sustainable forest management.

Objectives
- To improve the capacity to measure and monitor changes in the conservation and sustainable management of forests by identifying and developing areas requiring research.
- To ensure the availability and extent of up-to-date data, statistics and other information important to measuring or describing indicators associated with Criteria 1-7.

Indicative target
- Data requirements and monitoring methodologies are available to meet annual and 5-yearly reporting requirements of ESFM under the Regional Forest Agreements.

Data requirements and Monitoring methodology
- Table showing data availability and currency for each indicator associated with Criteria 1-7.
- Data to be collected from State agencies, institutions, Indigenous communities and others as appropriate.

Reporting
- Report summarising data inadequacies and/or the lack of relevance of some indicators in the region.
- Report addressing the comprehensiveness and adequacy of forest inventories, including monitoring.
- Refer to each indicator for details of reporting.

Research and Development
- Data needed for private lands.

Indicator 7.5 (Narrative) Capacity to conduct and apply research and development aimed at improving forest management and delivery of forest goods and services.

Rationale
A scientific understanding of forest ecosystem characteristics and functions is needed to underpin sustainable forest management.

Objectives
- To improve the capacity to conduct and apply research and development aimed at improving forest management and the delivery of forest goods and services.
- To develop scientific understanding of forest ecosystem characteristics and functions, forest management and delivery of forest good and services.
- To ensure Indigenous traditional forest knowledge is incorporated to improve forest management and delivery of forest good and services.
- To have sufficient coverage of areas of forest management by research papers and projects, and identification of areas not covered by current research.

Indicative targets

- Improvement of the capacity to conduct and apply research and development aimed at improving forest management and the delivery of forest goods and services.
- Development of a scientific understanding of forest ecosystem characteristics and functions, forest management and delivery of forest good and services.
- Assurance that Indigenous traditional forest knowledge is incorporated to improve forest management and delivery of forest good and services.
- Assurance of sufficient coverage of areas of forest management by research papers and projects, and identification of areas not covered by current research.

Data availability and Monitoring methodology

- Monitor research effort in terms of the number of research papers published and studies undertaken relevant to forest values and ecological sustainable forest management, the number of people employed (scientific and technical staff), and total expenditure on research and development.

Reporting

- Report on initiatives undertaken to address regional research needs.
- Report on changing forest management practices and adaptive management practices resulting from research.

Research and Development

- Develop mechanisms (e.g., predictive models) to measure the impacts of human intervention on forest values.

GLOSSARY

Indicator 1.1a

- **forest type** - a class in the hierarchy of vegetation classification of forests characterised by the taxonomic and or structural composition of canopy trees (usually by the dominant species) - as defined by CRA forest type data sets.
- **non-treed elements** - areas within the forest ecosystems in which trees are not the dominant structural vegetation type. e.g. swamps, marshes, rocky outcrops.
- **human induced disturbance** - disturbance of forest type extent by human activities, whether for land management, recreational or other purposes.

Indicator 1.1.e

- **general retained habitat** - habitat that is suitable for use by a species and is not subject to management practices or changes in land use that may render the habitat unsuitable for any period of time.
- **functional connectivity** - connectivity between patches of retained forest allowing for population viability and the continuation of ecosystem processes across the regional landscape. Connectivity is usually provided by corridors of retained or restored habitat.
- **functional populations** - populations that are both viable and of sufficient abundance to play their traditional role in ecosystem processes.

Indicator 1.2.a

- **forest dwelling** - species living in forest and/or reliant upon resources provided by forest. The term "forest dwelling" is taken to include all forest dependent species.
- **functional populations** - populations that are both viable and of sufficient abundance to play their traditional role in ecosystem processes.
- **viable populations** - populations that have enough individuals, genetic variation and are spatially distributed in such a way that allows continued survival of the population.

Indicator 1.2b

- **conservation status** - the designation of species on Commonwealth or State conservation legislation. e.g. threatened species may be either "endangered" or "vulnerable" under the NSW Threatened Species Conservation Act 1995 (TSC Act).
- **scheduled forest dwelling species** - forest dwelling species (above) that appear on the lists (schedules) of species identified on either Commonwealth or State species conservation legislation. e.g. endangered species are listed on Schedule 1 and vulnerable species are listed on Schedule 2, of the TSC Act.

Indicator 1.2b1

- **conservation status** - the designation of populations or ecosystems on Commonwealth or State conservation legislation. e.g. populations and ecosystems may be listed as endangered under the NSW Threatened Species Conservation Act 1995 (TSC Act).

Indicator 2.1.d

- **allowable timber cut** - as determined by the RFA

Indicator 2.1f

- **effective stocking** - the survival of planted trees one year after planting at a level that will provide a cost-effective return upon harvest.

Indicator 2.1.g

- **effective regeneration** - success of regeneration in re-establishing the pre-harvesting forest structure and species composition, specific for each forest type and locality.

Indicator 3.1.a

- **ecosystem health** - the state of an ecosystem's processes (energy, nutrient, hydrological, and biological processes) which maintains the vitality of the system.
- **vitality** - is equated to the ability of the ecosystem to perpetuate self.
- **climatic events** - including flood, storm, wind, drought etc.

Indicator 6.2c

- **carrying capacity** - the number of visitors to forest, for tourism and recreation purposes, that can be maintained without damage to ecosystem function, health or vitality. The ecologically sustainable rate of visitation and use.

Indicator 6.2d

- **recorded places** - sites of significance to Indigenous peoples that have been formally registered by State agencies, archaeological survey reports and on the Register of the National Estate.

Indicator 7.1

- **property rights -** the right of ownership, control or management over an area of land.
- **appropriate land tenure arrangements -** the recognition of rights of ownership, control or management by establishing land tenure agreements with the traditional Indigenous owners of an area of land.
- **traditional management practices -** the recognition and acceptance of traditional Indigenous management practices (including the harvesting of plants and animals, and the use of fire, for traditional purposes).
- **self management -** the recognition and acceptance of the rights of Indigenous people to manage their own interests without intervention.
- **co-existing rights -** the recognition and acceptance of the rights of Indigenous people to manage or have a say in management decisions of land under joint Indigenous and non-indigenous management (private or public).

ACRONYMS

ABS	**Australian Bureau of Statistics**
API	**Aerial Photography Interpretation**
BRS	**Bureau of Resource Sciences, Department of Primary Industries and Energy**
CDEP	**Community Development Employment Program**
CRA	**Comprehensive Regional Assessment**
EPA	**Environment Protection Authority**
ESFM	**Ecological Sustainable Forest Management**
LNE	**Lower North East**
MIG	**Montreal Implementation Group**
NFI	**National Forest Inventory**
NGGI	**National Greenhouse Gasses Inventory**
NPI	**National Plantation Inventory**
NPWS	**NSW National Parks and Wildlife Service**
RFA	**Regional Forest Agreement**
SFNSW	**State Forests of New South Wales**
UNE	**Upper North East**