Ecologically Sustainable Forest Management Criteria and Indicators for the NSW Forest Agreement regions
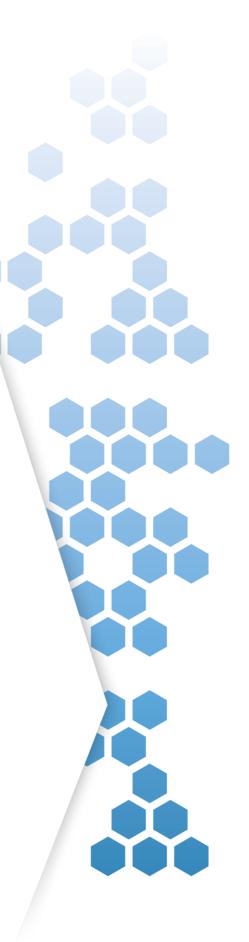
2016

New South Wales Forest Agreements

Contents

Introduction

The New South Wales (NSW) Government has established an integrated framework to support the sustainable management of forested lands under 'Forest Agreements'. Forest Agreements set out the principles for the cooperative management of forests, recognising all their inherent values.

Ecologically Sustainable Forest Management (ESFM) is an internationally recognised term which aims to maintain and monitor the broad range of social, economic and environmental values of forests. ESFM is defined as the management of forests so that they are sustained in perpetuity for the benefit of society, by ensuring that the values of forests are not degraded for current and future generations.

The NSW Forest Agreements are legislated under the *Forestry and National Park Estate Act 1998* (FNPE Act). Forest Agreements identify a system for monitoring ESFM in the State. A suite of 7 criteria and 54 performance indicators are identified under four coastal region Forest Agreements. The criteria are the same as those developed in 1994 by the international-level Montreal Process Working Group on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests, known as the Montreal Process Working Group. Indicators also broadly align with what is identified at the international level but are in places refined at the national level to be regionally specific. Monitoring, reporting and review of ESFM indicators is required under NSW Forest Agreements and the Commonwealth–State Government 'Regional Forest Agreements'. Therefore, both the National and State Agreements maintain consistency in ESFM monitoring and reporting.

The Forest Agreements require ESFM indicators to be assessed after the Agreements have been in place for five years to ensure they are practical, measurable, cost-effective and capable of being implemented at the regional level. This document outlines the revised ESFM indicators following their assessment in 2010.

Ecologically Sustainable Forest Management (ESFM) criteria and indicators

In 1993, Canada convened the International Seminar of Experts on the Sustainable Development of Boreal and Temperate Forests. This process established the Montreal Process Working Group on Criteria and Indicators in 1994 and included members from countries with temperate and boreal forests. Members included Argentina, Australia, Canada, Chile, China, Japan, the Republic of Korea, Mexico, New Zealand, the Russian Federation, the United States of America and Uruguay. The purpose of the Montreal Process Working Group was to develop a framework for describing, assessing and evaluating progress towards sustainable forest management in temperate and boreal forests. Australia has therefore adopted the following criteria as one of the 12 signatory countries to represent forest values to be enhanced or preserved:

1. Conservation of biological diversity;
2. Maintenance of productive capacity of forest ecosystems;
3. Maintenance of ecosystem health and vitality;
4. Conservation and maintenance of soil and water resources;
5. Maintenance of forest contribution to global carbon cycles;
6. Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of societies; and

7. Legal, institutional and economic framework for forest conservation and sustainable management

A suite of indicators under each criterion provide a measure of change over time. Australia has adapted the indicators to better suit the country's unique forests. The State and Commonwealth governments have worked together under the Montreal Implementation Group (MIG) to implement national indicators that have both national and regional relevance.

Together, the criteria and indicators can be used to assess progress towards achieving sustainable forest management.

Monitoring ESFM under the NSW Forestry framework

The NSW ESFM indicators broadly align with the Montreal Process criteria and indicators but are specific for coastal forest regions of NSW. Indicators are divided into categories.

NSW ESFM indicators attempt to reflect the key environmental, social and economic aspects of a healthy regional forest for the benefit of its community. Each indicator aims to measure performance against ESFM goals. Successful implementation of ESFM requires a collective commitment by forest managers and forest conservation and management agencies to monitor, report and interpret the trends in the indicators over time.

A Forest Agreement contains provisions that promote ESFM and the FNPE Act contains provisions that require the Minister who is party to a Forest Agreement to report annually on whether ESFM in the region is being achieved.

Forest Agreements outline the criteria and indicators that are to be systematically measured and monitored. This process is also consistent with National–State Regional Forest Agreements (RFAs).

Assessment of NSW ESFM indicators

The Forest Agreements required the ESFM indicators to be trialled and assessed during the first five-year period to ensure they were practical, measurable, cost-effective and capable of being implemented at the regional level.

The NSW ESFM indicators were assessed in 2010 by the then Department of Environment, Climate Change and Water and Forests NSW, following a comprehensive review conducted at the national level between 2005 and 2008.

The Australian Montreal Implementation Group (MIG), which includes representatives from the State and Commonwealth governments, including the Office of Environment and Heritage staff, Australian forest experts and managers representing all Australian jurisdictions and interest groups (including CSIRO and other scientific experts), worked extensively to assess whether existing national Montreal Process criteria and indicators could be refined. The MIG review aimed to remove duplication, fill gaps, reduce ambiguity and ensure indicators had both national and regional relevance. The forty-four national indicators were finalised in 2008.

Given the national MIG review considered the relevance of indicators that were meaningful and appropriate for implementation at the State/regional level, NSW EFSM indicators will align with the new MIG indicators wherever practical. Further information on the National MIG Criteria and Indicators and the national review process can be found at: http://adl.brs.gov.au/forestsaustralia/framework/indicator.html). Other States across Australia have also largely aligned their indicators with national indicators.

The assessment of NSW indicators has resulted in the consolidation of some of the 54 existing indicators that were achieving the same target but which had subtle wording differences across regions. The wording now aligns with the corresponding national MIG indicator, but with specific consideration of regional relevance. This will enable NSW to obtain a consistent set of baseline data between regions that is comparable and measurable over time. Consolidating some of the indicators across regions reduces the number of indicators from 54 to 36, while still collecting the same valuable data in accordance with the requirements for ESFM. This evaluation is included in Appendix 1 to this report.

The national MIG review also developed new indicators where there were elements of ESFM that had not been adequately addressed in the past. For this reason, NSW has adopted a number of additional indicators. For example, there are now recommended State-wide indicators to monitor investment and expenditure in forest management and research (6.2a and 6.2b).

The assessment of NSW ESFM indicators recognises that the process of reporting progress towards sustainable forest management is one of continuous improvement, capable of evolving as knowledge increases.

The assessment of NSW ESFM indicators therefore considered the expansion and improvement of the potential data sources for reporting and the utilisation of new and improved monitoring mechanisms that have been developed since the inception of the original ESFM criteria and indicators. For example, other data collection and reporting mechanisms – including information in the NSW State of the Environment Report, the State of the Parks Report and the Forests NSW Seeing report – may also be utilised.

The assessment of NSW ESFM indicators has also determined that reporting should be extended to intervals of five years. Extension of the reporting timeframe will allow changes in forest values over time to be reported against more meaningfully, providing a better measure of trend-analysis over time. This decision was also based on the practicality and cost-effectiveness of collating data once every five years for multiple reporting purposes, reducing the administrative burden on agencies. While reporting on NSW ESFM will move to intervals of five years, internal frameworks for data collection will still occur annually where it is important to maintain data on an annual basis. The move for NSW five-yearly ESFM reporting also aligns with other RFA states, such as Victoria and Tasmania.

Potential data sources

The key agencies responsible for accessing and coordinating data sets to contribute to reporting on ESFM indicators have been the EPA, the Office of Environment and Heritage and Forestry Corporation of NSW. Many of the data sources already exist, given that the revised NSW ESFM indicators are not significantly different from the previous indicators.

While these key agencies may still be the main contributors and organisations to source data from for the new ESFM indicators, further work will be done to establish the appropriate data sources and the agencies or organisations responsible for maintaining these data sources. This may mean including other government agencies, non-government organisations and private industry as data contributors in the future.

This future work will also consider the Government's broader goals for natural resource management monitoring, evaluation and reporting and ensure data collected is forest specific, has regional relevance, is appropriate for achieving the ESFM objectives for that indicator and is easily accessible.

In 2010, the then Department of Environment, Climate Change and Water released the New South Wales Natural Resources Monitoring, Evaluation and Reporting Strategy 2010–2015, which focuses on establishing a seamless link between local, regional, State and Australian

Government Natural Resource Management (NRM) data that informs and guides whole of community on how we care for the natural resources of the State. There is an opportunity for ESFM reporting and data collection to draw from and align with this process to ensure the State's NRM data is portrayed consistently.

Understanding the revised ESFM indicators

The next section of the report outlines the revised ESFM indicators. Each indicator sits under the relevant criteria. Each indicator includes:

1. A rationale to explain the indicator's purpose in the broader context of measuring ESFM and, where appropriate, detail on the scale to be monitored at.
2. An explanatory note recommending how data may be interpreted to achieve the objective of the performance indicator. The interpretation also takes into account State and Commonwealth governments' data-collection and monitoring processes and the NSW Government's key management requirements for ESFM.

Criterion 1: Conservation of biological diversity

Indicator 1.1a Area of forest by forest type and tenure

Rationale

This indicator will reflect changes in the forest cover over time. Basing the data on tenure aims to provide a good indication of how different land management might influence changes to forest ecosystems and biodiversity.

Interpretation

The information provided from this indicator will enable us to track changes in forest cover and non-forest cover. The data should be interpreted against land-management objectives where possible.

Indicator 1.1b Area of forest by growth stage

Rationale

This indicator will show changes in forest growth stages to determine how ecological processes and species habitat are affected by forest structure. The age and size of trees is important in maintaining forest biodiversity.

Interpretation

The data should track changes in forest growth stages over time. Where possible, data will be interpreted against forest management objectives.

> **Indicator 1.1c Area of forest in protected area categories**

Rationale

This indicator will report the area and proportion of forests that have been protected through informal and formal processes in NSW, to reflect the importance of preserving ecosystems that are comprehensive, adequate and representative in order to maintain and protect biodiversity.

Interpretation

Data should be interpreted to show changes in areas protected for nature conservation and ecological benefit across the State.

> **Indicator 1.1d Fragmentation of forest cover**

Rationale

This indicator provides information about the loss of forest cover and the spatial configuration of that loss. Fragmentation can impact on forest-dwelling species and gene pools due to disruption to dispersal of species. Less fragmentation of forest is considered to be favourable to the conservation of biodiversity.

Interpretation

Data should be interpreted to show configuration, connectivity and composition of forest cover where possible.

> **Indicator 1.2a Forest-dwelling species for which ecological information is available**

Rationale

This indicator can be used to report on the amount of information available for forest-dwelling species and helps assess the capacity for making species management decisions and implementing effective conservation strategies.

Interpretation

This data can be used to assess the level of knowledge available to manage forest-dwelling species and identify where further information may be required.

> **Indicator 1.2b The status of forest-dwelling species at risk of not maintaining viable breeding populations, as determined by legislation or scientific assessment**

Rationale

This indicator aims to identify the conservation status of listed forest-dwelling threatened species across the State. Changes to the listing of species may be used as a broad measure for demonstrating conservation risk for threatened species.

Interpretation

Data may be interpreted to track changes in species category listing in order to assist forest managers in planning conservation strategies for threatened species.

Indicator 1.2c Representative species from a range of habitats monitored at scales relevant to regional forest management

Rationale

This indicator provides information on population levels for representative species (both flora and fauna) across habitats.

Interpretation

Using 'representative' species identified at the State level, data may be interpreted to show changes in population levels across the species' range relevant to regional forest management.

Indicator 1.3b Native forest and plantations of indigenous timber species that have genetic resource conservation mechanisms in place

Rationale

This indicator identifies any formally recognised genetic resource conservation mechanisms in place at the State level as a means for managing and conserving timber species' genetic resources.

Interpretation

Data will be interpreted against forest management objectives for maintaining indigenous timber species and conserving genetic diversity.

Criterion 2: Maintenance of productive capacity of forest ecosystems

Indicator 2.1a Native forest available for wood production, area harvested and growing stock of merchantable and non-merchantable tree species

Rationale

This indicator is a broad measure of the productive capacity of NSW forests to meet resource demands in a sustainable manner by determining the size and nature of a region's native forest available for harvesting.

Interpretation

Interpretation of this data needs to consider factors that may change the value of the indicator such as reclassification of land tenure or changes in forest area.

Indicator 2.1b Age class and growing stock of plantations

Rationale

This indicator is a broad measure of the contribution NSW plantations make towards meeting timber resource demands using the area, age class and growing stock of native and exotic species plantation forests.

Interpretation

The data should be interpreted recognising trends in plantation demographics and timber resource.

Indicator 2.1c Annual removal of wood products compared to the volume determined to be sustainable for native forests, and the future yields for plantations

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Rationale

This indicator should measure the actual harvest levels for native forest timber against sustainable yield projections. The indicator will also measure the yield forecasts for plantations. Managing forest resources in a sustainable manner forms an integral part of NSW Forest policy.

Interpretation

The data should be interpreted considering current available harvest levels and yield projections.

Indicator 2.1d Annual removal of non-wood forest products compared to the level determined to be sustainable

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Rationale

This indicator identifies non-wood forest products for an assessment of their ability to contribute to the livelihoods of the NSW communities. (It also relates to the socio-economic evaluation provided at indicator 6.1d.)

Interpretation

The data should be interpreted considering current available information for measuring the sustainability of non-wood products and industries.

Indicator 2.1e The proportion of the total area of native forest harvested that has been effectively regenerated, and the area of plantation clearfell harvested and the proportion of that effectively re-established

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Rationale

This indicator aims to assess the regeneration of native forests and planted forests after harvesting.

Interpretation

The data should be interpreted considering factors that may influence successful re-generation and re-establishment, including different silvicultural treatments.

Criterion 3: Maintenance of ecosystem health and vitality

Indicator 3.1a Scale and impact of agents and processes affecting forest health and vitality

Rationale

A variety of agents and processes such as pests, weeds, disease and insect infestations can affect forest ecosystem health and vitality. This indicator aims to measure the scale and impact of various agents and processes that affect the forest and help to plan adequate management responses accordingly.

Interpretation

Where possible, data should be assessed using baseline criteria considered suitable to assess ecosystem health and vitality.

Indicator 3.1b Area of forest burnt by planned and unplanned fire

Rationale

This indicator is used to identify the area of planned and unplanned fires to provide detail on how fire may impact on forest ecosystems in NSW.

Interpretation

Fire can have either a negative or positive impact on forest health and vitality and careful consideration needs to be given when using this data for assessment purposes.

Criterion 4: Conservation and maintenance of soil and water resources

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Indicator 4.1a Area of forest land managed primarily for protective functions

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Rationale

This indicator identifies, as a broad measure, the importance of soil and hydrological functions in the forest ecosystem by identifying the area of forest land protected for these purposes.

Interpretation

Use of data should include areas protected and managed such as watersheds, riparian zones, areas assessed as a mass-movement hazard risk that serve the purpose of conserving and maintaining soil and hydrological functions within the forest.

Indicator 4.1b Management of the risk of soil erosion in forests

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Rationale

This indicator aims to detail the extent of measures and actions in place to address soil erosion in forest management planning and field operations. Managing and addressing soil erosion in forests helps protect soil fertility and water quality.

Interpretation

Data should be interpreted recognising the existing controls and regulations in place to protect and monitor soil erosion, and the value of these controls for mitigating and managing soil erosion.

Indicator 4.1c Management of the risks to soil physical properties in forests

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Rationale

This indicator aims to assess the extent of measures and actions in place to address the risk to soil physical properties in forest management planning and field operations. In forests where areas are subject to soil compaction resulting from human activities, managing and addressing the risk to soil physical properties helps protect soil structure, fertility and hydrological processes.

Interpretation

Data should be interpreted recognising the existing controls and regulations in place to protect and monitor soil physical properties, and the value of these controls for mitigating and managing soil erosion.

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Indicator 4.1d Management of the risks to water quantity in forests

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Rationale

This indicator aims to measure the extent to which the risk to water quantity has been identified and addressed in forest management. Water quantity is important for forest ecosystem heath and for maintaining sustainable water supply to downstream users.

Interpretation

Information collected should be interpreted by considering the significance of measures in place and how they might minimise risk to water flows and variation in flow. Note: this indicator applies to all forests including plantations.

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Indicator 4.1e Management of the risks to water quality in forests

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Rationale

This indicator aims to measure the extent to which the risk to water quality has been identified and addressed in forest management. Water quality is important for ecosystem health and for maintaining sustainable water supply.

Interpretation

Information collected should be interpreted by considering the extent of management controls in place for assessing risks to water quality, risk-reduction strategies and significance of water quality problems. The interpretation should consider water quality guidelines and policy management objectives. Note: this indicator applies to all forests including plantations.

Criterion 5: Maintenance of forest contribution to global carbon cycles

Indicator 5.1a Contribution of forest ecosystems and forest industries to the global greenhouse gas balance

Rationale

This indicator identifies the contribution of NSW forests to the global carbon cycle, recognising that forest management can affect the global greenhouse gas balance.

Interpretation

Interpretation of the data collected from forest managers should consider carbon stored and sequestered and mechanisms available to implement suitable greenhouse gas mitigation strategies.

Criterion 6: Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of society

Indicator 6.1a Value and volume of wood and wood products

Rationale

The forestry industry can contribute positively to the NSW economy and in turn the national economy, and provide significant benefits for NSW communities. This indicator aims to monitor the socio-economic benefits of wood products and their contribution to the state economy by assessing trends in value and volume of wood and wood products.

Interpretation

Data should be interpreted by identifying standard product groups across regions and monitoring changes in value and volume over time where possible.

Indicator 6.1b Values, quantities and use of non-wood forest products

Rationale

This indicator relates to indicator 6.1a and aims to monitor the socio-economic benefits of 'non-wood' forest products in NSW by assessing trends in value, quantities and use.

Interpretation

Data should be interpreted by identifying non-wood products across regions and monitoring changes in value and volume over time where possible.

Indicator 6.1c Value of forest-based services

Rationale

This indicator aims to identify both forest-based and ecosystem services to provide a broad measure of the value forest-based services provide to the environment and population of NSW.

Interpretation

The information collected should be interpreted considering the economic value of these services and current markets for these services.

Indicator 6.2a Investment and expenditure in forest management

Rationale

This indicator aims to evaluate investment and expenditure in forest management as a broad measure of long- and short-term commitment to forest management.

Interpretation

Data should quantify capital and recurrent expenditure by forest managers across the State where publicly available. Data should be interpreted to identify trends in investment in relation to the State's forest management objectives.

Indicator 6.2b Investment in research, development, extension and use of new and improved technologies

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Rationale

This indicator aims to evaluate State investment in forestry research, development and technologies as a broad measure of indicating the commitment of forest managers and governments to sustainable forest management practices and continual improvement in forest management practices.

Interpretation

Data should be interpreted considering both quantitative and qualitative information available and the State's forest management objectives.

Indicator 6.3a Area of forest available for public recreation/tourism and the use and type of facilities and activities on offer

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Rationale

This indicator identifies the area of land available for public recreation and tourism, and the range and use of recreation/tourism activities on offer. Identifying public recreation and tourism activities is a broad measure of the commitment to managing and maintaining the forest for this purpose to provide benefit and enjoyment for the people of NSW.

Interpretation

The data should detail the provision and availability of forest recreation and tourism over time. Trends will be interrelated in the context of forest management purposes and demand for services.

Indicator 6.4a Area of forest to which Indigenous people have use and rights that protect their special values and are recognised through formal and informal management regimes

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Rationale

This indicator monitors the area of land dedicated to protect Indigenous peoples' values of, and access to, forests. It indicates the need to recognise the multiple use and value of forested land for continuity of Indigenous peoples' cultural, spiritual and social connections to the land.

Interpretation

Data should be interpreted considering the policy measures in place at the State level that protect and recognise Indigenous peoples' connections to the forest and the involvement of Indigenous people to develop those policy measures.

Indicator 6.4b Registered places of non-Indigenous cultural value in forests that are formally managed to protect those values

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Rationale

This indicator monitors places dedicated to protect the values of non-Indigenous cultural needs such as historical, educational, aesthetic and social heritage values within forests. It indicates the need to recognise the multiple use and value of forested land for continuity of non-Indigenous peoples' cultural values.

Interpretation

Data should be interpreted considering the policy measures in place at the State level that protect and recognise non-Indigenous peoples' cultural values associated with forests.

Indicator 6.4c The extent to which Indigenous values are protected, maintained and enhanced through Indigenous participation in forest management

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Rationale

This indicator aims to measure the extent to which Indigenous people participate in forest management. Indigenous people have a strong relationship with the land and this indicator helps identify and highlight the importance of maintaining Indigenous participation in forest management.

Interpretation

Data should be interpreted broadly to demonstrate Indigenous peoples' access to, and involvement with, public participation mechanisms.

Indicator 6.5a Direct and indirect employment in the forest sector

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Rationale

This indicator measures the level of direct and indirect employment in the forest sector. Employment in the forest sector is a direct measure of how forest and forest-contact industries contribute to the NSW economy.

Interpretation

Data should be interpreted to assess direct and indirect employment in forest and forest-contact industries and trends in forest-related employment over time.

Direct employment is defined as employment in the wood and wood-product industries and forest contact industries – that is, those industries in direct contact with forests (e.g. beekeeping, eco-tourism operations, grazing, forest reserve management).

Indirect employment is the 'other' employment generated by direct forest employment. That is, the potential multiplier effect of direct forest employment

Criterion 7: Legal, institutional and economic framework for forest conservation and sustainable management

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Indicator 7.1a Extent to which the legal framework supports the conservation and sustainable management of forests

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Rationale

This indicator outlines the legal framework in NSW and describes how the legislation and policy can support the protection and sustainable management of forests in NSW.

Interpretation

The information should be interpreted considering the coverage, intent and objectives of the legislation at the State level that supports the protection and sustainable management of forests in NSW.

Indicator 7.1b Extent to which the institutional framework supports the conservation and sustainable management of forests

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Rationale

This indicator outlines the institutions and frameworks responsible for contributing to the sustainable management of the States forests. Such institutions include those which help engage the community in the broader process of sustainability and natural resource management decision-making with respect to sustainable forest management.

Interpretation

The information should be interpreted considering institutions and organisations and their policy mechanisms that may contribute to sustainable forest management decision-making at the State level.

Indicator 7.1c Extent to which the economic framework supports the conservation and sustainable management of forests

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Rationale

This indicator should outline Government policies on investment, taxation and trade in an attempt to demonstrate the extent to which economic policy supports the conservation and sustainable management of forests.

Interpretation

The information should be interpreted considering the extent of economic incentives or disincentives related to forest management in NSW and their potential to support the conservation and sustainable management of forests.

Indicator 7.1d Capacity to measure and monitor changes in the conservation and sustainable management of forests

Rationale

This indicator should identify assessment and monitoring systems in place to support and monitor changes and impacts in sustainable forest management.

Interpretation

The information should be interpreted considering the role and tools available at the State level for forest managers to measure and monitor the forest for all its values.

Indicator 7.1e Capacity to conduct and apply research and development aimed at improving forest management and delivery of forest goods and services

Rationale

This indicator should identify the scope of research effort in the forest sector. Developing a scientific understanding of the State's forest ecosystem characteristics and functions is important in assisting with sustainable forest management.

Interpretation

The data will be collected at the State-wide level and should be interpreted to assess the role and extent of forestry research, inventory and the development of assessment methodologies in NSW where possible.

APPENDIX 1

Criterion 1: Conservation of biological diversity

Revised ESFM indicator		MIG (2008) indicator	Original NSW ESFM indicator	Review comments
1.1 *Ecosystem diversity*				
1.1a	Area of forest by forest type and tenure	Area of forest by forest type and tenure	1.1.a Extent of area by forest type (forest ecosystem) and tenure (Eden, LNE, UNE, Southern)	Revised ESFM indicator aligns with the national (2008 revised) MIG indicator
			1.1.a (1) Understorey vegetation layer (Category B) (Southern Only)	Discontinue this subset indicator given it is not cost-effective to monitor, and there are no readily identifiable data sources
1.1b	Area of forest by growth stage	Area of forest by growth stage	1.1.b Area of forest type by growth stage distribution by tenure (UNE, LNE, Southern regions) 1.1 Extent of forest ecosystem types and vegetation types by growth stage (Eden region)	Revised ESFM indicator aligns with the national (2008 revised) MIG indicator
1.1c	Area of forest in protected area categories	Area of forest in protected area categories	No original corresponding indicator	Information on protected areas was reported on within the original 1.1a and 1.1b ESFM indicators
1.1d	Fragmentation of forest cover	Fragmentation of forest cover	Indicator 1.1.e — Fragmentation of forest types (UNE, LNE regions) Indicator 1.1.e — Fragmentation of forest ecosystems (Southern region)	Measures of fragmentation can involve the analysis of configuration, connectivity and composition so the revised ESFM

Revised ESFM indicator	MIG (2008) indicator	Original NSW ESFM indicator	Review comments
		Indicator 1.2 — Extent of connectivity in the forest landscape in relation to threatened species habitat, general retained habitat on public and private land, and conservation reserves (Eden region)	indicator can assess forest cover more broadly to incorporate all aspects of fragmentation and its effect. The revised ESFM indicator aligns with the national (2008 revised) MIG indicator.
1.2 *Species diversity*			
1.2a	Forest-dwelling species for which ecological information is available	Forest-dwelling species for which ecological information is available	1.2.a A list of forest-dwelling species (UNE, LNE, Eden) Southern regions) 1.3.b List of representative species by extent and abundance. Representative sample to include threatened species, key functional groups and indicator species (Eden region)	The old indicators are replaced with 1.2a and 1.2c for monitoring species. Note that revised ESFM indicator aligns with the national (2008 revised) MIG indicator.
1.2b	The status of forest-dwelling species at risk of not maintaining viable breeding populations, as determined by legislation or scientific assessment	The status of forest-dwelling species at risk of not maintaining viable breeding populations, as determined by legislation or scientific assessment	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 (Eden region) Sub indicator 1.2.b.1 The status of endangered populations and ecosystems as determined by legislation or scientific assessment (UNE, LNE regions) 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	Both the original 1.2b and its sub indicators relate to the revised indicator. The revised ESFM indicator aligns with the national (2008 revised) MIG indicator.

Revised ESFM indicator	MIG (2008) indicator	Original NSW ESFM indicator	Review comments
		legislation or scientific assessment (LNE, UNE, Southern region) Sub indicator 1.2.b.1 The status of endangered populations, ecological communities and ecosystems as determined by legislation or scientific assessment (Southern)	
1.2c	Representative species from a range of habitats monitored at scales relevant to regional forest management	Representative species from a range of habitats monitored at scales relevant to regional forest management	1.3.b List of representative species by extent and abundance. Representative sample to include threatened species, key functional groups and indicator species (Eden region)	Revised ESFM indicator aligns with the national (2008 revised) ESFM indicator
1.3 *Genetic diversity*			
	No revised indicator given the original one was an interim measure	No corresponding MIG indicator.	1.3 Management measures in place to maintain species extent and abundance (interim for the first five years of Agreement) (Eden region)	Discontinue use of the ESFM indicator as there are now policy and legislative frameworks in place which will be reported on under Criterion 7
1.3a	NIL	Forest-associated species at risk from isolation and the loss of genetic variation, and conservation efforts for those species	No original corresponding indicator	NSW will not adopt the MIG indicator as there is limited information available. As more information becomes available there is an opportunity to report under indicator 1.2b and 1.3b, which is closely related.
1.3b	Native forest and plantations of indigenous timber species that have genetic resource conservation mechanisms in place	Native forest and plantations of indigenous timber species that have genetic resource conservation mechanisms in place.	No original corresponding indicator	New ESFM indicator to align with the national (2008 revised) MIG-indicator and current best practice management requirements for forests

Criterion 2: Maintenance of productive capacity of forest ecosystems

	Revised ESFM indicator	MIG (2008) indicator	Original ESFM indicator	Review comments
2.1a	Native forest available for wood production, area harvested and growing stock of merchantable and non-merchantable tree species	Native forest available for wood production, area harvested and growing stock of merchantable and non-merchantable tree species	2.1.a Area of forest land and net area of forest land available for timber production (UNE, LNE, Eden, Southern regions) 2.3 Standing volume of log stocks by species groups and diameter at breast height class for multi-aged and regrowth native forest and available for timber production by land tenure (Eden region) 2.1.b Total growing stock of both merchantable and non-merchantable tree species on native forest land available for timber production (UNE, LNE, Southern regions)	The corresponding indicators were originally dealing with all forest land available for timber production. This revised ESFM indicator 2.1a, as well as the revised 2.1b, aligns with the national (2008 revised) MIG indicator and separates native timber harvesting from plantations (see indicator below).
2.1b	Age class and growing stock of plantations	Age class and growing stock of plantations	2.3 Standing volume of log stocks by species groups and diameter at breast height class for multi-aged and regrowth native forest and available for timber production by land tenure (Eden region) 2.1.b Total growing stock of both merchantable and non-merchantable tree species on native forest land available for timber production (UNE, LNE, Southern regions)	See explanation as above
2.1c	Annual removal of wood products compared to the volume determined to be sustainable for native forests, and the future yields for plantations	Annual removal of wood products compared to the volume determined to be sustainable for native forests, and the future yields for plantations	2.1.d Annual removal of wood products compared to sustainable volume (UNE, LNE, Southern regions) 2.1.b Annual removal of timber and non-timber products from forest ecosystems compared with those estimated to be	Revised ESFM indicator aligns with the national (2008 revised) MIG indicator

Revised ESFM indicator		MIG (2008) indicator	Original ESFM indicator	Review comments
			ecologically sustainable by tenure (Eden region)	
			2.1.d Annual removal of timber products and non-timber products from forest ecosystems by volume (Eden region)	
2.1d	Annual removal of non-wood forest products compared to the level determined to be sustainable	Annual removal of non-wood forest products compared to the level determined to be sustainable	2.1.b Annual removal of timber and non-timber products from forest ecosystems compared with those estimated to be ecologically sustainable by tenure (Eden region) 2.1.d Annual removal of timber products and non-timber products from forest ecosystems by volume (Eden region) 2.1.e Annual removal of non-timber forest products (e.g. berries, mushrooms, game, honey, wildflowers, tree ferns and possums) compared to the sustainable level (Southern region)	Revised ESFM indicator aligns with the national (2008 revised) MIG indicator
2.1e	The proportion of the total area of native forest harvested that has been effectively regenerated, and the area of plantation clearfell harvested and the proportion of that effectively re-established	The area of native forest harvested and the proportion of that effectively regenerated, and the area of plantation harvested and the proportion of that effectively re-established	2.1.f Area and percentage of plantation established meeting effective stocking one year after planting (UNE, LNE, Eden, Southern regions) 2.1.g Area and percentage of harvested area of native forest effectively regenerated (UNE, LNE, Eden, Southern regions)	Consistent with MIG indicator but slight change to the wording to emphasise that this is a proportion of the total area harvested

Criterion 3: Maintenance of ecosystem health and vitality

Revised ESFM indicator		MIG (2008) Indicator	Original ESFM indicator	Review comments
3.1a	Scale and impact of agents and processes affecting forest health and vitality	Scale and impact of agents and processes affecting forest health and vitality	3.1.a Area and percent of forest affected by processes or agents that may change ecosystem health and vitality (UNE, LNE, Eden, Southern regions) 3.1 List of biological factors influencing forest health and vitality, including weeds, feral animals, insects and disease (Eden region)	The revised indicator aligns with the national (2008 revised) MIG indicator
3.1b	Area of forest burnt by planned and unplanned fire	Area of forest burnt by planned and unplanned fire	3.2 Impact of fire on forest-related values (Eden region)	The revised indicator aligns with the national (2008 revised) MIG indicator

Criterion 4: Conservation and maintenance of soil and water resources

Revised ESFM indicator		MIG (2008) indicator	Original ESFM indicator	Review comments
4.1a	Area of forest land managed primarily for protective functions	Area of forest land managed primarily for protective functions	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 (UNE, LNE, Southern regions) 4.1 Road density by category and catchment, and stream crossing density by catchment, for the total forest agreement area, including forest and non-forest areas. Calculation of an ecologically sustainable road index and ecologically sustainable crossing index (Eden region)	The revised indicators align with the national (2008 revised) MIG indicators with the intention of providing a more direct measure of catchment health
4.1b	Management of the risk of soil erosion in forests	Management of the risk of soil erosion in forests		
4.1c	Management of the risks to soil physical properties in forests	Management of the risks to soil physical properties in forests		
4.1d	Management of the risks to water quantity in forests	Management of the risks to water quantity in forests		
4.1e	Management of the risks to water quality in forests	Management of the risks to water quality in forests		

Criterion 5: Maintenance of forest contribution to global carbon cycles

Revised ESFM indicator		MIG (2008) indicator	Original ESFM indicator	Review comments
5.1a	Contribution of forest ecosystems and forest industries to the global greenhouse gas balance	Contribution of forest ecosystems and forest industries to the global greenhouse gas balance	5.1.a Total forest ecosystem biomass and carbon pool, and if appropriate, by forest type, age class, and successional stages (UNE, LNE, Eden Southern regions) 5.1.c Contribution of forest products to the global carbon budget (UNE, LNE, Eden, Southern regions)	The revised indicator aligns with the national (2008 revised) MIG indicator to provide a broad measure of the contribution forest ecosystems and forest industries can make to the global greenhouse balance consistent across regions

Criterion 6: Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of societies

Revised ESFM indicator		MIG (2008) indicator	Original ESFM indicator	Review comments
6.1 *Production and consumption*				
6.1a	Value and volume of wood and wood products	Value and volume of wood and wood products	6.1 Average volume and royalty value of logs harvested per annum by species and grade by tenure (Eden region) 6.1.a Value and volume of wood and wood production (Southern)	Revised ESFM indicator aligns with the national (2008 revised) MIG indicator
6.1b	Values, quantities and use of non-wood forest products	Values, quantities and use of non-wood forest products	2.1.b Annual removal of non-timber products from forest ecosystems compared with those estimated to be ecologically sustainable by tenure (Eden region) 2.1.d Annual removal of non-timber products from forest ecosystems by volume (Eden region) 2.1.e Annual removal of non-timber forest products (e.g. berries, mushrooms, game, honey, wildflowers, tree ferns and possums) compared to the sustainable level (Southern region)	Revised ESFM indicator aligns with the national (2008 revised) MIG indicator
6.1c	Value of forest-based services	Value of forest-based services	No original corresponding indicator	Revised ESFM indicator aligns with the national (2008 revised) MIG indicator
6.1d	NIL	Production and consumption and import/export of wood, wood products and non-wood products	No original corresponding indicator	NSW supports the adoption of the MIG indicator at the national level for reporting purposes given the nature of the indicator

Revised ESFM indicator		MIG (2008) indicator	Original ESFM indicator	Review comments
6.1e	NIL	Degree of recycling of forest products	No original corresponding indicator	NSW supports the adoption of the MIG indicator at the national level for reporting purposes given the nature of the indicator
6.2 *Investment in the forest sector*				
6.2a	Investment and expenditure in forest management	Investment and expenditure in forest management	No original corresponding indicator	New indicator
6.2b	Investment in research, development, extension and use of new and improved technologies	Investment in research, development, extension and use of new and improved technologies	No original corresponding indicator	New indicator
6.3 *Recreation and tourism*				
6.3a	Area of forest available for public recreation/tourism and the use and type of facilities and activities on offer	Area of forest available for public recreation/tourism	6.3 Availability and usage of recreation/tourism facilities (Eden region) 6.2.c Number of visits per annum (UNE, LNE, Eden, Southern regions)	Revised ESFM indicator combines with the two national (2008 revised) MIG indicators and includes additional information on types of facilities available
6.3b	NIL	Range and use of recreation/tourism activities available	6.2.c Number of visits per annum (UNE, LNE, Eden, Southern regions) 6.3 Availability and usage of recreation/tourism facilities (Eden region)	This MIG indicator has been combined with the above indicator
6.4 *Cultural, social and spiritual needs and values*				
6.4a	Area of forest to which Indigenous people have use and rights that protect their special values and are recognised through formal	Area of forest to which Indigenous people have use and rights that protect their special values and are recognised	No original corresponding indicator	New indicator, although there were requirements for reporting under Criterion 7, which referred to Indigenous land-use rights

Revised ESFM indicator		MIG (2008) indicator	Original ESFM indicator	Review comments
	and informal management regimes	through formal and informal management regimes		
6.4b	Registered places of non-Indigenous cultural value in forests that are formally managed to protect those values	Registered places of non-Indigenous cultural value in forests that are formally managed to protect those values	6.4.c(ii) Change in condition and number of historic heritage features within the forest estate including recorded places, artefacts, sites, buildings or other structures (Southern region) 6.6 Change in condition and number of recorded places, artefacts, sites, buildings or other structures (Eden region) (this indicator related to both Indigenous and non-Indigenous culture)	Revised ESFM indicator aligns with the national (2008 revised) MIG indicator
6.4c	The extent to which Indigenous values are protected, maintained and enhanced through Indigenous participation in forest management	The extent to which Indigenous values are protected, maintained and enhanced through Indigenous participation in forest management	6.6 Change in condition and number of recorded places, artefacts, sites, buildings or other structures (Eden region) 6.4.c Change in condition and number of recorded places, artefacts, sites, buildings or other structures (UNE, LNE regions) (these indicators related to both Indigenous and non-Indigenous culture) 6.4.c(i) Change in condition and number of Aboriginal cultural heritage features within the forest estate including recorded places, artefacts, sites, or other structures (Southern region)	Revised ESFM indicator aligns with the national (2008 revised) MIG indicator
6.4d	NIL	The importance of forests to people	No original corresponding indicator	NSW supports the adoption of the MIG indicator at the national level
6.5 *Employment and community needs*				
6.5a	Direct and indirect employment in the forest sector	Direct and indirect employment in the forest sector	6.5.a Direct and indirect employment in the forest sector and forest sector employment as a proportion/percentage of	Revised ESFM indicator aligns with the national (2008 revised) MIG indicator

Revised ESFM indicator		MIG (2008) indicator	Original ESFM indicator	Review comments
			total employment (UNE, LNE, Eden, Southern regions)	
			6.4 Employment numbers by type across all forest users in the Eden region	
6.5b	NIL	Wage rates and injury rates within the forest sector	No original corresponding indicator	NSW supports the adoption of the MIG indicator at the national level
6.5c	NIL	Resilience of forest dependent communities to changing social and economic conditions	No original corresponding indicator	NSW supports the adoption of the MIG indicator at the national level
6.5d	NIL	Resilience of forest dependent Indigenous communities to changing social and economic conditions	No original corresponding indicator	NSW supports the adoption of the MIG indicator at the national level

Criteria 7: Legal, institutional and economic framework for forest conservation and sustainable management

Revised ESFM indicator		MIG (2008) indicator	Original ESFM indicator	Review comments
7.1a	Extent to which the legal framework supports the conservation and sustainable management of forests	Extent to which the legal framework supports the conservation and sustainable management of forests	7.1 Extent to which the legal framework (laws, regulations, guidelines) supports the conservation and sustainable management of forests (UNE, LNE, Eden, Southern regions)	Revised ESFM indicator aligns with the national (2008 revised) MIG indicator and provides a narrative on legislation and policy in place to support ESFM
7.1b	Extent to which the institutional framework supports the conservation and sustainable management of forests	Extent to which the institutional framework supports the conservation and sustainable management of forests	7.2 Extent to which the institutional framework supports the conservation and sustainable management of forests (UNE, LNE, Eden, Southern regions)	Revised ESFM indicator aligns with the national (2008 revised) MIG indicator and provides a narrative on institutional frameworks to support ESFM
7.1c	Extent to which the economic framework supports the conservation and sustainable management of forests	Extent to which the economic framework supports the conservation and sustainable management of forests	No original corresponding indicator	New indicator
7.1d	Capacity to measure and monitor changes in the conservation and sustainable management of forests	Capacity to measure and monitor changes in the conservation and sustainable management of forests	7.4 Capacity to measure and monitor changes in the conservation and sustainable management of forests (UNE, LNE, Eden, Southern regions)	Revised ESFM indicator aligns with the national (2008 revised) MIG indicator and provides a narrative on monitoring programs in place to support ESFM
7.1e	Capacity to conduct and apply research and development aimed at improving forest management and delivery of forest goods and services	Capacity to conduct and apply research and development aimed at improving forest management and delivery of forest goods and services	7.5 Capacity to conduct and apply research and development aimed at improving forest management and delivery of forest goods and services (Eden, LNE, UNE, Southern)	Revised ESFM indicator aligns with the national (2008 revised) MIG indicator and provides a narrative on forestry research and its ability to improve forestry management