NSW GOVERNMENT

Coastal IFOA: Monitoring plan

Baselines and trends in wood supply

October 2020

Monitoring strategy summary	
Monitoring strategy	Baselines and trends in wood supply
Version 1.0	8 October 2020

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Part 1: Monitoring strategy details

1.1 Strategy title

Monitoring wood supply baselines and trends

NB: In this document, **'wood supply'** is defined as: The volume, species and grade of native forest high quality logs (large and small), that can be economically and sustainably supplied to the forestry industry from a given region over the short to medium term (e.g. 5 to 20 years), while maintaining forest landscape values (as reflected in the Ecologically Sustainable Forest Management principles in Regional Forest Agreements) over the medium to long term (e.g. 20 to 100 years).

1.2 Protocol 38

- Protocol 38 clause 38.3 (1) (b) The monitoring program must be designed to establish a scientifically valid wood supply baseline to track and evaluate the effectiveness or impacts of the approval on the maintenance of wood supply
- Protocol 38 clause 38.3 (1) (f) The monitoring program must be designed to meet Principles of Ecologically Sustainable Forest Management (ESFM) under the NSW Regional Forest Agreements (RFAs)

1.3 Coastal IFOA timber product requirements

Protocol 31 Part 5: Timber product requirements:

- clause 31.4 (2) A harvesting operation must only be conducted with the purpose of producing high quality large sawlogs, high quality small sawlogs, veneer logs or piles, poles or girder logs
- clause 31.4 (6) Timber volume limits contained in Table 1 (of Protocol 31, Part 5) must be reviewed and updated within 12 months of the commencement of the approval, to align with sustainable yield , calculated and independently verified in accordance with the RFAs (see **Text Box 1**)
- clause 31.4 (7) Timber volume limits contained in Table 1 (of Protocol 31, Part 5) must be maintained to align with sustainable yield, calculated and independently verified in accordance with the RFAs (as current from time to time).

Text Box 1: Regional Forest Agreement commitments

Under the RFAs, NSW committed to manage the availability of timber resources for the state forest estate in each RFA region in accordance with ESFM principles and within sustainable yield limits, including to:

- take account of climate risks and adaptation responses
- ensure that the resource model used to determine **sustainable yield** is maintained and continually improved
- provide periodic reviews of wood product yields (comparing actual volumes harvested against predicted/modelled volumes)
- undertake and make publicly available independent reviews of sustainable yield estimates during each five-yearly review period under the RFAs.

Under the RFAs, **sustainable yield** is defined as:

> '*the long term estimated wood yield from forests that can be maintained from a given region in perpetuity under a given management strategy and suite of sustainable use objectives*'

The RFAs also note that FRAMES (or equivalent) provides a sound basis for volume allocations at the strategic level and will be used to estimate sustainable yield. The RFAs require sustainable yield calculations be based on modelling with the goal of yielding the maximum non-declining yield of high quality logs over a minimum period of 100 years.

Principles of ecologically sustainable forest management (from the RFAs)

> **Principle 1**: Maintain or increase the full suite of forest values for present and future generations across the NSW native forest estate. The aims for forest values include the **productive capacity and sustainability of forest ecosystems**, such as to ensure the rate of removal of any forest products is consistent with **ecologically sustainable levels**.

1.4 Monitoring questions

Landscape-scale trend monitoring:

- Is the Coastal IFOA having a neutral, positive or negative impact on landscape-scale wood supply?

Coastal IFOA condition effectiveness monitoring:

- Are conditions affecting current commitments to meet wood supply?
- Are conditions effectively supporting long-term sustainable wood supply?

1.5 Strategy objective

- Map the trajectory of wood supply from 2003 to present
- Establish a wood supply baseline under previous IFOA conditions for coastal native state forests
- Establish a scientifically valid method to track and evaluate the effectiveness or impacts of the Coastal IFOA on the maintenance of wood supply

- Determine if the Coastal IFOA conditions have met the NSW Government commitment to 'no net change to wood supply' as made ahead of the IFOA remake.[1]

1.6 Strategy summary

The Coastal IFOA requires that the monitoring program assess landscape-scale trends against baselines for wood supply from coastal native hardwood state forests.

Work undertaken by the Commission before the Coastal IFOA came into effect reported that the new conditions may result in reduced wood supply. For example, changes to wood supply could result from conditions that impact on the net harvest area (NHA), for example new threatened ecological community (TEC) mapping, or tree retention conditions for protecting threatened species and biodiversity.

Trend monitoring of actual harvest volumes and wood supply modelling will be used to:

- indicate whether the Coastal IFOA conditions are affecting wood supply over time and, if yes
- evaluate volumetric impacts and the specific conditions that are impacting wood supply.

It will do this by:

- considering trends in historic wood production data from 2003 to 2019 (i.e. actual yield not modelled) and the various factors influencing trends over time (e.g. changes to net harvest areas, introduction of new harvesting conditions or changed harvesting practices, commitments in wood supply agreements, market fluctuations (e.g. pulpwood market availability), and policy issues (e.g. Boral buyback)) – this may also consider published reconciliations[2] of historic actual and modelled wood yields
- establishing a modelled baseline wood yield from native coastal state forests under conditions in the previous IFOAs
- establishing a modelled wood yield from native coastal state forests under new conditions in the Coastal IFOA, including understanding how the changed conditions alter wood supply modelling assumptions
- evaluating modelled yield data from both scenarios to understand if the Coastal IFOA conditions are likely to have an impact on wood yield
- reconsidering modelled wood yields under the Coastal IFOA conditions over time as implementation data becomes available, noting that full implementation of Coastal IFOA conditions has not yet occurred.[3]

Preferred modelling approach:

The preferred modelling approach for this method is to use the Forest Resource and Management Evaluation System (FRAMES), which allows for interrogation of wood supply at multiple scales including the strategic and tactical levels.

[1] EPA (2014) *Remake of the Coastal Integrated Forestry Operations Approvals Discussion paper February 2014.*
[2] Forestry Corporation of NSW (n.d.), webpage accessed 15 April 2020, https://www.forestrycorporation.com.au/about/pubs/timber-volumes-and-modelling/auditor-generals-performance-audit-of-native-forest-and-hardwood-plantation-operations
[3] Transitional arrangements under Protocol 40 allowed FCNSW to continue planned forestry operations under previous IFOA conditions for two years, although this was changed in November 2019 to require specific approval by the EPA for existing approved operations to continue. The 2019-20 fires have also delayed implementation of the Coastal IFOA conditions as operations in burnt areas are being planned, approved and conducted under site specific conditions.

A key part of the modelling approach will be to evaluate the modelling assumptions used in FRAMES, under the conditions in the previous IFOAs, and under the Coastal IFOA conditions. This will include field assessments over time to revise NHA modifiers and strike rate modifiers used in modelling wood supply.

2019-20 fires:

Since the monitoring program was developed, the 2019-20 fires in NSW impacted around 890,000 hectares of native state forests, including between 40 to 80 percent of the net harvest area of native coastal state forests, and 15 percent of north coast hardwood plantations.[4] In addition, approximately 50 percent of growth plots and inventory plots have been burnt. The fires have had an impact on landscape values and potentially wood supply in the short- to medium-term. Fire impacts will be taken into consideration when developing wood supply baselines and when considering impacts of the Coastal IFOA conditions on wood supply.

1.7 Outline of methods and approach

Landscape-scales to be considered:

The assessment will consider different landscape scales, as wood supply impacts could vary significantly across the landscape. These scale issues can be important for assessing the economic delivery of timber under the wood supply agreements. The landscape scales to be considered, where relevant, include:

- supply zone and price zone
- Regional Forest Agreement regions or sub-regions / Coastal IFOA sub-regions
- north coast and south coast NSW geographic regions
- Coastal IFOA region.

What is wood supply?

Wood supply can be defined and interpreted in many ways, for example:

- the supply levels reflected in wood supply agreement volumes
- the actual volumes of timber produced and supplied to industry on an annual basis
- the standing volume of timber and modelled long-term wood supply available (sustainable yield) used to inform allocation volumes to industry
- any of the above, broken down into species, log grades and other specifications.

Furthermore, wood supply can be estimated and reported at various scales – notably, regional scale (e.g. north coast), sub-regional scale (supply or price zone), or site level (e.g. coupe or compartment). Different methods are used to estimate wood supply at different scales and over different time periods.

Wood supply can vary between years because of age class distributions (i.e. the profile of forest growth stages and prescribed cutting cycles and rotations) as well as operational restrictions, such as wet weather constraints on access for harvesting and transport and market demand.

Economic viability is a further important consideration, as wood volumes in very difficult to access areas, areas where yields are very low, or areas a long way from the delivery destination may be theoretically available, but not feasible to realise in practice.

[4] Forestry Corporation of NSW (2020), *Impact of fires 2019-20*, webpage accessed 8 April 2020, https://www.forestrycorporation.com.au/operations/fire-management/fire-impact-of-2019-20

Given the potential ambiguity in the interpretation of 'wood supply', this method has adopted a specific meaning:

> **Wood supply** is defined as: The volume, species and grade of native forest high quality logs (large and small), that can be economically and sustainably supplied to the forestry industry from a given region over the short to medium term (e.g. 5 to 20 years), while maintaining forest landscape values (as reflected in the Ecologically Sustainable Forest Management principles in Regional Forest Agreements) over the medium to long term (e.g. 20 to 100 years).

Trends in actual yield

- The key aspect of this monitoring strategy is to establish the impact, if any, that the Coastal IFOA conditions have on landscape-scale wood supply values, including:
  1. the historic trajectory of actual harvest volumes from native, coastal state forests
  2. the effect that implementation of the Coastal IFOA has on the trajectory of wood supply.
- Actual wood supply yields will be considered based on the following table:

Trends	Description
(1) Historic actual yields under previous IFOA conditions (2003 – 2019)	Trends in historic wood production/harvest volumes will be assessed using available data for actual annual yields from 2003 to 2019 (i.e. under previous IFOA conditions) This will be based on harvest volumes to identify longer-term trends in wood supply Volume metrics for this assessment will include: ▪ log grade and size ▪ species or species grouping. Significant changes that have potentially affected timber yield or net harvest areas, such as the transfers of state forest to National Parks estate, will be overlaid to inform the assessment of trends and what may have directly or indirectly influenced the trajectory Note: historical data may be challenging to work with as data collection and storage methods, and data collection requirements, have changed significantly over time. Historical market movements might not be clear.
(2) Actual yields under Coastal IFOA conditions (2019 onwards)	Wood production volumes (actual annual yields) will continue to be monitored and assessed annually using harvest volumes, net harvest areas and exclusion areas. Actual yield will need to be tracked over several years to assess the potential impact of the Coastal IFOA on trends in harvest volumes. This is because annual actual wood supply can vary due to weather and market conditions, and the Coastal IFOA allows annual harvest volumes to vary by up to 25 percent from annual limits. Note: significant changes in wood supply (harvest locations, volumes and species, and hardwood plantation volume harvested etc) are expected to be seen in the short-term in response to the 2019-20 fires.

Modelled yield

Wood supply modelling will be used to establish the baseline wood supply under previous IFOA conditions and changes due to the implementation of Coastal IFOA conditions.

Two scenarios for wood supply modelling will be developed in accordance with the following table:

Scenarios	Description
(1) Wood supply under previous IFOA conditions (pre-2019) **NB: baseline wood supply**	This will assess the modelled sustainable yield volumes under the previous IFOA conditions, i.e. this will model what yield would occur if the previous IFOA conditions continued. Modelling platform: FRAMES, using 100-year modelling period The baseline FRAMES model will adopt the following parameters: ▪ primary modelling objective: to maximise high quality log production under **previous IFOA conditions**, across the region and to meet ecological sustainable forest management commitments ▪ industry supply commitments as reflected in Wood Supply Agreements immediately prior to the Coastal IFOA coming into effect ▪ latest remote sensing data including LiDAR for predicting the location of steep terrain and drainage features, as well as native forest inventory estimates and other yield estimates ▪ current inventory data for both native forests and hardwood plantations (*NB: to be kept as a consistent input across both modelling scenarios*). This will establish a long-term sustainable yield baseline under previous IFOA conditions. A key step in this initial stage will be to interrogate elements of FRAMES (i.e. Woodstock and its LP Solver) to establish which constraints are binding and which are slack. The binding constraints should be examined carefully to see it they are relevant, or they can be relaxed. Note: existing FRAMES modelling work (DPI, 2018) cannot be used for this scenario as it will not ensure that all required parameters are kept constant between modelling scenarios. For example, hardwood plantation modelling has been updated since the 2018 work was undertaken. The modelling reported in DPI (2018) relaxed some commercial constraints that potentially should be retained in FRAMES to reflect economically viable wood supply under prevailing market conditions. Further, the Tumut sub-region model used in the 2018 work had not been updated since 2008.
(2) Wood supply under Coastal IFOA (post-2019)	This scenario will assess the modelled sustainable yield volumes under the Coastal IFOA conditions. It will utilise the same FRAMES parameters, inputs and 100-year modelling period as used in the baseline scenario, and only alter those elements that need to change to reflect any Coastal IFOA conditions that are new or different to the previous IFOA conditions. Changes required are likely to include the NHA modifiers and strike rate modifiers used in FRAMES. This will require new NHA modifier and silviculture field studies to assess the actual impact of the new conditions (such as clumps and tree retention, and silviculture limits), to be undertaken during harvest planning over the first 2-5 years of full implementation of the Coastal IFOA. This allows modelled wood supply under the Coastal IFOA to be compared with the wood supply that would be expected if the Coastal IFOA had not been implemented (i.e. previous IFOA conditions had continued).

Comparisons will be made of the following:

- log grade and size (high quality large and high quality small)
- species or species grouping
- supply zone and price zone
- haulage distance between harvest and supply nodes.

Species or species groupings

The species or species groupings that will be considered in the analysis of historic wood yield data (if available) and in the modelled yield scenarios are tabulated below for:

- North Coast – Upper North East and Lower North East regions
- Southern region (includes South Coast and Tumut sub-regions)
- Eden region.

Species and groupings in Upper North East and Lower North East regions

#	Species or grouping	Species in groupings
1	Blackbutt	Blackbutt (*Eucalyptus pilularis*)
2	Spotted gum	Spotted gum (*Corymbia maculata*)
3	Big 3 Hardwoods	Blue gum (*E. saligna*), tallowwood (*E. microcorys)* and brush box (*Lophostemon confertus*)
4	New England Hardwoods	High quality log species that occur in association in tablelands forests across northern NSW, including New England blackbutt (*E. campanulata*), messmate (*E. obliqua*), ribbon gum (*E. nobilis*), brown barrel (*E. fastigata*), peppermints (e.g. *E. radiata* and *E. dives*) and various stringybark species (e.g. *E. laveopinea* and *E. cameronii*).
5	Other Hardwoods	All other species not covered in the previous groups

Species and groupings in Southern region

#	Species or grouping	Species in groupings
1	Spotted gum	Spotted gum (*C. maculata)*
2	Alpine ash	Alpine ash (*E. delegatensis*)
3	Brown barrel	Brown barrel (*E. fastigata*)
4	Other hardwoods	Includes blackbutt (*E. pilularis*), bluegum (*E. saligna*) and the ironbark (e.g. *E. fibrosa* and *E. crebra)* and stringybark species groups (e.g. *E. laveopinea* and *E. cameronii*), which typically make up remaining minor components

Species and groupings in Eden region

#	Species or grouping	Species in groupings
1	Silvertop ash	Silvertop ash (*E. sieberi*)
2	Brown barrel	Brown barrel (*E. fastigata*)

3	Other hardwoods	Includes stringybark/gum forest types (e.g. *E. muellerana* and *E. cypellocarpa* amongst others) in the coastal and foothills forests, which typically make up remaining minor components

Inventory validation post 2019-20 fires

Given the scale of impacts from the 2019-20 fires across net harvest areas in coastal state forests, it is anticipated that field assessment of inventory plots may be required to validate inventory inputs into FRAMES. This field work would be conducted by FCNSW staff and may take up to two years to complete.

1.8 Summary of approach to develop baselines and benchmarks for adaptive management

A wood supply baseline will be set during the first three years of the program.

The NSW Government made a commitment ahead of the remake of the four coastal IFOAs that new conditions would result in no net change to wood supply. Where the modelled yield is shown to result in a potential change in yield, the model will be tested to identify the condition or conditions impacting wood supply.

When developed, the FRAMES spatial platform may also be used to determine the trajectory of wood supply within coastal state forests under different scenarios including different forest management practices and climate change.

Under the RFAs there are requirements for NSW to conduct an independent audit of sustainable yield calculations at least once every five-year period and to conduct reconciliations of actual and modelled yields twice every five-year period (i.e. in the third and fifth years).

Benchmarks will be established against the modelled yield scenarios and reconciled against the actual yield. A suitable approach for setting benchmarks and a time period over which they will be considered (e.g. 5, 10 or 20 years) will be determined during detailed development.

1.9 Existing programs and data that will inform the strategy

- Regional Forest Agreements - reporting, continual improvement programs, independent audits of sustainable yield calculations, and reconciliations of actual and modelled yields
- Coastal IFOA reporting (Forestry Snapshots prepared by EPA)
- Australia's State of the Forests reporting

1.10 How the data will be stored, analysed and presented

- Data will be collected and stored to the standards set out in the Forest Monitoring and Improvement Program data management system, including analysis and presentation, then made available for integration with the state-wide forest monitoring program analysis platform.

1.11 Expected strategy outcomes

- Monitor the effectiveness of the Coastal IFOA conditions at a landscape scale

1.12 Linkages and uses with the overall NSW Forest Monitoring and Improvement Program Framework

- Will inform and rely on information for the overall program.

Part 2: Timeline		
Activity description	**Start date**	**End date**
Design a new NHA modifier project	March 2021	June 2021
Design a new silviculture model project	March 2021	June 2021
Implement NHA modifier project	July 2021	June 2023
Implement silviculture project	July 2021	June 2023

Part 3: Milestones		
Milestone description	**Start date**	**End date**
1. FRAMES run under previous IFOA conditions	January 2023	June 2023
2. FRAMES run under Coastal IFOA conditions with new NHA and silviculture models	July 2023	September 2023
3. Report impact of Coastal IFOA conditions on yields	September 2023	November 2023