



**North East NSW
Forestry Hub**

Making The Timber Supply Chain More Bushfire Resilient



1 March 2025

www.nenswforestryhub.com.au

| Project name | | Making the timber supply chain more bushfire resilient | | | | | |
|-----------------------|-----------------|---|-----------------|------------------|---------------------------|------------------|-------------|
| Document title | | Making the timber supply chain more bushfire resilient Making the timber supply chain more bushfire resilient | | | | | |
| Project number | | 12605017 | | | | | |
| File name | | NE NSW Forestry Hub.docx | | | | | |
| Status Code | Revision | Author | Reviewer | | Approved for issue | | |
| | | | Name | Signature | Name | Signature | Date |
| S4 | B | P. de Mar, D Hood, M George | M George | On file | P de Mar | On file | 28/2/2025 |



GHD Pty Ltd ABN: 39 008 488 373

133 Castlereagh St, Level 15

Sydney, NSW 2000, Australia

T 02 9239 7100 | E paul.demar@ghd.com | ghd.com

Acknowledgments

This report was commissioned by the North East NSW Regional Forestry Hub with funding provided by the Australian Department of Agriculture, Fisheries and Forestry. The report was prepared by GHD Pty Ltd. The principal author from GHD was Paul de Mar. GHD's Mick George, Duncan Hood, and Pippa Fernandes all provided valuable contributions.

GHD acknowledges and thanks FCNSW for its support of the project especially Justin Williams for enabling targeted inspections of plantations and native forest impacted by the 2019-20 bushfires. Special thanks also go to Peter Walters and Tom Halliday from FCNSW and Andrew Hurford from Hurford Hardwoods for their guidance and assistance with the Clarence Valley and Northern Rivers pilot studies. Thanks also go to Rebel Talbert who provided constructive review comments on the draft report.

GHD also acknowledges and thanks the NSW RFS, including Melissa O'Halloran for advice on the BFRMP planning process, and Stuart Watts and Daniel Ainsworth for allowing the NE NSW Forestry Hub to have input to the Clarence Valley and Northern Rivers BFRMP planning processes.

Lastly, but not least, GHD also acknowledges and thanks Nick Cameron, Manager of the NE Forestry Hub, for his support, collaboration and constructive feedback throughout the project.

© GHD 2025

This document is and shall remain the joint property of the North East NSW Forestry Hub and GHD. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

Contents

| | |
|---|-----------|
| Acknowledgments | 1 |
| Key Findings | 3 |
| 1. Introduction | 6 |
| 1.1 Purpose of this report | 6 |
| 1.2 Scope and limitations | 6 |
| 1.3 Assumptions | 7 |
| Part A – Review on the impacts of the 2019-20 Bush fires on the North East NSW Timber | |
| 2. Impacts of 2019-20 fires on North East NSW forest resources | 9 |
| 2.1 Survey | 15 |
| 2.2 Loss and Damage to Infrastructure in the forestry supply chain | 16 |
| 2.3 Indirect longer-term losses | 16 |
| Part B - Review of Bush Fire Risk Management Plan process | 17 |
| 3. The NSW Bush Fire Risk Management Planning process | 18 |
| 3.1 Second generation bush fire risk management plans | 18 |
| 3.2 Third generation bush fire risk management plans | 21 |
| 3.3 Sample extracts from 3Gen BFRMPs | 22 |
| 4. Potential opportunities for better use of the NSW BFRMP system to reduce bushfire risk to the timber supply chain | 25 |
| 4.1 Provide NSW RFS with harvestable private forest spatial data | 25 |
| 4.2 NSW Forestry Hub identify and map ‘significant timber supply source areas’ | 25 |
| 4.3 Fire protection strategies for significant timber supply source areas | 25 |
| 5. Potential barriers to adoption of timber supply source area fire protection strategies | 32 |
| 6. Part B Recommendations | 34 |
| Part C – Pilot study – Improving consideration of timber supply chain assets in Section 52 bushfire risk management planning | 35 |
| 7. Pilot study area | 36 |
| 7.1 Selecting a pilot study area | 36 |
| 7.2 Resource mapping and focus area selection | 37 |
| 7.3 Timber supply chain value awareness raising and forestry ‘Focus Area’ advocacy to BFMCS | 39 |
| 8. Part C Recommendations | 41 |

Key Findings

2019/20 bushfire impacts

The State forests in northern NSW contain a mix of regrowth forest that has been harvested and regenerated for more than 100 years and areas of high environmental value that are managed for conservation. There are more than 450,000 hectares of native forest in the Upper North East sub-region and 386,000 hectares of native State forest in the Lower North East sub-region of the north coast Regional Forest Agreement (RFA). Around 60 per cent of the Upper North East sub-region and 40 per cent of the Lower North East sub-region was impacted by fires during 2019-20. ABARES (2023) have reported that the North Coast region plantation coverage reduced from 94,500 ha in 2018/19, to 69,200 ha in 2019/20 and further to 67,400 ha in 2021/22.

NSW Forestry Corporation (2020) modelled a 4% reduction in high quality logs (m3) for the North East RFA region for 2020-2031 year range, for an annualised sustainable yield of 230,000 m3 of high quality logs. Field inventory for full review of impacts on sustainable yields is ongoing and but is yet to be completed.

Since the 2019-20 bushfires Forestry Corporation has adopted additional environmental safeguards above the requirements of the strict ruleset in place in NSW, the Coastal Integrated Forestry Operations Approval, to balance providing timber to local industry employing local people to produce important timber products and ensuring the forests can regenerate after the bushfires. These measures reduced the scale, number and intensity of operations in coastal forests, while severe wet weather also reduced operations. Harvesting restrictions were also applied to unburnt public forests as these forests were considered important wildlife refuges. In contrast, restrictions on salvage harvesting of private native forests were limited and no restrictions applied to the salvage harvesting of plantations.

NSW Bush Fire Risk Management Planning System

Under statutory requirements of the Rural Fires Act 1997, all-tenure, inter-agency Bush Fire Risk Management Plans (BFRMPs) are prepared by Bush Fire Management Committees (BFMCs), in accordance with planning models approved by the NSW Bush Fire Coordinating Committee.

BFMCs are made up of a range of stakeholders with the general aim of ensuring the whole community has a say on bush fire management activities¹. Forestry Corporation of NSW (FCNSW) must be invited to be a member of any BFMC in which it has land tenure interests. To GHD's knowledge, no private forestry sector representatives participate in any of the BFMCs in the NE NSW forestry hub area, or anywhere else in NSW. The only BFMCs in the NE Forestry Hub area to date which have third generation (3Gen) BFRMPs in place are Hunter, Lower Hunter, and Coffs Coast BFMCs – all other BFRMPs covering the NE Forestry Hub area are 2Gen BFRMPs (some well overdue on their five years review cycle). There are significant differences between 2Gen and 3Gen bushfire risk management planning requirements and also in the support products provided by NSW RFS to BFMCs for the different plan types.

A number of opportunities exist for taking better advantage of the 3Gen BFRMP process as a means to better identifying bushfire risks to the timber supply chain and improving risk reduction in the NE NSW Forestry Hub region (Part B of this report provides more detailed analysis of the opportunities). The importance of private native forests and plantations to the timber supply chain has never been considered in bush fire risk management planning by BFMCs principally because harvestable private forest spatial data has never been provided to the NSW RFS for inclusion in the planning process – this should be addressed as part of the 3Gen BFRMP process. Using a combined data set for both private and public harvestable forest resource areas, in consultation with the timber supply and processing industry, the NE NSW Forestry Hub could identify and map the key areas considered by the local/regional timber industry to be the most critical areas for enhanced bushfire protection. These areas could then be properly factored-in to bushfire risk management planning.

¹ The mission of BFMC's (as per the BFMC Charter) is to 'ensure that bush fire management is adequately assessed and designed for holistic protection of the community, based on a tenure blind, cooperative and coordinated approach that utilises community and interagency involvement'

Reducing bushfire risk to the timber supply chain

Key strategies for reducing bushfire risk to the timber supply chain include:

1. Hazard reduction within the key timber supply source areas to mitigate the extent and degree of damage from fires that spread into the key areas.
2. Hazard reduction off-estate in fire paths toward key timber supply source areas.
3. Identification and maintenance of strategic trail networks which can be used for indirect firefighting methods (backburning) to prevent unplanned fires spreading into key timber supply source areas.
4. Early detection and control of new fires while small and able to be controlled.

The reasoning which supports the adoption and improvement merits for these strategies is provided at Section 4.3 of this report.

Over at least the last ten years, despite hazard reduction burning (and to a lesser degree mechanical forms of hazard reduction) being identified in existing BFRMPs as a key fire risk reduction strategy, in practice, in timber supply source areas, hazard reduction burning has been applied on a very small to negligible scale with the result that fuel loads are uniformly high across timber supply areas except where wildfires have impacted (which they did on an unprecedented scale in 2019/20). Hazard reduction burning in private harvestable forests is close to non-existent. The extent to which hazard reduction burning is applied across the NE Forestry Hub region is reported and analysed in Part B of this report.

Capabilities for early fire detection and rapid initial attack response in key timber supply source areas are significantly constrained, such that in drought-affected years, even with the enhanced capabilities provided for NSW RFS and NPWS following the 2020 NSW Bushfire inquiry, it can reasonably be expected that a significant proportion of fires in, or upwind of, key timber supply source areas will not be able to be contained and thus can be expected to develop into large, high intensity and impact fires upon the development of adverse fire weather conditions.

There are substantial barriers to the adoption of more proactive bushfire risk mitigation measure implementation for improved timber supply chain protection, noting all options come with significant recurrent annual costs (noting that inaction is associated with heavy recurrent damage/losses). It is beyond the scope of this project to quantify the extent or cost of bushfire risk mitigation measures for improved timber supply chain protection – the focus of this report is how the NSW coordinated BFRMP process can be better leveraged to identify key at-risk timber supply source areas and processing areas, and the key strategies which can be pursued to better manage bushfire risk (Section B of this report sets out how the BFRMP process can be used to better differentiate risks to the timber supply chain, and Section C identifies how timber supply chain risk identification improvement processes were applied in pilot studies in the Clarence Valley and Northern Rivers BFRMPs).

With regard to pursuing funding for fire protection infrastructure improvement for enhanced protection of the timber supply chain and implementing works pursuant to improved management of identified risks, a best practice example is the recent \$13M grant funding for Murray Region (MR) plantation forests², advocated for by MR Forestry Hub. This is a best in class tenure blind/multi stakeholder approach and provides an exemplar for how NE Forestry Hub might wish to pursue similar grant funding opportunities, in particular within the new and expanded Focus Areas identified in Clarence Valley and Northern Rivers BFRMPs, identified through this project.

² <https://www.nsw.gov.au/ministerial-releases/new-fire-protection-projects-to-help-protect-southern-nsw-plantation-forests>

Post-pilot study recommendations

As a result of undertaking the pilot study in CV and NR BFMC areas, the following follow-up steps and opportunities have been identified and are recommended to the NE Forestry Hub:

1. **Updates on the CV and NR BFRMP finalisation should be provided to the NE Forestry Hub.**
Finalisation of BFRMPs (BFMCs) – As at 19 February 2025, both the Clarence Valley (CV) and Northern Rivers (NR) Bush Fire Risk Management Plans remain in the ‘under development’ stage with the next step in the planning process to be the ‘public exhibition’ phase. As at 19 February 2025, it is understood the revised draft BFRMPs for CV and NR (with revised ‘focus areas’) are with RFS awaiting re-running of the Phoenix RapidFire Risk modelling.
2. **Review of fire trail adequacy in forestry ‘Focus Areas’ (FCNSW with input from NE NSW Forestry Hub)** – the opportunity to strengthen/improve fire trail networks can be pursued once the CV and NR BFRMPs are finalised, approved by the NSW Bush Fire Coordinating Committee, and published. The opportunity should be pursued by FCNSW through the BFMC Fire Access and Fire Trail (FAFT) plan review process. Through this process, fire trails of high strategic value for protection of key timber resource supply areas within the ‘focus areas’ can be nominated and designated as Strategic Fire Trails in each BFMC FAFT plan, which are afforded the highest level of prioritisation for improvement and maintenance works, potentially also improving prospects for obtaining funding from the Strategic Fire Trails Funding Program administered by the NSW RFS.
3. **Timber value bushfire risk and mitigation awareness program targeted to private plantation/forest owners/managers (NE NSW Forestry Hub).** Well managed and actively maintained forests and plantations can be more resilient to bushfire damage than forests/plantations subject to passive management with heavy fuel accumulations and substandard access. Property owners have varying degrees of awareness about the vulnerability of forests and plantations to fire damage. There may be an opportunity for the Hub to develop extension materials directed to enhancing private land owner knowledge of merchantable species resilience/vulnerability to bushfire damage and management actions which can improve forest/plantation resilience to fire. Management actions should not be limited in scope to hazard reduction burning and fire access provision – other property management activities including mechanical clearing, regrowth control, and grazing management (among other activities) are worthy of coverage.
4. **FCNSW internal review of hazard reduction burning program scale and design in focus areas.** The designation of key timber supply resource areas within BFRMP ‘Focus Areas’ may attract more attention from the BFMC about risk reduction measures directed to reducing the identified risks in the ‘focus areas’. The designation of the ‘focus areas’ provides an opportunity for FCNSW to review and develop a strategic plan for hazard reduction burning in the focus areas to improve resilience and fire protection levels for the timber assets therein.
5. **FCNSW should be encouraged to develop a NE NSW regional map showing the relative importance of their State forest assets (hardwood and softwood).**
6. **Advocacy for a NE Forestry Hub Fire Protection Fund grant scheme.** NE Forestry Hub should consider the recent success of the Murray Region Forestry Hub in advocating for the establishment, by the NSW Government, of a Fire Protection Fund to provide protection of critical timber supplies in the Murray region. Consideration should be given to scoping a program of fire protection improvements in the NE Forestry Hub, potentially prioritised to the Focus Areas identified in the CV and NR BFRMPs.

1. Introduction

GHD was engaged by the North East NSW Forestry Hub (the Hub) to investigate and evaluate the impacts of the 2019-20 bush fires in North East NSW on timber assets, and the role, effectiveness and efficiency of bush fire planning, management and resourcing in valuing and protecting forest resources.

1.1 Purpose of this report

Part A of this report is to enable a high-level semi-quantitative estimate of the fire-caused loss and damage occasioned across different segments of the timber industry supply chain, GHD has used desktop studies and an online survey to elicit information on:

- Direct fire loss and damage to timber resources
- Direct fire loss and damage to infrastructure used as part of undertaking forest/plantation access, protection, tending/silviculture, harvesting and log haulage (e.g. damage cause to bridges, crossings, roads, culverts/drains, signage, and fire protection and other multiple-use infrastructure)
- Indirect longer-term losses/financial impacts caused by reductions in woodflow including harvest and haulage volumes, reduced and/or altered wood supply to mills, impacts of charred logs on mill equipment, workforce reductions due to fire impacts
- Estimate of unrecoverable business losses attributable to reduced wood supply post-fire

Part B of this report is to enable the Hub to understand the bush fire risk management planning (BFRMP) process applied by statutory bush fire management committees, in particular how risks associated with the timber industry supply chain are taken account of in BFRMP in northern NSW. Differences between second generation (2Gen) BFRMPs and third generation (3Gen) BFRMPs are outlined and opportunities for improving assessment and treatment of risks to the timber supply chain risks are discussed.

The purpose of Part C of this report is to show through a pilot study how timber industry interests may be better served in the future through the BFRMP process.

1.2 Scope and limitations

This report: has been prepared by GHD for [Client name] who is contracted to the Commonwealth and may only be used and relied on by [Client name] for the purpose agreed between GHD and [Client name] as summarised in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than [Client name] arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the agreement between GHD and the Hub dated 19 April 2023.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 1.3 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

1.3 Assumptions

This report is based on the following assumptions:

- GHD have used publicly available spatial data sets accessed from agency websites. It was beyond the scope of this project to audit or otherwise validate the accuracy of those data sets.
- Information provided by respondents to the survey has been assumed to be correct, following clarification of items as needed.
- Prescribed burning data (NPWS fire history data) downloaded from the NSW Government's Sharing and Enabling Environmental Data (SEED) portal is sufficiently accurate for the purposes of this report.
- Spatial data pertaining to the extent of harvestable private and public forests and NSW is sufficiently accurate for the purposes of this report.

Part A

Review on the impacts of the 2019-20 Bush fires on the North East NSW Timber industry

2. Impacts of 2019-20 fires on North East NSW forest resources

The New South Wales 2019-20 bushfire season was the worst in living memory. Over 5.4 million hectares of land was burnt including over 4 million hectares of forest between August 2019 until February 2020. Over 2.3 million hectares of burnt land was located within LGAs that coincide with the North East NSW Forestry Hub region (Table 1).

The North East NSW Forestry Hub Region extends from the Hawkesbury River in the south to the Queensland border in the north. It has 5.84 million hectares of forest and 60% forest cover making it one of the most heavily forested regions in Australia. Forest ownership is split equally between the public and private sector.

Within the region there is just under 900,000 hectares of publicly owned State forest managed by the Forestry Corporation of NSW and 2.83 million hectares of private forest managed by over 10,000 private owners. The State forests include: 836,000 hectares of native regrowth forest, of which ~ 40% is available for timber production with the balance managed for environmental conservation, The State forests also include 29,000 hectares of hardwood plantation and 26,000 hectares of softwood plantation. On private land there is ~12,000 hectares of plantation most of which is hardwood. Within Northern NSW, which has a similar private property boundary to the NE NSW region, 490,000 hectares of native forest was approved for private native forestry since 2011.

The native working forests in the region contain a mix of even and multi-aged regrowth forest that was harvested and regenerated for more than 100 years and areas of high environmental value that are set aside for conservation. There are more than 450,000 hectares of native State forest in the Upper North East sub-region of the north coast Regional Forest Agreement (RFA). Around 60 per cent of this area was impacted by fires during 2019-20. In this region, around 200,000 hectares are designated as available for timber production and the rest of the forest is managed for conservation. Around 60 per cent of the net harvest area available for timber production was impacted by fires this season. There are around 386,000 hectares of native State forest in the Lower North East sub-region of the north coast Regional Forest Agreement. Around 40 per cent of this area was impacted by fires during 2019-20. In this region, around 155,000 hectares are designated as available for timber production and the rest of the State forest area is managed for conservation. Around 38 per cent of the net harvest area available for timber production was impacted by fires.

One third of the publicly owned State forest estate³ and 25 percent of private forest with a private native forestry approval within this region was subject to hot fire or crown fire (Table 1, Figure 2-1 and Figure 2-2). ABARES⁴ have reported that the North Coast region plantation coverage reduced from 94,500 ha in 2018/19, to 69,200 ha in 2019/20 and further to 67,400 ha in 2021/22. The 2019-20 fires burnt around half the Grafton softwood resource and destroyed the facility of the local processor, which will not be rebuilt. More than 4-million pine trees have been replanted across 4,000 hectares of pine forests, impacted by bushfires at Grafton since the fires⁵.

In terms of indicative impacts of the fires on replacement value, for the softwood plantations Forestry Corporation have indicated that the replanting cost is approximately \$3000/ha. Preparatory works costs before replanting varies by age class. For 0 – 12 year old plantations, salvage is minimal and an additional cost of approximately \$1000/ha is needed to clear and prepare the site for planting. For 12-18 year old plantations, some salvageable product effectively offsets these costs. For 18 – 24 year old plantations, the rotation is effectively cashed out at approximately 50% of the final estimated value (depending on fire intensity), while those plantations >25 years has a 25% reduction in expected final value.

For hardwood plantations, establishment costs have been estimated to be in the range of \$2500 – 6000/ha at a stocking rate of more than 1000 tree/ha.

³ Forestry Corporation. (2020). *2019-20 Wildfires NSW Coastal Hardwood Forests Sustainable Yield Review*. https://www.dpi.nsw.gov.au/_data/assets/pdf_file/0007/815146/report-survey-nsw-north-coast-private-native-forest-harvesting-contractors.pdf

⁴ ABARES 2023, Australian plantation statistics 2023 update, ABARES, Canberra, August, CC BY 4.0. DOI: <https://doi.org/10.25814/hhk8-4x26>.

⁵ **Forestry Corporation - Regrowing the state's legacy in timber**

| BFMC area | Total area (ha) | Harvestable private forest (ha) | Harvestable public forest (ha) | Total burnt area 2019/20 fires (ha) | % Area burnt |
|---------------------|-------------------|---------------------------------|--------------------------------|-------------------------------------|--------------|
| Far North Coast | 237,695 | 3,276 | 0 | 4,605 | 2% |
| Northern Rivers | 795,502 | 59,140 | 91,326 | 132,247 | 17% |
| Northern Tablelands | 2,142,500 | 25,495 | 100,263 | 317,920 | 15% |
| Clarence Valley | 1,044,121 | 86,224 | 195,845 | 433,777 | 42% |
| Mid North Coast | 277,800 | 9,407 | 73,597 | 21,821 | 8% |
| Lower North Coast | 486,848 | 38,968 | 54,306 | 204,245 | 42% |
| New England | 1,813,300 | 15,573 | 72,323 | 351,223 | 19% |
| Tamworth | 965,325 | 10,911 | 22,671 | 33,121 | 3% |
| Mid Coast | 1,310,882 | 102,012 | 195,333 | 294,237 | 22% |
| Liverpool Range | 1,818,136 | 15,890 | 8,651 | 9,729 | 1% |
| Hunter Valley | 275,900 | 6,476 | 29,038 | 264,065 | 96% |
| Lower Hunter | 557,113 | 21,600 | 40,510 | 71,156 | 13% |
| Newcastle | 21,450 | 222 | 0 | 0 | 0% |
| Central Coast | 243,800 | 412 | 26,874 | 25,424 | 10% |
| Hawkesbury | 277,600 | 0 | 2,910 | 148,519 | 54% |
| Total | 12,267,972 | 395,608 | 913,556 | 2,312,091 | 19% |

2. Impacts of 2019-20 fires on North East NSW forest resources

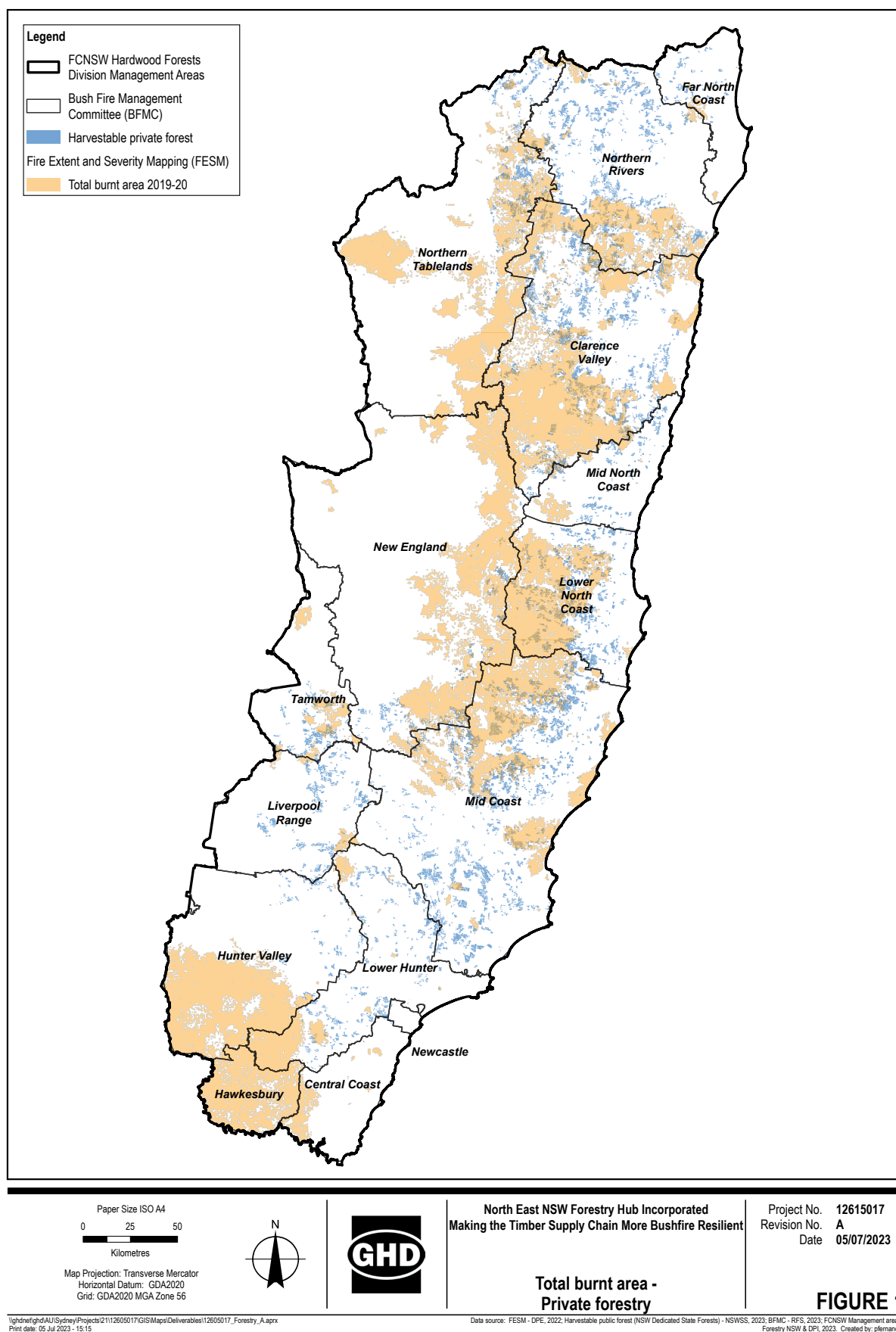


Figure 2-1 Total burnt area 2019/20 fires in relation to private forests

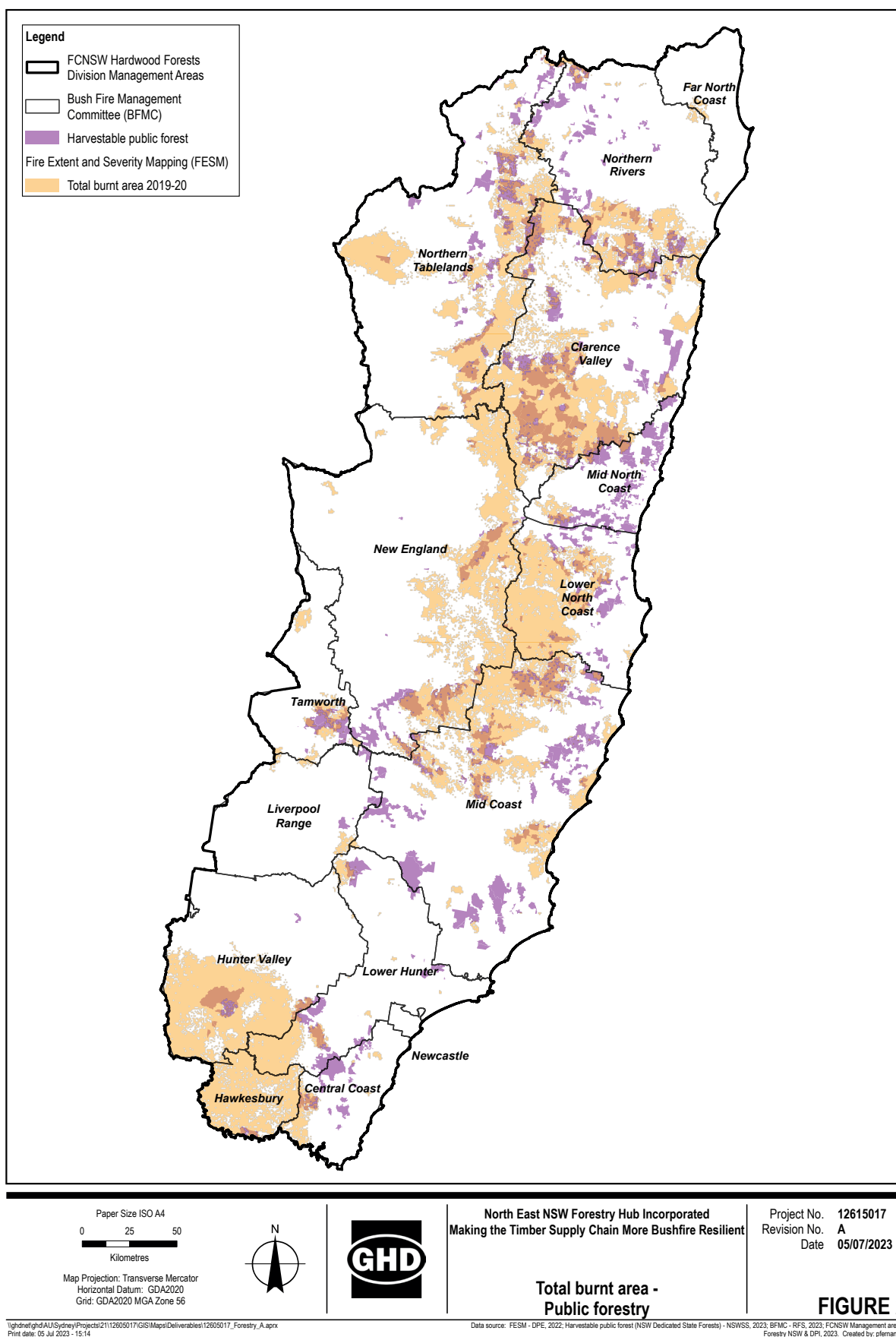


Figure 2-2 Total burnt area 2019/20 fires in relation to public forests

2. Impacts of 2019-20 fires on North East NSW forest resources

Native coastal eucalypts which are the main source of New South Wales hardwood timber are rarely killed by wildfire, however, the quality of their timber can decline over time if heat from a bushfire penetrates their bark and damages their cambium layer. Where native trees need to be harvested because of fire damage, the recovery window can be multiple years after the fire. Due to concerns about safety and further environmental impacts, post fire salvage harvesting of public native forests was not permitted. Since the 2019-20 bushfires Forestry Corporation has adopted additional environmental safeguards above the requirements of the strict ruleset in place in NSW, the Coastal Integrated Forestry Operations Approval, to balance providing timber to local industry employing local people to produce important timber products and ensuring the forests can regenerate after the bushfires. These measures reduced the scale, number and intensity of operations in coastal forests, while severe wet weather also reduced operations. Harvesting restrictions were also applied to unburnt public forests as these forests were considered important wildlife refuges. This included an additional five per cent of the harvest area are set aside as temporary clumps in each compartment, and use of selective harvesting as the only silvicultural method used on the North Coast in 2020, with no intensive harvesting.

In contrast, restrictions on salvage harvesting of private native forests were limited and no restrictions applied to the salvage harvesting of plantations. Forestry Corporation estimates that around 60% of the native forest area managed by the Corporation for timber production was affected by fires, but only a small proportion of these fire-affected areas will be subject to selective harvesting. Forestry Corporation modelled a 4% reduction in high quality logs (m³) for the North East RFA region for 2020-2031 year range, for an annualised sustainable yield of 230,000 m³ of high quality logs (Figure 2-3). Blackbutt forests which account for around 70 per cent of the long-term sustainable timber yield on the north coast were less impacted by severe fire. A higher than average impact was modelled for Spotted Gum, which is among the slower growing species and was also impacted to a greater extent by intense fire. The volume of Spotted Gum that can be produced has been modelled to decline by around 20% in the short term. The models show that the total volume of timber produced today can be sustained over the long term. Field inventory for full review of impacts on sustainable yields is ongoing and expected to be completed in 2024.

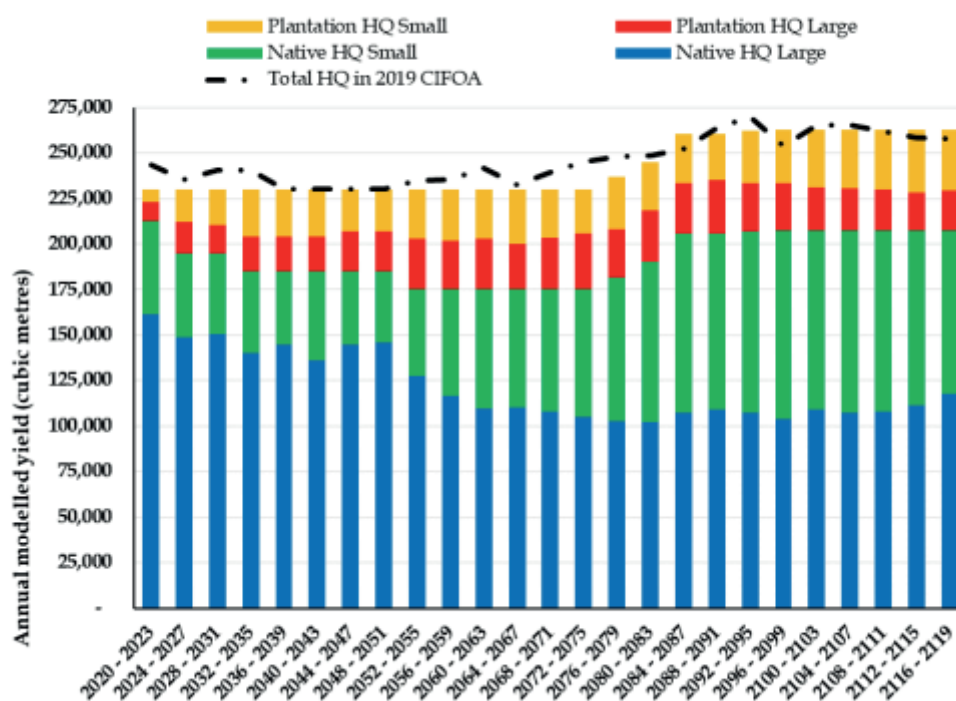


Figure 2-3 Post 2019/20 wildfires projected high quality wood supply from state forest for the North Coast compared to pre-fire long term projected sustainable yield

The LLS⁶ report that since F2012 there has been 489,355 hectares of private native forestry plans approved (plans last for 15 years) in Northern NSW. Approximately 40% of these were impacted by the 2019-20 fires.

North coast timber harvest and haulage contractors and timber processors were impacted by special regulatory restrictions under the CIFOA⁷, reduced quantity, as well as different species mixes and log sizes. NRC⁸ reported that as a result of the 2019/20 wildfires short term harvesting focus shifted to blackbutt plantations, however as a result of few mature hardwood plantations available to continue to supply timber in quantities to keep mills operating, a return to native supply is required to maintain normal supply volumes. The shift to blackbutt plantations impacted supply of other species traditionally required for specialty strength, durability, and appearance (for products such as power poles, piles, girders, key structural timbers and flooring). Spotted gum was the most heavily impacted commercial species on the north coast. A summary of the findings of the NRC study into wood supply changes is provided in Table 2.

Table 2 Wood supply reduction and modelled impacts to sustainable yields for North Coast region (from NRC 2021)

| Actual wood supply reduction in 2020 compared to average of preceding five years | Potential long-term impacts in wood supply (sustainable yield) |
|--|---|
| <p>19 percent overall reduction in high quality log supply due to reductions in native forest production. However, FCNSW supplemented further losses by accessing plantation harvesting</p> <p>Overall, blackbutt availability increased due to plantation harvesting</p> <p>Supply of other species fell overall: including north coast spotted gum (92 percent), and blue gum, tallowwood and brush box (35 percent)</p> <p>Native forest supply reduced by 58 percent</p> | <p>Supply over the next 20 years is projected to be less than 5 percent below pre-fire forecasts</p> <p>The proportion of smaller diameter logs will increase from plantations and post-fire regrowth</p> |

Companies with long term wood supply agreements with Forestry Corporation that were identified by the NRC as being impacted by the change in products and product mix included:

- J Notaras & Sons Pty Ltd
- Koppers Wood Products Pty Ltd
- Coffs Harbour Hardwoods Pty Ltd
- Dale and Meyers Operations Pty Ltd
- Williams Timber Pty Ltd
- Ironwood Taree Pty Ltd (NRC 2021).

The NRC further identified impact on processors of low-quality logs produced as a by-product of high quality log harvesting operations, as a smaller volume of this log grade is produced from plantations. Impacted mills include:

- Adams Sawmills Pty Ltd
- Aquafern Pty Ltd

⁶ LLS (2023) **Monitoring, Evaluation and Reporting - Local Land Services (nsw.gov.au)**

⁷ Environment Protection Authority (2023) **Site-specific environmental conditions applied to forestry operations in selected areas of fire-affected State Forests**

⁸ Natural Resources Commission (2021) Final report Coastal IFOA operations post 2019/20 wildfires **23 August 2022 - PC 7 - tabled by Sue Higginson.pdf (nsw.gov.au)**

2. Impacts of 2019-20 fires on North East NSW forest resources

- Henson Sawmilling Pty Ltd
- Thora Sawmilling Pty Ltd
- Hayden Sawmilling Pty Ltd
- Hurford Hardwood Kempsey Pty Ltd
- Newells Creek Sawmilling Pty Ltd
- RA Sweetman & Sons Pty Ltd.

2.1 Survey

To supplement the reported figures available on the impacts to the forest resource accessed from desktop studies, a survey was released to gain quantitative estimation of losses incurred by businesses in the Hub region due to the 2019-20 bushfire event. The survey targeted hardwood and softwood timber harvesters and processors and aimed to assess impact on production and profitability. Of the 20 businesses surveyed a total of 16 responses were received with only ten supplied information about the impacts on their business. A summary results is in Table 3.

Table 3 Summary data from survey responses

| Respondent ID | % of operation in hardwood | % of operation in softwood | % proportion of business with FCNSW | % proportion of business with private property | Change in turnover (+/- %) | Change in profitability (+/- %) | Change in amount of logs (+/- %) |
|---------------|----------------------------|----------------------------|-------------------------------------|--|----------------------------|---------------------------------|----------------------------------|
| 1 | 100 | 0 | 0 | 100 | -100 | -100 | -100 |
| 2 | 100 | 0 | 100 | 0 | 30 | 30 | 5 |
| 3 | 50 | 50 | 100 | 0 | 55 | 35 | 45 |
| 4 | 100 | 0 | 85 | 15 | No response | No response | No response |
| 5 | 100 | 0 | 65 | 35 | No response | 50 | 0 |
| 6 | 100 | 0 | 0 | 100 | Not sure | No response | No response |
| 7 | 10 | 90 | 0 | 100 | -60 | -50 | 60 |
| 8 | 50 | 50 | 0 | 100 | 20 | 20 | 20 |
| 9 | 100 | 0 | 0 | 100 | No response | No response | No response |
| 10 | 100 | 0 | 20 | 80 | 50 | 60 | 70 |
| 11 | 100 | 0 | 0 | 100 | -100 | -100 | 100 |
| 12 | 0 | 100 | 0 | 100 | No response | No response | N/A |
| 13 | 100 | 0 | 0 | 100 | No response | No response | No response |
| 14 | 100 | 0 | 60 | 40 | -20 | -10 | -20 |
| 15 | 100 | 0 | 80 | 20 | 0* | No response | 20 |
| 16 | 100 | 0 | 75 | 25 | No response | -40 | No response |
| Minimum | 0 | 0 | 0 | 0 | -100 | -100 | -100 |
| Maximum | 100 | 100 | 100 | 100 | 55 | 60 | 100 |
| Average | 81.88 | 18.13 | 39 | 57.19 | -15.63 | -10.5 | 22.22 |

*Change in business focus and direction following fires to diversify into earthworks

The poor response to the survey prevented any clear findings from being drawn from it. The responses that were received showed there were both winners and losers. The beneficiaries were contracting businesses that were able to shift their operations to plantations and undertake clear-fell harvesting. This is consistent with the findings

of NRC⁹ which show that the switch to plantation and private resource following the fires was critical in maintaining the industry. The losers were those whose turnover reduced by 20 percent or more. This was due to combined effects of more onerous environmental operating requirements, reduced production and changes on log quality and size classes, though this will have longer term implications on age class distribution.

2.2 Loss and Damage to Infrastructure in the forestry supply chain

This section includes damage and losses as part of undertaking forest/plantation access, protection, tending/silviculture, harvesting and log haulage (e.g. damage caused to bridges, roads, crossings, culverts/drains, signage, fire protection and other multiple-use infrastructure).

Regional infrastructure (timber bridges and culverts) losses (damage or destruction) were also significant and have been estimated at a value of \$60 million. There was loss of harvesting plant and equipment in areas, impacting not only on the individual operators but the capacity and capabilities across industry. The production and manufacturing industry were impacted, with the Rappville timber mill in the Northern Rivers destroyed.

2.3 Indirect longer-term losses

Indirect longer-term losses include losses/financial impacts caused by reductions in wood flow including harvest and haulage volumes and changes to log quality/log species mix, including a requirement to accept a growing proportion of tableland species in log mix. Tableland species are much less preferred being less durable and more defective than coastal species. This impacts upon the markets as well as business profitability. Forests support a range of social, environmental and economic values for the community – health, biodiversity, production, tourism – and management of the landscape over the long-term will influence how effectively forested regions can continue to provide those values. It also may include a decline in ‘regulating’ services, such as pollination, clean water supply from forested catchments, and carbon sequestration. Australia’s State of the Forest Report¹⁰ (2018, due to be updated and released in 2025) noted there are few data available on the value of most forest-based services. The notable exceptions are the provision of wood, the value of which is reported in national accounts and by some forest managers; and the provision of water, which can be valued using data from irrigation agriculture and domestic water suppliers.

In 2021 the NRC¹¹ found that there were limited data on the forest industry, and no NSW-specific data on the correlation between wood volumes and employment. Estimates based on direct ratios of wood supply to employment also do not consider operating needs of mills, which require enough throughput to remain competitive. The NRC further stated that the location of impact to the industry was difficult to determine and influenced by several factors, including the potential to supplement supply from private native forestry, the capacity to redirect supply-demand imbalances and capacity of industry to use less preferred timber species.

In 2023 the North East Forestry Hub commissioned Ernst & Young to quantify the economic contribution of the NSW hardwood timber industry¹². This report didn’t consider bushfire impacts but it did address some of the key data limitations identified by the NRC. It found that the North East NSW Region has the largest hardwood industry in the State contributing \$700 million annually to GDP and employing 5,700 people. It further found that hardwood timber is an important input across several downstream industries. For example, it is a key input in cladding, panelling, building, fencing, and agriculture products and has flow on effects to transport – trucking and transport of timber products to distributors, construction – timber is a key input for building materials, manufacturing – timber is crucial to the manufacturing of certain goods, and energy and mining – hardwood is used in poles and timbers.

⁹ Natural Resources Commission (2021) Final report Coastal IFOA operations post 2019/20 wildfires **23 August 2022 - PC 7 - tabled by Sue Higginson.pdf (nsw.gov.au)**

¹⁰ **Australia’s State of the Forests Report - DAFF (agriculture.gov.au)**

¹¹ Natural Resources Commission (2021) Final report Coastal IFOA operations post 2019/20 wildfires **23 August 2022 - PC 7 - tabled by Sue Higginson.pdf (nsw.gov.au)**

¹² Ernst & Young (2023) **Economic Contribution Study of the NSW hardwood timber industry**. North East NSW Forestry Hub.

Part B

Review of Bush Fire Risk Management Plan process

3. The NSW Bush Fire Risk Management Planning process

Part 3 of the *Rural Fires Act 1997* (NSW) (**RF Act**), which addresses coordinated bush firefighting arrangements in NSW, establishes a system of Bush Fire Management Committees (BFMCs) which are constituted for all Rural Fire (RF) Districts in NSW, and also in Fire Districts in which there is a reasonable risk of bushfire occurrence. BFMCs are constituted based on Local Government Areas (LGAs) or groups of LGAs.

BFMCs are made up of a range of stakeholders with the general aim of ensuring the whole community has a say on bush fire management activities. BFMC membership eligibility is set out in Section 15 of the Rural Fire Regulation 2022. Forestry Corporation of NSW (FCNSW) must be invited to be a member of any BFMC in which it has land tenure interests. A range of stakeholder organisations including government and non-government organisation are specifically named in the RF Regulation for BFMC membership invitation including the Nature Conservation Council, NSW Farmers Association and Local Aboriginal Land Council. Private forestry interests are not so named but could apply to the Bush Fire Coordinating Committee (BFCC) for membership of a particular BFMC if they sought to participate directly in the BFMC process. To GHD's knowledge, no private forestry sector representatives participate in any of the BFMCs in the NE NSW forestry hub area, or anywhere else in NSW.

A key function of BFMCs is to prepare BFRMP (as required by Section 52 of the *RF Act*) covering the area for which the BFMC is constituted. Additionally, BFMCs also prepare a Plan of Operations (including an Ignition Prevention Plan) and a Fire Access and Fire Trail (FAFT) Plan.

Section 54 of the *RF Act* establishes the content requirements for BFRMP's (expressed in broad terms to set out schemes for the reduction of bush fire hazards). BFMCs submit draft BFRMPs to the BFCC. The BFCC has established a policy for Bush Fire Risk Management (the current policy is BFCC Policy 01/2023) which sets out the methodology and process for preparing, endorsing, submitting and reviewing a BFRMP. BFCC Policy 01/23 includes a Model BFRMP and Guidelines for BFRMP development which the BFCC expects BFMCs to follow in preparing their draft BFRMP. BFCC Policy 01/23 also includes an Annexure (E) on BFRMP submission and approval. On behalf of the BFCC, the RFS will assess each draft BFRMP reviewing conformance with BFCC policy requirements. Draft plans assessed as not meeting BFCC policy requirements are sent back to the BFMC with identification of non-conformances and suggested modification requirements. Plans assessed to meet BFCC policy requirements are progressed for BFCC approval, with plan approval authorised by the NSW RFS Commissioner on behalf of the BFCC.

Current BFCC Policy 01/23 pertains to what is commonly referred to as the 'New Generation' or 3Gen BFRMPs. The only BFMCs in the NE NSW Region to date which have 3Gen BFRMPs in place are Hunter, Lower Hunter, and Coffs Coast BFMCs – all other BFRMPs covering the NE NSW Region are 2Gen BFRMPs (some well overdue on their five years review cycle). There are significant differences between 2Gen and 3Gen bushfire risk management planning requirements and also in the support products provided by NSW RFS to BFMCs for the different plan types. These are discussed further at Sections 3.1 and 3.2.

3.1 Second generation bush fire risk management plans

Second generation BFRMPs are currently in place for the following BFMCs in the NE Forestry Hub area:

| | |
|-------------------|---------------------|
| Central Coast | New England |
| Clarence Valley | Newcastle |
| Far North Coast | Northern Rivers |
| Hawkesbury | Northern Tablelands |
| Lower North Coast | Tamworth |
| Mid Coast | |

3. The NSW Bush Fire Risk Management Planning process

These 2Gen BFRMP's map significant State Forest areas as 'economic assets' but do not map any harvestable private forestry assets - neither private timber plantations nor harvestable private native forest areas. This effectively means private forestry assets are not considered in the BFRMP process.

With regard to publicly owned forestry resource areas, FCNSW assets, both native forests and timber plantations are mapped as 'Economic – Commercial Forest' assets but no differentiation is made between the commercial value, or supply criticality to the timber supply chain of different assets or areas. Accordingly, a large landscape area with a high volume and concentration of harvestable timber resources of particularly high value to the timber supply chain has no differentiation from small areas with relatively low volumes of mostly lower-value resources.

All assets, including 'Economic – Commercial Forest' assets, are listed in an 'Asset Register' usually contained at Appendix 2 of the BFRMP. Risk ratings based on fire impact likelihood and consequence assessments recorded in the BFRMP Asset Register are recorded for all listed 'Economic – Commercial Forest' assets. Most are identified as having either Almost Certain or Likely likelihood level. Consequence ratings are mostly either Minor, Moderate, or Major, which typically leads to risk ratings in the High to Extreme range. It is difficult to discern how the different consequence ratings have been applied in the risk assessment process noting that some large forest areas are rated 'minor' consequence and in contrast some small forest areas are rated 'major consequence, with no obvious rationale for the different consequence ratings although timber resource quality is a factor. In any case, the resulting risk rating does not appear to translate into any significant difference in the risk treatment measures applied as discussed further below.

In terms of risk treatment for mapped 'Economic – Commercial Forest' assets, typically the BFRMP identifies a suite of 'standard treatments' are applicable to those assets. These are commonly:

- 'hazard reduction' in three zones:
 - Asset Protection Zones (APZ) – typically undertaken by mechanical means such as slashing or trittering due to their relatively small size and more intensive treatment requirements
 - Strategic Fire Advantage Zone (SFAZ) – typically undertaken by prescribed burning due to their size generally being uneconomic for mechanical treatments (however in some cases mechanical treatment may be necessary or desirable)
 - Land Management Zone (LMZ) – generally prescribed burning and/or grazing consistent with land management objectives for the land
- 'preparedness' (including inspection and maintenance of fire trails) and
- community engagement activities (historically little if any focus on commercial forestry assets).

These treatments apply to the mapped commercial forest assets and do not normally extend onto or involve adjacent land tenure such as private property or National Park estate. This approach to identifying bushfire risk reduction treatments can reasonably be characterised as a 'cookie cutter' approach, noting the same suite of risk treatments are designated in the BFRMP regardless of the risk level determined for a specific forestry asset. This general approach to bush fire risk management planning has been in place since at least 2008, noting the BFCC BFRMP model applying to 2Gen BFRMPs was in place since that time.

It is notable that in the five-year period prior to the 2019/20 severe and unprecedented impact bushfire season, historically low levels of hazard reduction burning (HRB) were undertaken across the public forest estate (State forests and National Parks) in the NE NSW region, and negligible levels of HRB in private forests.

To determine the extent to which hazard reduction burning is being used, in practice, to reduce bushfire risk to harvestable native forests (both public and private), GHD downloaded NSW fire history data from the NSW Government's SEED web portal. The prescribed burn data was extracted and clipped to the NE Forestry Hub area. Annual total areas treated with prescribed burning were determined for each of the 5 years from 2014/15 to 2018/19 (Table 5) and 2019/20 to 2023/24 (Table 6), with separate calculations between the public (FCNSW-managed) native forestry estate, public harvestable forests, and NPWS estate. Annual areas treated by prescribed burning are also expressed as a proportion of total area. The results are tabulated below at Tables 5 and 6.

Table 4 Prescribed burning in NE Forestry Hub area 2014/15 to 2018/19

| Treatment years (FY) | Total area treated by prescribed burning (ha) | | | Proportion of estate treated | | |
|----------------------|---|---------|---------|------------------------------|---------|-------|
| | FC | Private | NPWS | FC | Private | NPWS |
| 2014/15 | 551 | 33 | 27,083 | 0.06% | 0.008% | 1.33% |
| 2015/16 | 643 | 51 | 53,424 | 0.07% | 0.013% | 2.62% |
| 2016/17 | 1,085 | 0 | 13,588 | 0.12% | 0.000% | 0.67% |
| 2017/18 | 1,570 | 2 | 18,238 | 0.17% | 0.001% | 0.90% |
| 2018/19 | 5,126 | 56 | 29,082 | 0.56% | 0.014% | 1.43% |
| 5 year total | 8,976 | 142 | 141,415 | 1.23% | 0.02% | 6.95% |
| 5 year average | 1,795 | 28.4 | 28,283 | 0.20% | 0.004% | 1.39% |

Table 5 Prescribed burning in NE Forestry Hub area 2019/20 to 2023/24

| Treatment years (FY) | Total area treated by prescribed burning (ha) | | | Proportion of estate treated | | |
|----------------------|---|---------|--------|------------------------------|---------|--------|
| | FC | Private | NPWS | FC | Private | NPWS |
| 2019/20 | 15 | 7 | 12,194 | 0.002% | 0.002% | 0.60% |
| 2020/21 | 263 | 56 | 5,041 | 0.029% | 0.014% | 0.25% |
| 2021/22 | 189 | 42 | 5,189 | 0.021% | 0.011% | 0.25% |
| 2022/23 | 55 | 21 | 10,513 | 0.006% | 0.005% | 0.52% |
| 2023/24 | 1 | 170 | 14,096 | 0.000% | 0.043% | 0.69% |
| 5 year total | 522 | 297 | 47,034 | 0.057% | 0.075% | 2.31% |
| 5 year average | 104 | 59 | 9,407 | 0.011% | 0.015% | 0.462% |

The annualised HRB figures in Table 5 and 6 demonstrate minimal bushfire risk reduction to the timber supply chain is being pursued and achieved through currently scaled HRB programs, even though HRB is a commonly specified risk reduction strategy for commercial forest assets. Prior to the 2019-20 bushfires 98.77% of the State forests in the region were carrying fuels older than 5 years since last fire. In the five years since the 2019-20 bushfires a mere 0.057% (522 hectares) of the regional estate was treated. On NPWS managed land the extent of land treated by HRB was only marginally higher with 93.05% of the estate untreated in the five year lead up to the 2019-20 bushfires. In the five years since the 2019-20 bushfires only 2.31% of the estate was treated. While it is not within the scope of this project to analyse and report on why HRB programs in the NE Forestry Hub area are at such small scales, it was generally identified by FCNSW that it is highly constrained by available resources in how much HRB it can do noting that NPWS received substantial funding enhancements directed to increased HRB

program output following the Victorian Bushfires Royal Commission and again following the 2019/20 NSW Bushfire Inquiry, for which FCNSW was not the beneficiary of similar funding enhancements.

Prescribed burning figures for private land are far less reliable as most burning occurs outside the Bushfire Permit season and there is no requirement for private landholders to report the areas that they treat. Based on the reported figures however prescribed burning for bushfire risk reduction in private harvestable forests is negligible.

Best practice in Australia occurs in WA where in the south-west forests (a mix of dry and wet sclerophyll forests), the Department of Biodiversity, Conservation and Attractions (DBCA) sets a government-monitored objective to maintain 45% of the publicly owned land carrying fuels less than 6 years old (which equates to an annual burn program of around 9% of managed estate). This involves substantial and sophisticated burning programs applied in Jarrah/Marri forest (dry sclerophyll) and Karri forest (wet sclerophyll). In Queensland, the Department of Environment and Conservation currently pursues a statewide annual target of 5% of terrestrial estate. In NSW, while completed hazard reduction areas are published in NSW RFS annual reports (including for FCNSW and NPWS) no annual targets are published or reported against in the RFS annual report.

Victoria has adopted a 'Residual Risk Target' of 70% of Victoria's potential maximum levels, through fuel management on public land. The 'maximum risk' is calculated as the risk that would be present across the state under catastrophic bushfire conditions and if no fuel reduction activities had been undertaken and no bushfires had impacted the landscape (i.e. fuel hazard is at its maximum level possible). The calculated fuel-driven bushfire risk is the percentage of risk remaining, relative to the potential maximum risk (set at 100%), following fuel management and/or bushfire. Risks to Victoria's timber assets are not the subject of risk treatment objectives.

3.2 Third generation bush fire risk management plans

3Gen BFRMPs completed to-date in the NE Forestry Hub area include Hunter (formerly Muswellbrook and Singleton), Lower Hunter, and Coffs Coast (formerly Mid North Coast) BFMC areas.

The RFS supports 3Gen BFRMP development by BFMC's through a range of systems and processes including preparation of 'an Economic Asset profile' for each BFMC and provides advice to BFMCs on the assessment of assets including 'economic assets'. To-date, profiling of significant timber supply risks has not been an explicit part of the economic asset profiling process.

For the 3Gen BFRMP areas, RFS has undertaken bushfire spread and impact modelling, using a bushfire simulation system called Phoenix Rapid fire, to support identification of areas with significantly elevated bushfire risk. In the 3Gen BFRMPs these areas are identified as 'Focus Areas' which were not an inclusion in the previous 2Gen BFRMPs. Mostly the new 'Focus Areas' are scoped to human settlement areas found during the bushfire spread modelling to have an elevated risk of bushfire loss and damage (Focus Areas are determined by decision of the BFMC, not as a direct output of the Phoenix modelling, however the modelling is used to inform the BFMC Focus Area identification decision process). However, the new 'Focus Areas' are not limited to human settlement areas – for example, both the Lower Hunter and Coffs Coast 3Gen BFRMPs identify 'Focus Areas' scoped to either 'significant environmental assets' or 'significant Aboriginal assets' or specific National Parks with World Heritage Values. None of the 3Gen BFRMPs to-date identify any 'Focus Areas' based on significant timber supply value, but it is open to NE Forestry Hub (potentially through FCNSW, or on the broader industry's behalf) to consider seeking such designation in 3Gen BFRMPs currently under development or yet to start development.

For each 'Focus Area' identified in a 3Gen BFRMP, a 'Risk Profile' statement is developed which describes the nature of the significant bushfire risks in that 'Focus Area'. Hypothetically, if a BFRMP was to identify one or more 'Focus Areas' based on the significant degree of bushfire risk to the timber supply chain in an area, a descriptive, semi-quantitative statement of the risk could be articulated providing improved awareness of the risk and differentiating them from areas with less significant risk.

A second new feature of 3Gen BFRMPs is the introduction of a new fire management zone, that being an 'Ignition Management Zone' (IMZ). Of particular relevance to NE Forestry Hub participants is that one of the specific applications of IMZs is to reduce fuels in areas prone to lightning ignitions (e.g. ridgetops) to enhance the effectiveness of rapid suppression operations to reduce the potential for incipient lightning-caused fires to develop into extreme bushfires. In a timber supply chain risk reduction context, in 3Gen BFRMPs, if significant timber supply areas are identified as 'Focus Areas' in the BFRMP, then in areas prone to lightning ignition located in an

adverse upwind direction from the identified 'Focus Areas' it would be open to the BFMC to identify IMZ's in those areas for targeting of fuel reduction in lightning prone areas to reduce risk to the 'Focus Areas'. Potentially, such IMZ's may not be on the same land tenure as the at-risk forestry assets in the designated 'Focus Area.'

| | |
|------------|---|
| IMZ | <p>Applications include:</p> <ul style="list-style-type: none"> ➤ To provide fuel reduced areas in locations that are subject to higher levels of human caused ignitions (including arson) reducing the likelihood of ignitions taking hold and improve suppression success; ➤ To reduce fuels in areas likely to be more prone to lightning ignitions (eg ridgetops) enhancing the effectiveness of rapid suppression operations and reducing the number of ignitions that develop into extreme bushfires; ➤ To reduce fuels associated with landscape features that generate extreme fire behaviour such as windward or lee slopes and series of ridgelines; ➤ Allow for the early establishment of a mosaic fuel pattern in the years following a significant bushfire event; and ➤ To enable frequent and thorough burning while seeking to avoid and mitigate environmental impact. |
|------------|---|

Figure 3-1 Ignition Management Zone (IMZ) applications

3.3 Sample extracts from 3Gen BFRMPs

The BFRMP extract from the Lower Hunter BFRMP at Figure 3-2 below shows the application of the new 'Focus Area' approach being pursued in 3Gen BFRMPs.

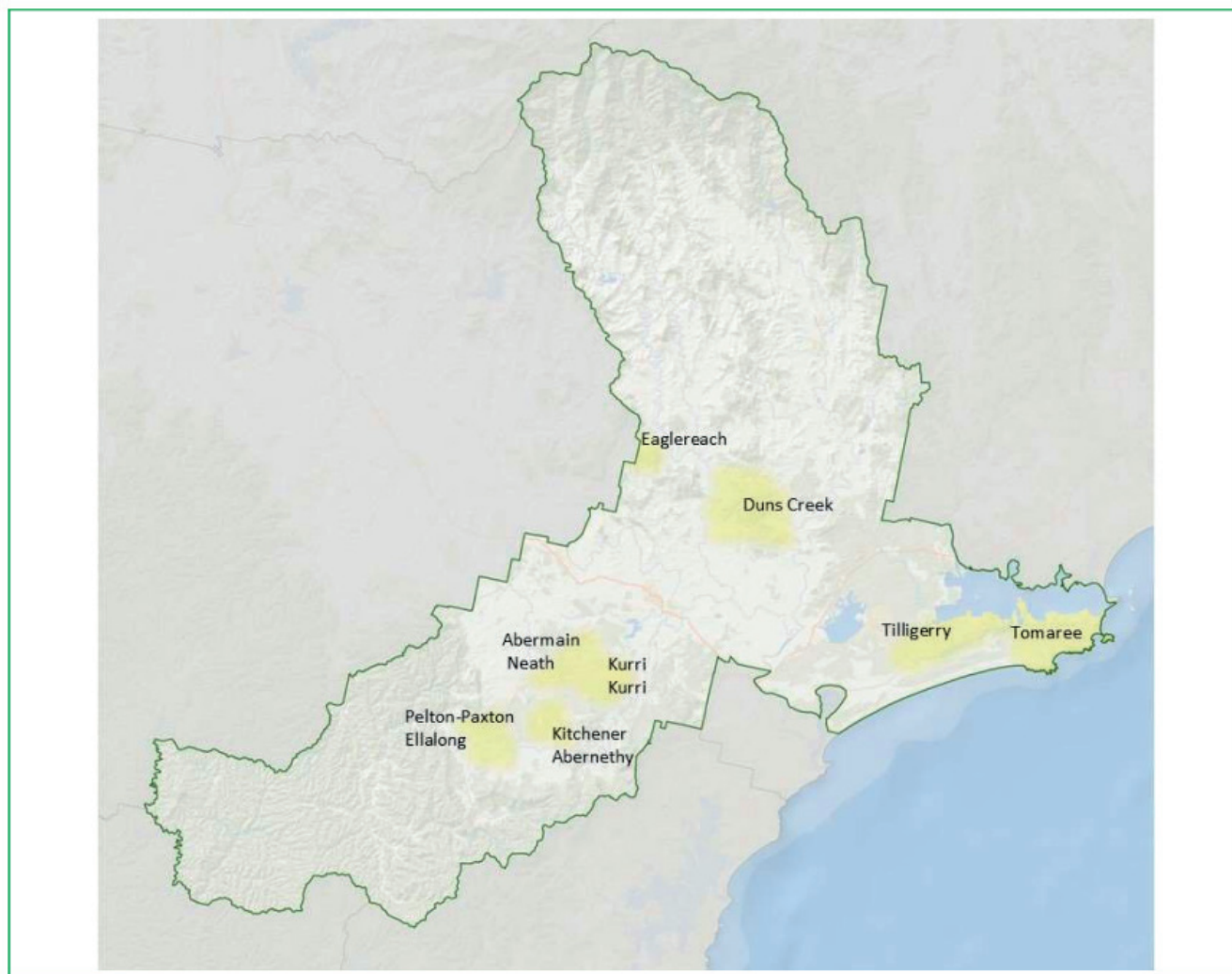


Figure 3-2 Focus Areas designated in the Lower Hunter BFRMP (2023)

While the 'Focus Areas' in depicted in Figure 3-2 are principally directed to life and property risk reduction in areas of significant bushfire risk to human settlements, they can also be directed to other asset classes potentially including assets important to the timber supply chain. For example, the Lower Hunter BFRMP contains the following (Figure 3-3) 'Focus Area' risk profile statement in relation to 'significant environmental assets' in the lower Hunter BFMC. This 'Focus Area' inclusion generates a specific requirement to identify and particularise strategies for reduction of the bushfire risk to the environmental assets identified in the 'Focus Area' risk profile.

1.9 SIGNIFICANT ENVIRONMENTAL ASSETS IN LOWER HUNTER BFMC

Risk Profile

The Lower Hunter Bush Fire Management Committee (BFMC) has assessed the risk to environmental assets and has identified a number of significant areas or assets that require treatment within the BFRMP. These areas include Barrington Tops, Blackcamp, Nooroo, Cessnock, Kurri Kurri, Port Stephens and Wallaroo.

There is risk that a high severity bush fire could cause serious damage or irreversible loss to a number of environmental assets within these areas.

The following assets are of particular concern and will be addressed through BFMC wide Treatments (land/asset management) as well as the Focus Area Treatments listed in table 9.

- Habitat for the Regent Honeyeater (*Anthochaera Phrygia*) - Critically Endangered;
- World Heritage values of the Barrington Tops Gondwana Rainforests;
- Regionally significant habitat for the Koala (*Phascolarctos cinereus*);
- Habitat for the Broad-toothed Rat (*Mastacomys fuscus*);
- Habitat for the Veined Doubletail Orchid (*Diuris venosa*);
- Broad-leaved Pepperbush (*Tasmannia purpurascens*);
- Habitat for the Australasian Bittern (*Botaurus poiciloptilus*)
- Habitat for the Bush Stone Curlew (*Burhinus grallarius*); and
- Habitat for the Sand Doubletail Orchid (*Diuris arenaria*).

There were also a number of other assets that were assessed as having a moderate risk. These include threatened flora and fauna, Threatened Ecological Communities, coastal wetlands, RAMSAR wetlands, private property conservation agreements and Declared Wilderness Areas.

The key BFMC objectives for the Significant Environmental Assets in Lower Hunter BFMC are response strategies and community preparedness. To reduce the potential impact of a fire, the BFMC will identify specific operational response strategies and Pre-Incident Plans for the assets/ areas of concern. The BFMC will also take steps to inform community members, land management agencies and firefighting personnel of the assets at risk so that they may better understand the consequences of fire in these areas.

The key Bush Fire Risk Management Plan Objectives and Treatment Strategies are listed in Table 9.

Figure 3-2 Sample of Lower Hunter Focus Area risk profile addressing significant environmental risks

4. Potential opportunities for better use of the NSW BFRMP system to reduce bushfire risk to the timber supply chain

Several opportunities exist for taking better advantage of the 3Gen BFRMP process to improve risk reduction to the timber supply chain in the NE NSW Forestry Hub region. These are set out at sections 4.1 to 4.3 below.

4.1 Provide NSW RFS with harvestable private forest spatial data

The importance of private native forests and plantations to the timber supply chain has never been considered in bush fire risk management planning by BFMCs principally because harvestable private forest spatial data has never been provided to the NSW RFS for inclusion in the planning process. Thus, it is likely that BFMC's are largely unaware of the extent of the risk of damage and loss of private forest resources for the timber supply chain and the local/Regional economic values relying on those resources.

Recommendation: Local Land Services Farm Forestry (LLSFF) Unit provide NSW RFS with harvestable private forest spatial data for incorporation in the bushfire risk assessment process. A live link to current data or an annually updated spatial dataset could be provided.

4.2 NSW Forestry Hub identify and map 'significant timber supply source areas'

BFMC's have access to maps depicting State forest land tenure. Spatial data identifying the distribution of 'suitability classes' (Very High; High; Medium; Low) of forest resources on private land is held by LLS and could be used in conjunction with FC resource data to identify key industry-critical 'wood-basket' areas where concentrations of high-value forest resources are located which have heightened value for bushfire protection. Such a task would not reasonably be expected to be undertaken BFMC's – the timber industry is best-placed to undertake identification of key wood-basket areas and to present and provide such spatial data to BFMC's.

Using a combined data set for both private and public harvestable forest resource areas, in consultation with the timber supply and processing industry, the NE NSW Forestry Hub could identify and map the key areas considered by the local/regional timber industry to be the most critical areas for enhanced bushfire protection. These areas could then be properly factored-in to bushfire risk management planning, including the bushfire impact modelling phase, the 'BFMC Focus Area' identification phase, and the risk reduction strategy development phase.

Recommendation: The NE NSW Forestry Hub in conjunction with Forestry Corporation of NSW, LLS and DPIRD consider undertaking a critical timber supply source area mapping process¹³ to identify industry-critical log supply source within the NE NSW Region¹⁴. The identified area mapping would include both public and private forest areas. The outputs of the mapping process should be provided to NSW RFS with a request that it be taken account of in all phases of the bushfire risk management planning process.

4.3 Fire protection strategies for significant timber supply source areas

Significant timber supply source areas can cover large landscape areas and include both public and private land areas. Protecting such areas from large-scale high intensity fires is particularly challenging as any strategy will typically involve multiple land tenures (often a combination of State forest, National Park and private property) and involve large land areas. Often, key timber supply source forest areas are contiguous with rugged mountain forests

¹³ LLS holds key data relating to PNF and DPIRD holds key data relating to private plantations.

¹⁴ This informally occurred for the BMFC pilot study

with limited access for fire control work. Particularly in drought conditions, fires starting in these more remote rugged areas, if not able to be contained early at an incipient stage, can readily attain a size and landscape position that is difficult to contain, being positioned for a large high-intensity, high-impact run when weather deteriorates. This characterisation generally fits the situation for many of the 2019/20 season bushfires in the NE Forestry Hub, and also elsewhere.

The heavier the fuels in the ignition areas, the faster fires can grow (noting all Australian forest fire spread models are directly influenced by fuel input values), the more intense the fire will be (noting fire intensity has a direct relationship to rate of spread and fuel load), and the more likely it will be that the fire will exceed safe direct and parallel attack suppression thresholds. When such fires are ignited, it can often be the case that there are already other fires burning in the region presenting more immediate threats to life and property and thus firefighting resources to attack new ignitions in remote rugged areas may be highly constrained.

There are four main strategies which can be pursued to improve fire protection outcomes for key timber supply source areas. All have significant costs, require sustained annual commitment to preparedness and ongoing implementation, and cannot eliminate adverse fire impacts altogether, only reduce and mitigate the degree of fire damage/loss impacting the timber supply chain.

1. Hazard reduction within the key timber supply source areas to mitigate the extent and degree of damage from fires that spread into the key areas.

The quantity of fuel accumulated within key timber supply source areas will have a direct bearing (along with slope and prevailing weather at the time of the fire) on the fire rate of spread and fire intensity, and thus also the degree of stand damage caused and also the prospects that fire can be controlled within the supply source area. Where very low to negligible levels of hazard reduction in the timber supply source area are undertaken (as Tables 1 and 2 indicate is currently the case), the extent of heavy fuel accumulations can be extensive and thus fire damage to timber resources more widespread and severe than would otherwise be the case if fuels are more actively managed.

There are two key effects of hazard reduction burning to consider. The first is the potential effect at landscape program scale in reducing the extent of area impacted by bushfire. The second is the effect of hazard reduction in reducing the impacts of timber (and other) values in areas where bushfires burn into HR-treated areas.

With regard to the first effect of reducing the extent of bushfire impacted areas within landscape areas it is challenging to conduct long-term studies at landscape scales and thus few such studies have been attempted. One study undertaken by Boer et al. (2009) in the Warren region of south-west WA (which has a high proportion of forest cover across the Region including both dry and wet sclerophyll forests) examined the relationship between the extent of fuel reduction burning and the extent of unplanned bushfire occurrence. The study period spanned a 52 year fire history period (1953 - 2004) in a region where prescribed burning was applied at annualised rates (proportion of managed forest area) ranging between 7 to 9% of area. The long term of the study, and its operational nature, make it the best study of its type ever conducted in Australia and especially useful for evaluating the effects of relatively high rates of prescribed burning application. The study found a strong inverse relationship between the extent of prescribed burning and the extent of bushfire. Higher range levels of prescribed burning resulted in reduced levels of bushfire extent, and conversely, lower levels of prescribed burning application resulted in higher levels of bushfire extent.

Figure 4-1 shows the inverse relationship between prescribed burning extent and the subsequent extent of unplanned bushfires in the Warren Region estate in south-west WA.

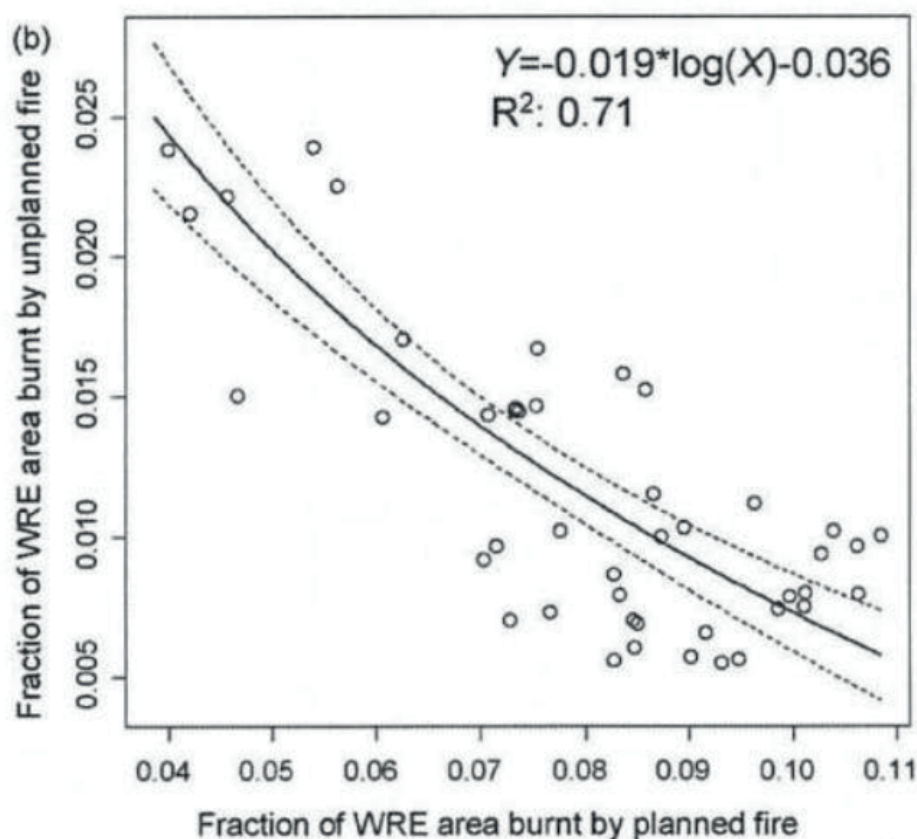


Figure 4-1 Relationship between planned fire and unplanned fire extent in Warren Region WA (source Boer et al, 2009)

Six-year running mean of the annual extent of unplanned fires against 6-year running means of the annual extent of planned fire (1958– 2003). Fire extent is shown as a fraction of the surface area of the Warren Region Estate. Black continuous lines are for fitted regression models. Dashed lines show 95% confidence intervals.

Adams and Attiwill (2013) examined a broader fire history dataset for forests in the south-west of WA and found a similar relationship to that demonstrated by Boer et (2009).

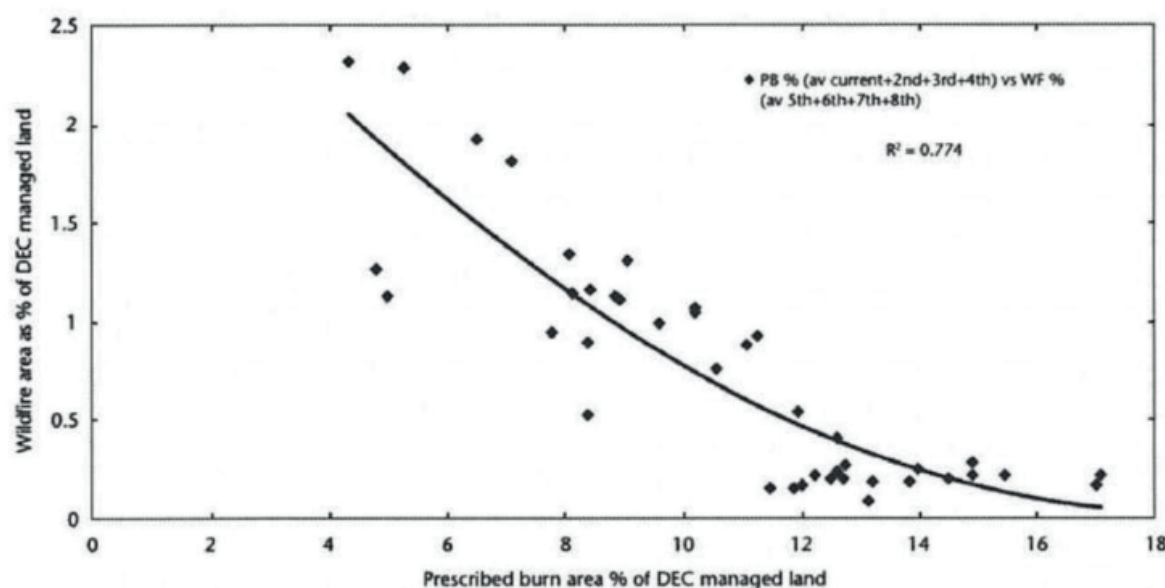


Figure 4-2 Relationship between prescribed burn area and wildfire extent as a % of Department of Environment and Conservation (DEC) managed land

An example of a retrospective study, where the actual impacts of a bushfire are compared to modelled impacts assuming different regimes of prescribed burning had been applied have also been undertaken. One example by Tolhurst (2007) examined the fire footprint covered by the 1983 Deans Marsh fire in Victoria. This fire burnt on what became known as ‘Ash Wednesday,’ and it was recorded as burning more than 40,000 hectares of forest with an extremely high proportion burnt at high intensity, destroying 780 structures and taking 3 lives. Most of the forests in the fire footprint had not been burnt for more than 40 years and more generally the fire footprint had been carrying long-unburnt fuel loads.

Tolhurst used Melbourne University’s Phoenix RapidFire fire simulation software (which used Australian forest fire behaviour models in operational use at the time) to model the extent of modelled fire spread under three alternative scenarios – a 10% area annual treatment rate; a 5% annual area treatment rate and a 2.5% annual treatment rate. Modelled area impacted by the fire was half of the actual impacted area for the 10% treatment scenario with the forests burning at a significantly lower and patchier intensity, thereby inflicting far less environmental damage. Modelled area impacted by the fire was around two thirds of the actual area for the 5% treatment scenario, with significantly less severe impact area. Modelled area impacted by the fire was around 80% of the actual area for the 2.5% treatment scenario, with significantly more of the affected area burnt at low intensity by patchy fire compared to what actually occurred.

Many case studies of the effect of prior prescribed burns on subsequent wildfire event impacts have been developed over the last five decades. Examples of these can be found on the Australasian Fire and Emergency Service Authorities Council (AFAC) document titled “Overview of Prescribed Burning in Australasia (AFAC, 2015).

The second effect of prescribed burning is to reduce the intensity and impact of unplanned bushfires which subsequently burn into hazard-reduced areas.

Table 7 below uses Australia’s Dry Eucalypt Forest Fire Model¹⁵ (DEFFM – developed by CSIRO) to predict the rate of spread of a bushfire burning in dry eucalypt forest, and in-turn, from fuel assumptions and modelled rate of spread fireline intensity can be determined¹⁶. Varying degrees of likely fire damage can be inferred from modelled fireline intensity. Different fire weather scenarios are used ranging from

¹⁵ Cheney NP, Gould JS, McCaw WL, and Anderson WR (2012) Predicting fire behaviour in dry eucalypt forest in southern Australia. *Forest Ecology and Management* 280, 120-131 [Reviewed and summarised in Cruz MG, Gould JS, Alexander ME, Sullivan AL, McCaw WL, and Matthews S (2015) *A Guide to Rate of Fire Spread Models for Australian Vegetation*. CSIRO Land and Water, Canberra, ACT, and AFAC, Melbourne, VIV, 125 pp.]

¹⁶ de Mar PJ (2020) Prescribed burning effectiveness – a practitioner’s perspective. In Leavesley A, Wouters M and Thronton R (2020) *Prescribed Burning in Australia – the science, practice and politics of burning the bush* 227-231. Australasian Fire and Emergency Service Authorities Council Limited. Melbourne: Victoria.

High to Catastrophic Fire Danger Rating (FDR) ranges (High, Extreme and Catastrophic under the new AFDRS). Three different fuel scenarios are used with fuel assumptions based on fuel ages of less than three years; 6 to 10 years; and greater than ten years (Table 3).

Table 6 Fire behaviour and impact potential analysis under different fuel and fire weather combinations

| FDR (AFDRS) Scenario | Predicted rate of spread in m/hr; (and fireline intensity in kW/m) | | |
|---|--|------------------------------------|---------------------------------|
| | Fuel age < 3 years [SF=2; NSF=1] ¹ | Fuel 6 – 10 years [SF=3; NSF=2] | Fuel 10+ years [SF=4; NSF=3] |
| Catastrophic (FBI=109) [T=40; RH=10; U ₁₀ =50] | 1,030 (5,855) | 2,556 (23,775) | 8,826 (107,838) |
| Extreme (FBI=85) [T=38; RH=12; U ₁₀ =45] | 813 (4,620) | 2,007 (18,668) | 6,914 (84,506) |
| Extreme (FBI=61) [T=35; RH=15; U ₁₀ =40] | 601 (3,415) | 1,475 (13,713) | 5,064 (61,919) |
| High (FBI=38) [T=30; RH=20; U ₁₀ =30] | 349 (1,982) | 840 (7,813) | 2,859 (35,003) |

T = Temperature (°C); RH = Relative Humidity (%); U₁₀ = Wind speed at 10m (km/h); Assumed Drought Factor = 10

What Table 7 (and Figure 4-3 below) shows is that for all FDR scenarios modelled, predicted rates of spread are at least eight times higher in the 10+-year-old fuels, relative to the < 3 years old fuel scenario. Predicted fireline intensity is 17 to 18 times greater in the 10+-year-old fuels than in the less than three years old fuel scenario. Figure 4-3 provides a bar chart depicting the effect of the different aged fuels on modelled fireline intensity, at each of the fire danger scenarios (Catastrophic, Extreme and High).

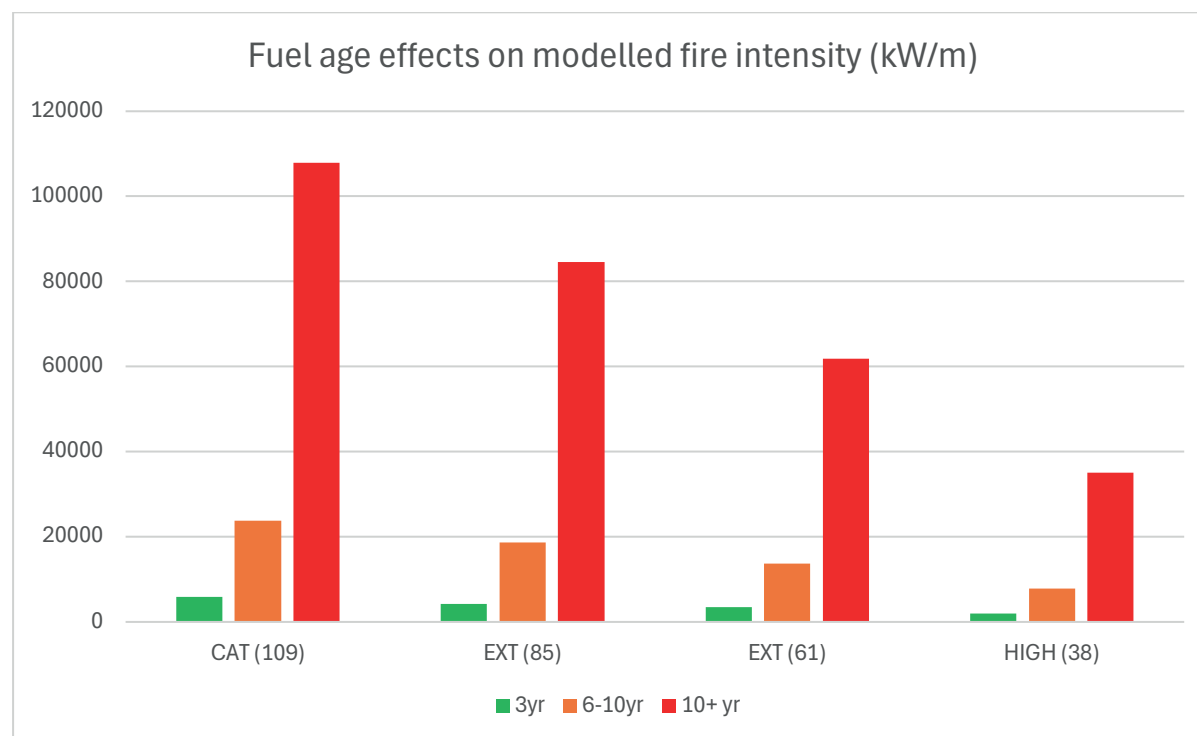


Figure 4-3 Fuel age effects on modelled fireline intensity at four different fire danger scenarios

The much lower intensity of fires in light fuel burning during adverse fire weather will result in much lower damage to timber resources in the fire-impacted forest and the fire will be easier and safer to control, relative to those burning in heavy fuels. In practical terms for forest firefighters, the availability of low fuel

areas to control unplanned bushfires can make the difference between whether a timber supply resource area is defensible or not.

In north-eastern NSW, the bushfires which burn-over large areas of timber source area forests at high intensity typically spread under westerly to north-westerly winds. The greatest proportion of resource damage tends to be on westerly aspects (where ridge-lines run generally north-south) and on northerly aspects (where ridgelines run generally east-west. Hazard reduction burning targeted to north to westerly aspects (generally the more easily treated aspects) can have significant benefits for reducing subsequent wildfire extent and damage, as well as significantly improving fire containment operations success prospects.

Presently in NE Forestry Hub region, the scale of hazard reduction burning in key timber supply areas is small and not strategically aligned to key timber supply source areas. Over the last 30 years, and particularly over the last 10 years, the quantum of hazard reduction burning in publicly owned timber supply source areas has declined markedly and the extent of hazard reduction in private forests has never been high, except where land use has also involved forest grazing and potentially use of burning (undocumented) for pasture management. At present rates of hazard reduction burning, based on the HRB treatment figures in Table 5 and 6, only around 1% of the public and private harvestable forest estate in the NE Forestry Hub area carries HRB-treated fuels less than 6 years old (except areas impacted by wildfires in the last 5 years). Put another way, at recent historical rates of prescribed burning, 99% of the public and private harvestable forest estate in the NE Forestry Hub area will be carrying fuels over 5 years old in which direct and parallel attack thresholds are typically exceeded on days of moderate to high fire danger. Thus the chance that a spreading wildfire will encounter areas treated by prescribed burning are extremely low.

The result is that unplanned wildfires are overwhelmingly the most prevalent form of 'hazard reduction', however such fires typically result in a high proportion of forest area being burnt by fires burning in heavy fuels, in adverse fire danger conditions in drought-affected years, which in combination are the conditions which cause the greatest degree of damage and loss to timber resources. Without a substantial step-change in the scale of use of HRB within key timber supply source areas, this trend is highly likely to continue, noting that climate change is projected to increase the occurrence and duration of adverse fire seasons and the occurrence of adverse fire danger days annually.

2. Hazard reduction off-estate in fire paths toward key timber supply source areas

The fourth strategy which could improve fire protection outcomes for key timber supply source areas is increased hazard reduction in off-estate areas (adjacent to key timber supply source areas including forested private property and NPWS-managed forests) in fire paths from where historically adverse high-impact fires have spread to the key timber supply source areas. In practice, this would require adjacent land owners to undertake HRB on their land, for the benefit of the timber industry. Given that the extent of HRB within the key timber supply source areas is at very low to negligible levels currently, it is problematic to expect adjacent land owners with no direct financial interest in the timber supply chain, to engage in increased fire protection activities on their land tenure, and almost certain not to occur if such work were expected to be at their own cost.

3. Identification and maintenance of strategic trail networks which can be used for indirect firefighting methods (backburning) to prevent unplanned fires spreading into key timber supply source areas.

When fires escape early rapid response efforts (noting that with current and foreseeable NE regional firefighting capabilities it is inevitable that some will), fires can spread and attain proportions for which their containment will necessarily involve indirect firefighting (backburning from roads and trails). It is not a realistic expectation that all new ignitions can be extinguished or contained in their emergent phase, and thus consideration of how to mitigate the damage potential of fires which escape initial attack efforts is important.

Strategically locating a linked road and trail network at or near the adverse upwind margins of key timber supply areas can provide suitable locations in the landscape from which firefighters can expeditiously undertake indirect fire control works (backburning) to protect downwind timber supply source areas from impact by an uncontrolled bushfire. In the absence of such maintained strategic trail networks, firefighters

may have no options for indirect containment, or highly compromised options if road and trail networks are not oriented and/or linked across adverse fire paths to the key timber supply source areas. The value and utility of strategic road networks can be further amplified by maintaining low fuel levels in adjacent forest – this facilitates safer and more expeditious backburning when defensive firefighting operations are necessitated. On sheltered slopes and relatively level areas, thinned forest zones can further enhance strategic trail performance for fire protection. BFMCs prepare FAFT Plans as required by the RF Act. As current BFRMPs do not identify key timber supply source areas FAFT plans do not explicitly consider timber supply chain risk mitigation in their fire trail network design. In key timber supply source areas, the adequacy of strategic trail networks could be reviewed to determine their suitability for timber supply source area protection.

Further, the alignment of SFAZs along strategic trail networks can facilitate improved fire control prospects from those trail networks and thus should also be considered.

4. Early detection and control of new fires while small and able to be controlled

While some fires may start in proximity to roads from where control efforts by ground crews can more readily be made, other ignitions can occur in locations remote from road access. Unless such fires are prioritised for early remote-area fire response, they have the potential to attain proportions that are difficult to control, particularly in drought-affected seasons. High-priority rapid response areas could be designated in BFMC Section 52 'Plan of Operations' based on threat assessment of potential fire ignition locations and fire paths within and toward the key timber supply source areas.

Further, the BFRMP could identify IMZ in appropriate areas (where ignitions could develop and spread from) to improve the prospects for remote area response success.

Both early remote response and IMZ strategies would typically involve landscape areas outside (as well as inside) of the key timber supply source areas and thus potentially involve public and private land tenures, including land reserved for conservation and land not available or used for timber supply.

5. Potential barriers to adoption of timber supply source area fire protection strategies

All four of the main improvement strategies (as set out at section 4.3) for timber supply source area fire protection involve significant recurrent operating expenditure to sustain. Historically, the costs of fire protection are borne by land managers and fire services. Such operating costs are not borne directly by parts of the timber supply chain other than growers/land managers, noting however that indirect costs through major fire impacts to timber supply flows and log size/grade are borne episodically by all parts of the supply chain and can be substantial.

Strategies such as improving early fire detection and mobilising rapid remote response operations are not cost-free. These incur significant costs through capability establishment and annual readiness and preparedness for fire response. Remote area firefighting in areas with limited road access typically entails the seasonal provision of helicopters for crew mobilisation, potentially also aerial waterbombers for aerial initial attack, and the provision of highly trained and experienced remote area fire teams able to operate in remote forest settings following insertion by helicopter. Both NSW RFS and NPWS have existing aerial remote area firefighting capabilities, however fire threat priorities at state level, including fires posing significant threats to life and property, will determine priorities for where such resources are used. Where demand for remote aerial fire response exceeds available resources, response to remote fires not threatening life and property in forecast conditions is likely to be a lower priority than fires of more immediate threat to life and property. Thus if the timber supply chain desired reliable, priority access to remote aerial fire response resources (similar to the manner in which FCNSW provides plantation industry-dedicated aerial firefighting resources in industry-critical softwood plantation areas), that would likely need to be additional to current NSW capabilities¹⁷ and require funding supplementation.

Presently, early fire detection and initial response in public timber supply forests is undertaken by FCNSW¹⁸, supported mainly by local RFS volunteer rural fire brigade units, noting that the latter need to balance provision of support to FCNSW with their primary responsibility to provide local fire response across the broader landscape with a particular focus on protecting life and property across private rural lands. FCNSW has a highly capable fire response capability in place, but this capability is significantly limited in quantum and geographic distribution. A high proportion of FCNSW fire response resources in the NE NSW Region are located in or near coastal forest areas, which is also where a high proportion of FCNSW fire response personnel live and are based for their operations.

Thus, initial response to fires in 'back country' areas in forests along the Great Dividing Range at or near the western margins of key timber supply areas can typically take more than an hour, and in some of the more remote areas, potentially not until the next day (for fires starting in the mid to late afternoon). The weight of response able to be mobilised by FCNSW is typically 1 or 2 units (one Category 1 heavy tanker and one Category 9 light striker unit) in situations where the reported fire is the only fire requiring response. Where two or more fires are active in an FCNSW operating area (typically a major river catchment scale) then a single unit initial response is commonly the best that can be dispatched initially. When regional fire activity is high, no FCNSW response may be possible due to commitments to existing fires. There are significant limitations to what a one or two crew initial response can achieve. In mild conditions they may be able to successfully contain an emergent fire, but in high fire danger conditions, even with assistance from local RFS units, they are often unable to contain such fires within 24 hours and thus such incidents become larger, multi-day fires.

In private harvestable forests, there is typically little, or no forest-owner firefighting capability locally available, and private owners are reliant on local RFS brigades supported by FCNSW (if not otherwise engaged with fires on their own estate).

In the NE NSW Region, most RFS brigades have either a 4WD Category 1 heavy tanker (or a 2WD Cat 3) typically with 3,000 to 4,000 litre water capacity, or a 4WD Category 2 medium tanker (or a 2WD Cat 4) typically

¹⁷ FCNSW observes that aircraft availability has reduced post 2019/20 and is expected to continue due to global supply chain delays for parts, pilot and engineer shortages and demand in the northern hemisphere. This means having aircraft on contract is a high priority to guarantee response rather than relying on Call When Needed (CWN) aircraft which may not be available.

¹⁸ FCNSW advises that rapid detection has reduced with less fire towers in operation in hardwood areas and fire detection cameras being prioritised in regions with pine plantations. There is an opportunity for improving rapid detection in NE Forestry Hub areas (camera/satellite) to identify new fires early and prioritise keeping small fires small.

with 1,600 to 3,000 litre capacity, and/or a light tanker ((Category 7 or 8) with an 800 to 1,600 litre capacity and potentially 4WD Striker Unit (Category 9) with less than 800 litre capacity. Whilst most brigades have 2 appliances, some of the larger brigades (typically located nearer to the more populous coastal areas) may have 3 appliances and even 4 appliances.

In general, RFS brigades are trained for, and experienced at, grass and bush firefighting, town, village and property protection, with training made available also in structure and vehicle fires. For many RFS brigades called out to fires located deep within timber plantations or forests, indirect firefighting operations (backburns) for fire containment from major access roads (rather than closer strategies along narrower more closed-in fire trails) or a plantation/forest edge, can understandably, often be the preferred tactic of choice. In private harvestable forests where it is common that RFS may be the only responder, local RFS brigades will typically make the key tactical on-ground decisions for fire control, and these may involve significant scale backburns from the more major trails. Where local forestry crews with experienced plantation and forest fire fighting leadership are on scene to work in close collaboration with RFS crews, closer-in strategies to minimise forest/plantation area burnt are more likely to be agreeable.

Whilst FCNSW resources will typically request RFS assistance and receive it (subject to existing RFS local unit availability), in drought affected years on days of High (ADFRS) or above fire danger, it can reasonably be expected that a significant proportion of fires are not containable at initial attack response resourcing scale and thus become multi-day events, a proportion of which will be subject to adverse fire weather becoming large scale campaign fires.

The key point arising from the foregoing discussion about local constraints to fire response capabilities in key timber supply source areas is that reliance on successful early fire detection and response for timber supply source area protection is not a tenable strategy – by necessity, fire protection strategies must contemplate requirements for containing larger multi-day fires, and even more importantly, mitigating damage from fires which spread into the key timber supply source areas¹⁹. Presently, this latter strategy option is not being implemented to any material degree on either the public or private harvestable forest areas.

Accordingly, creating opportunities in statutory BFRMP models and processes for improved awareness about the location and value of key timber supply source areas will not materially improve fire protection outcomes unless it is accompanied by improved application of actual bushfire risk reduction capability and hazard reduction work (including both mechanical means and by burning). By way of example, the fact that the 2Gen BFRMP's provided for FCNSW to map and list their commercial forest resources in BFRMPs and identify hazard reduction as a key risk reduction strategy, has not in practice led to significant scale application of hazard reduction as a timber resource protection strategy.

Strategic fire trail provision and recurrent maintenance can also generate significant capital expenditure (for establishment or upgrade) and operating expenditure for ongoing maintenance. Other than for Council or State-managed roads, such expenditure on fire roads/trails principally for fire protection are typically borne by land managers with limited opportunity for supplementation through the RFS-managed Strategic Fire Trail Funding Program²⁰ which is restricted in application to fire trails certified as either Strategic or Tactical fire trails in BFMC FAFT Plans.

Hazard reduction programs can also incur significant operating expenditure costs, as well as significant hazards and risks to be managed during implementation. Accordingly, program costs (and lack of suitable available capability) can be a significant barrier to the adoption of more strategic and extensive HRB programs²¹.

The above potential barriers to fire protection strategy improvement for key timber supply source areas are significant barriers to be overcome if improved planning is to translate into improved fire protection outcomes for the timber supply chain.

¹⁹ Notably during the severe drought-affected 2019/20 'black summer' fire season, many fires which heavily impacted timber supply resource areas started remote from such areas, were not able to be contained in initial attack, and hence burnt over multiple days and weeks making high intensity/impact runs during bouts of adverse weather causing widespread impact and damage in key timber supply resource areas.

²⁰ As at February 2025, FCNSW advises that no ongoing program funding has been committed and RFS Fire Trail funding for FY25 was reduced to \$1M for the whole state. This is a significant issue for timber supply resource area protection.

²¹ FCNSW advises that achieving expanded prescribed burning necessitates increased use of aircraft to complete more extensive operations in smaller windows of opportunity. Applications for grant funding for hazard reduction burning have increased in cost due to an increased use of aircraft following the 2019/20 bushfire

6. Part B Recommendations

1. The NE NSW Forestry Hub note that private harvestable forest areas are not explicitly recognised as assets of commercial value in Bush Fire Risk Management Plans (BFRMPs) and consider initiating action¹ to provide private harvestable forest data to the RFS for consideration in the BFRMP development process.
2. The NE NSW Forestry Hub note the potential opportunities in 3Gen BFRMPs for identifying key timber supply source areas² as high-value 'focus areas' requiring enhanced bushfire protection and consider identifying 'key timber supply source areas'.
3. The NE NSW Forestry Hub note that over at least the last ten years, despite 'hazard reduction burning' (HRB) being identified in existing BFRMPs as a key fire risk reduction strategy, in practice, HRB has been applied on a very small to negligible scale with the result that fuel loads are uniformly high across timber supply areas except where wildfires have impacted (which they did on an unprecedented scale in 2019/20). Reported HRB in private harvestable forests is close to non-existent.
4. The NE NSW Forestry Hub note that across its region, current capability for early fire detection and rapid initial attack response in key timber supply source areas is significantly constrained, such that in drought-affected years, based on current resourcing levels, it can reasonably be expected that a significant proportion of fires in, or upwind of, key timber supply source areas will not be able to be contained and thus can be expected to develop into large, high intensity and impact fires upon the development of adverse fire weather conditions. This means that multi-layered fire protection strategies (not relying on initial attack suppression alone) addressing risk mitigation (particularly fuel reduction) and preparedness for large fire incident containment are necessary.
5. The NE NSW Forestry Hub note that there are substantial barriers to the adoption of more proactive bushfire risk mitigation measure implementation for improved timber supply chain protection, noting all options come with significant recurrent annual costs (noting that inaction is associated with heavy recurrent damage/losses). Cost-Benefit Analysis (CBA) can be used as a means of evaluating the value proposition of additional investments in enhanced bush risk mitigation and in strengthened bushfire response capabilities. In practice, undertaking CBA for bushfire risk reduction is challenging and to-date in Australia, no fit-for-purpose CBA model for timber resource bushfire protection has been developed and adopted³. There is an aspirational opportunity for NE Forestry Hub to consider advocating for the development of, a fit-for-purpose CBA methodology for timber resource area bushfire protection.
6. NE NSW Forestry Hub consider a project to develop extension/educational materials for private forest owners identifying the nature of tree damage and associated timber value damage which can result from high intensity fire impacts, and the negligible impacts from low intensity prescribed burning and low to moderate intensity wildfire impact, thus improving the information basis on which private land owners make decisions for using prescribed fire for timber resource protection.

Footnotes to recommendations:

1. An option for consideration might be that NSW Local Land Services – Farm Forestry Unit and the Department of Primary Industry & Regional Development (DPIRD) - Plantations Unit provide NSW RFS with harvestable private forest spatial data for incorporation in the bushfire risk assessment process. A live link to current data or an annually updated spatial dataset could be provided. This proposed option is essential if the recommendation is to be actioned. There may be privacy sensitivities which could restrict the recommended action – these would need to be checked with LLS.
2. GHD, with the assistance of LLS and FCNSW, identified forestry assets in two pilot studies which helped guide the identification of timber protection focus areas within the 3Gen BFRMPs being developed for Clarence Valley and Northern Rivers.
3. The challenges include that firstly, a baseline (or status quo current-case) is required to assess against. Thus the first challenge is to quantify what is currently being done to manage bushfire risk to the timber supply chain, how much does it cost, and what are the current- case losses (through the supply chain) and costs of suppression over time. That question alone is a challenging one to answer, with costs and damage/loss value data often not available. Then it is necessary to identify some alternative cases (quantitative) to the current-case and cost those, and model what impact they have in terms of loss + cost reduction (noting that in fires we don't get a nice even loss profile year-to-year - we get massive years infrequently, large loss years moderate loss years and low loss years over time). A key modelling challenge is to determine the impact of extra capabilities and mitigation on that loss profile.

Part C

**Pilot study – Improving
consideration of timber supply
chain assets in Section 52 bushfire
risk management planning**

7. Pilot study area

The third and final phase of the 'Making the Timber Supply Chain More Bushfire Resilient' project was to conduct a pilot study in a selected Bush Fire Management Committee area within the NE NSW Region, seeking to improve recognition of the timber supply chain as a key regional economic assets important for incorporation in bushfire risk management planning, and pursue having key high value timber supply resource areas and at-risk processing facilities identified for risk reduction action.

7.1 Selecting a pilot study area

In selecting a pilot area, GHD considered that an important factor was to choose a BFMC area that was developing a BFMP and at a stage that the project could have input to and influence on the planning outcomes. To this end, GHD convened a meeting with RFS Manager, Bushfire Risk Management Planning program.

At the time of the project, the NSW Rural Fire Service was in the early stages of rolling out its third generation (3Gen) Bush Fire Risk Management Planning process and model. Within the NE NSW Region 3Gen bushfire risk management plans had already been completed for Hunter (formerly Muswellbrook and Singleton), Lower Hunter, and Coffs Coast (formerly Mid North Coast) BFMC areas. Clarence Valley and Northern Rivers BFMC areas were still in the relative early stages of plan development, with fire behaviour modelling already completed, but workshops to decide/finalise key Focus Areas and risk reduction strategies still yet to occur.

In consultation with the Hub, both Clarence Valley and Northern Rivers were considered areas of very high importance for forestry giving particular consideration to the following factors:

- Grafton being a major timber processing hub (with 7 mills/processors operating in the Grafton/Koolkahn area and a further three sawmills in the Clarence Valley (CV) BFMC area), where jobs in the timber supply chain are of high importance to the Regional economy;
- In Northern Rivers (NR) BFMC area, 4 mills operate – two in the Casino area and two in Kyogle, noting the Rappville sawmill was destroyed in the 2019/20 bushfires;
- The forest management and timber harvesting, haulage and processing industry segments have a high dependency on an extensive, dispersed mix of both public and private native forests and significant hardwood and softwood plantation estates in both the Northern Rivers and Clarence Valley BFMC areas;
- In both CV and NR, areas of higher rainfall and high site quality support highly productive merchantable timber resources of high importance to the timber supply chain and markets for timber – these key high quality resource areas (e.g. Clouds Creek/Wild Cattle Creek/Kangaroo River areas in the southern reaches of CV BFMC area) are vulnerable to timber quality downgrade and value reduction when impacted by high intensity bushfires as numerous such areas were impacted in the 2019/20 bushfires.
- Plantation assets (both softwood and hardwood) represent significant capital investments for their owners with long crop life – where significant plantation agglomeration areas are situated (such as softwood estates around Whiporie and Yabbra/Urbenville, and extensive hardwood plantation estate areas in the Bonalbo-Tabulam-Sugarloaf belt and east of Kyogle, landscape approaches for fire protection are prudent.

Based on both timber industry asset importance and bushfire risk management planning stage progression, the Northern Rivers and Clarence Valley BFMC areas were selected as the study area.

Outcome:

Northern Rivers and Clarence Valley BFMC areas selected for pilot study application.

7.2 Resource mapping and focus area selection

A key new element in 3Gen bush fire risk management plans is the identification of 'Focus Areas' where settlements or assets with high value and potentially high vulnerability to fire (both economic and environmental) are situated in bushfire-exposed landscape locations. These are effectively areas where highly significant losses from bushfire could occur and which bushfire modelling shows they are significantly exposed to bushfire impact. While there is no fixed limit of how many 'Focus Areas' a bush fire management plan can have, it is desirable to limit the number and extent of such areas within a BFRMP so that the focus of bushfire protection activity is not unduly diluted and is focussed on areas of greatest risk.

In the above context, it was necessary for the Hub to identify the key bushfire-exposed high-value timber supply areas for risk reduction prioritisation, as well as potentially bushfire-exposed timber processing clusters of heightened importance to the timber supply chain. In terms of timber supply resource areas, consideration was given to both public and private native forest areas and public and private plantation estate areas.

To identify key timber supply resource areas, the Hub convened a meeting for the purpose of identifying areas to nominate as forestry sector 'Focus Areas'. The meeting brought together Forestry Corporation of NSW (providing data and local knowledge of public native forest and plantation estate), Hub representatives (providing data and local knowledge on private native forestry suitability and capability) and Local Land Services (LLS) who regulate the private plantation and are custodians of private plantation estate data. With support from Forestry Corporation of NSW (FCNSW), private native forest and plantation estate data made available by the Hub and LLS were combined with FCNSW data (high merchantability species/yield association group data) to develop a single, composite map covering both CV and NE NSW BFMC areas depicting the distribution of high-quality timber supply resource areas. Using the composite map, meeting participants then identified the highest value resource areas in bushfire-exposed areas for designation as candidate 'Focus Areas'. Where possible, the candidate focus areas were linked to existing nominated focus areas (mostly on the basis of vulnerable human settlement localities) so as to minimise the number of 'new' focus areas. Where candidate focus areas were identified in locations where no existing focus area could be expanded, these were also nominated, the only such area being located to the north of the Koolkhan timber processing cluster near Grafton.

The new and expanded candidate focus areas were mapped and digitised to enable proposal and advocacy for focus area expansions and additions at the subsequent Bush Fire Management Committee (Planning sub-committee) meetings in both Clarence Valley and Northern Rivers. Figure 9 depicts the results of the NEF Hub-coordinated identification of key forest resource areas for nomination as 'focus areas'.

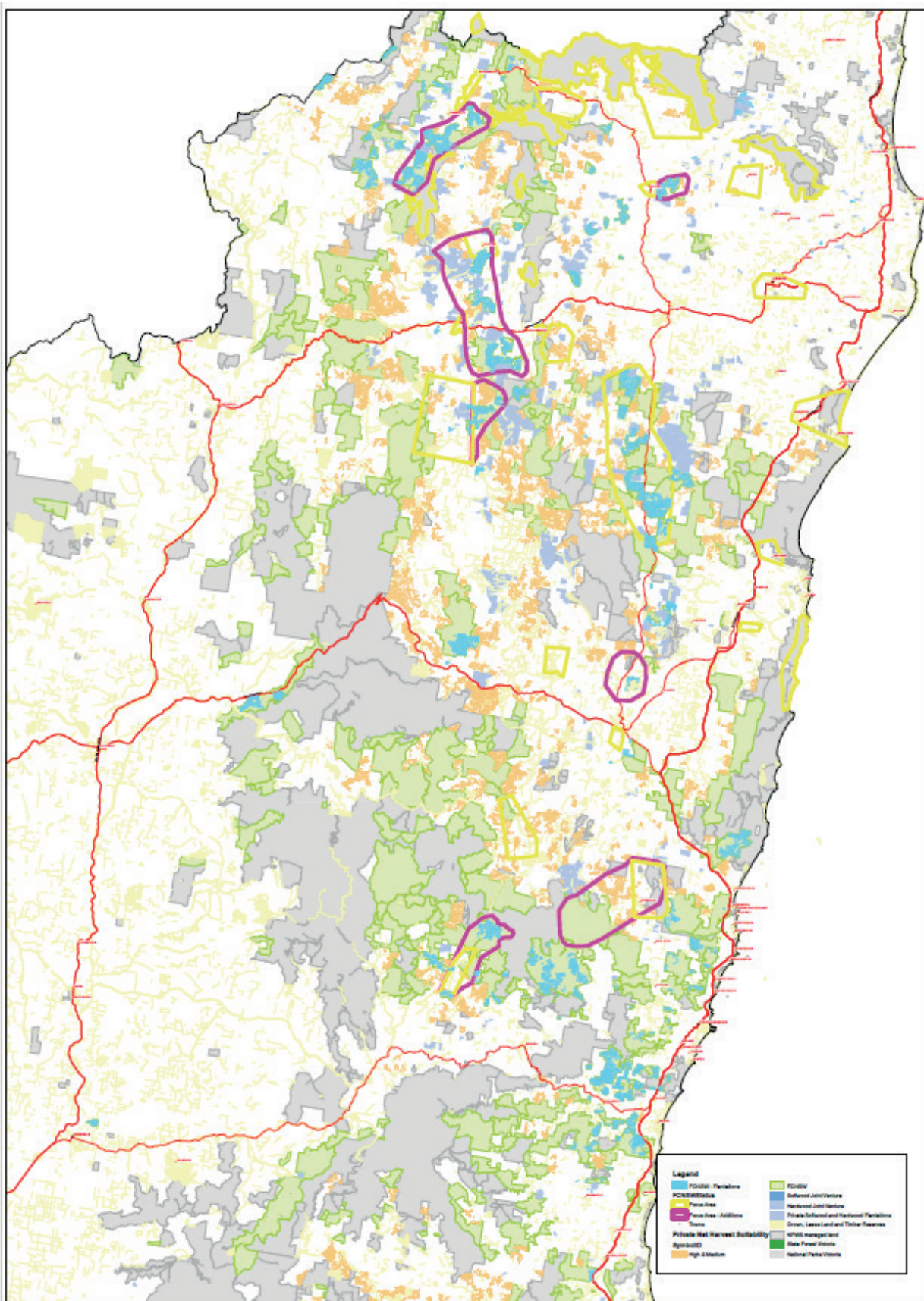


Figure 4 New and expanded candidate ‘focus areas’ for proposal to Bush Fire Management Committees

In addition to spatial identification of the candidate forestry 'Focus Areas', model text describing the key values and risks associated with each Focus Area were developed for inclusion in BFRMP's subject to their acceptance by the relevant BFMC. These focus area descriptions were developed collaboratively between the Hub and FCNSW.

Outcome:

Agreed forestry and timber industry 'Focus Area' candidate areas selected and identified for nomination to the Clarence Valley and Northern Rivers BFMCs.

7.3 Timber supply chain value awareness raising and forestry 'Focus Area' advocacy to BFMCs

Having identified candidate forestry 'Focus Areas' the next step to achieving inclusion of the candidate 'Focus Areas' in the CV and NR BFRMPs was to organise representation by NE NSW Forestry Hub to each BFMC, to make the case for inclusion of the candidate focus areas in the BFRMP. The Hub is not a member of either CV or NR BFMC and the best means of attaining an opportunity to advocate for the candidate focus areas was to request to attend the CV and NR BFMC meetings/workshops (specifically the BFRMP 2A risk assessment workshop at which focus area nominations are considered and decided), attending in an 'observer' category. For this project, the request for attendance was facilitated by FCNSW which is a statutory member of both CV and NR committees. NEF Hub's request to attend the BFRMP 2A risk assessment workshops for each of CV and NR were accepted.

On 21 August 2024, NE NSW Forestry Hub representatives attended the CV BFRMP 2A risk assessment workshop (P. de Mar (GHD) in person; N. Cameron (Manager, Hub via weblink).

On 22 August 2024, NE NSW Forestry Hub representatives attended the NR BFMC quarterly meeting and BFRMP 2A risk assessment workshop (P. de Mar (GHD – fire management consultant to the NEF Hub) and A. Hurford (Chair, NEF Hub) in person; N. Cameron (Manager, Hub via weblink).

To raise BFMC awareness about the NE NSW Forestry Hub, its activities, and the scale of timber industry economic activity in the BFMC areas, the Hub Manager gave a short informative slide presentation to BFMC members to appraise them of the economic importance of the timber industry locally, including the impacts of the 2019/20 fires on the timber supply chain, and the potential consequences of future further fire impacts for local and regional economies. The presentation is appended at Appendix 1. The presentation foreshadowed that the NE NSW Forestry Hub would seek expansion of selected existing 'Focus Areas' and one new Focus Area (in CV only) in recognition of the critical importance of key native forest/plantation resource areas and processing assets to the timber supply chain, and their high priority for protection.

While BFMC workshoping each of the existing nominated 'Focus Areas', the Hub members were invited to speak to the Focus Areas proposed for extension and the new Focus Area at Koolkhan. These representations were made by the Hub's appointed fire risk management consultant (Paul de Mar of GHD). The reasoning for each selected Focus Area extension was explained, in terms of the timber values at-risk in each and their criticality to the timber supply chain. Strategies for risk reduction enhancement were also identified (consistent with the strategies identified at Section 4.3 of this report, summarised below:

- Prioritisation of fire detection spotter flights following lightning storms to areas within the focus areas, and adverse upwind 'fire paths' to the focus areas, including potential nomination of focus areas and potentially also fire path areas as Ignition Management Zones in the BFRMP;
- Review of the fire trail network to determine if additional strategic fire trails are warranted in high risk exposure areas in each focus area (to be led by FCNSW as part of BFMC Fire Access and Fire Trail (FAFT) plan review processes.

- Increasing strategic hazard reduction burning activity above historical levels in the forestry Focus Areas, both on public and private forest areas, noting that over the past 10 years, HRB in private and public forest areas has been at a very low level. FCNSW on public land; private forest/plantation owners on private land.
- Prioritising Remote Area Firefighting Team response in focus areas and remote upwind fire paths (prioritised ahead of fires igniting outside of Focus Areas) – FCNSW to draw attention to focus areas in Incident Management Team deliberations and planning during fire response.
- Awareness programs targeted to private forest and plantation owners regarding the potential damage high intensity fires can cause trees and potential associated tree crop value reduction, and the risk reduction benefits which can be achieved through prescribed burning.

8. Part C Recommendations

As a result of undertaking the pilot study in CV and NR BFMC areas, the following follow-up steps and opportunities have been identified.

1. Finalisation of BFRMPs (BFMCs) – As at 19 February 2025, both the Clarence Valley (CV) and Northern Rivers (NR) Bush Fire Risk Management Plans remain in the ‘under development’ stage with the next step in the planning process to be the ‘public exhibition’ phase. As at 19 February 2025, it is understood the revised draft BFRMPs for CV and NR (with revised ‘focus areas’) are with RFS awaiting re-running of the Phoenix RapidFire Risk modelling.
2. Review of fire trail adequacy in forestry ‘Focus Areas’ (FCNSW with input from NE NSW Forestry Hub) – the opportunity to strengthen/improve fire trail networks can be pursued once the CV and NR BFRMPs are finalised, approved by the NSW Bush Fire Coordinating Committee, and published. The opportunity should be pursued by FCNSW through the BFMC Fire Access and Fire Trail (FAFT) plan review process. Through this process, fire trails of high strategic value for protection of key timber resource supply areas within the ‘focus areas’ can be nominated and designated as Strategic Fire Trails in each BFMC FAFT plan, which are afforded the highest level of prioritisation for improvement and maintenance works, potentially also improving prospects for obtaining funding from the Strategic Fire Trails Funding Program administered by the NSW RFS.
3. Timber value bushfire risk and mitigation awareness program targeted to private plantation/forest owners/managers (NE NSW Forestry Hub). Well managed and actively maintained forests and plantations can be more resilient to bushfire damage than forests/plantations subject to passive management with heavy fuel accumulations and substandard access. Property owners have varying degrees of awareness about the vulnerability of forests and plantations to fire damage. There may be an opportunity for the Hub to develop extension materials directed to enhancing private land owner knowledge of merchantable species resilience/vulnerability to bushfire damage and management actions which can improve forest/plantation resilience to fire. Management actions should not be limited in scope to hazard reduction burning and fire access provision – other property management activities including mechanical clearing, regrowth control, and grazing management (among other activities) are worthy of coverage.
4. FCNSW internal review of hazard reduction burning program scale and design in focus areas. The designation of key timber supply resource areas within BFRMP ‘Focus Areas’ may attract more attention from the BFMC about risk reduction measures directed to reducing the identified risks in the ‘focus areas’. The designation of the ‘focus areas’ provides an opportunity for FCNSW to review and develop a strategic plan for hazard reduction burning in the focus areas to improve resilience and fire protection levels for the timber assets therein.
5. FCNSW should to be encouraged to develop a NE NSW regional map showing the relative importance of their State forest assets (hardwood and softwood).
6. Advocacy for a NE Forestry Hub Fire Protection Fund grant scheme. NE Forestry Hub should consider the recent success of the Murray Region Forestry Hub in advocating for the establishment, by the NSW Government, of a Fire Protection Fund to provide protection of critical timber supplies in the Murray region. Consideration should be given to scoping a program of fire protection improvements in the NE Forestry Hub, potentially prioritised to the Focus Areas identified in the CV and NR BFRMPs.





**North East NSW
Forestry Hub**

www.nenswforestryhub.com.au



www.ghd.com