Forest & Wood Products Australia

Fire Research Development and Extension Investment Plan Review

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Waroo

Wise management of our natural resources

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Declarations of interest

Author of this review declare they have no direct interest in any of the RDE proposals put forward as part of this review. Participants acknowledge they may receive funding from RDE proposals considered in this investment plan review.

CONTENTS

1. PROJECT BACKGROUND

The vision of the FWPA Grower Research Advisory Committee (GRAC) is to double the value of Australia's commercial forests by 2040, by fostering an innovation culture, applying world's best practices, collaborating and investing into research and development. FWPA commissioned a suite of investment plans that provided technical reviews and business cases to guide industry investment in Research, Development and Extension (RDE) for the Australian forestry sector from 2019 to 2023, with an outlook to 2028 and beyond. These were developed in consultation with Australia's commercial forest growers to inform investment in RDE activities. From the Investment Plans, the Priority Topics were identified as the key targets for investment.

FWPA's Fire Research Investment Plan (FRIP) published in 2020, identified opportunities for progressing the GRAC Vision through investments in RDE that minimise the impacts of fire on Australia's commercial forest estate. FWPA engaged the author in 2023 to update the priorities and create a new five-year investment plan which reflects current developments and that is based on broad industry consultation.

2. REVIEW OBJECTIVES

This review aims to provide expert- and grower-driven recommendations to the GRAC to consider when making investment decisions and, to update the portfolio of RDE projects and priorities that should be considered in the Fire Research Development and Extension Investment Plan. In particular the review undertook the following:

- Review status of investment or completion of RDE projects proposed in the 2020 FRIP:
    - Do growers have the capacity to review and implement findings?
    - Has the research completed to date been useful?
    - How have growers used the outputs of the FWPA research?
- Evaluate the impact of the recent developments on commercial forestry, including the 2019-20 Black Summer bushfires and closure of State native forest harvesting in WA and Victoria:
    - Have forest growers' perceptions of bushfire risk and the priority for RDE investment changed?
    - What intersection is there between FWPA RDE projects and research being undertaken by other organisations?
- Develop a revised set of priority RDE projects for implementation from 2023 to 2028.

3. METHOD

The review was conducted by developing a series of grower workshops over a period of five weeks in August 2023. A call for participants in this project was emailed directly to the FWPA grower representatives for nominations and through a direct approach to grower personnel with a known fire management role. Twenty five people, representing 17 companies were invited to participate in the workshops.

Prior to the first workshop a survey of growers was conducted to evaluate grower's response to the previous FRIP and gauge their use of fire research products developed by FWPA in the past three years. Following the development of objective criteria for assessing the research priorities in

Workshop 2, a project Ranking Survey was conducted to evaluate the priorities for discussion in Workshop 3.

A summary of the workshops is given in Table 1 and the survey questions are available in Appendix B.

Table 1 Grower Workshops for plan revision

Workshop Theme	Number of participants	Number of Grower organisations represented
Review of 2020 FRIP and investigate potential changes in direction	18	13
New areas for RDE and development of objective assessment criteria	13	8
Consolidation and development of grower priorities	19	12

An Expert Review Group was also established by FWPA to value add to the process by ensuring adequate consultation with growers and the industry, providing guidance on fire RDE and evaluating the outcomes of the review against their knowledge and experience in the industry. The Review Group comprised of:

- Anthony Walsh – Manager of the Green Triangle Fire Alliance
- Dr Lachlan McCaw AFSM – Forest and Fire Science Consultant, WA
- Dr Richard Thornton GAICD, MInstP – former CEO at Natural Hazards Research Australia
- Dr Tony Bartlett AFSM– former Forestry Research Manager at ACIAR and Forestry Consultant

4. THEMES AND PROJECTS PLAN 2020

The 2020 plan developed projects under four broad themes:

- Understanding the Context
    - To gain an accurate national picture of the operating environment and the impacts of forest fire on FWPA Growers resources.
- Appreciating future plantation fire risks
    - To create a realistic view of what FWPA Growers may expect to face during the next plantation rotation, given the expected environmental impacts of Climate Change.
- Reducing forest fire risks
    - To provide FWPA Growers with knowledge so they can reduce their exposure to future bushfires.
- The economic impacts of managing in a fire prone environment
    - To understand the true costs of plantation fire management and how to minimize losses for forest growers.

In total 33 projects were identified, of which 14 topics were listed as priority topics which were listed in FWPA requests for research proposals.

5. FWPA FIRE RESEARCH SINCE 2020

The major project to arise from the 2020 Plan was conducted by the University of Melbourne – FLARE Wildfire Research team: Characterising and managing fire risks to plantations under changing climates. This project aimed to:

- Develop plantation-specific fuel accumulation models to better predict fire behaviour in plantations
- Quantify fire risks to plantations and nearby community assets under current and changing climates
- Evaluate management options for mitigating fire risks to plantations and nearby community assets under changing climates.

This project measured softwood and hardwood plantation fuel characteristics in four locations (SE NSW, Green Triangle – SE SA / SW Vic, SE Queensland and NE Tasmania.) Covid travel restrictions prevented measurements in WA hence surrogate data was obtained from the Green Triangle to estimate the fuel load accumulation curves in WA plantations. The project used PHOENIX RapidFire coupled with the FROST fire regime simulator to investigate different plantation fire management regimes (e.g. prescribed burning, modification of fuelbreaks, reduction in post-harvest residues and increasing suppression resources) in each of the five Regions – SE WA, SE NSW, Green Triangle – SE SA / SW Vic, SE Queensland and NE Tasmania. Two future climate scenarios (drier and hotter) were also overlayed on the scenarios. In general, most scenarios showed that the current management regimes control fire risks well. It showed that improved suppression response times may also lead to decreased plantation loss, particularly in the Green Triangle and Tasmania.

OTHER FWPA RESEARCH & REPORTS

Following the Black Summer Fires 2019-20 the following reports were commissioned:

- Database of Australian forestry plantation fire losses.
  - Report and database capturing historical information on larger-scale Australian plantation fire losses.
  - This project supports priority project FIR 1.1.1. – Data collection: Establishing the baseline for analysing benefits and costs.
- Guidelines for salvage harvest, storage and processing of plantation-grown logs affected by fire
  - Objective to develop guidelines to assist with the preplanning and implementation of salvage operations for fire affected plantation-grown logs.
  - Knowledge synthesised will assist in the maximation of returns from salvage operations and reduce the fire impacts on both forest growers and processors.
  - This project relates to the *Reducing forest fire risks research and economic impacts* themes and particularly supports FIR 1.1.2, *Characterisation of fire impacts on commercial forest assets.*

Other FWPA projects that have relevance to fire risk include:

1. A review of current mechanical & robotic tree pruning equipment
    - A desktop review of available technology for mechanical pruning for bushfire risk management or improved resource value.
    - The review showed that improvements have been made in technologies, however the range of equipment available is still very limited and in need of further development before it becomes commercially operational.
2. Exploring the use of the Internet of Things (IoT) in Monitoring and Managing Moisture in production forestry and landscape fire management
    - Current active project with Indicium Dynamics Pty Ltd and Sustainable Timber Tasmania (Tasmanian IoT Fuel moisture probes project)
    - This was a development project identified in the FRIP 2020.

Prior to the commencement of this review a number of forest growers were unaware of the existence of a number of these projects and reports, however several growers also reported they had used the report findings to make changes or assist in decision making.

6. WHAT HAS CHANGED SINCE LAST PLAN?

Since the 2020 Plan was published there are a number of significant events and developments that have changed both the perception and reality of fire risk for commercial forests. Two of the most significant events are the 2019-20 Black Summer Fires and the cessation of native forest harvesting in public forests in both Victoria and Western Australia to take effect from January 2024.

2019-20 BLACK SUMMER BUSHFIRES & FIRE RESEARCH

The 2019-20 Black Summer bushfires resulted in the most significant impact on the commercial forest estate experienced to date across Australia. By March 2020, fire had impacted more than 140,000 ha of commercial plantations (Geddes 2020) and greater than 2 million ha multiple-use public forest and 1.5 million ha of private forest (ABARES 2020.) Forestry Corporation NSW experienced the largest impact of any one grower, with fire damaging approximately 25% of its

> The first grower survey showed that all respondents perceived an increasing risk of bushfire for commercial forests. Some of the comments tendered in the survey included:
>
> - *…fires affected Southern NSW plantations to an extent that was at the very top end of what was conceivable prior to the event.*
> - *…evidence of increasingly intense fire behaviour is making us re-evaluate fire risk.*
> - *…scale of fire in the landscape and strain on firefighting resources was unprecedented in QLD…*
> - *Impact on insurance, perception of investors and investment in prevention*
> - *…the incidents have highlighted the limitations of the state's fire agencies to be able to prioritize and respond to fires threating timber assets.*

softwood estate which has resulted in the salvage of around 5 million tonnes of timber to date[1]. The fires also impacted 15% of their hardwood plantation estate and 830,000 hectares of native forest.

Following the 2019-20 fires, inquiries were held in Queensland, NSW, ACT, Victoria and South Australia as well as the Federal Royal Commission into National Natural Disaster Arrangements. Despite the significant impacts, none of these inquiries documented either the immediate or the long-term impacts on commercial forests and forest products industry.

The independent Major Event Review of the impacts of the 2019-20 bushfires on Victoria's five Regional Forest Agreements (Sparkes et al 2022) included consideration of the impacts of plantation losses. It found that these bushfires burnt about 8,350 ha of plantations including 7,453 ha of softwood and 901 ha of hardwood plantations across three Victorian RFA regions: East Gippsland, North East and Western Victoria. The review panel estimated that the total loss related to the burnt softwood plantations was $70 million and the total value of the burnt hardwood plantations in the order of $4 million to $5 million. The plantation-based processing industries also suffered economic losses, for example the Carter Holt Harvey softwood processing mill in Myrtleford experienced additional costs of $2 million from the processing of burnt logs. In addition, some softwood logging contractors had harvesting equipment destroyed, with an estimated total value of at least $2 million, depending on the age of the equipment. Therefore, it is likely that the total direct losses to Victoria's plantation-based industries from the 2019-20 bushfires were in the order of $80 million.

A recent study of economic losses associated with burnt softwood plantations in the Bombala region of southern New South Wales indicated that the economic value of lost future wood flows to processing industries is around 2.5 times the value of the burnt plantations. Applying this assumption to the Victorian situation suggests that there was an additional future economic loss to the plantation industries of about $180 million. This suggests the total short and long term economic loss to the Victorian plantation industry sector was in the order of $260 million.

Of significance to this FRIP revision is the revitalisation of the eighteen years of Cooperative Research Centre (CRC) bushfire research across the nation. The former Bushfire and Natural Hazards CRC has been transformed into the new organisation Natural Hazards Research Australia (NHRA) with a Federal Government commitment of $85 million funding over 10 years. There is an expectation this funding will be matched by partner funding. The Centre has two main investor levels, full participants who contribute more than $100,000 cash per annum and supporting participants who contribute between $20,000 to $99,000 cash per annum[2].

State Government agencies have advanced their bushfire research capability as well as a number of tertiary institutions. A variety of other funding sources has emerged, including major investment from private organisations such as the Minderoo Foundation[3]. Some of the key projects that may intersect with FWPA fire RDE are listed in Appendix C .

Another significant event for forest growers has been the introduction of the Australian Fire Danger Rating System (AFDRS). This system is designed to bring consistency in fire danger ratings across

[1] Forestry Corporation NSW Impact of fires 2019-20
[2] Natural Hazards Research Australia Prospectus
[3] Minderoo Foundation Fire and Flood Resilience Program Proposal

Australia and has standardised the public warning messages, signs and terminology. It has also introduced a number of new fire behaviour models, one of which is based on a softwood pine plantation fuel type. Growers are concerned that there has been little testing of this model against real conditions and there is general reluctance to adopt the new Fire Behaviour Indices (FBI) for forest operation restrictions and response readiness. Currently almost all growers are continuing to rely on somewhat manual calculations of the McArthur (1967, 1973) Forest Fire Danger Index.

CLOSURE OF STATE NATIVE FOREST HARVESTING IN WA AND VICTORIA BY 2024

Both Western Australia and Victoria have announced the cessation of native forest harvesting on public land by January 2024.

Potential impacts of closure include:

- Increased reliance on plantation estate for timber supplies / expansion of plantation (including farm forestry) estate.
- Increase in timber demand from private native forests, particularly for specialty timbers.
- Reduced active management of public forests.
- Reduced maintenance of forest road network and closure of some access.
- Reduced availability of machinery suited to forest fire suppression operations.
- Reduced forestry workforce with skills in fire management and operations.

7. BARRIERS TO FIRE RESEARCH UTILISATION

Fire research, development and extension is extensive, and is being conducted across Australia and around the world. One of the difficulties commercial forest growers face is to identify the most relevant research and define clear pathways for adoption into commercial forest management.

MAJOR ISSUES

Some of the difficulties facing commercial forest growers include:

- It is difficult to do experimental research that reflects the real-world situation.
    - Commercial forests are:
        - High value crops that take years to grow – destructive experiments have a high cost and are difficult to recreate at an appropriate scale.
        - Dynamic, constantly changing fuel structures due to harvesting & silviculture operations.
- Fire management is not the core-function of most commercial forest managers:
    - Diverse backgrounds and job duties
    - Low priority to seek out and understand research implications
    - Part-time activity with interest rising and peaking during fire season
    - Destructive fires do not happen every year leading to potential complacency.
- Fire research is a broad field and generates a lot of data and papers:
    - Difficult to find and distil the most relevant information
    - Fire researchers not always understanding the needs to commercial forest industry
    - University researchers favour biodiversity and environmental projects rather than industry or economic cost projects.

    - Some published research questions the value of active fire management practices, such as prescribed burning and thinning, without the existence of a strong body of alternative research on the same topics.
    - The focus on 'saving lives and property' tends to bias research towards community safety and less on ecology, land management or economic values.
- Fire research is not consistently funded whereas the need is ongoing and increasing:
    - Major events generate a high level of interest and a greater perception of the risks
    - Frequently there is a significant increase in the funding available for research following events
    - There is a danger that reactionary, post-event funding may bias research towards short-term results rather than focussing on longer-term preventative measures.
    - As time since events increases, the awareness of bushfire risk wanes / gets lost in more pressing day to day workload challenges.

Barbour 2007, found that the most successful science delivery projects shared some common characteristics:

- They did a good job of problem framing, enabling the research to focus on the pertinent land management issue
- The work was performed in a timely manner, so it remained relevant to the audience upon completion
- The information obtained through research was synthesized and presented in a way that directly addressed a management issue.
- A true collaborative effort existed, so the end users were involved throughout the process and may have even helped in collection of data or played other roles in the study.
- Communication with end users occurred throughout the process, which increased the ease of technology transfer.
- The internet was used as both a storehouse of information and a communication channel.
- Dissemination of information to larger audiences occurred through a variety of mechanisms, but there was an understanding of the hierarchical nature of the delivery systems that exists for management.

Despite the availability of research papers and online, centralised databases, Barbour found that capacity problems (i.e. having the time and devoting sufficient priority to understand and implement new ideas) at the unit level may be the biggest barrier to the incorporation of new research into management activities. Many field-level interviewees reported that the most important source for accessing research was "informal information networks" or key individuals that they know personally. These networks and individuals tend to screen and/or select research and send it to unit-level staff those papers, studies, etc., that they believe are relevant to their information needs.

Research conducted on the local unit is an important source of management information and informal experiments often provided valuable information. Creating opportunities for the field staff and researchers to interact both formally and informally assisted in developing trust and understanding of each other's needs and objectives.

POSSIBLE SOLUTIONS

Potential solutions enabling forest growers to better understand and adopt research into everyday forest management include:

- Need to use actual bushfire events as significant learning opportunities. To do this requires:
  - A high degree of flexibility (budgets and personnel) to maximise opportunities when they arise.
  - Good pre-planning to ensure that data is captured before, during and after the event.
  - Pre-defined data standards to enable cross-comparison between events.
  - Pre-defined data collection templates that reduce the impact on managing the event whilst ensuring consistent high-quality data is obtained.
- Develop decentralised trusted expertise
  - Trusted advisors who have operational commercial forestry and fire knowledge and experience and are able to:
    - Summarise important findings and tailor messages to commercial forestry
    - Organise field trips involving field personnel and researchers so that each understands the others' problems and creates a connected community
    - Be embedded into research projects to ensure they stay focused on practical outcomes
    - Be involved in the early adoption of innovation
  - There are a number of examples which may be used as a model for this:
    - Green Triangle Fire Alliance employs a manager who is able to investigate issues, explore concepts, organise workshops and discussions.
    - Queensland Fire & Biodiversity consortium provides a e-newsletter summarising recent fire research and publications with links to the relevant articles for more details.
    - Forestry Australia holds regular webinars on forest fire management topics and has employed two Forest Science Policy Officers who facilitate the development of policy and communications.
    - NSW Department of Planning & Environment Science, Economics and Insights Division.

> "*In a culture heavily focused on "can do," the necessary element of time for reflection in order to actually learn from all the "doing" gets disabled and frequently discarded in favour of simply continuing to keep "doing." This gets rationalized with being too busy to stop and learn."*
>
> Dialogos 2007

8. DISCUSSION

Following the first workshop, the 33 original projects were condensed into 13 projects and five new projects were added, three of which relate to the introduction of the AFDRS. An additional Future Workforce project was added after the second workshop resulting in a total of 19 projects. These projects have been grouped under four themes:

1. Improving resilience & response
2. Understanding risk
3. Effective community engagement
4. Long term adaption

A number of the projects that have emerged with very high priority can be greatly assisted by studying past events. The potential for fire case studies to inform a number of aspects of commercial forest risk management is shown in Figure 1. The importance of creating learning opportunities (incorporation into training materials, workshops, field trips and case study summaries) to allow the transfer of this knowledge into the industry and into firefighter education and training is a critical outcome for these projects.

To maximise the potential to continue to inform industry knowledge and enable research to be quickly engaged following future fire events, a common set of protocols for data collection metrics and formats should be developed. These protocols should be developed whilst undertaking case studies on previous fires that have had significant impacts on commercial forests.

Several fires from the 2019-20 fire season should present some interesting data for a range of the FWPA projects. These fires include the Tumbarumba Dunns Road NSW, East Gippsland Border Vic / NSW, Walcha Stockyard Flat NSW, Grafton Dorrigo Bees Nest NSW, Upper Murray Walwa NSW / Vic, Dandongadale Abbeyard – Yarrarabula South Vic and Wade Junction Vic fires.

Projects (in Table 2) have been identified as research projects (which may include some tool developments in the process) database or tool development and workshops / seminars / field trips. Research projects are generally larger and may be best commissioned though the expressions of interest process, however the tool development and workshops may be best undertaken by FWPA engaging a provider to undertake the work.

Consideration of the outcomes of the Ranking Survey and Workshop 3 resulted in the priority rankings for the projects shown in Table 2. Discussion in Workshop 3 changed the priorities of several projects. The socio-economic impacts to industry, regional economies and timber supply arising from major forest resource losses, was seen as a critical issue , providing valuable information to influence political and fire management decisions. Fire loss reporting may quote the area and the forest valuation lost, however the on-going impacts on the timber industry and regional jobs and economic development are poorly documented. Some of these effects may take many years to become apparent and effect long-term log supplies for over 25 years post fire. In 2018 the Carter Holt Harvey mill at Morwell in Victoria closed resulting in the loss of 160 jobs. This was largely the result of reduced log supply following the 2009 Black Saturday fires.

Remote sensing was given a lower priority. There has been significant work done in this field in recent years. The NIFPI project (O'Hehir, et al 2022) showed that satellite technology still has

further development and is largely reliant on the deployment of a significant number of cube-satellites. Various camera fire detection systems are currently being trialled, however these need to be evaluated over a number of fire seasons to prove their value.

Discussion during Workshop 3 developed a number of RDE implementation recommendations which are documented in Section 10.

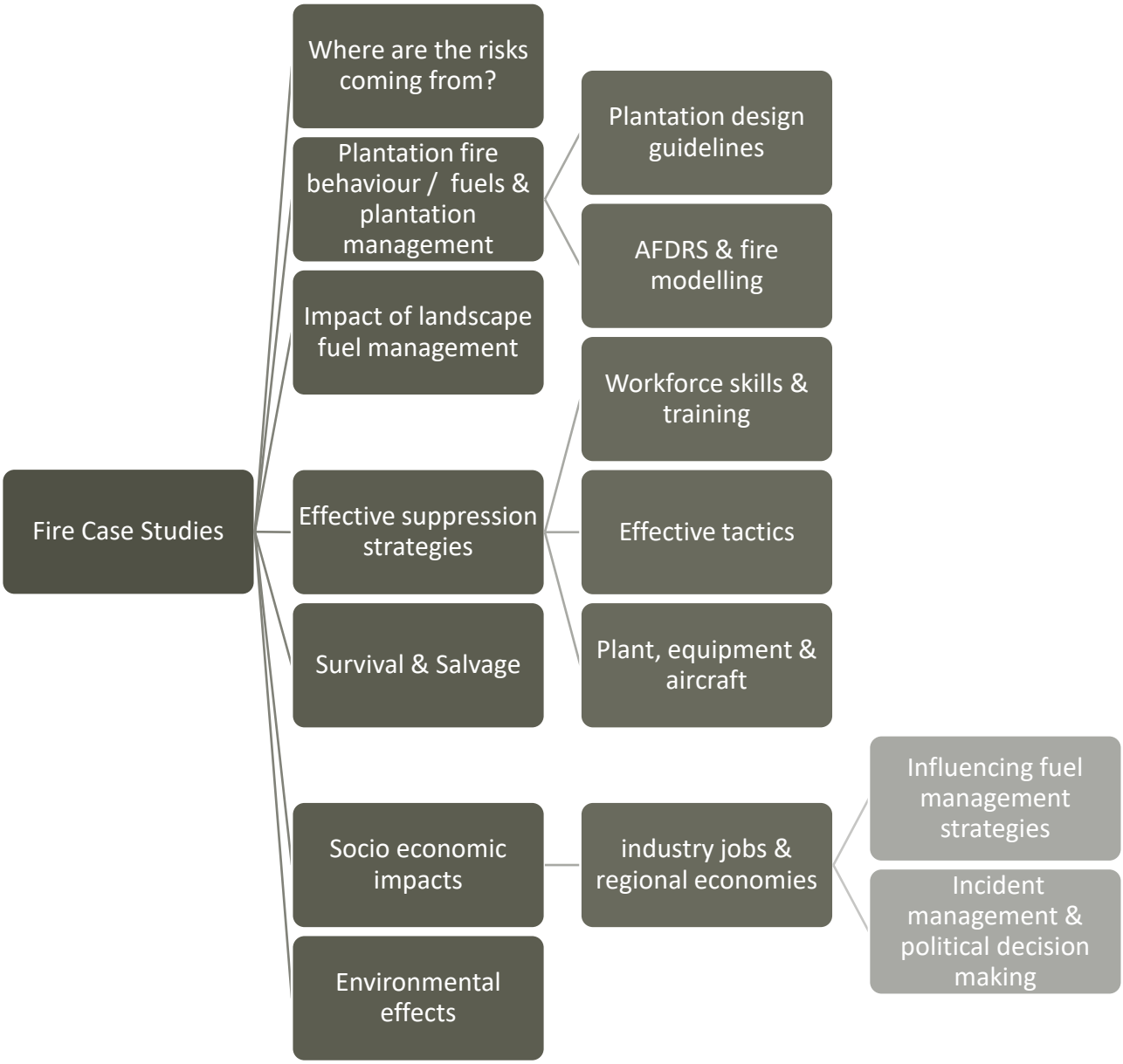


Figure 1 Illustration of how fire case studies are able to provide significant information for various RDE Projects and reduce fire risk.

9. OUTCOMES

Table 2 Priority Fire Research, development and extension Projects. (Projects highlighted with blue cells indicate potential lower cost / rapid development 'quick wins.')

#	Theme	Topic	Project	Context	Expected outcomes / Questions	Recommended type of RDE	Priority

1.1.2	Improving resilience & response	Understanding fire behaviour & impacts	Plantation fire behaviour	Experimental plantation fires are not feasible or commercially desirable. Forest growers need to take every opportunity to learn from actual fire events to evaluate the key metrics that influence fire behaviour and timber salvage opportunities.
				This information can then inform plantation design and operational guidelines.
					• Case study examinations of historic plantation fire behaviour
					• Key metrics that have significant impact on the ability to control plantation fires and commercial salvage operations
					• Viability / economics of:
					  ○ improved access
					  ○ chemical / mechanical fuel treatment of weeds, understory & harvest residue
					  ○ prescribed burning in plantations
					  ○ pruning
					  ○ bioenergy use of harvest waste
					  ○ Green firebreaks
					  ○ Improved plantation design guidelines.
					• Guidelines for forest operations to reduce fire risks
					• A tool that allows the evaluation of alternate plantation design and operational management decisions against the increase or decrease in potential fire risk.
					• Improved plantation fire modelling
					• Mapping products to display potential fire behaviour / plantation value.
					• Improved educational materials for firefighter education & training
						Research Project	**Very High**

#	Theme	Topic	Project	Context	Expected outcomes / Questions	Recommended type of RDE	Priority
1.2.1	Improving resilience & response	Forest fire response	Effectiveness of suppression strategies	Forest growers need a good knowledge of effective suppression strategies and to know how and when to use different tactics. Defensive strategies focussing on asset protection can lead to greater losses than strategic attack focussing on stopping wildfire spread. Identifying decision traps and creative ways to prevent these traps will ensure safer working environments for firefighters during dynamic and complex situations.	• Case studies of forest fire suppression strategies in a variety of landscapes. • Improved knowledge of successful fire suppression strategies. • What combination of resources (firefighters, plant, tankers, aircraft) is most effective in different situations? • What tools could be developed to assist decision making in uncertain and chaotic environments? • Ability for growers to prioritise resources to the most effective strategies. • Improved educational materials for firefighter education & training	Research Project	**Very High**
1.2.2	Improving resilience & response	Forest fire response	Effective use of heavy machinery / plant in forest fire suppression	The creation of mineral earth breaks, burning out unburnt country and effective blackout are critical tools in forest fire control. What machines are appropriate and how do we maximise the effectiveness of these operations?	• Case studies of machinery use in forest fires • Adaptions of forestry equipment for firefighting, what is practical, effective, eg forwarder firefighting units? • Time / motion / productivity studies to develop ready reckoners • What machinery will be available, post native forest harvesting ceasing? - skidders and bulldozers (not frequently used in plantations) • What skills / knowledge do the best firefighting plant operators have? • How do we train / get experience in the next generation of plant operators? • Improved educational materials for firefighter education & training	Research Project	**Very High**

#	Theme	Topic	Project	Context	Expected outcomes / Questions	Recommended type of RDE	Priority
2.1.3	Understanding risk	AFDRS & fire modelling	AFDRS - Plantation fuels	The current AFDRS Fuel state editor has only one fuel sub-type for pine plantations. The pine Fire Behaviour Indices (FBI) model calculates fire behaviour using the weighted mean of an ensemble of 6 fuel classes. The plantation industry has good GIS data which could be used to regularly update fuel models. Currently the AFDRS fuel state editor is based on a 1.5 km grid which is too coarse to account for plantation units with significantly different fuel arrangements. The result is fire modelling in plantations may poorly predict actual fires.	• Develop common standards that integrate plantation age / stage with harvest history into fuel types for fire modelling. • Development of a tool that produces plantation fuel maps within common GIS systems to allow easy integration of data into common fire modelling platforms. • Investigation of the potential for hardwood plantation fuel types in the AFDRS. • Development of a tool that allows forest growers to easily export GIS data into fire modelling AFDRS fuel state databases.	Tool development	**Very High**
2.1.4	Understanding risk	AFDRS & fire modelling	Access to fire modelling tools	Phoenix RAPIDFIRE has a proven a valuable tool for commercial forest growers to evaluate fire risks. New fire models are currently being developed, e.g. CSIRO's Spark, UoM FROST. The forest industry needs on-going access to modelling tools that reflect commercial forest fires and impacts. They are invaluable for risk assessments, firefighter training and risk communication.	• How does the industry ensure that the new models best reflect and simulate fire within commercial forests? • How does the industry maximise access to fire models in the future? • Does commercial forestry need to develop in-house skills in fire modelling? • Can these models be used to evaluate costs / benefits of various stand management options? • What additional data or tools are required to evaluate commercial / economic risks?	Research Project	**Very High**
3.2.1	Effective community engagement	Understanding fire socio-economic impacts	Socio-economic impacts to industry, regional economies and timber supply	The long-term impacts of fire on the whole industry, particularly the flow-on impacts to future log supply, industry jobs and regional economies, are not well understood are articulated. The forest industry needs to be able to clearly articulate to politicians, fire agencies and fire incident managers, the importance of the industry and the potential long-term consequences of fire damage.	• Evaluation of both the short-term and long-term impacts of fire events on industry viability, employment and regional economies. • Statistics to demonstrate the impacts of fire on forestry assets to politicians, fire agencies, IMTs, local communities. • A model to predict the full costs (financial and non-financial) of potential events to assist decision making.	Research Project	**Very High**

#	Theme	Topic	Project	Context	Expected outcomes / Questions	Recommended type of RDE	Priority
1.1.1	Improving resilience & response	Understanding fire behaviour & impacts	Where are the risks coming from?	Data on the cause and origin of fires that impact commercial forests is scattered across numerous databases in individual companies and agencies. Knowing the origins of the risk can assist forest growers in designing mitigation strategies. Collation of good data will enable analysis of trends and enhance the ability for the industry to respond to the risks.	• Development of data standards for collating fire information • Development of a commercial forest fire impact database and GIS files. • Report on fire risk origin - causes, land tenure, impact of adjacent land management, climate & weather events • Development of a GIS tool for compiling data for future fire events. • Company data reporting access • Annual reporting of trends.	Development of an FWPA database to enable direct input from each forest grower on at least an annual basis.	High
1.2.3	Improving resilience & response	Forest fire response	Future Workforce	The forestry workforce demographics is changing. There has been little forestry education provided in Australia at a tertiary level in the last 10 years. Generalist environmental courses are not providing a good background in forest fire management. Fewer people are choosing to accept manual outdoors based work. Contract employment has greatly relied on a transient workforce which has high turn-over.	• How do we best create a skilled and experienced workforce for the future? • What is the likely demographic of future rural workers? • What will attract and keep people working in the forest growing industry? • What are the best ways to transfer forest fire skills to the next generation? • How do we best manage and ensure effective firefighting without compromising good work, health and safety principles?	FWPA Workshop	High
2.1.1	Understanding risk	AFDRS & fire modelling	AFDRS - Fire Danger data for forestry locations	With the advent of the AFDRS, FFDI data is no longer readily available from the BoM. Public facing and Fire Agency fire danger products from the BoM currently cover much greater geographic areas than may be appropriate for commercial forestry operations. There is a need for the development of a user-selected localised fire danger generator to enable the implementation of forest work restrictions and adequate response scaling.	• Development of a tool to download gridded weather forecasts from the BoM database and produce AFDRS FBIs and FFDI for user-defined geographic areas. • Localised hourly fire weather and fire danger data available to forest growers. • Up to six day outlook forecasts for fire danger. • Automated systems for the implementation of forest operation restrictions.	Tool development	High

#	Theme	Topic	Project	Context	Expected outcomes / Questions	Recommended type of RDE	Priority
2.1.2	Understanding risk	AFDRS & fire modelling	AFDRS - Forest and Pine FBI models	The new AFDRS models have not had sufficient operational testing by forestry organisations for them to gain confidence in setting forest operation restrictions and response readiness on the outputs of the AFDRS models. The assumptions used for calculating fire behaviour index and ROS for pine and eucalypt plantation fires need to be validated against some real-world examples to ensure they best reflect actual conditions.	• Comparison of the new FBI outputs against existing FFDI / GFDI values using long-term weather data to see the variability in results over a significant number of fire seasons in locations of commercial forestry assets. • Validation of AFDRS outputs against real-world fires particularly plantation fires. • Examination of variability and explanation of possible causes. • Improvements to the FBI models so they better reflect on-ground conditions. • Sub-project to measure within plantation wind reduction factors.	Research Project	High
2.3.1	Understanding risk	Commercial risk	Insurance	With increasing natural disasters, forest grower insurance costs have risen significantly in recent years. Many growers are struggling to find suitable and affordable fire insurance for their crop. Contractors working with planned and unplanned fire are also struggling to find suitable / financially viable insurance products to adequately cover their potential liabilities.	• What insurance options are available to forest growers? • Survey of forest growers and contractors to ascertain current insurance models. • Is self-insurance feasible? • What are the potential financial / legal liabilities if not insured? • Do insurers understand fire risks in commercial forests? • Are there specific measures that growers can take that may reduce the risk to insurers?	FWPA Workshop	High
1.3.1	Improving resilience & response	Recovery	Salvage operations	The ability to rapidly plan and commence salvage operations following fire damage is crucial to economic recovery. Maximising the value recovery is highly dependent on available contactors and markets.	• Using the Fire Salvage Guidelines, are there tools that may be developed to assist planning and scheduling salvage operations? • Economic decision support tools for guiding salvage operations post forest fires	FWPA Workshop / Field trip	Moderate

#	Theme	Topic	Project	Context	Expected outcomes / Questions	Recommended type of RDE	Priority
2.2.1	Understanding risk	Deliberate fires	Arson and burning of stolen vehicles	Deliberate lighting of fires in forests are a common problem. Forests are commonly dumping grounds for stolen vehicles which are then set alight to destroy evidence. The subsequent fire may spread to adjoining forest and has the potential to become an ignition source that may result in a significant fire event.	• What can be done to reduce the potential for forest and vehicle arson? • Are there examples of effective forest arson prevention strategies? • Can forests be hardened to arson? • Are there effective ways to detect /monitor illegal activities in forests? • What deterrents work to prevent the dumping of stolen vehicles? • What strategies are effective in reducing the potential fire escape from the burning vehicle?	FWPA Workshop / Field trip	Moderate
3.2.1	Effective community engagement	Landscape management	Effective fuel management - tenure blind	Management of fuels, both within the commercial forest estate and surrounding landscape is one of the greatest factors influencing risk to the commercial forest. How can forest growers ensure that the socio-economic values of commercial forests are considered in the planning and implementation of landscape (tenure blind) fuel management?	• What influences political / social attitudes towards fuel management? • How do we ensure that commercial forests are treated as high value assets? • Case studies of examples where fuel management in surrounding landscape limited loss of commercial timber resources. • Review of decision support models for landscape (tenure blind) fuel management. • Development of (commercial forest) socio-economic metrics for integration into decision support models.	Research Project	Moderate
3.2.2	Effective community engagement	Landscape management	Effective fuel management - maximising opportunities	Climate change is reducing the windows available for prescribed burning. How can forest managers maximise all opportunities for fuel management?	• Tools to enable remote sensing of forest fuel moisture levels. (Current FWPA project) • A predictive model that uses current data to show future windows of opportunity for prescribed burning and forecast potential periods of increasing fire suppression difficulty. • Effectiveness of using aerial ignition technology for prescribed burning in cooler months	Tool development	Moderate

#	Theme	Topic	Project	Context	Expected outcomes / Questions	Recommended type of RDE	Priority
1.2.4	Improving resilience & response	Forest fire response	Remote sensing	Significant work is currently being undertaken in developing remote sensing technology for fire detection in Australia. As remote sensing technology advances, forest growers need to remain alert to developments which may significantly improve their ability to monitor and respond to risks.	• Has detection time really made a material difference in fire development for fires that have affected commercial forests? • Is early detection the issue or is it effective first attack? • Watching brief on developments in remote sensing of fires. • A periodic review of the current state of play and value for investment in remote sensing of fires. • Collaboration and cost sharing of fire detection - who benefits most / who should pay? • How can costs and information be shared across communities / organisations?	FWPA Workshop Integration into potential new FWPA remote sensing Investment Plan?	Low
1.3.2	Improving resilience & response	Recovery	Environmental effects	Soil degradation, environmental and infrastructure impact may be significant following fire events in commercial forests. An effective response to these impacts will greatly assist post-fire recovery.	• Best practice guidelines for the management of soils, infrastructure and environmental values following fires.	FWPA Workshop / Field trip	Low
4.1.1	Long term adaption	Resilient trees	Fire tolerant plantation tree species	Investigation of alternative fire tolerant commercial plantation species for future commercial plantings	• List of potential plantation species, eg Pinus canariensis, Southern pines (P. elliottii x P. caribaea) and potential for hybrids? • What other species can fit into current / future timber resources?	Integration into FWPA Genetics and Climate Change Investment Plan	Low

#	Theme	Topic	Project	Context	Expected outcomes / Questions	Recommended type of RDE	Priority

4.1.2	Long term adaption	Resilient trees	Fire resistance of existing commercial species	Forest growers have noticed significant differences in survival rates and salvage potential depending on post-fire weather conditions. Understanding the critical factors of post-fire mortality and timber degradation in commercial tree species will give insight into strategies that may enhance tree survival and ensure effective and efficient salvage operations.
				Opportunities may exist through tree breeding to develop existing species that are more tolerant to fire, eg increasing bark thickness, reducing ladder fuels.
				Tree breeding is a long-term strategy and there are bio-physical constraints to cross breeding within the Pinus genus.
				Greater fire tolerance may enhance opportunities for prescribed fire and reduce downgrades during post fire salvage.
					• Can current commercial species become more fire resilient?
					• What is the driver behind post-fire tree death?
					• How do the following factors influence tree survival:
					  ○ bark thickness?
					  ○ depth of feeder roots?
					  ○ pre-fire litter / duff dryness and surface fuel burning depth?
					  ○ post fire rainfall and weather - rain quantity / timing and temperature / humidity?
					• Would increased bark thickness result in less timber damage and lower mortality?
					• Can we influence ladder fuel traits?
						Integration into FWPA Genetics and Climate Change Investment Plan	Low

Overlapping areas of research and other organisations that have projects relevant to the topics listed above have been identified and documented in Appendix C. This list is not exhaustive but should serve as a guide when considering future RDE investments.

10. RECOMMENDATIONS

The following recommendations have arisen during the conduct of this review:

1. FWPA prioritise major investment in the projects identified as Very High and High in Table 2 of this review.
2. A number of smaller projects have been identified as having the ability to be rapidly developed with relatively small cost and should be considered, these include
   - Risks – fire history database
   - AFDRS – Fire Danger tool
   - AFDRS – Plantation Fuels – tool for plantation fuel mapping
   - Arson and burning stolen vehicles (workshop / seminar)
   - Insurance (workshop / seminar)
   - Salvage (workshop / field trip)
3. Engagement of a Development and Extension Coordinator who has a specific focus to undertake:
   - Regular scanning of fire conferences, literature and research reports to provide a monthly email summary of interesting developments that are particularly relevant to commercial forest growers.
   - Organise workshops and field trips between researchers and forest growers to explain research results, advance adoption of new practices and sharing of non-commercial information between growers.
   - Manage fire risk database and produce annual reports on fire risk trends.

   [*Note from FWPA: The coordinator could be engaged collectively by industry or by FWPA; however, if through FWPA the summarising of external research would not be eligible for matching funding*.]

4. FWPA should develop a Grower special interest group for Fire which involves growers' representatives who have a significant role or interest in fire management.
5. Expressions of Interest (EOI) for major research projects should be developed with specific and detailed EOI documentation which has been developed by an expert grower interest group to ensure the outcomes meet grower needs. An outline of the potential format for an EOI is documented in Appendix D.
6. To gain the most from RDE investment, growers need to be actively engaged and involved in projects at multiple stages:
   - Developing proposals
   - Ensuring RDE providers understand the commercial and field conditions
   - Assisting data collection
   - Keeping providers focused and accountable to project objectives
   - Devoting time to understand the results.

11. EXPERT REVIEW GROUP OBSERVATIONS

The Expert Review Group provided valuable feedback throughout the development of the revised Fire Research, Development and Extension Plan. Their individual expertise and geographic spread added significant value to both the project priority ranking exercise and the final report.

Fire is the greatest risk to the Australian forest and wood products industry. Due to the size and scale of impacts, fire has the potential to threaten investor confidence in the industry and create wood supply issues that threaten the viability of wood processing industries. Ultimately the consumer will be affected through timber scarcity and the costs of importing timber. Investment in fire research, development and extension must be a focus of not only the forest growers but also the wood processors.

Discussions with the Review Group endorsed the elevation of the socio-economic study to very high priority. They saw the need for objective data to support the forest industries in making submissions to governments as a key priority. This data is also required to ensure that the full value of the timber resources and processing industries are appropriately considered during incident management and landscape fuel management decision making. Fire managers and responders need better education on the value of the forests for long-term regional jobs and economies. The short and long-term economic impacts of fire on commercial forests is significant for the wood processors, hence the importance of this project for all members of FWPA, not only the forest growers.

The value of having good fire data and statistics is recognised as an important tool to enable lesson learning, demonstrate both the increasing risks and more successful mitigation strategies. It could also allow growers to benchmark themselves against industry standards. Collation of data by FWPA will allow better tracking of industry impacts, evaluation of emerging risks and improve decision making.

The Review Group identified that there are inconsistencies in the new AFDRS and that these may have significant implications for forestry operations and fire response decision making. There also seems to be little incentive or funding for the Emergency Response Agencies to further test and develop the AFDRS Fire Behaviour Indices to reflect field conditions in commercial forests. There is a danger that the flawed assumptions may flow on into future fire-spread modelling systems such as CSIRO's Spark.

Fire is the single greatest threat to the forest industries in Australia under a changing climate. It is vital that the forestry sector is able to implement effective strategies to manage this risk to reduce the impacts on wood supplies. This will not only to protect Australia's future timber and building supplies, but also to provide the on-going returns to the investors who are vital to the industry.

12. REFERENCES

ABARES, 2020, Fire extent derived from the Department of Agriculture, Water and the Environment National Indicative Aggregated Fire Extent Dataset (v20200428) current to 28 April 2020.

Barbour J 2007 Accelerating Adoption of Fire Science and Related Research. Final Report to the (USA) Joint Fire Science Program, JFSP Project # 05-S-07

Dialogos. 2007. Integrating mission accomplishment with safety at the U.S. Forest Service. Unpublished Diagnostic Memo. 46 p in Wright V 2010 Influences to the Success of Fire Science Delivery: Perspectives of Potential Fire / Fuels Science Users. Final Report to the (USA) Joint Fire Science Program JFSP Project #04-4-2-01

Geddes D, 2020 Database capture of individual significant-scale Australian forestry plantation fire losses, FWPA

O'Hehir J, Hay A, Saunder G, Salkin O, Ferguson E, Meng L, Peters S and Gao J, 2022. Scoping an Automated Forest Fire Detection and Suppression Framework: Forest Fire Detection and Suppression System in the Green Triangle. FWPA, National Institute for Forest Innovation, Mount Gambier.

McArthur, A.G., 1967. Fire behaviour in eucalypt forests. Forest Research Institute, Forestry and Timber Bureau, Canberra, ACT.

McArthur, A.G., 1973. Forest Fire Danger Meter Mark V (circular slide ruler). In. Commonwealth Department of National Development, Forestry and Timber Bureau, Canberra, ACT.

Sparkes G, Mullett K, Bartlett T, 2022, Victorian Regional Forest Agreements Major Event Review of the 2019–20 bushfires, Commonwealth of Australia and the State of Victoria.

13. APPENDIX A

PARTICIPANTS IN GROWER CONSULTATION

Name	Company / Institution
Adam Crook	Forico
Adrian Marti	ABP
Andrew Dunn	HQPlantations
Andrew Moore	Global Forest Partners
Anthony Walsh	Expert Review Group
Brad Barr	Westpine
Cameron Shaw	OneFortyOne Plantations
Darryn Crook	Reliance Forest Fibre
Dean Sheehan	Sustainable Timber Tasmania
Gordon Mansfield	New Forests
Greg Hodson	Forest Products Commission WA
Janette Newport	FWPA
Jodie Mason	FWPA
Justin Cook	OneFortyOne Plantations
Kelly Williamson	Timberlands Pacific
Lachie McCaw	Expert Review Group
Michael Lawson	SFM Asset Management
Mike Sutton	Forestry Corp NSW
Rebel Talbert	Forestry Corp NSW
Richard Mailer	HVP Plantations
Richard Thornton	Expert Review Group
Simon Gatt	AKD
Tony Bartlett	Expert Review Group

14. APPENDIX B

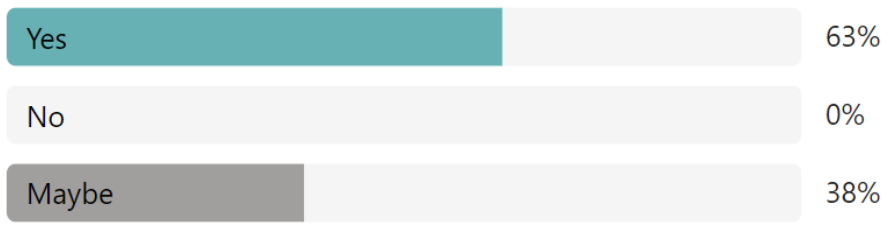
SURVEY QUESTIONS – GROWER ENGAGEMENT & 2020 PRIORITY SURVEY

1. General questions on survey responder
2. Since the development of the 2020 Fire Research investment plan, Australia experienced the Black summer fires which impacted significant commercial forest resources. Has there been any change in your company / agency's perception of bushfire risk to your commercial assets?
3. What is your company's knowledge of the following fire research developed by FWPA?
    - Characterising and managing fire risks to plantations under changing climates - Melbourne Uni FLARE
    - Database of Australian forestry plantation fire losses - Geddes Management
    - Guidelines for salvage harvest, storage and processing of plantation-grown logs affected by fire - Braden Jenkin
4. Do you have any comments regarding the value of any of the research mentioned above in regards to managing fire risk for commercial forests?
5. Rate the 33 projects identified in the 2020 FRIP
    - High
    - Medium
    - Low
    - No longer applicable / research is being done elsewhere
6. Other comments

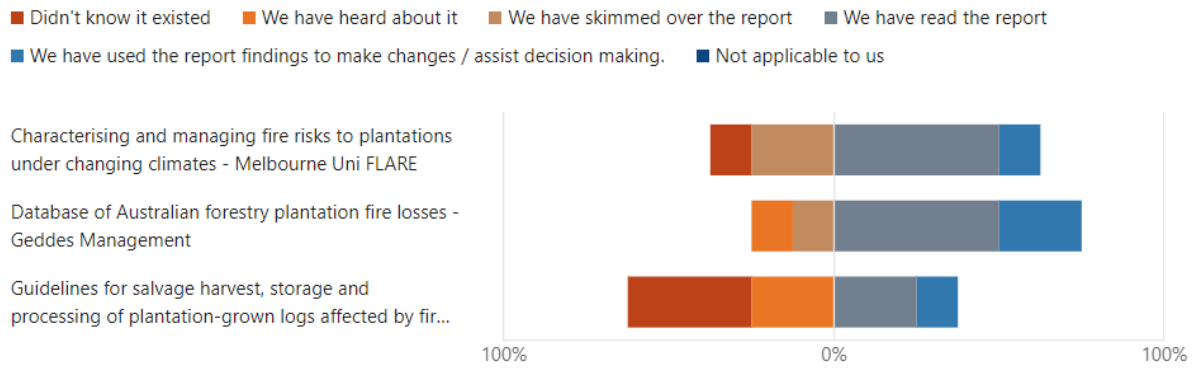
SIGNIFICANT RESULTS

Eight respondents from 7 companies based in Queensland, NSW, SA, Tasmania, Victoria and WA.

Has there been any change in your company / agency's perception of bushfire risk to your commercial assets?



FWPA Research reports awareness:



Top 10 Projects (out of 33 projects) coloured index cells indicate projects listed as High (dark red) or medium (pink) priority projects in the current call for expression of interest.

Index	Topic	1	2	3	4	5	6	7	8	Average
13	Fire preparedness decision support tools for rapid resource response in preparation of, and in response, to bushfire ignitions	3	3	3	3	2	3	3	3	2.875
6	Analysis of plantation design and rotational management for forest fire mitigation	3	3	3	3	2	2	3	3	2.75
5	Effectiveness of suppression strategies	3	3	3	3	2	2	2	3	2.625
27	Effective fuel management for plantation protection	2	3	2	3	3	2	2	3	2.5
3	Refinements for plantation fire spread models	2	2	3	3	3	2	3	2	2.5
30	Effective strategies to reduce arson	2	2	3	3	3	2	3	1	2.375
8	Understanding flammability pathways within softwood and hardwood plantations, and the impacts that climate change and management practices have on plantation flammability trajectories	2	2	2	3	3	3	2	2	2.375
12	Decision support tool for evaluating (tenure blind) fuel management strategies	3	2	1	3	2	2	2	2	2.125
2	Characterisation of fire impacts on commercial forest assets: Identifying the risks to the industry	3	0	0	3	2	3	3	3	2.125
31	Guidelines to reduce the impacts of forest fires through improved plantation designs	2	2	3	3	1	1	3	2	2.125

SURVEY QUESTIONS – PROJECT RANKING SURVEY

1. What is the likelihood of the project leading to significant impacts / developments that are implemented by industry to reduce fire risk for commercial forests and/or significant health & safety benefits for firefighters?
    - Minor / nil - of little benefit or return to growers, not applicable / not relevant to my company
    - Medium - Reduces overall risk but may not result in a measurable / quantifiable change in company profitability. Improved health & safety for <10% of workers.
    - Large - Improved company profitability through: reducing area lost by ~10%; reducing costs by ~10%; increasing salvage returns by~10%; improved health and safety for > 25% of workers.
    - Transformative - likely to result in a significant impact on company profitability by: reducing potential area lost by >20%; improving first attack efficiency / success by >20%; reducing costs (eg insurance / response) by >20%; increasing salvage returns by >20%; improving health & safety for >50% firefighters and forest workers.
2. Does the project result in the development of important (scientific / political / social / economic) data, create clear pathways for adoption or building blocks for future research and development?
    - Interesting research but of little on-going relevance
    - Good results may be difficult to implement

- Tangible, relevant results with some promise for implementation
- Highly relevant results that are likely to be implemented industry wide or boost future RDE efforts

3. Project is likely to generate involvement from the stakeholders and collaborators and generate products of particular relevance and importance for the stakeholders
   - Little stakeholder input
   - General community involvement
   - Significant industry (FWPA) involvement
   - Significant industry and community involvement
4. What amount of work (investment in resources and $) is required undertake the project and achieve results? How easy / hard is the project?
   - Extra large (>$2 million)
   - Large ($750,000 to $2 million)
   - Moderate / Medium ($250,000 to $750,000)
   - Low / Small (<$250,000)
5. How long will it take to get meaningful results? Can the work be performed in a timely manner, so it remains relevant to the audience on completion?
   - 3+ years
   - 2 years
   - 1 Years
   - < 12 months
6. Are there any projects which you consider to be critical / must do projects?
7. Are there any projects which you consider will give relatively quick returns for a small investment?
8. Are there any projects that you consider are no longer required or consider that sufficient work is currently progressing in this field, and it may not be great value for FWPA to invest further at this stage? Please explain why?
9. Would your organisation be willing to be the champion of any project/s?

SIGNIFICANT RESULTS

11 Respondents from 10 companies based in Queensland, NSW, SA, Tasmania, Victoria and WA.

Project Ranking:

Project Title	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	Total
Effectiveness of suppression strategies	15	17.5	21	21	15	16.5	20	18	17.5	13	21	195.5
Plantation fire behaviour	16	18.5	20	19	17.5	16.5	13	19.5	21.5	14	16.5	192
Access to fire modelling tools	17	12.5	22	20.5	17	16.5	16	17.5	17	19	16	191
Effective use of heavy machinery / plant in forest fire suppression	20.5	15.5	17.5	19.5	17	16.5	17.5	17.5	16.5	16.5	16.5	191
AFDRS - Plantation fuels	15	14.5	23	19	17	16.5	17	18	20.5	12	16.5	189
AFDRS - Fire Danger data for forestry locations	13.5	12.5	20	18	19	16.5	13	17	22	19.5	16	187
AFDRS - Forest and Pine FBI models	12.5	12.5	17.5	19	18	17.5	14	18	19.5	19.5	17.5	185.5
Where are the risks coming from?	13	17	21.5	19.5	16	15.5	13	15.5	17	18.5	17	183.5
Insurance	20	17	23	14	9.5	16.5	14	13	21	16	15	179
Future Workforce	18.5	11.5	17	19.5	14	16.5	13.5	20	15.5	17.5	13.5	177
Effective fuel management - tenure blind	16.5	18	20.5	12	17	12	15.5	17	15	17.5	15.5	176.5
Socio-economic impacts to industry, regional economies and timber supply	13.5	19.5	18	12.5	18	14	14	14.5	18.5	14.5	16	173
Effective fuel management - maximising opportunities	16.5	18	19.5	15.5	15	12	16	13.5	15	14.5	16.5	172
Salvage operations	16	11.5	19.5	13	14.5	16.5	13.5	18	17	14	18	171.5
Arson and burning of stolen vehicles	13	10	22	17.5	19.5	16.5	13	14	20	14	9.5	169
Remote sensing	15.5	8.5	21	14	12.5	15.5	16.5	16.5	17.5	18.5	13	169
Environmental effects	15.5	11.5	12.5	11.5	17	16.5	12.5	14	15	9.5	14	149.5
Fire resistance of existing commercial species	12.5	6.5	16.5	15	8.5	16.5	10.5	14.5	8.5	7	6.5	122.5
Fire tolerant plantation tree species	16	10	7.5	11	13	13	12	11.5	6.5	5.5	6.5	112.5
	15.6	**13.8**	**18.9**	**16.4**	**15.5**	**15.7**	**14.4**	**16.2**	**16.9**	**14.8**	**14.8**	**172.9**

Companies willing to assist with project development:

What grower / company do you represent?	Would your organisation be willing to be the champion of any project/s? eg: be actively involved in project description and development, contributing data, providing ground truthing and feedback ...
AKD	Effective use of heavy machinery
Wespine Industries	Yes. We are very interested in fuel modification and bioenergy utilisation. We are also open to conducting experimental fires in our mature and middle aged plantations.
Forico Pty Limited	Insurance issues for planned / unplanned fires, Arson & burning of stolen vehicles.
HQPlantations Pty Ltd	Plantations pine FBI development for sub-tropical/tropical pines
HVP Plantations	AFDRS and modelling related projects. Effective fuel management - tenure blind.

15. APPENDIX C

RELATED RDE PROJECTS AND ORGANISATIONS

Topic/s	Organisation / Funding involved	Location	Capability or Research	Status
Landscape management	AFAC	National	Establishment of the National Prescribed burning network at the Bushfire Centre of Excellence in Western Australia.	On going
Landscape management / Forest fire response	Disaster Ready Fund – R1	Vic	Integrated Strategic Bushfire Management (including prescribed burning, suppression, mechanical fuel treatments, fuel breaks) in a Changing Climate	Commencing
Landscape management	Disaster Ready Fund – R1 / FCNSW	NSW	Fire, Country and People: Aboriginal Community Disaster Ready partnership	Commencing
Landscape management	Disaster Ready Fund – R1	WA	Upgrading Fire History Datasets Using Fire Severity Dynamics	Commencing
Understanding fire behaviour & impacts	CSIRO	National	National Bushfire Intelligence Capability	On going
Understanding fire behaviour & impacts	NHRA	National	Hazard Note 1: Understanding the Black Summer bushfires through research	Complete
Understanding fire behaviour & impacts	NHRA	National	Bushfire reconstructions: developing a data solution to support simulator evaluation	Commencing
Understanding fire behaviour & impacts	NHRA	SA	Black summer bushfires SA reconstructions	Complete
Understanding fire behaviour & impacts	NHRA	National	Soil and fuel moisture precursors of fire activity during the 2019-20 fire season	Complete
Understanding fire behaviour & impacts	Disaster Ready Fund – R1	Tas	Tasmanian Climate Change Risk Assessment Supplementary Materials	Commencing

Topic/s	Organisation / Funding involved	Location	Capability or Research	Status
AFDRS & fire modelling	AFAC	National	Adoption of the new Australian Fire Danger Rating System (AFDRS) which includes eucalypt forest and pine fire behaviour models	On going
AFDRS & fire modelling	NHRA	National	Identifying and defining landscape dryness thresholds for fires	Commencing
AFDRS & fire modelling	NHRA	National	Capturing uncertainty in bushfire spread prediction	Proposed
AFDRS & fire modelling	Disaster Ready Fund – R1	WA	Fire Behaviour Predictions and Advice	Commencing
AFDRS & fire modelling	University of Sunshine Coast	National	NOBURN – Citizen science forest & fuel monitoring	Commencing
Forest fire response	CFA	Vic	Fire response & suppression effectiveness	On going
Forest fire response	NHRA	National	Productivity & effectiveness of suppression resources and tactics on large fires	Progressing
Forest fire response	NIFPI / Uni SA	National	Forest Fire Detection and Suppression System in the Green Triangle (O'Hehir et al 2022)	Complete
Forest fire response	GTFA / SA Government	SA / Vic	SA Government / Green Triangle Fire Alliance fire detection camera deployment to commence in 2023	Commencing
Forest fire response	Various	National	Fire detection cameras: • HQP • FCNSW • FireHawk • ForestWatch • Orora Technologies • Latrobe Valley Information Network (Attentis) • Pano AI	On going
Forest fire response	Minderoo Foundation		Fire & Flood Resilience Blueprint – particular focus on rapid detection, information gathering, predictions and response.	Progressing

Topic/s	Organisation / Funding involved	Location	Capability or Research	Status
Forest fire response	Disaster Ready Fund – R1	Vic	Federal Disaster Ready Fund: Vic - Remote Bushfire Detection	Commencing
Forest fire response	NHRA	National	Why fly? How do we know that aerial firefighting operations are effective and efficient?	Commencing
Forest fire response	Committee for the future of forestry education	National	Proposal for a Graduate Certificate and Graduate Diploma in Forestry programs	Commencing
Commercial Risk	Forestry Australia	National	Have done some investigation and developed a paper on Forestry Insurance.	Progressing

16. APPENDIX D

POTENTIAL FORMAT FOR CALL FOR EXPRESSIONS OF INTEREST IN PROJECTS

Project details

- Overview
- Statement of requirements
- Project description
    - Objectives
    - Must include…
    - Constraints / exclusions
    - Expected funding range or maximum funds available
    - Related research or organisational knowledge
- Expected outputs
- Anticipated outcomes
- Project governance, quality control and reporting
- Contractual arrangements

EOI Process

- Application & review process
    - Key dates
- Submission requirements
    - Limit on words / pages to ensure succinct descriptions
- Additional information sources
- Evaluation criteria and weightings
    - RDE capability
    - Project approach
    - Understanding of project outcomes and outputs
    - Industry engagement
    - Value for money

Several examples of Expressions of Interest can be found on the Natural Hazards Research Australia website. Two examples:

- Identifying and defining landscape dryness thresholds for fires
- Bushfire reconstructions: developing a data solution to support simulator evaluation