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IDENTIFYING OPPORTUNITIES FOR THE USE OF DIFFERENT FUEL MANAGEMENT STRATEGIES IN WESTERN AUSTRALIA

Mechanical Fuel Load Reduction Utilisation project

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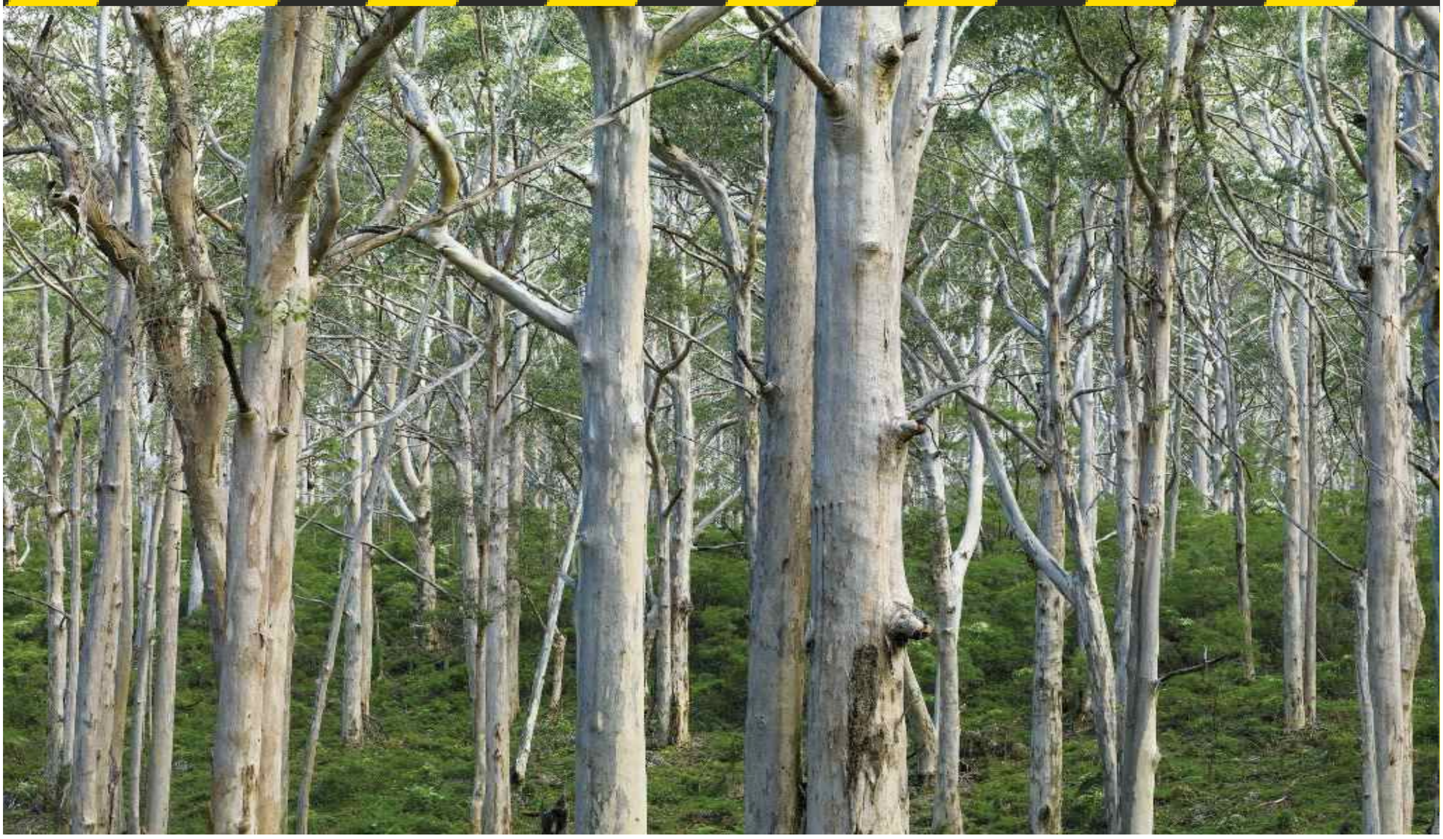

THE UNIVERSITY of ADELAIDE

GOVERNMENT OF WESTERN AUSTRALIA

DFES Department of Fire & Emergency Services

FOR A SAFER STATE

RIKS research institute for knowledge systems

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ACKNOWLEDGMENTS

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We would also like to thank everyone within the Bushfire and Natural Hazards CRC Office who have supported this work in multiple ways, from funding, contracting, and business development.

EXECUTIVE SUMMARY

Bushfire risk is likely to increase in the future due to the combined impacts of climate change and urban sprawl. Planned burning is one of the most utilised fuel management activities, but the safe application of this method is being threatened by climate change (e.g. shrinking and shifting windows of opportunity) and potential adverse societal outcomes (e.g. smoke impact, risk of fire escape). In order to address this issue, this report introduces a novel approach to determining the suitability of different fuel management approaches (e.g. forest thinning, scrub rolling, mulching, mowing/slashing, planned burning pile burning, chipping, grazing) in different areas using a combination of local knowledge/experience and spatial data analysis. The approach is applied to four areas of emerging bushfire risk in Western Australia identified in consultation with end-users, producing maps for different fuel management approaches that indicate where the application of particular fuel management approaches is suitable. These maps can be obtained for current and future conditions, therefore providing an assessment of which fuel management options are available to mitigate the impact in areas of emerging bushfire risk. The approach is generic and flexible and can be tailored to different locations based on information of local knowledge and experience.

END-USER PROJECT IMPACT STATEMENT

Tim McNaught, *Department of Fire and Emergency Services, WA*

In the context of an increasingly competitive environment for finite resources, designing efficient and effective mitigation programs become increasing critical to sustaining investment.

This research demonstrated the complexity in decision making about the type of activity and the different approaches/considerations planners currently take to determining the appropriate activity. The framework is designed to support decision making across both different spatial and temporal scales. Importantly, the integration of the spatial element with current and potential future considerations should provide greater insight into appropriate mitigation strategies building on different activities applied over time.

The application of a framework to guide the bushfire risk management planners towards a singular or varied suite of mitigation activities that suits both the local and spatial context is an important step towards the development of mitigation programs that can achieve efficient and effective use of resources.

1. INTRODUCTION

Bushfire risk is likely to increase in the future due to the combined impacts of climate change and urban sprawl. Planned burning is one of the most utilised fuel management activities for reducing this risk, but its safe application is hindered by climate change (e.g. shrinking and shifting windows of opportunity) and potential adverse societal outcomes (e.g. smoke impact, risk of fire escape). Consequently, this utilisation project focuses on developing approaches for determining opportunities for using alternatives to planned burning to manage fuel load and test these in areas of emerging bushfire risk in regions of interest to end-users in Western Australia. This provides fire managers with access to detailed information to help them make informed decisions and select a fuel management strategy compatible with a range of local factors under conditions of interest.

In order to achieve this, this report introduces a novel approach to determining the suitability of different fuel management activities (e.g. forest thinning, scrub rolling, mulching, mowing/slashing, planned burning pile burning, chipping, grazing) in different areas using a combination of local knowledge/experience and spatial data analysis. The approach (Fuel Management Suitability Tool) is applied to four areas of emerging bushfire risk in Western Australia identified in consultation with end-users (see Jeanneau et al. (2021b) for more details). This results in the production of maps for different fuel management approaches that indicate where the application of particular fuel management approaches is suitable. These maps can be obtained for current and future conditions, therefore assessing which fuel management options are available to mitigate the impact in areas of emerging bushfire risk. The approach is generic and flexible and can be tailored to different locations based on local knowledge and experience.

Section 2 describes the Fuel Management Suitability Tool. Section 3 presents the application of the method introduced in Section 2 to the four areas of interest in WA, resulting in maps of opportunities to apply different fuel management strategies for each region identified as areas of emerging bushfire risk.

2. THE FUEL MANAGEMENT SUITABILITY TOOL

2.1 GENERAL METHODOLOGY

To identify where and under which conditions different fuel management activities (e.g. planned burning, mechanical fuel load reduction, grazing) would be suitable (i.e. where fuel management can technically be applied) and desirable (i.e. where it is socially acceptable and economically feasible to reduce fuel loads), we developed a general conceptual approach for the selection of fuel management strategies (the Fuel Management Suitability Tool) (Figure 1). This approach builds on the approach to create applicability maps for mitigation options in the European RECARE[1] project (van Delden et al., 2019) and the soil improving cropping systems potential index (SICS) in the SoilCare[2] project (van Delden et al., 2021).

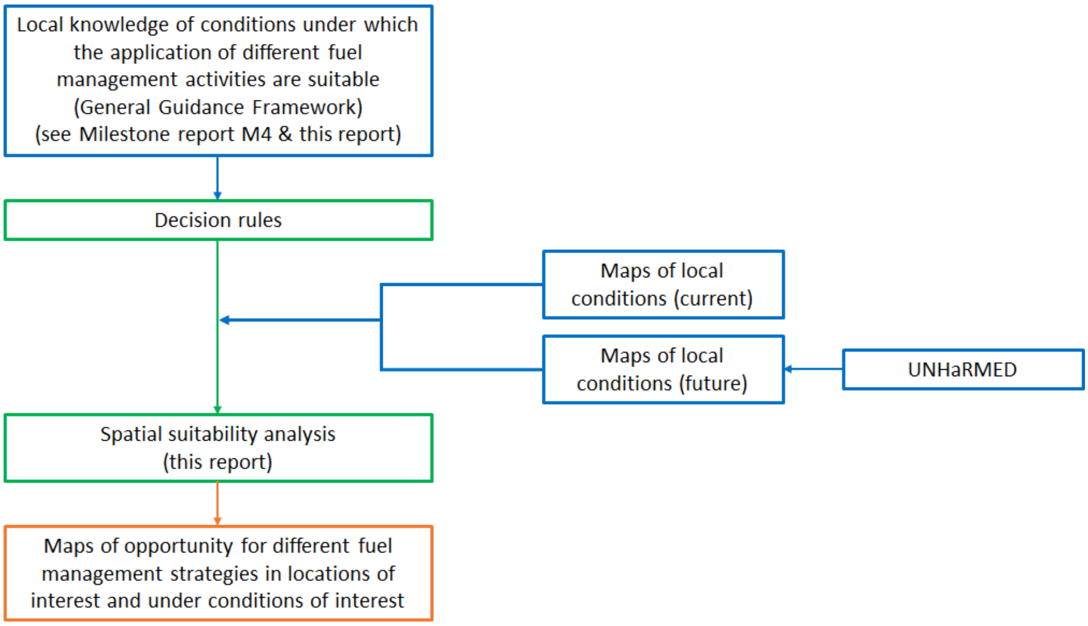

FIGURE 1. FLOW CHART REPRESENTING THE FUEL MANAGEMENT SUITABILITY TOOL TO PRODUCE MAPS OF OPPORTUNITY FOR FUEL MANAGEMENT ACTIVITIES

The proposed approach combines local knowledge/experience of conditions under which the application of different fuel management strategies is suitable with maps of current or future local conditions (e.g. land use, location of assets, etc.) where fuel management would be desirable to create maps of opportunity for different fuel management approaches in locations of interest (Figure 1). Local knowledge of the conditions under which different fuel management approaches are applicable can be obtained from local experts using instruments such as surveys, which can be complemented by generic information from literature, where required.

[1] https://www.recare-hub.eu/
[2] https://www.soilcare-project.eu/

An example of this local knowledge collection is the General Guidance Framework for selecting different fuel management approaches developed by Jeanneau et al. (2021a) for the case study regions of interest. This framework was developed by identifying a range of potential fuel management strategies and their various attributes, such as the information and knowledge needed to match different plans with particular circumstances (see Appendix1) (see also Jeanneau et al. (2021a) for details). The attributes of the possible fuel management strategies were determined with the aid of a literature review and an online stakeholder survey of Local Government Bushfire Mitigation Officers in WA, thereby drawing on both general and local knowledge sources. Therefore, the framework provides information on a set of conditions bushfire mitigation officers need to consider when developing fuel management plans for a range of fuel management techniques, including planned burning, mechanical fuel reduction, or grazing.

To be able to use the local knowledge on the conditions under which different fuel management strategies can be applied as part of a quantitative analysis framework, they have to be translated into a set of decision rules (Figure 1). For example, in the WA case study, survey participants were asked to classify a range of selection criteria that influence the choice of fuel management activities into three categories: *applicable*, *not preferred* or *not applicable*. An example of this reclassification is presented in Table 1, and a more comprehensive version is available in Appendix 2.

TABLE 1. EXAMPLE OF THE SELECTION FACTORS RECLASSIFICATION INTO A SET OF DECISION RULES FOR THREE FUEL MANAGEMENT ACTIVITIES.

	Mulching	Slashing	Fire Breaks
Slope			
Flat (0-2%)	applicable	applicable	applicable
Gentle (2-5%)	applicable	applicable	applicable
Moderate (5-8%)	applicable	applicable	applicable
Rolling (8-16%)	applicable	not preferred	applicable
Hilly (16-30%)	applicable	not preferred	not preferred
Steep (30-60%)	applicable	not preferred	not applicable
Very steep (>60%)	not preferred	not preferred	not applicable
Distance to access roads			
Very near (0-100m)	applicable	applicable	applicable
Near (100-300m)	not preferred	applicable	applicable
Moderate (300m-1km)	not preferred	not preferred	applicable
Far (1-5km)	not preferred	not preferred	applicable
Very far (5-10km)	not preferred	not preferred	not preferred
Extremely far (>10km)	not preferred	not preferred	not preferred

In order to determine the suitability of a range of fuel management approaches in different locations based on the decision rules, information on the conditions that influence the decisions (e.g. slope, proximity to settlements etc.) are required at each location. For current conditions, these can be obtained from available spatial data. For future conditions, these can be obtained using maps of projected or plausible future scenarios. These maps can be derived from the *Unified Natural Hazard Risk Mitigation Exploratory Decision Support System* framework (UNHaRMED, Riddell et al. (2016)), an integrated spatio-temporal model for analysing natural hazard risk within urban and rural environments (Figure 1).

The proposed Fuel Management Suitability Tool (Figure 1) uses a spatial overlay analysis to combine information from the decision rules derived from the online survey's results and information on local conditions (e.g. land use, assets location, etc.) to obtain the desired maps of opportunity to conduct fuel management activities. This approach can be tailored to different locations and conditions of interest (e.g. current, future), as it uses local information, both on physical conditions and decision rules.

2.2 CASE-STUDY EXAMPLE

The Fuel Management Suitability Tool presented in section 2.1 was applied to the areas of emerging bushfire risk identified by Jeanneau et al. (2021b). The General Guidance Framework developed by Jeanneau et al. (2021a) and methodology from the SoilCare project were used to create the decision rules for the following seven fuel management activities:

- Fire breaks and strategic access
- Parkland clearing
- Mulching
- Slashing
- Herbicide application
- Planned burning
- Grazing

For each fuel management activity, we selected a range of input maps defining current local conditions based on a selection of driving factors decided upon by the survey participants (Figure 2, Step 1; see Appendix 2 for more details). The detailed survey responses were then used to define boundaries for selecting driving factors and reclassifying the map values (Figure 2, Step 2). The values were reclassified as 2 for suitable, 1 for not preferred, and 0 for not possible. The reclassified maps were then loaded in ArcGIS 10.6 and combined with the *Weighted Overlay* tool. The intersection of all suitable locations (value of 2) was defined as suitable for each specific fuel management activity (Figure 2, Step 3).

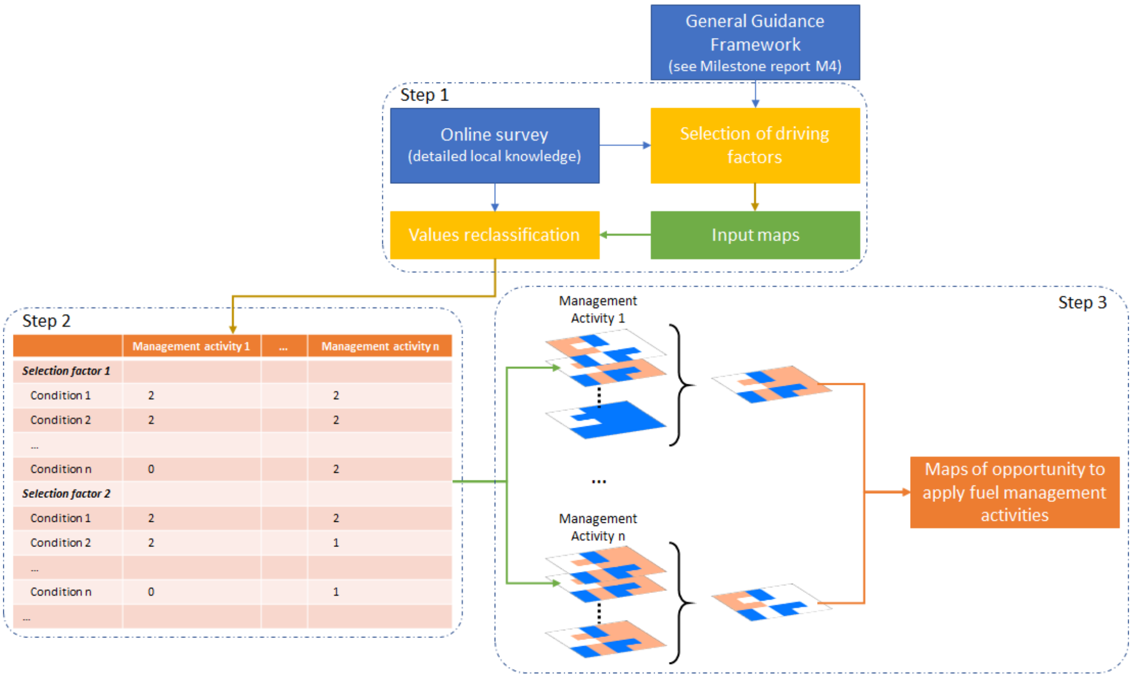

FIGURE 2. FLOW CHART REPRESENTING APPLICATION OF THE GENERAL CONCEPTUAL APPROACH TO THE AREAS OF INTEREST IN WESTERN AUSTRALIA. THE FLOW CHART IS BASED ON THE APPROACH DEVELOPED FOR THE SoilCare PROJECT.

3. CASE STUDY APPLICATION

The maps of opportunity for each fuel management activity listed above for each of the four regions of interest (Gingin, Augusta-Margaret River, Mundaring and Kalamunda) are presented and discussed below.

3.1 THE SHIRES OF GINGIN AND AUGUSTA MARGARET RIVER

Figure 3 and Figure 4 highlight that most mechanical fuel management options (top rows) seem to be following access roads (3 to 5m wide for fire breaks, and up to 500m from the road edges for other mechanical treatments), which is consistent with results from the General Guidance Framework (Jeanneau et al. (2021a)). However, planned burning, herbicide application and grazing, can potentially be applied at a larger scale in the two regions.

The results also indicate that planned burning and grazing could potentially be applied to most of the two regions, providing a greater choice of mitigation options.

3.2 THE SHIRE OF MUNDARING AND CITY OF KALAMUNDA

The Shire of Mundaring and City of Kalamunda are located on the outskirts of Perth and are more populated regions than the Shires of Gingin and Augusta-Margaret River (indicated by the greater proportion of assets in Figure 5), making them an ideal location to test the applicability of a range of fuel management strategies.

Figure 5 and Figure 6 indicate that bushfire mitigation officers could potentially choose from a wide range of fuel management activities to protect regional assets in these regions. Most activities would be directly applicable on the edge of residential areas along with the rural-urban interface. However, herbicide application, planned burning and grazing could be applied at a larger scale.

The locations of current fuel management work conducted by DFES correlated well with the maps of opportunity for fuel management (Figure 5, Figure 6), indicating that the suitability analysis performed reasonably well.

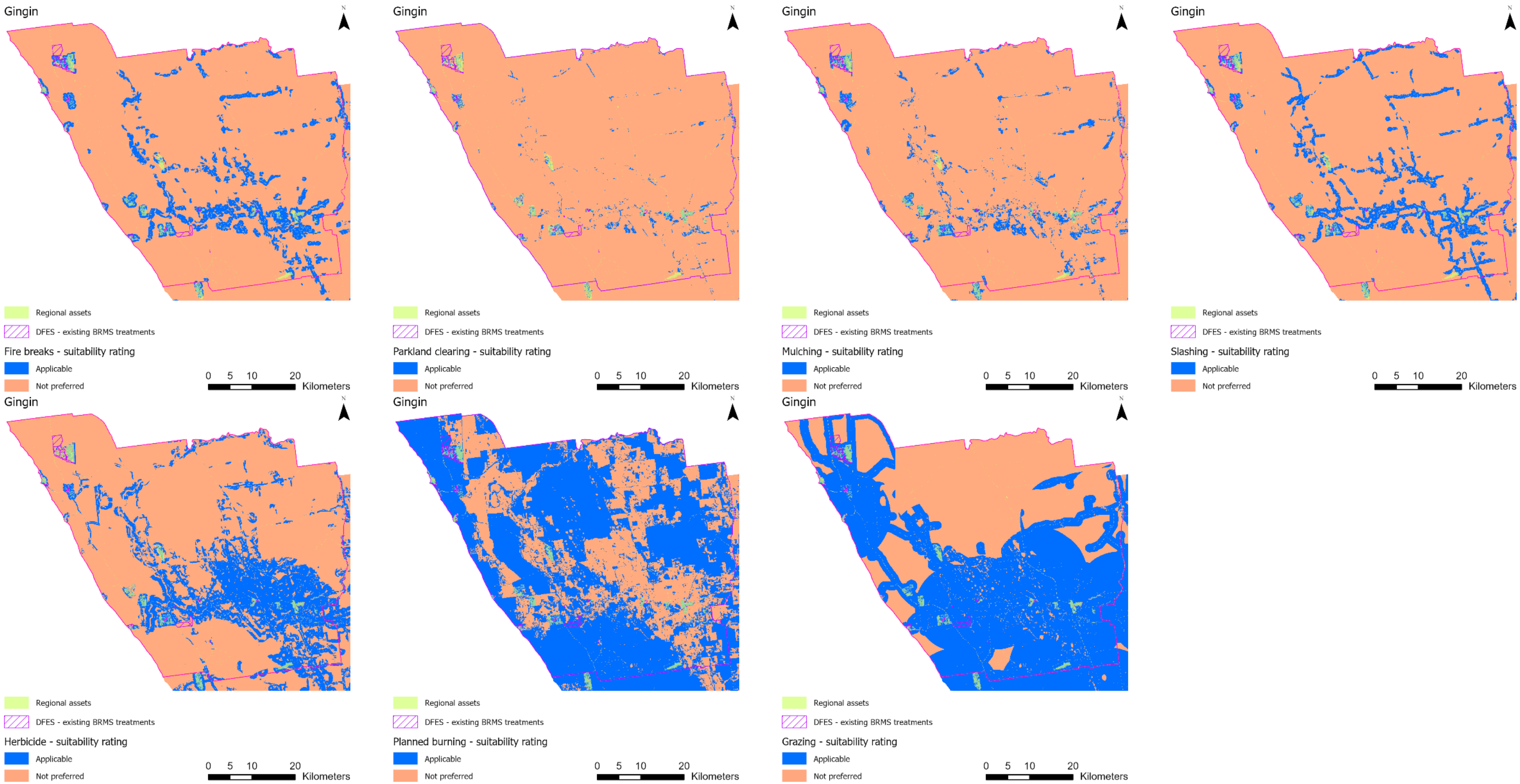

FIGURE 3. MAPS OF OPPORTUNITIES FOR THE FUEL MANAGEMENT ACTIVITIES SELECTED BY SURVEY PARTICIPANTS IN THE SHIRE OF GINGIN.

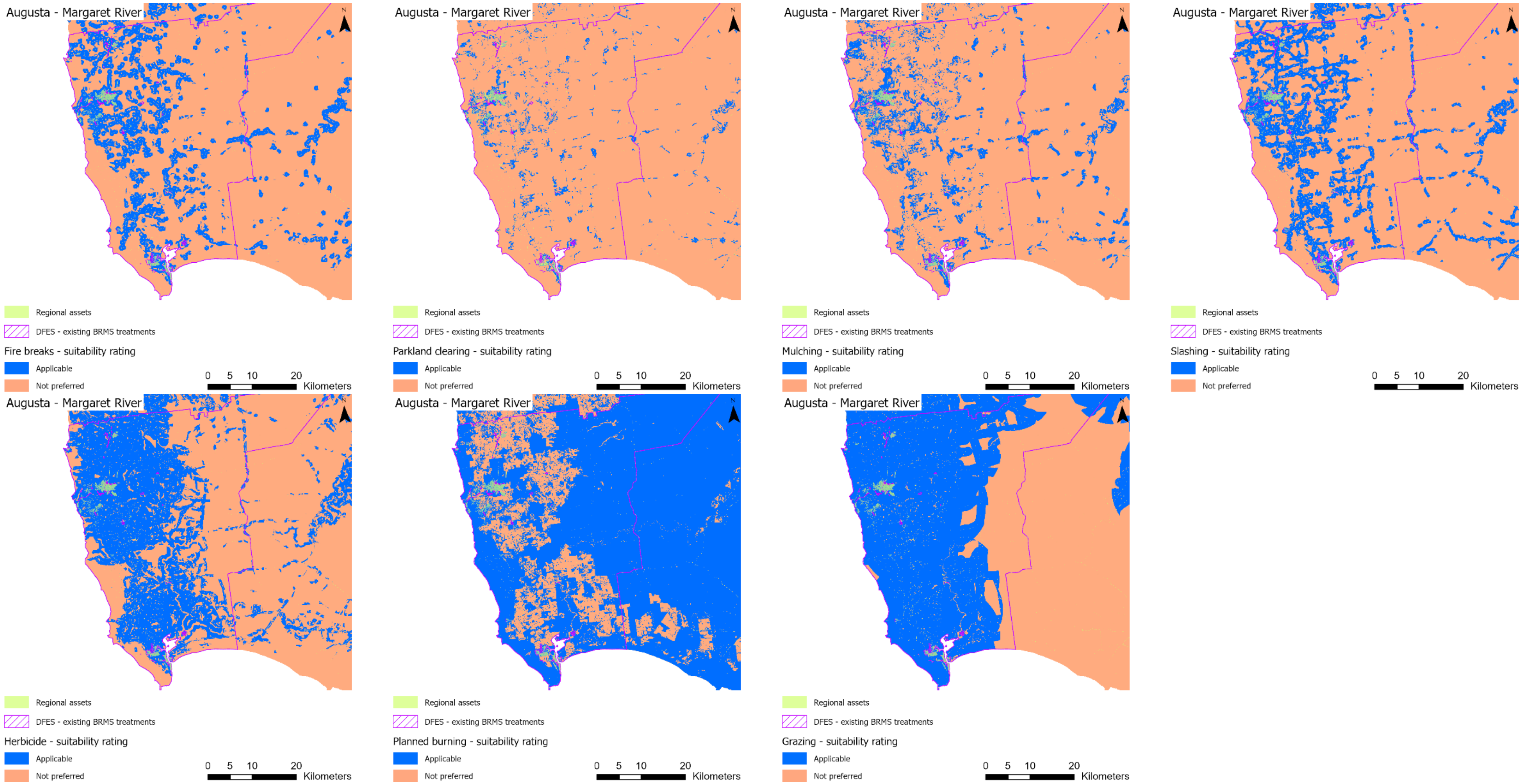

FIGURE 4. MAPS OF OPPORTUNITIES FOR THE FUEL MANAGEMENT ACTIVITIES SELECTED BY SURVAY PARTICIPANTS IN THE SHIRE OF AUGUSTA MARGARET RIVER

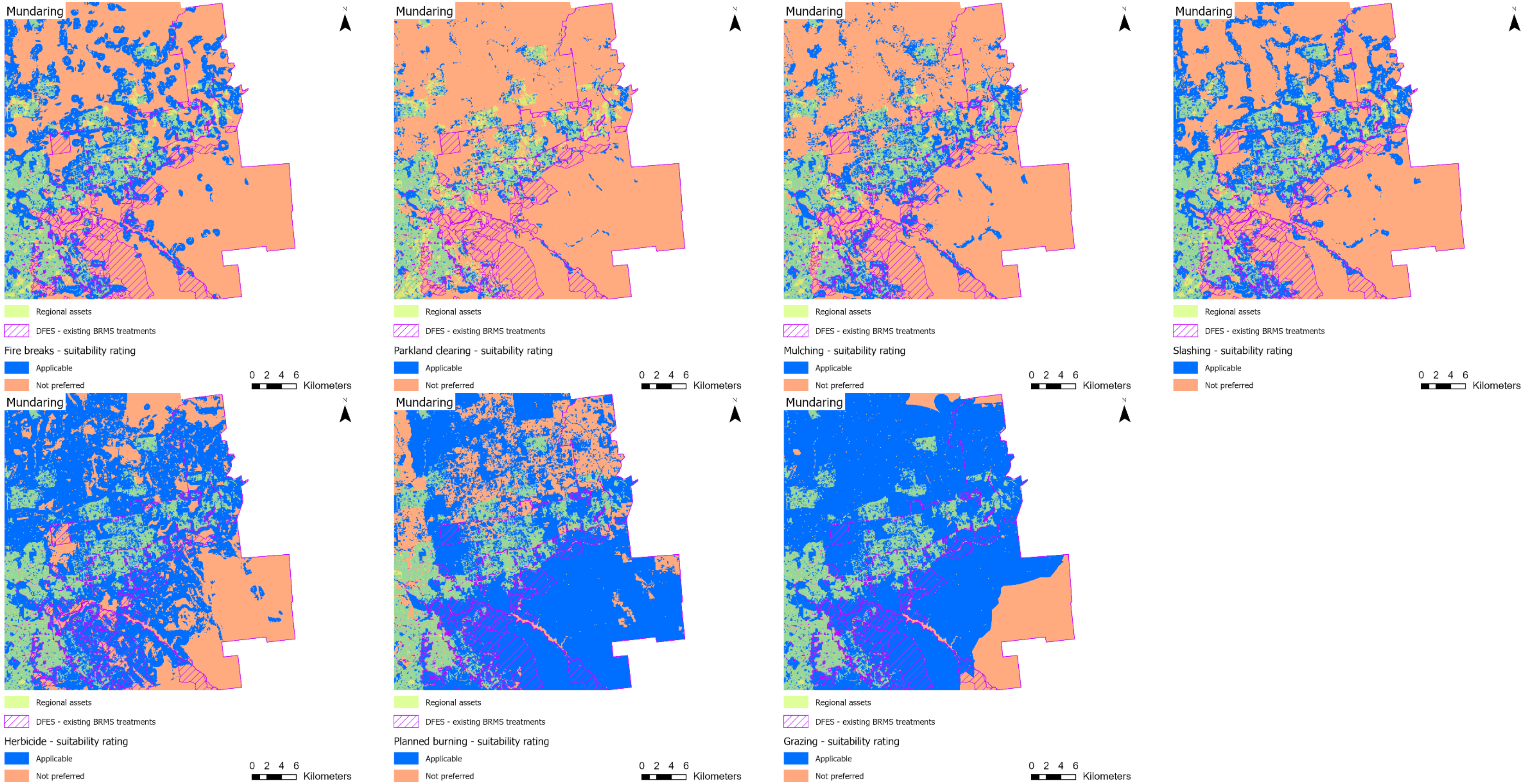

FIGURE 5. MAPS OF OPPORTUNITIES FOR THE FUEL MANAGEMENT ACTIVITIES SELECTED BY SURVAY PARTICIPANTS IN THE SHIRE OF MUNDARING

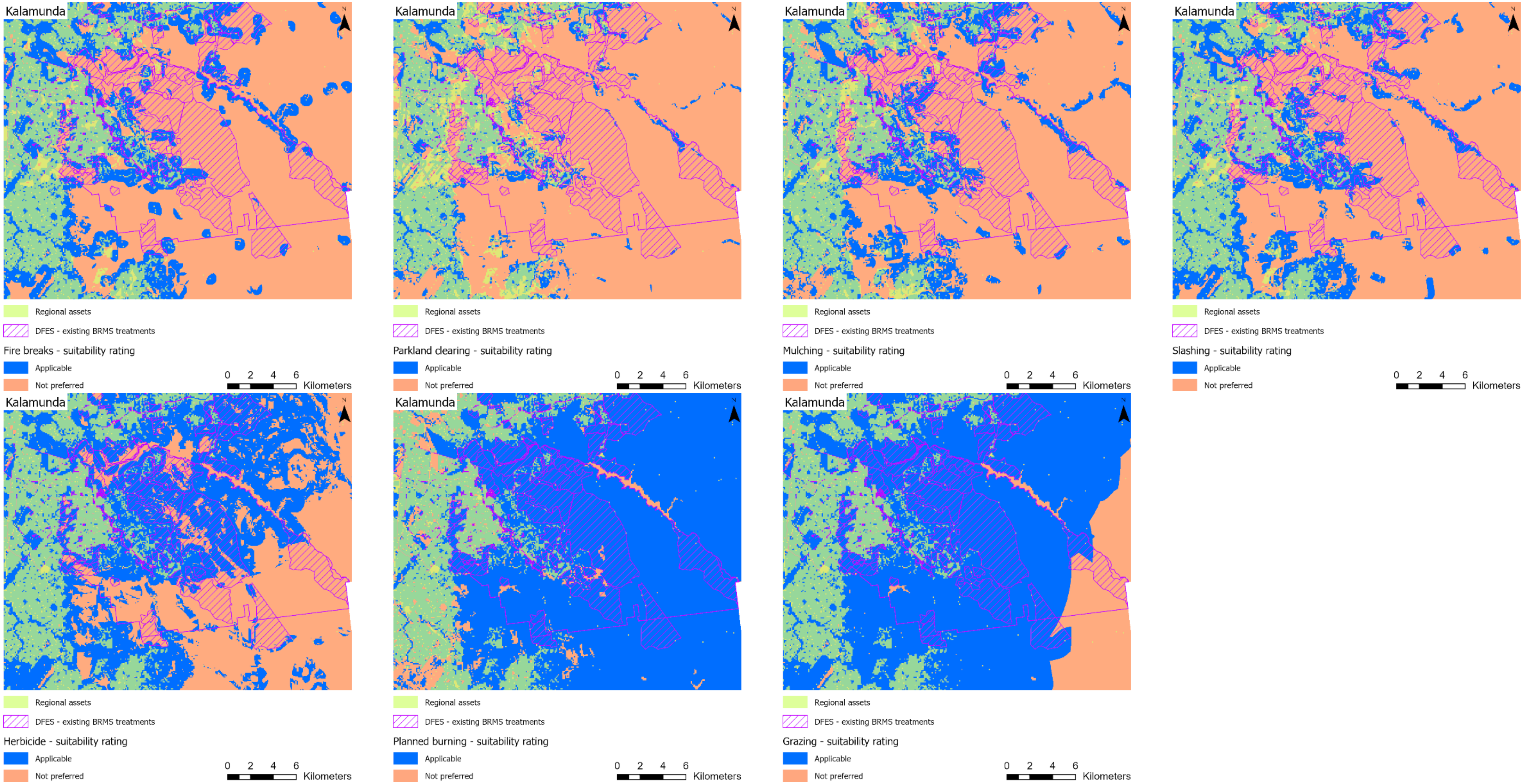

FIGURE 6. MAPS OF OPPORTUNITIES FOR THE FUEL MANAGEMENT ACTIVITIES SELECTED BY SURVAY PARTICIPANTS IN THE CITY OF KALAMUNDA

4. SUMMARY

This report presented how the General Guidance Framework for selecting fuel management strategies Jeanneau et al. (2021a) could be combined with detailed knowledge from local conditions to create maps of opportunities to apply a range of fuel management activities (= the Fuel Management Suitability Tool).

Bushfire mitigation officers could use the results presented here to prepare new bushfire risk management plans (BRM Plans) as they provide a range of mitigation opportunities to choose from for specific locations. However, the selection criteria used to the create maps presented here should be evaluated on a case-by-case basis as each local government has its own guidelines and the application of fuel management activities might be driven by other factors not captured in the current work (e.g. circumstances, location of proposed works).

Future work should assess the survey results further by contacting participants to refine the suitability maps. As part of this, participants would be given the opportunity to reflect on their answers (e.g. definition of boundaries) over multiple iterations to improve the reliability of the suitability maps and convert them into maps of applicability. This process would also identify additional information that was not captured by the survey questions (e.g. social acceptability).

Another approach could also compare survey results between different local governments to identify specific regional requirements and explore local differences.

The suitability maps presented here could also be updated with UNHaRMED simulations (e.g. future land use) and used to quantify the reduction in bushfire risk with the application of fuel management in the face of climate change. Results from this approach could then be used to prioritise funding allocation for fuel management strategies and help design more resilient communities (e.g. design of evacuation plans, shelters, etc.).

TEAM MEMBERS

RESEARCH TEAM

Prof Holger Maier (University of Adelaide): Lead Researcher

Dr Amelie Jeanneau: Key Researcher

Dr Aaron Zecchin (University of Adelaide): Key Researcher

A/Prof Hedwig van Delden (Research Institute for Knowledge Systems (RIKS) / University of Adelaide): Key Researcher, UNHaRMED development, conceptual development of the applicability/potential maps for the SoilCare and RECARE projects

Roel Vanhout: UNHaRMED software development, conceptual and technical development of the applicability/potential maps for the SoilCare and RECARE projects

END-USERS

End-user organisation	End-user representative
Department for Fire and Emergency Services (DFES)	Tim McNaught
Department for Environment and Water (DEW)	Mike Wouters Simeon Telfer
Tasmanian Fire Services (TFS)	Louise Mendel

APPENDIX 1: THE GENERAL GUIDANCE FRAMEWORK

TABLE 2. PRESENTATION OF THE GENERAL ANALYTICAL FRAMEWORK MECHANICAL FUEL MANAGEMENT ACTIVITIES). THE TEXT IN BLACK REPRESENTS INFORMATION COLLECTED THROUGH THE ONLINE SURVEY, IN BLUE INFORMATION COLLECTED FROM THE LITERATURE ONLY, AND IN ORANGE INFORMATION FOUND IN THE LITERATURE REVIEW AND THE ONLINE SURVEY.

	Forest thinning	Scrub rolling/ Brush-cutting	Mulching	Mowing/Slashing	Fire breaks and strategic access	Parkland clearing
Cost	US: $87 to $3000/ha	US: $90 to $110/ha	- Australia: highly variable[3] $100 to $280/hour, up to $3,000/ha; $6,000/ha in heavy forested fuels - US: $40 to $400/ha	- Australia: $100 to $120/hour - US: $10 to $16/ha	Australia: highly variable[3] $120/km to $1,000/ha	Australia: highly variable[3] $150 to $400/hour, up to $1,500/ha or $8,000/ha
Benefits	- Reduce the potential for active crown fire spread - Can be chipped and used as bio-fuel to generate energy - Sale of woodchips can reduce initial cost - Can remove invasive species (e.g. mistletoe, beetles, etc.)	- Fuel reduction - Blade-up and Chopper Rolling are much easier to manage around sensitive sites	- Fuel reduction - Reduce the potential for active crown fire spread - Improve the visual amenity of the area - Improve the amenity value - Improve ecological function of the area - Create a temporary buffer/fire break (for planned burning or wildfires)	- Fuel reduction - Provide mulch and minimise risk of fire - Improve the visual amenity of the area - Manage vegetation on verges and expanses of undeveloped land - Weed control - Productivity 3 to 5 times greater than mulching	- Fuel reduction - Improve ecological function of the area - Improve the visual amenity of the area - Create better access for future mitigation and suppression activities or for the search of missing person - Limit fire spread and size - Create a physical barrier between interfaces (e.g. rural-urban interface) - Easy to maintain	- Fuel reduction - Improve the visual amenity of the area - Alteration of fuel structure - Easy to maintain once established - Create a physical barrier between interfaces (e.g. rural-urban interface) - Easy to maintain once established - Minimal soil disturbance

[3] Will depend on depends on terrain, fuel load, state of existing tracks, contractor, type of treatment, extent of the area to treat, etc.

TABLE 2. (continued) PRESENTATION OF THE GENERAL ANALYTICAL FRAMEWORK (MECHANICAL FUEL MANAGEMENT ACTIVITIES). THE TEXT IN BLACK REPRESENTS INFORMATION COLLECTED THROUGH THE ONLINE SURVEY, IN BLUE INFORMATION COLLECTED FROM THE LITERATURE ONLY, AND IN ORANGE INFORMATION FOUND IN THE LITERATURE REVIEW AND THE ONLINE SURVEY.

	Forest thinning	Scrub rolling/ Brush-cutting	Mulching	Mowing/Slashing	Fire breaks and strategic access	Parkland clearing
Benefits (continued)					- Low impact on bush land - Reduce the perceived bushfire risk of neighbours.	
Limitations	- Soil moisture (for machinery accessibility) - Cost increases with distance to access roads - Transportation cost of hauling biomass - Nutrient removal	- Increases surface fuel density and continuity - Works better with dry or dead vegetation Only cost-effective if applied in strips of about 20m wide	- Risk of damaging trees when pruning (which can result in pathogen entry points for fungi) - Can be visually unappealing if unsuitable equipment is used or if site is left untidy after treatment - Cost increases with distance to access roads and tree diameter - Steep topography and poor site conditions (e.g. uneaven surface) - Does not produce merchantable forest products (e.g., saw logs or woodchips)	- Not species-specific - Risk of reducing the ecological function of the area if total vegetation removal (e.g. biodiversity, wildlife habitat) - Risk of causing fire with the mowing equipment - Limited to fine fuels - Limited equipment manoeuvrability in steep topography - Equipment availability - Dry roads to allow machinery access	- Increased erosion risk - Allows possible unauthorised access to area - Loss of vegetation - Increased maintenance costs - Not an effective fire break if not maintained properly (e.g. summer/during restricted period) - People may also assume fire breaks may actually stop all fires from progressing	Expensive

TABLE 2. (continued) PRESENTATION OF THE GENERAL ANALYTICAL FRAMEWORK (MECHANICAL FUEL MANAGEMENT ACTIVITIES). THE TEXT IN BLACK REPRESENTS INFORMATION COLLECTED THROUGH THE ONLINE SURVEY, IN BLUE INFORMATION COLLECTED FROM THE LITERATURE ONLY, AND IN ORANGE INFORMATION FOUND IN THE LITERATURE REVIEW AND THE ONLINE SURVEY.

	Forest thinning	Scrub rolling/ Brush-cutting	Mulching	Mowing/Slashing	Fire breaks and strategic access	Parkland clearing
Equipment	- Feller-bunchers - Chainsaw (hand felling) - Skidders and forwarders	- Large steel drums with cutting knives mounted on the face of the drum - Drums can be towed behind a wheeled or tracked by a tractor, or they can be pulled on a winch cable (for steeper slopes)	- Track and tyre based skid steer/Bobcat machines fitted with rotary drum nibbling heads - Excavators with a mastication head - Horizontal or vertical shaft cutting heads	- Ride on mowers - Whipper-snippers - Brush cutters - Chainsaws - Mulchers - Tractor mounted slashing equipment (3-point linkage equipment) - Steel-track tractor with a front-mounted rotating toothed drum	- Loader - Excavator - Skid Steer - Grader - Disc plough - "Posi-track" machines with mulching head - Bobcats - Chainsaws - Slashers - Chemical spray unit	- Mulching head - Bobcat
Experience and training	Machine operator	Machine operator	- Experienced machine operators - Understanding of forest types, environment and biodiversity - Fire and Land Management Training	- No specific training required - Conservation and Horticulture certificates. - Safety courses for equipment - Knowledge of machinery operations	- Understanding of the local regulations (e.g. Firebreak Notice, Bushfire Act, Environmental Protection Act, Biodiversity conservation Act, Aboriginal Heritage Act, etc.) - Experience in mapping and understanding the local topography - Contract management	- Very good machine operators - Background in horticulture and forestry

TABLE 2. (continued) PRESENTATION OF THE GENERAL ANALYTICAL FRAMEWORK (MECHANICAL FUEL MANAGEMENT ACTIVITIES). THE TEXT IN BLACK REPRESENTS INFORMATION COLLECTED THROUGH THE ONLINE SURVEY, IN BLUE INFORMATION COLLECTED FROM THE LITERATURE ONLY, AND IN ORANGE INFORMATION FOUND IN THE LITERATURE REVIEW AND THE ONLINE SURVEY.

	Forest thinning	Scrub rolling/ Brush-cutting	Mulching	Mowing/Slashing	Fire breaks and strategic access	Parkland clearing
Experience and training (continued)					- Project management - Knowledge of local fire activity/conditions to be able to take the path of least environmental damage	
Timing	- Autumn - Winter - Spring	When fuel is dry	- Summer[4] - Autumn[4] - Winter - Spring	- Summer[4] - Autumn - Winter - Late spring	- Late spring[4] - Summer[4] - Autumn - Winter	- Spring - Summer - Early autumn[4]
Vegetation	- Plantation forests (e.g. pine) - Overstory vegetation (for biomass harvesting)	- Shrubland - Plantation forests (e.g. eucalypts) - Mallee - Mallee-heath	- Forests (small hardwood species up to 25cm in diameter) - Shrubland - Woodland - Grassland	- Shrubland - Grassland - Spinifex	- Forests - Woodland - Shrubland - Grassland	- Woodland - Open forests
Driving factors	- Slope - Distance to access roads - Presence of protected biodiversity elements	- Terrain - Fuel dryness	- Slope - Distance to access roads - Distance to assets - Presence of protected biodiversity elements - Land use	- Terrain - Distance to access roads - Distance to assets - Distance to conservation areas -	- Terrain - Slope - Distance to assets - Distance to conservation areas - Presence of protected biodiversity elements	- Slope - Terrain - Distance to access roads - Distance to assets - Presence of protected biodiversity elements

[4] Seasons supporting the highest likelihood of an effective fuel management program (maximum consensus amongst the survey participants).

TABLE 2. (continued) PRESENTATION OF THE GENERAL ANALYTICAL FRAMEWORK (MECHANICAL FUEL MANAGEMENT ACTIVITIES). THE TEXT IN BLACK REPRESENTS INFORMATION COLLECTED THROUGH THE ONLINE SURVEY, IN BLUE INFORMATION COLLECTED FROM THE LITERATURE ONLY, AND IN ORANGE INFORMATION FOUND IN THE LITERATURE REVIEW AND THE ONLINE SURVEY.

	Forest thinning	Scrub rolling/ Brush-cutting	Mulching	Mowing/Slashing	Fire breaks and strategic access	Parkland clearing
Driving factors (continued)			- Vegetation type - Fuel structure - Amount of fuel - Size of the area to treat	- Presence of protected biodiversity elements - Land use type - Fuel structure - Amount of fuel - Soil conditions - Size of the area to treat	- Fuel structure - Amount of fuel - Soil conditions - Ability to keep burn within containment lines	- Amount of fuel - Size of the area to treat
Landscape	- Slopes: 0 – 30% - Treatment scale: > 10 ha	- Slopes: 0 – 35% - Treatment scale: 20 – 200 m wide strips	- Slopes: 0 – 16% (up to 35% with adapted machinery) - Treatment scale: 5 – 20 m wide	- Slopes: 0 – 16% - Treatment scale: small plots	- Slopes: 0 – 30% - Treatment scales: o Land vacant or over 4000 m^2 require fire breaks; o 3 – 5 m wide directly adjacent to assets o Slope 0-5% → 30m wide o Slope 5-15% → 40m wide o Slope>15% → 50m wide o Within 30 to 100 m from building zones - Within 300 m from plantation forests	- Slopes: 0 – 10% - Treatment scales: 20 m wide starting from structures and around the boundary of reserves within townsites

TABLE 2. (continued) PRESENTATION OF THE GENERAL ANALYTICAL FRAMEWORK (MECHANICAL FUEL MANAGEMENT ACTIVITIES). THE TEXT IN BLACK REPRESENTS INFORMATION COLLECTED THROUGH THE ONLINE SURVEY, IN BLUE INFORMATION COLLECTED FROM THE LITERATURE ONLY, AND IN ORANGE INFORMATION FOUND IN THE LITERATURE REVIEW AND THE ONLINE SURVEY.

	Forest thinning	Scrub rolling/ Brush-cutting	Mulching	Mowing/Slashing	Fire breaks and strategic access	Parkland clearing
Land use	- Plantation forests - Nature reserves and conservation forests	- Plantation forests - Nature reserves and conservation forests - Mixed farming and grazing	- Vacant plots - Nature reserves and conservation forests - Recreational areas - Residential and rural residential - Industrial	- Vacant plots - Nature reserves and conservation forests - Recreational areas - Residential and rural residential - Industrial - Pasture - Horticulture - Mixed farming and grazing	- Vacant plots - Nature reserves and conservation forests - Residential and rural residential - Industrial - Plantation forests - Intensive agriculture - Livestock grazing - Mixed farming and grazing	- Nature reserves and conservation forests - Residential and rural residential - Industrial - Utilities and infrastructure
Other considerations	- Removal of fine fuel in the understory to limit fire hazard - Set minimum distance and maximum surface treated in the presence of protected or endangered species - Consider combining with planned burning to maximise fuel reduction	- Can be used as a treatment for wildlife habitat improvement - Cost-effective if there is a commitment to ongoing management/maintenance to maintain risk reduction benefits over time	- Can be used to complement planned burning to reduce fuels in the landscape adjacent to assets - Follow up maintenance program to remain effective in the longer term - Vertical shaft cutting heads are generally lighter	- Prefer hand slashing where sensitive/endangered species are identified - Only apply where there is a significant need rather than removing all the vegetation	- Use contours and appropriate water runoff (e.g. fallen tree branches) to limit erosion risks - Consider offset planting to limit erosion risks - Use gates to reduce un-authorised access - Develop consistent firebreak specifications across different Local Governments	- Apply treatment as close as possible from assets to maximise fuel reduction Consider combining with planned burning to maximise fuel reduction

TABLE 2. (continued) PRESENTATION OF THE GENERAL ANALYTICAL FRAMEWORK (MECHANICAL FUEL MANAGEMENT ACTIVITIES). THE TEXT IN BLACK REPRESENTS INFORMATION COLLECTED THROUGH THE ONLINE SURVEY, IN BLUE INFORMATION COLLECTED FROM THE LITERATURE ONLY, AND IN ORANGE INFORMATION FOUND IN THE LITERATURE REVIEW AND THE ONLINE SURVEY.

	Forest thinning	Scrub rolling/ Brush-cutting	Mulching	Mowing/Slashing	Fire breaks and strategic access	Parkland clearing
Other considerations (continued)			- Horizontal shaft cutting heads provide more mulching action		- Promotion of property requirements, active annual property inspections, education programs and enforcement practices to minimise complacency risk	
Sources	Endress et al. (2012) Forestry Tasmania (2001) Hunter et al. (2007) Loudermilk et al. (2014) Metlen and Fiedler (2006) Nader et al. (2007) Stephens et al. (2009) Stephens et al. (2012) Volkova et al. (2017) Windell and Bradshaw (2000)	Burrows (2015) OBRM (2018) Rummer (2010) Windell and Bradshaw (2000)	Halbrook et al. (2006) Hunter et al. (2007) Jain et al. (2018) Kane et al. (2006) Kreye et al. (2014) Martorano et al. (2021) OBRM (2018) Rummer (2010) Windell and Bradshaw (2000)	Nader et al. (2007) OBRM (2018) Potts and Stephens (2009) Pyke et al. (2014)	Burrows (2015) Leask and Smith (2011) Partners in Protection (2003)	OBRM (2018)

TABLE 3. PRESENTATION OF THE GENERAL ANALYTICAL FRAMEWORK (OTHER FUEL MANAGEMENT ACTIVITIES). THE TEXT IN BLACK REPRESENTS INFORMATION COLLECTED THROUGH THE ONLINE SURVEY, IN BLUE INFORMATION COLLECTED FROM THE LITERATURE ONLY, AND IN ORANGE INFORMATION FOUND IN THE LITERATURE REVIEW AND THE ONLINE SURVEY.

	Planned burning	Pile burning	Chipping	Herbicide	Grazing
Cost	- Australia: highly variable[5] $500/ha to less than $100/ha - US: $14 to $120/ha	US: $18 to $300/ha	US: $1600/day	- Australia: highly variable[5]; less than $150/km to up to $500/ha - US: $10 to $100/ha	US: $25 to $30/ha
Benefits	- Fuel reduction - Improve ecological function of the area - Cheapest fuel management method	- Wider window of opportunity than planned burning - Low risk of fire escape - Minimal damage to surrounding trees	- Good alternative to pile burning if piles have already been constructed - Chips can be used for erosion protection - Promotes nutrient cycling - Selling of wood by-product	- Fuel reduction - Improve ecological function of the area - Improve the visual amenity of the area - Reduce invasive weeds into bushland - Can target specific plant species	- Fuel reduction - Short-term treatments to reduce flammable vegetation - Hoof incorporation of fine fuels (burial, mixing with soil)
Limitations	- Risk of damaging fire-sensitive vegetation - Burn cost per hectare is higher on small areas - Difficult to control (risk of fire escape) - Impact air quality - Limited window of opportunity - Difficult to implement if fuel load is too high	- Cost increases with distance to access roads	- Expensive technique - Towed chippers are limited to roadside processing	- Risk of killing vegetation outside the range of intended species - Can increase fuel load if left and not removed - Cost increases with distance to access roads - Contamination risk (leaching)	- Removal of native species - Spread of weeds - Risk of overgrazing - Grazing in non-palatable environments (e.g. conifer forests) can result in an increase in fuel loads - Livestock cannot effectively control mature bush plants - Risk of trampling/soil compaction (if stock density is too high)

[5] Will depend on depends on terrain, fuel load, state of existing tracks, contractor, type of treatment, extent of the area to treat, etc.

TABLE 3. (continued) PRESENTATION OF THE GENERAL ANALYTICAL FRAMEWORK (OTHER FUEL MANAGEMENT ACTIVITIES). THE TEXT IN BLACK REPRESENTS INFORMATION COLLECTED THROUGH THE ONLINE SURVEY, IN BLUE INFORMATION COLLECTED FROM THE LITERATURE ONLY, AND IN ORANGE INFORMATION FOUND IN THE LITERATURE REVIEW AND THE ONLINE SURVEY.

	Planned burning	Pile burning	Chipping	Herbicide	Grazing
Equipment	- Utility mounted flamethrower - Hand firelighters - Aerial ignition with drip torches - Four wheel drive mounted water firefighting units and larger truck mounted units	-	- Swing machine with a brush-cutter or saw-head attachment - Self-levelling feller-buncher (for slopes > 50%)	- Tank hose - Spray gun and backpacks - Fixed-wing aircraft or helicopter	- Livestock (e.g. cattle, goats, sheep) - Vehicles to transport stock
Experience and training	- Highly skilled operation officers (e.g. senior firefighter)	-	-	- Accredited supervisors and applicators - Experienced operator	Knowledge of livestock and local poisonous plant species
Timing	- Autumn[6] - Spring[6] - Winter	- Autumn - Winter	- Spring - Summer - Autumn - Winter	- Spring - Summer[6] - Autumn[6] - Winter	- Spring - Summer - Autumn - Winter
Vegetation	- Forests - Shrubland - Grassland - Woodland	- Biomass resulting from thinning operations (up to 1.5m height, 8.5m diameter)	- Small trunks and branches - Piled wood	- Shrubland - Forests - Spinifex - Grassland	- Forests - Grassland - Rangelands
Driving factors	- Slope - Distance to assets - Distance to conservation areas - Presence of protected biodiversity elements	- Distance to access roads - Fuel structure - Amount of fuel	- Slope - Distance to access roads	- Presence of protected biodiversity elements - Distance to riparian environments - Vegetation type - Distance to access roads	- Presence of protected biodiversity elements - Vegetation type - Structure of the fuel - Soil conditions - Size of the area to treat

[6] Seasons supporting the highest likelihood of an effective fuel management program (maximum consensus amongst the survey participants).

TABLE 3. (continued) PRESENTATION OF THE GENERAL ANALYTICAL FRAMEWORK (OTHER FUEL MANAGEMENT ACTIVITIES). THE TEXT IN BLACK REPRESENTS INFORMATION COLLECTED THROUGH THE ONLINE SURVEY, IN BLUE INFORMATION COLLECTED FROM THE LITERATURE ONLY, AND IN ORANGE INFORMATION FOUND IN THE LITERATURE REVIEW AND THE ONLINE SURVEY.

	Planned burning	Pile burning	Chipping	Herbicide	Grazing
Driving factors (continued)	- Ability to keep burn within containment lines - Fuel structure - Amount of fuel			- Distance to conservation areas - Land use type - Soil conditions - Size of the area to treat	
Landscape	- Slopes: 0 – 16% - Treatment scales: o < 200 ha around townships; o > 200 ha on Crown lands, National Parks and Nature reserves	-	Slopes: 0 – 10%	- Slopes: 2 – 15% - Treatment scale: 3 – 10 m wide	- Slopes: 0 – 30% (possible up to 60 in alpine environments) - Treatment scale: 1.5 to 65 ha
Land use	- Vacant plots - Nature reserves and conservation forests - Recreational areas - Residential and rural residential	- Nature reserves and conservation forests - Allowed near residential areas	-	- Vacant plots - Nature reserves and conservation forests - Recreational areas - Residential and rural residential - Industrial - Plantation forests - Horticulture	- Plantation forests - Intensive agriculture - Pasture - Livestock grazing - Horticulture - Mixed farming and grazing - Allowed near residential areas
Other considerations	- Ensure good planning to limit the risk of fire escape - Check weather conditions to control when to start/stop planned burning activities - Encourage the development of post-fire landscape mosaics	-	-	- Removal of dead fuel loads after treatment - Training to limit risk of off-target damages - Use chemicals as per label	- Consider combining with other management activities to maximise fuel reduction - Consider nutritional value of the feed

TABLE 3. (continued) PRESENTATION OF THE GENERAL ANALYTICAL FRAMEWORK (OTHER FUEL MANAGEMENT ACTIVITIES). THE TEXT IN BLACK REPRESENTS INFORMATION COLLECTED THROUGH THE ONLINE SURVEY, IN BLUE INFORMATION COLLECTED FROM THE LITERATURE ONLY, AND IN ORANGE INFORMATION FOUND IN THE LITERATURE REVIEW AND THE ONLINE SURVEY.

	Planned burning	Pile burning	Chipping	Herbicide	Grazing
Other considerations (continued)	- Potentially combine with other management activities				- Control stocking density during grazing; grazing duration; plant secondary compounds; and animal physiological state
Sources	Cirulis et al. (2020) Clarke et al. (2019) Dwire et al. (2016) Furlaud et al. (2018) Gazzard et al. (2020) Hartsough et al. (2008) Howard et al. (2020) Hunter et al. (2007) Leavesley et al. (2013) Morgan et al. (2020) OBRM (2018) Rummer (2010)	Hunter et al. (2007) Rummer (2010)	Rummer (2010) Windell and Bradshaw (2000)	Hunter et al. (2007) Nader et al. (2007) Pyke et al. (2014)	Bruegger et al. (2016) Davies et al. (2010) Davies et al. (2020) Endress et al. (2012) Fuhlendorf and Engle (2004) Nader et al. (2007) Porensky et al. (2018) Ruiz-Mirazo and Robles (2012)

APPENDIX 2: AGGREGATED RESULTS FROM THE ONLINE SURVEY

TABLE 4. MECHANICAL FUEL REDUCTION - AGGREGATED RESULTS FORM THE ONLINE SURVEY USED TO DEFINE SELECTION CRITERIAL FOR THE SUITABILITY ANALYSIS.

	Mulching	Slashing	Fire breaks	Parkland clearing
Driving factors				
Slope	Important	Moderately important	Important	Not important
Distance to access roads	Important	Moderately important	Moderately important	Moderately important
Distance to assets	Important	Important	Important	Important
Distance to conservation areas	Moderately important	Moderately important	Important	Moderately important
Presence of protected biodiversity elements	Important	Important	Important	Important
Distance to riparian environments	Important	Important	Important	Important
Land use type	Important	Important	Moderately important	Moderately important
Vegetation type	Important	Important	Moderately important	Moderately important
Amount of fuel	Important	Important	Important	Moderately important
Structure of fuel	Important	Moderately important	Important	Moderately important
Elevation	Moderately important	Important	Important	Moderately important
Terrain	Moderately important	Important	Important	Moderately important
Soil conditions	Moderately important	Important	Important	Moderately important
Size of area to treat	Important	Important	Moderately important	Moderately important
Burn security	NA	NA	Important	NA

TABLE 4. (CONTINUED) MECHANICAL FUEL REDUCTION - AGGREGATED RESULTS FORM THE ONLINE SURVEY USED TO DEFINE SELECTION CRITERIAL FOR THE SUITABILITY ANALYSIS. NOTE THAT 2 = APPLICABLE, 1 = NOT PREFERRED AND 0 = NOT APPLICABLE

	Mulching	Slashing	Fire Breaks	Parkland clearing
Boundaries definition for selection factors				
Slope				
Flat (0-2%)	2	2	2	2
Gentle (2-5%)	2	2	2	2
Moderate (5-8%)	2	2	2	1
Rolling (8-16%)	2	1	2	1
Hilly (16-30%)	2	1	1	1
Steep (30-60%)	2	1	0	1
Very steep (>60%)	1	1	0	1
Distance to access roads				
Very near (0-100m)	2	2	2	2
Near (100-300m)	1	2	2	1
Moderate (300m-1km)	1	1	2	0
Far (1-5km)	1	1	2	0
Very far (5-10km)	1	1	1	0
Extremely far (>10km)	1	1	1	0
Distance to assets				
Residential				
Very near (0-30m)	2	2	2	1
Near (30-500m)	2	2	2	2
Moderate (500m-1km)	2	1	1	1
Far (1-5km)	1	1	1	1
Very far (> 5km)	1	1	1	1

TABLE 4. (CONTINUED) MECHANICAL FUEL REDUCTION - AGGREGATED RESULTS FORM THE ONLINE SURVEY USED TO DEFINE SELECTION CRITERIAL FOR THE SUITABILITY ANALYSIS. NOTE THAT 2 = APPLICABLE, 1 = NOT PREFERRED AND 0 = NOT APPLICABLE.

	Mulching	Slashing	Fire Breaks	Parkland clearing
Industrial				
Very near (0-30m)	2	2	2	1
Near (30-500m)	2	2	1	2
Moderate (500m-1km)	2	1	1	1
Far (1-5km)	1	1	1	1
Very far (> 5km)	1	1	1	1
Utilities				
Very near (0-30m)	2	2	2	1
Near (30-500m)	2	2	2	2
Moderate (500m-1km)	2	1	1	1
Far (1-5km)	1	1	1	1
Very far (> 5km)	1	1	1	1
Transport				
Very near (0-30m)	2	2	2	0
Near (30-500m)	2	2	1	0
Moderate (500m-1km)	2	1	1	0
Far (1-5km)	1	1	0	0
Very far (> 5km)	1	0	0	0
Airports				
Very near (0-30m)	0	1	2	0
Near (30-500m)	0	1	2	0
Moderate (500m-1km)	0	1	1	0
Far (1-5km)	0	1	1	0
Very far (> 5km)	0		1	0

TABLE 4. (CONTINUED) MECHANICAL FUEL REDUCTION - AGGREGATED RESULTS FORM THE ONLINE SURVEY USED TO DEFINE SELECTION CRITERIAL FOR THE SUITABILITY ANALYSIS. NOTE THAT 2 = APPLICABLE, 1 = NOT PREFERRED AND 0 = NOT APPLICABLE

	Mulching	Slashing	Fire Breaks	Parkland clearing
Cultural Assets				
Very near (0-30m)	2	2	2	1
Near (30-500m)	2	2	2	2
Moderate (500m-1km)	1	1	1	1
Far (1-5km)	1	1	1	1
Very far (> 5km)	1		1	1
Distance to conservation areas				
Very near (0-30m)	2	2	2	2
Near (30-500m)	2	2	2	2
Moderate (500m-1km)	1	1	1	2
Far (1-5km)	1	1	1	2
Very far (> 5km)	1	1	1	2
Distance to protected biodiversity elements				
Very near (0-30m)	2	2	2	2
Near (30-500m)	2	2	2	0
Moderate (500m-1km)	1	1	1	0
Far (1-5km)	1	1	1	0
Very far (> 5km)	1	1	1	0
Distance to riparian environments				
Very near (0-150m)	2	2	2	1
Near (150-500m)	2	2	2	1
Moderate (500m-1km)	1	2	1	1
Far (1-5km)	1	1	1	1
Very far (> 5km)	1	1	1	1

TABLE 4. (CONTINUED) MECHANICAL FUEL REDUCTION - AGGREGATED RESULTS FORM THE ONLINE SURVEY USED TO DEFINE SELECTION CRITERIAL FOR THE SUITABILITY ANALYSIS. NOTE THAT 2 = APPLICABLE, 1 = NOT PREFERRED AND 0 = NOT APPLICABLE

	Mulching	Slashing	Fire Breaks	Parkland clearing
Soil conditions				
Coarse or light (sand)	2	2	2	2
Medium (loam)	2	2	2	2
Fine/heavy (clay)	2	1	2	2
Land use type				
Vacant	2	2	2	
Nature Reserves/Conservation/Forests	2	2	2	2
Recreational	2	2	2	-
Residential/Rural residential	2	2	2	2
Industrial	2	2	2	2
Forestry	2	-	2	2
Intensive agriculture	-	-	2	-
Pasture	-	2	2	-
Livestock	-	2	2	-
Horticulture	-	2	2	-
Mixed farming and grazing	-	2	2	-
Vegetation type				
Chenopods	2	-	2	-
Heath	2	2	2	2
Mallee Heath	2	-	-	-
Jarrah forests	2	-	2	-
Jarrah-Karri mosaic	2	-	2	-
Shrubland	2	2	2	-
Southern Grass/open grassland	2	2	2	-

TABLE 4. (CONTINUED) MECHANICAL FUEL REDUCTION - AGGREGATED RESULTS FORM THE ONLINE SURVEY USED TO DEFINE SELECTION CRITERIAL FOR THE SUITABILITY ANALYSIS. NOTE THAT 2 = APPLICABLE, 1 = NOT PREFERRED AND 0 = NOT APPLICABLE

	Mulching	Slashing	Fire Breaks	Parkland clearing
Vegetation type (continued)				
Spinifex	-	2	-	-
Woodland	2	-	2	2
Pinus	-	-	-	-
Other eucalypt forests	2	-	-	-
Banksia woodland	-	-	-	-
Pepermint woodland	-	-	-	2

TABLE 5. OTHER FUEL REDUCTION ACTIVITIES - AGGREGATED RESULTS FORM THE ONLINE SURVEY USED TO DEFINE SELECTION CRITERIAL FOR THE SUITABILITY ANALYSIS. NOTE THAT 2 = APPLICABLE, 1 = NOT PREFERRED AND 0 = NOT APPLICABLE.

	Planned burning	Herbicide	Grazing
Driving factors			
Slope	Important	Important	Moderately important
Distance to access roads	Moderately important	Moderately important	Moderately important
Distance to assets	Important	Important	Not important
Distance to conservation areas	Important	Moderately important	Not important
Presence of protected biodiversity elements	Important	Important	Important
Distance to riparian environments	Important	Important	Moderately important
Land use type	Moderately important	Moderately important	Moderately important
Vegetation type	Moderately important	Important	Important
Amount of fuel	Moderately important	Important	Moderately important
Structure of fuel	Moderately important	Important	Important
Elevation	Moderately important	Not important	Not important
Terrain	Moderately important	Not important	Moderately important
Soil conditions	Moderately important	Moderately important	Important
Size of area to treat	Moderately important	Moderately important	Important
Burn security	Important	NA	NA

TABLE 5. (CONTINUED) OTHER FUEL REDUCTION ACTIVITIES - AGGREGATED RESULTS FORM THE ONLINE SURVEY USED TO DEFINE SELECTION CRITERIAL FOR THE SUITABILITY ANALYSIS. NOTE THAT 2 = APPLICABLE, 1 = NOT PREFERRED AND 0 = NOT APPLICABLE.

	Planned burning	Herbicide	Grazing
Slope			
Flat (0-2%)	2	2	2
Gentle (2-5%)	2	2	2
Moderate (5-8%)	2	2	2
Rolling (8-16%)	1	1	2
Hilly (16-30%)	1	1	2
Steep (30-60%)	1	1	1
Very steep (>60%)	1	1	1
Distance to access roads			
Very near (0-100m)	2	2	2
Near (100-300m)	1	2	2
Moderate (300m-1km)	1	1	2
Far (1-5km)	1	1	1
Very far (5-10km)	1	0	1
Extremely far (>10km)	1	0	1
Distance to assets			
Residential			
Very near (0-30m)	2	2	2
Near (30-500m)	2	2	2
Moderate (500m-1km)	2	1	2
Far (1-5km)	2	1	2
Very far (> 5km)	2	1	2

TABLE 5. (CONTINUED) OTHER FUEL REDUCTION ACTIVITIES - AGGREGATED RESULTS FORM THE ONLINE SURVEY USED TO DEFINE SELECTION CRITERIAL FOR THE SUITABILITY ANALYSIS. NOTE THAT 2 = APPLICABLE, 1 = NOT PREFERRED AND 0 = NOT APPLICABLE.

	Planned burning	Herbicide	Grazing
Industrial			
Very near (0-30m)	2	2	2
Near (30-500m)	2	2	2
Moderate (500m-1km)	2	1	2
Far (1-5km)	2	1	2
Very far (> 5km)	2	1	2
Utilities			
Very near (0-30m)	2	2	2
Near (30-500m)	2	2	2
Moderate (500m-1km)	2	1	2
Far (1-5km)	2	1	2
Very far (> 5km)	2	1	2
Transport			
Very near (0-30m)	2	2	2
Near (30-500m)	2	2	2
Moderate (500m-1km)	2	1	2
Far (1-5km)	2	1	2
Very far (> 5km)	2	1	2
Airports			
Very near (0-30m)	1	2	2
Near (30-500m)	1	2	2
Moderate (500m-1km)	1	1	2
Far (1-5km)	2	1	2
Very far (> 5km)	2	1	2

TABLE 5. (CONTINUED) OTHER FUEL REDUCTION ACTIVITIES - AGGREGATED RESULTS FORM THE ONLINE SURVEY USED TO DEFINE SELECTION CRITERIAL FOR THE SUITABILITY ANALYSIS. NOTE THAT 2 = APPLICABLE, 1 = NOT PREFERRED AND 0 = NOT APPLICABLE.

	Planned burning	Herbicide	Grazing
Cultural Assets			
Very near (0-30m)	1	2	2
Near (30-500m)	2	2	2
Moderate (500m-1km)	2	1	2
Far (1-5km)	2	1	2
Very far (> 5km)	2	1	2
Distance to conservation areas			
Very near (0-30m)	1	1	2
Near (30-500m)	1	2	2
Moderate (500m-1km)	1	1	2
Far (1-5km)	1	1	2
Very far (> 5km)	1	1	2
Distance to protected biodiversity elements			
Very near (0-30m)	1	1	1
Near (30-500m)	1	2	2
Moderate (500m-1km)	1	2	2
Far (1-5km)	1	1	2
Very far (> 5km)	1	1	2
Distance to riparian environments			
Very near (0-150m)	1	1	1
Near (150-500m)	1	2	1
Moderate (500m-1km)	1	2	1
Far (1-5km)	1	1	1
Very far (> 5km)	1	1	1

TABLE 5. (CONTINUED) OTHER FUEL REDUCTION ACTIVITIES - AGGREGATED RESULTS FORM THE ONLINE SURVEY USED TO DEFINE SELECTION CRITERIAL FOR THE SUITABILITY ANALYSIS. NOTE THAT 2 = APPLICABLE, 1 = NOT PREFERRED AND 0 = NOT APPLICABLE.

	Planned burning	Herbicide	Grazing
Soil conditions			
Coarse or light (sand)	2	2	1
Medium (loam)	2	2	2
Fine/heavy (clay)	2	2	2
Land use type			
Vacant	2	2	-
Nature Reserves/Conservation/Forests	2	2	-
Recreational	2	2	-
Residential/Rural residential	2	2	2
Industrial	-	2	-
Forestry	-	2	2
Intensive agriculture	-	-	2
Pasture	-	-	2
Livestock	-	-	2
Horticulture	-	2	2
Mixed farming and grazing	-	-	2
Vegetation type			
Chenopods	-	-	-
Heath	2	-	-
Mallee Heath	2	-	-
Jarrah forests	2	2	2
Jarrah-Karri mosaic	-	2	2
Shrubland	2	2	2
Southern Grass/open grassland	2	-	-

TABLE 5. (CONTINUED) OTHER FUEL REDUCTION ACTIVITIES - AGGREGATED RESULTS FORM THE ONLINE SURVEY USED TO DEFINE SELECTION CRITERIAL FOR THE SUITABILITY ANALYSIS. NOTE THAT 2 = APPLICABLE, 1 = NOT PREFERRED AND 0 = NOT APPLICABLE.

	Planned burning	Herbicide	Grazing
Vegetation type (continued)			
Spinifex	-	2	-
Woodland	2	2	-
Pinus	-	2	-
Other eucalypt forests	2	2	2
Banksia woodland	-	-	-
Pepermint woodland	2	-	-

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