Concept Plan SP 2021-013

Fine-Scale Burn Mosaics in South West Forests

BCS Fire Science

Project Core Team

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Project status as of Sept. 15, 2023, 1:04 p.m.

X X New project, pending concept plan approval

Document endorsements and approvals as of Sept. 15, 2023, 1:04 p.m.

X X
Project Team granted
Program Leader granted
Directorate required

Fine-Scale Burn Mosaics in South West Forests

Program

BCS Fire Science

Departmental Service

Service 9: Prescribed Burning and Fire Management

Background

Fine scale patch mosaic burning (PMB) – a regime of low-intensity patchy fire introduced in a cell at high frequency – intersects with high-priority concerns for DBCA's management of conservation lands. Cultural, fire risk, and biodiversity management benefits have been put forward in support of the re-introduction of mosaic burning practices in SW forests. On the other hand, short fire intervals potentially resulting from high fire frequency is a potential threateneing process for sensative species.

Precedents for the practice of PMB in WA include the Walpole fine mosaic project (a Science-Warren Region collaboration), and the northern savanna PMB project (a Science Kimberley Region collaboration). Despite these precedents, PMB outcomes remain to be assessed at scale for forests, especially relative to current prescribed burning programs which burn whole blocks. DBCA's SW Region has commenced implementation of a soft edge mosaic burn prescription at two large sites, aiming to deliver a balance between improved risk reduction and biodiversity conservation through frequent introduction of fine-grained burns into the landscape.

Previous research has demonstrated that forest species richness of many groups is resilient to a range of fire regimes. Resilient groups include bird assemblages, most vascular flora, ground active invertebrates, some obligate seeder species and some small mammal species.

[variant=australian]Knowledge gaps that remain in our understanding of PMB application in forests include what the fire regime attributes actually are - in terms of patchines, intervals at a point, fire behaviour and severity, and outcomes for fuel consumption, fuel structure and hazard reduction, and modelled wildfire behaviour. Among the key b[variant=australian]iodiversity knowledge gaps are data on the persistence of slow maturing obligate seeder plants, critical weight range mammals, arboreal and tree hollow dependent fauna (e.g. forest cockatoos, western ringtail possums) and the structural habitat features that support them (e.g. hollows, thickets). Interactions between PMB and threatening processes such as climate change, feral predators, large feral herbivores and invasive plant species, represent further knowledge gaps.

Aims

- To assess PMB fire regime, including its fuel consumption outcomes, spatial complexity, severity and fire return intervals, and compare it to standard cell-scale Prescribed Burning.
- To assess fuel treatment effectiveness from PMB, including patterns of fuel and fire risk that result from treatments, and how fire behaviour and spread is affected if unplanned ignitions would occur.
- To assess biodiversity consequences of PMB for plant species sensitive to short fire intervals (obligate seeder shrubs), fire sensitive fauna (threatened mammals and arboreal species), and vegetation community composition and structure.

The study areas where PMB (AKA Soft Edge Mosaic burning, by fire practitioners) is being actively implemented within prescriptions is in the Milyeannup area south of Nannup (Blackwood district) and in forest blocks NE of Collie (Wellington District). All prescribed burning and wildfires across the SW generally represent a mosaic at some scale, with patchy fire outcomes a typical objective of forest area burn prescriptions. New remote sensing technologies now allow us to map fine grain mosaics in forest landscapes for the first time. Using this technology, PMB outcomes will be compared between SEM and adjacent forest blocks under conventional prescriptions. Mosaic complexity will be characterised across a range of vegetation types (jarrah, riparian, wandoo, heath), in relation to PMB treatments, and more broadly across the south west, to assess the biodiversity outcomes of realised fire mosaics in DBCA managed lands.

dNBR severity mapping will form the basis of remote sensing technology to document fire regime metrics annually for each site and treatment areas. The ability to define existing and applied mosaics is now substantially improved through the broad-scale fire severity mapping across the forest region.

Field campaigns surveyeing fauna responses (camera traps) and plant population responses (obligate seeders) will compare PMB and cell treatment areas.

Expected outcome

- Data on the effectiveness of PMB in reducing bushfire hazard and severity relative to conventional approaches to inform management.
- Empirical data on the consequences of PMB for the persistence of biota potentially sensitive to frequent fire.
- Inform how well PMB as a management approach balances mitigation of fire risk with biodiversity conservation.
- Data that discriminate the most important functional elements of fire mosaics necessary for hazard reduction (e.g. young fuels) and biodiversity outcomes (e.g. long unburnt patches).
- Data on whether hypothesised interactions between fire frequency and fire severity do protect fire sensitive flora populations, or if they heighten the risk that high-frequency fire will be detrimental.
- Knowledge on interactions of threatening processes (e.g., feral predator and herbivore activity, wildfire extent and impact) with mosaic treatments to identify any potential need for intervention.
- Inform management decisions and public debate over implementation of prescribed burning in the SW Region.
- Publications and media exploring fire mosaics and management alternatives.

Strategic context

The DBCA Fire Management Strategy has the following strategic statements that relate directly to this project:
Vision
To manage lands for which the Department of Biodiversity, Conservation and Attractions (the department) has legislated responsibility to protect people and communities from the impacts of bushfire, and to apply planned fire as a management tool to maintain and enhance the natural environment.
Values
Fire management activities will be evidence-based, collaborative, pursue technological and operationally innovation and apply risk management principles with a focus on delivering community protection and biodiversity outcomes.
Context and Challenges

- A changing climate leading to changing fire regimes across the State resulting in increased bushfire risk.
- Increasing complexity in risks to the conservation of natural values, including threatened species and ecological communities.

1. Managing bushfire risk by managing fuels
3. Maintaining Ecosystem Health
Objective: Use fire management to maintain and enhance the diversity and resilience of the State's ecosystems.
Actions

- Support research that assists in the development and implementation of fire management practices that maintain and enhance the diversity and resilience of ecosystems based on appropriate knowledge and technologies.
- Develop and implement adaptive fire management programs to protect specific fire-vulnerable species and ecological communities.

The BCS Fire Science Program Plan 2022-2025 has the following strategic statements that relate directly to this project:
Discover
Use world-recognised science to build and share biodiversity knowledge to support evidence-based management
Develop adaptive management tools to promote ecosystem resilience to the impacts of climate change and other threats
Conserve
Conserve, restore and manage plants and animals, ecosystems and landscapes using world-recognised science and best practice management
Protect
Protect communities and natural values from bushfires through a commitment to prescribed burning

Expected collaborations

- Ryan Butler & Ed Hatherly from RFMS in the SW Region are key partners in this project.
- Kim Williams, SW Regional Leaders Nature Conservation.
- Ricky van Dongen or designates from Remote Sensing and Spatial Analysis to provide severity mapping.
- Adrian Wayne and/or designates, Michelle Drew (CEM) and officers from Western Shield.
- Michael Craig
- External collaborations with academic partners and potential research students, including Rob Davis (ECU), Joe Fontaine (Murdoch Uni)
- Potential collaborations with Traditional Owners as permitted.

Proposed period of the project

July 1, 2021 – Dec. 31, 2030

Staff time allocation

to | X | X | X |

Role	Year 1	Year 2	Year 3
Scientist	1.4	1.4	1.4
Technical	1.2	1.2	1.2
Volunteer			
Collaborator	0.2	0.2	0.2

Indicative operating budget

to | X | X | X |

Source	Year 1	Year 2	Year 3
Consolidated Funds (BCS)	$33,039$	$31,414$	$40,932$
Consolidated Funds (FMP)	$20,000$	$20,000$	$20,000$