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 Aug. 14, 2023, 3:07 p.m.

X X New project, pending concept plan approval

Document endorsements and approvals as of Aug. 14, 2023, 3:07 p.m.

X X
Project Team required
Program Leader required
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.

Precedents for the practice of PMB in WA includes the Walpole fine mosaic project (a Science-Warren Region collaboration), and the northern savanna PMB project (a Science Kimberley Region collaboration). This research indicates that savanna and forest biota studied are largely resilient to PMB.

The PMB concept remains to be fully demonstrated 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, partly motivated by putative indigenous fire management, but also as a way 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 the resilience of forest biota in frequently burnt landscapes relate to the persistence of: slow maturing obligate seeder shrub species; critical weight range mammals; arboreal and tree hollow dependent fauna (e.g. forest cockatoos, western ringtail possums); and structural habitat features (e.g. hollow logs, riparian thicket). 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 characterise the fire regime created by the frequent introduction of fire in a forest landscape, including its spatial complexity, severity, fire return intervals. To understand how a PMB approach compares to standard cell-scale prescribed burning.
- To assess bushfire-risk benefits 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 determine any biodiversity consequences of PMB for plant species sensitive to short fire intervals, fire sensitive fauna, and vegetation community composition and structure.

The main study areas where PMB are being actively implemented in soft edge mosaic (SEM) prescriptions are at Milyeannup (Blackwood district) and NE of Collie (Wellington District). Prescribed burning and wildfires across the SW also result in mosaics at some scale, with patchy fire outcomes a typical objective of forest area burn prescriptions. 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 the SEM, and more broadly across the south west to assess the biodiversity outcomes of fire mosaics in DBCA managed lands.

To test for differences between different types of burning, monitoring sites will be stratified according to on-ground mosaic attributes using remote sensing. dNBR severity mapping will form the basis of the fire regime metrics assessed annually for each site. The ability to define existing and applied mosaics is now substantially improved through the broad-scale fire severity mapping across the forest region.

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.

- Evaluation of PMB adaptive management exploring improved methods to support fire risk and biodiversity management objectives.
- Data that discriminate functional and redundant elements of fire regimes and mosaics in relation to their influence on hazard reduction and biodiversity outcomes.
- Understanding interactions between fire frequency and fire severity that are suspected to enable the persistence of fire sensitive obligate seeder species in landscapes where fire is introduced at intervals close to or less than maturation times will resolve uncertainty around a potentially significant threat mechanism.
- 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

DBCA Fire Management Strategy

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.

Strategies from the Fire Science Program Plan 2022-2025

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

Collaboration with the SW Region (and other regions) is inherent in the project as the soft edge mosaic prescription is operated by the SW Forest Regional management team. Ryan Butler (Fire management) and Kim Williams (Nature Conservation) are key collaborators. BCS's Remote Sensing and Spatial Analysis program is expected to assist with spatial fire severity mapping to provide quantification of the fire mosaic both inside and outside the mosaic treatment blocks.

We also hope to collaborate with Adrian Wayne (BCS-ASP) and his team in exploring the mosaic attributes necessary for fire sensitive arboreal mammal species including the western ringtail possum. Extensive camera survey data already available on threatened mammal occupancy during Western Shield provides the opportunity to collaborate with Michelle Drew (CEM) and the Western Shield team to more fully quantify the role of fire mosaic context in influencing forest mammal assemblages.

There is potential to value add to our research on biodiversity impacts of mosaic burning through collaborations with academic partners and research students. For instance, we will seek to collaborate with Rob Davis (ECU) and Michael Craig (BCS-FSP) on development of suitable tree hollow nesting sites and forest cockatoo habitat within PMB and conventional burning treatments. Change in fire regime under PMB compared to conventional burning (e.g., increased potential for early autumn and summer patch burning in a landscape dominated by low fuels), provides the opportunity for collaborations with fire ecologists such as Joe Fontaine (Murdoch University).

There may be opportunities to collaborate with local Noongar traditional owners on traditional approaches to mosaic fire management within the forests. These collaborations are contingent on future establishment of native title in the SW, and also establishment of appropriate governance structures representing native title groups.

Proposed period of the project

July 1, 2021 – Dec. 31, 2030

Staff time allocation

to | X | 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 | X |

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