Concept Plan SP 2021-013

Fine-Scale Burn Mosaics in South West Forests

Fire Science

Project Core Team

Supervising Scientist	Ian Radford
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Project status as of Aug. 2, 2021, 2:17 p.m.

New project, pending concept plan approval

Document endorsements and approvals as of Aug. 2, 2021, 2:17 p.m.

Project Team	granted
Program Leader	granted
Directorate	required

Fine-Scale Burn Mosaics in South West Forests

Biodiversity and Conservation Science Program

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.

Precedence 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.

However, 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 species richness and composition for most forest biota is fairly resilient to fire regimes. Resilient groups include bird assemblages, most vascular flora, ground active invertebrates, some obligate seeder species and some small mammal species.

However, considerable knowledge gaps remain in our understanding of how more fire-sensitive biota, including obligate seeder shrubs, critical weight range mammals and aquatic/groundwater dependent biota, persist in frequently burnt landscapes either under conventional or mosaic burning programs.

Aims

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 South West (SW) forests. Mosaic burning has a number of precedents in Western Australia including the Walpole mosaic burning study in the Warren region.

However, these concepts remain to be fully demonstrated, especially relative to current prescribed burning programs which burn whole compartments. Although previous research has demonstrated that species richness and composition for most forest biota is fairly resilient to fire regimes, considerable knowledge gaps remain about how more fire-sensitive biota including obligate seeder shrubs, critical weight range mammals and aquatic/groundwater dependent biota, persist in frequently burnt landscapes either under conventional or mosaic burning programs. Interactions between PMB (vs conventional burning) and threatening processes including climate change, feral predators, large herbivores and invasive plant species are further knowledge gaps. In the context of these gaps, and with a soft edge program operating in the SW region, key questions include:-

- What is the fire regime – spatial complexity, severity, fire return intervals – created by frequent introduction of fire in a forest landscape? How does this compare to standard cell-scale prescribed burning?
- Assessing bushfire-risk benefits – What are the patterns of fuel and fire risk that result from the two treatments? If unplanned ignitions occur, how is fire behaviour and spread affected?
- Biodiversity consequences of PMB for key values – plant species sensitive to short fire intervals, fire sensitive fauna, vegetation community structure, composition and function, cultural resources and values.
- What other costs and benefits may be associated with PMB? Includes smoke production, nectar resources, water quality/production, cost-benefit assessment and Cultural values and indigenous engagement.

The study areas are Milyeannup+Hilliger, Chalk, and adjacent forest blocks (S of Nannup in Blackwood district, and NE of Collie in Wellington). Installation of PMB has been initiated in both areas.

The study will focus on fire sensitive groups and the operation of their threatening processes to test whether outcomes are better under fine grained soft edge mosaics compared to conventional compartment burning.

To test for differences between different types of burning, monitoring sites will be stratified according to on-ground mosaic attributes using remote sensing (SP2018-134). dNBR severity mapping will form the basis of the fire regime metrics assessed annually for each site.

Expected outcome

Knowledge on whether key fire threatened groups (obligate seeder heath species, critical weight range mammal species, aquatic or groundwater dependent biota) or key habitat structures (structural hollow bearing trees, hollow logs) have benefited/improved, are unaffected, or have declined (defined by persistence, reproductive output or recruitment) under soft edge mosaic burning vs landscape cell burning. Knowledge on interactions of threatening processes (e.g. feral predator and herbivore activity, wildfire extent and impact) with fire mosaic treatment, whether they have lessened, remained the same or increased. This will inform management decisions and public debate over implementation of prescribed burning in the SW Region. Informing fire management of South West forest region.

Strategic context

DBCA has a legislated responsibility for land and fire management in SW Region and throughout WA. In SW WA there has been a trend of declining rainfall since the 1970s, which along with changed human activities (e.g. clearing) has increased periods of high fire danger. In this situation it is incumbent on DBCA to test mosaic burning for efficacy in reducing risk associated with increasing fuel hazard. Mosaics have theoretical hazard reduction benefits relative to whole compartment fuel management (e.g. reduced total landscape flammability in Patch Mosaics vs conventional compartments where heavy continuous vegetation fuels accumulate over 8-12 years making fire management potentially hazardous). However potential risks to fire sensitive species including obligate seeders and species requiring long unburnt vegetation, must be addressed to allay fears that these species will decline under mosaic burning. This project will seek to address criticisms from some elements of the public and science communities regarding perceived risks and impacts under both conventional and mosaic burning. This project is a second step in the SW Region in addressing this highly relevant issue for DBCA.

Expected collaborations

Ben Miller, Ian Radford, Val Densmore, Allan Wills

Kim Williams and the South West Region, DBCA. Adrian Pinder for aquatic fauna. Adrian Wayne for mammals.

Joe Fontaine, Environmental Science, Murdoch University.

Stephen Van Leeuwen, BHP Curtin Indigenous Chair, Biodiversity and Environmental Science, Curtin University.

Opportunity for the project to develop synergies within NESP Resilient Landscapes

Proposed period of the project

July 1, 2021 – Dec. 31, 2030

Staff time allocation

Role	Year 1	Year 2	Year 3
Scientist	1.0	1.0	1.0
Technical	0.5	0.5	0.5
Volunteer			
Collaborator	0.1	0.1	0.1

Indicative operating budget

Source	Year 1	Year 2	Year 3
Consolidated Funds (DBCA)	32,600	32,600	32,600