Progress Report SP 2014-001

Understanding the changing fire environment of south-west Western Australia

Fire Science

Project Core Team

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Project Team	granted
Program Leader	granted
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Context

Fire environment is the resultant effect of factors that influence the ignition, behaviour and extent of fires in a landscape. These factors include climate and weather, topography, vegetation and fuel, and ignition. The climate of south-west Western Australia is becoming drier and warmer, and reduced autumn and winter rainfall is causing the landscape to become drier, thereby extending the duration of the traditional fire season. A combination of land use, socio-economic and organisational factors has resulted in more widespread extent of lands unburnt for two decades or more, increasing the risk of high severity fires with adverse impacts on the community and the environment. Much of the science linking interactions between climate, fire weather and fire behaviour was established in the 1960s and 1970s, and there is a need to review and update baseline information that underpins bushfire risk management and the program of planned burning undertaken by the department. This project will draw upon data held by the department and other organisations with expertise in climate and bushfire science.

Aims

- Provide an objective basis to review and revise management guidelines and practices based on past research and experience during wetter climate phases.
- Provide contextual information for investigations of the role and effects of fire in the south-west Australian environment.

Progress

- A Bayesian analytical approach has been used to explore the influence of climate variability modes on fire weather conditions and lightning-ignited bushfires in the Warren Region. A manuscript has been prepared for submission to *Climate Dynamics.*
- A chapter examining the role of prescribed fire in the management of forests and woodlands in southern Australia was included in a book on contemporary issues for prescribed burning published by the Australasian Fire and Emergency Service Authorities Council.
- Two papers on prescribed burning were published in a special issue of the *International Journal of Wildland Fire.*
- A paper comparing daily forest fire danger metrics for three case study areas in the south-west of Western Australia and three case study areas in Victoria was published in the *International Journal of Wildland Fire*.
- A paper examining fire management in Mediterranean-type regions on five continents and the challenges posed by population growth and climate change was published in *Environmental Research Letters*.
- Outcomes of prescribed burning undertaken in jarrah and karri regrowth forest at Gordon forest block were assessed using remote sensing and ground-based measurements as part of an adaptive management program undertaken jointly with Warren Region and Fire Management Services Branch.
- An interim report was provided to the Wheatbelt Region for an ongoing project investigating factors and methods that promote the regeneration of *Gastrolobium* species thickets in Dryandra woodland.

Management implications

- Understanding the factors that influence the location and timing of bushfire ignitions is important for developing effective management strategies to minimise the risks posed by unplanned fires, and to guide the level of resourcing required for bushfire suppression in different management areas. Lightning is an important cause of bushfire ignition in south-west Western Australia and the area burnt by lightning-caused fires has been disproportionately large relative to the number of ignitions during the past decade. Better

understanding of the links between climatic patterns and lightning ignition could provide advance warning of above-normal activity and the opportunity for improved preparation and resource deployment.
- The increased occurrence of large and damaging bushfires in the past five years has led to a refocus on the importance of managing fuels with prescribed fire. In order to achieve a safe and effective prescribed burning program there is a need to understand how weather and climate influence opportunities for burning, and how these opportunities may be changing over time.

Future directions

- Further evaluate and validate output from the JASMIN soil moisture model to determine its ability to quantify the dryness and availability of fuels in a variety of vegetation types.
- Collate and utilise fuel loading and consumption data for south-west Australian vegetation types to calibrate the AQFx smoke dispersion forecasting system.