

Progress Report SP 2014-001

Understanding the changing fire environment of south-west Western Australia

Fire Science

Project Core Team

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Understanding the changing fire environment of south-west Western Australia

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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

- Soil Dryness Index data for Manjimup and Dwellupup were used to calculate the cumulative moisture deficit during each fire season from 1992 to 2016 based on threshold values of 50, 140 and 165 mm. A number of years showed a strong dry anomaly during the fire season, which was not coupled to below-normal rainfall during the winter months. Four of the five driest seasons were common to both Manjimup and Dwellupup, indicating a relatively high level of spatial coherence in the severity of summer dryness across the south-west forests.
- Fire behaviour data from the Waroona bushfire of early January 2016 have been made available to the Bushfire and Natural Hazards Cooperative Research Centre for a project on coupled fire-atmosphere modelling. A manuscript examining meteorological drivers of extreme fire behaviour during this event was prepared and submitted for publication.
- The reconstruction of fire spread of the Waroona bushfire was made available as one of ten case studies used to evaluate the performance of bushfire simulators in a project coordinated by the NSW Rural Fire Service and Bureau of Meteorology.
- Forty years of lightning ignition data from the Warren region were collated and verified for a collaborative project on lightning climatology involving the Bureau of Meteorology, CSIRO and the Department.
- In conjunction with Warren region and Fire Management Services Branch, an adaptive management program has been developed to facilitate and evaluate prescribed burning in young regrowth stands of jarrah and karri. Achievement of prescribed burning objectives is being monitored using ground-based methods and assessment of burn severity derived from satellite remote sensing, and where possible linked to existing Forestcheck monitoring.

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 re-focus 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

- Finalise publication of the manuscript on meteorological drivers of extreme fire behaviour during the 2016 Waroona bushfire.
- Finalise and submit a manuscript analysing temporal and spatial patterns of lightning ignition for the Warren region, and continue to investigate climatic factors associated with lightning ignition.
- Harness existing data on fuel moisture content to evaluate and calibrate new measures of landscape dryness available from numerical weather prediction modelling, including outputs from JASMIN (Data Processing Environment) and the Australian Landscape Water Balance.
- Continue to monitor and report on the outcomes of the adaptive management trial of prescribed burning in regrowth forest.