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Fire behavior and fuel dynamics in coastal shrublands

Ecosystem Science

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Project Team	granted
Program Leader	granted
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Context

Shrubland ecosystems are widespread in south-western Australia and are the predominant vegetation type in coastal areas between Geraldton and Esperance. Coastal shrublands are renowned for their flammability, and fires can be fast-moving and intense when dead fine fuels are dry and wind speeds exceed 15 km h^{-1}. Fires may transition abruptly from the litter layer to the shrub layer in response to minor changes in wind speed and fuel dryness, making it difficult to use prescribed fire reliably to meet management objectives. Currently the Department does not have a fire behaviour prediction guide specific to coastal shrublands, and this represents a significant gap in science-based decision making to underpin the use of fire for bushfire risk management and biodiversity conservation. This issue was highlighted by the Special Inquiry into the November 2011 Margaret River bushfire conducted by the Hon. Mick Keelty. This project addresses Recommendation 4 of the Keelty Special Inquiry that the Department be supported to conduct further research into the fuel management of coastal heath in the south-west of Western Australia exploring alternatives to burning as well as best practice for burning.

Aims

- Provide a systematic approach for describing fuel characteristics and predicting fire behaviour in coastal shrublands in order to more effectively manage prescribed burning and bushfires.
- Facilitate evaluation of the effectiveness of prescribed fire and other fuel management practices for mitigating the impact of bushfires.

Progress

- Fire behaviour data have been collected from three sites (Albany, Frankland and Moora Districts) and data analysis has commenced.
- Collaboration with Blackwood District has developed an adaptive management framework for a planned burn at Boranup that includes coastal heath and mixed shrubland. Experimental sites were established in a planned burn at Boranup.
- Fire behaviour during the November 2015 Two Peoples Bay bushfire has been documented and is currently being used to validate existing fire rate of spread models. Findings were presented to South Coast Region.
- Regular sampling was conducted at Yanchep throughout the year for a study evaluating the potential application of remote sensing to determine live fuel moisture content in shrublands.
- A fire behaviour prediction system for semi-arid heath and mallee-heath was presented in the form of a simple guide suitable for use in the field by practitioners.

Management implications

- Development of a systematic approach to describing fuels and predicting fire behaviour in coastal shrublands will permit the implementation of better informed fire management programs in this habitat that is a critical component of urban environments.
- Improved knowledge of factors determining fire behaviour in shrublands will contribute to more effective training programs for fire managers and fire-fighters from the Department and other organisations with responsibility for fire preparedness, management and suppression.

Future directions

- Collect fire behaviour metrics from planned burns as these are implemented to verify the performance of the collaboratively-developed fire spread model for Western Australian shrublands.

- Plan and conduct further experimental burning to quantify threshold conditions for sustained fire spread in shrublands of different structure and time since fire.
- Finalise and publish the reconstruction of the Two Peoples Bay bushfire.
- Analyse and publish the findings from the study of remote sensing of live fuel moisture content.
- Expand the scope of the project to include quantification of fire severity and patchiness at the operational burning scale.