Abstract

Spatial Estimates of Future Fire Risk Considering Climate and Fuel Management for Conservation Planning †

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Abstract: A key gap in conservation management is understanding how fire regimes may shift under climate change and how these shifts might impact biodiversity. Conserving species and communities in the future will require the strategic prioritisation of conservation actions that account for shifting fire regimes. We used a landscape fire regime model, the Fire Regime and Operations Simulation Tool (FROST), to estimate the wildfire risk of 12 regions in Victoria, Australia. Each region is approximately 1.2 million hectares in size and collectively span a range of climatic gradients. We modelled three epochs of climate data: 1990 to 2009, 2020 to 2039, and 2060 to 2079, alongside three fuel management strategies: no prescribed burning, low rates of prescribed burning, and high rates of prescribed burning. We analyse changes in fire frequency, extent, intensity, and severity across Victoria to provide estimates of potential risk under the three management scenarios for each epoch. Wildfire risks increased under future climate predictions and from west to central Victoria, declining again in the eastern regions. These simulations provide baseline estimates for the spatial distribution of future wildfire risk across Victoria, Australia, and can be used to help prioritise conservation actions to areas of the lowest risk. We also found that there were no statistically significant differences between fuel management scenarios, reiterating that prescribed burning will not necessarily negate the impacts of climate change on future wildfire risk. Incorporating spatial estimates of future wildfire risk can improve the prioritisation of conservation decisions and can help protect biodiversity in the long term.

Keywords: climate change; fire regime; biodiversity; wildfire; risk analysis; prescribed burning; conservation planning


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