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## Operational wildfire suppression modelling: a review evaluating development, state of the art and future directions

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## Abstract

Wildfires are an inherent part of the landscape in many parts of the world; however, they often impose substantial economic burdens on human populations where they occur, both in terms of impacts and of management costs. As wildfires burn towards human assets, a universal response has been to deploy fire suppression resources (crews, vehicles and aircraft) to extinguish them, and limit their spread or impacts. The determination of the appropriate levels of investment, resource allocation and suppression tactics is a challenge for managers. As suppression expenses account for a substantial proportion of the cost of fires, and escaped fires account for a large portion of impacts, fire suppression models have been developed to better inform decision-makers. We undertake a review of the literature pertaining to the development of operational models that emulate fire suppression as part of decision support systems. We provide a summary of the development of modelling approaches, discuss strengths and limitations and provide perspectives on the direction of future research.

**Additional keywords:** bushfire, firefighting, forest, management science, operational research, optimisation.

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