APPLYING OPERATIONS RESEARCH METHODS TO BUSHFIRE MANAGEMENT

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Research questions

- What is the current state of knowledge in operations research use for emergency and wildfire management?
- What are some of the key challenges of the bushfire management decision environment that could benefit from operations research methods?
- How can operations research methods be applied to some pressing management problems arising in the Australian bushfire context?

Literature review

- Some defining challenges of bushfire management were identified:
  - complexity
  - multiple conflicting objectives
  - uncertainty
- A range of operations research methods were presented to address these challenges with illustrative examples from the wildfire and disaster literature
- Little operations research work has been done in the Australian bushfire context and substantial gaps exist between fire managers' needs and current decision support systems

Related publications

Minas JP, Hearne JW, Handmer JW (2012) A review of operations research (OR) methods applicable to wildfire management. *International Journal of Wildland Fire*, 21(3) 189-196

Integrating fuel treatment and suppression preparedness planning

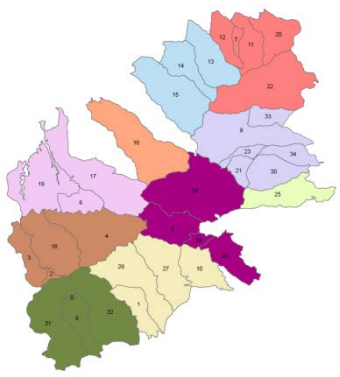
- An optimisation model was developed that included both fuel management and suppression preparedness decisions
- Integrating these decisions can lead to better initial attack coverage than approaching them in isolation from one another
- An integrated model allows for analysis of budget level and resource allocation to fuel management and fire suppression programs

Related publications

Minas JP, Hearne JW, Martell DL (2013)An integrated optimization model for fuel management and fire suppression preparedness planning. *Annals of Operations Research (to appear)*

Burn unit aggregation

- An optimisation model was developed for aggregation of fuel treatment units
- The model combines existing burn units into larger units so as to minimise perimeter requiring management
- This is a combinatorially complex problem and work is continuing on scaling-up this modelling approach to handle large landscapes



Long term fuel management planning

- A spatio-temporal optimisation model was developed for multi-year fuel management planning
- The model provides a framework for scheduling fuel treatments to generate and maintain fire resistant landscape patterns
- It allows for heterogeneity of landscape features such as: fuel type, topography and prevalent wind direction
- Several model extensions were presented including: incorporation of ecological considerations and delineation of zones with differing land-use and fuel treatment emphases

Related publications

Minas JP, Hearne JW, Martell DL. A spatial optimization model for multi-period landscape level fuel management to mitigate wildfire impacts, *European Journal of Operational Research (under review)*

End User Statement

"Operations research has played a significant role in improving the efficiency and effectiveness of many industries such as mining, transport and manufacturing. Despite being used to improve fire management in Canada for well over a decade it has not been widely used in Australia. This research has the potential transform the way we think about how, where and why we should invest in fire management to achieve the best outcomes for communities and Government." - *Liam Fogarty DEPI*

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