



Hazard reduction burn in the Blue Mountains. Photo: NSW NPWS

- Key Topics:
- fire [2]
  - prescribed burning [3]
  - risk management [4]


From hectares to tailor made solutions for risk mitigation [5]  
The key finding of the project is that the effectiveness of prescribed burning at mitigating area burnt by bushfire and other key values varies considerably across landscapes and values. This has major implications for fire managers, suggesting that tailored prescribed burning solutions are possible based on the unique risk mitigation profile for any given suite of management values in that region. The key product of the project is the Prescribed Burning Atlas, a new website that informs prescribed burning strategies and helps fire and land managers tailor their approaches to outcomes that will best reduce risk in a target area within available budgets.

Project: detail Notabs


Research team

Research leader

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RESEARCH LEADER



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## End User representatives

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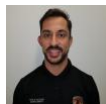


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STUDENT RESEARCHER



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## Description

Prescribed burning is a central feature of contemporary fire management, not just in Australia but in fire-prone countries around the world. Yet we lack a firm quantitative basis for understanding and comparing its effectiveness at mitigating risk across different regions. This project aimed to address these gaps and provide critical support to agency decision makers across southern Australia by undertaking a systematic investigation of the drivers of prescribed burning effectiveness across the region. This project is thus supporting fire managers in transitioning from hectare targets to a set of tailor-made, risk-based approaches.

**The key finding of the project is that the effectiveness of prescribed burning at mitigating area burnt by bushfire and other key values varies considerably across landscapes and values.** That is, there is no one-size-fits-all solution to prescribed burning. This has major implications for fire managers, suggesting that tailored prescribed burning solutions are possible, based on the unique risk mitigation profile for any given suite of management values in that region. Further details are included in this report and journal articles listed herein.

While the project has been completed, its findings live on in the Prescribed Burning Atlas, a dedicated website for fire managers, researchers and anyone else interested in using our project to support their planning, decision making and communication. The Prescribed Burning Atlas will provide a geographically-based summary of risk for decision makers in an accessible, user friendly format. The Prescribed Burning Atlas provides quantitative risk-response relationships for prediction of the most probable outcome of different treatment strategies across varied bioregions. The Atlas has an interactive interface for end-users that allows them to explore not just these risk-response relationships, but also fuel accumulation and ignition probability models as well as projections of changes to risk under different climate, land use and management scenarios. The Atlas can be used in a range of ways, from strategic and tactical decision-making to policy development, resource allocation and education. Access the Atlas here <https://prescribedburnatlas.science/> [33]

[Read the final report here.](#) [34]

## Related News



Young Tall Poppy Award for researcher  
FIRE, LAND MANAGEMENT

18 JUN 2021

[35]



30 MAR 2021

A staggering 1.8 million hectares burned in 'high-severity' fires during Australia's Black Summer  
CLIMATE CHANGE, FIRE IMPACTS

[36]

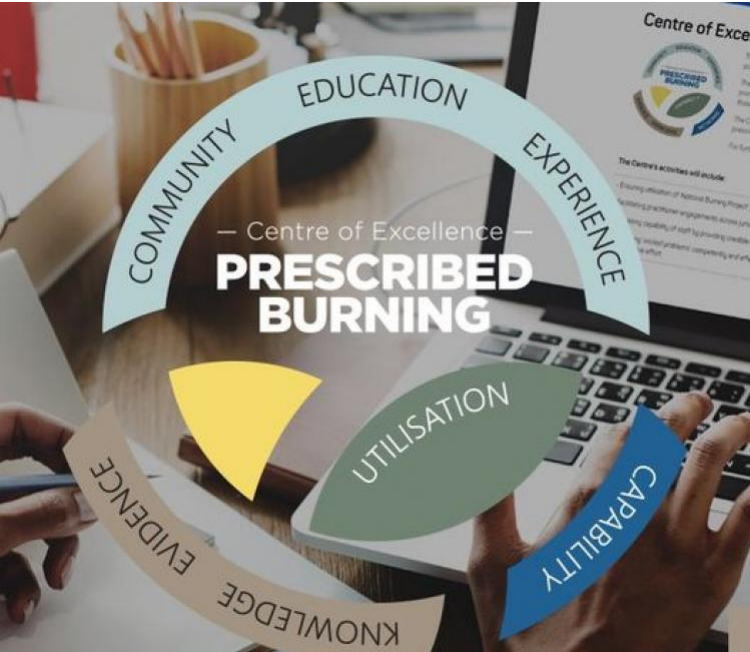


21 DEC 2020

How best to burn the bush  
LAND MANAGEMENT, PLANNING

[37]





An upcoming Prescribed Burning Atlas webinar  
FIRE, PRESCRIBED BURNING

04 DEC 2020

[38]



New online - October 2020  
COMMUNICATION, EMERGENCY MANAGEMENT

20 OCT 2020

[39]



New online - July 2020  
COMMUNICATION, EMERGENCY MANAGEMENT

22 JUL 2020

[40]



Science shows how to best burn the bush to reduce bushfire risk  
FIRE, LAND MANAGEMENT

15 JUL 2020

[41]



30 JUN 2020

Science galore – key CRC event dates  
EMERGENCY MANAGEMENT, PRESCRIBED BURNING

[42]



21 MAY 2020

New online - May 2020  
COMMUNICATION, EMERGENCY MANAGEMENT

[43]





Media seek research insights  
COMMUNICATION, FIRE

23 JAN 2020

[44]



Special edition Monographs share AFAC19 science  
EMERGENCY MANAGEMENT, LAND MANAGEMENT

11 DEC 2019

[45]





26 NOV 2019

Answering burning questions  
FIRE, PRESCRIBED BURNING

[46]



19 NOV 2019

CRC science making national impact  
FIRE, FIRE SEVERITY

[47]



09 SEP 2019

Global database published in prestigious journal  
FIRE, FIRE IMPACTS

[48]

# THE WEATHER WINDOW UNDER CLIMATE CHANGE

More evidence for **increases** than decreases

Changes in **seasonality**

**Regional** variation

**Highly sensitive to weather definition**



15 AUG 2019

Will the prescribed burning weather window close?  
CLIMATE CHANGE, LAND MANAGEMENT

[49]



24 JUL 2019

New online - July 2019  
EMERGENCY MANAGEMENT, FIRE

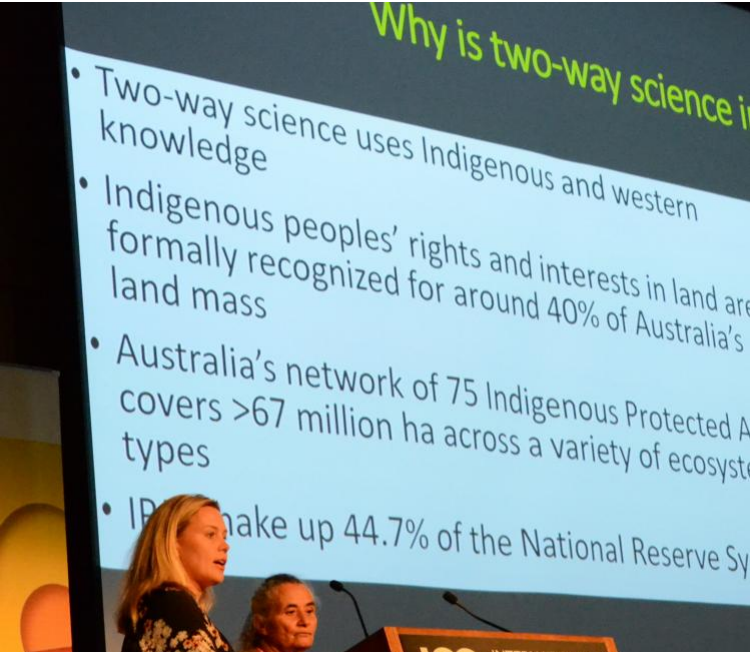
[50]



27 JUN 2019

New online - June 2019  
COMMUNITIES, EMERGENCY MANAGEMENT

[51]



Global fire focus on diversity, cultural burning and communities  
COMMUNITIES, DIVERSITY AND INCLUSION

15 MAY 2019

[52]



Prescribed burning research warm up to conference  
FORECASTING, MITIGATION

15 MAY 2019

[53]





New online – November 2018  
EARTHQUAKE, MODELLING

15 NOV 2018

[54]



New online - November 2017

17 NOV 2017

[55]



27 OCT 2016

Project update three - From hectares to tailor-made solutions  
FIRE, FIRE SEVERITY

[56]



16 AUG 2016

New online - August 2016

[57]



29 JUL 2016

Project update two - From hectares to tailor-made solutions  
FIRE, FIRE SEVERITY

[58]



20 MAY 2016

Project update - From hectares to tailor-made solutions  
FIRE, FIRE SEVERITY

















[59]

Publications



Year	Type	Citation
2020	Journal Article	Di Virgilio, G. [60] <i>et al.</i> <b>Climate Change Significantly Alters Future Wildfire Mitigation Opportunities in Southeastern Australia</b> [61]. <i>Geophysical Research Letters</i> <b>47</b> , (2020). DOI [62] Google Scholar [63]
2020	Journal Article	Filkov, A. [66], Ngo, T. [67], Matthews, S. [68], Telfer, S. [69] & Penman, T. [17] <b>Impact of Australia's catastrophic 2019/20 bushfire season on communities and environment. Retrospective analysis</b> [64]. (Bushfire and Natural Hazards CRC, 2020). Google Scholar [81] BibTeX [82] EndNote XML [83]
2020	Journal Article	Cawson, J. [75] <i>et al.</i> <b>Exploring the key drivers of forest flammability in wet eucalypt forests using expert-derived conceptual models</b> [76]. <i>Landscape Ecology</i> <b>35</b> , 1775–1798 (2020). DOI [77] Google Scholar [78]
2020	Report	Clarke, H. [11] <i>et al.</i> <b>From hectares to tailor-made solutions for risk mitigation – final project report</b> [34]. (Bushfire and Natural Hazards CRC, 2020). Google Scholar [81] BibTeX [82] EndNote XML [83]
2019	Conference Paper	Clarke, H. [11] <i>et al.</i> <b>A new decision support tool for prescribed burning risk assessment</b> [84]. <i>Bushfire and Natural Hazards CRC Research Day AFAC19</i> (2019). at <https://knowledge.aidr.org.au/afac19/abstracts/abstract-11>
2019	Journal Article	Clarke, H. [11] <i>et al.</i> <b>Climate change effects on the frequency, seasonality and interannual variability of suitable prescribed burning weather conditions in south-eastern Australia</b> [89]. <i>Agricultural and Forest Meteorology</i> <b>253</b> , 108206 (2019). DOI [90] Google Scholar [91] BibTeX [92] EndNote XML [93]
2019	Journal Article	Florec, V. [94], Burton, M. [95], Pannell, D. J. [96], Kelso, J. [97] & Milne, G. J. [98] <b>Where to prescribe burn: the costs and benefits of prescribed burning close to houses</b> [99]. <i>International Journal of Wildland Fire</i> <b>29</b> , 41–53 (2019). DOI [100] Google Scholar [101] BibTeX [102] EndNote XML [103]
2019	Journal Article	Cirulis, B. [10] <i>et al.</i> <b>Quantification of inter-regional differences in risk mitigation from prescribed burning across multiple management values</b> [104]. <i>International Journal of Wildland Fire</i> <b>29</b> , 41–53 (2019). DOI [105] Google Scholar [106] BibTeX [107] EndNote XML [108]
2019	Journal Article	Clarke, H. [11], Gibson, R. [109], Cirulis, B. [10], Bradstock, R. [6] & Penman, T. [17] <b>Developing and testing models of the drivers of anthropogenic and lightning-caused wildfire ignitions in south-eastern Australia</b> [110]. <i>International Journal of Wildland Fire</i> <b>29</b> , 41–53 (2019). DOI [111] Google Scholar [112] BibTeX [113] EndNote XML [114]
2019	Journal Article	Cirulis, B. [10] <i>et al.</i> <b>Quantification of inter-regional differences in risk mitigation from prescribed burning across multiple management values</b> [115]. <i>International Journal of Wildland Fire</i> (2019). DOI [116] Google Scholar [117] BibTeX [118] EndNote XML [119]
2019	Journal Article	Yebra, M. [118] <i>et al.</i> <b>Globe-LFMC, a global plant water status database for vegetation ecophysiology and wildfire applications</b> [119]. <i>Scientific Data</i> <b>6</b> , (2019). DOI [120] Google Scholar [121] BibTeX [122] EndNote XML [123]
2019	Report	Clarke, H. [11] <i>et al.</i> <b>From hectares to tailor-made solutions for risk mitigation: annual project report 2018-19</b> [124]. (Bushfire and Natural Hazards CRC, 2019). Google Scholar [125] BibTeX [126] EndNote XML [127]
2018	Conference Paper	Bates, J. [128] <b>Research proceedings from the 2018 Bushfire and Natural Hazards CRC and AFAC Conference</b> [129]. <i>Bushfire and Natural Hazards CRC &amp; AFAC annual conference 2017</i> (Bushfire and Natural Hazards CRC, 2018). Google Scholar [130] BibTeX [131] EndNote XML [132]
2018	Report	Clarke, H. [11] <i>et al.</i> <b>From hectares to tailor-made solutions for risk mitigation: annual project report 2017-18</b> [133]. (Bushfire and Natural Hazards CRC, 2018). Google Scholar [134] BibTeX [135] EndNote XML [136]
2017	Report	Clarke, H. [11] <i>et al.</i> <b>From hectares to tailor-made solutions for risk mitigation - systems to deliver effective prescribed burning across Australian ecosystems: annual project report 2016-17</b> [137]. (Bushfire and Natural Hazards CRC, 2017). Google Scholar [138] BibTeX [139] EndNote XML [140]
2016	Journal Article	Driscoll, D. A. [141] <i>et al.</i> <b>Resolving future fire management conflicts using multi-criteria decision making</b> [142]. <i>Conservation Biology</i> <b>30</b> , 196–205 (2016). DOI [143] Google Scholar [144] BibTeX [145] EndNote XML [146]
2016	Report	Bradstock, R. [6] <b>From hectares to tailor-made solutions for risk mitigation: systems to deliver effective prescribed burning across Australian ecosystems: Annual project report 2015-2016</b> [147]. (Bushfire and Natural Hazards CRC, 2016). Google Scholar [148] BibTeX [149] EndNote XML [150]
2015	Journal Article	Penman, T. [17] <i>et al.</i> <b>Reducing the risk of house loss due to wildfires</b> [151]. <i>Environmental Modelling and Software</i> <b>67</b> , 12–25 (2015). DOI [152] Google Scholar [153] BibTeX [154] EndNote XML [155]
2015	Journal Article	Price, O. [16], Penman, T. [17], Bradstock, R. [6], Boer, M. M. [15] & Clarke, H. [11] <b>Biogeographical variation in the potential effectiveness of prescribed fire in south-eastern Australia</b> [156]. <i>Journal of Environmental Management</i> <b>156</b> , 102–112 (2015). DOI [157] Google Scholar [158] BibTeX [159] EndNote XML [160]
2015	Presentation	Bradstock, R. [6] <b>From hectares to tailor-made solutions for risk mitigation: systems to deliver effective prescribed burning across Australian ecosystems</b> [161]. (2015). Google Scholar [162] BibTeX [163] EndNote XML [164]

## Presentations & Resources

DATE	TITLE	DOWNLOAD	KEY TOPICS
04 Dec 2014	From hectares to tailor-made solutions for prescribed burning [167]	 902.97 KB	[160] (2014) [169], prescribed burning [3]
11 Sep 2015	Hazard Reduction Burn Windows [170]	 875.51 KB	[171] (2015) [174], land management [175]
02 Feb 2016	Research for better land management [172]	 133.76 KB	[173] (2016) [174], land management [175]
24 Oct 2016	From hectares to tailor-made solutions for risk mitigation: systems to deliver effective prescribed burning across ecosystems [176]	 1.83 MB	[177] (2016) [174], prescribed burning [3]
07 Jul 2017	Building bushfire predictive services capability [178]	 9.97 MB	[179] (2017) [180], weather [180], management [175]
31 Oct 2017	Prescribed burning cluster [182]	 129.41 KB	[183] (2017) [174], mitigation [184]
31 Oct 2017	Prescribed burning and predictive services [184]	 4.46 MB	[185] (2017) [186], impacts [186], prescribed burning [3]
18 Sep 2018	Quantification of inter-regional differences in risk mitigation from prescribed burning across multiple management values [187]	 1.96 MB	[188] (2018) [186], impacts [186], prescribed burning [3]
23 Nov 2018	The prescribed fire atlas [189]	 960.9 KB	[190] (2018) [186], prescribed burning [3]
15 Aug 2019	Climate Change effects on prescribed burning conditions in SE Australia [191]	 0 bytes	[192] (2019) [193], land management [175]
27 Aug 2019	From hectares to tailor-made solutions for risk mitigation: An integrated prescribed burning research project [194]	 2.57 MB	[195] (2019) [196], fire [200]
14 Jul 2020	Prescribed Burning Atlas launch - webinar [197]	 0 bytes	[198] (2020) [199], management [175]
14 Jul 2020	Prescribed Burning Atlas Launch 14 July 2020 - Hamish Clarke [199]	 2.49 MB	[200] (2020) [199], management [175]
13 Aug 2020	Q&A with Dr Hamish Clarke - Prescribed Burning Atlas launch webinar [201]	 0 bytes	[202] (2020) [199], management [175]
09 Dec 2020	The Prescribed Burning Atlas: a new system to plan effective prescribed burns [203]	 872.25 KB	[204] (2020) [205], prescribed burning [3]
21 Dec 2020	Fire Australia Issue Four 2020 [205]	 4.58 MB	[206] (2020) [207], fire [200]

## Posters



A number of stakeholders defined several prescribed burning objectives. However, formal objectives were not effectively communicated. Key targets on bushfire risk to people, property and environmental values were often different to what was intended. Prescribed burning was being undertaken in a more opportunistic way to risk assessment. Knowledge of the best way to use prescribed burning risk to fire risk management was limited.

Working with stakeholders across southern Australia, the project will deliver:

1. A Prescribed Burning Atlas to guide implementation of better risk prescribed burning strategies and the landscape, climate and human context of prescribed burning systems in SE Australia.
2. Consistent data, validated models of fire risk and fuel availability to support decision making on the use of prescribed burning to reduce bushfire risk.

18 AUG 2015

**Delivering Effective Prescribed Burning Across Southern Australia**

[209]

FIRE [2], PRESCRIBED BURNING [3]

Although many jurisdictions are committed to prescribed burning, we do not understand its effects on risks to...



**RESPONSE TO DELIVERING EFFECTIVE PRESCRIBED BURNING ACROSS SOUTHERN AUSTRALIA**

The project will deliver:

- 1. A Prescribed Burning Atlas to guide implementation of better risk prescribed burning strategies and the landscape, climate and human context of prescribed burning systems in SE Australia.
- 2. Consistent data, validated models of fire risk and fuel availability to support decision making on the use of prescribed burning to reduce bushfire risk.

14 AUG 2016

[210]

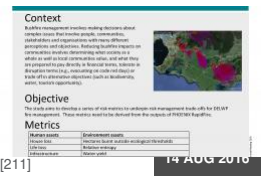


From hectares to tailor-made solutions for prescribed burning

[210]

PRESCRIBED BURNING [3]

This project will deliver a prescribed burning atlas to guide implementation of 'tailor-made' prescribed...

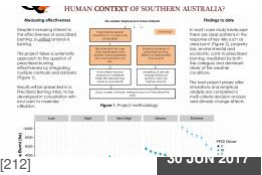


[211]

Developing wildfire risk metrics in Phoenix RapidFire

[211]

Bushfire management involves making decisions about complex issues that involve people, communities,...



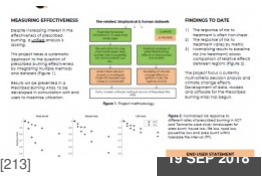
[212]

From hectares to tailor-made solutions for prescribed burning

[212]

FIRE [2], PRESCRIBED BURNING [3]

How does prescribed burning effectiveness in mitigating risk depend on the diverse and changing biophysical,...



[213]

From hectares to tailor-made solutions

[213]

FIRE [2], PRESCRIBED BURNING [3]

How does the diverse and changing biophysical, climatic and human context of southern Australia influence...



[214]

From hectares to tailor-made solutions to prescribed burning

[214]

MITIGATION [169]

Rising public and professional expectations require a greater, more transparent understanding of the trade-...



[215]

From hectares to tailor-made solutions for prescribed burning

[215]

MITIGATION [169], RISK ANALYSIS [216]

Key findings: We found there is no one-size-fits-all solution for prescribed burning. Risk mitigation varies...



[217]

Suppression Firing Prevalence & Practice

[217]

MITIGATION [169], RISK ANALYSIS [216]

Key findings: Suppression firing is a prominent containment tool. It occurred on half of the large fires in...

# Linked Projects

Economic analysis of prescribed burning

[218]

ECONOMICS AND STRATEGIC DECISIONS [219]

Dr Veronique Florec  
University of Western Australia [220]

## Links

<https://www.bnhcrc.com.au/resources/poster/7725> [216] <https://www.bnhcrc.com.au/research/topics/risk-analysis> [217] <https://www.bnhcrc.com.au/resources/poster/7729> [218] <https://www.bnhcrc.com.au/research/policy-and-economics-hazards/1147> [219] <https://www.bnhcrc.com.au/research/cluster/economics-decision-making> [220] <https://www.bnhcrc.com.au/organisations/uwa>