Tasmania bushfires, February 2016. Photo by Mick Reynolds, NSW Rural Fire Service

Key Topics:

- fire impacts [2]
- fire severity [3]
- fire weather [4]

Fire coalescence and mass spotfire dynamics [5]

Fire behaviour in dry eucalypt forests in Australia (and in many other vegetation types to a lesser extent) is characterised by the occurrence of spotfires—new fires ignited by the transport of burning debris such as bark ahead of an existing fire. Under most burning conditions, spotfires play little role in the overall propagation of a fire, except where spread is impeded by breaks in fuel or topography and spotfires allow these impediments to be overcome. However, under conditions of severe bushfire behaviour spotfire occurrence can be so prevalent that spotting becomes the dominant propagation mechanism and the fire spreads as a cascade of spotfires forming a 'pseudo' front. It has long been recognised that the presence of multiple individual fires affects the behaviour and spread of all fires present. The converging of separate individual fires into larger fires is called coalescence and can lead to rapid increases in fire intensity and spread rate, leading to the phenomenon of a 'fire storm'. This coalescence effect is frequently used in prescribed burning, with multiple point ignitions used to rapidly burn out large areas.

The team has demonstrated the performance advantages of fire propagation models incorporating curvature dependence when applied to simple wind-driven fires at both laboratory and field scales. The research has also produced fundamental insights into how the shape of the fire line affects the dynamic behaviour of the fire as a whole. Coupled fire-atmosphere modelling was used to investigate how fire-induced air movements (pyroconvection) can produce significantly enhanced rates of spread for certain fire shapes.

Project: detail Notabs

Research team

Research leader

[6]

Prof Jason Sharples

[6]

RESEARCH LEADER

UNSW THE UNIVERSITY OF NEW SOUTH WALES

[7]

Research team

[8]

Dr Andrew Sullivan
[8]
RESEARCH TEAM

[9]

[10]

Dr James Hilton
[10]
RESEARCH TEAM

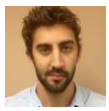
[9]

[11]

Richard Hurley
[11]
RESEARCH TEAM

[9]

[12]



Dr Will Swedosh
[12]
RESEARCH TEAM

[9]

End User representatives

[13]

Alen Slijepcevic
[13]
END-USER

[14]

[15]

Andrew Stark
[15]
END-USER

[16]

[17]

Brad Davies
[17]
END-USER

[18]

[19]

Joe Murphy
[19]
END-USER

[20]

[21]

Matt Chesnais
[21]
END-USER

[22]

[23]

Mark Chladil
[23]
END-USER

[24]

[25]

Dr Sarah Harris
[25]
END-USER

[26]

Dr Simon Heemstra
[26]
END-USER

[14]

[18]

Student researchers

[27]

Dr Christopher Thomas
[27]
STUDENT RESEACHER

[7]

[28]

Michael Storey
[28]
STUDENT RESEACHER

[29]

Description

Fire behaviour in dry eucalypt forests in Australia is characterised by the occurrence of spotfires—new fires ignited by the transport of embers ahead of an existing fire. Under most burning conditions, spotfires play little role in the overall propagation of a fire, except where spread is impeded by breaks in fuel or topography. Spotfires allow these impediments to be overcome.

However, under conditions of severe bushfire behaviour, spotfire occurrence can be so prevalent that spotting becomes the dominant propagation mechanism and the fire spreads as a cascade of spotfires forming a ‘pseudo’ front.

It has long been recognised that the presence of multiple individual fires affects the behaviour and spread of all fires present. The converging of separate individual fires into larger fires is called coalescence and can lead to rapid increases in fire intensity and spread rate, leading to the phenomenon of a ‘fire storm’. This coalescence effect is frequently used in prescribed burning, with multiple point ignitions used to rapidly burn out large areas.

This project is focusing on:

- Fire coalescence to provide better predictions of fire propagation
- The intrinsic dynamics of flame front propagation as a contributor to fire spread across different spatial and temporal scales
- Within a simulation framework an end-to-end model of the behaviour of mass spotfires, from firebrand/ember launch to fire coalescence.

The modelling and simulation aspects of the project have contributed to understanding the processes that drive fire coalescence and dynamic fire spread. In particular, the research has addressed the role that fire-line geometry (especially curvature) plays in the dynamic propagation of bushfires.

The team has demonstrated the performance advantages of fire propagation models incorporating curvature dependence when applied to simple wind-driven fires at both laboratory and field scales. The research has also produced fundamental insights into how the shape of the fire line affects the dynamic behaviour of the fire as a whole. Coupled fire-atmosphere modelling was used to investigate how fire-induced air movements (pyroconvection) can produce significantly enhanced rates of spread for certain fire shapes.

Utilising the research outcomes will include development of education and training materials relating to dynamic fire behaviour and extreme fire development, which will incorporate the research findings on fire coalescence and mass spotfires.

Research findings will also be used to develop metrics of relevance to the National Fire Danger Rating Project. In particular, existing measures of ‘convective fire power’ based solely on information relating to the fire perimeter will be extended to include contributions from within flaming zones where spot fire coalescence can contribute significantly to pyroconvective release.

Download:
Fire coalescence and mass spotfire dynamics - project overview [30]

Related News

10 DEC 2021

CRC researcher appointed Fellow
FIRE IMPACTS, FIRE SEVERITY

[31]

14 OCT 2021

CRC science in danger series

FIRE, FIRE WEATHER

[32]

18 JUN 2021

Queen’s Birthday Honours for CRC end-users

CAPABILITY, EMERGENCY MANAGEMENT

[33]

23 FEB 2021

New online - February 2021

COMMUNICATION, EMERGENCY MANAGEMENT

[34]

29 JAN 2021

How heatwaves and drought combine to produce the perfect firestorm

FIRE, FIRE SEVERITY

[35]

16 NOV 2020

New online - November 2020

COMMUNICATION, EMERGENCY MANAGEMENT

[36]

08 OCT 2020

CRC researchers recognised as science leaders

EMERGENCY MANAGEMENT, HYDROLOGY

[37]

25 SEP 2020

New online - September 2020

EMERGENCY MANAGEMENT, FIRE

[38]

21 APR 2020

New online - April 2020

COMMUNICATION, EMERGENCY MANAGEMENT

[39]

23 JAN 2020

Media seek research insights

COMMUNICATION, FIRE

[40]

19 NOV 2019

CRC science making national impact

FIRE, FIRE SEVERITY

[41]

29 OCT 2019

Bushfire modelling boost

COMMUNITIES, EMERGENCY MANAGEMENT

[42]

29 OCT 2019

Spotfires – a dynamic interaction

FIRE, FIRE IMPACTS

[43]

23 OCT 2019

Predictive services research spotlighted

EMERGENCY MANAGEMENT, FORECASTING

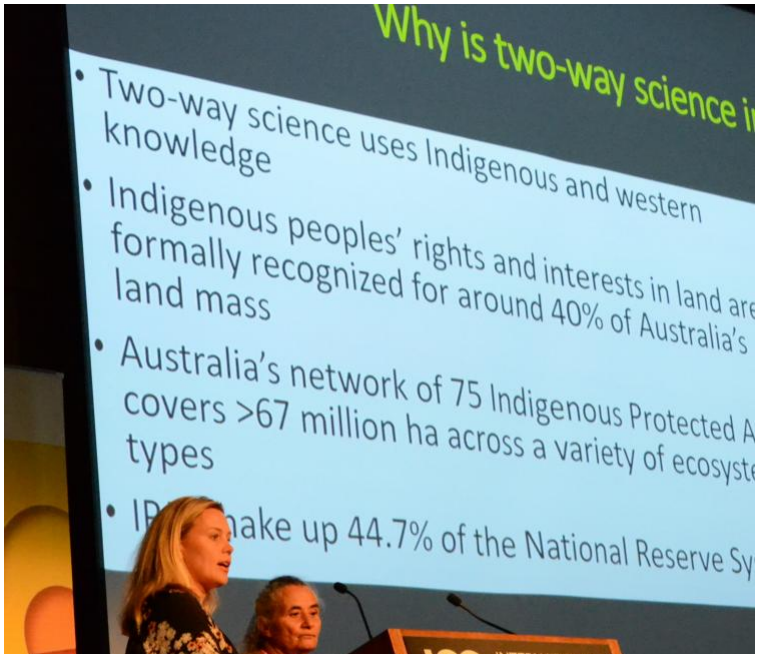
[44]

22 AUG 2019

New online - August 2019

DECISION MAKING, EMERGENCY MANAGEMENT

[45]



15 MAY 2019

Global fire focus on diversity, cultural burning and communities

COMMUNITIES, DIVERSITY AND INCLUSION

[46]

15 MAY 2019

Prescribed burning research warm up to conference

FORECASTING, MITIGATION

[47]

18 SEP 2018

Conference papers available online

EMERGENCY MANAGEMENT, MULTI-HAZARD

[48]

13 FEB 2018

New online - February 2018

EMERGENCY MANAGEMENT, MULTI-HAZARD

[49]

17 NOV 2017

New online - November 2017

[50]

27 FEB 2017

Focus on firestorms, disaster resilience and preparation in Bangladesh

CHILD-CENTRED, FIRE SEVERITY

[51]

19 DEC 2016

New online - December 2016

EMERGENCY MANAGEMENT, LAND MANAGEMENT

[52]

17 NOV 2016

New online - November 2016

[53]

11 NOV 2016

Firestorms: the bushfire/thunderstorm hybrids we urgently need to understand

FIRE, FIRE SEVERITY

[54]

11 NOV 2016

Increasing cost of natural hazards as climate changes

FIRE, FIRE SEVERITY

[55]

14 SEP 2016

New online - September 2016

[56]

08 APR 2016

Fire modelling in an uncertain world

FIRE WEATHER, MODELLING

[57]

14 OCT 2015

Succinct science is key

FIRE SEVERITY, FLOOD

[58]

Publications

Year	Type	Citation
2023	Report	Sharples, J. J. [6], Hilton, J. [10], Sullivan, A. [8] & Badlan, R. [59] **Fire coalescence and mass spot fire dynamics - final project report** [60]. (Natural Hazards Research Australia, 2023). Google Sch
2022	Report	Badlan, R. [59] & Sharples, J. J. [6] **Spotfire utilisation project: implementation of the VLS filter** [64]. (Bushfire and Natural Hazards CRC, 2022). Google Scholar [65] BibTeX [66] EndNote XML [67]
2021	Journal Article	Gould, J. S. [68] & Sullivan, A. [8] **Initial growth of fires in eucalypt litter, from ignition to steady-state rate of spread: laboratory studies** [69]. *International Journal of Wildland Fire* (2021). doi:http
2021	Journal Article	P reddy, J. [74], Perkins-Kirkpatrick, S. [75] & Sharples, J. J. [6] **Interactive influence of ENSO and IOD on contiguous heatwaves in Australia** [76]. *Environmental Research Letters* (2021). doi:https
2021	Journal Article	Sutherland, D. [81], Sharples, J. J. [6], Mell, W. [82] & Moinuddin, K. [83] **A response to comments of Cruz et al. on: 'Simulation study of grass fire using a physics-based model: striving toward**
2021	Journal Article	P reddy, J. [74], Sharples, J. J. [6], Lewis, S. [89] & Perkins-Kirkpatrick, S. [75] **Modulating influence of drought on the synergy between heatwaves and dead fine fuel moisture content of bushfi**
2020	Journal Article	Penman, T. [95] *et al.* **Effect of weather forecast errors on fire growth model projections** [96]. *International Journal of Wildland Fire* (2020). doi:https://doi.org/10.1071/WF19199 DOI [97] Google Sch
2020	Journal Article	Sharples, J. J. [6] & Hilton, J. [10] **Modeling Vorticity-Driven Wildfire Behavior Using Near-Field Techniques** [101]. *Frontiers in Mechanical Engineering* (2020). doi:https://doi.org/10.3389/fmech.201
2020	Report	Sharples, J. J. [6], Hilton, J. [10], Sullivan, A. [8] & Badlan, R. [59] **Fire coalescence and mass spot fire dynamics: experimentation, modelling and simulation – annual project report 2019-2020**
2020	Report	Sharples, J. J. [6], Hilton, J. [10] & Sullivan, A. [8] **Fire coalescence and mass spot fire dynamics: experimentation, modelling and simulation - Annual project report 2018-2019** [110]. (Bushfire
2020	Report	Lewis, S. [89] *et al.* **Deconstructing factors contributing to the 2018 fire weather in Queensland, Australia** [114]. *Explaining Extreme Events of 2018 from a Climate Perspective* **101,** S15-S21 (202
2019	Conference Paper	Hilton, J. [10], Garg, N. [119] & Sharples, J. J. [6] **Incorporating firebrands and spot fires into vorticity-driven wildfire behaviour models** [120]. *23rd International Congress on Modelling and Simul*
2019	Conference Paper	Hilton, J. [10] *et al.* **Wind-terrain effects on firebrand dynamics** [125]. *23rd International Congress on modelling and Simulation* (2019). doi:https://doi.org/10.36334/modsim.2019.H7.hilton DOI [126]
2019	Journal Article	Virgilio, G. [130] *et al.* **Climate Change Increases the Potential for Extreme Wildfires** [131]. *Geophysical Research Letters* **46,** 8517-8526 (2019). DOI [132] Google Scholar [133] BibTeX [134] EndN
2019	Journal Article	Quill, R. [136], Sharples, J. J. [6] & Sidhu, L. [137] **A Statistical Approach to Understanding Canopy Winds over Complex Terrain** [138]. *Environmental Modeling & Assessment* 1-20 (2019). doi:http
2018	Conference Paper	Hilton, J. [10] *et al.* **Pyroconvective interactions and dynamic fire propagation** [143]. *AFAC18* (2018). Google Scholar [144] BibTeX [145] EndNote XML [146]
2018	Conference Paper	Bates, J. [147] **Research proceedings from the 2018 Bushfire and Natural Hazards CRC and AFAC Conference** [148]. *Bushfire and Natural Hazards CRC & AFAC annual conference 2017* (Bushfir
2018	Journal Article	Lahaye, S. [152] *et al.* **What are the drivers of dangerous fires in Mediterranean France?** [153]. *International Journal of Wildland Fire* **27,** 155-163 (2018). DOI [154] Google Scholar [155] BibTeX [15
2018	Journal Article	Hilton, J. [10], Sullivan, A. [8], Swedosh, W. [158], Sharples, J. J. [6] & Thomas, C. [159] **Incorporating convective feedback in wildfire simulations using pyrogenic potential** [160]. *Environmental*
2018	Journal Article	Sharples, J. J. [6], Chaivaranont, W. [165], Evans, J. P. [166] & Y.Liu, Y. [167] **Estimating grassland curing with remotely sensed data** [168]. *Natural Hazards and Earth System Sciences* (2018). doi
2018	Journal Article	Raposo, J. R. [173] *et al.* **Analysis of the physical processes associated with junction fires at laboratory and field scales** [174]. *International Journal of Wildland Fire* **27,** (2018). DOI [175] Google
2018	Journal Article	Lahaye, S. [152] *et al.* **How do weather and terrain contribute to firefighter entrapments in Australia?** [179]. *International Journal of Wildland Fire* **27,** 85-98 (2018). DOI [180] Google Scholar [181]
2017	Conference Paper	Lahave, S. [184], Sharples, J. J. [6], Matthews, S. [185], Heemstra, S. [186] & Price, O. [187] **What are the safety implications of dynamic fire behaviours?** [188]. *22nd International Congress on Mo*
2017	Conference Paper	Rumsewicz, M. [192] **Research proceedings from the 2017 Bushfire and Natural Hazards CRC and AFAC Conference** [193]. *Bushfire and Natural Hazards CRC & AFAC annual conference 2017* (
2017	Conference Paper	Sharples, J. J. [6] **A unified approach to fire spread modelling** [197]. *AFAC17* (Bushfire and Natural Hazards CRC, 2017). Google Scholar [198] BibTeX [199] EndNote XML [200]
2017	Report	Sharples, J. J. [6], Hilton, J. [10] & Sullivan, A. [8] **Fire coalescence and mass spotfire dynamics - experimentation, modelling and simulation: annual project report 2016-17** [201]. (Bushfire and
2016	Journal Article	Sharples, J. J. [6] *et al.* **Natural hazards in Australia: extreme bushfire** [205]. *Climatic Change* **139,** 85-99 (2016). DOI [206] Google Scholar [207] BibTeX [208] EndNote XML [209]
2016	Journal Article	Hilton, J. [10], Sharples, J. J. [6] & Sullivan, A. [8] **Curvature effects in the dynamic propagation of wildfires** [210]. *International Journal of Wildland Fire* **25,** (2016). Google Scholar [211] BibTeX [212
2016	Report	Sharples, J. J. [6], Hilton, J. [10] & Sullivan, A. [8] **Fire coalescence and mass spot fire dynamics: experimentation, modelling and simulation: Annual project report 2015-2016** [214]. (Bushfire a
2015	Presentation	Sharples, J. J. [6], Hilton, J. [10] & Sullivan, A. [8] **Dynamic modelling of fire coalescence** [218]. (2015). Google Scholar [219] BibTeX [220] EndNote XML [221]
2015	Report	Sharples, J. J. [6] **Fire coalescence and mass spotfire dynamics: Experimentation, modelling and simulation - Annual project report 2014-2015** [222]. (Bushfire and Natural Hazards CRC, 2015)

Presentations & Resources

DATE [226]	TITLE [227]	DOWNLOAD	KEY TOPICS
04 Dec 2014	Fire coalescence and mass spotfire dynamics [228]	704.99 KB	[229] (704.99 KB) [3], modelling [231]
22 Mar 2016	Severe and High Impact Weather - cluster overview [232]	0 bytes	[233] (0 bytes) modelling [231], scenario analysis [2
20 Oct 2016	Fire coalescence and mass spotfire dynamics - project overview [235]	0 bytes	[236] (0 bytes) [2], fire severity [3], fire weather [4
24 Oct 2016	Fire coalescence and mass spot fire dynamics [237]	4.18 MB	[238] (4.18 MB) impacts [2], fire weather [4]
25 Oct 2016	Next generation fire modelling [239]	1.35 MB	[240] (1.35 MB) [2], fire severity [3], fire weather [4
27 Feb 2017	Fire Australia Issue One 2017 [241]	5.79 MB	[242] (5.79 MB) [243], fire severity [3], resilience
07 Jul 2017	Building bushfire predictive services capability [245]	9.97 MB	[246] (9.97 MB) weather [4], modelling [231]
07 Jul 2017	Building bushfire predictive services capability - Simon Heemstra [247]	0 bytes	[248] (0 bytes) impacts [2], modelling [231]
07 Sep 2017	A unified approach to fire spread modelling [249]	4.06 MB	[250] (4.06 MB) modelling [231], propagation [251]
31 Oct 2017	Fire coalescence and mass spotfire dynamics: experimentation, modelling and simulation [252]	932.85 KB	[253] (932.85 KB) fire severity [3], fire weather [4
18 Sep 2018	Pyroconvective interactions and dynamic fire propagation [254]	2.21 MB	[255] (2.21 MB) impacts [2], fire weather [4]
23 Nov 2018	Spot-fire project: research and utilisation [256]	1.26 MB	[257] (1.26 MB) impacts [2], fire severity [3]
13 Jun 2019	Pyroconvective interactions and spot fire dynamics [258]	626.55 KB	[259] (626.55 KB) fire severity [3], fire weather [4
17 Oct 2019	Spot-fire Project: research and utilisation [260]	2.37 MB	[261] (2.37 MB) [2], fire severity [3], fire weather [4
08 Jul 2021	Fire coalescence and mass spotfire dynamics - what do we now know and how can it be used? | Webinar [262]	0 bytes	[263] (0 bytes) [2], fire severity [3], fire weather [4

Posters

[264]

18 AUG 2015

Nature Abhors Curvature - Fires Included! Modelling Spot Fire Coalescence

[264]

FIRE SEVERITY [3], FIRE WEATHER [4]

Spotting can be the dominant fire propagation mechanism during times of extreme fire weather. Spot fires can...

[265]

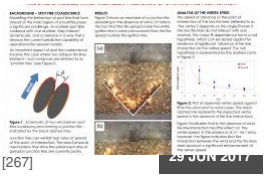
14 AUG 2018

Future technologies for predicting natural hazards

[265]

REMOTE
FIRE SEVERITY [3], SENSING [266]

Predictive models of natural hazards have become a necessity for emergency management, mitigation and...



[267]

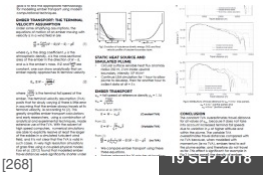
29 JUN 2017

Experimental investigation of junction fire dynamics, with and without wind

[267]

FIRE
IMPACTS [2], FIRE SEVERITY [3]

Junction fires occur when two oblique fire lines intersect with one another. The interaction of the two fire...



[268]

19 SEP 2018

Incorporation of spotting and fire dynamics in a coupled atmosphere - fire modelling framework

[268]

FIRE
IMPACTS [2], FIRE SEVERITY [3]

Spotting is a challenging aspect of bushfire operations. We currently have poor capacity to estimate exactly...

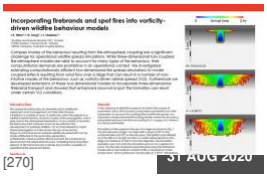
27 AUG 2019

Prediction of vorticity-driven wildfire propagation in operational time frames

[269]

FIRE
IMPACTS [2], FIRE SEVERITY [3]

Dynamic modes of fire propagation present a significant challenge for operational fire spread simulation....



[270]

31 AUG 2020

Incorporating firebrands and spot fires into vorticity-driven wildfire behaviour models

[270]

FIRE WEATHER [4], FUEL REDUCTION [271]

Key findings: Two-dimensional fire simulators have been extended to model vorticity-driven lateral spread and...

Linked Projects

Natural hazard exposure information modelling framework [272]

BUILT ENVIRONMENT [273]

Dr Krishna Nadimpalli
Geoscience Australia [274]

[274]

Threshold conditions for extreme fire behaviour [275]

BUSHFIRE PREDICTIVE SERVICES [276]

A/Prof Trent Penman
University of Melbourne [277]

[277]

Through the flames - quantitative analysis of strategic and tactical wildfire suppression [278]

BUSHFIRE PREDICTIVE SERVICES [276]

Dr Greg Penney
Edith Cowan University [279]

[279]

Coupled fire-atmosphere modelling [280]

SEVERE AND HIGH IMPACT WEATHER [281]

Dr Mika Peace
Bureau of Meteorology [282]

[282]

Links

[1] https://www.bnhcrc.com.au/files/mickreynoldsmgl2863webjpg-0 [2] https://www.bnhcrc.com.au/research/topics/fire-impacts [3] https://www.bnhcrc.com.au/research/topics/fire-severity [4] https://www.bnhcrc.com.au/research/topics/fire-weather [5] https://www.bnhcrc.com.au/research/firecoalescence [6] https://www.bnhcrc.com.au/people/jsharples [7] https://www.bnhcrc.com.au/organisations/unsw [8] https://www.bnhcrc.com.au/people/asullivan [9] https://www.bnhcrc.com.au/organisations/csiro [10] https://www.bnhcrc.com.au/people/james-hilton [11] https://www.bnhcrc.com.au/people/rhurley [12] https://www.bnhcrc.com.au/people/wswedosh [13] https://www.bnhcrc.com.au/people/aslijepcevic [14] https://www.bnhcrc.com.au/organisations/cfa [15] https://www.bnhcrc.com.au/people/astark [16] https://www.bnhcrc.com.au/organisations/cfs [17] https://www.bnhcrc.com.au/people/brdavies [18] https://www.bnhcrc.com.au/organisations/nswrfs [19] https://www.bnhcrc.com.au/people/jmurphy [20] https://www.bnhcrc.com.au/organisations/act-rfs [21] https://www.bnhcrc.com.au/people/mchesnais [22] https://www.bnhcrc.com.au/organisations/qfes [23] https://www.bnhcrc.com.au/people/mchladil [24] https://www.bnhcrc.com.au/organisations/tasfire [25] https://www.bnhcrc.com.au/people/sharris [26] https://www.bnhcrc.com.au/people/sheemstra [27] https://www.bnhcrc.com.au/people/cthomas [28] https://www.bnhcrc.com.au/people/mstorey [29] https://www.bnhcrc.com.au/organisations/uow [30] https://www.youtube.com/watch?v=TqdeVjqlVtk [31] https://www.bnhcrc.com.au/news/2021/crc-researcher-appointed-fellow [32] https://www.bnhcrc.com.au/news/2021/crc-science-danger-series [33] https://www.bnhcrc.com.au/news/2021/queen-s-birthday-honours-crc-end-users [34] https://www.bnhcrc.com.au/news/2021/new-online-february-2021 [35] https://www.bnhcrc.com.au/news/blogpost/jsharples/2021/how-heatwaves-and-drought-combine-produce-perfect-firestorm [36] https://www.bnhcrc.com.au/news/2020/new-online-november-2020 [37] https://www.bnhcrc.com.au/news/2020/crc-researchers-recognised-science-leaders [38] https://www.bnhcrc.com.au/news/2020/new-online-september-2020 [39] https://www.bnhcrc.com.au/news/2020/new-online-april-2020 [40] https://www.bnhcrc.com.au/news/2020/media-seek-research-insights [41] https://www.bnhcrc.com.au/news/2019/crc-science-making-national-impact [42] https://www.bnhcrc.com.au/news/2019/bushfire-modelling-boost [43] https://www.bnhcrc.com.au/news/2019/spotfires-dynamic-interaction [44] https://www.bnhcrc.com.au/news/2019/predictive-services-research-spotlighted [45] https://www.bnhcrc.com.au/news/2019/new-online-august-2019 [46] https://www.bnhcrc.com.au/news/2019/global-fire-focus-diversity-cultural-burning-and-communities [47] https://www.bnhcrc.com.au/news/2019/prescribed-burning-research-warm-conference [48] https://www.bnhcrc.com.au/news/2018/conference-papers-available-online [49] https://www.bnhcrc.com.au/news/2018/new-online-february-2018 [50] https://www.bnhcrc.com.au/news/2017/new-online-november-2017 [51] https://www.bnhcrc.com.au/news/2017/focus-firestorms-disaster-resilience-and-preparation-bangladesh [52] https://www.bnhcrc.com.au/news/2016/new-online-december-2016 [53] https://www.bnhcrc.com.au/news/2016/new-online-november-2016 [54] https://www.bnhcrc.com.au/news/2016/firestorms-bushfirethunderstorm-hybrids-we-urgently-need-understand [55] https://www.bnhcrc.com.au/news/2016/increasing-cost-natural-hazards-climate-changes [56] https://www.bnhcrc.com.au/news/2016/new-online-september-2016 [57] https://www.bnhcrc.com.au/news/2016/fire-modelling-uncertain-world [58] https://www.bnhcrc.com.au/news/2015/succinct-science-key [59] https://www.bnhcrc.com.au/people/rbadlan [60] https://www.bnhcrc.com.au/publications/biblio/bnh-8379 [61] http://scholar.google.com/scholar?btnG=Search%2BScholar&as_q=%22Fire%2Bcoalescence%2Band%2Bmass%2Bspot%2Bfire%2Bdynamics%2B-%2Bfinal%2Bproject%2Breport%22&as_sauthors=Sharples&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&as_ylo=&as_yhi=&as_sdtAAP=1&as_sdtp=1 [62] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/8379 [63] https://www.bnhcrc.com.au/publications/biblio/export/xml/8379 [64] https://www.bnhcrc.com.au/publications/biblio/bnh-8343 [65] http://scholar.google.com/scholar?btnG=Search%2BScholar&as_q=%22Spotfire%2Butilisation%2Bproject%3A%2Bimplementation%2Bof%2Bthe%2BVLS%2Bfilter%22&as_sauthors=Badlan&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&as_ylo=&as_yhi=&as_sdtAAP=1&as_sdtp=1 [66] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/8343 [67] https://www.bnhcrc.com.au/publications/biblio/export/xml/8343 [68] https://www.bnhcrc.com.au/people/jgould [69] https://www.bnhcrc.com.au/publications/biblio/bnh-8303 [70] http://dx.doi.org/10.1071/WF21094 [71] http://scholar.google.com/scholar?btnG=Search%2BScholar&as_q=%22Initial%2Bgrowth%2Bof%2Bfires%2Bin%2Beucalypt%2Blitter%2C%2Bfrom%2Bignition%2Bto%2Bsteady-state%2Brate%2Bof%2Bspread%3A%2Blaboratory%2Bstudies%22&as_sauthors=Gould&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&as_ylo=&as_yhi=&as_sdtAAP=1&as_sdtp=1 [72] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/8303 [73] https://www.bnhcrc.com.au/publications/biblio/export/xml/8303 [74] https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1937 [75] https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1450 [76] https://www.bnhcrc.com.au/publications/biblio/bnh-8288 [77] http://dx.doi.org/10.1088/1748-9326/ac3e9a [78] http://scholar.google.com/scholar?btnG=Search%2BScholar&as_q=%22Interactive%2Binfluence%2Bof%2BENSO%2Band%2BIOD%2Bon%2Bcontiguous%2Bheatwaves%2Bin%2BAustralia%22&as_sauthors=reddy&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&as_ylo=&as_yhi=&as_sdtAAP=1&as_sdtp=1 [79] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/8288 [80] https://www.bnhcrc.com.au/publications/biblio/export/xml/8288 [81] https://www.bnhcrc.com.au/people/dsutherland [82] https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1940 [83] https://www.bnhcrc.com.au/people/kmoinuddin [84] https://www.bnhcrc.com.au/publications/biblio/bnh-7838 [85] http://dx.doi.org/10.1071/WF20091 [86] http://scholar.google.com/scholar?btnG=Search%2BScholar&as_q=%22A%2Bresponse%2Bto%2Bcomments%2Bof%2BCruz%2Bet%2Bal.%2Bon%3A%2B%E2%80%98Simulation%2Bstudy%2Bof%2Bgrass%2Bfire%2Busing%2Ba%2Bphysics-

based%2Bmodel%3A%2Bstriving%2Btowards%2Bnumerical%2Brigour%2Band%2Bthe%2Beffect%2Bof%2Bgrass%2Bheight%2Bon%2Bthe%2Brate%2Bof%2Bspread%E2%80%99%22&as_sauthors=Sutherland&as_occ
[87] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/7838 [88] https://www.bnhcrc.com.au/publications/biblio/export/xml/7838 [89] https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1820 [90]
https://www.bnhcrc.com.au/publications/biblio/bnh-7834 [91] http://dx.doi.org/10.1016/j.wace.2020.100300 [92] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Modulating%2Binfluence%2Bof%2Bdrought%2Bon%2Bthe%2Bsynergy%2Bbetween%2Bheatwaves%2Band%2Bdead%2Bfine%2Bfuel%2Bmoisture%2Bcontent%2Bof%2Bbushfire%2Bfue
[93] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/7834 [94] https://www.bnhcrc.com.au/publications/biblio/export/xml/7834 [95] https://www.bnhcrc.com.au/people/tpenman [96]
https://www.bnhcrc.com.au/publications/biblio/bnh-7343 [97] http://dx.doi.org/10.1071/WF19199 [98] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Effect%2Bof%2Bweather%2Bforecast%2Berrors%2Bon%2Bfire%2Bgrowth%2Bmodel%2Bprojections%22&as_sauthors=Penman&as_occt=any&as_epq=&as_oq=&amp
[99] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/7343 [100] https://www.bnhcrc.com.au/publications/biblio/export/xml/7343 [101] https://www.bnhcrc.com.au/publications/biblio/bnh-6736 [102]
http://dx.doi.org/10.3389/fmech.2019.00069 [103] http://scholar.google.com/scholar?btnG=Search%2BScholar&as_q=%22Modeling%2BVorticity-Driven%2BWildfire%2BBehavior%2BUsing%2BNear-
Field%2BTechniques%22&as_sauthors=Sharples&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&as_ylo=&as_yhi=&as_sdtAAP=1&as_sdtp=1 [104]
https://www.bnhcrc.com.au/publications/biblio/export/bibtex/6736 [105] https://www.bnhcrc.com.au/publications/biblio/export/xml/6736 [106] https://www.bnhcrc.com.au/publications/biblio/bnh-7495 [107]
http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Fire%2Bcoalescence%2Band%2Bmass%2Bspot%2Bfire%2Bdynamics%3A%2Bexperimentation%2C%2Bmodelling%2Band%2Bsimulation%2B%E2%80%93%2Bannual%2Bproject%2Brep
2020%22&as_sauthors=Sharples&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&as_ylo=&as_yhi=&as_sdtAAP=1&as_sdtp=1 [108]
https://www.bnhcrc.com.au/publications/biblio/export/bibtex/7495 [109] https://www.bnhcrc.com.au/publications/biblio/export/xml/7495 [110] https://www.bnhcrc.com.au/publications/biblio/bnh-6811 [111]
http://scholar.google.com/scholar?btnG=Search%2BScholar&as_q=%22Fire%2Bcoalescence%2Band%2Bmass%2Bspot%2Bfire%2Bdynamics%3A%2Bexperimentation%2C%2Bmodelling%2Band%2Bsimulation%2B-
%2BAnnual%2Bproject%2Breport%2B2018-
2019%22&as_sauthors=Sharples&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&as_ylo=&as_yhi=&as_sdtAAP=1&as_sdtp=1 [112]
https://www.bnhcrc.com.au/publications/biblio/export/bibtex/6811 [113] https://www.bnhcrc.com.au/publications/biblio/export/xml/6811 [114] https://www.bnhcrc.com.au/publications/biblio/bnh-6737 [115]
http://dx.doi.org/10.1175/BAMS-D-19-0144.1 [116] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Deconstructing%2Bfactors%2Bcontributing%2Bto%2Bthe%2B2018%2Bfire%2Bweather%2Bin%2BQueensland%2C%2BAustralia%22&as_sauthors=Lewis&as_occt=any&as
[117] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/6737 [118] https://www.bnhcrc.com.au/publications/biblio/export/xml/6737 [119] https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1651 [120]
https://www.bnhcrc.com.au/publications/biblio/bnh-6292 [121] http://dx.doi.org/10.36334/modsim.2019.H7.hilton2 [122] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Incorporating%2Bfirebrands%2Band%2Bspot%2Bfires%2Binto%2Bvorticity-
driven%2Bwildfire%2Bbehaviour%2Bmodels%22&as_sauthors=Hilton&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&as_ylo=&as_yhi=&as_sdtAAP=1&as_sdtp=1
[123] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/6292 [124] https://www.bnhcrc.com.au/publications/biblio/export/xml/6292 [125] https://www.bnhcrc.com.au/publications/biblio/bnh-6291 [126]
http://dx.doi.org/10.36334/modsim.2019.H7.hilton [127] http://scholar.google.com/scholar?btnG=Search%2BScholar&as_q=%22Wind-
terrain%2Beffects%2Bon%2Bfirebrand%2Bdynamics%22&as_sauthors=Hilton&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&as_ylo=&as_yhi=&as_sdtAAP=1&as_sdtp
[128] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/6291 [129] https://www.bnhcrc.com.au/publications/biblio/export/xml/6291 [130] https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1899 [131]
https://www.bnhcrc.com.au/publications/biblio/bnh-7478 [132] http://dx.doi.org/10.1029/2019GL083699 [133] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Climate%2BChange%2BIncreases%2Bthe%2BPotential%2Bfor%2BExtreme%2BWildfires%22&as_sauthors=Virgilio&as_occt=any&as_epq=&as_oq=&as_eq=&am
[134] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/7478 [135] https://www.bnhcrc.com.au/publications/biblio/export/xml/7478 [136] https://www.bnhcrc.com.au/people/rquill [137]
https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1595 [138] https://www.bnhcrc.com.au/publications/biblio/bnh-5771 [139] http://dx.doi.org/10.1007/s10666-019-09674-w [140] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22A%2BStatistical%2BApproach%2Bto%2BUnderstanding%2BCanopy%2BWinds%2Bover%2BComplex%2BTerrain%22&as_sauthors=Quill&as_occt=any&as_epq=&as_
[141] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/5771 [142] https://www.bnhcrc.com.au/publications/biblio/export/xml/5771 [143] https://www.bnhcrc.com.au/publications/biblio/bnh-5024 [144]
http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Pyroconvective%2Binteractions%2Band%2Bdynamic%2Bfire%2Bpropagation%22&as_sauthors=Hilton&as_occt=any&as_epq=&as_oq=&as_eq=&as_publicat
[145] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/5024 [146] https://www.bnhcrc.com.au/publications/biblio/export/xml/5024 [147] https://www.bnhcrc.com.au/people/john-bates [148]
https://www.bnhcrc.com.au/publications/researchproceedings2018 [149] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Research%2Bproceedings%2Bfrom%2Bthe%2B2018%2BBushfire%2Band%2BNatural%2BHazards%2BCRC%2Band%2BAFAC%2BConference%22&as_sauthors=Bates&as_oc
[150] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/4739 [151] https://www.bnhcrc.com.au/publications/biblio/export/xml/4739 [152] https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1541 [153]
https://www.bnhcrc.com.au/publications/biblio/bnh-5193 [154] http://dx.doi.org/10.1071/WF17087 [155] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22What%2Bare%2Bthe%2Bdrivers%2Bof%2Bdangerous%2Bfires%2Bin%2BMediterranean%2BFrance%3F%22&as_sauthors=Lahaye&as_occt=any&as_epq=&as_oq=&
[156] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/5193 [157] https://www.bnhcrc.com.au/publications/biblio/export/xml/5193 [158] https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1424 [159]
https://www.bnhcrc.com.au/people/chthomas [160] https://www.bnhcrc.com.au/publications/biblio/bnh-5192 [161] http://dx.doi.org/10.1016/j.envsoft.2018.05.009 [162] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Incorporating%2Bconvective%2Bfeedback%2Bin%2Bwildfire%2Bsimulations%2Busing%2Bpyrogenic%2Bpotential%22&as_sauthors=Hilton&as_occt=any&as_epq=&as
[163] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/5192 [164] https://www.bnhcrc.com.au/publications/biblio/export/xml/5192 [165] https://www.bnhcrc.com.au/people/wchaivaranont [166]
https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1035 [167] https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1574 [168] https://www.bnhcrc.com.au/publications/biblio/bnh-5262 [169]
http://dx.doi.org/10.5194/nhess-18-1535-2018 [170] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Estimating%2Bgrassland%2Bcuring%2Bwith%2Bremotely%2Bsensed%2Bdata%22&as_sauthors=Sharples&as_occt=any&as_epq=&as_oq=&as_eq=&as_pul
[171] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/5262 [172] https://www.bnhcrc.com.au/publications/biblio/export/xml/5262 [173] https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1252 [174]
https://www.bnhcrc.com.au/publications/biblio/bnh-4427 [175] http://dx.doi.org/10.1071/WF16173 [176] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Analysis%2Bof%2Bthe%2Bphysical%2Bprocesses%2Bassociated%2Bwith%2Bjunction%2Bfires%2Bat%2Blaboratory%2Band%2Bfield%2Bscales%22&as_sauthors=Raposo&as
[177] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/4427 [178] https://www.bnhcrc.com.au/publications/biblio/export/xml/4427 [179] https://www.bnhcrc.com.au/publications/biblio/bnh-5194 [180]
http://dx.doi.org/10.1071/WF17114 [181] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22How%2Bdo%2Bweather%2Band%2Bterrain%2Bcontribute%2Bto%2Bfirefighter%2Bentrapments%2Bin%2BAustralia%3F%22&as_sauthors=Lahaye&as_occt=any&as_epq=
[182] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/5194 [183] https://www.bnhcrc.com.au/publications/biblio/export/xml/5194 [184] https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1237 [185]
https://www.bnhcrc.com.au/people/smatthews [186] https://www.bnhcrc.com.au/publications/biblio?f%5Bauthor%5D=1238 [187] https://www.bnhcrc.com.au/people/oprice [188] https://www.bnhcrc.com.au/publications/biblio/bnh-
4333 [189] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22What%2Bare%2Bthe%2Bsafety%2Bimplications%2Bof%2Bdynamic%2Bfire%2Bbehaviours%3F%22&as_sauthors=Lahave&as_occt=any&as_epq=&as_oq=&as_e
[190] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/4333 [191] https://www.bnhcrc.com.au/publications/biblio/export/xml/4333 [192] https://www.bnhcrc.com.au/people/michael-rumsewicz [193]
https://www.bnhcrc.com.au/publications/researchproceedings2017 [194] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Research%2Bproceedings%2Bfrom%2Bthe%2B2017%2BBushfire%2Band%2BNatural%2BHazards%2BCRC%2Band%2BAFAC%2BConference%22&as_sauthors=Rumsewicz&
[195] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/3946 [196] https://www.bnhcrc.com.au/publications/biblio/export/xml/3946 [197] https://www.bnhcrc.com.au/publications/biblio/bnh-3907 [198]
http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22A%2Bunified%2Bapproach%2Bto%2Bfire%2Bspread%2Bmodelling%22&as_sauthors=Sharples&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&a
[199] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/3907 [200] https://www.bnhcrc.com.au/publications/biblio/export/xml/3907 [201] https://www.bnhcrc.com.au/publications/biblio/bnh-4205 [202]
http://scholar.google.com/scholar?btnG=Search%2BScholar&as_q=%22Fire%2Bcoalescence%2Band%2Bmass%2Bspotfire%2Bdynamics%2B-
%2Bexperimentation%2C%2Bmodelling%2Band%2Bsimulation%3A%2Bannual%2Bproject%2Breport%2B2016-
17%22&as_sauthors=Sharples&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&as_ylo=&as_yhi=&as_sdtAAP=1&as_sdtp=1 [203]
https://www.bnhcrc.com.au/publications/biblio/export/bibtex/4205 [204] https://www.bnhcrc.com.au/publications/biblio/export/xml/4205 [205] https://www.bnhcrc.com.au/publications/biblio/bnh-3282 [206]
http://dx.doi.org/10.1007/s10584-016-1811-1 [207] http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Natural%2Bhazards%2Bin%2BAustralia%3A%2Bextreme%2Bbushfire%22&as_sauthors=Sharples&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=
[208] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/3282 [209] https://www.bnhcrc.com.au/publications/biblio/export/xml/3282 [210] https://www.bnhcrc.com.au/publications/biblio/bnh-3186 [211]
http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Curvature%2Beffects%2Bin%2Bthe%2Bdynamic%2Bpropagation%2Bof%2Bwildfires%22&as_sauthors=Hilton&as_occt=any&as_epq=&as_oq=&as_eq=&as_
[212] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/3186 [213] https://www.bnhcrc.com.au/publications/biblio/export/xml/3186 [214] https://www.bnhcrc.com.au/publications/biblio/bnh-2971 [215]
http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Fire%2Bcoalescence%2Band%2Bmass%2Bspot%2Bfire%2Bdynamics%3A%2Bexperimentation%2C%2Bmodelling%2Band%2Bsimulation%3A%2BAnnual%2Bproject%2Breport%2B2015-
2016%22&as_sauthors=Sharples&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&as_ylo=&as_yhi=&as_sdtAAP=1&as_sdtp=1 [216]
https://www.bnhcrc.com.au/publications/biblio/export/bibtex/2971 [217] https://www.bnhcrc.com.au/publications/biblio/export/xml/2971 [218] https://www.bnhcrc.com.au/publications/biblio/bnh-2394 [219]
http://scholar.google.com/scholar?
btnG=Search%2BScholar&as_q=%22Dynamic%2Bmodelling%2Bof%2Bfire%2Bcoalescence%22&as_sauthors=Sharples&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&as_ylo=&
[220] https://www.bnhcrc.com.au/publications/biblio/export/bibtex/2394 [221] https://www.bnhcrc.com.au/publications/biblio/export/xml/2394 [222] https://www.bnhcrc.com.au/publications/biblio/bnh-2339 [223]
http://scholar.google.com/scholar?btnG=Search%2BScholar&as_q=%22Fire%2Bcoalescence%2Band%2Bmass%2Bspotfire%2Bdynamics%3A%2BExperimentation%2C%2Bmodelling%2Band%2Bsimulation%2B-
%2BAnnual%2Bproject%2Breport%2B2014-
2015%22&as_sauthors=Sharples&as_occt=any&as_epq=&as_oq=&as_eq=&as_publication=&as_ylo=&as_yhi=&as_sdtAAP=1&as_sdtp=1 [224]
https://www.bnhcrc.com.au/publications/biblio/export/bibtex/2339 [225] https://www.bnhcrc.com.au/publications/biblio/export/xml/2339 [226] https://www.bnhcrc.com.au/node/1304/generate-pdf?
order=field_date_release&sort=asc [227] https://www.bnhcrc.com.au/node/1304/generate-pdf?order=title&sort=asc [228] https://www.bnhcrc.com.au/resources/presentation-slideshow/1497 [229]
https://www.bnhcrc.com.au/file/4814/download?token=aHGmQhV0 [230] https://www.bnhcrc.com.au/research/topics/fire [231] https://www.bnhcrc.com.au/research/topics/modelling [232]
https://www.bnhcrc.com.au/resources/presentation-audio-video/2630 [233] https://www.bnhcrc.com.au/file/6104/download?token=SoOFQFZf [234] https://www.bnhcrc.com.au/research/topics/scenario-analysis [235]
https://www.bnhcrc.com.au/resources/presentation-audio-video/3135 [236] https://www.bnhcrc.com.au/file/6619/download?token=PDvj-vt- [237] https://www.bnhcrc.com.au/resources/presentation-slideshow/3144 [238]
https://www.bnhcrc.com.au/file/6629/download?token=yXy3Sko1 [239] https://www.bnhcrc.com.au/hazardnotes/21 [240] https://www.bnhcrc.com.au/file/6657/download?token=3afCn-rX [241]
https://www.bnhcrc.com.au/resources/fireaustralia-edition/3375 [242] https://www.bnhcrc.com.au/file/7137/download?token=SCS0H1pM [243] https://www.bnhcrc.com.au/research/topics/child-centred [244]
https://www.bnhcrc.com.au/research/topics/resilience [245] https://www.bnhcrc.com.au/resources/presentation-slideshow/3755 [246] https://www.bnhcrc.com.au/file/7567/download?token=DIiXaif7 [247]
https://www.bnhcrc.com.au/resources/presentation-audio-video/3778 [248] https://www.bnhcrc.com.au/file/7591/download?token=FoO8FhRK [249] https://www.bnhcrc.com.au/resources/presentation-slideshow/3991 [250]
https://www.bnhcrc.com.au/file/7847/download?token=5GbeXjic [251] https://www.bnhcrc.com.au/research/topics/propagation [252] https://www.bnhcrc.com.au/resources/presentation-slideshow/4190 [253]
https://www.bnhcrc.com.au/file/7967/download?token=a0J8cY2E [254] https://www.bnhcrc.com.au/resources/presentation-slideshow/4853 [255] https://www.bnhcrc.com.au/file/8781/download?token=GL4WNqg9 [256]
https://www.bnhcrc.com.au/resources/presentation-slideshow/5125 [257] https://www.bnhcrc.com.au/file/9202/download?token=klRavD36 [258] https://www.bnhcrc.com.au/hazardnotes/61 [259]
https://www.bnhcrc.com.au/file/10009/download?token=-chTRQ5T [260] https://www.bnhcrc.com.au/resources/presentation-slideshow/6138 [261] https://www.bnhcrc.com.au/file/10562/download?token=XaUn3v1_ [262]
https://www.bnhcrc.com.au/resources/presentation-audio-video/8113 [263] https://www.bnhcrc.com.au/file/12993/download?token=21xpXct1 [264] https://www.bnhcrc.com.au/resources/poster/2013 [265]
https://www.bnhcrc.com.au/resources/poster/2891 [266] https://www.bnhcrc.com.au/research/topics/remote-sensing [267] https://www.bnhcrc.com.au/resources/poster/3674 [268] https://www.bnhcrc.com.au/resources/poster/4952
[269] https://www.bnhcrc.com.au/resources/poster/5898 [270] https://www.bnhcrc.com.au/resources/poster/7730 [271] https://www.bnhcrc.com.au/research/topics/fuel-reduction [272]
https://www.bnhcrc.com.au/research/hazardexposure [273] https://www.bnhcrc.com.au/research/cluster/built-environment [274] https://www.bnhcrc.com.au/organisations/ga [275]
https://www.bnhcrc.com.au/research/extremefirebehaviour [276] https://www.bnhcrc.com.au/research/cluster/bushfire-predictive-services [277] https://www.bnhcrc.com.au/organisations/umelb [278]
https://www.bnhcrc.com.au/research/understanding-and-mitigating-hazards/4648 [279] https://www.bnhcrc.com.au/organisations/edith-cowan-university [280] https://www.bnhcrc.com.au/research/coupledfire [281]
https://www.bnhcrc.com.au/research/cluster/severe-high-impact-weather [282] https://www.bnhcrc.com.au/organisations/bom