Department of Fire and Emergency Services
Department of Biodiversity, Conservation and Attractions
GOVERNMENT OF WESTERN AUSTRALIA

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IBOC Bushfire Research Subcommittee Selected Research Papers of Interest for 2025 Part 2

The papers listed below have been selected by the IBOC Bushfire Research Subcommittee to share recent research that is relevant to fire management practice. We provide plain-language summaries to make this information accessible to the broader community. These summaries are published on our website twice a year.

Selected New Research September - December 2025 by Bushfire Research Priority Theme

Theme 1 Managing bushfire risk and supporting planned burning – 3 papers selected

Theme 2: Fire impacts on biodiversity – 1 paper selected

Theme 3: Information and people - 0 papers selected

Theme 4: Building community resilience - 1 paper selected

Theme 5: Improving operational effectiveness - 1 paper selected

Theme 6: Psychological wellbeing - 2 papers selected

No.	Peer reviewed literature	Theme	Overview (What or why is this paper important)	Management Implication	Summary
1	Densmore VS, Barnesby TK. (2025). For peat's sake! Peat type influences critical moisture thresholds that prevent combustion of organic soils in Western Australia *International Journal of Wildland Fire*, *34*(9), WF24204.	1	Highly relevant to WA and current environmental challenges of managing flammability and fire in peat systems	Determining critical moisture thresholds and peat properties that influence peatland flammability informs potential mitigation techniques to reduce the incidence of smouldering peatlands.	The study found that peat type and moisture content were sufficient to predict whether the peat would ignite or burn.
2	Penman TD, Elliot-Kerr S, McColl-Gausden SC, Pickering BJ, Wintle BC, Marshall, E (2025). Strategic fuel breaks: Uses, features and perceived effectiveness in south-eastern Australia. *Australian Forestry*, *88*(3), 114–128.	1	Provides a methodology for studying experiential knowledge and provides experiential knowledge regarding use of fuel breaks in Victoria.	Highlights the benefits of collecting expert knowledge on fire management techniques when can then be used for training/guidance.	The study provides information on the current uses, features and placement of fuel breaks in Victoria, Australia; and (ii) estimated the effectiveness and strategic value of fuel breaks under a range of conditions.
3	Gray R, Gregory R, Sandborn C. (2025). Wildfire management at a crossroads: Mitigation and prevention or response and recovery? *Science*, *390*(6768), 30–33.	1	Discusses economics and policy options in relation to mitigation and prevention vs response and recovery.	Key to scaling up mitigation activities is building public and political understanding and support for the multidecade investments required, while developing strategies to manage treatment costs. Proactive communication will be necessary to gain public trust and understanding and to minimize negative reactions.	We examine the case of the Canadian province of British Columbia (BC) as a good example of a government at a crossroads: Does it begin to invest heavily in proactive large-scale efforts to mitigate the effects of current and future wildfires (i.e., preventive landscape-scale treatments), or does it continue to primarily react with fire suppression and postburn recovery measures?.
4	George RJ, Bell RA, McCaw WL, Raper GP. (2025). A Multidecadal Analysis of Groundwater Level and Streamflow Decline in Southern Forest Catchments, Western Australia. *Journal of The Royal Society of Western Australia*, *108*.	2	Shows that water tables in Southern Forest catchments have declined by 5-7 metres between 1975 and 2024.	Effective adaptation will require integrated ecological–hydrological management, climate-adjusted planning, and proactive restoration to support both environmental and human water resources.	The rate of decline of the water tables has increased in recent years, especially following 2000 and record dry conditions in 2010-2012. These results are consistent with observed watertable reductions seen in catchments in the Darling Ranges.

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5	Sandoval-Díaz J, Navarrete-Valladares C, Vega-Ortega, J, Suazo-Muñoz C et al. (2025). Community resilience to wildfires: A systematic review of impacts, coping strategies, indicators, and governance challenges. *Progress in Disaster Science*, *27*, 100447.	4	A systematic review of the literature in relation to community resilience carried out in 2024, including articles from 2013 to 2024.	The main indicators of CR in the face of wildfires include the existence of emergency and evacuation plans, the presence of active community leaders, social support among community members, and effective articulation between communities and institutions. The main obstacles identified include inadequate disaster risk management at the institutional level, coordination difficulties between local governments and key territorial actors, insufficient individual preparedness, loss of family unity, and weakening of community cohesion, and adverse environmental conditions.	Evidence-based recommendations for strengthening community-based disaster risk management strategies. Barriers included inadequate disaster risk governance, limited local capacities, and weakened community cohesion.
6	Paugam R, Benali, A, Harvie J, Meraner A, Andela N, Xu W. (2025). *Fire Behavior Monitoring using MeteoSat Third Generation, FCI-FireDyn algorithm: Rate Of Spread and Burnt Area Dynamics for large fire event* (arXiv:2510.26677).	5	This study presents FCI-FireDyn, a new algorithm developed to monitor wildfire dynamics using the Meteosat Third Generation satellite. The algorithm derives fire arrival time maps, rate of spread (ROS), and Burn Area (BA) evolution at sub-kilometre spatial resolution and 2-minute temporal intervals.	Near real time fire behaviour modelling using satellites would have significant application in WA.	FCI-FireDyn represents a proof of concept for deriving high-frequency fire behaviour metrics from geostationary observations to support operational and modelling applications.

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7	Wallace-Webb J, Coehoorn C, Purewal S, Thomas G, Muirhead K et al (2025). Fatigue in wildland firefighting: Relationships between sleep, shift characteristics, and cognitive function. *International Journal of Wildland Fire*, *34*(9), WF24212.	6	Average sleep duration on fire suppression days was 6.7 hours, while average shift duration was 13.8 hours. Poor sleep and longer shift durations were both associated with reduced cognitive function across all metrics.	The results highlight the need for fire agencies to consider fatigue-related cognitive impairment as an important factor for worker health and safety.	This study examined how sleep and shift characteristics relate to brain function in wildland firefighters. Ther findings showed that firefighters often experience poor sleep and long shifts, which are both associated with declines in brain function.
8	White AR (2025). Impact of wildfire smoke, heat stress and sleep deprivation on the brain health of wildland firefighters *International Journal of Wildland Fire*, *34*(9), WF24203.	6	A narrative review on studies that inform our knowledge on wildland firefighter (WLFF) brain health.	Protective strategies for WLFFs should include personal protective equipment, hydration protocols, extended recovery periods and mental health programs. Future research should focus on long-term studies to fully understand the cumulative effects of these occupational hazards on brain health and inform policy changes to safeguard WLFF well-being. This holistic approach is critical as fire seasons become longer and more intense due to climate change.	Wildland firefighters face brain health risks from wildfire smoke, heat, physical strain and disrupted sleep. These hazards increase neuroinflammation, cognitive decline and mental health challenges like post-traumatic stress disorder (PTSD) and depression. Protective measures, including better gear, hydration, recovery time and mental health support, are essential. Research is needed to understand and mitigate long-term effects.

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process is applied to papers before their selection is finalised. This document has been prepared in good faith and is derived from sources believed to be reliable and accurate at the time of publication. Nevertheless, the reliability and accuracy of the information cannot be guaranteed.