



What fuel is consumed in fires?

Bushfires, hazard reduction and cultural burns

Bushfires, hazard reduction burns (HRBs) and cultural burning practices affect Australian forests in diverse ways. The NSW Bushfire Risk Management Research Hub measured fuels at 44 sites in Sydney's resprouting dry sclerophyll eucalyptus forests, before and after 20 fires. Researchers compared how different fuels were consumed, according to fire severity and fire type.

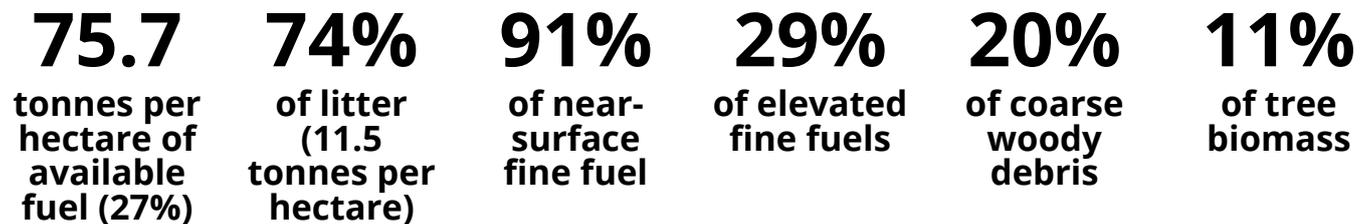
Most fires removed most fine litter and surface fuels, but a smaller and more variable percentage of other fine components and coarse fuels. Consumption largely depended on pre-fire fuel levels and varied according to fire severity.

Type of fire	Fuel consumed (t/ha)	Fuel consumed (% of total)
Bushfire	123.5	38%
Hazard reduction burn	75.7	27%
Cultural burn	12.8	13%

What fuel is consumed in hazard reduction burns?

HRBs, on average, burn 65% of the treatment area. They consume more fuel than cultural burns, but less than bushfires.

Of the burnt area, they consume:



HRBs consumed more twigs and coarse woody debris than cultural burns did. Estimates for HRBs are higher than in most previous reports for Australian forests, probably as the fires in the Hub study spanned a greater range of severity.



Fuel consumption: The Hub measured how much fuel was consumed in bushfires, hazard reduction and cultural burns.



What fuel is consumed in cultural burning?

Cultural burns, which are undertaken for many reasons important to their practitioners, consumed the least total fuel, at 12.8 tonnes per hectare, or 13% of pre-fire fuel. Less twigs and coarse woody debris were consumed than in HRBs and bushfires.

What fuel is consumed in a bushfire?

Bushfires consumed the most fuel, at 123.5 tonnes per hectare, or 38%. Tree biomass was 69% of total consumption. Bushfires consumed more canopy and tree wood than either HRBs or cultural burns.



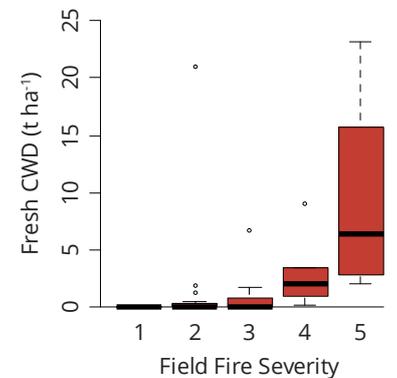
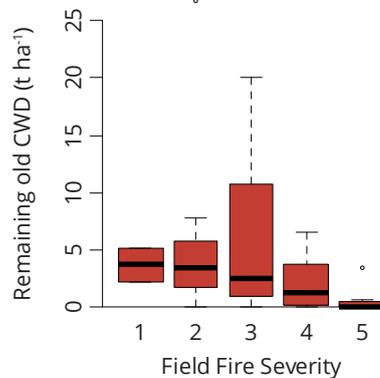
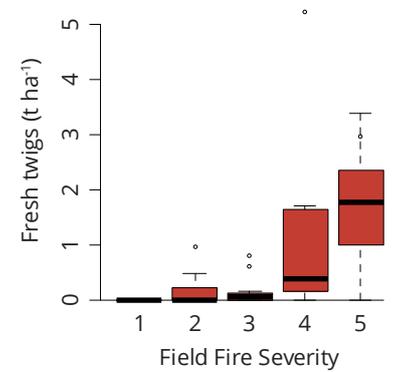
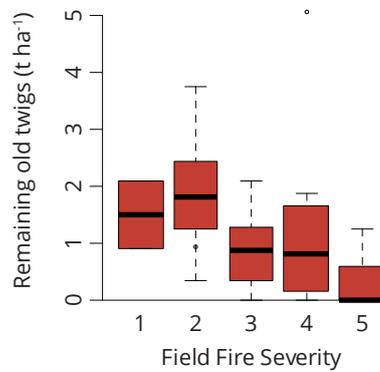
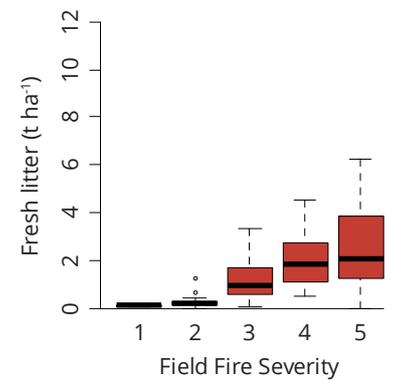
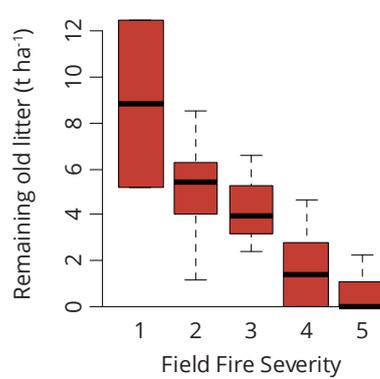
Leaf litter: A severe HRB at Woronora resulted in the deposit of considerable leaf litter, but consumed most of the surface fine fuel, which is considered the main driver of bushfire behaviour.





What should managers consider?

- Low severity HRBs leave a lot of unburnt fine fuel. This is important, as fine fuels are the main driver of bushfire behaviour.
- High severity HRBs consume more fine fuel, but also more tree biomass, and result in more newly deposited fuel (leaf litter, coarse woody debris).
- After a severe HRB, the amount of coarse woody debris roughly equals pre-fire levels. However, coarse woody debris is not as critical as fine fuels in bushfire behaviour.



What's left: The graphs above show what fuel remains in a dry sclerophyll forest after fire, according to its severity (with 1 being least severe and 5 most severe). Top: Hotter fires consume more litter, but also deposit litter. Centre: Hotter fires consume more twigs, but also deposit fresh ones. Bottom: Hotter fires consume more coarse woody debris (CWD), but deposit more, creating fresh fuel.



“It’s great to see comprehensive and up-to-date research to improve our knowledge of fire practices and fire types, and how different fuel can influence fire behaviour across the landscape.”

Leigh Nolan, NPWS team leader

What’s next?

Field measurements for a range of forest types and fire severity are needed. This information is scarce in Australia and elsewhere. Total fuel consumption depends heavily on how much tree biomass is consumed. This is highly variable and needs more study.



Fire management: Bushfires consume the most fuel, followed by HRBs and cultural burns.

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Associated article

- [Fuel consumption in resprouting eucalypt forests \(https://bit.ly/fuelconsume\)](https://bit.ly/fuelconsume)

More information

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The **NSW Bushfire Risk Management Research Hub** (www.bushfirehub.org) is a partnership between researchers at the University of Wollongong, Western Sydney University, the University of NSW, the University of Tasmania, supported by the NSW Department of Planning and Environment and the NSW Rural Fire Service.

