

Prescribed burning on private land: reflections on recent law reform in Australia and California

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ABSTRACT

Background. Prescribed fire is a critical tool for building resilience to changing fire regimes. Policymakers can accelerate the development of effective, adaptation-oriented fire governance by learning from other jurisdictions. **Aims.** We analyse reforms to prescribed fire governance to highlight improvements for fire hazard reduction and resilience. **Methods.** We searched legislative registers in New South Wales (NSW), Australia and California, United States, identifying Bills tabled between 2011 and 2022 that mention the terms ‘prescribed (fire or burn)’ or ‘controlled (fire or burn)’. We reviewed the eight relevant Bills from NSW and 67 Bills from California to identify and thematically code reforms relevant to private landowners. **Key results.** We found three primary themes across relevant legislative proposals: (1) reforms to simplify permitting and regulatory approval processes (primarily in Australia); (2) efforts to mitigate the risk of legal liability for escaped burns (primarily in California); and (3) recent recognition of and support for cultural burns (primarily in California). **Conclusions.** Expanding prescribed burning on private land remains an ongoing challenge in NSW and California but recent reforms indicate greater attention, and jurisdiction-specific approaches, to this challenge. **Implications.** Despite differing governance arrangements, California and NSW offer important insights for improving climate-adaptive governance of prescribed fire.

Keywords: California, climate adaptation, fire hazard mitigation, governance, law reform, New South Wales, prescribed fire, private land, responsibility.

Introduction

Climate change is driving rapid increases in the frequency and severity of wildfires around the world, with fire-prone continents already experiencing these changes (Dowdy *et al.* 2019). Disaster resilience and adaptation policies emphasise the need to adapt and build resilience to changing wildfire regimes (Moritz *et al.* 2014; Schoennagel *et al.* 2017). Adapting to future fires will require more strategic and inclusive use of prescribed burning to manage fire and fuel on both public and private land, particularly at the peri-urban interface (USDA 2015; Schoennagel *et al.* 2017; Paveglio *et al.* 2018). Prescribed burning involves the deliberate application of fire to vegetation to manage fuel loads, create fire breaks, and reduce the spread and impact of uncontrolled fires (Dovers 2020, p. 15; California Wildfire and Forest Resilience Task Force 2022). Reintroducing prescribed fire can also foster Indigenous cultural connection to land (Binskin *et al.* 2020b; Clark *et al.* 2021), and improve the health and function of fire-adapted ecosystems, particularly where previous policies have disrupted or excluded fire regimes from those landscapes (Stone *et al.* 2022). Other benefits include reducing smoke pollution and carbon emissions through the controlled reduction of fuels that might otherwise burn under catastrophic fire conditions (Ryan *et al.* 2013; Morgan *et al.* 2020; Mariani *et al.* 2022).

Different stakeholders have very different views about the appropriate role, objectives and locations for prescribed fire (Paveglio *et al.* 2018; Leavesley 2020, p. 5). Prescribed burning cannot prevent all wildfires and is only one tool in a suite that includes

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mechanical and selective clearing, fire-adapted vegetation planting and asset hardening (Paveglio *et al.* 2018). Nevertheless, prescribed burning can be cost-effective and successful at reducing fuel loads across large areas, particularly areas with limited access for mechanical clearing (North *et al.* 2012; Penman *et al.* 2020). There appears to be growing support across media reporting, independent reviews and inquiries, new legislative instruments and committee reports in Australia and the western United States for more prescribed burning and fuel management across landscapes and tenures (Binskin *et al.* 2020a; Kupfer *et al.* 2020; Leavesley *et al.* 2020; Miller *et al.* 2020). Governments in both jurisdictions have set ambitious targets for fuel treatment, including prescribed burning, across public, private and tribal land (MOU between the State of California and the USDA, USFS, Pacific Southwest Region 2020; McCormick and May 2021; cf. Rod 2021).

This paper focuses on the governance context for prescribed fire on land under private ownership, and land under Tribal or Indigenous ownership or management (referred to hereafter as 'First Nations land'). The reduction of wildfire risk on publicly owned land has been studied in detail in scholarly and policy documents in both the United States and Australia (Schultz *et al.* 2019; Binskin *et al.* 2020a, Chapter 17), whereas private land is relatively understudied. Private and First Nations tenures constitute a significant area of both California and Australia. Approximately 52 609 km² (39%) of California's forests are owned by private landowners, with 99% of these landowners owning small plots of under 2 km² (Forest Climate Action Team 2018). More than half of Australia's land mass is privately owned, with approximately another 26% of the land mass held as exclusive native title or Aboriginal freehold (Australian Bureau of Statistics (ABS) 2002; Nicholas *et al.* 2021).

Many factors influence why and how private landholders conduct prescribed burns on their land, including financial and other incentives, social dynamics and ideology (Paveglio *et al.* 2018; Rounge 2019). Governance arrangements also play an important role, including by imposing obligations and standards for prescribed fire that enable or constrain action. Governance for prescribed fire on private and First Nations land differs from public land. There are differences in resourcing and liability exposure, and prescribed burning on private land is complicated by the risk of legal liability or penalties for damage caused by escaped fire. Moreover, government planning and resourcing typically focus on publicly managed land, and government priorities have less influence on private landholder behaviour than on public authorities like forestry agencies and public protected area managers.

Australian natural disaster and bushfire policies rely heavily on the concept of 'shared responsibility' between governments, local communities and individuals. Shared responsibility often takes the form of legal obligations on

landholders to remove or manage wildfire hazards on private land, and potential legal liability for damage caused by fire ignited or exacerbated by those hazards (McDonald and McCormack 2022). There are no similar obligations on private landholders in California, though recent government strategies articulate an urgent need to mitigate fire hazards on both public and private land (Forest Climate Action Team 2018).

The local nuances of fuel, fire behaviour and climate change mean that if private landholders are to use prescribed fire well, they will need to be properly equipped. Landholders will need *knowledge* about fire behaviour and their local environment; *support*, including technical assistance with burn planning and preparation, and governance arrangements that empower landholders to use fire on their land; *resources*, including to manage a prescribed burn or cancel a planned burn in the wrong conditions; and *long-term capacity* to monitor and understand changing flammability and fuel loads on their land and adapt burn practices over time. Law and policies can set the necessary conditions for prescribed burning to be used safely and effectively by private landholders, as they assume responsibility to prepare for future fires.

Here, we focus on California in the United States and the Australian state of New South Wales (NSW). We analyse legal reforms designed to support private landowners to balance obligations and incentives for fire hazard reduction on their land, using prescribed fire. Both jurisdictions have been gravely affected by recent wildfires, which are increasing in frequency and severity consistent with climate projections (Canadell *et al.* 2021; United Nations Environment Programme 2022). State parliaments in both jurisdictions have legislated important reforms to facilitate prescribed burning on private land. These include limits on civil liability and compensation arrangements for fires that escape and cause damage (Miller *et al.* 2020) and more permissive rules about vegetation clearance (McDonald and McCormack 2022). Many other jurisdictions around the world are implementing reforms in response to recent fire seasons and, although a comprehensive international analysis is beyond the scope of this article, our findings may resonate in other countries facing similar increases in wildfire risk and severity, such as Canada, Mexico, South Africa, Brazil and Italy (Moreira *et al.* 2020).

This paper begins by briefly explaining the governance framework for prescribed burning on private land, drawing on scholarship to demonstrate the importance and complexity of this strategy for fire hazard reduction. We then identify our research method and highlight three important insights from our analysis, before reflecting on how these insights may inform future legal reform. We conclude with a call to embrace holistic approaches to governing prescribed fire on private land, recognising value beyond simple hazard reduction and learning from reforms implemented in other jurisdictions.

The governance framework for prescribed fire on private land

Governments in the United States and Australia have a range of strategies and plans that enable the use of prescribed fire at landscape scales (USDA 2015; Little Hoover Commission 2018; California Wildfire and Forest Resilience Task Force 2022; Forest Fire Management Victoria 2022), but there are differences in whether and how governments permit or *require* hazard reduction, and the circumstances in which prescribed fire will be required as opposed to other methods of fuel treatment (McDonald and McCormack 2022).¹ In both jurisdictions, flexibility to manage fire hazards on private land may be constrained by protection for other values such as clean air, threatened species or waterways, and a failure to control a prescribed fire may expose landholders to liability for any harm caused. In California, there are no positive legal obligations on private landholders to reduce or remove fire hazards, but private landowners may obtain permits to do so.

In some Australian states, prescribed burning may be expressly required if a landholder has not addressed a fire hazard on their land (s 66 Rural Fire Service Act 1997 (NSW)). If a landholder in NSW is ordered to remove a hazard, that order may also include a requirement for supervision or involvement of a rural fire brigade (Rural Fire Service Act 1997 (NSW) s 66(6)(b)). Alternatively, a municipal or state fire officer may undertake a prescribed burn on the landholder's behalf and, in some cases, invoice the landholder for costs incurred (McDonald and McCormack 2022). In other Australian states, and in California, there are no legal consequences for failing to address fire hazards on private land. Rather, landholders risk being penalised for any prescribed burn that escapes and causes damage. This risk of liability may create an incentive *not* to manage wild-fire hazards proactively using prescribed fire, despite fire being more efficient and cheaper than many other methods of fuel treatment, and despite unmanaged fuel loads posing greater risks in the event of a wildfire (Eburn and Cary 2017). Potential liability for an escaped burn complicates the regulatory environment in jurisdictions that impose a duty on landholders to manage fire hazards.

Environmental laws may constrain prescribed burning on private land and rarely address the risks of *not* burning, or the ecological benefits of fire (Quinn-Davidson and Varner 2012; Stone *et al.* 2022). Obligations to protect threatened species and habitat and preventing impacts on covenanted private land (New South Wales Rural Fire Service 2021) may also limit the use of fire or mechanical clearing. However, in practice, exemptions to environmental protections typically allow fire hazard mitigation activities to be prioritised over environmental protection. For example,

prescribed burning for a 'bushfire mitigation purpose' can be exempt from native vegetation clearing restrictions in NSW, provided a landowner has a burn permit or the burn is conducted in accordance with agency guidelines or standards (McDonald and McCormack 2022).

NSW and California also have mechanisms that are designed to make it easier to undertake prescribed burning, including opportunities for landholders to engage a fire agency or volunteer organisation to conduct a burn on their behalf (Rural Fire Service Act 1997 (NSW) s 12(5)). Free support programs such as the Hotspots Fire Project in NSW educate private landholders about fire hazard reduction activities and fire management planning (New South Wales Rural Fire Service *n.d.*) and, in other Australian states, can extend to coordinating regional burn plans and joint permit applications for multiple landholders, along with hazard reduction training and mentoring activities. The Californian Vegetation Management Program similarly enables private landholders to engage the California Department of Forestry and Fire Protection (Cal Fire) to conduct prescribed burns on their land (Cal Fire *n.d.*). Outsourcing prescribed burning can enable landholders to undertake hazard reduction even if they lack the necessary equipment or expertise. The benefits of these arrangements include harnessing substantial experience and expertise, accessing appropriate equipment, involving people with the confidence to manage prescribed burning efficiently and safely, and bringing a prescribed burn on private land under the relevant organisation's insurance policy and liability cover. In addition, prescribed burn associations support Californian landowners by providing access to equipment, training and guidance for burning and air quality permit applications (Stackhouse and Quinn-Davidson 2019).

Alongside enablers, there are important legal and policy restrictions on prescribed burning on private land. The most important is the need to obtain and comply with permits from the relevant fire agency (NSW Rural Fire Service (RFS) in rural fire districts, Cal Fire or a local fire department or council). Permitting obligations may be triggered by factors such as the location and size of the proposed burn, its timing, including whether it is a fire permit period or 'total fire ban day', and whether the burn will affect other landscape values such as cultural heritage, threatened species or waterways. In NSW, a bushfire hazard reduction certificate can be issued for any period of time that is deemed appropriate (Rural Fire Service Act 1997 (NSW) ss 100F(6)(d), 100I), and will typically include any necessary environmental and native vegetation clearing approvals. A fire permit is required for prescribed burning during the 'Bush Fire Danger Period' (summer, plus the spring and autumn 'shoulder periods') and in urban fire districts and, given the greater risk of bushfires at that time of year and in

¹Duties and powers of private landholders operate in parallel with statutory duties on public bodies in some jurisdictions, such as local councils and protected area agencies, to take practical steps to reduce bushfire hazards (e.g. s 43 Country Fire Authority Act 1958 (Victoria)).

urban areas, fire permits remain in force for no more than 21 days ([Rural Fire Service Act 1997 \(NSW\)](#) ss 89, 90). Fire permits for prescribed burning on private land in California similarly remain in force for up to 1 or 2 years depending on the jurisdiction, though private landholders that engage Cal Fire to conduct a prescribed burn on their land may, in some circumstances, benefit from longer approvals through 10-year contracts under the Vegetation Management Program (extended from 3 years in 2018 under California Senate Bill 1260; see discussion in [Stackhouse and Quinn-Davidson 2019](#)).

Landholders in both jurisdictions may be required to apply for an air quality permit to emit smoke from a prescribed burn. In Australia, air quality regulations may not be triggered for prescribed burns on private land if they are conducted outside peak burn periods or in a way that limits smoke emissions, and/or if air quality impacts are assessed and approved as part of a streamlined fire agency permitting process. In California, prescribed fires always trigger the need for air quality permits issued by local regulatory air districts, which consider the extent of smoke emissions, the potential impact of those emissions on public health and compliance with the United States' National Ambient Air Quality Standards or NAAQS (see California Code of Regulations Title 17, § 80120). If Cal Fire is conducting a prescribed fire on private land as part of its Vegetation Management Program, it must also obtain a permit under the *California Environmental Quality Act 1970* (CEQA) to minimise negative environmental impacts of the burn. California's Vegetation Treatment Program was designed to speed up regulatory processes, including CEQA permitting, for prescribed burns that are funded or conducted by Cal Fire ([California Board of Forestry and Fire Protection 2019](#); [Office of the Governor Gavin Newsom 2019](#)). Regulatory frameworks for managing air quality have long been recognised as a restriction, if not a barrier, to prescribed burning in the United States (cf. [Sneeuwjagt et al. 2013](#); [Schultz et al. 2019](#); [Miller et al. 2020](#)), though the extent to which these critiques apply to smaller-scale burns on private land is unclear.

Methods

We first reviewed the existing law governing the rights and responsibilities of private land owners in respect of prescribed burning. We then examined law reforms proposed in California, USA, and NSW, Australia, as case studies of the legal and policy trends in those jurisdictions. Following severe wildfire seasons in California and NSW, state legislatures in both jurisdictions have introduced law reforms to facilitate prescribed burning. We searched the legislative registers for draft legislation ('Bills') put before the Californian and NSW parliaments between 2011 and 2022, using the terms 'prescribed [fire or burn]' or 'controlled [fire or burn]'.

The NSW legislature considered eight relevant Bills across the 11 1-year legislative sessions in that period ([Fig. 1a](#)). Seven have been passed by both houses of parliament, with the eighth Bill still under consideration by the Legislative Council ([LLS Bill 2020](#)). The small number of Bills likely reflects the fact that existing NSW laws already supported prescribed burning, and more detailed arrangements are contained in subsidiary instruments such as the *Bush Fire Environmental Assessment Code* ([New South Wales Rural Fire Service 2021](#)), which can be amended without legislation.

We also reviewed the six 2-year California legislative sessions, between 2011–2012 and 2021–2022, and identified 66 proposed Bills related to prescribed fire, with a significant increase since the 2017–2018 session. Twenty-one (32%) Bills were passed and have become law ([Fig. 1b](#)).

Next, we filtered the results for their application to prescribed burning on private land, resulting in all eight Bills from NSW (100%) and 18 Bills from California (27%). We used qualitative content analysis ([Hsieh and Shannon 2005](#); [Elo and Kyngäs 2008](#)) to code the Bills by first identifying preliminary themes through thematic association and then recoding the preliminary themes in an iterative process. Each Bill was reviewed by both primary and secondary coders to resolve discrepancies and ensure consistency.

We identified two closely connected themes in the NSW Bills, both of which relate to the emphasis in Australian policies on 'sharing' responsibility for managing fire hazards with private landholders: (1) clarifying obligations on landholders to manage bushfire hazards on their land (75%, 6/8 Bills); and (2) streamlining and reducing formal permitting processes for vegetation management (87.5%, 7/8 Bills) (see 'Streamlined Permitting Processes'). The three primary themes in the relevant California Bills that passed the legislature were: (1) mitigating landowners' exposure to liability for escaped prescribed burns (56%, 10/18 Bills); (2) acknowledging and providing new, though limited, support for cultural burning across tenures (61%, 11/18); and (3) providing funding or resources for private landowners (39%, 7/18 Bills). In California, a 'cultural burn' is defined in Senate Bill 332 (now § 3333.8(e) of California's Civil Code) as:

the intentional application of fire to land by Native American tribes, tribal organizations, or cultural fire practitioners to achieve cultural goals or objectives, including subsistence, ceremonial activities, biodiversity, or other benefits.

Other definitions in the US and Australia are similar, emphasising the controlled application of fire to vegetation with a cultural focus (e.g. [McKemey et al. 2020](#)). Cultural burning is Indigenous-led, with elders and children actively participating to develop and maintain deep relationships with their land. Although not undertaken for fuel management purposes, *per se*, cultural burning can reduce fuel loads

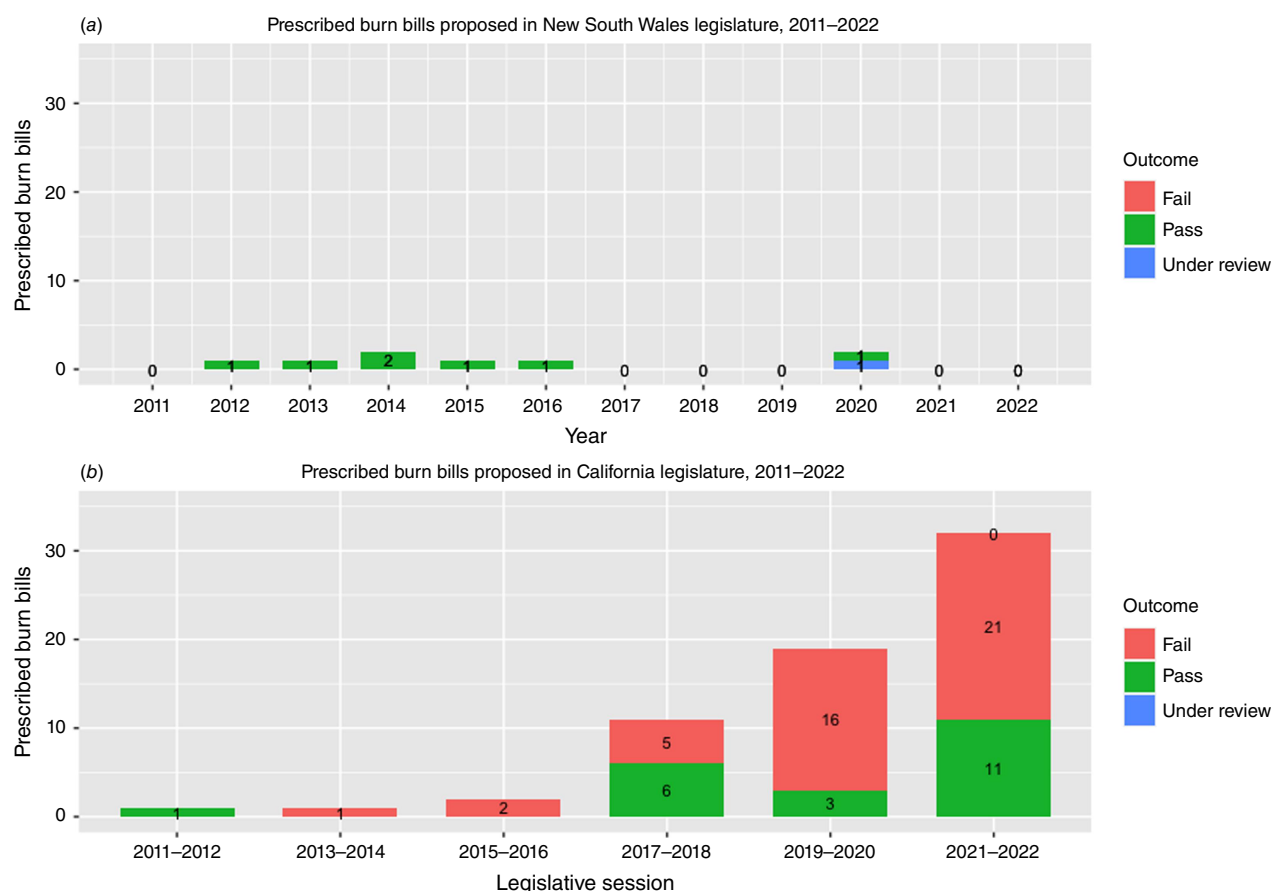


Fig. 1. Bills introduced to the (a) New South Wales, and (b) California state legislatures on prescribed burning between 2011 and 2022. All bills from New South Wales included language related to prescribed burning on private land.

while advancing other values such as reconciliation, human health and landscape management (Binskin *et al.* 2020b; Clark *et al.* 2021; and see Hoffman *et al.* 2022). Cultural fire management bases decisions about when and how to burn, and when not to burn, on cultural knowledge of landscapes, species and seasons (Long *et al.* 2021). Though we identified three main themes among California bills, we focus exclusively here on liability and cultural burning owing to the potentially transformative nature of these bills in expanding prescribed burning for private landowners. By comparison, bills related to funding or resources primarily describe new responsibilities for Cal Fire for grants or cost sharing. We reflect on the two main themes from California and their connection with the legal framework in NSW in ‘Managing Liability’ and ‘Cultural Burning’, below.

Trends in prescribed fire governance reforms

We identified three primary trends in our analysis of proposed reforms for prescribed burning on private land in California and NSW. First, the NSW legislature has

prioritised reforms intended to streamline fire hazard management permitting and clarify obligations on landholders to manage fire hazards on their land. Second, the California legislature has sought to empower landowners by tightening laws about liability for escaped fires. Third, new legislation in California explicitly supports cultural burning for the first time.

Streamlined permitting processes

The most consistent theme that we identified in NSW reforms was to streamline and expedite approvals for fire hazard reduction, including by limiting vegetation clearing constraints and exempting fire hazard reduction from certain conservation and heritage laws (New South Wales Rural Fire Service 2015; McCormack *et al.* 2022). These reforms enable landholders to meet their hazard reduction obligations, and respond to a perception that complex and prescriptive regulations currently impede necessary hazard reduction on private land (Binskin *et al.* 2020a, recommendations 3.1–3.6). For example, a 2013 NSW Bill allowed a single bush fire hazard reduction certificate to permit hazard reduction activities, including prescribed fire, across

multiple parcels of adjoining land ([Rural Fires Amendment Bill 2013](#), cl 22; [Rural Fire Service Act 1997 \(NSW\)](#) s 100E (3)). The same Bill extended bushfire hazard reduction certificates from 1 to 3 years, and enabled certificates to cover repeated hazard reduction activities in some circumstances ([Rural Fires Amendment Bill 2013](#), cl 23). A subsequent amendment empowered the RFS to endorse certificates for any period of time it deems appropriate ([RFS \(Vegetation Clearing\) Bill 2014](#)).

Law reform has cycled between expanding and contracting landholder rights. For example, following major bushfires in NSW in 2013, regulatory controls on land managers were relaxed ([Rural Fires Amendment Bill 2013](#)), but those streamlined processes were misused, including to improve property views and land values ([Hansard 2015](#); [McCormack et al. 2022](#), pp. 15–17). Statutory protections were subsequently tightened to better protect a wide diversity of landscape values such as biodiversity and ecological integrity, Aboriginal cultural heritage and built heritage, carbon sinks, water catchments and forestry assets.

The second reform theme in NSW focused on clarifying landholders' responsibilities to manage hazards on their land, including through increased government oversight of bushfire management plans on private land. For example, authorised officers can enter private property, impose fines and/or clear land or conduct hazard reduction burns if a landowner has failed or refused to do so ([Bushfires Legislation Amendment Bill 2020](#); [New South Wales Government 2021](#), p. 3; [McCormack et al. 2022](#), pp. 15–17). A 2020 Bill in NSW expanded fire agencies' responsibility to audit landholders' compliance with bushfire risk management plans – to improve compliance with hazard reduction goals.

By contrast, there has been little activity in the California State Legislature designed to streamline permitting processes for prescribed fire on private land, despite permitting being recognised as a barrier to burning in California ([Miller et al. 2020](#)). Adaptation of reforms similar to those in NSW could address criticisms of the burdensome permitting process in California. In addition, imposing legal obligations on Californian landholders to manage fire risks may face strong opposition from landholders, despite such a reform having been supported by at least one commentator ([Monthei and Wara 2022](#)).

Managing liability

In both California and NSW, common law liability may be imposed on a private landholder for damage caused by a fire they lit on their land. Fire services and volunteers typically enjoy statutory immunity from liability (e.g. [Rural Fire Service Act 1997 \(NSW\)](#) s 128) but a private landholder may be liable if a fire escapes and causes damage, either because the landholder created a nuisance or was negligent (though the risk of escape and potential for harm from prescribed and cultural burns are low, e.g. [Dether and](#)

[Black 2006](#); [McCaffrey and Dickinson 2006](#); [Weir et al. 2019](#); [McKemey et al. 2021](#)). For example, 99.84% of the US Forest Service's annual prescribed burns are completed 'according to plan', with only approximately one escape for every 1000 prescribed burns ([Moore 2022](#)). Prescribed burning is inherently risky, and under 'simple' or ordinary rules of negligence, there is a high risk of liability for private landholders who burn on their property. Landholders found to be negligent may have to cover the costs of fire suppression, rehabilitation and compensation for damages. Liability concerns are thus disincentives to burn ([Miller et al. 2020](#)). However, reducing the risk of liability by increasing the fault threshold to a standard known as 'gross negligence' has significantly increased the use of prescribed fire on private land across the southeastern United States ([Wonkka et al. 2015](#)). Recent Californian reforms respond to these concerns by introducing the higher gross negligence standard of fault in respect of liability for costs associated with fire suppression and investigation, though not for third party damages ([California Senate Bill 332 2021](#)).

In California, prescribed burn Bills have primarily aimed to mitigate the risk of legal liability being a barrier to prescribed burning on private land ([Wonkka et al. 2015](#); [Miller et al. 2020](#)). For example, a 2018 law ([California Senate Bill 1260 2018](#)) clarified that compliance with a permit was evidence of due diligence and also established a state-certified burn boss training program to increase the number and skills of people qualified to supervise prescribed fires. In 2021, SB332 passed, ensuring that qualified and appropriately prepared people who light prescribed fires will not be held liable for costs, including fire suppression and emergency medical costs, and the costs of investigating, reporting on and collecting funds in relation to the fire, except in cases of gross negligence ([California Senate Bill 332 2021](#)). In 2022, the legislature passed a Bill to establish a Prescribed Fire Liability Pilot Program ([California Senate Bill 926 2022](#)). The pilot program will establish a public 'Prescribed Fire Claims Fund' to cover losses of up to US \$2 million from escaped prescribed burns conducted by non-government entities such as private landholders and cultural fire practitioners. Commercial liability insurance is expensive, rarely available to prescribed burn operators and only covers losses from prescribed burns in rare circumstances. The new insurance pool is intended to reduce costs and 'increase the pace and scale' of prescribed fire and cultural burning in California ([Varner et al. 2021](#); [California Senate Bill 926 2022](#)). Claims against the Fund will only be permitted for prescribed or cultural burners that acquire and comply with all necessary permits and Cal Fire guidelines ([California Senate Bill 926 2022](#), 95–6). Implementing these new laws is intended to supplement demand for Cal Fire 'burn bosses' by increasing the range of people who can lead prescribed and cultural burns. This should help to rapidly expand prescribed and cultural burning across public and non-government lands.

Compared with California, the relevant standard of liability in Australia is less clear-cut because it remains a matter for the courts to determine. The most recent Australian decision on this issue reiterated that prescribed burning on private land may be reasonable and beneficial, even if it creates some risks for neighbouring landholders (*Woodhouse v Fitzgerald* (2021) 104 NSWLR 475; McDonald and McCormack 2022, pp. 14–15). Even so, multiple post-fire inquiries in Australia have recommended statutory clarification of liability standards and protecting private landowners from liability if they comply with valid permits and demonstrate appropriate diligence (Legislative Council Environment and Planning Committee, Parliament of Victoria 2017). Clarification about liability for prescribed (and ecological and cultural) fire could support an expansion of burning on private land in Australia.

Advocates and post-disaster inquiries have also recommended the introduction of disaster insurance in Australia for many years without success (Biggs 2012; Lucas and Booth 2020, p. 4). A national disaster insurance scheme could achieve similar goals to California's Senate Bill 926, supporting fire hazard reduction through prescribed burning and activities to mitigate other disasters such as extreme floods and storms. No laws in Australia have established funding or training programs specifically for private landowners, but targeted training programs could provide knowledge, equipment and expertise to support prescribed fire on private land, similar to California's reforms and building on existing programs such as the NSW Hotspots Fire Project.

Cultural burning

Finally, recent law reforms in California reveal nascent legislative recognition for First Nations' cultural knowledge and fire management practices (Ansell *et al.* 2020; California Assembly Bill 642 2021). The 2021–2022 legislative session featured the first recognition in law of the value of cultural fire for First Nations communities in California, and some limited legislative recognition of particular barriers to cultural burning (California Assembly Bill 642 2021; California Senate Bill 332 (SB332) 2021; Miller *et al.* 2022). The impact of fire suppression policies on First Nations communities was acknowledged in proposed legislation prior to the 2021–2022 legislative session, but those bills did not propose new measures to support or expand cultural burning. AB642 included the first mention of 'cultural burning' in state law, creating a new liaison role to advise Cal Fire on cultural burning in California. It also articulated a new Cal Fire position on cultural burning, tasking Cal Fire with actively engaging tribes, tribal organisations and cultural fire practitioners to expand cultural burning education and practice. In addition to increasing the general fault threshold for private burners to a gross negligence standard for fire suppression costs associated with prescribed burning (though not, as noted above, for third party damages),

SB332 extends that protection to First Nations fire practitioners conducting cultural burns. These reforms are not comprehensive and do not address many challenges that First Nations researchers have highlighted, including inadequate resourcing and inconsistencies and technicalities in permitting processes (Clark *et al.* 2021). However, they appear to signal a new willingness from the legislature to begin to recognise cultural fire management and perhaps, through future reform, to support and promote its use (Miller *et al.* 2022).

State and federal inquiries have urged Australian governments to support the reintroduction of cultural burning as a way to foster healthier landscapes and reduce wildfire hazards (Binskin *et al.* 2020a; Owens and O'Kane 2020, rec 25). Although NSW has not yet seen legal reform equivalent to that in California, cultural fire management is gaining institutional recognition. For example, the NSW Parks and Wildlife Service adopted a Cultural Fire Management Policy in 2016 to guide the reinstatement of cultural fire by Aboriginal communities in public protected areas in the state. More recently, a Cultural Fire Management Unit was established within the NSW Department of Planning, Industry and Environment, to 'coordinate and support the resurgence of cultural land management programs in NSW' (Williamson 2021, p. 2). Members of the Unit contributed to drafting a 'Cool Burning Bill' (Cronshaw 2021), though this Bill has not yet been presented to Parliament and its future is unclear. Greater legal recognition of the importance of First Nations fire management in both California and NSW may provide opportunities to promote reconciliation and cultural wellbeing, while also contributing to hazard reduction (Ansell *et al.* 2020; Clark *et al.* 2021).

Discussion

Current policies and reform proposals in NSW and California highlight challenges and opportunities for expanding the use of prescribed burning on private land as a climate adaptation strategy. The proposal and passage of new prescribed burn legislation reveals enthusiasm for fuel treatments among policymakers (Miller *et al.* 2022). Recent proposals emphasise streamlining vegetation clearing regulations in NSW, addressing liability concerns in California, and beginning to recognise and promote cultural burning in both jurisdictions. Despite significant differences in the legal systems and fire histories of NSW and California, both regions will require dramatic increases in prescribed burning and active management of fire hazards on private land over coming decades. Legislative changes can support these much-needed expansions in the pace and scale of prescribed burning.

Policymakers in NSW and California can draw on examples of legal and policy reform from their counterparts as they seek to respond to changing fire regimes. For example,

California could explore the benefits and trade-offs in NSW reform efforts, as it seeks to streamline fire regulations under the new Vegetation Treatment Program. Australia could look to California for insights on reforming negligence liability standards for prescribed burning and other activities that facilitate climate adaptation on private land. State governments in both NSW and California have committed to increasing First Nations' cultural fire management but research on legal and policy barriers to cultural burning demonstrates that further reforms will be necessary. These two jurisdictions may be well placed to learn from each other as they both seek to improve governance arrangement for cultural fire. Opportunities for legal transplantation and learning to improve governance frameworks could also support adaptation-oriented reform in other places that are facing many of the same challenges, such as South Africa (van Wilgen *et al.* 2012), New Zealand (Bayne *et al.* 2019), Europe and Latin America (Fernandes *et al.* 2013; Molina-Terrén *et al.* 2016; Metallinou 2020), and on land managed by First Nations' people around the world (Hoffman *et al.* 2022).

However, legal reform can also introduce new challenges. For example, there is a fine balance between removing regulatory complexity and ensuring that prescribed burns balance competing values. Prescribed burns can harm biodiversity (Pastro *et al.* 2011; Nimmo *et al.* 2022), and negatively affect health, carbon storage and cultural values if they are not carefully designed and implemented to maximise co-benefits (Pastro *et al.* 2011; Bentley and Penman 2017; Cirulis *et al.* 2020). Moreover, although trees may present some level of wildfire risk, they can also sequester carbon emissions and reduce the extreme effects of heatwaves and post-flood erosion. These factors mean that aggressive fuel management plans may, in some contexts, be maladaptive in the medium to long term. None of the NSW Bills that we analysed mentioned climate change, or acknowledged complexity in balancing trade-offs across landscapes and values, over the short and long term, or between private and public interests (Foerster *et al.* 2015). Both NSW and California face the challenge of finding a balance between streamlining permit processes and protecting values beyond simply hazard reduction.

In addition, while cultural burns have increased in scale in recent years (McKemey *et al.* 2020; Clark *et al.* 2021), First Nations researchers and fire practitioners in the United States, Australia and elsewhere around the world have identified a wide range of barriers to cultural burning, including on private land (Shaffer 2010; Binskin *et al.* 2020b; McKemey *et al.* 2020, p. 28; Clark *et al.* 2021; Hoffman *et al.* 2022). The most significant barriers are a lack of recognition for cultural expertise and complex legislative and regulatory processes. For an example of a legal response that appears to have successfully overcome some of these barriers, Californian and NSW legislatures may look to northern Australia. Although only relatively small areas of the Australian continent are managed with cultural fire – including just 0.54% (42 957 ha) of NSW (McKemey *et al.*

2020, p. 16) – Aboriginal fire practitioners in Australia's Northern Territory and the state of Queensland are considered 'world leaders in savanna fire management, due to their widespread reinstatement of landscape-scale, Indigenous-led, fire management programs' (Moura *et al.* 2019; Ansell *et al.* 2020). These savanna burning programs are supported under the Emissions Reduction Fund, a Federal law that awards tradable credits for carbon emissions avoided by cultural burning in savanna ecosystems, where small and frequent burning mitigates intense, late-season fires (Clean Energy Regulator 2018; Aboriginal Carbon Foundation 2022). The carbon trading mechanism that underpins savanna burning in northern Australia may be of interest to legislatures in California and NSW owing to its co-benefits for climate mitigation, fire hazard reduction and restoring cultural responsibility for fire.

Indigenous scholars have argued that legal reform to address barriers to cultural fire management should be led by First Nations' communities (McKemey *et al.* 2020; Clark *et al.* 2021; Hoffman *et al.* 2022). Recommended reforms include recognising First Nations' authority to conduct cultural burning including by exempting cultural fire management from 'settler state' permitting frameworks; providing culturally relevant incentives, resourcing and indemnities from liability where cultural burning is conducted in good faith; and ensuring that cultural burns are Indigenous-led and country-centred (McKemey *et al.* 2020; Owens and O'Kane 2020, rec 25; Clark *et al.* 2021; Weir *et al.* 2021). More broadly, legislation could establish processes for negotiating access to public and private land for cultural burners and create assessment mechanisms that are more consistent with First Nations' 'fire sovereignty' (Marks-Block and Tripp 2021).

The legislative reforms analysed in this paper are also supported by policies and programs that are implemented by the executive branch or non-government organisations, and these non-legislative arrangements will remain critical in supporting prescribed burning on private land. For example, California's Vegetation Treatment Program is a non-legislative program designed to speed up environmental approvals for prescribed burn projects undertaken by public agencies (California Board of Forestry and Fire Protection 2020). At the time of writing, it does not apply directly to private landholders but demonstrates a mechanism for increasing prescribed burning without legislative reform. Other non-legislative programs in both jurisdictions support prescribed fire on private land by providing information and equipment, and may need to be scaled up as climate change increases the frequency and severity of fire regimes (New South Wales Rural Fire Service n.d.).

Conclusion

Our research highlights ongoing opportunities for NSW, California and other jurisdictions to learn from each other

as we promote adaptation to changing wildfire regimes through legal reform. Laws must find a balance between supporting private landowners to undertake prescribed burning for fuel management with the need to protect other community and private values. Reducing regulatory complexity and legal risk are important reform objectives if we are to move from fire-shy to fire-proponent, and from fire-sensitive to fire-adapted. So too is the need to ensure that prescribed burning is managed for multiple values, especially on private lands where landowners have historically had a minimal role in setting prescribed burn targets. Embracing a more holistic approach to fire management through targeted law reform, including by supporting cultural fire management, can help advance this goal.

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