# The right to burn: barriers and opportunities for Indigenous-led fire stewardship in Canada

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## Abstract

Indigenous fire stewardship enhances ecosystem diversity, assists with the management of complex resources, and reduces wildfire risk by lessening fuel loads. Although Indigenous Peoples have maintained fire stewardship practices for millennia and continue to be keepers of fire knowledge, significant barriers exist for re-engaging in cultural burning. Indigenous communities in Canada have unique vulnerabilities to large and high-intensity wildfires as they are predominately located in remote, forested regions and lack financial support at federal and provincial levels to mitigate wildfire risk. Therefore, it is critical to uphold Indigenous expertise in leading effective and socially just fire stewardship. In this perspective, we demonstrate the benefits of cultural burning and identify five key barriers to advancing Indigenous fire stewardship in Canada. We also provide calls to action to assist with reducing preconceptions and misinformation and focus on creating space and respect for different knowledges and experiences. Despite growing concerns over wildfire risk and agency-stated intentions to establish Indigenous Peoples as partners in wildfire management, power imbalances still exist. The future and coexistence with fire in Canada needs to be a shared responsibility and led by Indigenous Peoples within their territories.

Key words: Indigenous fire stewardship, cultural burning, wildfire, risk reduction, wildland urban interface, Indigenous ecological knowledge, Canada, UNDRIP

# Introduction

Several recent disastrous wildfires in Canada have intensified the need to reduce wildfire risk to ecosystems and human communities (Sankey 2018; Parisien et al. 2020). On average, one billion dollars of public money is spent each year suppressing wildfires in Canada (Natural Resources Canada 2020), with indirect costs to livelihoods and health much higher (Sankey 2018; Johnston et al. 2020). However, relatively little of this money is invested in wildfire risk reduction practices such as Indigenous fire stewardship, one aspect of which is the purposeful application of fire to the landscape as a resource management tool (Christianson 2015; Lake and Christianson 2019). This is a significant oversight, as 60% of Indigenous communities in Canada are in remote and forested areas (McGee et al. 2019). Indigenous Peoples are also 30% more likely to be displaced by, and suffer from, the unintended outcomes of wildfires (McGee et al. 2019; McGee 2021).

Indigenous Nations have used fire as a tool for resource management and community protection for millennia (Kimmerer and Lake 2001; Turner et al. 2013; Lake and Christianson 2019; Hoffman et al. 2021). Cultural burning significantly reduces wildfire risk by lessening fuel loads, enhancing pyrodiversity (the frequency, timing, and severity of fire), and assisting with the management of complex resources for the benefit of all Canadians (Christianson 2015). Although Indigenous Peoples have maintained fire stewardship practices and continue to be keepers of fire knowledge, Western-trained fire scientists often remain skeptical of, or unfamiliar with, Indigenous Ecological Knowledge (IEK), and IEK has been consistently devalued and ignored by wildfire management agencies (Christianson 2015).

The systematic displacement of Indigenous Peoples and IEK resulted from intentional federal and provincial policies that outlawed cultural burning and dispossessed Indigenous Peoples from their broader traditional territories through the federal reserve and residential school systems (Weaver 2003). The forced removal of Indigenous Peoples from their territories disrupted intergenerational knowledge transmission and continuity, eroded subsistence stewardship practices, and resulted in the loss of knowledge keepers (Tennant 1999; Fernandez-Llamazares Onrubia et al. 2021). Persistent impacts of colonialism pose significant barriers for Indigenous Peoples to engage in and lead cultural burning, despite increasing concerns over wildfire risk and stated intentions to establish Indigenous Peoples as partners in wildfire management (Ray et al. 2012; Sankey 2018; Lake 2021).

There is a renewed interest by wildfire management agencies in Canada to use prescribed burning to reduce wildfire risk. Importantly, prescribed burning is distinct from cultural burning, primarily in the burn objectives, techniques used to burn, and who is conducting the burning. In Canada, First Nations[1] retain the right to undertake cultural burning on reserve lands, but significant wildfire agency oversight and control is often required, leading to tensions when cultural burning goes ahead with no formal government (municipal, provincial, and (or) federal) approval. There are also major barriers to utilizing cultural burning across broader Indigenous territories, which is considered Crown land under the statutory authority of provincial or federal governments. For example, Natural Resources Canada (2020) states that approximately 2% of forested land across Canada is "owned" by Indigenous Nations, yet the complexity of ownership and lack of titled lands—the direct cause of historical and ongoing colonization—over vast and overlapping territories is not accurately represented in this statistic (Branch 2020; **Fig. 1**). Shared governance and the right to burn across territories, including areas covered by historical and modern Treaties, has yet to be fully realized by provincially run wildfire agencies. The historical and contemporary uses of cultural burning have

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[1]The three distinct Indigenous groups recognized by the Constitution of Canada are First Nations, Métis, and Inuit (Department of Justice Canada 1982)
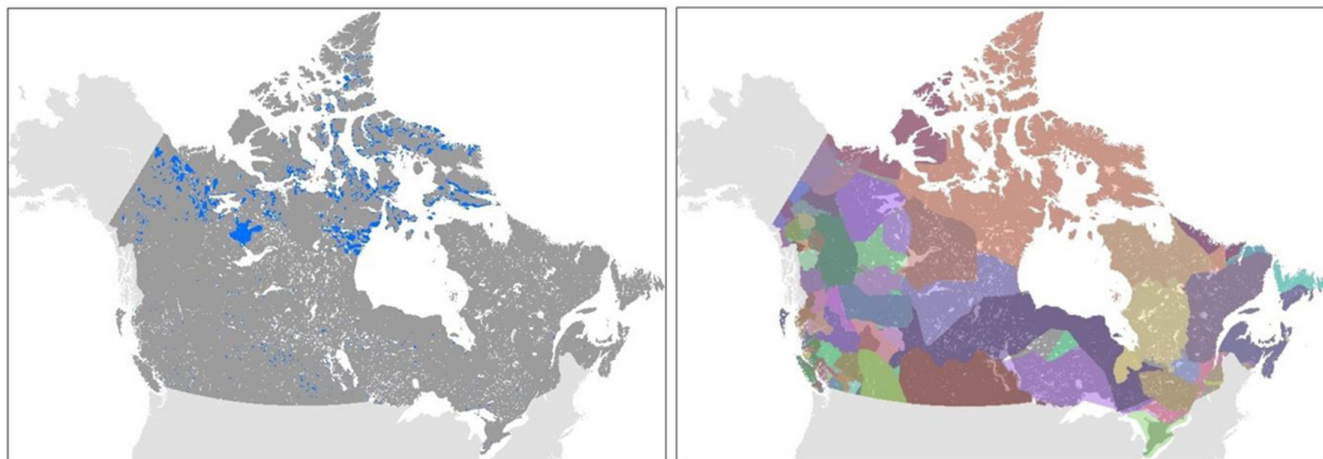
**Fig. 1.** State-recognized Indigenous lands in Canada (left), versus Indigenous territories as described at native-land.ca (right). State-recognized lands are derived from "Aboriginal Lands of Canada Legislative Boundaries" data set and include reserves, land claim settlement lands, and Indian Lands. Territories from native-land.ca represent "traditional territories", including overlap areas that fall within the territorial boundaries of more than one nation, with each territory appearing as a different colour. Disclaimer from native-land.ca: "This map does not represent or intend to represent official or legal boundaries of any Indigenous nations. To learn about definitive boundaries, contact the nations in question. Also, this map is not perfect—it is a work in progress with tons of contributions from the community." Visit native-land.ca for the most up-to-date version. Light grey areas represent land beyond Canada's borders. This figure is used with permission and originally appears in Artelle et al. (2019).

been largely omitted from strategic land-use plans, wildfire mitigation strategies, and community risk assessments. Unfortunately, there are very few examples of Indigenous-led fire management initiatives in Canada (but see Lewis et al. 2018; Stacey et al. 2019; Nikolakis et al. 2020; Dickson-Hoyle et al. 2021 for examples of cultural burning revitalization). As continues to experience record-setting wildfire seasons that disproportionately affect Indigenous communities, it is clear that support for Indigenous-led fire stewardship initiatives is long overdue.

This paper provides perspectives from Indigenous and non-Indigenous fire practitioners and fire researchers working within government, not-for-profit organizations, and university institutions. We identify five key barriers to re-engaging in cultural burning, present examples of First Nations that are leading cultural burning initiatives in their territories, and identify opportunities and calls-to-action to support Indigenous fire stewardship in Canada. This paper is not intended to represent an exhaustive list of barriers experienced by specific Nations or Indigenous Peoples, and barriers are not listed in order of importance. Instead, this paper reflects the authors' experiences navigating existing biases, governance processes, and capacity issues that hinder Indigenous-led fire stewardship.

## Barrier 1: perceptions, authority, and jurisdiction

One of the most challenging barriers to engaging in Indigenous fire stewardship is the lack of understanding by wildfire management agencies, decision-makers, and the general public of the relationship between Indigenous Peoples and fire (Lake et al. 2017; Stacey et al. 2019). Cultural burning involves knowing the intricate complexities of fire (when, how, and where fire should or should not be used) to maintain desirable ecosystem structures and enhance diversity and productivity of species for food, medicine, and ceremony (Kimmerer and Lake 2001). Regular cultural burning supports fire-dependent ecosystems, extending the season for burning, decreasing the return interval for wildfire activity, and supporting manageable suppression efforts when values are at risk from out-of-control wildfires (Hoffman et al. 2021). Indigenous Peoples' knowledge of and reliance on fire

is grounded in understandings involving specific relationships between humans, plants, and animals, including traditional governance practices and laws that have been developed, adapted, and passed down through generations (Lake and Christianson 2019).

Throughout Canada, Indigenous Peoples have specific times for burning, the majority of which takes place when fire risk is low. For example, First Nations in Northern Alberta and British Columbia generally burn in the early spring or late fall, guided by the snow melt/fall (Lewis 1982; Dickson-Hoyle et al. 2021). During these times, low-risk "cool" burns make up the majority of Indigenous cultural burning practices (**Fig. 2**; Lewis and Ferguson 1988; Lewis et al. 2018; Sankey 2018). Cultural burning is a family practice in which Elders and children actively participate (**Fig. 3**), and special protective equipment is often not required because fire intensity is low (Christianson et al. 2019). Depending on the governance and cultural structure of each Nation, there are often specific fire knowledge holders who make decisions about when and where to burn. These knowledge holders also understand that burning outside of these low-risk conditions will not result in the desired cultural outcomes (Lewis and Ferguson 1988), but see Nikolakis et al. (2020) for examples of specific management goals that require different fire treatments. Cultural burning is holistic—practices can assist with restoring ecosystem function, and landscapes can once again be cultivated to become more productive in ways that support the cultural practices and livelihoods of Indigenous Nations (Lake and Christianson 2019).

Cultural burning is a community practice that takes on many different forms. It promotes intergenerational teachings, strengthens social networks, and supports overall community physical and mental health (Lake et al. 2017; Lake and Christianson 2019; Steffensen 2020). Contrary to many perceptions, Indigenous fire stewardship is not something of the past, but is a dynamic knowledge system that adapts to changing environmental conditions (PAGC 2018; Thomassin et al. 2019). Although government agencies are showing increased interest in cultural burning, it is important to note that Indigenous knowledge is built on relationships and experience, embodied in practice and embedded in language and land (Ignace et al. 2016; Copes-Gerbitz et al. 2021). Huffman (2013; p. 1) describes "traditional fire knowledge" as "fire-related knowledge, beliefs, and practices that have been developed and applied on specific landscapes for specific purposes by long time inhabitants". As such, Indigenous knowledge is not a "thing" that can be captured and incorporated into plans by agencies to inform wildfire management (Mistry et al. 2016; Popp et al. 2019). Indigenous knowledge is decontextualized and ineffective when it is taken from the Nation and land that created it (Michell et al 2021). Wildfire agencies often try to appropriate and narrowly reconceive Indigenous fire use (Marks-Block and Tripp 2021). Prescribed fires as conducted by agencies generally compromise Indigenous objectives, as well as the spiritual and cultural systems that govern cultural burning practices (Marks-Block and Tripp 2021). Indigenous fire stewardship must be led by Indigenous Nations to be effective.

## Case study: Prince Albert Grand Council Wildfire Task Force

In January 2018, the Prince Albert Grand Council (PAGC) established a Wildfire Task Force through resolution at the Tribal Council's annual general meeting. The Task Force was created "with clear terms of reference to review and provide recommendations to Saskatchewan Environment – Wildfire Management Branch" regarding wildfire strategies, policies, and operations (PAGC 2018). The PAGC is a tribal council representing 12 First Nations and 28 communities (est. 40 000 people) from three First Nations cultural groups (Cree, Dakota, and Dene) whose lands encompass the province's boreal forest region. In northern Saskatchewan, wildfires and decisions about their management directly impact the well-being and livelihoods of First Nations whose economies, language, and cultural practices are directly tied to the land (Kasstan 2016; Mamun and Brook 2017;
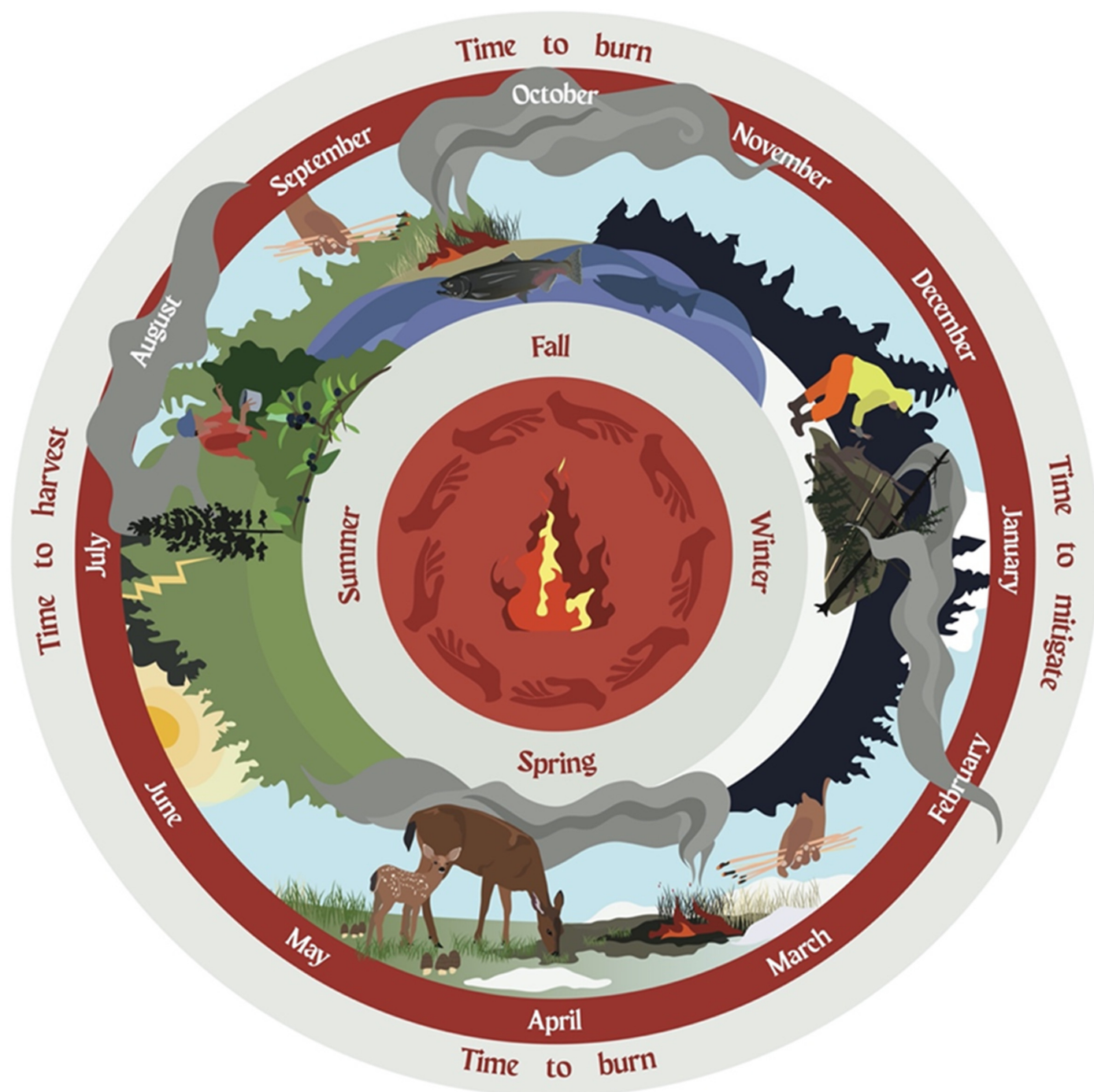
**Fig. 2.** A seasonal calendar illustrating aspects of Indigenous fire stewardship. The calendar depicts times to conduct safe "cool" burns (spring and fall months, when snow is still on the ground or before snow or rain falls), time to mitigate wildfire risk (in the winter, when fuels can be reduced, especially fuels in heavily forested and community-interface areas), and time to harvest (when foods and medicines are abundant, due to carefully timed cultural burning). Many hands (centre) depict inter-generational continuity and community-based relationships with fire, which are embedded in knowledges that have been passed down for millennia. Image concept by K.M. Hoffman and A.C. Christianson, design and illustration by Alexandra Langweider of Align Illustration.

**Fig. 3.** Left: Indigenous fire practitioner and co-author Russell Myers Ross burning with his daughter in April 2021. Right: Indigenous youth learning from Elders and community members how to conduct cool and safe burns in the early spring. Cultural burning is being revitalized by the Yunesit'in and Xeni Gwet'in First Nations on Yunesit'in community and Tsilhqot'in Title lands located in the central interior of British Columbia, Canada. Photos by Josh Neufeld (Gathering Voices Society).

Michell et al. 2021). Therefore, it is imperative that First Nations are able to exert jurisdiction and authority over how fires are managed on their traditional territories (PAGC 2018; Zahara 2020).

The Task Force was established to ensure that First Nations have input on all aspects of wildfire policy: from firefighting and suppression strategies to legislation that governs burn permitting and other aspects of wildfire management that may restrict traditional fire management activities. The Task Force is guided by Elders, as well as a technical advisory group of First Nations wildfire and emergency management experts and recognizes the vast IEK and firefighting expertise of First Nations people in northern Saskatchewan and the need to bridge knowledge systems. The Task Force has developed an inclusive and collaborative approach aimed at developing relationships between PAGC and provincial government officials, in part, through invitation to participate in annual meetings. Following a review of 2018 policies, the Task Force released a series of policy recommendations that resulted in changes to how fires are fought (e.g., moving from five- to ten-person fire crews), increasing the hiring of experienced First Nations firefighters, and affirming the need to document Indigenous knowledge and perspectives (PAGC 2018).

Going forward, the Task Force is working with researchers, including policy experts and fire scientists, as well as land users and knowledge holders on many projects to improve wildfire governance for PAGC member Nations. For example, in 2021, the PAGC Wildfire Task Force was awarded funding via the Canadian Forest Service to begin the PAGC Wildfire Resilience Initiative, which is aimed at documenting First Nations insights on wildfire policy for the use of PAGC member Nations. A major goal of this initiative is to train First Nations youth to ensure future generations can respond to wildfires on their territories in ways that respect First Nations laws and governance. Youth will be hired as researchers and trained to conduct interviews that follow and respect Nation-specific protocols for the documentation and storage of IEK. They will engage with First Nations firefighters, Elders, traditional land users, and university professionals from their communities to organize land-based activities related to wildfire, including cultural burning. Following Ownership, Control, Access, and Possession (OCAP) principles, all documented IEK will be the property of specific Nations, while summary documents will be used to inform Task Force decision-making and recommendations. The Task Force will build relationships across institutions and communities, facilitate

intergenerational sharing of knowledge, and foreground Indigenous data sovereignty to support and strengthen First Nations wildfire governance beyond provincial jurisdiction.

Additionally, the Task Force has recommended the creation of a First Nations advisory panel and co-management agreements to provide clear avenues for decision-making, outline shared responsibilities, and avoid the pitfalls of knowledge "inclusion". Ultimately, the creation of the Task Force supports a whole-of-society approach to First Nations wildfire governance, including lobbying, the training of future generations, and documenting of IEK so that First Nations in northern Saskatchewan may exert their expertise and sovereignty through, against, and beyond colonial wildfire management systems. PAGC initiatives promote trans-institutional learning and recommendations for wildfire management and emergency response and are understood by the First Nations as important steps on the road to self-determination.

## Call to action

**Establish a National Indigenous Wildfire Stewardship working group, which includes regional hubs of Indigenous fire practitioners and resource managers across provinces and territories.** The working group would support knowledge sharing outside of provincial and municipal jurisdictions and link Nations with similar cultural burning objectives. Elders and youth would have the opportunity to work together to support cultural burning practices. Regional hubs could have regular meetings, cultural burning workshops, and provide support for Indigenous employees and learning opportunities. Regional hubs would support opportunities to engage in knowledge sharing or information exchanges with academic institutions, agencies, and federal and provincial government bodies.

Wildfire management agencies across Canada could reach out to regional hubs to learn about or support cultural burning, build relationships, and co-develop partnerships. Local Indigenous Peoples can be involved in associated steering groups and committees through which decisions are made. Targeted funding should be provided to host and organize workshops or field trips, where agency staff can learn directly from Indigenous Peoples in a culturally appropriate way. Regional hubs could be combined to create national, cross-scale networks that wildfire management agencies should financially support to enable knowledge exchange.

## Barrier 2: governance, laws, and management

Wildfire management agencies in Canada devolved from colonial government systems; therefore, they monopolize power in terms of wildfire management decision-making. Since provincial and territorial government agencies are responsible for wildfire management on Crown land, they control decisions across most Canadian forests (Fig. 1). IEK is often perceived as a source of information that can be consulted on or incorporated into non-Indigenous institutions or processes (Mistry et al. 2019). However, this type of engagement reinforces the marginalization of Indigenous Peoples and knowledges, especially Indigenous fire practitioners whose knowledge is often seen as less technical and legitimate than that of agency-credentialled fire personnel (Dickson-Hoyle and John 2021). This perception creates a power imbalance over who is the "expert", in which governmental agencies are more likely to accept decisions from their staff and ignore the inputs of Indigenous fire practitioners who hold important expertise and are appointed by leadership within their communities to conduct cultural burning. This power imbalance is further exacerbated when an Indigenous person is specifically hired to "integrate" IEK into provincial and federal fire management plans. Although this approach may intend to include Indigenous knowledge, it often shifts fire stewardship away from community governance structures (Mistry et al. 2016; Marks-Block and Tripp 2021). Tokenism results when knowledge is extracted from an Indigenous employee, allowing non-Indigenous agencies

to copy cultural burning techniques without involving Indigenous Peoples, or when knowledge appropriation is substituted for "meaningful engagement" with Indigenous fire practitioners.

Power imbalances are perpetuated by self-reinforcing federal and provincial governance structures (Offen 2004; Armitage et al. 2012), such as government-issued permits required for cultural burning. For many Indigenous Peoples, the responsibility to steward the land and protect their communities is enacted through cultural burning (Lake and Christianson 2019). However, Indigenous Nations in Canada who want to burn on Crown land are required to submit a classical burn plan to a local wildfire management agency that acts as a gatekeeper to gain permission to use fire. Classical burn plans and permit applications were designed to regulate prescribed fires applied during timber management or ecological restoration and are constrained by concerns over fire escape, suppression, and liability. They focus on Western science criteria such as fire weather danger ratings, fuel types and moisture codes, and smoke venting requirements. The time, effort, and specific Western technical expertise required to complete a classical burn permit application is a major barrier for implementing cultural burning. Once submitted, approval processes can take weeks to several months. Time and time again, Indigenous communities have invested months to prepare fire prescriptions that were not approved or could not proceed because conditions were not suitable to achieve desired cultural outcomes during the agency-assigned burning period.

Since frameworks for classical burn plans and permits and the criteria to evaluate them were developed without input from Indigenous fire practitioners, they are often incongruent with community practices, desired outcomes, and optimal conditions for cultural burning. Indigenous fire practitioners draw from local and generational sources of knowledge that differ from western fuel classification systems and fire weather codes that guide most wildfire agencies. These differences do not impact Indigenous Peoples' ability to conduct a safe burn. Rather, their decision to burn is informed by the adaptive learning and practice gained through generations of Indigenous fire stewards. However, current permitting processes controlled by government agencies do not recognize this knowledge as a legitimate alternative to existing Western science-based criteria.

Discrepancies between optimal burning conditions as defined by government agencies versus Indigenous fire practitioners reflect different timing, reasons for fire, and criteria for success. For example, a provincial agency may give permission for burning, but the approved time window might not be favourable for meeting specific cultural resource management objectives. The timing of cultural burning in early spring or late fall, or during day or night, is generally associated with a specific resource management practice such as creating fodder for game, promoting the growth of mushrooms, increasing the productivity of berry-producing shrubs, or creating cover for migrating or spawning salmon (**Fig. 2**; Turner 1999; Kimmerer and Lake 2001; Lake et al. 2017; Lake and Christianson 2019). For cultural burning, decisions on when and where to burn are often made the "day of", when local conditions are appropriate.

One pathway for revitalization of cultural burning is through the implementation of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) that came into effect in Canada in December 2020. In BC, the *Declaration on the Rights of Indigenous Peoples Act 2019* requires a re-interpretation of provincial legislation through the lens of the UNDRIP. Agencies are required to report on how they are revising their activities and building partnerships with Indigenous governments. This will reshape how various fire and forest statutes are interpreted and applied. Specifically, Article 31(1) of the UNDRIP states that "Indigenous Peoples have the right to maintain, control, protect, and develop their cultural heritage, Traditional Knowledge, and traditional cultural expressions, as well as the manifestations of their sciences, technologies, and cultures." As cultural burning is a form of cultural expression, UNDRIP legislation should allow Indigenous Peoples to burn in their territories without oversight. Questions remain as to whether Indigenous

rights to cultural burning will be upheld in Canadian courts. Recognizing cultural burning within UNDRIP would avoid all Nations having to develop unique management agreements with provincial and federal governments, allowing Indigenous fire management programs to be implemented across broader territories.

## Call to action

**Introduce governance processes that equally prioritize Indigenous knowledge systems to correct power imbalances.** By engaging with Indigenous fire practitioners early and often, agencies can avoid tokenism, knowledge appropriation, and move forward with implementing UNDRIP legislation in a meaningful way. If burn permits are unavoidable, establish a cultural burning permit approval system managed by Indigenous Peoples that parallels existing classical burn plans and permits. Cultural burning permits could be community documents written with IEK and Indigenous fire science language to achieve cultural objectives.

Support flexible permits that allow wider burn periods when risk is low, such as two weeks following snowmelt in the spring and approximately two weeks prior to snow in the fall. Once cultural burning permits are granted, provide an option to notify appropriate municipal or provincial governments of the intention to burn on the day of burning. Reducing oversight reduces potential conflict with agency personnel who may have little fire experience or are not familiar with cultural burning protocols. This avoids undermining the expertise of Indigenous fire practitioners who are mentors in their respective communities (Lake 2021). Limit stricter burn permits and greater agency involvement only to cultural burns that are conducted outside of the low-risk cultural burn periods and where high-risk values may be affected.

Introducing more flexibility in burn permits and decreasing oversight are steps in acknowledging that Indigenous fire knowledge is deeply connected to land sovereignty. Supporting cultural burning means more controlled fire on the land, a goal shared by Indigenous communities and provincial, territorial, and federal governments. By increasing the amount of cultural burning, Indigenous fire practitioners will significantly lower risks of uncontrollable wildfire in forests surrounding their communities. Importantly, the continued dispossession of land from Indigenous Peoples should be recognized as a significant issue when trying to reinstate cultural burning. If cultural burning is supported in theory, but Indigenous Peoples have no land to carry out burning under their own jurisdiction, any decentralized decision-making is doomed to fail (Agrawal and Ostrom 2001).

## Barrier 3: access, accreditation, and training

In terms of Western (or European-style) academic training, Canada has no applied wildfire science programs at the technician, diploma, university, or graduate degree level. Current wildfire science and management courses predominantly focus on fire behaviour, biophysical effects, and fire management that prioritizes suppression using a command structure. None adequately address cultural burning. While a number of Canadian postsecondary education institutions offer programs in Indigenous environmental stewardship, and Indigenous Nations have partnered with universities to develop programs in Indigenous cultural heritage (e.g., Nicholas and Markey 2014), we are not aware of any courses focused on Indigenous fire stewardship, cultural fire ecology, or cultural burning. For Indigenous peoples who wish to obtain accreditation as fire practitioners outside of their communities, there are few postsecondary options. Government training is often only limited to internal personnel. There are also Indigenous Peoples who refuse the "validation" or "certification" of colonial institutions to be able to carry out their traditional responsibilities, particularly given the increased risk resulting from colonial fire management practices such as aggressive wildfire suppression.

Currently, the only way to acquire training in applied wildfire science and management in Canada is through employment with the federal or provincial governments or through privately-owned fire suppression crews. For example, in British Columbia (BC), the provincial wildfire management agency certifies burn bosses, but only personnel within the agency are eligible. This policy forms a barrier preventing Indigenous fire practitioners from becoming certified to gain accreditation to burn and communities from developing capacity for cultural burning. This is a clear example of government actors reinforcing their power through specific governance processes.

When opportunity for wildfire training is constrained, Indigenous fire practitioners are expected to undertake fire in strict and legally binding ways that go against cultural norms and responsibilities (Lake et al. 2017). With no fire practitioner accreditation outside of government, Indigenous Peoples with fire experience must join government or contract wildfire suppression crews. This option leaves many Indigenous Peoples engaging in direct fire suppression objectives under a colonial and hierarchical incident command structure, which opposes collectively responsible models of fire stewardship (Eriksen and Hankins 2014). Furthermore, governmental career paths offer little movement into upper management positions. Despite many Indigenous fire practitioners having decades of fire experience, very few Indigenous fire practitioners hold government supervisory roles, especially higher-level fire manager, incident command, or burn boss positions. Although experience is recognized and colonial governance models enable government personnel to obtain burn boss or ignitions specialist certifications, Indigenous perspectives and practices of fire stewardship remain unrecognized and nontransferable, prohibiting accreditation to apply cultural fire (Sankey 2018).

## Case study: Yunesit'in and Xeni Gwet'in Indigenous Fire Management Program

Following the record-breaking 2017 wildfire season in BC, Yunesit'in Government and Xeni Gwet'in partnered with Gathering Voices Society to develop an Indigenous Fire Management Program. At the time, the two communities recognized the need to test methods to revitalize fire practices to mitigate wildfire risk and restore degraded ecosystems. A pilot study was designed with test sites located in the Yunesit'in community, on Tsilhqot'in Title lands, and in the newly created Dasiqox Tribal Park (Nikolakis et al. 2020). A major goal was to train and employ community members, undertake fire management activities in the spring and fall, and begin exploring the potential for an applicable carbon framework to sustain the long-term viability of the program. In 2019, Dr. Victor Steffensen was employed in a cultural exchange, grounding Indigenous fire methodologies from Australia to revitalize Tsilhqot'in fire knowledge and to help facilitate training (Fig. 3). Under the direction of Steffensen, 10 community members from Yunesit'in and Xeni Gwet'in were reconnected with teachings on how to interpret landscapes, seasons, and local ecological indicators to determine where and when to burn. Trainees were mentored in experiential and practice-based approaches to fire management, which are used to connect communities to their local environment. Safe weather conditions limited the application of cultural burns in 2020, but in 2021, Yunesit'in and Xeni Gwet'in were able to resume fire management activities.

Yunesit'in Government has actively engaged with the BC Government, through the Ministry of Forests, Lands, Natural Resource Operations and Rural Development, and the provincial Wildfire Service, to gain understanding and support for the Indigenous Fire Management Program. Classical burn plans were developed, and a technical referral package was submitted to gain permitted approval for conducting cultural burning. Unfortunately, the approval process stretched over a year and required five levels of government authorizations before commencing. While general support for the Indigenous Fire Management Program exists within government, the time and technical expertise

required to implement Indigenous fire stewardship on Tsilhqot'in Title lands highlights the substantive barriers unique to Indigenous Peoples.

## Call to action

**Reduce wildfire science and management gate-keeping by opening up prescribed fire training and accreditation outside of wildfire management agencies.** Build capacity and support for Indigenous-led fire practitioner accreditation through programs such as Prescribed Burn Associations (PBAs) and Prescribed Fire Training Exchanges (e.g., TREX). PBAs and TREXs provide cooperative ways to pool equipment, knowledge, and experience across diverse partnerships including Indigenous communities, government agencies, private landowners, and academic institutions to conduct both prescribed and cultural burning. These associations and cooperatives have been used in other countries to support members to leverage skills, provide training, and assist with collective or group insurance, which reduces individual perceptions of risk and reduces costs (Weir et al. 2016; Joshi et al. 2019; Weir et al. 2019).

PBAs that are recognized by Indigenous, provincial, and federal governments play an important role in supporting cultural burning programs. Although there are thousands of examples of PBAs and burn cooperatives around the world, we are only aware of one PBA operating in Canada, which was established in 2021. In addition to PBAs, many countries offer certification and training programs specifically focused on cultural burning and Indigenous fire stewardship. For an example of a joint federal and not-for-profit program see Australia Cultural Fire Program and the Firesticks Alliance (firesticks.org.au/).

## Barrier 4: liabilities and insurance

Cultural burning is complex and laden with a history of convicting, jailing, and fining Indigenous Peoples for burning within their territories; a saga that continues into the present (Lewis 1978; Turner 1999; Lake 2021). In many jurisdictions, authorization to conduct cultural burning must be approved by a regional government land manager before a classical burn plan is submitted to a provincial or territorial government. Indigenous Peoples must demonstrate that they have acquired expensive personal protective equipment, heavy machinery, pumps, and hoses. Often, Indigenous fire practitioners are required to hold prescribed fire liability insurance and provide proof of accredited prescribed fire expertise. Indigenous Nations and communities are held responsible for all liability related to cultural burning, creating fear that they will be personally responsible for damages to private property and Crown land in the unlikely case of an escaped burn (Weir et al. 2016). Many municipalities fund and support fuels mitigation treatments such as mechanical thinning, but stop short of supporting cultural burning over concerns of fire escape and smoke in the community (Daniels et al. 2018).

Stacey et al. (2019) documented that Canadian disaster law does not explicitly identify the communities or individuals most vulnerable to disaster, despite substantial research documenting the importance of considering vulnerability in disaster policy (McGee et al. 2019). Thus, Canadian law fails to connect disaster recovery to disaster prevention, although doing so could empower communities to build resilience to future threats. Policies linking recovery with prevention enable communities to address the root causes of vulnerability to wildfire threats (Stacey et al. 2019; Schumann et al. 2020). When wildfire emergencies occur, the complex governance system for wildfire response, suppression, and recovery cause significant jurisdictional issues for Indigenous communities (Nikolakis and Roberts 2020), limiting the opportunity for recovery actions to be leveraged as mitigation and future prevention.

## Call to action

**Develop a network of Indigenous and non-Indigenous fire practitioners and researchers within each province and territory to identify key policy barriers for reintroducing cultural burning, including (but not limited to) jurisdiction, liability, and land governance.** Networks will include individuals who can act as boundary spanners and effectively facilitate communication between Indigenous and non-Indigenous decision-makers. These individuals ensure that Indigenous needs are represented at the start of conversations to address policy barriers, above and beyond mandated processes of "consultation" that perpetuate power imbalances (Goodrich et al. 2020). These individuals must include legal scholars with experience navigating and implementing UNDRIP.

Explore recent legislation and program development from other jurisdictions around cultural burning, certification of Indigenous practitioners, and liability for application to the appropriate Canadian context. California recently signed two laws into effect (SB332 and AB642), co-developed by Indigenous fire practitioners, which address the three topics. The Firesticks Alliance Indigenous Corporation in Australia recently launched the Cultural Fire Certification program, which is a new certification and assessment framework for Nations.

## Barrier 5: capacity and resources

For many Indigenous Peoples and Nations, re-engaging in cultural burning can be difficult because forests that were once carefully managed with fire have accumulated flammable fuels as a result of over a century of fire suppression and timber-focussed forest management (Parisien et al. 2020; Zahara 2020). In many places, hazardous fuel mitigation techniques such as forest thinning and mulching are necessary prior to cultural burning to limit fire intensity and ensure it is controllable. This takes significant time, person power, and money (Lake 2021). Colonial mismanagement of finances, infrastructure, and essential services on reserves has created poverty conditions so that Indigenous leaders must focus on acquiring funding for basic human necessities, such as clean drinking water and housing, instead of planning for the future. Very little funding is available for Indigenous communities to conduct cultural burns.

Applying cultural burning within community boundaries forming the wildland–urban interface and across broader territories has multiple benefits. It decreases the risk of severe wildfires that can threaten homes, businesses, and livelihoods (Christianson 2015; Kolden 2019), eliminates rodents and other pests, and promotes the growth of plants that provide foods, medicines, and reduce the effects of spring flooding (Hoffman et al. 2021). However, many provinces and territories in Canada prohibit burning within 100 m of residential buildings. This regulation can be problematic for Indigenous Peoples residing in small reserves, although they do not require permits from municipal or provincial jurisdictions to burn on their reserves. Funding programs addressing wildfire risk are often constrained to a government-defined wildland–urban interface (e.g., up to 2 km from a community), and do not necessarily align with areas of priority in broader Indigenous territories.

Applying cultural fire within interface areas is a desired practice for community protection as less than half of Indigenous reserves in Canada have fire departments that can quickly respond to a fire (McGee et al. 2021). Communities with fire departments often depend on unpaid volunteers who use personal vehicles and hand pumps to attend to structural and interface fires within communities. Most Indigenous communities or First Nations reserves rely on distant municipal or provincial agencies to respond to fires (Government of Canada 2011; National Indigenous Fire Safety Council Project 2020).

## Call to action

**Increase financial support for Indigenous fire stewardship that preventatively and economically reduces wildfire risk within community interface areas and across territories.** Financial contributions are needed to provide essential personal protective equipment, structural firefighting equipment, and wildfire mitigation equipment. In addition, supporting a paid emergency manager position in Indigenous communities is an effective way to reduce wildfire risk and ensure wildfire risk reduction is community specific. This position can reduce the burden placed on the Fire Chief or Lands Manager who often steps into this position and juggles numerous responsibilities. Supporting proactive instead of reactive approaches to wildfire provides sustained funding and resources for communities while preventing evacuations and the emotional, physical, and financial stressors associated with them. Emerging studies have demonstrated that supporting Indigenous-led fire stewardship and governance to mitigate impacts from out-of-control wildfires significantly reduces fire suppression costs in the long term (Marks-Block and Tripp 2021). Investing in Indigenous fire stewardship protects valuable social, ecological, and cultural resources.

Create a National Indigenous Incident Command team that works parallel to the Canadian Interagency Forest Fire Centre (CIFFC) to respond to wildfire emergencies threatening First Nations communities. Teams could deploy to incidents alongside wildfire agencies and Emergency Management teams to support Indigenous communities with wildfire assessment and response, sharing of resources, impacts to cultural and ecological values, and support for emergency evacuations or decisions to shelter in place. This is critical as more Indigenous communities are ignoring mandatory emergency evacuations due to lack of agency trust, poor communication, lack of safe spaces to house evacuees, and fear of family separation which is rooted in the trauma of residential school systems (McGee et al. 2019).

It is in the interest of all Canadians for the federal and provincial governments to provide reliable and sustained funding to reduce fuels in interface areas, support cultural burning, and train personnel to communicate stewardship values and span multi-agency roles. Allocating funds more equally between social and natural science research on wildfires and recruiting multiple Indigenous Peoples in relevant government departments can also help bring Indigenous perspectives to wildfire management. Other options, such as exploring private funding opportunities through carbon storage and greenhouse gas incentives could be invested into monetary support for common ecosystem stewardship services such as cultural burning.

## Conclusions

Removing barriers and creating space for different knowledges, perspectives, and experiences is critical to reviving Indigenous fire stewardship in Canada. Correcting power imbalances, increasing capacity, and supporting cultural burning without significant agency oversight are necessary steps in respecting Indigenous governance structures and community practices while upholding UNDRIP. Importantly, consultation and engagement must happen early, often, and include attention to broader questions of land governance, tenure, and non-Indigenous values that currently inhibit cultural burning. Long-held colonial preconceptions, misinformation, and marginalization of Indigenous knowledge continue to impede cultural burning. Increased Indigenous, social, and scientific communication of the benefits of Indigenous fire stewardship is needed to shift colonial perceptions of cultural burning for the benefit of all Canadians.

## Statement of positionality

The co-authors of this paper identify as Indigenous (Cardinal Christianson, Diabo, Michell, McLeod, Gilchrist, and Myers Ross) or of settler descent (Hoffman, Dickson-Hoyle, Copes-Gerbitz, Nikolakis,

Mamun, Mauro, Zahara, and Daniels). Our knowledges are embedded in community education, Indigenous teachings, and formal university-based training and experiences. Collectively, we are social and biophysical scientists, land managers, fire practitioners, lawyers, and Indigenous knowledge holders whose experiences are strengthened by collaborative and long-term relationships with Indigenous and non-Indigenous communities across Canada. With this paper, it is our intention to highlight barriers to engaging in cultural fire, but we acknowledge that we are not in a position to address values and intentions related to specific Nations whose experiences are not represented by co-authors.

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## Author contributions

KMH and ACC conceived and designed the study. KMH, ACC, and LDD contributed resources. KMH, ACC, SD-H, KC-G, WN, DAD, RM, HJM, AAM, AZ, NM, JG, and RMR drafted or revised the manuscript.

## Data availability statement

All relevant data are within the paper.

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