

Community Forests advance local wildfire governance and proactive management in British Columbia, Canada

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Abstract

As wildfires are increasingly causing negative impacts to communities and their livelihoods, many communities are demanding more proactive and locally driven approaches to address wildfire risk. This marks a shift away from centralized governance models where decision-making is concentrated in government agencies that prioritize reactive wildfire suppression. In British Columbia (BC), Canada, Community Forests—a long-term, area-based tenure granted to Indigenous and/or local communities—are emerging as local leaders facilitating proactive wildfire management. To explore the factors that are enabling local governance approaches to managing wildfire risk, we conducted semi-structured interviews with 26 Community Forest managers across BC. Managers highlighted financial and social capacity, especially trust and relationships with both community members and government agencies, as crucial factors influencing their ability to undertake proactive management. These factors enable Community Forests to address wildfire risk not only within their own tenure area, but also at household, community, and landscape scales, while balancing diverse community values, objectives for forest management, and legal and policy obligations. Despite ongoing challenges, Community Forests emphasized the importance of scaling up their efforts to address wildfire risk and are a critical form of local wildfire governance that can help advance proactive wildfire management across BC.

Key words: local governance, wildfire, collaborative governance, community forest, British Columbia

1. Introduction

Communities and governments worldwide are facing the reality of increasingly negative impacts from wildfires. Minimizing the impacts on lives and livelihoods is challenging, in part because wildfires occur in complex social-ecological systems where diverse actors, values, objectives, and processes for decision-making interact across scales and jurisdictions (Moritz et al. 2014; Spies et al. 2014; Fischer et al. 2016; Smith et al. 2016). Environmental governance refers to these complexities, including the processes and mechanisms through which these interactions occur (Lemos and Agrawal 2006). As such, understanding the governance context is imperative for developing effective ways to address wildfire risk (McCaffrey et al. 2013).

While many jurisdictions continue to operate on a model of centralized governance characterized by top-down, reactive, often suppression-focused wildfire management, it is widely understood that this approach is unsuitable for the social-ecological conditions of the 21st century, including climate change (Tedim et al. 2019; Hoffman et al. 2022a). Instead, many scholars and communities argue that models of governance that empower local decision-makers and prioritize proactive management are needed to address the complex

wildfire challenge (Mistry et al. 2016; Steelman 2016; Kelly et al. 2019; Tedim et al. 2019).

1.1. From centralized to local wildfire governance

The shift towards proactive management and local-scale decision-making has been slowed by ongoing constraints and the institutional inertia of prevailing centralized and reactive management (McWethy et al. 2019), as well as the fact that wildfire governance is inextricably connected with forest governance, Indigenous sovereignty, and land jurisdiction (Fischer et al. 2016; Hoffman et al. 2022a). For example, in settler colonial countries such as Canada, the United States, and Australia, where fire is integral to ecocultural functioning, centralized wildfire governance has overridden the decision-making authority of local and Indigenous communities (Lake and Christianson 2019; Tedim et al. 2019; Hoffman et al. 2022b; Sousa et al. 2022). This has historically been possible because forest and landscape governance have also been centralized and dominated by state-led government actors (Lemos and Agrawal 2006; Brondizio and Le Tourneau 2016) essentially minimizing land-based (including wildfire) decision-making authority at more local scales. By displacing

local governance systems, specific values such as timber, and approaches such as suppression, were prioritized, reflecting a command-and-control style of management that excludes diverse values, approaches, and actors (Holling and Meffe 1996; Berkes 2017).

This displacement and exclusion led to a widespread mistrust of government actors that, together with local demand for more decision-making authority, has helped catalyze a shift towards hybrid and decentralized models of environmental governance in the late 20th century (Lemos and Agrawal 2006; Agrawal et al. 2008). Models of decentralized environmental governance vary based on the extent of devolution of power (Pretty 2003; Lemos and Agrawal 2006), ranging from participatory to locally based, to co-governance, to polycentric, to full community ownership of natural resources (Gilmour 2016). Broadly, decentralized governance has multiple potential benefits to local actors. One primary benefit is more equitable decision-making processes that meaningfully support diverse participation from actors who have long been marginalized from decision-making (Berkes 2009; Tengö et al. 2014; Bennett and Satterfield 2018). Another benefit is stronger relationships across actors operating at different scales (Armitage et al. 2012). Local decision-making helps facilitate strong vertical relationships, such as with governments (higher-level) and individuals (lower-level), and horizontal relationships such as those with neighboring or overlapping jurisdictions (Lemos and Agrawal 2006; Nkhata et al. 2008; Bennett and Satterfield 2018). A third potential benefit is that when local decision-makers are empowered, they are more likely to invest in capacity-building, which is often not a priority for centralized governments (Armitage 2005; Agrawal et al. 2008; Bennett and Satterfield 2018). Having adequate social and financial capacities helps enable decision-making (Bennett and Satterfield 2018) and allows for flexible responses to changing environmental conditions inherent in complex social-ecological systems (Armitage 2005; Lemos and Agrawal 2006).

Nevertheless, not all forms of decentralized governance inherently lead to better social-ecological outcomes (Ostrom 1990; Agrawal and Gibson 1999). Issues such as ineffective or poorly coordinated decision-making scales, a lack of capacity, and the perpetuation of existing inequalities can all arise (Nadasdy 2005; Bork and Hirokawa 2021). Furthermore, legacies of mistrust can persist even when a shift towards decentralized governance has occurred (Tengö et al. 2014). In practice, fully decentralized wildfire (Kelly et al. 2019; Schultz et al. 2019; Copes-Gerbitz et al. 2022b) and environmental governance (Berkes 2009; Kelly et al. 2019) is rare, which can add pressure to local actors negotiating overly bureaucratic or technocratic government-driven processes (Weir et al. 2022).

There are several reasons for the challenges that may arise from decentralized governance in a wildfire context. First, given the exclusion of local and Indigenous actors from decision-making over the last century (Agrawal et al. 2008) and government retention of decision-making authority in many cases, many individuals continue to mistrust government-initiated or implemented wildfire risk reduction approaches (Winter et al. 2004; Lachapelle and McCool 2012).

This lack of trust poses a barrier because, ultimately, higher-level governments still retain some level of authority (Egunyu et al. 2016; Kelly et al. 2019). This authority may manifest, for example, as legislation that conflicts with locally preferred solutions (e.g., strict reforestation guidelines or narrow prescribed burning windows) or processes that require government approval (e.g., the sign-off of fuels treatments or prescribed burn plans). Second, fully decentralized governance can be constrained in practice when communities lack social, technical, or financial capacity to develop and implement preferred proactive approaches (Armitage 2005; Abrams et al. 2015). Overcoming these trust and capacity barriers is a priority for ensuring that communities can effectively minimize negative impacts from wildfires (Brenkert-Smith et al. 2017; Paveglio et al. 2018; Copes-Gerbitz et al. 2022a).

While not a complete devolution of authority, opportunities for local governance that “fit” the appropriate environmental context are increasingly common (Agrawal et al. 2008). In the wildfire context, local governance is often led by community-level actors (e.g., not-for-profit organizations, homeowner associations, municipalities, and Indigenous communities) who develop and leverage capacities and are more likely to prioritize proactive wildfire management (McCaffrey 2015; McGee et al. 2015). Stronger local governance, including models where decision-making is shared with higher-level actors, can be successful in advancing proactive wildfire management due to two main factors. First, locally appropriate solutions, such as those that are guided by cultural protocols, enhance local values, or are developed for specific ecologies, often have a stronger buy-in than those solutions developed from distant and centralized authorities (Ostrom et al. 1999; Christianson et al. 2014; S. McCaffrey 2015). Second, local “champions” can help develop, build support for, and implement proactive management. Champions are critical motivators who build trust across scales, with individual community members and government agencies (Lachapelle and McCool 2012), through long-term social interactions (Brenkert-Smith 2010; Koebele et al. 2015). These long-term interactions provide a critical pathway for implementing local governance (Ostrom et al. 1999; Armitage et al. 2009).

1.2. Local wildfire governance in British Columbia, Canada

In British Columbia (BC), Canada, a shift towards more local models of wildfire governance has resulted from assertions by Indigenous communities to reclaim governance over their territories (Lake and Christianson 2019; Dickson-Hoyle et al. 2021; Nikolakis and Roberts 2021; Hoffman et al. 2022b), from local and rural communities that are concerned about wildfire risk (Devisscher et al. 2021), and from municipalities that are actively taking responsibility to address wildfire risk (Labossière and McGee 2017). This shift has mirrored and is embedded within greater public and local community involvement in forest management in BC (Hagerman et al. 2010). In this context, Community Forests (hereafter, CFs) have emerged as leaders advancing local efforts to undertake proactive wildfire management (Labossière and McGee 2017;

Devisscher et al. 2021). However, CFs are still embedded in the broader forest and land governance context in BC.

CFs are a local institutional actor that were created in the late 1990s in response to public pressure on the provincial government for more local control over forests (Ambus and Hoberg 2011). As a long-term (25–99 years) area-based tenure allocated by the provincial government, CF agreements are held by First Nations (Indigenous communities in BC), municipalities, regional districts (covering unincorporated communities), community not-for-profit societies, or through co-governance agreements among these groups (BC Community Forest Association 2021). CFs are governed by boards of directors and managed by either internal staff or contracted consultant forest managers. Subject to provisions within provincial legislation and regulations, including the *Forest Act 1996* and the *Forest and Range Practices Act 2002*, CF agreement holders are provided the exclusive right to harvest timber within their agreement area, to harvest and manage other botanical and forest products, and to prioritize local values.

CF tenures are typically granted to a group with a common vision in a specific place-based context (Egunyu et al. 2016), often in the wildland–urban interface where there is a high concentration of values (Erni et al. 2021). Because CF tenures are managed by and in proximity to local communities, and their mandate is to manage forests for local values across a defined area, several CFs have been established or evolved—at the initiative of local actors—primarily to manage forests to reduce wildfire risk. They are unique in BC where ~94% of land (known as “Crown” land) is managed by the provincial government, despite most land lacking treaties with First Nations, and ongoing assertions of Indigenous Rights and Title. Likewise, although wildfire in BC is still primarily governed by the provincial government (Tymstra et al. 2020; Copes-Gerbitz et al. 2022b), CFs are leading diverse approaches to proactively manage wildfire risk, including through innovative approaches to forest management (Devisscher et al. 2021). Yet because they operate under a government-issued tenure, CFs are still constrained by regional and provincial forest and wildfire governance systems including provincial forestry legislation and regulations (Ambus and Hoberg 2011; Egunyu et al. 2016). Understanding how local forms of governance such as CFs are connected to decision-making at other scales can reveal important insights into their ability to address complex environmental challenges (Ostrom 2010).

Building on recent research that highlights five CFs in south-central and south-east BC as innovators addressing wildfire risk and resilience (Devisscher et al. 2021), in this paper we explore the role of CFs in facilitating local wildfire governance and proactive wildfire management in BC. Here, we define proactive management as prevention (including mitigation) and preparedness (Canadian Interagency Forest Fire Centre 2017). Prevention includes approaches to stop or slow a wildfire, including fuels treatments, which can involve mechanical or manual forest thinning or prescribed and cultural burning; public education such as FireSmart™; and regulations prohibiting ignitions. Preparedness includes planning and training to enhance response effectiveness.

Specifically, our research addresses the following three questions:

1. What approaches to proactive wildfire management are CFs currently undertaking?
2. How are CFs overcoming challenges to, and advancing, local wildfire governance and management?
3. What are CF priorities for local wildfire governance and proactive management in BC?

We begin by highlighting the diversity of approaches that CFs are taking to proactively manage risk both within and beyond their tenures. We then demonstrate how they are leveraging different capacities, such as financial resources and strong relationships and trust, to advance local priorities for proactively managing wildfire risk. In doing so, we argue that CF managers act as trusted actors that are enabling diverse proactive approaches to wildfire management. Further, as hubs of capacity with strong relationships, we demonstrate how CFs are facilitating a model of local wildfire governance that connects proactive efforts across multiple spatial and social scales. These features position CFs as leaders advancing a shared vision of applying a “fire lens” to forest management in BC.

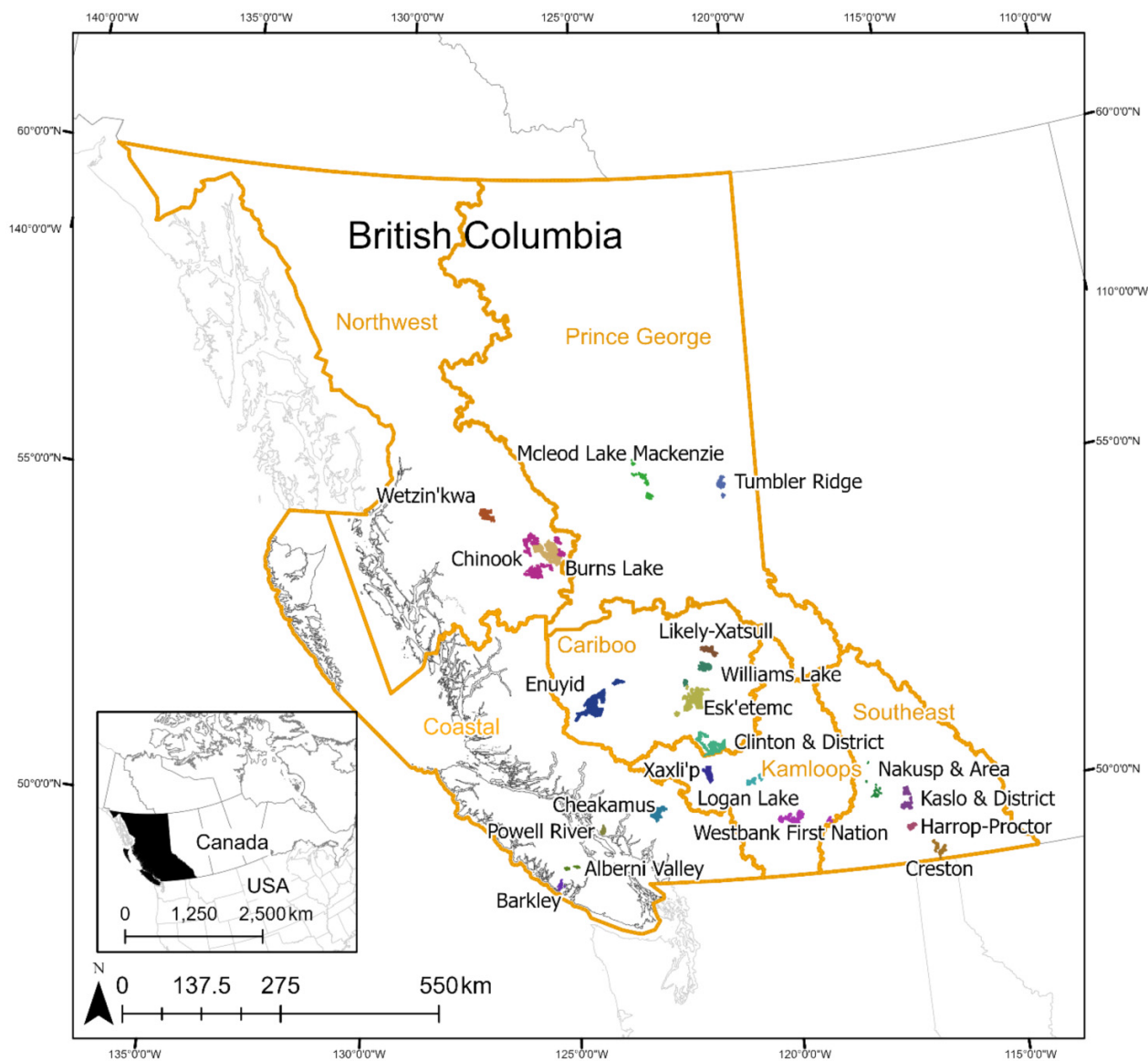
2. Methodology

2.1. Study context

In BC, wildfire is primarily governed by the provincial government’s Ministry of Forests (Tymstra et al. 2020; Copes-Gerbitz et al. 2022b). The BC Wildfire Service is the provincial agency mandated to undertake wildfire management and works with the Ministry of Forests across six regional Fire Centres to implement both wildfire response and proactive management. However, much of the proactive management is proponent-driven, meaning individual communities (such as municipalities, First Nations, or CFs) must apply for funding from various provincial host organizations and work with the Ministry of Forests and BC Wildfire Service to ensure that their plans adhere to legal requirements. Although funding programs continue to evolve based on lessons learned, this proponent-driven model has proven challenging for communities across BC, with many communities (such as First Nations or those with lower populations) experiencing higher barriers to access (Copes-Gerbitz et al. 2022a).

Widespread evacuations, record-breaking areas burned, and increasing response costs arising from catastrophic fire seasons in BC in 2017, 2018, 2021 and 2023 have highlighted that significant changes are needed to empower communities to lead proactive wildfire management (Abbott and Chapman 2018; Dickson-Hoyle and John 2021; Copes-Gerbitz et al. 2022b; Hoffman et al. 2022a). This is of particular significance for Indigenous communities who have long held responsibility for stewarding fire and fire-affected landscapes (Verhaeghe et al. 2019; Dickson-Hoyle et al. 2021; Nikolakis and Roberts 2021; Hoffman et al. 2022b), but were displaced and systematically marginalized by the colonial government of BC starting in the 1870s. This shift in wildfire governance coincided with an emphasis on reactive rather than proactive wildfire management (Copes-Gerbitz et al. 2022b).

Fig. 1. Location of 21 of 24 Community Forests represented by interviewees in British Columbia, Canada. Orange outlines and labels are six British Columbia Wildfire Service Fire Centres. Note: three Community Forests not listed to protect interviewee confidentiality. Figure was created using ArcGIS Pro version 3.1.1, using data from the BC Data Catalogue (accessed December 2022), Statistics Canada (accessed September 2016) and from the US Census Bureau (accessed December 2020).



2.2. Data collection and analysis

Between May and August 2019, we conducted in-depth, semi-structured interviews with 26 representatives from 24 CFs in BC, comprising forest managers ($n = 22$), contractors ($n = 2$), an administrator ($n = 1$), and a board member ($n = 1$) (hereafter all referred to as “managers”). We focused on perspectives of managers as the key decision-makers in CF management. Participants were selected through a combination of convenience and purposive sampling. Initially, LDD attended the annual meeting of the BC Community Forest Association in May 2018 to present results from a previous study of community engagement in proactive wildfire management in BC (Copes-Gerbitz et al. 2022a) and sought expressions of interest from managers to participate in subsequent research. Participants for this study were identified from this

initial list, with additional participants invited to ensure that the range of CFs represented a diversity of forest and fuel types, governance arrangements, and forest and wildfire governance jurisdictions throughout BC (Fig. 1, Table 1). At the time of research, this sample represented approximately 40% of the 58 Community Forest licenses awarded in BC at that time.

Interviews were conducted by SD-H and KC-G in person, except for one that was conducted over the phone for a more remote CF. Interviews averaged approximately 1 h and followed a thematic guide, with key topics including: values and objectives guiding CF management, managerial perceptions of wildfire risk and hazards; current and desired approaches for wildfire management; engagement with provincial and federal wildfire funding programs; involvement in

Table 1. Twenty-one of 24 Community Forests interviewed, including their area, year Community Forest license was issued, shareholders (responsible communities), and Fire Centre represented.

Community Forest	Area (ha)	Year license issued	Shareholder(s)	Fire Centre
Alberni Valley Community Forest	6378	2009	Alberni Valley Community Forest Corporation (City of Alberni Valley)	Coastal
Barkley Community Forest	6760	2015	Barkley Community Forest Corporation (Toquaht Nation, District of Uchuelet)	Coastal
Burns Lake Community Forest	92 000+	2000	Burns Lake Community Forest Ltd.	Northwest
Cheakamus Community Forest	Approx. 33 000	2009	Squamish Nation, Lil'wat Nation, Resort Municipality of Whistler	Coastal
Chinook Community Forest	104 000	2016	Burns Lake Band, Cheslatta Carrier Nation, Lake Babine Nation, Nee Tahi Buhn First Nation, Skin Tyee Band, Wet'suwet'en First Nation, Village of Burns Lake, Regional District of Bulkley Nechako (Areas B and E)	Northwest
Clinton and District Community Forest	62 000	2014	Village of Clinton	Cariboo
Creston Community Forest	21 408	2008 ²	Creston Valley Forest Corporation (Town of Creston, Regional District of Central Kootenay, Wildsight, Erickson Community Association, Trails for Creston Valley Society)	Southeast
Eniyud Community Forest	Approx. 115 000	2007	Eniyud Community Forest Ltd. (Alexis Creek Tsi Del Del First Nation, Tatla Lake Resource Association)	Cariboo
Eskétemc Community Forest	27 000	2006	Eskétemc First Nation	Cariboo
Harrop-Procter Community Forest	11 300	2000	Harrop-Procter Community Co-operative	Southeast
Kaslo and District Community Forest	32 416	2004 ²	Kaslo and District Community Forest Society	Southeast
Likely Xat'sull Community Forest	20 000	2003	Likely Community Forest Society and Soda Creek Indian Band	Cariboo
Logan Lake Community Forest	16 772	2008	Logan Lake Community Forest Corporation (District of Logan Lake)	Kamloops
McLeod Lake Mackenzie Community Forest	24 664	2009	McLeod Lake Indian Band, District of McKenzie	Prince George
Nakusp and Area Community Forest	Approx. 10 000	2011	Nakusp and Area Community Forest Inc. (Village of Nakusp)	Southeast
Powell River Community Forest	7100	2006	Powell River Community Forest Ltd. (City of Powell River)	Coastal
Tumbler Ridge Community Forest	19 739	2011	Tumbler Ridge Community Forest Corporation (District of Tumbler Ridge)	Prince George
Westbank First Nation Community Forest	46 000	2004	Westbank First Nation	Kamloops
Wetzin'kwa Community Forest	32 897	2007	Wetzin'kwa Community Forest Corporation (Town of Smithers, Village of Telkwa)	Northwest
Williams Lake Community Forest	28 828	2014	Williams Lake First Nation, City of Williams Lake	Cariboo
Xaxli'p Community Forest	24 5000	2011	Xaxli'p Community Forest Corporation (Xaxli'p First Nation)	Kamloops

Note: Three Community Forests not listed to protect interviewee confidentiality.

and approaches to landscape-level wildfire management; and visions for wildfire management in BC into the future.

All interviews were digitally recorded and transcribed verbatim for analysis. Qualitative thematic analysis was assisted with the use of Nvivo 12 qualitative data analysis software and was conducted through an iterative process combined with detailed and repeated reading of the data. Data were coded using a combination of a priori codes drawn from the literature on decentralized governance (e.g., collaboration, relationships, trust, and values),

as well as codes that were identified throughout the analysis process; codes were then grouped into higher-level categories and themes (Charmaz 2006; Maxwell 2013). We collectively coded a subset of interviews and developed a codebook of preliminary codes prior to commencing independent codebook thematic analysis, and frequently cross-checked code development and convergence of themes throughout the analysis process. Where respondents waived confidentiality, we have referred to their specific CF in this text. For respondents who requested confidentiality,

we simply attribute their quotes to “Community Forest manager.”

3. Results

Our analysis identified the numerous ways in which CFs are proactively managing wildfire risk both within and beyond their tenures, and how they are leveraging financial resources, strong relationships, and trust to advance local priorities for proactive wildfire management. Further, as hubs of capacity with strong relationships, we demonstrate how CFs are facilitating a model of local wildfire governance that prioritizes wildfire considerations in forest management and connects proactive efforts across multiple spatial and social scales.

3.1. Diverse approaches to proactive wildfire management

Community Forest managers, mandated by their local communities to protect priority community values within their tenures, are using a diversity of approaches to proactively manage wildfire risk. We grouped these approaches into three broad categories that reflect the increasing spatial scales at which CFs operate. These categories are: (1) household and community preparedness; (2) fuel treatments in the wildland–urban interface (e.g., modification or removal of living or dead forest fuels to reduce the likelihood of a wildfire starting, and to lessen the potential rate of spread and intensity of a wildfire that does start); and (3) planning (e.g., developing or updating community wildfire plans, facilitating multi-stakeholder planning processes). **Table 2** summarizes the range of proactive approaches to managing wildfire risk associated with each of these categories and highlights specific examples of these approaches being undertaken by Community Forests, as identified in interviews.

3.2. Overcoming barriers to local wildfire governance

3.2.1. Capacity and complex social-ecological landscape challenge progress

Community Forest managers spoke of two key barriers to local governance and management of wildfire risk: limited capacity, specifically social, technical, and financial capacity, and the challenge of prioritizing wildfire risk reduction in complex social-ecological landscapes. For many CF managers, their limited capacity was linked to a lack of expertise in fire science in BC:

“We’ve got HUGE gaps: the basic fire science, the modeling, the calibration and all that stuff. [The province is] weak as a jurisdiction...we talk about our forestry being so advanced and science-based and all that. On the fire side, I think it’s pretty weak.” (Harrop-Procter CF manager)

These gaps in technical expertise limit the progress that can be made; prescribed fire, for example, is one approach that requires a certified fire professional to develop a burn plan and implement the plan. However, in BC, the certifica-

tion to sign off on burn plans on provincial “Crown” land is currently only available to provincial government employees. Several CF managers commented that while they would like to incorporate more prescribed fire, it was challenging to find the right person to “light the match”:

“The problem is... the expertise is not around enough to be able to implement it...There are a few individuals that are very experienced in developing the [burn] plans, but there’s very few who are willing to light the match.” (Burns Lake CF manager)

Because this expertise is often external to CF staff, managers rely on funding programs that can be challenging to access or unsuitable for their needs. Many managers spoke of frustration with provincial funding programs related to timing (e.g., annual cycles when treatments can take years to plan and implement), lack of appropriate scope (e.g., funding only within “highest risk” areas), and the administrative burden of accessing funding, especially for smaller and more remote communities. The Likely Xat’sull CF, for example, said they would be more likely to apply for funding if they had “more time to dedicate to it...You need somebody that’s going to take it on and we all have jobs already.” While funding programs have evolved since the 2017 wildfire season to address some of these concerns, the Alberni Valley CF manager described how funding was not matching the scope of what they want to achieve: “They would pay us to go and kill all the alder along our river and convert it to [high-value] coniferous, to reduce our biodiversity and create a more fire-prone stand, but they won’t pay us to create a fire-resistant stand.”

Given their mandate to manage for the benefit of the entire community, as well as operate within provincial forestry legislation and planning contexts, CFs are constantly negotiating trade-offs between legal obligations and diverse community priorities in the complex landscapes that they manage:

“We have certain legal requirements as forest professionals. Under the Forest and Range Practices Act we manage for all [11 identified] resource values...But when you’re managing a community forest, it’s WAY beyond eleven. Because there’s a lot of social forestry that happens here.” (Logan Lake CF manager)

Some CF managers were hesitant to undertake proactive wildfire management because of potential pushback from local community members, not wanting to jeopardize the “social forestry” they were undertaking. This was especially prevalent in those places where perceived wildfire risk is low (e.g., in coastal forests), where there was mistrust in logging activity, or where people were not amenable to work near their private property:

“My biggest fear would be that we finally get to log this block which we think is awesome and creates a fuel break and stuff and the logging truck rolls down the valley and gets blocked. Because that’s what happened the last time a logging truck came here.” (CF manager)

Despite these challenges, CF managers are continuing to push for innovative ways to overcome capacity barriers and prioritize wildfire risk reduction in their tenures and beyond.

Table 2. Community Forest approaches to proactively manage wildfire risk.

Category	Proactive approaches	Examples from Community Forests
Household and community preparedness	Facilitate community FireSmart™ programs <ul style="list-style-type: none"> Promote “Home Partners” program Lead funding applications Partner with the municipality, municipal fire department, or regional district to support local FireSmart™ coordinator 	Nakusp and Area CF applied for FireSmart™ funding on behalf of the Village of Nakusp and subsequently hired a local coordinator. The following year the CF partnered with the regional district to support the coordination of a regional FireSmart™ program across multiple communities.
	Build community capacity for wildfire response <ul style="list-style-type: none"> Purchase wildfire suppression equipment (e.g., trucks, pumps, and portable sprinkler systems) Train contractors 	Powell River CF is building local response and initial attack suppression capacity by purchasing trailer-mounted sprinkler systems, mapping all access roads and water courses in the CF tenure, and providing funds to the local volunteer fire department to support training and equipment needs.
	Proactive engagement with wildfire agencies and forest tenure holders <ul style="list-style-type: none"> Align communication and operational systems (e.g., standardizing radio channels or suppression equipment) Share information (e.g., access routes and water sources) 	
Fuels treatments	Intensive forest management in proximity (e.g., 500 m) to community	Between 2014 and 2019, Westbank First Nation CF received funding to treat approximately 150 ha adjacent to communities in the interface. Beyond these interface treatments, the CF has treated approximately 200 ha through thinning and partial cuts.
	“Test” innovative silviculture treatments <ul style="list-style-type: none"> Selectively harvests to achieve multiple objectives, including fuels reduction Allow natural regeneration of deciduous species 	Tumbler Ridge CF employed a selective harvesting model to achieve the dual objectives of reducing fuel loads around the community while also salvaging beetle-killed trees for commercial gain (Fig. 2).
	Coordinate landscape-level fuel breaks across multiple tenures	Macleod Lake McKenzie CF is addressing wildfire risk along the single, 39 km evacuation road from McKenzie to the nearest major town by treating up to 150 m of forest on either side of the road. This treatment would involve working closely with private landholders, other tenure holders, and the municipality.
Planning	Develop and/or implement Community Wildfire Resilience Plans <ul style="list-style-type: none"> Identify values at risk, map hazards, prioritize mitigation measures Apply for funding, hold community meetings and gather feedback, and implement fuel treatments 	The Cheakamus CF works closely with the local municipality to design and implement fuels treatments identified in the community wildfire plan, and to obtain matching funding for additional treatments within the CF area.
	Undertake strategic landscape-level wildfire planning <ul style="list-style-type: none"> Guide wildfire management as part of forest stewardship and harvest planning Plan and implement strategic fuel treatments 	Kaslo and District CF’s 2020 Landscape Level Fire Plan was developed as a planning tool to implement strategic fuel treatment areas within the CF tenure.
	Wildfire advisory and planning committees <ul style="list-style-type: none"> Chair or coordinate multi-actor (e.g., First Nations, municipality, industry) planning processes 	McLeod Lake Mackenzie CF, in partnership with the District of Mackenzie, is chairing the Mackenzie Wildfire Advisory Committee, which brings together local First Nations, BC Wildfire Service, and forest industry partners to implement a coordinated approach to proactive wildfire management. The CF has hired a wildfire coordinator to support this committee.

3.2.2. Leveraging external and internal funding

Most CF managers interviewed had been successful in receiving funding to support a diversity of approaches, including household and community preparedness, fuel treatment, and multi-stakeholder community wildfire planning. Many

CF rely on provincial funding programs, with one going so far to say “*without the funding we wouldn’t be doing any of [our proactive wildfire management].*” Several managers have found success with one provincial funding program that is flexible and within the scope of the work they want to achieve:

Fig. 2. (a) and (b) Forest stand in Tumbler Ridge CF before (2a) and after (2b) a selective harvesting treatment. This treatment had multiple objectives including reducing hazardous fuels, addressing forest health issues, and promoting recreation opportunities. Photo credit: Tumbler Ridge CF Manager. Photo originally published in [Copes-Gerbitz et al. \(2020\)](https://www.ubctreeringlab.ca/post/wildfire-management-in-bc-community-forests-2020), available online at <https://www.ubctreeringlab.ca/post/wildfire-management-in-bc-community-forests-2020>.



“[One provincial funding agency] allows their funding to lapse fiscal [cycles], which is fantastic. It’s probably the most functional funding source that I’ve worked with... if [a proposed treatment] doesn’t happen because we don’t have a good winter so we don’t get a lot of mechanical treatments completed - you can span that funding into the next fiscal [year] and actually complete it when the conditions are favourable.” (CF manager)

Community Forest managers who praised this funding program highlighted how important their relationships are with the funding managers to help achieve successful funding outcomes: *“we know our local [funding coordinator] quite well because...he lives here, and we know what the expectations are and we seem to be meeting them.”* (CF manager)

Despite the importance of these external funding programs, the challenges accessing funding, limited number of experts in the province, and high costs associated with preferred fuel treatments often require CFs to *“put skin in the game”* (Westbank First Nation CF manager) by absorbing planning costs and self-funding implementation of work. As the Harrop-Proctor CF manager said, *“a lot of community forests are self-funding projects, whether they’re formally called fuel treatments or whether they’re just doing fuel treatment as a part of [harvesting operations].”*

Those CFs with financial capacity often leverage it to support proactive wildfire management beyond their tenure. The McLeod Lake Mackenzie CF, for example, co-led the formation of a wildfire advisory committee with the District of Mackenzie and provided funding to hire a wildfire coordinator. This advisory committee also includes members from the McLeod Lake Indian Band, the BC Wildfire Service, the Ministry of Forests, forest industries, and other local stakeholders. The financial capacity provided by McLeod Lake Mackenzie CF helped situate them as a leader in community wildfire protection:

“Some municipalities are so far behind they don’t even have a [community wildfire plan] done. And we recognize how lucky we are to have a

community forest that is on board for taking over that. Because I think that is key for a municipality.” (McLeod Lake Mackenzie, CF board member)

3.2.3. Building relationships and trust

Strong relationships and trust with local communities and other stakeholders underpins all CF approaches to managing wildfire risk. Relationship-building is enabled by the fact that managers often have a physical presence in and personal connection to these communities, which play out both informally in places like grocery stores and on ferries or more formally through dedicated engagement processes:

“You’re close to the community – people watch you. They will voice their opinion and you will hear it. And you will hear it right away... And so there’s lots of communication that needs to happen and I think that’s a very unique thing about community forests.” (Logan Lake CF manager)

Critically, these informal types of exchanges represent the personal contact that is necessary for helping educate and inform communities about addressing wildfire risk. CF managers would often rely on these informal relationships to help guide more formal engagement, such as community meetings. Community Forest managers also spoke of having an *“open door policy”* and encouraging two-way communication with their communities so that wildfire can *“become part of the conversation”* (Burns Lake CF manager). These communication approaches include education to help communities understand risk and discuss forest management options to address that risk (Esk’etemc CF manager) or through targeted stakeholder communication:

“It boils down to communication with the stakeholders. Explaining to the stakeholders and listening to the stakeholders so that we understand what their concerns and values are. Nobody likes to be told by

somebody standing up in front of the room, “this is what we’re going to do”... So it’s working from the grassroots level up, rather than dictating from the top down.” (Westbank First Nation CF manager)

Many CF managers were starting to see the impacts of these dedicated efforts, both in terms of their CF being increasingly trusted by community members and in terms of raised awareness of the importance of proactive wildfire management. After the 2017 wildfire season, for example, one manager recalled “our phone was ringing and people were saying...couldn’t you start [fuels treatments] soon?...We knew there would be a lot more public acceptance for us being in their backyard right away.” Another recalled a change in attitude of a major recreational group whose initial response to seeing fuel treatments was “this logging looks terrible...this is awful!” After being told by their fellow recreationalist and CF manager it was a fuel treatment to reduce wildfire risk, the rest of the group thought it was “great”: “it’s exactly the same thing but because it’s wildfire people have a totally different lens on it,” said the manager.

Managing wildfire risk on multi-value landscapes also requires strong relationships with government agencies. CF managers emphasized the importance of “getting to know a key contact” in local BC Wildfire Service offices who can assist with funding applications, support fuel treatment planning, and help coordinate wildfire response. Others work closely with the Ministry of Forests on fuel treatments to ensure compliance with forest management obligations or to access unallocated “Crown” and to conduct landscape-level treatments. These working relationships also help with the success of FireSmart™ and prescribed burns, as well as enable rapid and coordinated wildfire response; managers shared stories of providing infrastructure, such as phone lines, generators, and fire-fighting equipment, to support their local communities during the 2017 wildfire season. The Powell River CF manager highlighted just how critical these relationships are:

“It doesn’t matter where the fire starts, it’s going to impact each other right? So we’re trying to pool our resources to be able to work together. And where there’s a fire doesn’t matter, I don’t care if it’s on my neighbor’s property I’m going to go help put it out.”

Due to these trusted relationships and strong networks, CF managers often act as a community champion, motivating proactive approaches to managing wildfire risk. Importantly, in this role, CFs help facilitate the acceptability and success of different approaches by navigating complex trade-offs in the social-ecological systems in which they operate, such as potentially losing timber revenue because they prioritize removal of higher-risk fuels, while simultaneously identifying local priorities for wildfire governance and management.

3.3. Advancing priorities for proactive wildfire management through local wildfire governance

In leveraging their diverse capacities and relationships with both community-level and centralized government actors, CFs play a key role in advancing local priorities for proactively managing wildfire risk. We identified two key priorities of CFs for wildfire governance and management in BC:

(1) managing forests with a “fire lens” and (2) scaling up proactive management across the landscape and beyond the wildland–urban interface.

3.3.1. Refocusing forest management with a fire lens

Proactive wildfire management is increasingly a priority and guiding objective for CF managers, with one manager emphasizing that “Wildfire [is] our number one concern now. As a community forest we’ve kind of shifted into that being what we’re managing for.” However, managers spoke of numerous challenges associated with this shift in focus, in particular the lack of consideration of wildfire-related objectives or targets in established management plans and mandates, and the need to revise these considering recent wildfire seasons and re-evaluations of risk. In this context, managers emphasized the need for wildfire to be “the driving force” underpinning contemporary approaches to forest and landscape planning, requiring a shift from a primary focus on wildfire suppression:

“I would hope that fire management could become a year-round activity. I think that we need to not just think about managing fire between May 1st and September 30th. We need to manage fire outside of those [months] too, whether it’s through prescribed burns or it’s through planning, whether it’s through hazard mitigation and burning of logging debris or the treatment of fuel-loading that happens with harvesting.” (CF manager)

Taking a “fire lens” to forest management also involves considering the importance of restoring fire to fire-adapted forest ecosystems in BC, with a focus on managing for ecosystem resilience. In practice, managers described creating structural and compositional mosaics on the landscape; managing for biodiversity, including promotion of deciduous species; the potential of assisted migration of native tree species from outside of their natural range; and replicating ecosystem-specific natural disturbance regimes through using prescribed burns. These strategies help restore natural forest resilience and address the century plus of wildfire suppression and control that was the norm in BC (Hoffman et al. 2022a).

In addition to the ecological role of fire in many of BC’s ecosystems, other managers, particularly those managing First Nations-led CFs, highlighted the cultural significance of fire to many Indigenous peoples in BC: “I was quickly educated in the importance of fire in the culture, in the community. And why these forests need fire.” (Esk’etemc CF manager). Further, in CFs governed or co-governed by a First Nation, priorities such as building local response capacity are interwoven with cultural values and priorities, such as protecting important cultural sites as well as the built environment, restoring cultural burning, or communal planning for evacuations to ensure cultural protocols are met. More broadly, restoring fire to the land as both an ecological and cultural process is a priority for many CFs and their communities. Most managers expressed a desire to (re)introduce prescribed or cultural burning within their CF to achieve multiple objectives, including ecological restoration, cultural revitalization and hazard reduction. Continuing to build relationships amongst BC Wild-

fire Service, forestry professionals and communities are seen as priorities for achieving this goal. As the Esk'etemc Community Forest manager said: *“burning is a social issue. It's not just a technical issue. It's not a bureaucratic issue. It's a social issue. And if you don't have the support of the community, you won't be able to do it.”*

3.3.2. Scaling-up proactive wildfire management

Although CFs are currently working with homeowners, in their tenure and in the wildland–urban interface, and supporting landscape-scale efforts, managers shared the sentiment that proactive wildfire management needed to continue to be scaled-up. They described broadening the focus of community wildfire protection beyond the current 2 km designated wildland–urban interface boundary; what one manager called a *“logical extension from a [community wildfire plan], to move out...into a larger landscape level.”* One manager reflected on why refocusing forest management with a fire lens was crucial to being able to address wildfire risk at the landscape scale:

“Doing all these fuel management projects around the towns are great. But it represents, maybe, 1% of the forests that we need to deal with. So, we got a huge fire risk outside the communities. Obviously, we need to focus on protecting communities and the infrastructure, but we need to look at harvesting as a whole.”

Increasing collaboration between communities, tenure holders, and government agencies with overlapping and adjacent jurisdictions is seen as a key mechanism to scale up wildfire management. One manager described how they envision the work scaling up: *“We have to trust that, as we work within the boundaries of the community forest there are other groups and proponents that are working on the extra, the pieces outside the community forest. We haven't directly seen that, but we see the work happening in the community and we just assume that's where we're going to end up.”* Numerous managers expressed a desire to see greater coordination between government agencies regarding wildfire management, including for response; one manager said: *“we have to work on better getting along with each other, because if one agency is doing something and another agency is doing something else and there's a fire, that's not going to work in the end. That's one of the key things I'd like to see—more harmony.”* Scaling up approaches will require additional efforts to navigate and reconcile potentially conflicting values and objectives: *“there's so many different objectives on the land base that push one another, maybe it's time to create a hierarchy of what we're trying to do in certain areas.”* (CF manager)

Ultimately, many managers pointed to the work being led by CFs as justification to expand the CF program in BC, which would be one way to scale-up proactive wildfire management. Managers highlighted how their area-based tenures and community ties are key in promoting alternative approaches that are responsive to community needs and values *“because that's what community forestry is all about”* (CF manager). Emphasizing the mandate of CFs to *“be innovative and show what works”* (Tumbler Ridge, CF manager), they spoke about how CF tenures allow them to push the boundaries and pilot new approaches to forest and wildfire management.

4. Discussion

Our results demonstrate that CFs in BC are successfully overcoming barriers to local wildfire governance to implement diverse proactive approaches to reduce wildfire risk. Community Forest managers not only play a central role in doing this in their own tenure, but, as local champions, they also help facilitate proactive approaches across multiple scales. We find that trust—both with other members of their communities and with government agencies—is central to the success of CFs in this space. We argue that this trust is a primary element of social capacity that, if leveraged, can help align wildfire governance with the scales needed to address the complex social-ecological wildfire challenge in BC. Additional financial capacity and removal of policy constraints will also help ensure that future forest management can be undertaken through a fire lens, which is a key priority for CFs across BC.

4.1. Community Forests leverage diverse capacities to champion proactive wildfire management

Community Forests are leading proactive wildfire management not only at the local scale, but across broader spatial and social scales, connecting efforts with overlapping and adjacent jurisdictions, and working with communities, funding agencies, and governments to achieve this. The diversity of approaches is possible because CFs are hubs of technical, financial, and social capacity; capacity is a critical input that affects the functioning and performance of environmental governance arrangements (Bennett and Satterfield 2018). Financial capacity for proactive wildfire management is concentrated within CFs both through their own internal funding or leveraging external funding, consistent with findings from previous studies (Labossière and McGee 2017; Devisscher et al. 2021). In 2021, for example, the 30 CFs who reported their finances (70% existing at the time) invested a total of \$2 million CAD of their internal operating budget in proactive wildfire management such as fuel treatments, and leveraged an additional \$14.4 million CAD from provincial and federal government funding sources (BC Community Forest Association 2021). The important role of CFs in mitigating risk around communities was further recognized by the provincial government, which allocated \$5 million CAD to the BC Community Forest Association in 2021 to fund fuel treatments across 15 CFs; ongoing research in partnership with these CFs is evaluating the efficacy of these treatments in mitigating risk.

The increasing negative impacts from wildfires in BC has been a key motivator of this investment, with a tripling of investment in the 3 years after the catastrophic 2017 and 2018 wildfire seasons (BC Community Forest Association 2020). Devisscher et al. (2019) found that most internal investment comes from mid-size CFs with operating areas of ~16 000–23 000 ha. This pattern could suggest that larger CFs perceive certain approaches (e.g., fuels treatments) as a normal part of forestry operations (Ambus and Hoberg 2011) rather than as a separate investment, suggested by our data on managing

forests with a “fire lens.” However, evidence suggests that a lack of financial capacity is still a limiting factor for smaller CFs (Devisscher et al. 2021). This finding aligns with research in BC (Copes-Gerbitz et al. 2022a) and the US (Trainor et al. 2009; Wigtil et al. 2016) that demonstrates that smaller communities are less likely to have the financial capacity to invest in proactive wildfire management.

In addition to financial capacity, CFs are also hubs of social and technical capacity, in particular skills and expertise required to assess and manage hazards and navigate administrative or institutional processes (Kuhlicke et al. 2011). For example, CF managers are often Registered Professional Foresters (RPFs) in BC who have the legal authority to develop and implement fuel treatments. Although approval of these plans ultimately rests with the government, CF managers are willing to take risks and test different approaches; another form of social capacity linked to motivation and sense of responsibility (Kuhlicke et al. 2011). Yet proactive wildfire management requires a range of skills and forms of expertise that RPFs are not necessarily required to have, such as being a burn boss who can implement prescribed burning. CFs that have the financial capacity to do so will often hire external consultants to access these increasingly needed forms of expertise, yet smaller CFs often lack this financial capacity.

The social capacity of CFs is also due to their role in establishing strong relationships and networks among different organizational and individual actors. As local champions, CF acts as motivators in communities who can help facilitate acceptability and success of proactive approaches to managing wildfire (Koebele et al. 2015; Labossière and McGee 2017) and other related risks associated with climate change (Salon et al. 2014). Previous studies have highlighted the important role of both individual citizens (Koebele et al. 2015) or neighborhood organizations (Shiralipour et al. 2006) as local champions who encourage others to engage in proactive wildfire management. Our data show that CFs exhibit characteristics of both—as individual managers who are often members of their respective communities and as local institutions motivated to address wildfire risk. Furthermore, managers’ regular informal interactions in their communities help to strengthen the outcomes of local wildfire governance (Morehouse et al. 2011) because they help provide the “bridging capital” needed to motivate locally relevant solutions that balance potentially conflicting perspectives (Brenkert-Smith 2010).

Another key reason why CFs are successful as local champions is because they prioritize locally relevant solutions that reflect local perceptions of risks and values (Brenkert-Smith et al. 2017; Christianson et al. 2013; S. McCaffrey 2015). Yet despite changes by the BC government to incorporate more locally relevant solutions through, for example, an emphasis on incorporating Indigenous and local knowledge (Copes-Gerbitz et al. 2022b), a lack of consideration of local context in government-led approaches continues to be a source of frustration for communities in BC (Abbott and Chapman 2018; Verhaeghe et al. 2019; Dickson-Hoyle and John 2021; Hoffman et al. 2022b). The CF emphasis on locally relevant solutions responds to these concerns and contributes to their ability to function as an effective and equitable form of more

local governance (Ostrom et al. 1999; Bennett and Satterfield 2018) operating in a complex social-ecological system (Lachapelle and McCool 2012).

4.2. Trust enables local wildfire governance

Trust is a critical factor that contributes to the success of proactive wildfire management (Lachapelle and McCool 2012; Olsen and Sharp 2013; S. McCaffrey 2015). Although our research did not explicitly aim to explore the role of trust, CF managers continually emphasized the importance of good relationships with both community members and government agencies as a factor in their success. This aligns with findings that public trust in a manager can predict acceptance levels of fuel treatments (Toman et al. 2014) and that trust between communities and agencies is critical for implementing proactive management (Winter et al. 2004). Trust is built not only through informal, interpersonal interactions (Brenkert-Smith 2010), but also through institutional processes such as methods and forums for engagement (Olsen and Sharp 2013). Since CFs are operating in a middle ground between communities and governments in BC, the trust they build vertically across these groups can help overcome legacies of mistrust in government action (Lachapelle and McCool 2012). As local champions, CF managers are often playing leading roles in proactive wildfire management, and trust is an important quality of a leader who is navigating complex challenges in dynamic social-ecological systems (Lachapelle and McCool 2012). Trust also helps to facilitate more innovative and equitable solutions because it allows for transparency and consensus-building (Lachapelle and McCool 2012; Devisscher et al. 2021).

Just as trust is key for enabling proactive wildfire management, it is also important for advancing local environmental governance (Ostrom et al. 1999; Armitage et al. 2009). In this context, trust that is built through repeated interactions (Rousseau et al. 1998) can provide legitimacy to decision-making actors (Turner et al. 2016). While we did not initially define trust as a part of social capacity as others have done (Armitage et al. 2009), our data show that it forms a critical part of the functioning of CFs. The role of CFs as a form of local environmental governance is reflected in the CF managers’ emphasis on “social forestry” (not just wildfire management) and on the need to refocus forest management with a “fire lens.” In these ways, they are thinking beyond narrow definitions of wildfire governance and trying to reconnect forest and wildfire governance that have long been siloed in BC (Copes-Gerbitz et al. 2022b). Nevertheless, previous research has highlighted that CFs are still constrained by higher-level processes and decision-making (and therefore governance) that has not fully devolved from centralized government (Ambus and Hoberg 2011; Egunyu et al. 2016; Sutherland et al. *accepted manuscript*). Despite this, CFs are well situated to navigate and constantly negotiate the extent to which they are able to exercise decision-making authority.

In BC, there is an increasing emphasis on sharing decision-making for wildfire management between local communities and government agencies (BC Wildland Fire Management Branch 2010; Abbott and Chapman 2018; Copes-Gerbitz et al.

2022b). In reality, decision-making exists across scales: within individual communities (such as within a CF tenure), at regional scales (such as through Fire Centres or with neighboring timber licensees or other tenure holders), and at provincial scales (where funding is disbursed and legislation defined). These nested scales of decision-making reflect the complexity of wildfire governance within social-ecological systems (Kelly et al. 2019). The trust that CFs have to undertake proactive wildfire management is critical for bridging governance efforts across scales (Lemos and Agrawal 2006; Nkhata et al. 2008; Bennett and Satterfield 2018) because it helps to connect different forms of expertise (Armitage et al. 2009, 2012; Tengö et al. 2014).

While CFs themselves are operating at local scales, the diversity and method of approaches means they are facilitating wildfire governance at higher scales. For example, CFs are bridging spatial scales by not only working in their tenure area on fuel treatments, but also supporting FireSmart™ initiatives on private property, building response capacity for whole communities that can be utilized across territories or regional areas, and leading or contributing to landscape-scale fuel breaks or egress routes. Community Forests are successful at bridging these spatial scales because they are trusted local champions that can simultaneously connect knowledge and expertise across scales, for example through multi-actor strategic planning processes such as Community Wildfire Resilience Plans. In these ways, they complement resource-constrained agencies and are a key link of expertise between the public and government agencies (Brenkert-Smith 2010; McCaffrey and Olsen 2012; Koebele et al. 2015). These characteristics situate CFs as an important component of wildfire governance in BC, where local, regional, and provincial actors are all (working towards) sharing responsibility (Copes-Gerbitz et al. 2022b). Therefore, rather than focusing on whether CFs represent a wholly decentralized model of governance (Ambus and Hoberg 2011; Eguny et al. 2016), and acknowledging the potential drawbacks and challenges of local governance (Bork and Hirokawa 2021), we instead argue that CFs are well-positioned to help advance locally led wildfire governance and negotiate across other wildfire and forestry governance institutions in BC. These benefits of community-led decision-making in wildfire governance are a global trend (Rodríguez et al. 2013; Martínez-Torres et al. 2016; Mistry et al. 2016; Lake and Christianson 2019; Marks-Block and Tripp 2021).

5. Conclusions: advancing proactive wildfire management in BC

Despite the leadership, innovation, and critical role of CFs in wildfire governance in BC, CFs continue to face challenges undertaking proactive wildfire management. Our data align with other research (Devisscher et al. 2021), highlighting that not all CFs have the social or technical capacity, in terms of time or expertise, to apply for funding programs, and many lack internal financial capacity because they are smaller or newer. While the scope of eligible activities in existing funding programs has grown, certain administration

costs are ineligible, such as the extensive consultation with agencies required for approvals on proposed approaches; financial capacity can thus remain a barrier for CFs. In addition, the high costs associated with fuel treatments mean that available funding may restrict larger fuel treatments, except for within CFs that can bear the financial burden (Ambus and Hoberg 2011). Furthermore, existing funding programs and provincial legislation can still be misaligned with priorities for proactive management, such as replanting to lower densities or regrowing deciduous species. Adjustments to funding programs to help CF managers navigate trade-offs in social-ecological systems will be imperative, especially as changes to the *Forest and Range Practices Act*, which governs forest management in BC, adds wildfire risk reduction in the wildland–urban interface as a legislated value. While important for helping managers navigate trade-offs among values in the wildland–urban interface, this change could potentially reduce funding availability as some approaches (such as fuel treatments) may become part of a legal duty of care rather than an added and therefore funded approach. Addressing these barriers is key to ensuring not only that CFs can continue addressing wildfire risk, but also to help expand access to proactive wildfire management that many communities across BC continue to lack (Copes-Gerbitz et al. 2022a).

Ultimately, CFs play a unique and pivotal role in advancing proactive wildfire management across scales in BC. Critically, they do so by implementing locally relevant approaches, demonstrating the importance of no one-size-fits-all solution to the modern wildfire challenge (Brenkert-Smith et al. 2017; Paveglio and Edgeley 2017; Copes-Gerbitz et al. 2022a). Future research that evaluates the efficacy of these distinct approaches in reducing wildfire risk is needed to provide additional technical expertise, for example for fuels treatments. Such research, along with capacity supports for local models of governance, is critical for scaling up local solutions and implementing a “fire lens” while managing the broader forested land base. Trust from the public and government agencies is a key factor that contributes to the success of CFs who are helping to overcome legacies of mistrust in centralized government institutions. The success of CFs advancing a diversity of proactive approaches to wildfire management demonstrates the opportunity for local environmental governance to contribute to solutions at local, regional, and provincial scales in complex social-ecological systems in BC (Devisscher et al. 2021) and beyond.

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Due to participant confidentiality and research ethics, research data are not made available beyond the research team.

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References

- Abbott, G., and Chapman, M. 2018. Addressing the new normal: 21st century disaster management in British Columbia.
- Abrams, J.B., Knapp, M., Paveglio, T.B., Ellison, A., Moseley, C., Nielsen-Pincus, M., and Carroll, M.S. 2015. Re-envisioning community-wildfire relations in the U.S. west as adaptive governance. *Ecol. Soc.* **20**(3): doi:10.5751/ES-07848-200334.
- Agrawal, A., and Gibson, C.C. 1999. Enchantment and disenchantment: the role of community in natural resource conservation. *World Dev.* **27**(4): 629–649. doi:10.1016/S0305-750X(98)00161-2.
- Agrawal, A., Chaatre, A., and Hardin, R. 2008. Changing governance of the world's forests. *Science*, **320**(June): 1460–1462. doi:10.1126/science.320.5882.1435. PMID: 18556552.
- Ambus, L., and Hoberg, G. 2011. The evolution of devolution: a critical analysis of the Community Forest Agreement in British Columbia. *Soc. Nat. Resour.* **24**(9): 933–950. doi:10.1080/08941920.2010.520078.
- Armitage, D. 2005. Adaptive capacity and community-based natural resource management. *Environ. Manage.* **35**(6): 703–715. doi:10.1007/s00267-004-0076-z. PMID: 15940398.
- Armitage, D., de Loe, R., and Plummer, R. 2012. Environmental governance and its implications for conservation practice. *Conserv. Lett.* **5**(4): 245–255. doi:10.1111/j.1755-263X.2012.00238.x.
- Armitage, D., Plummer, R., Berkes, F., Arthur, R.I., Charles, A. T., and Davidson-Hunt, I.J., 2009. Adaptive co-management for social-ecological complexity. *Front. Ecol. Environ.* **7**(2): 95–102. doi:10.1890/070089.
- BC Community Forest Association. 2020. Community Forest Indicators 2020.
- BC Community Forest Association. 2021. Community Forest Indicators 2021.
- BC Wildland Fire Management Branch. 2010. BC Wildland fire management strategy(Issue September).
- Bennett, N.J., and Satterfield, T. 2018. Environmental governance: a practical framework to guide design, evaluation, and analysis. *Conserv. Lett.* **11**(6): 1–13. doi:10.1111/conl.12600.
- Berkes, F. 2009. Evolution of co-management: role of knowledge generation, bridging organizations and social learning. *J. Environ. Manage.* **90**(5): 1692–1702. doi:10.1016/j.jenvman.2008.12.001. PMID: 19110363.
- Berkes, F. 2017. Environmental governance for the anthropocene? Social-ecological systems, resilience, and collaborative learning. *Sustainability*, **9**(7): doi:10.3390/su9071232. PMID: 29707262.
- Bork, K., and Hirokawa, K. 2021. Trends in local ecosystem governance. *Front. Clim.* **3**(September): 1–18. doi:10.3389/fclim.2021.719150.
- Brenkert-Smith, H. 2010. Building bridges to fight fire: the role of informal social interactions in six Colorado wildland-urban interface communities. *Int. J. Wildland Fire*, **19**(6): 689–697. doi:10.1071/WF09063.
- Brenkert-Smith, H., Meldrum, J.R., Champ, P.A., and Barth, C.M. 2017. Where you stand depends on where you sit: qualitative inquiry into notions of fire adaptation. *Ecol. Soc.* **22**(3): doi:10.5751/ES-09471-220307.
- Brondizio, E.S., and Le Tourneau, F.M. 2016. Environmental governance for all. *Science*, **352**(6291): 1272–1273. doi:10.1126/science.aaf5122. PMID: 27284179.
- Canadian Interagency Forest Fire Centre. 2017. Canadian Wildland Fire Management Glossary. In *Canadian Wildland Fire Management Glossary*. Canadian Interagency Forest Fire Centre Inc., Winnipeg, Manitoba.
- Charmaz, K. 2006. *Constructing Grounded Theory: a Practical Guide*. SAGE Publications, Thousand Oaks.
- Christianson, A., McGee, T.K., and L'Hirondelle, L. 2013. How historic and current wildfire experiences in an aboriginal community influence mitigation preferences. *Int. J. Wildland Fire*, **22**(4): 527–536. doi:10.1071/WF12041.
- Christianson, A., McGee, T.K., and L'Hirondelle, L. 2014. The influence of culture on wildfire mitigation at Peavine Métis Settlement, Alberta, Canada. *Soc. Nat. Resour.* **27**(9): 931–947. doi:10.1080/08941920.2014.905886.
- Copes-Gerbitz, K., Dickson-Hoyle, S., Hagerman, S.M., and Daniels., L.D. 2020. BC Community Forest Perspectives and Engagement in Wildfire Management. Report to the Union of BC Municipalities, First Nations Emergency Services Society, BC Community Forest Association and BC Wildfire Service.
- Copes-Gerbitz, K., Dickson-Hoyle, S., Ravensbergen, S.L., Hagerman, S.M., Daniels, L.D., and Coutu, J. 2022a. Community engagement with proactive wildfire management in British Columbia, Canada: perceptions, preferences, and barriers to action. *Front. For. Glob. Change*, **5**(March): doi:10.3389/ffgc.2022.829125. PMID: 36278245.
- Copes-Gerbitz, K., Hagerman, S.M., and Daniels, L.D. 2022b. Transforming fire governance in British Columbia, Canada: an emerging vision for coexisting with fire. *Reg. Environ. Change*, **22**(2): 1–15. doi:10.1007/s10113-022-01895-2.
- Devisscher, T., Spies, J., and Griess, V. 2021. Time for change: learning from community forests to enhance the resilience of multi-value forestry in British Columbia, Canada. *Land Use Policy*, **103**(January): 105317. doi:10.1016/j.landusepol.2021.105317.
- Dickson-Hoyle, S., and John, C. 2021. Elephant Hill: Secwépemc leadership and lessons learned from the collective story of wildfire re-

- covery. Secwepemcul'ecw Restoration and Stewardship Society, Kamloops, BC.
- Dickson-Hoyle, S., Ignace, R.E., Ignace, M.B., Hagerman, S.M., Daniels, L.D., and Copes-Gerbitz, K. 2021. Walking on two legs: a pathway of indigenous restoration and reconciliation in fire-adapted landscapes. *Restor. Ecol.* **30**: 1–9. doi:10.1111/rec.13566.
- Egunyu, F., Reed, M.G., and Sinclair, J.A. 2016. Learning through new approaches to forest governance: evidence from Harrop-Procter Community Forest, Canada. *Environ. Manage.* **57**(4): 784–797. doi:10.1007/s00267-015-0652-4. PMID: 26725053.
- Erni, S., Johnston, L., Boulanger, Y., Manka, F., Bernier, P., and Eddy, B., 2021. Exposure of the Canadian wildland–human interface and population to wildland fire, under current and future climate conditions. *Can. J. For. Res.* **51**(9): 1357–1367. doi:10.1139/cjfr-2020-0422.
- Fischer, A.P., Spies, T.A., Steelman, T.A., Moseley, C., Johnson, B.R., and Bailey, J.D., 2016. Wildfire risk as a socioecological pathology. *Front. Ecol. Environ.* **14**(5): 276–284. doi:10.1002/fee.1283.
- Gilmour, D. 2016. Forty years of community-based forestry. Food and Agriculture Organization of the United Nations, Rome, Italy.
- Hagerman, S.M., Dowlatabadi, H., and Satterfield, T. 2010. Observations on drivers and dynamics of environmental policy change: insights from 150 years of Forest management in British Columbia. *Ecol. Soc.*, **15**(1): doi:10.5751/ES-03073-150102.
- Hoffman, K.M., Christianson, A.C., and Gray, R.W. 2022a. Western Canada's new wildfire reality needs a new approach to fire management. *Environ. Res. Lett.*, **17**(6): 061001. doi:10.1088/1748-9326/ac7345.
- Hoffman, K.M., Christianson, A.C., Dickson-Hoyle, S., Copes-Gerbitz, K., Nikolakis, W., and Diabo, D.A., 2022b. The right to burn : barriers and opportunities for Indigenous-led fire stewardship in Canada. *FACETS*, **7**: 464–481. doi:10.1139/facets-2021-0062.
- Holling, C.S., and Meffe, G.K. 1996. Command and control and the pathology of natural resource management. *Conserv. Biol.* **10**(2): 328–337. <http://www.jstor.org/stable/2386849%5Cn> <http://www.jstor.org/page/>. doi:10.1046/j.1523-1739.1996.10020328.x.
- Kelly, E.C., Charnley, S., and Pixley, J.T. 2019. Polycentric systems for wildfire governance in the Western United States. *Land Use Policy*, **89**(March): 104214. doi:10.1016/j.landusepol.2019.104214.
- Koebeler, E., Crow, D.A., Lawhon, L.A., Kroepsch, A., Schild, R., and Clifford, K. 2015. Wildfire outreach and citizen entrepreneurs in the wildland–Urban interface: a cross-case analysis in Colorado. *Soc. Nat. Res.*, **28**(8): 918–923. doi:10.1080/08941920.2015.1054975.
- Kuhlicke, C., Steinführer, A., Begg, C., Bianchizza, C., Bründl, M., and Buchecker, M., 2011. Perspectives on social capacity building for natural hazards: outlining an emerging field of research and practice in Europe. *Environ. Sci. Pol.*, **14**(7): 804–814. doi:10.1016/j.envsci.2011.05.001.
- Labossière, L.M.M., and McGee, T.K. 2017. Innovative wildfire mitigation by municipal governments: two case studies in Western Canada. *Int. J. Disaster Risk Reduct.* **22**(March): 204–210. doi:10.1016/j.ijdr.2017.03.009.
- Lachapelle, P.R., and McCool, S.F. 2012. The role of trust in community Wildland Fire Protection planning. *Soc. Nat. Resour.* **25**(4): 321–335. doi:10.1080/08941920.2011.569855.
- Lake, F.K., and Christianson, A.C. 2019. Indigenous Fire Stewardship. In *Encyclopedia of Wildfires and Wildland-Urban Interface (WUI) Fires*. Edited by S. L. Manzello. Springer, Cham. pp. 1–9. doi:10.1007/978-3-319-51727-8_225-1.
- Lemos, M.C., and Agrawal, A. 2006. Environmental governance. *Annu. Rev. Environ. Resour.*, **31**: 297–325. doi:10.1146/annurev.energy.31.042605.135621.
- Marks-Block, T., and Tripp, W. 2021. Facilitating prescribed fire in northern California through indigenous governance and interagency partnerships. *Fire*, **4**(3): doi:10.3390/fire4030037.
- Martínez-Torres, H.L., Castillo, A., Ramírez, M.I., and Pérez-Salícup, D.R. 2016. The importance of the traditional fire knowledge system in a subtropical montane socio-ecosystem in a protected natural area. *Int. J. Wildl. Fire*, **25**(9): 911–921. doi:10.1071/WF15181.
- Maxwell, J.A. 2013. *Qualitative Research Design: an Interactive Approach*. SAGE Publications, Thousand Oaks.
- McCaffrey, S. 2015. Community wildfire preparedness: a global state-of-the-knowledge summary of social science research. *Curr. For. Rep.* **1**(2): 81–90. doi:10.1007/s40725-015-0015-7.
- McCaffrey, S., Toman, E., Stidham, M., and Shindler, B. 2013. Social science research related to wildfire management: an overview of recent findings and future research needs. *Int. J. Wildland Fire*, **22**: 15–24. doi:10.1071/WF11115.
- McCaffrey, S.M., and Olsen, C.S. 2012. Research perspectives on the public and fire management: a synthesis of current social science on eight essential questions. U.S. Department of Agriculture, Forest Service, Northern Research Station, Newtown Square, PA. 40 p.
- McGee, T., McFarlane, B., and Tymstra, C. 2015. Wildfire: a Canadian perspective. In *Wildfire Hazards, Risks, and Disasters*. 1st ed. Edited by D. Paton and J.F. Shroder. Elsevier, New York, NY. pp. 35–58. doi:10.1016/B978-0-12-410434-1.00003-8.
- McWethy, D.B., Schoennagel, T., Higuera, P.E., Krawchuk, M., Harvey, B.J., Metcalf, E.C., et al. 2019. Rethinking resilience to wildfire. *Nat. Sustain.* **2**(9): 797–804. doi:10.1038/s41893-019-0353-8.
- Mistry, J., Bilbao, B.A., and Berardi, A. 2016. Community owned solutions for fire management in tropical ecosystems: case studies from indigenous communities of South America. *Philos. Trans. R Soc. Lond. B Biol. Sci.*, **371**(1696): 20150174. doi:10.1098/rstb.2015.0174.
- Morehouse, B.J., Henderson, M., Kalabokidis, K., and Iosifides, T. 2011. Wildland Fire governance: perspectives from Greece. *J. Environ. Policy Plan.* **13**(4): 349–371. doi:10.1080/1523908X.2011.611678.
- Moritz, M.A., Batllori, E., Bradstock, R.A., Gill, A.M., Handmer, J., and Hessburg, P.F., 2014. Learning to coexist with wildfire. *Nature*, **515**(7525): 58–66. doi:10.1038/nature13946. PMID: 25373675.
- Nadasdy, P. 2005. The anti-politics of TEK: The institutionalization of co-management discourse and practice. *Anthropologica*, **47**(2): 215–232.
- Nikolakis, W., and Roberts, E. 2021. Wildfire governance in a changing world: insights for policy learning and policy transfer. *Risk, Hazards Crisis Public Policy*, 1–21. doi:10.1002/rhc3.12235.
- Nkhata, A.B., Breen, C.M., and Freimund, W.A. 2008. Resilient social relationships and collaboration in the management of social-ecological systems. *Ecol. Soc.* **13**(1): doi:10.5751/es-02164-130102.
- Olsen, C.S., and Sharp, E. 2013. Building community-agency trust in fire-affected communities in Australia and the United States. *Int. J. Wildland Fire*, **22**(6): 822–831. doi:10.1071/WF12086.
- Ostrom, E. 1990. *Governing the commons*. Cambridge University Press, Cambridge.
- Ostrom, E. 2010. Polycentric systems for coping with collective action and global environmental change. *Glob. Environ. Change*, **20**(4): 550–557. doi:10.1016/j.gloenvcha.2010.07.004.
- Ostrom, E., Burger, J., Christopher, B.F., Richard, B.N., and Policansky, D. 1999. Revisiting the commons: local lessons, global challenges. *Science* (New York, N.Y.), **284**(5412): 278–282. doi:10.1126/science.284.5412.278. PMID: 10195886.
- Paveglio, T., and Edgeley, C. 2017. Community diversity and hazard events: understanding the evolution of local approaches to wildfire. *Natural Hazards*, **87**(2): 1083–1108. doi:10.1007/s11069-017-2810-x.
- Paveglio, T.B., Carroll, M.S., Stasiewicz, A.M., Williams, D.R., and Becker, D.R. 2018. Incorporating social diversity into wildfire management: proposing “pathways” for fire adaptation. *For. Sci.*, **64**(5): 515–532. doi:10.1093/forsci/fxy005.
- Pretty, J. 2003. Social Capital and the Collective Management of Resources. *Science*, **302**(5652): 1912–1914. doi:10.1126/science.1090847. PMID: 14671287.
- Rodríguez, I., Sletto, B., Bilbao, B., Sánchez-Rose, I., and Leal, A. 2013. Speaking of fire: reflexive governance in landscapes of social change and shifting local identities. *J. Environ. Policy Plan.* **7200**(March): 1–20. doi:10.1080/1523908X.2013.766579.
- Rousseau, D.M., Sitkin, S.B., Burt, R.S., and Camerer, C. 1998. Not so different after all: a cross-discipline view of trust. *Acad. Manage. Rev.*, **23**(3): 393–404. doi:10.5465/AMR.1998.926617.
- Salon, D., Sinnott, M., and Sciarra, G.C., 2014. Local climate action: motives, enabling factors and barriers. *Carbon Manage.*, **5**(1): 67–79. doi:10.4155/cmt.13.81.
- Schultz, C.A., Thompson, M.P., and McCaffrey, S.M. 2019. Forest Service fire management and the elusiveness of change. *Fire Ecol.* **15**(1): doi:10.1186/s42408-019-0028-x.
- Shiralipour, H.J., Monroe, M.C., and Payton, M. 2006. Working with neighborhood organizations to promote wildfire preparedness. In *The Public and Wildland Fire Management: social science findings for managers*. Technical Report NRS-1. Edited by S.M. McCaffrey. USDA Forest

- Service, Northern Research Station General, Madison, WI. pp. 151–162
- Smith, A.M.S., Kolden, C.A., Paveglio, T.B., Cochrane, M.A., Bowman, D.M.J.S., and Moritz, M.A., 2016. The science of fire-scapes: achieving fire-resilient communities. *BioScience*, **66**(2): 130–146. doi:[10.1093/biosci/biv182](https://doi.org/10.1093/biosci/biv182). PMID: 29593361.
- Sousa, J., Çinar, C., Carmo, M., and Malagoli, M.A.S. 2022. Social and historical dimensions of wildfire research and the consideration given to practical knowledge : a systematic review. *Nat. Hazards*, **114**: 1103–1123. doi:[10.1007/s11069-022-05460-2](https://doi.org/10.1007/s11069-022-05460-2).
- Spies, T.A., White, E.M., Kline, J.D., Fisher, A.P., Ager, A., and Bailey, J., 2014. Examining fire-prone forest landscapes as coupled human and natural systems. *Ecol. Soc.*, **19**(3): 9. doi:[10.5751/ES-06584-190309](https://doi.org/10.5751/ES-06584-190309).
- Steelman, T. 2016. U. S. wildfire governance as social-ecological problem. *Ecol. Soc.* **21**(4): doi:[10.5751/ES-08681-210403](https://doi.org/10.5751/ES-08681-210403).
- Tedim, F., McCaffrey, S., Leone, V., Delogu, G.M., Castelnou, M., and McGee, T.K., 2019. What can we do differently about the extreme wildfire problem: an overview. *In* Extreme wildfire events and disasters: root causes and new management strategies. *Edited by* F. Tedim, L. Vittorio and T.K. McGee. Elsevier Inc., Cambridge, MA. pp. 233–263. doi:[10.1016/B978-0-12-815721-3.00013-8](https://doi.org/10.1016/B978-0-12-815721-3.00013-8).
- Tengö, M., Brondizio, E.S., Elmqvist, T., Malme, P., and Spierenburg, M. 2014. Connecting diverse knowledge systems for enhanced ecosystem governance: the multiple evidence base approach. *Ambio*, **43**(5): 579–591. doi:[10.1007/s13280-014-0501-3](https://doi.org/10.1007/s13280-014-0501-3). PMID: 24659474.
- Toman, E., Shindler, B., McCaffrey, S., and Bennett, J. 2014. Public acceptance of wildland fire and fuel management: panel responses in seven locations. *Environ. Manage.* **54**(3): 557–570. doi:[10.1007/s00267-014-0327-6](https://doi.org/10.1007/s00267-014-0327-6). PMID: 25034754.
- Trainor, S.F., Calef, M. F., Natcher, D., Chapin, F.S., McGuire, A.D., and Huntington, O., 2009. Vulnerability and adaptation to climate-related fire impacts in rural and urban interior Alaska. *Polar Res.*, **28**(1): 100–118. doi:[10.1111/j.1751-8369.2009.00101.x](https://doi.org/10.1111/j.1751-8369.2009.00101.x).
- Turner, R.A., Addison, J., Arias, A., Bergseth, B.J., Marshall, N.A., and Morrison, T.H., 2016. Trust, confidence, and equity affect the legitimacy of natural resource governance. *Ecol. Soc.*, **21**(3): doi:[10.5751/ES-08542-210318](https://doi.org/10.5751/ES-08542-210318).
- Tymstra, C., Stocks, B.J., Cai, X., and Flannigan, M.D. 2020. Wildfire management in Canada: review, challenges and opportunities. *Prog. Dis. Sci.* **5**: 100045. doi:[10.1016/j.pdisas.2019.100045](https://doi.org/10.1016/j.pdisas.2019.100045).
- Verhaeghe, C., Feltes, E., and Stacey, J. 2019. Nagwedizk'an Gwanes Gangu Ch'inidzed: the fire awakened us. Tsilhqot'in report on the 2017 wildfires.
- Weir, J.K., Neale, T., and Clarke, E.A. 2022. The recalibration of our relationships with science (and nature) by natural hazard risk mitigation practitioners. *Environ. Plan. E Nat. Space*, **5**(3): 1654–1677. doi:[10.1177/25148486211019828](https://doi.org/10.1177/25148486211019828).
- Wigtil, G., Hammer, R.B., Kline, J.D., Mockrin, M.H., Stewart, S.I., Roper, D., and Radeloff, V.C. 2016. Places where wildfire potential and social vulnerability coincide in the coterminous United States. *Int. J. Wildland Fire*, **25**(8): 896–908. doi:[10.1071/WF15109](https://doi.org/10.1071/WF15109).
- Winter, G., Vogt, C.A., and McCaffrey, S. 2004. Examining social trust in fuels management strategies. *J. For.*, **102**: 8–15.