Reinterpreting Human-Fire Relations in Cultural and Prescribed Fire: The Implications of Climate Change and the Work to Change Paradigms

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Climate change is posing specific risks to the Earth's major elements and our global resources: including fire, water, soil, and air. These elements have been observed from both positive and negative perspectives within academic and public discourse, emphasizing their inherent power and ability for both destruction and creation as well as sustaining forces for life on Earth. They inform each other in different ways, appearing as both opposites and related forces. Since they are all life-sustaining, the changing nature of these forces with climate change pose certain risks for both human and non-human life in both the immediate present and prospective future. Climate change is predicted to intensify over the 21st century with ongoing human emissions of greenhouse gases and human impacts on terrestrial and marine ecosystems and the effects from this are being understood through the idea of "tipping elements", which refers to the components of Earth's system that could undergo state shifts that exceed critical thresholds or "tipping points" and that these tipping elements could drive significant biodiversity loss, alter the distributions of major ecological biomes, compound greenhouse gas emissions and radiative forcing, and produce important consequences for human society – such as sea-level rise and severe weather events (Wang et al., 2023, p. 2). The prevalence of severe weather events is particularly of note and the interactions between climate change and fire are of interest to many people residing in fire-prone regions, including myself, such as in British Columbia where larger than normal wildfires are becoming a growing cause for concern.

My research is in part influenced by the practicum work I completed as part of my Master of Arts degree in Human Rights and Social Justice (HRSJ) at Thompson Rivers University. For my practicum, I worked with the Grasslands Conservation Council of BC in Kamloops

researching the POLIS Wildfire Resilience Project (2024) and cultural burning and was in charge of writing a contribution for their annual magazine. The piece I wrote focused on the state of wildfire in British Columbia and utilized current public news sources and websites including the *Good Fire* podcast, *The Globe and Mail*, *The Narwhal*, and *Parks Canada* in order to discuss the importance of the resurgence of cultural and prescribed fire in fighting against extreme wildfire activity, restoring ecosystem health, and working towards reconciliatory action and healing by reintegrating a practice that historically prohibited Indigenous communities from conducting these vital practices under colonial governance. Furthermore, the piece highlighted the importance of cultural and prescribed burns in grassland ecosystems. The magazine covers various subjects and projects related to the Grasslands Conservation Council of BC to an audience of people across Canada, with a concentration on local residents in Kamloops that are active citizens or engaged Thompson Rivers University students, professors, and alumni. Contributing to this magazine was important in that it is a site of public knowledge and intersects with various community perspectives. This experience helped to inform my larger research project for my master's program and effectively integrate my interests in climate change, wildfire management in British Columbia, decolonization, and environmental policy. My interest in all of these interlinking areas of research comes from being born and growing up in Lheidli T'enneh Territory (Prince George, BC, Canada). I spent the majority of my young years enjoying various outdoor recreation activities in the area like camping, swimming, and hiking. Living in British Columbia nearly all my life, the increase in wildfires has been very apparent to me, from notably smoky summers, close fires of note, evacuations of nearby communities that resulted in an influx of evacuees during summers of high fire activity, and concern for family members residing in rural areas. Climate change and wildfire management is a complex issue in British

Columbia, impacting various groups of people of different racial backgrounds, socioeconomic statuses, gender identities, and abilities.

In my research, taking a decolonial approach that emphasizes Indigenous voices is important, as Indigenous knowledge keepers have skills in maintaining and living on this land that have been passed down for centuries, and this is especially pertinent in the case of wildfire management and mismanagement. Defining decolonization within climate change research is something I will expand on in succeeding sections.

My research also aims to highlight women in wildfire management and climate change research, as the intersection of gender and climate change is pertinent. For example, women are often at higher risk of climate-related burdens and impacts, as well as unequal participation in decision-making and labour markets that prevent women from being able to contribute to climate-related planning, policymaking, and implementation (United Nations Climate Change, n.d., para. 1). Highlighting the experiences of women and the challenges they face in a time of climate change is important in recognizing the unique burdens women face in times of natural disaster including poverty, home-based occupations, a lack of access to education and representation in leadership roles (Climate Change, n.d., 0:20). The benefits of the inclusion of women's voices and leadership in these processes include greater environmental protections, more stringent climate policies, and the ratification of environmental treaties (Wray et al., 2023, p. 1088). This is supported by the fact that environmental and climate policies passed when women have positions of power are more likely to be effective and promote equality, which is supported by studies that show women's presence in the Executive Committees of CFIs in India and Nepal positively impacts forest conservation and women's empowerment, justice, and welfare and enforcing gender quotas in forest management community groups in Indonesia,

Peru, and Tanzania found that groups in which women comprised an equal number or majority of members conserved more trees and shared payments more equally among members (Wray et al., 2023, p. 1088). Women in climate leadership are currently hindered by many factors – including cultural norms, childminding, lack of financial support, and lack of access to education, which requires structural changes and supportive services in order to address these inequalities (Wray et al., 2023, p. 1089). Although understudied, the representation of women in cultural burning initiatives is also of significance. For example, Martu Indigenous women (the Martu people are Indigenous inhabitants of Western Australia), were found to apply fire in a specific fashion that was distinct from that of Martu men and that women's burning was important for women's hunting needs (Cavanagh, 2022, p. 89-90). There needs to be space and opportunities made for Indigenous women's voices so that they are also heard (Cavanagh, 2022, p. 91). It is vital that the unique perspectives of Indigenous women are taken seriously in cultural and prescribed fire initiatives in such a way that their lived experience is not overlooked or continued to be erased in the patriarchal colonial systems which govern them.

This is especially important in considering *intersectionality* within climate change research. Intersectionality was originally coined by Kimberlé Crenshaw (1989) and was a critique of feminist theory and anti-racist politics by highlighting the unique experiences of black women in experiencing oppression and exclusion (Mikulewicz et al., 2022, p. 1276). If applied more broadly, intersectionality refers to the idea that oppression operates in such a way that different types of oppression intersect with each other, depending on an individual's lived experiences. This ideology emphasized the reality that women of colour face unique barriers that must be considered within feminist theory. If applied more specifically, climate change and intersectionality are linked in that they both have roots in radical theory and share a commitment

to human emancipation and ending the oppression of marginalized groups (Mikulewicz et al., 2022, p. 1278). A gendered analysis within climate change research allows for a more nuanced understanding of human emancipation through the focus on women as a large and encompassing group that has historically been restrained in social, political, and cultural realms.

A notable creative account of the personal, lived effects of climate change and its impact on women comes from Meghan Fandrich, a writer from Lytton who experienced the tragic fire that destroyed the town in 2021. Fandrich's collection of poems *Burning Sage: Poems from the Lytton Fire*, was published in 2023 and details her experiences navigating being evacuated from Lytton and losing her home, the place where she worked, lived, and owned the Klowa Art Café, while supporting and looking after her daughter. Her poetry is captivating in that it details the experiences that are easily taken for granted until a traumatic event occurs:

> and somewhere among those flames
>
> were homes, farms
>
> the school
>
> probably burning
>
> that red glow
>
> our whole world
>
> on fire (Fandrich, "Fire at Night", 14-20)

What is of emphasis in these lines is the reminder that every community serves as a microcosm of something larger. Every community member is enveloped by places that constitute an individual's world, and this can be hard to remember or digest fully in a world that functions through globalized relationality. In another vein, some of her poems highlight the importance of community and external support in surviving traumatic events:

People are fishing today

the Nlaka'pamux

dipping their nets into strong water

hanging deep red flesh

to dry in the wind

almost like

life goes on

my neighbour brought me a salmon

heavy gift

almost like she had always been next door

almost like her house

didn't burn (Fandrich, "Sockeye", 1-12)

These lines reveal profound community relations. Not just with other people in the community, but with the surrounding ecosystems, the fish, the water, and the continuity of life. These connections are important in understanding the impact of climate change on individuals, and especially in the context of wildfire management in British Columbia, as new and more intense wildfire activity continues to put communities at risk. These connections also evoke the idea of kinship in times of crisis, as things we take for granted in our everyday lives like houses and food are evocative of memories and emotional responses in that they are associated with our sensory experiences from childhood (Carsten, 2020, p. 325). This helps to illustrate the emotive qualities in both of Fandrich's poems and the emphasis on both homes and food as sources of memory and symbols of one's basic needs. This can be seen as the entanglement of kinship with different forms of property, which seemingly associates kinship with settled existence, but the tie

to "the evocative powers of memory, and the capacity of portable objects and technologies to evoke relational ties with emotional resonance, means that kinship can readily be carried from one place to another even by solitary travellers and in the absence of living relatives" (Carsten, 2020, p. 325). Kinship does not cease to exist among displaced individuals in times of environmental crisis. Kinship can therefore be seen as something that is essential in times of environmental crisis. Harroway (2016) argues that making kin with others, even those that we may not be similar to, is necessary in facing the predicted increase in natural disasters of the future, which is often referred to as the sixth mass extinction or the next extinction in the history of life on Earth that has been accelerated by human-induced climate change (Drake, 2015, para. 1). Thus, kinship is important to consider in that it increases our ability to foster resilience in times of crisis and navigate necessary displacement.

Climate Change as a 'Wicked Problem' with Influences from the Age of Enlightenment and Western Colonialism

Understanding climate change as both a distinct phenomenon and a nuanced problem to tackle on a global scale involves different perspectives and approaches. The idea that climate change is layered and multi-faceted is not a new concept. Climate change can be seen as a 'wicked problem' due to the interconnected nature of climate change with other major social issues and its consequences on related systems. Theorists Horst Rittel and Melvin Webber (1973) coined the term *wicked problem* to help highlight the complexities and challenges of addressing planning and social policy problems. Some clear identifiers of how climate change meets the criteria of a wicked problem are that there is no end to the number of possible solutions to the problem, it can be described as the symptom of other problems, and it is a problem that lacks an inherent logic that signals when it is solved (Stony Brook University, n.d.). Since climate change

unequivocally meets the criteria of being a wicked problem, it suggests that climate change should be treated as an interdisciplinary problem and remarkable area of research among a variety of scholars.

In considering what has come to be known as the Anthropocene, which was coined by chemist Paul J Crutzen and diatom researcher Eugene F Stoermer (2000) and refers to a new geological epoch, or the unit of time that human beings are currently occupying – and in which human beings are having the greatest impact on the natural environment, (Pavid, n.d., para. 1) one can look backwards in time to consider what has led us here and the types of thinking that have resulted in a global system that is dependent on the extraction and exploitation of natural resources. This extraction and exploitation did not come out of nowhere, "the replacement of renewable energies (wind, water …) by coal at the beginning of the industrial revolution did not owe to some simple technological advantage that coal had over renewables. Rather, it was used the better to subject the uprooted peasants to the industrial machinery which was producing for the market" (Felli, 2021, p. 5). This notion stems from Malm (2013), who argues that fossil fuels should be understood within social relation and as a necessity to commodity production and result of wage or forced labour (p. 17). Thus, the value system associated with capitalism, and more specifically, anthropocentric and extractive decision making, is one that is inherently based on power and inequality.

The terminology of the Anthropocene is rightfully contested, as it separates humans from non-living entities (Masaki, 2021, p. 4). Western philosophy can help to explain how the conception of an Anthropocene came into being and why the climate crisis has advanced from historical Western philosophical thinking, as early philosophers like John Locke centered human beings in their conceptions of the world, making non-human entities and resources subject to our

control by a conceptualized 'inherent' right (Masaki, 2021, p. 5). Rousseau had a different influential outlook on humans in relation to nature, seeing animals of equal creation to humans and emphasizing Earth's inherent beauty (Masaki, 2021, p. 7). However, aestheticizing nature has its own criticisms, in that it views nature as something that can inherently benefit humans or be a source of pleasure which implies the objectification and or utilization of nature for personal gain. The idea of the sublime emerged in the Enlightenment period and was influenced by many prominent figures like Kant and Wollstonecraft, emphasizing the "awe-inspiring capacity of nature and beauty, characteristics that artists and thinkers sought to replicate in their own work and even to apply to ethics" (Cartwright, 2024, para. 1). The sublime also evokes an inherent conflict between the appreciation of beauty with a feeling of awe, astonishment, and incomprehension of the eternal (Cartwright, 2024, para. 2). The sublime helps to explain why the beauty of nature was emphasized, but it does not outright explain how it led to misinterpreting the role of nature.

A potential answer can be found in the conflation of nature and beauty with human characteristics and behaviour. Van Dyke stated in *The Desert: Further Studies in Natural Appearances* (1901) that "beauty is an intrinsic quality in nature, he argues in the book; it has nothing to do with human ideas of goodness or morality. It is not something men and women bestow on the world, whether by deeds or imagination, but is independent of human beings, though it can afford sensuous pleasure" (Worster, 1992, p. 72). This helps to illustrate why this conflation could be dangerous in that it distracts from the reality that nature is not inherently beautiful for any greater function or understanding. Nature is beautiful because it is, and beauty can only ever function as an observation, not an objective truth. Recognizing these early Western perspectives of domination and control, aestheticization and goodness, helps in the analysis of

why we have been and continue to be estranged from nature in major part by colonialism, the industrial revolution, and late stage capitalism.

Productive climate change research "implies a rupture, breaking from the neoliberal moment. It calls for the democratic extension of social protection, and a different way of organizing the fabric of our lives" (Felli, 2021, p. 159). Indigenous studies looks to understand vulnerability as influenced by climate change within colonialism and as a direct contributor to climate change (Whyte, 2017, p. 156). Furthermore, productive climate change research also implies a rupture from what Miranda Fricker (2007) coined as "epistemic injustice" or the unfair treatment of individuals based on ideas of one's capacity for and execution of knowledge. The long history of epistemic injustice against Indigenous peoples in Canada has resulted in "...a barrier to collaboration and coordination between multiple knowledges and different stakeholders, and this barrier is particularly strongly felt in sustainable development because of the power differentials and distance. Byskov, for example, argues that the exclusion and underrepresentation of Indigenous peoples from national climate strategy deliberations is epistemic injustice because they have 'a special interest in implementing sustainable and responsive climate strategies that take their knowledge and interests into account'" (Cummings et al., 2023, p. 1969; Byskov 2018). Thus, climate change research should also seek to employ a decolonial lens and center Indigenous voices in order to deconstruct climate change's colonial origins and perpetuity.

This academic report intends to address key questions within current climate change research related to the increased incidence and severity of wildfires in British Columbia, Canada, the barriers to cultural burning practices that would support Indigenous land sovereignty and promote ecological health, the consequences of extreme wildfire activity on water ecosystems,

education and community involvement as methodology, and recommendations for fire managers.

I use the term 'stewardship' throughout this report in order to encapsulate the relationship

between human and non-human entities in thoughtful conservatory action. However, the term

also evokes a hierarchical relationship, in which humans are the owners or proprietors of the

Earth and that this relationship is nonreciprocal. McIntyre-Mills (2021) suggests that if

stewardship is to be taken seriously then steps need to be taken to recognize the habitat of all

creatures including those living in cities and suburbs as well as wild animals and that loss of

habitat for plants and animals is an inevitable issue that needs to be addressed (p. 123).

Therefore, stewardship also implies that wellbeing should be protected and that mitigating the

issues associated with climate change needs to happen through green methods of production and

non-anthropocentric ethics that place humans at the centre of a web instead of above the web

(McIntyre-Mills, 2021, p. 130). Transforming the ideologies surrounding stewardship into these

suggested definitions is no easy task and involves larger restructuring. However, challenging

stewardship as a term and invoking responsibilities at a higher level is essential to decolonial

climate change research and action.

The Climate Crisis and the Increase in Wildfire Activity in Canada

A significant number of scholars in environmental science and adjacent disciplines find

that wildfires are going to become more prevalent and extreme with climate change (Boegelsack

et al. 2018; Di Virgilio et al. 2019; Hoffman et al. 2022). Boegelsack et al. (2018) outline climate

change effects on wildfires as being both direct and indirect, and environmental and human

caused. Direct environmental causes are rising temperatures, decreased humidity, prolonged

drought periods, and strong and shifting winds (Boegelsack et al., 2018, p. 462). Indirect

environmental causes are increased pollution affecting tree health and mortality and pest

populations like pine beetles (Boegelsack et al., 2018, p. 463). Direct human causes include accidental fires due to ignorance as well as arson, while indirect human causes include extensive logging and grazing, and the introduction of invasive species (Boegelsack et al., 2018, p. 465). Understanding which causes are direct and indirect helps give context to which causes can be managed through intentional changes in human action and which causes may be harder to manage due to overlapping influences like pollution and current environmental policies.

Di Virgilio et al. (2019) show that climate change effects are associated with the development of pyrocumulonimbus wildfires (extreme wildfires) in southeastern Australia and that the conditions, such as atmospheric instability and dryness that would cause the development of more pyrocumulonimbus wildfires, is especially prevalent to the consideration of urban expansion in fire-prone regions (p. 8517). Furthermore, as observed in a multi-regional data set across wildfire sites in the US Rocky Mountains, there is evidence that significantly less tree regeneration is occurring after wildfires in the 21st century in comparison to the 20th century due to warmer and drier conditions (Stevens-Rumann et al., 2018, p. 249). The effects of severe wildfires on people are extensive. For example, material loss can include but is not limited to loss of livelihood, homes, businesses, family heirlooms, sentimental items, and financial loss (Rossiello & Szema, 2019, p. 2). More direct loss can occur as well, such as the loss of lives of vulnerable populations and decreased public health from exposure to wildfire smoke causing significant respiratory distress or related chronic conditions (Rossiello & Szema, 2019, p. 2). Hoffman et al. (2022) echo similar sentiments and highlight that the increase of high-severity fires in Canada needs to be addressed and that wildfire policy needs to be changed, as well as the fact that we need to be looking to Indigenous-led cultural burning to reduce wildfire risk in

wildfire-prone zones (p. 4). This leads to the history and prevalence of cultural burning in wildfire management.

Resiliency in Wildfires through Traditional Burning Methods

Cultural burning has existed from time immemorial and was practiced by Indigenous peoples across Canada. The literature in the field of environmental science that largely comprises Western science and epistemologies (although more recently includes perspectives of Indigenous science and epistemologies) observes that ecological health and fire resiliency can be bolstered through cultural burning (Eisenberg et al. 2019; Hoffman et al. 2021; Van Vugt 2021). Additionally, fire served to create a mosaic of growth in forests and grasslands, which bolstered biodiversity and ecological health (Eisenberg et al., 2019, p. 2). The overt benefits of fire in Canadian (and other) landscapes begs the question of why fire has been suppressed. The answer lies in colonialism and the public perception of wildfire as being inherently 'bad' or 'destructive' (Hoffman et al., 2021, p. 1). The public perception of fire being inherently 'bad' or 'destructive' is a consequence of continued fire suppression and the subsequent effects of colonization that resulted in capitalism and a resource-based economy. Thus, advocating for fire resiliency, embracing pro-fire approach to biodiversity, and revitalizing Indigenous knowledge and stewardship is inherently a human rights and social justice issue that requires taking a critical stance on the systems that currently govern environmental action. Understanding cultural burning as a historical issue is essential in that it has played an important role in maintaining the land, multiple forms of knowledge, and generational transference that was disappreciated, misunderstood, and feared, which resulted in active banning (Van Vugt, 2021, p. 18). This prohibition occurred in British Columbia in the early 20th century through fines, withholding resources, and embargos on hiring Indigenous peoples on all scales of government with the

wrongful characterization of cultural burning as an unsafe activity and Indigenous peoples as uneducated in the 'proper' ways of wildfire management that served to make white settlers feel safe and, as a result, contributed to the loss of many techniques and ceremonies surrounding fire (Van Vugt, 2021, p. 18). Reintegrating cultural burning into conversations surrounding climate change and wildfire management is nuanced and involves recognizing the history of settler colonial relations with Indigenous peoples.

Methodology

As mentioned previously in this report, a component of my master's work in the MA HRSJ program included a practicum term, and for this term I worked with the Grasslands Conservation Council of BC in Kamloops, writing a piece about current cultural burning initiatives in BC for the council's annual magazine. The practicum component of my program allowed for hands-on experience and collaboration with an organization to gain skills and applied experience. This experience allowed me the opportunity to develop a larger project based on what I learned and contribute to the organization. There were certain limitations to the practicum with time constraints and program planning requirements associated with the program. The practicum covered 126 hours of work and had to be completed by the end of the summer term. This meant that my work with the organization needed to be focused and concerned with what would benefit both the organization and my professional development as a graduate student. Writing for the magazine allowed me to contribute something meaningful to the council, create something focused within my academic interests, and support my research.

Data collection for this article was gathered through academic sources, news articles, government and non-governmental organizations websites, and professional experience learning about and working with members of the Grasslands Conservation Council of BC. This leads to

the key information I collected while researching cultural and prescribed fire, current examples within and outside the province, and implications surrounding the revitalization of cultural burning practices.

Examples of Indigenous Fire Stewardship in British Columbia: Yunesit'in, Lytton, Siwash, Aq'am, and Xwisten

Similar to Canada, in the United States in the 20th century, federal and state agencies instituted fire suppression policies that excluded prescribed fires, including cultural burning by Indigenous communities" (Murveit et al., 2023, p. 181). California is a state within the United States that is also facing an increase in climate-related extreme fire activity. One example is from the mid-Klamath River Basin where the Karuk and other Indigenous peoples have historically used low-intensity fires to minimize the risk of larger wildfires, encourage wanted plant communities, increase hunting, and maintain cultural resources (Murveit et al., 2023, p. 181). The study describes the research between the Karuk Tribe Department of Natural Resources and a cohort of graduate students and their advisors who represent the Southwest Climate Adaptation Science Center. Two essential questions were of focus in this study: how can a collaborative process to guide ethical research on topics related to Indigenous knowledge be developed and how can the knowledge and culture of the Karuk People be amplified (Murveit et al., 2023, p. 183). Data collection involved in-person semi-structured interviews in the Karuk Aboriginal Territory in August 2021, and was informed by Storywork (Murveit et al., 2023, p. 193). Results yielded from this project took the form of a four-episode podcast called *Intentional Fire* (2022) that shared stories from the Karuk people about their relationship with fire and the importance of sovereignty over fire practices. The podcast episodes discuss different fire-related topics such as Tribal sovereignty, colonization, forest and fire management, changes in the land over time,

traditional and medicinal plants, and experiences with cultural and prescribed burning (Murveit et al., 2023, p. 194-95). Success of this method of research comes from collaborators having expressed interest in working together beyond the Intentional Fire podcast and into a second season, which points to the potential for academia and Indigenous communities to work together in an ethical manner to strengthen skills and research protocols that ensure that all voices are heard. The author-collaborators of this study predict that "the podcast episodes will fulfill their objective to disseminate cultural knowledge to the younger generations, policymakers, and broader public" (Murveit, 2023, p. 195). The strength of this study is that it is a strong example of collaborative research practice, qualitative data collection, and accessible knowledge dissemination. These strengths in research are important within the topic of cultural burning, as they allow multiple voices and perspectives to be heard simultaneously and work to diminish hierarchical power imbalances.

Examples of Indigenous Fire Stewardship in British Columbia are similarly only entering the conversation surrounding climate change wildfire management in recent years, and more notably within the last year accompanying the release of the POLIS Wildfire Resilience Project (2024) from the University of Victoria's Centre for Global Studies. This report highlights key points surrounding wildfire activity and climate change in British Columbia and what actions should be taken. Such as, wildfire activity is increasing in frequency and destructive magnitude, the state of wildfire in British Columbia requires an all of society approach, and prescribed burns need to be increased in frequency. Furthermore, the provincial government needs to address the current state of wildfire in British Columbia, work on wildfire resilience, and all levels of government need to be involved: the provincial government, Indigenous governments, federal and local governments, industry, researchers, and civil society (MacNaull, 2024). Therefore, the

POLIS Wildfire Resilience Project (2024) serves as a collection of professional opinions to help bring voice and urgency to the implications of climate change in British Columbia, emphasizing that the current state of wildfire is not going to improve without significant changes.

Indigenous cultural burning in British Columbia has been primarily carried out in collaboration with the BC Wildfire Service. Recent examples posted to the Government of British Columbia website are from the Yunesit'in, Lytton, and Siwash areas and include collaboration with the Yunesit'in and Lytton Nations. The burning occurred between April 2023 and October 2024 and had shared goals to improve public safety, especially to communities residing in places where burn risk is high and there is an accumulation of fuels in nearby brush areas. Additionally, there were shared goals to improve forest or grassland health while also contributing to community collaboration with the BCWS and the recognition and resurgence of traditional land practices by Indigenous communities. Reducing wildfire hazard within at-risk communities is especially prevalent in that wildfire hazard and risk has spatial implications in British Columbia, as "the cumulative impacts of successive fire emergencies have a profound effect on the long-term resilience and resources of many remote and isolated communities" and can be seen through repeat emergency incidents with the increase in wildfire activity and repeat wildfire evacuations in specifically at-risk communities (Erni et al., 2024, p. 12). Furthermore, Indigenous on-reserve communities are disproportionately affected by emergencies related to natural hazard, such as wildfires, as a result of remote location and socioeconomic conditions (Erni et al., 2024, p. 13). Erni et al. (2024) conducted a wildfire spatial risk assessment evaluating vulnerability and risk to Canadian communities and found that 18.9% of people living in reserves reside in high fire risk areas in comparison to 2.5% of the non-reserve population (p. 13). This discrepancy in relative hazard and risk with certain populations residing in high-risk

communities needs to be considered in fire mitigation efforts, meaning that cultural and prescribed fire efforts in remote areas of British Columbia are particularly pressing.

Yunesit'in First Nation, which is located 114 km West of Williams Lake, is reclaiming Qwen (fire) stewardship, which is important in the context of the 2017 Hanceville wildfires (Nikolakis & Ross, 2023, p. 105). The 2017 Hanceville wildfires burned a large amount of the Chilcotin region and impacted the territories of the Yunesit'in where forests and grasslands burned, stressful evacuations occurred, psychological and cultural impacts were felt, in addition to reduced hunting and gathering opportunities and poor water quality (Nikolakis & Ross, 2023, p. 107). The pilot Qwen stewardship program from April 2019, which was supported by the Gathering Voices Society (an organization that facilitates Indigenous environmental stewardship programs in British Columbia) aimed to strengthen landscape stewardship, train local people in fire stewardship practices rooted in Indigenous knowledge, and to center the communities in collectively determining where and when to burn, as well as establishing the rationale for these decisions (Nikolakis & Ross, 2023, p. 107-8). An inquiry into the success of this program consisted of unstructured, open-ended interviews and documented the fire-stewardship goals of Yunesit'in and Xeni Gwet'in community members for their fire knowledge and to be representative of diverse voices in the communities and discussion focused on the importance of bringing fire back to the land and the goals desired from the program. As a result, "three general goals from their Qwen (fire) management program were identified in the interviews: strengthening cultural connection and well-being, which included revitalizing and sharing Indigenous fire knowledge that can connect people to their land and to individual and community well-being; restoring the health of the land through Indigenous fire stewardship, to produce resilience to wildfire and protect Mother Earth (biodiversity), and maintaining culturally

important sites; and respecting traditional laws, or Tsilhqot'in laws that reflect and maintain responsibilities to the land and to future generations" (Nikolakis & Ross, 2023, p. 109). Amy Cardinal Christianson (2015), a policy advisor and cultural fire researcher/practitioner, has stated that there is a lack of studies on the goals from Indigenous fire stewardship in the social science and natural science literatures due to differences in worldview, ethical requirements, and the time needed to build relationships with Indigenous peoples, that makes research complex and time consuming (Nikolakis & Ross, 2023, p. 108). The perspectives of community members revealed that fire is viewed as a tool and important piece of a complex and adaptive socio-ecological system that is bound up in duties and laws to steward lands for all living beings and future generations, as well as honouring ancestors. Participants expressed goals from the program as connecting people to the land in deep ways, improving human health and wellbeing, empowerment, and maintaining and transferring traditional knowledge (Nikolakis & Ross, 2023, p. 113). The results of this program evaluation reveal that a holistic, long-term perspective on social value is essential (Nikolakis & Ross, 2023, p. 114). This case study highlights important considerations for Indigenous fire stewardship and cultural burning and prescribed fire collaborations. Specifically, developing the relationships required for these collaborations will take time and the deliberation of both Western and Indigenous worldviews in that these collaborations can be improved through broadening the timeframe for evaluating initiatives and accommodating qualitative perspectives.

There have also been noteworthy examples of cultural burns near Cranbrook and Lillooet that also had shared goals of reducing the risk of larger, more severe fires in the area and revitalizing cultural burning practices. The first case study near Cranbrook took place April 28, 2023, with the Aq'am community of the Ktunaxa Nation. The fire was notable in that its purpose

was to mitigate future wildfire activity effects and also that it represents a case study of not only fighting fire proactively but revitalizing previous Indigenous fire practices (Stueck, 2024, para. 7). Stueck (2024), states that "prescribed fires are at once a throwback and a possible glimpse into the future" (para. 11). This is true in the sense that cultural burning has helped to maintain ecosystems prior to colonization and cultural and prescribed fire has the ability to help mitigate the effects of increased and extreme wildfire activity in the future. However, the space in-between the past and the future remains critical in understanding cultural and prescribed burning is perceived and where we can go from here. This insinuates recognizing that cultural burning was prohibited for many years (since the Bush Fire Act in 1874) (Strachan, 2024, para. 9) and that we are in a position now to try and re-integrate past practices in order to help address the current climate crisis and improve future outcomes that have resulted from this prohibition.

The next case study near Lillooet was proactive in helping improve future resilience to increased fire activity and took place in the community of Xwisten (Bridge River Indian Band) on March 18, 2024, under the authority of the Bridge River Indian Band, in order to reduce hazardous fire fuel associated with the risk of extreme wildfires in the area (Strachan, 2024, para. 5). In the words of St'at'imc Government Services (SGS) political lead for the joint planning forum with BC Hydro, Qwalqwalten (personal communication, November 2024):

> The prescribed burn was a joint effort with BC Wildfire Service. They identified a several hectare burn around the three main village sites. Initial attack, Xwisten fuel management crew teamed up. Xwisten has several folks who worked with BC Wildfire for several years. The combined efforts made for great collaboration. The burn went off without a hitch as far as I could see. The fuel load was definitely reduced. I believe they were able to utilize a helicopter to drop incendiary devices that were triggered to ignite once they

hit the ground. Crews on ground had cut fuel breaks on the perimeter of the burn area. Xwisten has done smaller burns on their own over the years. This was the first time it had been done on a large scale. Xwisten has also set up sprinklers on each home in the community. This is a precautionary measure in the event a fire does break out and threatens homes. One of the dilemmas for Xwisten is that their water system can be depleted very quickly. So, the prescribed burn is a great way to reduce the impacts if a fire were to break out.

These examples present a glance into the 61 prescribed or cultural burns planned for the year to treat 47 square kilometres of land, according to the B.C. government (51 of which Indigenous communities are developing or co-developing), which is lacking in comparison to plans for other jurisdictions. (para. 28). For example, New Jersey, which is 40 times smaller than British Columbia, treated 5 times as much land last year (Strachan, 2024, para. 30). Therefore, it is important that education on cultural burning increases and legislative barriers are lessened in order to ensure that burns are able to make a difference on a larger scale.

A relevant creative and collaborative case study related to cultural burning is Peter Holub and Sarah Sigurson's work with the Williams Lake First Nation and Yunesit'in community facilitating art-based workshops (four in Williams Lake First Nation and two in Yunesit'in) (FireSmart BC, n.d., para. 9). The workshops, facilitated by Sarah Sigurson, were tailored to the communities and involved forest materials, like juniper, sage, rosehips, and burned bark from the 2017 wildfires (FireSmart BC, n.d., para. 10). Participants were able to lead, make conversation, and while having varying degrees of knowledge on cultural burning and art, found a way to relate and connect to the land through themes of survival, regrowth, colonization, and interconnection. The experience was deemed beneficial by participants in that the creative space

for family and sharing also allowed for an opportunity to recollect the past (FireSmart BC, n.d., para. 11). This example of expression and sharing knowledge through creative means is important in the larger conversation of education in cultural burning initiatives. It allows a complex issue to be digested in an alternative fashion and allows individuals to share their stories and contribute to a larger body of knowledge at the community level.

These case studies encompass current initiatives towards cultural burning access, planning, and execution – as well as partnership between the government and Indigenous communities to mitigate risk and promote long-term ecological health through cultural and prescribed fire. Furthermore, the example of knowledge mobilization through art in Williams Lake suggests movement towards bringing the topic of cultural burning into public consciousness and spaces where community members can learn more about the history of cultural burning and or contribute their own recollections, which supports movement towards shifting paradigms surrounding the representation of different knowledge systems as valid and the effects of climate change. Throughout history, cultural burning has maintained different ecosystems extending outside of forests, such as grasslands.

Canada's Grasslands: An Endangered Ecosystem

The importance of recognizing grassland ecosystems in Canada and their relationship with fire is supported by the fact that they are extremely endangered, vital to conserving native species, have been stewarded by Indigenous peoples since time immemorial, and are ecological sites where cultural burning can yield benefits (Driver 1987; Blackstock & Allister 2004; Hisey et al. 2022). Canada's grasslands are an endangered ecosystem that also needs fire, as "both grasslands and forests evolved with fire as one of the natural agents, resulting in diversity of form and species" (Driver, 1987, p. 217). Grasslands also underwent fire suppression from the

influences of European settlers and the influence of human development like roads, fields, and heavily grazed pastures (see Figure 1), which can contain naturally occurring fires (Driver, 1987, p. 217).

Figure 1

Hereford Cattle On Open Grassland Nicola Valley

Note. By British Columbia. Forest Service, 1949, Image na-10104 courtesy of the BC Archives.

Grasslands risk being overlooked in the conversation about fire management with a sharp focus being on managing large-scale forest fires, but they are a key component to healthy ecosystems and host vast biodiversity in terms of both flora and fauna. For perspective, grasslands have lost about 70% of their historic range due to factors such as urban development and agriculture (Hisey et al., 2022, p. 684).

This means conservation policy needs to look towards protective measures to maintain the grasslands that are left while also upholding the *United Nations Declaration on the Rights of Indigenous Peoples* through increasing Indigenous conservation (Hisey et al., 2022, p. 690). Thus, it is important to raise awareness about grassland ecosystems and how cultural and

prescribed burning can be used to help bolster resilience in a time of both increasing extreme wildfires and human development that continues to put grasslands at risk, as well as promote the education of the local Indigenous peoples and their practices within the grasslands in order to support their historical benefits and continued survival.

Using fire as a management tool in grasslands has been practiced over the years. For example, the prescribed burning of grassland plants in study plots at Last Mountain Lake in Saskatchewan (Driver, 1987, p. 219). In this study, plant species did not show significant declines after fire and heavy layers of dead vegetation were able to be removed, allowing more plants to receive more light and moisture to grow, which contributed to increased small mammal and bird diversity as well (Driver, 1987, p. 221). However, the inclusion of Indigenous perspectives on fire management practices in grasslands has long been left out of the conversation due to the favouring of Western science and policy initiatives and the suppression of Indigenous knowledge systems and land-based practices. For example, "throughout several thousand years, the Secwépemc developed ways to harvest, manage, and enhance the resources of their diverse environment, adapting to changing ecologies and fine-tuning the ways that plants, animals, and fish could be sustainably harvested" (Ignace & Ignace, 2017, p. 145). These ways of looking after the land contributed to enduring ecological health of the grasslands pre-colonization.

Indigenous Perspectives from Nlaka'pamux, Syilx, Secwépemc, Stl'atl'imx and Tŝilquot'in (British Columbia's) Grasslands

Listening to Indigenous voices in the conservation of grasslands is vital in working towards decolonial action, supporting the policies outlined in the United Nations Declaration of the Rights of Indigenous Peoples, and advocating for the protection of grasslands in Canada, as

Indigenous knowledge is generational and showcases living memory of grasslands pre-settler contact and colonization (Blackstock and McAllister 2004; Lewis et al. 2018). Blackstock and McAllister (2004) use ethnographic and historical research methods to document Indigenous experts' historical memory of the grasslands in the southern interior of British Columbia. Indigenous peoples of the southern interior grasslands include the Nlaka'pamux, Syilx, Secwépemc, Stl'atl'imx and Tŝilquot'in (Blackstock and McAllister, 2004, p. 24).

Indigenous perspectives on the history of grassland ecosystems is important in understanding ecosystem structure prior to European contact, analyzing grazing impacts, and providing insight for the management of grasslands (Blackstock and McAllister, 2004, p. 24). Blackstock and McAllister's (2004) study has as its objectives: the recording of Indigenous perspectives on agricultural activity in relation to land and culture and the discussion of grassland restoration ecology, using ethnographic and historical research methods (p. 24). Here, grasslands were observed to have belly-high grasses by the Nlaka'pamux (Thompson), Syilx (Okanagan), Secwépemc (Shuswap), Stl'atl'imx (Lillooet), and Tŝilquot'in (Chilcotin) nations and plants from the grasslands were used and managed by Indigenous peoples for subsistence, medicine, technology, and spiritual and ceremonial purposes. Examples include arrow-leaved balsamroot, bitterroot, and spring beauty that were important food sources, shrubs like saskatoon that provided both food and medicine, and paper birch which provided for making baskets (p. 24) (see Figures 2, 3, and 4 for examples of arrow-leaved balsamroot, spring beauty, and saskatoon in Secwépemc and Stl'atl'imx territories from within the last 20 years).

Figure 2

Kamloops...on the McQueen Lk "O" map...masses of Balsamroot.

Note. By Murray Foubister, 2013, Creative Commons Attribution-Share Alike 2.0.

Figure 3

2009 Sun Peaks Summer...Western Spring Beauty (Clintonia lanceolata)...

Note. By Murray Foubister, 2009, Creative Commons Attribution-Share Alike 2.0.

Figure 4

Saskatoon Berries in Seton Portage

Note. By John Freeland, 2011, Creative Commons Attribution-Share Alike 2.0.

Blackstock and McAllister (2004) found that in relation to fire, prior research documents that Indigenous peoples used fire to manipulate grassland succession to maintain browse for ungulates, suppress sagebrush, and encourage herb growth. Furthermore, elders adapted their use of fire to suppress the intruding sagebrush, and the Secwépemc people managed tree encroachment on the prehistoric grasslands through landscape burning of the grasslands, which also created healthy forage for the ungulate species (p. 28). These perspectives reveal the importance of fire in grassland management and the relationship between fire and grassland ecosystems within British Columbia's southern interior grasslands (see Figures 2, 3, and 4 for a historical representation of the grasslands in Secwépemc territory from over 100 years ago and within the last 20 years.).

Figure 5

Same : Lac du Bois

Note. By British Columbia. Dept. of Mines, 1913, Image i-62213 courtesy of the BC Archives.

Figure 6

Lac du Bois, Arnold's ranch, 15 miles N by E Kamloops

Note. By British Columbia. Dept. of Mines, 1913, Image i-62212 courtesy of the BC Archives.

Figure 7

Lac du Bois grasslands…

Note. By Murray Foubister, 2012, Creative Commons Attribution-Share Alike 2.0.

These figures mark differences in tree density, the abundance and height of grass, human settlement, and technological advancements. Since these fire regimes have been long suppressed in grassland ecosystems and human encroachment remains a risk to British Columbia's grasslands, learning from historical and ongoing Indigenous perspectives is vital in discerning how to build grassland resilience in a time of environmental crisis.

Lewis et al. (2018) conducted a study looking at the use of cultural burning in the past and present in Lytton First Nation (LFN). Traditionally, fire was used as a tool by the Nlaka'pamux people in the area of λ'q'əmcín (Kumsheen or Camchin), now known generally as Lytton, to maximize desirable plants and animals and achieve ecological and cultural objectives before European contact (Government of British Columbia, n.d.; Lytton First Nation, n.d.; Lewis et al., 2018, p. 143). The study sought to answer to what extent members of the LFN have resumed burning after nearly half a century of fire exclusion and to establish a baseline for the

present burning practices of members of the LFN and determine the current status of Indigenous fire in the valley and the implications on desirable ecological and cultural outcomes for the inhabitants through a series of personal interviews (Lewis et al., 2018, p. 145). Results of the study found that participants were aware of historic burning in the valley and were frequent burners, and although many LFN members burn today, broadcast or area burning is no longer common and few burn beyond their property (Lewis et al., 2018, p. 147-8). In terms of rationale behind the burns, they are conducted for similar reasons as the historic ones, including to improve natural conditions through decreasing weeds and fuel, improving grazing for ungulates, and to minimize fire threat (Lewis et al., 2018, p. 148). A strong finding in this study is that fire use in the Lytton area remains but has decreased in scope and that traditional rationales like foodstuff amelioration have become less common (more so among participants 50 years of age or older) whereas debris control and hazard abatement are predominant motivators for using fire. This contrasts pre-colonization Indigenous groups, who burned for a variety of rationales such as cultural, social, and ecological (Lewis et al., 2018, p. 149). The results of this study support a decreased use of fire after a long history of fire exclusion. However, the results also suggest that the use of fire has persisted over time despite this exclusion, and that traditional rationales for fire use in grasslands is still of importance, primarily among older generations.

Wildfires, Water Quality, and How Fire Influences Water Ecosystem Health

The lack of fire on the landscape over time has led to extreme wildfires and this has unique consequences on water ecosystems, in which there are observed links between wildfire severity and the quality of water ecosystems (Scott & Pike 2003; Emmerton et al. 2020; Robinne et al. 2021). An article from Scott & Pike (2003) looked at the relationship between wildfires and watershed effects in the Southern BC Interior. Hydrologic effects are measured in relation to the

size and severity of wildfires. Results of wildfire include reduced evapotranspiration losses, increased water availability for replenishing soil and groundwater stores, increased streamflow, earlier and larger peak flows, and deeper snowpacks that melt earlier. Severe wildfires can accelerate the potential for soil erosion, destroy soil aggregates, create water-repellent conditions, and stream temperatures may increase where riparian shade is reduced (Scott & Pike, 2003, p. 4). Consequences of severe wildfires on water quality can be seen in drinking water. For example, a study in southeastern British Columbia found that wildfire produced detectable changes in several measured drinking water parameters such as increases in nitrate-nitrogen, pH, total nitrogen, magnesium, calcium, conductivity, total hardness, total alkalinity, turbidity and true colour. Turbidity and true colour were found to exceed Canadian Drinking Water Standards during the study period (Scott & Pike, 2003, p. 4). Understanding how wildfires impact water quality is essential in addressing the long-term effects of extreme wildfire events within public health and human rights discourse on natural disaster management.

Increasing and more extreme wildfires poses certain risks for water quality in that wildfires can enhance meteoric runoff from watersheds through chemical sealing and reduction in evapotranspiration due to vegetation removal and depending on the timing and severity of the fire, delivery of ash and sediment, organic matter and nutrients, major ions, and trace contaminants can occur in receiving waters and cause secondary ecological impacts on aquatic ecosystems (Emmerton et al., 2020, p. 2). Emmerton et al.'s (2020) study looks to assess the impacts of the May 2016 Fort McMurray wildfire in northeastern Alberta, Canada on the water quality of large and low-relief rivers in the region using a multi-tiered monitoring approach to target signal detection (Emmerton et al., 2020, p. 2). Results from this study found that wildfire impacts on river water quality were detectable at the very large basin scale following the 2016

Fort McMurray wildfire (Emmerton et al., 2020, p. 7). The broader wildfire impacts to water quality of regional rivers were markedly lower than commonly reported in smaller watersheds of greater relief, but water quality impacts were observed across a range of very large river basin scales nonetheless (Emmerton et al., 2020, p. 11). This study reveals important data regarding extreme wildfires and water quality. The 2016 Fort McMurray wildfire was a significant natural disaster that reflects much of what is predicted to be in store for British Columbia as wildfires continue to grow in size and intensity.

There is an urgent need for baseline information on the vulnerability of source waters to wildfire in the literature, as it remains limited despite the inherent risk and as climatic and hydrologic extremes grow in magnitude and frequency, which increases water security issues (Robinne et al., 2022, p. 1). A first step in the assessment of wildfire-water risk is a baseline of hydrologic datasets where deviations from normal conditions could point to fire-related disturbances (Robinne et al., 2022, p. 6). Wildfires in municipal watersheds can disrupt drinking water production in downstream communities for several years after the burn, cause expensive water treatments, and many communities lack source water protection plans addressing wildfire hazards (Robinne et al., 2022, p. 8). One suggestion from Robinne et al. (2022) is to extend collaboration in the risk management sector and develop wildfire-watershed risk research through emergency management strategy to help identify the different actors involved in forest conservation and water management including "...drinking water providers, First Nations, watershed councils, forestry companies, municipalities and provincial agencies responsible for water resource management, and federal agencies involved in forest research and water science, among others" with which collaboration would be paramount to the production of risk information (p. 11). This commentary points to the importance of continued research in wildfire-

watershed risk and the collaboration of different groups to produce risk information and call for action to key stakeholders.

A current, ongoing initiative involving the effects of wildfires on watersheds is a research project funded by the BC Salmon Restoration and Innovation Fund (BC-SRIF) and is working to restore the Deadman River (located west of Kamloops) and investigate how mitigation measures following severe wildfires can help protect landscapes and important salmon habitats (University of Northern British Columbia, 2024, para. 1). This project, Tsecmenúɫecwem-kt (We Repair the Land), is a three-year, $4 million project led by the Skeetchestn Indian Band in collaboration with Skeetchestn Natural Resources Corp., University of Northern British Columbia, University of British Columbia, Thompson Rivers University, BC Ministry of Forests, Fisheries and Oceans Canada, Pacific Salmon Foundation, SLR Consulting, Secwépemc Fisheries Commission and Urban Systems and was made in response to the Deadman Watershed being severely impacted by the Sparks Lake wildfire (the largest in BC in 2021 and which burnt more than 900 square kilometres of land including 60% of the traditional territory of the Skeetchestn Indian Band (University of Northern British Columbia, 2024, para. 2). This project suggests that efforts are being made to address gaps in current research surrounding the effects of wildfires on watersheds and how water quality can be preserved during extreme wildfire events.

Current Political Limitations

The imminent need for proactive measures in wildfire management and its effects on water ecosystems is largely left in the hands of political leaders and policy makers. There are barriers to cultural burning as existing within political frameworks that perpetuate colonialism in that Western science initiatives are put at the forefront of government policy and the policies in place inhibit decision-making, create extensive timeframes, and limit resources (Sloan Morgan

and Burr 2024; Hoffman et al. 2022). Sloan Morgan and Burr (2024) offer a critical analysis, employing a political and justice-based approach to fire research in British Columbia, Canada, and look at how settler colonialism reveals tensions in land management and fire with an emphasis on how this affects the places that are our homes as well as how colonialism can be viewed as ongoing (p. 1919).

Thus, politically, at the federal, provincial, and local levels there still needs to be greater movement to promote practices such as cultural burning as a potential solution to the long-term and detrimental effects of severe wildfires and less diverse forests. Additionally, there needs to be a movement to allow and implement cultural burning as an Indigenous-led practice where relationships are built on the recognition and respect of traditional land-based knowledge as a valid knowledge and governance system. Recognizing the need to revitalize cultural burning practices also requires the acknowledgment that cultural burning did not fade away or become frozen in time, as it was always there, nascent, but actively prohibited. Conservation has been militarized and the impacts on Indigenous peoples have been severe or even fatal in that "fortress conservation is typically brutally enforced by military and paramilitary operatives, sometimes in conjunction with the army and police" (Dawnson, 2023, p. 37). Therefore, the definition of conservation needs to be challenged and decolonized, as conservation implies that the only way to protect the planet is through colonial and racist Western notions, which insinuates "...that conservationist views are 'scientific' and that their monolithic definitions of 'humanity' and 'nature' are true and nonideological" (Dawson, 2023, p. 8). Conservation in British Columbia still operates under these colonial notions and the history and prohibition surrounding cultural burning serves as a good example. Conversations surrounding the revitalization of cultural burning and the removal of certain barriers to cultural burning are only recently making their

way into public consciousness. Movement into challenging and changing colonial conceptions of conservation is a conversation that while ongoing, is still not being integrated into public discourse at a larger scale. In regard to both of these observations, work that fights against environmental and social calamities should aim to join Indigenous and local communities around the world (Dawson, 2023, p. 5). This is because advocacy work at the community level has the potential to grow in strength and scale.

Discussion

Writing about current issues and contributing to public discourse allows for the transference of knowledge and an important idea in climate change research – which is that the most effective way to change the perspectives of individuals and current systems is to do the work to change paradigms or build movement from the community-level up (Meadows 2008; Norgaard 2011). Meadows (2008) describes paradigms as beliefs that are unstated because everybody knows them, are represented by common ideologies, and function as the source of larger systems from which shared social agreements and system goals emerge (p. 163). This illustrates paradigms as the building blocks of shared beliefs and knowledge transference, which implies an inherent power, but also an inherent difficulty in that it can be hard to dismantle or change a system that has solidified over time. Meadows (2008) references Thomas Kuhn in suggesting how to change paradigms, who says "you keep pointing at the anomalies and failures in the old paradigm. You keep speaking and acting, loudly and with assurance, from the new one. You insert people with the new paradigm in places of public visibility and power. You don't waste time with reactionaries; rather, you work with active change agents and with the vast middle ground of people who are open-minded" (p. 164). This is not an easy or time-efficient approach, but it is a thorough and enduring methodology.

Norgaard (2011) echoes similar sentiments to Meadows (2008), suggesting that climate change denial results in answering big questions as to how we garner awareness and influence political and economic systems to enact change. The examples Norgaard (2011) leans into include The Slow Food movement, which launched in Italy in 1986, and the reinvigoration of the environmental movement in the western United States, as these are examples, although imperfect, work from the ground up and suggest climate denial can be disrupted in what Norgaard refers to as making the path by walking it (p. 227). Work at the community-level is also important in that "typically, interpersonal and small-group dialogue can address these needs much better than mass communication received in the privacy of one's living room'" (Norgaard, 2011, p. 228-229). Although work from the ground-up can be seen as intimidating and laborious, and communicating with people across different political stances is intrinsically challenging, it is worth trying (Norgaard, 2011, p. 229). One of the challenges with climate change is that it is something that is not going to go away; rather, it is predicted to intensify incrementally and affect people across the globe, regardless of location or socioeconomic status. Considering all aspects of how to bring about change and rethink current systems is critical in initiating potential solutions.

Recommendations for Fire Managers

This academic report has intended to address timely key questions within current interdisciplinary climate change research surrounding the increased incidence and severity of wildfires in British Columbia. More specifically, it has sought to address the barriers to cultural burning practices that would support Indigenous sovereignty and longstanding land use practices and promote greater ecological health in both forest and grassland ecosystems, the consequences

of extreme wildfire activity on water ecosystems, and the necessity of education and community involvement as methodology.

I have created a number of key recommendations for current and future fire managers by analyzing in-depth the key messages from my research and the larger scholarly debate in each core section of this report. These include:

1. **Indigenous knowledge and governance practices need to be at the forefront of cultural and prescribed fire initiatives, as cultural burning has directly contributed to the long-term maintenance of vital ecosystems.** Furthermore, the history of cultural burning being prohibited and managed through the systems of colonialist and capitalist jurisdictions requires dismantling power imbalances in order to advance authentic and enduring relationships. Given that cultural burning was subject to intended erasure through The Bush Fire Act (1874) and the effects of colonization in Canada, reintegrating the practice is not a straightforward process. It can be framed as both working with memory and unraveling trauma, and this contrasts what some professionals may be experiencing in the field. For example, "fire managers are not necessarily attempting to envision a premodern nature when it comes to returning fire to national parks—there is a recognition that these landscapes are in flux—but instead their work is an attempt to piece memories and present circumstances together. They are also very much aware that they cannot remember everything because the contemporary landscape is something that has been made as much by ecology as by culture" (Sutherland, 2018, p. 21-22). In this sense, reviving cultural burning means trying to work in the present with something that was marked by past circumstances, and this makes the work inherently challenging. Indigenous leadership in wildfire management means integrating Traditional Ecological

Knowledge (TEK) into the forefront of the conversation, which is not a quick or easy

task, and is linked to memories that are not always accessible and communities that feel

unwilling to share memories with the federal and provincial governments due to the

history of the violent colonization of Indigenous knowledge and peoples surrounding fire

management (Sutherland, 2018, p. 23-24). Furthermore, much of the landscapes that need

fire are still under colonial rule and are places where Indigenous relationships with the

land have been prohibited. The importance of memory reveals the relationships with fire

that used to exist and how fire has been transformed into political discourse where the

goal was to manage fire in order to create unnatural landscapes (Sutherland, 2018, p. 24).

This also resulted in the valuing of Western epistemologies above all others, especially

Indigenous ones. Therefore, it is important to recognize "by virtue of the changing set of

relationships between people, policies, and landscapes, memory work must be coupled

with 'imagining work,' answering countless calls for us to see the Anthropocene as an

opportunity to become otherwise than we are now" and that while many working

professionals in wildfire management will grapple with how to integrate fire into larger

processes and not disrupt other mandates, it is vital to aim towards an honest portrayal of

human-environment relations and to engage in what work there still is to do (Sutherland,

2018, p. 24-25). Sutherland (2019) also engages the idea of prescribed burns as 'contact

zones', which suggests that they envelope "...a particular set of actions and processes that

ignite new relationships between humans and landscapes that burn. The places where

burns unfold are already entangled in specific political and institutional geographies" (p.

783). Repairing relationships surrounding wildfire management in British Columbia will

take time, effort, and work to break down outdated knowledge systems. Framing cultural

and prescribed fire as memory work and contact zones (Sutherland 2018; 2019) is useful in that it places the complexity surrounding the history of colonialism and wildfire management into a site of understanding among individuals and illustrates the expansiveness of knowledge and the care it requires in navigating the work to put fire back onto the landscape.

2. **There needs to be gender-diverse representations within climate change research and wildfire management, which represents the unique experience of women navigating natural disasters and ongoing systemic issues**. Grasslands have until recent contact been governed by matriarchal systems and in support and rejuvenation of these, these perspectives should be lifted up more (personal communication, anonymous Secwépemc Elder, January 2025; *The Secwépemc Nation Research Ethics Guidelines*, n.d.).

3. **Further research initiatives and policymaking surrounding the relationship between wildfires and water quality need to be advanced and upheld in order to help evaluate potential long-term impacts and create innovative and inclusive mitigation strategies.** There is a lack of current research on the potential long-term effects of wildfires on water quality. However, the literature on the subject implies that "projections for increased occurrence of catastrophic megafires have intensified concerns regarding the threats posed to the high quality water from forested landscapes and resulted in many new initiatives to reduce wildfire threats to aquatic systems and drinking water supply" (Bladon et al., 2014, p. 8937). Thus, wildfire is known to significantly threaten water quality and aquatic ecosystems which also evokes issues of community infrastructure and public health that will vary substantially by geographic region (Bladon et al., 2014, p.

8941). This means that the impacts will be highly variable, creating a challenge to produce reputable science and accurate predictions of the relationship between wildfires and water, as it is constantly changing with the climate. Furthermore, it suggests decision making on major issues like the regionalization of drinking water supply and treatment in smaller communities, the management of forests to protect water from wildfire, and who should pay for land and water management (Bladon et al., 2014, p. 8941). These are difficult questions that involve investment from a variety of actors and policy decisions that require significant research and funding in order to fill knowledge gaps (Bladon et al., 2014, p. 8941). The intersections between wildfire and water are undeniable, and given the importance of both resources, the interactions between the two should be taken seriously as the effects of climate change intensify and persist.

4. **Cultural and prescribed burning initiatives need to be adequately funded and implemented on a larger scale within a shorter and more adaptive timeline.** As highlighted in this report, cultural burning has been historically prohibited, meaning that funding and implementation efforts have long been neglected. This has resulted in the imminent need for action and work to bolster cultural and prescribed fire in order to promote lost ecological health and diversity in a time of climate change. Funding for scientific research, equipment, and the time and efforts needed for fire practitioners to put fire back on the land needs to be on a larger scale and implemented in a shorter timeframe than what is currently being done. This has to do with the urgency of more extreme wildfires occurring at a faster rate and the financial implications of wildfire damage on at-risk communities. Another implication of increased cultural and prescribed burning initiatives is the reduction of appeals versus the wildfire act in British Columbia.

Public appeals from the previous 10 years highlight individuals that burned on their property with the intent to burn off dead vegetation and or actively reduce wildfire risk. These appeals can be found on the BC Forest Appeals Commission website (*Welcome To The Forest Appeals Commission*, n.d.) and depicts a reactionary relationship between individuals and the government, in which fines are significant and consequential in the case of accidental fires that were derived from good-intended precautionary actions. This begs the question as to why there is not more being done to support individuals in protecting and managing their properties and reducing fire hazards so that people do not face the consequences of having to try and treat the problem by their own means.

5. **The ideologies and uses of the words 'conservation', 'caretaking,' and 'stewardship' need to be challenged and decolonized.** For example, there has been a recent movement to use the terms 'guardianship' and 'guardians', and this terminology supports that guardians' work is guided by both Indigenous and Western science (*What Guardians Do*, n.d., para. 2). Challenging the definitions and uses associated with the terms 'conservation' and 'stewardship' is important in creating what McIntyre-Mills (2021) refers to as transformative research (Mertens 2017) and implies that research is both personal and societal in that "...social and environmental justice requires upholding the right to a life worth living and to ensure that sentient beings are not commodified and abused" (p. 126). This suggests a non-anthropocentric approach to democracy and governance in order to ensure that those who are elected are held accountable so that collective responsibility is taken in protecting people and the planet (McIntyre-Mills, 2021, p. 132). However, this requires recognition of the interdependency of living systems and making ongoing policy adjustments so that a new form of organizational

relationships would redress the power imbalances that contribute to social, economic, and environmental injustice and promote the appreciation of cycles for regeneration that sustain living systems (McIntyre-Mills, 2021, p. 132). As older systems need to be transformed, so do the terminology and the ideologies they carry.

6. **Access to current information on cultural and prescribed burning needs to be improved so that it is a part of public consciousness.** Climate change discourse is of increasing importance. The intersection of discourse surrounding Indigenous rights, reconciliation, and Indigenous land sovereignty is also of great importance and the intersections of all of these conversations are vital to future decisions regarding natural disaster management in British Columbia. However, these conversations are both nuanced and controversial in that "politically fragmentation and populism have become the new order driven by capitalism, anthropocentrism, sexism, speciesism, nationalism and racism. The case is made that liberalism has progressed too far in undermining collective (cosmopolitan) responsibility. Current forms of democracy, governance and economics need to be re-framed by recognizing that we are interdependent" (p. 127). Thus, public discourse needs to encompass a lens of interdependency, that highlights the need to work together in a time of crisis and recognizes the mistakes that have been made in social and environmental policy decisions that have historically led us here. Furthermore, including the public in environmental discourse, through increased accessibility to current knowledge on climate change research and what is being done, could help in extending a sense of 'ecological citizenship' and could foster awareness surrounding democracy and rights – so that rights are considered responsibilities and the economy and market not as eternal but as part of the global commons on which the next

generations depends (McIntyre-Mills, 2021, p. 134). This is especially of relevance in the case of grasslands, which are the most endangered ecosystem in the country. Reinforcing the idea of the power of citizens and working to empower and include individuals instead of limiting available information on current issues is crucial in helping to motivate people to care about the future of climate change and invest in what can be done in the present.

The next steps in restoring ecosystems and managing wildfire require consideration of the past, taking the rapidly changing effects of climate change seriously, and the creative application of various knowledge systems in order to foster resiliency, kinship, and courage in a time of mutual adversity. John Vaillant, author of *Fire Weather* (2023) states in a recent article from The Narwhal, "you can see why people are freaking out. It's not a rational time. Nature isn't behaving rationally; it's behaving reactively and we have ecosystems and infrastructure that are equally unsuited to what's coming" (Simmons, 2025, para. 29). However, the idea that ecosystems are unsuited to what is coming is not a new concept. Higgs (2003) explores the legacy and change in use of Jasper National Park, which hauntingly prefaces the recent 2024 wildfire (Government of Canada, 2024). Higgs' (2003) argument lies in the changes in human interaction and development in Jasper National Park, such as the disappearance of hunting in the area due to changed laws and the growth to millions of people that now use the Yellowhead Pass (p. 269). These changes infer that places like Jasper National Park and all of the ecosystems that surround us are always in flux. Higgs (2003) invites us to see these significant changes as an invitation to imagine if there is a possibility to make equally large changes in the future but with a greater intention to ecologically restore (Higgs, 2003, p. 269). Higgs (2003) also evokes Simon Shama, author of *Landscape and Memory* (1995) who suggests that landscape and memory are intertwined and require consideration of cultural and natural history, which does not deny the

seriousness and urgency of the present ecological predicament, but questions if we should look to new myths as potential cures rather than to the old ones (p. 22). This perspective speaks to the resurgence of cultural burning. We have often looked too far ahead and not at what is behind us and has worked before. It is now up to us to decide how to move forward.

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