

Overcoming the Barriers to the Use of Traditional Burning Knowledge for Forest Fire Prevention in British Columbia

**by
Eric Christensen**

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Declaration of Committee

Name: Eric Christensen

Degree: Master of Public Policy

Title: Overcoming the Barriers to the Use of Traditional Burning Knowledge for Forest Fire Prevention in British Columbia

Committee:

Chair: Genevieve LeBaron
Professor, Public Policy

Mohsen Javdani
Supervisor
Associate Professor, Public Policy

Natahnee Winder
Examiner
Assistant Professor, Public Policy

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Abstract

The increasing severity of forest fires in British Columbia is proving to be a crucial issue facing British Columbians as well as policymakers. In addition to improving methods of fire suppression, prevention strategies are also critical in addressing this problem.

Prescribed burning has proven to be an effective practice in both limiting the impacts of damaging wildfires and sustaining ecosystem biodiversity. Indigenous communities have long and extensive experience conducting traditional burns. Despite their knowledge and experience, Indigenous practitioners have faced numerous barriers to reviving traditional burning. The goal of this paper is to identify these barriers and to explore how they can be overcome in partnership with Indigenous communities. A jurisdictional scan, a media scan, and expert interviews have helped us develop three policy options that would support the increased use of traditional burning across the province. An analysis of these policy options concludes with two options being recommended for implementation by policymakers.

Keywords: Indigenous Knowledge; traditional burning; forest fire prevention; British Columbia

Dedication

Around the time that I was considering topics for this research project, reports were released of the officially uncovered graves of at least 215 Indigenous children at the former Kamloops Indian residential school on Tk'emlups te Secwépemc First Nation. Like many members of our community, I was heartbroken to hear these reports and the many others that followed. I would like to dedicate my efforts to these dear souls who were taken from us too early and to all their loved ones.

Acknowledgements

This research project has been an equally challenging and rewarding experience. Its completion could not have been possible without the dedicated support of faculty, peers, family, and friends. First, I would like to thank my supervisor, Mohsen Javdani, for all his guidance, insights, and assistance with edits. I would also like to thank Nancy Olewiler for her support and direction as I decided on my research topic and began working on this project. My thanks also to Natahnee Winder who served as my defence examiner. I appreciated the questions you posed and the revisions that you recommended.

Additionally, I would like to thank our interview participants for sharing their valuable views and expertise which helped deepen my understanding of this complex issue. Thank you to my parents, fiancé, and siblings for your unwavering encouragement and efforts to help me balance life's many responsibilities. Finally, I would like to thank my fellow students and friends, for helping me learn and for keeping me motivated throughout this process.

Situating Myself

I was drawn to the topic of this research project for two reasons. First, I was concerned by the growing severity of and increasing risk posed by forest fires in British Columbia. Second, I felt certain that Indigenous communities, as experienced caretakers of the land, had a crucial role to play in addressing these challenges. As my research uncovered the effectiveness of traditional burning practices, it became ever more apparent that Indigenous practitioners and communities needed to be at the forefront of this conversation and co-creators of the required shift in public policy. As a non-Indigenous member of the British Columbian community, studying and working on the unceded traditional territories of the Coast Salish peoples, including the səliłwətaʔ (Tsleil-Waututh), kwikwəłəm (Kwkwetlem), Sḱwxwú7mesh Úxwumixw (Squamish) and xʷməθkʷəyəm (Musqueam) Nations, this raised the question of what my role should be.

My hope for this project is to advocate for this greater engagement of Indigenous practitioners and communities in revitalizing traditional burning practices across our province. My intention is that my voice does not take space away from the Indigenous voices that need to be heard, but that it provides support in a small way. Although I have tried to draw on insights from Indigenous communities and leaders, through reports and studies I found, I must underline that this does not meet the standard of partnership with Indigenous people that we should continuously strive for. I should also note that my expert interviewees are non-Indigenous and, while I am grateful for their valuable contributions, they share similar flaws to my approach.

As a student of public policy, a contribution I thought I could make was the development and recommendation of policy options that bring these Indigenous voices to the decision-making table in a meaningful way. All of my contributions in this paper are meant simply as that: contributions. My hope is that others can further this research and continue to advance our collective understanding.

I also feel that it is important to situate my contributions within the context of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and the Truth and Reconciliation Commission (TRC) of Canada's Calls to Action. A few UNDRIP articles that should guide the implementation of the proposed policy options in this paper include: Article 19 which calls for states to "consult and cooperate in good faith with the

indigenous peoples concerned through their own representative institutions in order to obtain their free, prior and informed consent before adopting and implementing legislative or administrative measures that may affect them”; Article 29 which affirms the right of Indigenous peoples “to the conservation and protection of the environment and the productive capacity of their lands or territories and resources”; and Article 31 which defines their “right to maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions, as well as the manifestations of their sciences, technologies and cultures, including human and genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs, sports and traditional games and visual and performing arts” (United Nations, 2008).

Additionally, the TRC’s 92nd Call to Action calls for the corporate sector to provide their staff with education on the history of Indigenous peoples, UNDRIP, and Treaties and Aboriginal rights. Similar educational opportunities would also be beneficial for government agencies that support the implementation of our proposed policy options. Finally, their 14th Call to Action includes the principle that “the preservation, revitalization, and strengthening of Aboriginal languages and cultures are best managed by Aboriginal people and communities” (Truth and Reconciliation Commission of Canada, 2015). I feel that this principle should also guide solutions to the policy problem that we explore in this research project.

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List of Acronyms

BC	British Columbia
BCWS	BC Wildfire Service
CEMA	Collaborative Emergency Management Agreement
CFI	Carbon Farming Initiative
CRI	Community Resiliency Investment Program
FNESS	First Nations Emergency Services Society
FNHA	First Nations Health Authority
FNLC	First Nations Leadership Council
FCI	Forest Carbon Initiative
FESBC	Forest Enhancement Society BC
FLNRORD	Ministry of Forests, Lands, Natural Resource Operations and Rural Development
IPA	Indigenous Protected Area
IPBN	Indigenous Peoples Burning Network
NGO	Non-Governmental Organization
PWCC	Provincial Wildfire Coordination Centre
SFU	Simon Fraser University
TREX	Prescribed Fire Training Exchanges
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
US	United States

Executive Summary

Traditional burning practices by Indigenous peoples in British Columbia (BC) were initially a means to sustaining ecosystem biodiversity. Presently they are also considered as an effective way of mitigating the effects of wildfires. Despite this, the use of traditional burning is very limited across BC. Due to rising temperatures, a lengthening wildfire season, and a build up of forest vegetation, the severity of forest fires has been increasing significantly over the past twenty years. Evidence of this can be found in the increasing forest area that burns annually, the provincial government's rising wildfire suppression costs, and the rising greenhouse gas emissions from British Columbian forests. Managing these wildfires is a critical issue currently facing BC's policymakers. While different measures are required to adequately address this problem, evidence suggests that the increased use of traditional burning could be one of the key prevention measures to help address this challenge. The purpose of this research project is to explore the benefits of traditional burning practices and barriers to its wider implementation; and to develop, analyze, and recommend policy options that would help Indigenous communities and the province of British Columbia to overcome these barriers.

Three methodologies were used to develop the policy options proposed: a jurisdictional scan, a media scan, and two expert interviews. This led to the creation of three policy options: the establishment of formalized partnerships between BC's Fire Service Centres and all interested First Nations communities, the creation of a regional network of Indigenous fire stewards, and the integration of prescribed burning into BC's Forest Carbon Initiative (FCI). Their analysis, based on two key objectives and other considerations, found the first two to be more effective and more equitable, yet more costly and complex to administrate. The third policy option was found to be less effective and equitable, yet easier to implement. Therefore, the research project concludes by recommending the immediate introduction of the first two policy options, due to their greater effectiveness and equity, with the third policy option left for future consideration.

Chapter 1. Introduction

Canada is a country with abundant riches when it comes to forest resources, with 35% of its total land area in forest cover. Forests cover an area of approximately 60 million hectares in the province of British Columbia (BC), with its forestry industry harvesting roughly 42% of Canadian roundwood (Ministry of Forests, 2003; Statistics Canada, 2018). The presence of these vast forests is accompanied by the regular risk of forest fires that can alter ecosystems and threaten the livelihood of humans and animals. These fires have likely been present as long as the land, but more recent data indicates an increasing severity and frequency of fires in BC from 1959 till present day (Murphy, 2020).

The increasing severity of wildfires is evident from the larger areas being burned, the higher rates of greenhouse gases being emitted, and the increasing cost of fire suppression measures. Additionally, results from a recent preparedness survey suggests that wildfires were the number one natural disaster concern for respondents in the North and Southern Interior of BC. In other parts of the province, earthquakes were seen as the primary concern, with wildfires still in the top five (Ipsos, 2018).

With rising temperatures and a lengthening of the wildfire season in British Columbia, coupled with evidence of their increasing severity, preventing the impacts of forest fires has become a key challenge facing the province. The historical presence of traditional burning practices amongst Indigenous communities, originally intended as a way to sustain biodiversity, provides us with a wildfire prevention tool which increasing evidence suggests effectively limits the impacts of damaging forest fires, in addition to contributing other ecological benefits. The purpose of this research project is to explore the benefits of traditional burning practices and barriers to its wider implementation; and to develop, analyze, and recommend policy options that would help Indigenous communities and the province of British Columbia to overcome these barriers.

This paper begins by providing background information on British Columbia's forest fires and traditional burning practices. Evidence is presented of the increasing severity of wildfires in recent years and the impacts they can have on humans and ecosystems. This includes the risk of habitats and infrastructure being destroyed, British Columbians being forced to evacuate from their communities, the health risks posed by

wildfire smoke, and the increasing amounts of greenhouse gases that wildfires emit. The paper goes on to describe the emergence of the BC Wildfire Service and its role in managing forest fires. Information is then provided on the historical presence of traditional burning by Indigenous communities, the subsequent suppression of these practices by the provincial government, due to colonial mentalities and the fear of fires escaping, and the sustained knowledge of these practices amongst many Indigenous communities. The background section concludes by listing the many ecological, cultural, social, and practical benefits of traditional burning; in addition to highlighting the barriers to its wider use: the lasting effects of government suppression, the fears of the general public, the lack of financial resources, the mistrust of Indigenous communities, and the lack of meaningful partnerships between the BC Wildfire Service and Indigenous practitioners.

Three research methods were drawn on to support the development of policy options: a jurisdictional scan, a media scan, and expert interviews. The jurisdictional scan uncovered efforts in Canada to build meaningful relationships between government agencies and Indigenous communities seeking to be engaged in wildfire management, as well as revitalization projects that aimed to share traditional burning knowledge with others. A scan of the United States discovered networks of Indigenous fire stewards who shared knowledge and provided training on traditional burning, in addition to Indigenous groups who were managing larger forested areas. Australia's use of traditional burning as a tool for their Carbon Farming Initiative was also explored, and other co-management principles and emerging examples of traditional burns being revitalized were drawn from New Zealand and South America. Additional examples of emerging partnerships and instances of the use of traditional burns to manage wildfires and improve ecological outcomes were uncovered through a media scan of over fifty news articles and two expert interviews.

These findings resulted in the development of three policy options: the establishment of formalized partnerships between BC's Fire Service Centres and all interested First Nations communities, the creation of a regional network of Indigenous fire stewards, and the integration of prescribed burning into BC's Forest Carbon Initiative (FCI). These policy options were then analyzed based on their ability to address two key objectives: their effectiveness at increasing the wider use of traditional burning throughout the province, and their level of equity (in terms of meaningfully engaging

Indigenous communities in the implementation of these practices). Additionally, the policy analysis considered other government impacts such as stakeholder acceptance, administrative complexity, and cost. Criteria and measures for each of these objectives and considerations were also included in the analysis. This research project concludes by recommending the immediate implementation of the first two policy options: the formalized partnerships between BC's Fire Service Centres and all interested First Nations communities, and the creation of a regional network of Indigenous fire stewards.

Chapter 2. Background

This section begins by examining the presence of forest fires in British Columbia over the years, the harms that these fires present, and the provincial government's role in managing these fires. This is followed by an exploration of the experience that Indigenous communities in British Columbia have with prescribed burning, the benefits of traditional burning, and the ongoing barriers to the use of traditional burning practices.

The following are brief definitions for some of the key terms used throughout this paper to ensure clarity. When referring to fuel, we mean the elements that power a forest fire, such as an accumulation of vegetation. The most dangerous types of forest fires are those that take place in the upper parts of trees, known as crown fires. Ladder fuel occurs when the build up of vegetation allows the fire to climb into these upper parts. Fuel management refers to efforts to reduce the amount of vegetation that would fuel damaging forest fires. Prevention and mitigation are terms used for proactive measures taken to minimize fire hazards and their impacts (Abbott and Chapman, 2018).

We use the terms forest fires and wildfires interchangeably to describe the spreading of an unplanned fire through a landscape with vegetation. Prescribed and controlled burning will also be used interchangeably to define the planned use of fire in a landscape with vegetation to serve a beneficial purpose, such as reducing the levels of fuel found in a forest and reducing the risk of damaging forest fires. Within this broader term of prescribed burning, we will use the terms cultural and traditional burning to describe burning practices conducted historically by Indigenous communities, which include broader cultural significance.

2.1. British Columbia's Forest Fires Through the Years

This section highlights the historical occurrence of forest fires in British Columbia and the worrying trend of their increasing severity in terms of the damage they cause to both ecosystems and communities. We will begin by highlighting the major forest fires that have taken place over the years. Overall, although recent data shows a decreasing number of wildfires in the province, they also indicate that larger areas are being burned, greenhouse gas emissions from these fires are increasing, and the costs of suppressing them are also on the rise.

The Government of British Columbia identifies a clearing fire (a fire used to clear land for human use) which destroyed most of Vancouver in 1886 as one of the earliest recorded examples of a significant fire threat to British Columbians. Throughout the 1900s, seven particularly large and destructive fires took place across the province. The 2003 fire season witnessed many fires, with the Okanagan Mountain Park Wildfire being one of the worst; burning 25,600 hectares, causing 33,050 people to be evacuated, and 238 homes to be lost (Government of British Columbia, 2021). In 2009 3 significant fires took place: the Junction of Smith and Liard River Wildfire, the Lava Canyon Wildfire (which was the largest, burning 66,719 hectares), and the Kelly Creek Wildfire. In 2010 the province experienced the Pelican Lake Complex fires, the Binta Lake Wildfire (burning 40,000 hectares), the Meldrum Creek Complex of fires, and the Bull Canyon complex of fires. Finally, 2014 witnessed the occurrence of five significant fires: the Chelaslie River Wildfire, the Tenakihi-Mesilinka Complex of fires, the Forres Mountain Wildfire, the Red Deer Creek Wildfire, and the Mount McAllister Wildfire (Government of British Columbia, 2021).

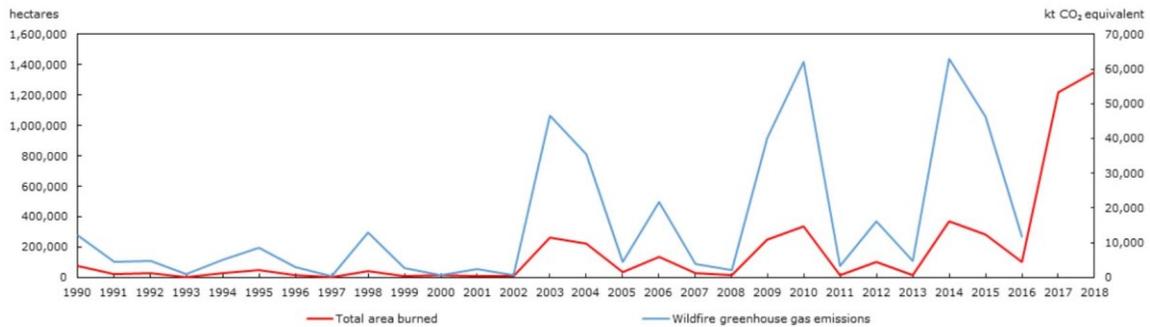
In more recent years, the fire seasons of 2017 and 2021 were particularly dire. During 2017 the province of British Columbia had to evacuate over 65,000 people and over 1.2 million hectares of forest burned. The initial fires began on the 6th of July 2017 and were caused by a lightning storm. A provincial State of Emergency was called on the 7th of July and lasted till September 15th of the same year (the longest State of Emergency in the province's history). During this crisis, BC received support in the form of resources and personnel from every Canadian province and territory, in addition to numerous other countries such as the US, Mexico, Australia and New Zealand (Government of British Columbia, 2021).

After two below average years, 2021 witnessed an increase in forest fires across the province. The management of these fires was made more challenging due to the historic "heat dome" throughout June and July which led to record-high temperatures being reached, the high number of wildfires taking place throughout Canada and neighbouring regions in the United States (which competed for available resources and personnel), and the ongoing COVID-19 pandemic (which restricted travel and had other significant health impacts). Over the course of the summer there were over 1,600 fires (and at its peak 300 active wildfires and 67 of significance) and 868,203 hectares burned. Again, a provincial State of Emergency was called on the 21st of July 2021 and

lasted till the 14th of September. The southern half of BC was particularly affected by the fires, due to below-average precipitation and snowfall that had taken place over the previous winter and spring, and which led to extended drought conditions (specifically throughout the Okanagan, the Cariboo region, and the eastern side of the Rockies). A province-wide prohibition of campfires was enacted on the 28th of June. By the end of the season, approximately 4,000 people were engaged in suppressing the fires and associated costs were estimated at \$565 million (Government of British Columbia, 2021).

Figure 1 from Wang and Strong (2019) highlights the increasing impact of forest fires in BC, both in terms of the area burned and the greenhouse gas emissions released from 1990 to 2018. Figure 2 also illustrates the increasing area burned, in addition to the number of fires per year in BC between 1990 and 2020.

Figure 1: Fire area and greenhouse gas emissions, British Columbia, 1990 to 2018



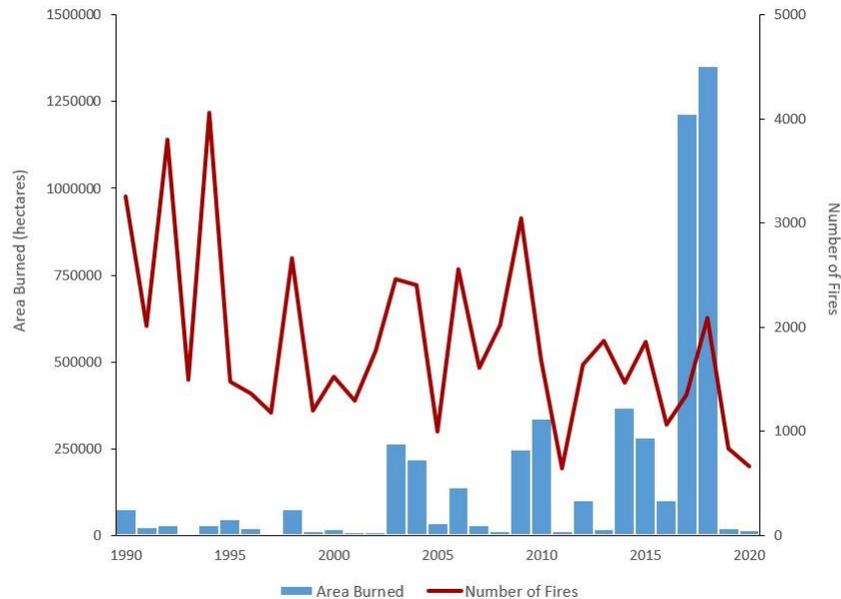
Source: Wang and Strong, 2019, British Columbia’s forest fires, 2018, <https://www150.statcan.gc.ca/n1/pub/16-508-x/16-508-x2019002-eng.htm> (accessed March 19, 2022).

Both figures indicate that there has been a significant increase in hectares burned by forest fires in the past five years, increasing to well over 1,250,000 hectares. This can be compared to the less than 125,000 hectares that burned annually between 1990 and 2000. Even by 2015 the peak amount of area burned was under 375,000 hectares.

Even if the monitoring of burnt forest areas has improved over the past thirty years, this significant jump in values indicates that wildfires are affecting larger areas than previously seen. These observations indicate large expanses of ecosystems being destroyed and a greater number of human livelihoods being at risk. These significant changes can be attributed to the growing influences of climate change, which has led to

increasingly hot summer temperatures, longer summer periods, and the increasing risk of lightning storms. These factors are compounded by forests with increasingly dense undergrowth that augment the speedy spread of forest fires (Abbott and Chapman, 2018).

Figure 2: Area Burned and Number of Fires Per Year BC from 1990 to 2020

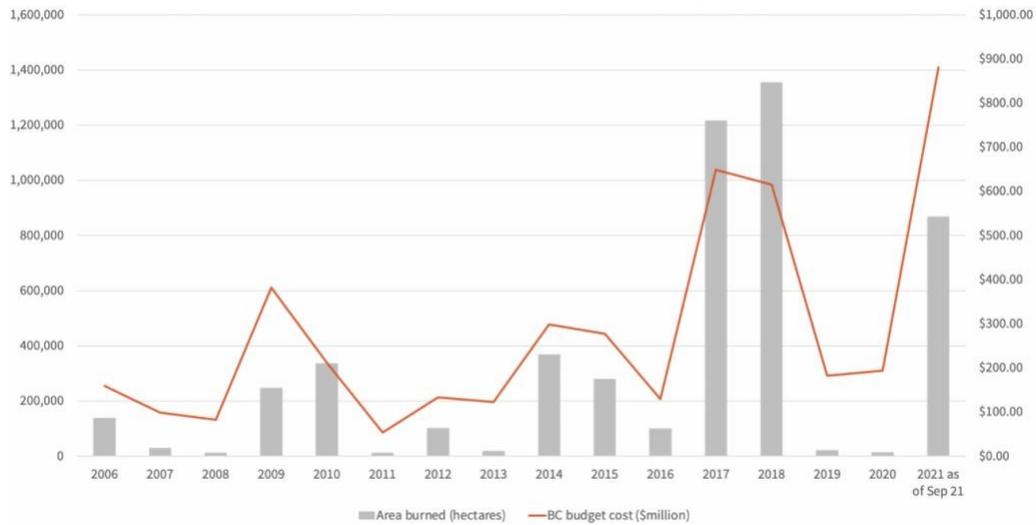


Source: National Forestry Database, 2021, Forest Fires, <http://nfdp.ccfm.org/en/data/fires.php> (accessed December 15, 2021).

Figure 2 also reveals that, although there has been quite a large fluctuation in the number of forest fires from year to year (sometimes a difference of over 2,000 fires), there is a general trend towards a decreasing number of fires annually. However, despite lower incidence of forest fires, Figure 2 suggests that the province is witnessing more damages caused by forest fires as they burn larger areas of forest. This seems to indicate that forest fires are now larger and are harder to control, even if they are fewer in number. Additionally, we should note that the province still seems to experience between 1,000 to 2,000 wildfires per year, which remains a significant number.

Figure 3 from Marc Lee (2021) captures the increasing financial costs to the provincial government associated with firefighting to suppress wildfires. This provides further evidence of the increasing severity and impacts of these fires on British Columbia, despite a decrease in the number of wildfires over a similar period.

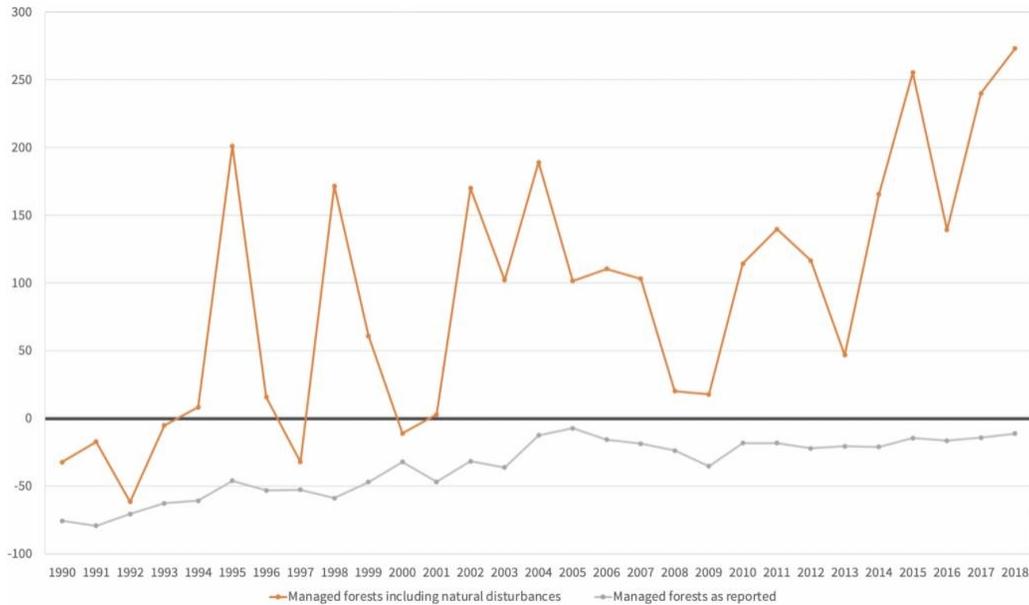
Figure 3: BC wildfires: Forest area burned and firefighting costs



Source: Lee, 2021, Five lessons from BC’s horrific wildfire season, <https://www.policynote.ca/horrific-wildfires/> (accessed March 19, 2022).

Finally, Figure 4 complements the evidence in Figure 1 that greenhouse gas emissions from forests are rising. Although this figure draws on Canadian data, it demonstrates that Canadian forests have incorrectly been reported as a carbon sink. As of the early 2000s they are now a carbon source. This change is due to several natural disturbances that have taken place, such as deforestation and forest fires (Lee, 2021). This data, coupled with Figure 1’s evidence of increasing greenhouse gas emissions from British Columbian forests, further supports our understanding of the increasing severity of BC’s wildfire and the negative effects they will have on society and the environment.

Figure 4: Emissions from Canada's managed forests: Reported carbon sink vs actual carbon source



Source: Lee, 2021, Five lessons from BC's horrific wildfire season, <https://www.policynote.ca/horrific-wildfires/> (accessed March 19, 2022).

2.2. The Impacts of Forest Fires

In the previous section, we reviewed data showing that forest fires in BC have been burning larger areas of land, emitting more greenhouse gases, and costing the province more for firefighting than in previous years (despite a decreasing number of fires annually). The larger areas being burned are of particular concern because of the risk they pose to human safety, infrastructure, and ecosystems. Additionally, as fires approach human settlements, they can cause numerous negative economic impacts: the loss of valuable timber, businesses being forced to close down, evacuation costs, and supply chains being disrupted (Wang & Strong, 2019).

Further to the risk wildfires pose to general human safety, recent research shows that the smoke from wildfires can have lasting health effects, depending on the length of time one is exposed to it (Ghosh, 2020). During the disastrous 2017 fire season, the city of Kamloops reported their worst air quality ever recorded (Abbott and Chapman, 2018). In terms of the impact of wildfires on the surrounding environment, their rising levels of greenhouse gas emissions are of particular concern. In 2017, British Columbia's forest fires were estimated to have emitted 190 million tonnes of greenhouse

gases, which is three times more than the province's typical annual carbon footprint (Abbott and Chapman, 2018). New research from Australia also indicates that smoke from increasing wildfires may slow the recovery of the world's ozone layer. This is due to chemical reactions in the atmosphere caused by the release of smoke which can further damage the ozone (Briggs, 2022).

A report on the lessons learned from the Elephant Hill wildfire recovery efforts added the disruption of cultural practices which directly impact the wellbeing of communities to the threats on human life and property that forest fires pose. "The back-to-back 2017 and 2018 wildfire seasons negatively impacted Secwépemc peoples' abilities to get out on the land. This limited access to traditional foods and medicines, as well as abilities to practice and pass on cultural traditions, that are vital for sustaining community health and wellbeing" (Dickson-Hoyle and John, 2021).

2.3. The BC Government's Role in Wildfire Management

In this section, we will share what steps the government of British Columbia has taken to address the increasing risk of wildfires and the extent to which they support traditional burning initiatives. We will begin by highlighting the creation of the BC Wildfire Service, how it functions, and its considerations when fighting forest fires. We will then review its efforts to prevent wildfires and its use of prescribed burning.

The Government of British Columbia, under the Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) which is responsible for the stewardship of all provincial Crown land, created an agency in 1912 called the BC Wildfire Service to deal with concerns regarding forest fires (Dickson-Hoyle and John, 2021; Government of BC, 2021). A description of its purpose and mandate can be found below.

The BC Wildfire Service is tasked with managing wildfires through a combination of wildfire prevention, mitigation and suppression strategies, on both Crown and private lands outside of organized areas such as municipalities or regional districts.

While the BC Wildfire Service is mandated to mitigate the impacts of wildfire on life and assets, particularly forests and grasslands, it gives high priority to fuel management and wildfire suppression in interface areas where communities and forests come together.

Since its formation in 1912, the BC Wildfire Service has accumulated over 100 years of experience and is proud to share its knowledge and expertise with the international wildfire management community. Since the early 1990s, the BC Wildfire Service has participated in projects throughout Europe, Asia, Africa and Latin America, providing customised fire suppression training and advice on available equipment and systems technologies (Government of BC, 2021).

The BC Wildfire Service states that with over 94 million hectares of wildlands and forests, British Columbia faces an average of 1,600 forest fires each year, 94% of which (Rank 1-4) are contained by 10:00 am the next day. The BC Wildfire Service uses a scale of 1 to 6 to rank wildfire behaviour, from a smouldering ground fire (Rank 1) to a conflagration or extreme fire behaviour (Rank 6). This containment is primarily conducted by personnel on the ground. However, aircrafts and support from other jurisdictions are also required to support some larger fires. When forest fires have no perceived threat to the public, property or other values, they may be considered beneficial and are monitored, rather than contained (Government of BC, 2021).

The BC Wildfire Service has divided the province into six Fire Centre regions responsible for particular jurisdictions, which are outlined in Figure 5. These regions consist of the Northwest Fire Centre, the Prince George Fire Centre, the Coastal Fire Centre, the Cariboo Fire Centre, the Kamloops Fire Centre and the Southwest Fire Centre. These regions are further divided into local fire zones. These regional Fire Centres are responsible for managing any wildfires that take place within their jurisdiction, and the overall coordination of their efforts are the responsibility of the Provincial Wildfire Coordination Centre (PWCC) and the BC Wildfire Service Headquarters (Government of BC, 2021).

The BC Wildfire Service highlights naturally-caused and human-caused wildfires as the primary causes of forest fires, with most naturally-caused wildfires being ignited by lightning. Their wildfire detection methods comprise of reports from the general public (40% of wildfires annually), air patrols, fire wardens, infrared technology, computer technology, and lookout stations. The BC Wildfire Service also lists 3 types of fire response: a full response, a modified response, and monitored. The response type is decided on by considering the rank of the wildfire and the risk it poses to communities, resources, and ecosystems. Additionally, the BC Wildfire Service describes stages of

control for forest fires, which include: out of control, being held, under control, and out (Government of BC, 2021).

Figure 5: British Columbia's Fire Centres



Source: Government of BC, 2021, Fire Centres, <https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/wildfire-response/fire-centres> (accessed on December 21, 2021).

On their website¹, the BC Wildfire Service also highlights their efforts to prevent wildfires. This includes funding for the Community Resiliency Investment Program (CRI) and the Forest Enhancement Society BC (FESBC), who both oversee wildfire risk

¹ <https://www2.gov.bc.ca/gov/content/safety/wildfire-status/prevention/funding-for-wildfire-prevention> (accessed on December 21, 2021).

reduction projects in partnership with communities and organizations across the province. They also list wildfire legislation and regulation that are in place to curb human activities that might start or exacerbate wildfires, and highlight fuel management tools that can be drawn on by communities and industry operators. Of particular interest, they outline the benefits and effectiveness of prescribed burning (although there exists minimal reference to traditional burning by Indigenous communities). Their website also highlights the requirements for a prescribed burn, which includes the submission of a burn plan to an official (60 days prior to the burn date) and its subsequent approval, as well as providing details on numerous prescribed burning projects that are underway or have been completed in BC. For example, they listed 20 prescribed fire projects that had taken place during the Spring 2021 season (Government of BC, 2021).

The BC Wildfire Service also indicates that a key focus in recent years has been to increase collaboration with First Nation communities, both in terms of forest fire prevention and response measures. Building capacity in local communities (both Indigenous and non-Indigenous) to form firefighting crews and preparing them with the necessary resources have also been important recent strategies (Government of BC, 2021).

2.4. British Columbia's History of Traditional Burning

In this section we will consider British Columbia's history of traditional burning by Indigenous communities, the reasons why these practices were suppressed, and how this was done. We will conclude by looking at the current state of traditional burning knowledge in communities across the province.

Oral histories and archaeological records show that Indigenous communities used fire as a tool ever since the early Holocene period (Lewis, Christianson & Spinks, 2018). The purpose of these controlled burns was to revitalize ecosystems, with fires often leading to the growth of foodstuffs that Indigenous communities could harvest. This practice was typically carried out throughout the spring and fall seasons, with fires being allowed to burn out in controlled directions (for example, upslope) (Lewis, Christianson & Spinks, 2018; Favrholt, 2004; Parminter, 1991).

However, within two centuries this practice was extinguished due to colonization. European settlements and the discovery of gold in 1858 in the Fraser Valley led to pressure on the government to address fires, due to its threat to rapidly growing populations. These fires that threatened settlements were often unfairly attributed to First Nations groups (Lewis, Christianson & Spinks, 2018; Parminter, 1991). By 1900 controlled burning practices were being suppressed by the provincial government (Lewis, Christianson & Spinks, 2018; Parminter, 1991). This led to numerous negative ecological and cultural effects, such as grasslands being replaced by dense ponderosa pine forests with dense understories that increased the fuel available to uncontrolled fires. These denser forests also left the trees more susceptible to disease and pests (Lewis, Christianson & Spinks, 2018; Parminter, 1991).

Hoffman et al. (2017) use 700 years of temporal and spatial findings of fire activity to confirm these oral histories by linking historical records of fires to anthropogenic burning, both intentional and accidental. Their study also shows a disappearance of fire activity (or the presence of fire on a landscape) by the end of the 19th century, which aligns with the increased regulation of fires by colonial governments. (Hoffman, Lertzman & Starzomski, 2017). A recent report reflecting on the Elephant Hill wildfires highlights industrial forest management, climate change, and the historical suppression of fires (including prescribed burning) by colonial governments as key reasons for the increasing severity of forest fires (Dickson-Hoyle and John, 2021).

The Bush Fire Act of 1874 is an example of provincial legislation which inhibited the ability of Indigenous communities to continue their burning practices if they affected Crown or private lands (Labbé, 2021; Rodriguez, 2021; Parminter, 1991). The act could be enforced through fines or imprisonment, and in 1887, the act was amended to give it a province-wide reach. It continued to be changed over the years, as it incorporated many modern-day features (such as campfire regulations and fire permits), and in 1912, it was integrated into the Forest Act (Parminter, 1991). This piece of legislation and its gradual enforcement by government agencies (such as the Forest Branch) is seen as the primary cause for the increased suppression of fires, including the practice of traditional burning, starting in the late 1800s (Labbé, 2021; Rodriguez, 2021; Parminter, 1991).

Similarly, the Yurok, Karuk, North Fork Mono, and Hoopa tribes in northern California had historically used prescribed fires to encourage the growth of foodstuff like acorns and materials for basket-weaving such as hazel. However, throughout the 1900s, federal fire policy (in the form of penalties and restrictions) in the United States limited their ability to conduct fires, with its focus on fire suppression (Buono, 2020; Kolden, 2019; Sommer, 2020). The Martu and Northern Kaanju peoples in Australia, who used traditional burning to promote the growth of desirable plant species and to attract animals, also saw their burning efforts suppressed by the Australian government and its agencies (Burr, 2013).

Despite past efforts to suppress fire by many colonial states, there is growing evidence that traditional burning knowledge is still present in Indigenous communities and being practiced on a small scale. A 2018 study conducted by interviewing members of the Lytton First Nation (in the Fraser Canyon region of BC) found that many members of the community still have traditional burning knowledge. These interviews indicated that most current spring burning takes place on the individual's own property and for "hazard abatement" purposes (Lewis, Christianson & Spinks, 2018). They also demonstrated that older individuals (over fifty years of age) are more likely to burn for other reasons, such as improving berry harvests. Other indicated reasons for controlled burning included removing undesirable animal and plant species, and improving grazing for cattle. These interviews also highlighted the timing of these controlled burns, which avoid the peak summer times for forest fires, in addition to when fire bans are in place. (Lewis, Christianson & Spinks, 2018)

Abbott and Chapman's 2018 report and the 2021 Elephant Hill wildfires report provide further evidence of the presence of traditional burning knowledge in other Indigenous communities in the province. The Elephant Hill wildfires report calls attention to the role that Secwépemc knowledge keepers and Skeetchestn community members (such as Darrell Peters) have played in supporting recent prescribed burning efforts. They also share the example of former Kukpi7 Ron Ignace who continues the practice of traditional burning, which was passed down to him by his elders, on his own property. Abbott and Chapman also highlight the many wildfire prevention measures that the Skeetchestn Indian Band have undertaken in recent years, including the use of traditional knowledge.

2.5. The Benefits of Traditional Burning Practices

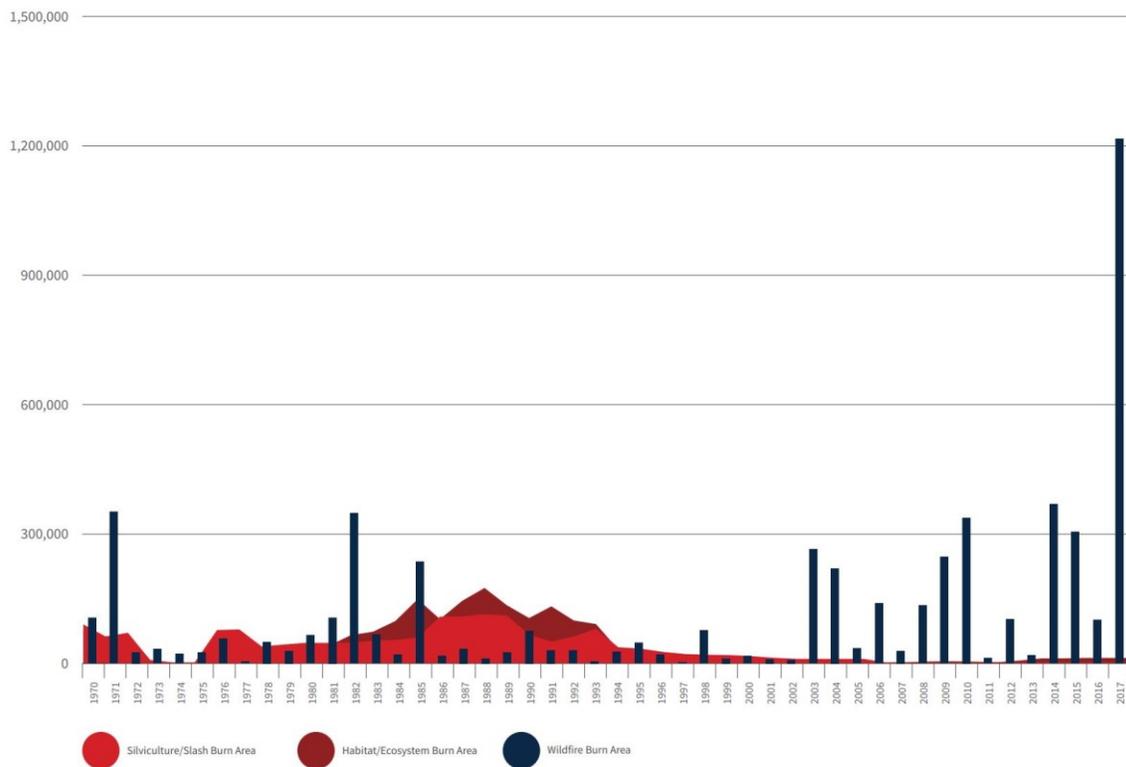
This section will review the numerous benefits associated with traditional burning practices. They include ecological, cultural, and other practical considerations. We also examine potential disadvantages associated with such practices.

The traditional practice of prescribed burning has many documented benefits and has been a tool initially used by Indigenous peoples in Canada to “maximize desirable plants and animals and achieve ecological and cultural objectives long before European contact” (Lewis, Christianson & Spinks, 2018). These practices also controlled the growth of certain tree species (such as the ponderosa pine), allowing other grass ecosystems to thrive, which in turn supported other animal species like elk and other foodstuffs to flourish (Lewis, Christianson & Spinks, 2018; Parminter, 1991). Another example of how prescribed burning benefitted the survival of certain ecosystems (and plant and animal species) is their historical role in protecting grasslands, bighorn sheep, American badgers, and limber pine in the Kootenay National Park; when fires were carried out every few years. (Patterson, 2022).

Burns have also been linked to more sustainable forest management practices. Evidence has shown that traditional burning helps reduce overall greenhouse gas emissions (by minimizing the risk of larger, damaging wildfires that would emit more) and, contrary to claims by certain government agencies, it does not lead to deforestation (Mistry, Bilbao & Berardi, 2016; Abbott and Chapman, 2018). Figure 6, from Abbott and Chapman’s 2018 report on disaster management in BC, demonstrates how the use of burns may have led to less catastrophic wildfire seasons. The figure (found on the next page) illustrates higher controlled burn areas over the 1970s, 1980s, and 1990s. Correspondingly these years witnessed lower wildfire burn areas, with a few exceptions. In contrast, the 2000s and 2010s saw a decrease in the area of controlled burns, while wildfire burn areas increased significantly and peaked in 2017. A study by Crystal Kolden (2019) reveals that southern regions of the United States, which had significantly higher rates of prescribed burning, experienced less catastrophic wildfire events than other regions of the country. Additionally, a study by Paulo Fernandes (2015), using observational evidence, indicates that prescribed burning is an effective way of treating wildfire fuel and limiting their impacts, if they are conducted regularly and over a large area.

In addition to being environmentally sustainable, prescribed burning as a wildfire management tool is seen as both effective and inexpensive (Abbott and Chapman, 2018). A 2017 study conducted by researchers at the University of British Columbia has also shown that there is growing understanding and support amongst the general public for the use of prescribed burning for wildfire management, often sparked by personal experiences. This study was conducted through an online survey with 77 participants from across British Columbia submitting a valid response (due to some respondents filling out partial surveys). The results indicated that 90% of respondents agreed that burning was a necessary element of forest ecosystems, 94% supported the removal of trees as a forest fire mitigation effort, and 93% supported the use of prescribed burning around their community (Daniels, Hagerman and Ravensbergen, 2018).

Figure 6: Prescribed burning over time



Source: Abbott and Chapman, 2018, Addressing the New Normal: 21st Century Disaster Management in British Columbia, <https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/embc/bc-flood-and-wildfire-review-addressing-the-new-normal-21st-century-disaster-management-in-bc-web.pdf> (accessed on December 21, 2021).

As a cultural practice that was conducted by Indigenous communities throughout the province, and was subsequently suppressed by the regulations of a colonial

government, another benefit of revitalizing traditional burning is allowing Indigenous communities to reclaim these practices. Support for traditional burning would further the Government of BC's efforts to uphold the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), promote self-governance through place-based practices, and work towards reconciliation (Dickson-Hoyle and John, 2021; Mistry, Bilbao & Berardi, 2016; Abbott and Chapman, 2018; Nikolakis and Roberts, 2020).

Despite various benefits associated with prescribed burning practices discussed above, there could also exist potential risks and disadvantages associated with them. However, these potential risks and disadvantages need to be more carefully studied since our review of the literature did not find any evidence to support significant harms that prescribed burnings might pose. As mentioned earlier in this section, the alleged link between prescribed burning and deforestation has not been substantiated, and although these fires do emit smoke and greenhouse gases, their rate of emission is lower than those of wildfires that could otherwise take their place. Additionally, there seems to be little evidence of experienced practitioners losing control of prescribed burns. Despite this, the provincial government requires precautions to be taken and fire suppression equipment to be on hand, in case it is needed (Government of British Columbia, 2021). Furthermore, we believe that working closely with Indigenous communities and using their knowledge and expertise would further help to mitigate any potential risks or disadvantages.

2.6. Barriers to the Use of Traditional Burning

The past thirty-five years have witnessed a gradual reintroduction of traditional burning practices, due to “increasing suppression costs and decreasing forest health” (Lewis, Christianson & Spinks, 2018). Indigenous communities have played a key role by maintaining their cultural burning knowledge, continuing to practice burns on a small scale, and advocating for its revitalization (Abbott and Chapman, 2018; Dickson-Hoyle and John, 2021; Lewis, Christianson & Spinks, 2018). Although Indigenous communities were historically allowed to conduct burns on reserve land, British Columbians as a whole are now allowed to carry out prescribed burns on their own property by going through an application process with the BC Wildfire Service (Government of BC, 2021). However, this application process is lengthy, and after 50 years of these practices being

discouraged or made illegal, rebuilding this habit amongst community members is a barrier that needs to be overcome (Lewis, Christianson & Spinks, 2018).

Most community members are also unaware that the BC Wildfire Service has fuel management goals (to decrease forest debris and dense vegetation), which they could contribute towards by conducting prescribed burns over larger geographic areas than they might have in recent years. In particular, Indigenous practitioners or communities with the knowledge and expertise could offer a significant contribution (Lewis, Christianson & Spinks, 2018).

Another barrier that has been identified is the resistance that practitioners might face from the public. This is due to their fear of fire and their concern that prescribed burning practitioners might lose control of them. Indigenous community members who have traditional burning knowledge have shared their worry that, with larger surrounding populations (particularly those who are non-Indigenous), their controlled burning efforts will be reported and will be viewed negatively. This is despite their efforts being legal and being conducted during the shoulder seasons when fire bans are not in place and risks are not as great. This concern is likely due to members of the wider community being unaware of the legality of such practices and being unfamiliar with the precautions being taken when conducting prescribed burns (with fire suppression measures in place) (Abbott, 2022; Lewis, Christianson & Spinks, 2018). Additionally, “concerns about smoke, escaping fires, lack of burning expertise and local bylaws” are viewed as current obstacles to implementing prescribed burns (Abbott and Chapman, 2018).

Pressure from the forestry industry, who are worried about losing valuable timber, was another perceived barrier to the wider adoption of controlled burning practices that has been identified (Lewis, Christianson & Spinks, 2018). However, this barrier is disputed, with others suggesting that the forest industry would be keen to support traditional burning practices and build partnerships with Indigenous communities (Abbott, 2022; Walton, 2021).

Another barrier to the implementation of traditional burning is the financial support necessary to ensure that appropriate precautionary measures are in place (to manage any escaping fires). A 2018 Ipsos study in British Columbia revealed that 96% of respondents indicated that the lack of financial resources available to communities is

one of the main inhibiting factors to wildfire management (Daniels et al, 2018). Additionally, Abbott and Chapman (2018) suggest that the challenge of forest fire management will only continue to increase as the size of communities also grows over time. The Elephant Hill wildfires report also highlights that the BC Wildfire Service has acknowledged that its limited engagement of First Nations has deepened mistrust for the BCWS amongst Indigenous communities, who have felt frustrated by their expertise and knowledge being ignored and undervalued. An important first step to overcoming this barrier will be to create space and time for Indigenous community members to share their experience and frustrations (Dickson-Hoyle and John, 2021).

Other barriers mentioned in the Elephant Hill wildfires report, that Secwépemc communities have faced, are a lack of clarity regarding the mandates and responsibilities of involved stakeholders (i.e., themselves, the provincial agencies, etc.), a strategic disconnect between different levels of government (i.e., between provincial and federal agencies), access to provincial decision-makers when engaging in collaborative efforts, the availability of training resources, and concerns surrounding liability. These have often continued as persistent barriers for the meaningful engagement of Indigenous communities, despite assurances from the government that they are being addressed. (Dickson-Hoyle and John, 2021). The marginalization of Indigenous knowledge in research and policy making is another barrier that has been identified; often because the Western approach “does not correspond to the multidimensional (spiritual, social, ecological) experiences as perceived by Indigenous people” (Mistry, Bilbao & Berardi, 2016).

Chapter 3. Methodology

Three methodologies were used for this research paper: a jurisdictional scan, a media scan, and an expert interview. The purpose of these methodologies was to identify barriers to the use of traditional burning knowledge for forest fire prevention and to highlight strategies that could be used to overcome these barriers in British Columbia.

The jurisdictional scan aims to draw on experiences from different regions of the world. Considerations for the jurisdictions selected included the availability of information, their experience with traditional burning or the incorporation of Indigenous Knowledge, and socioeconomic similarities to British Columbia (and Canada) that might indicate the applicability of recommended policy options. The regions selected included Canada (primarily experience drawn from British Columbia), the United States of America, Australia, New Zealand, and South America (specifically Venezuela, Brazil and Guyana).

New Zealand was found to have limited experience with traditional burning, yet they were included due to their experience with the incorporation of Indigenous Knowledge and the meaningful engagement of Indigenous communities. The jurisdictional scan drew primarily on academic literature and information found on the websites of government agencies and non-profit organizations.

The goal of the media scan is to draw out experiences of traditional burning practices being revitalized from recent news articles. Our search was conducted primarily on British Columbian and Canadian news agencies, and it included over 50 related articles. Finally, we were able to interview two experts in the field. The two interviews lasted between 40 to 60 minutes and were comprised of a few general queries related to our research question, as well as asking for their reflections on the 3 policy options that we proposed. A limitation of this methodology was the small number of interviews we were able to carry out, due to low response rates, which may be due to the subject matter and sensitivity surrounding it.

Chapter 4. Jurisdictional Scan

4.1. Canada

Most studies found on the Canadian experience were focused on British Columbia, which seemed to have more advanced discourses on this subject and was determined to be a helpful starting point given the purpose of this paper. An informative report was Abbott and Chapman's "Addressing the New Normal: 21st Century Disaster Management in British Columbia" which highlights the need for an increased use of prescribed burning and the significant role that First Nations should play in its implementation with their extensive experience and familiarity with the land.

An online engagement survey that they conducted with 929 British Columbians showed that over 75% of respondents agreed with the question: "Prescribed fires or burns are a method to minimize wildfire threats. I feel my community could benefit from prescribed burning." Less than 10% of respondents disagreed with this statement. This indicates a significant amount of support amongst British Columbians for this method of forest fire mitigation. Similarly, input from First Nations communities indicated a high-level of support for prescribed burns, with questions raised regarding their role as firekeepers, the need for these burns to be scheduled and regular, and gaps related to current prescribed burning policies. Other related questions raised by the report include the need for increased funding for fuel management efforts and greater collaboration between stakeholders (Abbott and Chapman, 2018).

The report also highlights an example from Logan Lake (a municipality southwest of Kamloops) of additional strategies for fuel management which include manually removing bushes and fallen trees, or using grazing cows and goats to remove certain types of vegetation. Of the report's 108 recommendations, five are closely related to prescribed burning and can be found in Table 1. They call on the provincial government to increase their collaboration with Indigenous communities regarding the integration of Indigenous Knowledge, to establish the use of traditional burning as a forest fire prevention tool, and to reduce barriers faced by traditional burning practitioners (Abbott and Chapman, 2018).

Table 1: Prescribed Burning Recommendations from “Addressing the New Normal: 21st Century Disaster Management in British Columbia”

Recommendation Number	Recommendation Details
31	Establish pathways for collaboration with First Nations to enable the integration of traditional ecological knowledge with Western science. Ensure risk modelling is built upon a greater understanding of the land base, values and practices of First Nations.
57	BC and Indigenous governments review traditional First Nations burning practices for their applicability and suitability for future forest and fuel management.
61	The Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Ministry of Environment and Climate Change, Ministry of Health and other applicable ministries reconcile existing statutes limiting more extensive use of traditional and prescribed burning.
75	BC increase the use of traditional and prescribed burning as a tool to reduce the risk associated with landscape and local-level hazards, and to regenerate ecosystems. BC expand the window for traditional and prescribed burns by modifying how the venting index determines burn windows, including recognizing the difference between burns following timber harvest and burns as part of a wildfire risk-reduction prescription.
76	BC investigate and assess the possibility of a prescribed burn statute that would offer protection for responsible and permitted burners.

Source: Abbott and Chapman, 2018, Addressing the New Normal: 21st Century Disaster Management in British Columbia, <https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/emergency-preparedness-response-recovery/embc/bc-flood-and-wildfire-review-addressing-the-new-normal-21st-century-disaster-management-in-bc-web.pdf> (accessed on December 21, 2021).

In response to Abbott and Chapman’s report, the Government of British Columbia has released three Action Plan reports that outline their commitments to the proposed recommendations and the progress that had been made to date. In their 2018 report, the government described their intentions to implement and monitor a Provincial Improvement Plan in collaboration with numerous stakeholders, which will be guided by principles from the United Nations Declaration of the Rights of Indigenous People and the Truth and Reconciliation Calls to Action. They also highlighted their commitment of \$72 million over three years to support both forest fire prevention and recovery, and describe key principles as “planning must include partners and must contribute to reconciliation with First Nations” and “local and traditional knowledge must be respected and utilized.” (Government of British Columbia, 2018) The report goes on to list a First Nations Leadership Gathering, input from the First Nations Leadership Council (FNLC), regional First Nations Emergency Management Partnership Tables, and the First

Nations Emergency Services Society (FNESS) as avenues to further discuss Abbott and Chapman's report recommendations. (Government of British Columbia, 2018)

In the provincial government's April 2019 report, they share that regional partnership tables have been established across BC, a disaster recovery framework has been developed and will be implemented in collaboration with numerous First Nations, and a tripartite agreement has been signed with the FNLC and FNESS that formalizes the partnership of First Nations in both the governance and operations of emergency management. The report also highlights other efforts that have been made to engage First Nations in meaningful partnerships and conversations: the signing of a tripartite Collaborative Emergency Management Agreement (CEMA) with the T̓silhqot'in Nation, the First Nations Leaders Gathering, the active engagement of the First Nations Health Authority, the role of the FNESS, and BCWS's regular meetings with Indigenous communities.

The April 2019 report also outlines the government's development of a prescribed burning program, with an initial funding commitment of \$10 million. Steps described as part of its development include creating a framework, collaborating with local authorities and First Nations, refreshing knowledge and skills in burning alongside partners, and working with First Nations, local communities and industry to increase the use of prescribed fire on the land. (Government of British Columbia, 2019) The provincial government's October 2019 report indicates that funding for the prescribed burning program was increased and that prescribed burns were already used on over 1,000 hectares of land during the spring of 2019 alone. The report also indicates that the program will now include a "curriculum and training component to build capacity and increase knowledge regarding prescribed fire" with the FNESS supporting the inclusion of First Nations traditional knowledge in the modules. (Government of British Columbia, 2019) Statements from the federal government have also indicated support for increased collaboration between its agencies (such as Indigenous Services Canada) and both Indigenous and non-Indigenous communities to encourage the use of prescribed burning as an emergency management measure. (Standing Committee on Indigenous and Northern Affairs, 2018)

A report by the Secwépemc leadership, in the aftermath of the Elephant Hill wildfires, highlighted the role of Joint Leadership Councils as a way to connect their

Nation's leadership to the government and other stakeholders in the absence of formal partnerships. These councils helped guide recovery efforts and provided a possible avenue for increasing the role that First Nations could play in forest fire prevention and management. A key partner of these efforts was the Ministry of Forests, Lands, Natural Resource Operations & Rural Development, which is responsible for all Crown land, and the BC Wildfire Service as its agency with the specific focus of managing wildfires. The councils were also supported by a Joint Technical Committee, which provided technical expertise from both a Western and Indigenous perspective. The report also identified how the significant impacts of the Elephant Hill wildfire, combined with other political shifts and renewed reconciliation efforts, has created a policy window for the increased engagement of First Nations in addressing the issue of forest fires (Dickson-Hoyle and John, 2021).

Key elements that allowed for this collaboration to develop included “strong leadership and coordination from both Secwépemc communities and the Province of BC”, “flexibility and a willingness, particularly on the part of the provincial government, to work outside of usual policy or process”, “the governance structure of a Joint Leadership Council, Joint Technical Committee and sub-committees”, “spending time to develop shared understandings and identify shared values”, and “open, honest communication in communities to build trust” (Dickson-Hoyle and John, 2021). Changes that have been observed since 2017, and due to these collaborations, include improved information sharing and communication with the public, increased funding for fuel management efforts, and the establishment of regional agreements (Dickson-Hoyle and John, 2021).

The report also put forward 30 recommendations, three of which relate to prescribed burning. They include Recommendation 11 which calls on the BCWS “to establish partnerships with local First Nations to facilitate active involvement in prescribed burns within their respective traditional territories as and when desired”; Recommendation 12 which calls on the FNESS “to establish regional Indigenous fire stewardship networks” that “would bring together community-based Indigenous fire practitioners and resource/stewardship managers to support knowledge sharing and connections within and between Indigenous Nations”; and Recommendation 13 which calls on the BCWS “to enable a First Nations led cultural burning permit system that empowers First Nations communities and fire knowledge keepers to determine cultural burn objectives; allows for the incorporation of community knowledge and language, and

community participation; and would be flexible to allow wider burn periods and reduced oversight.” (Dickson-Hoyle and John, 2021)

An exploration of the FNESS’s website outlines their Revitalizing Traditional Burning project which “is intended to inform policy makers, wildfire management specialists, crew leaders, land planners, and program managers in developing wildfire mitigation strategies that can maintain or enhance cultural attributes of First Nations communities” (FNESS, 2022). The program supports the collection and sharing of Indigenous knowledge, provides communities with funding, engages communities in the planning of forest management efforts, and encourages Indigenous traditional burning storytelling initiatives. To this end two short videos have already been produced which consist of interviews with FNESS representatives and members of a few First Nations, which speak to the importance of these cultural burning practices and the need for their revitalization (FNESS, 2022). In addition to acting as a means to share knowledge amongst First Nations and fire practitioners, these developments are of particular interest given a recent emergency preparedness study by Ipsos which found that most British Columbians rely on media (55%) and websites (48%) for their information, with younger audiences also reliant on social media. (Ipsos, 2018) This highlights the role videos could have on informing the public, as well as effective avenues that could be used to share them.

Another article on efforts to restore grassland habitats in the Kootenay National Park describes the three steps taken as part of their restoration process: “removing buildings, thinning forests so controlled burns could be done safely, and setting controlled burns.” (Patterson, 2022) Furthermore, Patterson indicates that prescribed burns could be conducted in such a way that they mimic natural burning patterns, by carrying out burns in an area every twenty or thirty years. Additional considerations when conducting burns should include the increasing length of the forest fire season and the key role that Indigenous peoples should play due to their expertise (Patterson, 2022).

Finally, a 2018 study on the impacts of wildfires on the Lytton First Nation led to four recommendations for further research: “(1) the comparison of historical uses of fire in the community to contemporary fire use objectives by conducting research with community Elders, (2) the impact of forest disturbances (natural and non-natural) on the

production of natural foodstuffs, (3) low-intensity burning as a means of ecosystem management in Bunchgrass–ponderosa pine mixed zones, and (4) Indigenous community-led burning as a means of achieving both traditional and ecological goals” (Lewis, Christianson & Spinks, 2018).

4.2. The United States of America

Experiences of reviving the use of traditional burning in the United States were predominantly from the Pacific Northwest. A case from Mendocino County (located along the North Coast of California) showed how ownership of over 500 acres of forest were returned to ten tribes, providing them with the ability to act as stewards of the land and to implement traditional knowledge. (Paz, 2022) In northern California, the Karuk and Yurok tribes have partnered with the government (in the form of the US Forest Service) to both address wildfires and revitalize traditional practices. However, many barriers still exist due to historical efforts to suppress prescribed burning and the absence of burning permits in many counties. (Sommer, 2020; Burr, 2013)

The case of the North Fork Mono is another example of increased collaboration with the US Forest Service, in addition to their prioritization of the development of educational curricula alongside academics. (Burr, 2013) The Yurok tribe also established the Cultural Fire Management Council, a community-run non-profit, with the objective of returning traditional burning to all their ancestral lands. Over time the Cultural Fire Management Council has also hosted larger training exchanges (TREX) for firefighters and fire practitioners from across the US and other Indigenous nations. These “training exchange[s] helped the Yurok Tribe meet some of the legal requirements for conducting a prescribed burn - like having authorized burn bosses and extensive firefighting equipment on hand.” (Buono, 2020) The Yurok Tribe and Council now host two TREX gatherings each year and have trained 21 members of their tribe, who are paid to manage fires in the community and accompany other community members when conducting smaller burns around their homes. However, concerns remain that not enough burning is taking place to adequately address the risk of wildfires. Finally, the efforts of the Yurok Tribe have led to the creation of the Indigenous Peoples Burning Network (IPBN) which provides support to Indigenous communities who wish to revitalize their burning practices. This support network now includes pueblos in New Mexico and other tribes in Minnesota, New Mexico and Oregon. (Buono, 2020)

Other examples of prescribed burning networks include the Southern Blue Ridge Fire Learning Network, which was formed by the South Carolina State Parks Service to support their controlled burning program. In addition, efforts in South Carolina have highlighted the “creation of community trust and involvement, [the] use of signs to indicate the use of beneficial fire in an area, and [the] development of specific and appropriate messaging” as ways to remove barriers to prescribed burning. Collaborating with educational programs, gathering community feedback, and social media campaigns have also been found to be helpful. (Woodlee, 2016)

Increasing levels of public support for prescribed burning are also becoming visible, as demonstrated by a 2018 study conducted in North Carolina which found that most respondents thought prescribed burning to be a beneficial initiative and that they did not feel threatened by it. A respondent’s perception that forest fires are a natural element of the ecosystem, their political affiliation, and the recent level of risk that wildfires have posed to their residence were seen as statistically significant indicators of the above stated beliefs. (Gaasch, 2018) Research has also highlighted four factors that increase the effectiveness of collaboration between Indigenous communities and fire management agencies: 1) strong leadership which can bridge the gap between policies and cultural concerns; 2) the presence of community-backed NGOs which can strengthen the relationship between land management agencies and communities; 3) formal planning arrangements which can ensure long-term collaboration that seek mutually beneficial outcomes; and 4) greater public awareness and support, with social media and film as effective educational tools. (Burr, 2013)

4.3. Australia

Experiences from Australia show both a rich history of the Indigenous use of traditional burning, in addition to more recent success stories of revitalizing these practices. A key strategy has been the adoption of Indigenous fire knowledge as a market-based instrument for reducing greenhouse gas emissions, as an approved tool of Australia’s Carbon Farming Initiative (CFI). This provides multinationals with the opportunity to decrease their carbon footprint, by funding projects that both mitigate wildfires and benefit Indigenous peoples (in terms of both encouraging their cultural practices and providing communities with job opportunities.) However, this approach does not incentivize these companies to reduce the amount of greenhouse gases they

are producing (since they can offset their carbon impact), and there are concerns of how it might marginalize the role of Indigenous peoples: “Inherent in the nature of institutionalized management programmes is to replace the complexity and contingency of Indigenous fire management with standardized goals, while treating Indigenous people as workers executing plans developed by others rather than as genuine partners.” (Mistry, Bilbao & Berardi, 2016)

Furthermore, a Western implementation of traditional burning practices is sometimes seen to further sideline the role of Indigenous practitioners, while not considering the full breadth of Indigenous Knowledge available. This can often lead to opposition from Indigenous communities. (Fache and Moizo, 2015) Additionally, fears exist that a system being driven by corporations, who may have alternative priorities (such as meeting carbon offsetting goals), will lead to prescribed fires being applied carelessly and not with the best interests of the ecosystem in mind. (Mistry, Bilbao & Berardi, 2016; Royal Commission into National Natural Disaster Arrangements, 2020) Questions of co-designing programs and having timely and equitable access to resources are also frequently asked of the government. Despite these drawbacks, carbon farming is seen as an effective and popular way of reintroducing traditional burning to many regions in Australia, with the technical support of many organizations and the financial support of the Emissions Reduction Fund. (Royal Commission into National Natural Disaster Arrangements, 2020)

Recent efforts to increase the presence of prescribed burning has generally been met by increasing community support in Australia due to its beneficial impact on mitigating wildfires, restoring environmental processes, and revitalizing traditional Indigenous practices. (Australasian Fire and Emergency Service Authorities Council Limited, 2015) The Martu have collaborated with the Australian government to revive prescribed burning efforts, often through Martu NGOs (such as Kanyirninpa Jukurrpa) which receive government funding. The Northern Kaanju people have also worked with the government to establish an Indigenous Protected Area (IPA) - 1,975 square kilometers of their traditional territories - that falls under Australia’s National Reserve System, but allows them to be responsible for its management. This has provided space for traditional burning practices to be brought back and for Indigenous-led burning workshops to be hosted. (Burr, 2013) Similar cases of handing land management over to Indigenous people (although remaining as part of the National Reserve System) can be

found in other parts of the country, such as with the area of Fish River. (Department of Agriculture, Water and the Environment, 2022)

4.4. New Zealand

Experiences in New Zealand did not indicate a significant history of traditional burning for forest fire mitigation and ecosystem restoration, since much of its vegetation had not been naturally subjected to wildfires. (Australasian Fire and Emergency Service Authorities Council Limited, 2015) However, the Maori had used fire to clear land for agriculture, to support hunting, and to clear travel paths. Additionally, European settlers had utilized fire for similar reasons in addition to managing levels of forest fuel. Because of this, prescribed burning has not been widely used, although there has been a growing conversation about its implementation, with a few cases taking place in rural settings on a small-scale. (Baillie and Bayne, 2019) New Zealand does have experience integrating Indigenous knowledge and collaborating with Maori groups on other environmental issues. For example, Indigenous values have informed New Zealand's approach to freshwater management; with co-governance, co-planning, and co-management upheld as models for these partnerships. Co-governance is defined as “[f]ormal arrangement to share decision making”, co-planning as “[p]lanning together under co-governance agreements”, and co-management as “[a]ctions and responsibilities implemented jointly by the parties.” (Harmsworth, Awatere and Robb, 2016)

4.5. South America

Venezuela has a more progressive stance on Indigenous rights amongst South American nations, as evidenced by its constitution's provisions. However, despite this, the implementation of burning is still heavily regulated under the supervision of environmental authorities. Under their Programme for Prevention and Protection Against Forests, training for forest rangers has been enhanced, although it primarily focuses on fire suppression, despite many of their firefighters being Indigenous. Brazil's fire management efforts include both fire suppression and prevention, with prescribed burning an avenue for its prevention. These initiatives have been closely connected to their climate change agenda. Although they have turned to satellite imaging to identify forest areas that are ideal for burning (due to drying vegetation or forest density), there

have also been efforts to draw on Indigenous knowledge; such as consulting with elders to create a fire calendar and burning plan (in the Xerente Indigenous territory). This highlights a significant shift from policy makers who now see the benefits and potential of these traditional practices. Finally, experience in Guyana indicates minimal acknowledgement of prescribed burning at a policy level, with little current implementation. (Mistry, Bilbao & Berardi, 2016)

4.6. Summary

In conclusion, our jurisdictional scan indicates a growing level of support among British Columbians for the use of prescribed burning as a forest fire prevention measure. A 2018 report called for greater collaboration with First Nations in implementing forest fire prevention initiatives (such as traditional burning) and increased government funding to support these efforts. Government responses to this report have dedicated funds for prescribed burning projects, established entities to meaningfully engage Indigenous communities, and supported the development of related educational materials. Additionally, a report on the Elephant Hill wildfires highlighted the emergence of a policy window for advancing traditional burning practices and shared the success of Joint Leadership Councils as an informal way of building relationships between the BC Wildfire Service and Indigenous communities. This report also recommends greater involvement of First Nations, the creation of fire stewardship networks, and the establishment of a First Nations-led cultural burning permit system. The FNESS's Revitalizing Traditional Burning project was also identified as an example of building capacity and educating the public through storytelling and short films.

In the United States we discovered cases of Indigenous groups being given ownership over forests and re-establishing traditional burning patterns. The Yurok tribe's creation of a Cultural Fire Management Council gave insights into what a fire stewardship network could look like and efforts in South Carolina found that engaging the public in prescribed burning initiatives deepened trust and led to greater public support. A review of Australia uncovered Indigenous managed forests, in addition to the successes of integrating traditional burning into their Carbon Farming Initiative. Although there was less evidence of traditional burning practices in New Zealand, other ecological projects highlighted the principles of co-governance, co-planning, and co-management when engaging with Indigenous communities. Finally, glimmerings of traditional burning

efforts could also be found in the South American countries of Venezuela, Brazil and Guyana.

Chapter 5. Media Scan

The objective of the media scan was to draw out experiences communities have had in encouraging the use of prescribed burning and the role that Indigenous peoples have played in doing so. Secondary objectives included identifying barriers to traditional burning and getting a sense of the level of support for burning as a forest fire mitigation measure. Over fifty articles across a number of news agencies were reviewed as part of this scan, with British Columbia being the jurisdiction of choice.

One example of greater collaboration between regional governments and First Nations that was found in a Vancouver Sun article, titled “Indigenous stewardship of BC parks a step on path to reconciliation”, was the 2020 signing of a cooperation agreement between the Metro Vancouver Regional District and the Tsleil-Waututh Nation to act as stewards of the Belcarra Regional Park (təmtəmíxwtən) together. Other examples of parks being cooperatively managed include the Pacific Rim National Park Reserve, which is overseen by eight Nuu-chah-nulth Nations and Parks Canada through cooperative management boards that began in 1995 (Luymes, 2022). Although the practice of traditional burning was not brought up as part of these agreements, these formalized arrangements would increase the ability of First Nations to incorporate cultural values and practices.

Another case found in the Narwhal article “The art of fire: reviving the Indigenous craft of cultural burning” was the Collaborative Emergency Management Agreement between the Tsilhqot’in Nation and the federal and provincial governments. This partnership was the first of its kind and emerged out of lessons learned from the 2017 forest fire season. The same journalist described the difference between cultural and prescribed burning; with prescribed burning focusing on managing forest fuel levels, whereas cultural burning does this in addition to its attempts to restore ecosystems and positively impact both wildlife and foodstuffs. They go on to highlight the popularity of cultural burning in northern Australia and its effectiveness (halving the area affected by wildfires and reducing its greenhouse gas emissions by forty percent). The Tsilhqot’in project has collaborated with Australian expertise to begin forming a carbon credits program of their own, with Australia’s program generating annual revenue of \$40 million. This tripartite arrangement allows for these practices to be pioneered on a larger scale in

BC, although there is recognition that this requires increasing planning and an increasing number of collaborators. The Xwisten Fire Council (which brings elders together) and the First Nations Emergency Services Society's Revitalizing Traditional Burning project (which collects stories from knowledge keepers across Nations) were also identified as effective ways of sharing burning knowledge (Boutsalis, 2020).

A 2022 article in the *Narwhal* by Ainslie Cruickshank identified strong leadership from Indigenous groups and local governments as a key contributor to encouraging traditional practices, with these institutions being more closely connected to community concerns. Additionally, smaller communities are in greater need of support with funding and capacity building (Cruickshank, 2022). Brenna Owen's 2021 article titled "Fire experts prescribe Indigenous cultural burns to reduce wildfire risk in BC" calls for an easier path in the province's approval system for low-risk traditional burns. For example, during the spring and in areas of higher elevation where there is greater moisture present. BC has also identified the revitalization of cultural burning as a key commitment to their implementation of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). The province's community resiliency investment program (started in 2018) calls for the BCWS to partner with First Nations on supporting prescribed burning efforts, in addition to providing funding and its collaboration with the FNESS (Owen, 2021).

A 2021 article by Jeremiah Rodriguez highlights that First Nations leaders have also questioned how long it takes to get burns approved, in addition to the rigorousness of the process which takes many meteorological and geographical considerations into account (Rodriguez, 2021). Labbé's 2021 article for the *Pique News Magazine* underlines how the provincial government itself acknowledges that burns can take months and sometimes even years to be put into action. Which makes burning even more difficult, with the unpredictability of climate change already making it significantly challenging for fire practitioners (Labbé, 2021). Although First Nations groups can conduct burns without approval on reserves, they still do not have access to many of their traditional lands which fall outside their jurisdiction (Rodriguez, 2021). As per another 2021 article by Breanna Owen, these calls for more flexible permit systems that require less government management are echoed in the recent Elephant Hill wildfires report (Owen, 2021). Denise Ryan's 2021 article "Indigenous 'cultural burns' can strengthen biodiversity in fire-ravaged BC" highlights recommendations made that

cultural burning be explored during fall and winter months, when risks of fires spreading are lower, as well as encouraging community-led efforts (Ryan, 2021). Yvette Brend's article "Burning BC: Time to fight fire with fire, says expert" challenges the government to ensure that the area surrounding every community is treated with burns as added protection (Brend, 2017). Finally, a 2021 article by Dan Walton mentions an Indigenous forestry company that makes an effort to remove forest fuel, although they are unable to use prescribed burning due to legal complications and concerns of its effects on air quality (although the build up of fuel leads to larger wildfires that also worsen air quality). Even the burning of slash piles is limited to colder months, when weather conditions make it more difficult for them to be carried out (Walton, 2021).

In summary, our media scan uncovered recent agreements between First Nations and regional agencies to act as park co-stewards. Additionally, the Collaborative Emergency Management Agreement between the Tsilhqot'in Nation and the provincial and federal government is an example of greater ownership by an Indigenous community in managing their emergency response procedures. The Tsilhqot'in Nation has also explored the applicability of the use of traditional burning similar to Australia's Carbon Farming Initiative. Fire Councils and the FNESS's Revitalizing Traditional Burning project were highlighted as effective ways to share traditional burning knowledge with other practitioners. The provincial government also recognized that their commitment to UNDRIP should manifest itself in support for revitalizing the use of cultural burning practices. Finally, questions were raised regarding the prescribed burns approval process and how to best engage the forestry industry in these controlled burning efforts.

Chapter 6. Interviews

The purpose of our expert interviews was to ask a few general questions related to overcoming the barriers to the use of traditional burning knowledge in British Columbia. We conducted two interviews that lasted between 40 to 60 minutes. The limited number of interviews we carried out was due to a low response rate from academics that we reached out to, possibly due to the subject matter and the sensitivity that surrounds it. Despite these limitations, we thought it would be helpful to include the insights we gained from the interview we were able to conduct.

6.1. Interview with Dr. George Abbott

Our first interview was conducted with Dr. George Abbott, a public policy consultant, former BC politician and Cabinet minister, including Minister of Aboriginal Relations and Reconciliation, and co-author of the 2018 report “Addressing the New Normal: 21st Century Disaster Management in British Columbia”. When asked what types of Indigenous Knowledge used for forest fire prevention that he is aware of, Abbott answered that he was primarily aware of traditional burning. However, he did highlight that historically the use of burns by Indigenous communities were intended to sustain forest biodiversity and not to prevent wildfires (although they have recently proven effective in preventing severe forest fires). When asked how widely used he thought traditional burning was in BC, Abbott highlighted a few examples of its application, but acknowledged that it was still not widely used across the province. He mentioned that although the provincial government had accepted all the recommendations from their 2018 report and had shared annual updates listing the steps taken so far, progress had still been slow. He suggested that the COVID-19 pandemic (and other issues) had played a significant role in these delays through its preoccupation of the government’s attention.

When asked about the benefits of traditional burning, Abbott mentioned that it helps manage the land and makes it less vulnerable; particularly as annual temperatures rise and periods of drought lengthen. He also pointed to its ability to burn the build up of debris that was left behind after large portions of forest were logged due to the Mountain Pine beetle outbreak. Abbott also mentioned the beneficial use of prescribed burns

around towns or settlements, as a protective measure. When prompted about the possibility that prescribed burns could have positive health impacts, by decreasing the scale and severity of wildfires, Abbott agreed and shared that research at UBC indicated that controlled burns conducted during the spring burnt less hot and emitted less smoke and greenhouse gases (particularly when carried out regularly, in order to avoid a build up of fuel). When asked about its role as part of the reconciliation process, Abbott again agreed that it is always beneficial to build meaningful relationships with Indigenous communities and highlighted the importance of revitalizing cultural practices such as traditional burning.

When asked about barriers to the implementation of traditional burns, Abbott mentioned the public's general fear of fire (as evidenced by the frequent calls by the public when prescribed burns are being conducted) and the slow shift that public policy seems to require when policymakers are trained in a certain approach or mindset. When prompted about the possibility of the forest industry being a barrier, Abbott felt that they would be more supportive (rather than acting as a barrier) and that they seemed keen to learn from and partner with First Nations communities. When asked whether historical bans had played a significant role in minimizing the presence of traditional burns, Abbott felt that this was a fair assessment. He mentioned that Canada has a history of treating Indigenous communities disdainfully and he highlighted the negative impacts on cultural practices that were caused by residential schools, and bans on the potlatch and traditional burns.

Finally, when presented with the three policy options that this paper analyzes, Abbott felt that the first option had an excellent approach of emphasizing the need to strengthen relationships with Indigenous communities. Although he was supportive of the second option's proposal to have a regional network of Indigenous fire stewards, he cautioned against presenting them with a model and instead encouraged that the fire stewards be allowed to co-create the goals of this entity. Abbott also agreed that the third policy option was not as straightforward and that the first two policy options should be prioritized by policymakers. In conclusion, he highlighted the need for many models to be tested out and that the policy framework that supports the revitalization of traditional burning practices will continue to evolve.

6.2. Interview with Dr. Ken Lertzman

Our second interview was conducted with Dr. Ken Lertzman, a Professor Emeritus with Simon Fraser University's School of Resource and Environmental Management. Ken is a forest ecologist interested in topics related to ecosystem dynamics, conservation, and management. When asked what types of Indigenous Knowledge used for forest fire prevention that he is aware of, Ken shared that the role of fire by Indigenous practitioners was embedded in a rich toolkit of ecosystem management tools that were developed with specific local ecosystems in mind.

When asked how widely used he thought traditional burning was in BC, Ken shared that historically it was most common in the interior of the province. Used as a method of foodstuff amelioration, the practice was widely suppressed by the provincial government throughout the late 1800s till the mid 1900s. He felt that where traditional burning was continued, it was done off the radar and with the risk of penalties. Although Ken felt that traditional burns were not practiced widely across BC, he did highlight its use by some Indigenous practitioners (such as in the Lytton area and the Skeetchestn Indian Band).

When asked about the benefits of traditional burning, Ken highlighted that traditional burns were not primarily developed for forest fire prevention purposes, and instead, were used to maintain a package of ecosystem services. He agreed that the use of frequent low severity prescribed fires have proven effective at reducing the risk of catastrophic wildfires.

When asked about barriers to the implementation of traditional burns, Ken mentioned the previous illegality of these practices, as well as the risk posed by liability if a prescribed fire were to escape the designated burn area. Ken also indicated that barriers could include: a historical mindset that fire is bad amongst policymakers, the extensive training and measures required to conduct a prescribed burn in the modern policy environment, and the changing dynamics of ecosystems (compared to when traditional burns were historically carried out).

Additionally, he highlighted the lack of traditional burning knowledge that has been retained by Indigenous communities in many areas (due to the province's historical suppression of such practices). He underlined the significance of this barrier when

considering that traditional burning requires highly trained specialists who know how and when to carry out burns. When prompted about whether public perception might influence the implementation of traditional burning, Ken felt that the public was typically not very knowledgeable on the subject and would, therefore, not influence its implementation. When asked about the role of the forestry industry, he indicated that the forestry industry (and the provincial government) is more knowledgeable about these practices, and because they are very conservative and protective of the forests, he assumes they would be cautious of its wider implementation.

After considering the barriers to the use of traditional burning practices, Ken recommended the integration of both Indigenous Knowledge and Western methodologies as a key way to most effectively conduct prescribed burns and address issues such as wildfire management. When asked about the risks or harms that prescribed burns might pose, given that we found little information on this using our two other research methods, he felt that escaping fires were the primary issue and that documented cases of this could be found in the United States. When asked whether conducting burns during the shoulder seasons could limit the risk of escaping fires, he agreed that this could be the case, but that many factors made it challenging to give a blanket statement. He also shared that lower severity prescribed burns could also end up being less effective, both in terms of preventing catastrophic wildfires and achieving ecosystem biodiversity goals.

Finally, when presented with the three policy options that this paper analyzes, Ken was supportive of the first policy option. He highlighted its ability to encourage a two-way flow of knowledge between Indigenous communities and the BC Wildfire Service as a strength. He also shared that BC's fire service has a lot of autonomy (and operates in many ways like a paramilitary organization), which can be helpful in advancing initiatives and avoiding bureaucracy. However, their internal culture can be quite set and resist change.

Ken was also supportive of Policy Option 2 and highlighted the example of the Coastal Guardian Watchmen who act as stewards for their coastal region, while overseeing many aspects of resource management. When related to the proposed network of Indigenous fire stewards, one can see the possibilities for this network to grow into other forms of forest management across the province. Ken also suggested

that funding a Centre for Indigenous Fire at a BC university could provide the support services required by this network. The students engaged at the centre could then help facilitate their gatherings, manage logistics, oversee their data management, etc. When presented with the third policy option, Ken felt that it would be hard to accurately calculate carbon offsets through prescribed burning initiatives. He also shared that a criticism of carbon offset initiatives is that it is not fully addressing the intended issue (of reducing carbon emissions). Therefore, he recommended being cautious when considering the level of support one would provide to such a mechanism.

Chapter 7. Policy Options

After conducting a jurisdictional scan, a media scan, and expert interviews to identify best practices related to prescribed burning, three policy options have been developed. Below we have provided a description of these policy options and we have summarized the main points in Table 2.

7.1. Policy Option 1: Formalized Partnerships

Policy Option 1 is the establishment of formalized partnerships between BC's Fire Service Centres and all interested Indigenous communities. These partnerships will be overseen by the BC Wildfire Service and will require every Fire Service Centre to form independent partnerships with all Indigenous communities within their jurisdiction. Indigenous communities will have the option to opt out. These partnerships can draw inspiration from the Joint Leadership Councils that were formed in the aftermath of the Elephant Hill wildfires (and call on additional support from agencies like their Joint Technical Committees) or the Collaborative Emergency Management Agreement that was signed with the T̓silhqot'in Nation. The purpose of these partnerships will be to encourage increased and wider use of cultural burning on their traditional territories, in collaboration with other local communities and organizations.

These partnerships will also address the following: review areas for the possibility of cultural burning, remove limitations for Indigenous peoples to burn or introduce an Indigenous-led burning permit system, engage the forestry industry in their area to explore collaborative possibilities, increase government funding that Indigenous communities could draw on for burn-related activities, fund and oversee ongoing research on the value and effectiveness of cultural burning, and support the dissemination of learning around cultural burning to the public, other Indigenous communities, and other fire practitioners. When exploring possibilities for the burning permit system, Florida's Prescribed Burning Act may be a helpful starting point. This legislation removed civil liability from prescribed burners, which encouraged its wider use for ecological reasons.

7.2. Policy Option 2: A Network of Indigenous Fire Stewards

Policy Option 2 is the creation of a regional network of Indigenous fire stewards. Again, the BC Wildfire Service would be responsible for its establishment and for inviting representatives from Indigenous groups across the province to participate. However, this network would manage itself, with the provincial government providing funding and any additional support required. Participating fire stewards would be responsible for developing the structure and goals of the network, as was suggested by our interviewees.

If needed, the regional network could draw inspiration from the Yurok tribe's training exchanges and the Southern Blue Ridge Fire Learning Network in the US, as well as build off of the FNESS's Revitalizing Traditional Burning project. A possible purpose of the network could be to promote traditional burning knowledge sharing. The network could host cultural burning workshops (open to both fire practitioners and the general public), provide tailored support and training to Indigenous communities, create educational materials for the wider public (such as videos and graphics) which could be disseminated through social media, government websites and the news, engage the wider community (through educational programs, feedback surveys or town hall meetings), and collect and report evidence of the benefits of cultural burning. The network would also develop relationships with prescribed burning networks in other regions or countries to further the aim of sharing knowledge. This network would draw their funding from the existing amounts pledged by the provincial government in their responses to Abbott and Chapman's 2018 report (included in the Canada section of our Jurisdictional Scan).

7.3. Policy Option 3: A Tool of the Forest Carbon Initiative

Policy Option 3 is the integration of prescribed burning into BC's Forest Carbon Initiative (FCI). This would draw on the use of prescribed burning as a tool in Australia's Carbon Farming Initiative. The purpose of this option would be to have prescribed burning formalized as one of the FCI's activity types and allow private firms to fund prescribed burning initiatives across BC to offset their carbon footprint.

It would also be worth exploring the steps needed for Indigenous communities in BC to co-manage the forests on their traditional territories, similar to experiences with co-management, co-governance and co-planning in New Zealand and the recent cooperation agreement signed by the Metro Vancouver Regional District. Examples from Australia and the US of forest ownership being turned over to Indigenous communities is another consideration for the future that will not be explored in great detail in this paper.

Table 2: A Summary of the Policy Options

Option 1: Formalized partnerships between BC's Fire Service Centres and all interested First Nations communities	Option 2: Regional network of Indigenous fire stewards	Option 3: Integrating prescribed burning into BC's Forest Carbon Initiative
<p>Description:</p> <ul style="list-style-type: none"> • Partnerships between each Fire Service Centre and all interested First Nations communities within their jurisdiction. • Draw on the Joint Leadership Councils from the Elephant Hill report. • Their purpose will be to encourage increased and wider use of cultural burning on their traditional territories. • They will review areas for the possibility of cultural burning. • They will remove limitations for First Nations peoples to burn or introduce a First Nations-led burning permit system. • They will engage with the forestry industry to further collaboration. • They will increase the flow of government funds to First Nations communities for burn-related activities. • They will support the dissemination of learning around cultural burning. 	<p>Description:</p> <ul style="list-style-type: none"> • Participating fire stewards would be responsible for developing the structure and goals of the network. • The BC Wildfire Service would be responsible for its establishment and for inviting representatives from Indigenous groups across the province to participate. • Could draw inspiration from networks and training exchanges in the US and build off the work of the FNESS's Revitalizing Traditional Burning project. • A possible purpose could be to promote traditional burning knowledge sharing. 	<p>Description:</p> <ul style="list-style-type: none"> • Draw on the use of prescribed burning as a tool in Australia's Carbon Farming Initiative. • The purpose will be to have prescribed burning formalized as one of the FCI's activity types and allow private firms to fund initiatives to offset their carbon footprint.

Chapter 8. Evaluation Criteria

The proposed policy options will be evaluated based on how well they address our two key objectives of effectiveness and equity, as well as their performance related to the considerations of stakeholder acceptance, administrative ease, and cost. All the policy options will be scored as “desirable”, “sufficient”, or “insufficient”. With “desirable” being the highest rating and “insufficient” being the lowest. This section will define the evaluation criteria and measures used for our analysis of how each proposed policy option meets these objectives and considerations. A summary of these descriptions can be found in Table 3.

8.1. Effectiveness

With the policy problem being the increasing severity of wildfires and barriers to the use of traditional burning practices, one of our key objectives is the effectiveness of our policy options to increase the use of traditional burning across BC, and therefore, prevent or limit the damaging effects of wildfires, as well as to sustain ecosystem biodiversity. The criteria for the key objective of effectiveness will be to increase the size of the area where traditional burning takes place on an annual basis and to increase the number of Indigenous communities engaged in burning. The first criterion will be measured by the extent to which the forested area being treated with traditional burns increases, and the second criterion will be measured by the number of Indigenous communities that begin carrying out traditional burns.

8.2. Equity

Our second key objective is the equity of proposed policy options. By this we mean the extent to which Indigenous communities and practitioners are engaged in meaningful partnerships with policymakers and government agencies to overcome the barriers to the wider use of traditional burning practices. This would also include recognizing the rights of Indigenous peoples as stewards of the land, allowing them to share their knowledge if they choose to, and empowering them to determine how they will re-engage with cultural practices that were stripped away by colonial powers. The criteria for the key objective of equity will be to increase the access Indigenous

communities have to wildfire management decision-makers and to increase the level of autonomy Indigenous communities have in determining how they will re-engage with these practices. The first criterion will be measured by the number of interactions with BC Wildfire Service officials and the second criterion will be measured by the perceived level of self-determination by Indigenous communities relating to traditional burning activities.

8.3. Stakeholder Acceptance

Stakeholder acceptance is viewed as an important consideration because the level of support felt by different societal groups will manifest itself in resistance to or acceptance of a policy's course of action. The key stakeholders that will comprise the consideration of stakeholder acceptance include Indigenous communities, the forestry industry, the provincial government, and the general public. The criterion for this consideration is to increase the level of support that each of these four stakeholder groups will have for the policy. This can be measured by the number of complaints received by Indigenous community members, representatives of the forestry industry, employees of the provincial government, and members of the general public. A lower number of complaints would be understood as a higher level of support.

8.4. Administrative Ease

By administrative ease is meant the administrative and logistical considerations that would determine how easy or difficult it would be to implement the policy. The criterion for this consideration is to increase the level of administrative ease for all involved stakeholders. This can be measured by tracking the number of new procedures that would need to be created and the number of stakeholders engaged in its implementation. The lower the number of new procedures and the number of stakeholders that need to be engaged, the easier we would assume it is to administrate a given policy.

8.5. Cost

Finally, the consideration of cost would assess the financial resources required to carry out a policy option. The criterion for this consideration will be to limit the financial

cost to the provincial government. This can be measured by tracking the flow of funds to support the implementation of a policy.

Table 3: Summary of Evaluation Criteria

Key Objectives and Considerations	Criteria	Measures
Key Objective: Effectiveness	<ol style="list-style-type: none"> 1. Increase the size of the area where traditional burning takes place on an annual basis. 2. Increase the number of Indigenous communities engaged in burning. 	<ol style="list-style-type: none"> 1. The extent to which the forested area being treated with traditional burns increases. 2. The number of Indigenous communities that begin carrying out traditional burns.
Key Objective: Equity	<ol style="list-style-type: none"> 1. Increase the access Indigenous communities have to wildfire management decision-makers. 2. Increase the level of autonomy Indigenous communities have in determining how they will re-engage with these practices. 	<ol style="list-style-type: none"> 1. The number of interactions with BC Wildfire Service officials. 2. The perceived level of self-determination by Indigenous communities relating to traditional burning activities.
Stakeholder Acceptance	Increase the level of support that Indigenous communities, the forestry industry, the provincial government, and the general public will have for the policy.	The number of complaints received by Indigenous community members, representatives of the forestry industry, employees of the provincial government, and members of the general public.
Administrative Ease	Increase the level of administrative ease for all involved stakeholders.	The number of new procedures that would need to be created and the number of stakeholders engaged in its implementation.
Cost	Limit the financial cost to the provincial government.	Tracking the flow of funds needed to support the policy's implementation.

Chapter 9. Policy Analysis

Table 4 provides a summary of our analysis of the three proposed policy options using the different criteria discussed in the previous section. It also demonstrates the trade-offs between these policy options. Our analysis indicates that Policy Option 1 scores the highest in terms of the key objectives of effectiveness and equity, as well as the consideration of stakeholder acceptance. However, the two considerations of administrative ease and cost rate as relatively insufficient. Option 2 also scores highly in terms of the key objectives, although it is slightly less effective than Option 1. Option 2 also rates lower regarding administrative ease, but it is not as costly as Option 1. Finally, Option 3 does not rate as well as the first two in terms of our key objectives (sufficient for effectiveness and insufficient for equity) and the consideration of stakeholder acceptance. However, it is administratively easier and less costly to implement than Options 1 and 2.

Overall, Option 1 seems to best address our key objectives, followed closely by Option 2. However, these two options do not fare as well in terms of their administrative ease and cost. Option 3 does not seem to address our key objectives well, but it does rate higher when looking at the considerations of cost and administrative ease.

Table 4: Analysis of Policy Options

	Option 1: Formalized partnerships between BC's Fire Service Centres and all interested First Nations communities	Option 2: Regional network of Indigenous fire stewards	Option 3: Integrating prescribed burning into BC's Forest Carbon Initiative
Effectiveness	Desirable	Sufficient	Sufficient
Equity	Desirable	Desirable	Insufficient
Stakeholder Acceptance	Desirable	Desirable	Sufficient
Administrative Ease	Insufficient	Insufficient	Sufficient
Cost	Insufficient	Sufficient	Desirable

Note: "Desirable" is the highest score, "Insufficient" is the lowest score, and "Sufficient" is in the middle. We opted against utilizing a numerical grading system.

9.1. Effectiveness

When looking at the key objective of effectiveness, Policy Option 1 rates the highest, as it is more likely to address many of the barriers described in the literature review and jurisdictional scan. Formalized partnerships would strengthen relationships between Indigenous groups and the provincial government, would create additional space for dialogue, would increase access to decision-makers, would address permitting issues, would increase access to funding, and would stimulate knowledge sharing across the region. The comprehensive approach of this increased collaboration has the potential to significantly scale-up traditional burning initiatives.

Comparatively, Policy Option 2 is likely to be somewhat effective in increasing the amount of traditional burning that takes place across the province. This policy option focuses on sharing knowledge (through networking opportunities and possible workshops and trainings). It is also expected to increase the general public's appreciation for these practices. However, it does not address the lack of funding, lack of collaboration with government agencies, and legal obstacles to the same extent that Option 1 does. This led us to ranking it as sufficient in relation to effectiveness.

Finally, Policy Option 3 was also deemed to be sufficiently effective at increasing the use of traditional burning across BC. Based on evidence from Australia's Carbon Farming Initiative, when this practice is seen as an accepted method for firms to offset their carbon footprint, many will likely find it profitable to do so. However, similar to Option 2, this option does not address the full range of barriers that its implementation currently faces in the province. Additionally, ongoing monitoring and evaluation of Option 3 would be needed, to ensure that it does not lead to over-burning of forested areas due to the prospects of carbon offsets, and which might have fewer desirable outcomes in terms of forest health.

9.2. Equity

When considering the key objective of equity, Policy Option 1 again rates highly, since it creates meaningful partnerships with all interested Indigenous communities and supports them to take on a leading role in implementing traditional burns. Option 2 is expected to be even more equitable, since it calls for Indigenous communities, leaders,

and fire practitioners to take the lead on forming a fire steward network. Although possible purposes and models for this network are provided, its development is left in the hands of its Indigenous members and allows for the highest level of autonomy. Therefore, the second option best addresses the second criterion of increasing the level of self-determination experienced by Indigenous communities. Finally, Policy Option 3 scores as insufficient in terms of equity, since it does not provide clear avenues for meaningful partnerships with Indigenous communities to be created, and it does little to provide them with greater autonomy. However, as discussed in the section on our media scan, the Tsilhqot'in Nation has already initiated a project with an Australian fire practitioner that is developing a program that sells carbon credits based on prescribed burns. If this program were to be deemed successful by Indigenous communities testing it, an Indigenous-led approach to Option 3 might make it more equitable and allow for its wider implementation.

9.3. Stakeholder Acceptance

In terms of stakeholder acceptance, Policy Option 1 is rated as “desirable”, since it should be generally supported by stakeholders. Indigenous communities are expected to be highly supportive of this option, due to the opportunity to strengthen their relationship with the provincial government and to overcome many barriers that have been identified. The provincial government is also expected to be supportive of these partnerships as they further their aims of building meaningful partnerships with Indigenous peoples, working towards reconciliation, limiting the risk of wildfires to British Columbian communities, and restoring Indigenous ecosystems. However, the government is likely to have concerns regarding the funding required to sustain these partnerships and the capacity of their human resources to do so. That being said, the provincial government has made clear financial commitments to developing their emergency management efforts, and this is funding that could be drawn on. The forestry industry is also expected to be supportive of this policy option, as our expert interviewees pointed out that they are keen to work collaboratively with Indigenous communities and to advance measures that will protect forests from catastrophic wildfires. Similarly, the general public will likely be supportive of this policy, particularly if evidence of its effectiveness is clearly communicated to them. However, they are also

likely to have persisting concerns regarding possible air pollution and the perceived risk of escaping fires.

For Policy Option 2, Indigenous communities are expected to be highly supportive, since it allows for Indigenous representatives to be the main protagonists and to more fully determine its purpose and course of action. The provincial government is likely to be highly supportive of this option, as they see the benefits of an Indigenous-led network that will disseminate learning and also continue collecting evidence on the effectiveness of burning practices. They will likely want to be engaged in the discourse and will be counted on to provide funding and logistical support. The forestry industry is also expected to favour this policy option, as they seem keen to support Indigenous-led initiatives. Finally, the general public is likely to also be highly supportive of this regional network, which might inform them of and engage them in burning initiatives. This consideration was rated as “desirable” for Option 2.

Finally, Option 3 is expected to have mixed support from Indigenous communities. Again, based on the Australian experience, where there was significant push back from Indigenous communities with concerns regarding the standardization of their cultural practices and its careless application for profitable purposes. However, there is also likely to be some support for it from Indigenous communities, as it will provide jobs and support the scale-up of these traditional practices. Again, evidence of this can be found with Tsilhqot'in Nation's exploratory carbon credits program. The provincial government is expected to be highly supportive of this option due to its minimal government impacts and its ability to add a new carbon offsetting tool, but they will also be mindful of any increased regulatory efforts required and they will likely want to ensure that this is an option for which Indigenous communities are generally supportive. The forestry industry may have concerns with this approach, due to their cautious approach to forest management, and the possibility that this policy option could lead to the burning of large expanses of forest. The general public will likely be supportive of this option, due to the possibility of increased job opportunities for fire practitioners. However, concerns over increased air pollution and the perceived risk of escaped fires may remain. For these reasons, we rated Policy Option 3 as “sufficient” for stakeholder acceptance.

9.4. Administrative Ease

In terms of administrative ease, Policy Option 1 will likely be a highly complex option since it has numerous deliverables and requires Fire Service Centres to develop meaningful relationships with many Indigenous communities within their jurisdiction and engage them on a regular basis. This would likely require additional human resources to develop and sustain these partnerships. This led us to rate this impact as “insufficient”.

Option 2 is also expected to be a highly complex policy option, albeit to a slightly lesser degree than Option 1. The creation of a regional network that tries to engage all interested Indigenous groups across the province and the general public will require a strong administrative structure to support it, or numerous collaborators across the region. For these reasons, we also rated this consideration as “insufficient” for Option 2. Finally, Option 3 will be somewhat complex since it requires regulatory efforts to implement cultural burning as one of the FCI’s activity types. However, it does not seem to require the same level of development and accompaniment that the other two options would need. Therefore, we rated this option as “sufficient” for administrative ease.

9.5. Cost

In terms of the final consideration of cost, Policy Option 1 will be costly since additional fire suppression resources will be required to ensure that scaled-up burns are conducted safely, in addition to added costs for engaging various stakeholders and disseminating learning. We rated Option 1 as “insufficient” when considering the government impact of cost.

Option 2 is also expected to be costly. Although, again, less so than Option 1. Although it is up to its membership to determine the direction and activities of this network, possibilities such as hosting workshops, engaging communities, partnering with other networks, and developing educational materials would all require extensive financial resources. Therefore, this consideration was rated as “sufficient” for Policy Option 2. Finally, Option 3 is not expected to be very costly. Its costs will be limited to its integration into the FCI as a new tool and its regulation. Because of this, Option 3 received a “desirable” rating for cost. It is important to note that all three policy options

would have access to the funds committed by the provincial government in recent years (such as the \$10 million commitment made in 2019).

Chapter 10. Recommendations and Conclusion

This paper begins by describing British Columbia's history of forest fires, the harms that forest fires cause, and the provincial government's role in wildfire management. It goes on to highlight the historical experience of Indigenous communities with cultural burning, the benefits of these traditional practices, and the current barriers to their use. A jurisdictional scan and a media scan help draw out best practices for overcoming these barriers and increasing the use of cultural burning in BC. From these best practices, three policy options are proposed that would encourage the greater use of traditional burning practices: 1) the establishment of formalized partnerships between BC's Fire Service Centres and all interested First Nation communities, 2) the creation of a regional network of Indigenous fire stewards, and 3) the integration of cultural burning into BC's Forest Carbon Initiative (FCI).

The analysis of these three policy options is based on two key objectives and three other considerations, for which criteria and measures have been identified. They include the key objectives of effectiveness and equity, as well as considerations such as stakeholder acceptance, administrative ease, and cost. The analysis shows that Policy Option 1 rates highly in terms of effectiveness, equity and stakeholder acceptance. However, it rates insufficiently in terms of administrative ease and cost (although provincial funding is already being made available).

The analysis of Policy Option 2 suggests that it would be moderately effective, highly equitable, and that it would have a high level of stakeholder acceptance. However, it rated as insufficient in terms of administrative ease and it was considered to be somewhat costly (although not to the same extent as Policy Option 1). Finally, the analysis of Policy Option 3 shows that it would be sufficiently effective, it would have a sufficient level of stakeholder acceptance, as well as be somewhat administratively complex (yet less so than Options 1 and 2). It was also rated as insufficient in terms of the key objective of equity, but it was less costly than the other policy options.

Based on the above findings, our recommendation would be to adopt Policy Options 1 and 2, with the possibility of exploring Option 3 in the future and in partnership with Indigenous communities. Policy Options 1 and 2 seem to best address our key objectives of effectiveness and equity, while also demonstrating a high level of

stakeholder acceptance. However, they will also be more costly and administratively complex to put into action. Overall, we felt that the importance of the key objectives outweighed these other considerations. Furthermore, the provincial government's recent reports indicate a desire to invest in emergency management measures (and prescribed burning specifically), in addition to increasing the role that Indigenous communities play in addressing recent natural disasters, such as through the integration of Indigenous knowledge and practices. Although Policy Option 3 does seem somewhat effective at increasing the use of traditional burning and its implementation would be easier (due to lower costs and administrative complexity), its lower ratings relating to our key objectives (particularly equity) made us question the need to prioritize its adoption. However, this policy option would be deemed more favourable if its implementation was led by Indigenous communities and practitioners, and if ongoing monitoring and evaluation efforts demonstrated that it would not lead to the over-burning of forested areas.

As discussed in the "Situating Myself" section of this paper, the implementation of all three of these policy options should be guided by the United Nations Declaration on the Rights of Indigenous Peoples (Articles 19, 29, and 31) and the Truth and Reconciliation Commission of Canada's Calls to Action (14 and 92). These articles and recommendations outline the standard of engagement with Indigenous peoples that is required.

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